



# MICROSmart

## User's Manual

### FC6A Series



# SAFETY PRECAUTIONS

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- Read the "FC6A Series MICROSmart User's Manual" to ensure correct operation before starting installation, wiring, operation, maintenance, and inspection of the FC6A Series MICROSmart.
- All FC6A Series MICROSmart modules are manufactured under IDEC's rigorous quality control system, but users must add a backup or failsafe provision to the control system when using the FC6A Series MICROSmart in applications where heavy damage or personal injury may be caused, in case the FC6A Series MICROSmart should fail.
- Care should be taken such that unauthorized access to the FC6A Series MICROSmart does not come from outside network connections. Please note that the Company shall not be liable for any loss, damage or other expenses incurred directly or indirectly by unauthorized access, etc.
- In this manual, safety precautions are categorized in order of importance:



**Warning** Warning notices are used to emphasize that improper operation may cause severe personal injury or death.

- The FC6A Series MICROSmart is not designed for use in applications requiring a high degree of reliability and safety. The FC6A Series MICROSmart should not be used for such applications.
- When using the FC6A Series MICROSmart in applications (not described above) that require a high degree of reliability in terms of functionality and precision, appropriate measures such as failsafe mechanisms and redundant mechanisms must be taken for the system containing the FC6A Series MICROSmart. The following are specific examples.
  - Emergency stop and interlocking circuits must be configured outside the FC6A Series MICROSmart.
  - If relays or transistors in the FC6A Series MICROSmart output circuits should fail, outputs may remain at on or off state. For output signals which may cause serious accidents, configure monitor circuits outside the FC6A Series MICROSmart.
  - The FC6A Series MICROSmart self-diagnostic function may detect internal circuit or program errors, stop programs, and turn outputs off. Configure circuits so that the system containing the FC6A Series MICROSmart is not jeopardized when outputs turn off.
- Turn off power to the FC6A Series MICROSmart before installation, removal, wiring, maintenance, and inspection of the FC6A Series MICROSmart. Failure to turn power off may cause damage, electrical shocks or fire hazard. If such a circuit is configured inside the FC6A Series MICROSmart, failure of the FC6A Series MICROSmart may cause disorder of the control system, damage, or accidents.
- Special expertise is required to install, wire, program, and operate the FC6A Series MICROSmart. People without such expertise must not use the FC6A Series MICROSmart.
- Install the FC6A Series MICROSmart according to the instructions described in the "FC6A Series MICROSmart User's Manual". Improper installation will result in falling, failure, or malfunction of the FC6A Series MICROSmart.



**Caution** Caution notices are used where inattention might cause personal injury or damage to equipment.

- The FC6A Series MICROSmart is designed for installation in a cabinet. Do not install the FC6A Series MICROSmart outside a cabinet.
- Install the FC6A Series MICROSmart in environments described in the "FC6A Series MICROSmart User's Manual". If the FC6A Series MICROSmart is used in places where the FC6A Series MICROSmart is subjected to high-temperature, high-humidity, condensation, corrosive gases, excessive vibrations, or excessive shocks, then electrical shocks, fire hazard, or malfunction will result.
- The environment for using the FC6A Series MICROSmart is "Pollution degree 2." Use the FC6A Series MICROSmart in environments of pollution degree 2 (according to IEC 60664-1).
- Prevent the FC6A Series MICROSmart from falling while moving or transporting the FC6A Series MICROSmart, otherwise damage or malfunction of the FC6A Series MICROSmart will result.
- Wiring must use lead sizes that are appropriate for the applied voltage and current. Terminal screws must be tightened with the prescribed tightening torque.
- Prevent metal fragments and pieces of wire from dropping inside the FC6A Series MICROSmart housing. Put a cover on the FC6A Series MICROSmart modules during installation and wiring. Ingress of such fragments and chips may cause fire hazard, damage, or malfunction.
- Use a power supply of the rated value. Use of a wrong power supply may cause fire hazard.
- Use an IEC 60127-approved fuse on the power line outside the FC6A Series MICROSmart. This is required when equipment containing the FC6A Series MICROSmart is destined for Europe.
- Use an IEC 60127-approved fuse on the output circuit. This is required when equipment containing the FC6A Series MICROSmart is destined for Europe.
- Use an EU-approved circuit breaker. This is required when equipment containing the FC6A Series MICROSmart is destined for Europe.
- Make sure of safety before starting and stopping the FC6A Series MICROSmart or when operating the FC6A Series MICROSmart to force outputs on or off. Incorrect operation of the FC6A Series MICROSmart may cause machine damage or accidents.
- This product cannot be directly connected to the communication lines (including public wireless LAN) of telecommunication carriers (mobile communication companies, fixed-line communication companies, Internet providers, etc.). When connecting this product to the Internet, be sure to connect via a device, such as a router.
- Do not connect the ground wire directly to the FC6A Series MICROSmart. Connect a protective ground to the cabinet containing the FC6A Series MICROSmart using an M4 or larger screw. This is required when equipment containing the FC6A Series MICROSmart is destined for Europe.
- Do not disassemble, repair, or modify the FC6A Series MICROSmart modules.
- The FC6A Series MICROSmart contains electronic parts and batteries. When disposing of the FC6A Series MICROSmart, do so in accordance with national and local regulations.

# ABOUT THIS MANUAL

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This manual describes functions, specifications, installation, and operation basics of the FC6A Series MICROSmart. Also included is information on the powerful communications tools of the FC6A Series MICROSmart, as well as troubleshooting procedures.

## **Chapter 1: General Information**

General information about the FC6A Series MICROSmart functions and system configuration examples.

## **Chapter 2: Product Specifications**

Specifications of the FC6A Series MICROSmart.

## **Chapter 3: Installation and Wiring**

Methods and precautions for installing and wiring the FC6A Series MICROSmart.

## **Chapter 4: Operation Basics**

General information about setting up the basic FC6A Series MICROSmart system for programming, starting and stopping the FC6A Series MICROSmart operation, and simple operating procedures. Everything from creating a user program using WindLDR on a computer to monitoring the FC6A Series MICROSmart operation.

## **Chapter 5: Functions and Settings**

Functions of the FC6A Series MICROSmart and convenient functions that you should know about in using the WindLDR (Windows compatible) programming software.

## **Chapter 6: Devices**

Descriptions of the allocations of devices such as inputs, outputs, internal relays, registers, timers, and counters that are used in the basic and advanced instructions, as well as details about the allocations of special internal relays and special data registers.

## **Chapter 7: HMI Function**

Functions that can be used with the HMI module connected to the CPU module and their operating procedures.

## **Chapter 8: Instructions Reference**

List of basic and advanced instructions to program the FC6A Series MICROSmart and descriptions of their functions.

## **Chapter 9: Analog I/O Modules**

Overview of each analog module and their specifications. Module parameters and configuration methods are also described.

## **Chapter 10: I/O Cartridges**

Overview of the cartridges and their specifications. Cartridge parameters and configuration methods are also described.

## **Chapter 11: SD Memory Card**

Functions that can be used with SD memory card connected to the CPU module and their specifications.

## **Chapter 12: Module Configuration Editor**

Description of the module configuration editor that can be used to configure parameters for the modules and cartridges.

## **Chapter 13: Troubleshooting**

Procedures to determine the cause of trouble and actions to be taken when any trouble occurs while operating the FC6A Series MICROSmart.

## **Appendix**

Additional information about type numbers, system software upgrade, and USB driver installation.

## **Related Manuals**

Refer to the following manuals according to your purpose.

| Manual Name  | Description  |
|--|--|
| FC6A Series MICROSmart User's Manual (this manual)       | Describes product specifications, installation and wiring instructions, instructions for basic programming operations and special functions, device and instruction lists, and troubleshooting procedures for the FC6A MICROSmart. |
| FC6A Series MICROSmart Communication Manual              | Describes specifications related to FC6A MICROSmart communication, descriptions of functions, configuration methods, and usage examples.   |
| FC6A Series MICROSmart PID Module User's Manual          | Describes PID module specifications and functions.   |
| FC6A Series MICROSmart Safety Relay Module User's Manual | Describes product specifications and functions for safety relay module.  |
| Ladder Programming Manual                                | Describes basic operations for programming with ladders, monitoring methods, device and instruction lists, and details of each instruction.  |
| Network User's Manual                                    | Describes how to configure and use specific communication protocols (BACnet/IP communication, EtherNet/IP communication, MQTT communication).  |

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- The contents of this manual are subject to change without notice.
- Every effort has been made to ensure the content of the product, but if you find any suspicious points or mistakes, please contact the store where you purchased the product or our sales office or branch office.

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All other company names and product names used in this manual are trademarks of their respective owners.



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## Regarding laws and compatible standards

This product adheres to the laws and compatible standards of all countries involved, as shown below.

### European laws and standards

This product complies with the following EU directives.

- Low Voltage Directive
- EMC Directive
- RoHS Directive
- RE Directive (FC6A-PC4 only)

To comply with these directives, this product has been designed and evaluated on the basis of the following international and European standard.

- EN 61131-2: 2007
- EN IEC 63000
- EN301 489-1 V2.1.1& EN301 489-17 V2.1.1 (FC6A-PC4 only)

For details on the compatible standards and EU Directives, contact the distributor from which you purchased this product or visit our web site.

### North America laws and standards

This product complies with the following standards.

- UL508<sup>\*1</sup>
- UL61010-1<sup>\*1</sup>
- UL61010-2-201<sup>\*1</sup>
- CSA C22.2 No.142<sup>\*1</sup>
- CSA C22.2 No.61010-1<sup>\*1</sup>
- CSA C22.2 No.61010-2-201<sup>\*1</sup>
- ANSI/ISA 12.12.01
- CAN/CSA C22.2 No.213

<sup>\*1</sup> Certain FC6A Series MICROSmart models are not compatible. For details about applicable standards, please contact IDEC Corporation.

### Marine standards

This product has been certified by the following classification societies.

(FC6A-C16R1DE, FC6A-C16P1DE and FC6A-C16K1DE are not certified.)

- ABS (American Bureau of Shipping)
- DNV (Det Norske Veritas)
- LR (Lloyd's Register)
- NK (Nippon Kaiji Kyokai)

\* This product has not been certified for use on the bridge or deck.

For details on applicable standards and EU directives, please contact the dealer where purchased or check the IDEC website.

### IMPORTANT INFORMATION

Under no circumstances shall IDEC Corporation be held liable or responsible for indirect or consequential damages resulting from the use of or the application of IDEC PLC components, individually or in combination with other equipment.

All persons using these components must be willing to accept responsibility for choosing the correct component to suit their application and for choosing an application appropriate for the component, individually or in combination with other equipment.

All diagrams and examples in this manual are for illustrative purposes only. In no way does including these diagrams and examples in this manual constitute a guarantee as to their suitability for any specific application. To test and approve all programs, prior to installation, is the responsibility of the end user.

# NAMES AND ABBREVIATIONS USED IN THIS MANUAL

| Item                                     | Description   |
|--|---|
| FC6A                                     | Generic term used to refer to CPU module, expansion module, expansion interface module, HMI module, cartridge base module, cartridge. |
| CPU module                               | Generic term used to refer to All-in-One CPU module, CAN J1939 All-in-One CPU module, Plus CPU module.                                |
| All-in-One CPU module                    | Generic term used to refer to FC6A-C****E CPU modules.  |
| 16-I/O type                              | Generic term used to refer to All-in-One CPU modules with a total number of 16 inputs/outputs.<br>(FC6A-C16****)                      |
| 24-I/O type                              | Generic term used to refer to All-in-One CPU modules with a total number of 24 inputs/outputs.<br>(FC6A-C24****)                      |
| CAN J1939 All-in-One CPU module          | Generic term used to refer to FC6A-C40***EJ CPU modules.  |
| Plus CPU module                          | Generic term used to refer to FC6A-D****CEE CPU modules.  |
| Plus 16-I/O type                         | Generic term used to refer to Plus CPU modules with a total number of 16 inputs/outputs.<br>(FC6A-D16****)                            |
| Plus 32-I/O type                         | Generic term used to refer to Plus CPU modules with a total number of 32 inputs/outputs.<br>(FC6A-D32****)                            |
| 40-I/O type                              | Generic term used to refer to CPU modules with a total number of 40 inputs/outputs.<br>(FC6A-C40****)                                 |
| AC power type                            | Generic term used to refer to CPU modules with AC power supply.<br>(FC6A-C****AE, FC6A-C****AEJ)                                      |
| DC power type                            | Generic term used to refer to CPU modules with 24VDC power supply or 12VDC power supply.  |
| 24V DC power type                        | Generic term used to refer to CPU modules with 24VDC power supply.<br>(FC6A-C****CE, FC6A-C****CEJ, FC6A-D****CEE)                    |
| 12V DC power type                        | Generic term used to refer to CPU modules with 12VDC power supply.<br>(FC6A-C****DE, FC6A-C****DEJ)                                   |
| Relay output type                        | Generic term used to refer to CPU modules with relay outputs.<br>(FC6A-C**R**E, FC6A-C**R**E*)  |
| Transistor output type                   | Generic term used to refer to CPU modules with transistor sink outputs or transistor protection source outputs.                       |
| Transistor sink output type              | Generic term used to refer to CPU modules with transistor sink outputs.<br>(FC6A-C**K**E, FC6A-C**K**E*, FC6A-D**K*CEE)               |
| Transistor protection source output type | Generic term used to refer to CPU modules with transistor protection source outputs.<br>(FC6A-C**P**E, FC6A-C**P**E*, FC6A-D**P*CEE)  |
| Expansion module                         | Generic term used to refer to I/O module, communication module, PID module.   |
| I/O module                               | Generic term used to refer to digital I/O module, analog I/O module, safety relay module.   |
| Digital I/O module                       | Generic term used to refer to digital input module, digital output module, digital mixed I/O module.                                  |
| Digital input module                     | Generic term used to refer to digital I/O modules with input terminals.<br>(FC6A-N****)   |
| Digital output module                    | Generic term used to refer to digital I/O modules with output terminals.<br>(FC6A-R***, FC6A-T****)                                   |
| Digital mixed I/O module                 | Generic term used to refer to digital I/O modules with input and output terminals.<br>(FC6A-M****)                                    |
| Analog I/O module                        | Generic term used to refer to analog input module, analog output module, analog mixed I/O module.                                     |
| Analog input module                      | Generic term used to refer to analog I/O modules with input terminals.<br>(FC6A-J***, FC6A-J4CN*, FC6A-J4CH**, FC6A-J8CU*)            |
| Analog output module                     | Generic term used to refer to analog I/O modules with output terminals.<br>(FC6A-K****)   |
| Analog mixed I/O module                  | Generic term used to refer to analog I/O modules with input and output terminals.<br>(FC6A-L03CN*, FC6A-L06A*)                        |
| Safety relay module                      | Generic term used to refer to FC6A-SAK64.   |
| Communication module                     | Generic term used to refer to serial communication modules.   |
| Serial communication module              | Generic term used to refer to FC6A-SIF52, FC6A-SIF524.  |
| PID module                               | Generic term used to refer to FC6A-F2M*, FC6A-F2MR*.  |

| Item                                       | Description   |
|--|---|
| Expansion interface module                 | Generic term used to refer to expansion interface module (Expander), expansion interface module (remote master), expansion interface module (remote slave).   |
| Expansion interface module (Expander)      | Generic term used to refer to FC6A-EXM2, FC6A-EXM24.  |
| Expansion interface module (remote master) | FC6A-EXM1M  |
| Expansion interface module (remote slave)  | Generic term used to refer to FC6A-EXM1S, FC6A-EXM1S4.  |
| HMI module                                 | FC6A-PH1  |
| Cartridge base module                      | FC6A-HPH1   |
| Cartridge                                  | Generic term used to refer to I/O cartridge, communication cartridge.   |
| I/O cartridge                              | Generic term used to refer to digital I/O cartridge, analog I/O cartridge   |
| Digital I/O cartridge                      | Generic term used to refer to I/O cartridges that extend digital inputs or outputs. (FC6A-PN4, FC6A-PT*4)   |
| Analog I/O cartridge                       | Generic term used to refer to I/O cartridges that extend analog inputs or outputs. (FC6A-PJ2A, FC6A-P*2**)  |
| Communication cartridge                    | Generic term used to refer to RS232C communication cartridge, RS485 communication cartridge, Bluetooth communication cartridge.   |
| RS232C communication cartridge             | FC6A-PC1  |
| RS485 communication cartridge              | FC6A-PC3  |
| Bluetooth communication cartridge          | FC6A-PC4  |
| WindLDR                                    | This software is used to create ladder programs for the FC6A.   |
| USB cable                                  | Generic term used to refer to USB maintenance cable (HG9Z-XCM42), USB Mini-B extension cable (HG9Z-XCE21).  |
| User program                               | It refers to the data that combines function area settings and ladder programs configured by the ladder programming software WindLDR.   |
| Function area settings                     | These are various settings for FC6A.<br>These are the settings to be configured in the Settings tab and the module configuration editor.  |
| Ladder program                             | Generic term used to refer to main program, subroutine program, user-defined macros.  |
| Main program                               | This is a program whose first row is the entry point of the ladder program. The entry point is the starting point where the ladder program is executed. It is created in the Main Program tab of the ladder program editor.   |
| Subroutine program                         | It refers to one of the following programs. <ul style="list-style-type: none"> <li>Programs from the LABEL instruction to the LRET instruction</li> <li>Programs created using WindLDR subroutine function (In the ladder program editor tab, it is indicated by [# Subroutine] (#: subroutine number).)</li> </ul> |
| User-defined macros                        | It is a program created using WindLDR user-defined macro function. (In the ladder program editor tab, it is indicated by [# User-defined macro name] (#: user-defined macro number).)   |
| Source device                              | It is a device (the place where data is stored to execute an advanced instruction) on which the operation is performed.   |
| Destination device                         | It is a device that stores the operation result.  |
| Timer instruction                          | Generic term used to refer to TML, TIM, TMH, TMS instruction.   |
| Off-delay timer instruction                | Generic term used to refer to TML0, TIMO, TMHO, TMSO instruction.   |
| Counter instruction                        | Generic term used to refer to CNT, CDP, CUD instruction.  |
| Double-word counter instruction            | Generic term used to refer to CNTD, CDPD, CUDD instruction.   |
| Shift register instruction                 | Generic term used to refer to SFR, SFRN instruction.  |
| Shot instruction                           | Generic term used to refer to SOTU, SOTD instruction.   |
| Counter compare instruction                | Generic term used to refer to CC=, CC>= instruction.  |
| Compare instruction                        | Generic term used to refer to CMP=, CMP<>, CMP<, CMP>, CMP<=, CMP>= instruction.  |
| Pulse output instruction                   | Generic term used to refer to PULS, PWM, RAMP, RAMPL, ARAMP, ABS, JOG instruction.  |
| Dual/teaching timer instruction            | Generic term used to refer to DTIM, DTML, DTMH, DTMS, TTIM instruction.   |

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## Name of WindLDR

| Name Used in this Manual    | WindLDR Operating Procedure  |
|-----------------------------|--|
| Function area settings      | <b>Configuration</b> tab > <b>Function Area Settings</b> group   |
| Monitors                    | Select <b>Online</b> > <b>Monitor</b> > <b>Start Monitor</b> .   |
| PLC status                  | Select <b>Online</b> > <b>PLC</b> > <b>Status</b> .  |
| Communication settings      | Select <b>Online</b> > <b>Communication</b> > <b>Set Up</b> .  |
| Modbus master request table | On the <b>Configuration</b> tab, in <b>Function Area Settings</b> , click <b>Communication Ports</b> , and in the displayed <b>Function Area Settings</b> dialog box, for <b>Communication Mode</b> under <b>Communication Ports</b> , select <b>Modbus RTU Master</b> or <b>Modbus TCP Client</b> |
| Application button          | The button displayed on the left side of the menu bar. Click to display the menu with <b>New</b> , <b>Save</b> , and <b>Save As</b> , recent projects, <b>WindLDR Options</b> , and <b>Exit WindLDR</b> .  |

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# 1: GENERAL INFORMATION

## Introduction

This chapter describes FC6A functions and system configuration examples.

## About the FC6A

The FC6A is a small, All-in-One CPU module or Plus CPU module programmable PLC with excellent expandability and a variety of communication functions. The CPU modules are equipped with 16-, 24-, 32-, or 40-I/Os and support either 100 to 240V AC, 24V DC, or 12V DC power supplies.

Expansion modules, cartridges, HMI modules, and other modules can be connected to the CPU module. Inputs, outputs, and communication ports can be expanded according to application.

The FC6A can also be linked to various types of external devices with communication functions that include maintenance communication, user communication, and Modbus communication. The FC6A is also equipped with functions for high-speed counters, pulses, flow calculation, and data logging functions.

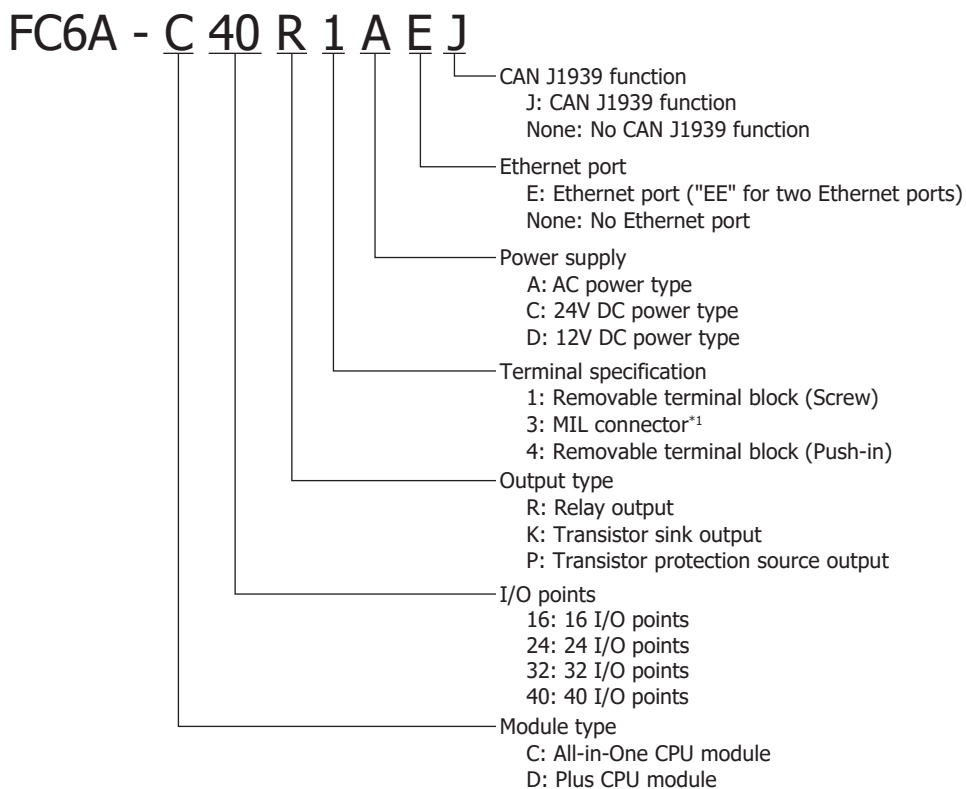
Programs used on the FC6A are created with WindLDR, easy-to-use, Windows-compatible ladder programming software. This ladder programming software also supports the FC4A Series and the FC5A Series, so you can use your existing ladder program resources.

## Type Numbers

The notation for FC6A part numbers is as follows.

For details on the product specifications, see "Product Specifications" on page 2-1.

### CPU module



\*1 The power supply terminals are a removable terminal block (screw fastened type).

**HMI module**

FC6A - PH 1

Interface specification  
1: Communication connector

Module type  
PH: HMI module

**Cartridge base module**

FC6A - HPH1

Module type  
HPH1: Cartridge base module

**Digital I/O module**

FC6A - M 0 8 B R 1

Terminal specification  
1: Removable terminal block (Screw)  
3: MIL connector  
4: Removable terminal block (Push-in)

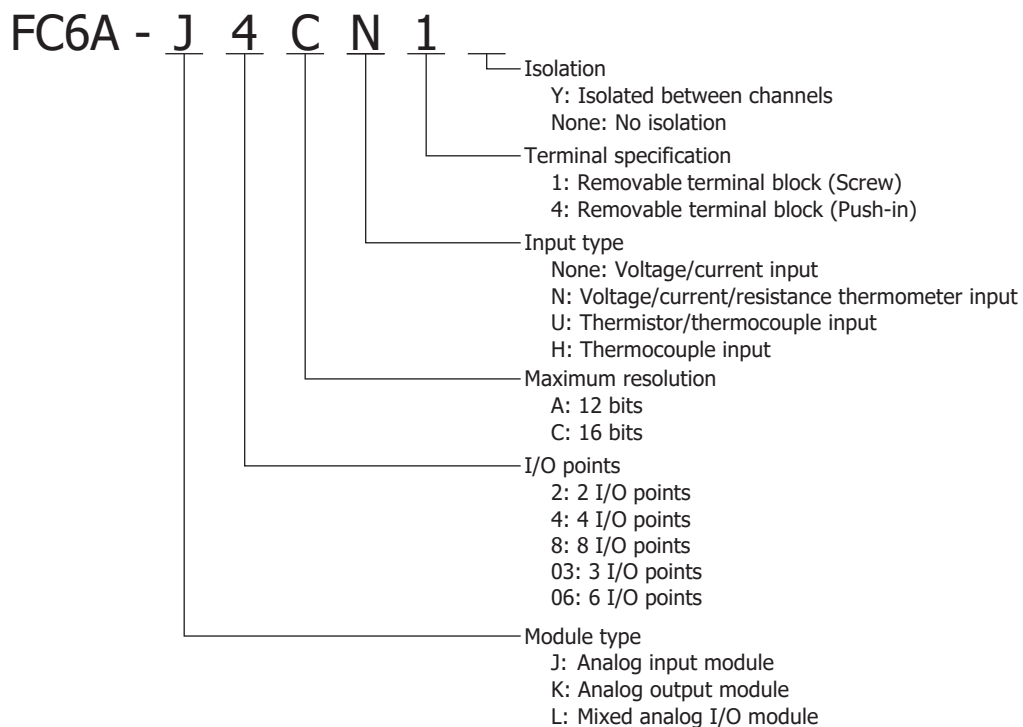
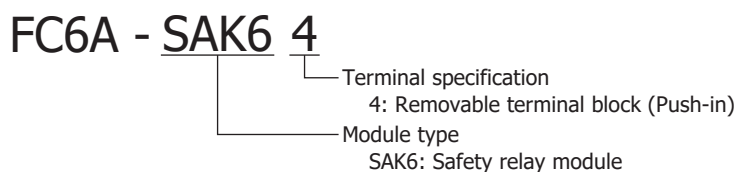
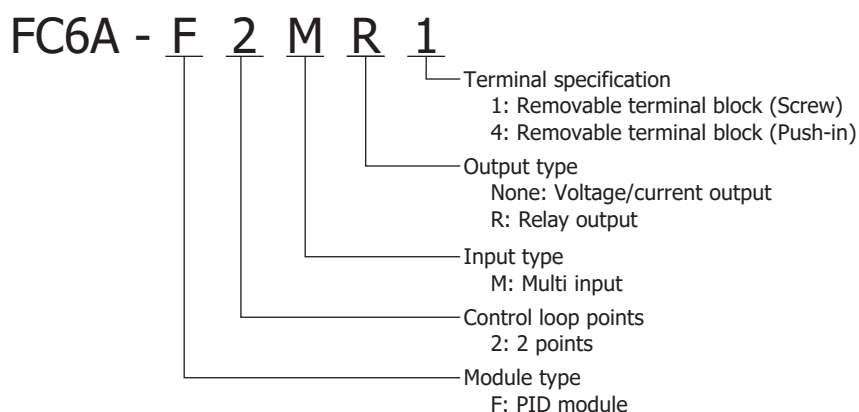
Output type  
R: Relay output (Mixed I/O module only)  
K: Transistor sink output  
P: Transistor protection source output  
None: No output

Input type  
A1: 120V AC  
B: 12/24V DC\*1  
None: No input

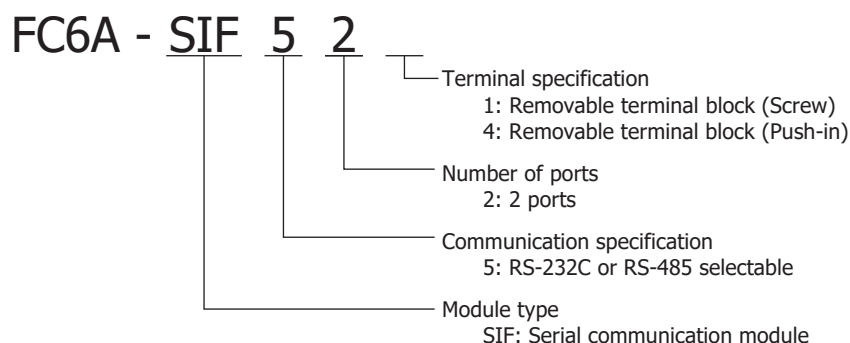
I/O points  
08: 8 I/O points  
16: 16 I/O points  
24: 24 I/O points  
32: 32 I/O points

Module type  
N: Digital input module  
R: Digital output module (Relay output)  
T: Digital output module (Transistor output)  
M: Digital mixed I/O module

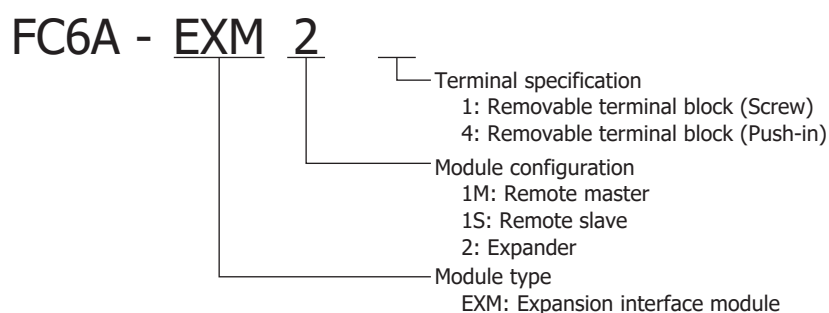
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

**Analog I/O module****Safety relay module****PID module**

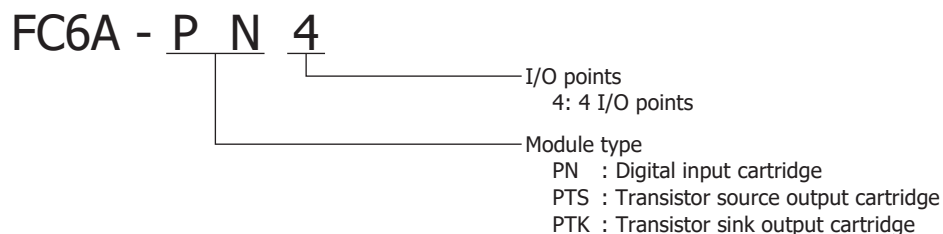
### Communication module



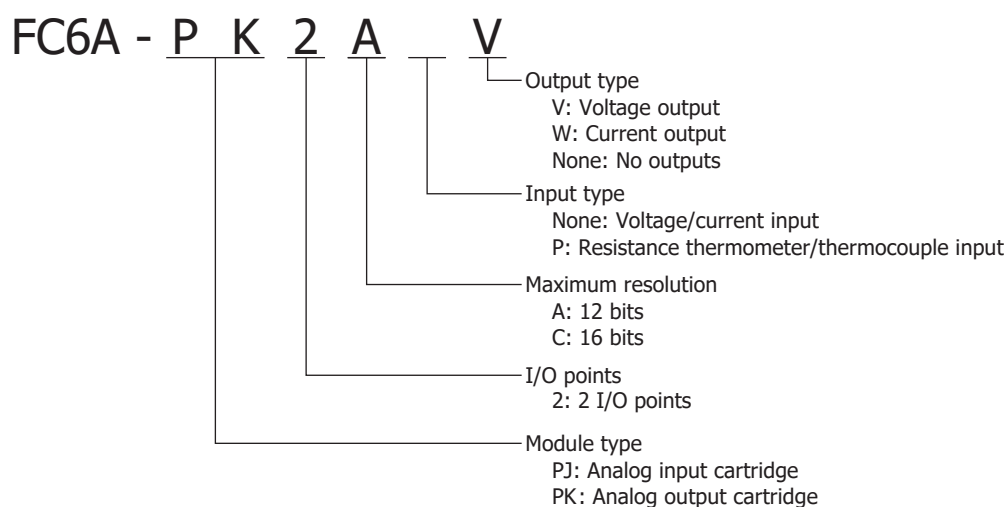
### Expansion interface module



### Digital I/O cartridge



### Analog I/O cartridge



**Communication cartridge**

FC6A - P C 1

- Communication/terminal specifications  
 1: RS232C communication/terminal block  
 3: RS485 communication/terminal block  
 4: Bluetooth communication
- Module type  
 PC : Communication cartridge

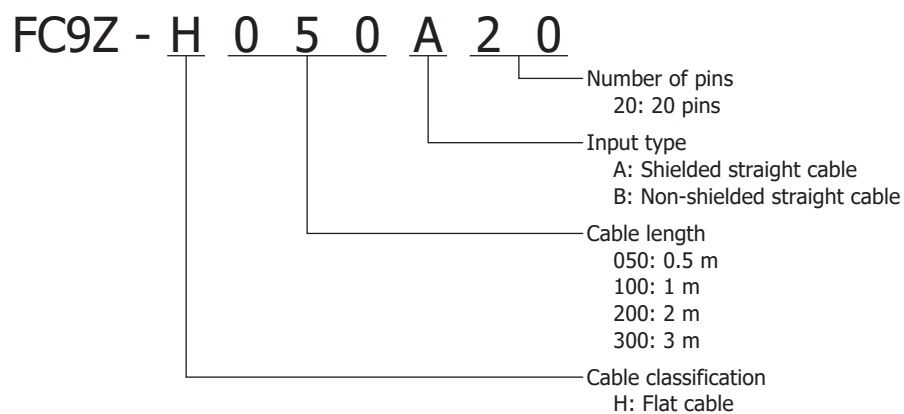
**Connector**

FC6A - P M T C K 1 1

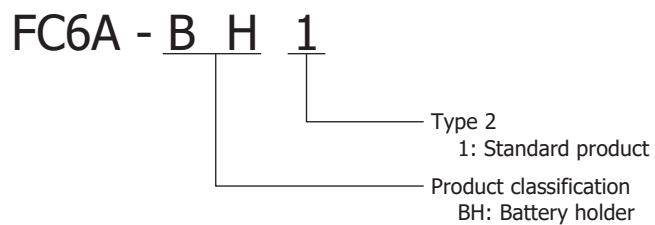
- Number of pins  
 03: 3 pins  
 05: 5 pins  
 08: 8 pins  
 09: 9 pins  
 10: 10 pins  
 11: 11 pins  
 12: 12 pins  
 13: 13 pins  
 17: 17 pins  
 20: 20 pins
- Silk-screen printing  
 S: Silk-screen printing for source outputs  
 K: Silk-screen printing for sink outputs  
 A: Silk-screen printing for AC input  
 C: Silk-screen printing for 24-V DC input  
 D: Silk-screen printing for 12-V DC input  
 None: No silk-screen printing
- Terminal specification  
 A: 5.08 mm pitch, side connection  
 B: 5.08 mm pitch, front connection  
 C: 3.81 mm pitch, front connection  
 D: 5.08 mm pitch, side connection  
   (dedicated for use with the CPU module  
   power supply terminal)  
 E: Front connection with screw flange  
   (dedicated for use with CAN communication)  
 None: MIL connector<sup>\*1</sup>
- Wiring connection configuration  
 T: Screw fastened type  
 S: Push-in type  
 C: MIL connector<sup>\*1</sup>
- Product classification  
 PM: Connector

<sup>\*1</sup> The type number for the MIL connector starts with "FC4A-" instead of "FC6A-".

**Cable**



**Battery holder**



## CPU Module Type Numbers and Functions List

## Type numbers and functions

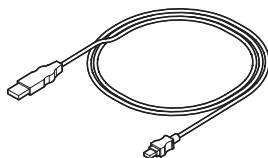
| Type Number*1 | Power Supply   | Inputs and Outputs*2 | USB Port | Ethernet Port 1 | Ethernet Port 2 | Number of Cartridge Slots | CAN Port | Serial Port 1 | SD Memory Card Slot | Analog Input/Volume |  |  |  |  |  |  |  |  |  |  |  |
|---------------|----------------|----------------------|----------|-----------------|-----------------|---------------------------|----------|---------------|---------------------|---------------------|--|--|--|--|--|--|--|--|--|--|--|
| FC6A-C**R*AE  | 100 to 240V AC | 16 (404)             | Yes      | Yes             | —               | 1 (2)                     | —        | Yes           | Yes                 | Yes (1 each)        |  |  |  |  |  |  |  |  |  |  |  |
|               |                | 24 (508)             |          |                 |                 | 2 (3)                     |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
|               |                | 40 (528)             |          |                 |                 | 1 (2)                     |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C16**CE  | 24V DC         | 16 (404)             |          |                 |                 | 1 (2)                     |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C16**DE  | 12V DC         |                      |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C24**CE  | 24V DC         | 24 (508)             |          |                 |                 | 2 (3)                     |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C40**CE  |                | 40 (528)             |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C40**DE  | 12V DC         |                      |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C40**AEJ | 100 to 240V AC | 40 (528)             |          |                 |                 | —                         |          | —             |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C40**CEJ | 24V DC         |                      |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-C40**DEJ | 12V DC         |                      |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |
| FC6A-D****CEE | 24V DC         | 16 (2,044)           | Yes      | Yes             | Yes             | 0 (3)                     | —        | —             | Yes                 | Yes (1 each)        |  |  |  |  |  |  |  |  |  |  |  |
|               |                | 32 (2,060)           |          |                 |                 |                           |          |               |                     |                     |  |  |  |  |  |  |  |  |  |  |  |

\*1 For CPU module type numbers, see "CPU module" on page 1-1.

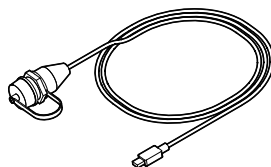
\*2 The value in parentheses ( ) is the number of inputs and outputs when using the expansion interface module and the maximum number of expansion modules are connected.

## Options

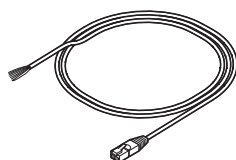
USB Maintenance Cable  
HG9Z-XCM42



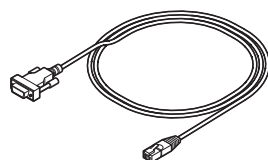
Panel Mount USB Extension Cable  
HG9Z-XCE21



External Device/O/I Communication Cable  
FC6A-KC1C



O/I Communication Cable  
FC6A-KC2C



### Features

This section describes the features of the FC6A.

#### High-speed Instruction Processing

The FC6A is capable of high-speed arithmetic processing of basic instructions (LOD) in 0.042  $\mu$ s and advanced instructions (MOV) in 0.120  $\mu$ s. This improves real time performance during program execution.

#### Abundant Program Capacity

The FC6A has large program capacity.

| CPU Module                      | Program Capacity                                   |  |
|---------------------------------|--|--|
|                                 | Standard   | When Online Edit Is Used                         |
| All-in-One CPU module           | 384,000 bytes maximum<br>(48,000 steps equivalent) | 72,000 bytes maximum<br>(9,000 steps equivalent) |
| CAN J1939 All-in-One CPU module | 640,000 bytes maximum<br>(80,000 steps equivalent) |  |
| Plus CPU module                 | 800,000 bytes maximum (100,000 steps equivalent)   |  |

**Note:** "Step" is the unit to calculate the program size. One step is 8 bytes, which is the instruction size of contacts or coils.

#### Online Edit

User programs can be overwritten (run-time programming) and tests can be written while the ladder program is being executed.

#### Various Communication Functions

The FC6A supports the following communications:

- Maintenance communication
- User communication
- Modbus communication
- Datalink communication
- Bluetooth communication
- MC protocol communication (Plus CPU module only)
- BACnet/IP communication (Plus CPU module only)
- EtherNet/IP communication (Plus CPU module only)
- MQTT communication (Plus CPU module only)
- J1939 communication (CAN J1939 All-in-One CPU module only)

The following functions using Ethernet are also supported so that a variety of requirements can be achieved, such as remote monitoring or maintenance.

- SNMP
- FTP server/client
- PING
- Send e-mail
- Web server

The FC6A can be connected to a variety of devices such as computer, operator interface, and printer.

#### SD Memory Card

The FC6A is equipped with an SD memory card slot. The log data of device values, configuration data, user programs, and system software can be saved to a commercially available SD memory card (32 GB maximum).

#### Powerful HMI Functions

Device values can be checked and modified on the HMI module's LCD. The LCD can also display the current time, bar charts, messages, and text. The HMI module is equipped with fonts in the following nine languages and can display messages and text in those languages. The HMI module can be operated using the operation buttons. Operations such as switching what is shown on the LCD can be performed using the operation buttons.

| Setting Name | Character Set        | Supported Languages  |
|--------------|----------------------|--|
| European     | ISO 8859-1 (Latin-1) | English, German, Italian, Spanish, Dutch (Note), French (Note) |
| Japanese     | Shift-JIS            | Japanese (level 1)   |
| Chinese      | GB2312               | Chinese (simplified)   |
| Cyrillic     | ANSI 1251            | Russian  |

**Note:** Some of the characters cannot be input.



## Special Functions

This section describes the functions of the FC6A.

### I/O Related Functions

#### Catch Input

The catch input function is used to receive shot pulses (minimum pulse width: 5  $\mu$ s) that is shorter than the user program scan time. A maximum of 6 catch inputs can be used.

**Note:** The scan time is the time duration for executing one cycle of the user program that is cyclically executed.

#### Input Filter

The input filter is the function to reduce the influence from the bounce or noise on input contacts by adjusting the filter width according to the input signal width. The input filter of 0 ms (no filter) or 3 to 15 ms (1 ms increments) can be configured for individual input.

#### Interrupt Input

The interrupt input can be used to call an interrupt program to respond to an external input that requires a response faster than the ladder program scan time. A maximum of six interrupt inputs can be used.

#### Stop and Reset Inputs

The stop input is a function to stop ladder program execution. The reset input is a function to stop ladder program operation and clear device values. Any input terminal on the FC6A can be designated as a stop or reset input to control the FC6A operation.

#### Built-in Analog Input Function

This function acquires 0 to 10V DC analog input as a digital value in a special data register. There is one built-in analog input.

#### Analog Potentiometer Function

This function acquires volume input as a 0 to 1,000 digital value in a special data register according to the position of the volume. There is one analog potentiometer.

#### Forced I/O

The inputs and outputs of the FC6A can be forced on or off. This function can be used to check the I/O wiring or the user program operation.

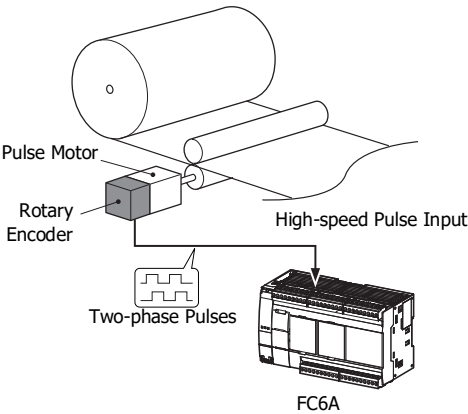
High-speed I/O Functions

High-speed Counter

This function counts high-speed pulse inputs that cannot be measured in normal user program processing. Use this function for applications such as positioning control with a rotary encoder or motor control. The FC6A can use single-phase high-speed counters and two-phase high-speed counters. A maximum of six single-phase high-speed counters and a maximum of two two-phase high-speed counters (three maximum for Plus CPU module only) can be used simultaneously.

| CPU Module  |                  | Single-phase High-speed Counter | Two-phase High-speed Counter |
|---|------------------|---------------------------------|------------------------------|
| All-in-One CPU module/<br>CAN J1939 All-in-One CPU module | 16-I/O type      | 6 maximum                       | 2 maximum                    |
|   | 24-I/O type      |                                 |                              |
|   | 40-I/O type      |                                 |                              |
| Plus CPU module   | Plus 16-I/O type |                                 | 3 maximum                    |
|   | Plus 32-I/O type |                                 |                              |

Example: Controlling a motor by counting two-phase pulse input with a high-speed counter



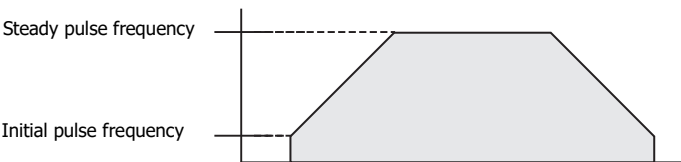
Positioning Control

The FC6A can perform positioning control with pulse outputs. The FC6A features the PULS instructions that can generate pulse outputs with configured frequency at the fixed pulse width ratio, JOG instructions, pulse-width modulation (PWM) instructions that can generate pulse outputs with configured pulse width ratio at a fixed frequency, RAMP instructions for trapezoidal control, ZRN instructions for zero return operation, and ARAMP instructions that can generate pulse outputs according to a table in which the changes of the frequency are configured.

The FC6A also manages coordinates internally and can increment or decrement coordinates according to the number of pulses that were output and the direction.

After confirming the origin using the ZRN instruction, the target position can also be specified by absolute position.

Example: Pulse output by the RAMP instruction



Frequency Measurement

This function measures the frequency of pulses input to an input terminal. The frequencies of a maximum of six inputs can be measured.

## **Convenient Functions**

### **Calendar/Clock**

The FC6A features a real-time clock on-board. Using the calendar and clock function, the FC6A can operate according to the current date and time. These functions can be used to control a time schedule for lighting or air conditioning equipments.

The FC6A also supports daylight savings time and the date and time of the switch can be freely set to allow for use in any region.

### **User Program Read/Write Protection**

The user program in the FC6A can be protected against reading and/or writing by including a password in the user program. This function is effective for security of user programs.

### **"Keep" or "Clear" Designation of FC6A Data**

This function specifies whether or not to keep FC6A device values when there is a power interruption.

Devices that can be specified as kept are internal relays, shift registers, counter current values, and data registers.

### **RUN/STOP Selection at Startup when "Keep" Data is Lost**

When the backup battery is dead, all data to be kept are lost. The user can select whether the FC6A starts to run or not to prevent undesirable operation at the startup.

### **Log Data**

Device values of the FC6A can be saved as CSV files on the SD memory card. The DLOG instruction saves device values to the SD memory card. The TRACE instruction accumulates device values at each scan and saves them to the SD memory card at the desired timing.

### **Constant Scan Time**

The variations in scan time that occur when the user program is running can be made constant.

### **Timer Interrupt**

The timer interrupt can be used to call an interrupt program at a predetermined interval of time without being affected by the scan time.

### **Script Function**

This function allows programming complicated processing with conditional branching, logical operations, arithmetic operations, and functions as text. Devices can also be read and written. Execute scripts using the SCRPT instruction.

### **Recipe Function**

This function allows the values of device settings to be written to a CSV file to create a recipe file. The values of device settings can be read from a recipe file and reflected in the FC6A devices.

Applicable devices are word devices such as timers, counters, and data registers.

### **SNTP Function**

The current time can be acquired from an SNTP server.

### **USB Boot Function**

This function starts the FC6A with power supplied from the USB cable.

This allows the user program and system software to be updated.

During USB boot, USB communication and the SD memory card can be used.

### **PID Control Function**

PID control performs temperature control and other types of control using a PID (proportional-integral-derivative) calculation algorithm. The FC6A can perform PID control by automatically calculating the optimal PID value using the auto tuning function.

### **Function Switch**

The FC6A is equipped with a function switch which can be used to run or stop the user program. The button can be used for any desired purpose by using the on/off status of the function switch stored in the special internal relay.

### Communication Functions

The FC6A can perform RS232C and RS485 communication using serial port 1. The communication ports can be expanded by using communication cartridges to allow for multiple instances of RS-232C, RS-485, and Bluetooth communication. The Ethernet port is standard equipment to enable communication using Ethernet. The CAN J1939 All-in-One CPU module is equipped with a CAN port to enable J1939 communication.

#### Communication Functions

|                                  |  |
|----------------------------------|--|
| <b>Maintenance Communication</b> | Maintenance communication enables you to check the operating status and I/O status of the FC6A, to display and change device values, and download and upload user programs using a computer or operator interface. |
| <b>User Communication</b>        | Data can be sent and received by creating commands for external devices (computers, printers, barcode readers, and other devices).   |
| <b>Modbus Communication</b>      | Data can be sent and received between communication device that conforms to the Modbus protocol and the FC6A.  |
| <b>Data Link Communication</b>   | Data can be sent and received between a master station and slave stations by connecting a maximum of 31 FC6As (slave station) to a FC6A (master station).  |
| <b>MC Protocol Communication</b> | The Plus CPU module supports MC protocol communication Client.   |
| <b>BACnet/IP Communication</b>   | The Plus CPU module supports BACnet communication using the Internet protocol (IP).  |
| <b>EtherNet/IP communication</b> | The Plus CPU module supports EtherNet/IP (scanner) communication.  |
| <b>MQTT Communication</b>        | The Plus CPU module supports MQTT communication.   |
| <b>J1939 Communication</b>       | The CAN J1939 All-in-One CPU module can send and receive data with communication device that conforms to the SAE-J1939 standard.   |

For details on communication functions, see the "FC6A Series MICROSmart Communication Manual".

### Allocations of the Communication Port Numbers

All-in-One CPU module, CAN J1939 All-in-One CPU module, and Plus CPU module support serial communication with the target device. Serial communication is possible with built-in interface or expanded interface of each CPU module. Interfaces supporting the serial communication are as follows:

|                                 |  |
|---------------------------------|--|
| All-in-One CPU module           | : Serial port 1, cartridge slots 1 and 2, communication module ports |
| CAN J1939 All-in-One CPU module | : Cartridge slots 1 and 2, communication module ports                |
| Plus CPU module                 | : Cartridge slots 1 to 3, communication module ports                 |

In order to use each interface as communication port, the communication parameters must be configured according to the communication parameters of the target device. Configure the communication parameters in **Communication Ports** tab in the **Function Area Settings** dialog box. The allocation between each interface and communication port is described below.

For details on each setting, refer to chapter 3 "Communication Port Settings" in the "FC6A Series MICROSmart Communication Manual".

#### ■ Ports and Cartridge Slots 1 to 3 on the CPU Module and HMI Module

— : Not equipped with the CPU module.

No : Cannot be used as the serial communication ports.

| CPU Module                      |                  | Port          |          |                 |                 |                   |          | Cartridge Slot |            |            |
|---------------------------------|------------------|---------------|----------|-----------------|-----------------|-------------------|----------|----------------|------------|------------|
|                                 |                  | Serial Port 1 | USB Port | Ethernet Port 1 | Ethernet Port 2 | HMI-Ethernet Port | CAN Port | 1              | 2          | 3          |
| All-in-One CPU module           | 16-I/O type      | Port 1        | No       | No              | —               | No*1              | —        | Port 2*2*5     | —          | —          |
|                                 | 24-I/O type      |               |          |                 |                 |                   |          |                | Port 3*2*5 |            |
|                                 | 40-I/O type      |               |          |                 |                 |                   |          |                |            |            |
| CAN J1939 All-in-One CPU module | 40-I/O type      | —             | No       | No              | No              | No*1              | No       | Port 1*3*5     | Port 2*3*5 | Port 3*4*5 |
| Plus CPU module                 | Plus 16-I/O type |               |          |                 |                 |                   | —        |                |            |            |
|                                 | Plus 32-I/O type |               |          |                 |                 |                   |          |                |            |            |

\*1 When the HMI module is connected to the CPU module and HMI-Ethernet port is added.

\*2 When a communication cartridge is installed on the cartridge slot.

\*3 When the cartridge base module is connected to the CPU module and a communication cartridge is installed on the cartridge slot.

\*4 When the HMI module is connected to the CPU module and a communication cartridge is installed on the cartridge slot.

\*5 The combination of "Data Bits: 7" and "Parity: None" is not possible.

#### Notes:

- For the locations of each port and cartridge slot, see "Part Names and Functions" on page 2-4.
- For serial port 1 wiring, see "Other Inputs and Ports" on page 2-47. For communication cartridge wiring, see "Terminal Arrangement and Wiring Examples" on page 2-174.

#### ■ Ports on Communication Modules

| CPU Module                      |                  | Communication Module |           |           |             |     |             |
|---------------------------------|------------------|----------------------|-----------|-----------|-------------|-----|-------------|
|                                 |                  | 1st                  | 2nd       | 3rd       | 4th         | ... | 15th        |
| All-in-One CPU module           | 16-I/O type      | Port 4, 5            | Port 6, 7 | Port 8, 9 | *1          | *1  | *1          |
|                                 | 24-I/O type      |                      |           |           |             |     |             |
|                                 | 40-I/O type      |                      |           |           |             |     |             |
| CAN J1939 All-in-One CPU module | 40-I/O type      | Port 4, 5            | Port 6, 7 | Port 8, 9 | Port 10, 11 | ... | Port 32, 33 |
| Plus CPU module                 | Plus 16-I/O type |                      |           |           |             |     |             |
|                                 | Plus 32-I/O type |                      |           |           |             |     |             |

\*1 Four or more communication modules cannot be connected to the All-in-One CPU module and CAN J1939 All-in-One CPU module.

Maintenance Communication

The maintenance communication of the FC6A enables you to check the operating status and I/O status of the FC6A, monitor and change device values, and download and upload user programs with the PLC programming software WindLDR installed on a computer. For details on maintenance communication, see the "FC6A Series MICROSmart Communication Manual".

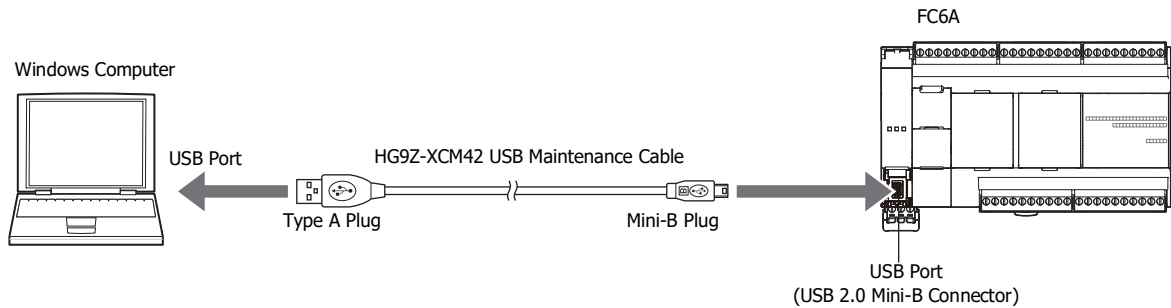
Supported ports\*1

| USB Port | Serial Port 1 | Ethernet Port 1, 2 and HMI-Ethernet Port*2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|--|--|----------|
| Yes      | Yes           | Yes  | Yes  | No       |

\*1 Depending on the port that will be used, there are differences in maintenance communication functionalities that can be used. For details on the restrictions, see the "FC6A Series MICROSmart Communication Manual".  
\*2 Only maintenance communication can be used with the HMI-Ethernet port.

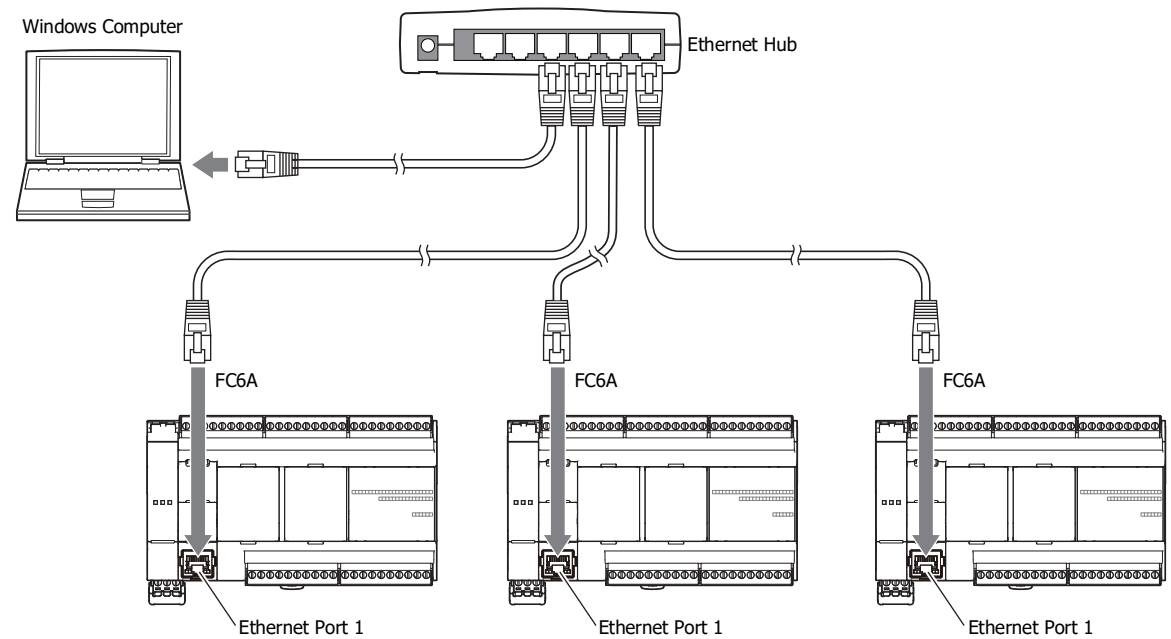
■ 1:1 Maintenance Communication System

This example shows a 1:1 maintenance communication system in which a FC6A and a computer are connected with USB. The USB maintenance cable (HG9Z-XCM42) is used.



■ 1:N Maintenance Communication System

This example shows a 1:N maintenance communication system in which three FC6A and a computer are connected over Ethernet. The Ethernet cables are connected to the Ethernet port 1 of three FC6A, and those FC6A are connected to the computer via an Ethernet hub.



## User Communication

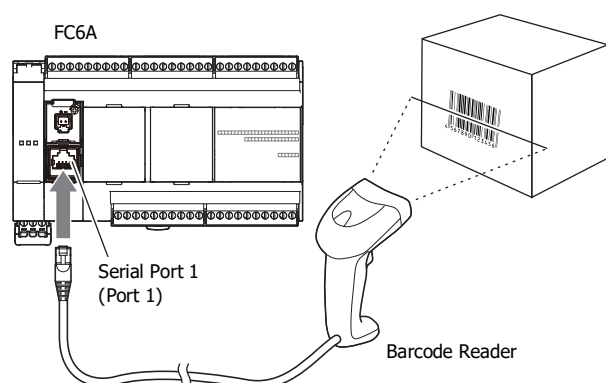
The user communication of the FC6A enables you to control external devices such as computers, printers, and barcode readers. For details on user communication, see the "FC6A Series MICROSmart Communication Manual".

### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|-----------------------|--|----------|
| No       | Yes           | Yes                   | Yes  | No       |

#### ■ User Communication Using Serial Port 1

This example shows a system in which a FC6A receives the data read by a barcode reader. A barcode reader is connected to port 1 of the FC6A.



## Modbus Communication

The FC6A is compliant with Modbus RTU protocol and can be used as either a Modbus communication master or slave. With Modbus communication, the FC6A can monitor and modify the data of inverters and temperature controllers.

Ethernet ports 1 and 2 also support the Modbus TCP communication protocol.

For details on Modbus communication, see the "FC6A Series MICROSmart Communication Manual".

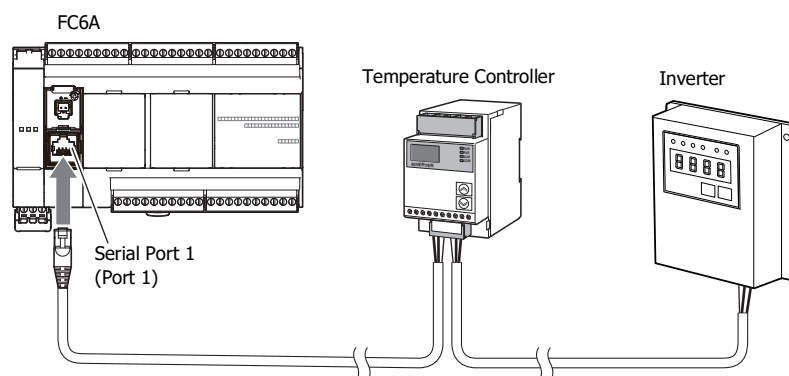
### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge <sup>*1</sup> and Communication Module | CAN Port |
|----------|---------------|-----------------------|--|----------|
| No       | Yes           | Yes                   | Yes  | No       |

<sup>\*1</sup> Only the RS-232C communication cartridge and RS-485 communication cartridge are supported.

#### ■ Modbus RTU Communication Using Serial Port 1

This example shows a system in which a FC6A is communicating with a temperature controller and an inverter that support Modbus RTU. The A temperature controller is connected to port 1 of the FC6A.



Data Link Communication

The FC6A supports data link communication, and it can share data between CPU modules using serial port 1 and cartridge slots. The FC6A can also share data with FC5A Series and FC4A Series CPU modules. Configure the settings in WindLDR to enable distributed control of a maximum of 31 CPU modules.

For details about the data link communication, see the "FC6A Series MICROSmart Communication Manual".

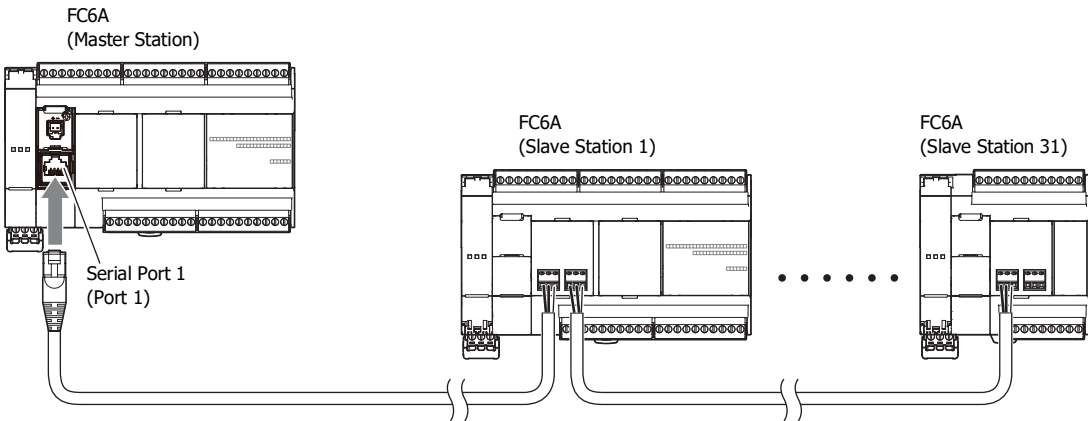
Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge*1 and Communication Module | CAN Port |
|----------|---------------|-----------------------|--|----------|
| No       | Yes           | No                    | Yes  | No       |

\*1 Only the RS-232C communication cartridge and RS-485 communication cartridge are supported.

■ Data Link Communication Using Serial Port 1

This example shows communication between multiple CPU modules with the FC6A as the master station. A slave station CPU module is connected to Serial Port 1 of the FC6A.



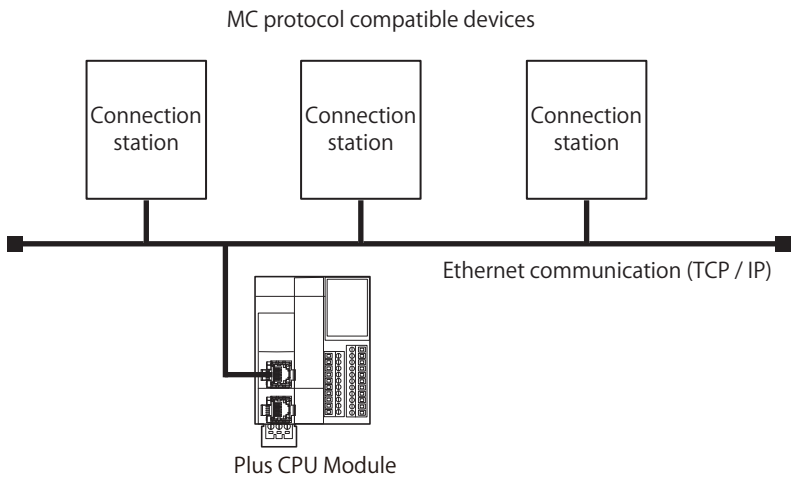
MC Protocol Communication

The Plus CPU module can read and write device values of MC protocol compatible device as client in MC Protocol Communication using Ethernet port 1 or 2. For details, see the "FC6A Series MICROSmart Communication Manual".

Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 | Ethernet Port 2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|-----------------|-----------------|--|----------|
| No       | No            | Yes             | Yes             | No   | No       |

■ MC protocol Communication Example with Ethernet Port 1





## BACnet/IP Communication

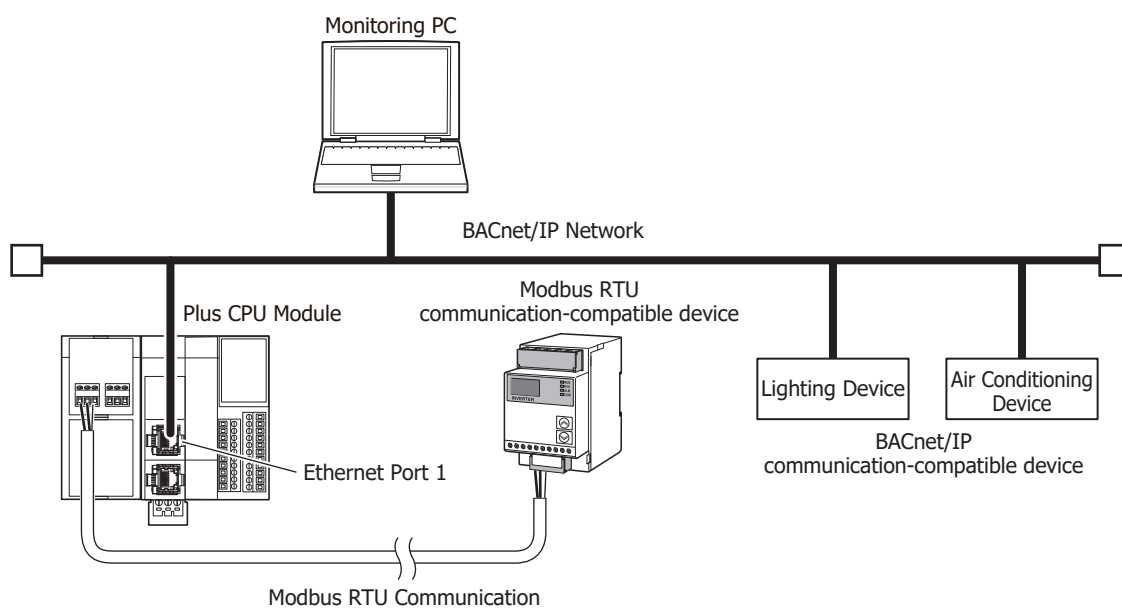
The Plus CPU module can be connected to a BACnet/IP network using Ethernet port 1 and communicate with other BACnet communication-compatible external devices. For details on BACnet/IP communications, see the "Network User's Manual".

### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 | Ethernet Port 2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|-----------------|-----------------|--|----------|
| No       | No            | Yes             | No              | No   | No       |

#### ■ BACnet Communication Using Ethernet Port 1

This example shows the Plus CPU module aggregating information from Modbus RTU communication-compatible devices, communicating with a BACnet communication-compatible device connected to a BACnet/IP network, and making that information publicly available.



EtherNet/IP Communication

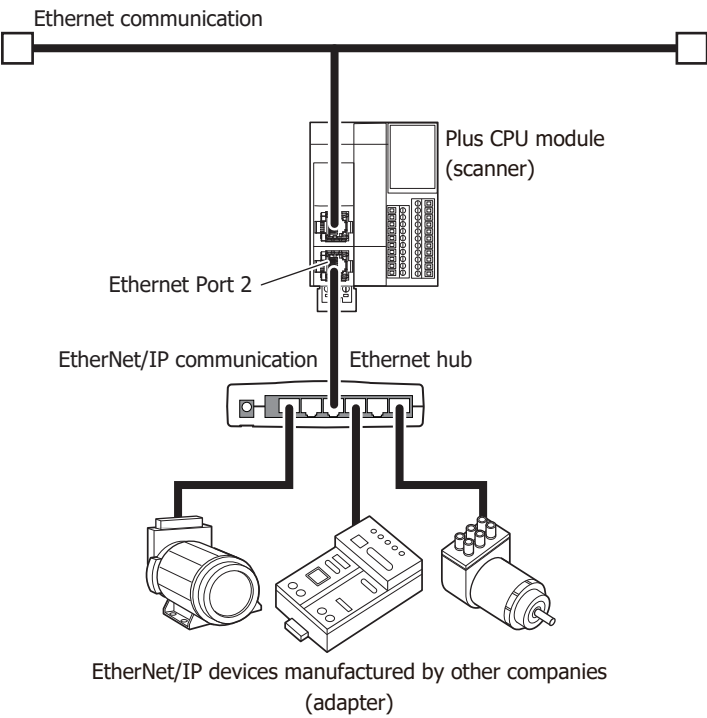
The Plus CPU module can be connected to an Ethernet network using Ethernet port 2 and communicate with other EtherNet/IP communication-compatible external devices. EtherNet/IP communication uses standard Ethernet technologies, which allows networks to be built that include various Ethernet-compatible devices. For details on EtherNet/IP communications, see the "Network User's Manual".

Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 | Ethernet Port 2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|-----------------|-----------------|--|----------|
| No       | No            | No              | Yes             | No   | No       |

■ EtherNet/IP Communication Using Ethernet Port 2

This example shows the Plus CPU module communicating with EtherNet/IP communication-compatible devices and controlling those devices.



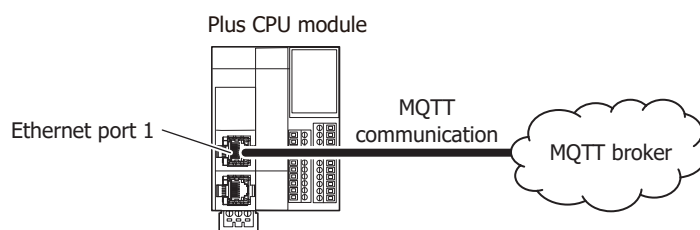
## MQTT Communication

The Plus CPU module can communicate with a broker as a client (publisher and subscriber) in MQTT communication using Ethernet port 1. For details on MQTT communications, see the "Network User's Manual".

### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 | Ethernet Port 2 | Communication Cartridge and Communication Module | CAN Port |
|----------|---------------|-----------------|-----------------|--|----------|
| No       | No            | Yes             | No              | No   | No       |

#### ■ MQTT Communication Using Ethernet Port 1



## J1939 Communication

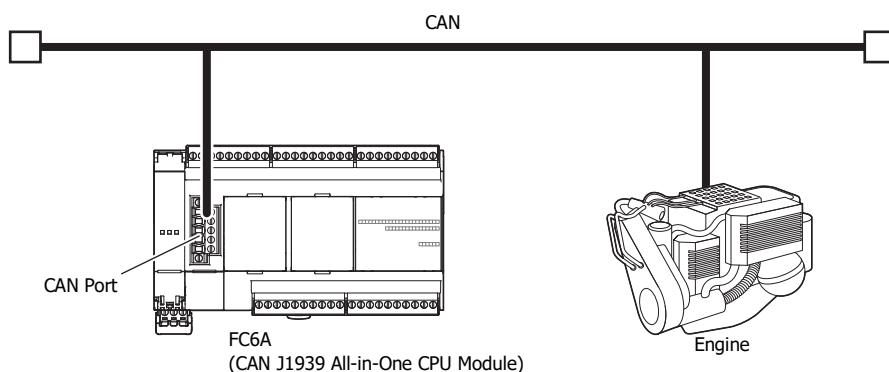
The CAN J1939 All-in-One CPU module can be connected to a J1939 communication network using the CAN port and it can communicate with other J1939 communication-compatible devices. Messages that conform to the SAE J1939 standard can be sent and received. For details on J1939 communication, see the "FC6A Series MICROSmart Communication Manual".

### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge | CAN Port |
|----------|---------------|-----------------------|-------------------------|----------|
| No       | No            | No                    | No                      | Yes      |

#### ■ CAN Port Usage Example

This example shows the FC6A communicating with a J1939-compatible engine. The CAN port of the CAN J1939 All-in-One CPU module is connected to the engine.



Ethernet Communication

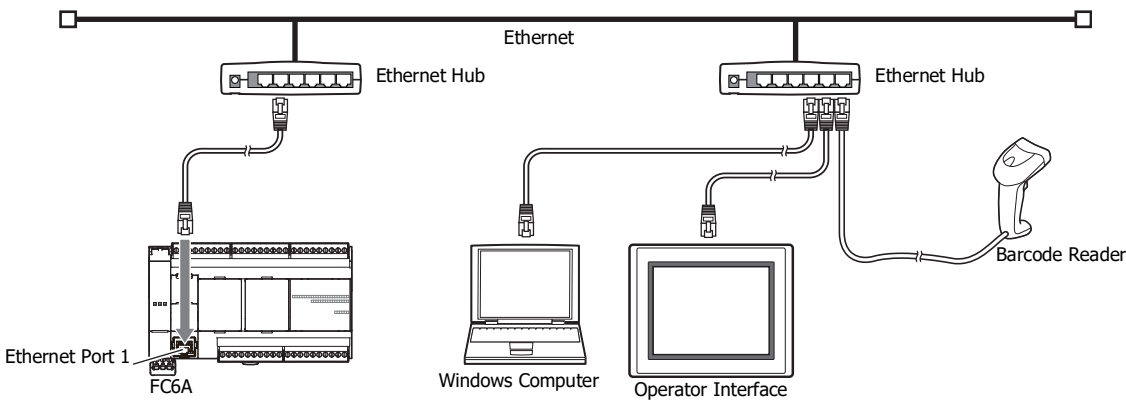
The FC6A can be connected to the Ethernet network using Ethernet port 1 and communicate with network devices over Ethernet. The All-in-One CPU module and CAN J1939 All-in-One CPU module have eight TCP/IP connections and the Plus CPU module has 16 TCP/IP connections that can be used for Ethernet communication. Different communication protocols can be simultaneously used on these connections. Each connection can be configured for maintenance communication server, user communication server/client, Modbus TCP server/client communication, etc.

Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge | CAN Port |
|----------|---------------|-----------------------|-------------------------|----------|
| No       | No            | Yes                   | No                      | No       |

Ethernet Communication Example

This example shows Ethernet communication between the FC6A equipped with Ethernet port 1, an operator interface, and a computer. Among the three connections the FC6A has, Connection 1 is configured as maintenance communication server for the computer to communicate with the FC6A. Connection 2 is configured as Modbus TCP server for the operator interface to communicate with the FC6A. Connection 3 communicates with the barcode reader with the user communication. Connection 4 to connection 8 are not used.



Notes:

- When accessing the FC6A over the Internet, adequate security measures for the network to prevent unauthorized access are required. Be sure to consult your network administrator or Internet service provider. IDEC bears no responsibility for damages or problems caused due to security in Ethernet communication.
- Restrict the access to FC6A with IP addresses and ports by using appropriate measures such as the firewall.

## Operator Interface Connectivity

The FC6A can perform maintenance communication with IDEC operator interfaces using Ethernet port 1, serial port 1, and communication cartridge. FC6A device values can be monitored and modified by the connected operator interface. An Ethernet cable or an O/I communication cable<sup>\*1</sup> is used to connect the FC6A and the operator interface. For details on the communication settings, see the "WindO/I-NV2 User's Manual", the "WindO/I-NV3 User's Manual", and the "WindO/I-NV4 User's Manual".

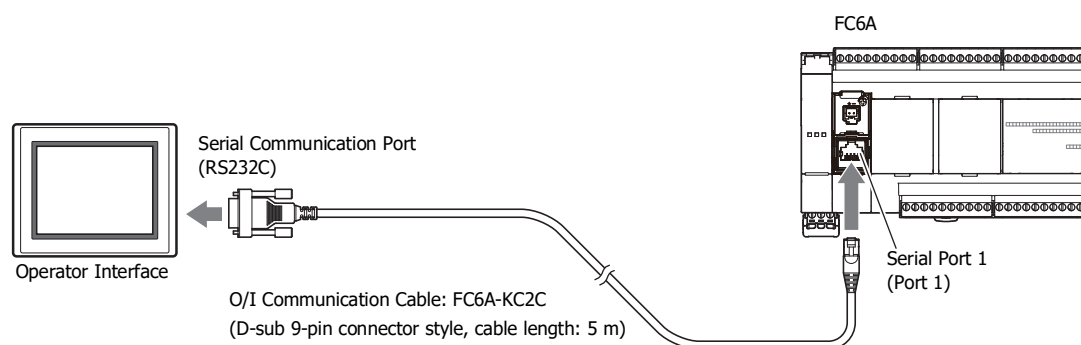
### Supported ports

| USB Port | Serial Port 1 | Ethernet Port 1 and 2 | Communication Cartridge <sup>*1</sup><br>and Communication Module | CAN Port |
|----------|---------------|-----------------------|---|----------|
| No       | Yes           | Yes                   | Yes   | No       |

<sup>\*1</sup> Only the RS-232C communication cartridge and RS-485 communication cartridge are supported.

### ■ 1:1 Maintenance Communication Example with an IDEC Operator Interface Using Serial Port 1

This example shows maintenance communication between the FC6A and an operator interface, as well as monitoring and changing FC6A device values using the operator interface. An IDEC operator interface is connected to serial port 1 of the FC6A.



<sup>\*1</sup> For details on O/I communication cables, see "Cables" on page A-14.



## 2: PRODUCT SPECIFICATIONS

This chapter describes the part names and specifications of the modules that make up the FC6A.

Various types of modules are available for the FC6A. These include the CPU modules (All-in-One CPU module, CAN J1939 All-in-One CPU module, and Plus CPU module), digital I/O modules (digital input modules, digital output modules, and digital mixed I/O modules), analog I/O modules (analog input modules, analog output modules, and analog mixed I/O modules), safety relay modules, PID modules, communication modules, expansion interface modules (expander and remote master/slave), HMI modules, cartridge base modules, and cartridges (digital I/O cartridges, analog I/O cartridges, and communication cartridges).

For the part names and specifications of the safety relay module, see the "FC6A Series MICROSmart Safety Relay Module User's Manual".

### Normal Operating Conditions

The normal operating conditions common to all modules except the safety relay module are as follows.

|   |   |
|---|---|
| <b>Ambient Operating Temperature</b>  | -10 to +55°C * <sup>1</sup> (no freezing)   |
| <b>Expanded Ambient Operating Temperature</b>   | -25 to -10°C, +55 to +65°C* <sup>2</sup> (no freezing)                                    |
| <b>Ambient Storage Temperature</b>  | -25 to +70°C (no freezing)  |
| <b>Relative Humidity</b>  | 10 to 95%, no condensation  |
| <b>Storage Humidity</b>   | 10 to 95%, no condensation  |
| <b>Pollution Degree</b>   | 2 (IEC60664-1)  |
| <b>Degree of Protection</b>   | IP20 (IEC60529)   |
| <b>Atmosphere</b>   | No corrosive gas  |
| <b>Altitude or Air Pressure</b>   | 1,013 to 795 hPa (0 to 2,000 m) during operation  |
|   | 1,013 to 701 hPa (0 to 3,000 m) during transport  |
| <b>Installation Location</b>  | Inside cabinet  |
| <b>Device Class</b>   | Open equipment  |
| <b>Overvoltage Category</b>   | II  |
| <b>Vibration Resistance</b>   | <b>DIN Rail Mounted</b>   |
|   | <b>Panel Mounted</b>  |
| 5 to 8.4 Hz half amplitude 3.5 mm, 8.4 to 150 Hz, acceleration 9.8 m/s <sup>2</sup> (1 G), each direction XYZ, 2 hours (IEC/EN 61131-2) |   |
| <b>Shock Resistance</b>   | 147 m/s <sup>2</sup> (15 G), 11 ms, XYZ, 3 axes, 6 directions, 3 times each (IEC 61131-2) |
| <b>EMC Immunity</b>   | IEC/EN61131-2, Zone B compatibility   |

\*1 The HMI module (FC6A-PH1) is 0 to 55°C.

\*2 For the status of support for expanded ambient operating temperatures in each product, see "Status of Support for Expanded Ambient Operating Temperatures (-25 to -10°C and 55 to 65°C)" on page 2-2. Certain products are also unable to support expanded ambient operating temperatures, depending on the product version. Check the product version number before using the product in expanded ambient operating temperatures.

The product ratings and usage conditions of certain models will also change if used in expanded ambient operating temperatures. For details, see the following sections.

- "Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio" (Pages 2-30, 2-63, 2-71, 2-73, 2-83, 2-85, 2-87, 2-99, 2-100)
- "Ambient Temperature and Analog Input/Output Restrictions" (Page 2-115)
- "Rating at Max Surrounding Air Temperature of 55°C/65°C" (Page 2-185)
- "Connection Restrictions When Expanding the PLC" (Page 3-37)

### Checking the Version Number

The version number of each module is listed on the side of the module. The performance and functionality of the analog I/O module will differ by its version, so check the version number before use.

S/N:XXXXX-XXXXX  
IDEC CORPORATION

V100

Version Number

The version number on a CPU module is HV\*\*\* and the version number on other modules is V\*\*\*.

## 2: PRODUCT SPECIFICATIONS

### Status of Support for Expanded Ambient Operating Temperatures (-25 to -10°C and 55 to 65°C)

| Name                            | Type No. *1             | Applicability of Expanded Ambient Operating Temperature |                |
|---------------------------------|-------------------------|---|----------------|
|                                 |                         | Status  | Version        |
| All-in-One CPU module           | FC6A-C*****E            | Applicable  | HV200 or later |
| CAN J1939 All-in-One CPU module | FC6A-C40***EJ           | Applicable  | HV200 or later |
| Plus CPU module                 | FC6A-D****CEE           | Applicable  | HV200 or later |
| Digital I/O module              | FC6A-N08B1/FC6A-N08B4   | Applicable  | V300 or later  |
|                                 | FC6A-N16B1/FC6A-N16B4   |   |                |
|                                 | FC6A-N16B3              |   |                |
|                                 | FC6A-N32B3              |   |                |
|                                 | FC6A-N08A11/FC6A-N08A14 |   |                |
|                                 | FC6A-R081/FC6A-R084     |   |                |
|                                 | FC6A-R161/FC6A-R164     |   |                |
|                                 | FC6A-T08P1/FC6A-T08P4   |   |                |
|                                 | FC6A-T16P1/FC6A-T16P4   |   |                |
|                                 | FC6A-T16P3              |   |                |
|                                 | FC6A-T32P3              |   |                |
|                                 | FC6A-T08K1/FC6A-T08K4   |   |                |
|                                 | FC6A-T16K1/FC6A-T16K4   |   |                |
|                                 | FC6A-T16K3              |   |                |
|                                 | FC6A-T32K3              |   |                |
|                                 | FC6A-M08BR1/FC6A-M08BR4 |   |                |
|                                 | FC6A-M24BR1/FC6A-M24BR4 |   |                |
| Analog I/O module               | FC6A-J2C1/FC6A-J2C4     | Applicable  | V300 or later  |
|                                 | FC6A-J4A1/FC6A-J4A4     |   |                |
|                                 | FC6A-J8A1/FC6A-J8A4     |   |                |
|                                 | FC6A-L03CN1/FC6A-L03CN4 |   |                |
|                                 | FC6A-J4CN1/FC6A-J4CN4   |   |                |
|                                 | FC6A-K2A1/FC6A-K2A4     |   |                |
|                                 | FC6A-J8CU1/FC6A-J8CU4   |   |                |
|                                 | FC6A-J4CH1Y/FC6A-J4CH4Y |   |                |
|                                 | FC6A-K4A1/FC6A-K4A4     | Not applicable  | —              |
|                                 | FC6A-L06A1/FC6A-L06A4   |   |                |
|                                 | FC6A-F2M1/FC6A-F2M4     |   |                |
|                                 | FC6A-F2MR1/FC6A-F2MR4   |   |                |
| Safety relay module             | FC6A-SAK64              | Not applicable  | —              |
| Expansion interface module      | FC6A-EXM1M              | Applicable  | V200 or later  |
|                                 | FC6A-EXM1S/FC6A-EXM1S4  |   |                |
|                                 | FC6A-EXM2/FC6A-EXM24    |   |                |
| HMI module                      | FC6A-PH1                | Not applicable  | —              |
| Cartridge base module           | FC6A-HPH1               | Not applicable  | —              |
| Communication module            | FC6A-SIF52/FC6A-SIF524  | Applicable  | V200 or later  |
| Digital I/O cartridge           | FC6A-PTK4               | Not applicable  | —              |
|                                 | FC6A-PTS4               |   | —              |
|                                 | FC6A-PN4                |   | —              |
| Analog I/O cartridge            | FC6A-PJ2A               | Not applicable  | —              |
|                                 | FC6A-PJ2CP              |   | —              |
|                                 | FC6A-PK2AV              |   | —              |
|                                 | FC6A-PK2AW              |   | —              |



| Name                    | Type No. *1             | Applicability of Expanded Ambient Operating Temperature |                |
|-------------------------|-------------------------|---|----------------|
|                         |                         | Status  | Version        |
| Communication cartridge | FC6A-PC1                | Not applicable  | —              |
|                         | FC6A-PC3                |   | —              |
|                         | FC6A-PC4                |   | —              |
| FC6B series             | FC6B-C16R1A/FC6B-C16R4A | Applicable  | HV200 or later |
|                         | FC6B-C16R1C/FC6B-C16R4C |   |                |
|                         | FC6B-C16K1C/FC6B-C16K4C |   |                |
|                         | FC6B-C16P1C/FC6B-C16P4C |   |                |
|                         | FC6B-C24R1A/FC6B-C24R4A |   |                |
|                         | FC6B-C24R1C/FC6B-C24R4C |   |                |
|                         | FC6B-C24K1C/FC6B-C24K4C |   |                |
|                         | FC6B-C24P1C/FC6B-C24P4C |   |                |
|                         | FC6B-C40R1A/FC6B-C40R4A |   |                |
|                         | FC6B-C40R1C/FC6B-C40R4C |   |                |
|                         | FC6B-C40K1C/FC6B-C40K4C |   |                |
|                         | FC6B-C40P1C/FC6B-C40P4C |   |                |
|                         | FC6B-D16R1C/FC6B-D16R4C |   |                |
|                         | FC6B-D16K1C/FC6B-D16K4C |   |                |
|                         | FC6B-D16P1C/FC6B-D16P4C |   |                |
|                         | FC6B-D32K3C/FC6B-D32K4C |   |                |
|                         | FC6B-D32P3C/FC6B-D32P4C |   |                |

\*1 For CPU module type numbers, see "CPU module" on page 1-1.

## CPU Module

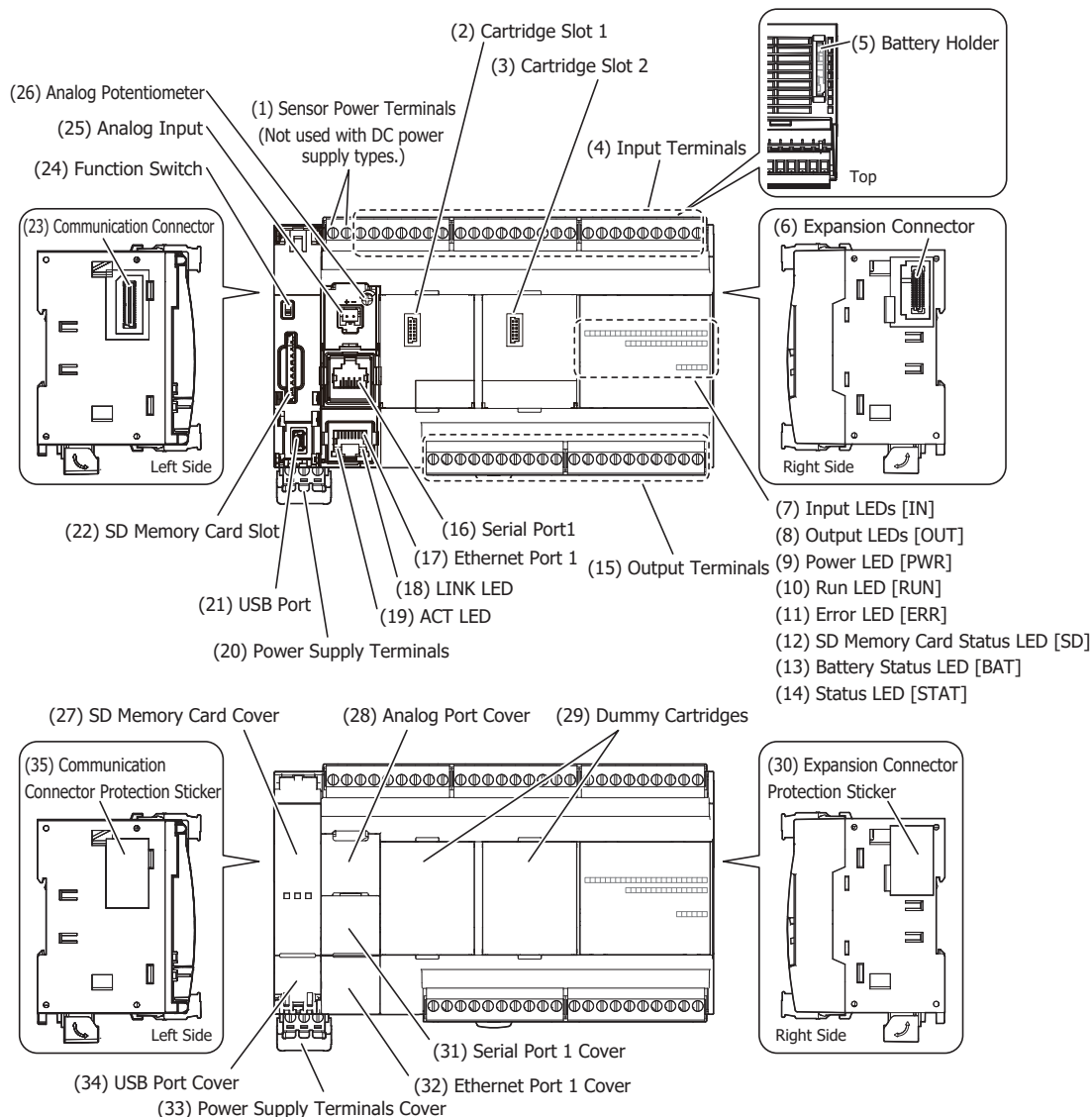
### All-in-One CPU module/CAN J1939 All-in-One CPU module

The All-in-One CPU module is equipped with analog input and serial ports (RS-232C/RS-485). CAN J1939 All-in-One CPU module is equipped with a CAN port.

## Part Names and Functions

- **All-in-One CPU module**

Example: FC6A-C40R1AE



The content in brackets is the LED indicator name on the FC6A.

## LED Indicators

### 16-I/O Type

(7) IN

|   |   |   |   |   |   |   |   |    |
|---|---|---|---|---|---|---|---|----|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 10 |
|   |   |   |   |   |   |   |   |    |

(8) OUT

|   |   |   |   |   |   |   |  |
|---|---|---|---|---|---|---|--|
|   |   |   |   |   |   |   |  |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 |  |

(9)(10)(11)(12)(13)(14)

|     |     |     |     |     |      |  |  |
|-----|-----|-----|-----|-----|------|--|--|
|     |     |     |     |     |      |  |  |
| PWR | RUN | ERR | ISD | BAT | STAT |  |  |

## 24-I/O Type

[illegible]

### 40-I/O Type

Diagram illustrating the bit fields for the **IN** (Input) and **OUT** (Output) registers.

**IN Register (7-bit):** Bits 0 through 7 are labeled. Bit 7 is also labeled (7).

**OUT Register (8-bit):** Bits 0 through 7 are labeled. Bit 7 is also labeled (8). Bits 9 through 14 are labeled (9) through (14).

**OUT Register Bit Fields:**

- Bit 9: PWR
- Bit 10: RUN
- Bit 11: ERR
- Bit 12: USD
- Bit 13: BAT
- Bit 14: STAT

**(1) Sensor power terminals (AC power type only)**

These terminals supply DC power (24V DC, 250 mA) for a sensor (can also be used as a power supply for inputs).  
The DC power type does not use these terminals.

**(2) Cartridge Slot 1**

This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

**(3) Cartridge Slot 2 (40-I/O type only)**

This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.  
The 16-I/O and 24-I/O types do not have this slot.

**(4) Input Terminals**

These terminals connect input devices such as push buttons and limit switches. DC inputs are both sinks and sources.

**(5) Battery Holder**

This holder is for installing the backup battery.

**(6) Expansion Connector**

This connector is used to connect expansion modules.

**(7) Input LEDs [IN]**

These LEDs turn on when an input is on. The LED with the corresponding number turns on.

**(8) Output LEDs [OUT]**

These LEDs turn on when an output is on. The LED with the corresponding number turns on.

**(9) Power LED [PWR]**

This LED turns on when the power is supplied to the CPU module.

**(10) Run LED [RUN]**

This LED turns on while the CPU module is running the user program.

This LED flashes when using certain functions while the user program is running.

| LED                           | Status   |
|-------------------------------|--|
| ON                            | <ul style="list-style-type: none"> <li>While the CPU module is running the user program</li> </ul>   |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"> <li>When executing the forced I/O function while the user program is running</li> </ul>   |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"> <li>While the CPU module is in USB boot.</li> <li>When executing the forced I/O function while the user program is stopped</li> </ul> |

**(11) Error LED [ERR]**

This LED turns on when an error occurs in the CPU module.

**(12) SD Memory Card Status LED [SD]**

This LED turns on or flashes when the SD memory card is being read or written.

| LED                           | Status  |
|-------------------------------|---|
| OFF                           | <ul style="list-style-type: none"> <li>When the SD memory card is not inserted</li> <li>When an unsupported or unformatted SD memory card was inserted</li> <li>Unmount SD memory card (M8072) is on, so the SD memory card has been unmounted</li> <li>When the FC6A power is off</li> </ul> |
| ON                            | <ul style="list-style-type: none"> <li>The standby state where the SD memory card can be written or read</li> </ul>   |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"> <li>When the FC6A is recognizing the SD memory card</li> <li>Unmount SD memory card (M8072) is turned on and the FC6A is unmounting the SD memory card (slow flashing, then off)</li> </ul>  |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"> <li>Reading or writing the SD memory card</li> </ul>   |

**(13) Battery Status LED [BAT]**

This LED turns on or flashes when the backup battery level is low.

| LED                  | Condition                                    | Battery Status |  |
|----------------------|--|----------------|--|
| Off                  | Battery voltage (D8056) > 2,300              | Normal         | Sufficient battery level.                  |
| Flashing (1 s cycle) | $2,300 \geq$ battery voltage (D8056) > 2,000 | Warning        | Low battery level. Replace the battery.    |
| On                   | $2,000 \geq$ battery voltage (D8056)         | Dead battery   | The battery is almost dead. Or no battery. |

**(14) Status LED [STAT]**

This LED can be turned on or off in the user program.

**(15) Output Terminals**

These terminals connect output devices such as electromagnetic switches and solenoid valves. The CPU module is available in the relay output type (240V AC: 2 A, 30V DC: 2 A), the transistor sink output type (0.5 A), and the transistor protection source output type (0.5 A).

**(16) Serial Port 1**

This port allows serial communication with connected devices that are equipped with a serial interface (RS-232C or RS-485).

**(17) Ethernet Port 1**

This port allows Ethernet communication with connected devices that are equipped with an Ethernet interface.

**(18) LINK LED**

This LED is on when a network-compatible device is connected to Ethernet Port 1.

**(19) ACT LED**

This LED flashes when sending or receiving data while the LINK LED is on.

**(20) Power Supply Terminals**

These terminals are used to supply power to the CPU module.

The AC power type uses an AC power supply (100 to 240 V).

The DC power type is available as the 24V DC power type and the 12V DC power type.

**(21) USB Port**

A mini-B type USB 2.0 connector. A USB cable can be attached to the FC6A and connected to a PC to download and upload user programs using WindLDR.

**(22) SD Memory Card Slot**

This slot is for inserting the SD memory card. The SD memory card allows for data logs using the DLOG/TRACE instructions, reading and writing device data, downloads from the SD memory card (user program, system software, web page), and uploads to the SD memory card.

**(23) Communication Connector**

This connector is used to connect the HMI module.

**(24) Function Switch**

This switch turns M8073 on or off (default setting: 0 (off)).

You can run or stop the CPU module with this switch by enabling **Run/Stop PLC by Function Switch** in WindLDR (default setting: enabled).

For details on the function switch, see "Function Switch Configuration" on page 5-10.

**(25) Analog Input**

The connector for the analog input.

**(26) Analog Potentiometer**

A volume for setting a timer or other device. This allows an analog value used in the user program to be set without the use of an external device.

**(27) SD Memory Card Cover**

An openable cover that protects the SD memory card and function switch. Open the SD memory card cover when inserting or ejecting the SD memory card and when using the function switch.

**(28) Analog Port Cover**

A removable cover that protects the analog input and analog potentiometer. When using these, remove the analog port cover.

**(29) Dummy Cartridges**

Removable dummy cartridges that protect the cartridge slots. Remove the dummy cartridge when connecting a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

**(30) Expansion Connector Protection Sticker**

This sticker protects the expansion connector. Remove the expansion connector protection sticker when connecting an expansion module.

**(31) Serial Port 1 Cover**

A removable cover that protects Serial Port 1. When using the serial port, remove the Serial Port 1 cover.

**(32) Ethernet Port 1 Cover**

A removable cover that protects Ethernet Port 1. When using the Ethernet port, remove the Ethernet Port 1 cover.

**(33) Power Supply Terminals Cover**

An openable cover that protects the power supply terminals. Open the power supply terminals cover when removing and attaching the power supply terminals.

**Note:**

The push-in type does not have the power supply terminals cover. The type numbers of the push-in type of All-in-One CPU module are as follows.

FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE, FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE, FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE

**(34) USB Port Cover**

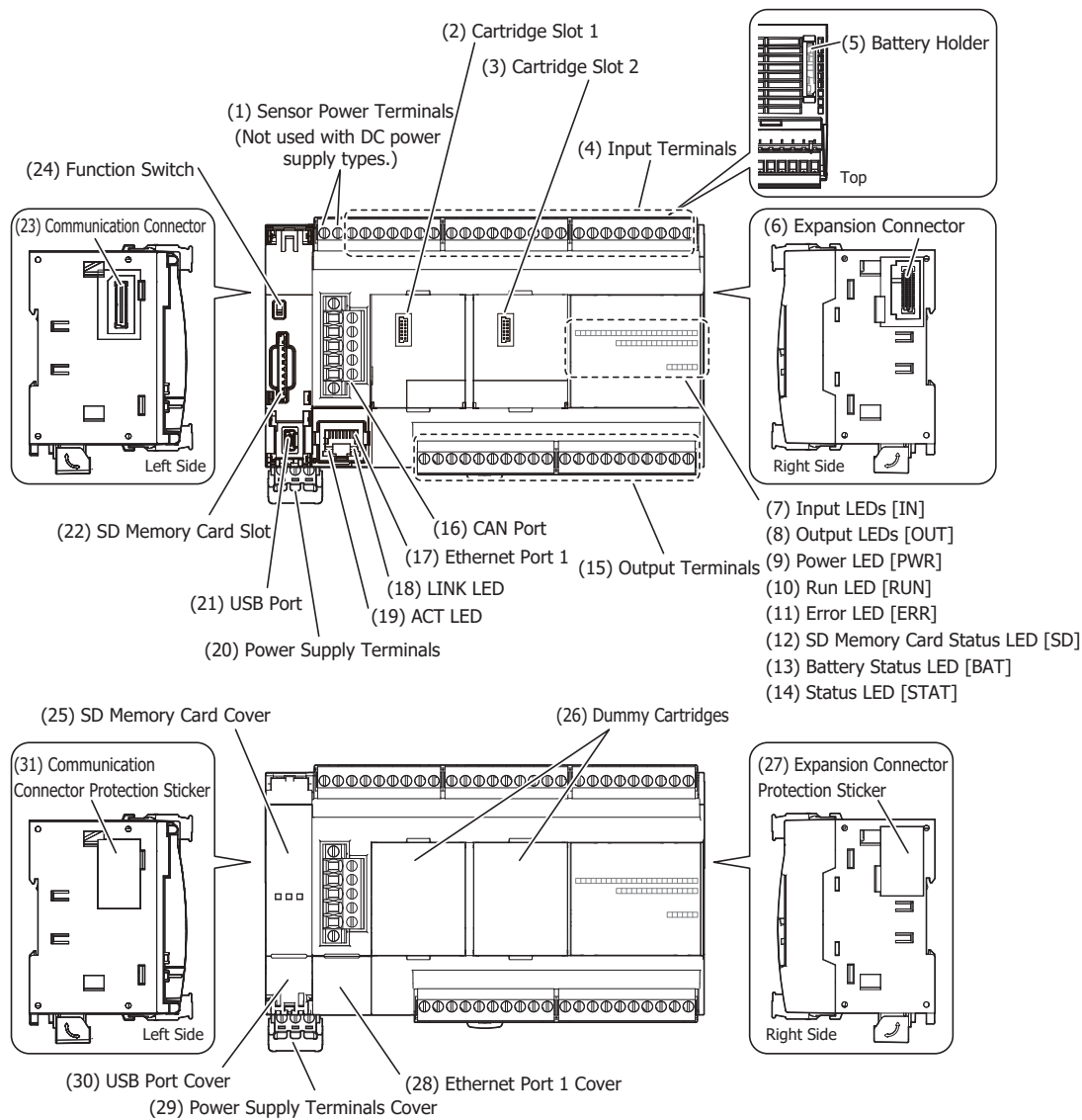
An openable cover that protects the USB port. When using the USB port, open the USB port cover.

**(35) Communication Connector Protection Sticker**

This sticker protects the communication connector. Remove the communication connector protection sticker when connecting the HMI module.

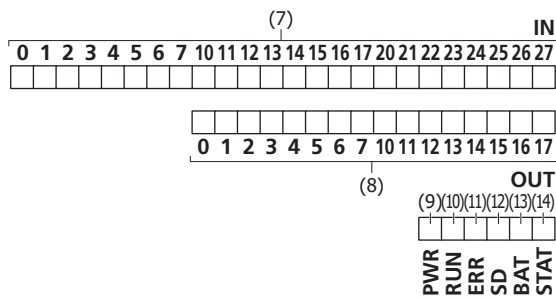
**■ CAN J1939 All-in-One CPU module**

Example: FC6A-C40R1AEJ



The content in brackets is the LED indicator name on the FC6A.

LED Indicators



- (1) Sensor power terminals (AC power type only)**  
These terminals supply DC power (24V DC, 250 mA) for a sensor (can also be used as a power supply for inputs).  
The DC power type does not use these terminals.
- (2) Cartridge Slot 1**  
This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.
- (3) Cartridge Slot 2**  
This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

**(4) Input Terminals**

These terminals connect input devices such as push buttons and limit switches. DC inputs are both sinks and sources.

**(5) Battery Holder**

This holder is for installing the backup battery.

**(6) Expansion Connector**

This connector is used to connect expansion modules.

**(7) Input LEDs [IN]**

These LEDs turn on when an input is on. The LED with the corresponding number turns on.

**(8) Output LEDs [OUT]**

These LEDs turn on when an output is on. The LED with the corresponding number turns on.

**(9) Power LED [PWR]**

This LED turns on when the power is supplied to the CPU module.

**(10) Run LED [RUN]**

This LED turns on while the CPU module is running the user program.

This LED flashes when using certain functions while the user program is running.

| LED                           | Status   |
|-------------------------------|--|
| ON                            | <ul style="list-style-type: none"> <li>While the CPU module is running the user program</li> </ul>   |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"> <li>When executing the forced I/O function while the user program is running</li> </ul>   |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"> <li>While the CPU module is in USB boot.</li> <li>When executing the forced I/O function while the user program is stopped</li> </ul> |

**(11) Error LED [ERR]**

This LED turns on when an error occurs in the CPU module.

**(12) SD Memory Card Status LED [SD]**

This LED turns on or flashes when the SD memory card is being read or written.

| LED                           | Status  |
|-------------------------------|---|
| OFF                           | <ul style="list-style-type: none"> <li>When the SD memory card is not inserted</li> <li>When an unsupported or unformatted SD memory card was inserted</li> <li>Unmount SD memory card (M8072) is on, so the SD memory card has been unmounted</li> <li>When the FC6A power is off</li> </ul> |
| ON                            | <ul style="list-style-type: none"> <li>The standby state where the SD memory card can be written or read</li> </ul>   |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"> <li>When the FC6A is recognizing the SD memory card</li> <li>Unmount SD memory card (M8072) is turned on and the FC6A is unmounting the SD memory card (slow flashing, then off)</li> </ul>  |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"> <li>Reading or writing the SD memory card</li> </ul>   |

**(13) Battery Status LED [BAT]**

This LED turns on or flashes when the remaining voltage in the backup battery is low.

| LED                  | Condition                                    | Battery Status |  |
|----------------------|--|----------------|--|
| Off                  | Battery voltage (D8056) > 2,300              | Normal         | Sufficient battery level.                  |
| Flashing (1 s cycle) | $2,300 \geq$ battery voltage (D8056) > 2,000 | Warning        | Low battery level. Replace the battery.    |
| On                   | $2,000 \geq$ battery voltage (D8056)         | Dead battery   | The battery is almost dead. Or no battery. |

**(14) Status LED [STAT]**

This LED can be turned on or off in the user program.

**(15) Output Terminals**

These terminals connect output devices such as electromagnetic switches and solenoid valves. The CPU module is available in the relay output type (240V AC: 2 A, 30V DC: 2 A), the transistor sink output type (0.5 A), and the transistor protection source output type (0.5 A).

**(16) CAN Port**

This port allows J1939 communication.

**(17) Ethernet Port 1**

This port allows Ethernet communication with connected devices that are equipped with an Ethernet interface.

### (18) LINK LED

This LED is on when a network-compatible device is connected to Ethernet Port 1.

### (19) ACT LED

This LED flashes when sending or receiving data while the LINK LED is on.

### (20) Power Supply Terminals

These terminals are used to supply power to the CPU module.

The AC power type uses an AC power supply (100 to 240 V).

The DC power type is available as the 24V DC power type and the 12V DC power type.

### (21) USB Port

A mini-B type USB 2.0 connector. A USB cable can be attached to the FC6A and connected to a PC to download and upload user programs using WindLDR.

### (22) SD Memory Card Slot

This slot is for inserting the SD memory card. This slot is for inserting the SD memory card. The SD memory card allows for data logs using the DLOG/TRACE instructions, reading and writing device data, downloads from the SD memory card (user program, system software, web page), and uploads to the SD memory card.

### (23) Communication connector

This connector is used to connect the HMI module.

### (24) Function Switch

This switch turns M8073 on or off (default setting: 0 (off)).

You can run or stop the CPU module with this switch by enabling **Run/Stop PLC by Function Switch** in WindLDR (default setting: enabled).

For details on the function switch, see "Function Switch Configuration" on page 5-10.

### (25) SD Memory Card Cover

An openable cover that protects the SD memory card and function switch. Open the SD memory card cover when inserting or ejecting the SD memory card and when using the function switch.

### (26) Dummy Cartridges

Removable dummy cartridges that protect the cartridge slots. Remove the dummy cartridge when connecting a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

### (27) Expansion Connector Protection Sticker

This sticker protects the expansion connector. Remove the expansion connector protection sticker when connecting an expansion module.

### (28) Ethernet Port 1 Cover

A removable cover that protects Ethernet Port 1. When using the Ethernet port, remove the Ethernet Port 1 cover.

### (29) Power Supply Terminals Cover

An openable cover that protects the power supply terminals. Remove the dummy cartridge when connecting a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

#### Note:

The push-in type does not have the power supply terminals cover. The type numbers of the push-in type of CAN J1939 All-in-One CPU module are as follows.

FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ

### (30) USB Port Cover

An openable cover that protects the USB port. When using the USB port, open the USB port cover.

### (31) Communication Connector Protection Sticker

This sticker protects the communication connector. Remove the communication connector protection sticker when connecting the HMI module.



## Power Supply Specifications

## ■ AC Power Type

| Type No.                                   | FC6A-C16R1AE, FC6A-C16R4AE, FC6A-C24R1AE, FC6A-C24R4AE, FC6A-C40R1AE, FC6A-C40R4AE, FC6A-C40R1AEJ, FC6A-C40R4AEJ |                                |
|--|--|--------------------------------|
| Rated Operating Voltage                    | 100 to 240V AC   |                                |
| Voltage Fluctuation Range                  | 85 to 264V AC  |                                |
| Rated Power Frequency                      | 50/60 Hz (47 to 63 Hz)   |                                |
| Maximum Power Consumption                  | Standalone   | When Maximum Load is Connected |
| FC6A-C16R1AE                               | 33 VA  | 54 VA                          |
| FC6A-C16R4AE                               | 33 VA  | 54 VA                          |
| FC6A-C24R1AE                               | 35 VA  | 61 VA                          |
| FC6A-C24R4AE                               | 35 VA  | 61 VA                          |
| FC6A-C40R1AE                               | 41 VA  | 74 VA                          |
| FC6A-C40R4AE                               | 41 VA  | 74 VA                          |
| FC6A-C40R1AEJ                              | 37 VA  | 74 VA                          |
| FC6A-C40R4AEJ                              | 37 VA  | 74 VA                          |
| Allowable Momentary Power Interruption     | 10 ms or longer (when rated power supply voltage)  |                                |
| Withstand Voltage                          | Between power and PE terminals: 1,500V AC, 1 minute  |                                |
|  | Between input and PE terminals: 1,500V AC, 1 minute  |                                |
|  | Between relay output and PE terminals: 2,300V AC, 1 minute   |                                |
|  | Between power and input terminals: 1,500V AC, 1 minute   |                                |
|  | Between power and relay output terminals: 2,300V AC, 1 minute  |                                |
|  | Between input and relay output terminals: 2,300V AC, 1 minute  |                                |
| Insulation Resistance                      | Between power and PE terminals: 100 MΩ or higher (500V DC insulation resistance tester)                          |                                |
|  | Between input and PE terminals: 100 MΩ or higher (500V DC insulation resistance tester)                          |                                |
|  | Between relay output and PE terminals: 100 MΩ or higher (500V DC insulation resistance tester)                   |                                |
|  | Between power and input terminals: 100 MΩ or higher (500V DC insulation resistance tester)                       |                                |
|  | Between power and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)                |                                |
|  | Between input and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)                |                                |
| Inrush Current                             | 40 A maximum   |                                |
| Isolation                                  | Between power terminal and internal circuit: Transformer isolated  |                                |
| Ground                                     | D-type ground (Class 3 ground)   |                                |
| Grounding Wire                             | See "Recommended Ferrule List" on page 3-46  |                                |
| Power Supply Wire                          | See "Recommended Ferrule List" on page 3-46  |                                |
| Effect of Improper Power Supply Connection | Reverse polarity: Normal operation   |                                |
|  | Improper voltage or frequency: Permanent damage may be caused  |                                |
|  | Improper lead connection: Permanent damage may be caused   |                                |
| Weight (approx.)                           | FC6A-C16R1AE   | 370 g                          |
|  | FC6A-C16R4AE   | 370 g                          |
|  | FC6A-C24R1AE   | 420 g                          |
|  | FC6A-C24R4AE   | 420 g                          |
|  | FC6A-C40R1AE   | 560 g                          |
|  | FC6A-C40R4AE   | 565 g                          |
|  | FC6A-C40R1AEJ  | 560 g                          |
|  | FC6A-C40R4AEJ  | 555 g                          |

## 2: PRODUCT SPECIFICATIONS

### ■ 24V DC Power Type

|  |  |                                |
|--|--|--------------------------------|
| Type No.                               | FC6A-C16R1CE, FC6A-C16R4CE, FC6A-C16K1CE, FC6A-C16K4CE, FC6A-C16P1CE, FC6A-C16P4CE, FC6A-C24R1CE, FC6A-C24R4CE, FC6A-C24K1CE, FC6A-C24K4CE, FC6A-C24P1CE, FC6A-C24P4CE, FC6A-C40R1CE, FC6A-C40R4CE, FC6A-C40K1CE, FC6A-C40K4CE, FC6A-C40P1CE, FC6A-C40P4CE, FC6A-C40R1CEJ, FC6A-C40R4CEJ, FC6A-C40K1CEJ, FC6A-C40K4CEJ, FC6A-C40P1CEJ, FC6A-C40P4CEJ |                                |
| Rated Power Voltage                    | 24V DC   |                                |
| Voltage Fluctuation Range              | 20.4 to 28.8V DC (including ripple)  |                                |
| Maximum Power Consumption              | Standalone   | When Maximum Load is Connected |
| FC6A-C16R1CE                           | 3.36 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C16R4CE                           | 3.36 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C16K1CE                           | 4.56 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C16K4CE                           | 4.56 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C16P1CE                           | 4.56 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C16P4CE                           | 4.56 W (24V DC)  | 13.44 W (24V DC)               |
| FC6A-C24R1CE                           | 3.72 W (24V DC)  | 16.32 W (24V DC)               |
| FC6A-C24R4CE                           | 3.72 W (24V DC)  | 16.32 W (24V DC)               |
| FC6A-C24K1CE                           | 4.8 W (24V DC)   | 16.32 W (24V DC)               |
| FC6A-C24K4CE                           | 4.8 W (24V DC)   | 16.32 W (24V DC)               |
| FC6A-C24P1CE                           | 4.8 W (24V DC)   | 16.32 W (24V DC)               |
| FC6A-C24P4CE                           | 4.8 W (24V DC)   | 16.32 W (24V DC)               |
| FC6A-C40R1CE                           | 4.68 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40R4CE                           | 4.68 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40K1CE                           | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40K4CE                           | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40P1CE                           | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40P4CE                           | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40R1CEJ                          | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40R4CEJ                          | 4.92 W (24V DC)  | 21.84 W (24V DC)               |
| FC6A-C40K1CEJ                          | 4.2 W (24V DC)   | 21.84 W (24V DC)               |
| FC6A-C40K4CEJ                          | 4.2 W (24V DC)   | 21.84 W (24V DC)               |
| FC6A-C40P1CEJ                          | 4.2 W (24V DC)   | 21.84 W (24V DC)               |
| FC6A-C40P4CEJ                          | 4.2 W (24V DC)   | 21.84 W (24V DC)               |
| Allowable Momentary Power Interruption | 10 ms or longer (when rated power supply voltage)  |                                |
| Withstand Voltage                      | Between power and FE terminals: 500V AC, 1 minute  |                                |
|  | Between input and FE terminals: 500V AC, 1 minute  |                                |
|  | Between transistor output and FE terminals: 500V AC, 1 minute  |                                |
|  | Between relay output and FE terminals: 2,300V AC, 1 minute   |                                |
|  | Between power and input terminals: 500V AC, 1 minute   |                                |
|  | Between power and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between power and relay output terminals: 2,300V AC, 1 minute  |                                |
|  | Between input and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between input and relay output terminals: 2,300V AC, 1 minute  |                                |
| Insulation Resistance                  | Between power and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between transistor output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between relay output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and input terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
| Inrush Current                         | 35 A maximum   |                                |
| Isolation                              | Between power terminal and internal circuit: Transformer isolated  |                                |

|   |                      |   |
|---|----------------------|---|
| <b>Ground</b>                                     |                      | D-type ground (Class 3 ground)                                |
| <b>Grounding Wire</b>                             |                      | See "Recommended Ferrule List" on page 3-46                   |
| <b>Power Supply Wire</b>                          |                      | See "Recommended Ferrule List" on page 3-46                   |
| <b>Effect of Improper Power Supply Connection</b> |                      | Reverse polarity: Normal operation                            |
|   |                      | Improper voltage or frequency: Permanent damage may be caused |
|   |                      | Improper lead connection: Permanent damage may be caused      |
| <b>Weight<br/>(approx.)</b>                       | <b>FC6A-C16R1CE</b>  | 360 g   |
|   | <b>FC6A-C16R4CE</b>  | 360 g   |
|   | <b>FC6A-C16K1CE</b>  | 340 g   |
|   | <b>FC6A-C16K4CE</b>  | 340 g   |
|   | <b>FC6A-C16P1CE</b>  | 340 g   |
|   | <b>FC6A-C16P4CE</b>  | 340 g   |
|   | <b>FC6A-C24R1CE</b>  | 400 g   |
|   | <b>FC6A-C24R4CE</b>  | 400 g   |
|   | <b>FC6A-C24K1CE</b>  | 380 g   |
|   | <b>FC6A-C24K4CE</b>  | 380 g   |
|   | <b>FC6A-C24P1CE</b>  | 380 g   |
|   | <b>FC6A-C24P4CE</b>  | 380 g   |
|   | <b>FC6A-C40R1CE</b>  | 530 g   |
|   | <b>FC6A-C40R4CE</b>  | 535 g   |
|   | <b>FC6A-C40K1CE</b>  | 480 g   |
|   | <b>FC6A-C40K4CE</b>  | 485 g   |
|   | <b>FC6A-C40P1CE</b>  | 480 g   |
|   | <b>FC6A-C40P4CE</b>  | 485 g   |
|   | <b>FC6A-C40R1CEJ</b> | 530 g   |
|   | <b>FC6A-C40R4CEJ</b> | 525 g   |
|   | <b>FC6A-C40K1CEJ</b> | 480 g   |
|   | <b>FC6A-C40K4CEJ</b> | 475 g   |
|   | <b>FC6A-C40P1CEJ</b> | 480 g   |
|   | <b>FC6A-C40P4CEJ</b> | 475 g   |

## 2: PRODUCT SPECIFICATIONS

### ■ 12V DC Power Type

|  |  |                                |
|--|--|--------------------------------|
| Type No.                                   | FC6A-C16R1DE, FC6A-C16R4DE, FC6A-C16K1DE, FC6A-C16K4DE, FC6A-C16P1DE, FC6A-C16P4DE, FC6A-C40R1DE, FC6A-C40R4DE, FC6A-C40K1DE, FC6A-C40K4DE, FC6A-C40P1DE, FC6A-C40P4DE, FC6A-C40R1DEJ, FC6A-C40R4DEJ, FC6A-C40K1DEJ, FC6A-C40K4DEJ, FC6A-C40P1DEJ, FC6A-C40P4DEJ |                                |
| Rated Power Voltage                        | 12V DC   |                                |
| Voltage Fluctuation Range                  | 10.2 to 18V DC (including ripple)  |                                |
| Maximum Power Consumption                  | Standalone   | When Maximum Load is Connected |
| FC6A-C16R1DE                               | 3.24 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C16R4DE                               | 3.24 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C16K1DE                               | 3.00 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C16K4DE                               | 3.00 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C16P1DE                               | 3.12 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C16P4DE                               | 3.12 W (12V DC)  | 12.00 W (12V DC)               |
| FC6A-C40R1DE                               | 4.14 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40R4DE                               | 4.14 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40K1DE                               | 3.12 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40K4DE                               | 3.12 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40P1DE                               | 3.12 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40P4DE                               | 3.12 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40R1DEJ                              | 4.08 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40R4DEJ                              | 4.08 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40K1DEJ                              | 3.84 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40K4DEJ                              | 3.84 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40P1DEJ                              | 3.84 W (12V DC)  | 23.28 W (12V DC)               |
| FC6A-C40P4DEJ                              | 3.84 W (12V DC)  | 23.28 W (12V DC)               |
| Allowable Momentary Power Interruption     | 10 ms or longer (when rated power supply voltage)  |                                |
| Withstand Voltage                          | Between power and FE terminals: 500V AC, 1 minute  |                                |
|  | Between input and FE terminals: 500V AC, 1 minute  |                                |
|  | Between transistor output and FE terminals: 500V AC, 1 minute  |                                |
|  | Between relay output and FE terminals: 2,300V AC, 1 minute   |                                |
|  | Between power and input terminals: 500V AC, 1 minute   |                                |
|  | Between power and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between power and relay output terminals: 2,300V AC, 1 minute  |                                |
|  | Between input and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between input and relay output terminals: 2,300V AC, 1 minute  |                                |
| Insulation Resistance                      | Between power and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between transistor output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between relay output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and input terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between input and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
| Inrush Current                             | 35 A maximum   |                                |
| Isolation                                  | Between power terminal and internal circuit: Transformer isolated  |                                |
| Ground                                     | D-type ground (Class 3 ground)   |                                |
| Grounding Wire                             | See "Recommended Ferrule List" on page 3-46  |                                |
| Power Supply Wire                          | See "Recommended Ferrule List" on page 3-46  |                                |
| Effect of Improper Power Supply Connection | Reverse polarity: Normal operation   |                                |
|  | Improper voltage or frequency: Permanent damage may be caused  |                                |
|  | Improper lead connection: Permanent damage may be caused   |                                |

|                             |                      |       |
|-----------------------------|----------------------|-------|
| <b>Weight<br/>(approx.)</b> | <b>FC6A-C16R1DE</b>  | 350 g |
|                             | <b>FC6A-C16R4DE</b>  | 350 g |
|                             | <b>FC6A-C16K1DE</b>  | 340 g |
|                             | <b>FC6A-C16K4DE</b>  | 340 g |
|                             | <b>FC6A-C16P1DE</b>  | 340 g |
|                             | <b>FC6A-C16P4DE</b>  | 340 g |
|                             | <b>FC6A-C40R1DE</b>  | 560 g |
|                             | <b>FC6A-C40R4DE</b>  | 565 g |
|                             | <b>FC6A-C40K1DE</b>  | 530 g |
|                             | <b>FC6A-C40K4DE</b>  | 535 g |
|                             | <b>FC6A-C40P1DE</b>  | 530 g |
|                             | <b>FC6A-C40P4DE</b>  | 535 g |
|                             | <b>FC6A-C40R1DEJ</b> | 560 g |
|                             | <b>FC6A-C40R4DEJ</b> | 555 g |
|                             | <b>FC6A-C40K1DEJ</b> | 530 g |
|                             | <b>FC6A-C40K4DEJ</b> | 525 g |
|                             | <b>FC6A-C40P1DEJ</b> | 530 g |
|                             | <b>FC6A-C40P4DEJ</b> | 525 g |

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

#### ■ CPU Module Performance

|                                  |  |  |                        |  |  |              |     |   |    |               |  |
|----------------------------------|--|--|------------------------|--|--|--------------|-----|---|----|---------------|--|
| Type No.                         |  |  | FC6A-C16R1AE           |  | FC6A-C24R1AE<br>FC6A-C24R4AE<br>FC6A-C24R1CE<br>FC6A-C24R4CE<br>FC6A-C24K1CE<br>FC6A-C24K4CE<br>FC6A-C24P1CE<br>FC6A-C24P4CE | FC6A-C40R1AE |     | FC6A-C40R1AEJ   |    |               |  |
|                                  |  |  | FC6A-C16R4AE           |  |  | FC6A-C40R4AE |     | FC6A-C40R4AEJ   |    |               |  |
|                                  |  |  | FC6A-C16R1CE           |  |  | FC6A-C40R1CE |     | FC6A-C40R1CEJ   |    |               |  |
|                                  |  |  | FC6A-C16R4CE           |  |  | FC6A-C40R4CE |     | FC6A-C40R4CEJ   |    |               |  |
|                                  |  |  | FC6A-C16K1CE           |  |  | FC6A-C40K1CE |     | FC6A-C40K1CEJ   |    |               |  |
|                                  |  |  | FC6A-C16K4CE           |  |  | FC6A-C40K4CE |     | FC6A-C40K4CEJ   |    |               |  |
|                                  |  |  | FC6A-C16P1CE           |  |  | FC6A-C40P1CE |     | FC6A-C40P1CEJ   |    |               |  |
|                                  |  |  | FC6A-C16P4CE           |  |  | FC6A-C40P4CE |     | FC6A-C40P4CEJ   |    |               |  |
|                                  |  |  | FC6A-C16R1DE           |  |  | FC6A-C40R1DE |     | FC6A-C40R1DEJ   |    |               |  |
|                                  |  |  | FC6A-C16R4DE           |  |  | FC6A-C40R4DE |     | FC6A-C40R4DEJ   |    |               |  |
|                                  |  |  | FC6A-C16K1DE           |  |  | FC6A-C40K1DE |     | FC6A-C40K1DEJ   |    |               |  |
|                                  |  |  | FC6A-C16K4DE           |  |  | FC6A-C40K4DE |     | FC6A-C40K4DEJ   |    |               |  |
|                                  |  |  | FC6A-C16P1DE           |  |  | FC6A-C40P1DE |     | FC6A-C40P1DEJ   |    |               |  |
|                                  |  |  | FC6A-C16P4DE           |  |  | FC6A-C40P4DE |     | FC6A-C40P4DEJ   |    |               |  |
| Program Capacity*1               |  |  | Program Data           |  | 72,000 bytes<br>(9,000 steps)<br>* Writable during run-time  |              |     |   |    |               |  |
|                                  |  |  |                        |  | 384,000 bytes<br>(48,000 steps)<br>* Not writable during run-time  |              |     | 640,000 bytes<br>(80,000 steps)<br>* Not writable during run-time |    |               |  |
|                                  |  |  | Comment Data           |  | 256,000 bytes  |              |     |   |    | 256,000 bytes |  |
| I/O Expansion                    |  |  | Basic Expansion        |  | 4  | 7            | 7   | 7   |    |               |  |
|                                  |  |  | Expansion Interface    |  | 8  | 8            | 8   | 8   |    |               |  |
|                                  |  |  | Cartridges*2 *3        |  | 2  | 2            | 3   | 3   |    |               |  |
| I/O Points                       |  |  | Basic                  |  | Input  |              | 9   | 14  | 24 | 24            |  |
|                                  |  |  |                        |  | Output   |              | 7   | 10  | 16 | 16            |  |
|                                  |  |  | Basic Expansion *4     |  | 128  | 224          | 224 | 224   |    |               |  |
|                                  |  |  | Expansion Interface *5 |  | 256  | 256          | 256 | 256   |    |               |  |
|                                  |  |  | Cartridges*2 *3        |  | 8  | 8            | 12  | 12  |    |               |  |
| User Program Download            |  |  | 1,000 times            |  |  |              |     |   |    |               |  |
| Control System                   |  |  | Stored program system  |  |  |              |     |   |    |               |  |
| Instructions                     |  |  | Basic Instructions     |  | 42 types   |              |     |   |    |               |  |
|                                  |  |  | Advanced Instructions  |  | 129 types  |              |     |   |    |               |  |
| Processing Speed                 |  |  | Basic Instruction      |  | 0.042 ms/1,000 steps   |              |     |   |    |               |  |
|                                  |  |  | END Processing         |  | 1 ms   |              |     |   |    |               |  |
| Internal Relay                   |  |  | 12,400                 |  |  |              |     |   |    |               |  |
| Shift Register                   |  |  | 256                    |  |  |              |     |   |    |               |  |
| Data Register                    |  |  | 54,000                 |  |  |              |     |   |    |               |  |
| Counter (adding, reversible)     |  |  | 512                    |  |  |              |     |   |    |               |  |
| Timer (1 ms, 10 ms, 100 ms, 1 s) |  |  | 1,024                  |  |  |              |     |   |    |               |  |

\*1 1 step is equivalent to 8 bytes.

\*2 As given below, certain digital I/O cartridges cannot be used in cartridge slot 3 depending on the configuration of expansion modules.

#### Limitations on Using Digital I/O Cartridges

| Configuration of Expansion Modules | Digital I/O Cartridges That Cannot Be Used in Cartridge Slot 3 |
|------------------------------------|--|
| FC6A-N32B3×15                      | FC6A-PN4   |
| FC6A-T32K3 and FC6A-T32P3×15       | FC6A-PTK4, FC6A-PTS4   |

\*3 A maximum of two or three cartridges can be used by connecting the HMI module.

\*4 There are limitations on the maximum number of outputs that can be simultaneously turned on.  
For details, see "Connection Restrictions When Expanding the PLC" on page 3-37.

\*5 The maximum number of expansion modules that can be connected can be increased by using the expansion interface module. For details, see "Expansion Interface Modules" on page 2-143.

**Backup Function**

|                       |  |
|-----------------------|--|
| <b>Backup Data</b>    | RAM (internal relays, shift registers, counters, data registers)* <sup>1</sup> , clock   |
| <b>Backup Battery</b> | Lithium ion primary cell (A battery is included with the product. The model of battery to be included with the product cannot be specified.)<br>Panasonic: BR2032/CR2032A/CR2032B, Murata: CR2032X/CR2032W |
| <b>Battery Life</b>   | Guaranteed 1 year, replacement recommended every 4 years (+25°C)* <sup>2</sup>   |
| <b>Replaceability</b> | Replace within 1 minute after power off (recommended)* <sup>3</sup>  |

\*1 To prepare for when the battery dies, the contents of RAM (internal relays, shift registers, counters, and data registers) can be saved to non-volatile memory. For how to save the contents of RAM, see "SD Memory Card" on page 11-1.

\*2 The battery is primarily consumed by backup current while unpowered. However, the ambient environment (temperature and humidity) while unpowered and powered also affects consumption. In particular, battery life is greatly reduced in a high-temperature and high-humidity environment, so replacement is recommended every year when the effect of the ambient environment (temperature and humidity) while unpowered and powered is included.

\*3 Replacement while powered and replacement while power is supplied from the USB bus are also possible. For the replacement method, see "Replacing the Backup Battery" on page 3-34.

**Clock Function**

|                 |                           |
|-----------------|---------------------------|
| <b>Accuracy</b> | ±30 seconds/month at 25°C |
|-----------------|---------------------------|

**Self-diagnostic Functions**

- Keep data
- User program (ROM) CRC check
- Timer/counter preset value change check
- User program syntax check
- User program execution check
- Watchdog timer check
- User program download check
- Power failure detection
- Clock error
- Data link connection check
- Expansion bus initialization check
- System check
- SD memory card transfer check
- SD memory card access check

**Input Filter**

0 ms (no filter), 3 to 15 ms selectable (in 1 ms increments)

**Catch Input/Interrupt Input**

|   |                               |            |
|---|-------------------------------|------------|
| <b>High-speed 4 Points (I0, I1, I6, I7)</b> | Minimum turn on pulse width:  | 5 $\mu$ s  |
|   | Minimum turn off pulse width: | 5 $\mu$ s  |
| <b>Medium-speed 2 Points (I3, I4)</b>       | Minimum turn on pulse width:  | 35 $\mu$ s |
|   | Minimum turn off pulse width: | 35 $\mu$ s |

**High-speed Counter**

|   |  |   |
|---|--|---|
| <b>Maximum Counter Frequency and Points</b> | Single-phase, two-phase common:                                      | 100 kHz (single-phase 4 points max, two-phase 2 points max) |
|   | Single-phase dedicated:  | 5 kHz (2 points)  |
| <b>Count Range</b>                          | Single-phase, two-phase common:                                      | 0 to 4,294,967,295 (32 bits)                                |
|   | Single-phase dedicated:  | 0 to 4,294,967,295 (32 bits)                                |
| <b>Operation Mode</b>                       | Rotary encoder mode, adding counter mode, frequency measurement mode |   |

## 2: PRODUCT SPECIFICATIONS

### Pulse Output (Transistor Output Type Only)

| Part No.                       | FC6A-C16K1CE<br>FC6A-C16K4CE<br>FC6A-C16P1CE<br>FC6A-C16P4CE<br>FC6A-C16K1DE<br>FC6A-C16K4DE<br>FC6A-C16P1DE<br>FC6A-C16P4DE  | FC6A-C24K1CE<br>FC6A-C24K4CE<br>FC6A-C24P1CE<br>FC6A-C24P4CE | FC6A-C40K1CE<br>FC6A-C40K4CE<br>FC6A-C40P1CE<br>FC6A-C40P4CE<br>FC6A-C40K1DE<br>FC6A-C40K4DE<br>FC6A-C40P1DE<br>FC6A-C40P4DE   | FC6A-C40K1CEJ<br>FC6A-C40K4CEJ<br>FC6A-C40P1CEJ<br>FC6A-C40P4CEJ<br>FC6A-C40K1DEJ<br>FC6A-C40K4DEJ<br>FC6A-C40P1DEJ<br>FC6A-C40P4DEJ |
|--------------------------------|---|--|--|--|
| Points                         | 4   |  |  |  |
| Maximum output pulse frequency | Q0,Q1: 100kHz<br>Q2,Q3: 5kHz  |  | Q0,Q2,Q4,Q6: 100kHz  |  |
| Reversible control             | Single-pulse output mode: 2axis (Q0-Q3)<br>Dual-pulse output mode: 1axis (Q0-Q1)  |  | Single-pulse output mode: 4axis (Q0-Q7)<br>Dual-pulse output mode: 4axis (Q0-Q7)   |  |
| PWM output                     | Duty cycle: 0.1 to 100.0 (increments of 0.1%)<br>Output pulse frequency: 15 to 5,000 (increments of 1Hz)<br>: 4 points(Q0-Q3)<br>*Q0,Q1:Adjust min. 5μs as ON time, and min. 15μs as OFF time.<br>*Q2,Q3:Adjust min. 100μs as ON/OFF time . |  | Duty cycle: 0.1 to 100.0 (increments of 0.1%)<br>Output pulse frequency: 15 to 5,000 (increments of 1Hz)<br>: 4 points(Q0,Q2,Q4,Q6)<br>*Adjust min. 5μs as ON time, and min. 15μs as OFF time. |  |

### Function Switch

|          |   |
|----------|---|
| Points   | 1 (2 position slide switch)   |
| Function | Program run/stop<br>The function can be set in the function area settings (default setting: enabled). |

### Run/Stop Methods

- Power on/off
- WindLDR RUN/STOP command
- Function switch operation
- Special internal relay (M8000) operation
- Operation of stop input and reset input

### Sensor External Output Power (AC Power Type Only)\*1

|                                    |   |
|------------------------------------|---|
| Type No.                           | FC6A-C16R1AE, FC6A-C16R4AE, FC6A-C24R1AE, FC6A-C24R4AE, FC6A-C40R1AE, FC6A-C40R4AE, FC6A-C40R1AEJ, FC6A-C40R4AEJ            |
| Output Voltage/Current             | 24 V (+10%, -15%)/250 mA (however, capacitive load is 2,500 μF or lower)  |
| Overload Detection                 | Not possible (an overcurrent protection circuit is built in, but there is a risk of damage from a long term short circuit.) |
| Isolation between Internal Circuit | Isolated  |

\*1 When the FC6A is used in expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C), sensor external output power cannot be used.

### USB Port

|  |   |
|--|---|
| Points   | 1   |
| Communication Type                             | USB2.0 Full speed, CDC class  |
| Communication Functions                        | Capable of maintenance communication with a PC                                      |
| Connector                                      | USB mini-B  |
| Isolation between Internal Circuit             | Not isolated  |
| Available Function when FC6A is Powered by USB | Downloading/uploading user programs, downloading system software, data file manager |



**Ethernet Port 1**

|   |   |
|---|---|
| <b>Points</b>                             | 1<br>(When the HMI module is connected, this can be expanded by 1 point with the Ethernet port that has the web server function.) |
| <b>Communication Type</b>                 | IEEE 802.3 compliant  |
| <b>Communication Speed</b>                | 10BASE-T, 100BASE-TX  |
| <b>Number of Connections</b>              | 8   |
| <b>Communication Functions</b>            | Maintenance communication, user communication, Modbus TCP server/client, MC protocol client                                       |
| <b>Connector</b>                          | RJ45 (Auto MDI/MDI-X compatible)  |
| <b>Cable</b>                              | CAT 5 or higher, STP  |
| <b>Maximum Cable Length</b>               | 100 m   |
| <b>Isolation between Internal Circuit</b> | Pulse transformer isolated  |

**SD Memory Card Slot**

|                                     |  |
|-------------------------------------|--|
| <b>Points</b>                       | 1  |
| <b>Supported SD Card</b>            | SD memory cards (max 2 GB), SDHC memory cards (max 32 GB)                                  |
| <b>File System</b>                  | FAT16, FAT32   |
| <b>Function</b>                     | Downloading/uploading user programs, saving log data, recipes, downloading system software |
| <b>Insertion/Removal Durability</b> | 2,000 times  |

**Cartridge Slots**

|          |                                     |  |  |  |  |   |
|----------|-------------------------------------|--|--|--|--|---|
| Type No. |                                     | FC6A-C16R1AE<br>FC6A-C16R4AE<br>FC6A-C16R1CE<br>FC6A-C16R4CE<br>FC6A-C16K1CE<br>FC6A-C16K4CE<br>FC6A-C16P1CE<br>FC6A-C16P4CE<br>FC6A-C16R1DE<br>FC6A-C16R4DE<br>FC6A-C16K1DE<br>FC6A-C16K4DE<br>FC6A-C16P1DE<br>FC6A-C16P4DE | FC6A-C24R1AE<br>FC6A-C24R4AE<br>FC6A-C24R1CE<br>FC6A-C24R4CE<br>FC6A-C24K1CE<br>FC6A-C24K4CE<br>FC6A-C24P1CE<br>FC6A-C24P4CE | FC6A-C40R1AE<br>FC6A-C40R4AE<br>FC6A-C40R1CE<br>FC6A-C40R4CE<br>FC6A-C40K1CE<br>FC6A-C40K4CE<br>FC6A-C40P1CE<br>FC6A-C40P4CE<br>FC6A-C40R1DE<br>FC6A-C40R4DE<br>FC6A-C40K1DE<br>FC6A-C40K4DE<br>FC6A-C40P1DE<br>FC6A-C40P4DE | FC6A-C40R1AEJ<br>FC6A-C40R4AEJ<br>FC6A-C40R1CEJ<br>FC6A-C40R4CEJ<br>FC6A-C40K1CEJ<br>FC6A-C40K4CEJ<br>FC6A-C40P1CEJ<br>FC6A-C40P4CEJ<br>FC6A-C40R1DEJ<br>FC6A-C40R4DEJ<br>FC6A-C40K1DEJ<br>FC6A-C40K4DEJ<br>FC6A-C40P1DEJ<br>FC6A-C40P4DEJ |   |
|          | Cartridge Connections* <sup>1</sup> | Slots  | 1  | 1  | 2  | 2 |

When the HMI module is connected, the analog I/O cartridge or the digital I/O cartridge can be expanded.

\*1 All devices that are connectable to the cartridge slots cannot be used in expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C). Do not connect these devices when the product is used in expanded ambient operating temperatures.

**Communication Connector**

|                                |              |   |
|--------------------------------|--------------|---|
| <b>HMI Module Connection*1</b> | <b>Slots</b> | 1 |
|--------------------------------|--------------|---|

\*1 All devices that are connectable to the communication connector cannot be used in expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C). Do not connect these devices when the product is used in expanded ambient operating temperatures.

## 2: PRODUCT SPECIFICATIONS

### ■ All-in-One CPU Module Only

#### Analog Potentiometer

|                 |            |
|-----------------|------------|
| Points          | 1          |
| Data Resolution | 0 to 1,000 |

#### Analog Input

|                             |  |
|-----------------------------|--|
| Points                      | 1  |
| Input Range                 | 0 to 10 V  |
| Data Resolution             | 0 to 1,000   |
| Input Impedance             | Approx. 100 k $\Omega$   |
| Error                       | $\pm 1\%$ of full scale ( $\pm 5\%$ of full scale when noise is applied) |
| Input Delay Time            | 12 ms (including the software filter)                                    |
| Maximum Allowed Steady Load | 13 V   |
| Isolation                   | Not isolated   |
| Cable                       | Unshielded cable 1 m (included with the product)                         |

#### Serial Port 1

|                                    |   |
|------------------------------------|---|
| Points                             | 1 (ports can be added that are capable of using RS-232C or RS-485 communication by using cartridges.) |
| Communication Type                 | EIA RS-232C or RS-485 software selectable   |
| Maximum Communication Speed        | 115,200 bps   |
| Communication Functions            | Maintenance communication, user communication, Modbus communication, data link communication          |
| Connector                          | RJ45  |
| Cable                              | RS232C: Shielded multicore<br>RS485: Shielded twisted-pair  |
| Maximum Cable Length               | RS-232C: 5 m<br>RS-485 : 200 m  |
| Isolation between Internal Circuit | Not isolated  |

### ■ CAN J1939 All-in-One CPU Module Only

#### CAN Port

|                                    |   |
|------------------------------------|---|
| Points                             | 1   |
| Communication Type                 | CAN bus communication   |
| Communication Speed                | 250 kbps  |
| Communication Functions            | J1939 communication   |
| Connector                          | Push-in type : FC6A-PMSE05<br>Screw fastened type : FC6A-PMTE05                         |
| Cable                              | SAE-J1939-11 : Shielded twisted-pair<br>SAE-J1939-15 : Unshielded twisted-pair          |
| Maximum Cable Length               | SAE-J1939-11 : 40 m, stub 1 m maximum<br>SAE-J1939-15 : 40 m, stub 3 m maximum          |
| Terminating Resistance             | 120 $\Omega$ (0.5 W or higher)  |
| Isolation between Internal Circuit | Power supply: Transformer isolated<br>Signal: Galvanic isolation, photocoupler isolated |

## DC Input Specifications

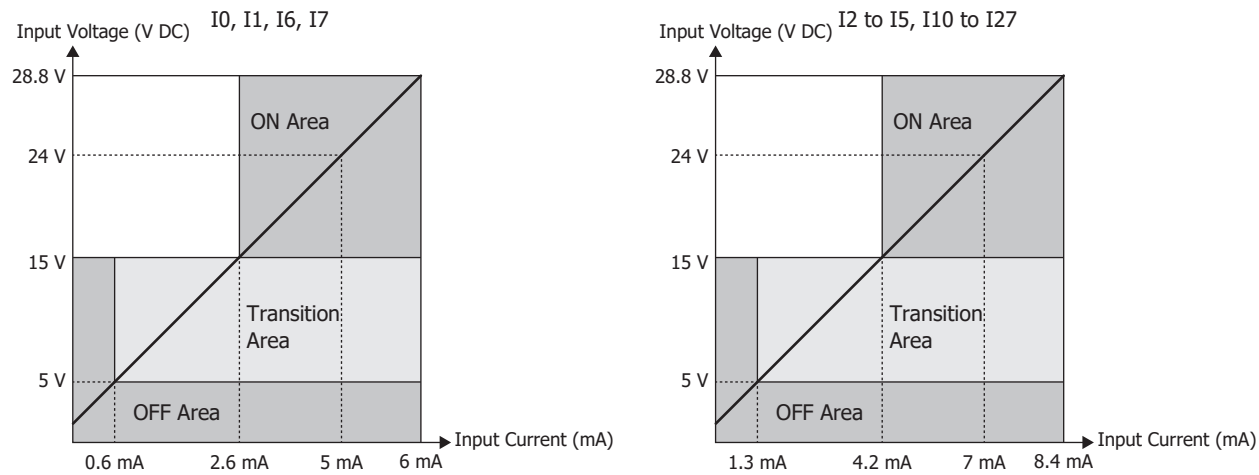
## ■ AC Power Type, 24V DC Power Type

|                                       |                              |   |  |  |
|---------------------------------------|------------------------------|---|--|--|
| Type No.                              |                              | FC6A-C16R1AE<br>FC6A-C16R4AE<br>FC6A-C16R1CE<br>FC6A-C16R4CE<br>FC6A-C16K1CE<br>FC6A-C16K4CE<br>FC6A-C16P1CE<br>FC6A-C16P4CE  | FC6A-C24R1AE<br>FC6A-C24R4AE<br>FC6A-C24R1CE<br>FC6A-C24R4CE<br>FC6A-C24K1CE<br>FC6A-C24K4CE<br>FC6A-C24P1CE<br>FC6A-C24P4CE | FC6A-C40R1AE<br>FC6A-C40R4AE<br>FC6A-C40R1CE<br>FC6A-C40R4CE<br>FC6A-C40K1CE<br>FC6A-C40K4CE<br>FC6A-C40P1CE<br>FC6A-C40P4CE<br>FC6A-C40R1AEJ<br>FC6A-C40R4AEJ<br>FC6A-C40R1CEJ<br>FC6A-C40R4CEJ<br>FC6A-C40K1CEJ<br>FC6A-C40K4CEJ<br>FC6A-C40P1CEJ<br>FC6A-C40P4CEJ |
| Rated Input Voltage                   |                              | 24V DC shared sink/source   |  |  |
| Input Voltage Range                   |                              | 0.0 to 28.8V DC   |  |  |
| Rated Input Current                   | I0, I1, I6, I7               | 5 mA/point (at 24V DC)  |  |  |
|                                       | I2 to I5, I10 to I27         | 7 mA/point (at 24V DC)  |  |  |
| Terminal Arrangement                  |                              | See "AC Power Type" on page 2-34, "24V DC Power Type" on page 2-37  |  |  |
| Input Impedance                       | I0, I1, I6, I7               | 4.9 kΩ  |  |  |
|                                       | I2 to I5, I10 to I27         | 3.4 kΩ  |  |  |
| Input Delay Time                      | Turn ON Time                 | I0, I1, I6, I7  | 5 μs + software filter setting   |  |
|                                       |                              | I2 to I5  | 35 μs + software filter setting  |  |
|                                       |                              | I10 to I27  | 35 μs + software filter setting  |  |
|                                       | Turn OFF Time                | I0, I1, I6, I7  | 5 μs + software filter setting   |  |
|                                       |                              | I2 to I5  | 35 μs + software filter setting  |  |
|                                       |                              | I10 to I27  | 100 μs + software filter setting   |  |
| Input Points                          |                              | 9 points in 1 common line   | 14 points in 1 common line   | 24 points in 1 common line   |
| Isolation                             | Between Input Terminals      | Not isolated  |  |  |
|                                       | Internal Circuit             | Photocoupler isolated   |  |  |
| Input Type                            |                              | Type 1 (IEC61131-2)   |  |  |
| External Load for I/O Interconnection |                              | Not needed  |  |  |
| Signal Determination Method           |                              | Static  |  |  |
| Effect of Improper Input Connection   |                              | Even if wiring for sink or source connection is incorrect, no damages are caused.<br>However, if high voltage is applied that exceeds the input voltage range, there is a risk of permanent damage. |  |  |
| Cable Length                          |                              | 3 m   |  |  |
| I/O Terminal Connector                | Type                         | See "AC Power Type" on page 2-34, "24V DC Power Type" on page 2-37  |  |  |
|                                       | Insertion/Removal Durability | 100 times minimum   |  |  |

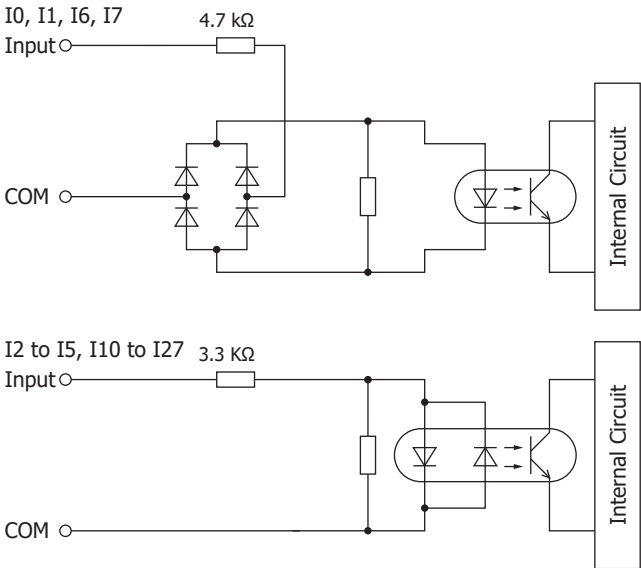
2: PRODUCT SPECIFICATIONS

Operating Ranges

The operating range of Type 1 (IEC 61131-2) DC input modules is as follows.



Input Internal Circuit



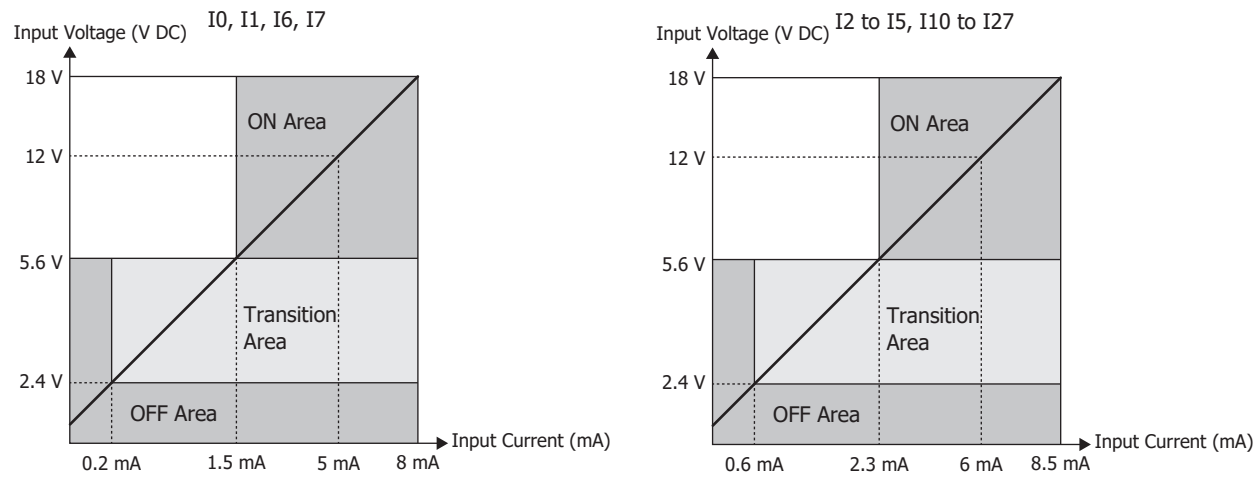
## ■ 12V DC Power Type

|                                       |                              |   |  |  |
|---------------------------------------|------------------------------|---|--|--|
| Type No.                              |                              | FC6A-C16R1DE<br>FC6A-C16R4DE<br>FC6A-C16K1DE<br>FC6A-C16K4DE<br>FC6A-C16P1DE<br>FC6A-C16P4DE  | FC6A-C40R1DE<br>FC6A-C40R4DE<br>FC6A-C40K1DE<br>FC6A-C40K4DE<br>FC6A-C40P1DE<br>FC6A-C40P4DE | FC6A-C40R1DEJ<br>FC6A-C40R4DEJ<br>FC6A-C40K1DEJ<br>FC6A-C40K4DEJ<br>FC6A-C40P1DEJ<br>FC6A-C40P4DEJ |
| Rated Input Voltage                   |                              | 12V DC shared sink/source   |  |  |
| Input Voltage Range                   |                              | 0.0 to 18.0V DC   |  |  |
| Rated Input Current                   | I0, I1, I6, I7               | 5 mA/point (at 12V DC)  |  |  |
|                                       | I2 to I5, I10 to I27         | 6 mA/point (at 12V DC)  |  |  |
| Terminal Arrangement                  |                              | See "12V DC Power Type" on page 2-43  |  |  |
| Input Impedance                       | I0, I1, I6, I7               | 2.0 kΩ  |  |  |
|                                       | I2 to I5, I10 to I27         | 2.0 kΩ  |  |  |
| Input Delay Time                      | Turn ON Time                 | I0, I1, I6, I7  | 5 μs + software filter setting   |  |
|                                       |                              | I2 to I5  | 35 μs + software filter setting  |  |
|                                       |                              | I10 to I27  | 35 μs + software filter setting  |  |
|                                       | Turn OFF Time                | I0, I1, I6, I7  | 5 μs + software filter setting   |  |
|                                       |                              | I2 to I5  | 35 μs + software filter setting  |  |
|                                       |                              | I10 to I27  | 100 μs + software filter setting   |  |
| Input Points                          |                              | 9 points in 1 common line   | 24 points in 1 common line   |  |
| Isolation                             | Between Input Terminals      | Not isolated  |  |  |
|                                       | Internal circuit             | Photocoupler isolated   |  |  |
| Input Type                            |                              | Type 1 (IEC61131-2)   |  |  |
| External Load for I/O Interconnection |                              | Not needed  |  |  |
| Signal Determination Method           |                              | Static  |  |  |
| Effect of Improper Input Connection   |                              | Even if wiring for sink or source connection is incorrect, no damages are caused.<br>However, if high voltage is applied that exceeds the input voltage range, there is a risk of permanent damage. |  |  |
| Cable Length                          |                              | 3 m   |  |  |
| I/O Terminal Connector                | Type                         | See "12V DC Power Type" on page 2-43  |  |  |
|                                       | Insertion/Removal Durability | 100 times minimum   |  |  |

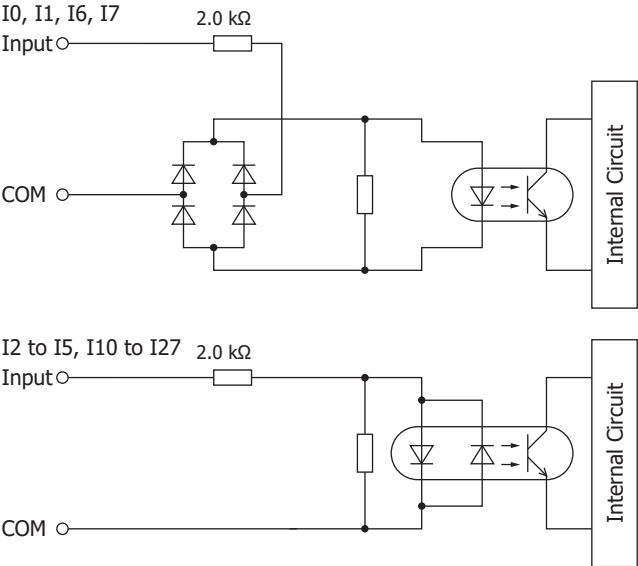
2: PRODUCT SPECIFICATIONS

Operating Ranges

The operating range of Type 1 (IEC 61131-2) DC input modules is as follows.



Input Internal Circuit



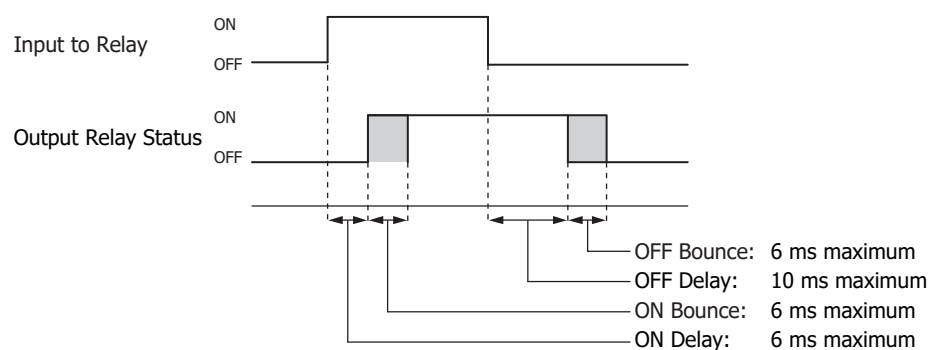
## Relay Output Specifications

## ■ AC Power Type, 24V DC Power Type, 12V DC Power Type

| Type No.                      |  | FC6A-C16R1AE<br>FC6A-C16R4AE<br>FC6A-C16R1CE<br>FC6A-C16R4CE<br>FC6A-C16R1DE<br>FC6A-C16R4DE         | FC6A-C24R1AE<br>FC6A-C24R4AE<br>FC6A-C24R1CE<br>FC6A-C24R4CE | FC6A-C40R1AE<br>FC6A-C40R4AE<br>FC6A-C40R1CE<br>FC6A-C40R4CE<br>FC6A-C40R1DE<br>FC6A-C40R4DE<br>FC6A-C40R1AEJ<br>FC6A-C40R4AEJ<br>FC6A-C40R1CEJ<br>FC6A-C40R4CEJ<br>FC6A-C40R1DEJ<br>FC6A-C40R4DEJ |
|-------------------------------|--|--|--|--|
| No. of Outputs                |  | 7  | 10   | 16   |
| Output Points per Common Line | COM0   | 4  | 4  | 4  |
|                               | COM1   | 3  | 4  | 4  |
|                               | COM2   | —  | 2  | 4  |
|                               | COM3   | —  | —  | 4  |
| Terminal Arrangement          |  | See "AC Power Type" on page 2-34, "24V DC Power Type" on page 2-37, "12V DC Power Type" on page 2-43 |  |  |
| Output Type                   |  | 1a contact   |  |  |
| Maximum Load Current *1       | 1  | 2 A maximum  |  |  |
|                               | 1 Common                                     | 7 A maximum  |  |  |
| Minimum Switching Load        |  | 1.0 mA/5.0V DC (reference value)   |  |  |
| Initial Contact Resistance    |  | 30 mΩ or lower   |  |  |
| Electrical Life               |  | 100,000 operations minimum (rated load 1,800 operations/hour)  |  |  |
| Mechanical Life               |  | 20,000,000 operations minimum (no load 18,000 operations/hour)                                       |  |  |
| Rated Load *1                 |  | 240V AC 2 A, 30V DC 2 A  |  |  |
| Withstand Voltage             | Between Output Terminal and FE               | 2,300V AC 1 minute   |  |  |
|                               | Between Output Terminal and Internal Circuit | 2,300V AC 1 minute   |  |  |
|                               | Between Output Terminals (COMs)              | 2,300V AC 1 minute   |  |  |
| I/O Terminal Connector        | Type   | See "AC Power Type" on page 2-34, "24V DC Power Type" on page 2-37, "12V DC Power Type" on page 2-43 |  |  |
|                               | Insertion/Removal Durability                 | 100 times minimum  |  |  |

\*1 Values for resistive/inductive load.

## Output Delay



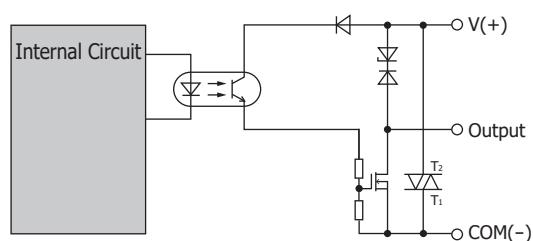
## 2: PRODUCT SPECIFICATIONS

### Transistor Sink Output Specifications

#### ■ 24V DC power type

| Type No.                      |  | FC6A-C16K1CE<br>FC6A-C16K4CE   | FC6A-C24K1CE<br>FC6A-C24K4CE | FC6A-C40K1CE<br>FC6A-C40K4CE | FC6A-C40K1CEJ<br>FC6A-C40K4CEJ                                 |
|-------------------------------|--|--|------------------------------|------------------------------|--|
| No. of Outputs                |  | 7  | 10                           | 16                           |  |
| Output Points per Common Line | COM0   | 7  | 10                           | 8                            |  |
|                               | COM1   | —  | —                            | 8                            |  |
| Rated Load Voltage            |  | 24V DC   |                              |                              |  |
| Operating Load Voltage Range  |  | 20.4 to 28.8V DC   |                              |                              |  |
| Terminal Arrangement          |  | See "24V DC Power Type" on page 2-37   |                              |                              |  |
| Maximum Load Current          | 1  | 0.5 A maximum  |                              |                              |  |
|                               | 1 Common                                     | 3.5 A maximum  | 5 A maximum                  | 4 A maximum                  |  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON   |                              |                              |  |
| Maximum Inrush Current        |  | 1 A  |                              |                              |  |
| Leakage Current               |  | 0.1 mA maximum   |                              |                              |  |
| Clamping Voltage              |  | 39 V $\pm$ 1 V   |                              |                              |  |
| Maximum Lamp Load             |  | 12 W   |                              |                              |  |
| Inductive Load                |  | L/R = 10 ms (28.8V DC, 1 Hz)   |                              |                              |  |
| External Current Draw         |  | 100 mA maximum, 24V DC (+V terminal supply power)  |                              |                              |  |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated  |                              |                              |  |
|                               | Between Output Terminals                     | Not isolated   |                              |                              |  |
| I/O Terminal Connector        | Type   | See "24V DC Power Type" on page 2-37   |                              |                              |  |
|                               | Insertion/Removal Durability                 | 100 times minimum  |                              |                              |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q1: 5 $\mu$ s or less<br>Q2 to Q3: 30 $\mu$ s or less<br>Q4 to Q7, Q10 to Q17: 300 $\mu$ s or less |                              |                              | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |
|                               | Turn OFF Time                                | Q0 to Q1: 5 $\mu$ s or less<br>Q2 to Q3: 30 $\mu$ s or less<br>Q4 to Q7, Q10 to Q17: 300 $\mu$ s or less |                              |                              | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |

### Output Internal Circuit

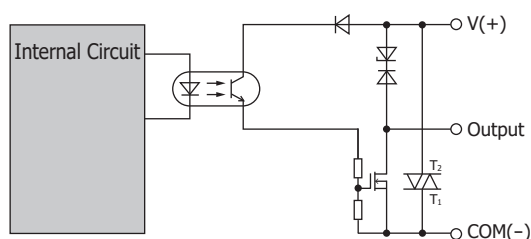




## ■ 12V DC Power Type

| Type No.                      |  | FC6A-C16K1DE<br>FC6A-C16K4DE  | FC6A-C40K1DE<br>FC6A-C40K4DE | FC6A-C40K1DEJ<br>FC6A-C40K4DEJ                       |
|-------------------------------|--|---|------------------------------|--|
| No. of Outputs                |  | 7   | 16                           |  |
| Output Points per Common Line | COM0   | 7   | 8                            |  |
|                               | COM1   | —   | 8                            |  |
| Rated Load Voltage            |  | 12V DC  |                              |  |
| Operating Load Voltage Range  |  | 10.2 to 18.0V DC  |                              | 10.2 to 16.0V DC                                     |
| Terminal Arrangement          |  | See "12V DC Power Type" on page 2-43  |                              |  |
| Maximum Load Current          | 1  | 0.5 A maximum   |                              |  |
|                               | 1 Common                                     | 3.5 A maximum   | 4 A maximum                  |  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON                              |                              |  |
| Maximum Inrush Current        |  | 1 A   |                              |  |
| Leakage Current               |  | 0.1 mA maximum  |                              |  |
| Clamping Voltage              |  | 39 V±1 V  |                              | 27 V±1 V   |
| Maximum Lamp Load             |  | 12 W  |                              |  |
| Inductive Load                |  | L/R = 10 ms (18.0V DC, 1 Hz)  |                              | L/R = 10 ms (16.0V DC, 1 Hz)                         |
| External Current Draw         |  | 100 mA maximum, 12V DC (+V terminal supply power)   |                              |  |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated   |                              |  |
|                               | Between Output Terminals                     | Not isolated  |                              |  |
| I/O Terminal Connector        | Type   | See "12V DC Power Type" on page 2-43  |                              |  |
|                               | Insertion/Removal Durability                 | 100 times minimum   |                              |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |
|                               | Turn OFF Time                                | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |

## Output Internal Circuit



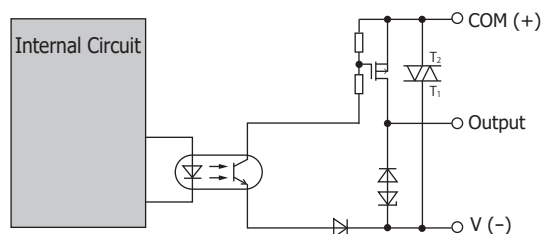
## 2: PRODUCT SPECIFICATIONS

### Transistor Protection Source Output Specifications

#### ■ 24V DC power type

| Type No.                      |  | FC6A-C16P1CE<br>FC6A-C16P4CE   | FC6A-C24P1CE<br>FC6A-C24P4CE | FC6A-C40P1CE<br>FC6A-C40P4CE | FC6A-C40P1CEJ<br>FC6A-C40P4CEJ                       |
|-------------------------------|--|--|------------------------------|------------------------------|--|
| No. of Outputs                |  | 7  | 10                           | 16                           |  |
| Output Points per Common Line | COM0   | 7  | 10                           | 8                            |  |
|                               | COM1   | —  | —                            | 8                            |  |
| Rated Load Voltage            |  | 24V DC   |                              |                              |  |
| Operating Load Voltage Range  |  | 20.4 to 28.8V DC   |                              |                              |  |
| Terminal Arrangement          |  | See "24V DC Power Type" on page 2-37   |                              |                              |  |
| Maximum Load Current          | 1  | 0.5 A maximum  |                              |                              |  |
|                               | 1 Common                                     | 3.5 A maximum  | 5 A maximum                  | 4 A maximum                  |  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON   |                              |                              |  |
| Maximum Inrush Current        |  | 1 A  |                              |                              |  |
| Leakage Current               |  | 0.1 mA maximum   |                              |                              |  |
| Clamping Voltage              |  | 39 V±1 V   |                              |                              |  |
| Maximum Lamp Load             |  | 12 W   |                              |                              |  |
| Inductive Load                |  | L/R = 10 ms (28.8V DC, 1 Hz)   |                              |                              |  |
| External Current Draw         |  | 100 mA maximum, 24V DC (-V terminal supply power)  |                              |                              |  |
| Output Protection Functions   |  | Overcurrent protection function (not a thermal shutdown function).<br>Overcurrent detected with 4 outputs as 1 group. (Group 1: Q0 to Q3, Group 2: Q4 to Q7, Group 3: Q10 to Q13, Group 4: Q14 to Q17)<br>When overcurrent is detected, the 4 outputs in the corresponding group are turned off for a fixed period (1 s). When overcurrent is detected, a special internal relay turns on (M8172 to M8175) and the error LED [ERR] turns on. |                              |                              |  |
| Output Current Limit Value    |  | 1.0 to 2.0 A   |                              |                              |  |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated  |                              |                              |  |
|                               | Between Output Terminals                     | Not isolated   |                              |                              |  |
| I/O Terminal Connector        | Type   | See "24V DC Power Type" on page 2-37   |                              |                              |  |
|                               | Insertion/Removal Durability                 | 100 times minimum  |                              |                              |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less  |                              |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |
|                               | Turn OFF Time                                | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less  |                              |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |

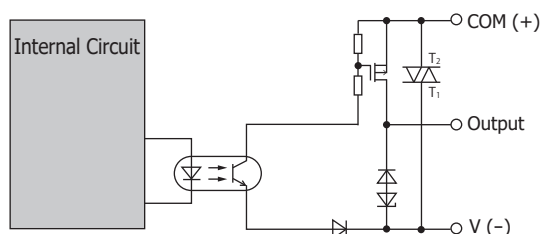
#### Output Internal Circuit (The overcurrent detection circuit has been omitted.)



## ■ 12V DC Power Type

| Type No.                      |  | FC6A-C16P1DE<br>FC6A-C16P4DE   | FC6A-C40P1DE<br>FC6A-C40P4DE | FC6A-C40P1DEJ<br>FC6A-C40P4DEJ                       |
|-------------------------------|--|--|------------------------------|--|
| No. of Outputs                |  | 7  | 16                           |  |
| Output Points per Common Line | COM0   | 7  | 8                            |  |
|                               | COM1   | —  | 8                            |  |
| Rated Load Voltage            |  | 12V DC   |                              |  |
| Operating Load Voltage Range  |  | 10.2 to 18.0V DC   |                              | 10.2 to 16.0V DC                                     |
| Terminal Arrangement          |  | See "12V DC Power Type" on page 2-43   |                              |  |
| Maximum Load Current          | 1  | 0.5 A maximum  |                              |  |
|                               | 1 Common                                     | 3.5 A maximum  | 4 A maximum                  |  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON   |                              |  |
| Maximum Inrush Current        |  | 1 A  |                              |  |
| Leakage Current               |  | 0.1 mA maximum   |                              |  |
| Clamping Voltage              |  | 39 V±1 V   |                              | 27 V±1 V   |
| Maximum Lamp Load             |  | 12 W   |                              |  |
| Inductive Load                |  | L/R = 10 ms (28.8V DC, 1 Hz)   |                              | L/R = 10 ms (16.0V DC 1 Hz)                          |
| External Current Draw         |  | 100 mA maximum, 12V DC (-V terminal supply power)  |                              |  |
| Output Protection Functions   |  | Overcurrent protection function (not a thermal shutdown function).<br>Overcurrent detected with 4 outputs as 1 group.<br>When overcurrent is detected, the 4 corresponding outputs are turned off for a fixed period (1 s).<br>When overcurrent is detected, a special internal relay turns on (M8172) and the error LED [ERR] turns on. |                              |  |
| Output Current Limit Value    |  | 1.0 to 2.0 A   |                              |  |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated  |                              |  |
|                               | Between Output Terminals                     | Not isolated   |                              |  |
| I/O Terminal Connector        | Type   | See "12V DC Power Type" on page 2-43   |                              |  |
|                               | Insertion/ Removal Durability                | 100 times minimum  |                              |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less  |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |
|                               | Turn OFF Time                                | Q0 to Q1: 5 μs or less<br>Q2 to Q3: 30 μs or less<br>Q4 to Q7, Q10 to Q17: 300 μs or less  |                              | Q0 to Q7: 5 μs or less<br>Q10 to Q17: 300 μs or less |

## Output Internal Circuit (The overcurrent detection circuit has been omitted.)



2: PRODUCT SPECIFICATIONS

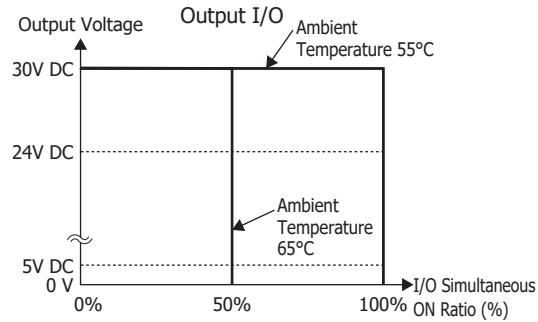
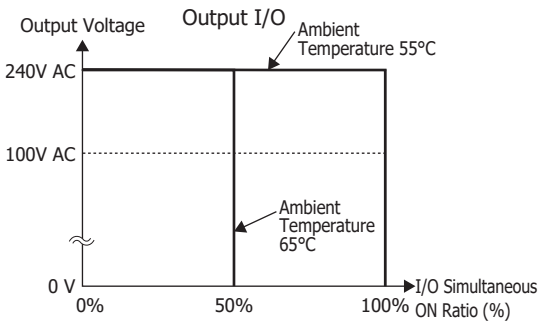
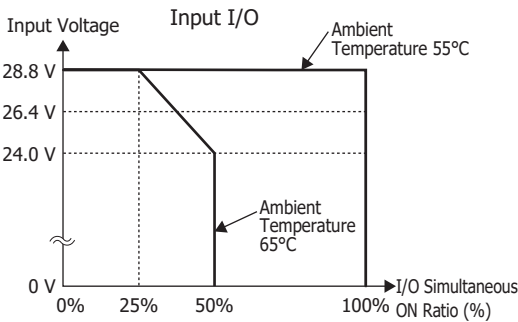
Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio

When the FC6A is used in an ambient temperature of 45°C or higher, reduce the input voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

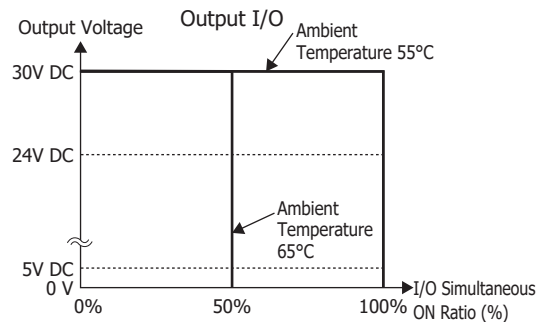
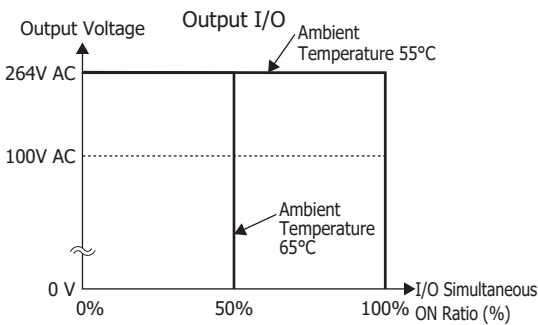
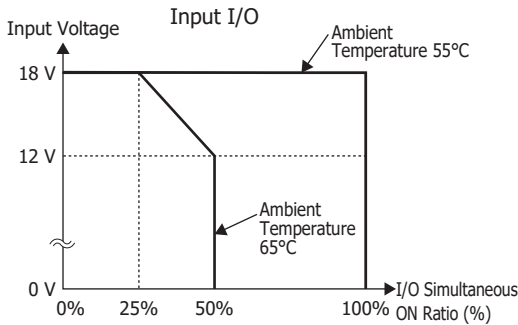
**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.  
The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

■ Relay output type

24V DC Power Type



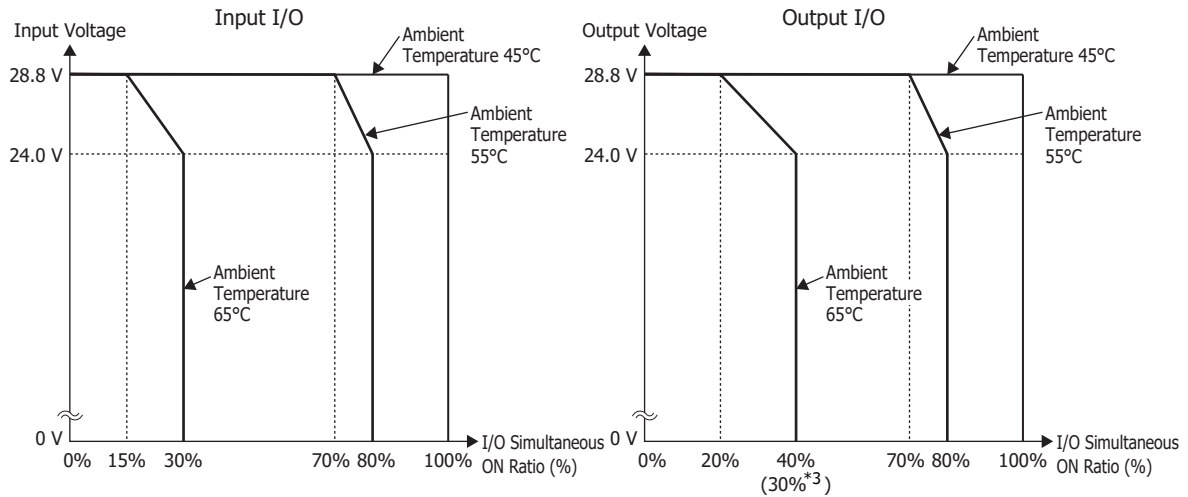
12V DC Power Type



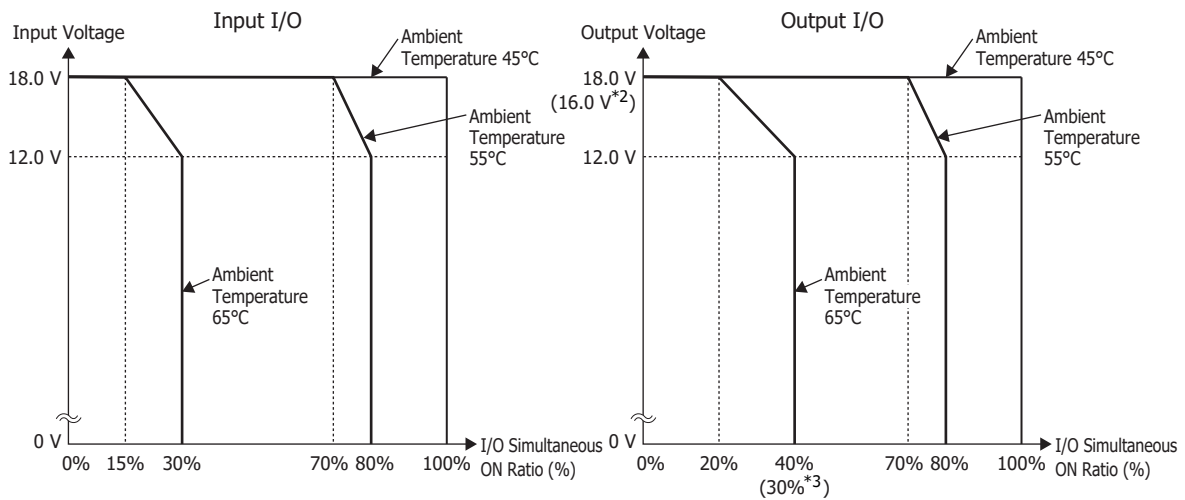
### ■ Transistor sink output type

- There are no usage restrictions for input and output I/O when the ambient temperature is 55°C or lower and no cartridges are connected.
- When a cartridge is connected or the ambient temperature is greater than 55°C, reduce the input voltage, output voltage, and I/O simultaneous ON ratio as shown in the following diagrams. <sup>\*1</sup>

#### 24V DC Power Type



#### 12V DC Power Type



\*1 Cartridges cannot be used in environments with expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C).

\*2 The values in parentheses are for the CAN J1939 All-in-One CPU module.

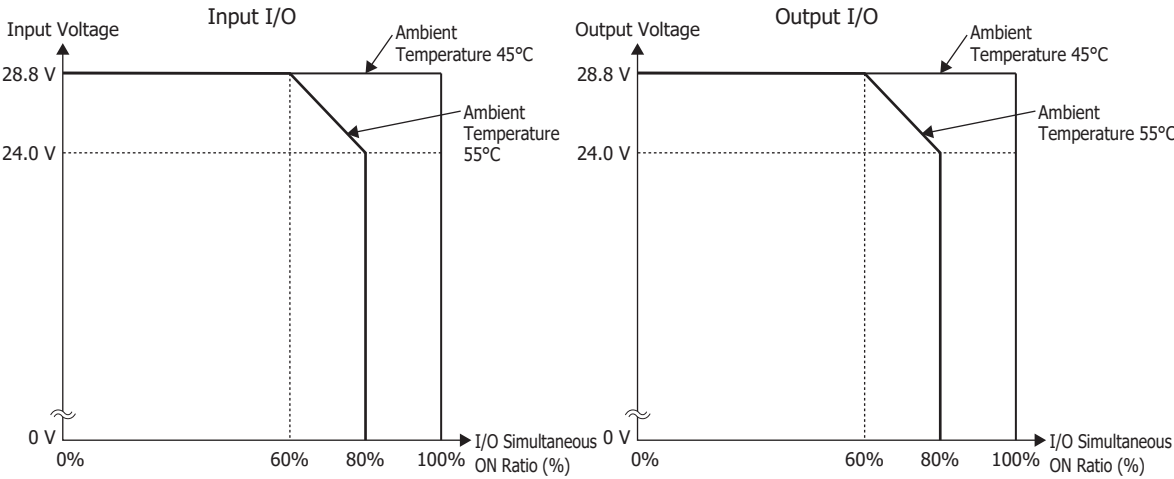
\*3 The values in parentheses are for the 16-I/O type All-in-One CPU module.

2: PRODUCT SPECIFICATIONS

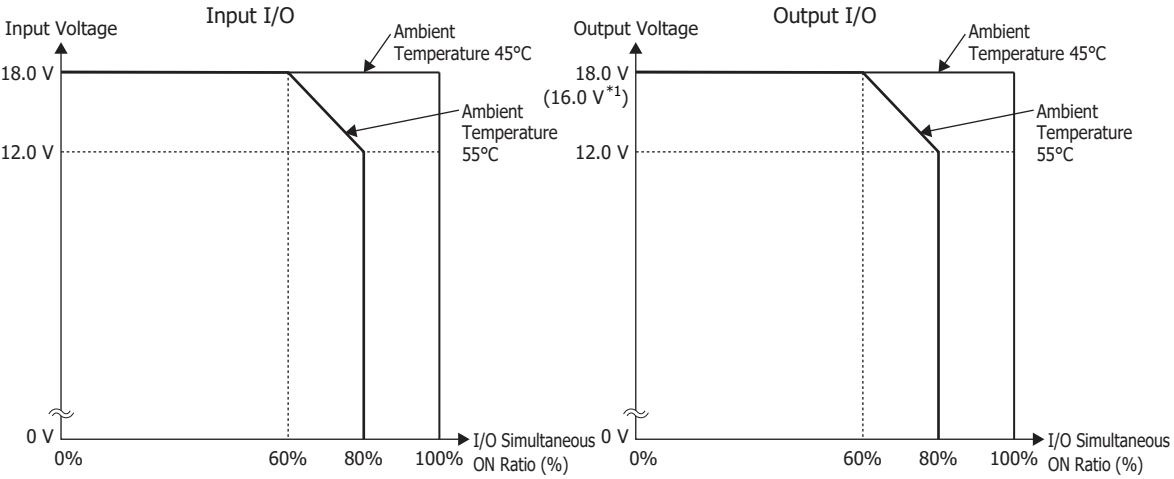
■ Transistor protection source output type

- When the ambient temperature is 55°C or lower and no cartridges are connected, reduce the input voltage, output voltage, and I/O simultaneous ON ratio as shown in the following diagrams.

24V DC Power Type



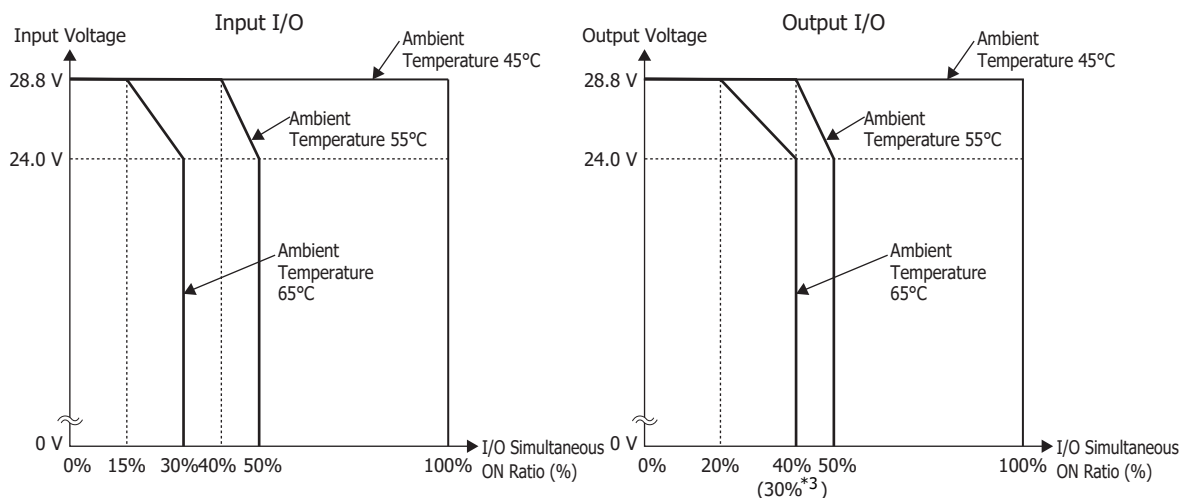
12V DC Power Type



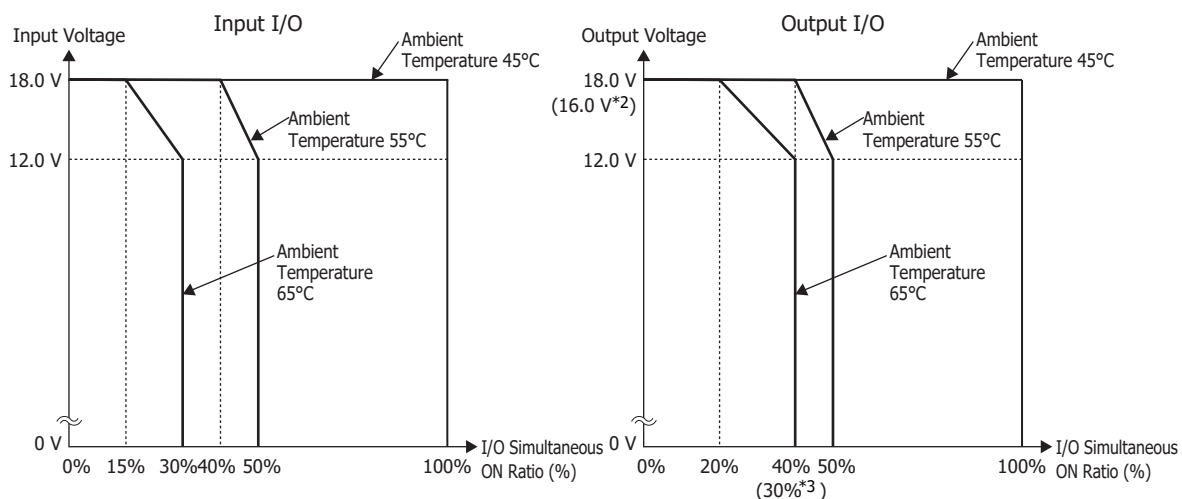
\*1 The values in parentheses are for the CAN J1939 All-in-One CPU module.

- When a cartridge is connected or the ambient temperature is greater than 55°C, reduce the input voltage, output voltage, and I/O simultaneous ON ratio as shown in the following diagrams. \*1

### 24V DC Power Type



### 12V DC Power Type



\*1 Cartridges cannot be used in environments with expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C).

\*2 The values in parentheses are for the CAN J1939 All-in-One CPU module.

\*3 The values in parentheses are for the 16-I/O type All-in-One CPU module.

Terminal Arrangement and Wiring Examples

■ AC Power Type

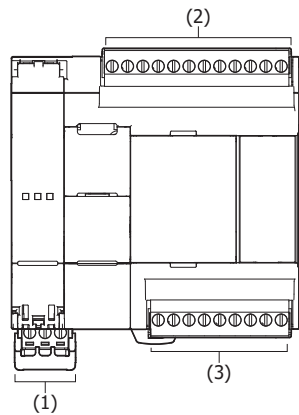
16-I/O Type: Screw fastened type: FC6A-C16R1AE

Push-in type: FC6A-C16R4AE

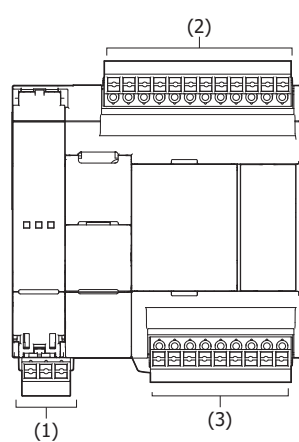
Applicable connector

|   |                     |              |
|---|---------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type | FC6A-PMTD03  |
|   | Push-in type (AC)   | FC6A-PMSDA03 |
| (2) Sensor power terminals, input terminals | Screw fastened type | FC6A-PMTA12  |
|   | Push-in type        | FC6A-PMSA12  |
| (3) Output terminals                        | Screw fastened type | FC6A-PMTA09  |
|   | Push-in type        | FC6A-PMSA09  |

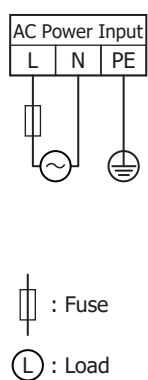
Screw fastened type



Push-in type

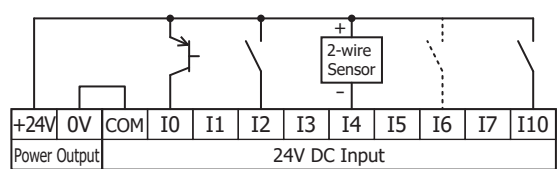


(1) Power supply terminals

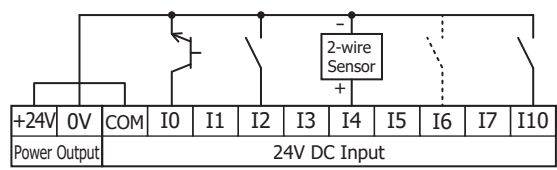


(2) Sensor power terminals, input terminals

DC Sink Input Wiring

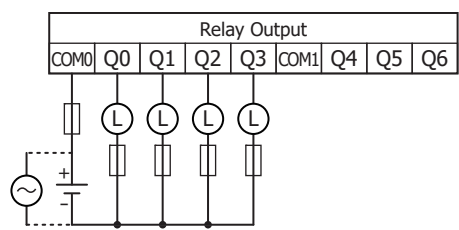


DC Source Input Wiring



(3) Output terminals

Relay Output





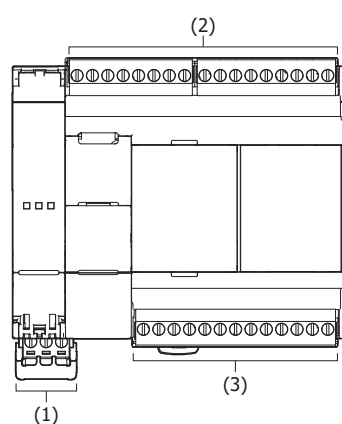
## 24-I/O Type: Screw fastened type: FC6A-C24R1AE

## Push-in type: FC6A-C24R4AE

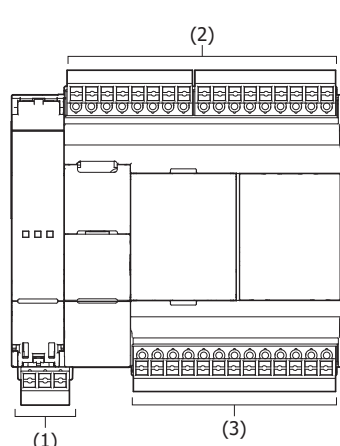
Applicable connector

|   |                     |              |
|---|---------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type | FC6A-PMTD03  |
|   | Push-in type (AC)   | FC6A-PMSDA03 |
| (2) Sensor power terminals, input terminals | Screw fastened type | FC6A-PMTA08  |
|   |                     | FC6A-PMTA09  |
|   | Push-in type        | FC6A-PMSA08  |
|   |                     | FC6A-PMSA09  |
| (3) Output terminals                        | Screw fastened type | FC6A-PMTA13  |
|   | Push-in type        | FC6A-PMSA13  |

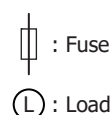
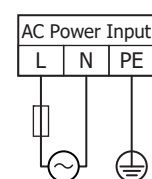
### Screw fastened type



### Push-in type

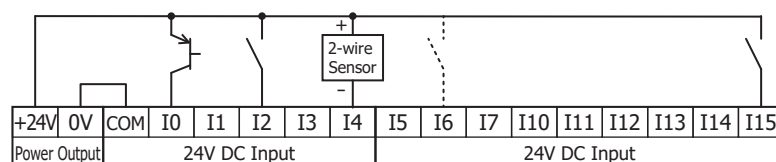


### (1) Power supply terminals

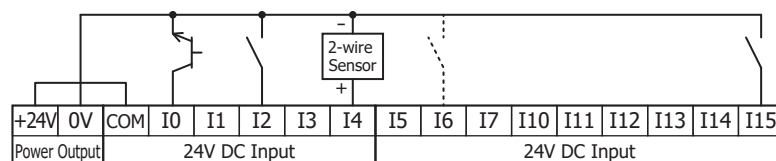


### (2) Sensor power terminals, input terminals

#### DC Sink Input Wiring

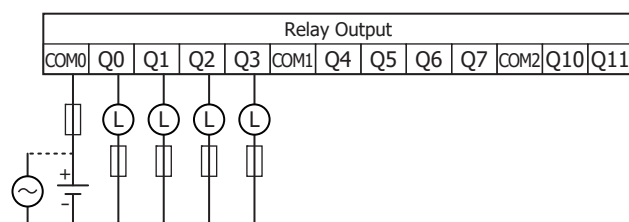


#### DC Source Input Wiring



### (3) Output terminals

#### Relay Output



2: PRODUCT SPECIFICATIONS

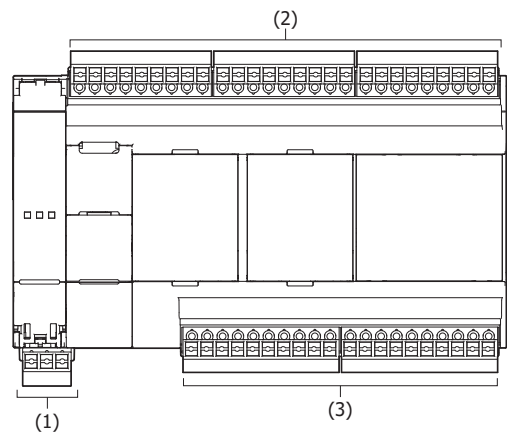
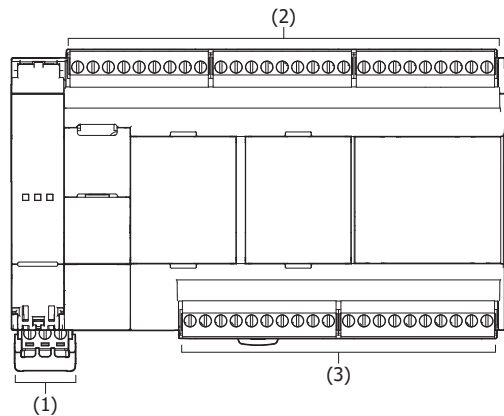
40-I/O Type: Screw fastened type: FC6A-C40R1AE, FC6A-C40R1AEJ  
Push-in type: FC6A-C40R4AE, FC6A-C40R4AEJ

Applicable connector

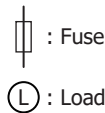
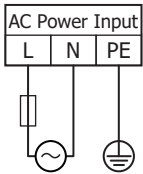
|   |                     |              |
|---|---------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type | FC6A-PMTD03  |
|   | Push-in type (AC)   | FC6A-PMSDA03 |
| (2) Sensor power terminals, input terminals | Screw fastened type | FC6A-PMTA09  |
|   | Push-in type        | FC6A-PMSA09  |
| (3) Output terminals                        | Screw fastened type | FC6A-PMTA10  |
|   | Push-in type        | FC6A-PMSA10  |

Screw fastened type

Push-in type

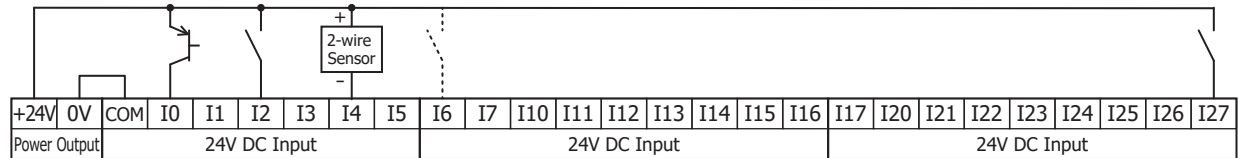


(1) Power supply terminals

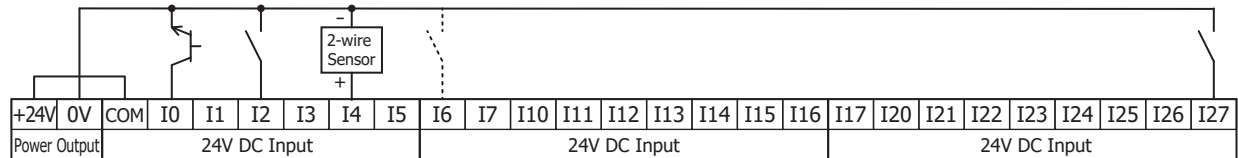


(2) Sensor power terminals, input terminals

DC Sink Input Wiring

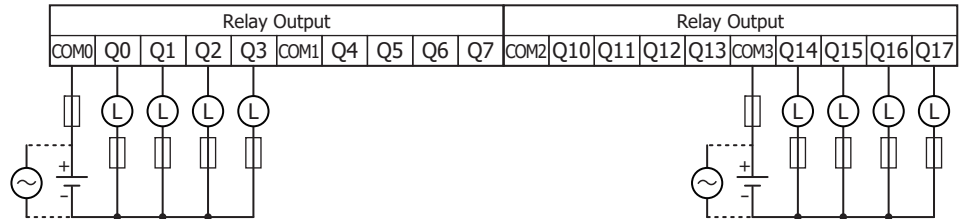


DC Source Input Wiring



(3) Output terminals

Relay Output



## ■ 24V DC Power Type

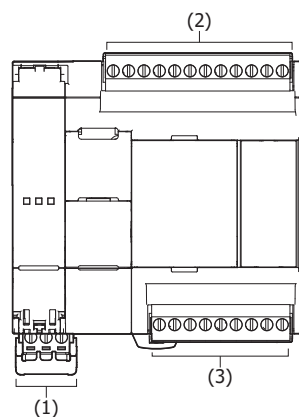
**16-I/O type: Screw fastened type: FC6A-C16R1CE, FC6A-C16K1CE, FC6A-C16P1CE**

**Push-in type: FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE**

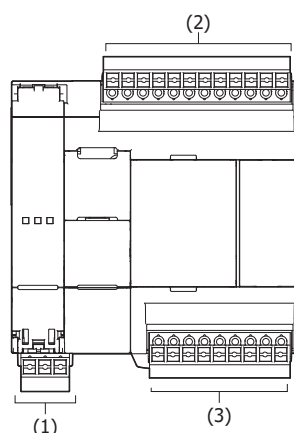
Applicable connector

|   |                       |              |
|---|-----------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type   | FC6A-PMTD03  |
|   | Push-in type (24 VDC) | FC6A-PMSDC03 |
| (2) Sensor power terminals, input terminals | Screw fastened type   | FC6A-PMTA12  |
|   | Push-in type          | FC6A-PMSA12  |
| (3) Output terminals                        | Screw fastened type   | FC6A-PMTA09  |
|   | Push-in type          | FC6A-PMSA09  |

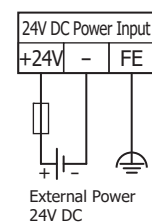
### Screw fastened type



### Push-in type



### (1) Power supply terminals

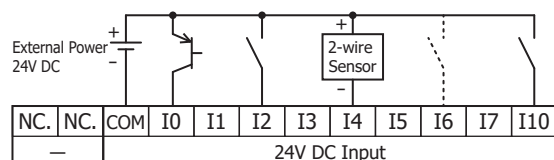


 : Fuse

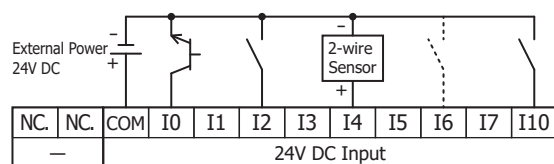
 : Load

### (2) Input terminals

DC Sink Input Wiring



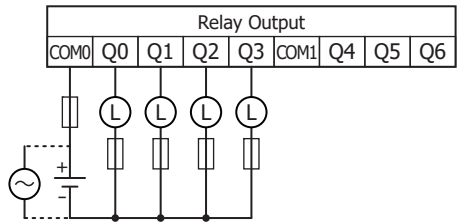
DC Source Input Wiring



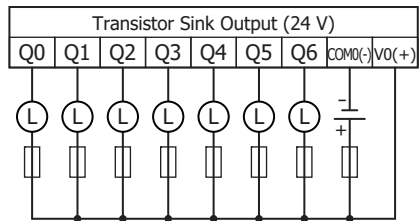
2: PRODUCT SPECIFICATIONS

(3) Output terminals

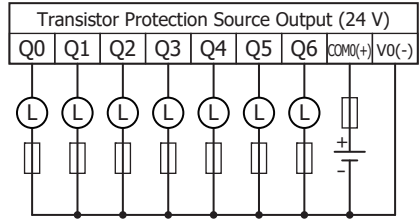
Relay Output: FC6A-C16R1CE, FC6A-C16R4CE



Transistor Sink Output: FC6A-C16K1CE, FC6A-C16K4CE



Transistor Protection Source Output: FC6A-C16P1CE, FC6A-C16P4CE

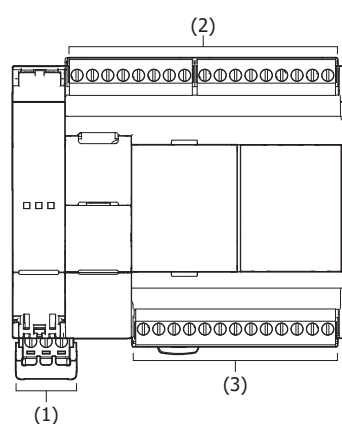


**24-I/O Type: Screw fastened type: FC6A-C24R1CE, FC6A-C24K1CE, FC6A-C24P1CE**  
**Push-in type: FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE**

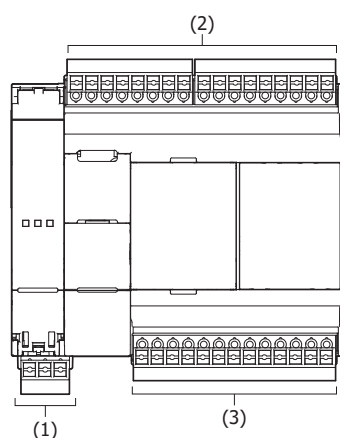
Applicable connector

|   |                       |              |
|---|-----------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type   | FC6A-PMTD03  |
|   | Push-in type (24 VDC) | FC6A-PMSDC03 |
| (2) Sensor power terminals, input terminals | Screw fastened type   | FC6A-PMTA08  |
|   |                       | FC6A-PMTA09  |
|   | Push-in type          | FC6A-PMSA08  |
|   |                       | FC6A-PMSA09  |
| (3) Output terminals                        | Screw fastened type   | FC6A-PMTA13  |
|   | Push-in type          | FC6A-PMSA13  |

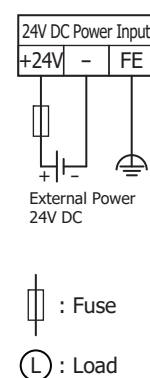
**Screw fastened type**



**Push-in type**

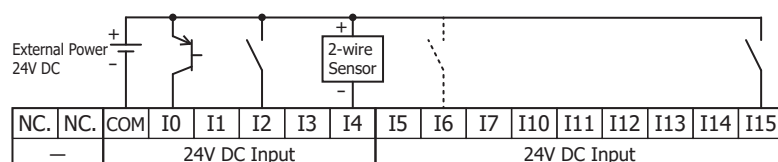


**(1) Power supply terminals**

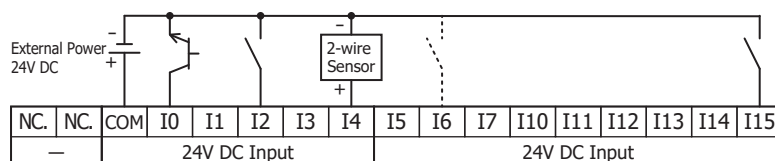


**(2) Input terminals**

**DC Sink Input Wiring**



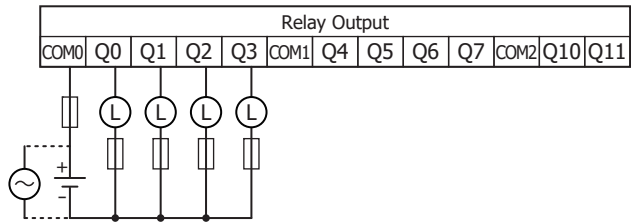
**DC Source Input Wiring**



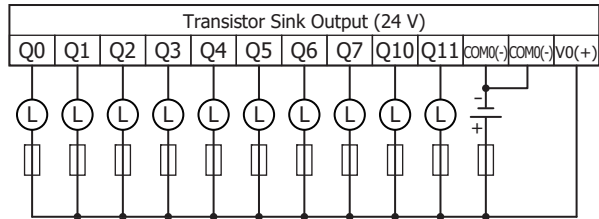
2: PRODUCT SPECIFICATIONS

(3) Output terminals

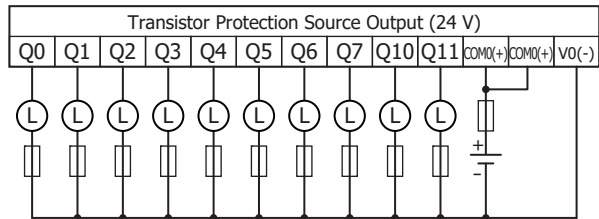
Relay Output: FC6A-C24R1CE, FC6A-C24R4CE



Transistor Sink Output: FC6A-C24K1CE, FC6A-C24K4CE



Transistor Protection Source Output: FC6A-C24P1CE, FC6A-C24P4CE



**40-I/O Type: Screw fastened type: FC6A-C40R1CE, FC6A-C40K1CE, FC6A-C40P1CE, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ**

**Push-in type: FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ**

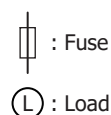
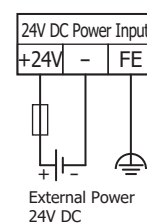
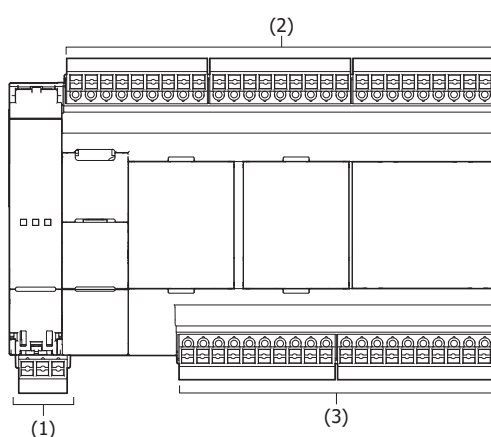
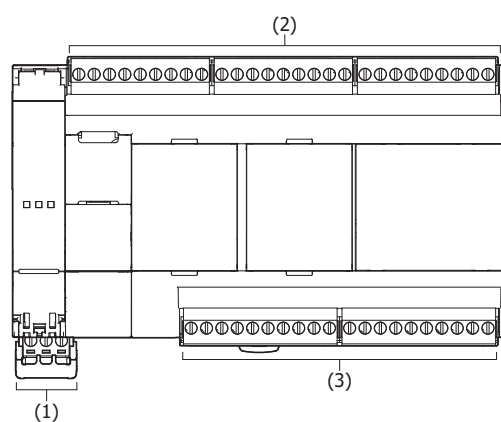
Applicable connector

|   |                       |              |
|---|-----------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type   | FC6A-PMTD03  |
|   | Push-in type (24 VDC) | FC6A-PMSDC03 |
| (2) Sensor power terminals, input terminals | Screw fastened type   | FC6A-PMTA09  |
|   | Push-in type          | FC6A-PMSA09  |
| (3) Output terminals                        | Screw fastened type   | FC6A-PMTA10  |
|   | Push-in type          | FC6A-PMSA10  |

### Screw fastened type

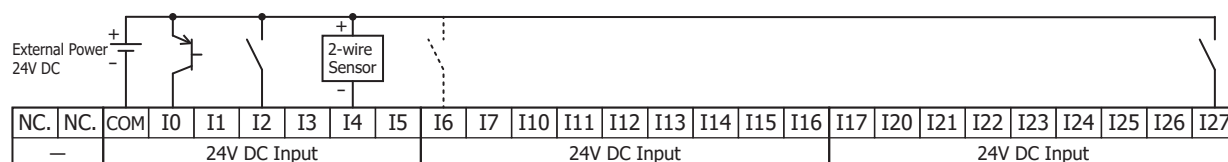
### Push-in type

### (1) Power supply terminals

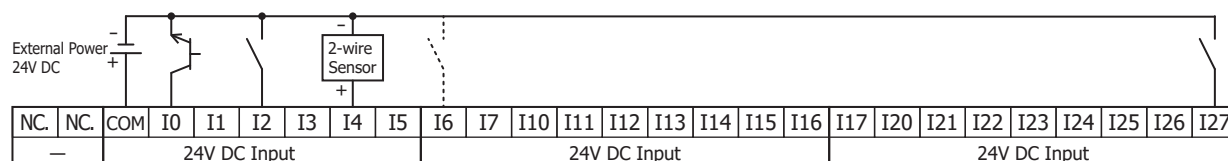


### (2) Input terminals

#### DC Sink Input Wiring



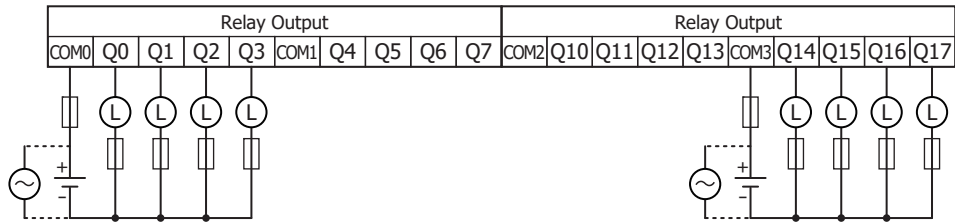
#### DC Source Input Wiring



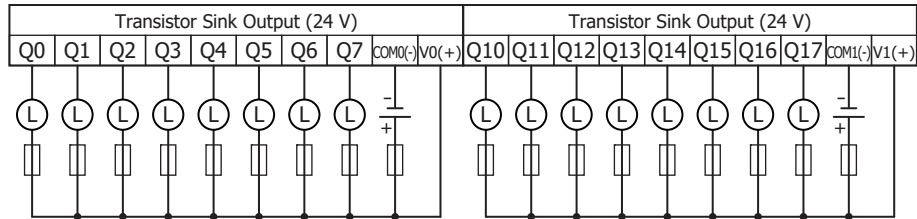
2: PRODUCT SPECIFICATIONS

(3) Output terminals

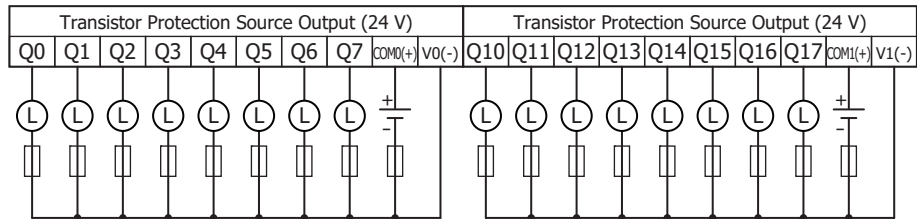
Relay Output: FC6A-C40R1CE, FC6A-C40R4CE, FC6A-C40R1CEJ, FC6A-C40R4CEJ



Transistor Sink Output: FC6A-C40K1CE, FC6A-C40K4CE, FC6A-C40K1CEJ, FC6A-C40K4CEJ



Transistor Protection Source Output: FC6A-C40P1CE, FC6A-C40P4CE, FC6A-C40P1CEJ, FC6A-C40P4CEJ





## ■ 12V DC Power Type

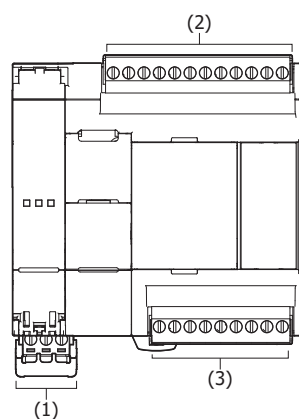
**16-I/O type: Screw fastened type: FC6A-C16R1DE, FC6A-C16K1DE, FC6A-C16P1DE**

**Push-in type: FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE**

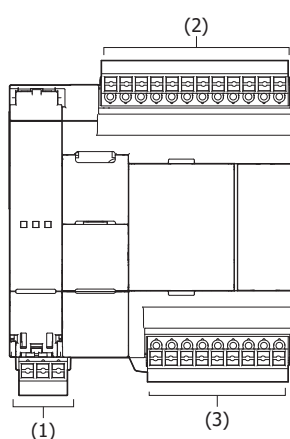
Applicable connector

|   |                       |              |
|---|-----------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type   | FC6A-PMTD03  |
|   | Push-in type (12 VDC) | FC6A-PMSDD03 |
| (2) Sensor power terminals, input terminals | Screw fastened type   | FC6A-PMTA12  |
|   | Push-in type          | FC6A-PMSA12  |
| (3) Output terminals                        | Screw fastened type   | FC6A-PMTA09  |
|   | Push-in type          | FC6A-PMSA09  |

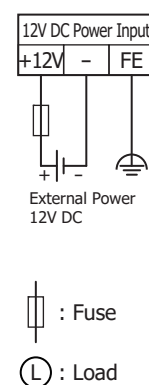
### Screw fastened type



### Push-in type

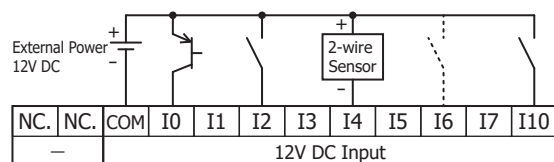


### (1) Power supply terminals

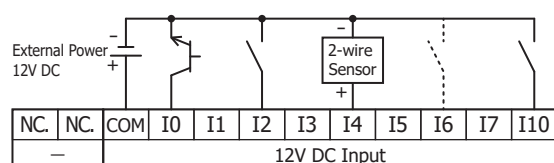


### (2) Input terminals

DC Sink Input



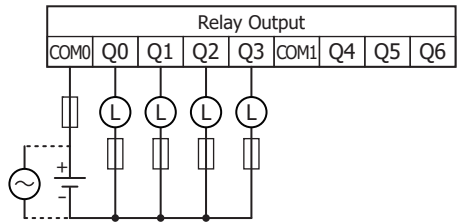
DC Source Input



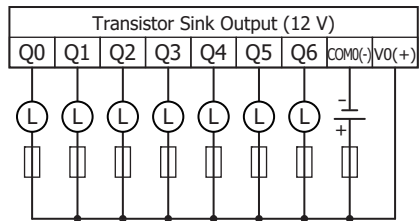
2: PRODUCT SPECIFICATIONS

(3) Output terminals

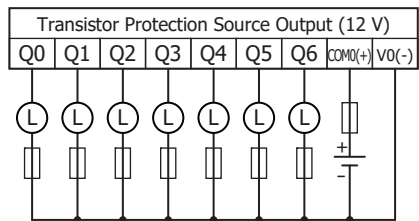
Relay Output: FC6A-C16R1DE, FC6A-C16R4DE



Transistor Sink Output: FC6A-C16K1DE, FC6A-C16K4DE



Transistor Protection Source Output: FC6A-C16P1DE, FC6A-C16P4DE



**40-I/O Type: Screw fastened type: FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ**

**Push-in type: FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ**

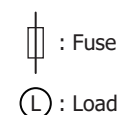
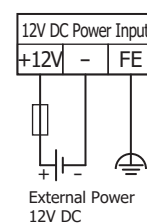
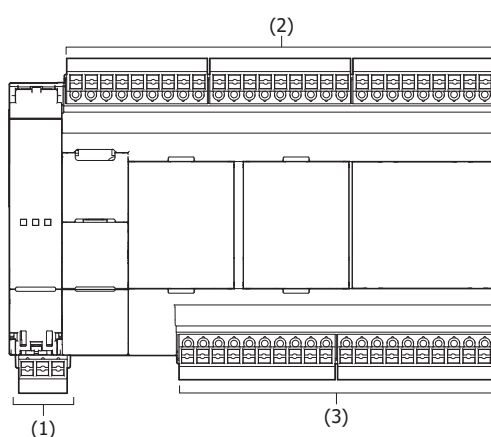
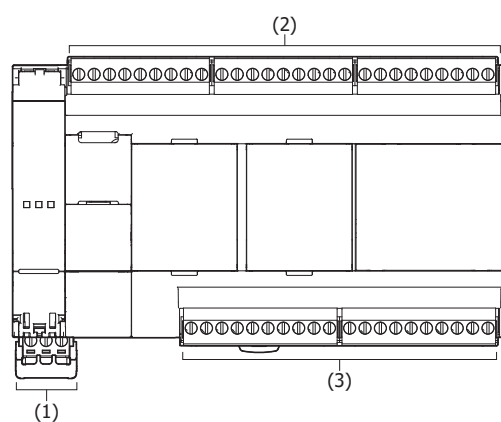
Applicable connector

|   |                       |              |
|---|-----------------------|--------------|
| (1) Power supply terminals                  | Screw fastened type   | FC6A-PMTD03  |
|   | Push-in type (12 VDC) | FC6A-PMSDD03 |
| (2) Sensor power terminals, input terminals | Screw fastened type   | FC6A-PMTA09  |
|   | Push-in type          | FC6A-PMSA09  |
| (3) Output terminals                        | Screw fastened type   | FC6A-PMTA10  |
|   | Push-in type          | FC6A-PMSA10  |

### Screw fastened type

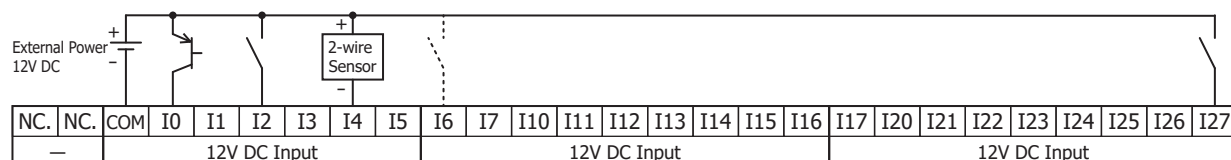
### Push-in type

### (1) Power supply terminals

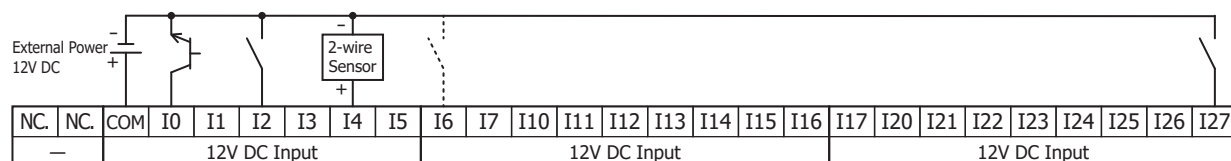


### (2) Input terminals

#### DC Sink Input Wiring

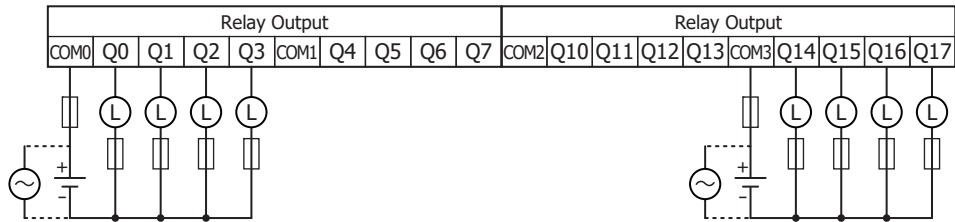


#### DC Source Input Wiring

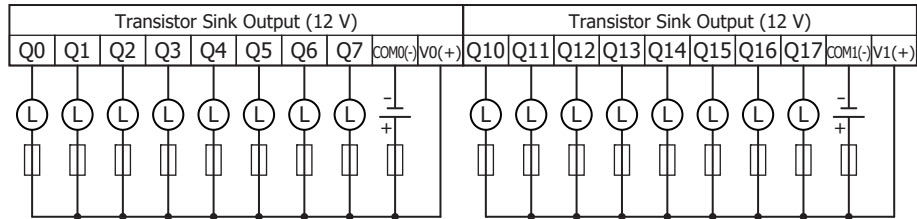


(3) Output terminals

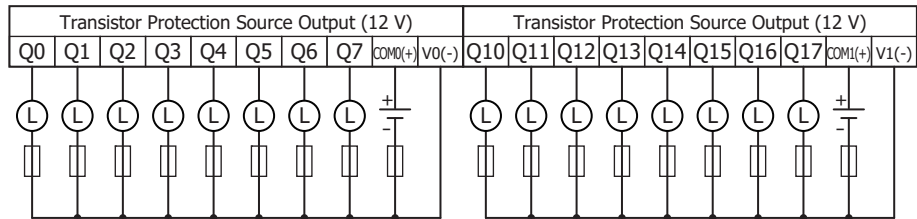
Relay Output: FC6A-C40R1DE, FC6A-C40R4DE, FC6A-C40R1DEJ, FC6A-C40R4DEJ



Transistor Sink Output: FC6A-C40K1DE, FC6A-C40K4DE, FC6A-C40K1DEJ, FC6A-C40K4DEJ

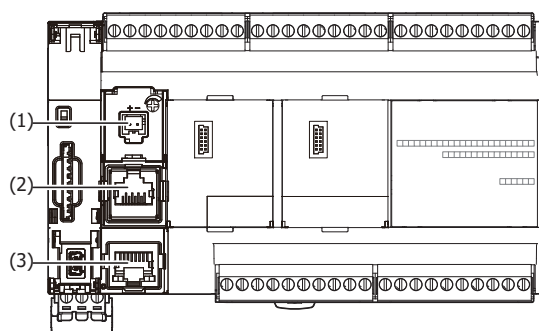


Transistor Protection Source Output: FC6A-C40P1DE, FC6A-C40P4DE, FC6A-C40P1DEJ, FC6A-C40P4DEJ

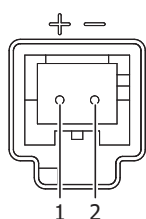


## Other Inputs and Ports

### ■ All-in-One CPU module

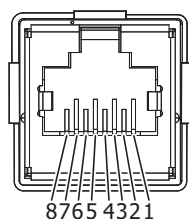


#### (1) Analog input



| No. | Signal Wire | Cable Color |
|-----|-------------|-------------|
| 1   | AN(+)       | Red         |
| 2   | AN(-)       | Black       |

#### (2) Serial Port 1

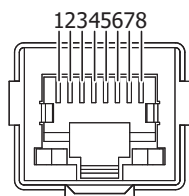


| No.     | Signal Wire<br>(RS-232C) | Signal Wire<br>(RS-485) |
|---------|--------------------------|-------------------------|
| 1       | RD                       | —                       |
| 2       | SD                       | —                       |
| 3       | ER                       | —                       |
| 4       | —                        | A                       |
| 5       | —                        | B                       |
| 6       | DR                       | —                       |
| 7       | —                        | —                       |
| 8       | SG                       | SG                      |
| Shell*1 | Shield                   | Shield                  |

\*1 Shell is connected to PE or FE on the power supply terminals.

**Note:** The recommended cable to connect to this port is the FC6A-KC1C or the FC6A-KC2C. For details, see "Cables" on page A-14.

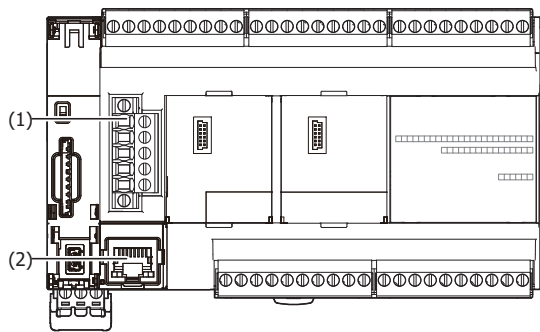
#### (3) Ethernet Port 1



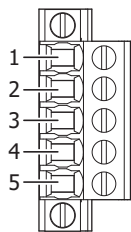
| No.     | Signal Wire |
|---------|-------------|
| 1       | TPO+        |
| 2       | TPO-        |
| 3       | TPI+        |
| 4       | —           |
| 5       | —           |
| 6       | TPI-        |
| 7       | —           |
| 8       | —           |
| Shell*1 | Shield      |

\*1 Shell is connected to PE or FE on the power supply terminals.

CAN J1939 All-in-One CPU module



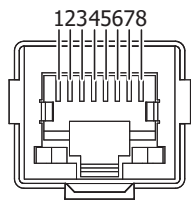
(1) CAN port



| No. | Signal Wire | Description  |
|-----|-------------|--|
| 1   | SG          | CAN external power supply (-)  |
| 2   | CAN_L       | CAN_L bus line (dominant low)  |
| 3   | CAN_SHLD    | CAN cable shield*1   |
| 4   | CAN_H       | CAN_H bus line (dominant high)   |
| 5   | (V+)        | CAN external power supply (+).<br>(This port is not used with the FC6A.) |

\*1 Internally connected to the SG via a resistor and capacitor connected in a series. (R = 1 Ω, 0.68 μF)  
Applicable connector: FC6A-PMTE05 (screw fastened type), FC6A-PMSE05 (push-in type)

(2) Ethernet Port 1



| No.     | Signal Wire |
|---------|-------------|
| 1       | TPO+        |
| 2       | TPO-        |
| 3       | TPI+        |
| 4       | —           |
| 5       | —           |
| 6       | TPI-        |
| 7       | —           |
| 8       | —           |
| Shell*1 | Shield      |

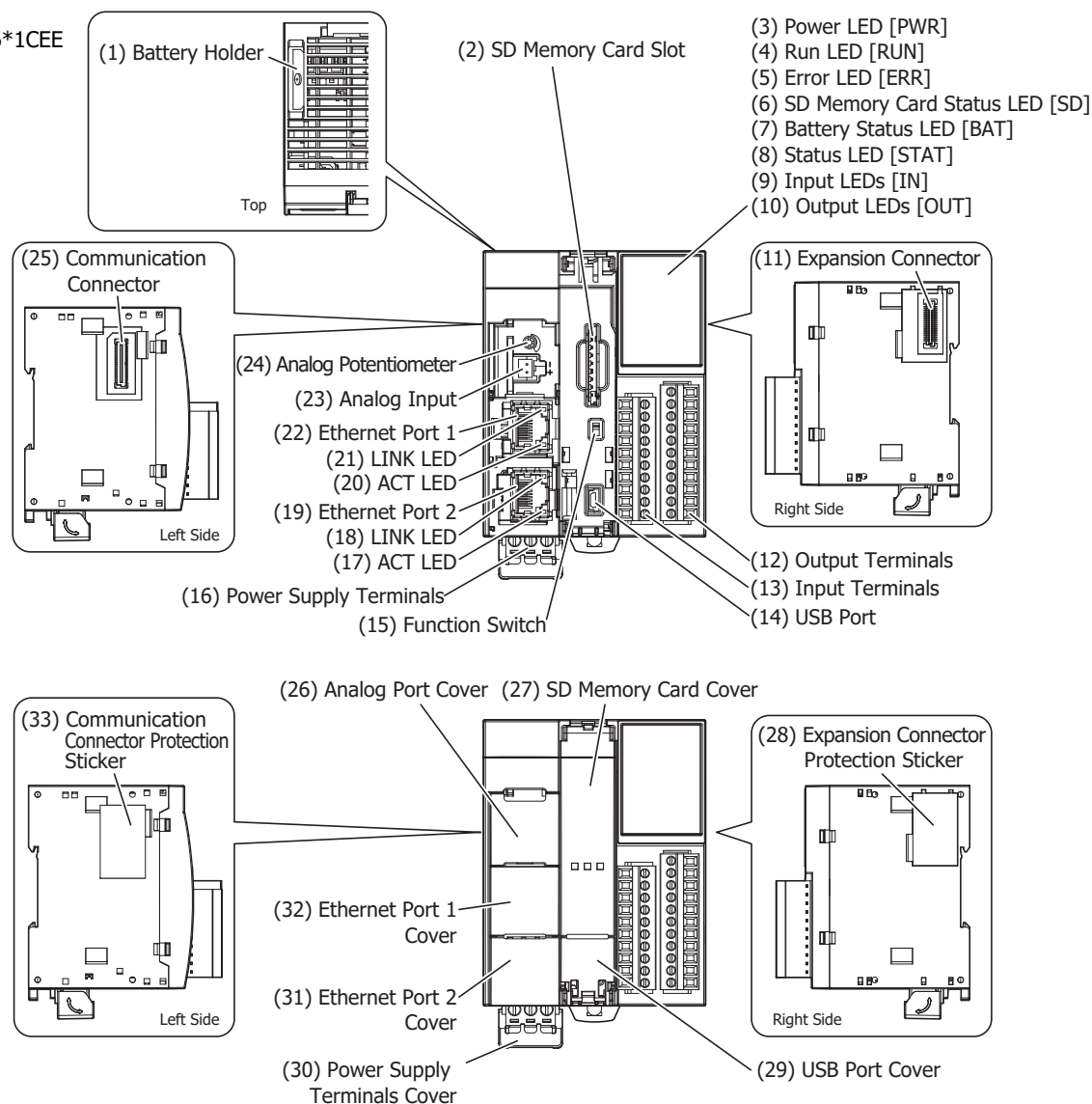
\*1 Shell is connected to PE or FE on the power supply terminals.

## Plus CPU module

### Part Names and Functions

Example:

FC6A-D16\*1CEE



The content in brackets is the LED indicator name on the FC6A.

### LED Indicators

Plus 16-I/O Type

| IN         |                            | OUT                        |          |
|------------|----------------------------|----------------------------|----------|
| (3) — PWR  | <input type="checkbox"/> 0 | <input type="checkbox"/> 0 | (9) (10) |
| (4) — RUN  | <input type="checkbox"/> 1 | <input type="checkbox"/> 1 |          |
| (5) — ERR  | <input type="checkbox"/> 2 | <input type="checkbox"/> 2 |          |
| (6) — SD   | <input type="checkbox"/> 3 | <input type="checkbox"/> 3 |          |
| (7) — BAT  | <input type="checkbox"/> 4 | <input type="checkbox"/> 4 |          |
| (8) — STAT | <input type="checkbox"/> 5 | <input type="checkbox"/> 5 |          |
|            | <input type="checkbox"/> 6 | <input type="checkbox"/> 6 |          |
|            | <input type="checkbox"/> 7 | <input type="checkbox"/> 7 |          |

Plus 32-I/O Type

| IN         |                             | OUT                         |          |
|------------|-----------------------------|-----------------------------|----------|
| (3) — PWR  | <input type="checkbox"/> 0  | <input type="checkbox"/> 0  | (9) (10) |
| (4) — RUN  | <input type="checkbox"/> 1  | <input type="checkbox"/> 1  |          |
| (5) — ERR  | <input type="checkbox"/> 2  | <input type="checkbox"/> 2  |          |
| (6) — SD   | <input type="checkbox"/> 3  | <input type="checkbox"/> 3  |          |
| (7) — BAT  | <input type="checkbox"/> 4  | <input type="checkbox"/> 4  |          |
| (8) — STAT | <input type="checkbox"/> 5  | <input type="checkbox"/> 5  |          |
|            | <input type="checkbox"/> 6  | <input type="checkbox"/> 6  |          |
|            | <input type="checkbox"/> 7  | <input type="checkbox"/> 7  |          |
|            | <input type="checkbox"/> 10 | <input type="checkbox"/> 10 |          |
|            | <input type="checkbox"/> 11 | <input type="checkbox"/> 11 |          |
|            | <input type="checkbox"/> 12 | <input type="checkbox"/> 12 |          |
|            | <input type="checkbox"/> 13 | <input type="checkbox"/> 13 |          |
|            | <input type="checkbox"/> 14 | <input type="checkbox"/> 14 |          |
|            | <input type="checkbox"/> 15 | <input type="checkbox"/> 15 |          |
|            | <input type="checkbox"/> 16 | <input type="checkbox"/> 16 |          |
|            | <input type="checkbox"/> 17 | <input type="checkbox"/> 17 |          |

## 2: PRODUCT SPECIFICATIONS

### (1) Battery Holder

This holder is for installing the backup battery.

### (2) SD Memory Card Slot

This slot is used to insert the SD memory card.

### (3) Power LED [PWR]

This LED turns on when the power is supplied to the CPU module.

### (4) Run LED [RUN]

This LED turns on while the CPU module is running the user program.

This LED flashes when using certain functions while the user program is running.

| LED                           | Status   |
|-------------------------------|--|
| ON                            | <ul style="list-style-type: none"><li>While the CPU module is running the user program</li></ul>   |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"><li>When executing the forced I/O function while the user program is running</li></ul>   |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"><li>While the CPU module is in USB boot</li><li>When executing the forced I/O function while the user program is stopped</li></ul> |

### (5) Error LED [ERR]

This LED turns on when an error occurs in the CPU module.

### (6) SD Memory Card Status LED [SD]

This LED turns on or flashes when the SD memory card is being read or written.

| LED                           | Status   |
|-------------------------------|--|
| OFF                           | <ul style="list-style-type: none"><li>When the SD memory card is not inserted</li><li>When an unsupported or unformatted SD memory card was inserted</li><li>Unmount SD memory card (M8072) is on, so the SD memory card has been unmounted</li><li>When the FC6A power is off</li></ul> |
| ON                            | <ul style="list-style-type: none"><li>The standby state where the SD memory card can be written or read</li></ul>  |
| Slow flashing (1 s cycle)     | <ul style="list-style-type: none"><li>When the FC6A is recognizing the SD memory card</li><li>Unmount SD memory card (M8072) is turned on and the FC6A is unmounting the SD memory card</li></ul>  |
| Quick flashing (100 ms cycle) | <ul style="list-style-type: none"><li>Reading or writing the SD memory card</li></ul>  |

### (7) Battery Status LED [BAT]

This LED turns on or flashes when the backup battery level is low.

| LED                  | Condition                                    | Battery Status |  |
|----------------------|--|----------------|--|
| OFF                  | Battery voltage (D8056) > 2,300              | Normal         | Sufficient battery level.                  |
| Flashing (1 s cycle) | $2,300 \geq$ battery voltage (D8056) > 2,000 | Warning        | Low battery level. Replace the battery.    |
| ON                   | $2,000 \geq$ battery voltage (D8056)         | Dead battery   | The battery is almost dead. Or no battery. |

### (8) Status LED [STAT]

This LED can be turned on or off in the user program.

### (9) Input LEDs [IN]

These LEDs turn on when the corresponding input is on.

### (10) Output LEDs [OUT]

These LEDs turn on when the corresponding output is on.

### (11) Expansion Connector

This connector is used to connect an expansion module.

### (12) Output Terminals

These terminals connect output devices such as electromagnetic switches and solenoid valves. The CPU module is available in the relay output type (240V AC: 2 A, 30V DC: 2 A), the transistor sink output type (0.5 A), and the transistor protection source output type (0.5 A).



**(13) Input Terminals**

These terminals connect input devices such as push buttons and limit switches. DC inputs are both sinks and sources.

**(14) USB Port**

A mini-B type USB 2.0 connector. A USB cable can be attached to the FC6A and connected to a PC to download and upload user programs using WindLDR.

**(15) Function Switch**

This switch turns M8073 on or off (default setting: 0 (off)).

You can run or stop the CPU module with this switch by enabling **Run/Stop PLC by Function Switch** in WindLDR (default setting: enabled).

For details about the function switch, see "Function Switch Configuration" on page 5-10.

**(16) Power Supply Terminals**

These terminals are used to supply 24V DC power to the CPU module.

**(17) ACT LED**

This LED flashes when sending or receiving data while the LINK LED (18) is on.

**(18) LINK LED**

This LED is on when a network-compatible device is connected to Ethernet port 2.

**(19) Ethernet Port 2**

This port allows Ethernet communication with connected devices that are equipped with an Ethernet interface.

**(20) ACT LED**

This LED flashes when sending or receiving data while the LINK LED (21) is on.

**(21) LINK LED**

This LED is on when a network-compatible device is connected to Ethernet port 1.

**(22) Ethernet Port 1**

This port allows Ethernet communication with connected devices that are equipped with an Ethernet interface.

**(23) Analog Input**

The connector for the analog input.

**(24) Analog Potentiometer**

A potentiometer for setting a timer or other device. This allows an analog value used in the user program to be set without the use of an external device.

**(25) Communication Connector**

This connector is used to connect the HMI module and cartridge base module.

**(26) Analog Port Cover**

A removable cover that protects the analog input and analog potentiometer. When using these, remove the analog port cover.

**(27) SD Memory Card Cover**

An openable cover that protects the SD memory card and function switch. Open the SD memory card cover when inserting or ejecting the SD memory card or when using the function switch.

**(28) Expansion Connector Protection Sticker**

This sticker protects the expansion connector. Remove the expansion connector protection sticker when connecting an expansion module.

**(29) USB Port Cover**

An openable cover that protects the USB port. When using the USB port, open the USB port cover.

**(30) Power Supply Terminals Cover**

An openable cover that protects the power supply terminals. Open the power supply terminals cover when removing and attaching the power supply terminals.

**Note:** The FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE, FC6A-D32K4CEE, and FC6A-D32P4CEE do not have a power supply terminal cover.

## **2: PRODUCT SPECIFICATIONS**

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**(31) Ethernet Port 2 Cover**

A removable cover that protects Ethernet Port 2. When using the Ethernet port, remove the Ethernet Port 2 cover.

**(32) Ethernet Port 1 Cover**

A removable cover that protects Ethernet Port 1. When using the Ethernet port, remove the Ethernet Port 1 cover.

**(33) Communication Connector Protection Sticker**

This sticker protects the communication connector. Remove the communication connector protection sticker when connecting the HMI module or cartridge base module.

## Power Supply Specifications

## ■ 24V DC Power Type

|  |  |                                |
|--|--|--------------------------------|
| Type No.                                   | FC6A-D16R1CEE, FC6A-D16R4CEE, FC6A-D16K1CEE, FC6A-D16K4CEE, FC6A-D16P1CEE, FC6A-D16P4CEE, FC6A-D32K3CEE, FC6A-D32K4CEE, FC6A-D32P3CEE, FC6A-D32P4CEE |                                |
| Rated Power Voltage                        | 24V DC   |                                |
| Voltage Fluctuation Range                  | 20.4 to 28.8V DC (including ripple)  |                                |
| Maximum Power Consumption                  | Standalone   | When Maximum Load is Connected |
| FC6A-D16R1CEE/<br>FC6A-D16R4CEE            | 2.88 W (24V DC)  | 18.24 W (24V DC)               |
| FC6A-D16K1CEE/<br>FC6A-D16K4CEE            | 2.88 W (24V DC)  | 18.24 W (24V DC)               |
| FC6A-D16P1CEE/<br>FC6A-D16P4CEE            | 2.88 W (24V DC)  | 18.24 W (24V DC)               |
| FC6A-D32K3CEE/<br>FC6A-D32K4CEE            | 3.36 W (24V DC)  | 18.72 W (24V DC)               |
| FC6A-D32P3CEE/<br>FC6A-D32P4CEE            | 3.36 W (24V DC)  | 18.72 W (24V DC)               |
| Allowable Momentary Power Interruption     | 10 ms or longer (when rated power supply voltage)  |                                |
| Withstand Voltage                          | Between power and FE terminals: 500V AC, 1 minute  |                                |
|  | Between input and FE terminals: 500V AC, 1 minute  |                                |
|  | Between transistor output and FE terminals: 500V AC, 1 minute  |                                |
|  | Between relay output and FE terminals: 2,300V AC, 1 minute   |                                |
|  | Between power and input terminals: 500V AC, 1 minute   |                                |
|  | Between power and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between power and relay output terminals: 2,300V AC, 1 minute  |                                |
|  | Between input and transistor output terminals: 500V AC, 1 minute   |                                |
|  | Between input and relay output terminals: 2,300V AC, 1 minute  |                                |
| Insulation Resistance                      | Between power and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between transistor output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between relay output and FE terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and input terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between power and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
|  | Between input and transistor output terminals: 100 MΩ or higher (500V DC insulation resistance tester)   |                                |
|  | Between input and relay output terminals: 100 MΩ or higher (500V DC insulation resistance tester)  |                                |
| Inrush Current                             | 35 A maximum   |                                |
| Isolation                                  | Between power terminal and internal circuit: Transformer isolated  |                                |
| Ground                                     | D-type ground (Class 3 ground)   |                                |
| Grounding Wire                             | See "Recommended Ferrule List" on page 3-46.   |                                |
| Power Supply Wire                          | See "Recommended Ferrule List" on page 3-46.   |                                |
| Effect of Improper Power Supply Connection | Reverse polarity: Normal operation   |                                |
|  | Improper voltage or frequency: Permanent damage may be caused  |                                |
|  | Improper lead connection: Permanent damage may be caused   |                                |

## 2: PRODUCT SPECIFICATIONS

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|                             |                      |       |
|-----------------------------|----------------------|-------|
| <b>Weight<br/>(approx.)</b> | <b>FC6A-D16R1CEE</b> | 290 g |
|                             | <b>FC6A-D16R4CEE</b> | 280 g |
|                             | <b>FC6A-D16K1CEE</b> | 275 g |
|                             | <b>FC6A-D16K4CEE</b> | 265 g |
|                             | <b>FC6A-D16P1CEE</b> | 275 g |
|                             | <b>FC6A-D16P4CEE</b> | 265 g |
|                             | <b>FC6A-D32K3CEE</b> | 255 g |
|                             | <b>FC6A-D32K4CEE</b> | 255 g |
|                             | <b>FC6A-D32P3CEE</b> | 255 g |
|                             | <b>FC6A-D32P4CEE</b> | 255 g |

## Function Specifications

## ■ CPU Module Performance

| Type No.  |                       | FC6A-D16R1CEE, FC6A-D16R4CEE<br>FC6A-D16K1CEE, FC6A-D16K4CEE<br>FC6A-D16P1CEE, FC6A-D16P4CEE |   | FC6A-D32K3CEE, FC6A-D32K4CEE<br>FC6A-D32P3CEE, FC6A-D32P4CEE |    |  |
|---|-----------------------|--|---|--|----|--|
| Program Capacity*1  | Program Data          |  | 800,000 bytes<br>(100,000 steps)  |  |    |  |
|   | Comment Data          |  | 384,000 bytes   |  |    |  |
| I/O Expansion   | Basic Expansion       |  | 7   |  |    |  |
|   | Expansion Interface   |  | 8   |  |    |  |
|   | Cartridges*3          |  | 3   |  |    |  |
| I/O Points  | Basic                 | Input  | 8   |  | 16 |  |
|   |                       | Output   | 8   |  | 16 |  |
|   | Basic Expansion*2     |  | 224   |  |    |  |
|   | Expansion Interface*4 |  | 256   |  |    |  |
|   | Cartridges*3          |  | 12  |  |    |  |
| Expanded I/O with Expansion Interface Remote Master/Slave Modules |                       |  | I/O in the system can be expanded up to a maximum of 63 modules using expansion interface modules (remote master/slave) (I/O points: maximum 2,016 points). For details, see "Expansion Interface Modules (Remote Master/Slave)" on page 2-146. |  |    |  |
| User Program Download   |                       |  | 1,000 times   |  |    |  |
| Control System  |                       |  | Stored program system   |  |    |  |
| Instructions  | Basic Instructions    |  | 42 types  |  |    |  |
|   | Advanced Instructions |  | 130 types   |  |    |  |
| Processing Speed  | Basic Instruction     |  | 0.021 ms/1,000 steps  |  |    |  |
|   | END Processing        |  | 1 ms  |  |    |  |
| Internal Relay  |                       |  | 15,400  |  |    |  |
| Shift Register  |                       |  | 256   |  |    |  |
| Data Register   |                       |  | 60,000  |  |    |  |
| Counter (adding, reversible)                                      |                       |  | 512   |  |    |  |
| Timer (1 ms, 10 ms, 100 ms, 1 s)                                  |                       |  | 2,000   |  |    |  |

\*1 1 step is equivalent to 8 bytes.

\*2 There are limitations on the maximum number of outputs that can be simultaneously turned on.

For details, see "Connection Restrictions When Expanding the PLC" on page 3-37.

\*3 A maximum of three cartridges can be used by connecting the cartridge base module and HMI module.

\*4 The maximum number of expansion modules that can be connected can be increased by using the expansion interface module. For details, see "Expansion Interface Modules" on page 2-143.

## Backup Function

|                |  |
|----------------|--|
| Backup Data    | RAM (internal relays, shift registers, counters, data registers*1)*2, clock  |
| Backup Battery | Lithium ion primary cell (A battery is included with the product. The model of battery to be included with the product cannot be specified.)<br>Panasonic: BR2032/CR2032A/CR2032B, Murata: CR2032X/CR2032W |
| Battery Life   | Guaranteed 1 year, replacement recommended every 4 years (+25°C)*3   |
| Replaceability | Replace within 1 minute after power off (recommended)*4  |

\*1 D70000 to D269999 cannot be designated as "Keep." Data register values are kept when you switch the PLC from Stop to Run, but those values are cleared at power up.

\*2 To prepare for when the battery dies, the contents of RAM (internal relays, shift registers, counters, and data registers) can be saved to non-volatile memory. For how to save the contents of RAM, see "SD Memory Card" on page 11-1.

\*3 The battery is primarily consumed by backup current while unpowered. However, the ambient environment (temperature and humidity) while unpowered and powered also affects consumption. In particular, battery life is greatly reduced in a high-temperature and high-humidity environment, so replacement is recommended every year when the effect of the ambient environment (temperature and humidity) while unpowered and powered is included.

\*4 Replacement while powered and replacement while power is supplied from the USB bus are also possible. For the replacement method, see "Replacing the Backup Battery" on page 3-34.

## 2: PRODUCT SPECIFICATIONS

### Clock Function

|                 |                           |
|-----------------|---------------------------|
| <b>Accuracy</b> | ±30 seconds/month at 25°C |
|-----------------|---------------------------|

### Self-diagnostic Functions

- Keep data
- User program (ROM) CRC check
- Timer/counter preset value change check
- User program syntax check
- User program execution check
- Watchdog timer check
- User program download check
- Power failure detection
- Clock error
- Data link connection check
- Expansion bus initialization check
- System check
- SD memory card transfer check
- SD memory card access check

### Input Filter

0 ms (no filter), 3 to 15 ms (selectable in increments of 1 ms)

| Type No.          | FC6A-D16R1CEE, FC6A-D16R4CEE<br>FC6A-D16K1CEE, FC6A-D16K4CEE<br>FC6A-D16P1CEE, FC6A-D16P4CEE | FC6A-D32K3CEE, FC6A-D32K4CEE<br>FC6A-D32P3CEE, FC6A-D32P4CEE    |
|-------------------|--|---|
| <b>I0 to I7</b>   | 0 ms (no filter), 3 to 15 ms (selectable in increments of 1 ms)                              |   |
| <b>I10 to I13</b> | —  | 0 ms (no filter),<br>3 to 15 ms selectable (in 1 ms increments) |
| <b>I14 to I17</b> | —  | 3 ms fixed  |

### Catch Input/Interrupt Input

| Type No.  | FC6A-D16R1CEE, FC6A-D16R4CEE<br>FC6A-D16K1CEE, FC6A-D16K4CEE<br>FC6A-D16P1CEE, FC6A-D16P4CEE | FC6A-D32K3CEE, FC6A-D32K4CEE<br>FC6A-D32P3CEE, FC6A-D32P4CEE |
|---|--|--|
| <b>High-speed 6 Points (I0, I1, I3, I4, I6, I7)</b> | Minimum turn on pulse width: 5 µs  |  |
|   | Minimum turn off pulse width: 5 µs   |  |
| <b>Medium-speed 3 Points (I11, I12, I13)</b>        | —  | Minimum turn on pulse width: 35 µs                           |
|   |  | Minimum turn off pulse width: 35 µs                          |

### High-speed Counter

|   |   |
|---|---|
| <b>Maximum Counter Frequency and Points</b> | Single-phase, two-phase common: 100 kHz (single-phase 6 points max, two-phase 3 points max) |
| <b>Count Range</b>                          | Single-phase, two-phase common: 0 to 4,294,967,295 (32 bits)                                |
| <b>Operation Mode</b>                       | Rotary encoder mode, adding counter mode, frequency measurement mode                        |

### Pulse Output (Transistor Output Type Only)

| Points | High-speed Output (100 kHz) | 4 |
|--------|-----------------------------|---|
|--------|-----------------------------|---|

### Function Switch

|                 |   |
|-----------------|---|
| <b>Points</b>   | 1 (2 position slide switch)   |
| <b>Function</b> | Program run/stop  |
|                 | The function can be set in the function area settings (default setting: enabled). |

### Analog Potentiometer

|                        |            |
|------------------------|------------|
| <b>Points</b>          | 1          |
| <b>Data Resolution</b> | 0 to 1,000 |

### Analog Input

|                        |   |
|------------------------|---|
| <b>Points</b>          | 1   |
| <b>Input Range</b>     | 0 to 10 V   |
| <b>Data Resolution</b> | 0 to 4,095  |
| <b>Input Impedance</b> | Approx. 100 kΩ  |
| <b>Error</b>           | ±1% of full scale (±5% of full scale when noise is applied) |

|                                    |  |
|------------------------------------|--|
| <b>Input Delay Time</b>            | 12 ms (including the software filter)            |
| <b>Maximum Allowed Steady Load</b> | 13 V   |
| <b>Isolation</b>                   | Not isolated                                     |
| <b>Cable</b>                       | Unshielded cable 1 m (included with the product) |

**Run/Stop Methods**

- Power on/off
- WindLDR RUN/STOP command
- Function switch operation
- Special internal relay (M8000) operation
- Operation of stop input and reset input

**USB Port**

|   |   |
|---|---|
| <b>Points</b>   | 1   |
| <b>Communication Type</b>                             | USB2.0 Full speed, CDC class  |
| <b>Communication Functions</b>                        | Capable of maintenance communication with a PC                                      |
| <b>Connector</b>                                      | USB mini-B  |
| <b>Isolation between Internal Circuit</b>             | Not isolated  |
| <b>Available Function when FC6A is Powered by USB</b> | Downloading/uploading user programs, downloading system software, data file manager |

**Ethernet Port**

|   |   |
|---|---|
| <b>Points</b>                             | 2<br>(When the HMI module is connected, this can be expanded by 1 point with the Ethernet port that has the web server function.)   |
| <b>Communication Type</b>                 | IEEE 802.3 compliant  |
| <b>Communication Speed</b>                | 10BASE-T, 100BASE-TX  |
| <b>Communication Functions</b>            | <b>Port 1</b><br>Maintenance communication server,<br>User communication server/client (TCP/UDP),<br>Modbus TCP server/client,<br>MC protocol client,<br>PING, SNTP, e-mail, web server, FTP server/client, BACnet/IP |
|   | <b>Port 2</b><br>Maintenance communication server,<br>User communication server/client (TCP/UDP),<br>Modbus TCP server/client,<br>MC protocol client,<br>PING, EtherNet/IP communication                              |
| <b>Connector</b>                          | RJ45 (Auto MDI/MDI-X compatible)  |
| <b>Cable</b>                              | CAT 5 or higher, STP  |
| <b>Maximum Cable Length</b>               | 100 m   |
| <b>Isolation between Internal Circuit</b> | Pulse transformer isolated  |

**SD Memory Card Slot**

|                                     |  |
|-------------------------------------|--|
| <b>Points</b>                       | 1  |
| <b>Supported SD Card</b>            | SD memory cards (max 2 GB), SDHC memory cards (max 32 GB)  |
| <b>File System</b>                  | FAT16, FAT32   |
| <b>Function</b>                     | Downloading/uploading user programs, saving log data, recipes, downloading system software, saving web pages |
| <b>Insertion/Removal Durability</b> | 2,000 times  |

**Communication Connector**

|   |                       |  |
|---|-----------------------|--|
| <b>Cartridge Base Module Connection*1</b> | <b>No. of Modules</b> | 1<br>(Two cartridges can be connected to the cartridge base module when it is connected to the Plus CPU module.) |
| <b>HMI Module Connection*1</b>            | <b>No. of Modules</b> | 1<br>(One cartridge can be connected to the HMI module when it is connected to the Plus CPU module.)             |

## 2: PRODUCT SPECIFICATIONS

\*1 All devices that are connectable to the communication connector cannot be used in expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C). Do not connect these devices when the product is used in expanded ambient operating temperatures.

### DC Input Specifications

#### ■ 24V DC Power Type

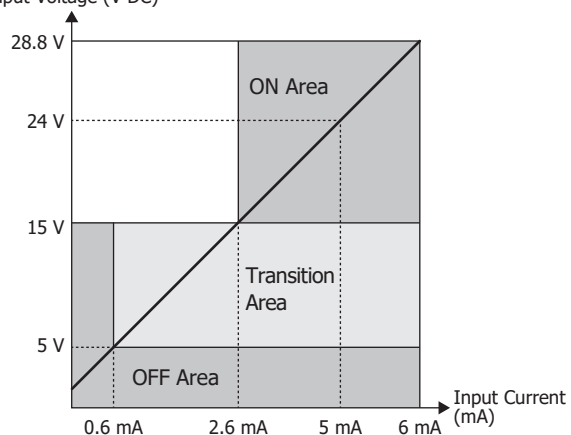
|                                       |                              |  |                                 |  |  |
|---------------------------------------|------------------------------|--|---------------------------------|--|--|
| Type No.                              |                              | FC6A-D16R1CEE, FC6A-D16R4CEE<br>FC6A-D16K1CEE, FC6A-D16K4CEE<br>FC6A-D16P1CEE, FC6A-D16P4CEE   |                                 | FC6A-D32K3CEE, FC6A-D32K4CEE<br>FC6A-D32P3CEE, FC6A-D32P4CEE |  |
| Rated Input Voltage                   |                              | 24V DC shared sink/source  |                                 |  |  |
| Input Voltage Range                   |                              | 20.4 to 28.8V DC   |                                 |  |  |
| Rated Input Current                   | I0, I1, I3, I4, I6, I7       | 5 mA/point (at 24V DC)   |                                 |  |  |
|                                       | I2, I5, I10 to I17           | 7 mA/point (at 24V DC)   |                                 |  |  |
| Terminal Arrangement                  |                              | See "24V DC Power Type" on page 2-64.  |                                 |  |  |
| Input Impedance                       | I0, I1, I3, I4, I6, I7       | 4.9 kΩ   |                                 |  |  |
|                                       | I2, I5, I10 to I17           | 3.4 kΩ   |                                 |  |  |
| Input Delay Time                      | Turn ON Time                 | I0, I1, I3, I4, I6, I7   | 5 μs + software filter setting  |  |  |
|                                       |                              | I2, I5   | 35 μs + software filter setting |  |  |
|                                       |                              | I10 to I13   | —                               | 35 μs + software filter setting                              |  |
|                                       |                              | I14 to I17   | —                               | 4.1 ms   |  |
|                                       | Turn OFF Time                | I0, I1, I3, I4, I6, I7   | 5 μs + software filter setting  |  |  |
|                                       |                              | I2, I5   | 35 μs + software filter setting |  |  |
|                                       |                              | I10 to I13   | —                               | 35 μs + software filter setting                              |  |
|                                       |                              | I14 to I17   | —                               | 4.1 ms   |  |
| Quantity of Inputs                    |                              | 8 points in 1 common line  |                                 | 16 points in 1 common line                                   |  |
| Isolation                             | Between Input Terminals      | Not isolated   |                                 |  |  |
|                                       | Internal circuit             | Photocoupler isolated  |                                 |  |  |
| Input Type                            |                              | Type1 (IEC61131-2)   |                                 |  |  |
| External Load for I/O Interconnection |                              | Not needed   |                                 |  |  |
| Signal Determination Method           |                              | Static   |                                 |  |  |
| Effect of Improper Input Connection   |                              | Even if wiring for sink or source connection is incorrect, no damages are caused. However, if high voltage is applied that exceeds the input voltage range, there is a risk of permanent damage. |                                 |  |  |
| Cable Length                          |                              | 3 m  |                                 |  |  |
| I/O Terminal Connector                | Type                         | See "24V DC Power Type" on page 2-64.  |                                 |  |  |
|                                       | Insertion/Removal Durability | 100 times minimum  |                                 |  |  |



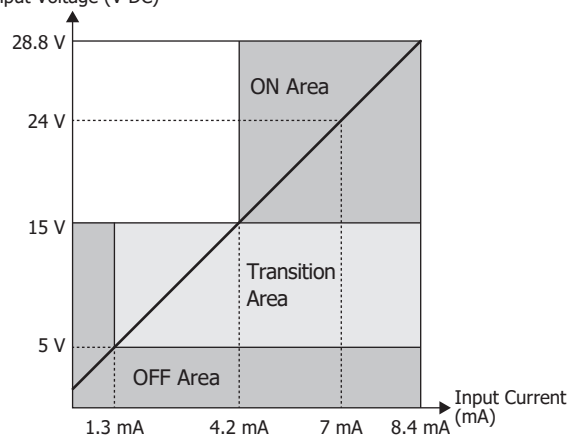
### Operating Ranges

The operating range of Type 1 (IEC 61131-2) DC input is as follows.

Input Voltage (V DC) I0, I1, I3, I4, I6, I7

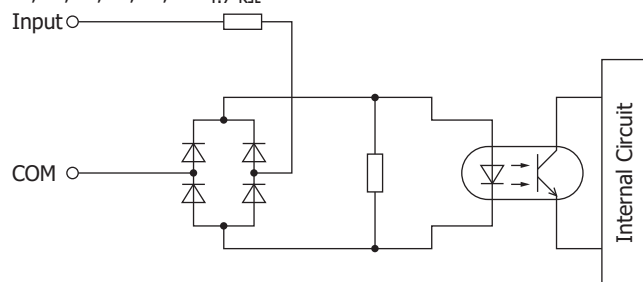


Input Voltage (V DC) I2, I5, I10 to I17

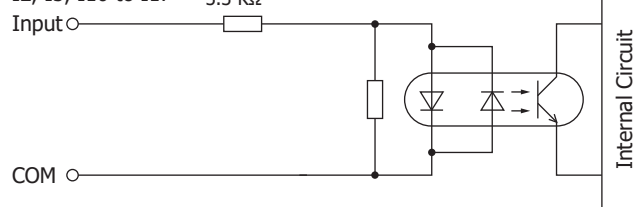


### Input Internal Circuit

I0, I1, I3, I4, I6, I7 4.7 kΩ



I2, I5, I10 to I17 3.3 kΩ



## 2: PRODUCT SPECIFICATIONS

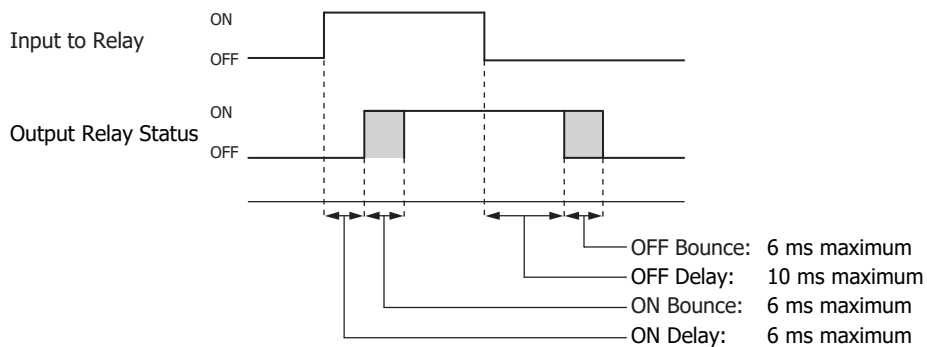
### Relay Output Specifications

#### ■ 24V DC Power Type

| Type No.                      |  | FC6A-D16R1CEE, FC6A-D16R4CEE                                   |
|-------------------------------|--|--|
| No. of Outputs                |  | 8  |
| Output Points per Common Line | COM1   | 4  |
|                               | COM2   | 4  |
| Terminal Arrangement          |  | See "24V DC Power Type" on page 2-64.                          |
| Output Type                   |  | 1a contact   |
| Maximum Load Current *1       | 1  | 2 A maximum  |
|                               | 1 Common                                     | 7 A maximum  |
| Minimum Switching Load        |  | 1.0 mA/5.0V DC (reference value)                               |
| Initial Contact Resistance    |  | 30 mΩ or lower   |
| Electrical Life               |  | 100,000 operations minimum (rated load 1,800 operations/hour)  |
| Mechanical Life               |  | 20,000,000 operations minimum (no load 18,000 operations/hour) |
| Rated Load *1                 |  | 240V AC 2 A, 30V DC 2 A  |
| Withstand Voltage             | Between Output Terminal and FE               | 2,300V AC, 1 minute  |
|                               | Between Output Terminal and Internal Circuit | 2,300V AC, 1 minute  |
|                               | Between Output Terminals (COMs)              | 2,300V AC, 1 minute  |
| I/O Terminal Connector        | Type   | See "24V DC Power Type" on page 2-64.                          |
|                               | Insertion/Removal Durability                 | 100 times minimum  |

\*1 Values for resistive/inductive load.

### Output Delay

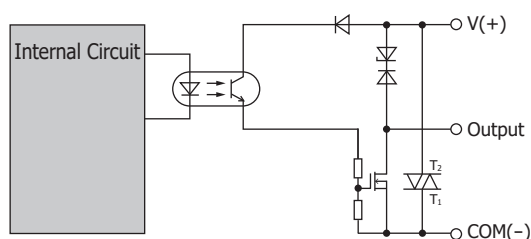


## Transistor Sink Output Specifications

## ■ 24V DC Power Type

| Type No.                      |  | FC6A-D16K1CEE, FC6A-D16K4CEE                                 | FC6A-D32K3CEE, FC6A-D32K4CEE                                   |
|-------------------------------|--|--|--|
| Output Points                 |  | 8  | 16   |
| Output Points per Common Line |  | 8  | 16   |
| Rated Load Voltage            |  | 24V DC   |  |
| Operating Load Voltage Range  |  | 20.4 to 28.8V DC   |  |
| Terminal Arrangement          |  | See "24V DC Power Type" on page 2-64.                        |  |
| Maximum Load Current          | 1  | 0.5 A maximum  | 0.1 A maximum  |
|                               | 1 Common                                     | 4 A maximum  | 1.6 A maximum  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON |  |
| Maximum Inrush Current        |  | 1 A  | 0.2 A  |
| Leakage Current               |  | 0.1 mA maximum   |  |
| Clamping Voltage              |  | 39 V $\pm$ 1 V   |  |
| Maximum Lamp Load             |  | 12 W   | 2.4 W  |
| Inductive Load                |  | L/R = 10 ms (28.8V DC, 1 Hz)                                 |  |
| External Current Draw         |  | 100 mA maximum, 24V DC (+V terminal supply power)            |  |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated  |  |
|                               | Between Output Terminals                     | Not isolated   |  |
| I/O Terminal Connector        | Type   | See "24V DC Power Type" on page 2-64.                        |  |
|                               | Insertion/Removal Durability                 | 100 times minimum  |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q7: 5 $\mu$ s or less                                  | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |
|                               | Turn OFF Time                                | Q0 to Q7: 5 $\mu$ s or less                                  | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |

## Output Internal Circuit

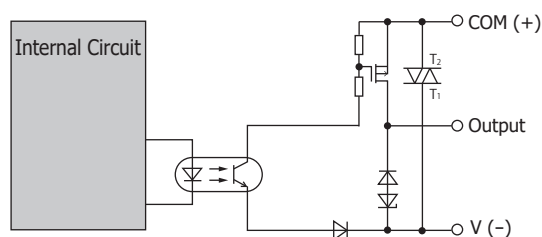


### Transistor Protection Source Output Specifications

#### ■ 24V DC Power Type

| Type No.                      |  | FC6A-D16P1CEE, FC6A-D16P4CEE   | FC6A-D32P3CEE, FC6A-D32P4CEE                                   |
|-------------------------------|--|--|--|
| Output Points                 |  | 8  | 16   |
| Output Points per Common Line |  | 8  | 16   |
| Rated Load Voltage            |  | 24V DC   |  |
| Operating Load Voltage Range  |  | 20.4 to 28.8V DC   |  |
| Terminal Arrangement          |  | See "24V DC Power Type" on page 2-64.  |  |
| Maximum Load Current          | 1  | 0.5 A maximum  | 0.1 A maximum  |
|                               | 1 Common                                     | 4 A maximum  | 1.6 A maximum  |
| Voltage Drop (ON Voltage)     |  | 1 V or less, voltage between COM and output terminal when ON   |  |
| Maximum Inrush Current        |  | 1 A  | 0.2 A  |
| Leakage Current               |  | 0.1 mA maximum   |  |
| Clamping Voltage              |  | 39 V $\pm$ 1 V   |  |
| Maximum Lamp Load             |  | 12 W   | 2.4 W  |
| Inductive Load                |  | L/R = 10 ms (28.8V DC, 1 Hz)   |  |
| External Current Draw         |  | 100 mA maximum, 24V DC (-V terminal supply power)  |  |
| Output Protection Functions   |  | Overcurrent protection function (not a thermal shutdown function).<br>Overcurrent detected with 4 outputs as 1 group. (Group 1: Q0 to Q3, Group 2: Q4 to Q7, Group 3: Q10 to Q13, Group 4: Q14 to Q17)<br>When overcurrent is detected, the 4 outputs in the corresponding group are turned off for a fixed period (1 s). When overcurrent is detected, a special internal relay turns on (M8172 to M8175) and the error LED [ERR] turns on. |  |
| Output Current Limit Value    |  | 1.0 to 2.0 A   | 0.2 to 0.3 A   |
| Isolation                     | Between Output Terminal and Internal Circuit | Photocoupler isolated  |  |
|                               | Between Output Terminals                     | Not isolated   |  |
| I/O Terminal Connector        | Type   | See "24V DC Power Type" on page 2-64.  |  |
|                               | Insertion/Removal Durability                 | 100 times minimum  |  |
| Output Delay                  | Turn ON Time                                 | Q0 to Q7: 5 $\mu$ s or less  | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |
|                               | Turn OFF Time                                | Q0 to Q7: 5 $\mu$ s or less  | Q0 to Q7: 5 $\mu$ s or less<br>Q10 to Q17: 300 $\mu$ s or less |

#### Output Internal Circuit



(The overcurrent detection circuit has been omitted.)

**Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 45°C or higher, reduce the input voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

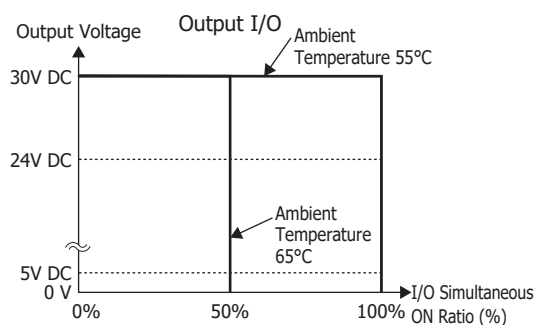
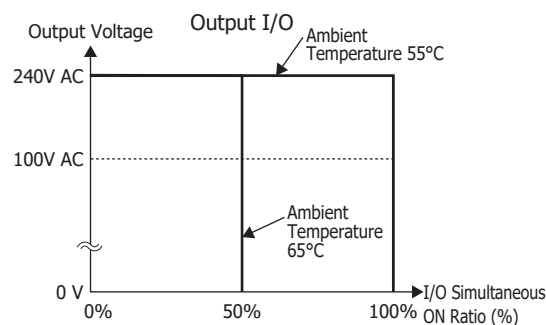
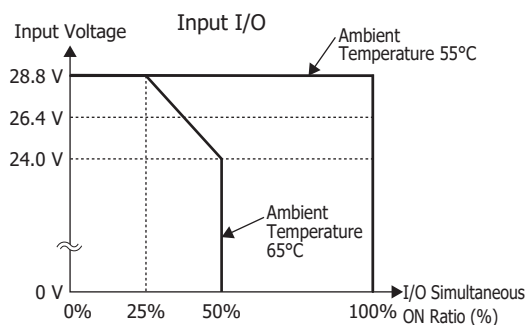
**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

**■ Relay Output Type**

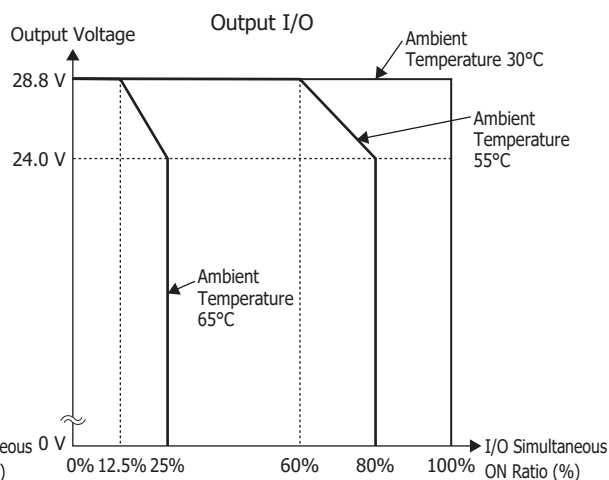
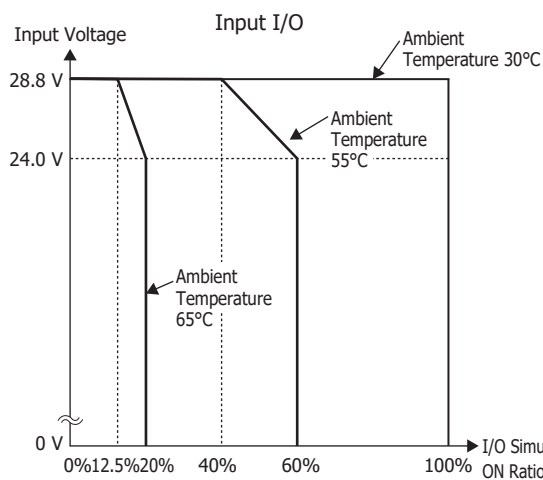
(FC6A-D16R1CEE, FC6A-D16R4CEE)

Reduce the input voltage, output voltage, and I/O simultaneous ON ratio as shown in the following diagrams.

**■ Transistor Output Type**

(FC6A-D16K1CEE, FC6A-D16P1CEE, FC6A-D32K1CEE, FC6A-D32P1CEE, FC6A-D16K4CEE, FC6A-D16P4CEE, FC6A-D32K4CEE, FC6A-D32P4CEE)

Reduce the input voltage, output voltage, and I/O simultaneous ON ratio as shown in the following diagrams.



2: PRODUCT SPECIFICATIONS

Terminal Arrangement and Wiring Examples

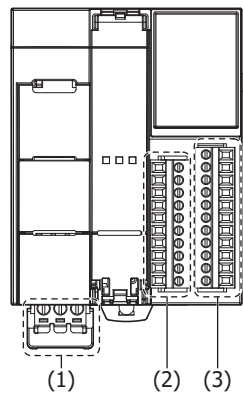
■ 24V DC Power Type

Plus 16-I/O type:      Screw fastened type: FC6A-C16R1CEE, FC6A-D16K1CEE, FC6A-D16P1CEE  
                                 Push-in type:                FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE

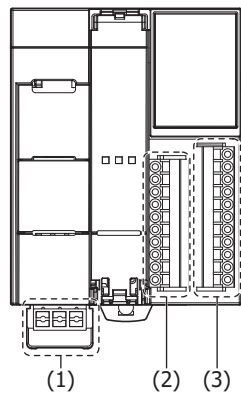
Applicable connector

|                            |                                     |                     |              |
|----------------------------|-------------------------------------|---------------------|--------------|
| (1) Power supply terminals |                                     | Screw fastened type | FC6A-PMTD03  |
|                            |                                     | Push-in type        | FC6A-PMSDC03 |
| (2) Input terminals        |                                     | Screw fastened type | FC6A-PMTCN10 |
|                            |                                     | Push-in type        | FC6A-PMSCN10 |
| (3) Output terminals       | Relay output                        | Screw fastened type | FC6A-PMTCR11 |
|                            |                                     | Push-in type        | FC6A-PMSCR11 |
|                            | Transistor sink output              | Screw fastened type | FC6A-PMTCR11 |
|                            |                                     | Push-in type        | FC6A-PMSCR11 |
|                            | Transistor protection source output | Screw fastened type | FC6A-PMTCR11 |
|                            |                                     | Push-in type        | FC6A-PMSCR11 |

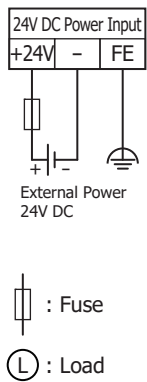
Screw fastened type



Push-in type

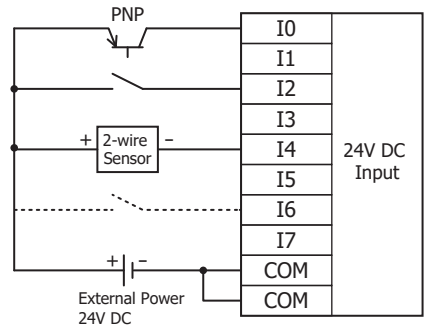


(1) Power supply terminals

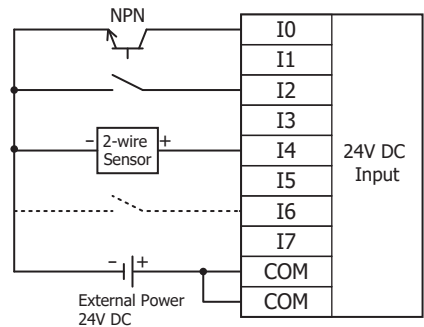


(2) Input terminals

DC Sink Input Wiring

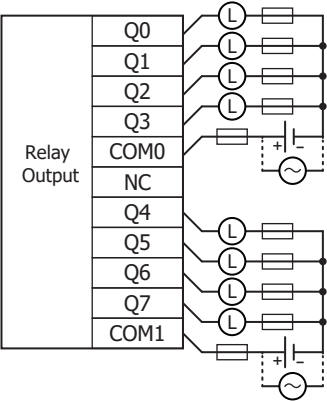


DC Source Input Wiring

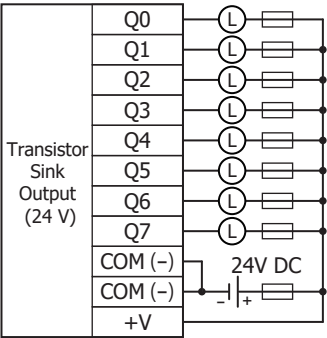


(3) Output terminals

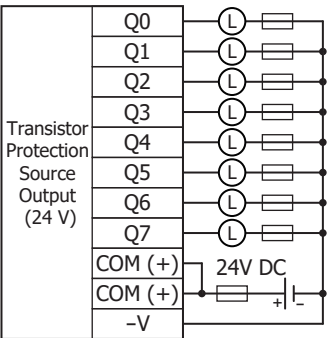
Relay Output:  
FC6A-D16R1CEE, FC6A-D16R4CEE



Transistor Sink Output:  
FC6A-D16K1CEE, FC6A-D16K4CEE



Transistor Protection Source Output:  
FC6A-D16P1CEE, FC6A-D16P4CEE



2: PRODUCT SPECIFICATIONS

Plus 32-I/O type: Screw fastened type: FC6A-D32K3CEE, FC6A-D32P3CEE  
Push-in type: FC6A-D32K4CEE, FC6A-D32P4CEE

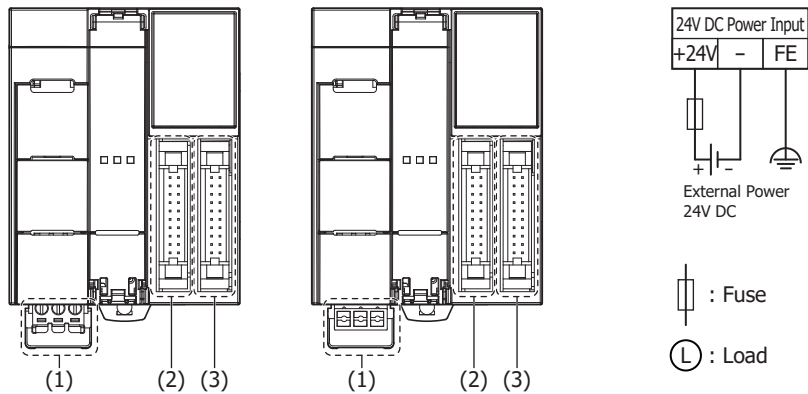
Applicable connector

|                            |                     |              |
|----------------------------|---------------------|--------------|
| (1) Power supply terminals | Screw fastened type | FC6A-PMTD03  |
|                            | Push-in type        | FC6A-PMSDC03 |
| (2) Input terminals        |                     | FC4A-PMC20   |
| (3) Output terminals       |                     | FC4A-PMC20   |

Screw fastened type

Push-in type

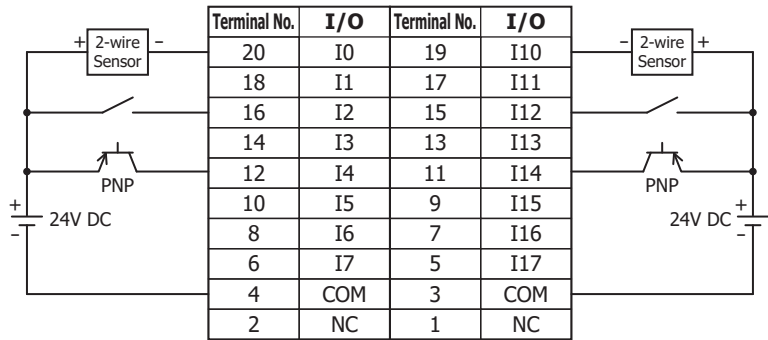
(1) Power supply terminals



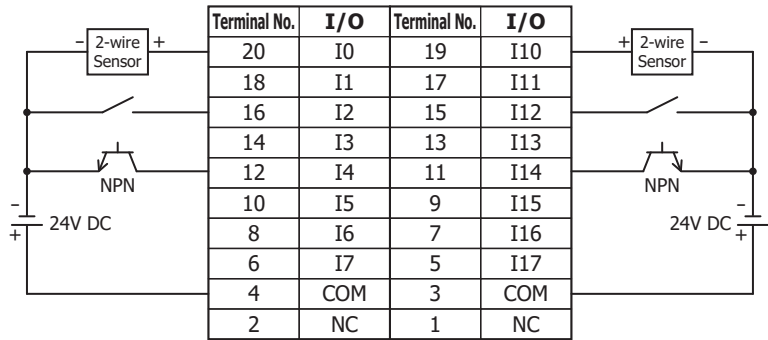
(2) Input terminals

The two COM lines are each connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18. For the connector cable, see "Cables" on page A-14.

DC Sink Input Wiring



DC Source Input Wiring





**(3) Output terminals**

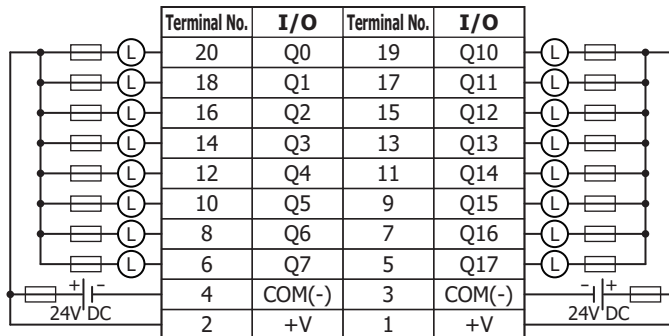
The two COM(+) and COM(-) lines are each connected in the module.

The two +V and -V lines are each connected in the module.

For wiring precautions, see "Input/Output Wiring" on page 3-18.

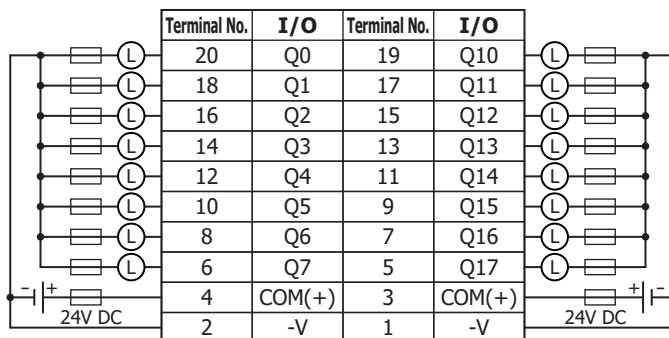
For the connector cable, see "Cables" on page A-14.

Transistor sink output type: FC6A-D32K3CEE, FC6A-D32K4CEE



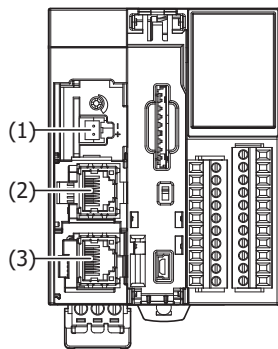
Insert a fuse that corresponds to the load.

Transistor Protection Source Output Type: FC6A-D32P3CEE, FC6A-D32P4CEE

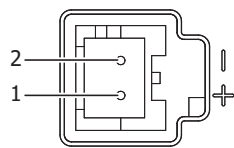


Insert a fuse that corresponds to the load.

Other Inputs and Ports

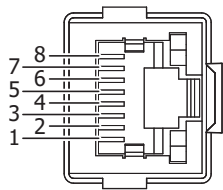


(1) Analog input



| No. | Signal Wire | Cable Color |
|-----|-------------|-------------|
| 1   | AN(+)       | Red         |
| 2   | AN(-)       | Black       |

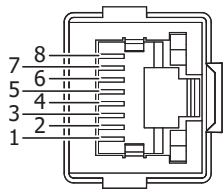
(2) Ethernet Port 1



| No.     | Signal Wire |
|---------|-------------|
| 1       | TPO+        |
| 2       | TPO-        |
| 3       | TPI+        |
| 4       | —           |
| 5       | —           |
| 6       | TPI-        |
| 7       | —           |
| 8       | —           |
| Shell*1 | Shield      |

\*1 Shell is connected to FE on the power supply terminals.

(3) Ethernet Port 2



| No.     | Signal Wire |
|---------|-------------|
| 1       | TPO+        |
| 2       | TPO-        |
| 3       | TPI+        |
| 4       | —           |
| 5       | —           |
| 6       | TPI-        |
| 7       | —           |
| 8       | —           |
| Shell*1 | Shield      |

\*1 Shell is connected to FE on the power supply terminals.

## Digital I/O Modules

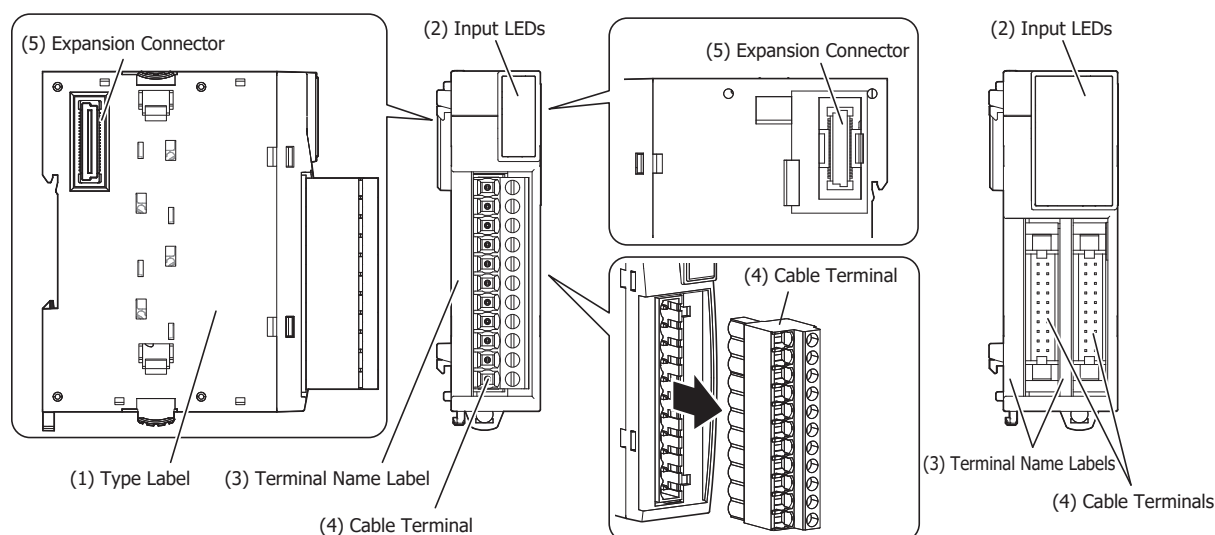
Digital I/O modules are available as three types of modules: digital input modules equipped with input terminals, digital output modules equipped with output terminals, and digital mixed I/O modules equipped with both input and output terminals.

### Digital Input Module

#### Parts Description

Example: FC6A-N08B1

Example: FC6A-N32B3



#### (1) Type Label

Indicates the digital input module type number and specifications.

#### (2) Input LEDs

These LEDs turn on when an input is on.

#### (3) Terminal Name Label

Indicates terminal numbers.

#### (4) Cable Terminal

Three types of terminals are separately available: the terminal block type (3.81 mm pitch), the terminal block type (5.08 mm pitch), and the connector type.

#### (5) Expansion Connector

Connects the expansion modules and the CPU module.

### Model List

#### ■ DC Input Modules

| Cable Terminal Type                 |                     | DC Input 8 Points | DC Input 16 Points | DC Input 32 Points |
|-------------------------------------|---------------------|-------------------|--------------------|--------------------|
| Terminal block type (5.08 mm pitch) | Screw fastened type | FC6A-N08B1        | —                  | —                  |
|                                     | Push-in type        | FC6A-N08B4        |                    |                    |
| Terminal block type (3.81 mm pitch) | Screw fastened type | —                 | FC6A-N16B1         | —                  |
|                                     | Push-in type        | —                 | FC6A-B16B4         |                    |
| Connector type                      |                     | —                 | FC6A-N16B3         | FC6A-N32B3         |

#### ■ AC Input Modules

| Cable Terminal Type                 |                     | AC Input 8 Points |
|-------------------------------------|---------------------|-------------------|
| Terminal block type (5.08 mm pitch) | Screw fastened type | FC6A-N08A11       |
|                                     | Push-in type        | FC6A-N08A14       |

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

#### ■ DC Input Module Specifications

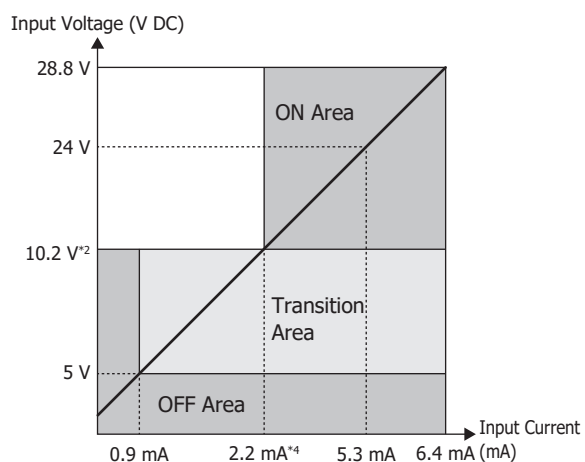
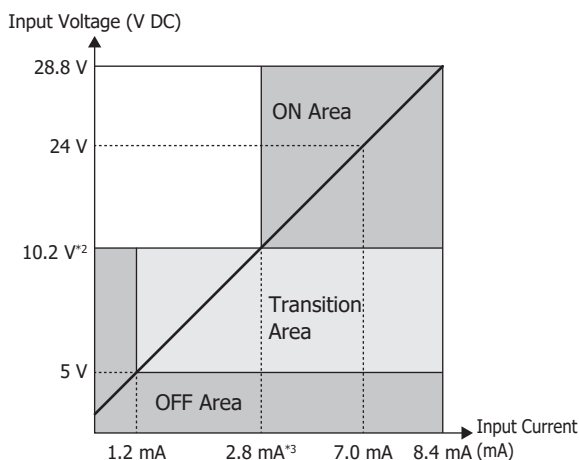
| Type No.                              |                              | FC6A-N08B1<br>FC6A-N08B4  | FC6A-N16B1<br>FC6A-N16B4              | FC6A-N16B3                                       | FC6A-N32B3                      |
|---------------------------------------|------------------------------|---|---------------------------------------|--|---------------------------------|
| Rated Input Voltage                   |                              | 12/24V DC <sup>*1</sup> shared sink/source  |                                       |  |                                 |
| Operating Load Voltage Range          |                              | 0.0 to 28.8V DC   |                                       |  |                                 |
| Rated Input Current                   |                              | 3.5 mA/point (at 12V DC), 7 mA/point (at 24V DC)  |                                       | 2.5 mA/point (at 12V DC), 5 mA/point (at 24V DC) |                                 |
| Input Points                          |                              | 8 (8 points in 1 common line)   | 16 (16 points in 1 common line)       |  | 32 (16 points in 1 common line) |
| Terminal Arrangement                  |                              | See 2-74  | See 2-75                              | See 2-77   | See 2-78                        |
| Input Impedance                       |                              | 3.4 kΩ  |                                       | 4.4 kΩ   |                                 |
| Input Delay Time (24V DC)             | Turn ON Time                 | 4.1 ms  |                                       |  |                                 |
|                                       | Turn OFF Time                | 4.1 ms  |                                       |  |                                 |
| Isolation                             | Between Channels             | Not isolated  |                                       |  |                                 |
|                                       | Internal Circuit             | Photocoupler isolated   |                                       |  |                                 |
| External Load for I/O Interconnection |                              | Not needed  |                                       |  |                                 |
| Signal Determination Method           |                              | Static  |                                       |  |                                 |
| Effect of Improper Input Connection   |                              | Even if wiring for sink or source connection is incorrect, no damages are caused.<br>If any input exceeding the rated value is applied, permanent damage may be caused. |                                       |  |                                 |
| Cable Length                          |                              | 3 m   |                                       |  |                                 |
| Connector                             | Insertion/Removal Durability | 100 times minimum   |                                       |  |                                 |
| Internal Current Draw                 | All Points ON                | 30 mA (5V DC)<br>0 mA (24V DC)  | 40 mA (5V DC)<br>0 mA (24V DC)        |  | 65 mA (5V DC)<br>0 mA (24V DC)  |
|                                       | All Points OFF               | 17 mA (5V DC)<br>0 mA (24V DC)  |                                       |  |                                 |
| Weight (approx.)                      |                              | FC6A-N08B1: 110 g<br>FC6A-N08B4: 95 g   | FC6A-N16B1: 105 g<br>FC6A-N16B4: 95 g | 75 g   | 110 g                           |

\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

#### Operating Ranges

The operating range of Type 1 (IEC 61131-2) DC input modules is as follows.

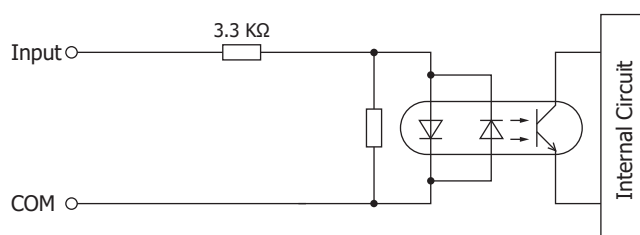
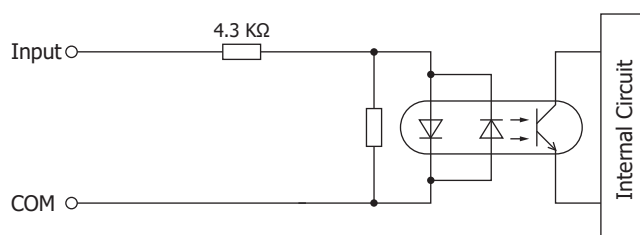
#### FC6A-N08B1, FC6A-N08B4, FC6A-N16B1, FC6A-N16B4 FC6A-N16B3, FC6A-N32B3



\*2 15 V for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

\*3 4.2 mA for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

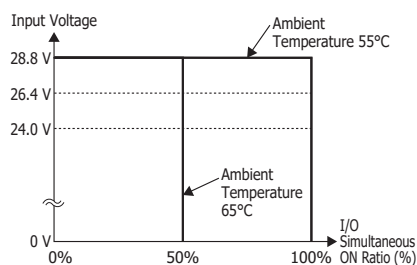
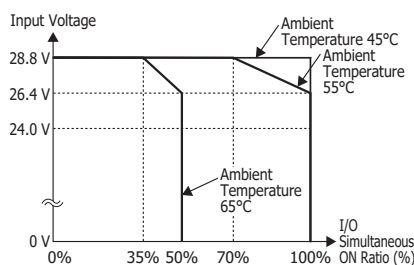
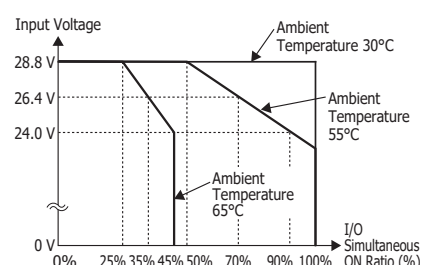
\*4 3.2 mA for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

**Input Internal Circuit****FC6A-N08B1, FC6A-N08B4, FC6A-N16B1, FC6A-N16B4****FC6A-N16B3, FC6A-N32B3****Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 30°C or higher, reduce the input voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

**FC6A-N08B1, FC6A-N08B4****FC6A-N16B1, FC6A-N16B4****FC6A-N16B3, FC6A-N32B3**

I/O Simultaneous ON Ratio (a%)

|                                   |  |  |
|-----------------------------------|--|--|
| <b>FC6A-N08B1,<br/>FC6A-N08B4</b> | <b>I0 to I7</b>                          | There are no usage restrictions for input and output I/O.  |
| <b>FC6A-N16B1,<br/>FC6A-N16B4</b> | <b>I0 to I7<br/>I10 to I17</b>           | Set the usage ratio of the inputs (ON status) to a% or lower according to the conditions in the above graph.   |
| <b>FC6A-N16B3</b>                 | <b>I0 to I7<br/>I10 to I17</b>           | Set the usage ratio of the inputs (ON status) to a% or lower according to the conditions in the above graph.   |
| <b>FC6A-N32B3</b>                 | <b>CN1<br/>I0 to I7<br/>I10 to I17</b>   | Set the usage ratio of the inputs (ON status) to a% or lower according to the conditions in the above graph.*1 |
|                                   | <b>CN2<br/>I20 to I27<br/>I30 to I37</b> | Set the usage ratio of the inputs (ON status) to a% or lower according to the conditions in the above graph.*1 |

\*1 For the usage ratio of connector CN1 and CN2 inputs, set each to a% or lower.

## 2: PRODUCT SPECIFICATIONS

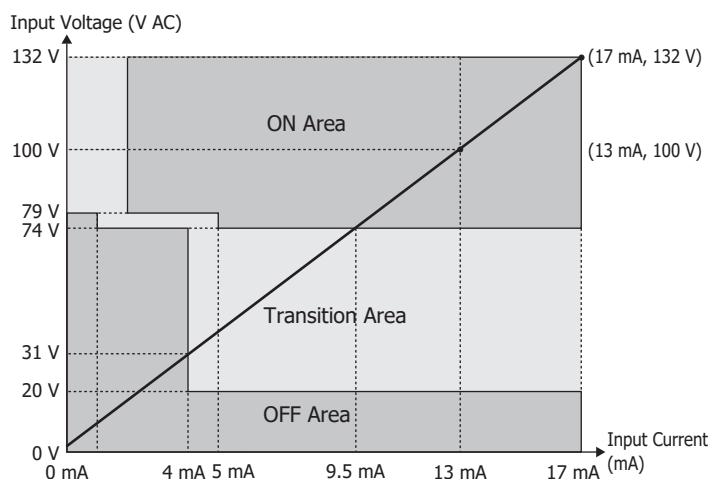
### ■ AC Input Module Specifications

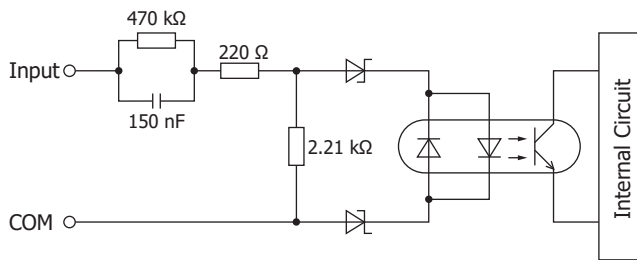
| Type No.                              |                                    | FC6A-N08A11, FC6A-N08A14  |
|---------------------------------------|------------------------------------|---|
| Rated Input Voltage                   |                                    | 100 to 120V AC  |
| Operating Load Voltage Range          |                                    | 0 to 132V AC  |
| Rated Power Frequency                 |                                    | 50/60 Hz  |
| Rated Input Current                   |                                    | 15 mA/1 point (at 120V AC, 50/60 Hz)  |
| Input Points                          |                                    | 8 points in 2 common lines  |
| Terminal Arrangement                  |                                    | See 2-79  |
| Input Type                            |                                    | AC input<br>Type 1, 2 (IEC 61131-2)   |
| Input Impedance                       |                                    | 8.0 kΩ (at 60 Hz)   |
| Input Delay Time                      | Turn ON Time                       | 25 ms   |
|                                       | Turn OFF Time                      | 30 ms   |
| Isolation                             | In the Same Common Channel         | Not isolated  |
|                                       | In Different Common Channels       | Isolated  |
|                                       | Between Input and Internal Circuit | Photocoupler isolated   |
| External Load for I/O Interconnection |                                    | Not needed  |
| Signal Determination Method           |                                    | Static  |
| Effect of Improper Input Connection   |                                    | If high voltage is applied that exceeds the input voltage range, there is a risk of permanent damage. |
| Connector                             | Insertion/Removal Durability       | 100 times minimum   |
| Internal Current Draw                 | All Points ON                      | 40 mA (5V DC)<br>0 mA (24V DC)  |
|                                       | All Points OFF                     | 17 mA (5V DC)<br>0 mA (24V DC)  |
| Weight (approx.)                      | FC6A-N08A11                        | 110 g   |
|                                       | FC6A-N08A14                        | 95 g  |

### Operating Ranges

The operating range of Type 1 and 2 (IEC 61131-2) AC input modules is as follows.

#### FC6-N08A11, FC6A-N08A14

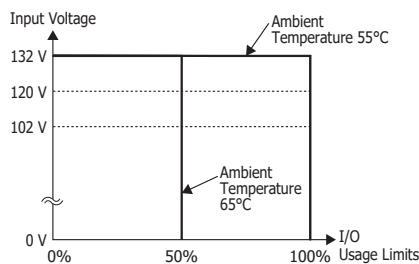


**Input Internal Circuit****FC6-N08A11, FC6A-N08A14****Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

- At conditions where the ambient temperature is 55°C and the input voltage is 132 V, the inputs can be 100% used.
- When the is used in an ambient temperature of 55°C or higher, reduce the input voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

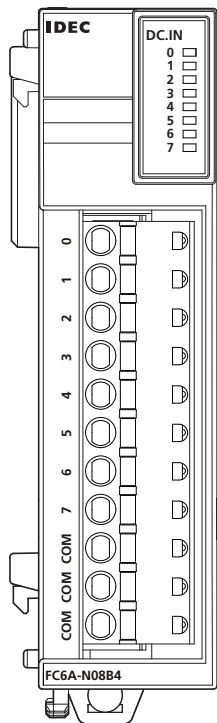
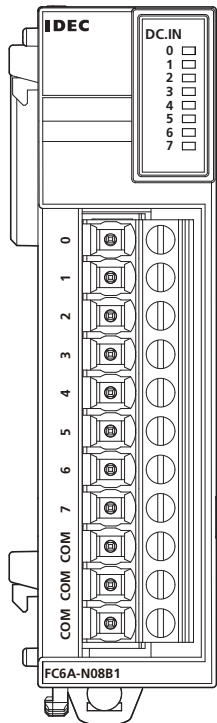
**FC6-N08A11, FC6A-N08A14**

Terminal Arrangement and Wiring Examples

■ FC6A-N08B1, FC6A-N08B4

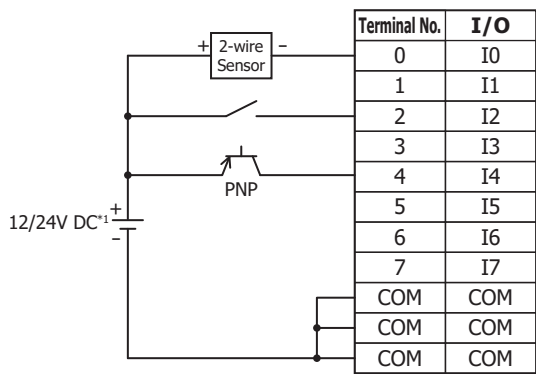
Screw fastened type: FC6A-N08B1  
Applicable connector: FC6A-PMTB11

Push-in type: FC6A-N08B4  
Applicable connector: FC6A-PMSB11

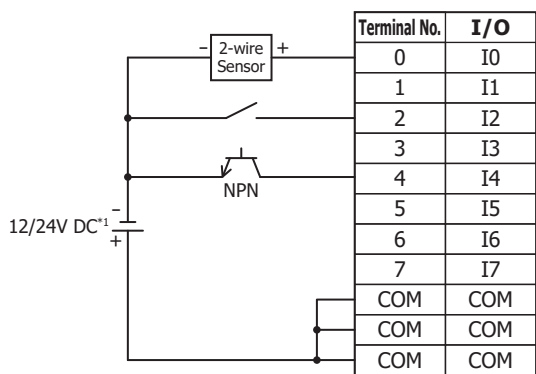


The 3 COM lines are connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

DC Sink Input Wiring Example



DC Source Input Wiring Example

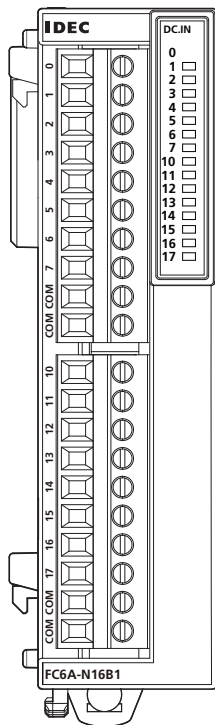


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

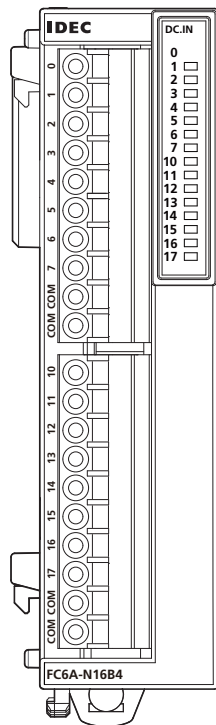


■ FC6A-N16B1, FC6A-N16B4

**Screw fastened type: FC6A-N16B1**  
Applicable connector: FC6A-PMTC10

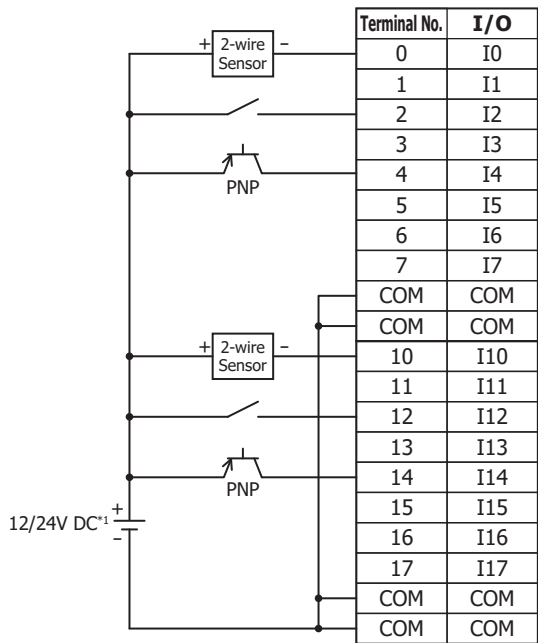


**Push-in type: FC6A-N16B4**  
Applicable connector: FC6A-PMSC10



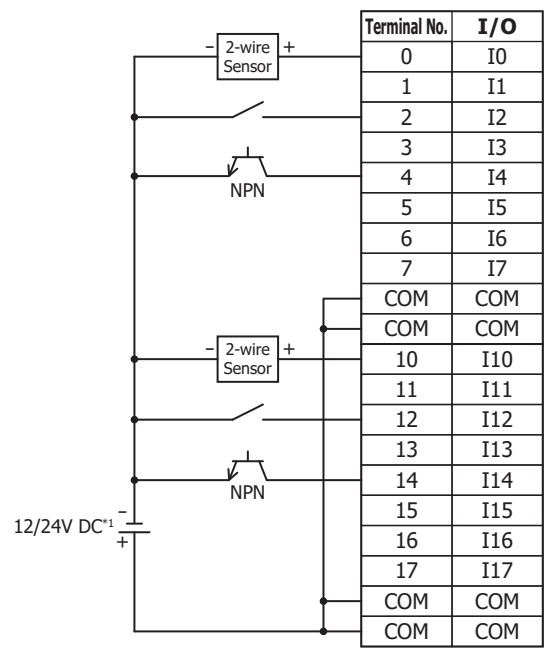
The 4 COM lines are connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

**DC Sink Input Wiring Example**



\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

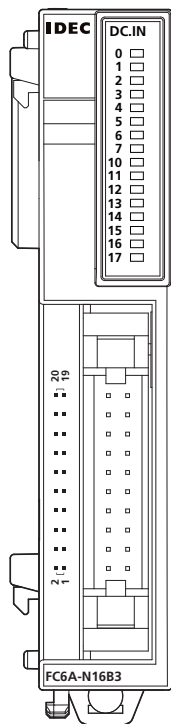
DC Source Input Wiring Example



\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

## ■ FC6A-N16B3

## Connector type

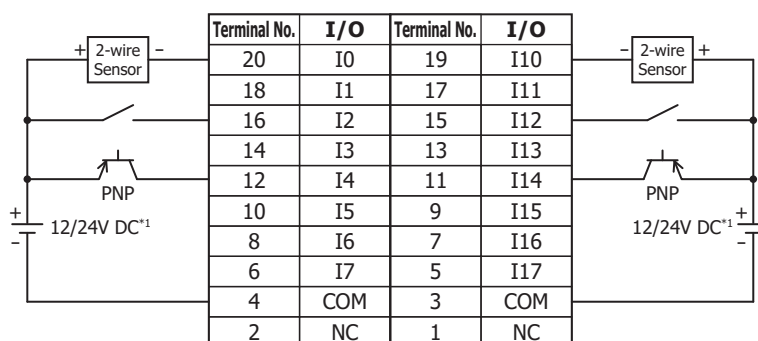


Applicable connector: FC4A-PMC20

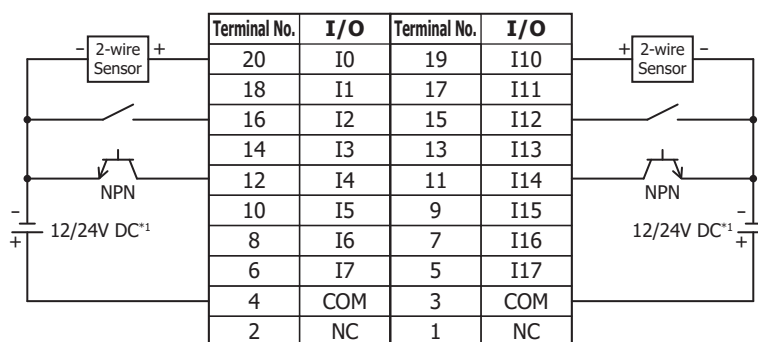
The two COM lines are each connected in the module.

For wiring precautions, see "Input/Output Wiring" on page 3-18. For the connector cable, see "Cables" on page A-14.

## DC Sink Input Wiring Example



## DC Source Input Wiring Example

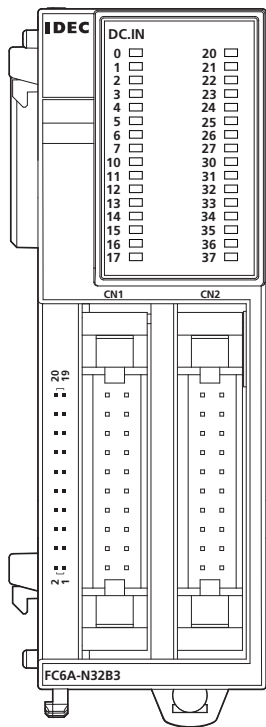


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

2: PRODUCT SPECIFICATIONS

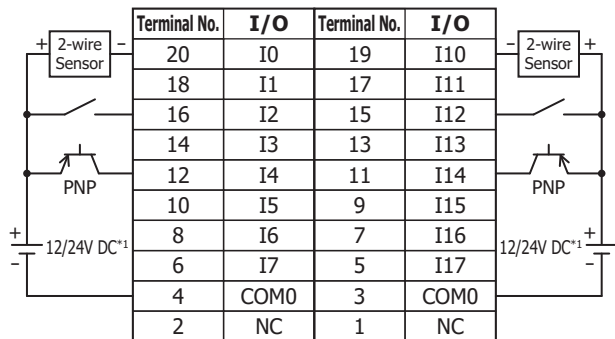
FC6A-N32B3

Connector type

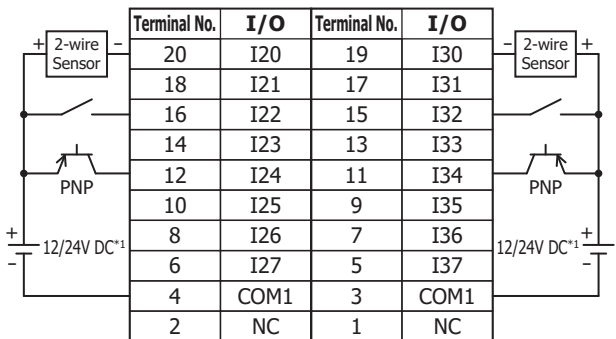


Applicable connector: FC4A-PMC20  
The two COM0 and COM1 lines are each connected in the module.  
Each of the terminals for COM0 and COM1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18. For the connector cable, see "Cables" on page A-14.

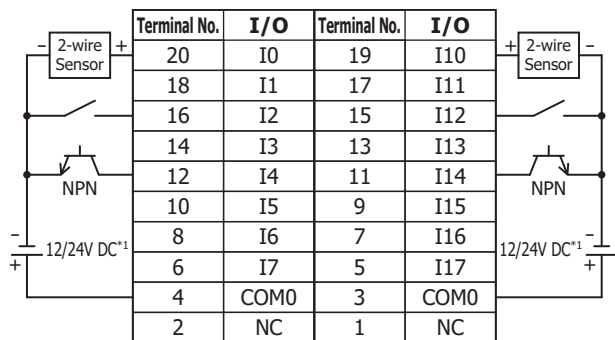
DC Sink Input Wiring Example  
CN1



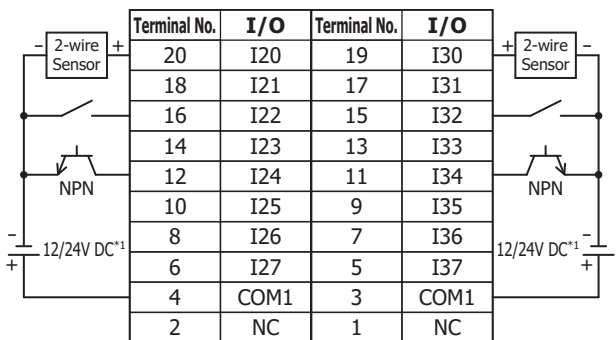
CN2



DC Source Input Wiring Example  
CN1



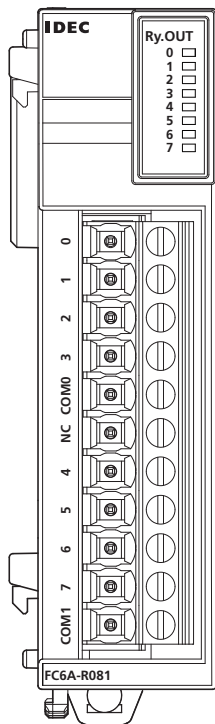
CN2



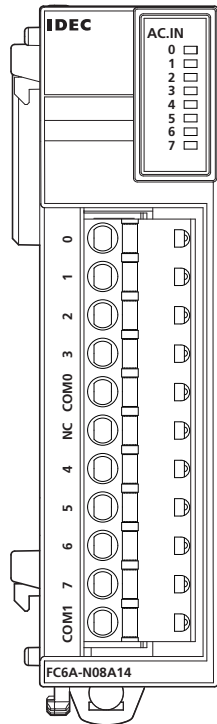
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-N08A11, FC6A-N08A14

**Screw fastened type: FC6A-N08A11**  
Applicable connector: FC6A-PMTB11

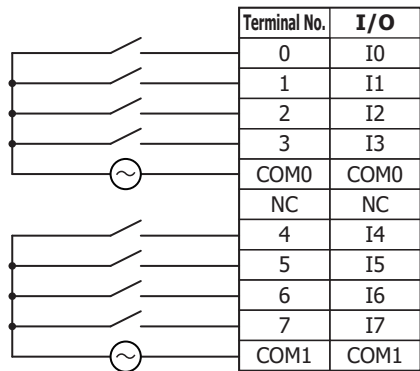


**Push-in type: FC6A-N08A14**  
Applicable connector: FC6A-PMSB11



Each of the terminals for COM0 and COM1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

**AC input wiring example**



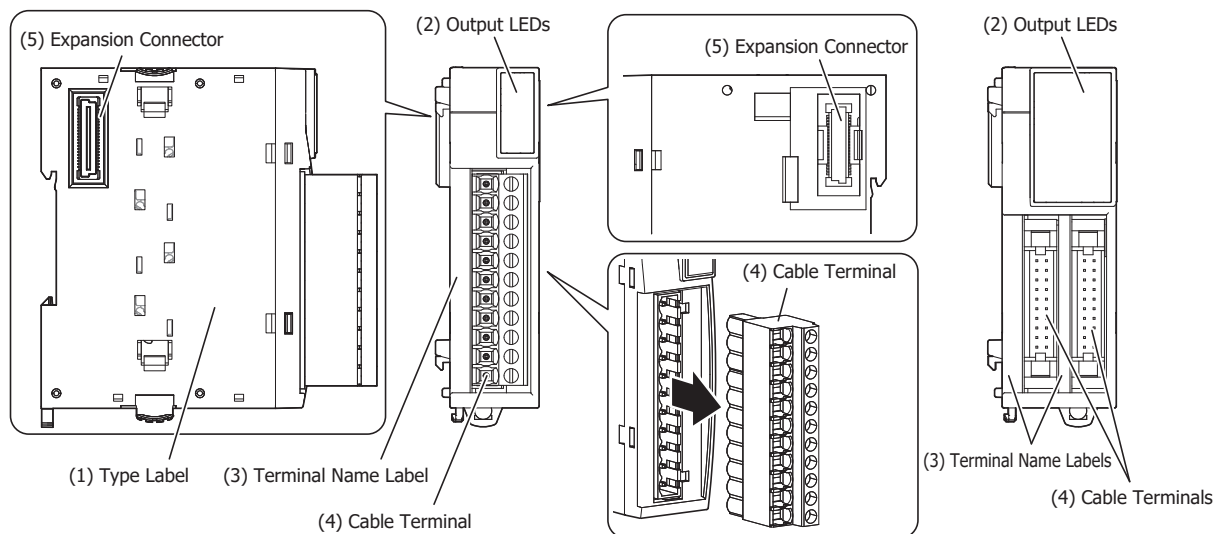
**Caution** Do not connect an external load.

### Digital Output Module

#### Parts Description

Example: FC6A-R081

Example: FC6A-T32K3



#### (1) Type Label

Indicates the digital output module type number and specifications.

#### (2) Output LEDs

These LEDs turn on when an output is on.

#### (3) Terminal Name Label

Indicates terminal numbers.

#### (4) Cable Terminal

Three types of terminals are separately available: the terminal block type (3.81 mm pitch), the terminal block type (5.08 mm pitch), and the connector type.

#### (5) Expansion Connector

Connects the expansion modules and the CPU module.

## Model List

### ■ Relay Output Modules

| Cable Terminal Type                    |                     | Relay Output 8 Points | Relay Output 16 Points |
|--|---------------------|-----------------------|------------------------|
| Terminal block type<br>(5.08 mm pitch) | Screw fastened type | FC6A-R081             | —                      |
|  | Push-in type        | FC6A-R084             |                        |
| Terminal block type<br>(3.81 mm pitch) | Screw fastened type | —                     | FC6A-R161              |
|  | Push-in type        |                       | FC6A-R164              |

### ■ Transistor Sink Output Modules

| Cable Terminal Type                    |                     | Tr Sink Output 8 Points | Tr Sink Output 16 Points | Tr Sink Output 32 Points |
|--|---------------------|-------------------------|--------------------------|--------------------------|
| Terminal block type<br>(5.08 mm pitch) | Screw fastened type | FC6A-T08K1              | —                        | —                        |
|  | Push-in type        | FC6A-T08K4              |                          |                          |
| Terminal block type<br>(3.81 mm pitch) | Screw fastened type | —                       | FC6A-T16K1               | —                        |
|  | Push-in type        |                         | FC6A-T16K4               |                          |
| Connector type                         |                     | —                       | FC6A-T16K3               | FC6A-T32K3               |

### ■ Transistor Source Output Modules

| Cable Terminal Type                    |                     | Tr Source Output 8 Points | Tr Source Output 16 Points | Tr Source Output 32 Points |
|--|---------------------|---------------------------|----------------------------|----------------------------|
| Terminal block type<br>(5.08 mm pitch) | Screw fastened type | FC6A-T08P1                | —                          | —                          |
|  | Push-in type        | FC6A-T08P4                |                            |                            |
| Terminal block type<br>(3.81 mm pitch) | Screw fastened type | —                         | FC6A-T16P1                 | —                          |
|  | Push-in type        |                           | FC6A-T16P4                 |                            |
| Connector type                         |                     | —                         | FC6A-T16P3                 | FC6A-T32P3                 |

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

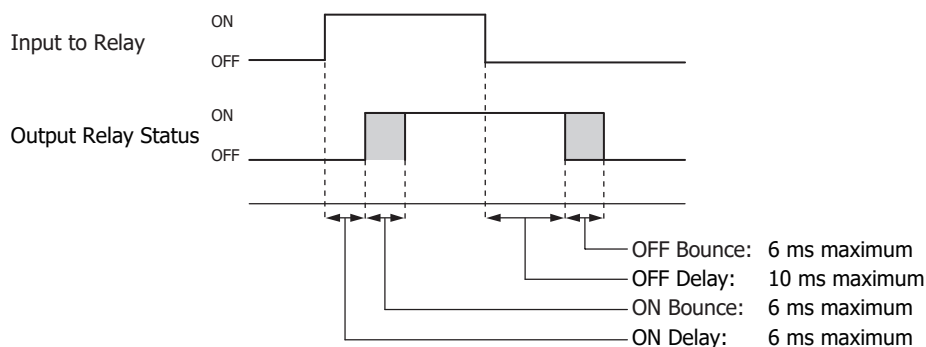
#### ■ Relay Output Module Specifications

| Type No.                     | FC6A-R081, FC6A-R084   |                                 | FC6A-R161, FC6A-R164                 |
|------------------------------|--|---------------------------------|--------------------------------------|
| No. of Outputs               | 8 (4 points in 1 common line)                                  |                                 | 16 (8 points in 1 common line)       |
| Output Type                  | 1a contact   |                                 |                                      |
| Terminal Arrangement         | See 2-88   |                                 | See 2-89                             |
| Load Current                 | 1  | 2 A maximum                     |                                      |
|                              | 1 Common   | 7 A maximum                     | 8 A maximum                          |
| Minimum Switching Load       | 1.0 mA/5.0V DC (reference value)                               |                                 |                                      |
| Initial Contact Resistance   | 30 mΩ or lower   |                                 |                                      |
| Electrical Life              | 100,000 operations minimum (rated load 1,800 operations/hour)  |                                 |                                      |
| Mechanical Life              | 20,000,000 operations minimum (no load 18,000 operations/hour) |                                 |                                      |
| Rated Load                   | 240V AC 2 A (resistive load, $\cos\phi=0.4$ inductive load)    |                                 |                                      |
|                              | 30V DC 2 A (resistive load, L/R=7 ms inductive load)           |                                 |                                      |
| Withstand Voltage            | Between Output Terminal and FE                                 | 2,300V AC 1 minute              |                                      |
|                              | Between Output Terminal and Internal Circuit                   | 2,300V AC 1 minute              |                                      |
|                              | Between Output Terminals (COMs)                                | 2,300V AC 1 minute              |                                      |
| Connector                    | Insertion/Removal Durability                                   | 100 times minimum               | 100 times minimum                    |
| Module Internal Current Draw | All Points ON  | 35 mA (5V DC)<br>50 mA (24V DC) | 50 mA (5V DC)<br>100 mA (24V DC)     |
|                              | All Points OFF   | 17 mA (5V DC)<br>0 mA (24V DC)  | 17 mA (5V DC)<br>0 mA (24V DC)       |
| Weight (approx.)             | FC6A-R081: 130 g<br>FC6A-R084: 115 g                           |                                 | FC6A-R161: 140 g<br>FC6A-R164: 130 g |

**Note:** When expanding the CPU module with relay output modules, there are limitations on the number of relays that can be simultaneously on. For details, see "Connection Restrictions When Expanding the PLC" on page 3-37.

If the maximum number of relays is exceeded, it may not be possible to turn on output relays.

#### Output Delay



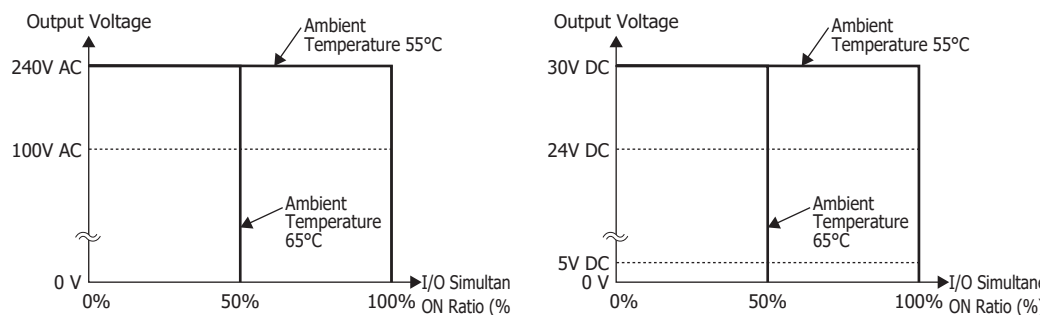


**Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 55°C or higher, reduce the output voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

**FC6A-R081, FC6A-R084, FC6A-R161, FC6A-R164**

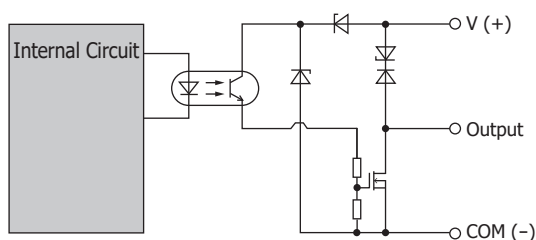
## 2: PRODUCT SPECIFICATIONS

### ■ Transistor Sink Output Module Specifications

| Type No.                     |  | FC6A-T08K1<br>FC6A-T08K4                                       | FC6A-T16K1<br>FC6A-T16K4              | FC6A-T16K3    | FC6A-T32K3                         |
|------------------------------|--|--|---------------------------------------|---------------|------------------------------------|
| Output Signal                |  | Transistor sink output   |                                       |               |                                    |
| Rated Load Voltage           |  | 12/24V DC*1  |                                       |               |                                    |
| Operating Load Voltage Range |  | 10.2 to 28.8V DC   |                                       |               |                                    |
| No. of Outputs               |  | 8<br>(8 points in 1 common line)                               | 16<br>(16 points in 1 common line)    |               | 32<br>(16 points in 1 common line) |
| Rated Load                   |  | 0.5 A 1 point  |                                       | 0.1 A 1 point |                                    |
| Terminal Arrangement         |  | See 2-90   | See 2-92                              | See 2-94      | See 2-95                           |
| Voltage Drop (ON Voltage)    |  | 0.4 V or less, voltage between COM and output terminal when ON |                                       |               |                                    |
| Allowed Inrush Current       |  | 1 A maximum  |                                       |               |                                    |
| Leakage Current              |  | 0.1 mA maximum   |                                       |               |                                    |
| Clamping Voltage             |  | 50 V   |                                       |               |                                    |
| Lamp Load                    |  | 12 W maximum   |                                       | 2.4 W maximum |                                    |
| Inductive Load               |  | L/R = 10 ms (28.8V DC, 1 Hz)                                   |                                       |               |                                    |
| External Current Draw        |  | 100 mA maximum, 24V DC (+V terminal supply power)              |                                       |               |                                    |
| Isolation                    | Between Output Terminal and Internal Circuit | Photocoupler isolated  |                                       |               |                                    |
|                              | Between Output Terminals                     | Not isolated   |                                       |               |                                    |
| Connector                    | Insertion/Removal Durability                 | 100 times minimum  |                                       |               |                                    |
| Internal Current Draw        | All Points ON                                | 25 mA (5V DC)<br>15 mA (24V DC)                                | 30 mA (5V DC)<br>25 mA (24V DC)       |               | 45 mA (5V DC)<br>50 mA (24V DC)    |
|                              | All Points OFF                               | 17 mA (5V DC)<br>0 mA (24V DC)                                 |                                       |               |                                    |
| Output Delay                 | Turn ON Time                                 | 450 μs or lower  |                                       |               |                                    |
|                              | Turn OFF Time                                | 450 μs or lower  |                                       |               |                                    |
| Weight (approx.)             |  | FC6A-T08K1: 110 g<br>FC6A-T08K4: 95 g                          | FC6A-T16K1: 105 g<br>FC6A-T16K4: 95 g | 70 g          | 115 g                              |

\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

### Output Internal Circuit

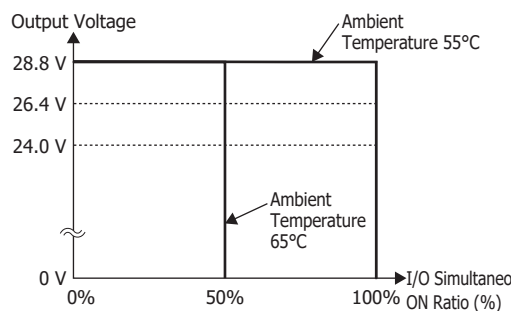


**Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 55°C or higher, reduce the output voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

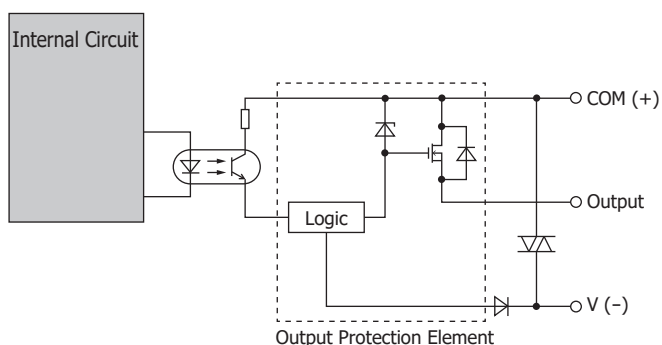
**FC6A-T08K1, FC6A-T08K4, FC6A-T16K1, FC6A-T16K4, FC6A-T16K3, FC6A-T32K3**

## 2: PRODUCT SPECIFICATIONS

### ■ Transistor Protection Source Output Module Specifications

| Type No.                     | FC6A-T08P1<br>FC6A-T08P4   | FC6A-T16P1<br>FC6A-T16P4              | FC6A-T16P3                      | FC6A-T32P3                         |
|------------------------------|--|---------------------------------------|---------------------------------|------------------------------------|
| Output Signal                | Transistor protection source output  |                                       |                                 |                                    |
| Rated Load Voltage           | 24V DC   |                                       |                                 |                                    |
| Operating Load Voltage Range | 20.4 to 28.8V DC   |                                       |                                 |                                    |
| No. of Outputs               | 8<br>(8 points in 1 common line)   | 16<br>(16 points in 1 common line)    |                                 | 32<br>(16 points in 1 common line) |
| Rated Load                   | 0.5 A 1 point  |                                       | 0.1 A 1 point                   |                                    |
| Terminal Arrangement         | See 2-91   | See 2-93                              | See 2-94                        | See 2-96                           |
| Output Current Limit Range   | 1.01 to 2.6 A  |                                       | 0.7 to 1.7 A                    |                                    |
| Voltage Drop (ON Voltage)    | 0.4 V or less, voltage between COM and output terminal when ON   |                                       |                                 |                                    |
| Allowed Inrush Current       | 1 A maximum  |                                       |                                 |                                    |
| Leakage Current              | 0.1 mA maximum   |                                       |                                 |                                    |
| Clamping Voltage             | 41 to 52 V   |                                       |                                 |                                    |
| Lamp Load                    | 12 W maximum   |                                       | 9.6 W maximum                   |                                    |
| Inductive Load               | L/R = 10 ms (28.8V DC, 1 Hz)   |                                       |                                 |                                    |
| Protection Operation         | Temporarily protected by element heat generation, automatic recovery.<br>(There is no function that detects the protection error.) |                                       |                                 |                                    |
| External Current Draw        | 100 mA maximum, 24V DC (-V terminal supply power)  |                                       |                                 |                                    |
| Isolation                    | Between Output Terminal and Internal Circuit   | Photocoupler isolated                 |                                 |                                    |
|                              | Between Output Terminals   | Not isolated                          |                                 |                                    |
| Connector                    | Insertion/Removal Durability   | 100 times minimum                     |                                 |                                    |
| Module Internal Current Draw | All points ON  | 25 mA (5V DC)<br>15 mA (24V DC)       | 30 mA (5V DC)<br>25 mA (24V DC) | 45 mA (5V DC)<br>50 mA (24V DC)    |
|                              | All points OFF   | 17 mA (5V DC)<br>0 mA (24V DC)        |                                 |                                    |
| Output Delay                 | Turn ON Time   | 450 $\mu$ s or lower                  |                                 |                                    |
|                              | Turn OFF Time  | 450 $\mu$ s or lower                  |                                 |                                    |
| Weight (approx.)             | FC6A-T08P1: 110 g<br>FC6A-T08P4: 95 g  | FC6A-T16P1: 105 g<br>FC6A-T16P4: 95 g | 75 g                            | 115 g                              |

### Output Internal Circuit



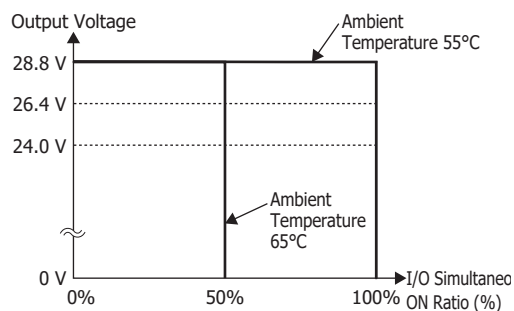
(The overcurrent detection circuit has been omitted.)

**Ambient Temperature, Input Voltage, Output Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 55°C or higher, reduce the output voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

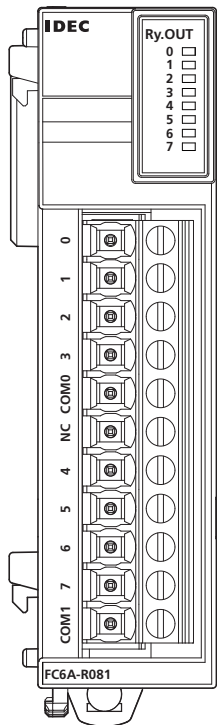
**FC6A-T08P1, FC6A-T08P4, FC6A-T16P1, FC6A-T16P4, FC6A-T16P3, FC6A-T32P3**

Terminal Arrangement and Wiring Examples

■ FC6A-R081, FC6A-R084

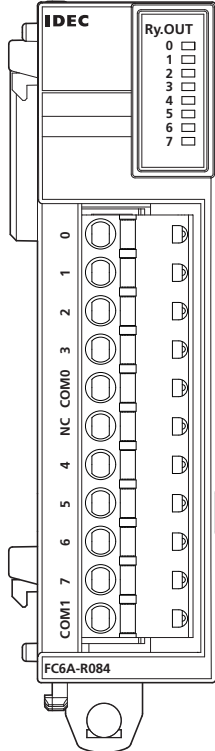
Screw fastened type: FC6A-R081

Applicable connector: FC6A-PMTB11



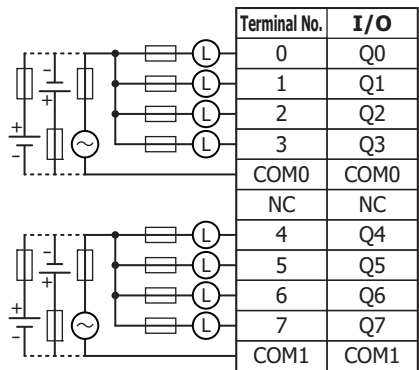
Push-in type: FC6A-R084

Applicable connector: FC6A-PMSB11



Each of the terminals for COM0 and COM1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

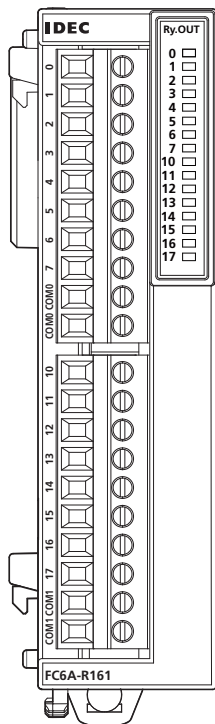
— : Fuse    (L) : Load



■ FC6A-R161, FC6A-R164

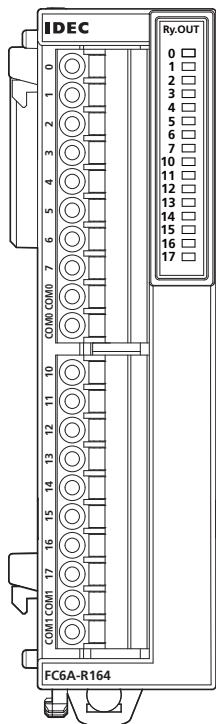
Screw fastened type: FC6A-R161

Applicable connector: FC6A-PMTC10



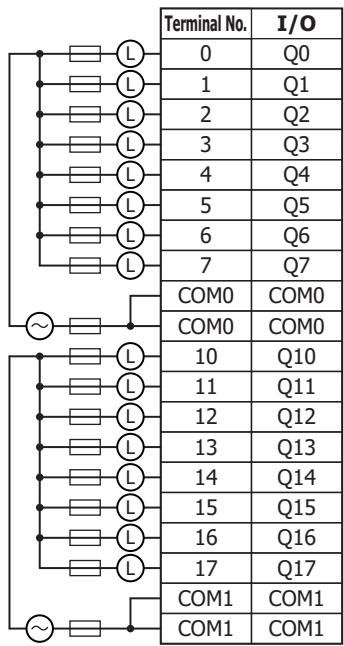
Push-in type: FC6A-R164

Applicable connector: FC6A-PMSC10



The two COM0 and COM1 lines are each connected in the module.  
Each of the terminals for COM0 and COM1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

—□— : Fuse      (L) : Load

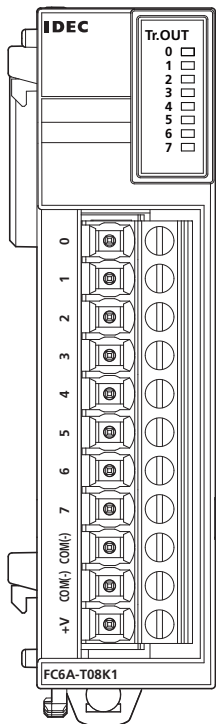


2: PRODUCT SPECIFICATIONS

■ FC6A-T08K1, FC6A-T08K4

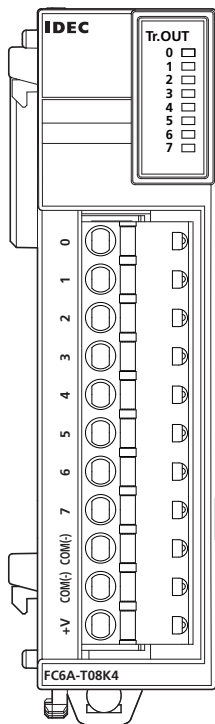
Screw fastened type: FC6A-T08K1

Applicable connector: FC6A-PMTB11



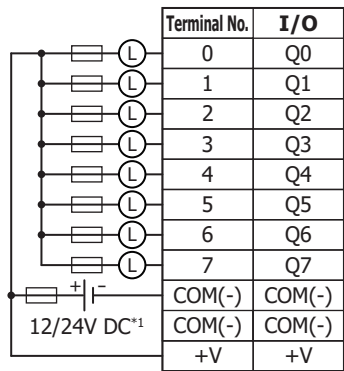
Push-in type: FC6A-T08K4

Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

— : Fuse    (L) : Load



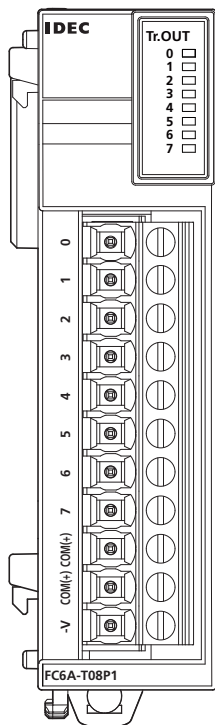
Insert a fuse that corresponds to the load.

\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

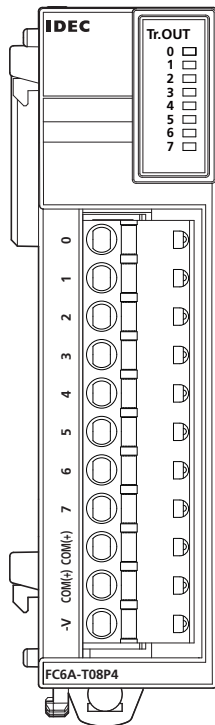


■ FC6A-T08P1, FC6A-T08P4

**Screw fastened type: FC6A-T08P1**  
Applicable connector: FC6A-PMTB11

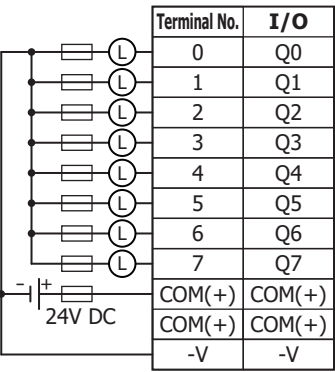


**Push-in type: FC6A-T08P4**  
Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

 : Fuse     : Load



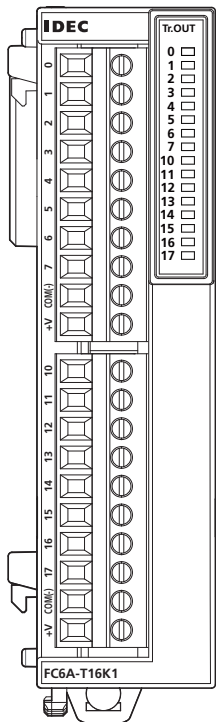
Insert a fuse that corresponds to the load.

2: PRODUCT SPECIFICATIONS

■ FC6A-T16K1, FC6A-T16K4

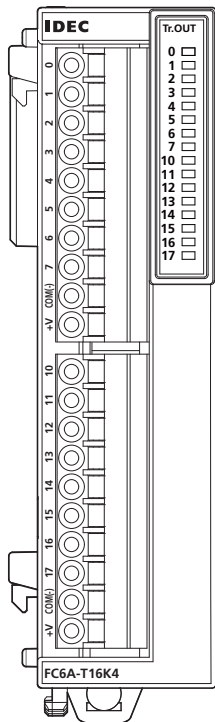
Screw fastened type: FC6A-T16K1

Applicable connector: FC6A-PMTC10



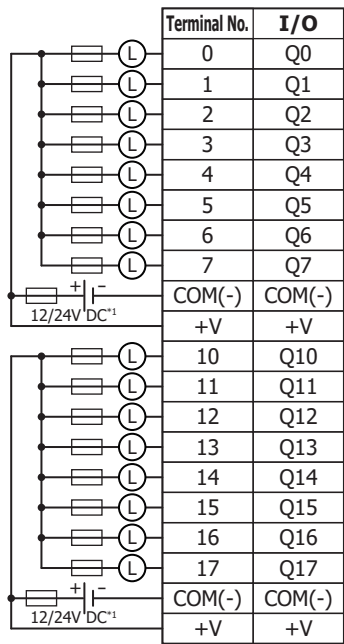
Push-in type: FC6A-T16K4

Applicable connector: FC6A-PMSC10



The two COM(-) lines are each connected in the module.  
The two +V lines are each connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

— : Fuse    (L) : Load

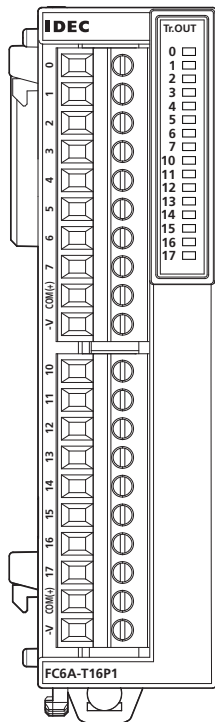


Insert a fuse that corresponds to the load.

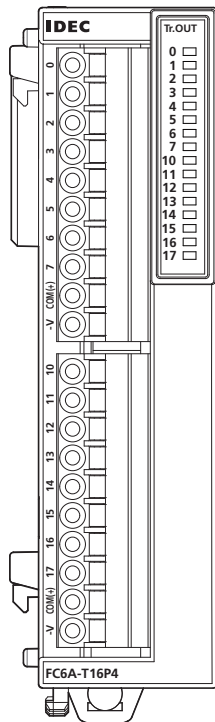
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-T16P1, FC6A-T16P4

**Screw fastened type: FC6A-T16P1**  
Applicable connector: FC6A-PMTC10

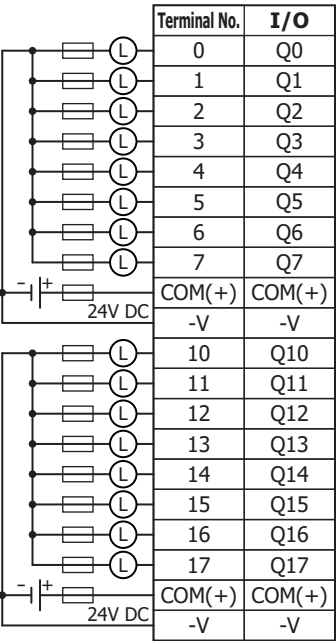


**Push-in type: FC6A-T16P4**  
Applicable connector: FC6A-PMSC10



The two COM(+) lines are each connected in the module.  
The two -V lines are each connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

— : Fuse      (L) : Load



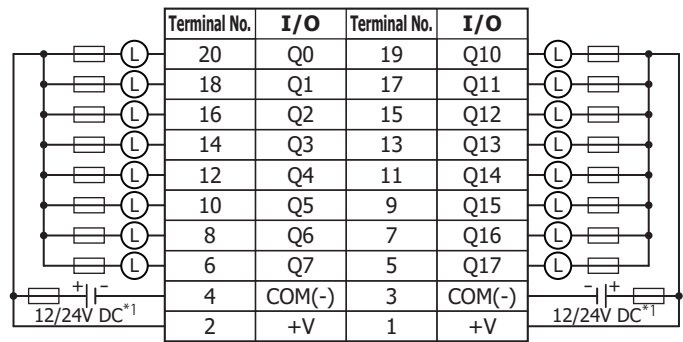
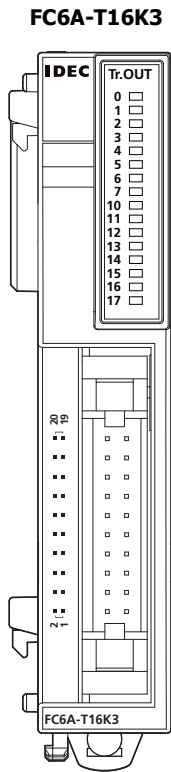
Insert a fuse that corresponds to the load.

■ FC6A-T16K3, FC6A-T16P3

Terminal block types

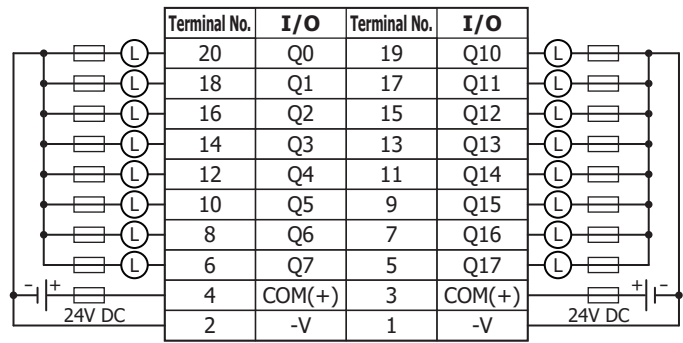
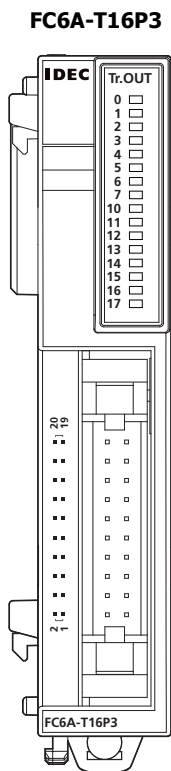
Applicable connector: FC4A-PMC20  
The two COM(+) and COM(-) lines are each connected in the module.  
The two +V and -V lines are each connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.  
For the connector cable, see "Cables" on page A-14.

—□— : Fuse      (L) : Load



Insert a fuse that corresponds to the load.

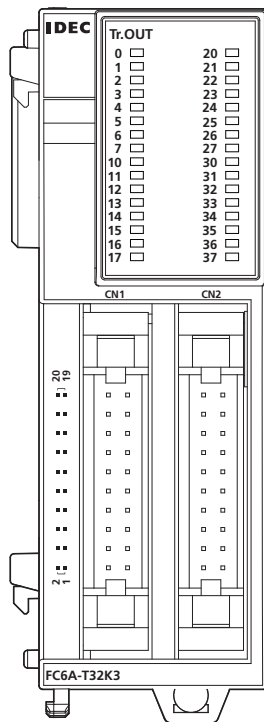
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.



Insert a fuse that corresponds to the load.

## ■ FC6A-T32K3

## Terminal block type



Applicable connector: FC4A-PMC20

The two COM0(-) and COM1(-) lines are each connected in the module.

Each of the terminals for COM0(-) and COM1(-) are independent.

The two +V0 and +V1 lines are each connected in the module.

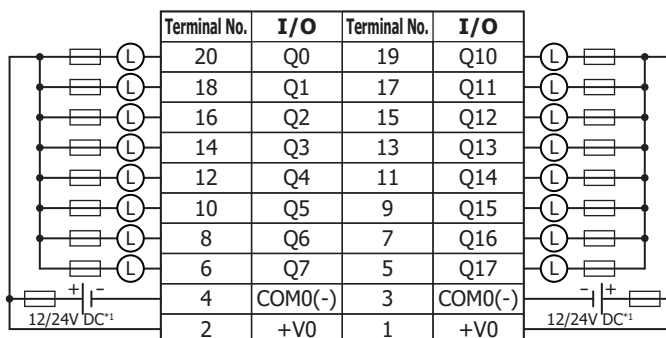
Each of the terminals for +V0 and +V1 are independent.

For wiring precautions, see "Input/Output Wiring" on page 3-18.

For the connector cable, see "Cables" on page A-14.

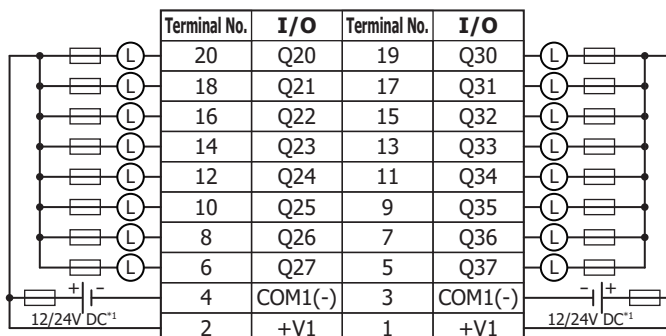
— : Fuse (L) : Load

## CN1



Insert a fuse that corresponds to the load.

## CN2

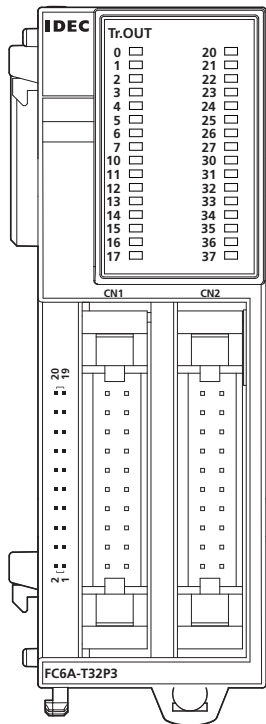


Insert a fuse that corresponds to the load.

\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-T32P3

Terminal block type

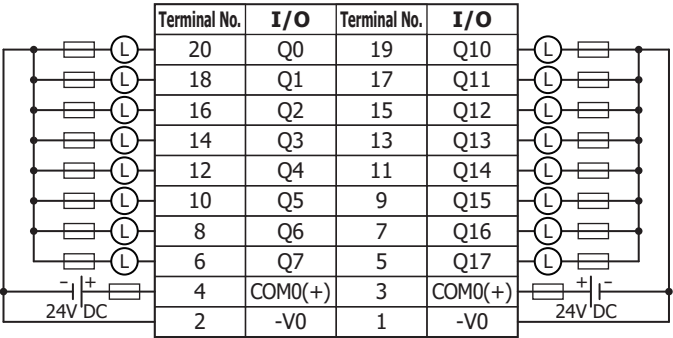


Applicable connector: FC4A-PMC20

The two COM0(+) and COM1(+) lines are each connected in the module.  
Each of the terminals for COM0(+) and COM1(+) are independent.  
The two -V0 and -V1 lines are each connected in the module.  
Each of the terminals for -V0 and -V1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.  
For the connector cable, see "Cables" on page A-14.

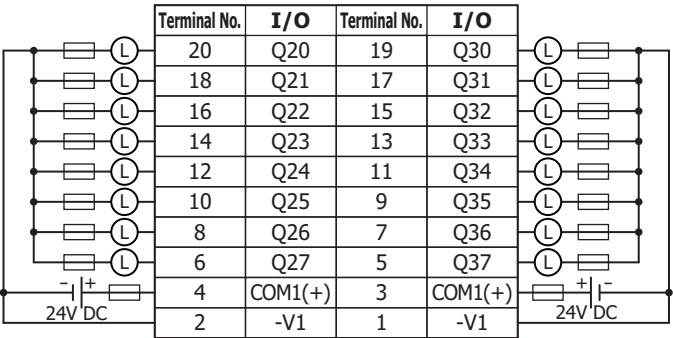
— : Fuse    (L) : Load

CN1



Insert a fuse that corresponds to the load.

CN2

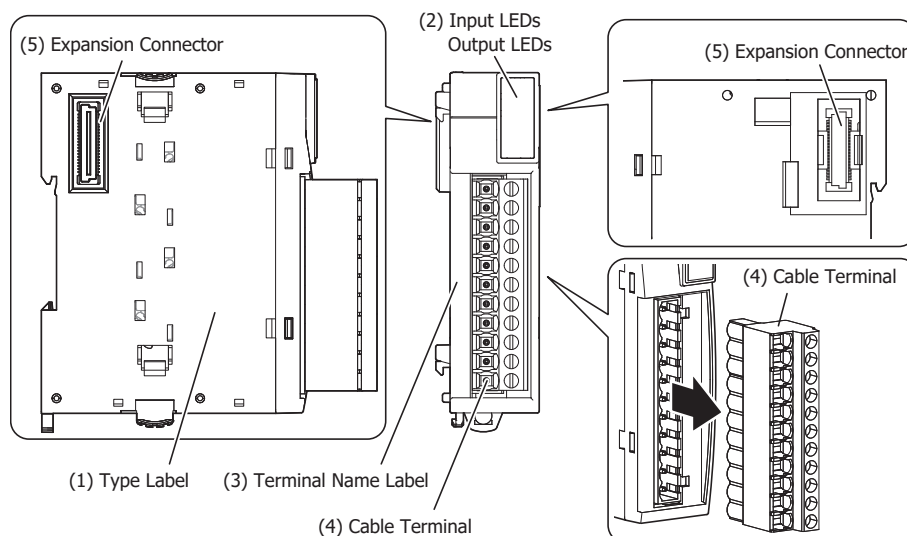


Insert a fuse that corresponds to the load.

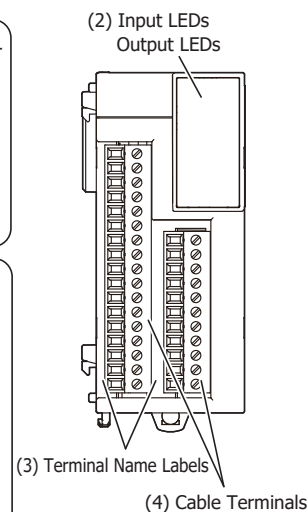
## Digital Mixed I/O Module

### Parts Description

Example: FC6A-M08BR1



Example: FC6A-M24BR1



#### (1) Type Label

Indicates the digital mixed I/O module type number and specifications.

#### (2) Input LEDs

These LEDs turn on when an input is on.

#### Output LEDs

These LEDs turn on when an output is on.

#### (3) Terminal Name Label

Indicates terminal numbers.

#### (4) Cable Terminal

Two types of terminals are separately available: the terminal block type (3.81 mm pitch) and the terminal block type (5.08 mm pitch).

#### (5) Expansion Connector

Connects the expansion modules and the CPU module.

### Model List

| Cable Terminal Type                 |                     | DC Input 4 Points/<br>Relay Output 4 Points | DC Input 16 Points/<br>Relay Output 8 Points |
|-------------------------------------|---------------------|---|--|
| Terminal block type (5.08 mm pitch) | Screw fastened type | FC6A-M08BR1                                 | —  |
|                                     | Push-in type        | FC6A-M08BR4                                 |  |
| Terminal block type (3.81 mm pitch) | Screw fastened type | —   | FC6A-M24BR1                                  |
|                                     | Push-in type        |   | FC6A-M24BR4                                  |

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

#### ■ Power Supply Specifications

| Type No.              |                              | FC6A-M08BR1, FC6A-M08BR4                 | FC6A-M24BR1, FC6A-M24BR4                 |
|-----------------------|------------------------------|--|--|
| Points                | Input Points                 | 4 (4 points in 1 common line)            | 16 (16 points in 1 common line)          |
|                       | No. of Outputs               | 4 (4 points in 1 common line)            | 8 (4 points in 1 common line)            |
| Terminal Arrangement  |                              | See 2-101                                | See 2-103                                |
| Connector             | Insertion/Removal Durability | 100 times minimum                        |  |
| Internal Current Draw | All Points ON                | 30 mA (5V DC)<br>25 mA (24V DC)          | 55 mA (5V DC)<br>50 mA (24V DC)          |
|                       | All Points OFF               | 17 mA (5V DC)<br>0 mA (24V DC)           |  |
| Weight (approx.)      |                              | FC6A-M08BR1: 120 g<br>FC6A-M08BR4: 100 g | FC6A-M24BR1: 165 g<br>FC6A-M24BR4: 155 g |

#### ■ Input Specifications

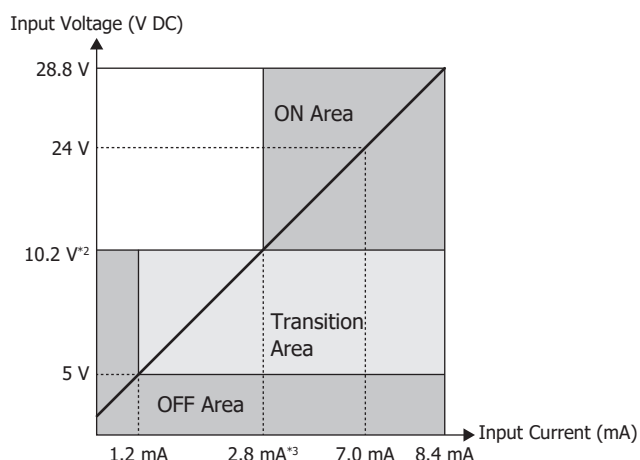
| Type No.                              |                  | FC6A-M08BR1, FC6A-M08BR4  | FC6A-M24BR1, FC6A-M24BR4 |
|---------------------------------------|------------------|---|--------------------------|
| Rated Input Voltage                   |                  | 12/24V DC*1 shared sink/source  |                          |
| Operating Load Voltage Range          |                  | 0.0 to 28.8V DC   |                          |
| Rated Input Current                   |                  | 3.5 mA/point (at 12V DC), 7 mA/point (at 24V DC)  |                          |
| Input Impedance                       |                  | 3.4 kΩ  |                          |
| Input Delay Time (24V DC)             | Turn ON Time     | 4.1 ms  |                          |
|                                       | Turn OFF Time    | 4.1 ms  |                          |
| Isolation                             | Between Channels | Not isolated  |                          |
|                                       | Internal Circuit | Photocoupler isolated   |                          |
| External Load for I/O Interconnection |                  | Not needed  |                          |
| Signal Determination Method           |                  | Static  |                          |
| Effect of Improper Input Connection   |                  | Even if wiring for sink or source connection is incorrect, no damages are caused.<br>If any input exceeding the rated value is applied, permanent damage may be caused. |                          |
| Cable Length                          |                  | 3 m   |                          |

\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

### Operating Ranges

The operating range of Type 1 (IEC 61131-2) DC input modules is as follows.

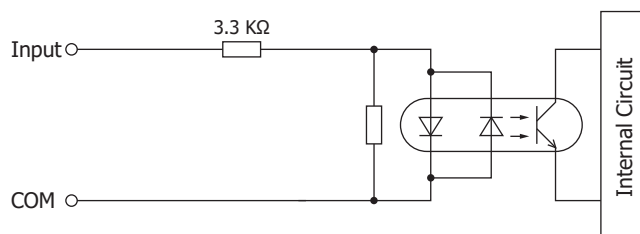
#### FC6A-M08BR1, FC6A-M08BR4, FC6A-M24BR1, FC6A-M24BR4



\*2 15 V for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

\*3 4.2 mA for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

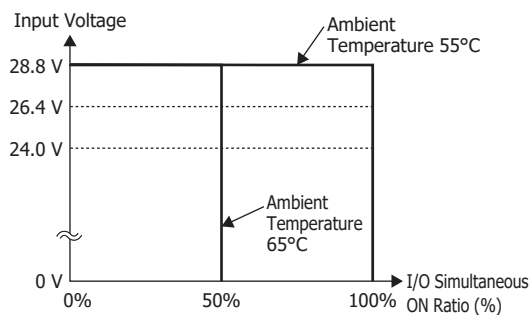
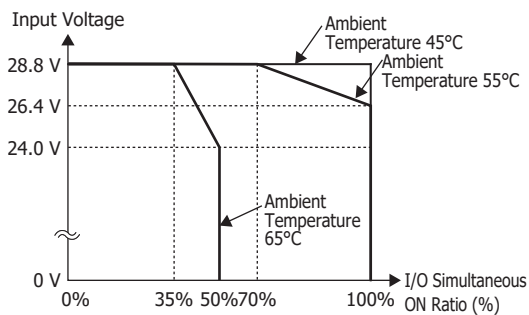


**Input Internal Circuit****FC6A-M08BR1, FC6A-M08BR4, FC6A-M24BR1, FC6A-M24BR4****Ambient Temperature, Input Voltage, I/O Simultaneous ON Ratio**

When the FC6A is used in an ambient temperature of 45°C or higher, reduce the input voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

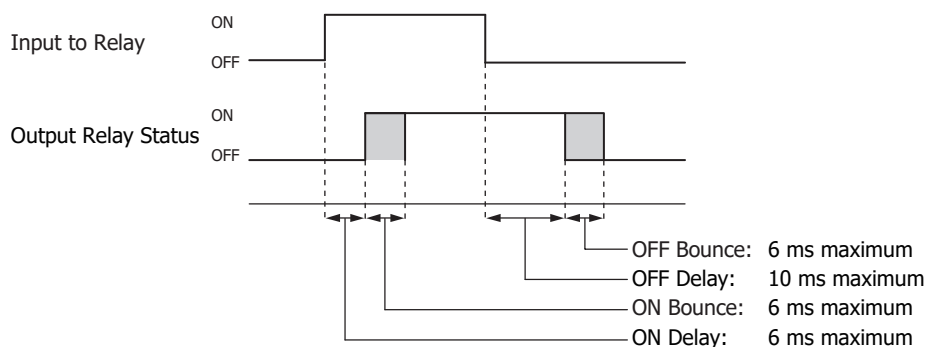
**FC6A-M08BR1, FC6A-M08BR4****FC6A-M24BR1, FC6A-M24BR4**

## 2: PRODUCT SPECIFICATIONS

### ■ Output Specifications

| Type No.                      |  | FC6A-M08BR1, FC6A-M08BR4                                       | FC6A-M24BR1, FC6A-M24BR4 |
|-------------------------------|--|--|--------------------------|
| Output Points per Common Line | COM1   | 4  | 4                        |
|                               | COM2   | —  | 4                        |
| Output Type                   |  | 1a contact   |                          |
| Load Current                  | 1  | 2 A maximum  |                          |
|                               | 1 Common                                     | 7 A maximum  |                          |
| Minimum Switching Load        |  | 1.0 mA/5.0V DC (reference value)                               |                          |
| Initial Contact Resistance    |  | 30 mΩ or lower   |                          |
| Electrical Life               |  | 100,000 operations minimum (rated load 1,800 operations/hour)  |                          |
| Mechanical Life               |  | 20,000,000 operations minimum (no load 18,000 operations/hour) |                          |
| Rated Load                    |  | 240V AC 2 A (resistive load, $\cos\phi=0.4$ inductive load)    |                          |
|                               |  | 30V DC 2 A (resistive load, L/R=7 ms inductive load)           |                          |
| Withstand Voltage             | Between Output Terminal and FE               | 2,300V AC 1 minute   |                          |
|                               | Between Output Terminal and Internal Circuit | 2,300V AC 1 minute   |                          |
|                               | Between Output Terminals (COMs)              | 2,300V AC 1 minute   |                          |

### Output Delay



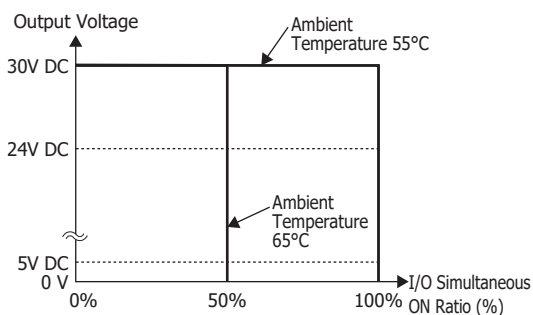
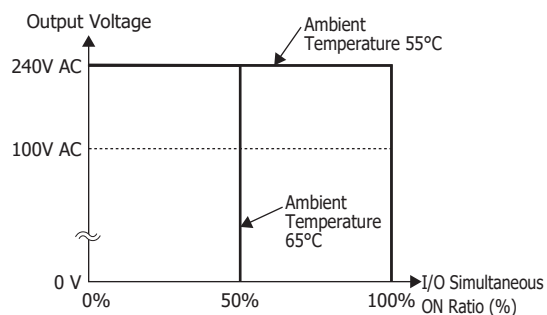
### Ambient Temperature, Input Voltage, I/O Simultaneous ON Ratio

When the FC6A is used in an ambient temperature of 55°C or higher, reduce the output voltage and I/O utilization (simultaneous ON ratio: a%) according to the following diagrams. However, the following diagrams show the temperature conditions when the FC6A is normally installed.

**Note:** Normally installed means the state in the diagram in "Normal Installation State" on page 3-1.

The usage conditions will also change according to the installation state. For details, see "Installation Location" on page 3-1.

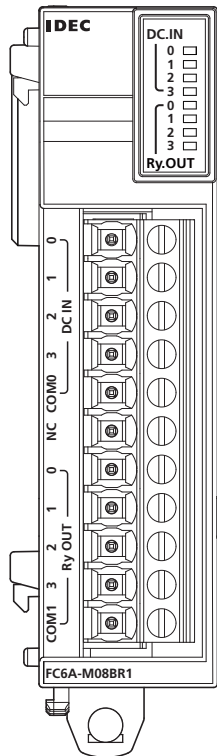
#### FC6A-M08BR1, FC6A-M08BR4, FC6A-M24BR1, FC6A-M24BR4



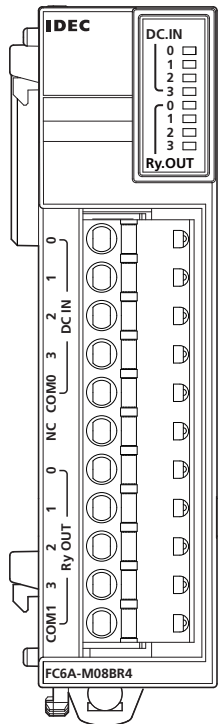
Terminal Arrangement and Wiring Examples

■ FC6A-M08BR1, FC6A-M08BR4

**Screw fastened type: FC6A-M08BR1**  
Applicable connector: FC6A-PMTB11



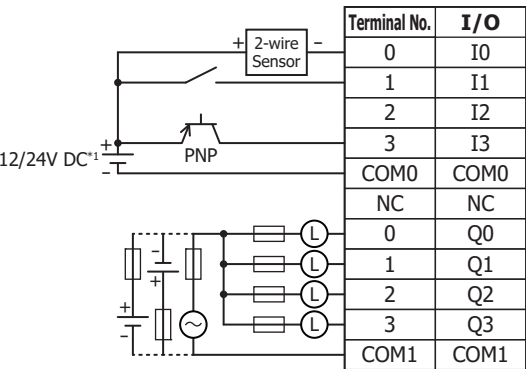
**Push-in type: FC6A-M08BR4**  
Applicable connector: FC6A-PMSB11



Each of the terminals for COM0 and COM1 are independent.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

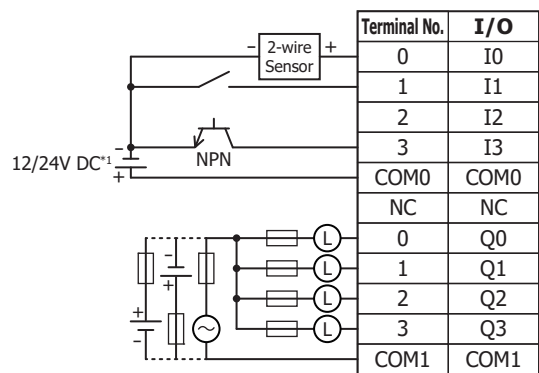
— : Fuse    (L) : Load

DC Sink Input Wiring Example



\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

DC Source Input Wiring Example

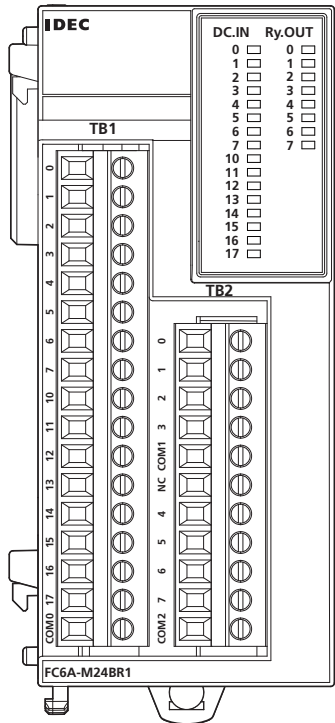


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-M24BR1, FC6A-M24BR4

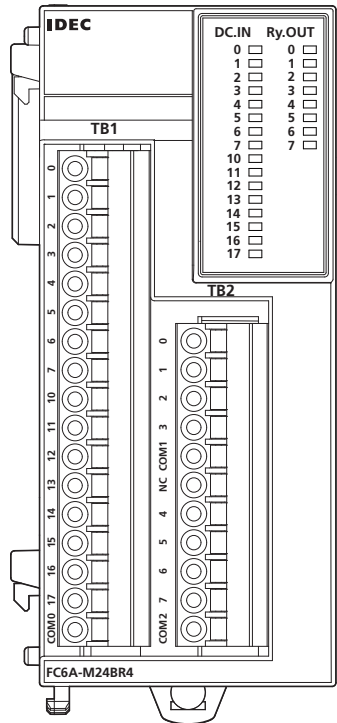
Screw fastened type: FC6A-M24BR1

Applicable connector: FC6A-PMTC17  
FC6A-PMTC11



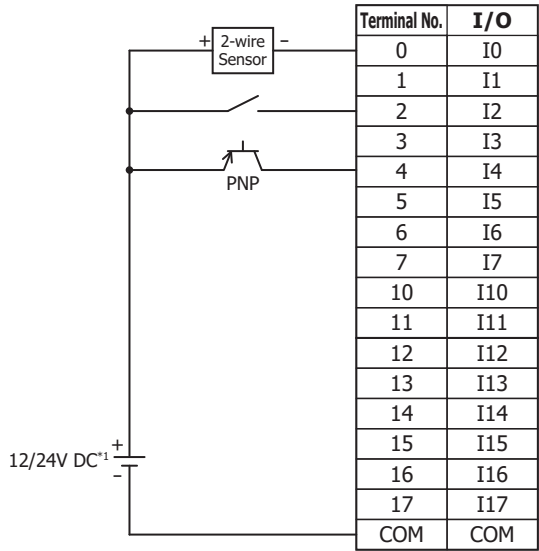
Push-in type: FC6A-M24BR4

Applicable connector: FC6A-PMSC17  
FC6A-PMSC11



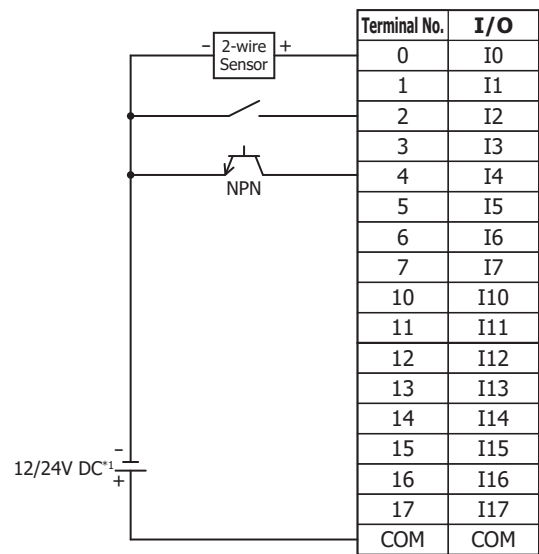
The 3 COM lines are connected in the module.  
For wiring precautions, see "Input/Output Wiring" on page 3-18.

DC Sink Input Wiring Example



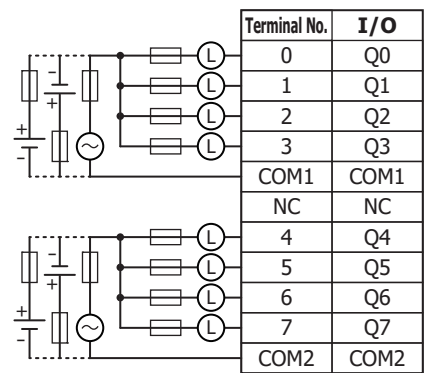
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

DC Source Input Wiring Example



\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

Relay Output Wiring Example



Insert a fuse that corresponds to the load.

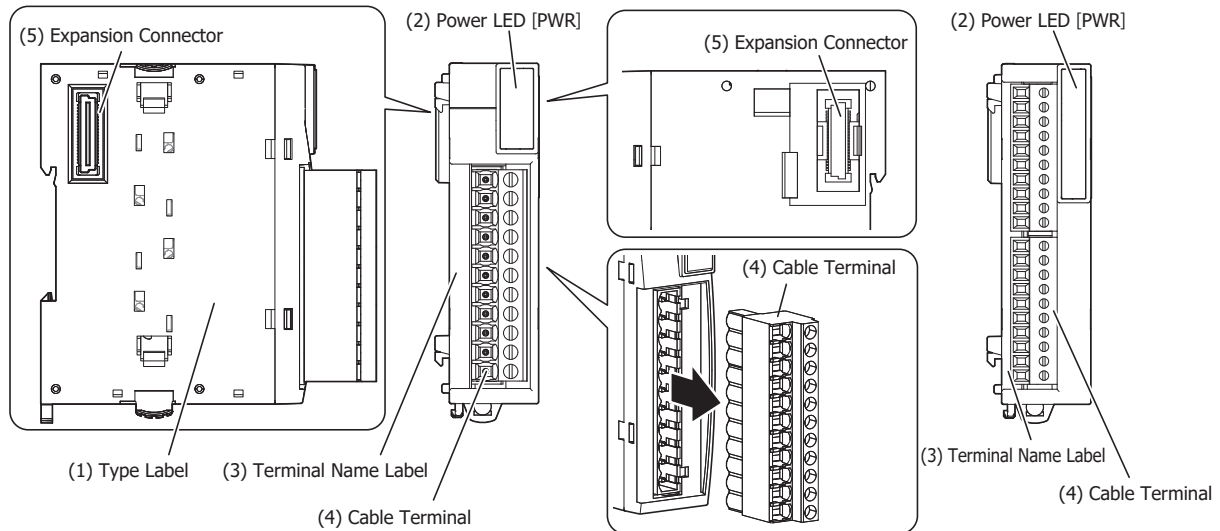
## Analog I/O Modules

Three type of analog I/O modules are available: analog input modules equipped with input terminals, analog output modules equipped with output terminals, and analog mixed I/O modules equipped with both input and output terminals.

### Parts Description

Example: FC6A-J2C1

Example: FC6A-L06A1



#### (1) Type Label

Indicates the analog I/O module type no. and specifications.

#### (2) Power LED [PWR]

This LED turns on when the power is supplied to the analog I/O module.

#### (3) Terminal Name Label

Indicates terminal numbers.

#### (4) Cable Terminal

Two types of terminals are separately available: the terminal block type (3.81 mm pitch) and the terminal block type (5.08 mm pitch).

#### (5) Expansion Connector

Connects the expansion modules and the CPU module.

## 2: PRODUCT SPECIFICATIONS

### Model List

| Module Type             | I/O Points |            | I/O Signal   | Cable Terminal Type 1               | Cable Terminal Type 2               | Type No.                   |
|-------------------------|------------|------------|--|-------------------------------------|-------------------------------------|----------------------------|
| Analog input module     | Input      | 2          | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)  | Terminal block type (5.08 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J2C1<br>FC6A-J2C4     |
|                         |            | 4          | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)  | Terminal block type (3.81 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J4A1<br>FC6A-J4A4     |
|                         |            | 8          | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)  | Terminal block type (3.81 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J8A1<br>FC6A-J8A4     |
|                         |            | 4          | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)<br>Thermocouple (K, J, R, S, B, E, T, N, C)<br>Resistance thermometer (Pt100, Pt1000, Ni100, Ni1000) | Terminal block type (3.81 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J4CN1<br>FC6A-J4CN4   |
|                         |            | 4          | Thermocouple (K, J, R, S, B, E, T, N, C)   | Terminal block type (3.81 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J4CH1Y<br>FC6A-J4CH4Y |
|                         |            | 8          | Thermocouple (K, J, R, S, B, E, T, N, C)<br>Thermistor (PTC, NTC)<br>Resistance (100 to 32,000 Ω)  | Terminal block type (3.81 mm pitch) | Screw fastened type<br>Push-in type | FC6A-J8CU1<br>FC6A-J8CU4   |
|                         |            |            |  |                                     |                                     |                            |
| Analog output module    | Output     | 2          | Voltage output (0 to 10 V, -10 to +10 V)<br>Current output (4 to 20 mA, 0 to 20 mA)  | Terminal block type (5.08 mm pitch) | Screw fastened type<br>Push-in type | FC6A-K2A1<br>FC6A-K2A4     |
|                         |            | 4          | Voltage output (0 to 10 V, -10 to +10 V)<br>Current output (4 to 20 mA, 0 to 20 mA)  | Terminal block type (5.08 mm pitch) | Screw fastened type<br>Push-in type | FC6A-K4A1<br>FC6A-K4A4     |
| Mixed analog I/O module | I/O        | 2 (Input)  | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)<br>Thermocouple (K, J, R, S, B, E, T, N, C)<br>Resistance thermometer (Pt100, Pt1000, Ni100, Ni1000) | Terminal block type (5.08 mm pitch) | Screw fastened type                 | FC6A-L03CN1                |
|                         |            | 1 (Output) | Voltage output (0 to 10 V, -10 to +10 V)<br>Current output (4 to 20 mA, 0 to 20 mA)  |                                     | Push-in type                        | FC6A-L03CN4                |
|                         | I/O        | 4 (Input)  | Voltage input (0 to 10 V, -10 to +10 V)<br>Current input (4 to 20 mA, 0 to 20 mA)  | Terminal block type (3.81 mm pitch) | Screw fastened type                 | FC6A-L06A1                 |
|                         |            | 2 (Output) | Voltage output (0 to 10 V, -10 to +10 V)<br>Current output (4 to 20 mA, 0 to 20 mA)  |                                     | Push-in type                        | FC6A-L06A4                 |



## Power Supply Specifications

| Type No.  |                              | FC6A-J2C1<br>FC6A-J2C4               | FC6A-J4A1<br>FC6A-J4A4               | FC6A-J8A1<br>FC6A-J8A4               | FC6A-J4CN1<br>FC6A-J4CN4               | FC6A-J4CH1Y<br>FC6A-J4CH4Y               |
|---|------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--|--|
| External Power  | Power Supply Voltage         | 12/24V DC <sup>*2</sup>              |                                      |                                      |  |  |
|   | Allowed Fluctuation Range    | 10.2 to 28.8V DC                     |                                      |                                      |  |  |
| Terminal Arrangement                                    |                              | 2-116                                | 2-117                                | 2-118                                | 2-119                                  | 2-120                                    |
| Connector Module  | Insertion/Removal Durability | 100 times minimum                    |                                      |                                      |  |  |
| Internal Current Draw                                   | 5V DC                        | 40 mA                                | 45 mA                                | 40 mA                                | 50 mA                                  | 50 mA                                    |
|   | 24V DC                       | 0 mA                                 | 0 mA                                 | 0 mA                                 | 0 mA                                   | 0 mA                                     |
| Module External Power Supply Current Draw <sup>*1</sup> |                              | 50 mA (12V DC)<br>25 mA (24V DC)     | 60 mA (12V DC)<br>30 mA (24V DC)     | 80 mA (12V DC)<br>40 mA (24V DC)     | 80 mA (12V DC)<br>40 mA (24V DC)       | 80 mA (12V DC)<br>40 mA (24V DC)         |
| Weight (approx.)  |                              | FC6A-J2C1: 115 g<br>FC6A-J2C4: 100 g | FC6A-J4A1: 110 g<br>FC6A-J4A4: 100 g | FC6A-J8A1: 110 g<br>FC6A-J8A4: 100 g | FC6A-J4CN1: 110 g<br>FC6A-J4CN4: 100 g | FC6A-J4CH1Y: 110 g<br>FC6A-J4CH4Y: 100 g |

\*1 The value when the input is not open and the output is 100% output.

\*2 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

| Type No.  |                              | FC6A-J8CU1<br>FC6A-J8CU4               | FC6A-K2A1<br>FC6A-K2A4               | FC6A-K4A1<br>FC6A-K4A4               | FC6A-L03CN1<br>FC6A-L03CN4               | FC6A-L06A1<br>FC6A-L06A4               |
|---|------------------------------|--|--------------------------------------|--------------------------------------|--|--|
| External Power  | Power Supply Voltage         | 12/24V DC <sup>*2</sup>                |                                      | 24V DC                               | 12/24V DC <sup>*2</sup>                  | 24V DC                                 |
|   | Allowed Fluctuation Range    | 10.2 to 28.8V DC                       |                                      | 20.4 to 28.8V DC                     | 10.2 to 28.8V DC                         | 20.4 to 28.8V DC                       |
| Terminal Arrangement                                    |                              | 2-121                                  | 2-122                                | 2-123                                | 2-124                                    | 2-125                                  |
| Connector Module  | Insertion/Removal Durability | 100 times minimum                      |                                      |                                      |  |  |
| Internal Current Draw                                   | 5V DC                        | 45 mA                                  | 40 mA                                | 50 mA                                | 60 mA                                    | 55 mA                                  |
|   | 24V DC                       | 0 mA                                   | 0 mA                                 | 0 mA                                 | 0 mA                                     | 0 mA                                   |
| Module External Power Supply Current Draw <sup>*1</sup> |                              | 60 mA (12V DC)<br>30 mA (24V DC)       | 140 mA (12V DC)<br>70 mA (24V DC)    | 125 mA (24V DC)                      | 160 mA (12V DC)<br>80 mA (24V DC)        | 100 mA (24V DC)                        |
| Weight (approx.)  |                              | FC6A-J8CU1: 110 g<br>FC6A-J8CU4: 100 g | FC6A-K2A1: 115 g<br>FC6A-K2A4: 100 g | FC6A-K4A1: 115 g<br>FC6A-K4A4: 100 g | FC6A-L03CN1: 115 g<br>FC6A-L03CN4: 100 g | FC6A-L06A1: 110 g<br>FC6A-L06A4: 100 g |

\*1 The value when the input is not open and the output is 100% output.

\*2 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

#### ■ Analog Input Specifications

##### Analog Input Module

| Type No.                         |                             | FC6A-J2C1<br>FC6A-J2C4                                 | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4  | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4                          |
|----------------------------------|-----------------------------|--|------------------------|------------------------|---|----------------------------|---|
| Input Type<br>and Input<br>Range | Voltage                     | 0 to 10 V<br>-10 to 10 V                               |                        |                        |   | —                          |   |
|                                  | Current                     | 4 to 20 mA<br>0 to 20 mA                               |                        |                        |   | —                          |   |
|                                  | Thermocouple                | —  |                        |                        | (K) -200 to 1,300°C (-328 to 2,372°F)<br>(J) -200 to 1,000°C (-328 to 1,832°F)<br>(R) 0 to 1,760°C (32 to 3,200°F)<br>(S) 0 to 1,760°C (32 to 3,200°F)<br>(B) 0 to 1,820°C (32 to 3,308°F)<br>(E) -200 to 800°C (-328 to 1,472°F)<br>(T) -200 to 400°C (-328 to 752°F)<br>(N) -200 to 1,300°C (-328 to 2,372°F)<br>(C) 0 to 2,315°C (32 to 4,199°F) |                            |   |
|                                  | Resistance<br>Thermometer*1 | —  |                        |                        | Pt100:<br>-200 to 850°C<br>(-328 to 1,562°F)<br>Pt1000:<br>-200 to +600°C<br>(-328 to 1,112°F)<br>Ni100:<br>-60 to +180°C<br>(-76 to 356°F)<br>Ni1000:<br>-60 to +180°C<br>(-76 to 356°F)   | —                          |   |
|                                  | Thermistor                  | —  |                        |                        |   |                            | NTC<br>(-90 to 150°C)<br>PTC<br>(100 to 10,000 Ω) |
|                                  | Resistor                    | —  |                        |                        |   |                            | 100 to 32,000 Ω                                   |
|                                  | Input<br>Impedance          | Voltage  | 1 MΩ or higher         |                        |   |                            |   |
| Current                          |                             | 50 Ω or lower  |                        |                        |   |                            |   |
| Thermocouple                     |                             | 1 MΩ or higher   |                        |                        |   |                            |   |
| Resistance Thermometer           |                             | 1 MΩ or higher   |                        |                        |   |                            |   |
| Thermistor                       |                             | 1 MΩ or higher   |                        |                        |   |                            |   |
| Resistor                         |                             | 1 MΩ or higher   |                        |                        |   |                            |   |
| AD<br>Conversion                 | Sampling Time               | 1 ms   | 1 ms or 10 ms          |                        | 10 ms, 100 ms<br>or 104 ms  | 120 ms or 30<br>ms         | 104 ms  |
|                                  | Sampling Repetition Time    | Sampling time × Number of enabled input channels       |                        |                        |   |                            |   |
|                                  | Total Input Delay Time*2    | Sampling time + Sampling repetition time + 1 scan time |                        |                        |   |                            |   |
|                                  | Type of Input               | Single-ended   |                        |                        |   | Differential<br>input      | Single-ended                                      |
|                                  | Operation Mode              | Self-scan  |                        |                        |   |                            |   |
|                                  | Conversion Method           | ΣΔ type ADC  |                        |                        |   |                            |   |
| Input Error                      | Maximum Error at 25°C       | ±0.1% of full<br>scale                                 | ±0.2% of full scale    |                        | ±0.2% of full scale<br>Cold junction compensation accuracy: ±4.0°C or<br>lower<br>Exceptions<br>R, S: ±6°C (0 to 200°C)<br>B: Not possible to guarantee accuracy (0 to 300°C)<br>K, J, E, T, N:<br>±0.4% of full scale (0°C or lower)   |                            |   |
|                                  | Temperature Coefficient     | 0.006%/°C  | 0.01%/°C               |                        |   |                            |   |

| Type No.                            |   |   | FC6A-J2C1<br>FC6A-J2C4                              | FC6A-J4A1<br>FC6A-J4A4                              | FC6A-J8A1<br>FC6A-J8A4  | FC6A-J4CN1<br>FC6A-J4CN4                            | FC6A-J4CH1Y<br>FC6A-J4CH4Y   | FC6A-J8CU1<br>FC6A-J8CU4 |  |
|-------------------------------------|---|---|---|---|---|---|--|--------------------------|--|
| Data                                | Digital Resolution  | Voltage   | 65,536<br>(16 bits)                                 | 4,096<br>(12 bits)                                  | 65,536<br>(16 bits)* <sup>3</sup>   | 65,536 (16 bits)                                    | —  |                          |  |
|                                     |   | Current   | 65,536<br>(16 bits)                                 | 4,096<br>(12 bits)                                  | 65,536<br>(16 bits)* <sup>3</sup>   | 65,536 (16 bits)                                    |  | —                        |  |
|                                     |   | Thermocouple  | —   |   |   |   | K: 15,000 (14 bits)<br>J: 12,000 (14 bits)<br>R: 17,600 (15 bits)<br>S: 17,600 (15 bits)<br>B: 18,200 (15 bits)<br>E: 10,000 (14 bits)<br>T: 6,000 (13 bits)<br>N: 15,000 (14 bits)<br>C: 23,150 (15 bits) |                          |  |
|                                     |   | Resistance Thermometer  | —   |   |   |   | Pt100:<br>10,500 (14 bits)<br>Pt1000:<br>8,000 (13 bits)<br>Ni100:<br>2,400 (12 bits)<br>Ni1000:<br>2,400 (12 bits)  | —                        |  |
|                                     |   | Thermistor  | —   |   |   |   |  |                          | NTC: 2,400 (12 bit)<br>PTC: 9,900 (14 bit) |
|                                     |   | Resistor  | —   |   |   |   |  |                          | 31,900 (15 bit)                            |
|                                     | Input Value per Step                                      | Voltage   | 0.15 mV<br>(0 to 10 V)<br>0.30 mV<br>(-10 to +10 V) | 2.44 mV<br>(0 to 10 V)<br>4.88 mV<br>(-10 to +10 V) | 0.15 mV<br>(0 to 10 V)* <sup>3</sup><br>0.30 mV<br>(-10 to +10 V)* <sup>3</sup> | 0.15 mV<br>(0 to 10 V)<br>0.30 mV<br>(-10 to +10 V) | —  |                          |  |
|                                     |   | Current   | 0.30 μA<br>(0 to 20 mA)<br>0.244 μA<br>(4 to 20 mA) | 4.88 μA<br>(0 to 20 mA)<br>3.91 μA<br>(4 to 20 mA)  | 0.30 μA<br>(0 to 20 mA)* <sup>3</sup><br>0.244 μA<br>(4 to 20 mA)* <sup>3</sup> | 0.30 μA<br>(0 to 20 mA)<br>0.244 μA<br>(4 to 20 mA) | —  |                          |  |
|                                     |   | Thermocouple  | —   |   |   |   | 0.1°C or 0.18°F  |                          |  |
|                                     |   | Resistance Thermometer  |   |   |   |   |  |                          |  |
|                                     |   | Thermistor (NTC)  |   |   |   |   |  |                          |  |
|                                     |   | Thermistor (PTC)  | —   |   |   |   |  |                          | 1 Ω  |
|                                     | Data Type in Application Program                          | Can be arbitrarily set for each CH in a range between -32,768 to 32,767* <sup>4</sup> |   |   |   |   |  |                          |  |
|                                     | Monotonicity  | Yes   |   |   |   |   |  |                          |  |
|                                     | Input Data Out of Range                                   | Detectable* <sup>5</sup>  |   |   |   |   |  |                          |  |
| Noise Resistance                    | Maximum Temporary Deviation during Electrical Noise Tests | ±4.0% or lower  |   |   |   |   |  |                          |  |
|                                     | Input Filter  | Yes   |   |   |   |   |  |                          |  |
|                                     | Recommended Cable for Noise Immunity                      | Current/voltage: Pair shielded cable<br>Other: Pair cable                             |   |   |   |   |  |                          |  |
|                                     | Crosstalk   | 1 LSB or lower  |   |   |   |   |  |                          |  |
| Isolation                           | Between Input and Power Circuit                           | Isolated power supply   |   |   |   |   |  |                          |  |
|                                     | Between Input and Internal Circuit                        | Photocoupler isolated   |   |   |   |   |  |                          |  |
|                                     | Between Inputs  | —   |   |   |   |   | Photocoupler isolated  | —                        |  |
| Effect of Improper Input Connection |   | No damage   |   |   |   |   |  |                          |  |

## 2: PRODUCT SPECIFICATIONS

| Type No.  | FC6A-J2C1<br>FC6A-J2C4     | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4 | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4 |
|---|----------------------------|------------------------|------------------------|--------------------------|----------------------------|--------------------------|
| <b>Maximum Permanent Allowed Overload (No Damage)</b>         | 30V DC, 160mA or lower*6   |                        |                        |                          |                            |                          |
| <b>Selection of Input Type and Input Range</b>                | Using programming software |                        |                        |                          |                            |                          |
| <b>Calibration or Verification to Maintain Rated Accuracy</b> | Not possible               |                        |                        |                          |                            |                          |

\*1 The resistance (allowable conductor resistance) of the electrical leads to connect to the resistance thermometer is 10 Ω or less per wire.

\*2 The total input delay time increases in proportion to the number of channels used. Input channels that have been set to unused are not included in the number of enabled input channels.

\*3 FC6A-J8A1 and FC6A-J8A4 (Version lower than 200) supports 4096 (12 bits) digital resolution.

The input values per step are as follows:

Voltage: 2.44 mV (0 to 10 V), 4.88 mV (-10 to +10 V)

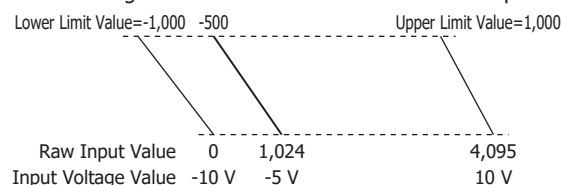
Current: 4.88 μA (0 to 20 mA), 3.91 μA (4 to 20 mA)

When using FC6A-J8A1/FC6A-J8A4 (Version 200 or later), the digital resolution can be selected from 12 bits or 16 bits in Analog I/O Module Configuration dialog box in WindLDR.

\*4 The arbitrary setting is a function that uses the digital resolution data by scaling it to arbitrary data (that arbitrarily sets the lower limit value and the upper limit value). The range setting (-32,768 to 32,767) is specified with data registers.

Example: When -5 V is input, 1,024 is displayed as long as the arbitrary setting is not configured, but -500 is displayed when the arbitrary setting is configured as upper limit value = 1,000 and lower limit value = -1,000, and this makes it easier to intuitively read the input voltage value.

When the digital resolution data is 12 bits and the input range is -10 to +10 V



\*5 Input data out of range is reflected in the status of the analog I/O module.

\*6 For products with a version lower than 200, the maximum permanent allowed overload is 13V DC (when the voltage input is set) and 40mA DC (when the current input is set). If a current of 160mA or higher (at an ambient temperature of 25°C) flows through the circuit, the protection function for the input circuit starts operating and works to reduce the applied current. However, the circuit will be damaged if the applied current is due to voltage applied at 30V DC or higher. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

### Mixed Analog I/O Module

| Type No.                          |                                 | FC6A-L06A1, FC6A-L06A4   | FC6A-L03CN1, FC6A-L03CN4  |
|-----------------------------------|---------------------------------|--------------------------|---|
| <b>Input Type and Input Range</b> | <b>Voltage</b>                  | 0 to 10 V<br>-10 to 10 V |   |
|                                   | <b>Current</b>                  | 4 to 20 mA<br>0 to 20 mA |   |
|                                   | <b>Thermocouple</b>             | —                        | (K) -200 to 1,300°C (-328 to 2,372°F)<br>(J) -200 to 1,000°C (-328 to 1,832°F)<br>(R) 0 to 1,760°C (32 to 3,200°F)<br>(S) 0 to 1,760°C (32 to 3,200°F)<br>(B) 0 to 1,820°C (32 to 3,308°F)<br>(E) -200 to 800°C (-328 to 1,472°F)<br>(T) -200 to 400°C (-328 to 752°F)<br>(N) -200 to 1,300°C (-328 to 2,372°F)<br>(C) 0 to 2,315°C (32 to 4,199°F) |
|                                   | <b>Resistance Thermometer*1</b> | —                        | Pt100: -200 to +850°C (-328 to 1,562°F)<br>Pt1000: -200 to +600°C (-328 to 1,112°F)<br>Ni100: -60 to +180°C (-76 to 356°F)<br>Ni1000: -60 to +180°C (-76 to 356°F)  |
|                                   | <b>Thermistor</b>               |                          | —   |
|                                   | <b>Resistor</b>                 |                          | —   |

| Type No.   |   | FC6A-L06A1, FC6A-L06A4               |   | FC6A-L03CN1, FC6A-L03CN4   |   |   |   |  |
|--|---|--------------------------------------|---|--|---|---|---|--|
| Input Impedance  | Voltage   |                                      | 1 MΩ or higher  |  |   |   |   |  |
|  | Current   |                                      | 50 Ω or lower   |  |   |   |   |  |
|  | Thermocouple  |                                      | 1 MΩ or higher  |  |   |   |   |  |
|  | Resistance Thermometer                                    |                                      | 1 MΩ or higher  |  |   |   |   |  |
|  | Thermistor  |                                      | 1 MΩ or higher  |  |   |   |   |  |
|  | Resistor  |                                      | 1 MΩ or higher  |  |   |   |   |  |
| AD Conversion  | Sampling Time   |                                      | 1 ms or 10 ms   | 10 ms, 100 ms, or 104 ms   |   |   |   |  |
|  | Sampling Repetition Time                                  |                                      | Sampling time × Number of enabled input channels  |  |   |   |   |  |
|  | Total Input Delay Time <sup>*2</sup>                      |                                      | Sampling time + Sampling repetition time + 1 scan time  |  |   |   |   |  |
|  | Type of Input   |                                      | Single-ended  |  |   |   |   |  |
|  | Operation Mode  |                                      | Self-scan   |  |   |   |   |  |
|  | Conversion Method   |                                      | ΣΔ type ADC   |  |   |   |   |  |
| Input Error  | Maximum Error at 25°C                                     |                                      | ±0.2% of full scale   |  | ±0.1% of full scale                           |   |   |  |
|  | Temperature Coefficient                                   |                                      | 0.01% of full scale/°C  |  | 0.006% of full scale/°C                       |   |   |  |
| Data   | Digital Resolution  | Voltage                              | 4,096 (12 bits)   |  | 65,536 (16 bits)                              |   |   |  |
|  |   | Current                              | 4,096 (12 bits)   |  | 65,536 (16 bits)                              |   |   |  |
|  |   | Thermocouple                         | —   | K: 15,000 (14 bits)<br>J: 12,000 (14 bits)<br>R: 17,600 (15 bits)<br>S: 17,600 (15 bits)<br>B: 18,200 (15 bits)<br>E: 10,000 (14 bits)<br>T: 6,000 (13 bits)<br>N: 15,000 (14 bits)<br>C: 23,150 (15 bits) |   |   |   |  |
|  |   |                                      |   | Resistance Thermometer   | —   | Pt100: 10,500 (14 bits)<br>Pt1000: 8,000 (13 bits)<br>Ni100: 2,400 (12 bits)<br>Ni1000: 2,400 (12 bits) |   |  |
|  |   |                                      |   |  |   | Thermistor  | — |  |
|  |   |                                      |   |  |   | Resistor  | — |  |
|  |   | Input Value per Step                 | Voltage   | 2.44 mV (0 to 10 V)<br>4.88 mV (-10 to +10 V)  |   | 0.15 mV (0 to 10 V)<br>-0.30 mV (-10 to +10 V)  |   |  |
|  | Current   |                                      | 4.88 μA (0 to 20 mA)<br>3.91 μA (4 to 20 mA)  |  | 0.30 μA (0 to 20 mA)<br>0.244 μA (4 to 20 mA) |   |   |  |
|  | Thermocouple  |                                      | —   |  | 0.1°C or 0.18°F                               |   |   |  |
|  | Resistance Thermometer                                    |                                      |   |  |   |   |   |  |
|  | Thermistor (NTC)  |                                      |   |  |   |   |   |  |
|  | Thermistor (PTC)  |                                      | —   |  |   |   |   |  |
|  | Data Type in Application Program                          |                                      | Can be arbitrarily set for each CH in a range between -32,768 to 32,767 <sup>*3</sup>                               |  |   |   |   |  |
|  | Monotonicity  |                                      | Yes   |  |   |   |   |  |
|  | Input Data Out of Range                                   |                                      | Detectable <sup>*4</sup>  |  |   |   |   |  |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests |                                      | ±4% or less of full scale   |  |   |   |   |  |
|  | Input Filter  |                                      | Yes   |  |   |   |   |  |
|  | Recommended Cable for Noise Immunity                      |                                      | Current/voltage: Pair shielded cable Wire length: 30 m or shorter<br>Other: Pair cable Wire length: 30 m or shorter |  |   |   |   |  |
|  | Crosstalk   |                                      | 1 LSB or lower  |  |   |   |   |  |
| Isolation  | Between Input and Power Circuit                           |                                      | Transformer isolated  |  |   |   |   |  |
|  | Between Input and Internal Circuit                        |                                      | Photocoupler isolated   |  |   |   |   |  |
| Effect of Improper Input Connection                    |   | No damage                            |   |  |   |   |   |  |
| Maximum Permanent Allowed Overload (No Damage)         |   | 30V DC, 160mA or lower <sup>*5</sup> |   |  |   |   |   |  |
| Selection of Input Type and Input Range                |   | Using programming software           |   |  |   |   |   |  |
| Calibration or Verification to Maintain Rated Accuracy |   | Not possible                         |   |  |   |   |   |  |

\*1 The resistance (allowable conductor resistance) of the electrical leads to connect to the resistance thermometer is 10  $\Omega$  or less per wire.

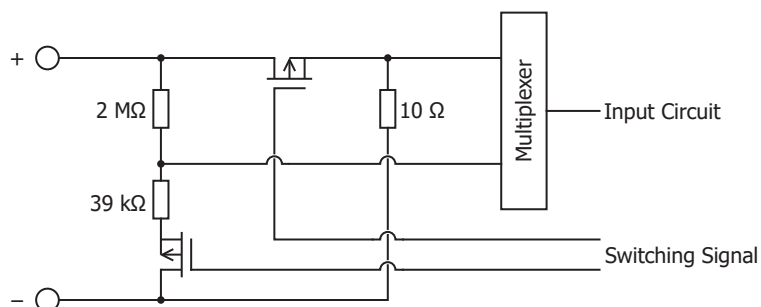
## 2: PRODUCT SPECIFICATIONS

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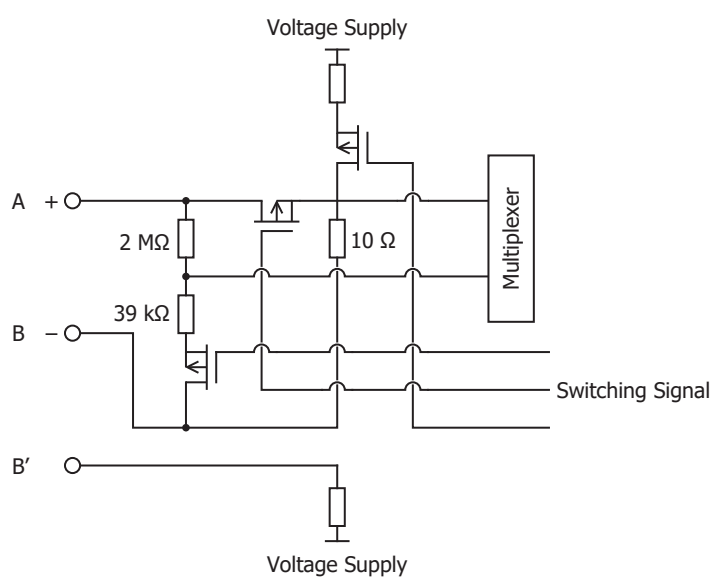
- \*2 The total input delay time increases in proportion to the number of channels used. Input channels that have been set to unused are not included in the number of enabled input channels.
- \*3 The arbitrary setting is a function that uses the digital resolution data by scaling it to arbitrary data (that arbitrarily sets the lower limit value and the upper limit value). The range setting (-32,768 to 32,767) is specified with data registers.
- \*4 Input data out of range is reflected in the status of the analog I/O module.
- \*5 For products with a version lower than 200, the maximum permanent allowed overload is 13V DC (when the voltage input is set) and 40mA DC (when the current input is set). If a current of 160mA or higher (at an ambient temperature of 25°C) flows through the circuit, the protection function for the input circuit starts operating and works to reduce the applied current. However, the circuit will be damaged if the applied current is due to voltage applied at 30V DC or higher. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

**Input Internal Circuit**

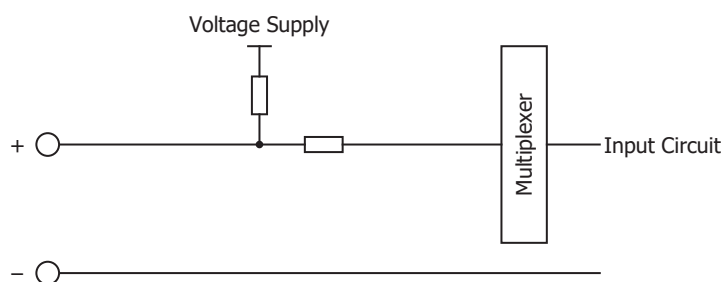
FC6A-J2C1, FC6A-J2C4, FC6A-J4A1, FC6A-J4A4, FC6A-J8A1, FC6A-J8A4, FC6A-L06A1, FC6A-L06A4



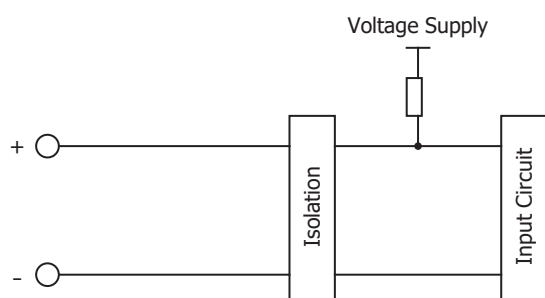
FC6A-J4CN1, FC6A-J4CN4, FC6A-L03CN1, FC6A-L03CN4



FC6A-J8CU1, FC6A-J8CU4



FC6A-J4CH1Y, FC6A-J4CH4Y



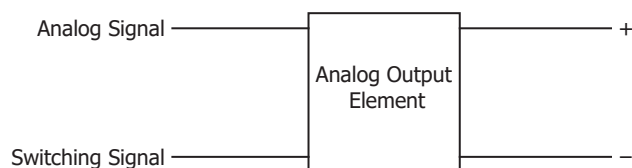
## 2: PRODUCT SPECIFICATIONS

### ■ Analog Output Specifications

| Output Type and Output Range                           |   |                | Voltage   | Current                  |
|--|---|----------------|---|--------------------------|
|  |   |                | 0 to 10 V<br>-10 to 10 V  | 4 to 20 mA<br>0 to 20 mA |
| Load   | Impedance   |                | 1 kΩ or higher  | 300 Ω or lower           |
|  | Load Type   |                | Resistive load  |                          |
| DA Conversion  | DA Conversion Time  |                | 1 ms  |                          |
|  | Output Update Interval                                    |                | 1 ms  |                          |
|  | Total Output System Transfer Time                         |                | DA conversion time + Output Update Interval + 1 scan time                             |                          |
| Output Error   | Maximum Error at 25°C                                     | FC6A-L03CN1    | ±0.1% of full scale   |                          |
|  |   | FC6A-L03CN4    |   |                          |
|  |   | FC6A-L06A1     | ±0.2% of full scale   |                          |
|  |   | FC6A-L06A4     |   |                          |
|  |   | FC6A-K2A1      |   |                          |
|  |   | FC6A-K2A4      |   |                          |
|  |   | FC6A-K4A1      |   |                          |
|  |   | FC6A-K4A4      |   |                          |
|  | Temperature Coefficient                                   | FC6A-L03CN1    | 0.006% of full scale/°C   |                          |
|  |   | FC6A-L03CN4    |   |                          |
|  |   | FC6A-L06A1     | 0.01% of full scale/°C  |                          |
|  |   | FC6A-L06A4     |   |                          |
|  |   | FC6A-K2A1      |   |                          |
|  |   | FC6A-K2A4      |   |                          |
|  |   | FC6A-K4A1      |   |                          |
|  |   | FC6A-K4A4      |   |                          |
|  | Output Ripple   |                | 1 LSB or lower  |                          |
|  | Overshoot   |                | 0%  |                          |
| Data   | Digital Resolution  |                | 4,096 steps (12 bits)   |                          |
|  | Input Value per Step                                      |                | 2.44 mV (0 to 10 V)   |                          |
|  |   |                | 4.88 mV (-10 to +10 V)  |                          |
|  |   |                | 4.88 μA (0 to 20 mA)  |                          |
|  |   |                | 3.91 μA (4 to 20 mA)  |                          |
|  | Application   |                | Can be arbitrarily set for each CH in a range between -32,768 to 32,767 <sup>*1</sup> |                          |
| Monotonicity   |   | Yes            |   |                          |
| Current Loop Open                                      |   | Not detectable |   |                          |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests |                | ±4% or less of full scale   |                          |
|  | Recommended Cable for Noise Immunity                      |                | Current/voltage: Pair shielded cable<br>Other: Pair cable                             |                          |
|  | Crosstalk   |                | 1 LSB   |                          |
| Isolation  | Between Output and Power Circuit                          |                | Transformer isolated  |                          |
|  | Between Output and Internal Circuit                       |                | Photocoupler isolated   |                          |
| Effect of Improper Output Connection                   |   |                | No damage   |                          |
| Selection of Analog Output Signal Type                 |   |                | Using programming software  |                          |
| Calibration or Verification to Maintain Rated Accuracy |   |                | Not possible  |                          |


\*1 The arbitrary setting is a function that uses the digital resolution data by scaling it to arbitrary data (that arbitrarily sets the lower limit value and the upper limit value). The range setting (-32,768 to 32,767) is specified with data registers.



**Output Internal Circuit****Ambient Temperature and Analog Input/Output Restrictions**

- Certain models of the analog module do not support expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C). Do not use unsupported models in an environment with expanded ambient operating temperatures.
- For the status of support for expanded ambient operating temperatures, see "Status of Support for Expanded Ambient Operating Temperatures (-25 to -10°C and 55 to 65°C)" on page 2-2.
- When using the product in high temperatures that exceed 55°C, do not use analog current output from the FC6A-L03CN1 or FC6A-L03CN4. For other models, there are no restrictions on analog input/output.

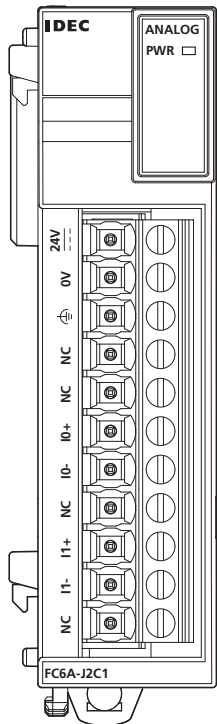
Terminal Arrangement and Wiring Examples

**Caution**

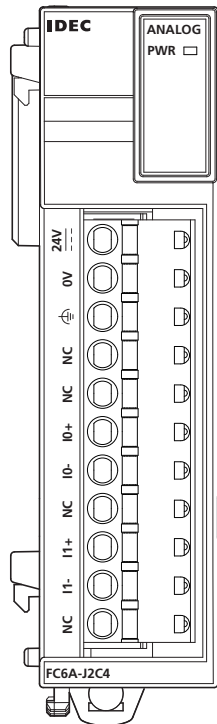
- When connecting the terminal, insert an IEC 60127-approved fuse suitable for the applied voltage and current draw at the position shown in the following diagram.  
(Applicable when equipment containing the FC6A is destined for Europe)
- Do not connect a thermocouple to a part with hazardous voltage (60V DC or peak 42.4V DC or higher part).
- Before turning on the power, always check the wiring. If wiring is incorrect, the analog I/O module may be damaged.

■ FC6A-J2C1, FC6A-J2C4


**Screw fastened type: FC6A-J2C1**  
Applicable connector: FC6A-PMTB11

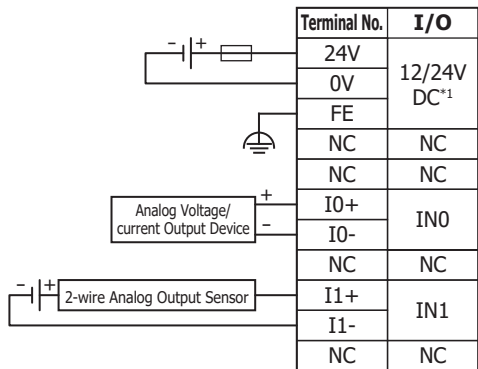


**Push-in type: FC6A-J2C4**  
Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

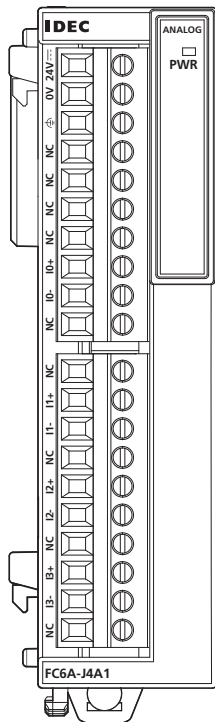
 : Fuse



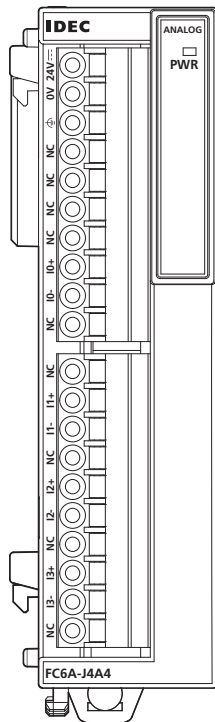
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-J4A1, FC6A-J4A4

**Screw fastened type: FC6A-J4A1**  
Applicable connector: FC6A-PMTC10

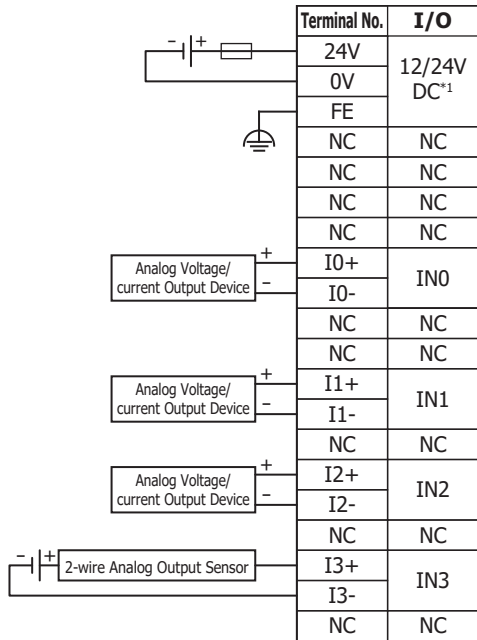


**Push-in type: FC6A-J4A4**  
Applicable connector: FC6A-PMSC10



For wiring precautions, see "Input/Output Wiring" on page 3-18.

: Fuse

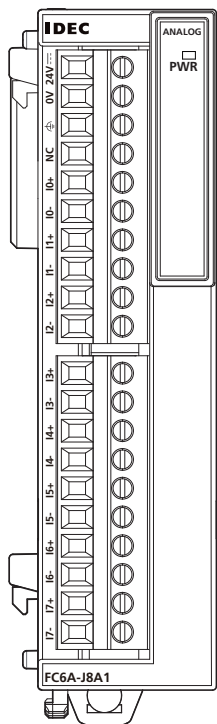


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

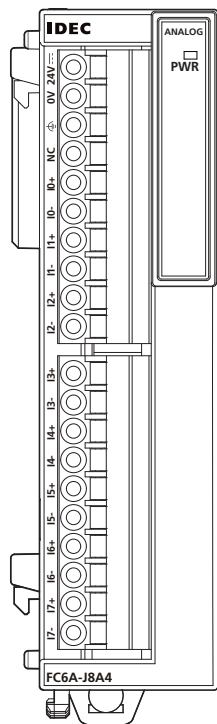
2: PRODUCT SPECIFICATIONS

■ FC6A-J8A1, FC6A-J8A4

**Screw fastened type: FC6A-J8A1**  
Applicable connector: FC6A-PMTC10

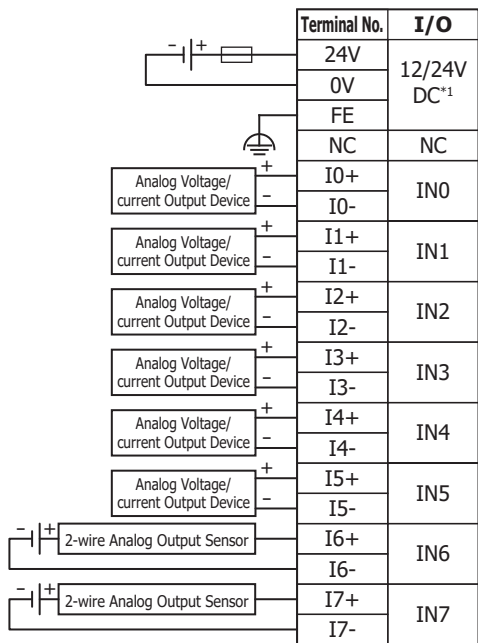


**Push-in type: FC6A-J8A4**  
Applicable connector: FC6A-PMSC10



For wiring precautions, see "Input/Output Wiring" on page 3-18.

: Fuse

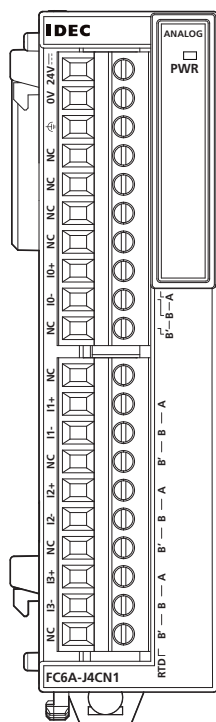


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

### ■ FC6A-J4CN1, FC6A-J4CN4

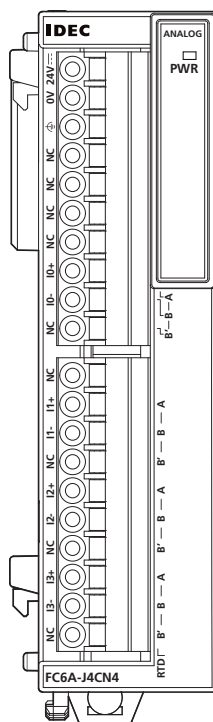
#### Screw fastened type: FC6A-J4CN1

Applicable connector: FC6A-PMTC10




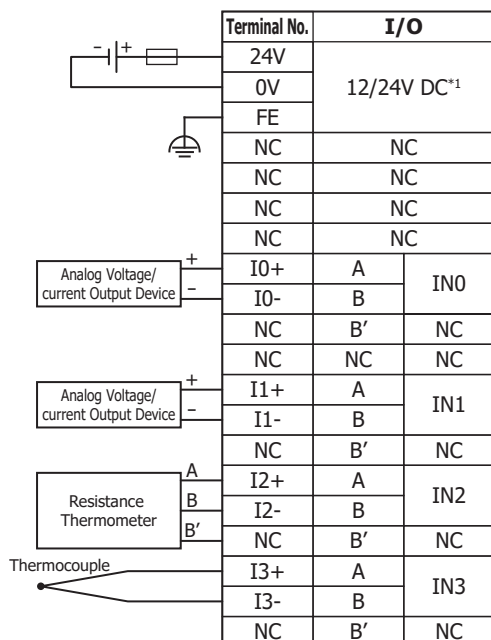
#### Push-in type: FC6A-J4CN4

Applicable connector: FC6A-PMSC10



For wiring precautions, see "Input/Output Wiring" on page 3-18.

 : Fuse



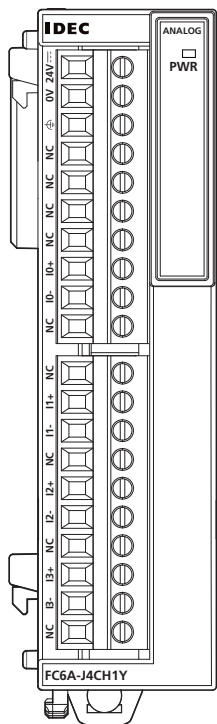
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

2: PRODUCT SPECIFICATIONS

■ FC6A-J4CH1Y, FC6A-J4CH4Y

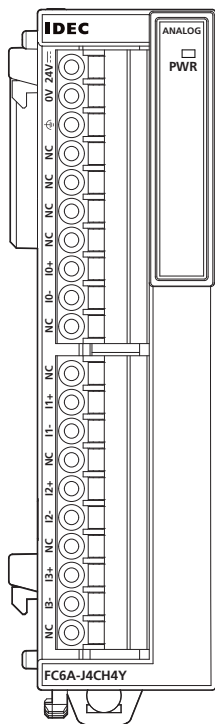
Screw fastened type: FC6A-J4CH1Y

Applicable connector: FC6A-PMTC10




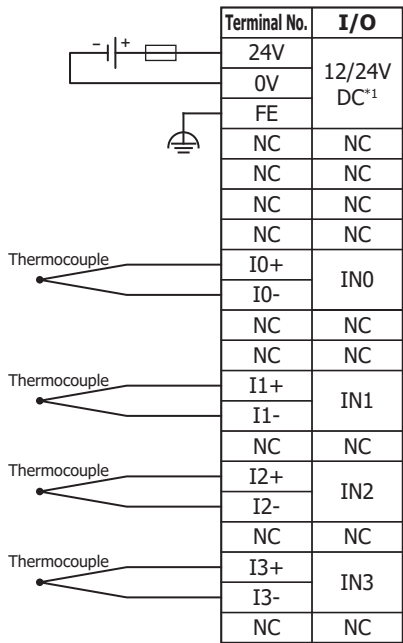
Push-in type: FC6A-J4CH4Y

Applicable connector: FC6A-PMSC10



For wiring precautions, see "Input/Output Wiring" on page 3-18.

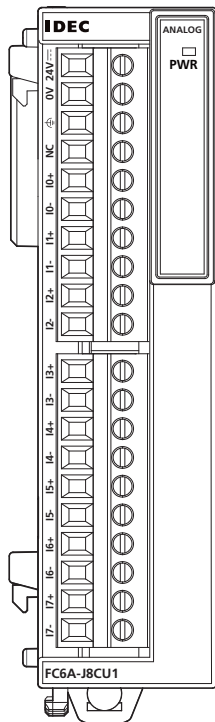
 : Fuse



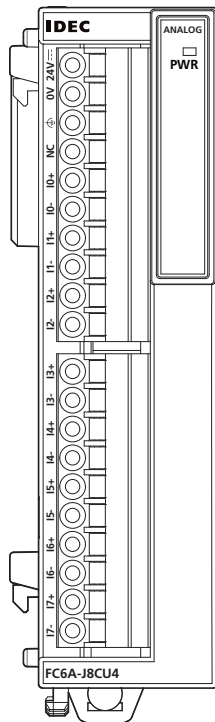
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-J8CU1, FC6A-J8CU4

**Screw fastened type: FC6A-J8CU1**  
Applicable connector: FC6A-PMTC10

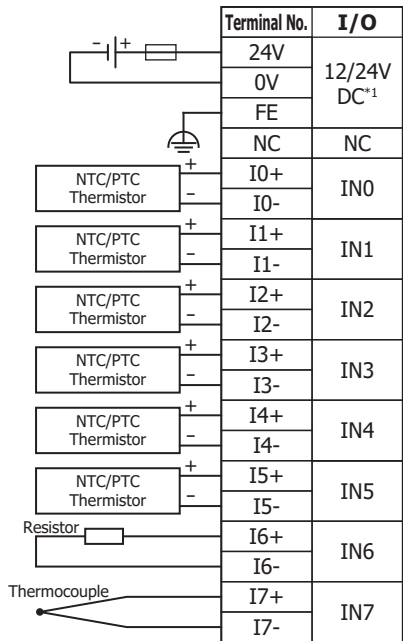


**Push-in type: FC6A-J8CU4**  
Applicable connector: FC6A-PMSC10



For wiring precautions, see "Input/Output Wiring" on page 3-18.

: Fuse

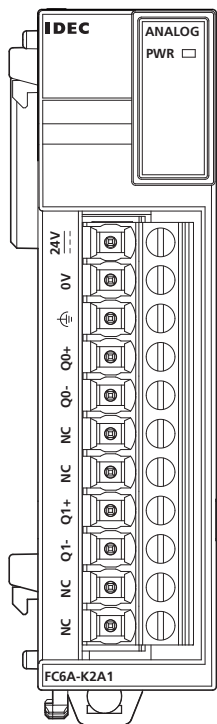


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

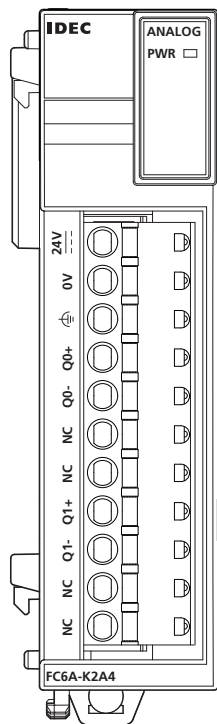
2: PRODUCT SPECIFICATIONS

■ FC6A-K2A1, FC6A-K2A4


**Screw fastened type: FC6A-K2A1**  
Applicable connector: FC6A-PMTB11

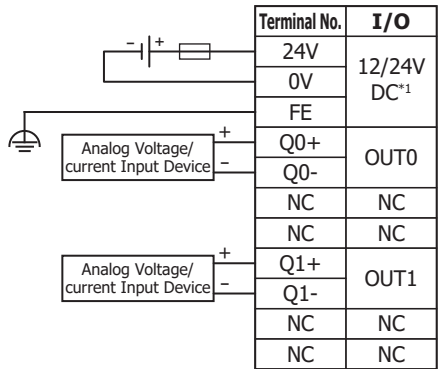


**Push-in type: FC6A-K2A4**  
Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

 : Fuse

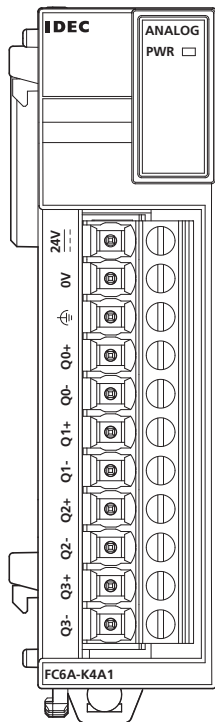


\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

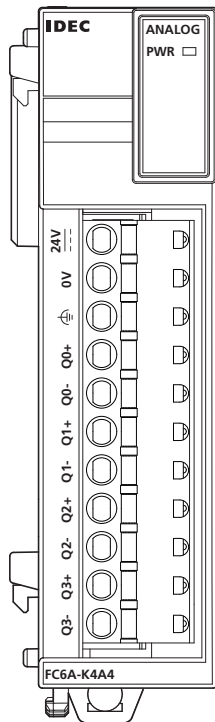


■ FC6A-K4A1, FC6A-K4A4


**Screw fastened type: FC6A-K4A1**  
Applicable connector: FC6A-PMTB11

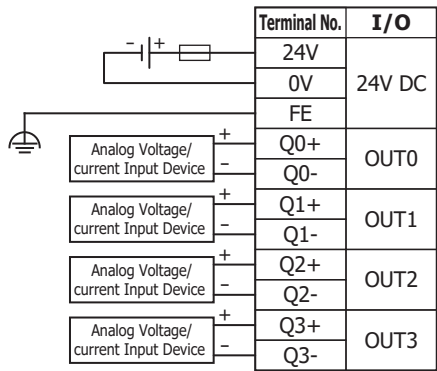


**Push-in type: FC6A-K4A4**  
Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

 : Fuse

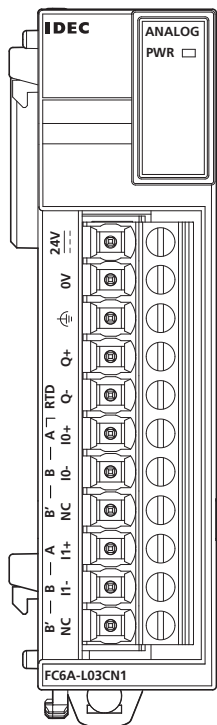


2: PRODUCT SPECIFICATIONS

■ FC6A-L03CN1, FC6A-L03CN4

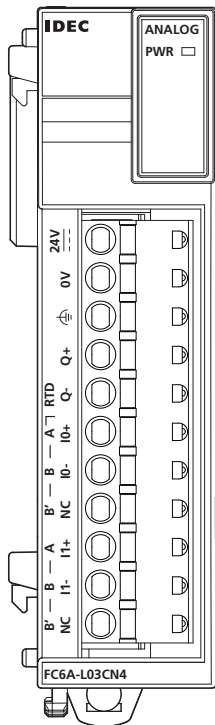
Screw fastened type: FC6A-L03CN1

Applicable connector: FC6A-PMTB11




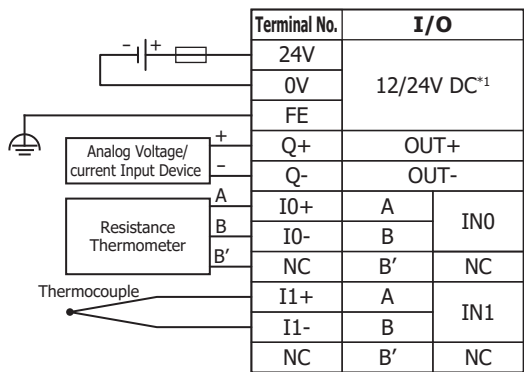
Push-in type: FC6A-L03CN4

Applicable connector: FC6A-PMSB11



For wiring precautions, see "Input/Output Wiring" on page 3-18.

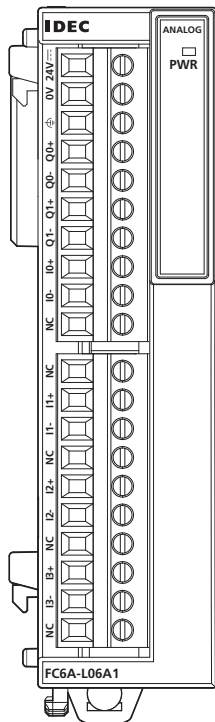
 : Fuse



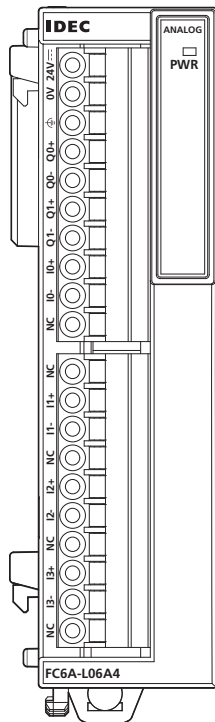
\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

■ FC6A-L06A1, FC6A-L06A4

**Screw fastened type: FC6A-L06A1**  
Applicable connector: FC6A-PMTC10

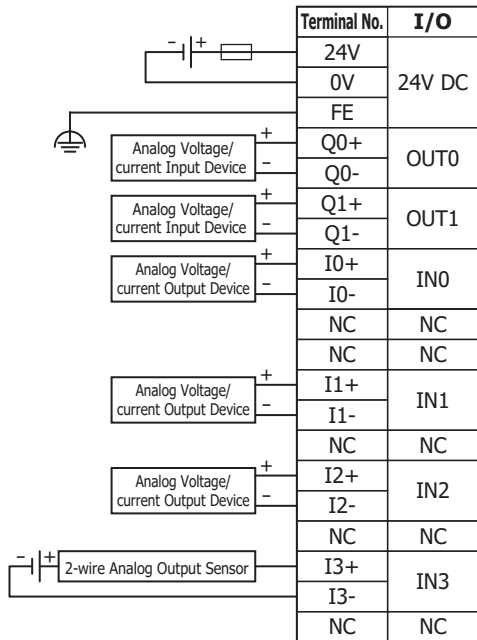


**Push-in type: FC6A-L06A4**  
Applicable connector: FC6A-PMSC10



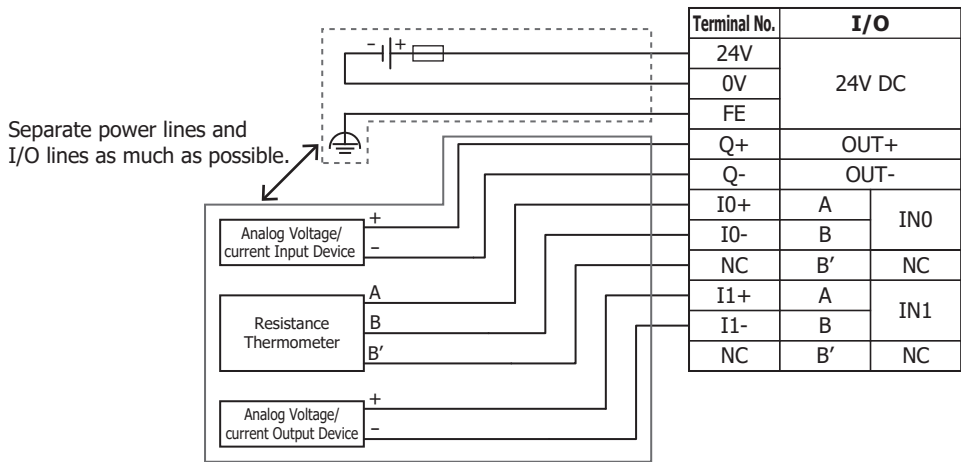
For wiring precautions, see "Input/Output Wiring" on page 3-18.

—|— : Fuse



Precautions when Supplying Power to the Analog I/O Module

Separate analog I/O lines (resistance thermometers in particular) from power lines as much as possible to reduce the effect of noise.



Safety Relay Module

The safety relay modules are digital I/O functional safety modules and they can be used to incorporate machine safety into the overall machine control. The safety relay modules can be connected to a CPU module. For details, see Chapter 1 "FC6A Safety Relay Module Description" in the "FC6A Series MICROSmart Safety Relay Module User's Manual".

## PID Module

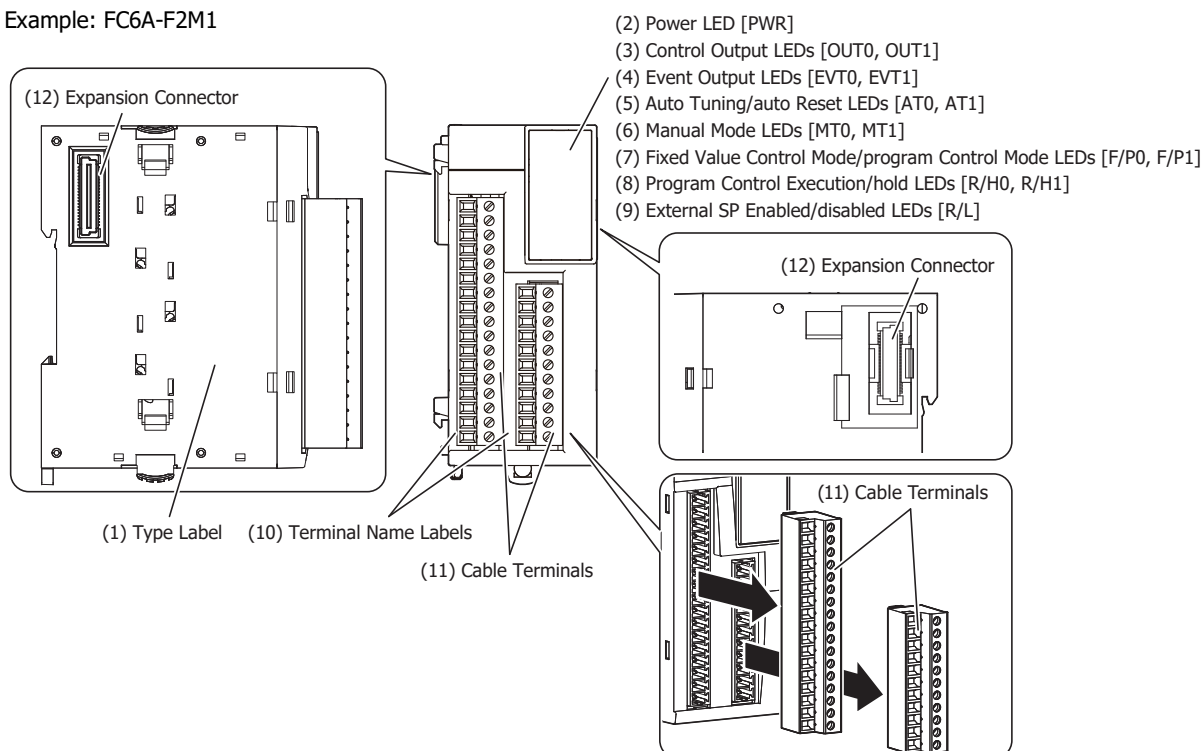
The PID module performs control actions to eliminate the deviation between the set point (SP) and process variable (PV). The PID module, which is an expansion module, is required to connect to the CPU module for use. Depending on the difference of output specifications, the PID modules are categorized into two types.

The input channel can accept voltage, current, thermocouple or resistance thermometer signals. The output channel generates relay output, non-contact voltage (for SSR drive), or current signals.

To configure the PID modules, the Expansion Modules Configuration dialog box in WindLDR is used. For detailed configuration methods, see "Module Configuration Editor" on page 12-1. For details on the PID module parameter settings, see the "FC6A PID Module User's Manual".

### Parts Description

Example: FC6A-F2M1



The content in brackets is the LED indicator name on the PID module.

### LED Indicators

|      |      |
|------|------|
| PWR  | □(2) |
| OUT0 | □(3) |
| EVT0 | □(4) |
| AT0  | □(5) |
| MT0  | □(6) |
| F/P0 | □(7) |
| R/H0 | □(8) |
| R/L  | □(9) |
| OUT1 | □(3) |
| EVT1 | □(4) |
| AT1  | □(5) |
| MT1  | □(6) |
| F/P1 | □(7) |
| R/H1 | □(8) |

#### (1) Type Label

Indicates the PID module type no. and specifications.

#### (2) Power LED [PWR]

On: Power normally supplied

Flashing: When there is an external power supply (24V DC) fault

Off: Power is not supplied

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### (3) Control Output LEDs [OUT0, OUT1]

On: Control output is on

Off: Control output is off

Flashing: For current output only, flashes at the duty cycle that corresponds to the output manipulated variable in a 100 ms cycle.

For an output manipulated variable of 20%, the LED is on for 20 ms and off for 80 ms.

### (4) Event Output LEDs [EVT0, EVT1]

On: When alarm 1 to alarm 8 or a loop error alarm has occurred

Off: When no alarms have occurred

### (5) Auto Tuning/auto Reset LEDs [AT0, AT1]

Flashing: When executing auto tuning or auto reset

Off: When auto tuning or auto reset is stopped

### (6) Manual Mode LEDs [MT0, MT1]

On: When program control mode is selected

Off: When auto mode is selected

### (7) Fixed Value Control Mode/program Control Mode LEDs [F/P0, F/P1]

On: During program control mode

Off: During fixed value control mode

### (8) Program Control Execution/hold LEDs [R/H0, R/H1]

On: During program control execution or while control is allowed in fixed value control

Flashing: When there is a power interruption during program control hold or during program control execution

Off: During program control stopped or while control prohibited in fixed value control

### (9) External SP Enabled/disabled LEDs [R/L]

On: External SP input is enabled

Off: External SP input is disabled

### (10) Terminal Name Label

Indicates terminal numbers.

### (11) Cable terminals

These terminals are for connecting cables. Terminal block type (3.81 mm pitch).

### (12) Expansion connector

Connects the expansion modules and the CPU module.

### Model List

| Module type   | I/O Points |            | I/O Signal   | Cable Terminal Type 1               | Cable Terminal Type 2 | Type No.   |
|---|------------|------------|--|-------------------------------------|-----------------------|------------|
| Non-contact voltage output (to drive SSRs)/ current output type | I/O        | 2 (Input)  | Voltage input (0 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 1 V)<br>Current input (4 to 20 mA, 0 to 20 mA)<br>Thermocouple (K, J, R, S, B, E, T, N, PL-II, C)<br>Resistance thermometer (Pt100, jPt100) | Terminal block type (3.81 mm pitch) | Screw fastened type   | FC6A-F2M1  |
|   |            | 2 (Output) | Voltage output (12V DC digital output)<br>Current output (4 to 20 mA)  |                                     | Push-in type          | FC6A-F2M4  |
| Relay contact output type                                       | I/O        | 2 (Input)  | Voltage input (0 to 10 V, 0 to 5 V, 1 to 5 V, 0 to 1 V)<br>Current input (4 to 20 mA, 0 to 20 mA)<br>Thermocouple (K, J, R, S, B, E, T, N, PL-II, C)<br>Resistance thermometer (Pt100, jPt100) | Terminal block type (3.81 mm pitch) | Screw fastened type   | FC6A-F2MR1 |
|   |            | 2 (Output) | Relay output   |                                     | Push-in type          | FC6A-F2MR4 |

**Quantity of Applicable PID Modules**

The maximum number of PID modules that can be connected depends on the CPU module type. The maximum number of PID modules that can be connected to the CPU modules is as follows.

| Module Type           |                                 | Type No.   | Quantity of Applicable PID Modules  |
|-----------------------|---------------------------------|--|-------------------------------------|
| All-in-One CPU module | All-in-One CPU module           | FC6A-C16R1AE, FC6A-C16R4AE<br>FC6A-C16R1CE, FC6A-C16R4CE<br>FC6A-C16K1CE, FC6A-C16K4CE<br>FC6A-C16P1CE, FC6A-C16P4CE<br>FC6A-C16R1DE, FC6A-C16R4DE<br>FC6A-C16K1DE, FC6A-C16K4DE<br>FC6A-C16P1DE, FC6A-C16P4DE               | 4 modules + 8 modules <sup>*1</sup> |
|                       |                                 | FC6A-C24R1AE, FC6A-C24R4AE<br>FC6A-C24R1CE, FC6A-C24R4CE<br>FC6A-C24K1CE, FC6A-C24K4CE<br>FC6A-C24P1CE, FC6A-C24P4CE   | 7 modules + 8 modules <sup>*1</sup> |
|                       | CAN J1939 All-in-One CPU module | FC6A-C40R1AE, FC6A-C40R4AE<br>FC6A-C40R1CE, FC6A-C40R4CE<br>FC6A-C40K1CE, FC6A-C40K4CE<br>FC6A-C40P1CE, FC6A-C40P4CE<br>FC6A-C40R1DE, FC6A-C40R4DE<br>FC6A-C40K1DE, FC6A-C40K4DE<br>FC6A-C40P1DE, FC6A-C40P4DE               |                                     |
|                       |                                 | FC6A-C40R1AEJ, FC6A-C40R4AEJ<br>FC6A-C40R1CEJ, FC6A-C40R4CEJ<br>FC6A-C40K1CEJ, FC6A-C40K4CEJ<br>FC6A-C40P1CEJ, FC6A-C40P4CEJ<br>FC6A-C40R1DEJ, FC6A-C40R4DEJ<br>FC6A-C40K1DEJ, FC6A-C40K4DEJ<br>FC6A-C40P1DEJ, FC6A-C40P4DEJ |                                     |
| Plus CPU module       | Plus CPU module                 | FC6A-D16R1CEE<br>FC6A-D16R4CEE<br>FC6A-D16K1CEE<br>FC6A-D16K4CEE<br>FC6A-D16P1CEE<br>FC6A-D16P4CEE   | 63 modules <sup>*2</sup>            |
|                       |                                 | FC6A-D32K3CEE<br>FC6A-D32K4CEE<br>FC6A-D32P3CEE<br>FC6A-D32P4CEE   |                                     |

<sup>\*1</sup> When the expansion interface module (expander) is used, an additional eight PID modules can be connected to the expansion interface side (right side) of the expansion interface module (expander). The maximum number of modules that can be connected does not include the expansion interface module (expander).

<sup>\*2</sup> The number of modules that can be connected does not include the expansion interface modules (expander and remote master/slave).

## 2: PRODUCT SPECIFICATIONS

### Power Supply Specifications

| Type No.                                  |                              | FC6A-F2M1, FC6A-F2M4   | FC6A-F2MR1, FC6A-F2MR4                 |
|---|------------------------------|--|--|
| External Power                            | Power Supply Voltage         | 24V DC   |  |
|   | Allowed Fluctuation Range    | 20.4 to 28.8V DC   |  |
| Terminal Arrangement                      |                              | See "Terminal Arrangement and Wiring Examples" on page 2-135 |  |
| Connector                                 | Insertion/Removal Durability | 100 times minimum  |  |
| Module                                    | 5V DC                        | 65 mA  | 65 mA                                  |
| Internal Current Draw                     | 24V DC                       | 0 mA   | 0 mA                                   |
| Module External Power Supply Current Draw |                              | 150 mA (24V DC)  | 150 mA (24V DC)                        |
| Weight (approx.)                          |                              | FC6A-F2M1: 140 g<br>FC6A-F2M4: 130 g                         | FC6A-F2MR1: 140 g<br>FC6A-F2MR4: 130 g |

### Function Specifications

#### ■ Input Specifications

| Type No.                   |                          | FC6A-F2M1, FC6A-F2M4, FC6A-F2MR1, FC6A-F2MR4                      |                   |                     |
|----------------------------|--------------------------|---|-------------------|---------------------|
| Input Type and Input Range | Voltage                  | 0 to 10 V   |                   |                     |
|                            |                          | 0 to 5 V  |                   |                     |
|                            |                          | 1 to 5 V  |                   |                     |
|                            |                          | 0 to 1 V  |                   |                     |
|                            | Current                  | 4 to 20 mA  |                   |                     |
|                            |                          | 0 to 20 mA  |                   |                     |
|                            | Thermocouple             | K   | -200 to 1,370°C   | -328 to 2,498°F     |
|                            |                          | K (with decimal point)  | -200.0 to 400.0°C | -328.0 to 752.0°F   |
|                            |                          | J   | -200 to 1,000°C   | -328 to 1,832°F     |
|                            |                          | R   | 0 to 1,760°C      | 32 to 3,200°F       |
|                            |                          | S   | 0 to 1,760°C      | 32 to 3,200°F       |
|                            |                          | B   | 0 to 1,820°C      | 32 to 3,308°F       |
|                            |                          | E   | -200 to 800°C     | -328 to 1,472°F     |
|                            |                          | T   | -200.0 to 400.0°C | -328.0 to 752.0°F   |
|                            |                          | N   | -200 to 1,300°C   | -328 to 2,372°F     |
|                            |                          | PL-II   | 0 to 1,390°C      | 32 to 2,534°F       |
|                            |                          | C (W/Re5-26)  | 0 to 2,315°C      | 32 to 4,199°F       |
|                            | Resistance Thermometer*1 | Pt100   | -200 to 850°C     | -328 to 1,562°F     |
|                            |                          | Pt100 (with decimal point)  | -200.0 to 850.0°C | -328.0 to 1,562.0°F |
|                            |                          | JPt100  | -200 to 500°C     | -328 to 932°F       |
|                            |                          | JPt100 (with decimal point)                                       | -200.0 to 500.0°C | -328.0 to 932.0°F   |
| Input Impedance            | Voltage                  | 1 MΩ or higher (0 to 1 V range)<br>100 kΩ or higher (other range) |                   |                     |
|                            | Current                  | 50 Ω or lower   |                   |                     |
|                            | Thermocouple             | 1 MΩ or higher  |                   |                     |
|                            | Resistance Thermometer   | 1 MΩ or higher  |                   |                     |
| AD Conversion              | Sampling Time            | 100 ms  |                   |                     |
|                            | Sampling Repetition Time | 100 ms  |                   |                     |
|                            | Total Input Delay Time*2 | Sampling time + Sampling repetition time + 1 scan time            |                   |                     |
|                            | Type of Input            | Differential input  |                   |                     |
|                            | Operation Mode           | Self-scan   |                   |                     |
|                            | Conversion Method        | ΣΔ type ADC   |                   |                     |



| Type No.    |                         |                          | FC6A-F2M1, FC6A-F2M4, FC6A-F2MR1, FC6A-F2MR4   |   |                                 |
|-------------|-------------------------|--------------------------|--|---|---------------------------------|
| Input Error | Maximum Error at 25°C   | Thermocouple             | Within $\pm 0.2\%$ of full scale or $\pm 2^\circ\text{C}$ ( $4^\circ\text{F}$ ), whichever is larger<br>Cold junction compensation accuracy: $\pm 1.0^\circ\text{C}$ or lower<br>However, R, S input 0 to $200^\circ\text{C}$ (0 to $400^\circ\text{F}$ ) is within $\pm 6^\circ\text{C}$ ( $12^\circ\text{F}$ )<br>B input 0 to $300^\circ\text{C}$ (0 to $600^\circ\text{F}$ ) is outside the guaranteed range of accuracy<br>K, J, E, T, N input less than $0^\circ\text{C}$ ( $32^\circ\text{F}$ ) is within $\pm 0.4\%$ of full scale |   |                                 |
|             |                         | Resistance Thermometer   | Within $\pm 0.1\%$ of full scale or $\pm 1^\circ\text{C}$ ( $2^\circ\text{F}$ ), whichever is larger   |   |                                 |
|             |                         | Voltage/Current          | Within $\pm 0.2\%$ of full scale   |   |                                 |
|             | Temperature Coefficient |                          | $\pm 0.005\%$ of full scale/ $^\circ\text{C}$  |   |                                 |
| Data        | Digital Resolution      | Voltage                  | 12,000 (14 bits)   |   |                                 |
|             |                         | Current                  | 12,000 (14 bits)   |   |                                 |
|             |                         | Thermocouple             |  | Celsius ( $^\circ\text{C}$ )              | Fahrenheit ( $^\circ\text{F}$ ) |
|             |                         |                          | K  | 1,570                                     | 2,826                           |
|             |                         |                          | K (with decimal point)   | 6,000                                     | 10,800                          |
|             |                         |                          | J  | 1,200                                     | 2,160                           |
|             |                         |                          | R  | 1,760                                     | 3,169                           |
|             |                         |                          | S  | 1,760                                     | 3,169                           |
|             |                         |                          | B  | 1,820                                     | 3,277                           |
|             |                         |                          | E  | 1,000                                     | 1,800                           |
|             |                         |                          | T  | 6,000                                     | 10,800                          |
|             |                         |                          | N  | 1,500                                     | 2,700                           |
|             |                         |                          | PL-II  | 1,390                                     | 2,503                           |
|             |                         |                          | C (W/Re5-26)   | 2,315                                     | 4,168                           |
|             |                         | Resistance Thermometer*1 |  | Celsius ( $^\circ\text{C}$ )              | Fahrenheit ( $^\circ\text{F}$ ) |
|             |                         |                          | Pt100  | 1,050                                     | 1,890                           |
|             |                         |                          | Pt100 (with decimal point)   | 10,500                                    | 18,900                          |
|             |                         |                          | JPt100   | 700                                       | 1,260                           |
|             |                         |                          | JPt100 (with decimal point)  | 7,000                                     | 12,600                          |
|             | Input Value per Step    | Voltage                  | 0 to +10V DC: 0.83 mV<br>0 to +5V DC: 0.416 mV<br>1 to +5V DC: 0.333 mV<br>0 to +1V DC: 0.083 mV   |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         | Current                  | 4 to 20mA DC: 1.333 $\mu\text{A}$<br>0 to 20mA DC: 1.666 $\mu\text{A}$   |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         |                          |  |   |                                 |
|             |                         | Thermocouple             | Type   | Input Value per Step                      |                                 |
|             |                         |                          | K  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | K (with decimal point)   | 0.1 $^\circ\text{C}$ ( $^\circ\text{F}$ ) |                                 |
|             |                         |                          | J  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | R  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | S  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | B  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | E  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | T  | 0.1 $^\circ\text{C}$ ( $^\circ\text{F}$ ) |                                 |
|             |                         |                          | N  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | PL-II  | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |
|             |                         |                          | C (W/Re5-26)   | 1 $^\circ\text{C}$ ( $^\circ\text{F}$ )   |                                 |

## 2: PRODUCT SPECIFICATIONS

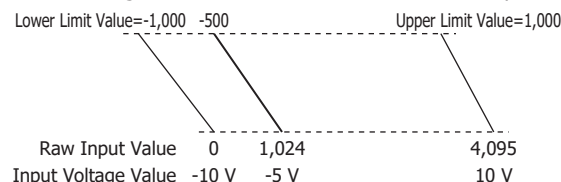
| Type No.   |   |                        | FC6A-F2M1, FC6A-F2M4, FC6A-F2MR1, FC6A-F2MR4                              |                      |
|--|---|------------------------|---|----------------------|
| Data   | Input Value per Step                                      | Resistance Thermometer | Type  | Input Value per Step |
|  |   |                        | Pt100   | 1°C (°F)             |
|  |   |                        | Pt100 (with decimal point)  | 0.1°C (°F)           |
|  |   |                        | JPt100  | 1°C (°F)             |
|  |   |                        | JPt100 (with decimal point)   | 0.1°C (°F)           |
|  | Data Type in Application Program                          |                        | Can be arbitrarily set for each CH in a range between -32,768 to 32,767*2 |                      |
|  | Monotonicity  |                        | Yes   |                      |
|  | Input Data Out of Range                                   |                        | Detectable*3  |                      |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests |                        | ±4% or less of full scale   |                      |
|  | Input Filter  |                        | Yes   |                      |
|  | Recommended Cable for Noise Immunity                      |                        | Current/voltage: Pair shielded cable<br>Other: Pair cable                 |                      |
|  | Crosstalk   |                        | None  |                      |
| Isolation  | Between Input and Power Circuit                           |                        | Transformer isolated  |                      |
|  | Between I/O and Internal Circuit                          |                        | Photocoupler isolated   |                      |
|  | Between Inputs  |                        | Photocoupler isolated   |                      |
| Effect of Improper Input Connection                    |   |                        | No damage   |                      |
| Maximum Permanent Allowed Overload (No Damage)         |   |                        | 15V DC or lower (0 to 1 V range is 5V DC or lower), 50 mA or lower        |                      |
| Selection of Input Type and Input Range                |   |                        | Using programming software  |                      |
| Calibration or Verification to Maintain Rated Accuracy |   |                        | Not possible  |                      |

\*1 The resistance (allowable conductor resistance) of the electrical leads to connect to the resistance thermometer is 10 Ω or less per wire.

\*2 The arbitrary setting is a function that uses the digital resolution data by scaling it to arbitrary data (that arbitrarily sets the lower limit value and the upper limit value). The range setting (-32,768 to 32,767) is specified with data registers.

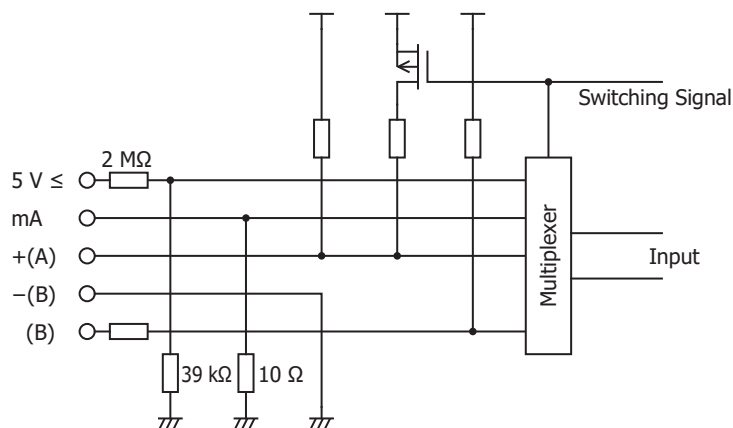
Example: When -5 V is input, 1,024 is displayed as long as the arbitrary setting is not configured, but -500 is displayed when the arbitrary setting is configured as upper limit value = 1,000 and lower limit value = -1,000, and this makes it easier to intuitively read the input voltage value.

When the digital resolution data is 12 bits and the input range is -10 to +10 V



\*3 Input data out of range is reflected in the status of the analog I/O module.

### Input Internal Circuit



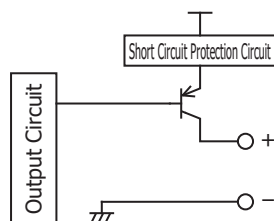
## ■ Output Specifications

| Type No.   |   | FC6A-F2M1, FC6A-F2M4  | FC6A-F2MR1, FC6A-F2MR4                |
|--|---|---|---------------------------------------|
| Output Type and Output Range                           | Digital Output  | Transistor protection source output (12V DC output)   | Relay output                          |
|  | Analog Output   | 4 to 20 mA  | —                                     |
| Load   | Digital Output  | Max 40 mA (12V DC)  | —                                     |
|  | Analog Output   | 550 Ω or higher   | —                                     |
|  | Relay Output  | —   | 5 A 250V AC (resistive load)          |
|  |   |   | 5 A 30V DC (resistive load)           |
|  |   |   | 3 A 250V AC (inductive load cosφ=0.4) |
|  |   |   | 3 A 30V DC (inductive load L/R=7 ms)  |
| Load Type  | Resistive load  | Resistive load/inductive load   |                                       |
| DA Conversion  | Analog Output Settling Time                               | 80 ms   | —                                     |
|  | Digital Output Delay Time                                 | Turn OFF time: 10 ms<br>Turn ON time: 5 ms  | —                                     |
|  | Total Output System Transfer Time                         | Analog output: Settling time + input sampling time (100 ms)<br>Digital output/relay output: Output delay time + proportional cycle (1 to 120 s) |                                       |
| Output Error   | Maximum Error at 25°C                                     | ±0.5% of full scale   |                                       |
|  | Temperature Coefficient                                   | ±0.01% of full scale/°C   |                                       |
|  | Output Ripple   | ±0.2% or less of full scale   |                                       |
|  | Overshoot   | 0%  |                                       |
| Data   | Digital Resolution  | 1,000 steps (10 bits)   |                                       |
|  | Input Type and Input Range                                | 0.0016 mA (4 to 20 mA)  |                                       |
|  | Monotonicity  | Yes   |                                       |
|  | Current Loop Open   | Not detectable  |                                       |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests | ±4% or less of full scale   |                                       |
|  | Recommended Cable for Noise Immunity                      | Current/voltage: Pair shielded cable  |                                       |
|  | Crosstalk   | 1 LSB   |                                       |
| Isolation  | Between Output and Power Circuit                          | Transformer isolated  |                                       |
|  | Between Output and Internal Circuit                       | Photocoupler isolated   |                                       |
| Effect of Improper Output Connection                   |   | No damage   |                                       |
| Selection of Analog Output Signal Type                 |   | Using programming software  |                                       |
| Calibration or Verification to Maintain Rated Accuracy |   | Not possible  |                                       |

### Output Internal Circuit

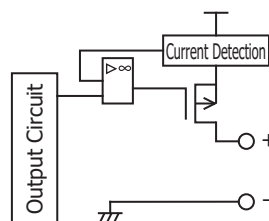
FC6A-F2M1, FC6A-F2M4

(non-contact voltage output (to drive SSRs))

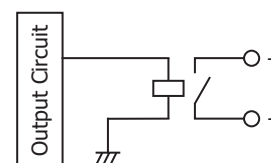


FC6A-F2M1, FC6A-F2M4

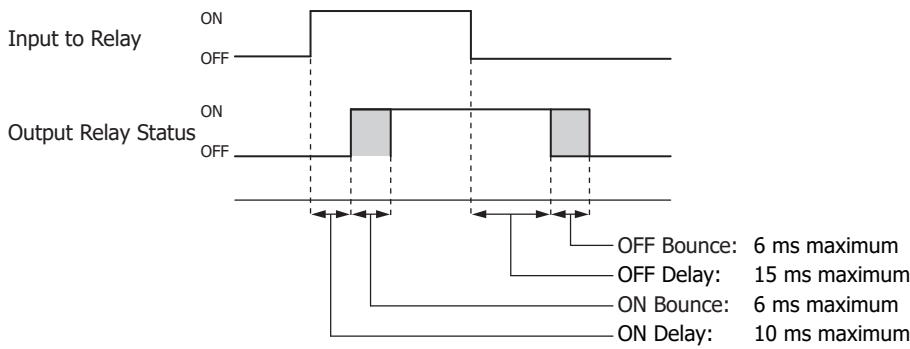
(current output)



FC6A-F2MR1, FC6A-F2MR4



Output Delay



■ Program Performance

| Item  | Specifications               |
|---|------------------------------|
| Time setting accuracy                           | Within ±0.5% of the set time |
| Progression time error after power interruption | 6 minutes maximum            |

## Terminal Arrangement and Wiring Examples

**Caution**

- When connecting the terminal, insert an IEC 60127-approved fuse suitable for the applied voltage and current draw at the position shown in the following diagram. This is required when equipment containing the FC6A is destined for Europe.
- Do not connect a thermocouple to a part with hazardous voltage (60V DC or peak 42.4V DC or higher part).
- Before turning on the power, always check the wiring. If the wiring is incorrect, the PID module may be damaged.
- When connecting stranded wire or multiple wires to a terminal block, always use a ferrule for the terminal block. For details, see "Recommended Ferrule List" on page 3-46.

■ **FC6A-F2M1, FC6A-F2M4, FC6A-F2MR1, FC6A-F2MR4****Screw fastened type: FC6A-F2M1, FC6A-F2MR1**

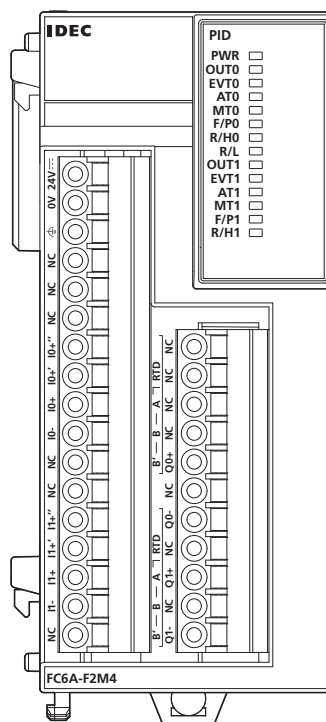
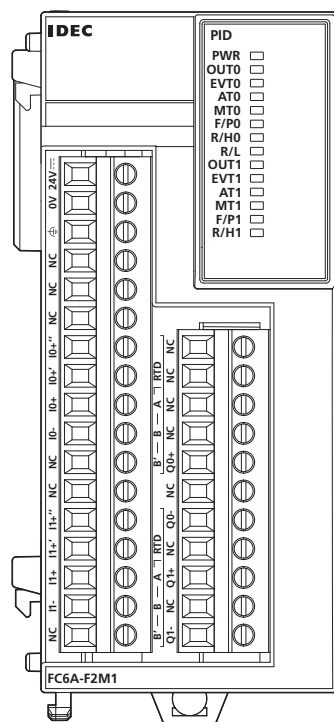
Applicable connector: FC6A-PMTC11

FC6A-PMTC17

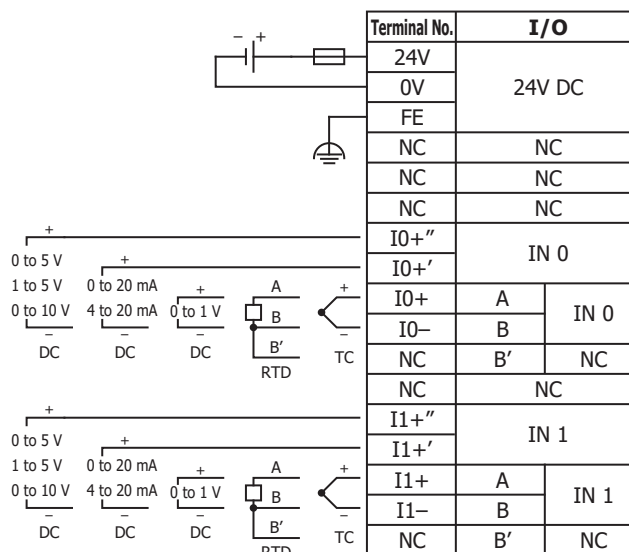
**Push-in type: FC6A-F2M4, FC6A-F2MR4**

Applicable connector: FC6A-PMSC11

FC6A-PMSC17



: Fuse



DC : Voltage/current

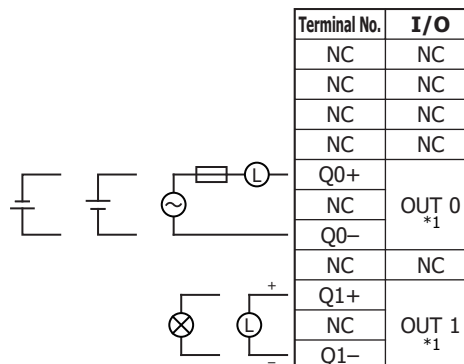
RTD : Resistance Thermometer

TC : Thermocouple

: Load

: Analog Current Input Device

: Fuse



\*1 OUT0: Relay output and OUT1: Non-contact voltage/current output connection examples are shown. There are no models with both types of specifications.

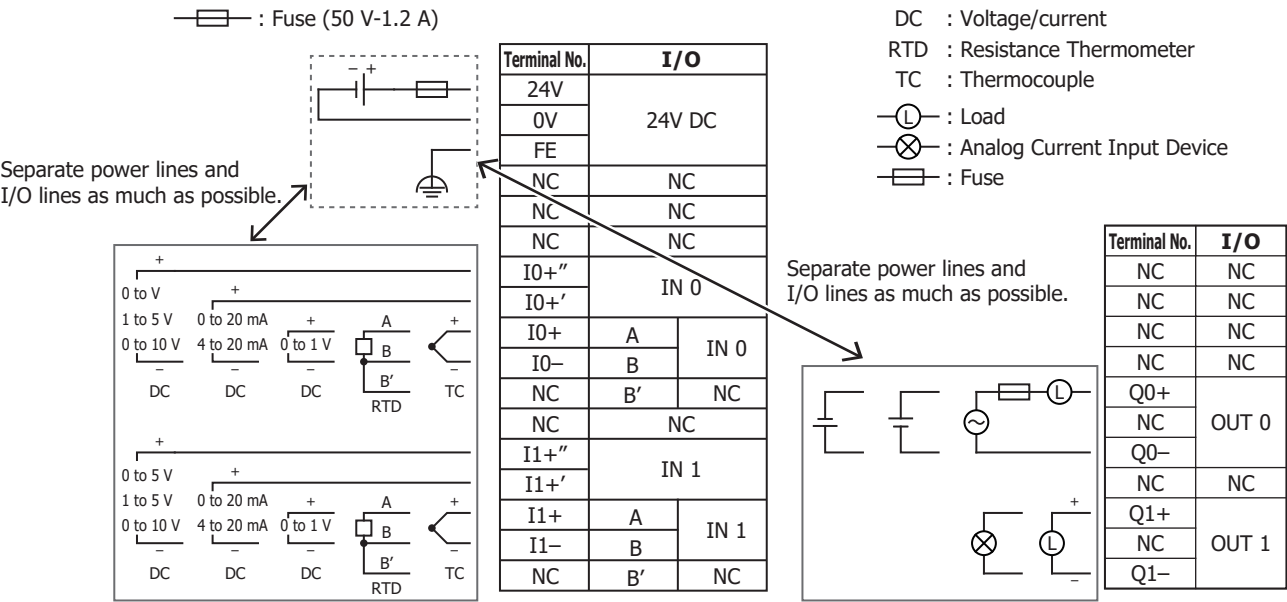
2: PRODUCT SPECIFICATIONS

Precautions when Supplying Power to the PID Module

When the PID module and the CPU module are set to the same power supply, the PID module will be initialized for a maximum of approximately 5 seconds after the power is turned on and the CPU module is set to run, so the parameters will not be stable. Always enable control after the module status flag changes to "0001H" (operating normally).

Wiring PID Module Power and I/O Lines

Separate I/O lines (resistance thermometers in particular) from power lines as much as possible to reduce the effect of noise.



## Communication Modules

The communication modules include the serial communications module that communicate with peripheral devices using RS-232C or RS-485 communications.

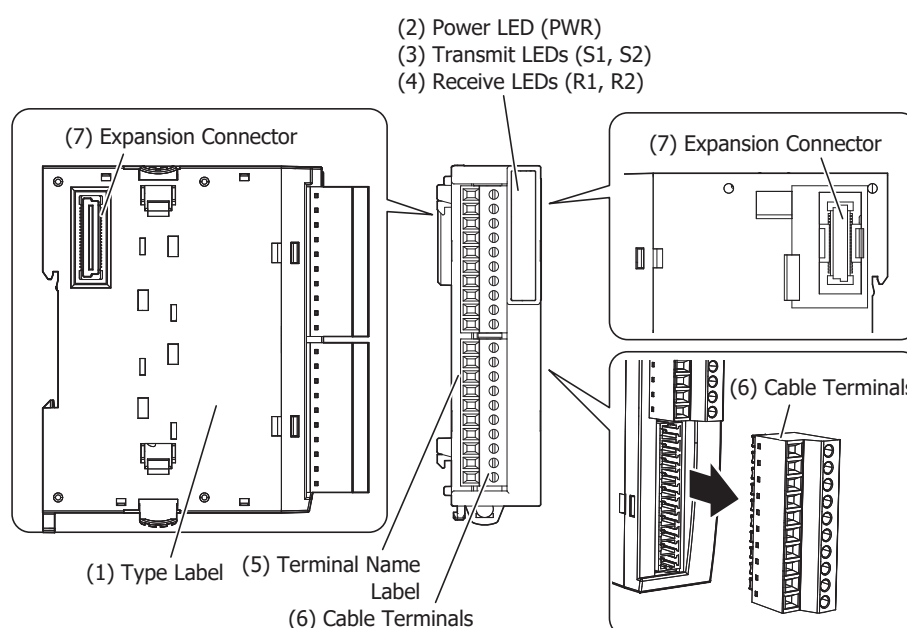
The communication modules are equipped with two serial ports, and RS-232C or RS-485 can be selected and used for each port. These modules support the maintenance communication function, user communication function, data link communication, and Modbus communication function.

Use the communication modules by connecting them to the CPU module. For details on the maximum number of communication modules that can be connected and slots to install those modules, see "Maximum Number of Modules and Slots to Install" on page 2-139. To use a communication module, it must be configured in the Module Configuration Editor. For detailed configuration methods, see "Module Configuration Editor" on page 12-1. For details on communication settings, see Chapter 3 "Communication Settings" in the "FC6A Series MICROSmart Communication Manual".

**Note:** Communication modules cannot be connected to the expansion interface remote slave module.

### Part Names and Functions

FC6A-SIF52



#### (1) Type Label

Indicates the communication module type number and specifications.

#### (2) Power LED (PWR)

This LED turns on when the power is supplied to the communication module.

#### (3) Transmit LEDs (S1, S2)

These LEDs turn on when data is being transmitted from the communication module.

#### (4) Receive LEDs (R1, R2)

These LEDs turn on when the communication module is receiving data.

#### (5) Terminal Name Label

Indicates terminal numbers.

#### (6) Cable Terminals

Wires for RS232C or RS485 communication are connected to these terminals.

#### (7) Expansion Connector

This connector is used to connect expansion modules and the CPU module.

## 2: PRODUCT SPECIFICATIONS

### Model List

| Module Type          | Points | Type  | Cable Terminal Type | Type No.    |
|----------------------|--------|---|---------------------|-------------|
| Communication module | 2      | Serial communication interface (RS-232C/RS-485) | Screw fastened type | FC6A-SIF52  |
|                      |        |   | Push-in type        | FC6A-SIF524 |

**Note:** A single port cannot be used as both RS-232C and RS-485 simultaneously.

### Function Specifications

| Type No.              | FC6A-SIF52, FC6A-SIF524                                       |                   |
|-----------------------|---|-------------------|
| Terminal Arrangement  | See "Terminal Arrangement and Wiring Examples" on page 2-141. |                   |
| Connector             | Insertion/Removal Durability                                  | 100 times minimum |
| Internal Current Draw | 5V DC   | 35 mA             |
|                       | 24V DC  | 35 mA             |
| Weight (approx.)      | FC6A-SIF52  | 110 g             |
|                       | FC6A-SIF524   | 100 g             |

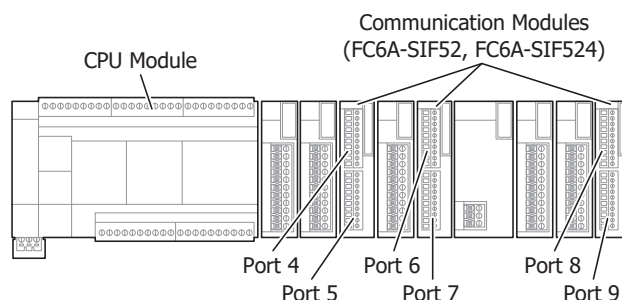
### ■ Communication Specifications

| Type No.                           | FC6A-SIF52, FC6A-SIF524                         |  |
|------------------------------------|---|--|
| Points                             | 2   |  |
| Electrical Characteristics         | EIA RS-232C/EIA RS-485*1                        |  |
| Maximum Communication Speed        | 115,200 bps                                     |  |
| Maintenance Communication          | Yes   |  |
| User Communication                 | Yes   |  |
| Data Link Communication            | Yes   |  |
| Modbus Master                      | Yes   |  |
| Modbus Slave                       | Yes   |  |
| Maximum Cable Length               | 15 m (RS232C)/1,200 m (RS485)                   |  |
| Isolation between Internal Circuit | Between Communication Port and Internal Circuit | Photocoupler isolation   |
|                                    | Between Ports                                   | Transformer isolation  |
| Cable                              | Recommended Cable                               | RS-232C: 24 AWG shielded multicore cable<br>RS-485: 24 AWG twisted-pair shielded cable |

\*1 Specify RS232C or RS485 in the WindLDR **Function Area Settings**. The combination of "Data Bits: 7 bits" and "Parity: None" cannot be set.

### Communication Port Assignments

The communication ports are assigned to port 4, port 5, and so on in order from the ports closest to the CPU module.





**Maximum Number of Modules and Slots to Install**

The maximum number of communication modules that can be connected to the CPU module depends on the CPU module. The following table gives the maximum number of communication modules that can be connected to each CPU module and slots to install those modules.

| Module Type                     | Type No.   | Maximum Number of Modules | Location             |                          |   |                          |
|---------------------------------|--|---------------------------|----------------------|--------------------------|---|--------------------------|
|                                 |  |                           | CPU Module           |                          | Expansion Interface Remote Slave Module |                          |
|                                 |  |                           | Basic Expansion Side | Expansion Interface Side | Basic Expansion Side                    | Expansion Interface Side |
| All-in-One CPU module           | FC6A-C16R1AE<br>FC6A-C16R4AE<br>FC6A-C16R1CE<br>FC6A-C16R4CE<br>FC6A-C16K1CE<br>FC6A-C16K4CE<br>FC6A-C16P1CE<br>FC6A-C16P4CE<br>FC6A-C16R1DE<br>FC6A-C16R4DE<br>FC6A-C16K1DE<br>FC6A-C16K4DE<br>FC6A-C16P1DE<br>FC6A-C16P4DE               | 3 modules*1               | Yes                  | Yes                      | —*3                                     | —*3                      |
|                                 | FC6A-C24R1AE<br>FC6A-C24R4AE<br>FC6A-C24R1CE<br>FC6A-C24R4CE<br>FC6A-C24K1CE<br>FC6A-C24K4CE<br>FC6A-C24P1CE<br>FC6A-C24P4CE   |                           |                      |                          |   |                          |
|                                 | FC6A-C40R1AE<br>FC6A-C40R4AE<br>FC6A-C40R1CE<br>FC6A-C40R4CE<br>FC6A-C40K1CE<br>FC6A-C40K4CE<br>FC6A-C40P1CE<br>FC6A-C40P4CE<br>FC6A-C40R1DE<br>FC6A-C40R4DE<br>FC6A-C40K1DE<br>FC6A-C40K4DE<br>FC6A-C40P1DE<br>FC6A-C40P4DE               |                           |                      |                          |   |                          |
| CAN J1939 All-in-One CPU module | FC6A-C40R1AEJ<br>FC6A-C40R4AEJ<br>FC6A-C40R1CEJ<br>FC6A-C40R4CEJ<br>FC6A-C40K1CEJ<br>FC6A-C40K4CEJ<br>FC6A-C40P1CEJ<br>FC6A-C40P4CEJ<br>FC6A-C40R1DEJ<br>FC6A-C40R4DEJ<br>FC6A-C40K1DEJ<br>FC6A-C40K4DEJ<br>FC6A-C40P1DEJ<br>FC6A-C40P4DEJ | 3 modules*1               | Yes                  | Yes                      | —*3                                     | —*3                      |

## 2: PRODUCT SPECIFICATIONS

| Module Type     | Type No.   | Maximum Number of Modules | Location             |                          |   |                          |
|-----------------|--|---------------------------|----------------------|--------------------------|---|--------------------------|
|                 |  |                           | CPU Module           |                          | Expansion Interface Remote Slave Module |                          |
|                 |  |                           | Basic Expansion Side | Expansion Interface Side | Basic Expansion Side                    | Expansion Interface Side |
| Plus CPU module | FC6A-D16R1CEE<br>FC6A-D16R4CEE<br>FC6A-D16K1CEE<br>FC6A-D16K4CEE<br>FC6A-D16P1CEE<br>FC6A-D16P4CEE | 7 modules + 8 modules*2   | Yes                  | Yes                      | —                                       | —                        |
|                 | FC6A-D32K3CEE<br>FC6A-D32K4CEE<br>FC6A-D32P3CEE<br>FC6A-D32P4CEE                                   |                           |                      |                          |   |                          |

\*1 When the expansion interface module (expander) is used, communication modules can also be connected to the expansion interface side (right side).

\*2 When the expansion interface module (expander) is used, a total of 15 communication modules, seven communication modules on the basic expansion side (left side) and additional eight communication modules on the expansion interface side (right side), can be connected to the CPU module. Communication modules cannot be connected to the expansion interface remote slave module.

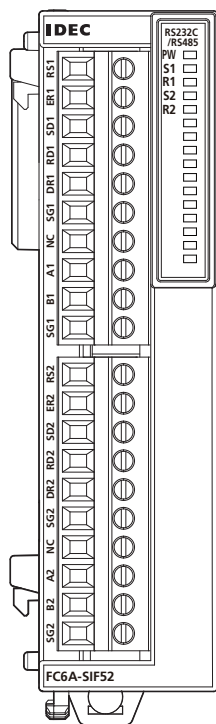
\*3 The expansion interface remote master/slave module cannot be connected to All-in-One CPU module or CAN J1939 All-in-One CPU module.

## Terminal Arrangement and Wiring Examples

### ■ FC6A-SIF52, FC6A-SIF524

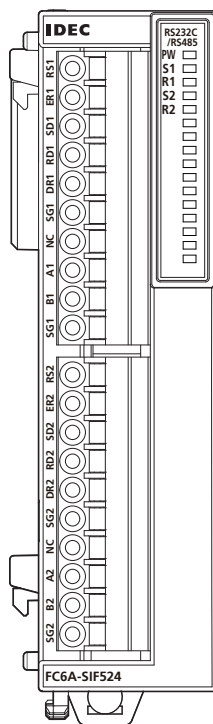
#### Screw fastened type: FC6A-SIF52

Applicable connector: FC6A-PMTC10



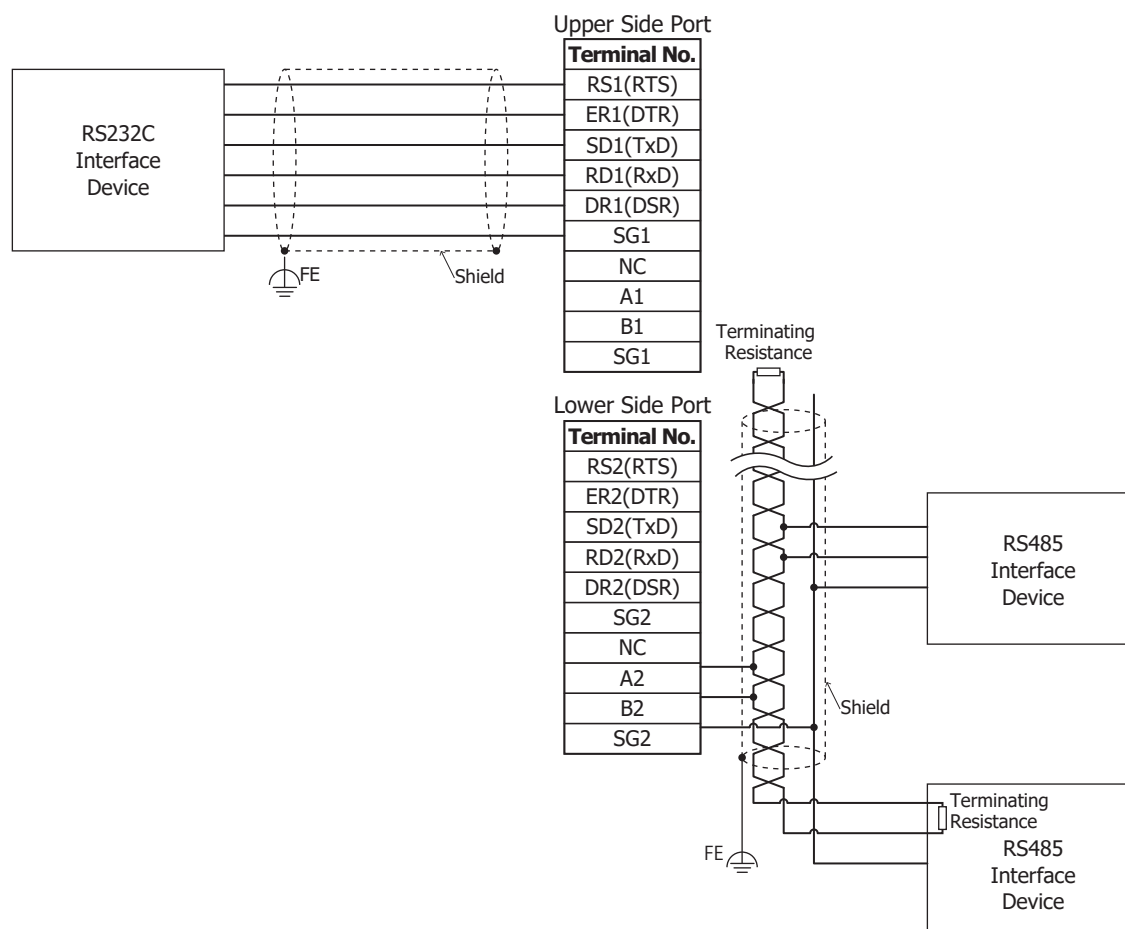
#### Push-in type: FC6A-SIF524

Applicable connector: FC6A-PMSC10



|                 |        | Terminal No. | I/O          | Signal Name         |
|-----------------|--------|--------------|--------------|---------------------|
| Upper Side Port | RS232C | RS1(RTS)     | Output       | Request to send     |
|                 |        | ER1(DTR)     | Output       | Data terminal ready |
|                 |        | SD1(TxD)     | Output       | Transmitted data    |
|                 |        | RD1(RxD)     | Input        | Received data       |
|                 |        | DR1(DSR)     | Input        | Data set ready      |
|                 |        | SG1          | —            | Signal ground       |
|                 | RS485  | NC           | —            | —                   |
|                 |        | A1           | Input/output | Data A              |
|                 |        | B1           | Input/output | Data B              |
|                 |        | SG1          | —            | Signal ground       |
| Lower Side Port | RS232C | RS2(RTS)     | Output       | Request to send     |
|                 |        | ER2(DTR)     | Output       | Data terminal ready |
|                 |        | SD2(TxD)     | Output       | Transmitted data    |
|                 |        | RD2(RxD)     | Input        | Received data       |
|                 |        | DR2(DSR)     | Input        | Data set ready      |
|                 |        | SG2          | —            | Signal ground       |
|                 | RS485  | NC           | —            | —                   |
|                 |        | A2           | Input/output | Data A              |
|                 |        | B2           | Input/output | Data B              |
|                 |        | SG2          | —            | Signal ground       |

### Wiring Example When Using Both Ports



The serial communication module is equipped with two serial ports, and serial communication can be performed using both serial ports simultaneously. RS-232C or RS-485 can be selected and used for each port.

Above wiring example shows RS-232C communication with the upper side port and RS-485 communication with the lower side port.

#### Notes:

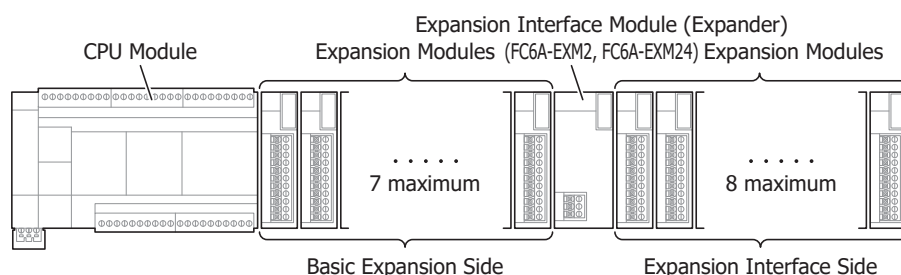
- A single port cannot be used as RS-232C and RS-485 simultaneously.
- When communication conditions are unstable, add terminating resistance matched to the characteristic impedance to both ends of the cable. Use resistance with a rating of 1/2 W or higher.

## Expansion Interface Modules

The expansion interface modules are available as an expander that is added in between expansion modules to expand the number of connected modules and as remote modules (remote master and remote slave) that are daisy chained by Ethernet cables and allow expansion modules to be positioned away from the CPU module. Remote master/slave modules can be connected only to the Plus CPU module.

### Expansion Interface Module (Expander)

The number of expansion modules that can be connected to the CPU module (basic expansion side) is seven modules, but additional eight expansion modules (expansion interface side, maximum 256 I/O points) can be connected by installing the expansion interface module (expander).

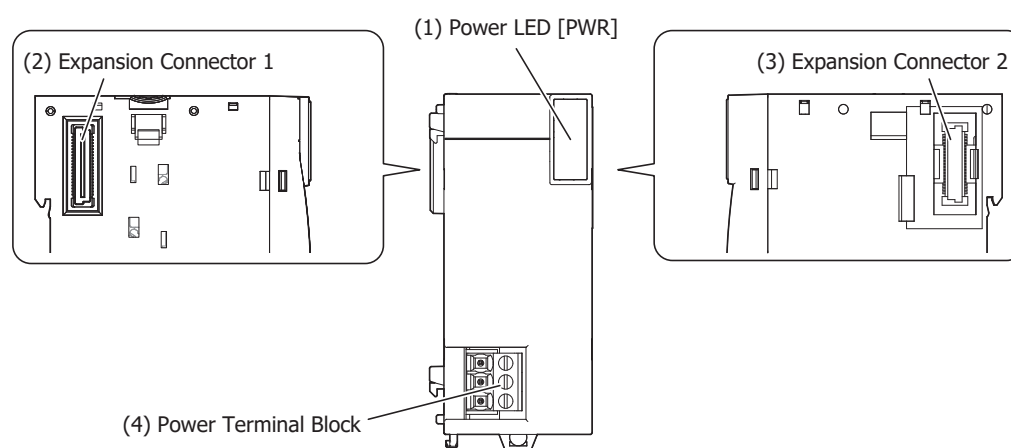


#### Notes:

- Only one expansion interface module (expander) can be connected to one CPU module.
- When using the expansion interface module (expander) together with expansion interface modules (remote master/slave) on the Plus CPU module, one expansion interface module (expander) can be connected per remote slave that is daisy chained to the remote master. For details, see "Expansion Interface Modules (Remote Master/Slave)" on page 2-146.
- The maximum number of modules that can be connected depends on the modules. For detailed restrictions when using the expansion interface module and connection examples, see "Connection Restrictions When Expanding the PLC" on page 3-37.

## Parts Description

### FC6A-EXM2



#### (1) Power LED [PWR]

This LED turns on when the power is supplied to the expansion interface module (expander).

#### (2) Expansion Connector 1

This connector is used to connect the expansion module on the basic expansion side.

#### (3) Expansion Connector 2

This connector is used to connect the expansion module on the expansion interface side.

#### (4) Power Terminal Block

These terminals supply 24V DC power to the expansion interface module (expander).

## 2: PRODUCT SPECIFICATIONS

### Function Specifications

|   |                                     |   |
|---|-------------------------------------|---|
| <b>Type No.</b>                                   |                                     | <b>FC6A-EXM2, FC6A-EXM24</b>  |
| <b>Rated Operating Voltage</b>                    |                                     | 24V DC (supplied from external power)   |
| <b>Voltage Fluctuation Range</b>                  |                                     | 20.4 to 28.8V DC (including ripple)   |
| <b>Current Draw</b>                               | <b>Internal Power</b>               | CPU module side supply 20 mA (5V DC), 0 mA (24V DC)   |
|   | <b>External Power</b>               | When maximum number of modules is connected*1 0.77 A (28.8V DC)                                   |
| <b>Maximum Power Consumption*1</b>                |                                     | 19 W (28.8V DC)   |
| <b>I/O Expansion</b>                              | <b>Basic Expansion Side</b>         | Connectable CPU modules: All CPU modules<br>Connectable expansion modules: Maximum of 7 modules*2 |
|   | <b>Expansion Interface Side</b>     | Connectable expansion modules: Maximum of 8 modules   |
| <b>Allowable Momentary Power Interruption</b>     |                                     | 10 ms or longer (when rated power supply voltage)   |
| <b>Isolation between Internal Circuit</b>         |                                     | Not isolated  |
| <b>Withstand Voltage</b>                          |                                     | Between power and FE terminals: 500V AC, 1 minute   |
| <b>Insulation Resistance</b>                      |                                     | Between power and FE terminals: 10 MΩ or higher (500V DC insulation resistance tester)            |
| <b>Inrush Current</b>                             |                                     | 35 A maximum  |
| <b>Ground</b>                                     |                                     | D-type ground (Class 3 ground)  |
| <b>Ground Wire</b>                                |                                     | See "Connection Restrictions When Expanding the PLC" on page 3-37                                 |
| <b>Power Supply Wire</b>                          |                                     | See "Connection Restrictions When Expanding the PLC" on page 3-37                                 |
| <b>Power Supply Connector</b>                     | <b>Insertion/Removal Durability</b> | 100 times minimum   |
| <b>Effect of Improper Power Supply Connection</b> |                                     | Reverse polarity: No operation, no damage   |
|   |                                     | Improper voltage: Permanent damage may be caused  |
|   |                                     | Improper lead connection: Permanent damage may be caused  |
| <b>Weight</b>                                     |                                     | 150 g   |

\*1 The value when the expansion interface module (expander) + 8 expansion modules (expansion interface side) are used.

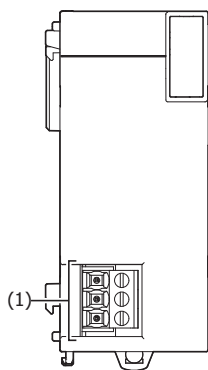
\*2 The maximum is five modules when the expansion interface remote master module is connected to the Plus CPU module.

### Terminal Arrangement and Wiring Examples

#### ■ FC6A-EXM2, FC6A-EXM24

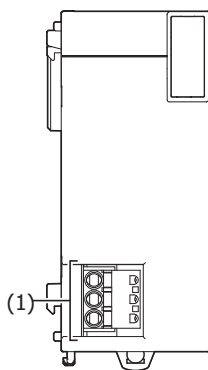
##### Screw fastened type: FC6A-EXM2

Applicable connector: FC6A-PMTB03

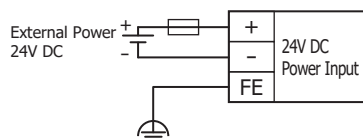



##### Push-in type: FC6A-EXM24

Applicable connector: FC6A-PMSB03



#### (1) Power supply terminals



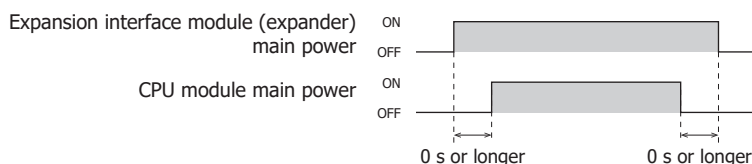
 : Fuse

For wiring precautions, see "Power Supply and Power Supply Wiring" on page 3-20.

### Power Supply Precautions

- When supplying the power to the CPU module and to the expansion interface module (expander) with different power supplies, turn the modules on and off in the order in the following table. An error may occur on the CPU module if the power on order or the power off order is mistaken.

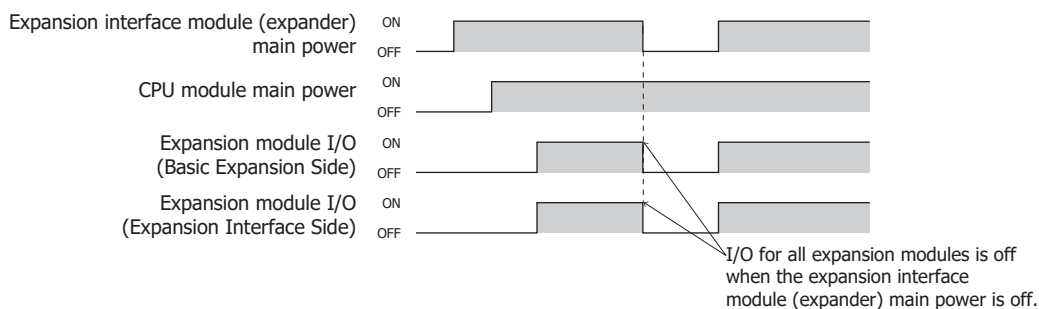
| Power Supply | Order  |
|--------------|--|
| Power on     | Turn on the expansion interface module (expander) and the CPU module at the same time, or in expansion interface module (expander) → CPU module order  |
| Power off    | Turn off the expansion interface module (expander) and the CPU module at the same time, or in CPU module → expansion interface module (expander) order |



- When the CPU has suffered a power interruption and restarts, RUN/STOP follows the function area settings. When the expansion interface module (expander) has suffered a power interruption, the CPU maintains its RUN/STOP status regardless of that power interruption.

The other cartridges and the HMI module operate regardless of whether or not the expansion interface module is powered.

This section describes items that are particular affected by a power interruption of the expansion interface module.



- If the expansion interface module (expander) main power supply is on and the CPU module main power supply is off, the expansion modules on the expansion interface side are set to the reset status. Please note that during the reset status, the analog I/O module and PID module LED indicators are on. This is not a malfunction.

### Expansion Interface Modules (Remote Master/Slave)

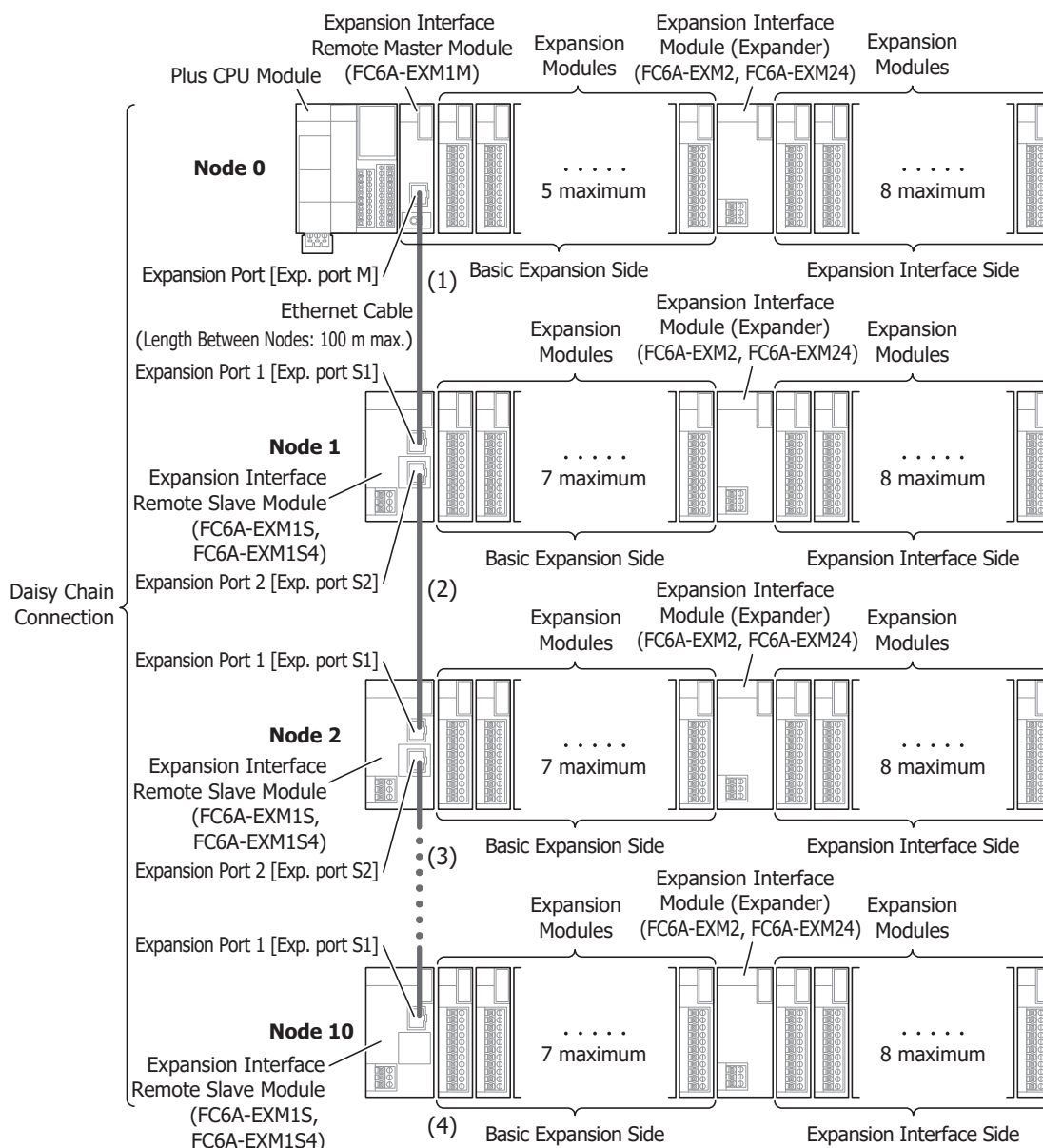
The Plus CPU module can be expanded with up to a maximum of 63 modules (I/O points: maximum 2,016 points) using expansion interface modules (remote master/slave). The expansion interface modules (remote master/slave) are the remote master which connects to the expansion connector of the Plus CPU module and the remote slave which connects to expansion modules that are positioned away from the CPU module.

The expansion interface remote master module can be connected only to the basic expansion side of the Plus CPU module. At this time, the maximum number of expansion modules (basic expansion side) that can be connected to the remote master is five modules, but additional eight expansion modules (expansion interface side) can be connected by installing the expansion interface module (expander).

Expansion interface remote slave modules are daisy chained to the remote master using Ethernet cables.

The group of expansion modules that are connected to the expansion connectors and communication connectors of the Plus CPU module and expansion interface remote slave modules are called as nodes. As illustrated below, the first node that includes the Plus CPU module is called node 0, and the nodes containing remote slaves are called node 1, node 2, and up to node 10 in order from those closest to node 0. The maximum number of nodes is 11, from node 0 to node 10.

The maximum number of expansion modules (basic expansion side) that can be connected to the remote slaves is seven modules, but additional eight expansion modules (expansion interface side) can be connected by installing the expansion interface module (expander).





- (1) For the remote master, connect expansion port [Exp. port M] to expansion port 1 [Exp. port S1] on the remote slave installed as node 1 using an Ethernet cable.
- (2) To install node 2, connect expansion port 2 [Exp. port S2] on the remote slave of node 1 to expansion port 1 [Exp. port S1] on the remote slave installed as node 2 using an Ethernet cable.
- (3) To add more nodes, follow the same procedure and connect expansion port 2 [Exp. port S2] on the remote slave of upstream node n to expansion port 1 [Exp. port S1] on the remote slave of downstream node n+1 using an Ethernet cable. (n = 3 to 9)
- (4) A maximum of 10 nodes can be used.  
Do not connect an Ethernet cable to expansion port 2 [Exp. port S2] of the remote slave installed as the last node.

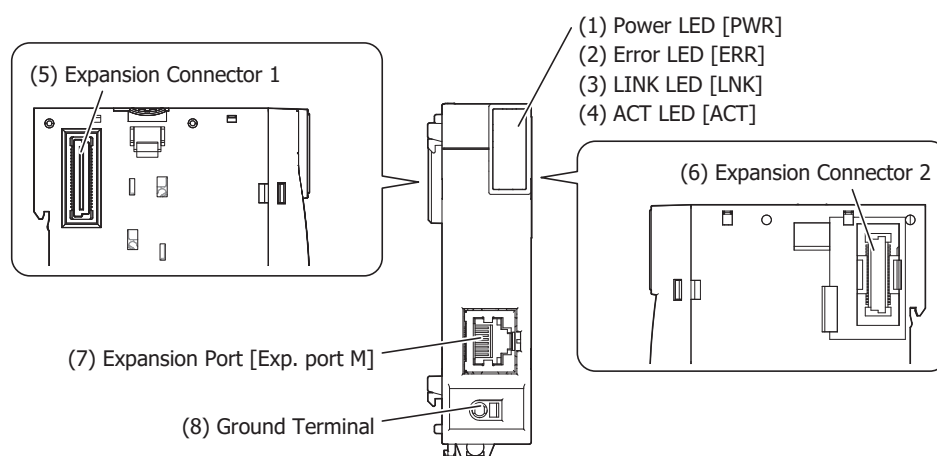
#### Notes:

- The expansion interface remote master module can be connected only to the Plus CPU module and used on the basic expansion side.
- A maximum of 10 expansion interface remote slave modules can be used within a single daisy chain connection setup.
- Only one expansion interface module (expander) can be connected to each node.
- The only connection that is supported between the remote master and remote slaves is a daisy chain connection. Star connections and tree connections are not supported.
- The maximum number of expansion modules that can be connected is 63 modules, but the maximum number of modules that can be connected depends on the connected module. For details on restrictions when using expansion interface modules (remote master/slave), see "Connection Restrictions When Expanding the PLC" on page 3-37.
- Any devices other than the expansion interface remote master/slave modules do not operate even if they are connected to the expansion port [Exp. port M] on the expansion interface remote master module or the expansion port 1 [Exp. port S1] or the expansion port 2 [Exp. port S2] on the expansion interface remote slave module. If connected with an Ethernet cable, the expansion interface remote master module does not recognize the expansion interface remote slave modules.

## Part Names and Functions

### ■ Expansion Interface Remote Master Module

FC6A-EXM1M



#### (1) Power LED [PWR]

This LED turns on when the power is supplied to the expansion interface remote master module from the internal power supply of the Plus CPU module.

#### (2) Error LED [ERR]

This LED turns on when the following errors occur in the expansion interface remote master module.

- When the cable breaks or the power supply to the expansion interface remote slave modules is turned off (LINK not established state continues for 10 seconds or longer)
- When there is an Ethernet communication error (when LINK is established and data is not normally received for a fixed amount of time or longer even when one expansion interface remote slave module is connected)
- When there is an internal circuit error
- When there is a CPU module error

#### (3) LINK LED [LNK]

This LED turns on when an expansion interface remote slave module is connected using an Ethernet cable.

### (4) ACT LED [ACT]

This LED flashes when the module is communicating with the expansion interface remote slave module connected using an Ethernet cable.

### (5) Expansion Connector 1

This connector is used to connect the Plus CPU module or an expansion module.

### (6) Expansion Connector 2

This connector is used to connect an expansion module.

### (7) Expansion Port [Exp. port M]

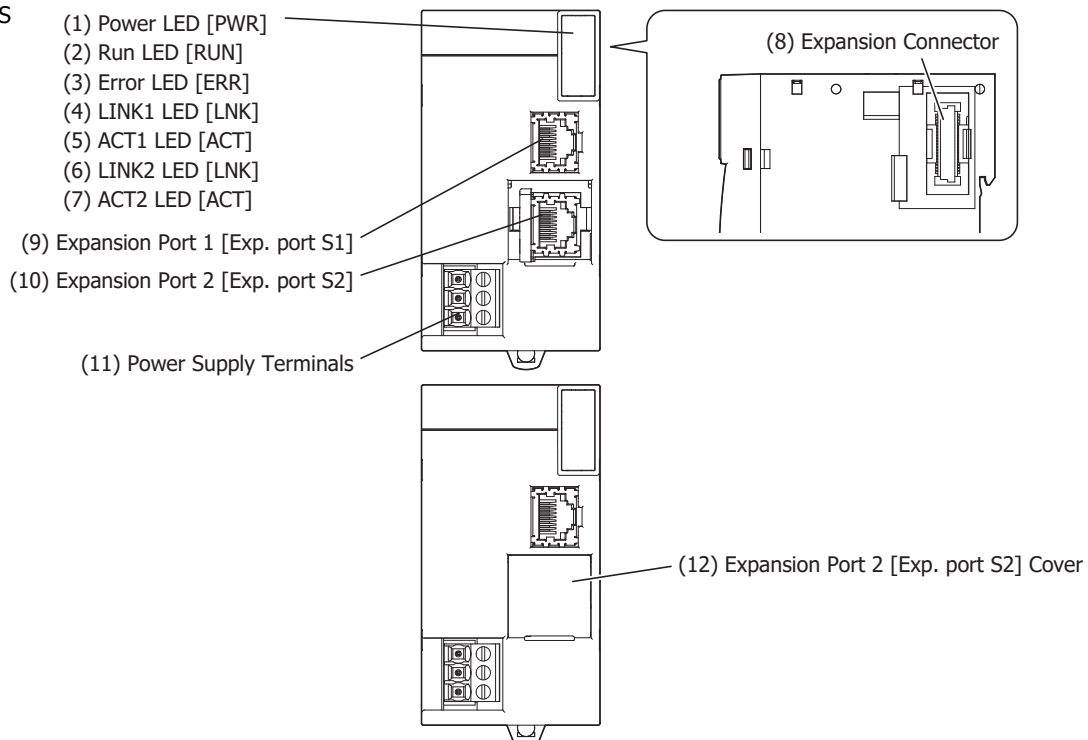
This port is used to connect an expansion interface remote slave module using an Ethernet cable.

### (8) Ground Terminal

The functional ground terminal.

### ■ Expansion Interface Remote Slave Module

FC6A-EXM1S



### (1) Power LED [PWR]

This LED turns on when the power is supplied to the expansion interface remote slave module.

### (2) Run LED [RUN]

This LED turns on when the expansion interface remote slave module is operating.

### (3) Error LED [ERR]

This LED turns on when the following errors occur in the expansion interface remote slave module.

- When the cable breaks (data is not normally received for 10 seconds or longer on expansion port 1 [Exp. port S1])
- When the following occur for a connected expansion module:
  - An unsupported module was connected.
  - Exceeded 15 modules.
  - Exceeded seven modules on the basic expansion side.
  - Exceeded eight modules on the expansion interface side.
  - Initialization error

### (4) LINK1 LED [LNK]

This LED turns on when the expansion interface remote master module or upstream expansion interface remote slave module is connected to expansion port 1 [Exp. port S1] using an Ethernet cable.

**(5) ACT1 LED [ACT]**

When the LINK1 LED is on, this LED flashes when the module is communicating with the expansion interface remote master module or upstream expansion interface remote slave module.

**(6) LINK2 LED [LNK]**

This LED turns on when the downstream expansion interface remote slave module is connected to expansion port 2 [Exp. port S2] using an Ethernet cable.

**(7) ACT2 LED [ACT]**

When the LINK2 LED is on, this LED flashes when the module is communicating with the downstream expansion interface remote slave module.

**(8) Expansion Connector**

This connector is used to connect an expansion module.

**(9) Expansion Port 1 [Exp. port S1]**

This port is used to connect the expansion interface remote master module or upstream expansion interface remote slave module to the module using an Ethernet cable.

**(10) Expansion Port 2 [Exp. port S2]**

This port is used to connect the downstream expansion interface remote slave module to the module using an Ethernet cable.

**(11) Power Supply Terminals**

These terminals supply 24V DC power to the expansion interface remote slave module.

**(12) Expansion Port 2 [Exp. port S2] Cover**

A removable cover that protects expansion port 2 [Exp. port S2]. When using expansion port 2 [Exp. port S2], remove the expansion port 2 [Exp. port S2] cover.

**Expansion Modules That Can Be Connected to an Expansion Interface Remote Slave Module**

| Module Type                              | Connectable to Expansion Interface Remote Slave Module |
|--|--|
| Digital I/O module                       | Yes  |
| Analog I/O module                        | Yes  |
| Safety relay module                      | No   |
| PID module                               | Yes  |
| Communication module                     | No   |
| Expansion interface module (expander)    | Yes  |
| Expansion interface remote master module | No   |

**Function Specifications**

| Type No.                                      | FC6A-EXM1M<br>(Expansion interface remote master module) | FC6A-EXM1S, FC6A-EXM1S4<br>(Expansion interface remote slave module)                   |
|---|--|--|
| <b>Rated Operating Voltage</b>                | Internal power: 5V DC (supplied from CPU module)         | External power: 24V DC   |
| <b>Voltage Fluctuation Range</b>              | —  | 20.4 to 28.8V DC (including ripple)  |
| <b>Current Draw</b>                           | <b>Internal Power</b>                                    | 75 mA supplied from CPU module (5V DC)   |
|   | <b>External Power</b>                                    | —  |
| <b>Allowable Momentary Power Interruption</b> | —  | 10 ms or longer (when rated power supply voltage)                                      |
| <b>Isolation between Internal Circuit</b>     | Not isolated   | Not isolated   |
| <b>Withstand Voltage</b>                      | —  | Between power and FE terminals: 500V AC, 1 minute                                      |
| <b>Insulation Resistance</b>                  | —  | Between power and FE terminals: 10 MΩ or higher (500V DC insulation resistance tester) |

## 2: PRODUCT SPECIFICATIONS

| Type No.                                   | FC6A-EXM1M<br>(Expansion interface remote master module) | FC6A-EXM1S, FC6A-EXM1S4<br>(Expansion interface remote slave module) |
|--|--|--|
| Inrush Current                             | —  | 35 A maximum   |
| Ground                                     | D-type ground (Class 3 ground)                           |  |
| Ground Wire                                | See "Recommended Ferrule List" on page 3-46.             |  |
| Power Supply Wire                          | —  | See "Recommended Ferrule List" on page 3-46.                         |
| Power Supply Connector                     | —  | 100 times minimum  |
| Effect of Improper Power Supply Connection | —  | Reverse polarity: No operation, no damage                            |
|  | —  | Improper voltage: Permanent damage may be caused                     |
|  | —  | Improper lead connection: Permanent damage may be caused             |
| Weight (approx.)                           | 80 g   | 165 g  |

### Communication Port Specifications (Exp. port M, Exp. port S1, Exp. port S2)

|                                    |  |
|------------------------------------|--|
| Communication Type                 | IEEE 802.3-compliant 100BASE-TX (Auto MDI/MDI-X supported)                           |
| Communication Protocol             | Dedicated communications (the modules cannot be connected to other Ethernet network) |
| Connector                          | RJ45   |
| Cable                              | CAT 5 or higher, STP   |
| Maximum Cable Length               | 100 m  |
| Isolation between Internal Circuit | Pulse transformer isolated   |

### Terminal Arrangement and Wiring Examples

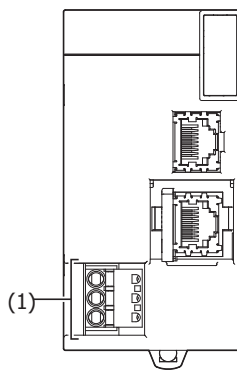
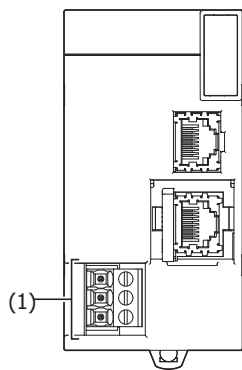
#### ■ FC6A-EXM1S, FC6A-EXM1S4 (Expansion Interface Remote Slave Module)

##### Screw fastened type: FC6A-EXM1S

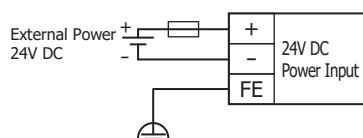
Applicable connector: FC6A-PMTB03

##### Push-in type: FC6A-EXM1S4

Applicable connector: FC6A-PMSB03



#### (1) Power supply terminals



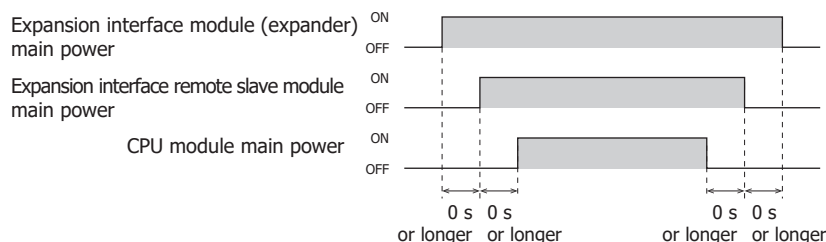
— : Fuse

For wiring precautions, see "Power Supply and Power Supply Wiring" on page 3-20.

### Power Supply Precautions

When supplying the power to the CPU module, expansion interface remote slave modules, and expansion interface modules (expander) with separate power supplies, turn the modules on and off in the order given in the following table. An error will occur on the CPU module if the order to turn the power supply on and off is wrong.

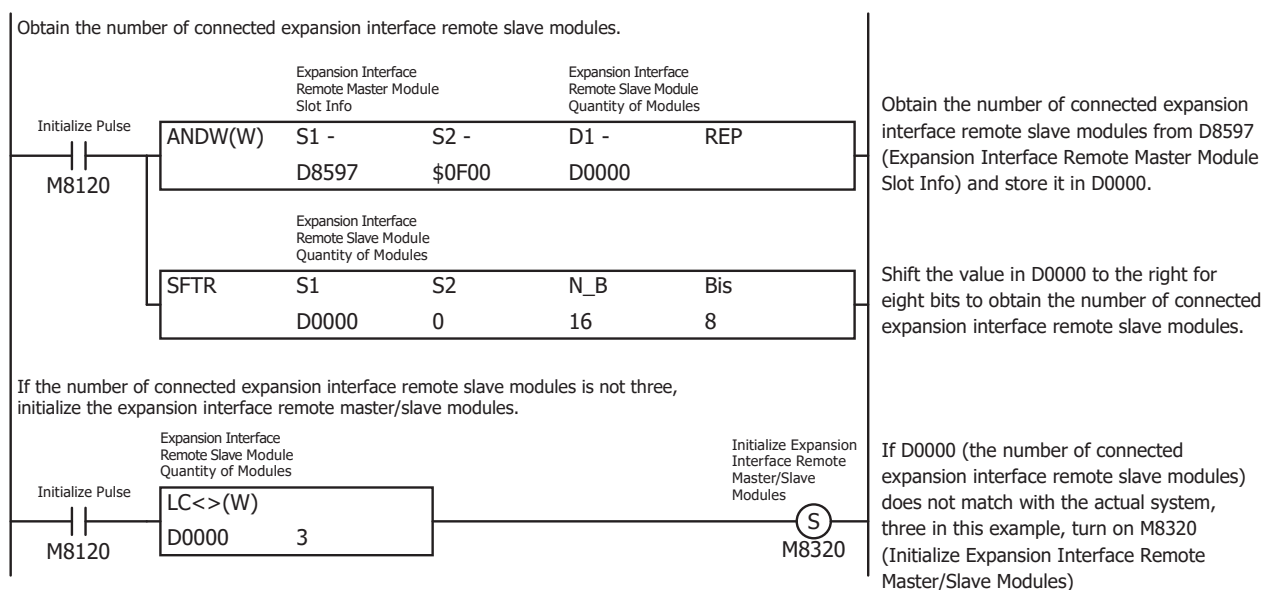
| Power Supply | Order  |
|--------------|--|
| ON           | Expansion interface module (expander) -> Expansion interface remote slave module -> CPU module order |
| OFF          | CPU module -> Expansion interface remote slave module -> Expansion interface module (expander) order |



If the order to turn on the power supply is wrong, the expansion interface modules (remote master/slave) along with the connected expansion modules can be initialized by turning on M8320 (Initialize Expansion Interface Remote Master/Slave Modules).

### Programming Example

The following program shows how to recover the operation of the system using three expansion interface remote slave modules when the power supply to those modules are turned on in a wrong order.

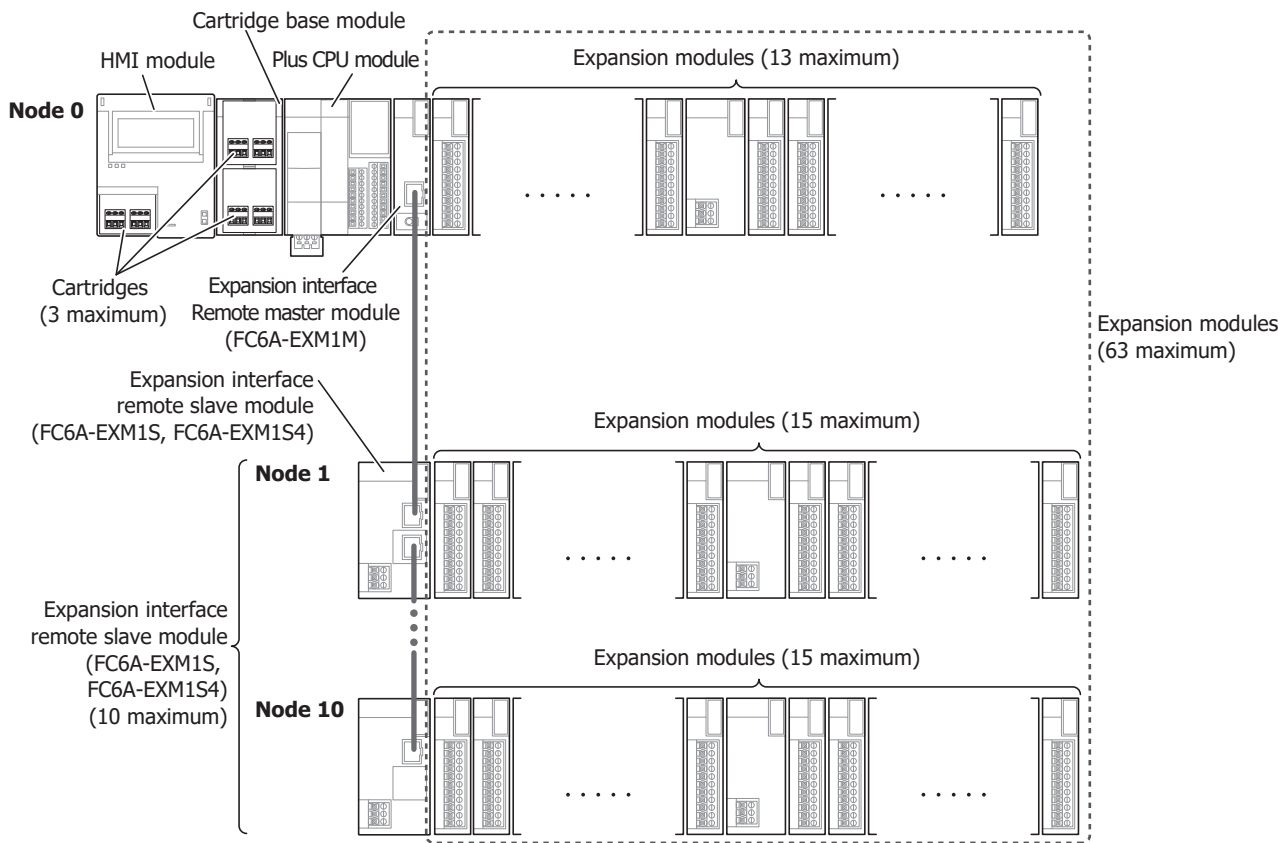


2: PRODUCT SPECIFICATIONS

Maximum I/O Points When Using Expansion Interface Modules (Remote Master/Slave)

The following table gives the number of digital I/O points and analog I/O points when expansion interface modules (remote master/slave) are connected to the Plus CPU module and the maximum number of expansion modules and cartridges are connected to the system.

| I/O         |        | Maximum No. of I/O Points |
|-------------|--------|---------------------------|
| Digital I/O | Input  | 2,044                     |
|             | Output | 2,044                     |
| Analog I/O  | Input  | 511                       |
|             | Output | 258                       |



Maximum number of expansion modules: 63

Maximum number of expansion cartridges: 3

Notes:

- I/O refresh time of the expansion interface remote master/slave modules is stored in D8618 (Refresh Time of Expansion Interface Remote Master/Slave Modules Current Value) and D8619 (Refresh Time of Expansion Interface Remote Master/Slave Modules Maximum Value). When the outputs status are changed in a shorter time than the I/O refresh time of the expansion interface remote master/slave modules, the outputs status may be reflected to the actual outputs. Make sure that the outputs are controlled in a longer time than the I/O refresh time of the expansion interface remote master/slave modules.
- The expansion interface master/slave modules cannot be connected over the Ethernet switch.

### Calculation Method of I/O Data Refresh Time

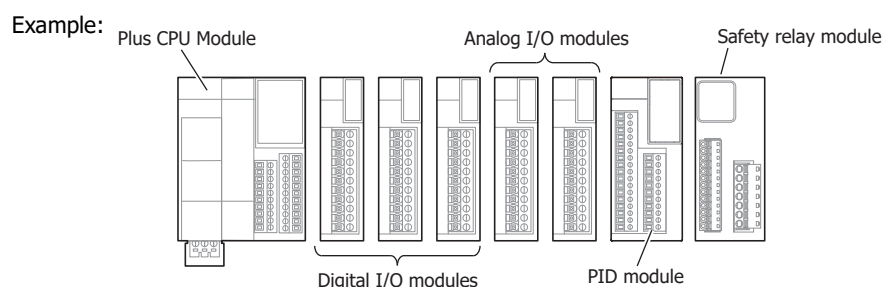
When expansion modules are used with the CPU module, an approximate value for the I/O data refresh time can be calculated with the following equations.

Use the I/O data refresh time obtained with the following equations as a rough estimate.

#### ■ When Not Using an Expansion Interface Module (FC6A-EXM2, FC6A-EXM24, FC6A-EXM1M, FC6A-EXM1S, or FC6A-EXM1S4)

$$\begin{aligned} \text{I/O data refresh time} = & ( \quad ) \text{ module(s)} \times 0.04 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.17 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.34 \text{ ms} \\ & + ( \quad ) \text{ module(s)} \times 1.09 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.05 \text{ ms} + \text{scan time} \end{aligned}$$

Digital I/O module
Analog I/O module
PID module
Communication module
Safety relay module

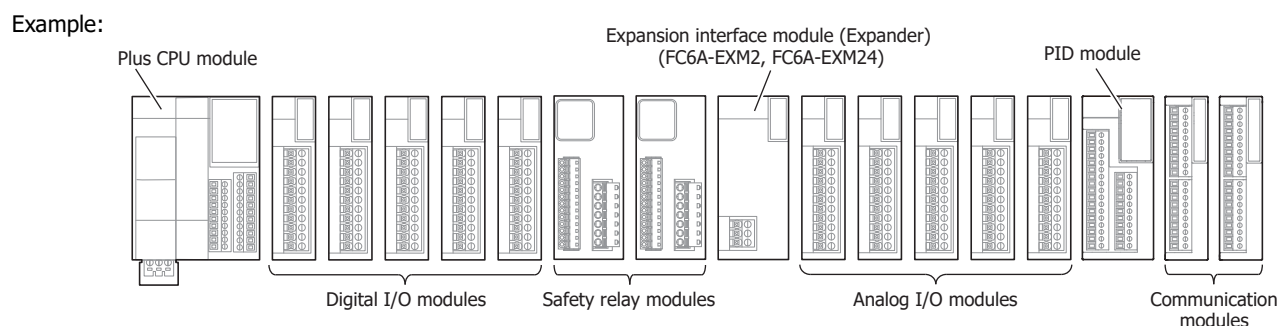


$$\begin{aligned} \text{I/O data refresh time} &= 3 \times 0.04 \text{ ms} + 2 \times 0.17 \text{ ms} + 1 \times 0.34 \text{ ms} + 1 \times 0.05 \text{ ms} + \text{scan time} \\ &= 0.85 \text{ ms} + \text{scan time} \end{aligned}$$

#### ■ When Using an Expansion Interface Module (Expander) (FC6A-EXM2, FC6A-EXM24)

$$\begin{aligned} \text{I/O data refresh time} = & ( \quad ) \text{ module(s)} \times 0.08 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.29 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.58 \text{ ms} \\ & + ( \quad ) \text{ module(s)} \times 1.09 \text{ ms} + ( \quad ) \text{ module(s)} \times 0.10 \text{ ms} + \text{scan time} \end{aligned}$$

Digital I/O module
Analog I/O module
PID module
Communication module
Safety relay module



$$\begin{aligned} \text{I/O data refresh time} &= 5 \times 0.08 \text{ ms} + 5 \times 0.29 \text{ ms} + 1 \times 0.58 \text{ ms} + 2 \times 1.09 \text{ ms} + 2 \times 0.10 \text{ ms} + \text{scan time} \\ &= 4.81 \text{ ms} + \text{scan time} \end{aligned}$$

### ■ When Using an Expansion Interface Module (Remote Master/Slave) without Expansion Interface Module (Expander)

#### 1. I/O data refresh time of node 0

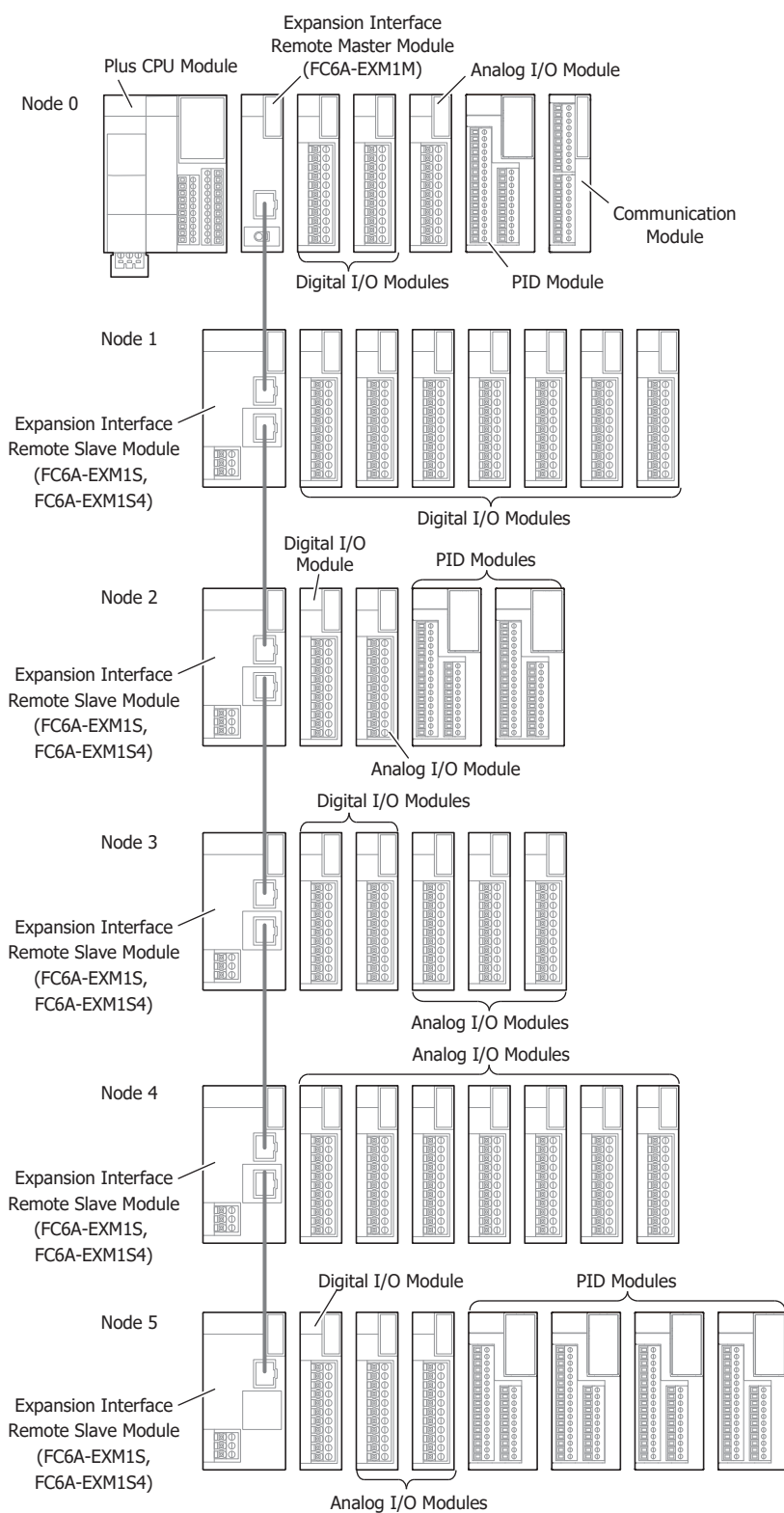
$$\begin{aligned}
 \text{I/O data refresh time} = & \underbrace{(\quad) \text{ module(s)} \times 0.34 \text{ ms}}_{\substack{\text{FC6A-EXM1M} \\ \text{FC6A-EXM1S} \\ \text{FC6A-EXM1S4}}} + \underbrace{(\quad) \text{ module(s)} \times 0.04 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.17 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.34 \text{ ms}}_{\text{PID module}} + \underbrace{(\quad) \text{ module(s)} \times 1.09 \text{ ms}}_{\text{Communication module}} + \underbrace{(\quad) \text{ module(s)} \times 0.05 \text{ ms}}_{\text{Safety relay module}} \\
 & \hspace{15em} \text{Expansion modules of node 0} \\
 & + \underbrace{(\quad) \text{ module(s)} \times 0.04 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.17 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.34 \text{ ms}}_{\text{PID module}} + \text{scan time} \\
 & \hspace{15em} \text{Expansion modules of node 1 and subsequent nodes}
 \end{aligned}$$

#### 2. I/O data refresh time of node 1 and subsequent nodes

$$\begin{aligned}
 \text{I/O data refresh time} = & \text{I/O data refresh time of node 0 (1.)} + \{ \underbrace{(\quad) \text{ module(s)} \times 1.2 \text{ ms}}_{\substack{\text{FC6A-EXM1S} \\ \text{FC6A-EXM1S4}}} + \underbrace{(\quad) \text{ module(s)} \times 0.3 \text{ ms}}_{\substack{\text{Analog I/O module} \\ \text{PID module}}} \} \\
 & \hspace{15em} \text{Expansion modules of node 1 and subsequent nodes} \\
 & + \underbrace{(\quad) \text{ module(s)} \times 0.04 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.17 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.34 \text{ ms}}_{\text{PID module}} + 5 \text{ ms} \} \div 2 + \text{scan time} \\
 & \hspace{15em} \text{Expansion modules of node 1 and subsequent nodes}
 \end{aligned}$$



Examples:



## 2: PRODUCT SPECIFICATIONS

1. I/O data refresh time of node 0

$$\begin{aligned} \text{I/O data refresh time} &= 6 \times 0.34 \text{ ms} + 2 \times 0.04 \text{ ms} + 1 \times 0.17 \text{ ms} + 1 \times 0.34 \text{ ms} + 1 \times 1.09 \text{ ms} + 0 \times 0.05 \text{ ms} \\ &\quad + 11 \times 0.04 \text{ ms} + 13 \times 0.17 \text{ ms} + 6 \times 0.34 \text{ ms} + \text{scan time} \\ &= 8.41 \text{ ms} + \text{scan time} \end{aligned}$$

2. I/O data refresh time of node 1 and subsequent nodes

$$\begin{aligned} \text{I/O data refresh time} &= 8.41 \text{ ms} + \{ 5 \times 1.2 \text{ ms} + 19 \times 0.3 \text{ ms} + 11 \times 0.04 \text{ ms} + 13 \times 0.17 \text{ ms} + 6 \times 0.34 \text{ ms} + 5 \text{ ms} \} \div 2 \\ &\quad + \text{scan time} \\ &= 19.11 \text{ ms} + \text{scan time} \end{aligned}$$

### ■ When Using an Expansion Interface Module (Remote Master/Slave) with Expansion Interface Module (Expander)

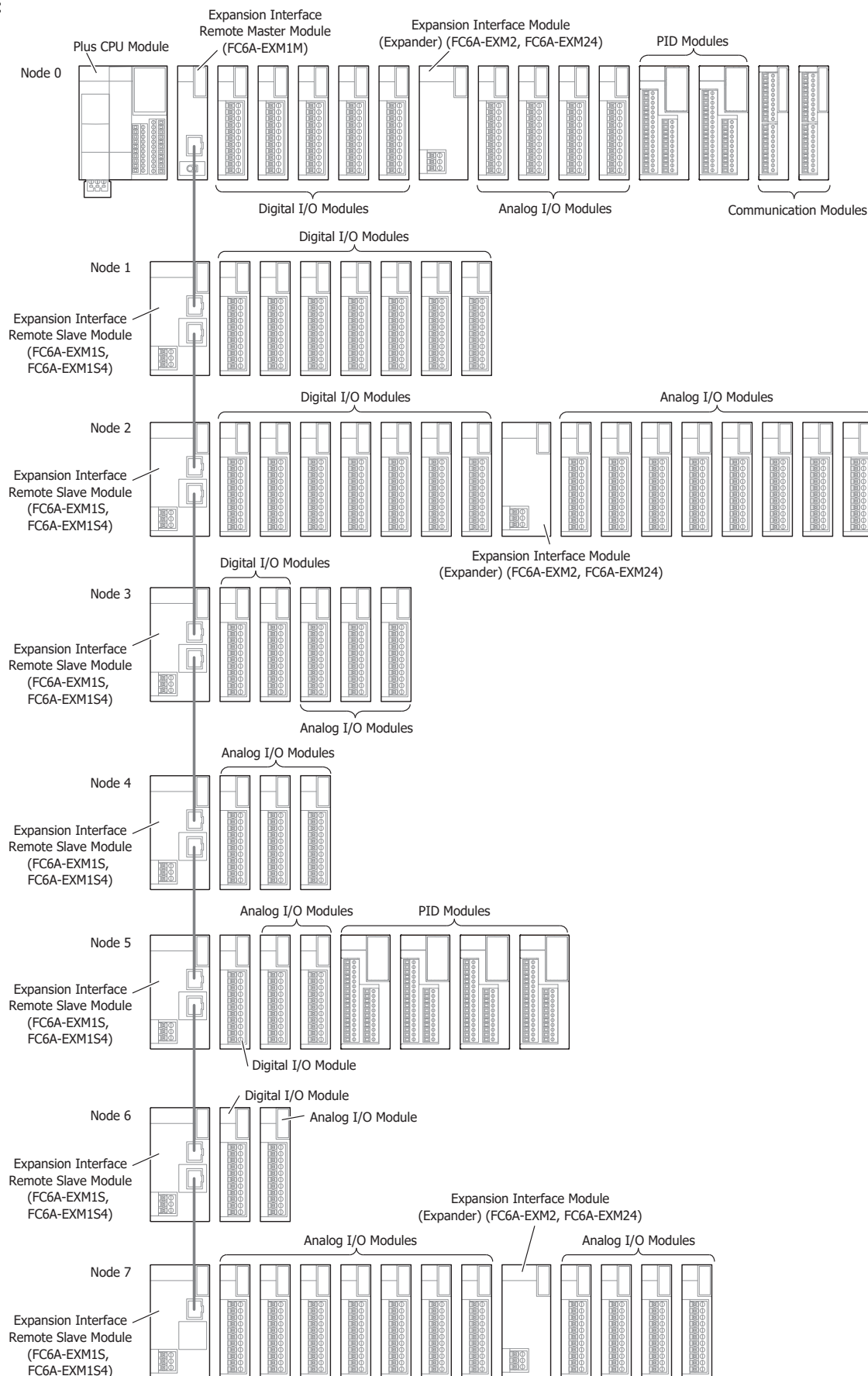
#### 1. I/O data refresh time of node 0

$$\begin{aligned} \text{I/O data refresh time} &= \underbrace{(\quad) \text{ module(s)} \times 0.68 \text{ ms}}_{\substack{\text{FC6A-EXM1M} \\ \text{FC6A-EXM1S} \\ \text{FC6A-EXM1S4}}} + \underbrace{(\quad) \text{ module(s)} \times 0.08 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.29 \text{ ms}}_{\text{Analog I/O module}} \\ &\quad + \underbrace{(\quad) \text{ module(s)} \times 0.58 \text{ ms}}_{\text{PID module}} + \underbrace{(\quad) \text{ module(s)} \times 1.09 \text{ ms}}_{\text{Communication module}} + \underbrace{(\quad) \text{ module(s)} \times 0.10 \text{ ms}}_{\text{Safety relay module}} \\ &\quad \underbrace{\hspace{15em}}_{\text{Expansion modules of node 0}} \\ &\quad + \underbrace{(\quad) \text{ module(s)} \times 0.08 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.29 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.58 \text{ ms}}_{\text{PID module}} + \text{scan time} \\ &\quad \underbrace{\hspace{15em}}_{\text{Expansion modules of node 1 and subsequent nodes}} \end{aligned}$$

#### 2. I/O data refresh time of node 1 and subsequent nodes

$$\begin{aligned} \text{I/O data refresh time} &= \text{I/O data refresh time of node 0 (1.)} + \underbrace{\{ (\quad) \text{ module(s)} \times 1.2 \text{ ms} \}}_{\substack{\text{FC6A-EXM1S} \\ \text{FC6A-EXM1S4}}} + \underbrace{(\quad) \text{ module(s)} \times 0.3 \text{ ms}}_{\substack{\text{Analog I/O module} \\ \text{PID module}}} \\ &\quad \underbrace{\hspace{15em}}_{\text{Expansion modules of node 1 and subsequent nodes}} \\ &\quad + \underbrace{(\quad) \text{ module(s)} \times 0.04 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.17 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.34 \text{ ms}}_{\text{PID module}} \\ &\quad \underbrace{\hspace{15em}}_{\text{Expansion modules of node 1 and subsequent nodes that are not using the FC6A-EXM2, FC6A-EXM24}} \\ &\quad + \underbrace{(\quad) \text{ module(s)} \times 0.08 \text{ ms}}_{\text{Digital I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.29 \text{ ms}}_{\text{Analog I/O module}} + \underbrace{(\quad) \text{ module(s)} \times 0.58 \text{ ms}}_{\text{PID module}} + 5 \text{ ms} \} \div 2 + \text{scan time} \\ &\quad \underbrace{\hspace{15em}}_{\text{Expansion modules of node 1 and subsequent nodes that are using the FC6A-EXM2, FC6A-EXM24}} \end{aligned}$$

Examples:



## 2: PRODUCT SPECIFICATIONS

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1. I/O data refresh time of node 0

$$\begin{aligned}\text{I/O data refresh time} &= 8 \times 0.68 \text{ ms} + 5 \times 0.08 \text{ ms} + 4 \times 0.29 \text{ ms} + 2 \times 0.58 \text{ ms} + 2 \times 1.09 \text{ ms} + 0 \times 0.10 \text{ ms} + 18 \times 0.08 \text{ ms} \\ &\quad + 28 \times 0.29 \text{ ms} + 4 \times 0.58 \text{ ms} + \text{scan time} \\ &= 22.22 \text{ ms} + \text{scan time}\end{aligned}$$

2. I/O data refresh time of node 1 and subsequent nodes

$$\begin{aligned}\text{I/O data refresh time} &= 22.22 \text{ ms} + \{ 7 \times 1.2 \text{ ms} + 32 \times 0.3 \text{ ms} + 11 \times 0.04 \text{ ms} + 9 \times 0.17 \text{ ms} + 4 \times 0.34 \text{ ms} \\ &\quad + 7 \times 0.08 \text{ ms} + 19 \times 0.29 \text{ ms} + 0 \times 0.58 \text{ ms} + 5 \text{ ms} \} \div 2 + \text{scan time} \\ &= 38.42 \text{ ms} + \text{scan time}\end{aligned}$$

### Notes:

- The scan time is the time duration for executing one cycle of the user program that is cyclically executed.
- The scan time can be checked with special data register D8023 (Scan Time Current Value (ms)).

## HMI Module

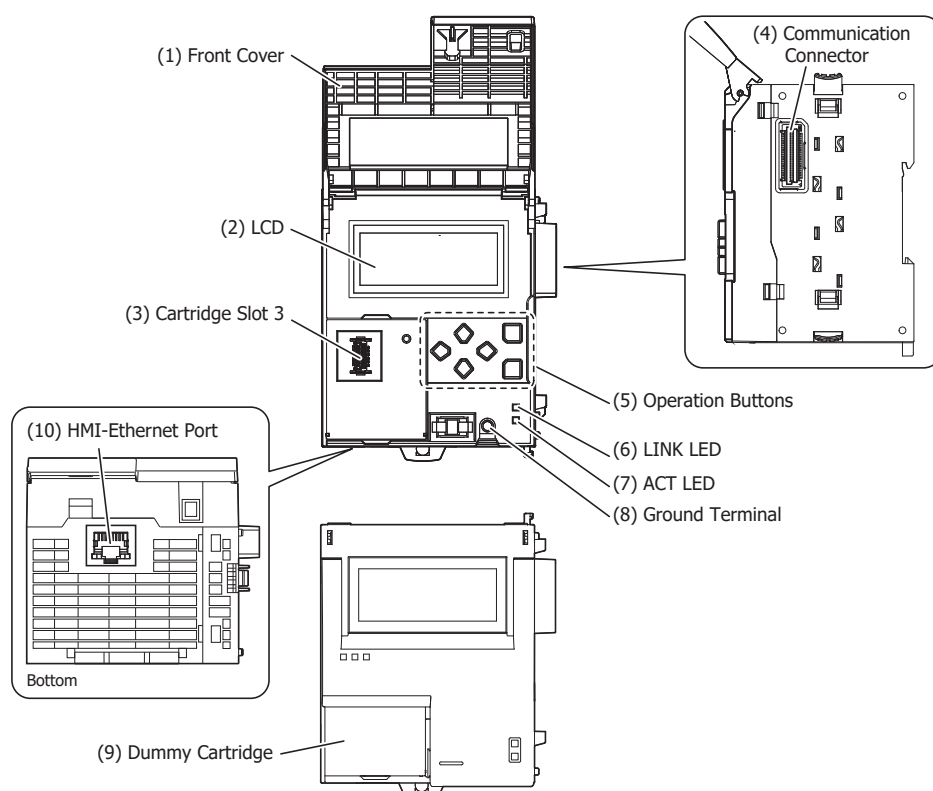
The HMI module is connected to the CPU module's communication connector.

You can run and stop the user program, monitor device values, and modify settings using the LCD and operation buttons on the HMI module. The HMI module also features the maintenance communication function, web server function, and send e-mail function using Ethernet communication.

For details on the HMI module functions, the menu screen, and the operation methods, see "HMI Function" on page 7-1.

### Parts Description

FC6A-PH1



#### (1) Front Cover

This cover prevents the mistaken operation of the operation buttons. Open the front cover when using the operation buttons and when installing or ejecting the cartridge.

#### (2) LCD

Displays the menus to control the FC6A and display the status and settings for the FC6A.

#### (3) Cartridge Slot 3

This slot is used for installing a cartridge. However, a communication cartridge cannot be used in cartridge slot 3 of the All-in-One CPU module. A communication cartridge can be used in cartridge slot 3 of the Plus CPU module.

#### (4) Communication Connector

Connects the HMI module and the CPU module.

#### (5) Operation Buttons

Selects the display menu on the LCD and other functions. There are six buttons: (Up), (Down), (Left), (Right), (ESC), (OK).

#### (6) LINK LED

This LED is on when a network-compatible device is connected to the HMI-Ethernet port with an Ethernet cable.

#### (7) ACT LED

This LED flashes when sending or receiving data while the LINK LED is on.

#### (8) Ground Terminal

The functional ground terminal.

## 2: PRODUCT SPECIFICATIONS

### (9) Dummy Cartridge

A removable dummy cartridge that protects the cartridge slot. Remove the dummy cartridge when connecting a cartridge.

### (10) HMI-Ethernet Port

This port allows Ethernet communication with connected devices that are equipped with an Ethernet interface.

### Function Specifications

| Type No.                                   |                              | FC6A-PH1                      |
|--|------------------------------|-------------------------------|
| Rated Power Voltage (Supplied from Module) |                              | 5V DC                         |
|  |                              | 24V DC                        |
| Connector                                  | HMI-Ethernet Port            | RJ45                          |
|  | Insertion/Removal Durability | 100 times minimum             |
| Module                                     | 5V DC                        | 300 mA                        |
| Internal Current Draw                      | 24V DC                       | 15 mA                         |
| Ground                                     |                              | D-type ground (Type 3 ground) |
| Ground Wire                                |                              | UL1007 AWG18                  |
| Weight                                     |                              | 170 g                         |

#### ■ HMI-Ethernet Port Specifications

|                                    |                                  |
|------------------------------------|----------------------------------|
| Points                             | 1                                |
| Communication Type                 | IEEE 802.3 compliant             |
| Communication Speed                | 10BASE-T, 100BASE-TX             |
| Communication Functions            | Maintenance communication        |
| Connector                          | RJ45 (Auto MDI/MDI-X compatible) |
| Cable                              | CAT 5 or higher, STP             |
| Maximum Cable Length               | 100 m                            |
| Isolation between Internal Circuit | Pulse transformer isolated       |

#### ■ Ethernet Communication Specifications

|                       |   |
|-----------------------|---|
| Number of Connections | 8 maximum   |
| Communication Mode    | Maintenance Communication                                     |
| Web Server Function   | Yes   |
| Web Data Storage      | FROM  |
| Web Data Capacity     | 5 Mbyte (Total size of the system web page and user web page) |
| Send E-mail Function  | Yes   |

#### ■ LCD Specifications

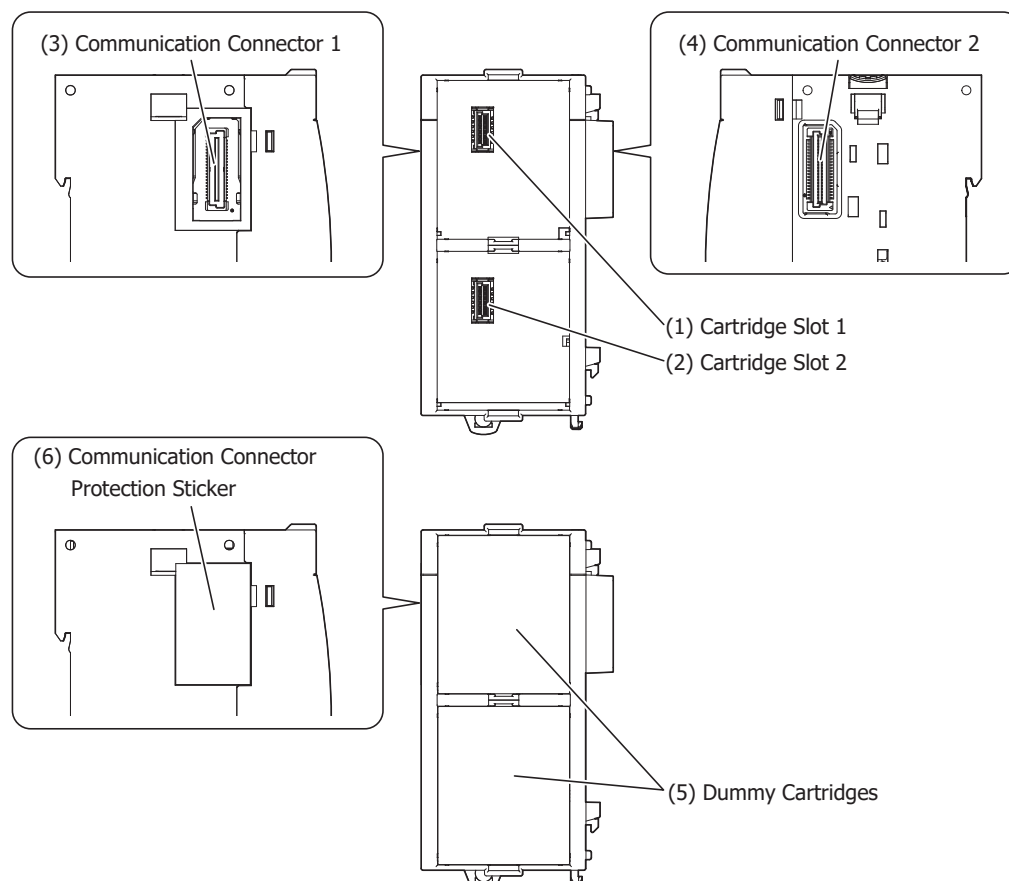
|                      |  |
|----------------------|--|
| Type                 | STN monochrome LCD                               |
| Resolution           | 64 x 192 pixels                                  |
| Number of Characters | 24 digits x 8 lines (8 x 8 pixel font)           |
|                      | 12 digits x 8 lines (16 x 8 pixel font)          |
|                      | 12 digits x 4 lines (16 x 16 pixel font)         |
| Display Content      | System menus, messages, operation status monitor |
| Contrast Adjustment  | Not possible                                     |
| Backlight            | Yes (can be turned on and off)                   |

## Cartridge Base Module

The cartridge base module can be connected to the communication connector on the Plus CPU module to allow the use of cartridges. The cartridge base module is equipped with cartridge slots 1 and 2. One cartridge base module can be connected to the Plus CPU module.

### Part Names and Functions

FC6A-HPH1



#### (1) Cartridge Slot 1

This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

#### (2) Cartridge Slot 2

This slot is used to connect a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

#### (3) Communication Connector 1

This connector is used to connect an HMI module.

#### (4) Communication Connector 2

This connector is used to connect the module to the Plus CPU module.

**Note:** The cartridge base module cannot be connected to the All-in-One CPU module or CAN J1939 All-in-One CPU module.

#### (5) Dummy Cartridges

Removable dummy cartridges that protect the cartridge slots. Remove the dummy cartridge when connecting a digital I/O cartridge, analog I/O cartridge, or communication cartridge.

#### (6) Communication Connector Protection Sticker

This sticker protects the communication connector. Remove the communication connector protection sticker when connecting the HMI module.

## 2: PRODUCT SPECIFICATIONS

---

### Function Specifications

| Type No.                       | FC6A-HPH1 |
|--------------------------------|-----------|
| Number of connected cartridges | 2 maximum |
| Weight                         | 90 g      |

#### Notes:

- Do not install the cartridge base module in the Plus CPU module or remove it from the Plus CPU module when the Plus CPU module is powered. Otherwise there is a risk of damage.
- Do not touch the connectors on the back of the cartridge when installing or removing it. Otherwise there is a risk of damaging the connectors and making poor contact with module.



## Cartridges

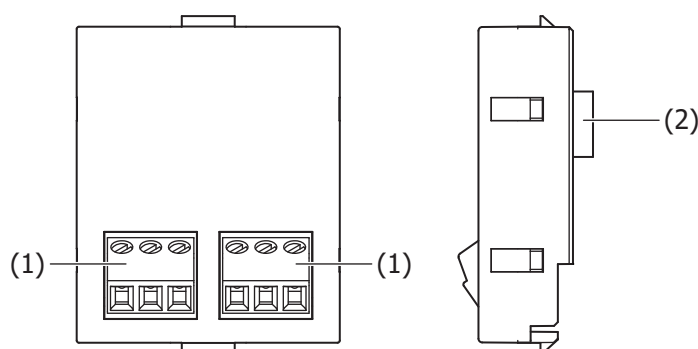
Three types of cartridges are available for the FC6A: digital I/O cartridges that expand the number of digital inputs or outputs, analog I/O cartridges that expand the number of analog inputs or outputs, and communication cartridges that expand RS-232C communication ports, RS-485 communication ports, or Bluetooth communication ports.

### Digital I/O Cartridges

Digital I/O cartridges expand the system with four digital inputs or outputs. Those cartridges can be connected to cartridge slots on the All-in-One CPU module, CAN J1939 All-in-One CPU module, the cartridge base module, or the HMI module. For details on digital cartridges, see "Digital I/O Cartridge" on page 10-1.

### Digital I/O Cartridge Specifications

#### Part Names and Functions



#### (1) Terminals

These terminals connect the cartridge to the power supply and to input or output devices. The devices that can be connected differ by the type of digital I/O cartridge.

#### (2) Connector

This connector connects the cartridge to Cartridge Slot 1 or 2 of the All-in-One CPU module or the cartridge base module.

### Model List

| Cartridge Type           | I/O Points |   | I/O Signal                               | Type No.  |
|--------------------------|------------|---|--|-----------|
| Digital input cartridge  | Input      | 4 | DC input (shared sink/source): 12/24V DC | FC6A-PN4  |
| Digital output cartridge | Output     | 4 | Transistor sink output: 12/24V DC        | FC6A-PTK4 |
|                          |            |   | Transistor source output: 12/24V DC      | FC6A-PTS4 |

### Function Specifications

| Type No.            | FC6A-PN4                                | FC6A-PTK4 | FC6A-PTS4 |
|---------------------|---|-----------|-----------|
| Rated Power Voltage | 5.0 V, 3.3 V (supplied from CPU module) |           |           |
| Current Draw        | 5.0 V: 0 mA<br>3.3 V: 35 mA             |           |           |
| Weight              | 15 g                                    |           |           |

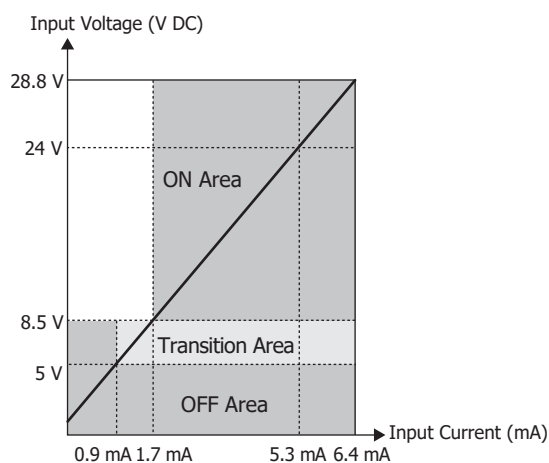
## 2: PRODUCT SPECIFICATIONS

### Digital Input Specifications

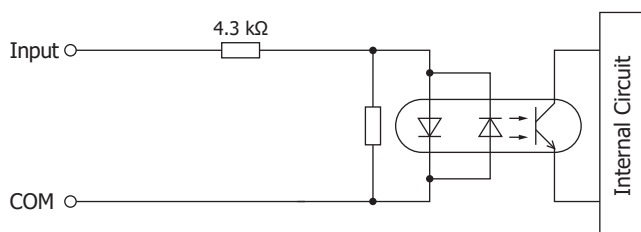
| Type No.                              | FC6A-PN4  |        |
|---------------------------------------|---|--------|
| Rated Input Voltage                   | 12/24V DC (shared sink/source)  |        |
| Operating Load Voltage Range          | 0 to 28.8V DC   |        |
| Rated Input Current                   | 5 mA/1 point (when 24V DC)<br>2.5 mA/1 point (when 12V DC)  |        |
| Terminal Arrangement                  | See "Wiring Arrangement and Wiring Examples" on page 2-166.   |        |
| Input Impedance                       | 4.4 k $\Omega$  |        |
| Input Delay Time<br>(24V DC)          | Turn ON Time  | 0.5 ms |
|                                       | Turn OFF Time   | 0.5 ms |
| External Load for I/O Interconnection | Not needed  |        |
| Signal Determination Method           | Static  |        |
| Effect of Improper Input Connection   | Even if wiring for sink or source connection is incorrect, no damages are caused.<br>If any input exceeding the rated value is applied, permanent damage may be caused. |        |
| Cable Length                          | 3 m   |        |

### Input Operating Range

The operating range of Type 1 (IEC 61131-2) DC input modules is as follows.



### Input Internal Circuit

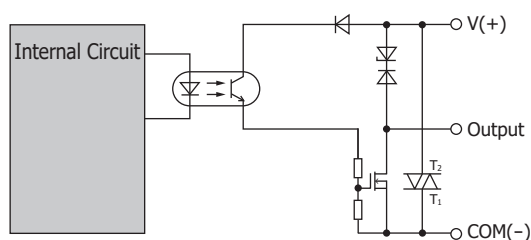


## Digital Output Specifications

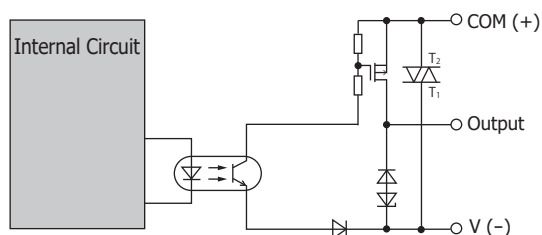
| Type No.                     | FC6A-PTK4  | FC6A-PTS4                |
|------------------------------|--|--------------------------|
| Output Signal                | Transistor sink output   | Transistor source output |
| Rated Load Voltage           | 12/24V DC  |                          |
| Operating Load Voltage Range | 10.2 to 28.8V DC   |                          |
| Output Points                | 4 (4 points in 1 common line)                                  |                          |
| Rated Load                   | 0.1 A/1 point  |                          |
| Terminal Arrangement         | See "Wiring Arrangement and Wiring Examples" on page 2-166.    |                          |
| Voltage Drop (ON Voltage)    | 0.4 V or less, voltage between COM and output terminal when ON |                          |
| Allowed Inrush Current       | 1 A maximum  |                          |
| Leakage Current              | 0.1 mA maximum   |                          |
| Clamping Voltage             | 50 V   |                          |
| Lamp Load                    | 2.4 W maximum  |                          |
| Inductive Load               | L/R = 10 ms (28.8V DC, 1 Hz)                                   |                          |
| Protection Operation         | None   |                          |
| External Current Draw        | 100 mA maximum, 24V DC (+V terminal supply power)              |                          |
| Output Delay Time (24V DC)   | Turn ON Time   | 450 $\mu$ s maximum      |
|                              | Turn OFF Time  | 450 $\mu$ s maximum      |

## Output Internal Circuit

## FC6A-PTK4

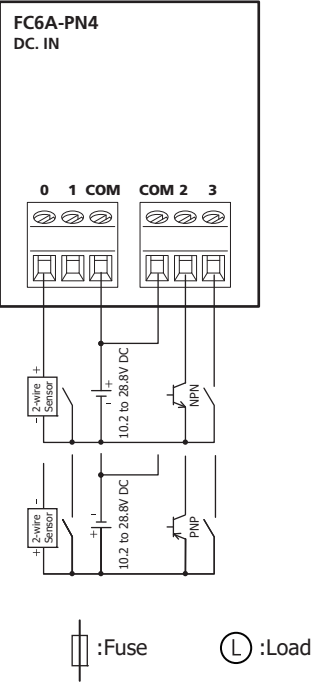


## FC6A-PTS4

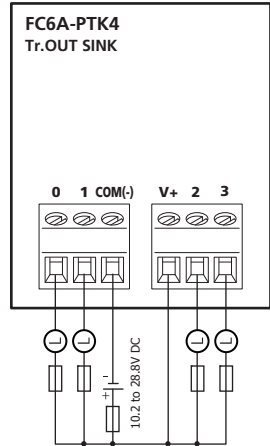


Wiring Arrangement and Wiring Examples

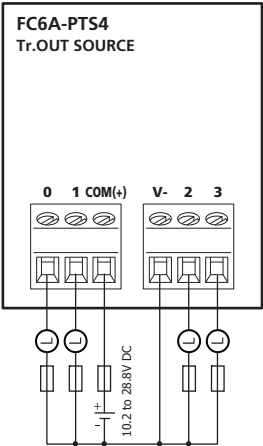
FC6A-PN4



FC6A-PTK4



FC6A-PTS4

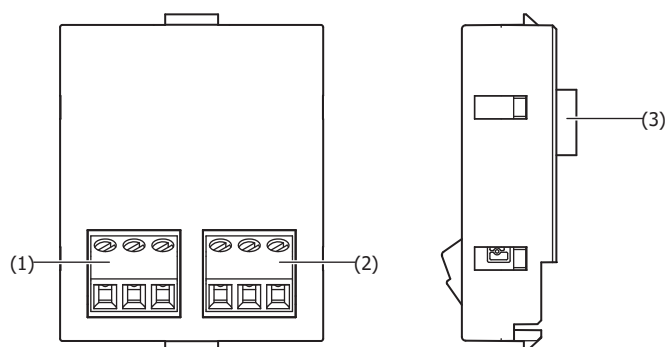


Insert a fuse that corresponds to the load.

## Analog I/O Cartridges

Analog I/O cartridges can be connected to cartridge slots on the All-in-One CPU module, CAN J1939 All-in-One CPU module, cartridge base module, or HMI module. These cartridges expand the system with a maximum of six analog inputs or outputs. For details on analog I/O cartridges, see "Analog I/O Cartridge" on page 10-7.

### Parts Description



#### (1) Channel 0 terminals

The terminals connect an input device or an output device. The devices that can be connected differ by the type of analog I/O cartridge.

#### (2) Channel 1 terminals

The terminals connect an input device or an output device. The devices that can be connected differ by the type of analog I/O cartridge.

#### (3) Connector

Connects the cartridge to cartridge slot 1 or 2 on the All-in-One CPU module, CAN J1939 All-in-One CPU module, or cartridge base module or cartridge slot 3 on the HMI module.

### Model List

| Cartridge Type          | I/O Points |   | I/O Signal  | Type No.   |
|-------------------------|------------|---|---|------------|
| Analog output cartridge | Output     | 2 | Voltage output: 0 to 10V DC   | FC6A-PK2AV |
|                         | Output     | 2 | Current output: 4 to 20mA DC  | FC6A-PK2AW |
| Analog input cartridge  | Input      | 2 | Voltage input: 0 to 10V DC<br>Current input: 0 to 20mA DC, 4 to 20mA DC                                     | FC6A-PJ2A  |
|                         | Input      | 2 | Thermocouple input: K, J, R, S, B, E, T, N, C<br>Resistance thermometer input: Pt100, Pt1000, Ni100, Ni1000 | FC6A-PJ2CP |

### Function Specifications

| Type No.            | FC6A-PK2AV                          | FC6A-PK2AW                    | FC6A-PJ2A                | FC6A-PJ2CP               |
|---------------------|-------------------------------------|-------------------------------|--------------------------|--------------------------|
| Rated Power Voltage | 5.0 V, 3.3 V (supplied from module) |                               |                          |                          |
| Current Draw        | 5.0 V: 70 mA<br>3.3 V: 30 mA        | 5.0 V: 185 mA<br>3.3 V: 30 mA | 5.0 V: —<br>3.3 V: 30 mA | 5.0 V: —<br>3.3 V: 30 mA |
| Weight              | 15 g                                | 15 g                          | 15 g                     | 15 g                     |

## 2: PRODUCT SPECIFICATIONS

### ■ Analog Output Specifications

| Type No.   |   | FC6A-PK2AV  | FC6A-PK2AW              |
|--|---|---|-------------------------|
| Output Type and Output Range                           | Voltage   | 0 to 10V DC   | —                       |
|  | Current   | —   | 4 to 20mA DC            |
| Load   | Impedance   | 2 kΩ or higher  | 500 Ω or lower          |
|  | Load Type   | Resistive load  |                         |
| DA Conversion  | DA Conversion Time  | Max 40 ms   | Max 20 ms               |
|  | Output Update Interval                                    | 20 ms   | 20 ms                   |
|  | Total Output System Transfer Time                         | DA conversion time + Output Update Interval + 1 scan time |                         |
| Output Error   | Maximum Error at 25°C                                     | ±0.3% of full scale                                       | ±0.3% of full scale     |
|  | Temperature Coefficient                                   | ±0.02% of full scale/°C                                   | ±0.02% of full scale/°C |
|  | Output Ripple   | Max 30 mV   | Max 30 mV               |
|  | Overshoot   | 0%  | 0%                      |
| Data   | Digital Resolution  | 4,096 steps (12 bits)                                     | 4,096 steps (12 bits)   |
|  | Input Value per Step                                      | 2.44 mV (0 to 10 V)                                       | 3.91 μA (4 to 20 mA)    |
|  | Data Type in Application Program                          | 0 to 4,095 (0 to 10 V)                                    | 0 to 4,095 (4 to 20 mA) |
|  | Monotonicity  | Yes   | Yes                     |
|  | Current Loop Open   | —   | Not detectable          |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests | Max ±4.0% of full scale                                   | Max ±4.0% of full scale |
|  | Recommended Cable   | Pair shielded cable                                       |                         |
|  | Crosstalk   | MAX 1 LSB   | MAX 1 LSB               |
| Isolation  |   | None  | None                    |
| Effect of Improper Output Connection                   |   | No damage   | No damage               |
| Calibration or Verification to Maintain Rated Accuracy |   | Not possible  | Not possible            |

### ■ Analog Input Specifications

| Type No.                     | FC6A-PJ2A                |  | FC6A-PJ2CP  |   |
|------------------------------|--------------------------|--|---|---|
| Input Type                   | Voltage                  | Current  | Resistance Thermometer  | Thermocouple  |
| Input Type and Input Range   | 0 to 10V DC              | 4 to 20mA DC<br>0 to 20mA DC                           | Pt100:<br>-200 to 850°C<br>(-328 to 1,562°F)<br>Pt1000:<br>-200 to +600°C<br>(-328 to 1,112°F)<br>Ni100:<br>-60 to +180°C<br>(-76 to 356°F)<br>Ni1000:<br>-60 to +180°C<br>(-76 to 356°F) | (K) -200 to 1,300°C (-328 to 2,372°F)<br>(J) -200 to 1,000°C (-328 to 1,832°F)<br>(R) 0 to 1,760°C (32 to 3,200°F)<br>(S) 0 to 1,760°C (32 to 3,200°F)<br>(B) 0 to 1,820°C (32 to 3,308°F)<br>(E) -200 to 800°C (-328 to 1,472°F)<br>(T) -200 to 400°C (-328 to 752°F)<br>(N) -200 to 1,300°C (-328 to 2,372°F)<br>(C) 0 to 2,315°C (32 to 4,199°F) |
| Input Impedance              | Min 1 MΩ                 | Max 250 Ω  | Min 1 MΩ  |   |
| Allowed Conductor Resistance | —                        | —  | Max 10 Ω  | —   |
| Detected Input Current       | —                        | —  | TYP: 0.2 mA Max 1.0 mA  | —   |
| AD Conversion                | Sampling Time            | 10 ms  | 10 ms   | 250 ms  |
|                              | Sampling Repetition Time | 20 ms  |   | 500 ms  |
|                              | Total Input Delay Time*1 | Sampling time + Sampling repetition time + 1 scan time |   |   |
|                              | Type of Input            | Single-ended   |   |   |
|                              | Operation Mode           | Self-scan  |   |   |
|                              | Conversion Method        | SAR  |   |   |

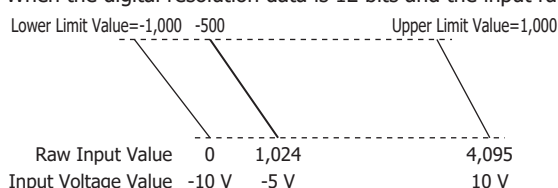
| Type No.   |   | FC6A-PJ2A  |  | FC6A-PJ2CP  |  |
|--|---|--|--|---|--|
| Input Type   |   | Voltage  | Current  | Resistance Thermometer  | Thermocouple   |
| Input Error  | Maximum Error at 25°C                                     | ±0.1% of full scale  |  | ±0.1% of full scale   | ±0.1% of full scale<br>Cold junction compensation accuracy ±4.0°C or lower<br><br>Exceptions<br>R, S thermocouple error: ±6.0°C (0 to 200°C range only)<br>B thermocouple error: Not guaranteed (0 to 300°C range only)<br>K, J, E, T, N thermocouple error: ±0.4% of full scale (0°C or lower range only) |
|  | Temperature Coefficient                                   | ±0.02% of full scale/°C  |  | ±0.02% of full scale/°C   |  |
| Data   | Digital Resolution  | 4,096 steps (12 bits)  |  | Pt100: Approx. 10,500 (equivalent to 14 bits)<br>Pt1000: Approx. 8,000 (equivalent to 13 bits)<br>Ni100: Approx. 2,400 (equivalent to 12 bits)<br>Ni1000: Approx. 2,400 (equivalent to 12 bits) | K: 15,000 (14 bits)<br>J: 12,000 (14 bits)<br>R: 17,600 (15 bits)<br>S: 17,600 (15 bits)<br>B: 18,200 (15 bits)<br>E: 10,000 (14 bits)<br>T: 6,000 (13 bits)<br>N: 15,000 (14 bits)<br>C: 23,150 (15 bits)   |
|  | Input Value per Step                                      | 2.44 mV (0 to 10V DC)  | 4.88 µA (0 to 20mA DC)<br>3.91 µA (4 to 20mA DC) | 0.1°C<br>0.18°F   | 0.1°C<br>0.18°F  |
|  | Application Data Type                                     | Can be arbitrarily set for each channel in a range between -32,768 to 32,767*2 |  |   |  |
|  | Monotonicity  | Yes  |  |   |  |
|  | Input Data Out of Range                                   | Detectable*3   |  |   |  |
| Noise Resistance                                       | Maximum Temporary Deviation during Electrical Noise Tests | Max ±4.0% of full scale  |  |   |  |
|  | Recommended Cable   | Pair shielded cable  |  | Pair cable  |  |
|  | Crosstalk   | Max 1 LSB  |  |   |  |
| Isolation  |   | None   |  |   |  |
| Effect of Improper Input Connection                    |   | No damage  |  |   |  |
| Maximum Permanent Allowed Overload*4 (No Damage)       |   | 13 V   | 40 mA  | 13 V  |  |
| Selection of Input Type and Input Range                |   | Using programming software   |  |   |  |
| Calibration or Verification to Maintain Rated Accuracy |   | Not possible   |  |   |  |

\*1 Total input delay time indicates the total value of the sampling repetition time plus the internal processing time. The total input delay time increases in proportion to the number of channels used.

\*2 The arbitrary setting is a function that uses the digital resolution data by scaling it to arbitrary data (that arbitrarily sets the lower limit value and the upper limit value). The range setting (-32,768 to 32,767) is specified with data registers.

Example: When -5 V is input, 1,024 is displayed as long as the arbitrary setting is not configured, but -500 is displayed when the arbitrary setting is configured as upper limit value = 1,000 and lower limit value = -1,000, and this makes it easier to intuitively read the input voltage value.

When the digital resolution data is 12 bits and the input range is -10 to +10 V



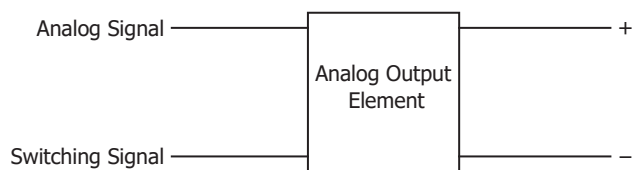
\*3 Input data out of range is reflected in the status of the analog I/O module.

\*4 The maximum voltage/current value that can be input without damage.

## 2: PRODUCT SPECIFICATIONS

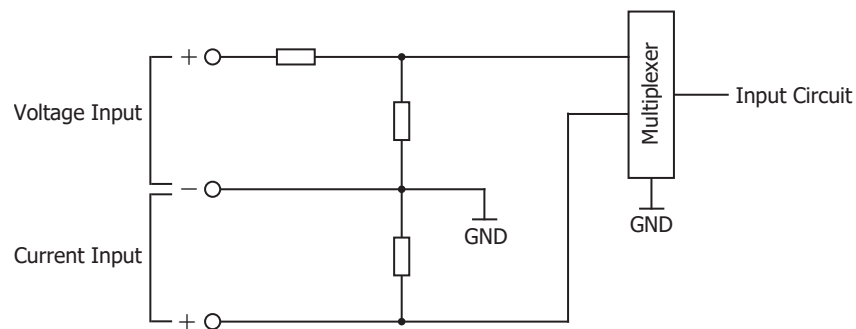
### Output Internal Circuit

FC6A-PK2AV, FC6A-PK2AW

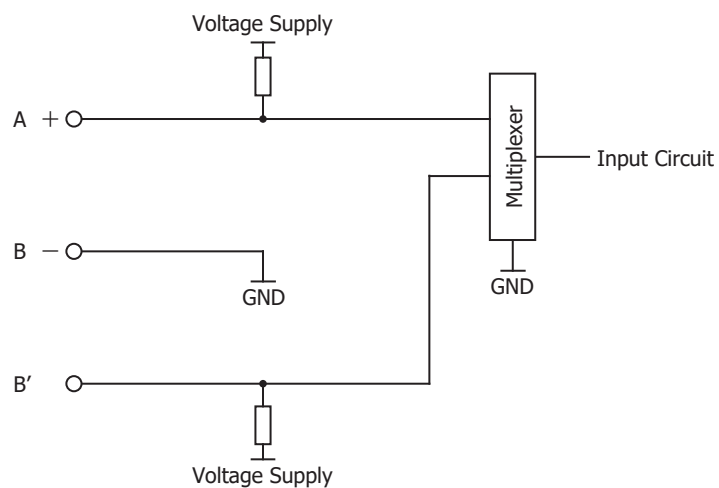


### Input Internal Circuit

FC6A-PJ2A



FC6A-PJ2CP

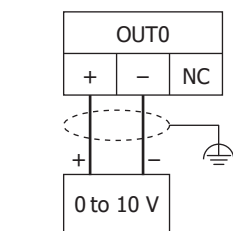




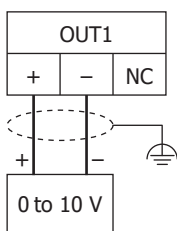
## Wiring Arrangement and Wiring Examples

**Caution**

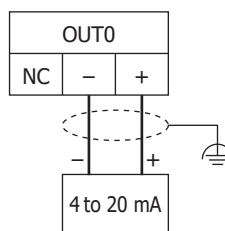
- Do not connect a thermocouple to a part with hazardous voltage (60V DC or peak 42.4V DC or higher part).
- Before turning on the power, please check that the wiring is correct. If the wiring is incorrect, the analog I/O cartridge may be damaged. When the analog I/O cartridge may malfunction due to noise, wire it with a shielded cable and connect both ends to the FE.
- When connecting cables to the analog I/O cartridges, the tightening torque is 0.22 to 0.25 Nm.

**FC6A-PK2AV**

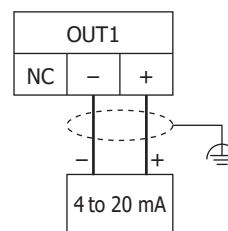
Analog Voltage Input Device



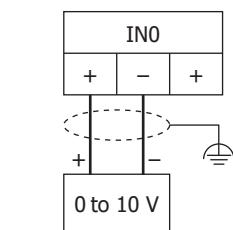
Analog Voltage Input Device

**FC6A-PK2AW**

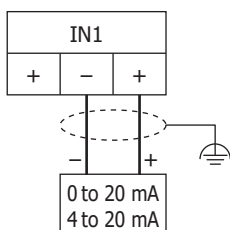
Analog Current Input Device



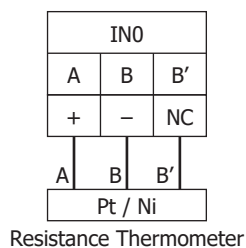
Analog Current Input Device

**FC6A-PJ2A**

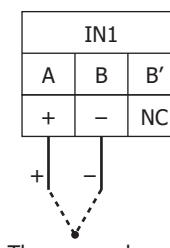
Analog Voltage Output Device



Analog Current Output Device

**FC6A-PJ2CP**

Resistance Thermometer



Thermocouple

## 2: PRODUCT SPECIFICATIONS

### Communication Cartridges

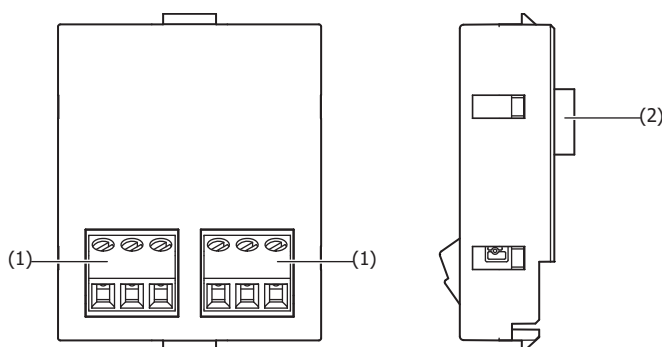
Communication cartridges can be connected to cartridge slots on the All-in-One CPU module, CAN J1939 All-in-One CPU module, the cartridge base module, or HMI module connected to the Plus CPU module. These cartridges expand the system with RS-232C, RS-485, or Bluetooth communication ports.

**Note:** The cartridge slot on the HMI module connected to the All-in-One CPU module or CAN J1939 All-in-One CPU module cannot be used.

### RS-232C and RS-485 Communication Cartridges

The RS-232C and RS-485 communication cartridges support the maintenance communication, user communication, and Modbus communication. The RS-485 communication cartridge also supports the data link communication.

### Parts Description



#### (1) Terminals

These terminals connect a device equipped with a serial interface (RS-232C or RS-485). The devices that can be connected differ by the type of communication cartridge.

#### (2) Connector

The connector used to connect the cartridge to cartridge slot 1 or 2 on the All-in-One CPU module, CAN J1939 All-in-One CPU module, or cartridge base module or cartridge slot 3 on the HMI module connected to the Plus CPU module.

### Model List

| Cartridge Type                  | Points | Type                       | Type No. |
|---------------------------------|--------|----------------------------|----------|
| RS-232C communication cartridge | 1      | Serial interface (RS-232C) | FC6A-PC1 |
| RS-485 communication cartridge  | 1      | Serial interface (RS-485)  | FC6A-PC3 |

**Function Specifications**

| Type No.                   | FC6A-PC1                            | FC6A-PC3                            |
|----------------------------|-------------------------------------|-------------------------------------|
| <b>Rated Power Voltage</b> | 5.0 V, 3.3 V (supplied from module) | 5.0 V, 3.3 V (supplied from module) |
| <b>Current Draw</b>        | 5.0 V: Max 23 mA<br>3.3 V: Max 6 mA | 5.0 V: Max 23 mA<br>3.3 V: Max 6 mA |
| <b>Weight</b>              | 15 g                                | 15 g                                |

**■ Communication Specifications**

| Type No.                                  | FC6A-PC1                         | FC6A-PC3                            |
|---|----------------------------------|-------------------------------------|
| <b>Electrical Characteristics</b>         | EIA RS232C                       | EIA RS485                           |
| <b>Maximum Communication Speed</b>        | 115,200 bps                      | 115,200 bps                         |
| <b>Maintenance Communication</b>          | Yes                              | Yes                                 |
| <b>User Communication</b>                 | Yes                              | Yes                                 |
| <b>Data Link Communication</b>            | Yes                              | Yes                                 |
| <b>Modbus Master</b>                      | Yes                              | Yes                                 |
| <b>Modbus Slave</b>                       | Yes                              | Yes                                 |
| <b>Maximum Cable Length</b>               | 5 m                              | 200 m                               |
| <b>Isolation between Internal Circuit</b> | Not isolated                     | Not isolated                        |
| <b>Cable</b>                              | <b>Recommended Cable</b>         |                                     |
|   | Shielded multicore cable: 24 AWG | Shielded twisted-pair cable: 24 AWG |

**Caution**

When connecting cables to the communication cartridges, the tightening torque is 0.22 to 0.25 Nm.  
Recommended screwdriver: SZS 0.4×2.5 (Phoenix Contact) and SDS 0.4×2.5×75 (Weidmüller)

## 2: PRODUCT SPECIFICATIONS

### Terminal Arrangement and Wiring Examples

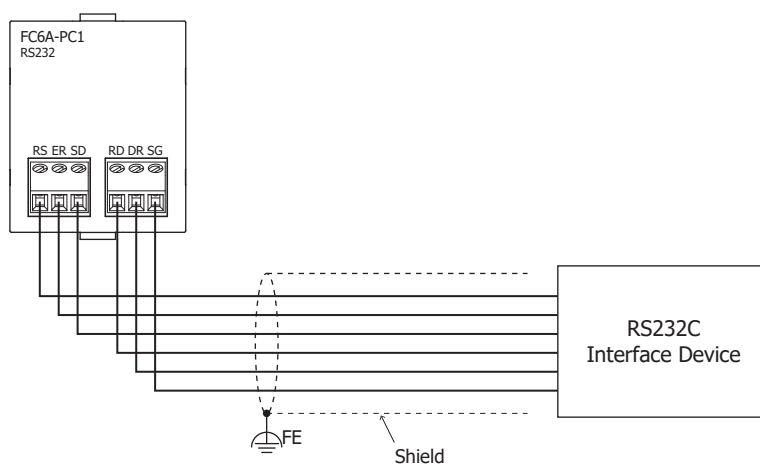
#### Notes:

- For the cables to use for wiring, fabricate and use the recommended cable or an equivalent type of shielded cable.
- When there is a risk of malfunction due to noise, ground the shielded cables.
- Fully read and understand the manual for the device that will be connected to and communicate with the communication cartridge before wiring it.

#### FC6A-PC1

| Terminal Name | I/O Direction | Signal Name, etc.   |
|---------------|---------------|---------------------|
| RS (RTS)*1    | Output        | Request to send     |
| ER (DTR)      | Output        | Data terminal ready |
| SD (TxD)      | Output        | Transmitted data    |
| RD (RxD)      | Input         | Received data       |
| DR (DSR)      | Input         | Data set ready      |
| SG (SG)       | —             | Signal ground       |

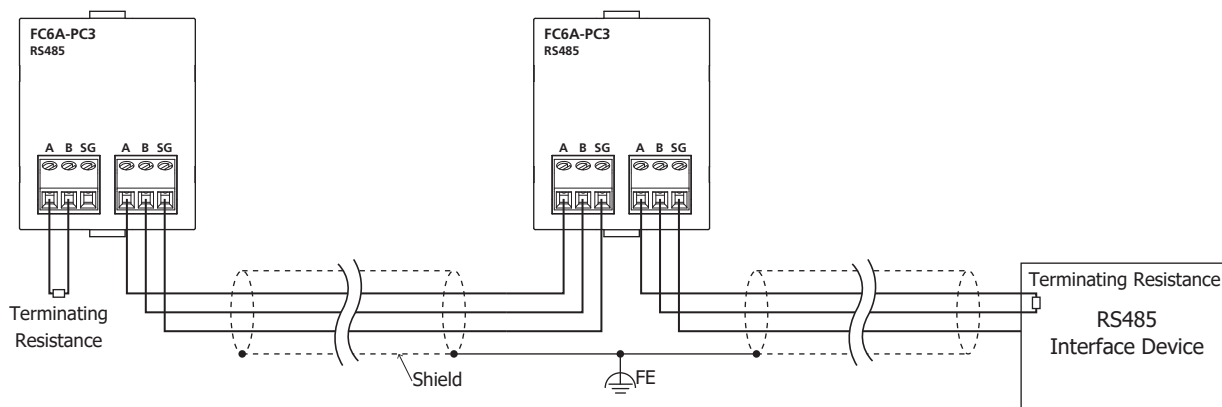
\*1 The RS terminal is a constant output terminal.



#### FC6A-PC3

| Terminal Name | I/O Direction | Signal Name, etc. |
|---------------|---------------|-------------------|
| A             | I/O           | Data A*1          |
| B             | I/O           | Data B*1          |
| SG            | —             | Signal ground*1   |

\*1 The terminals are shorted inside the cartridge.

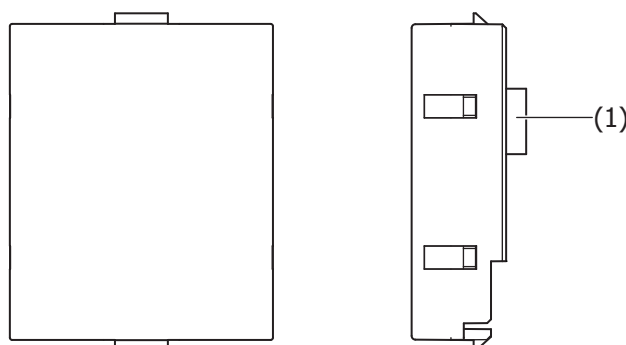


**Note:** When communication quality is unstable, add terminating resistance matched to the characteristic impedance to both ends of the cable. Use resistance with a rating of 1/2 W or higher.

## Bluetooth Communication Cartridge

The Bluetooth communication cartridge supports the maintenance communication and user communication.

### ■ Part Names and Functions



#### (1) Connector

The connector used to connect the cartridge to cartridge slot 1 or 2 or cartridge slot 3 on the HMI module connected to the Plus CPU module.

### ■ Function Specifications

| Type No.            | FC6A-PC4                                      |
|---------------------|---|
| Rated Power Voltage | 5.0 V, 3.3 V (supplied from module)           |
| Current Draw        | 5.0 V: 120 mA maximum<br>3.3 V: 30 mA maximum |
| Weight              | 15 g  |

### Wireless Communication Specifications

| Type No.                              | FC6A-PC4  |
|---------------------------------------|---|
| Bluetooth Standard                    | Bluetooth ver.2.1 + EDR   |
| Profile                               | SPP (Serial Port Profile)<br>iAP (iPod Accessory Protocol)      |
| Frequency Range                       | 2,402 MHz to 2,480 MHz  |
| Wireless Transmission Distance*1      | 10 m (Class 2)  |
| Multi-point Function                  | 8 units   |
| Communication Protocol                | Maintenance communication protocol, user communication protocol |
| Bluetooth Wireless Approved Regions*2 | Japan, China, USA, Canada, Australia, New Zealand, Europe       |

\*1 Connection effective range is affected by obstacles (human, metal, wall) and wave signal condition. Make sure to confirm the connection status before actual operation.

\*2 Depending on countries or regions, evaluations on the device equipped with FC6A may be necessary.

**Note:** Communication performance (required time) in maintenance communication is as follows.

- User program upload equivalent to 10,000 steps: 40 seconds approx.
- User program download equivalent to 10,000 steps: 50 seconds approx.
- User program upload equivalent to 20,000 steps: 1 minute 20 seconds approx.
- User program download equivalent to 20,000 steps: 1 minute 40 seconds approx.
- 100 KB CSV file retrieval: 30 seconds approx.
- 200 KB CSV file retrieval: 1 minute approx.

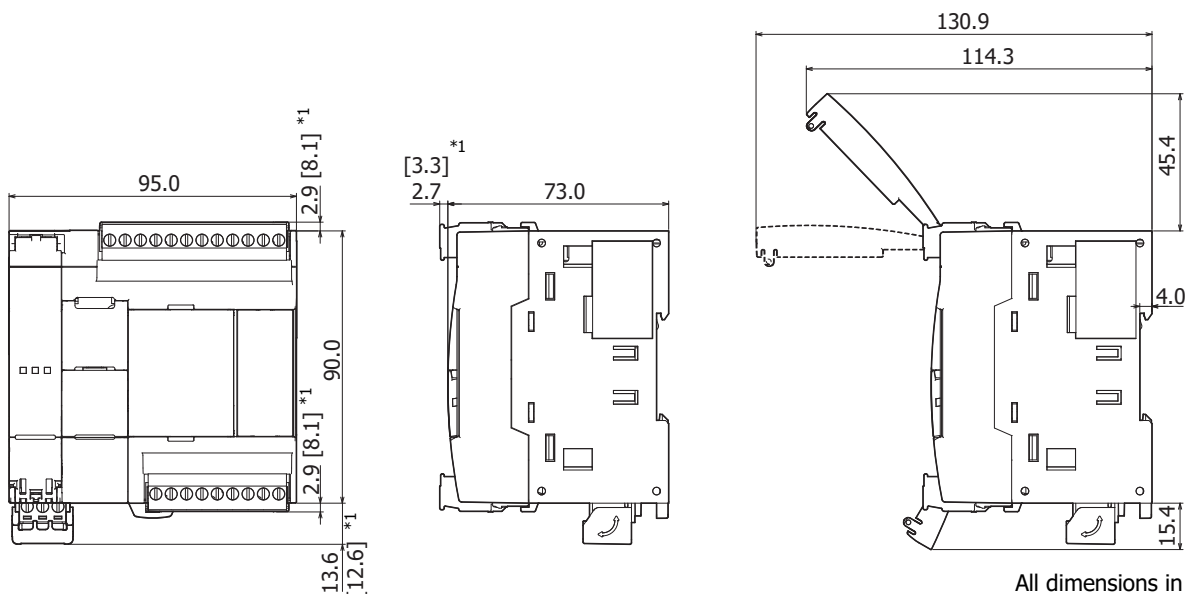
### Dimensions

#### CPU Modules

##### All-in-One CPU module

**16-I/O Type: Screw fastened type:** FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C16K1CE, FC6A-C16P1CE, FC6A-C16R1DE, FC6A-C16K1DE, FC6A-C16P1DE

**Push-in type:** FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE

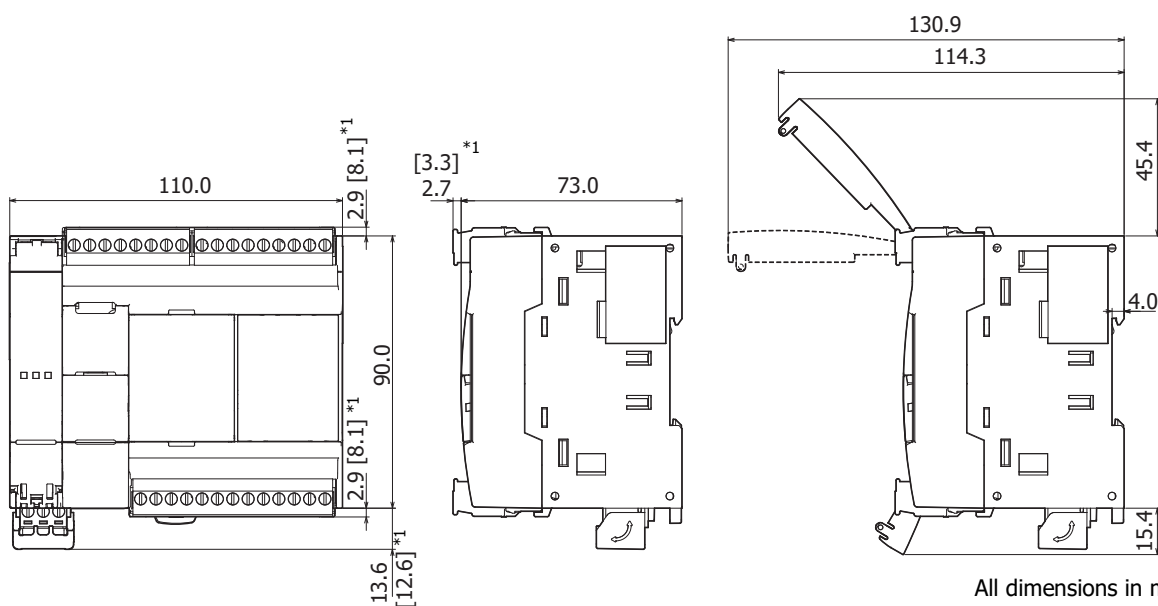


All dimensions in mm.

\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

**24-I/O Type: Screw fastened type:** FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C24K1CE, FC6A-C24P1CE

**Push-in type:** FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE

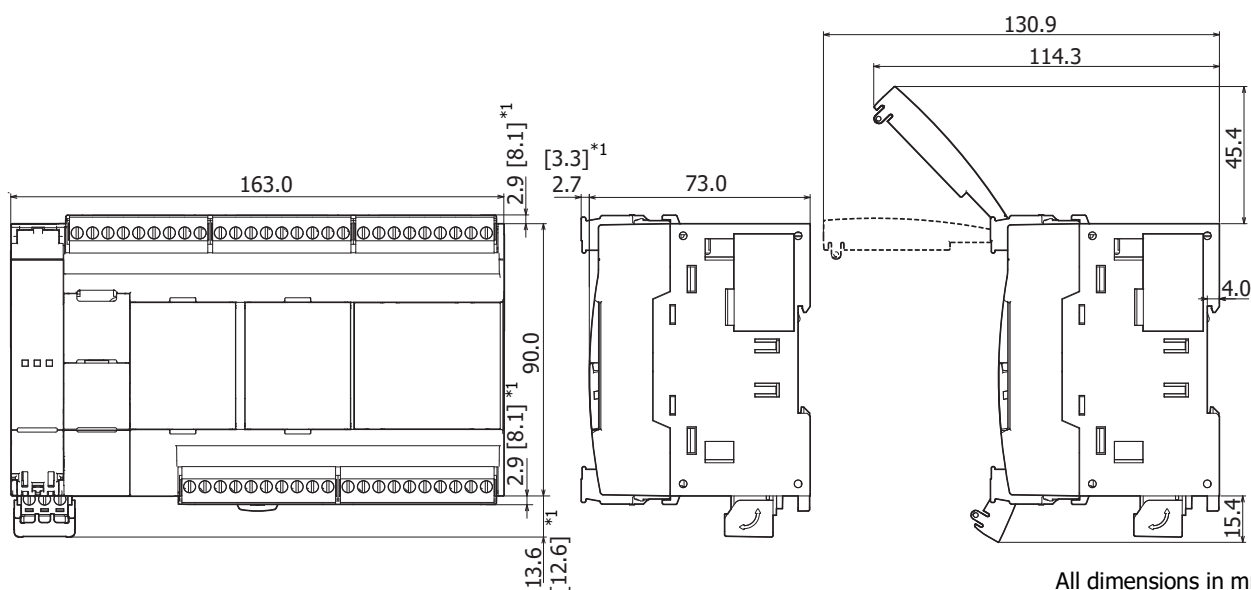


All dimensions in mm.

\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

**40-I/O Type: Screw fastened type:** FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40K1CE, FC6A-C40P1CE, FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE

**Push-in type:** FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE



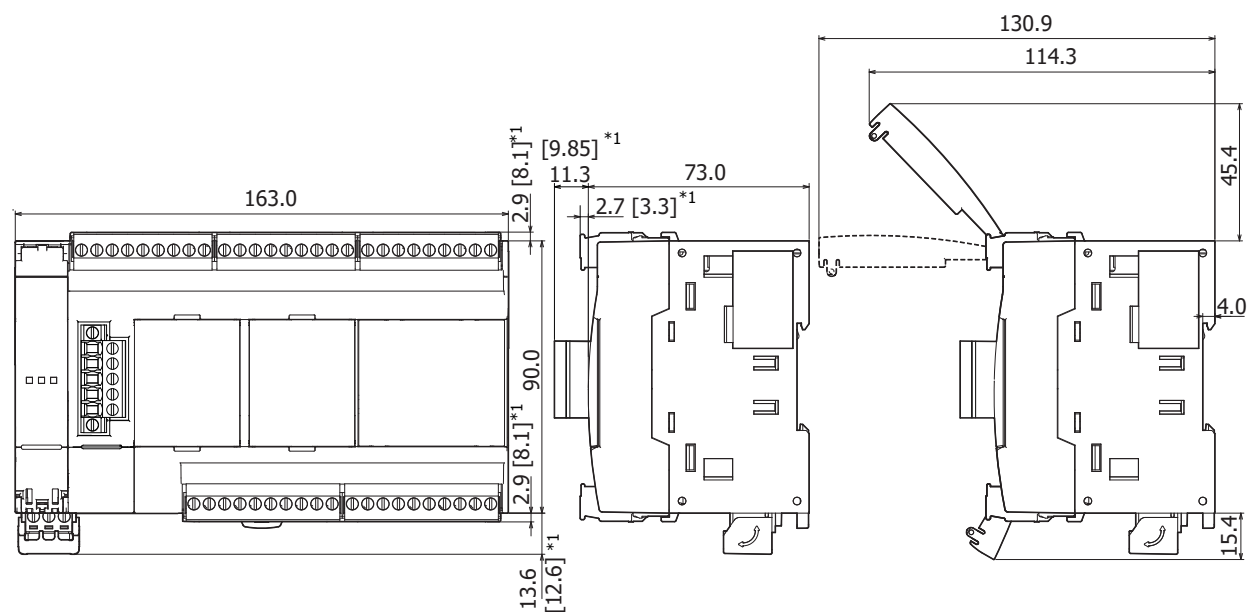
All dimensions in mm.

\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

### CAN J1939 All-in-One CPU module

**40-I/O Type: Screw fastened type:** FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ

**Push-in type:** FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ



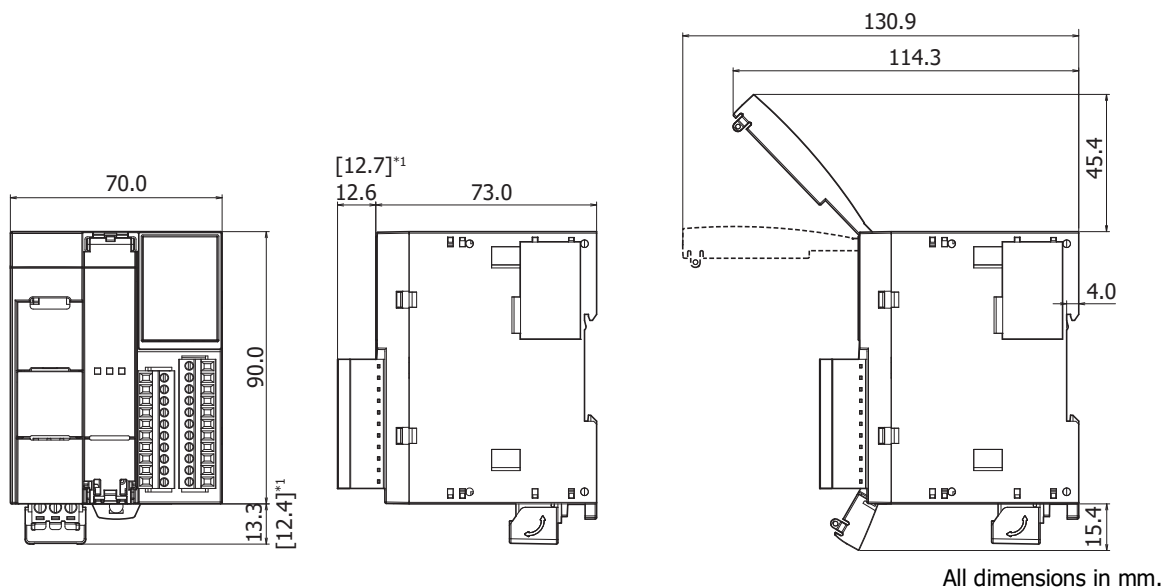
All dimensions in mm.

\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

## 2: PRODUCT SPECIFICATIONS

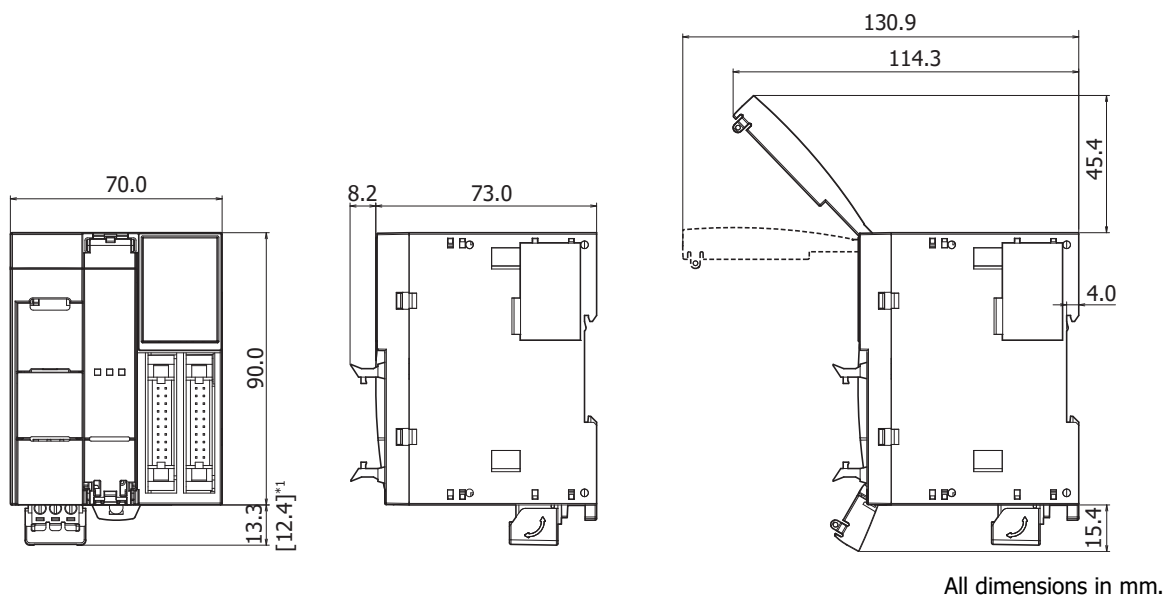
### Plus CPU module

**Plus 16-I/O type:** Screw fastened type: FC6A-D16R1CEE, FC6A-D16K1CEE, FC6A-D16P1CEE  
Push-in type: FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE



\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

**Plus 32-I/O type:** Screw fastened type: FC6A-D32K3CEE, FC6A-D32P3CEE  
Push-in type: FC6A-D32K4CEE, FC6A-D32P4CEE

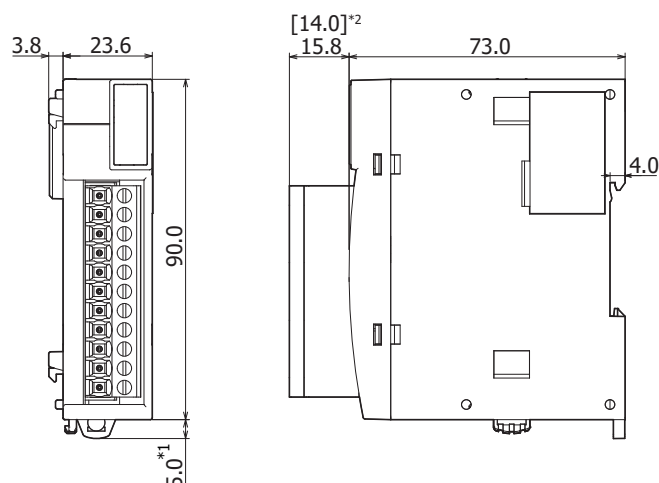


\*1 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].



## Expansion Modules

|                                   |   |
|-----------------------------------|---|
| <b>Digital input modules:</b>     | <b>Screw fastened type:</b> FC6A-N08B1, FC6A-N08A11<br><b>Push-in type:</b> FC6A-N08B4, FC6A-N08A14   |
| <b>Digital output modules:</b>    | <b>Screw fastened type:</b> FC6A-R081, FC6A-T08K1, FC6A-T08P1<br><b>Push-in type:</b> FC6A-R084, FC6A-T08K4, FC6A-T08P4                     |
| <b>Digital mixed I/O modules:</b> | <b>Screw fastened type:</b> FC6A-M08BR1<br><b>Push-in type:</b> FC6A-M08BR4   |
| <b>Analog I/O modules:</b>        | <b>Screw fastened type:</b> FC6A-J2C1, FC6A-K2A1, FC6A-K4A1, FC6A-J4CN1<br><b>Push-in type:</b> FC6A-J2C4, FC6A-K2A4, FC6A-K4A4, FC6A-J4CN4 |

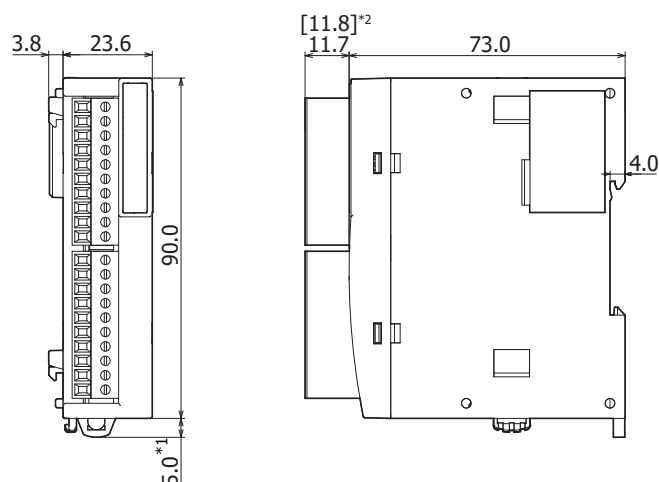


All dimensions in mm.

\*1 9.3 mm when the hook is pulled out.

\*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

|                                |   |
|--------------------------------|---|
| <b>Digital input modules:</b>  | <b>Screw fastened type:</b> FC6A-N16B1<br><b>Push-in type:</b> FC6A-N16B4   |
| <b>Digital output modules:</b> | <b>Screw fastened type:</b> FC6A-R161, FC6A-T16K1, FC6A-T16P1<br><b>Push-in type:</b> FC6A-R164, FC6A-T16K4, FC6A-T16P4   |
| <b>Analog I/O modules:</b>     | <b>Screw fastened type:</b> FC6A-J4A1, FC6A-J8A1, FC6A-J4CN1, FC6A-J4CH1Y,<br>FC6A-J8CU1, FC6A-L06A1<br><b>Push-in type:</b> FC6A-J4A4, FC6A-J8A4, FC6A-J4CN4, FC6A-J4CH4Y, FC6A-J8CU4,<br>FC6A-L06A4 |
| <b>Communication modules:</b>  | <b>Screw fastened type:</b> FC6A-SIF52<br><b>Push-in type:</b> FC6A-SIF524  |



All dimensions in mm.

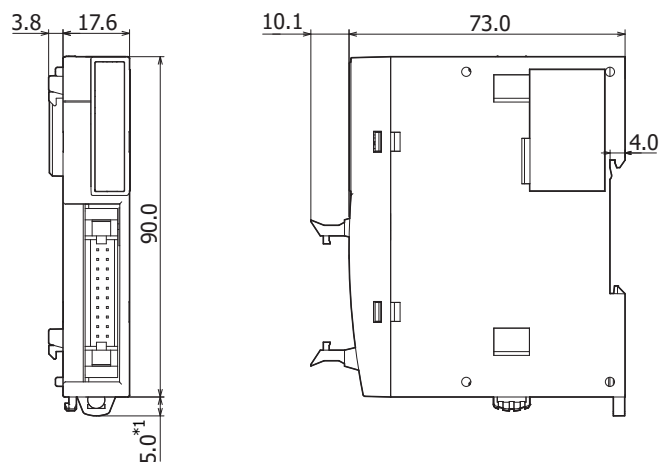
\*1 9.3 mm when the hook is pulled out.

\*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

## 2: PRODUCT SPECIFICATIONS

**Digital input modules:** FC6A-N16B3

**Digital output modules:** FC6A-T16K3, FC6A-T16P3

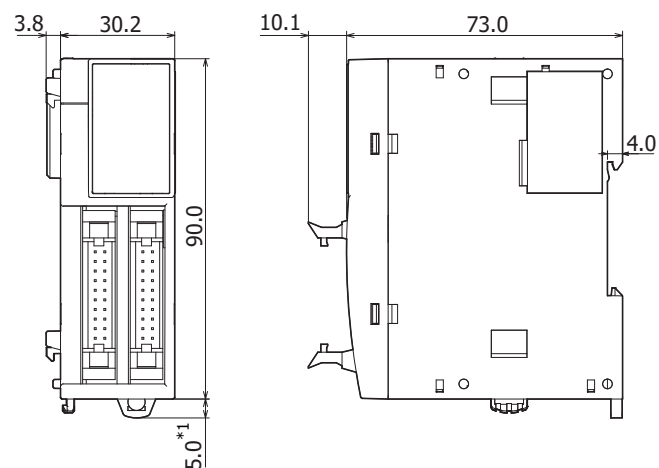


\*1 9.3 mm when the hook is pulled out.

All dimensions in mm.

**Digital input modules:** FC6A-N32B3

**Digital output modules:** FC6A-T32K3, FC6A-T32P3



\*1 9.3 mm when the hook is pulled out.

All dimensions in mm.

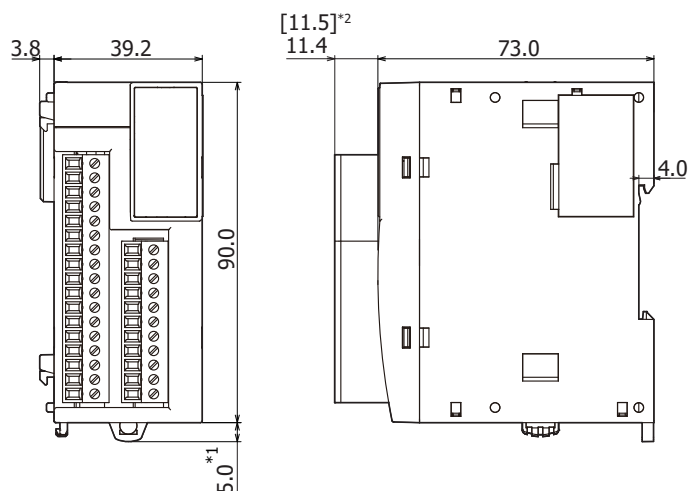
**Digital mixed I/O modules: Screw fastened type: FC6A-M24BR1**

**Push-in type: FC6A-M24BR4**

**PID modules:**

**Screw fastened type: FC6A-F2M1, FC6A-F2MR1**

**Push-in type: FC6A-F2M4, FC6A-F2MR4**



All dimensions in mm.

\*1 9.3 mm when the hook is pulled out.

\*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

**Safety relay module:**

**Push-in type: FC6A-SAK64**

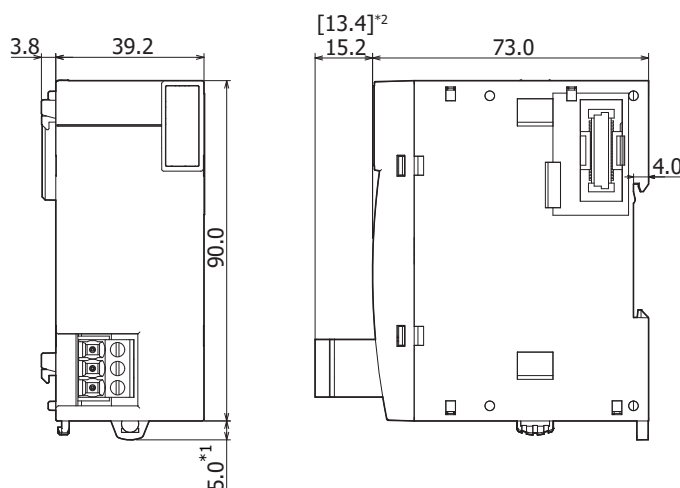
See Chapter 3 "Dimensions" in the "FC6A Series MICROSmart Safety Relay Module User's Manual".

## Expansion Interface Module

**Expander:**

**Screw fastened type: FC6A-EXM2**

**Push-in type: FC6A-EXM24**



All dimensions in mm.

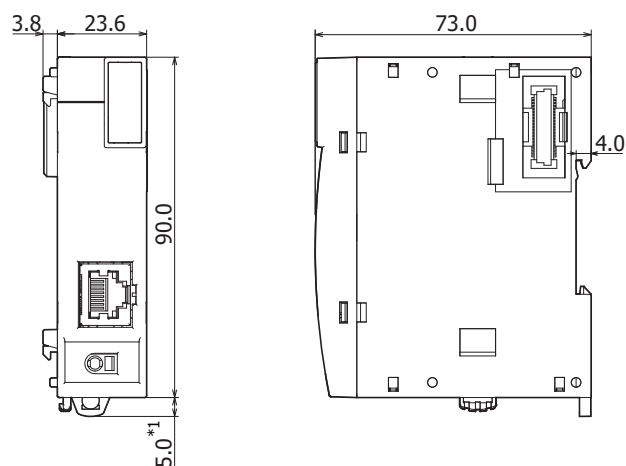
\*1 9.3 mm when the hook is pulled out.

\*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

## 2: PRODUCT SPECIFICATIONS

### Remote Master:

#### FC6A-EXM1M



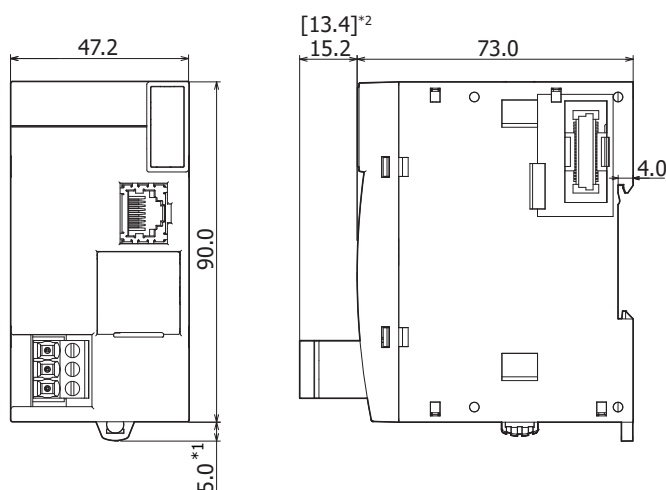
All dimensions in mm.

\*1 9.3 mm when the hook is pulled out.

### Remote Slave:

#### Screw fastened type: FC6A-EXM1S

#### Push-in type: FC6A-EXM1S4



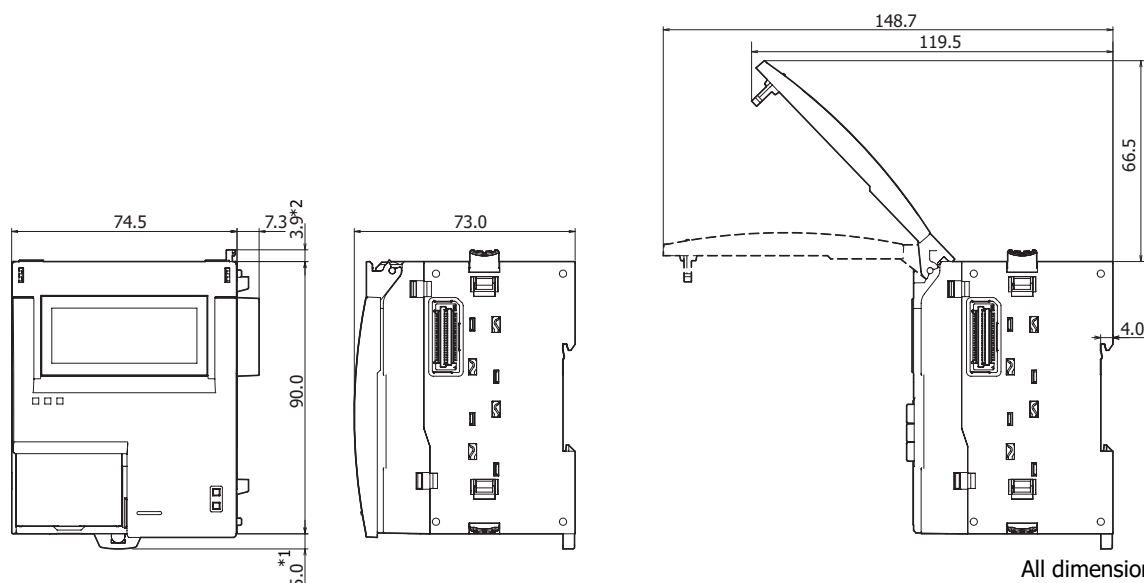
All dimensions in mm.

\*1 9.3 mm when the hook is pulled out.

\*2 The above drawing is for the screw fastened type. Dimensions for the push-in type are given in [ ].

## HMI Module

### FC6A-PH1

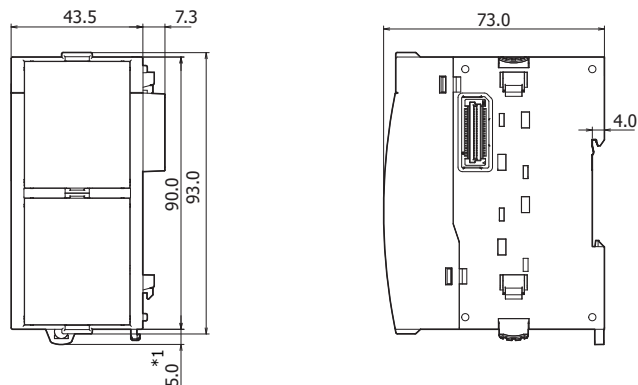


\*1 9.3 mm when the hook is pulled out.

\*2 This dimension is 0 mm when the eject button is locked.

## Cartridge Base Module

### FC6A-HPH1



\*1 9.3 mm when the hook is pulled out.

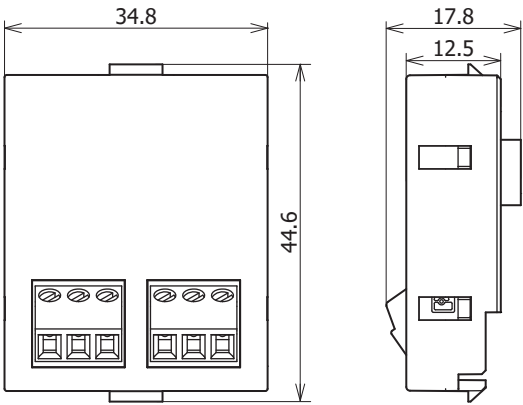
Cartridges

- Digital I/O cartridges:

FC6A-PN4, FC6A-PTK4, FC6A-PTS4
- Analog I/O cartridges:

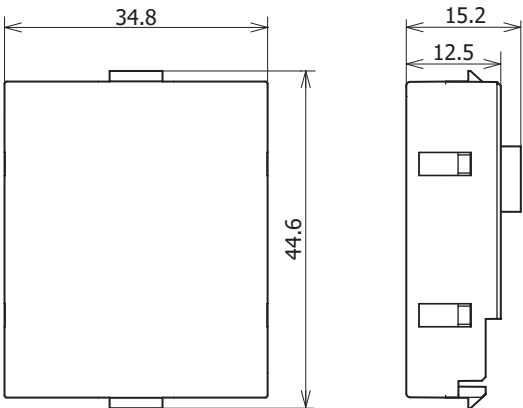
FC6A-PK2AV, FC6A-PK2AW, FC6A-PJ2A, FC6A-PJ2CP
- Communication cartridges:

FC6A-PC1, FC6A-PC3



All dimensions in mm.

Communication cartridges: FC6A-PC4



All dimensions in mm.

### Rating at Max Surrounding Air Temperature of 55°C/65°C

The input/output ratings at Max Surrounding Air Temperature of 55°C/65°C are as follows.

| Model Names           | Type         | Air Temp | Inputs  | Outputs   |
|-----------------------|--------------|----------|---|---|
| All-in-One CPU module | FC6A-C16R1AE | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                      |
|                       |              | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 28 mA, 4 PTs  | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 6 A, 3 PTs             |
|                       | FC6A-C16R1CE | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                      |
|                       |              | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 28 mA, 4 PTs  | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 6 A, 3 PTs             |
|                       | FC6A-C16P1CE | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2   |
|                       |              | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 17 mA, 3 PTs  | 7 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 1 A, 2 PTs                  |
|                       | FC6A-C16K1CE | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 transistor sink outputs:<br>24V DC, 0.5 A/PT  |
|                       |              | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 17 mA, 3 PTs  | 7 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Total Max. 1 A, 2 PTs                               |
|                       | FC6A-C16R1DE | 55°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                      |
|                       |              | 65°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 24 mA, 4 PTs  | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 6 A, 3 PTs             |
|                       | FC6A-C16P1DE | 55°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 7 transistor source outputs:<br>12 V DC, 0.5 A/PT resistive<br>Limited energy                         |
|                       |              | 65°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 18 mA, 3 PTs  | 7 transistor source outputs:<br>12 V DC, 0.5 A/PT resistive<br>Total Max. 1A, 2 PTs<br>Limited energy |
|                       | FC6A-C16K1DE | 55°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 7 transistor sink outputs:<br>12 V DC, 0.5 A/PT resistive<br>Limited energy                           |
|                       |              | 65°C     | 9 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 18 mA, 3 PTs  | 7 transistor sink outputs:<br>12 V DC, 0.5 A/PT resistive<br>Total Max. 1A, 2 PTs<br>Limited energy   |
|                       | FC6A-C24R1AE | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                            | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                     |
|                       |              | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 45 mA, 7 PTs | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 10 A, 5 PTs           |
|                       | FC6A-C24R1CE | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                            | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                     |
|                       |              | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 45 mA, 7 PTs | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 10 A, 5 PTs           |

## 2: PRODUCT SPECIFICATIONS

| Model Names           | Type         | Air Temp | Inputs   | Outputs   |
|-----------------------|--------------|----------|--|---|
| All-in-One CPU module | FC6A-C24P1CE | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 10 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                |
|                       |              | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 27 mA, 5 PTs  | 10 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 2 A, 4 PTs       |
|                       | FC6A-C24K1CE | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 10 transistor sink outputs:<br>24V DC, 0.5 A/PT   |
|                       |              | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 27 mA, 5 PTs  | 10 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Total Max. 2 A, 4 PTs                    |
|                       | FC6A-C40R1AE | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|                       |              | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs |
|                       | FC6A-C40R1CE | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|                       |              | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs |
|                       | FC6A-C40P1CE | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                |
|                       |              | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs  | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs       |
|                       | FC6A-C40K1CE | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT   |
|                       |              | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs  | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Total Max. 3 A, 6 PTs                    |
|                       | FC6A-C40R1DE | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|                       |              | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 70 mA, 12 PTs | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs |
|                       | FC6A-C40P1DE | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 16 transistor source outputs:<br>12V DC, 0.5 A/PT<br>Class 2                                |
|                       |              | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 42 mA, 8 PTs  | 16 transistor source outputs:<br>12V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs       |
|                       | FC6A-C40K1DE | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                             | 16 transistor sink outputs:<br>12V DC, 0.5 A/PT   |
|                       |              | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 42 mA, 8 PTs  | 16 transistor sink outputs:<br>12V DC, 0.5 A/PT<br>Total Max. 3 A, 6 PTs                    |



| Model Names                     | Type          | Air Temp | Inputs   | Outputs  |
|---------------------------------|---------------|----------|--|--|
| CAN J1939 All-in-One CPU module | FC6A-C40R1AEJ | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                                 | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)  |
|                                 |               | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs     | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs  |
|                                 | FC6A-C40R1CEJ | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                                 | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)  |
|                                 |               | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs     | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs  |
|                                 | FC6A-C40P1CEJ | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                                 | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2   |
|                                 |               | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs      | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs  |
|                                 | FC6A-C40K1CEJ | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                                 | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT  |
|                                 |               | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs      | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Total Max. 3 A, 6 PTs   |
|                                 | FC6A-C40R1DEJ | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                                 | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)  |
|                                 |               | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 70 mA, 12 PTs     | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs  |
|                                 | FC6A-C40P1DEJ | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                                 | 16 transistor source outputs:<br>12V DC, 0.5 A/PT<br>Class 2   |
|                                 |               | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 42 mA, 8 PTs      | 16 transistor source outputs:<br>12V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs  |
|                                 | FC6A-C40K1DEJ | 55°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT                                 | 16 transistor sink outputs:<br>12V DC, 0.5 A/PT  |
|                                 |               | 65°C     | 24 inputs: 12V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 6 mA/PT<br>Total Max. 42 mA, 8 PTs      | 16 transistor sink outputs:<br>12V DC, 0.5 A/PT<br>Total Max. 3 A, 6 PTs   |
| Plus CPU module                 | FC6A-D16R1CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                            | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common);<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty                          |
|                                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 22 mA, 4 PTs | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common);<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty<br>Total Max. 8 A, 4 PTs |
|                                 | FC6A-D16R4CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                            | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common);<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty                          |
|                                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 22 mA, 4 PTs | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common);<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty<br>Total Max. 8 A, 4 PTs |

## 2: PRODUCT SPECIFICATIONS

| Model Names     | Type          | Air Temp | Inputs   | Outputs   |
|-----------------|---------------|----------|--|---|
| Plus CPU module | FC6A-D16P1CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 26.4 mA      | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy      |
|                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy |
|                 | FC6A-D16P4CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 26.4 mA      | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy      |
|                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy |
|                 | FC6A-D16K1CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 26.4 mA      | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy        |
|                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy   |
|                 | FC6A-D16K4CEE | 55°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 26.4 mA      | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy        |
|                 |               | 65°C     | 8 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy   |
|                 | FC6A-D32P3CEE | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 60.0 mA     | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy    |
|                 |               | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA       | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, Limited energy     |
|                 | FC6A-D32P4CEE | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 60.0 mA     | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy    |
|                 |               | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA       | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, Limited energy     |
|                 | FC6A-D32K3CEE | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 60.0 mA     | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A                      |
|                 |               | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA       | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A                       |
|                 | FC6A-D32K4CEE | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 60.0 mA     | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A                      |
|                 |               | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 3, 4, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA       | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A                       |

| Model Names        | Type                        | Air Temp | Inputs  | Outputs  |
|--------------------|-----------------------------|----------|---|--|
| Digital I/O module | FC6A-N08B1/<br>FC6A-N08B4   | 55°C     | 8 inputs: 24V DC,<br>7 mA/PT  | -  |
|                    |                             | 65°C     | 8 inputs: 24V DC,<br>7 mA/PT<br>Total Max. 28 mA, 4 PTs             | -  |
|                    | FC6A-N16B1/<br>FC6A-N16B4   | 55°C     | 16 inputs: 24V DC,<br>7 mA/PT<br>Total max. 123.2 mA                | -  |
|                    |                             | 65°C     | 16 inputs: 24V DC,<br>7 mA/PT<br>Total Max. 56 mA 8 PTs             | -  |
|                    | FC6A-N16B3                  | 55°C     | 16 inputs: 24V DC,<br>5 mA/PT<br>Total Max. 72 mA                   | -  |
|                    |                             | 65°C     | 16 inputs: 24V DC,<br>5 mA/PT<br>Total Max. 35 mA, 7 PTs            | -  |
|                    | FC6A-N32B3                  | 55°C     | 32 inputs: 24V DC,<br>5 mA/PT<br>Total Max. 144 mA                  | -  |
|                    |                             | 65°C     | 32 inputs: 24V DC,<br>5 mA/PT<br>Total Max. 70 mA, 14 PTs           | -  |
|                    | FC6A-N08A11/<br>FC6A-N08A14 | 55°C     | 8 inputs: 120V AC,<br>50/60 Hz, 15 mA/PT                            | -  |
|                    |                             | 65°C     | 8 inputs: 120V AC,<br>50/60 Hz, 15 mA/PT<br>Total Max. 60 mA, 4 PTs | -  |
|                    | FC6A-R081/<br>FC6A-R084     | 55°C     | -   | 8 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common                             |
|                    |                             | 65°C     | -   | 8 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common<br>Total Max. 8 A, 4 PTs    |
|                    | FC6A-R161/<br>FC6A-R164     | 55°C     | -   | 16 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 8 A/Common                            |
|                    |                             | 65°C     | -   | 16 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 8 A/Common<br>Total Max. 16 A, 8 PTs  |
|                    | FC6A-T08P1/<br>FC6A-T08P4   | 55°C     | -   | 8 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                              |
|                    |                             | 65°C     | -   | 8 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 2 A, 4 PTs     |
|                    | FC6A-T16P1/<br>FC6A-T16P4   | 55°C     | -   | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -   | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 4 A, 8 PTs    |
|                    | FC6A-T16P3                  | 55°C     | -   | 16 transistor source outputs:<br>24V DC, 0.1 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -   | 16 transistor source outputs:<br>24V DC, 0.1 A/PT<br>Class 2<br>Total Max. 0.8 A, 8 PTs  |
|                    | FC6A-T32P3                  | 55°C     | -   | 32 transistor source outputs:<br>24V DC, 0.1 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -   | 32 transistor source outputs:<br>24V DC, 0.1 A/PT<br>Class 2<br>Total Max. 1.6 A, 16 PTs |

## 2: PRODUCT SPECIFICATIONS

| Model Names        | Type                        | Air Temp | Inputs   | Outputs  |
|--------------------|-----------------------------|----------|--|--|
| Digital I/O module | FC6A-T08K1/<br>FC6A-T08K4   | 55°C     | -  | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2                              |
|                    |                             | 65°C     | -  | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 2 A, 4 PTs     |
|                    | FC6A-T16K1/<br>FC6A-T16K4   | 55°C     | -  | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -  | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 4 A, 8 PTs    |
|                    | FC6A-T16K3                  | 55°C     | -  | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -  | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT<br>Class 2<br>Total Max. 0.8 A, 8 PTs  |
|                    | FC6A-T32K3                  | 55°C     | -  | 32 transistor sink outputs:<br>24V DC, 0.1 A/PT<br>Class 2                             |
|                    |                             | 65°C     | -  | 32 transistor sink outputs:<br>24V DC, 0.1 A/PT<br>Class 2<br>Total Max. 1.6 A, 16 PTs |
|                    | FC6A-M08BR1/<br>FC6A-M08BR4 | 55°C     | 4 inputs: 24V DC,<br>7 mA/PT                             | 4 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common                           |
|                    |                             | 65°C     | 4 inputs: 24V DC,<br>7 mA/PT<br>Total Max. 14 mA, 2 PTs  | 4 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common<br>Total Max. 4 A, 2 PTs  |
|                    | FC6A-M24BR1/<br>FC6A-M24BR4 | 55°C     | 16 inputs: 24V DC,<br>7 mA/PT<br>Total Max. 123.2 mA     | 8 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common                           |
|                    |                             | 65°C     | 16 inputs: 24V DC,<br>7 mA/PT<br>Total Max. 56 mA, 8 PTs | 8 relay outputs:<br>240V AC/30V DC, 2 A (GEN/RES) 7 A/Common<br>Total Max. 8 A, 4 PTs  |
| Analog I/O module  | FC6A-J2C1/<br>FC6A-J2C4     | 55°C     | 2 analog inputs  | -  |
|                    |                             | 65°C     | 2 analog inputs  | -  |
|                    | FC6A-J4A1/<br>FC6A-J4A4     | 55°C     | 4 analog inputs  | -  |
|                    |                             | 65°C     | 4 analog inputs  | -  |
|                    | FC6A-J8A1/<br>FC6A-J8A4     | 55°C     | 8 analog inputs  | -  |
|                    |                             | 65°C     | 8 analog inputs  | -  |
|                    | FC6A-L03CN1/<br>FC6A-L03CN4 | 55°C     | 2 analog inputs  | 1 analog output, Class 2   |
|                    |                             | 65°C     | 2 analog inputs  | 1 analog voltage output only, Class 2  |
|                    | FC6A-J4CN1/<br>FC6A-J4CN4   | 55°C     | 4 analog inputs  | -  |
|                    |                             | 65°C     | 4 analog inputs  | -  |
|                    | FC6A-K2A1/<br>FC6A-K2A4     | 55°C     | -  | 2 analog outputs, Class 2  |
|                    |                             | 65°C     | -  | 2 analog outputs, Class 2  |
|                    | FC6A-J8CU1/<br>FC6A-J8CU4   | 55°C     | 8 analog inputs  | -  |
|                    |                             | 65°C     | 8 analog inputs  | -  |
|                    | FC6A-J4CH1Y/<br>FC6A-J4CH4Y | 55°C     | 4 analog inputs  | -  |
|                    |                             | 65°C     | 4 analog inputs  | -  |

| Model Names                | Type        | Air Temp | Inputs   | Outputs  |
|----------------------------|-------------|----------|--|--|
| Expansion interface module | FC6A-EXM1M  | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
|                            | FC6A-EXM1S  | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
|                            | FC6A-EXM1S4 | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
|                            | FC6A-EXM2   | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
|                            | FC6A-EXM24  | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
| Communication module       | FC6A-SIF52  | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
|                            | FC6A-SIF524 | 55°C     | -  | -  |
|                            |             | 65°C     | -  | -  |
| FC6B series                | FC6B-D16K1C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5mA/PT<br>Others : 7 mA/PT<br>Total Max. 28.8 mA       | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy   |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy  |
|                            | FC6B-D16K4C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5mA/PT<br>Others : 7 mA/PT<br>Total Max. 28.8 mA       | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy   |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 10 mA, 2 PTs | 8 transistor sink outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy  |
|                            | FC6B-D16P1C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 28.8 mA      | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy   |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5mA/PT<br>Others : 7 mA/PT<br>Total Max. 10 mA, 2 PTs  | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy  |
|                            | FC6B-D16P4C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 28.8 mA      | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 3.2 A, Limited energy   |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5mA/PT<br>Others : 7 mA/PT<br>Total Max. 10 mA, 2 PTs  | 8 transistor source outputs:<br>24V DC, 0.5 A/PT resistive<br>Total Max. 1 A, 2 PTs, Limited energy  |
|                            | FC6B-D16R1C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT                            | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES), 7 A (Common)<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty                          |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 24 mA, 4 PTs | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES), 7 A (Common)<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty<br>Total Max. 8 A, 4 PTs |
|                            | FC6B-D16R4C | 55°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT                            | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES), 7 A (Common)<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty                          |
|                            |             | 65°C     | 8 inputs: 24V DC, Input 0, 1, 6, 7: 5 mA/PT<br>Others : 7 mA/PT<br>Total Max. 24 mA, 4 PTs | 8 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES), 7 A (Common)<br>D300, 2 A 30V AC, 180 VA 120/240V AC, R300, 1 A 30V DC, 28 VA 125/250V DC pilot duty<br>Total Max. 8 A, 4 PTs |

## 2: PRODUCT SPECIFICATIONS

| Model Names | Type        | Air Temp | Inputs  | Outputs  |
|-------------|-------------|----------|---|--|
| FC6B series | FC6B-D32K3C | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 62.4 mA      | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy         |
|             |             | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA, 3 PTs | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, 4 PTs, Limited energy   |
|             | FC6B-D32K4C | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 62.4 mA      | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy         |
|             |             | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA, 3 PTs | 16 transistor sink outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, 4 PTs, Limited energy   |
|             | FC6B-D32P3C | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 62.4 mA      | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy       |
|             |             | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA, 3 PTs | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, 4 PTs, Limited energy |
|             | FC6B-D32P4C | 55°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 62.4 mA      | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 1.28 A, Limited energy       |
|             |             | 65°C     | 16 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 21 mA, 3 PTs | 16 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>Total Max. 0.4 A, 4 PTs, Limited energy |
|             | FC6B-C16R1A | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                       |
|             |             | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 28 mA, 4 PTs  | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 6 A, 3 PTs              |
|             | FC6B-C16R1C | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                       |
|             |             | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 28 mA, 4 PTs  | 7 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 6 A, 3 PTs              |
|             | FC6B-C16P1C | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2  |
|             |             | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 17 mA, 3 PTs  | 7 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 1 A, 2 PTs                   |
|             | FC6B-C16K1C | 55°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 7 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2  |
|             |             | 65°C     | 9 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 17 mA, 3 PTs  | 7 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 1 A, 2 PTs                     |
|             | FC6B-C24R1A | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                            | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                                      |
|             |             | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 45 mA, 7 PTs | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 10 A, 5 PTs            |

| Model Names | Type        | Air Temp | Inputs   | Outputs   |
|-------------|-------------|----------|--|---|
| FC6B series | FC6B-C24R1C | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|             |             | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 45 mA, 7 PTs  | 10 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 10 A, 5 PTs |
|             | FC6B-C24P1C | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 10 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                |
|             |             | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 27 mA, 5 PTs  | 10 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 2 A, 4 PTs       |
|             | FC6B-C24K1C | 55°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 10 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                  |
|             |             | 65°C     | 14 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 27 mA, 5 PTs  | 10 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 2 A, 4 PTs         |
|             | FC6B-C40R1A | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|             |             | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs |
|             | FC6B-C40R1C | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)                           |
|             |             | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 80 mA, 12 PTs | 16 relay outputs:<br>240V AC / 30V DC, 2 A (GEN/RES) 7 A (Common)<br>Total Max. 16 A, 8 PTs |
|             | FC6B-C40P1C | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                |
|             |             | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs  | 16 transistor source outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs       |
|             | FC6B-C40K1C | 55°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT                             | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2                                  |
|             |             | 65°C     | 24 inputs: 24V DC,<br>Input 0, 1, 6, 7: 5 mA/PT<br>Others: 7 mA/PT<br>Total Max. 48 mA, 8 PTs  | 16 transistor sink outputs:<br>24V DC, 0.5 A/PT<br>Class 2<br>Total Max. 3 A, 6 PTs         |

## 2: PRODUCT SPECIFICATIONS

The following products can be used at Max Surrounding Air Temperature of 55°C only.

The input/output ratings of the following products at Max Surrounding Air Temperature of 55°C are as follows.

| Model Names             | Type                      | Air Temp | Inputs  | Outputs  |
|-------------------------|---------------------------|----------|---|--|
| Analog I/O module       | FC6A-K4A1/<br>FC6A-K4A4   | 55°C     | -   | 4 analog outputs, Class 2  |
|                         | FC6A-L06A1/<br>FC6A-L06A4 | 55°C     | -   | 2 analog outputs, Class 2  |
|                         | FC6A-F2M1/<br>FC6A-F2M4   | 55°C     | 2 analog inputs                                   | 2 analog outputs or digital output, Class 2  |
|                         | FC6A-F2MR1/<br>FC6A-F2MR4 | 55°C     | 2 analog inputs                                   | 2 relay outputs:<br>250V AC/30V DC, 5 A (RES), 3 A (GEN)   |
| HMI module              | FC6A-PH1                  | 55°C     | -   | -  |
| Cartridge base module   | FC6A-HPH1                 | 55°C     | -   | -  |
| Analog I/O cartridge    | FC6A-PJ2A                 | 55°C     | 2 analog inputs                                   | -  |
|                         | FC6A-PJ2CP                | 55°C     | 2 analog inputs                                   | -  |
|                         | FC6A-PK2AV                | 55°C     | -   | 2 analog outputs   |
|                         | FC6A-PK2AW                | 55°C     | -   | 2 analog outputs   |
| Communication cartridge | FC6A-PC1                  | 55°C     | -   | -  |
|                         | FC6A-PC3                  | 55°C     | -   | -  |
|                         | FC6A-PC4                  | 55°C     | -   | -  |
| Digital I/O cartridge   | FC6A-PTK4                 | 55°C     | -   | 4 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>12V DC, 0.1 A/PT resistive<br>Limited energy |
|                         | FC6A-PTS4                 | 55°C     | -   | 4 transistor source outputs:<br>24V DC, 0.1 A/PT resistive<br>12V DC, 0.1 A/PT resistive<br>Limited energy |
|                         | FC6A-PN4                  | 55°C     | 4 inputs:<br>24V DC, 5 mA/PT<br>12V DC, 2.5 mA/PT | -  |



# 3: INSTALLATION AND WIRING

## Introduction

This chapter describes the methods and precautions for installing and wiring FC6A modules.

Before starting installation and wiring, be sure to read "Safety Precautions" in the beginning of this manual and understand precautions described under Warning and Caution.

This section describes the precautions when installing and wiring the FC6A.



### Warning

- Turn off the power to the FC6A before starting installation, removal, wiring, maintenance, and inspection of the FC6A. Failure to turn power off may cause electrical shocks or fire hazard.
- Emergency stop and interlocking circuits must be configured outside the FC6A. If such a circuit is configured inside the FC6A, failure of the FC6A may cause disorder of the control system, damage, or accidents.
- Special expertise is required to install, wire, program, and operate the FC6A. People without such expertise must not use the FC6A.



### Caution

- Prevent metal fragments and pieces of wire from dropping inside the FC6A housing. Put a cover on the FC6A modules during installation and wiring. Ingress of such fragments and chips may cause fire hazard, damage, or malfunction.
- Do not touch the connector pins with your hand. Electrostatic discharge may damage the internal elements.
- When handling the FC6A, take measures to discharge static electricity.
- Keep the FC6A wiring away from motor lines.
- Wire the connectors and terminal blocks so that no force is applied to them.

## Installation Location

The FC6A is designed to be installed in control panels and similar locations.

Install the FC6A within product specifications.

Avoid use in the environments below, as doing so may cause electric shock, fire, or malfunction:

Places where there is a lot of dust, salt, iron powder, or soot.

Places exposed to direct sunlight.

Places where the FC6A may be exposed to vibration or shock, either directly or indirectly.

Atmospheres of corrosive or flammable gases.

Places where condensation may form.

Places where the FC6A may be directly exposed to water.

Around high-voltage lines, high-voltage equipment, motor lines, or motor equipment.

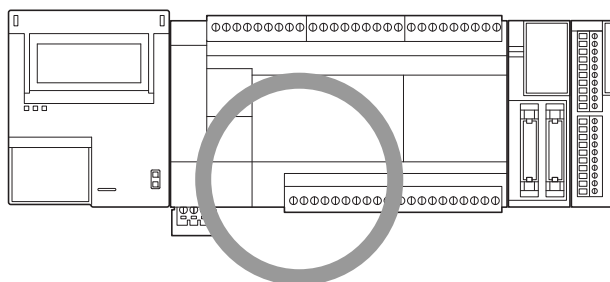
Places near where a large switching surge may occur.

Places subject to a strong magnetic or electrical field.

Mount the FC6A as follows. To provide ample ventilation, ensure that there is sufficient space between the FC6A and other devices, heat sources, and panel surfaces.

### Normal Installation State

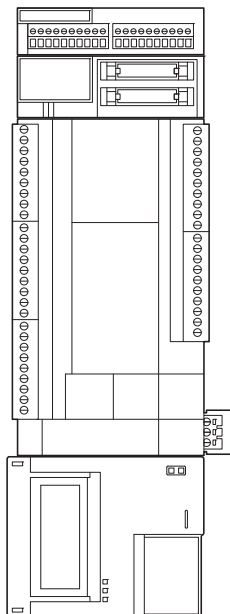
FC6A



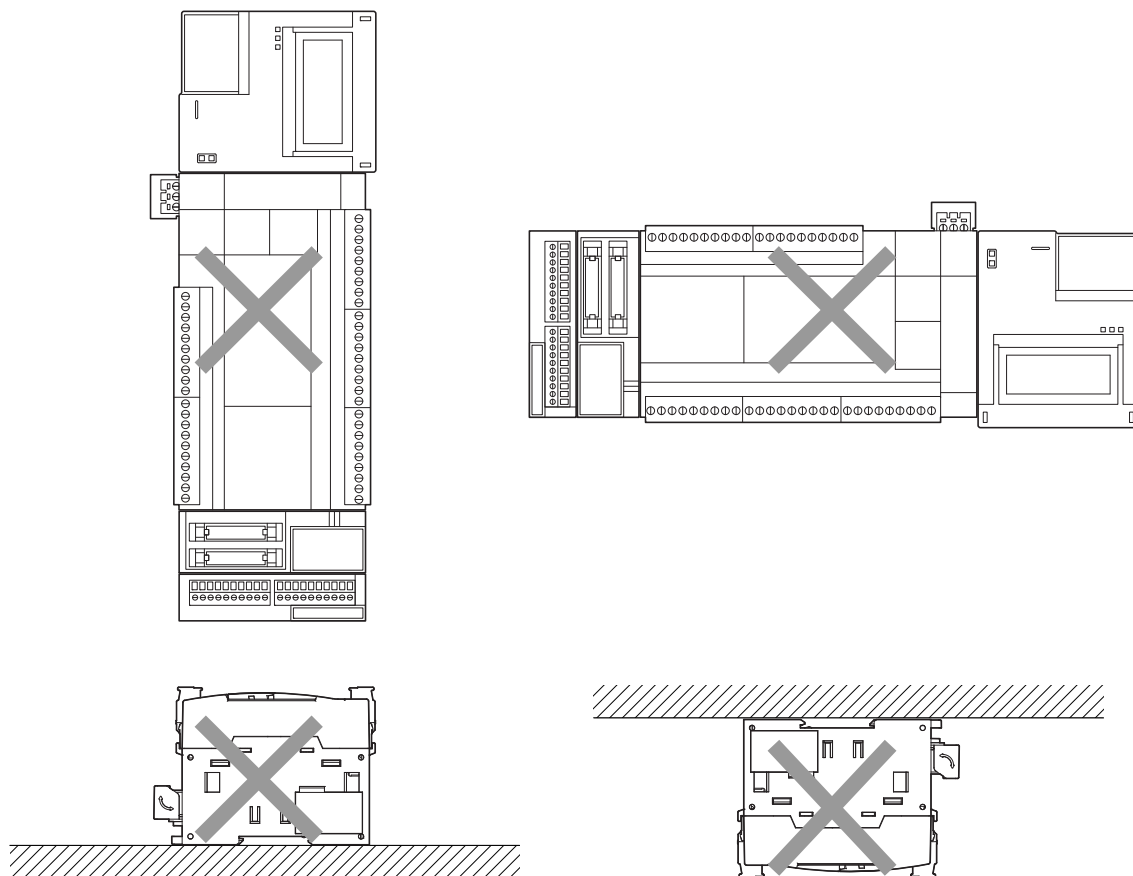
### 3: INSTALLATION AND WIRING

The FC6A can be mounted with the following orientation when the operating temperature is 35°C or lower.

Side Orientation (Use this orientation with an operating temperature of 35°C or lower.)

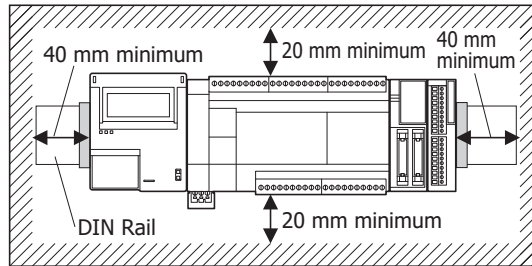


The FC6A cannot be mounted with the following orientations.

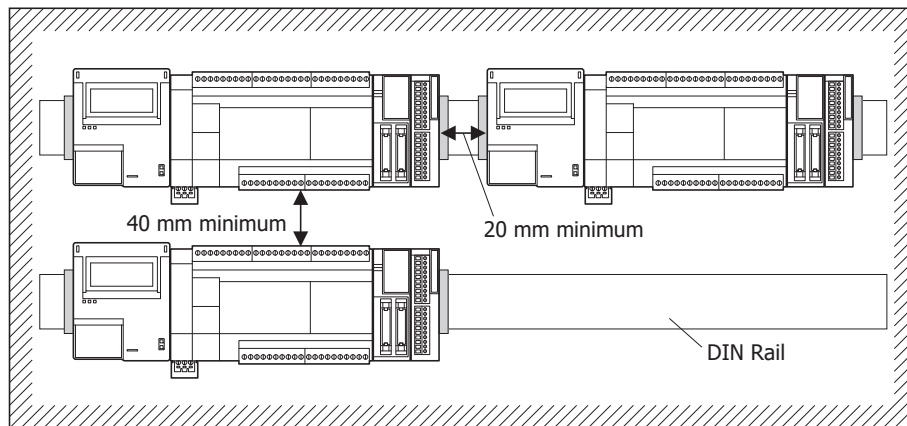


### Mounting Space

To allow for heat dissipation and facilitate replacement, ensure that there are at least 20 to 40 mm between the FC6A and surrounding equipment and ducts.



### Mounting Two or More Units



#### Assembly Methods

This section describes how to assemble the FC6A.



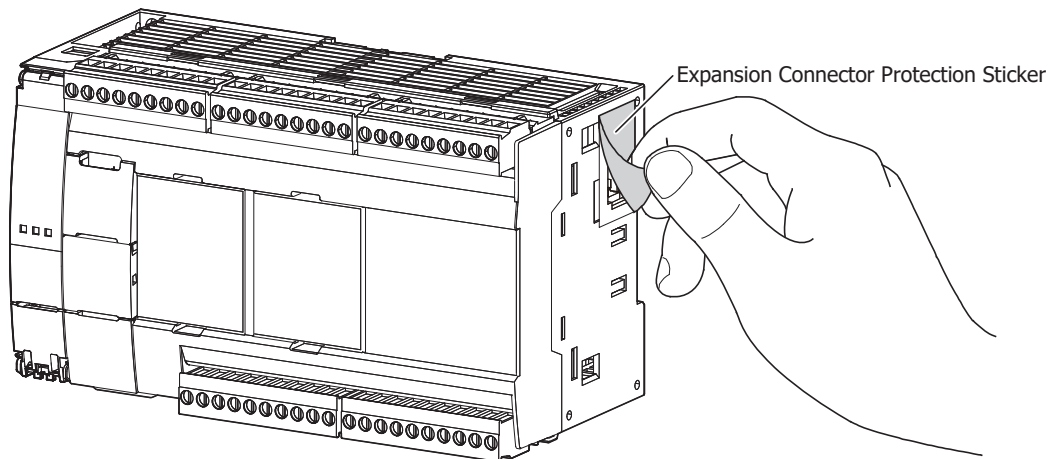
#### Caution

Assemble the FC6A before mounting it to a DIN rail or directly mounting it. When mounting the FC6A to a DIN rail, if it is assembled after being mounted to the DIN rail, there is a risk of damage.

#### Assembling the CPU Module and Expansion and Expansion Interface Modules

The following procedure describes the assembly of the CPU module and an expansion module.

1. Peel off the protection sticker applied to the expansion connector on the CPU module.

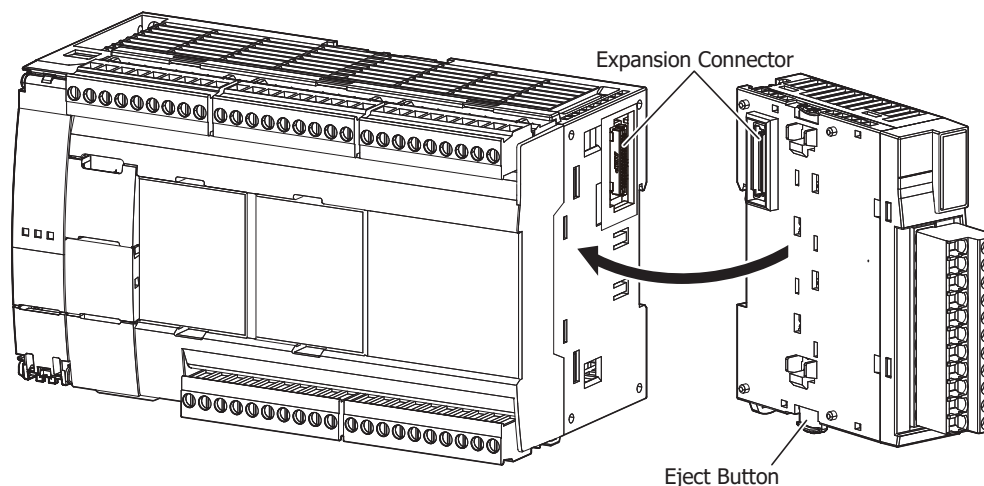


2. Line up the expansion module alongside the CPU module.

**Note:** The CPU module and the expansion module are easier to line up if you use the position of the expansion connector as a guide.

3. Confirm that the expansion module eject button is depressed and push the expansion module until it clicks while taking care with the position of the expansion connector. If the eject button is not depressed, push in the eject button until it clicks after the expansion module has been pushed onto the CPU module.

The expansion module is now locked on the CPU module.



#### Caution

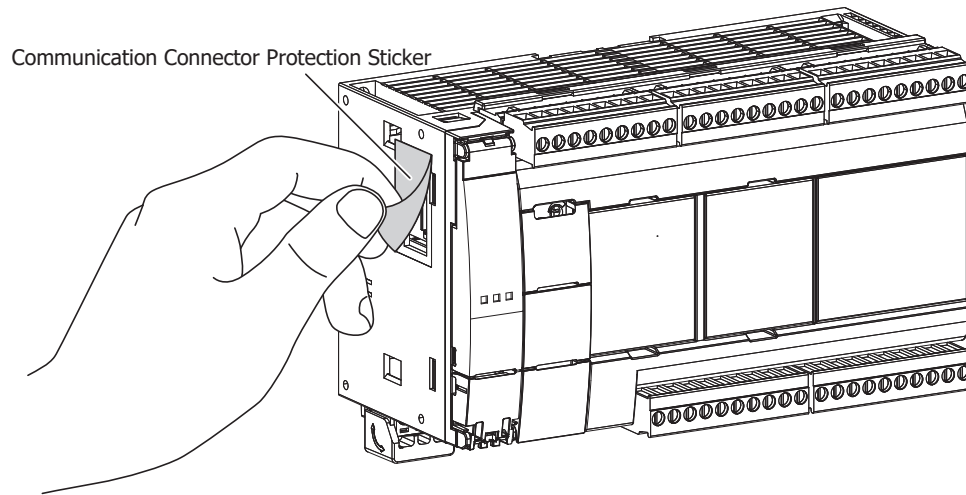
Do not perform this work when the FC6A is powered. Otherwise there is a risk of damage.

**Note:** The assembly of an expansion module and the expansion interface module is the same, first peel off the expansion connector protection sticker on the expansion module and then mount it.

### Assembling the CPU Module and the HMI Module

The following procedure describes the assembly of the CPU module and the HMI module.

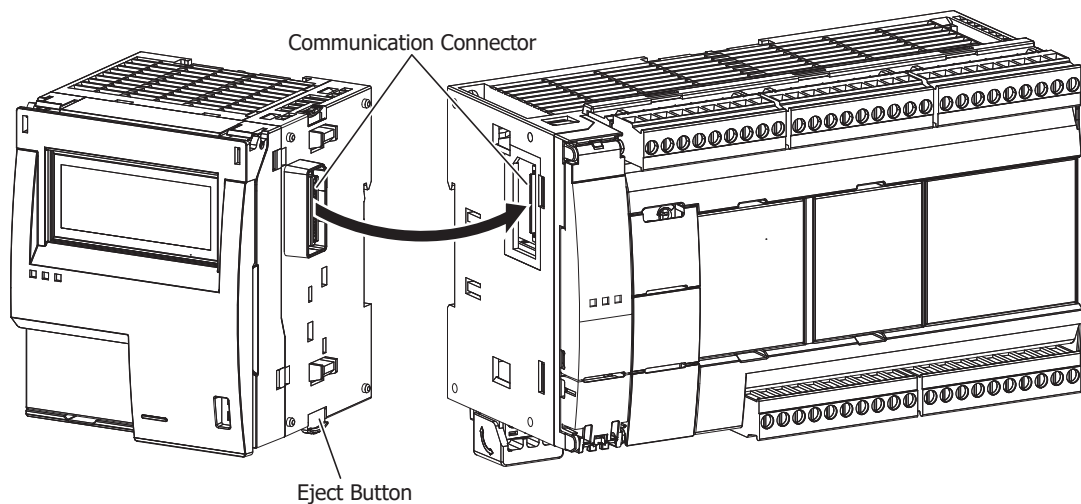
1. Peel off the protection sticker applied to the communication connector on the CPU module.



2. Line up the HMI module alongside the CPU module.

**Note:** The CPU module and the HMI module are easier to line up if you use the position of the communication connector as a guide.

3. Confirm that the HMI module eject button is depressed and push the HMI module until it clicks while taking care with the position of the communication connector. If the eject button is not depressed, push in the eject button until it clicks after the HMI module has been pushed onto the CPU module.  
The HMI module is now locked on the CPU module.

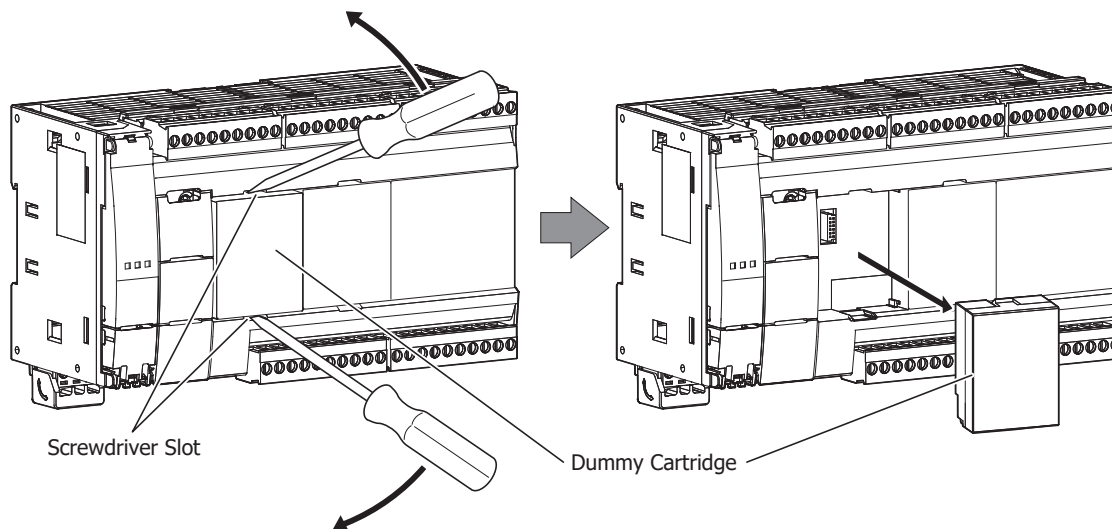


**Caution** Do not perform this work when the FC6A is powered. Otherwise there is a risk of damage.

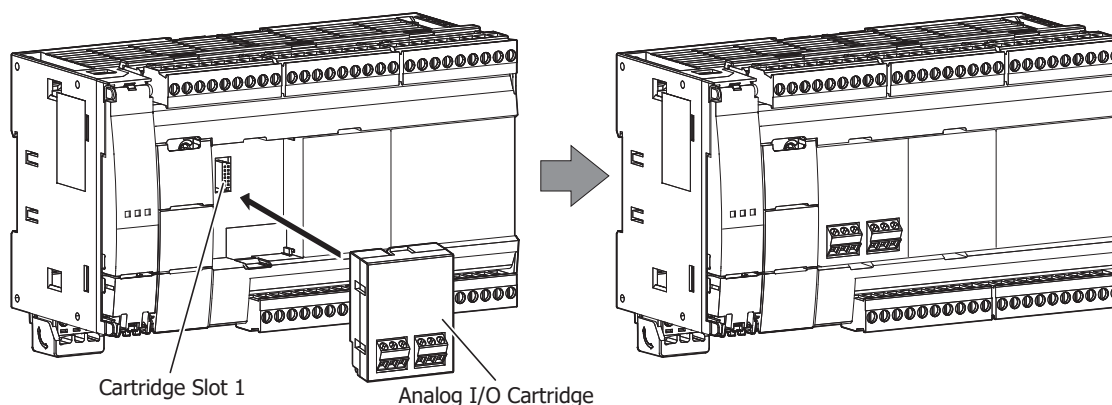
#### Assembling the CPU Module and a Cartridge

The following procedure describes the assembly of the CPU module (cartridge slot 1) and an analog I/O cartridge.

1. Insert a flathead screwdriver into each of the screwdriver slots (two locations) on the CPU module (cartridge slot 1) and remove the dummy cartridge straight off the CPU module by pushing down the dummy cartridge tabs.



2. Take care with the vertical orientation of the analog I/O cartridge and firmly push the analog I/O cartridge connector onto cartridge slot 1 on the CPU module.



#### Caution

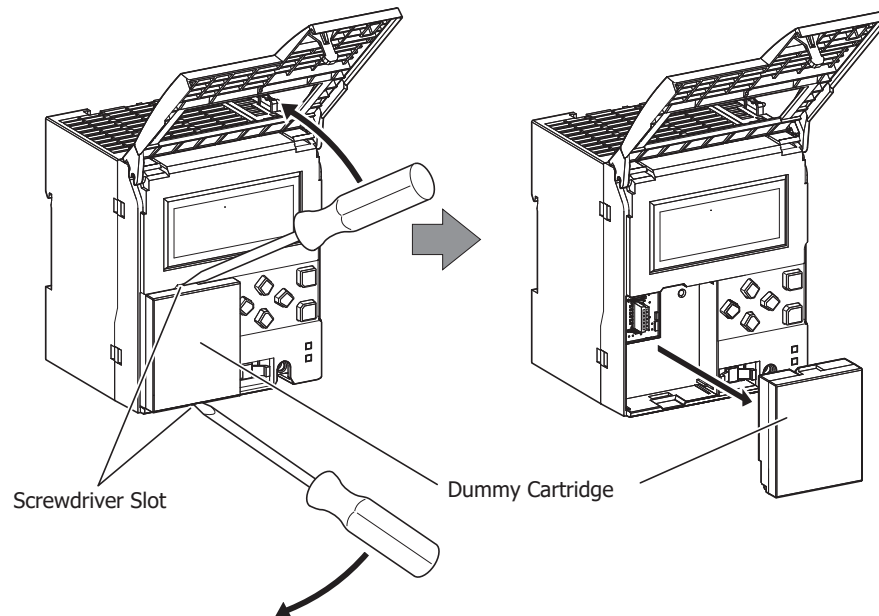
- Do not perform this work when the FC6A is powered. Otherwise there is a risk of damage.
- Attach and remove the cartridge straight in relation to the CPU module. If you attach or remove the cartridge at an angle, there is a risk of damage or communication failure.

**Note:** Cartridges cannot be attached to the Plus CPU module.

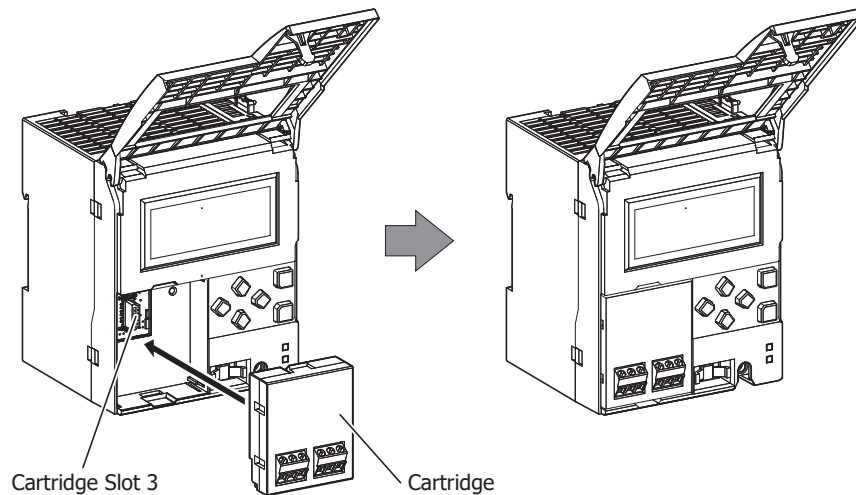
### Assembling the HMI Module and a Cartridge

The following procedure describes the assembly of the HMI module (cartridge slot 3) and an analog I/O cartridge.

1. Unlock and open the front cover of the HMI module.  
For details, see "Opening the Front Cover" on page 3-9.
2. Insert a flathead screwdriver into each of the screwdriver slots (two locations) on the HMI module and remove the dummy cartridge straight off the HMI module by pushing in the dummy cartridge tabs.



3. Take care with the vertical orientation of the cartridge and firmly push the cartridge connector onto cartridge slot 3 on the HMI module.



#### Caution

- Do not perform this work when the FC6A is powered. Otherwise there is a risk of damage.
- Attach and remove the cartridge straight in relation to the HMI module. If you attach or remove the cartridge at an angle, there is a risk of damage or communication failure.

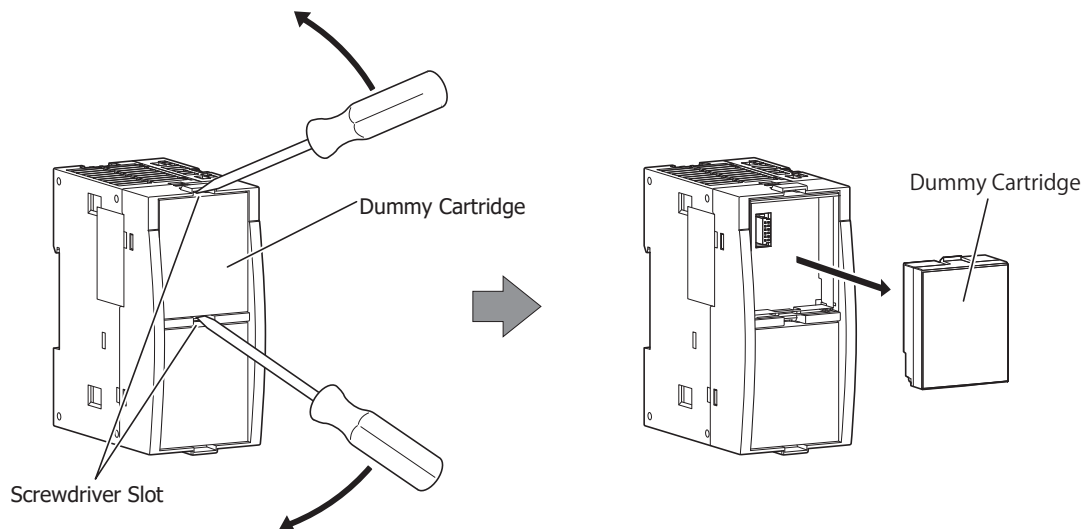
**Note:** A communication cartridge cannot be attached to cartridge slot 3 of an HMI module added to the All-in-One CPU module.

4. Close and lock the front cover of the HMI module.  
For details, see "Closing the Front Cover" on page 3-9.

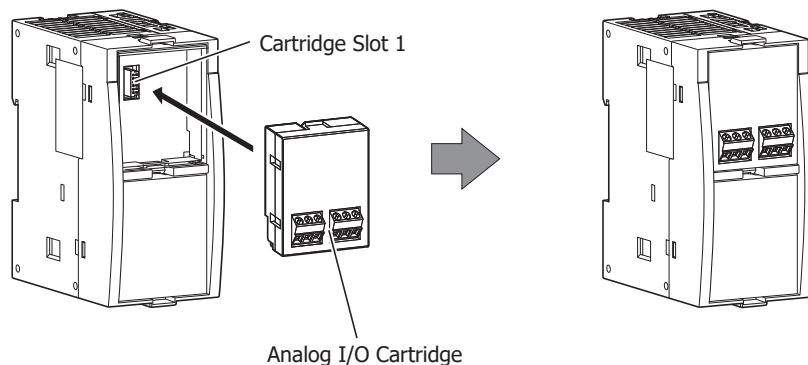
#### Assembling the Cartridge Base Module and a Cartridge

The following procedure describes the assembly of the cartridge base module (cartridge slot 1) and an analog I/O cartridge.

1. Insert a flathead screwdriver into each of the screwdriver slots (two locations) on the cartridge base module (cartridge slot 1) and remove the dummy cartridge straight off the cartridge base module by pushing down the dummy cartridge tabs.



2. Take care with the vertical orientation of the analog I/O cartridge and firmly push the analog I/O cartridge connector onto cartridge slot 1 on the cartridge base module.



#### Caution

- Do not perform this work when the FC6A is powered. Otherwise there is a risk of damage.
- Attach and remove the cartridge straight in relation to the cartridge base module. If you attach or remove the cartridge at an angle, there is a risk of damage or communication failure.

**Note:** The cartridge base module cannot be attached to the All-in-One CPU module.



## Opening and Closing the Front Cover of the HMI Module

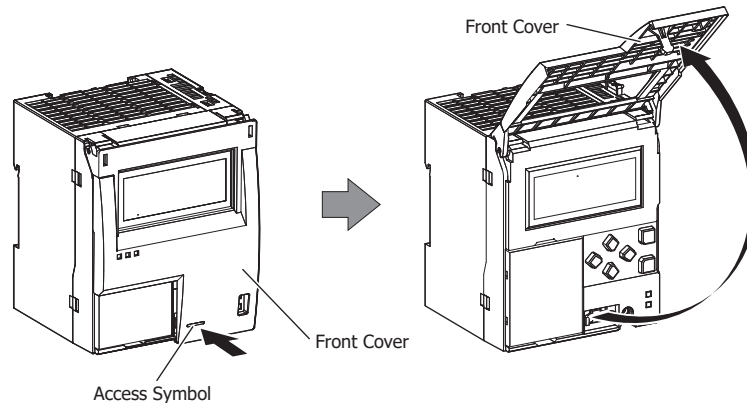
The following procedure describes how to open and close the front cover of the HMI module.

### Opening the Front Cover


**Caution**

Always unlock the front cover before opening it with the following procedure. Otherwise there is a risk of damage to the HMI module.

1. Push the access symbol until it clicks to unlock the front cover.
2. The front cover will open.

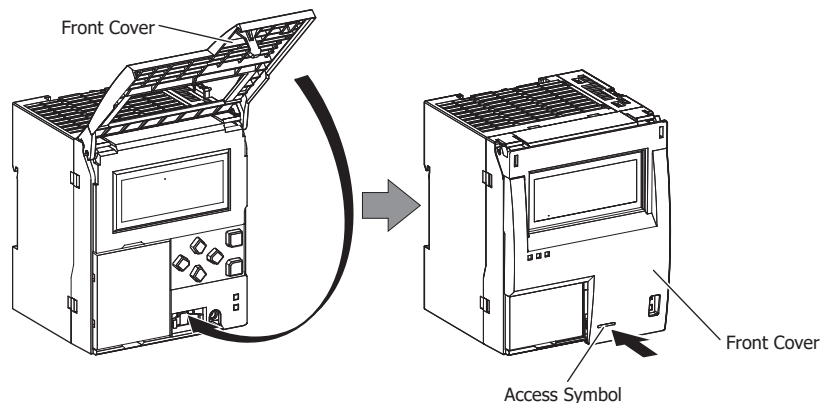


### Closing the Front Cover


**Caution**

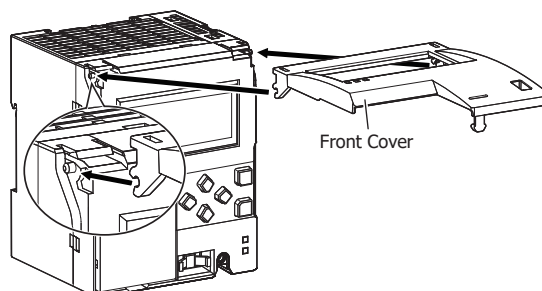
Always lock the front cover with the following procedure.

1. Close the front cover.
2. Push the access symbol until it clicks to lock the front cover.


**Caution**

Applying too much force to the front cover may cause it to fall off.

If this happens, make the front cover vertical with the HMI module as shown in the following figure, and then slowly push on the part indicated by the arrow.



## Mounting on DIN Rail



### Caution

- Install the FC6A modules according to instructions described in this manual. Improper installation will result in falling, failure, or malfunction of the FC6A.
- Do not install the FC6A when it is powered up. Doing so may result in electric shock and may damage the product.

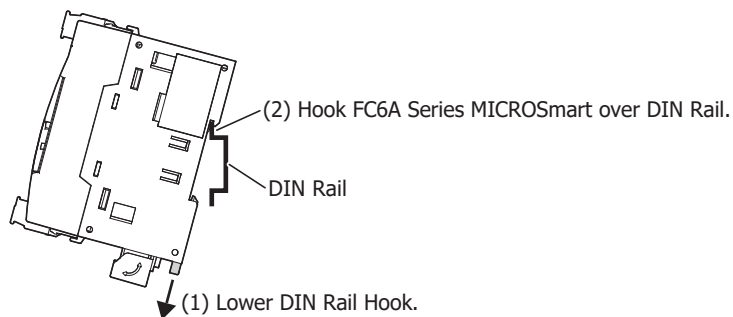
This section describes how to mount the FC6A.

The FC6A can be mounted on a DIN rail or directly to a panel inside a cabinet.

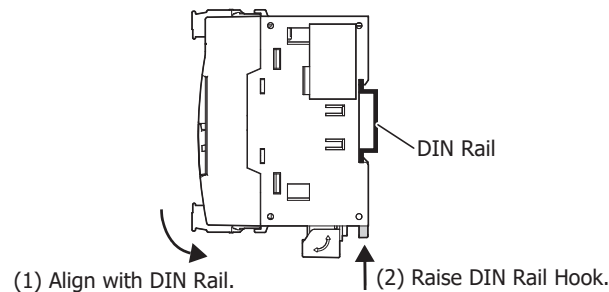
## DIN Rail Mounting and Removal

The following procedure describes how to mount and remove the FC6A to and from a DIN rail.

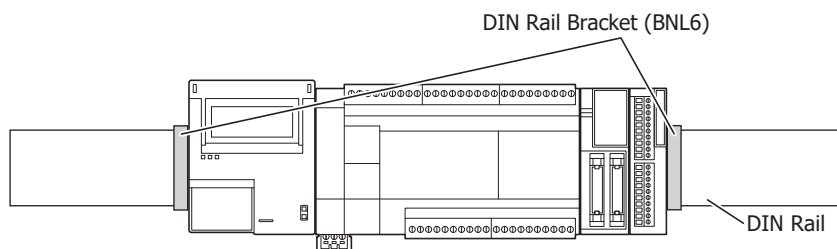
1. Firmly fasten the DIN rail to a panel using screws.
2. Using a flat head screwdriver, lower the DIN rail hook (1) and hang the FC6A on the DIN rail (2).



3. Align the FC6A with the DIN rail (1) and raise the DIN rail hook (2).



4. Secure both ends of the FC6A using the DIN rail brackets.

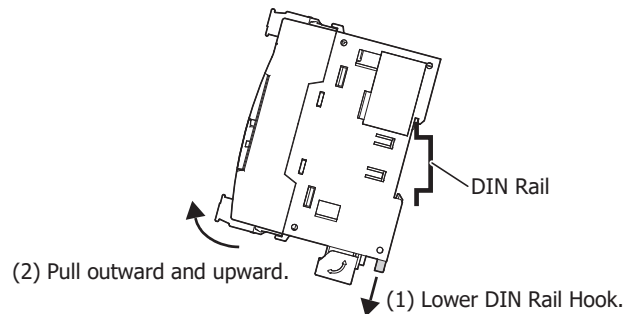


### Notes:

- The FC6A supports 35 mm wide DIN rails.  
Supported rails: IDEC BAA1000 (Length: 1,000 mm)  
Rail bracket: BNL6
- The FC6A can also be mounted by hooking it onto the DIN rail when the DIN rail hook is raised and pushing it on until it clicks.

### Removing from DIN Rail

1. Lower the FC6A's DIN rail hook with a flathead screwdriver (1) and lift it up while pulling forward (2).



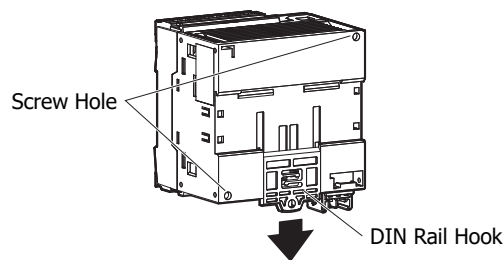
### Direct Mounting on Panel Surface

This section describes how to mount the FC6A directly onto a mounting plate for installation in a control panel. The direct mounting method differs according to the FC6A. To mount the FC6A directly, it may be necessary to make holes in the mounting plate depending on the FC6A model.

#### Direct Mounting Methods

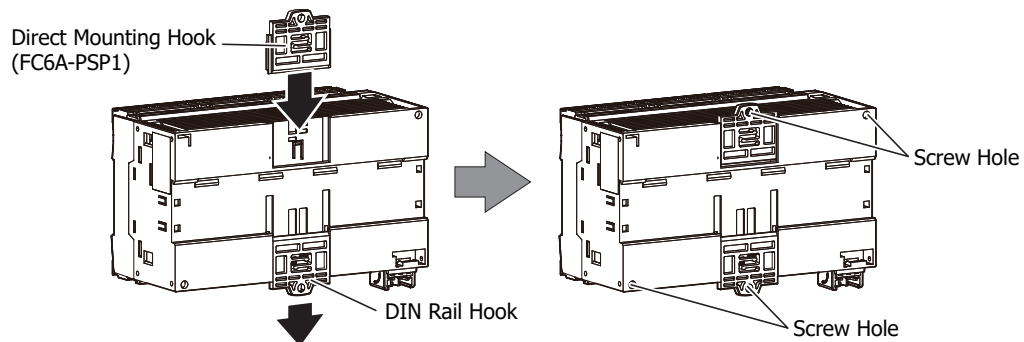
##### ■ 16- and 24-I/O types

Mount using the screw holes on the back of the module.



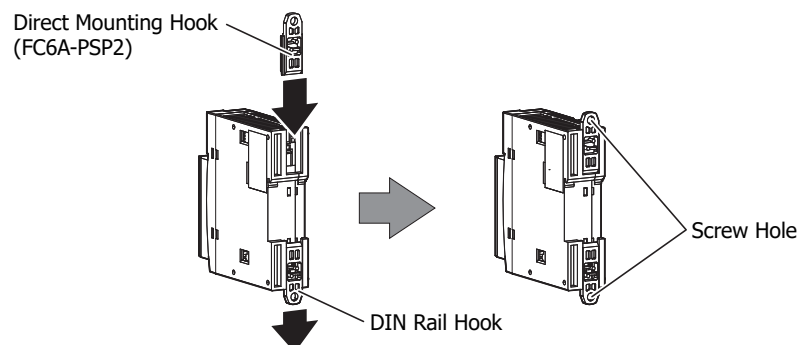
##### ■ 40-I/O type and the HMI module

Pull out the DIN rail hook on the back of the module, attach the direct mounting hook (maintenance part: FC6A-PSP1), and then mount the module to the mounting plate using the screw holes.



##### ■ Expansion and expansion interface modules

Pull out the DIN rail hook on the back of the module, attach the direct mounting hook (maintenance part: FC6A-PSP2), and then mount the module to the mounting plate using the screw holes.



#### Mounting Hole Layout for Direct Mounting on Panel Surface

As shown in the following diagram, mount the FC6A to the mounting plate with M4 pan head screws.

Always give sufficient consideration to operability, ease-of-maintenance, and environmental resistance when deciding on the mounting position.



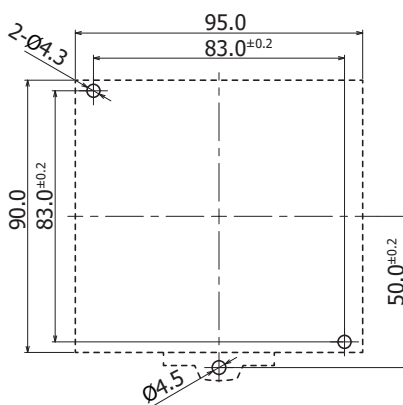
**Caution** When directly mounting the FC6A, tighten mounting screws with torque of 1 N·m (kgf·cm).

#### ■ CPU Modules

- **16-I/O type:** Screw fastened type: FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C16K1CE, FC6A-C16P1CE, FC6A-C16R1DE, FC6A-C16K1DE, FC6A-D16P1DE

Push-in type:

FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-D16P4DE

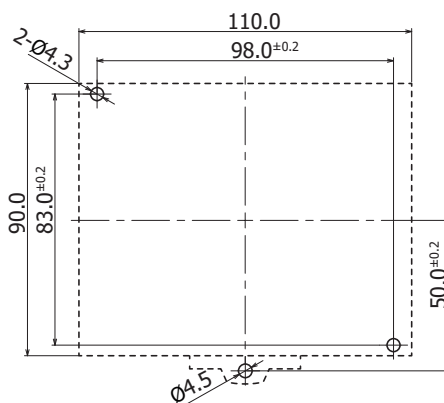


All dimensions in mm.

- **24-I/O type:** Screw fastened type: FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C24K1CE, FC6A-C24P1CE

Push-in type:

FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE

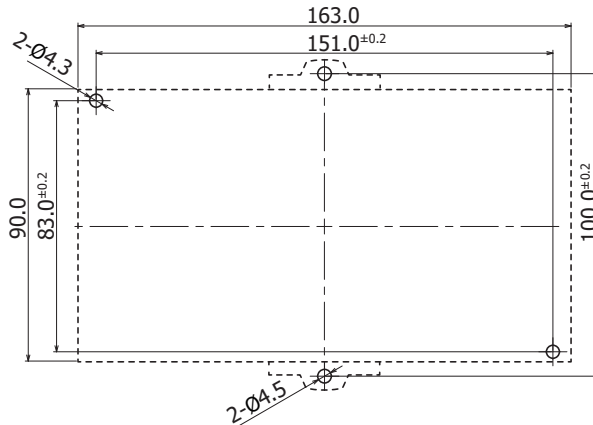


All dimensions in mm.

- 40-I/O type: Screw fastened type: FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40K1CE, FC6A-C40P1CE, FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE, FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ

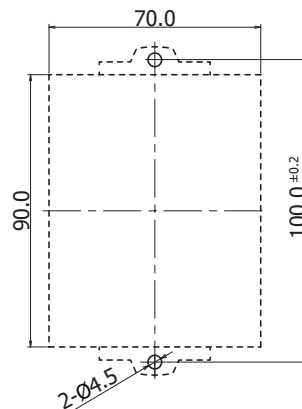
Push-in type:

FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE, FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ



All dimensions in mm.

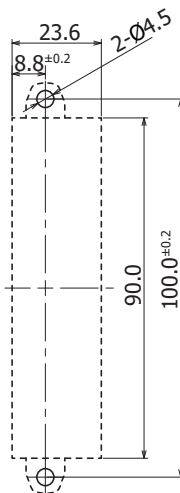
- Plus CPU module: FC6A-D16R1CEE, FC6A-D16R4CEE, FC6A-D16K1CEE, FC6A-D16K4CEE, FC6A-D16P1CEE, FC6A-D16P4CEE, FC6A-D32K3CEE, FC6A-D32K4CEE, FC6A-D32P3CEE, FC6A-D32P4CEE



All dimensions in mm.

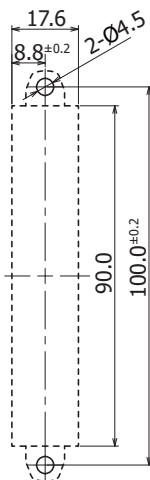
#### ■ Expansion Modules, Expansion Interface Modules, HMI Module, and Cartridge Base Module

|   |                      |   |
|---|----------------------|---|
| Digital input modules:                    | Screw fastened type: | FC6A-N08B1, FC6A-N16B1, FC6A-N08A11   |
|   | Push-in type:        | FC6A-N08B4, FC6A-N16B4, FC6A-N08A14   |
| Digital output modules:                   | Screw fastened type: | FC6A-R081, FC6A-R161, FC6A-T08K1, FC6A-T16K1, FC6A-T08P1, FC6A-T16P1  |
|   | Push-in type:        | FC6A-R084, FC6A-R164, FC6A-T08K4, FC6A-T16K4, FC6A-T08P4, FC6A-T16P4  |
| Digital mixed I/O modules:                | Screw fastened type: | FC6A-M08BR1   |
|   | Push-in type:        | FC6A-M08BR4   |
| Analog I/O modules:                       | Screw fastened type: | FC6A-J2C1, FC6A-J4A1, FC6A-J8A1, FC6A-K2A1, FC6A-K4A1, FC6A-J4CN1, FC6A-J4CH1Y, FC6A-J8CU1, FC6A-K2A1, FC6A-K4A1, FC6A-L03CN1, FC6A-L06A1 |
|   | Push-in type:        | FC6A-J2C4, FC6A-J4A4, FC6A-J8A4, FC6A-K2A4, FC6A-K4A4, FC6A-J4CN4, FC6A-J4CH4Y, FC6A-J8CU4, FC6A-K2A4, FC6A-K4A4, FC6A-L03CN4, FC6A-L06A4 |
| Communication modules:                    | Screw fastened type: | FC6A-SIF52  |
|   | Push-in type:        | FC6A-SIF524   |
| Expansion interface remote master module: |                      | FC6A-EXM1M  |



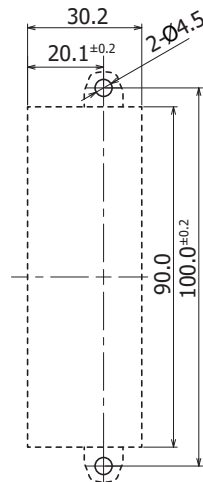
All dimensions in mm.

Digital input modules: FC6A-N16B3  
 Digital output modules: FC6A-T16K3, FC6A-T16P3



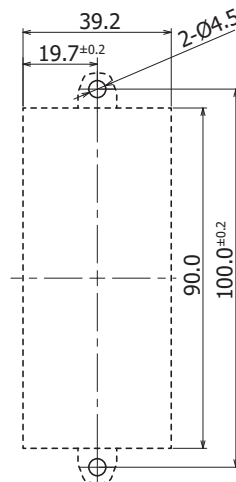
All dimensions in mm.

**Digital input modules:** FC6A-N32B3  
**Digital output modules:** FC6A-T32K3, FC6A-T32P3



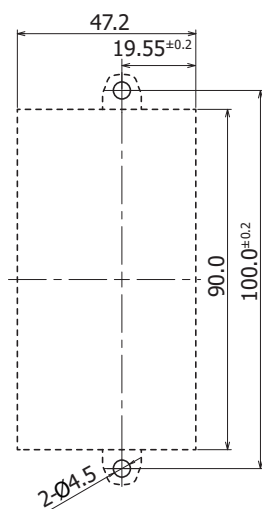
All dimensions in mm.

**Digital mixed I/O modules:** Screw fastened type: FC6A-M24BR1  
Push-in type: FC6A-M24BR4  
**PID modules:** Screw fastened type: FC6A-F2M1, FC6A-F2MR1  
Push-in type: FC6A-F2M4, FC6A-F2MR4  
**Expansion interface module (expander):** Screw fastened type: FC6A-EXM2  
Push-in type: FC6A-EXM24



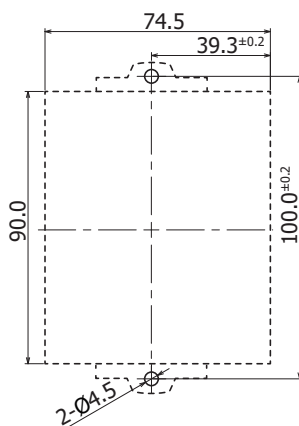
All dimensions in mm.

#### Expansion interface remote slave module: FC6A-EXM1S, FC6A-EXM1S4



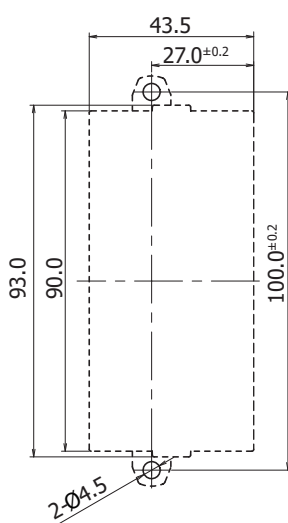
All dimensions in mm.

#### HMI module: FC6A-PH1



All dimensions in mm.

#### Cartridge base module: FC6A-HPH1

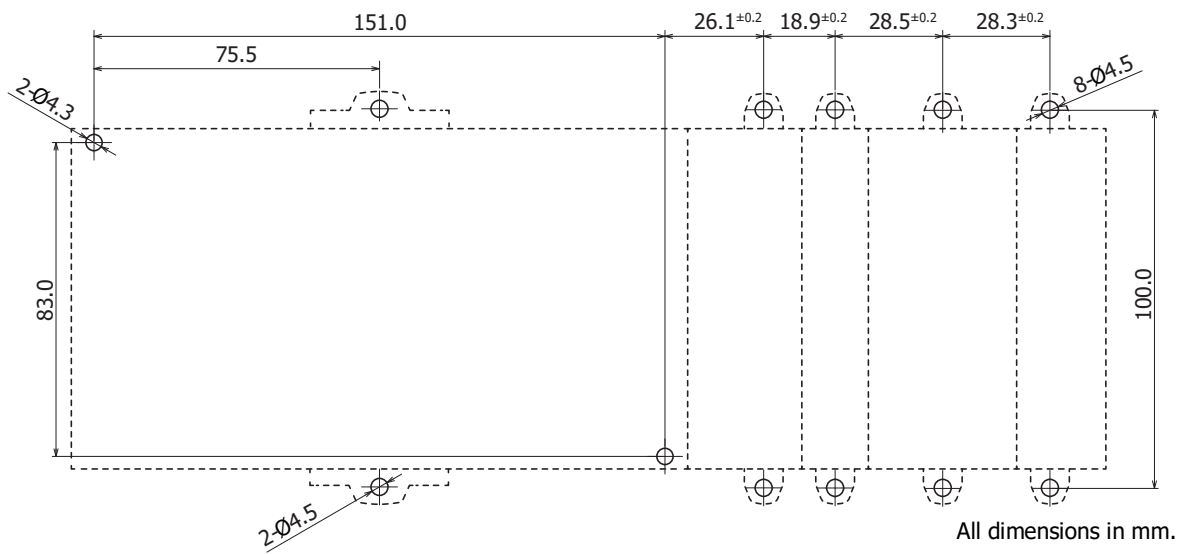


All dimensions in mm.



- **Example:**

**Mounting hole layout for FC6A-C40R1AE, FC6A-N32B3, FC6A-T16K3, FC6A-F2MR1, and C6A-L06A1**



Input/Output Wiring

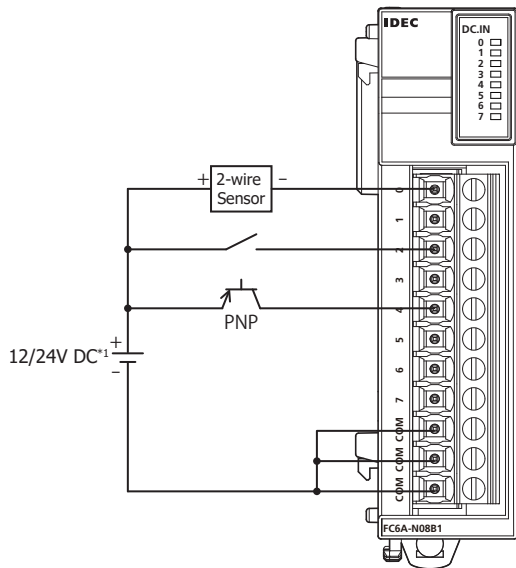
This section describes FC6A input/output device wiring.

Precautions for I/O Device Wiring

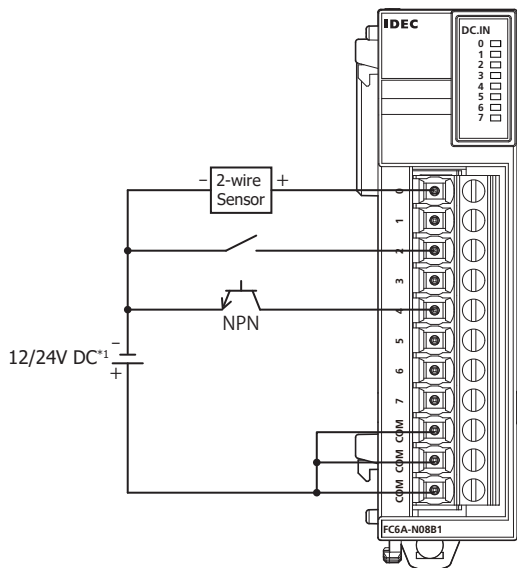
Input Terminal Wiring

When wiring input devices, separate wiring from power, output, and motor lines.  
For the wires to use with the CPU modules, expansion modules, and cartridges, see "Recommended Ferrule List" on page 3-46.

DC Sink Input Wiring Example



DC Source Input Wiring Example



\*1 24V DC for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

Output Terminal Wiring



Caution

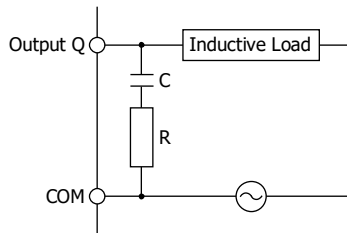
- If output relays or transistors in the FC6A or output modules should fail, outputs may remain on or off. For output signals which may cause heavy accidents, provide a monitor circuit outside the FC6A.
- Connect a fuse to the output module, selecting a fuse appropriate for the load.
- When equipment containing the FC6A is intended for use in European countries, insert an IEC 60127-approved fuse to each output of every module for protection against overload or short-circuit. This is required when equipment containing the FC6A is destined for Europe.
- When driving an inductive load that emits noise like a magnet or a valve, to reduce noise and protect circuits, use a diode for the output on DC power type models and a surge absorber for the output on AC power type models.
- For the wires to use with the CPU modules, expansion modules, and cartridges, see "Recommended Ferrule List" on page 3-46.

### Output Protection Circuit

When a motor, solenoid, or similar inductive load is connected, the life of the contact is shortened due to the inrush current and counter-electromotive force acting on the load. In order to prevent this, set up an output protection circuit outside the FC6A. Choose a protection circuit from (1) through (4) shown below, according to the power supply, and connect the protection circuit to the outside of the FC6A.

For protection of the transistor output of the FC6A modules, connect protection circuit (3) shown below to the transistor output circuit.

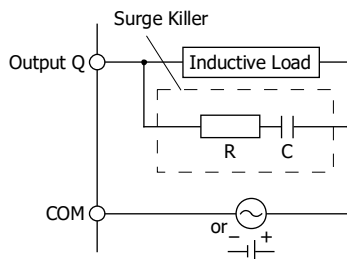
#### Protection Circuit (1)



This protection circuit can be used when the load impedance is smaller than the RC impedance in an AC load power circuit.

R: Resistor of approximately the same resistance value as the load  
C: 0.1 to 1  $\mu\text{F}$

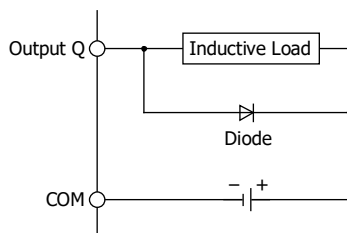
#### Protection Circuit (2)



This protection circuit can be used for both AC and DC load power circuits.

R: Resistor of approximately the same resistance value as the load  
C: 0.1 to 1  $\mu\text{F}$

#### Protection Circuit (3)

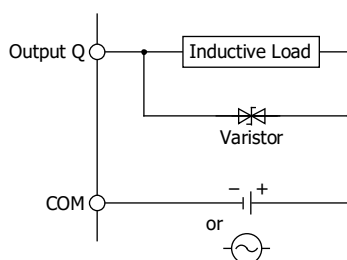


This protection circuit can be used for DC load power circuits.

Use a diode with the following ratings.

Reverse withstand voltage: Power voltage of the load circuit  $\times 10$   
Forward current: More than the load current

#### Protection Circuit (4)



This protection circuit can be used for both AC and DC load power circuits.

## Power Supply and Power Supply Wiring

### Power Supply

This section describes how to connect a power supply to the FC6A.

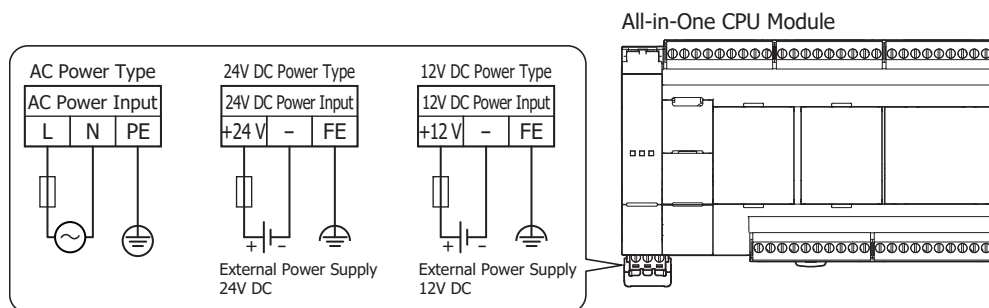


#### Caution

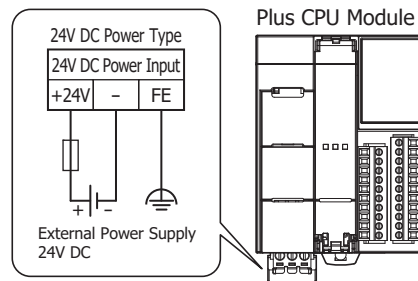
- Use a power supply of the rated value. Use of the wrong power supply may cause fire or malfunction.
- Ensure that the power voltage to the FC6A does not exceed the allowable power voltage range described in the power supply specifications. The FC6A may run and stop repeatedly within this voltage range, particularly if the power voltage turns on or off very slowly.
- Use an IEC 60127-approved fuse on the power line outside the FC6A. This is required when equipment containing the FC6A is destined for Europe.

### CPU Module

There are three power supply specifications for the All-in-One CPU module: the AC power type, the 24V DC power type, and the 12V DC power supply type.



The power supply specification of the Plus CPU module is the 24V DC power type only.



#### ■ Power Supply Voltage

- The power supply voltages that can be used with the All-in-One CPU module are as follows.  
AC power type: 85 to 264V AC  
24V DC power type: 20.4 to 28.8V DC  
12V DC power type: 10.2 to 18.0V DC
- The power supply voltage that can be used with the Plus CPU module is as follows.  
24V DC power type: 20.4 to 28.8V DC



#### Warning

Do not use the FC6A outside of the power supply voltages listed above.  
When an external device that carries the risk of causing a serious accident is connected to the inputs and outputs of the FC6A, implement measures in the external circuit (such as voltage monitoring) so that the device will function safely when there is a failure.

- The power failure detection voltage varies depending on the usage conditions of the inputs and outputs, but a power failure is normally detected when the power supply voltage is the following values.  
AC power type: Less than 85V AC  
24V DC power type: Less than 20.4V DC  
12V DC power type: Less than 10.2V DC
- For all power supply types, a momentary power interruption of 10 ms or less is not recognized as a power failure when the power voltage is at the rated voltage.

#### ■ Inrush Current at Powerup

The following inrush current flows through the FC6A when powered up. Use a power supply with sufficient capacity.

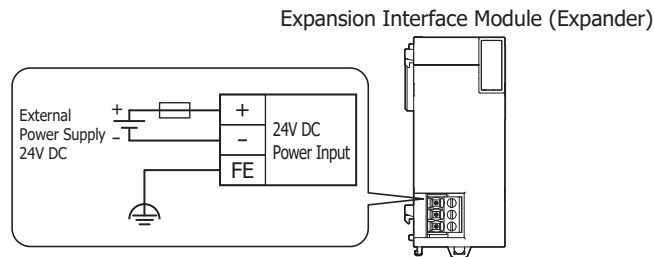
AC power type: 40 A or lower

24V DC power type: 35 A or lower

12V DC power type: 35 A or lower

#### Expansion interface module

The power supply specification of the expansion interface module (expander) and expansion interface remote slave module is the 24V DC power type.



#### ■ Power Supply Voltage

- The power supply voltage that can be used with the expansion interface module (expander) and expansion interface remote slave module is 20.4 to 28.8V DC.



#### Warning

Do not use the FC6A outside of the power supply voltages listed above.

When using the expansion interface module and an external device that carries the risk of causing a serious accident has been connected, implement measures in the external circuit (such as voltage monitoring) so that the device will function safely when there is a failure.

- The power failure detection voltage varies depending on the usage conditions of the inputs and outputs, but a power failure is normally detected when the power supply voltage is less than 20.4V DC.
- A momentary power interruption of 10 ms or less is not recognized as a power failure when the power voltage is at the rated voltage.

#### ■ Inrush Current at Powerup

An inrush current of 35 A or lower flows through the expansion interface module (expander) and expansion interface remote slave module when powered on. Use a power supply with sufficient capacity.



#### Caution

When using the CPU module, expansion interface module (expander), and expansion interface remote slave module with separate power supplies, turn the power on and off in the following order.

Power-up: Expansion interface module (expander) -> Expansion interface remote slave module (Downstream -> Upstream) -> CPU module

Power-down: CPU module -> Expansion interface remote slave module (Upstream -> Downstream) -> Expansion interface module (expander)

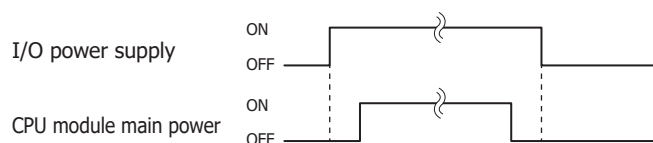
If the power supply is not shut off with the above sequence, the I/O for all expansion modules will not be updated.

#### About the sequence to turn on and off the I/O power supply

When automatically running and stopping the FC6A in conjunction with turning the power supply to the FC6A on and off, use the following sequence to turn on and off the I/O power supply and CPU module main power supply. If the sequence is wrong, inputs and outputs may be mistakenly activated.

Power on: I/O power supply → CPU module main power

Power off: CPU module main power → I/O power supply



#### Power Supply Wiring

- Make the power line as short as possible. For details, see "Recommended Ferrule List" on page 3-46.
- Run the power line as far away as possible from motor lines.

#### Note:

Review the following items when there is a risk of malfunction due to electric shock and noise.

- Ground the PE and FE terminals with D-type ground (type 3: ground resistance of 100  $\Omega$  or lower).
- Do not use a shared ground wire for the FC6A and motor equipment.
- For ground wire details, see "Recommended Ferrule List" on page 3-46.

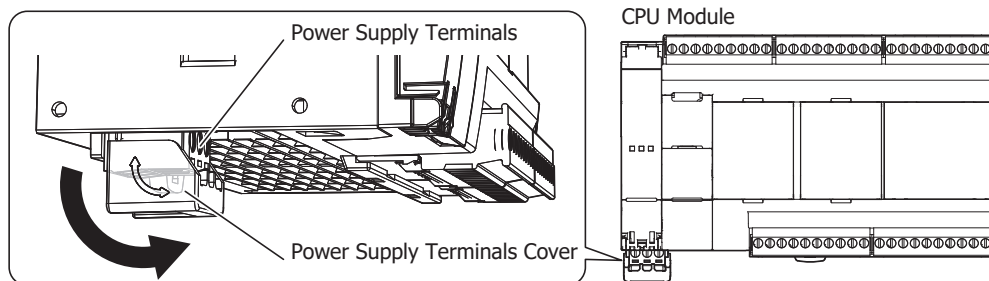
#### Power Supply Terminal Wiring Method

When wiring the power supply to the CPU module, the power supply terminals are removed from the CPU module, wired, and then once again attached to the CPU module.

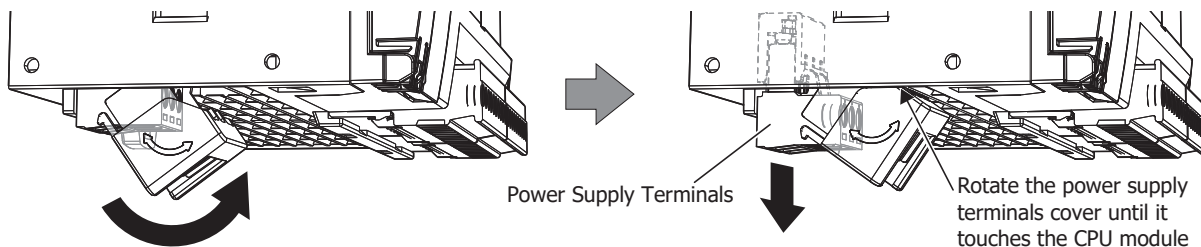
The following procedure describes how to remove and attach the power supply terminals.

#### ■ Removing the Power Supply Terminals

1. Slowly rotate the power supply terminals cover in the direction of the arrow.



2. Rotate the power supply terminals cover until it touches the CPU module to unlock it, and then remove the power supply terminals.

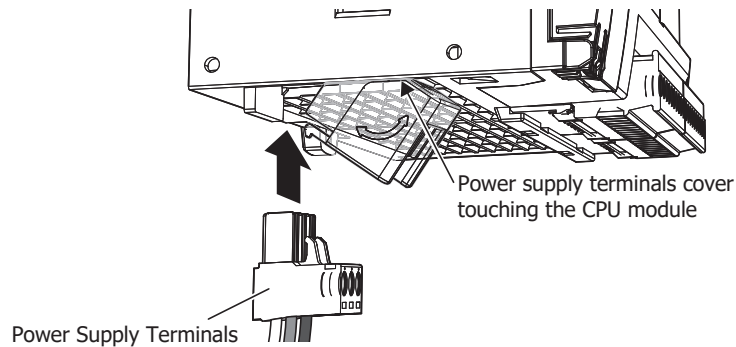


#### Notes:

- Rotate the power supply terminals cover in the direction of the arrow printed on the side.
- The power supply terminals move together with the power supply terminals cover when it is rotated.
- The following push-in types of CPU modules do not have the power supply terminals cover.
  - All-in-One CPU module:  
FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE, FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE, FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE
  - CAN J1939 All-in-One CPU module:  
FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ
  - Plus CPU module:  
FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE, FC6A-D32K4CEE, FC6A-D32P4CEE

### ■ Attaching the Power Supply Terminals

1. With the power supply terminals cover touching the CPU module, slowly push the power supply terminals with the attached power line straight into their original position.

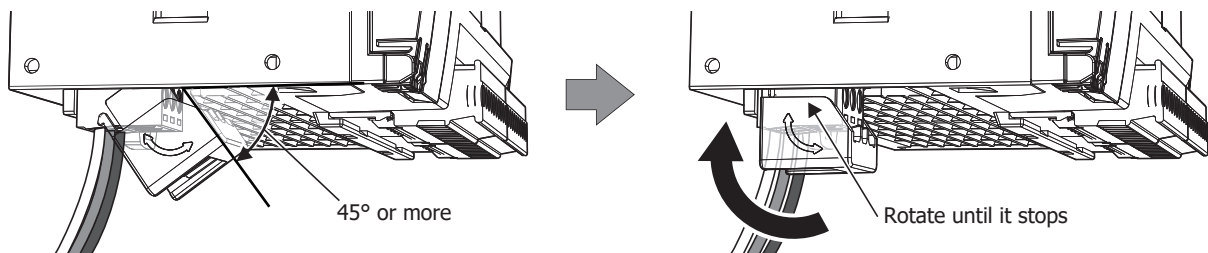


#### Caution

Push the power supply terminals straight in relation to the CPU module. If you push them in at an angle, there is a risk of damage or poor contact.

2. When the power supply terminals cover is rotated 45° or more from the CPU module, slowly rotate it in the direction of the arrow until it stops.

The power supply terminals cover and the power supply terminal block are locked.



#### Notes:

- Rotate the power supply terminals cover in the direction of the arrow printed on the side.
- The power supply terminals move together with the power supply terminals cover when it is rotated.
- The following push-in types of CPU modules do not have the power supply terminals cover.
  - All-in-One CPU module:  
FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, FC6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE, FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24K4CE, FC6A-C24P4CE, FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40K4CE, FC6A-C40P4CE, FC6A-C40R4DE, FC6A-C40K4DE, FC6A-C40P4DE
  - CAN J1939 All-in-One CPU module:  
FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40K4CEJ, FC6A-C40P4CEJ, FC6A-C40R4DEJ, FC6A-C40K4DEJ, FC6A-C40P4DEJ
  - Plus CPU module:  
FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE, FC6A-D32K4CEE, FC6A-D32P4CEE



#### Caution

Push the power supply terminals straight in relation to the CPU module. If you push them in at an angle, there is a risk of damage or poor contact.

## Using the Ports

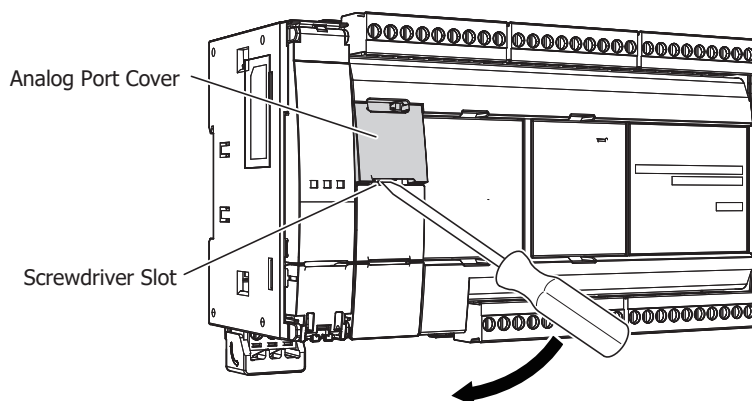
This section describes how to use the analog input and analog potentiometer, serial port 1, Ethernet port 1, and the USB port.

### Removing and Attaching the Analog Port Cover

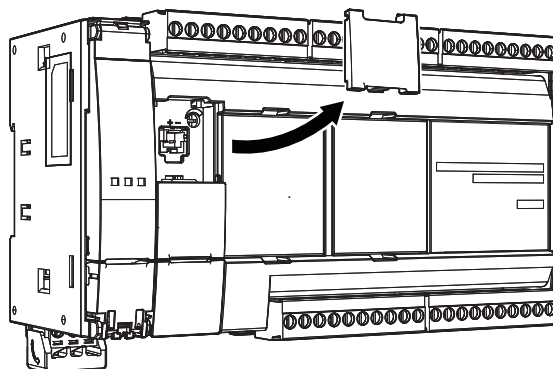
The following procedure describes how to remove and attach the analog port cover.

#### Removing the Analog Port Cover

1. Insert a flathead screwdriver into the screwdriver slot on the analog port cover and slowly move the screwdriver in the direction of the arrow to unlock the bottom lock.



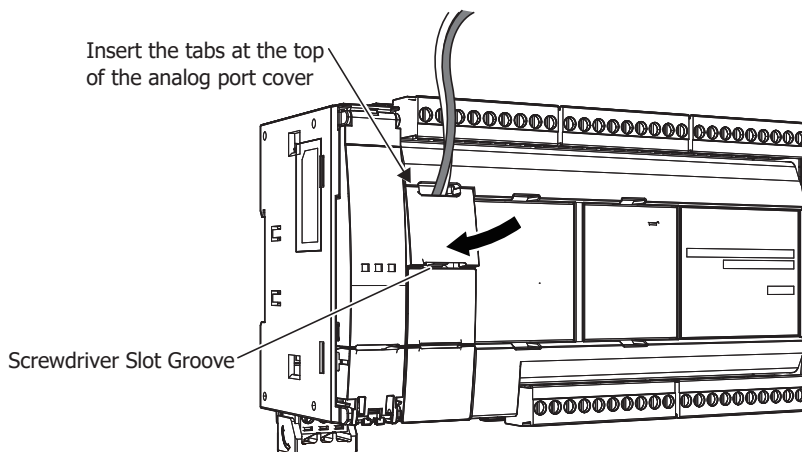
2. Lift up the analog port cover in the direction of the arrow to remove it.



#### Attaching the Analog Port Cover

Attach the analog port cover after wiring the port.

1. Insert the tabs at the top of the analog port cover into the analog port cover slots, then push the bottom of the analog port cover in the direction of the arrow to attach it.



**Note:** Take care with the orientation of the analog port cover. The groove to insert the screwdriver goes on the bottom.

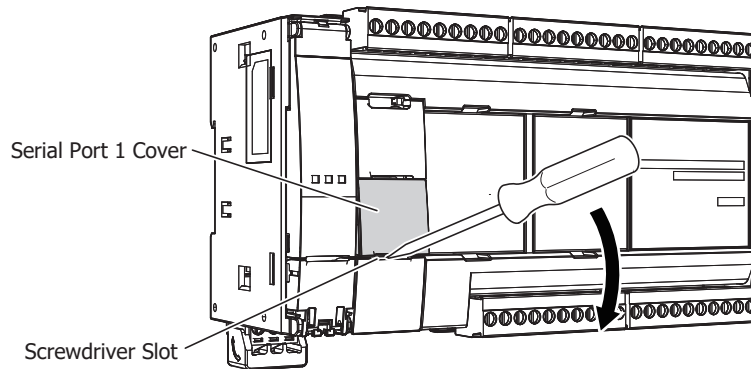


### Removing and Attaching the Serial Port 1 Cover

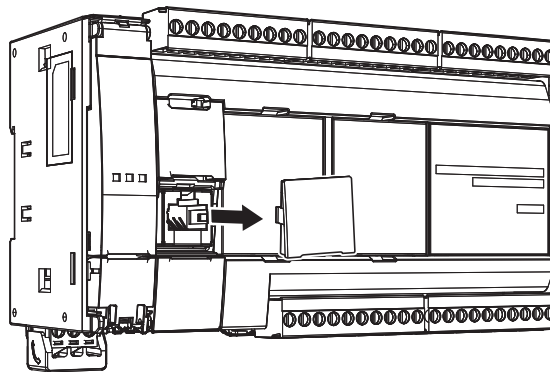
The following procedure describes how to remove and attach the serial port 1 cover.

#### Removing the Serial Port 1 Cover

1. Insert a flathead screwdriver into the screwdriver slot on the serial port 1 cover and slowly move the screwdriver in the direction of the arrow to unlock the bottom lock.



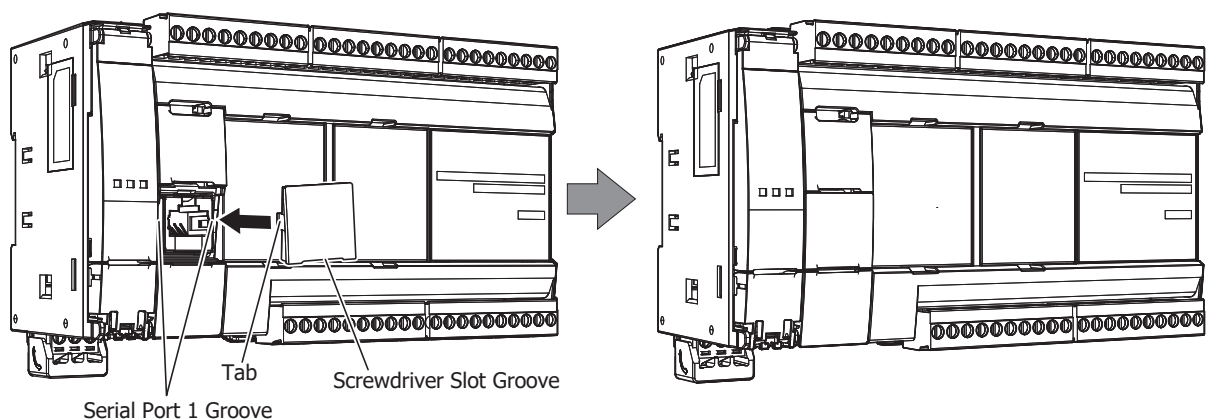
2. Lift the serial port 1 cover straight up in the direction of the arrow to remove it.



#### Attaching the Serial Port 1 Cover

When not using serial port 1, attach the serial port 1 cover.

1. Insert the serial port 1 cover tabs into the grooves on the left and right sides of serial port 1 and push the cover straight in to attach it.



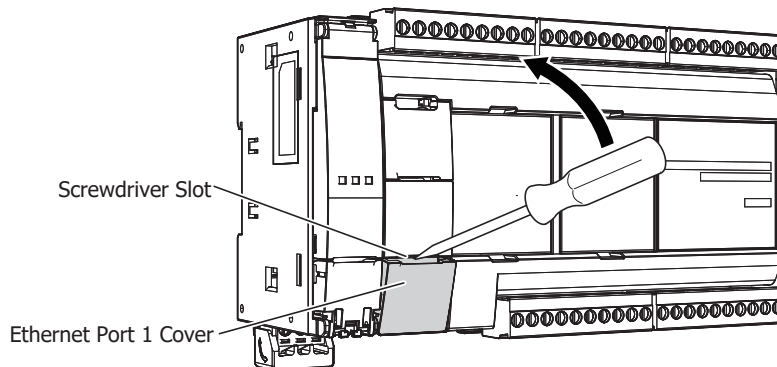
**Note:** Take care with the orientation of the serial port 1 cover. The groove to insert the screwdriver goes on the bottom.

#### Removing and Attaching the Ethernet Port 1 Cover

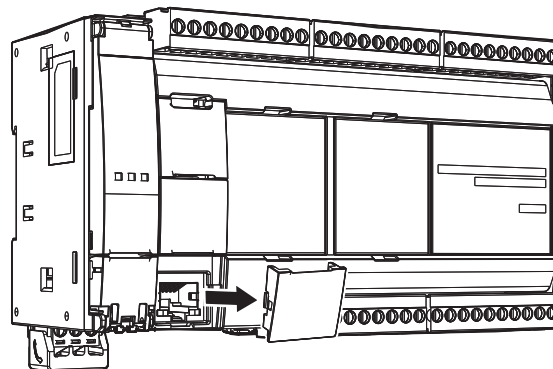
The following procedure describes how to remove and attach the Ethernet port 1 cover. The procedure is the same for Ethernet port 1 cover and Ethernet port 2 cover on the Plus CPU module.

##### Removing the Ethernet Port 1 Cover

1. Insert a flathead screwdriver into the screwdriver slot on the Ethernet port 1 cover and slowly move the screwdriver in the direction of the arrow to unlock the top lock.



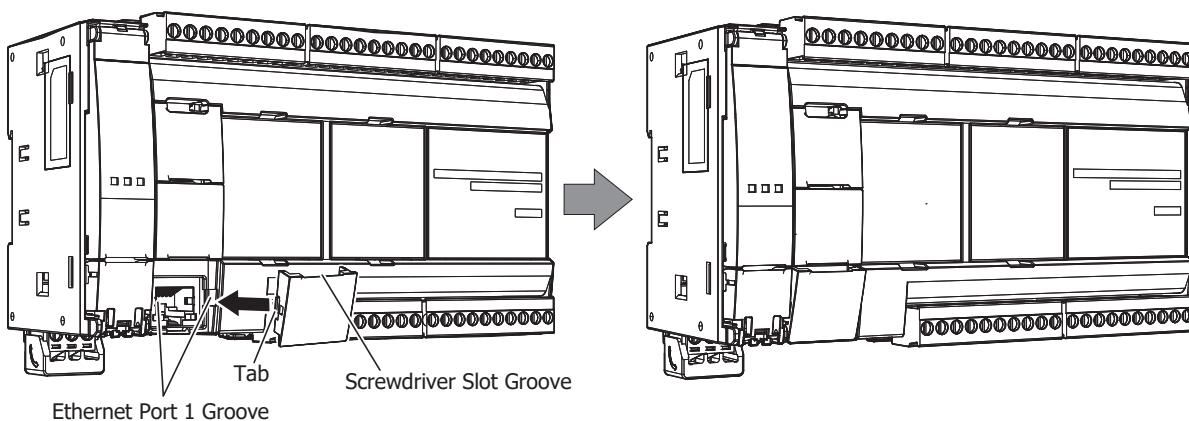
2. Lift the Ethernet port 1 cover straight up in the direction of the arrow to remove it.



##### Attaching the Ethernet Port 1 Cover

When not using Ethernet port 1, attach the Ethernet port 1 cover.

1. Insert the Ethernet port 1 cover tabs into the grooves on the left and right sides of Ethernet port 1 and push the cover straight in to attach it.



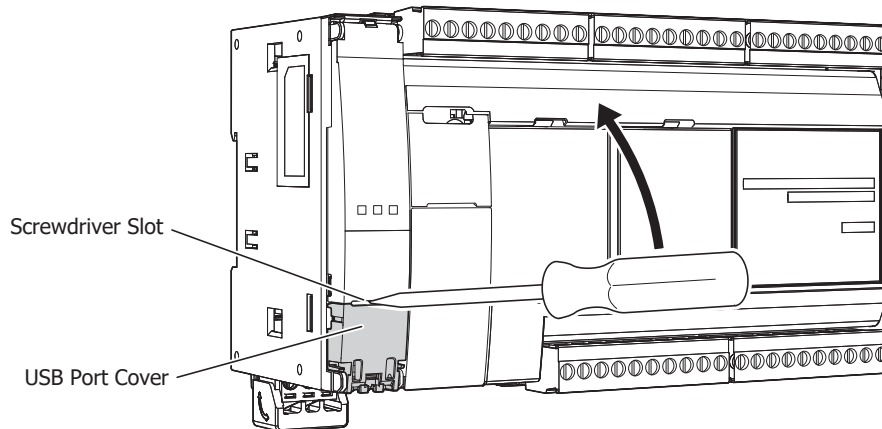
**Note:** Take care with the orientation of the Ethernet port 1 cover. The groove to insert the screwdriver goes on the bottom.

### Opening and Closing the USB Port Cover

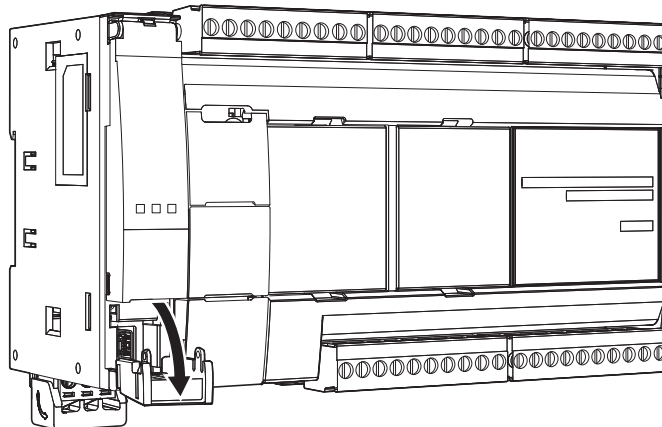
The following procedure describes how to open and close the USB port cover.

#### Opening the USB Port Cover

1. Insert a flathead screwdriver into the screwdriver slot on the USB port cover and slowly move the screwdriver in the direction of the arrow to unlock the top lock.



2. Open the USB port cover in the direction of the arrow.



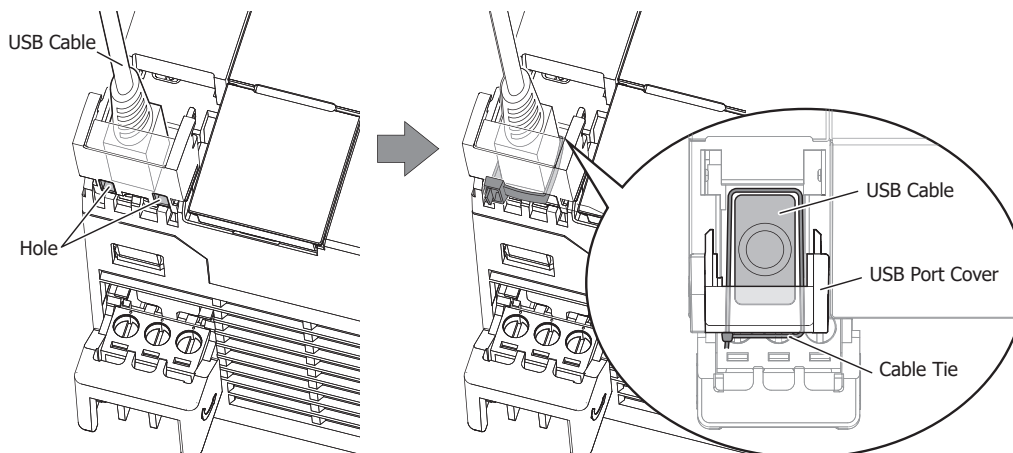
**Note:** To remove the USB cover, first open the cover in step 2, and then apply force in that same direction to remove the cover.

To communicate with a computer, use the USB cable (model: HG9Z-XCM42).

If you use the USB extension cable (model: HG9Z-XCE21), you can perform maintenance on an FC6A installed in a control panel from the face of the control panel. We recommend securing the USB extension cable to the USB port cover with a cable tie (HellermannTyton cable tie: T18R) so that the USB extension cable is not disconnected from the FC6A.

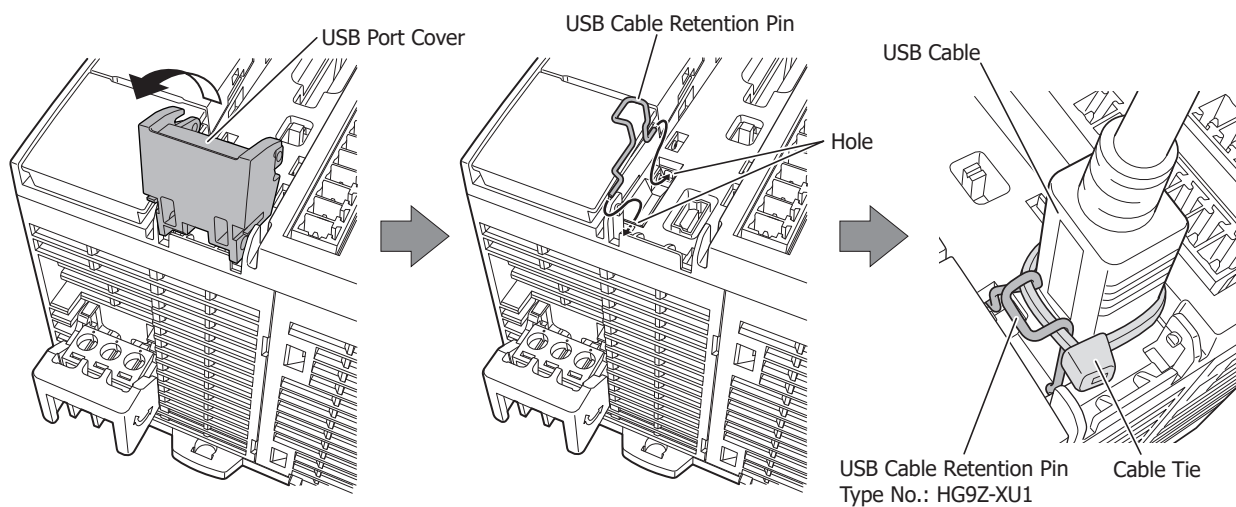
#### All-in-One CPU module/CAN J1939 All-in-One CPU module

- (1) Open the USB port cover and plug the USB cable into the USB port.
- (2) Lock the USB port cover and USB cable with a cable tie.



#### Plus CPU module

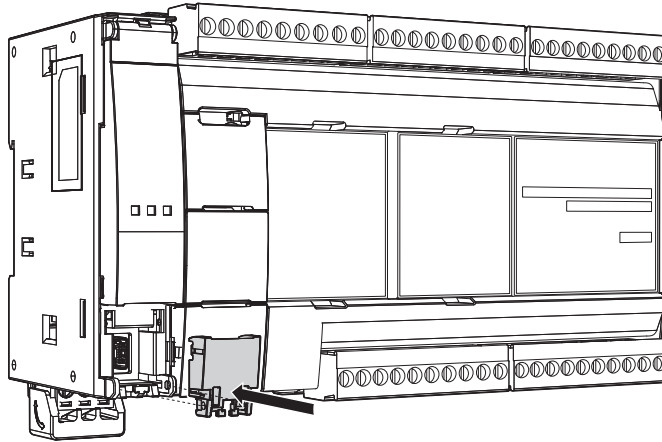
- (1) Open the SD memory card cover and remove the USB port cover.  
Carefully store the removed USB port cover in a safe location.
- (2) Insert the USB cable retention pin into the top hole, and then insert it into the bottom hole.
- (3) Plug the USB cable into the USB port, and then lock the USB cable to the USB cable retention pin with a cable tie.



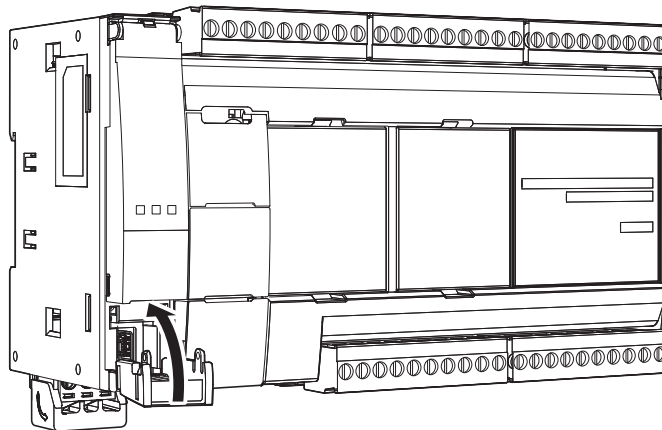
**Caution**

Applying too much force to the USB port cover may cause it to fall off.

If this happens, make the USB port cover parallel with the CPU module as shown in the following figure, and then slowly push on the part indicated by the arrow.

**Closing the USB Port Cover**

1. Close the USB port cover and push it until it clicks.



#### Using an SD Memory Card

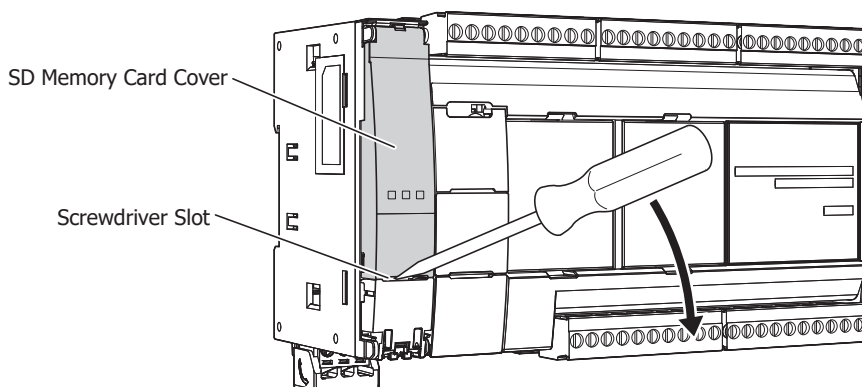
This section describes how to use an SD memory card.

##### Opening and Closing the SD Memory Card Cover

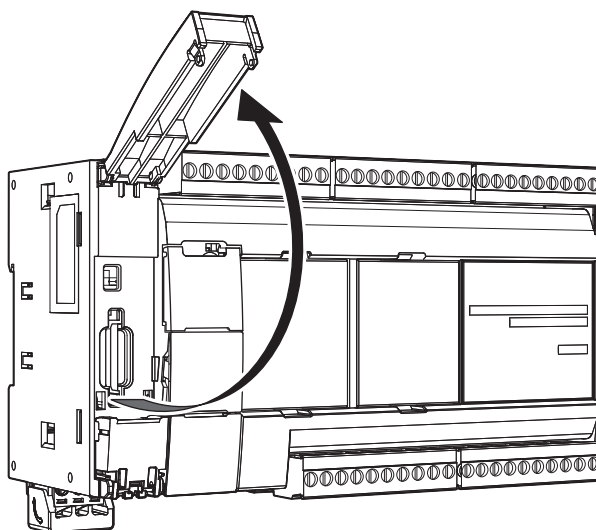
The following procedure describes how to open and close the SD memory card cover.

##### Opening the SD Memory Card Cover

1. Insert a flathead screwdriver into the screwdriver slot on the SD memory card cover and slowly move the screwdriver in the direction of the arrow to unlock the bottom lock.



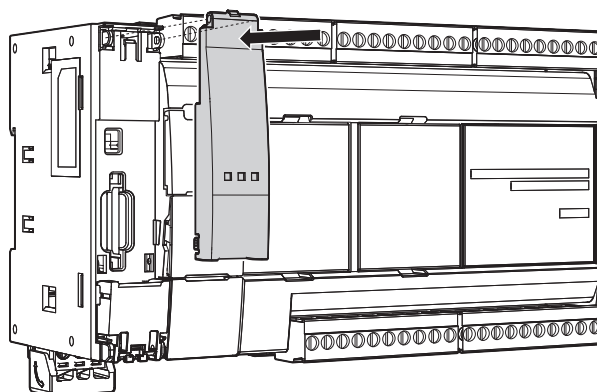
2. Open the SD memory card cover in the direction of the arrow.



#### Caution

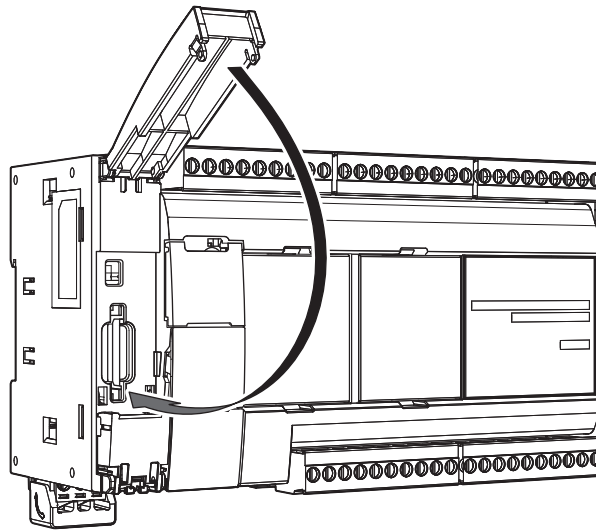
Applying too much force to the SD memory card cover may cause it to fall off.

If this happens, make the SD memory card cover parallel with the CPU module as shown in the following figure, and then slowly push on the part indicated by the arrow.



### Closing the SD Memory Card Cover

1. Close the SD memory card cover and push it until it clicks.



### Inserting and Removing the SD Memory Card

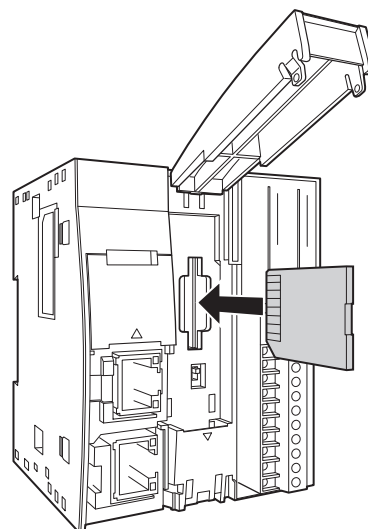
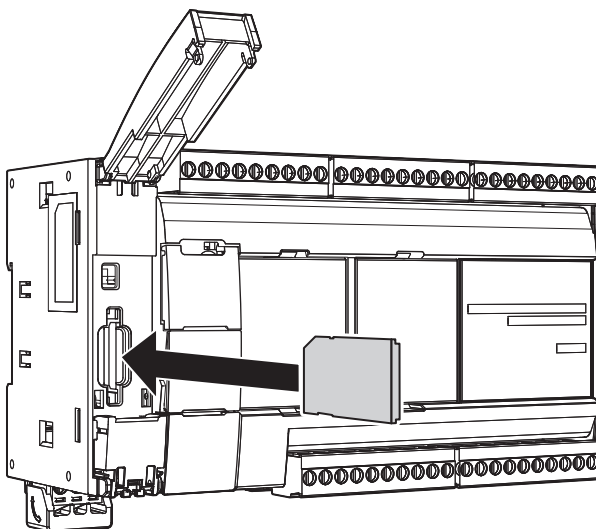
The following procedure describes how to insert and remove the SD memory card.

#### Inserting the SD Memory Card

1. Unlock and open the SD memory card cover.  
For details, see "Opening the SD Memory Card Cover" on page 3-30.
2. With the missing corner of the SD memory card facing the function switch side, push the SD memory card straight in until it clicks.

All-in-One CPU module  
CAN J1939 All-in-One CPU module

Plus CPU module



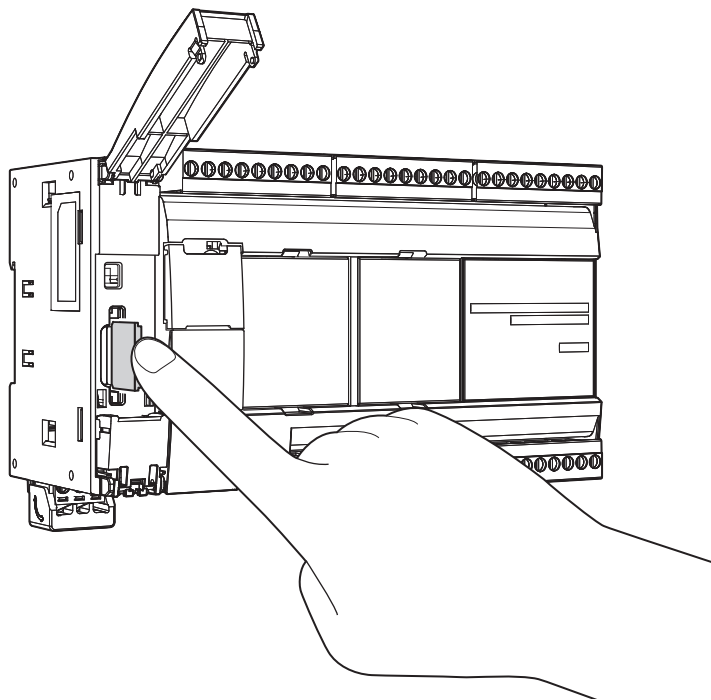
#### Notes:

- Use caution as the direction to insert the SD memory card depends on the model.
- Turn off the write protect switch on the SD memory card that will be inserted into the FC6A.

3. Close the SD memory card cover and push it until it clicks.  
For details, see "Closing the SD Memory Card Cover" on page 3-31.

#### Removing the SD Memory Card

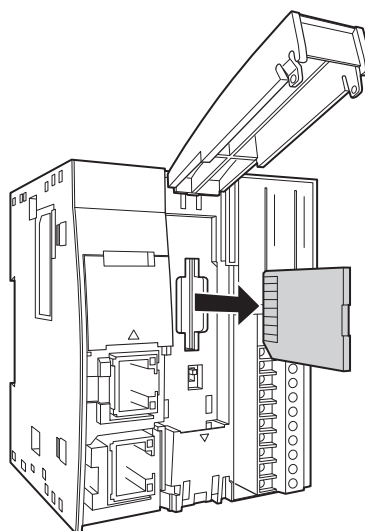
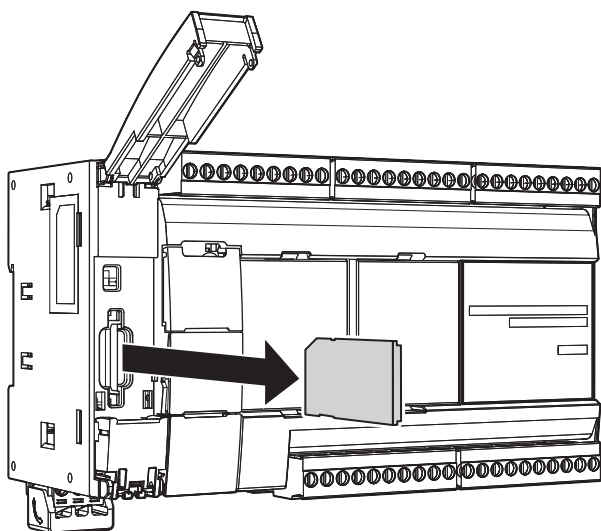
1. Unlock and open the SD memory card cover.  
For details, see "Opening the SD Memory Card Cover" on page 3-30.
2. Push the SD memory card inserted into the FC6A until it clicks to unlock it.



3. Slowly pull out the SD memory card.

All-in-One CPU module  
CAN J1939 All-in-One CPU module

Plus CPU module



4. Close the SD memory card cover and push it until it clicks.  
For details, see "Closing the SD Memory Card Cover" on page 3-31.



**Caution**

The data on the SD memory card may be corrupted by doing the following during access to the SD memory card.

- Turning the FC6A power OFF.
- Removing the SD memory card.

Do not turn OFF the FC6A power during access to the SD memory card (while the SD card status LED "SD" is flashing). First confirm that the SD card status LED "SD" is not flashing, then remove the SD memory card from FC6A. For details on the SD card status LED "SD", see "SD Memory Card" on page 11-1.

## Replacing the Backup Battery

This section explains how to replace the backup battery.

### Warning

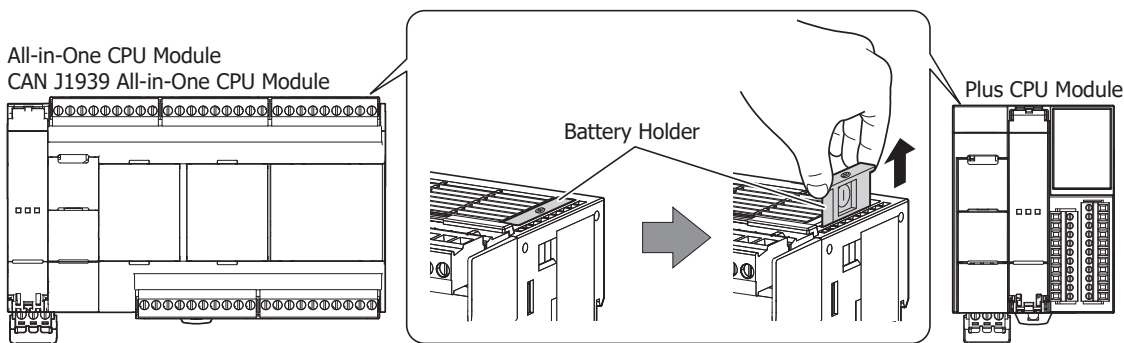
Performing the work to attach and replace the backup battery in the unpowered state is recommended to avoid electric shock by touching the product and wired parts with the body or tools and to avoid damage to the product and malfunction. The backup battery can also be attached and replaced while powered and while power is supplied from the USB bus. However, first discharge any static electricity built up in the body by touching grounded metal before performing the work. Use caution so that electric shock from touching the product and wired parts with the body or tools, damage to the product, and malfunction do not occur.

### Replacing the Backup Battery While Unpowered (Recommended)

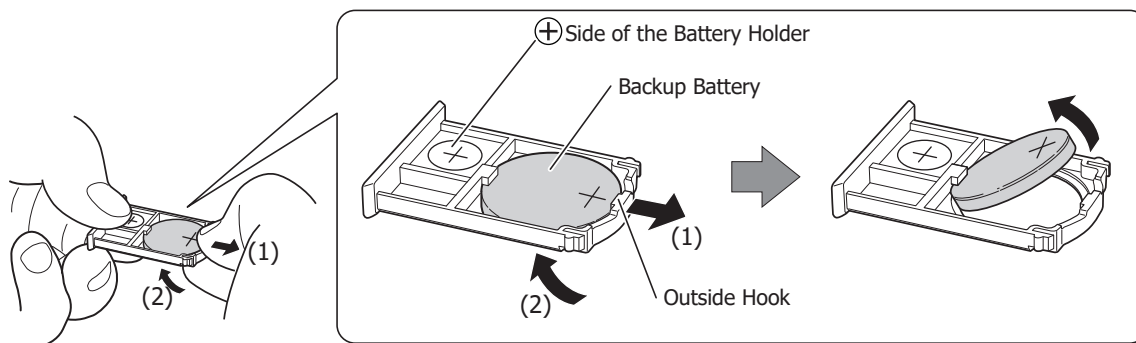
To replace the backup battery, first turn off the power, and then perform the following steps 1 to 4 within 1 minute.

(The position of the battery holder is located on the right side of the top of the All-in-One CPU module and CAN J1939 All-in-One CPU module, and it is located on the left side of the top of the Plus CPU module.)

1. Grip both ends of the battery holder, and then pull it out.  
The battery holder pulls out to a length of 36 mm.

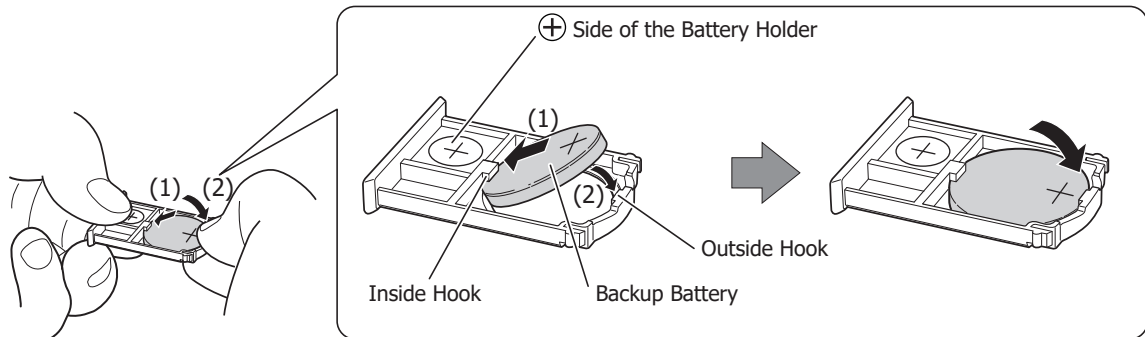


2. Remove the dead backup battery from the battery holder.  
Orient the battery holder with the ⊕ side facing up. While pulling on the outside hook (1), press the backup battery from below (2).



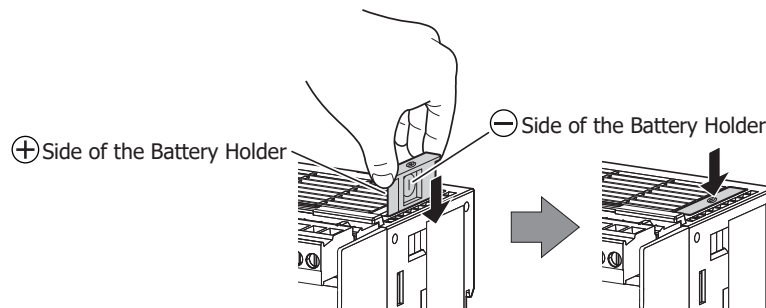
**3. Insert a new backup battery into the battery holder.**

Orient the battery holder with the ⊕ side facing up. Orient the new backup battery with the ⊕ side facing up. Press the backup battery into the inside hook of the battery holder (1), and then press down on the battery until you hear a click from the outside hook (2).



**Note:** Exercise caution regarding the orientation of the backup battery when you insert it.

**4. Insert the battery holder into its original position, and then press it firmly as far as it will go.**



**Note:** Exercise caution regarding the orientation of the battery holder when you insert it.

**5. After installing the battery, promptly turn on the power and confirm that the battery status LED [BAT] turns off (within one hour as a general rule).**



**Caution**

- To replace the backup battery while unpowered, complete the work within 1 minute after the power is turned off. If it takes a long time to replace the battery, the device values will be reset to the initial values.
- After the battery is installed, relatively large amount of current may flow in the battery until the CPU module is powered. For this reason, immediately turn on the power or the USB bus power after installing the battery (within about an hour).

**Replacing the Backup Battery While Power Is Supplied from the USB Bus**

The backup battery can be replaced by supplying power from the USB bus. Use the following procedure to replace the backup battery by supplying power from the USB bus.

1. Turn on the power to supply to the product.
2. Connect a USB cable. (Start supplying USB bus power.)

**Note:** To supply power from the USB bus, use a computer or a power bank compatible with USB 2.0.

3. Turn off the power supplied to the product.
4. Replace the backup battery by following steps 1 to 4 in the replacement procedure in "Replacing the Backup Battery While Unpowered (Recommended)" on page 3-34. There is no time limit.
5. Disconnect the USB cable.
6. Turn on the power to supply to the product, and confirm that the battery status LED [BAT] turns off.

#### Replacing the Backup Battery While Powered

The backup battery can be replaced while the product is powered without turning off the power.

Perform steps 1 to 4 in "Replacing the Backup Battery While Unpowered (Recommended)" on page 3-34 while the product is powered. There is no time limit on the replacement work.

#### **Warning**

- When the backup battery is attached and replaced while powered or while power is supplied from the USB bus, first discharge any static electricity built up in the body by touching grounded metal before performing the work. Use caution so that electric shock from touching the product and wired parts with the body or tools, damage to the product, and malfunction do not occur.
- Performing the work in the unpowered state is recommended to avoid electric shock by touching the product and wired parts with the body or tools and to avoid damage to the product and malfunction.

#### **Caution**

- If the battery dies, device values are reset to their initial values when the power is turned off. Replace the backup battery before it dies.

Recommended Backup Batteries

Panasonic: BR2032, CR2032A, CR2032B

Murata: CR2032X, CR2032W



This symbol mark means that batteries and accumulators, at their end-of life, should be disposed of separately from your household waste. If a chemical symbol is printed beneath the symbol shown above, this chemical symbol means that the battery or accumulator contains a heavy metal at a certain concentration. This will be indicated as follows:

Hg : Mercury (0.0005%)   Cd : Cadmium (0.002%)   Pb : Lead (0.004%)

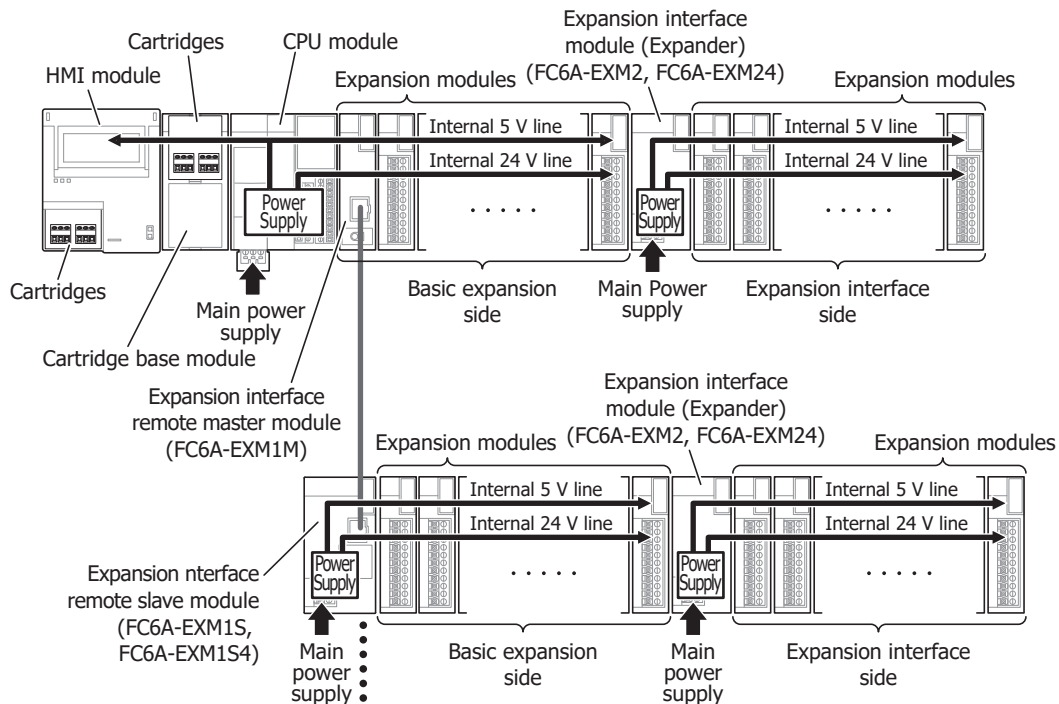
In the European Union there are separate collection systems for used batteries and accumulators.

Please dispose of batteries and accumulators correctly in accordance with each country or local regulation.

## Connection Restrictions When Expanding the PLC

### Connection Restrictions When Expanding the PLC

Expansion modules, the HMI module, the cartridge base module, and cartridges on the basic expansion side operate with the internal power supply that is supplied from the CPU module or the expansion interface remote slave module. Expansion modules on the expansion interface side operate with the internal power supply that is supplied from the expansion interface module (expander).



The internal power supply current that can be supplied to the expansion modules on the basic expansion side, HMI module, cartridge base module, and cartridges depends on the module supplying the power. Ensure that the total amount of current for the expansion modules on the basic expansion side, HMI module, cartridge base module, and cartridges does not exceed the limit of the internal power supply that can be supplied.

#### Notes:

- A maximum of eight expansion modules can be connected on the expansion interface side, regardless of the internal power supply current that can be supplied from the CPU module or the expansion interface remote slave module.
- Expansion modules require an I/O external power supply.

### 3: INSTALLATION AND WIRING

#### Connecting Modules to the CPU Module

The internal power supply current that can be supplied from the CPU module to the expansion modules on the basic expansion side, HMI module, cartridge base module, and cartridges is as follows.

| CPU Module                      |                  | Maximum Number of Modules That Can Be Connected to the CPU Module |            |     |                       |   |                 |   |
|---------------------------------|------------------|---|------------|-----|-----------------------|---|-----------------|---|
|                                 |                  | Expansion Modules<br>(basic expansion side)*1                     | HMI Module |     | Cartridge Base Module |   | CPU Module Unit |   |
|                                 |                  |   | Cartridges |     | Cartridges            |   | Cartridges      |   |
| All-in-One CPU module           | 16-I/O type      | 4*2   | 1          | 1*3 | —                     | — | —               | 1 |
|                                 | 24-I/O type      | 7*2   | 1          | 1*3 | —                     | — | —               | 1 |
|                                 | 40-I/O type      | 7*2   | 1          | 1*3 | —                     | — | —               | 2 |
| CAN J1939 All-in-One CPU module | 40-I/O type      | 7*2   | 1          | 1*3 | —                     | — | —               | 2 |
| Plus CPU module                 | Plus 16-I/O type | 7*2*4   | 1          | 1   | 1                     | 2 | —               | — |
|                                 | Plus 32-I/O type |   |            |     |                       |   |                 |   |



| CPU Module                      |                  | Internal Power Supply Current That Can Be Supplied from the CPU Module |  |  |   |
|---------------------------------|------------------|--|--|--|---|
|                                 |                  | Internal 5 V Line Total*5  |  | Internal 24 V Line Total*6                     |   |
|                                 |                  | Ambient Operating Temperature<br>(-10 to 55°C)                         | Expanded Ambient Operating Temperature<br>(-25 to -10°C, 55 to 65°C) | Ambient Operating Temperature<br>(-10 to 55°C) | Expanded Ambient Operating Temperature<br>(-25 to 10°C, 55 to 65°C) |
| All-in-One CPU module           | 16-I/O type      | ≤ 695 mA   | ≤ 347 mA   | ≤ 126 mA                                       | ≤ 63 mA   |
|                                 | 24-I/O type      | ≤ 890 mA   | ≤ 445 mA   | ≤ 167 mA                                       | ≤ 83 mA   |
|                                 | 40-I/O type      | ≤ 1,070 mA   | ≤ 535 mA   | ≤ 270 mA                                       | ≤ 135 mA  |
| CAN J1939 All-in-One CPU module | 40-I/O type      | ≤ 960 mA   | ≤ 480 mA   | ≤ 270 mA                                       | ≤ 135 mA  |
| Plus CPU module                 | Plus 16-I/O type | ≤ 1,070 mA   | ≤ 535 mA   | ≤ 350 mA                                       | ≤ 175 mA  |
|                                 | Plus 32-I/O type |  |  |  |   |

\*1 The number of modules that can be connected on the basic expansion side does not include the expansion interface module (expander). When using the expansion interface module (expander), add the following current.

| Module Type                           | Model                 | Internal 5 V Line Current |
|---------------------------------------|-----------------------|---------------------------|
| Expansion interface module (expander) | FC6A-EXM2, FC6A-EXM24 | 20 mA                     |

\*2 Only the following number of communication modules can be connected to the CPU module, regardless of the internal power supply current that can be supplied from the CPU module.

| Module Type                     | Maximum No. of Modules (Total on Basic Expansion and Expansion Interface Sides) |
|---------------------------------|---|
| All-in-One CPU module           | 3   |
| CAN J1939 All-in-One CPU module | 3   |
| Plus CPU module                 | 15  |

\*3 Only an analog I/O cartridge can be connected.

\*4 When an expansion interface remote master module (FC6A-EXM1M) is connected to the basic expansion side, a maximum of five modules can be connected on the basic expansion side.

\*5 The internal power supply for the internal 5 V line is used to run the expansion modules (basic expansion side), the HMI module, and the cartridges. Calculate the total current that is used by the modules and ensure that the limit is not exceeded. Use caution because the upper limits differ with expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C). For details, see "Internal Power Supply Current of the Modules and Cartridges" on page 3-39.

\*6 The internal power supply for the internal 24 V line is used to drive the output module relays and transistors. Calculate the total current when the outputs are simultaneously ON with the following values as the current per output and ensure that the limit is not exceeded. Use caution because the upper limits differ with expanded ambient operating temperatures (-25 to -10°C and 55 to 65°C).

- Relay output: 6 mA/point
- Transistor output: 1.5 mA/point

#### Connecting Modules to the Expansion Interface Remote Slave Module

A maximum of seven expansion modules can be connected on the basic expansion side, regardless of the internal power supply current that can be supplied from the expansion interface remote slave module.


**Caution**

The CPU module cannot detect the internal power supply current that the expansion modules are using. Observe the restrictions in this section because malfunction or failure may result if the FC6A is continuously used when the current exceeds the limit.

**Internal Power Supply Current of the Modules and Cartridges**

| Module Type                                       |                         | Model                   | Internal 3.3 V<br>Line Current*1 | Internal 5 V<br>Line Current | Internal 24 V<br>Line Current |
|---|-------------------------|-------------------------|----------------------------------|------------------------------|-------------------------------|
| Digital I/O module                                | Digital input module    | FC6A-N08B1/FC6A-N08B4   | —                                | 30 mA                        | —                             |
|   |                         | FC6A-N16B1/FC6A-N16B4   | —                                | 40 mA                        | —                             |
|   |                         | FC6A-N16B3              | —                                | 40 mA                        | —                             |
|   |                         | FC6A-N32B3              | —                                | 65 mA                        | —                             |
|   |                         | FC6A-N08A11/FC6A-N08A14 | —                                | 40 mA                        | —                             |
|   | Digital output module   | FC6A-R081/FC6A-R084     | —                                | 35 mA                        | 6 mA/point                    |
|   |                         | FC6A-R161/FC6A-R164     | —                                | 50 mA                        | 6 mA/point                    |
|   |                         | FC6A-T08P1/FC6A-T08P4   | —                                | 25 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T16P1/FC6A-T16P4   | —                                | 30 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T16P3              | —                                | 30 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T32P3              | —                                | 45 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T08K1/FC6A-T08K4   | —                                | 25 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T16K1/FC6A-T16K4   | —                                | 30 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T16K3              | —                                | 30 mA                        | 1.5 mA/point                  |
|   |                         | FC6A-T32K3              | —                                | 45 mA                        | 1.5 mA/point                  |
| Digital mixed I/O module                          | FC6A-M08BR1/FC6A-M08BR4 | —                       | 30 mA                            | 6 mA/point                   |                               |
|   | FC6A-M24BR1/FC6A-M24BR4 | —                       | 55 mA                            | 6 mA/point                   |                               |
| Analog I/O module                                 | Analog input module     | FC6A-J2C1/FC6A-J2C4     | —                                | 40 mA                        | —                             |
|   |                         | FC6A-J4A1/FC6A-J4A4     | —                                | 45 mA                        | —                             |
|   |                         | FC6A-J8A1/FC6A-J8A4     | —                                | 40 mA                        | —                             |
|   |                         | FC6A-J4CN1/FC6A-J4CN4   | —                                | 50 mA                        | —                             |
|   |                         | FC6A-J4CH1Y/FC6A-J4CH4Y | —                                | 50 mA                        | —                             |
|   |                         | FC6A-J8CU1/FC6A-J8CU4   | —                                | 45 mA                        | —                             |
|   | Analog output module    | FC6A-K2A1/FC6A-K2A4     | —                                | 40 mA                        | —                             |
|   |                         | FC6A-K4A1/FC6A-K4A4     | —                                | 50 mA                        | —                             |
|   | Analog mixed I/O module | FC6A-L03CN1/FC6A-L03CN4 | —                                | 55 mA                        | —                             |
|   |                         | FC6A-L06A1/FC6A-L06A4   | —                                | 60 mA                        | —                             |
| Safety relay module                               |                         | FC6A-SAK64              | —                                | 40 mA                        | —                             |
| PID module  |                         | FC6A-F2M1/FC6A-F2M4     | —                                | 65 mA                        | —                             |
|   |                         | FC6A-F2MR1/FC6A-F2MR4   | —                                | 65 mA                        | —                             |
| Serial communication module                       |                         | FC6A-SIF52/FC6A-SIF524  | —                                | 35 mA                        | 35 mA                         |
| Cartridges  | Digital I/O cartridge   | FC6A-PN4                | 35mA                             | —                            | —                             |
|   |                         | FC6A-PTK4               | 35mA                             | —                            | —                             |
|   |                         | FC6A-PTS4               | 35mA                             | —                            | —                             |
|   | Analog I/O cartridge    | FC6A-PJ2A               | 35mA                             | —                            | —                             |
|   |                         | FC6A-PJ2CP              | 35mA                             | —                            | —                             |
|   |                         | FC6A-PK2AV              | 35mA                             | 80 mA                        | —                             |
|   |                         | FC6A-PK2AW              | 35mA                             | 190 mA                       | —                             |
|   | Communication cartridge | FC6A-PC1                | 35mA                             | 10 mA                        | —                             |
|   |                         | FC6A-PC3                | 35mA                             | 60 mA                        | —                             |
|   |                         | FC6A-PC4                | 35mA                             | 120 mA                       | —                             |
| Cartridge base module (no installed cartridges)*2 |                         | FC6A-HPH1               | —                                | —                            | —                             |
| HMI module (no installed cartridges)              |                         | FC6A-PH1                | —                                | 150 mA                       | 15 mA*3                       |

### 3: INSTALLATION AND WIRING

| Module Type            | Model               | Internal 3.3 V Line Current* <sup>1</sup> | Internal 5 V Line Current | Internal 24 V Line Current |
|------------------------|---------------------|---|---------------------------|----------------------------|
| HMI module + cartridge | FC6A-PH1+FC6A-PJ2A  | —   | 170 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PJ2CP | —   | 170 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PK2AV | —   | 250 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PK2AW | —   | 360 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PC1   | —   | 180 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PC3   | —   | 230 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PC4   | —   | 290 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PN4   | —   | 175 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PTK4  | —   | 175 mA                    | 15 mA* <sup>3</sup>        |
|                        | FC6A-PH1+FC6A-PTS4  | —   | 175 mA                    | 15 mA* <sup>3</sup>        |

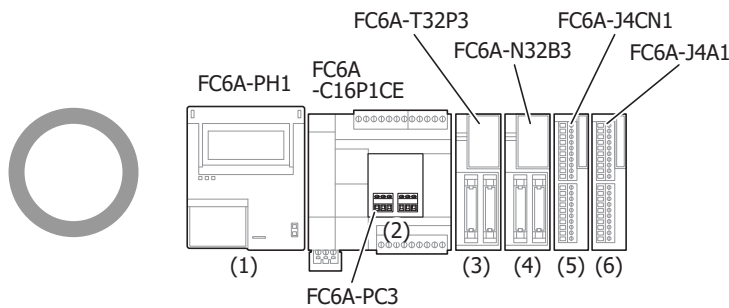
\*1 Not included in the calculation of the connection restriction.

\*2 There is no change in the current of the internal power supply for the cartridge base module, even if cartridges are connected.

\*3 Current for the backlight. This is not included in the calculation of the connection restriction.

#### ■ Connection Example 1

This example describes the number of connected modules, the internal 5 V line current, and the internal 24 V line current when the expansion modules, HMI module, and cartridges in the below diagram are connected to the 16-I/O type.



| No. | Module Type                                 | Model             | Internal 5 V Line Current | Internal 24 V Line Current   |
|-----|---|-------------------|---------------------------|------------------------------|
| (1) | <b>HMI Module</b> (no installed cartridges) | <b>FC6A-PH1</b>   | 150 mA                    | —                            |
| (2) | <b>Communication Cartridge</b>              | <b>FC6A-PC3</b>   | 60 mA                     | —                            |
| (3) | <b>Digital Output Module</b>                | <b>FC6A-T32P3</b> | 45 mA                     | 48 mA (= 1.5 mA × 32 points) |
| (4) | <b>Digital Input Module</b>                 | <b>FC6A-N32B3</b> | 65 mA                     | —                            |
| (5) | <b>Analog Input Module</b>                  | <b>FC6A-J4CN1</b> | 50 mA                     | —                            |
| (6) | <b>Analog Input Module</b>                  | <b>FC6A-J4A1</b>  | 45 mA                     | —                            |
|     |   |                   | 415 mA (695 mA or lower)  | 48 mA (126 mA or lower)      |

- Number of connected modules

For the 16-I/O type, the number of modules that can be connected must be four expansion modules (basic expansion side), one HMI module, and two cartridges or lower. There are four expansion modules (basic expansion side), one HMI module, and one cartridge, so there is no problem because the maximum number of modules was not exceeded.

- Internal 5 V line current

The current must be 695 mA or lower. The total current is 415 mA, so there is no problem because it is not exceeded 695 mA.

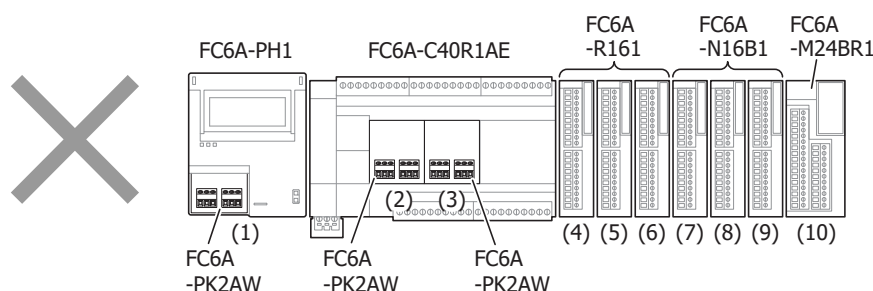
- Internal 24 V line current

The current must be 126 mA or lower. The total current is 48 mA, so there is no problem because it is not exceeded 126 mA.



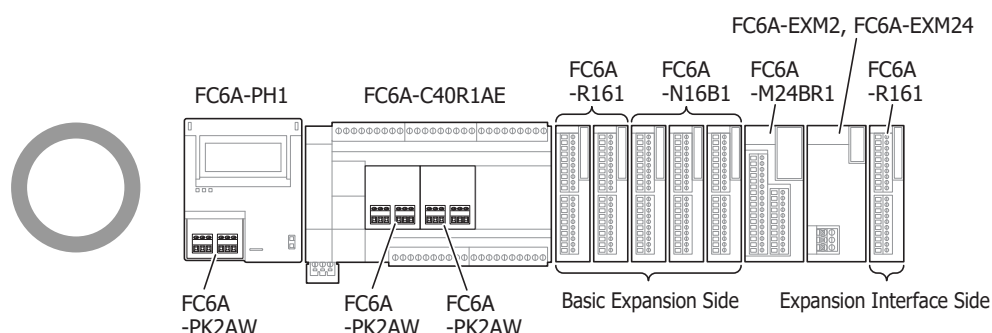
## ■ Connection Example 2

This example describes the number of connected modules, the internal 5 V Line Current, and the internal 24 V line current when the expansion modules, HMI module, and cartridges in the below diagram are connected to the 40-I/O type.



| No.  | Module Type              | Model                 | Internal 5 V Line Current    | Internal 24 V Line Current |
|------|--------------------------|-----------------------|------------------------------|----------------------------|
| (1)  | HMI Module + Cartridge   | FC6A-PH1 + FC6A-PK2AW | 360 mA                       | —                          |
| (2)  | Analog I/O Cartridge     | FC6A-PK2AW            | 190 mA                       | —                          |
| (3)  | Analog I/O Cartridge     | FC6A-PK2AW            | 190 mA                       | —                          |
| (4)  | Digital Output Module    | FC6A-R161             | 50 mA                        | 96 mA (= 6 mA × 16 points) |
| (5)  | Digital Output Module    | FC6A-R161             | 50 mA                        | 96 mA (= 6 mA × 16 points) |
| (6)  | Digital Output Module    | FC6A-R161             | 50 mA                        | 96 mA (= 6 mA × 16 points) |
| (7)  | Digital Input Module     | FC6A-N16B1            | 40 mA                        | —                          |
| (8)  | Digital Input Module     | FC6A-N16B1            | 40 mA                        | —                          |
| (9)  | Digital Input Module     | FC6A-N16B1            | 40 mA                        | —                          |
| (10) | Digital Mixed I/O Module | FC6A-M24BR1           | 55 mA                        | 48 mA (= 6 mA × 8 points)  |
|      |                          |                       | 1,065 mA (1,070 mA or lower) | 336 mA (270 mA or lower)   |

- Number of connected modules  
For the 40-I/O type, the number of modules that can be connected must be seven expansion modules (basic expansion side), one HMI module, and three cartridges or lower. There are seven expansion modules (basic expansion side), one HMI module, and two cartridges, so there is no problem because the maximum number of modules was not exceeded.
- Internal 5 V line current  
The current must be 1,070 mA or lower. The total current is 1,065 mA, so there is no problem because it does not exceed 1,070 mA.
- Internal 24 V line current  
The current must be 270 mA or lower. The total current is 336 mA, which exceeds 270 mA.  
Program the PLC so that 45 or fewer relay outputs turn ON simultaneously (270 mA or lower = 6 mA × 45 points) or use the expansion interface module (FC6A-EXM2, FC6A-EXM24) and connect the digital output modules with an insufficient amount of current to the expansion interface side.



### 3: INSTALLATION AND WIRING

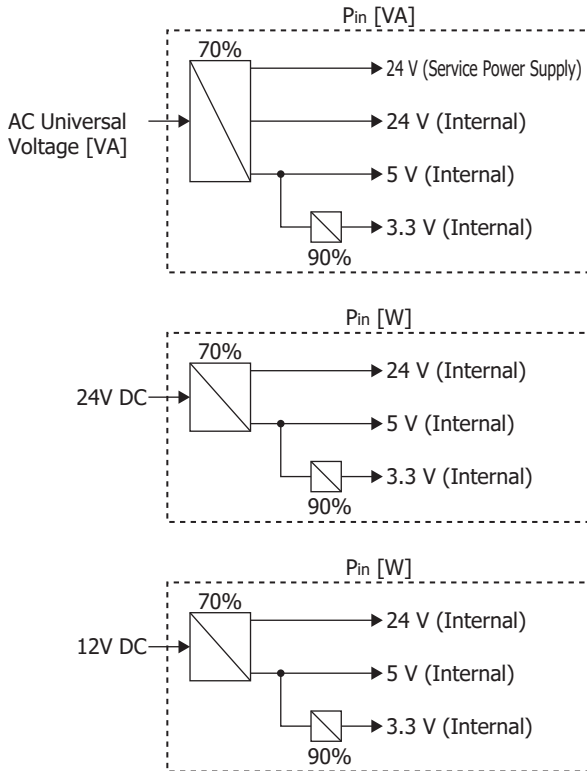
#### Calculating the Power Consumed by the Main Power Supply

Calculate the power by referring to the values of the modules given in the table in "Internal Power Supply Current of the Modules and Cartridges" on page 3-39.

#### ■ Examples of Calculating the Power Consumed by Expansion Modules

##### When the FC6A-R081 is connected to the All-in-One CPU module/CAN J1939 All-in-One CPU module

Calculate the voltage conversion in the CPU module with the following efficiencies.



For the FC6A-R081

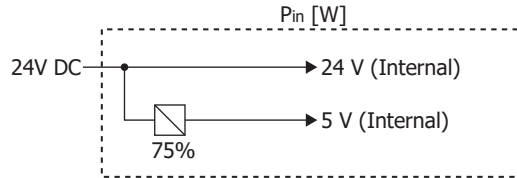
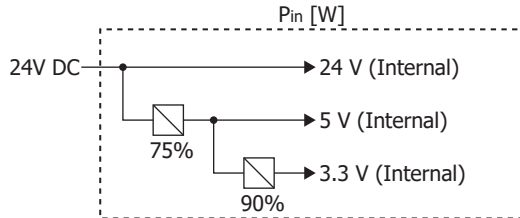
$$\begin{aligned}
 P_{R081} &= \frac{\overbrace{(I_{out} \times V_{out})}^{5\text{ V}} + \overbrace{(I_{out} \times V_{out})}^{24\text{ V}}}{0.7} \\
 &= \frac{\left( \frac{0\text{ A} \times 3.3\text{ V}}{0.9 \times 5\text{ V}} \right) + (0.035\text{ A} \times 5\text{ V}) + (0.006\text{ A} \times 8\text{ points} \times 24\text{ V})}{0.7} \\
 &\approx 1.9\text{ [W]}
 \end{aligned}$$

### When the FC6A-R081 or FC6A-PC4 is connected to the Plus CPU module or an expansion interface module

Calculate the voltage conversion in the CPU module and expansion interface module with the following efficiencies.

Plus CPU module

Expansion interface module (Expander) (FC6A-EXM2, FC6A-EXM24)  
Expansion interface module (remote master/slave) (FC6A-EXM1M, FC6A-EXM1S, FC6A-EXM1S4)



For the FC6A-R081

$$\begin{aligned}
 P_{R081} &= \frac{\left( \frac{I_{out} \times V_{out}}{0.75} \right) + (I_{out} \times 24 \text{ V})}{0.75} \\
 &= \frac{\left( \frac{0 \text{ A} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) + (0.035 \text{ A} \times 5 \text{ V})}{0.75} + (0.006 \text{ A} \times 8 \text{ points} \times 24 \text{ V}) \\
 &\approx 1.39 \text{ [W]}
 \end{aligned}$$

For the FC6A-PC4\*1

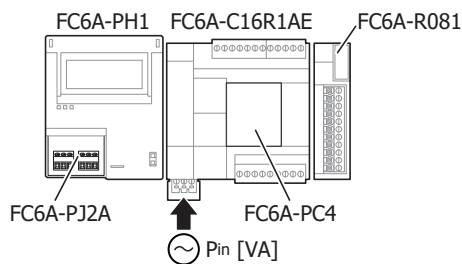
$$\begin{aligned}
 P_{PC4} &= \frac{\left\{ \left( \frac{I_{out} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) + I_{out} \right\} \times 5 \text{ V}}{0.75} \\
 &= \frac{\left\{ \left( \frac{0.035 \text{ A} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) + 0.12 \text{ A} \right\} \times 5 \text{ V}}{0.75} \\
 &\approx 0.97 \text{ [W]}
 \end{aligned}$$

\*1 Cartridges cannot be connected to expansion interface modules.

### ■ Example 1 of Calculating the Power Consumed by the Main Power Supply

This example shows how to calculate the power consumed by the main power supply when the expansion module, HMI module, and cartridge in the below diagram are connected to the 16-I/O type.

Example:



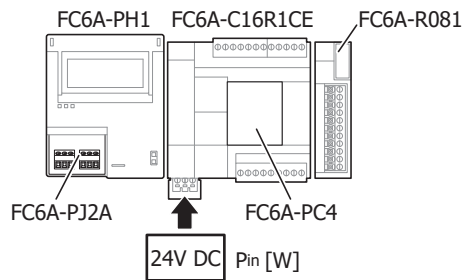
$$\begin{aligned}
 \text{FC6A-C16R1AE} &: 33 \text{ [VA]} \text{ when alone}^{*1} \\
 \text{FC6A-PC4} &: \frac{\left\{ \left( \frac{0.035 \text{ A} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) + 0.12 \text{ A} \right\} \times 5 \text{ V}}{0.7} \approx 1.04 \text{ [VA]} \\
 \text{FC6A-R081} &: \frac{(0.035 \text{ A} \times 5 \text{ V}) + (0.006 \times 8 \text{ points} \times 24 \text{ V})}{0.7} \approx 1.9 \text{ [VA]} \\
 \text{FC6A-PH1 + FC6A-PJ2A} &: \frac{(0.17 \text{ A} \times 5 \text{ V}) + (0.015 \text{ A} \times 24 \text{ V})}{0.7} \approx 1.73 \text{ [VA]}
 \end{aligned}$$

$$\begin{aligned}
 P_{in} &\approx 33 + 1.04 + 1.9 + 1.73 \\
 &\approx 37.67 \text{ [VA]}
 \end{aligned}$$

\*1 For the power consumption of each CPU module alone, see "Product Specifications" on page 2-1.

### 3: INSTALLATION AND WIRING

The power consumed by the main power supply will differ if the CPU module is different, even if the system configuration is the same.



|                      |   |                                   |
|----------------------|---|-----------------------------------|
| FC6A-C16R1CE         | : | 3.36 [W] when alone <sup>*1</sup> |
| FC6A-PC4             | : | ≈ 1.04 [W]                        |
| FC6A-R081            | : | ≈ 1.9 [W]                         |
| FC6A-PH1 + FC6A-PJ2A | : | ≈ 1.73 [W]                        |



$$P_{in} \approx 3.36 + 1.04 + 1.9 + 1.73$$

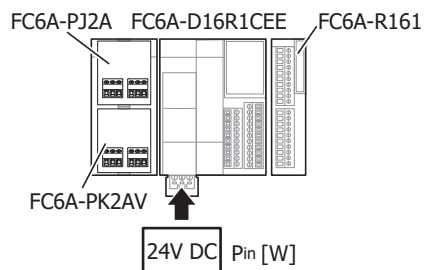
$$\approx 8.03 \text{ [W]}$$

<sup>\*1</sup> For the power consumption of each CPU module alone, see "Product Specifications" on page 2-1.

#### ■ Example 2 of Calculating the Power Consumed by the Main Power Supply

This example shows how to calculate the power consumed by the main power supply when the expansion modules and cartridge in the below diagram are connected to the Plus 16-I/O type.

Example:



|               |   |  |
|---------------|---|--|
| FC6A-D16R1CEE | : | 2.88 [W] when alone <sup>*1</sup>  |
| FC6A-PJ2A     | : | $= \frac{\left( \frac{0.035 \text{ A} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) \times 5 \text{ V}}{0.75} \approx 0.17 \text{ [W]}$                                  |
| FC6A-PK2AV    | : | $= \frac{\left\{ \left( \frac{0.035 \text{ A} \times 3.3 \text{ V}}{0.9 \times 5 \text{ V}} \right) + 0.08 \text{ A} \right\} \times 5 \text{ V}}{0.75} \approx 0.7 \text{ [W]}$ |
| FC6A-R161     | : | $= \frac{0.05 \text{ A} \times 5 \text{ V}}{0.75} + (0.006 \text{ A} \times 16 \text{ points} \times 24 \text{ V}) \approx 2.64 \text{ [W]}$                                     |



$$P_{in} \approx 2.88 + 0.17 + 0.7 + 2.64$$

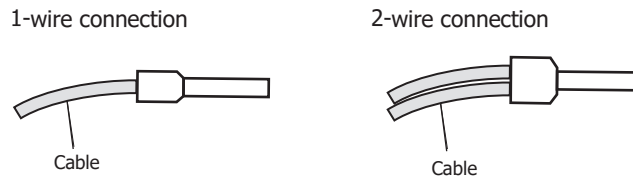
$$\approx 6.39 \text{ [W]}$$

<sup>\*1</sup> For the power consumption of each CPU module alone, see "Product Specifications" on page 2-1.

## Terminal Connection

This section describes types of terminals and how to use them.

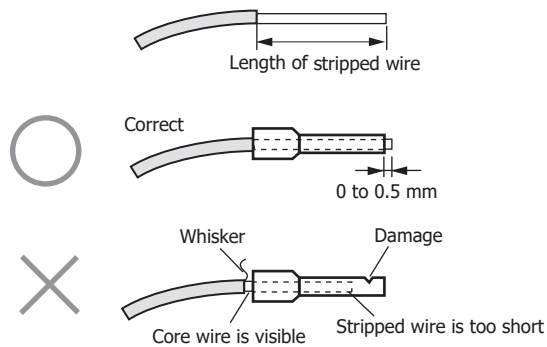
- When connecting stranded wire or multiple solid wires to a terminal block, use appropriate ferrule for the terminal block. For details, see "Recommended Ferrule List" on page 3-46.
- 1-wire and 2-wire ferrules can be used with the FC6A.



### Terminals for Terminal Blocks

Crimp ferrules using an appropriate tool according to the size of ferrules. Cut the end of the wire to the same length or about 0.5 mm longer than the ferrule.

Ensure that the core wire does not protrude at the end of the shield and there are no whiskers.



- The thickness and stripping length of stranded wire and single wire differs according to the connectors that will be used. For wire thickness, see "Recommended Ferrule List" on page 3-46.
- Single wire assumes the use of one wire. Do not attach two or more wires to the one connector hole.
- When using single wires, you do not need to use ferrules.

### 3: INSTALLATION AND WIRING

#### Recommended Ferrule List

The following ferrules can be used with the FC6A.

The recommended ferrules are manufactured by IDEC (top), Weidmüller (middle) or Phoenix Contact (bottom).

#### ■ All-in-One CPU module/CAN J1939 All-in-One CPU module

| CPU Module Terminals              |        |              |   | Power Supply Terminals         |                      | Input Terminals<br>Output Terminals |                      | CAN Port<br>(CAN J1939 All-in-One CPU module only) |                        |
|-----------------------------------|--------|--------------|---|--------------------------------|----------------------|-------------------------------------|----------------------|--|------------------------|
| Wire Type                         |        |              |   | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent      | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent*1                   | UL1015<br>Equivalent*1 |
| Stripping length (mm)             |        |              |   | 7                              |                      | 7                                   |                      | 10   |                        |
| Wire thickness (mm <sup>2</sup> ) |        |              |   | 0.2 to 2.5                     |                      | 0.2 to 2.5                          |                      | 0.2 to 2.5   |                        |
| Wire gauge                        | AWG 24 | 1-wire usage | S3TL-H025-10WJ (S3TL-H025-10WJ)<br>H0.25/10 HBL (9025740000)<br>AI 0,25- 6 (3203040)                                      | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | S3TL-H025-12WJ (S3TL-H025-12WJ)<br>H0.25/12T GE (9021020000)<br>AI 0,25- 8 (3203037)                                      | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | —<br>—<br>AI 0,25-10 (3241128)  | —                              | —                    | —                                   | —                    | Yes  | —                      |
|                                   | AWG22  | 1-wire usage | S3TL-H034-10WT (S3TL-H034-10WT)<br>H0.34/10 TK (9025750000)<br>AI 0,34- 6 (3203053)                                       | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | S3TL-H034-12WT (S3TL-H034-12WT)<br>H0.34/12 TK (9025770000)<br>AI 0,34- 8 (3203066)                                       | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | —<br>—<br>AI 0,34-10 (3241129)  | —                              | —                    | —                                   | —                    | Yes  | —                      |
|                                   | AWG20  | 1-wire usage | S3TL-H05-12WA (S3TL-H05-12WA)<br>H0.5/12D W (9019000000)<br>H0.5/12 OR (040950000)<br>AI 0,5- 6 (3200687)                 | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | S3TL-H05-14WA (S3TL-H05-14WA)<br>H0.5/14D W (9019010000)<br>H0.5/14 OR (0690700000)<br>AI 0,5- 8 (3200014)                | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | —<br>—<br>AI 0,5- 8 GB (1208966)  | —                              | Yes                  | —                                   | Yes                  | —  | —                      |
|                                   |        |              | S3TL-H05-16WA (S3TL-H05-16WA)<br>H0.5/16D W (9019020000)<br>H0.5/16 OR (9025870000)<br>AI 0,5-10 (3201275)                | —                              | —                    | —                                   | —                    | Yes  | —                      |
|                                   |        |              | —<br>H0.5/16 DS W (9202910000)<br>AI 0,5-10 GB (3203150)  | —                              | —                    | —                                   | —                    | —  | Yes                    |
|                                   |        | 2-wire usage | S3TL-J05-14WA (S3TL-J05-14WA)<br>H0.5/14D ZH W (9037380000)<br>H0.5/14 ZH OR (9037200000)<br>AI-TWIN 2 x 0,5-8 (3200933)  | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                                   |        |              | S3TL-J05-16WA (S3TL-J05-16WA)<br>H0.5/16D ZH W (9037390000)<br>H0.5/16 ZH OR (9037210000)<br>AI-TWIN 2 x 0,5-10 (3203309) | —                              | —                    | —                                   | —                    | Yes  | —                      |

| CPU Module Terminals    |  |              |   | Power Supply Terminals         |                      | Input Terminals<br>Output Terminals |                      | CAN Port<br>(CAN J1939 All-in-One CPU module only) |                        |
|-------------------------|--|--------------|---|--------------------------------|----------------------|-------------------------------------|----------------------|--|------------------------|
| Wire Type               |  |              |   | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent      | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent*1                   | UL1015<br>Equivalent*1 |
| Wire gauge              | AWG18  | 1-wire usage | S3TL-H075-12WW (S3TL-H075-12WW)<br>H0.75/12D GR (9019030000)<br>H0.75/12 W (0409600000)<br>AI 0,75- 6 (3200690)               | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                         |  |              | S3TL-H075-14WW (S3TL-H075-14WW)<br>H0.75/14D GR (9019040000)<br>H0.75/14 W (0462900000)<br>AI 0,75- 8 (3200519)               | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                         |  |              | S3TL-H075-16WW (S3TL-H075-16WW)<br>H0.75/16D GR (9019050000)<br>H0.75/16 W (9025860000)<br>AI 0,75-10 (3201288)               | —                              | —                    | —                                   | —                    | Yes  | —                      |
|                         |  |              | S3TL-H10-14WY (S3TL-H10-14WY)<br>H1.0/14D R (9019080000)<br>H1.0/14 GE (0463000000)<br>AI 1-8 (3200030)                       | —                              | Yes                  | —                                   | Yes                  | —  | —                      |
|                         |  |              | S3TL-H10-16WY (S3TL-H10-16WY)<br>H1.0/16D R (9019100000)<br>H1.0/16 GE (9025950000)<br>AI 1-10 (3200182)                      | —                              | —                    | —                                   | —                    | —  | Yes                    |
|                         |  | 2-wire usage | S3TL-J075-14WW (S3TL-J075-14WW)<br>H0.75/14D ZH GR (9037410000)<br>H0.75/14 ZH W (9037230000)<br>AI-TWIN 2 x 0,75-8 (3200807) | Yes                            | —                    | Yes                                 | —                    | —  | —                      |
|                         | S3TL-J075-16WW (S3TL-J075-16WW)<br>H0.75/16D ZH GR (9037420000)<br>H0.75/16 ZH W (9037240000)<br>AI-TWIN 2 x 0,75-10 (3200975) |              | —   | —                              | —                    | —                                   | Yes                  | —  |                        |
|                         | AWG16  | 1-wire usage | —<br>—<br>AI 1,5- 6 (3200755)   | Yes                            | Yes                  | Yes                                 | Yes                  | —  | —                      |
|                         |  |              | S3TL-H15-14WR (S3TL-H15-14WR)<br>H1.5/14D SW (9019120000)<br>H1.5/14 R (0463100000)<br>AI 1,5- 8 (3200043)                    | Yes                            | Yes                  | Yes                                 | Yes                  | —  | —                      |
|                         |  |              | S3TL-H15-16WR (S3TL-H15-16WR)<br>H1.5/16D SW (9019130000)<br>H1.5/16 R (0635100000)<br>AI 1,5-10 (3200195)                    | —                              | —                    | —                                   | —                    | Yes  | Yes                    |
|                         |  | 2-wire usage | S3TL-J15-16WR (S3TL-J15-16WR)<br>H1.5/16D ZH SW (9037470000)<br>H1.5/16 ZH R (9037290000)<br>AI-TWIN 2 x 1,5-8 (3200823)      | Yes                            | Yes                  | Yes                                 | Yes                  | —  | —                      |
| Screwdriver             |  |              | S3TL-D04-25-75 (S3TL-D04-25-75)<br>SDIS 0.4×2.5×75 (2749790000)<br>SZS 0.4×2.5 (1205037)                                      | —                              |                      | —                                   |                      | —  |                        |
|                         |  |              | S3TL-D06-35-100 (S3TL-D06-35-100)<br>SDIS 0.6×3.5×100 (2749810000)<br>SZS 0.6×3.5 (1205053)                                   | Yes                            |                      | Yes                                 |                      | Yes  |                        |
| Tightening torque (N·m) |  |              |   | 0.51                           |                      | 0.51                                |                      | 0.49 (Terminal)<br>0.2 to 0.3 (Flange)             |                        |

\*1 For the wires that can be used, see "Wiring the CAN J1939 Bus" on page 3-55.

### 3: INSTALLATION AND WIRING

#### ■ Plus CPU module

| CPU Module Terminals              |              |              | Power Supply Terminals  |                      | Input Terminals/Output Terminals (FC6A-D16R1CEE, FC6A-D16K1CEE, FC6A-D16P1CEE, FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE only) |                      |
|-----------------------------------|--------------|--------------|---|----------------------|--|----------------------|
| Wire Type                         |              |              | UL1007<br>UL2464<br>Equivalent  | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent |
| Stripping length (mm)             |              |              | 7   |                      | 9  |                      |
| Wire thickness (mm <sup>2</sup> ) |              |              | 0.2 to 2.5  |                      | 0.14 to 1.50   |                      |
| Wire gauge                        | AWG 24       | 1-wire usage | S3TL-H025-10WJ (S3TL-H025-10WJ)<br>H0.25/10 HBL (9025740000)<br>AI 0,25- 6 (3203040)                                      | Yes                  | —  | —                    |
|                                   |              |              | S3TL-H025-12WJ (S3TL-H025-12WJ)<br>H0.25/12T GE (9021020000)<br>AI 0,25- 8 (3203037)                                      | Yes                  | —  | Yes                  |
|                                   |              |              | —<br>—<br>AI 0,25-10 (3241128)  | —                    | —  | Yes                  |
|                                   | AWG22        | 1-wire usage | S3TL-H034-10WT (S3TL-H034-10WT)<br>H0.34/10 TK (9025750000)<br>AI 0,34- 6 (3203053)                                       | Yes                  | —  | —                    |
|                                   |              |              | S3TL-H034-12WT (S3TL-H034-12WT)<br>H0.34/12 TK (9025770000)<br>AI 0,34- 8 (3203066)                                       | Yes                  | —  | Yes                  |
|                                   |              |              | —<br>—<br>AI 0,34-10 (3241129)  | —                    | —  | Yes                  |
|                                   | AWG20        | 1-wire usage | S3TL-H05-12WA (S3TL-H05-12WA)<br>H0.5/12D W (9019000000)<br>H0.5/12 OR (040950000)<br>AI 0,5- 6 (3200687)                 | Yes                  | —  | —                    |
|                                   |              |              | S3TL-H05-14WA (S3TL-H05-14WA)<br>H0.5/14D W (9019010000)<br>H0.5/14 OR (0690700000)<br>AI 0,5- 8 (3200014)                | Yes                  | —  | Yes                  |
|                                   |              |              | —<br>—<br>AI 0,5- 8 GB (1208966)  | —                    | Yes  | —                    |
|                                   |              |              | S3TL-H05-16WA (S3TL-H05-16WA)<br>H0.5/16D W (9019020000)<br>H0.5/16 OR (9025870000)<br>AI 0,5-10 (3201275)                | —                    | —  | Yes                  |
|                                   |              |              | H0.5/16 DS W (9202910000)<br>AI 0,5-10 GB (3203150)   | —                    | —  | Yes                  |
|                                   |              |              | S3TL-J05-14WA (S3TL-J05-14WA)<br>H0.5/14D ZH W (9037380000)<br>H0.5/14 ZH OR (9037200000)<br>AI-TWIN 2 x 0,5-8 (3200933)  | Yes                  | —  | —                    |
|                                   | 2-wire usage |              | S3TL-J05-16WA (S3TL-J05-16WA)<br>H0.5/16D ZH W (9037390000)<br>H0.5/16 ZH OR (9037210000)<br>AI-TWIN 2 x 0,5-10 (3203309) | —                    | —  | Yes                  |



| CPU Module Terminals    |              |  |  | Power Supply Terminals         |                      | Input Terminals/Output Terminals (FC6A-D16R1CEE, FC6A-D16K1CEE, FC6A-D16P1CEE, FC6A-D16R4CEE, FC6A-D16K4CEE, FC6A-D16P4CEE only) |                      |
|-------------------------|--------------|--|--|--------------------------------|----------------------|--|----------------------|
| Wire Type               |              |  |  | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent |
| Wire gauge              | AWG18        | 1-wire usage   | S3TL-H075-12WW (S3TL-H075-12WW)<br>H0.75/12D GR (9019030000)<br>H0.75/12 W (0409600000)<br>AI 0,75- 6 (3200690)          | Yes                            | —                    | —  | —                    |
|                         |              |  | S3TL-H075-14WW (S3TL-H075-14WW)<br>H0.75/14D GR (9019040000)<br>H0.75/14 W (0462900000)<br>AI 0,75- 8 (3200519)          | Yes                            | —                    | —  | —                    |
|                         |              |  | S3TL-H075-16WW (S3TL-H075-16WW)<br>H0.75/16D GR (9019050000)<br>H0.75/16 W (9025860000)<br>AI 0,75-10 (3201288)          | —                              | —                    | —  | —                    |
|                         |              |  | S3TL-H10-14WY (S3TL-H10-14WY)<br>H1.0/14D R (9019080000)<br>H1.0/14 GE (0463000000)<br>AI 1-8 (3200030)                  | —                              | Yes                  | —  | —                    |
|                         |              |  | S3TL-H10-16WY (S3TL-H10-16WY)<br>H1.0/16D R (9019100000)<br>H1.0/16 GE (9025950000)<br>AI 1-10 (3200182)                 | —                              | —                    | —  | —                    |
|                         | 2-wire usage | S3TL-J075-14WW (S3TL-J075-14WW)<br>H0.75/14D ZH GR (9037410000)<br>H0.75/14 ZH W (9037230000)<br>AI-TWIN 2 x 0,75-8 (3200807)  | Yes  | —                              | —                    | —  |                      |
|                         |              | S3TL-J075-16WW (S3TL-J075-16WW)<br>H0.75/16D ZH GR (9037420000)<br>H0.75/16 ZH W (9037240000)<br>AI-TWIN 2 x 0,75-10 (3200975) | —  | —                              | —                    | —  |                      |
|                         | AWG16        | 1-wire usage   | —<br>—<br>AI 1,5- 6 (3200755)  | Yes                            | Yes                  | —  | —                    |
|                         |              |  | S3TL-H15-14WR (S3TL-H15-14WR)<br>H1.5/14D SW (9019120000)<br>H1.5/14 R (0463100000)<br>AI 1,5- 8 (3200043)               | Yes                            | Yes                  | —  | —                    |
|                         |              |  | S3TL-H15-16WR (S3TL-H15-16WR)<br>H1.5/16D SW (9019130000)<br>H1.5/16 R (0635100000)<br>AI 1,5-10 (3200195)               | —                              | —                    | —  | —                    |
|                         |              | 2-wire usage   | S3TL-J15-16WR (S3TL-J15-16WR)<br>H1.5/16D ZH SW (9037470000)<br>H1.5/16 ZH R (9037290000)<br>AI-TWIN 2 x 1,5-8 (3200823) | Yes                            | Yes                  | —  | —                    |
| Screwdriver             |              |  | S3TL-D04-25-75 (S3TL-D04-25-75)<br>SDIS 0.4×2.5×75 (2749790000)<br>SZS 0.4×2.5 (1205037)                                 | —                              |                      | Yes  |                      |
|                         |              |  | S3TL-D06-35-100 (S3TL-D06-35-100)<br>SDIS 0.6×3.5×100 (2749810000)<br>SZS 0.6×3.5 (1205053)                              | Yes                            |                      | —  |                      |
| Tightening torque (N·m) |              |  |  | 0.51                           |                      | 0.28   |                      |

### 3: INSTALLATION AND WIRING

#### ■ Expansion Modules, Expansion Interface Module (Expander), and Expansion Interface Remote Slave Module

| Expansion Modules, Expansion Interface Module (Expander), and Expansion Interface Remote Slave Module Terminal Block Types |        |                 |  | 3.81 mm Pitch  |  | 5.08 mm Pitch  |   |
|--|--------|-----------------|--|--|--|--|---|
| Model  |        |                 |  | FC6A-N16B1,<br>FC6A-R161,<br>FC6A-T16K1,<br>FC6A-T16P1,<br>FC6A-M24BR1,<br>FC6A-J4A1,<br>FC6A-J8A1,<br>FC6A-L06A1,<br>FC6A-J4CN1,<br>FC6A-J4CH1Y,<br>FC6A-J8CU1,<br>FC6A-F2M1,<br>FC6A-F2MR1,<br>FC6A-SIF52, | FC6A-N16B4,<br>FC6A-R164,<br>FC6A-T16K4,<br>FC6A-T16P4,<br>FC6A-M24BR4,<br>FC6A-J4A4,<br>FC6A-J8A4,<br>FC6A-L06A4,<br>FC6A-J4CN4,<br>FC6A-J4CH4Y,<br>FC6A-J8CU4,<br>FC6A-F2M4,<br>FC6A-F2MR4,<br>FC6A-SIF524 | FC6A-N08B1,<br>FC6A-N08A11,<br>FC6A-R081,<br>FC6A-T08K1,<br>FC6A-T08P1,<br>FC6A-M08BR1,<br>FC6A-J2C1,<br>FC6A-K2A1,<br>FC6A-K4A1,<br>FC6A-L03CN1,<br>FC6A-EXM2,<br>FC6A-EXM1S, | FC6A-N08B4,<br>FC6A-N08A14,<br>FC6A-R084,<br>FC6A-T08K4,<br>FC6A-T08P4,<br>FC6A-M08BR4,<br>FC6A-J2C4,<br>FC6A-K2A4,<br>FC6A-K4A4,<br>FC6A-L03CN4,<br>FC6A-EXM24,<br>FC6A-EXM1S4 |
| Wire Type  |        |                 |  | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent   | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent  |
| Stripping length (mm)  |        |                 |  | 9  |  | 10   |   |
| Wire thickness (mm <sup>2</sup> )  |        |                 |  | 0.14 to 1.50   |  | 0.2 to 2.5   |   |
| Wire<br>gauge  | AWG 24 | 1-wire<br>usage | S3TL-H025-10WJ (S3TL-H025-10WJ)<br>H0.25/10 HBL (9025740000)<br>AI 0,25- 6 (3203040)                       | —  | —  | —  | —   |
|  |        |                 | S3TL-H025-12WJ (S3TL-H025-12WJ)<br>H0.25/12T GE (9021020000)<br>AI 0,25- 8 (3203037)                       | Yes  | —  | —  | —   |
|  |        |                 | —<br>—<br>AI 0,25-10 (3241128)   | Yes  | —  | Yes  | —   |
|  | AWG22  | 1-wire<br>usage | S3TL-H034-10WT (S3TL-H034-10WT)<br>H0.34/10 TK (9025750000)<br>AI 0,34- 6 (3203053)                        | —  | —  | —  | —   |
|  |        |                 | S3TL-H034-12WT (S3TL-H034-12WT)<br>H0.34/12 TK (9025770000)<br>AI 0,34- 8 (3203066)                        | Yes  | —  | —  | —   |
|  |        |                 | —<br>—<br>AI 0,34-10 (3241129)   | Yes  | —  | Yes  | —   |
|  | AWG20  | 1-wire<br>usage | S3TL-H05-12WA (S3TL-H05-12WA)<br>H0.5/12D W (9019000000)<br>H0.5/12 OR (0409500000)<br>AI 0,5- 6 (3200687) | —  | —  | —  | —   |
|  |        |                 | S3TL-H05-14WA (S3TL-H05-14WA)<br>H0.5/14D W (9019010000)<br>H0.5/14 OR (0690700000)<br>AI 0,5- 8 (3200014) | Yes  | —  | —  | —   |
|  |        |                 | —<br>—<br>AI 0,5- 8 GB (1208966)   | —  | Yes  | —  | —   |
|  |        |                 | S3TL-H05-16WA (S3TL-H05-16WA)<br>H0.5/16D W (9019020000)<br>H0.5/16 OR (9025870000)<br>AI 0,5-10 (3201275) | Yes  | —  | Yes  | —   |
|  |        |                 | —<br>H0.5/16 DS W (9202910000)<br>AI 0,5-10 GB (3203150)   | —  | Yes  | —  | Yes   |
|  |        |                 |  |  |  |  |   |

| Expansion Modules, Expansion Interface Module (Expander), and Expansion Interface Remote Slave Module Terminal Block Types |       |              |  | 3.81 mm Pitch  |  | 5.08 mm Pitch  |   |
|--|-------|--------------|--|--|--|--|---|
| Model  |       |              |  | FC6A-N16B1,<br>FC6A-R161,<br>FC6A-T16K1,<br>FC6A-T16P1,<br>FC6A-M24BR1,<br>FC6A-J4A1,<br>FC6A-J8A1,<br>FC6A-L06A1,<br>FC6A-J4CN1,<br>FC6A-J4CH1Y,<br>FC6A-J8CU1,<br>FC6A-F2M1,<br>FC6A-F2MR1,<br>FC6A-SIF52, | FC6A-N16B4,<br>FC6A-R164,<br>FC6A-T16K4,<br>FC6A-T16P4,<br>FC6A-M24BR4,<br>FC6A-J4A4,<br>FC6A-J8A4,<br>FC6A-L06A4,<br>FC6A-J4CN4,<br>FC6A-J4CH4Y,<br>FC6A-J8CU4,<br>FC6A-F2M4,<br>FC6A-F2MR4,<br>FC6A-SIF524 | FC6A-N08B1,<br>FC6A-N08A11,<br>FC6A-R081,<br>FC6A-T08K1,<br>FC6A-T08P1,<br>FC6A-M08BR1,<br>FC6A-J2C1,<br>FC6A-K2A1,<br>FC6A-K4A1,<br>FC6A-L03CN1,<br>FC6A-EXM2,<br>FC6A-EXM1S, | FC6A-N08B4,<br>FC6A-N08A14,<br>FC6A-R084,<br>FC6A-T08K4,<br>FC6A-T08P4,<br>FC6A-M08BR4,<br>FC6A-J2C4,<br>FC6A-K2A4,<br>FC6A-K4A4,<br>FC6A-L03CN4,<br>FC6A-EXM24,<br>FC6A-EXM1S4 |
| Wire Type  |       |              |  | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent   | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent  |
| Wire gauge   | AWG20 | 2-wire usage | S3TL-J05-14WA (S3TL-J05-14WA)<br>H0.5/14D ZH W (9037380000)<br>H0.5/14 ZH OR (9037200000)<br>AI-TWIN 2 x 0,5-8 (3200933)       | —  | —  | —  | —   |
|  |       |              | S3TL-J05-16WA (S3TL-J05-16WA)<br>H0.5/16D ZH W (9037390000)<br>H0.5/16 ZH OR (9037210000)<br>AI-TWIN 2 x 0,5-10 (3203309)      | Yes  | —  | Yes  | —   |
|  | AWG18 | 1-wire usage | S3TL-H075-12WW (S3TL-H075-12WW)<br>H0.75/12D GR (9019030000)<br>H0.75/12 W (0409600000)<br>AI 0,75- 6 (3200690)                | —  | —  | —  | —   |
|  |       |              | S3TL-H075-14WW (S3TL-H075-14WW)<br>H0.75/14D GR (9019040000)<br>H0.75/14 W (0462900000)<br>AI 0,75- 8 (3200519)                | —  | —  | —  | —   |
|  |       |              | S3TL-H075-16WW (S3TL-H075-16WW)<br>H0.75/16D GR (9019050000)<br>H0.75/16 W (9025860000)<br>AI 0,75-10 (3201288)                | —  | —  | Yes  | —   |
|  |       |              | S3TL-H10-14WY (S3TL-H10-14WY)<br>H1.0/14D R (9019080000)<br>H1.0/14 GE (0463000000)<br>AI 1-8 (3200030)                        | —  | —  | —  | —   |
|  |       |              | S3TL-H10-16WY (S3TL-H10-16WY)<br>H1.0/16D R (9019100000)<br>H1.0/16 GE (9025950000)<br>AI 1-10 (3200182)                       | —  | —  | —  | Yes   |
|  |       | 2-wire usage | S3TL-J075-14WW (S3TL-J075-14WW)<br>H0.75/14D ZH GR (9037410000)<br>H0.75/14 ZH W (9037230000)<br>AI-TWIN 2 x 0,75-8 (3200807)  | —  | —  | —  | —   |
|  |       |              | S3TL-J075-16WW (S3TL-J075-16WW)<br>H0.75/16D ZH GR (9037420000)<br>H0.75/16 ZH W (9037240000)<br>AI-TWIN 2 x 0,75-10 (3200975) | —  | —  | Yes  | —   |

### 3: INSTALLATION AND WIRING

| Expansion Modules, Expansion Interface Module (Expander), and Expansion Interface Remote Slave Module Terminal Block Types |       |              |  | 3.81 mm Pitch  |   | 5.08 mm Pitch  |   |
|--|-------|--------------|--|--|---|--|---|
| Model  |       |              |  | FC6A-N16B1,<br>FC6A-R161,<br>FC6A-T16K1,<br>FC6A-T16P1,<br>FC6A-M24BR1,<br>FC6A-J4A1,<br>FC6A-J8A1,<br>FC6A-L06A1,<br>FC6A-J4CN1,<br>FC6A-J4CH1Y,<br>FC6A-J8CU1,<br>FC6A-F2M1,<br>FC6A-F2MR1,<br>FC6A-SIF52, | FC6A-N16B4,<br>FC6A-R164,<br>FC6A-T16K4,<br>FC6A-T16P4,<br>FC6A-M24BR4,<br>FC6A-J4A4,<br>FC6A-J8A4,<br>FC6A-L06A4,<br>FC6A-J4CN4,<br>FC6A-J4CH4Y,<br>FC6A-J8CU4,<br>FC6A-F2M4,<br>FC6A-F2MR4<br>FC6A-SIF524 | FC6A-N08B1,<br>FC6A-N08A11,<br>FC6A-R081,<br>FC6A-T08K1,<br>FC6A-T08P1,<br>FC6A-M08BR1,<br>FC6A-J2C1,<br>FC6A-K2A1,<br>FC6A-K4A1,<br>FC6A-L03CN1,<br>FC6A-EXM2,<br>FC6A-EXM1S, | FC6A-N08B4,<br>FC6A-N08A14,<br>FC6A-R084,<br>FC6A-T08K4,<br>FC6A-T08P4,<br>FC6A-M08BR4,<br>FC6A-J2C4,<br>FC6A-K2A4,<br>FC6A-K4A4,<br>FC6A-L03CN4,<br>FC6A-EXM24,<br>FC6A-EXM1S4 |
| Wire Type  |       |              |  | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent  | UL1007<br>UL2464<br>Equivalent   | UL1015<br>Equivalent  |
| Wire gauge   | AWG16 | 1-wire usage | —<br>—<br>AI 1,5- 6 (3200755)  | —  | —   | —  | —   |
|  |       |              | S3TL-H15-14WR (S3TL-H15-14WR)<br>H1.5/14D SW (9019120000)<br>H1.5/14 R (0463100000)<br>AI 1,5- 8 (3200043)               | —  | —   | —  | —   |
|  |       |              | S3TL-H15-16WR (S3TL-H15-16WR)<br>H1.5/16D SW (9019130000)<br>H1.5/16 R (0635100000)<br>AI 1,5-10 (3200195)               | —  | —   | Yes  | Yes   |
|  |       | 2-wire usage | S3TL-J15-16WR (S3TL-J15-16WR)<br>H1.5/16D ZH SW (9037470000)<br>H1.5/16 ZH R (9037290000)<br>AI-TWIN 2 x 1,5-8 (3200823) | —  | —   | —  | —   |
| Screwdriver  |       |              | S3TL-D04-25-75 (S3TL-D04-25-75)<br>SDIS 0.4×2.5×75 (2749790000)<br>SZS 0.4×2.5 (1205037)                                 | Yes  |   | —  |   |
|  |       |              | S3TL-D06-35-100 (S3TL-D06-35-100)<br>SDIS 0.6×3.5×100 (2749810000)<br>SZS 0.6×3.5 (1205053)                              | —  |   | Yes  |   |
| Tightening torque (N·m)  |       |              |  | 0.28   |   | 0.49   |   |

#### ■ Expansion Interface Remote Master Module, HMI Module, and Cartridge

| Module Type                       |        |              |  | Expansion Interface Remote Master Module |                      | HMI Module                     |                      | Cartridges                     |                      |
|-----------------------------------|--------|--------------|--|--|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|
| Wire Type                         |        |              |  | UL1007<br>UL2464<br>Equivalent           | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent |
| Stripping length (mm)             |        |              |  | 7  |                      | 7                              |                      | 5                              |                      |
| Wire thickness (mm <sup>2</sup> ) |        |              |  | 0.14 to 2.5                              |                      | 0.14 to 2.5                    |                      | 0.14 to 1.50                   |                      |
| Wire gauge                        | AWG 24 | 1-wire usage | S3TL-H025-10WJ (S3TL-H025-10WJ)<br>H0.25/10 HBL (9025740000)<br>AI 0,25- 6 (3203040) | —  | —                    | Yes                            | —                    | Yes                            | —                    |
|                                   |        |              | S3TL-H025-12WJ (S3TL-H025-12WJ)<br>H0.25/12T GE (9021020000)<br>AI 0,25- 8 (3203037) | Yes                                      | —                    | Yes                            | —                    | —                              | —                    |
|                                   |        |              | —  | —  | —                    | —                              | —                    | —                              | —                    |
|                                   |        |              | —<br>AI 0,25-10 (3241128)  | —  | —                    | —                              | —                    | —                              | —                    |

| Module Type |       |              |   | Expansion Interface Remote Master Module |                      | HMI Module                     |                      | Cartridges                     |                      |
|-------------|-------|--------------|---|--|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|
| Wire Type   |       |              |   | UL1007<br>UL2464<br>Equivalent           | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent |
| Wire gauge  | AWG22 | 1-wire usage | S3TL-H034-10WT (S3TL-H034-10WT)<br>H0.34/10 TK (9025750000)<br>AI 0,34- 6 (3203053)                                       | —  | —                    | Yes                            | —                    | Yes                            | —                    |
|             |       |              | S3TL-H034-12WT (S3TL-H034-12WT)<br>H0.34/12 TK (9025770000)<br>AI 0,34- 8 (3203066)                                       | Yes                                      | —                    | Yes                            | —                    | —                              | —                    |
|             |       |              | —<br>—<br>AI 0,34-10 (3241129)  | —  | —                    | —                              | —                    | —                              | —                    |
|             | AWG20 | 1-wire usage | S3TL-H05-12WA (S3TL-H05-12WA)<br>H0.5/12D W (9019000000)<br>H0.5/12 OR (0409500000)<br>AI 0,5- 6 (3200687)                | —  | —                    | Yes                            | —                    | Yes                            | —                    |
|             |       |              | S3TL-H05-14WA (S3TL-H05-14WA)<br>H0.5/14D W (9019010000)<br>H0.5/14 OR (0690700000)<br>AI 0,5- 8 (3200014)                | Yes                                      | —                    | Yes                            | —                    | —                              | —                    |
|             |       |              | —<br>—<br>AI 0,5- 8 GB (1208966)  | —  | Yes                  | —                              | Yes                  | —                              | —                    |
|             |       |              | S3TL-H05-16WA (S3TL-H05-16WA)<br>H0.5/16D W (9019020000)<br>H0.5/16 OR (9025870000)<br>AI 0,5-10 (3201275)                | —  | —                    | —                              | —                    | —                              | —                    |
|             |       |              | —<br>H0.5/16 DS W (9202910000)<br>AI 0,5-10 GB (3203150)  | —  | —                    | —                              | —                    | —                              | —                    |
|             |       | 2-wire usage | S3TL-J05-14WA (S3TL-J05-14WA)<br>H0.5/14D ZH W (9037380000)<br>H0.5/14 ZH OR (9037200000)<br>AI-TWIN 2 x 0,5-8 (3200933)  | Yes                                      | —                    | Yes                            | —                    | —                              | —                    |
|             |       |              | S3TL-J05-16WA (S3TL-J05-16WA)<br>H0.5/16D ZH W (9037390000)<br>H0.5/16 ZH OR (9037210000)<br>AI-TWIN 2 x 0,5-10 (3203309) | —  | —                    | —                              | —                    | —                              | —                    |
|             |       |              | S3TL-H075-12WW (S3TL-H075-12WW)<br>H0.75/12D GR (9019030000)<br>H0.75/12 W (0409600000)<br>AI 0,75- 6 (3200690)           | —  | —                    | Yes                            | —                    | —                              | —                    |
|             |       |              | S3TL-H075-14WW (S3TL-H075-14WW)<br>H0.75/14D GR (9019040000)<br>H0.75/14 W (0462900000)<br>AI 0,75- 8 (3200519)           | Yes                                      | —                    | Yes                            | —                    | —                              | —                    |
|             | AWG18 | 1-wire usage | S3TL-H075-16WW (S3TL-H075-16WW)<br>H0.75/16D GR (9019050000)<br>H0.75/16 W (9025860000)<br>AI 0,75-10 (3201288)           | —  | —                    | —                              | —                    | —                              | —                    |
|             |       |              | S3TL-H10-14WY (S3TL-H10-14WY)<br>H1.0/14D R (9019080000)<br>H1.0/14 GE (0463000000)<br>AI 1-8 (3200030)                   | Yes                                      | —                    | —                              | Yes                  | —                              | —                    |
|             |       |              | S3TL-H10-16WY (S3TL-H10-16WY)<br>H1.0/16D R (9019100000)<br>H1.0/16 GE (9025950000)<br>AI 1-10 (3200182)                  | —  | —                    | —                              | —                    | —                              | —                    |

### 3: INSTALLATION AND WIRING

| Module Type   |             |                 |  | Expansion Interface<br>Remote Master<br>Module  |                      | HMI Module                     |                      | Cartridges                     |                      |
|---|-------------|-----------------|--|---|----------------------|--------------------------------|----------------------|--------------------------------|----------------------|
| Wire Type   |             |                 |  | UL1007<br>UL2464<br>Equivalent  | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent | UL1007<br>UL2464<br>Equivalent | UL1015<br>Equivalent |
| Wire<br>gauge   | AWG18       | 2-wire<br>usage | S3TL-J075-14WW (S3TL-J075-14WW)<br>H0.75/14D ZH GR (9037410000)<br>H0.75/14 ZH W (9037230000)<br>AI-TWIN 2 x 0,75-8 (3200807)  | Yes   | —                    | Yes                            | —                    | —                              | —                    |
|   |             |                 | S3TL-J075-16WW (S3TL-J075-16WW)<br>H0.75/16D ZH GR (9037420000)<br>H0.75/16 ZH W (9037240000)<br>AI-TWIN 2 x 0,75-10 (3200975) | —   | —                    | —                              | —                    | —                              | —                    |
|   | AWG16       | 1-wire<br>usage | —<br>—<br>AI 1,5- 6 (3200755)  | —   | —                    | Yes                            | Yes                  | —                              | —                    |
|   |             |                 | S3TL-H15-14WR (S3TL-H15-14WR)<br>H1.5/14D SW (9019120000)<br>H1.5/14 R (0463100000)<br>AI 1,5- 8 (3200043)                     | Yes   | Yes                  | —                              | Yes                  | —                              | —                    |
|   |             |                 | S3TL-H15-16WR (S3TL-H15-16WR)<br>H1.5/16D SW (9019130000)<br>H1.5/16 R (0635100000)<br>AI 1,5-10 (3200195)                     | —   | —                    | —                              | —                    | —                              | —                    |
|   |             | 2-wire<br>usage | S3TL-J15-16WR (S3TL-J15-16WR)<br>H1.5/16D ZH SW (9037470000)<br>H1.5/16 ZH R (9037290000)<br>AI-TWIN 2 x 1,5-8 (3200823)       | Yes   | —                    | —                              | —                    | —                              | —                    |
|   | Screwdriver |                 |  | S3TL-D04-25-75 (S3TL-D04-25-75)<br>SDIS 0.4×2.5×75 (2749790000)<br>SZS 0.4×2.5 (1205037)    | —                    | —                              | —                    | Yes                            |                      |
|   |             |                 |  | S3TL-D06-35-100 (S3TL-D06-35-100)<br>SDIS 0.6×3.5×100 (2749810000)<br>SZS 0.6×3.5 (1205053) | —                    | Yes                            | —                    |                                |                      |
| S3TL-D06-35-100 (S3TL-D06-35-100)<br>SDIS 0.6×3.5×100 (2749810000)<br>SZF 1-0,6×3,5 (1204517) |             |                 |  | Yes*1   | —                    | —                              |                      |                                |                      |
| Tightening torque (N·m)   |             |                 |  | —*2   |                      | 0.5 to 0.6                     |                      | 0.2                            |                      |

\*1 Used when removing the wires.

\*2 Push-in type.

#### Crimping Tool

The following crimping tool can be used with FC6A.

| Tool Name     | Model Number (Order Number)                        |                          |                      |
|---------------|--|--------------------------|----------------------|
|               | IDEC   | Weidmüller               | Phoenix Contact      |
| Crimping tool | S3TL-CR06D (S3TL-CR06D)<br>S3TL-CR04T (S3TL-CR04T) | PZ 6 Roto L (1444050000) | CRIMPFOX 6 (1212034) |



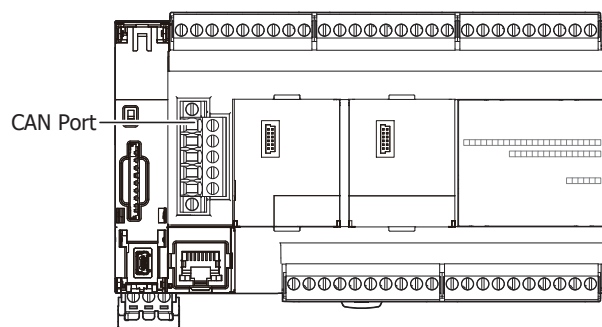
#### Caution

- Do not touch live terminals. There is a risk of electric shock.
- When powered, the terminals that are connected to external devices may become hot. Do not touch the terminals immediately after turning the power off.
- Do not touch the power supply terminals immediately after turning the power off. There is a risk of electric shock.
- Insert the wire all the way to the tip of the ferrule and crimp it.
- When connecting stranded wire or multiple wires to a terminal block, use a ferrule. Otherwise there is a risk of wires becoming disconnected.
- When using single wires, you do not need to use ferrules.
- Single wire assumes the use of one wire. Do not attach two or more wires to the one connector hole.

## Wiring the CAN J1939 Bus

This section describes the CAN port terminal arrangement, internal equivalent circuit, and specifications.

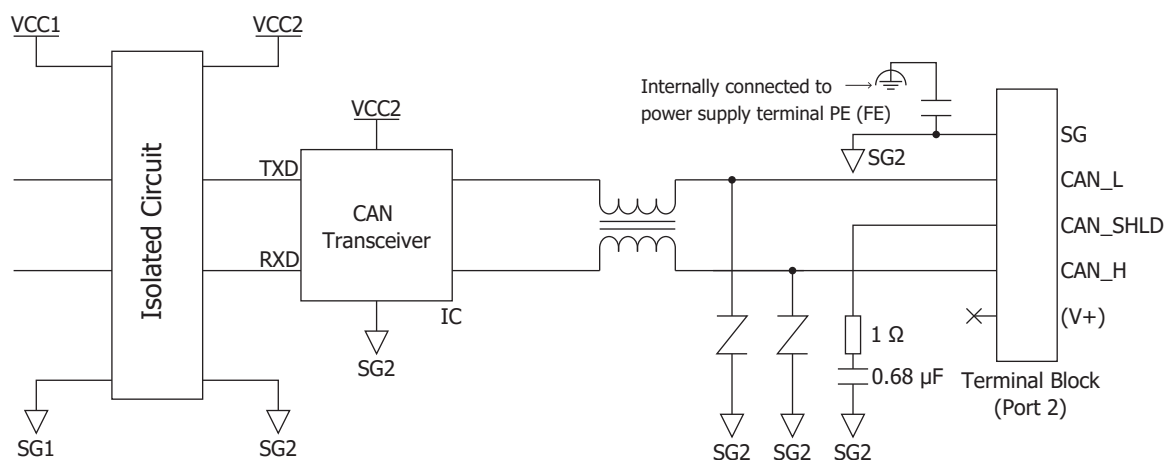
### CAN Port Terminal Arrangement



| No. | Signal Wire | Details   |
|-----|-------------|---|
| 1   | SG          | CAN external power supply (-)                                   |
| 2   | CAN_L       | CAN_L bus line (dominant low)                                   |
| 3   | CAN_SHLD    | CAN cable shield <sup>*1</sup>                                  |
| 4   | CAN_H       | CAN_H bus line (dominant high)                                  |
| 5   | (V+)        | CAN external power supply (+). (N.C. Not connected internally.) |

<sup>\*1</sup> Internally connected to the SG via a resistor and capacitor connected in a series. ( $R = 1 \Omega$ ,  $0.68 \mu F$ )

### Internal Equivalent Circuit

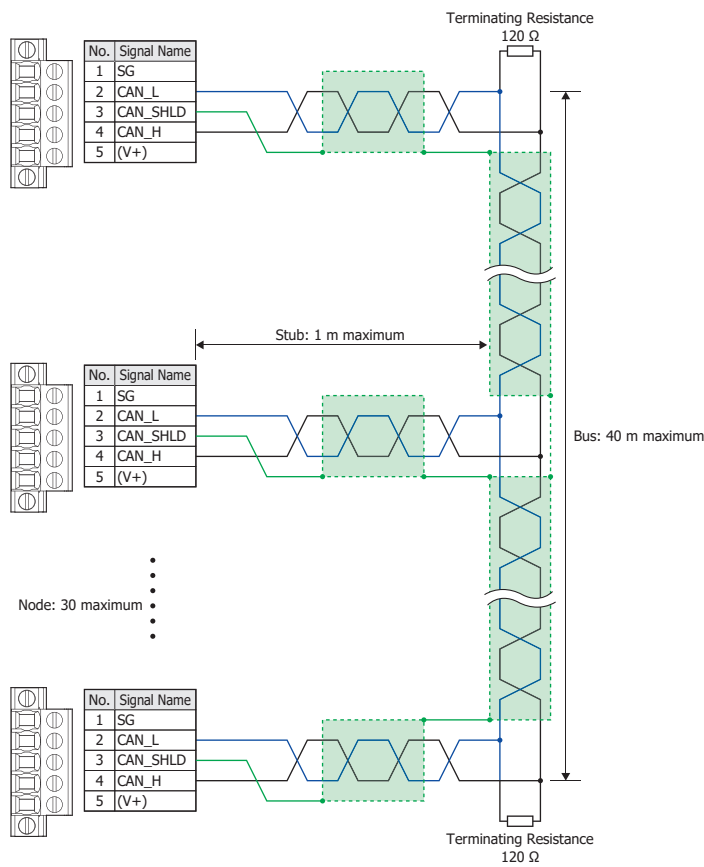


### CAN J1939 Wiring

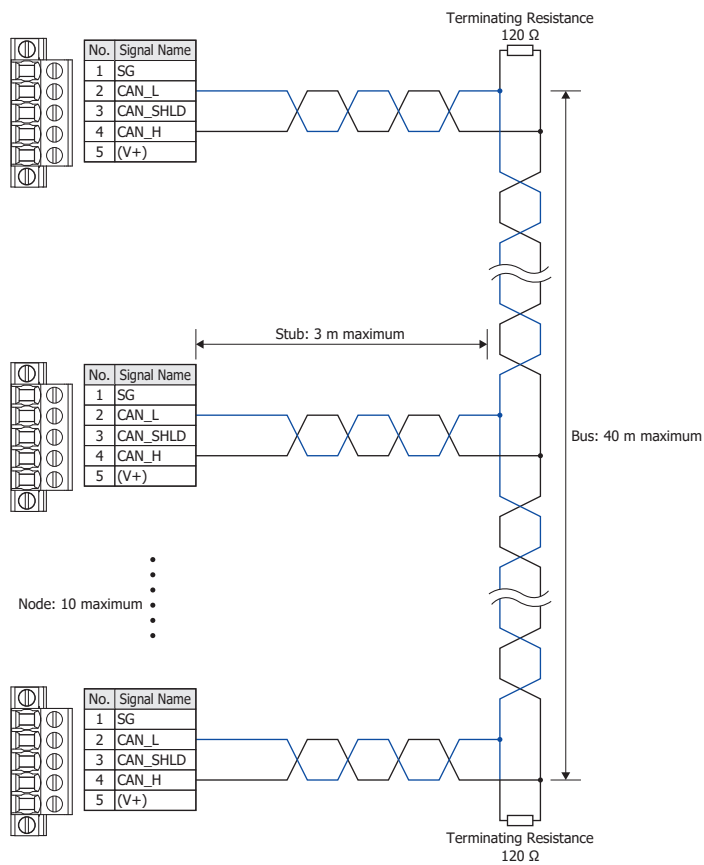
The specifications and wiring examples differ according to CAN protocol standard J1939-11 and J1939-15. Connect terminating resistance ( $120 \Omega$ ,  $0.5 W$  or higher) between CAN\_H and CAN\_L at both ends of the main line when wiring the CAN port.

| CAN Protocol Standard |                          | J1939-11   | J1939-15                       |
|-----------------------|--------------------------|--|--------------------------------|
| Communication Speed   |                          | 250 kbps   |                                |
| Nodes                 |                          | 30   | 10                             |
| Cable                 | Wire Configuration       | Twisted pair   |                                |
|                       |                          | Shielded   | Unshielded                     |
|                       |                          | $0.3 \text{ mm}^2$ to $0.82 \text{ mm}^2$ (AWG 22 to 18) |                                |
|                       | Applicable Standards     | ISO 11898/1993   |                                |
|                       | Characteristic Impedance | $120 \Omega$   |                                |
| Cable Length          |                          | 40 m maximum, stub 1 m maximum                           | 40 m maximum, stub 3 m maximum |

J1939-11



J1939-15





## Introduction

The following version of WindLDR is required for FC6A programming and maintenance:

- When you use All-in-One CPU module/CAN J1939 All-in-One CPU module: WindLDR version 8.0.0 or later
- When you use Plus CPU module: WindLDR version 8.6.0 or later

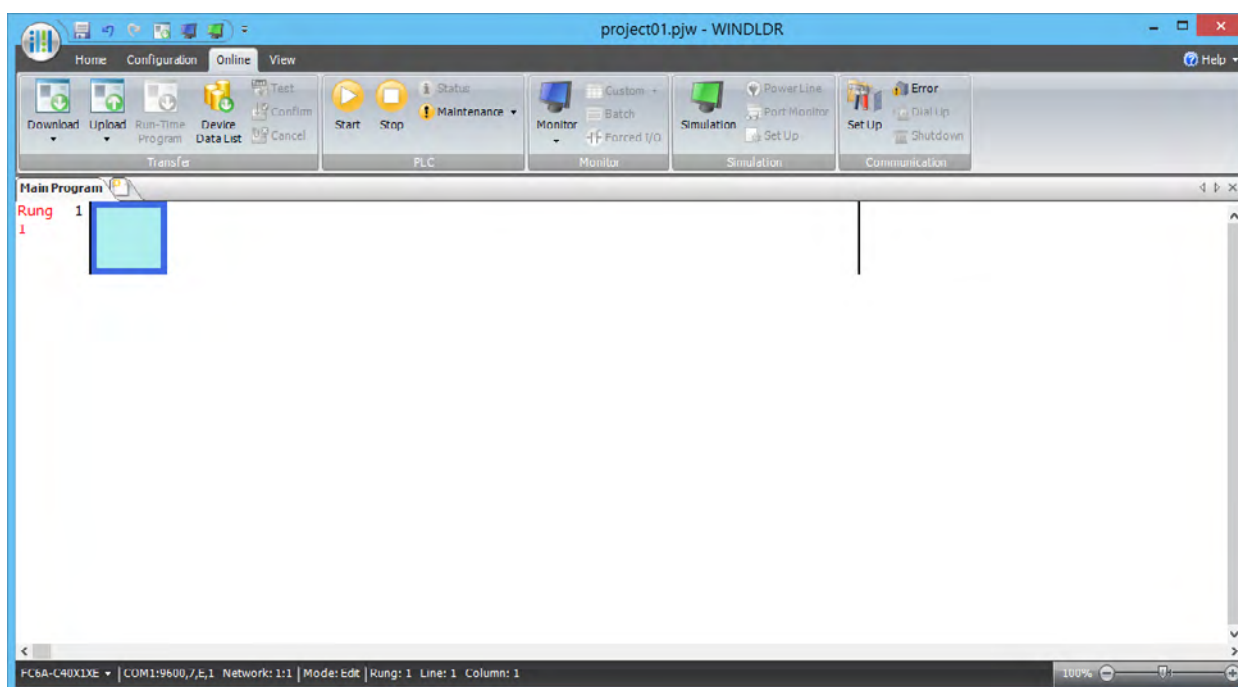
For details on how to check the version, see "Checking the WindLDR Version Number" on page 4-17.

This chapter describes basic procedures for operating WindLDR, programming and maintenance software for the FC6A.

## Start WindLDR

## ■ Windows 11/10

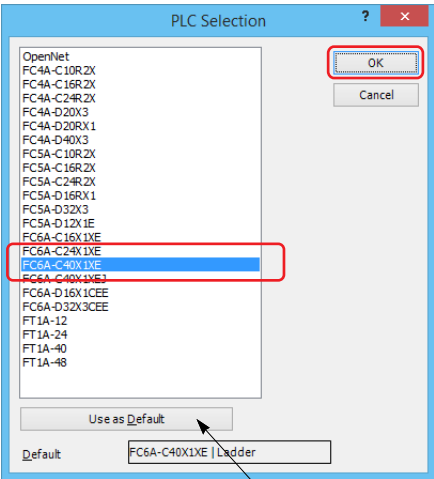
Click Start and then **All Apps > IDEC Automation Organizer > WindLDR.**



PLC Selection

Before programming a user program on WindLDR, select a PLC type.

- 1. Select **Configuration** from the WindLDR menu bar, then select **PLC Type**.  
The **PLC Selection** dialog box appears.
- 2. Select a PLC type in the selection box and the programming language to use.
- 3. Click **OK**.



Select the PLC type from the list and click **Use as Default** to set the selected PLC type as the default type when WindLDR starts.

In WindLDR, the FC6A is categorized by the number of inputs and outputs and the PLC type names are displayed as follows.

| PLC Selection Option | Type No.   |
|----------------------|--|
| FC6A-C16X1XE         | FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C16K1CE, F6A-C16P1CE, FC6A-C16R1DE, FC6A-C16K1DE, FC6A-C16P1DE<br>FC6A-C16R4AE, FC6A-C16R4CE, FC6A-C16K4CE, F6A-C16P4CE, FC6A-C16R4DE, FC6A-C16K4DE, FC6A-C16P4DE                     |
| FC6A-C24X1XE         | FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C24P1CE, FC6A-C24K1CE<br>FC6A-C24R4AE, FC6A-C24R4CE, FC6A-C24P4CE, FC6A-C24K4CE   |
| FC6A-C40X1XE         | FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40P1CE, FC6A-C40K1CE, FC6A-C40R1DE, FC6A-C40P1DE, FC6A-C40K1DE<br>FC6A-C40R4AE, FC6A-C40R4CE, FC6A-C40P4CE, FC6A-C40K4CE, FC6A-C40R4DE, FC6A-C40P4DE, FC6A-C40K4DE                   |
| FC6A-C40X1XEJ        | FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40P1CEJ, FC6A-C40K1CEJ, FC6A-C40R1DEJ, FC6A-C40P1DEJ,<br>FC6A-C40K1DEJ, FC6A-C40R4AEJ, FC6A-C40R4CEJ, FC6A-C40P4CEJ, FC6A-C40K4CEJ, FC6A-C40R4DEJ,<br>FC6A-C40P4DEJ, FC6A-C40K4DEJ |
| FC6A-D16X1CEE        | FC6A-D16R1CEE, FC6A-D16R4CEE, FC6A-D16K1CEE, FC6A-D16K4CEE, FC6A-D16P1CEE, FC6A-D16P4CEE   |
| FC6A-D32X3CEE        | FC6A-D32K3CEE, FC6A-D32K4CEE, FC6A-D32P3CEE, FC6A-D32P4CEE   |

PLC selection is now complete. Next, create a ladder program.

## Create Program

### Create Ladder Program

This section describes the operating procedure to create a ladder program in WindLDR.

**Note:** For details about devices, see "Devices" on page 6-1. See the "Ladder Programming Manual" for details on basic and advanced instructions.

### Sample User Program

Create a simple program using WindLDR. The sample program performs the following operation:

When only input I0 is turned on, output Q0 is turned on.

When only input I1 is turned on, output Q1 is turned on.

When both inputs I0 and I1 are turned on, output Q2 flashes in 1-s increments.

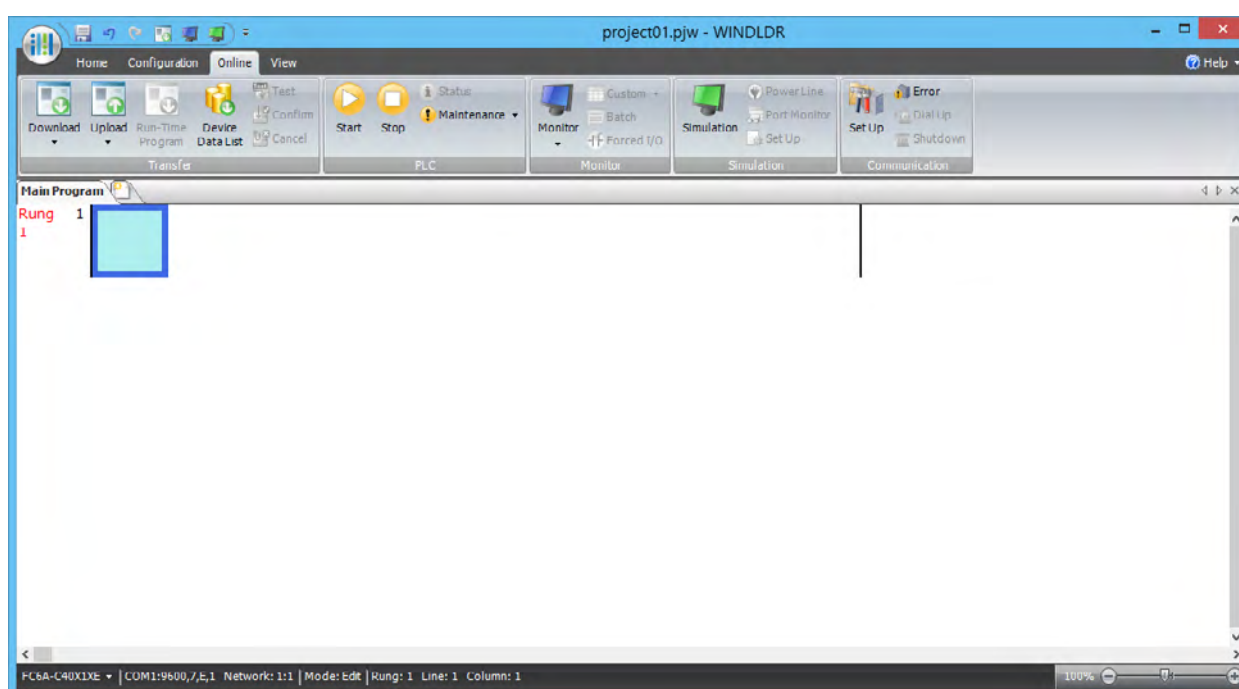
| Rung No. | Input I0 | Input I1 | Output Operation                     |
|----------|----------|----------|--------------------------------------|
| 1        | ON       | OFF      | Output Q0 is turned ON.              |
| 2        | OFF      | ON       | Output Q1 is turned ON.              |
| 3        | ON       | ON       | Output Q2 flashes in 1-s increments. |

**Note:** One collection of a group of instructions that control output or advanced instructions is called a rung. WindLDR manages programs in rung units. Function descriptions can be configured as rung comments for individual rungs.

### Start WindLDR

From the **Start** menu of Windows, select **Programs > IEC Automation Organizer > WindLDR**.

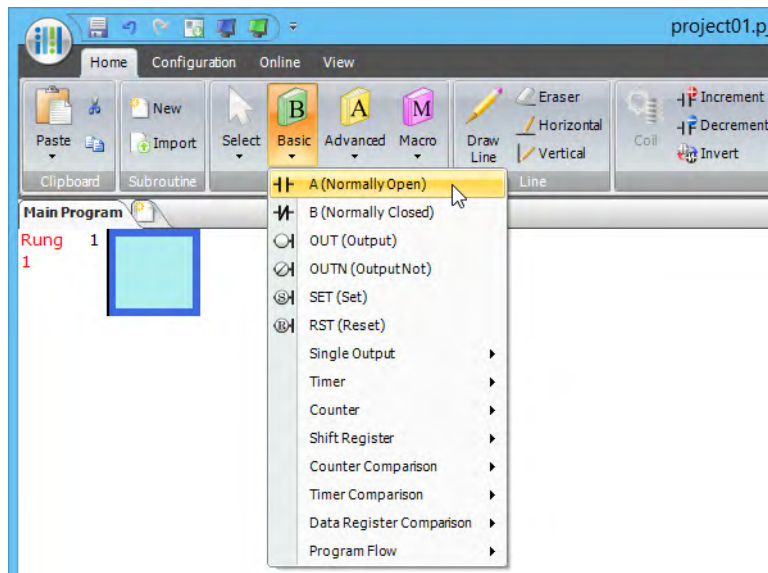
WindLDR starts and a blank ladder editing screen appears with menus and tool bars shown on top of the screen.



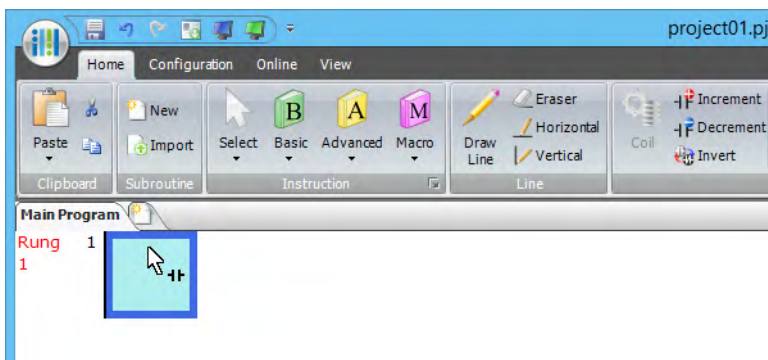
### Edit User Program Rung by Rung

Start the user program with the LOD instruction by inserting a NO contact of input I0.

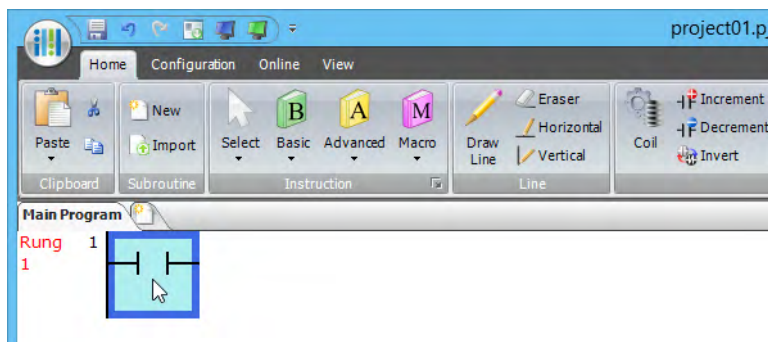
1. From the WindLDR menu bar, select **Home > Basic > A (Normally Open)**.



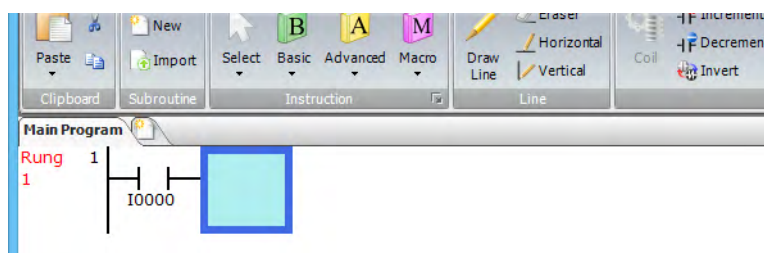
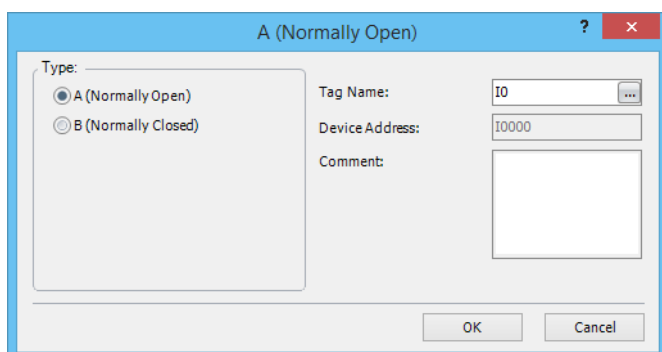
2. Move the mouse pointer to the first column of the first line where you want to insert a NO contact, and click the left mouse button.



3. Double-click **Normally Open**.  
The **A (Normally Open)** dialog box is displayed.



4. Enter **I0** in the **Tag Name** field, and click **OK**.



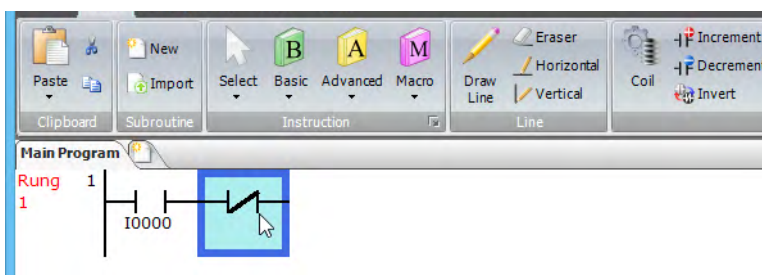
**Note:**

- To enter an NO contact from the right-click menu, right-click at the location to insert the NO contact, and on the right-click menu, click **Basic Instructions (B)**, then **A (Normally Open)**.
- To enter an NO contact from the keyboard, press **A** to display the **Coil Selection** dialog box. Select **A (Normally Open)**, and then press **[Enter]** (Enter).

A NO contact of input I0 is programmed in the first column of the first ladder line.

Next, program the ANDN instruction by inserting a NC contact of input I1.

- From the WindLDR menu bar, select **Home > Basic > B (Normally Closed)**.
- Move the mouse pointer to the second column of the first ladder line where you want to insert a NC contact, and click the left mouse button.
- Double-click **Normally Closed**.  
The **B (Normally Closed)** dialog box is displayed.



8. Enter **I1** in the Tag Name field, and click **OK**.

An NC contact of input I1 is programmed in the second column of the first ladder line.

At the end of the first ladder line, program the OUT instruction by inserting a NO coil of output Q0.

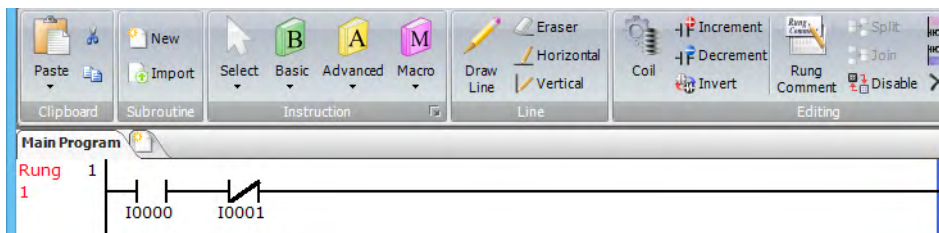
- From the WindLDR menu bar, select **Home > Basic > OUT (Output)**.
- Move the mouse pointer to the third column of the first ladder line where you want to insert an output coil, and click the left mouse button.

**Note:** Another method to insert an instruction (either basic or advanced) is to type the instruction symbol, OUT, where you want to insert the instruction.

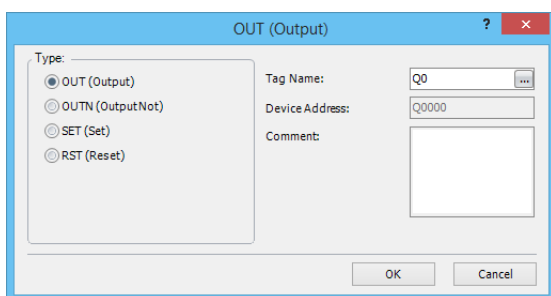
## 4: OPERATION BASICS

### 11. Double-click **Output**.

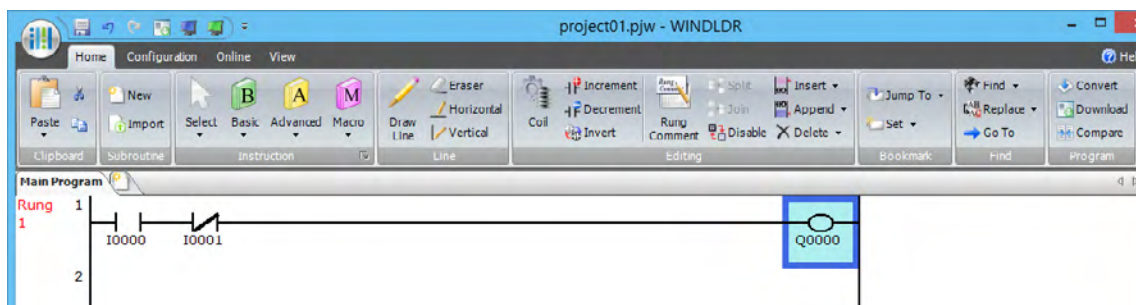
The **Out (Output)** dialog box is displayed.



### 12. Enter **Q0** in the Tag Name field, and click **OK**.



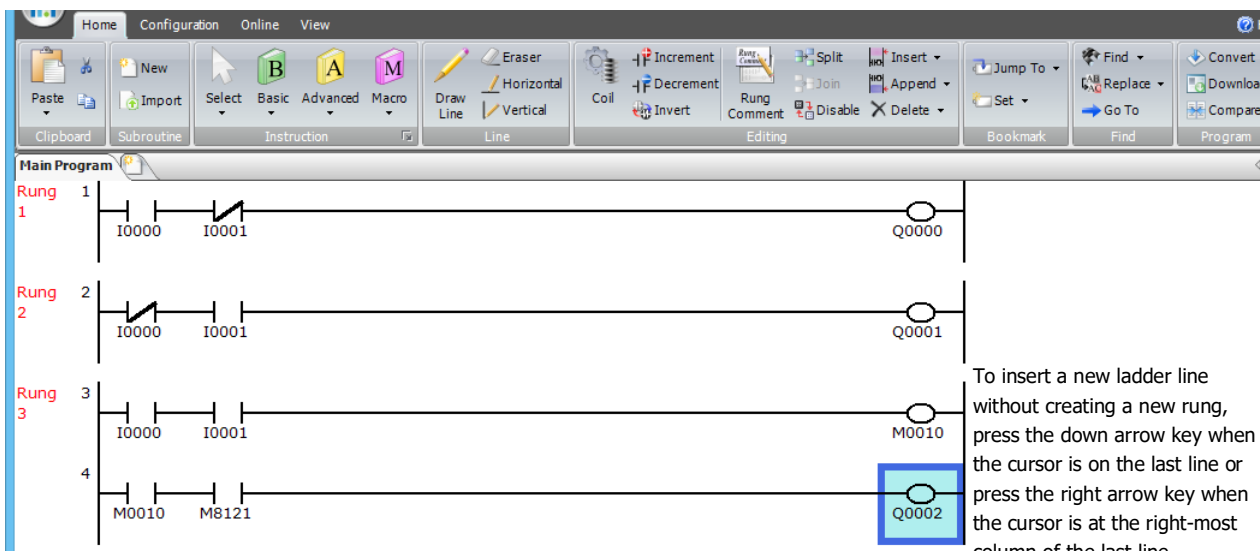
A NO output coil of output Q0 is programmed in the right-most column of the first ladder line. This completes programming for rung 1.



Continue programming for rungs 2 and 3 by repeating similar procedures.

A new rung is inserted by pressing the **Enter** key while the cursor is on the preceding rung. A new rung can also be inserted by selecting **Home > Append > Append a Rung**.

When completed, the ladder program looks like below.



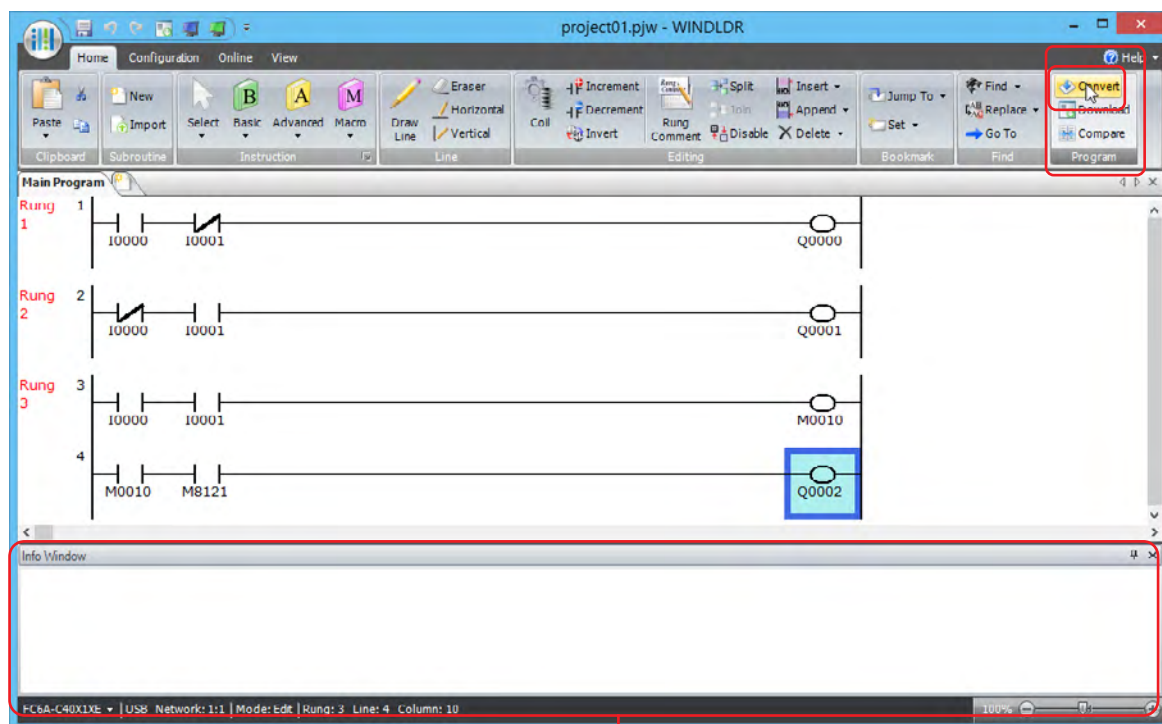
To insert a new ladder line without creating a new rung, press the down arrow key when the cursor is on the last line or press the right arrow key when the cursor is at the right-most column of the last line.

## Convert Program

The program can be checked whether it contains any user program syntax error.

From the menu bar, select **Home > Convert (Program group)**.

When the instruction/FB symbols are connected correctly, the program conversion is completed successfully. If any error is found, the errors are listed on the Info Window. Then, make corrections as necessary.



Info Window



### Protect Project

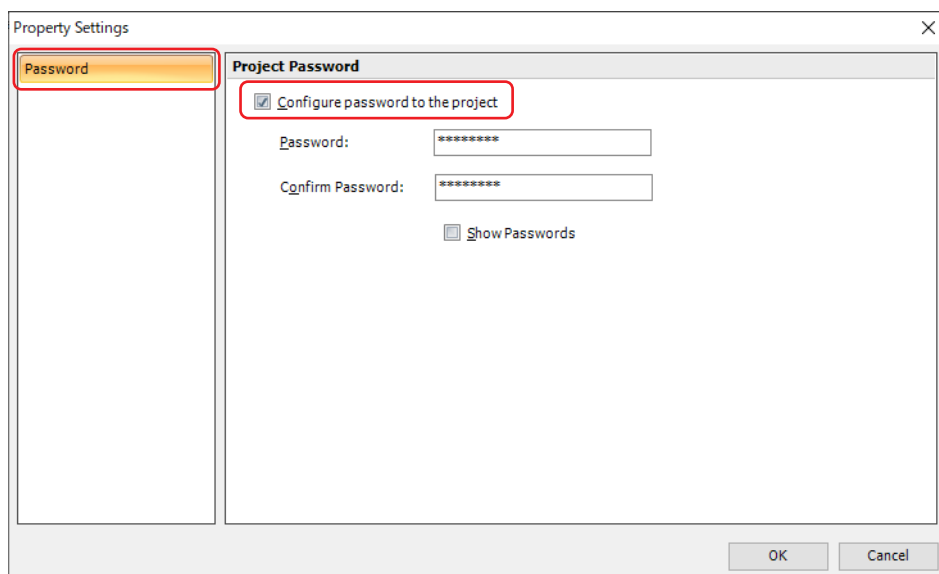
The ladder program created in WindLDR is managed as a project file.

You can set a password for your project and save it to protect the project file from being viewed or edited by a third party. This section describes the operating procedure to set a password to a project.

1. Click  (application) button > **Property**.

The **Property Settings** dialog box appears.

2. Click the **Password** tab, and in the **Project Password** group, select the **Configure password to the project** check box.



3. Set a password.

**Note:**

- The length of the password is 4 to 15 characters.
- Use the **Show Passwords** check box to show or hide the password. When the **Show Passwords** check box is selected, the set password is displayed.
- Manage the password appropriately so that third parties do not know it. If you forget the password of a project, you can no longer open that project file.
- A project with a password can only be downloaded to the CPU module with the following system software versions.

| CPU module                      | System Software       |
|---------------------------------|-----------------------|
| All-in-One CPU module           | Version 2.40 or later |
| CAN J1939 All-in-One CPU module |                       |
| Plus CPU module                 | Version 2.00 or later |

4. Click **OK**.


This concludes configuring the settings.

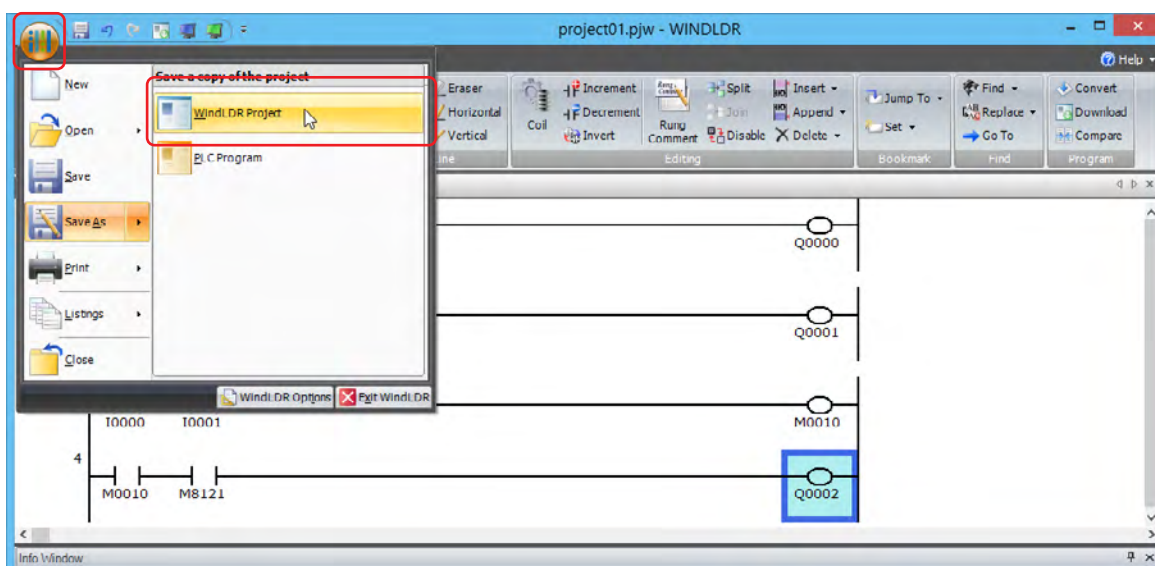


## Save Project

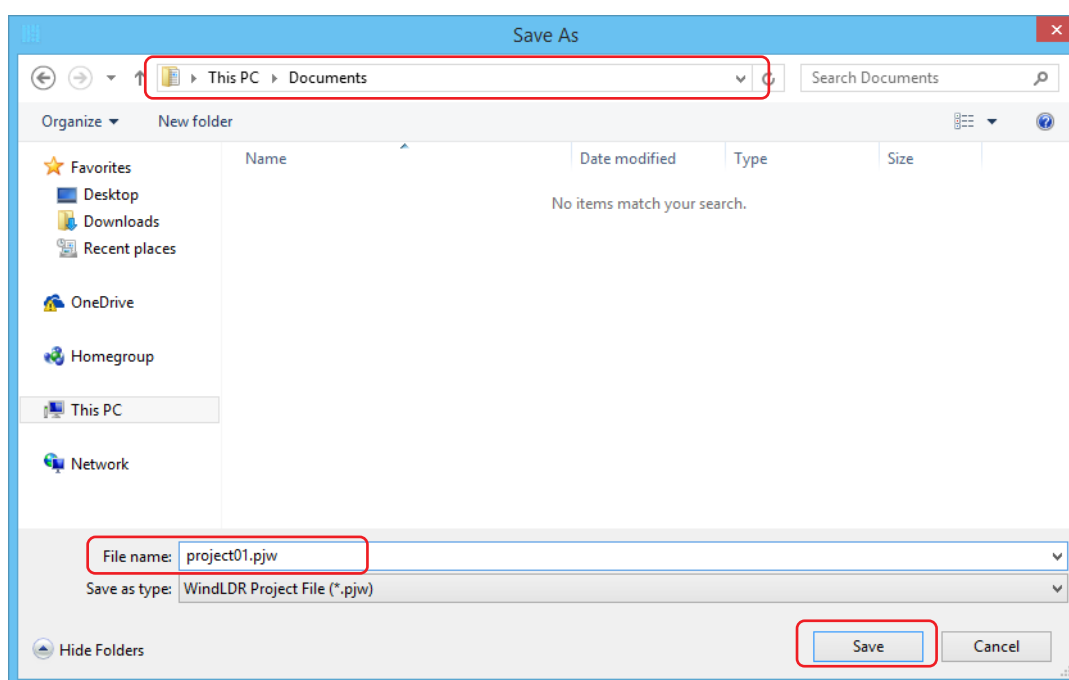
This section describes the operating procedure to save the created ladder program as a project file.

1. Save the current project with a new name.

Click  (application) button > **Save As** > **WindLDR Project**.



2. Enter the file name in **File name**, specify the folder to save to, and click **Save**.

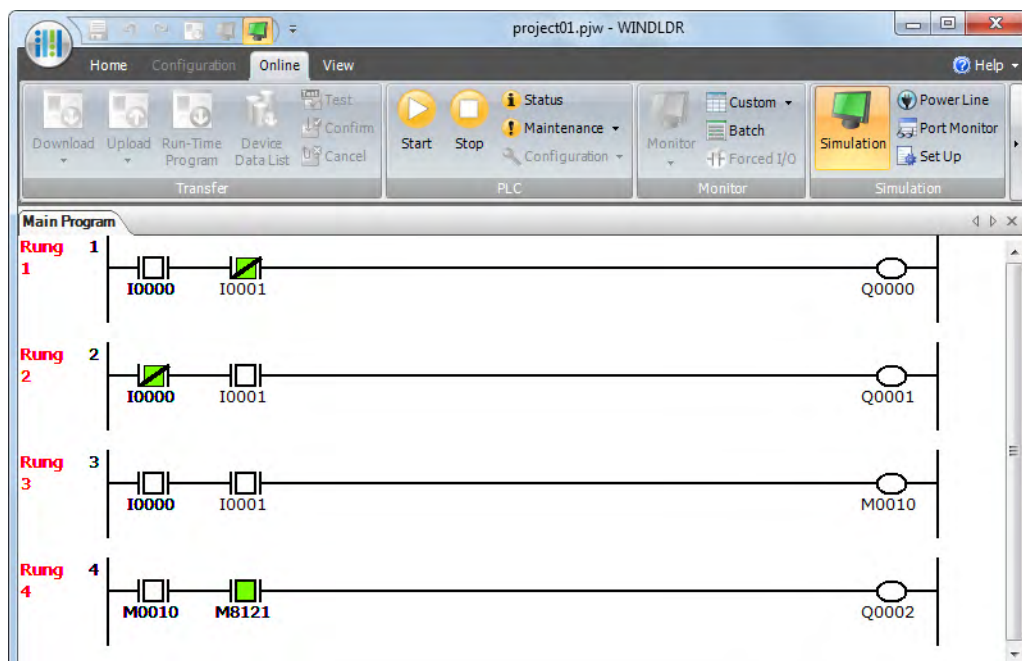


This completes the procedure to save a project to a file.

**Note:** The saved file is called a project file. The extension is ".pjw".

### Simulate Operation

This section describes the operating procedure to check the operation of the user program before transferring it to the FC6A. From the WindLDR menu bar, select **Online** > **Simulation**. The Simulation screen appears.



Select and right-click the input contact you want to change, and on the right-click menu, click **Set** or **Reset**.

To quit simulation, from the WindLDR menu bar, select **Online** > **Simulation**.

#### Notes:

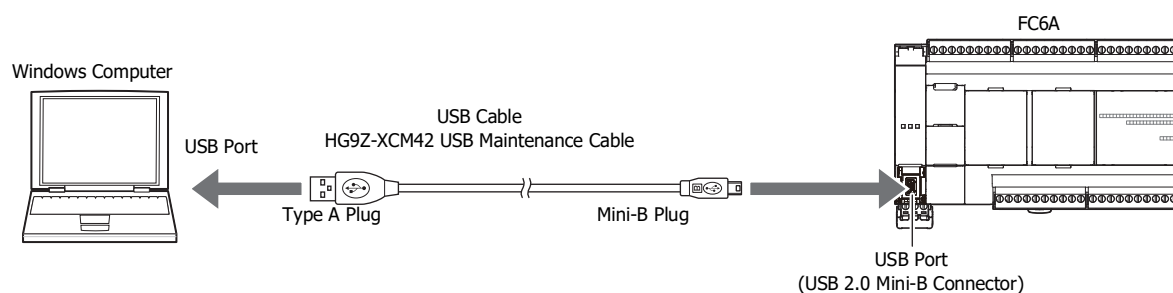
- You can also change the status of an input contact by double-clicking it.
- To quit simulation, from the WindLDR menu bar, once more select **Online** > **Simulation** > **Simulation**.

## Download Program

While WindLDR is running on a PLC, you can download the user program to the FC6A.

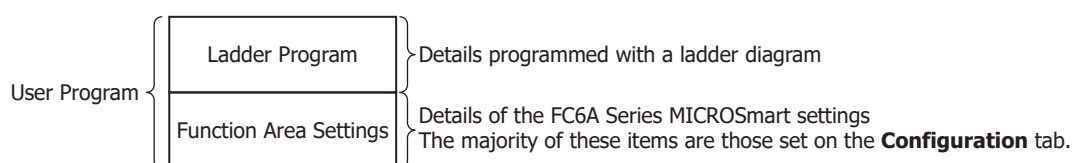
User programs can be downloaded to the FC6A from WindLDR using USB or Ethernet.

This section describes the operating procedure from configuring communication settings to downloading the user program using a USB connection as an example.

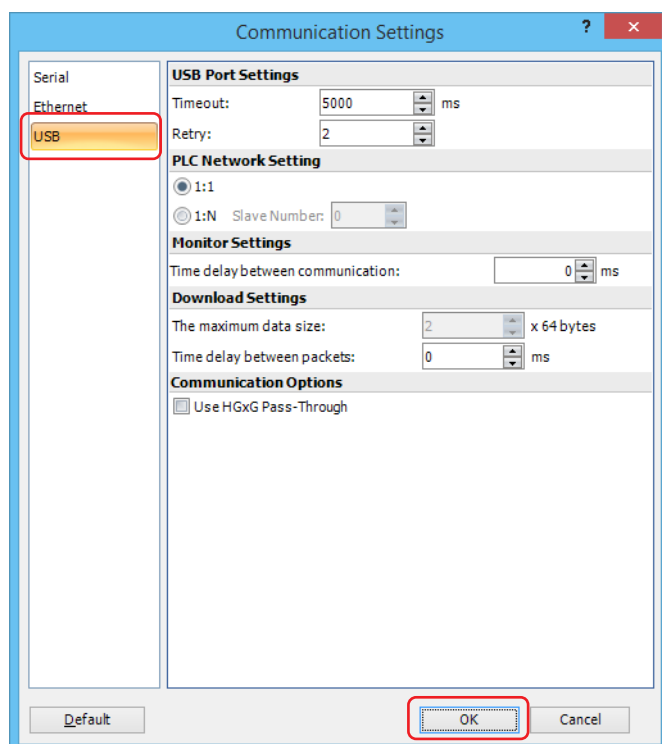


### Notes:

- In order for WindLDR to communicate with the FC6A via USB, a dedicated USB driver must be installed on the computer. For details, see "How to install USB driver". Click ▼ to the right of the icon ⓘ at the top right corner of the WindLDR window and click **How to install USB driver** to display **How to install USB driver**.
- A user program is a combination of a ladder program and the setting details (Function Area Settings).



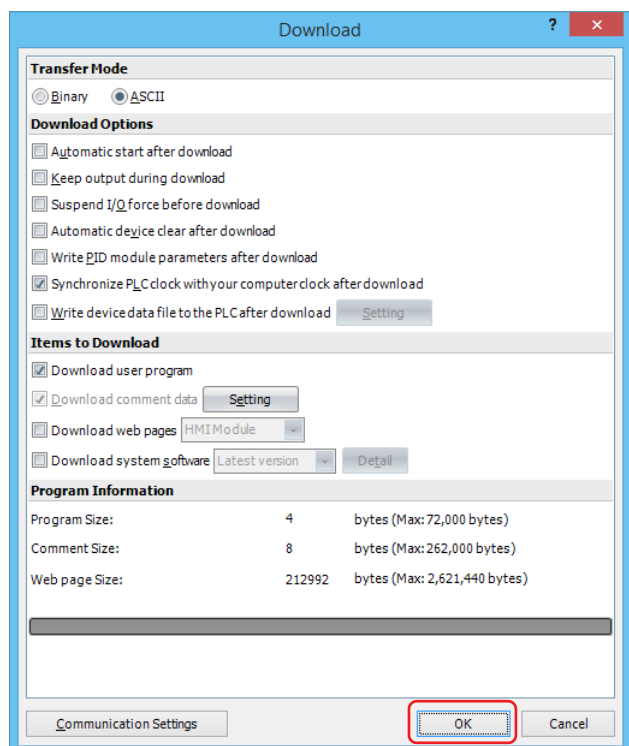
1. From the WindLDR menu bar, select **Online > Set Up**.  
The **Communication Settings** dialog box is displayed.
2. Click the **USB** tab and then click **OK**.



The communication method is now set to USB. Next, download a user program.

## 4: OPERATION BASICS

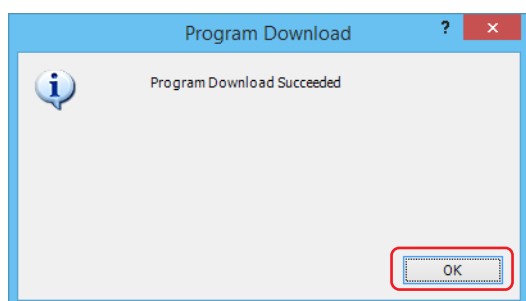
3. From the WindLDR menu bar, select **Online > Download**. The **Download** dialog box appears, then click **OK**. The user program is downloaded to the FC6A.



**Note:** The Download dialog box can also be opened by selecting **Home > Download**.

**Note:** When downloading a user program, all values and selections in the Function Area Settings are also downloaded to the FC6A. For details on function settings, see "Functions and Settings" on page 5-1.

When the following message appears, the download has completed successfully. Click **OK**.



**Notes:**

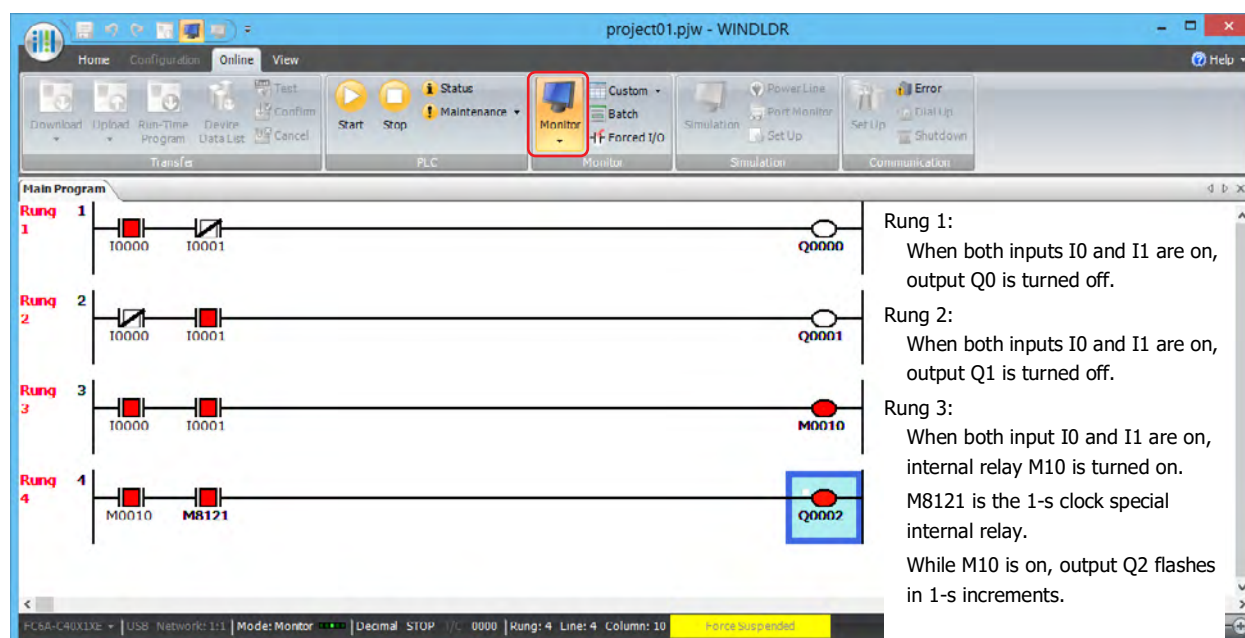
- The PLC will not run if the function switch is 0 when **Run/Stop PLC by Function Switch** is enabled in WindLDR and a program is downloaded with **Automatic start after download** enabled.  
To run the PLC, the function switch must be set to 1.
- Enabled is the default setting for **Run/Stop PLC by Function Switch** in WindLDR.

## Monitor Operation

Another powerful function of WindLDR is to monitor the PLC operation on the computer. The input and output statuses of the sample program can be monitored in the ladder diagram.

From the WindLDR menu bar, select **Online > Monitor > Monitor**.

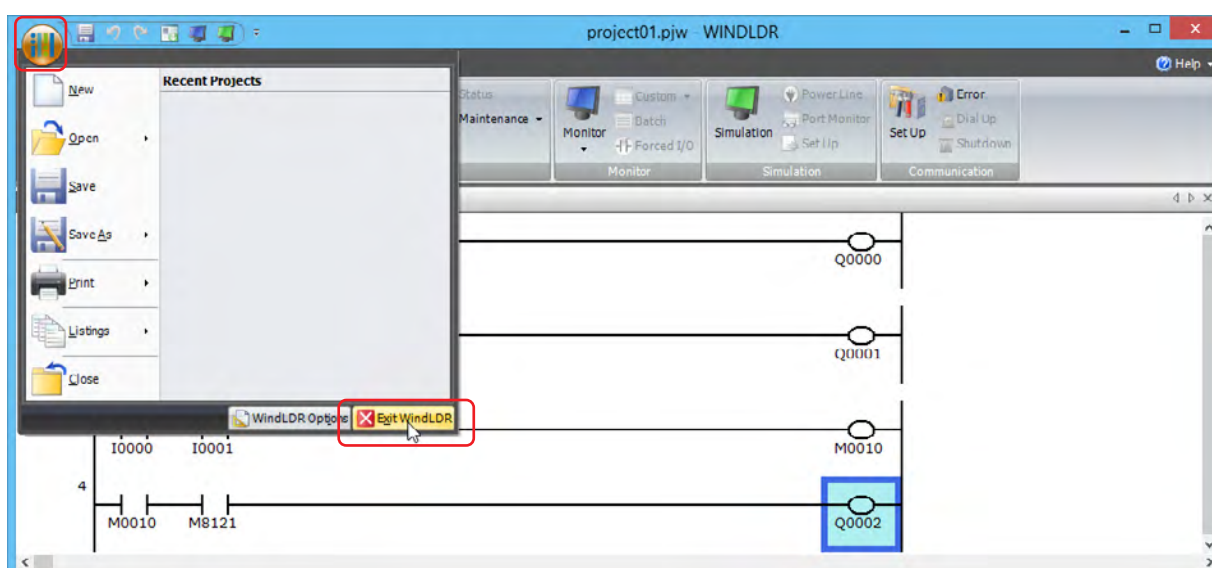
When both inputs I0 and I1 are on, the ladder diagram on the monitor screen looks as follows:



## Exit WindLDR

This section describes the operating procedure to exit WindLDR.

When you have completed monitoring, you can exit WindLDR either directly from the monitor screen or from the editing screen. In both cases, from the WindLDR application button, click **Exit WindLDR**.



Windows Displayed in the Workspace

This section describes how to change the position and display method of windows.

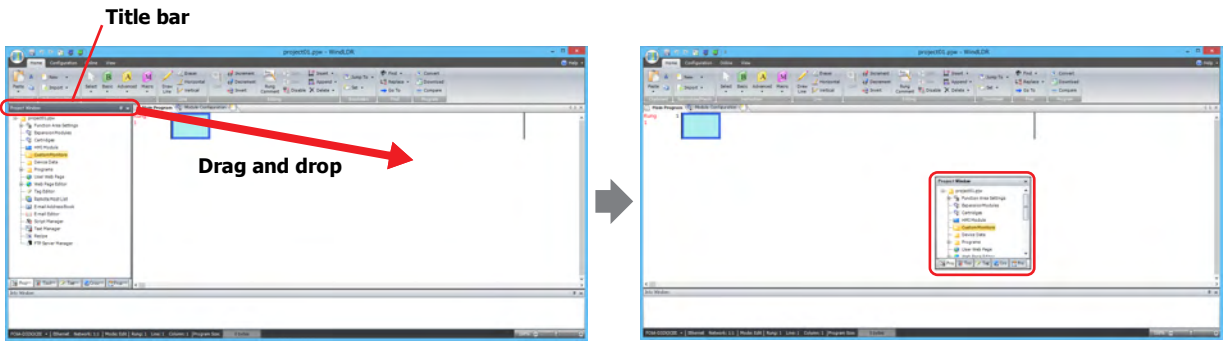
Changing the position of windows

You can change the display position of the window by dragging and dropping the title bar of the window or its tab to disable docking. Windows that are not docked are called floating windows.

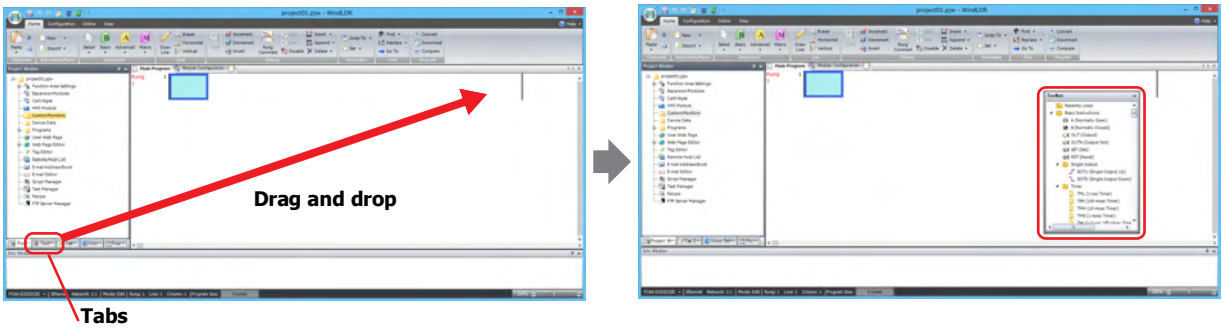
Disabling docking

This section describes how to disable the docking of a title bar or tab of a window.

- If you drag the title bar of the workspace window, you can move all the docked windows together.




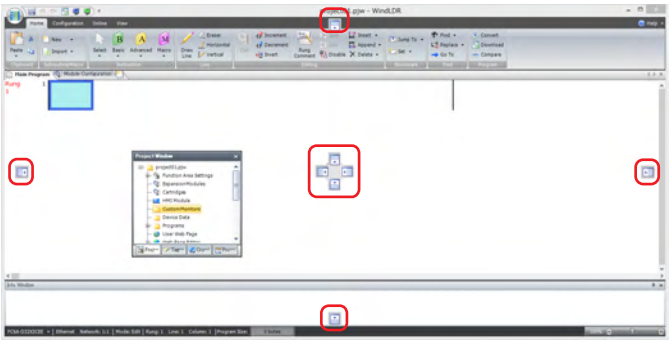
- If you drag the tab of a workspace window, you can move just the selected window.




Docking windows

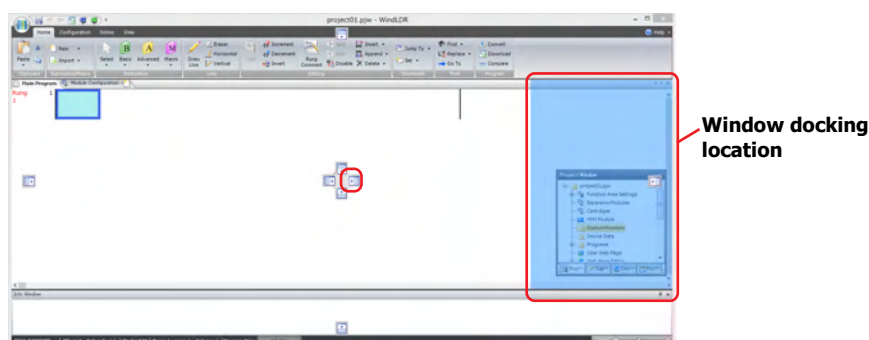
This section describes how to dock a floating window to another window or the frame at the top, bottom, left, and right sides of WindLDR.



1. Drag the window's title bar or tab.  
The  (Docking) icon is displayed.

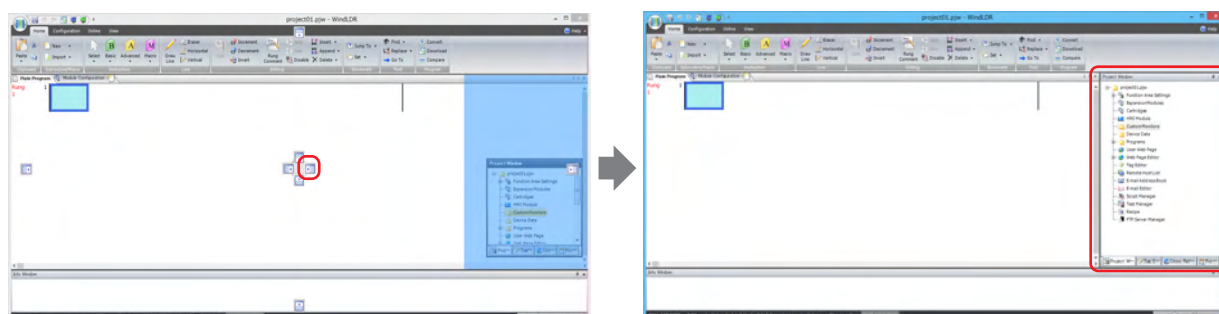





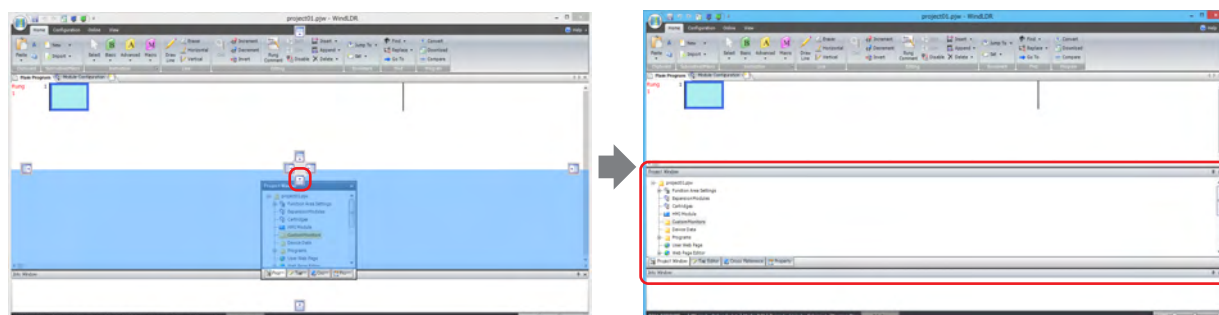
**Note:** When the mouse cursor gets close to a  (Docking) icon while dragging the title bar or tab, the location to dock the window is displayed.





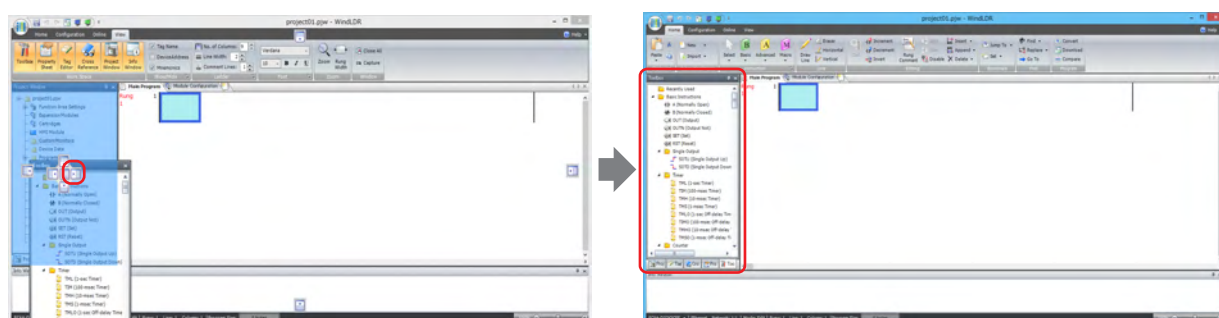
2. Drop the title bar or tab on the  (Docking) icon to dock that window to WindLDR's left, right, top, or bottom frame or a separate window.
  - If the workspace window is dropped on the  (Docking) icon, it is docked to WindLDR's left, right, top, or bottom frame.



- If a floating window is dropped on the  (Docking) icon, it is docked to WindLDR's left, right, top, or bottom frame or a docked window.




- If you put the mouse cursor on another window while dragging a floating windows title bar, the  (Docking) icon is displayed. Drop the title bar on the  (Docking) icon to dock the floating window to that window. Change the displayed window with the tabs.

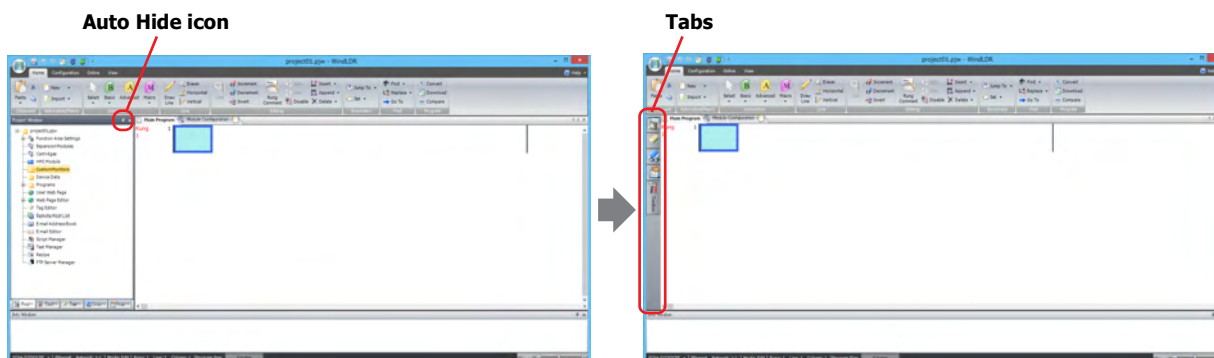


## 4: OPERATION BASICS

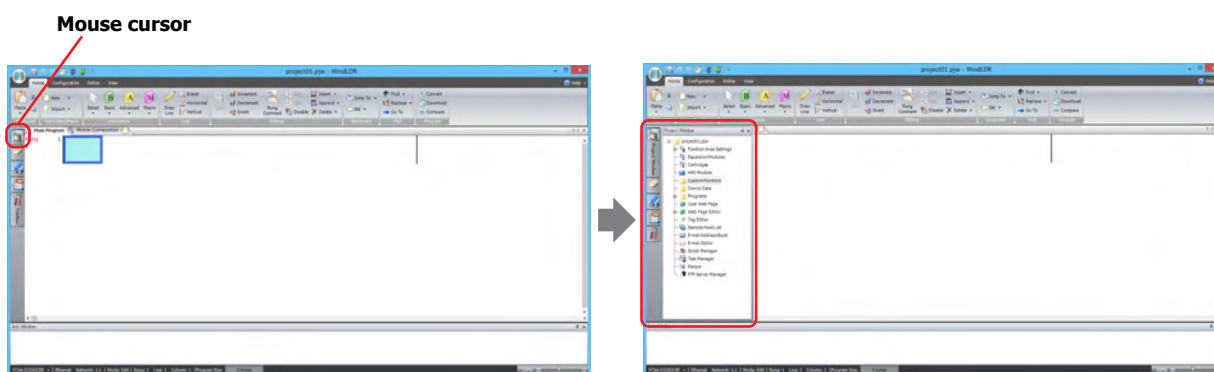
### Changing the display method of windows

If the workspace window is docked, you can change the window to automatically hide and show only its tabs.



- Click the  (Auto Hide) icon to change the window to show only its tabs.



- The window is displayed when you bring the mouse cursor close to the tabs.




#### Notes:

- Click  (Auto Hide) to secure the window in place.
- Click  (Close) to close the window.

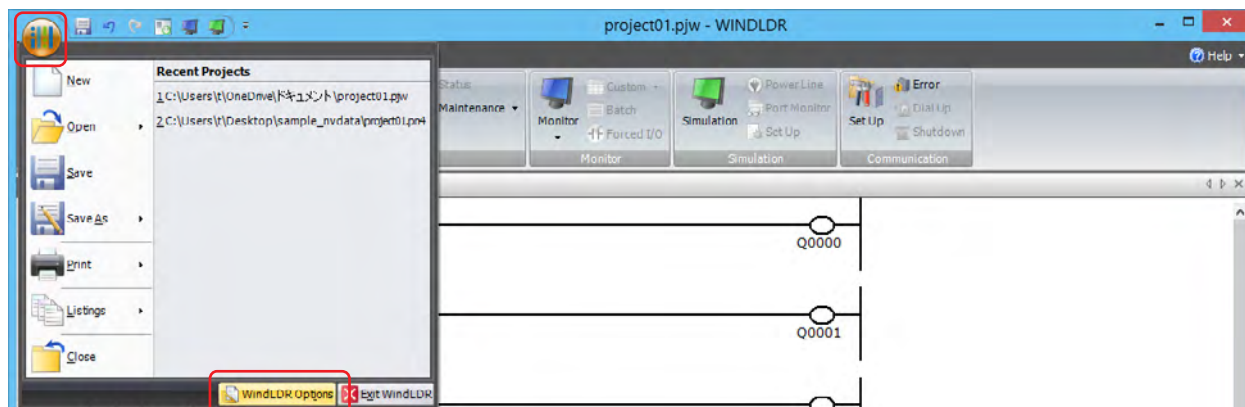


## Checking the WindLDR Version Number

This section describes how to check the WindLDR version.

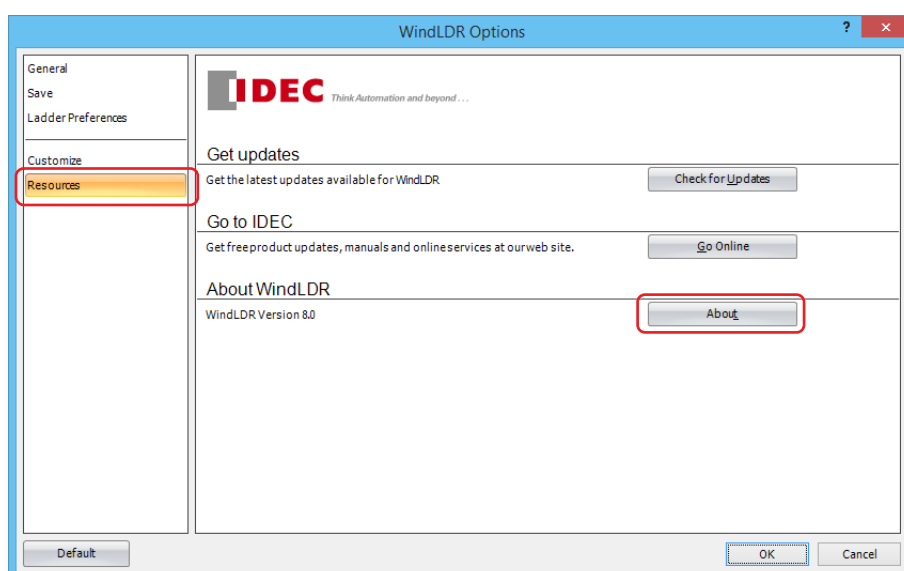
1. Click  (application) button > **WindLDR Options**.

The **WindLDR Options** dialog box appears.



2. Click the **Resources** tab, and then click **About**.

The **About WindLDR** dialog box appears.



You can check the WindLDR version. When finished, click **OK**.



**Note:** When using the FC6A, use the following versions of WindLDR.

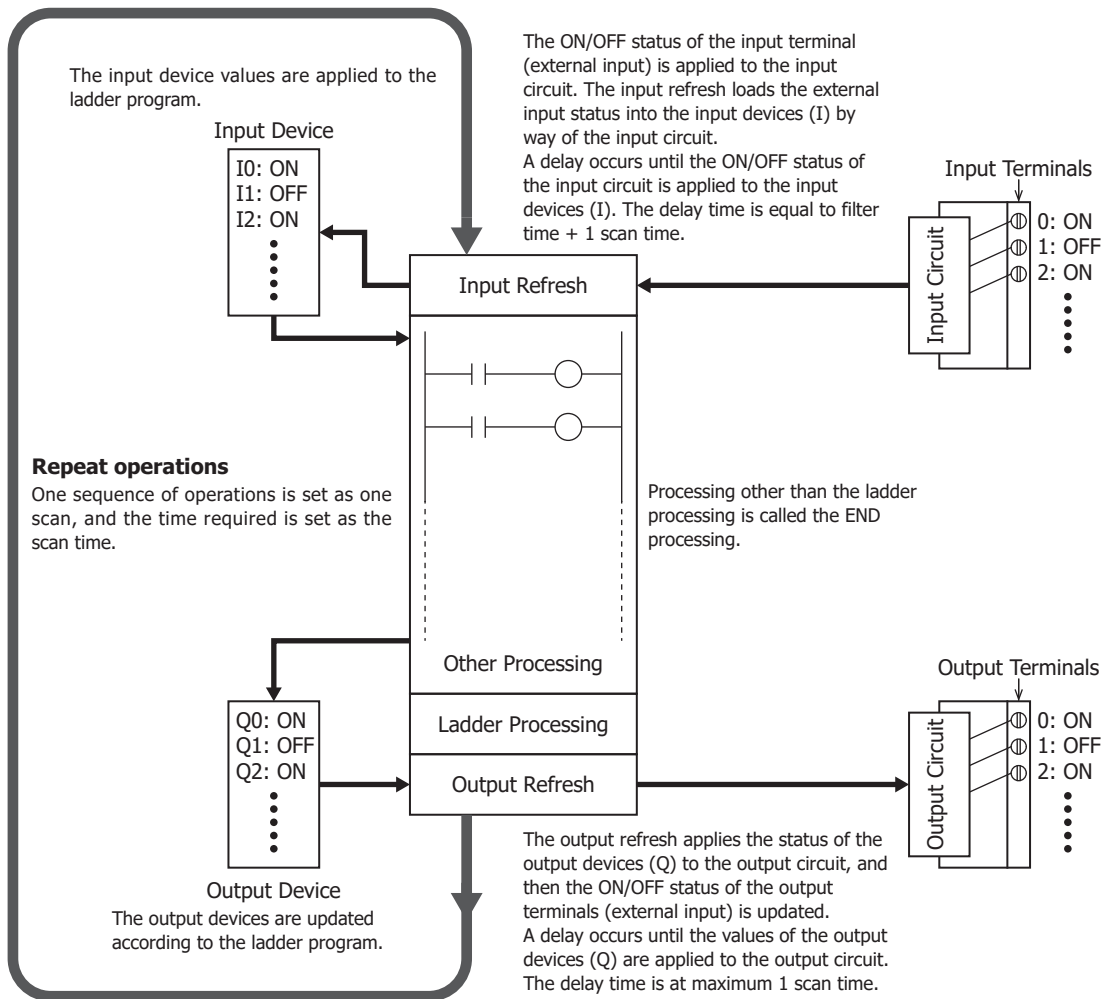
- All-in-One CPU module/CAN J1939 All-in-One CPU module: WindLDR version 8.0.0 or later
- Plus CPU module: WindLDR version 8.6.0 or later

If you are using a version of WindLDR that does not meet this condition, click **Check for Updates** on the **Resources** tab to obtain the latest version of WindLDR.

This concludes the procedure for checking the WindLDR version.

### Ladder Program Operation

The FC6A performs the following operations to process ladder programs.



#### Notes:

- The delay time of the hardware is added to the actual input and output delay times. For details on the hardware input/output delay times, see "Product Specifications" on page 2-1.
- The filter time differs depending on the input used.
  - When the input is a CPU module input (I0 to I27) See the input filter time configured in the WindLDR **Function Area Settings**. The initial value is 3 ms.
  - When the input is an expansion input (I30 or greater) There is no filter time.

## Start/Stop Operation

This section describes how to run and stop the FC6A.



### Caution

Make sure of safety before starting and stopping the FC6A. Incorrect operation of the FC6A may cause machine damage or accidents.

You can start and stop FC6A operations by using WindLDR operations, FC6A operations, function switch operations, menu operations using an HMI module, by turning the FC6A on or off, or by using the stop/reset input function by way of external input.

- For operations using WindLDR, see "Start/Stop Operation Using WindLDR" on page 4-19.
- For operations using the FC6A power supply, see "Start/Stop Operation Using the Power Supply" on page 4-20.
- For operations using the function switch, see "Function Switch Configuration" on page 5-10.
- For operations using an HMI module, see "HMI Function" on page 7-1.
- For the stop input settings, see "Stop Input" on page 5-5.
- For the reset input settings, see "Reset Input" on page 5-5.

The switch from start to stop is performed during the END processing of the user program, and the following functions are also stopped when the user program is stopped. For details on END processing, see the appendix "Breakdown of END Processing Time" in the "Ladder Programming Manual".

High-speed counter/frequency measurement/user interrupt/catch input/timer interrupt/user communication/pulse output

- You can use M8025 (Maintain Outputs While Stopped) to select whether to maintain or clear the outputs while the CPU is stopped.  
For details on M8025 (Maintain Outputs While Stopped), see "M8025: Maintain Outputs While Stopped" on page 6-10.
- The current value of the timer instruction is reset.  
For details on timer instructions, see Chapter 4 "TML (1-s Timer)" in the "Ladder Programming Manual".

Also, when you switch from stop to start, the device status is cleared or kept depending on **Memory Backup** in the **Function Area Settings**. For details, see "Memory Backup" on page 5-12.

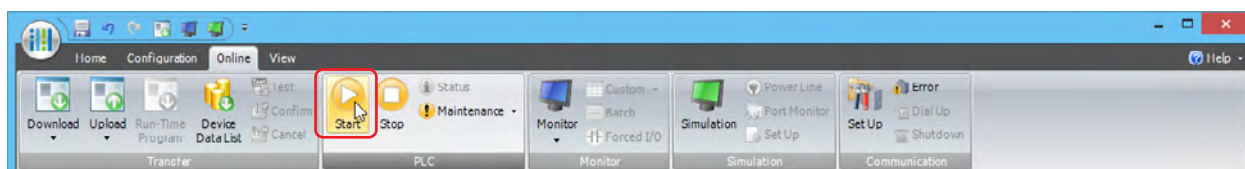
## Start/Stop Operation Using WindLDR

The FC6A can be started and stopped using WindLDR run on a Windows computer connected to the FC6A. When the **Start** button is pressed in the menu bar shown below, start control special internal relay M8000 is turned on to start the FC6A. When the **Stop** button is pressed, M8000 is turned off to stop the FC6A.

1. Connect the computer to the FC6A, start WindLDR, and power up the FC6A.
2. Check that a stop input is not designated using **Configuration > Run/Stop Control > Stop and Reset Inputs**. See "Stop Input and Reset Input" on page 5-5.

**Note:** When a stop input is designated, the FC6A cannot be started or stopped by turning start control special internal relay M8000 on or off.

3. Select **Online** from the WindLDR menu bar.  
The Online tab appears.



4. Click the **Start** button to start operation, then the start control special internal relay M8000 is turned on.
5. Click the **Stop** button to stop operation, then the start control special internal relay M8000 is turned off.  
The PLC operation can also be started and stopped while WindLDR is in the monitor mode. Select **Online > Monitor > Monitor** and click the **Start** or **Stop** button.

**Note:** Special internal relay M8000 is a keep type internal relay and stores the status when the power is turned off. M8000 retains its previous status when the power is turned on again. However, when the backup battery is dead, M8000 loses the stored status, and can be turned on or off as programmed when the FC6A is powered up. The selection is made in **Configuration > Run/Stop Control > Run/Stop Selection at Memory Backup Error**. See "Run/Stop Selection at Keep Data Error" on page 5-8.

### **Start/Stop Operation Using the Power Supply**

The FC6A can be started and stopped by turning power on and off.

1. Power up the FC6A to start operation.
2. Turn power on and off to start and stop operation.

# 5: FUNCTIONS AND SETTINGS

## Introduction

This chapter describes the FC6A's special functions and convenient functions that you should know about in using the WindLDR (Windows compatible) PLC programming software.

## Function List

The FC6A supports many functions in addition to instructions.

For functions that require advanced setup including the high-speed counters, user program protection functions, and Ethernet communication functions, first configure those settings in the **Function Area Settings** dialog box, and then download the user program to the FC6A.

| Function Name                         | Overview   | Reference |
|---------------------------------------|--|-----------|
| Stop input                            | The FC6A can be started/stopped with a specified input.  | 5-6       |
| Reset input                           | The device values of the FC6A can be cleared with a specified input.   | 5-6       |
| Run/stop selection at keep data error | This function specifies the user program operating state (run/stop) when the FC6A power is turned on when the backup battery has died.                             | 5-8       |
| Run/stop selection at power up        | Whether to start or stop the FC6A regardless of the M8000 status when the FC6A is powered up can be specified.   | 5-9       |
| Function switch configuration         | This function configures the operation when the FC6A function switch is used.  | 5-10      |
| Memory backup                         | Whether to clear or keep the device values, such as counter current values, when the FC6A starts running can be specified.   | 5-12      |
| High-speed counter                    | The high-speed counters can be used to count input pulses from rotary encoders or proximity switches regardless of the scan time.                                  | 5-14      |
| Catch input                           | The catch input can be used to receive short pulses from sensors regardless of the scan time.  | 5-34      |
| Interrupt input                       | When a quick response to an external input is required, such as in positioning control, the interrupt input can call a subroutine to execute an interrupt program. | 5-36      |
| Frequency measurement                 | The pulse frequency of input signals to input terminals can be counted regardless of the scan time.  | 5-39      |
| Input filter                          | The input filter rejects short input pulses when the FC6A is used with input signals containing noises.  | 5-41      |
| Analog voltage input                  | Analog voltage input, such as input from pressure sensor, can be read and stored in special data register as digital value.  | 5-43      |
| Analog potentiometer                  | This function changes the analog value used in a user program with the FC6A's analog potentiometer.  | 5-45      |
| Timer interrupt                       | When executing the same program repeatedly regardless of the scan time is required, the timer interrupt can call a subroutine at specified time interval.          | 5-47      |
| Forced I/O function                   | The inputs or outputs of the FC6A can forcibly be turned on or off regardless of the actual inputs and outputs status.   | 5-49      |
| External memory devices               | Configure the CSV file format of the log data to save to the SD memory card.   | 5-53      |
| Log data file size                    | The maximum file size of the log data that is saved to the SD memory card can be configured.   | 5-54      |
| 32-bit data storage setting           | The order of upper and lower words for 32-bit data can be specified.   | 5-55      |
| User program protection               | The user program in the FC6A can be protected with a password against the user program upload or download.   | 5-57      |
| Watchdog timer settings               | The watchdog timer monitors the FC6A operation and the watchdog time preset value can be changed.  | 5-60      |
| Constant scan time                    | The scan time of the FC6A can be made constant by specifying the constant scan time.   | 5-61      |
| Time Zone                             | This function sets the time zone as the difference between the FC6A internal clock and Universal Coordinated Time (UTC).   | 5-62      |
| Daylight savings time                 | The internal clock of the FC6A can automatically be adjusted according to the configured daylight saving time period.  | 5-63      |
| Clock function                        | The FC6A can operate according to the current date and time and be used in applications, such as lighting or air conditioning.                                     | 5-64      |
| Battery monitor                       | This function monitors the voltage of the backup battery.  | 5-67      |
| USB boot                              | This function starts the FC6A with only USB bus power (5 V).   | 5-69      |
| User program capacity                 | This function selects the FC6A user program capacity.  | 5-71      |
| Online Edit                           | This function rewrites the user program without stopping FC6A operation.   | 5-72      |
| Initialize PLC                        | This function initializes the CPU module to the factory default settings.  | 5-79      |

## 5: FUNCTIONS AND SETTINGS

| Function Name       | Overview  | Reference            |
|---------------------|---|----------------------|
| Communication port  | Configures the communication methods and ports for the connected devices.   | Communication Manual |
| Network settings    | Configures information for connecting the FC6A to a network.  |                      |
| Network management  | Configures SNTP settings and the PING instruction timeout time.   |                      |
| Connection settings | Communication mode and parameters for the Ethernet communication can be configured for each connection so that the FC6A can communicate with other network devices over the Ethernet. | *1                   |
| Ethernet Port 1     | Configures Ethernet port 1 and the functions that use Ethernet port 1.  |                      |
| Ethernet Port 2     | Configures Ethernet port 2 and the functions that use Ethernet port 2.  |                      |

\*1 For BACnet/IP communication, EtherNet/IP communication, and MQTT communication, see the "Network User's Manual". For other functions and settings, see the "FC6A Series MICROSmart Communication Manual".

Each communication setting is made in the dialog box for each communication function.

Each dialog box is displayed in the following steps.

| Communication             | Steps   |
|---------------------------|---|
| BACnet/IP communication   | <ol style="list-style-type: none"> <li>1. On the <b>Configuration</b> tab, in the <b>Function Area Settings</b> group, click <b>Ethernet Port 1</b>.</li> <li>2. The <b>Function Area Settings dialog</b> box is displayed. Under BACnet/IP settings, select the <b>Enable BACnet/IP</b> check box and click <b>Configure</b>.</li> </ol>     |
| EtherNet/IP communication | <ol style="list-style-type: none"> <li>1. On the <b>Configuration</b> tab, in the <b>Function Area Settings</b> group, click <b>Ethernet Port 2</b>.</li> <li>2. The <b>Function Area Settings dialog</b> box is displayed. Under EtherNet/IP settings, select the <b>Enable EtherNet/IP</b> check box and click <b>Configure</b>.</li> </ol> |
| MQTT communication        | <ol style="list-style-type: none"> <li>1. On the <b>Configuration</b> tab, in the <b>Function Area Settings</b> group, click <b>Ethernet Port 1</b>.</li> <li>2. The <b>Function Area Settings dialog</b> box is displayed. Under MQTT settings, click <b>Configure</b>.</li> </ol>   |

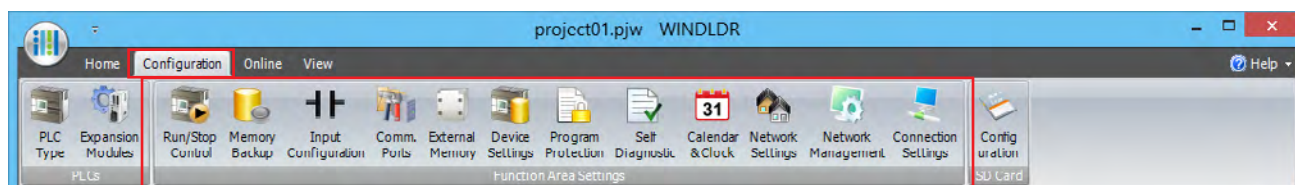
## Function Area Settings

This section describes the function area settings that configure the environment settings for using the FC6A, such as the operation when starting the FC6A and the communication ports.

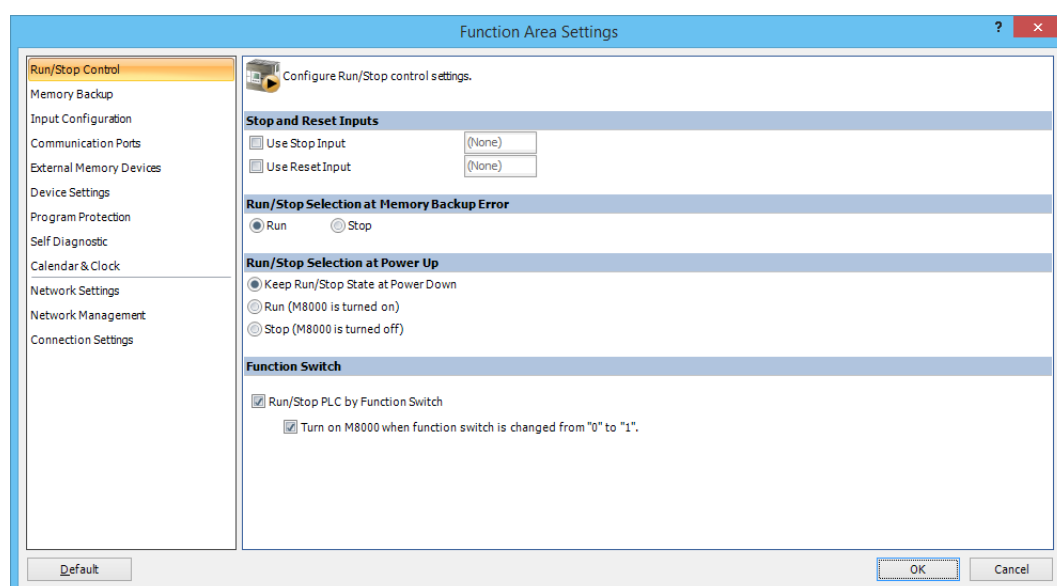
The function area settings are configured on the **Function Area Settings** dialog box in the WindLDR PLC programming software (Windows compatible).

### Displaying the Dialog Box

To display the **Function Area Settings** dialog box, on the **Configuration** tab, in the **Function Area Settings** group, click a configuration item.



The **Function Area Settings** dialog box is displayed with the selected configuration item.



### Configuration Items and Functions

The function area settings configuration items and functions are as follows.

|                  |  |
|------------------|--|
| Run/Stop Control | <p>Configure the following run/stop control settings.</p> <ul style="list-style-type: none"> <li>• Stop input</li> <li>• Reset input</li> <li>• Run/stop selection at memory backup error</li> <li>• Run/stop selection at power up</li> <li>• Function switch configuration</li> </ul>  |
| Memory Backup    | <p>These functions keep or clear devices (the contents of memory) when a user program starts operation (RUN).</p> <p>The following devices can be configured to be kept or cleared.</p> <ul style="list-style-type: none"> <li>• Internal relays</li> <li>• Shift registers</li> <li>• Counters</li> <li>• Data registers</li> </ul> |

## 5: FUNCTIONS AND SETTINGS

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|                                  |  |
|----------------------------------|--|
| Input Configuration              | <p>These settings configure special input functions such as the external input filter values and high-speed counters.</p> <ul style="list-style-type: none"><li>• High-speed counter</li><li>• Catch input</li><li>• Interrupt input</li><li>• Frequency measurement</li><li>• Input filter</li><li>• Analog voltage input</li><li>• Analog input</li><li>• Timer interrupt</li></ul>  |
| Communication Ports              | <p>These settings configure the FC6A communication ports that communicate with external devices.</p> <ul style="list-style-type: none"><li>• Maintenance communication</li><li>• User communication</li><li>• Modbus RTU master/slave</li><li>• Data link master/slave station</li><li>• J1939 (CAN J1939 All-in-One CPU module only)</li></ul>  |
| External Memory Devices          | <p>These settings configure the CSV file format and the maximum file size of the log data that is saved to the SD memory card.</p> <ul style="list-style-type: none"><li>• CSV file format</li><li>• Data log and trace<sup>*1</sup></li></ul>   |
| Device Settings                  | <p>Configure the order to store the upper and lower words for 32-bit data.</p>   |
| Program Protection               | <p>Applies the protection to the user program by configuring a password so unauthorized users cannot inadvertently upload or download it.</p>  |
| Self Diagnostic                  | <p>Configure the watchdog timer monitoring the operating status of the FC6A.</p>   |
| Calendar & Clock                 | <p>The FC6A is equipped with an internal clock and its calendar data (year, month, day, day of the week) and clock data (hour, minute, second) can be used in user programs. Daylight savings time can also be configured for the internal clock.</p>  |
| Network Settings <sup>*2</sup>   | <p>These settings configure information for connecting the All-in-One CPU module to a network using Ethernet port 1.</p>   |
| Network Management <sup>*2</sup> | <p>These settings configure the FC6A's internal clock and the ping timeout time for the PING instruction and when the auto ping function is being executed.</p> <ul style="list-style-type: none"><li>• SNTP settings</li><li>• Ping settings</li></ul>  |
| Ethernet Port 1 <sup>*1</sup>    | <p>These settings configure information for connecting the Plus CPU module to a network using Ethernet port 1. These settings are also used to configure SNTP settings for getting the time, the ping timeout duration when using the PING instruction or auto ping, the send e-mail settings, web server settings, and FTP client/server settings.</p> <ul style="list-style-type: none"><li>• IP settings</li><li>• DNS settings</li><li>• SNTP settings</li><li>• Ping settings</li><li>• E-mail settings</li><li>• Web server settings</li><li>• FTP client settings</li><li>• FTP server settings</li></ul> |
| Ethernet Port 2 <sup>*1</sup>    | <p>These settings configure information for connecting the Plus CPU module to a network using Ethernet port 2. These settings are also used to configure the ping timeout duration when using the PING instruction or auto ping.</p> <ul style="list-style-type: none"><li>• IP settings</li><li>• DNS settings</li><li>• Ping settings</li></ul>  |
| Connection Settings              | <p>These settings configure server/client communication used in FC6A Ethernet communication.</p> <ul style="list-style-type: none"><li>• Maintenance communication server</li><li>• User communication server/client</li><li>• User communication (UDP)<sup>*1</sup></li><li>• Modbus TCP communication server/client</li><li>• MC protocol client</li></ul>   |

<sup>\*1</sup> Can be used only with the Plus CPU module.

<sup>\*2</sup> Can be used only with the All-in-One CPU module.



## Stop Input and Reset Input

As described on "Start/Stop Operation" on page 4-19, the FC6A can be started and stopped using a stop input or reset input, which can be designated from the **Function Area Settings** menu. When the designated stop or reset input is turned on, the FC6A stops operation.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings.

### Stop Input

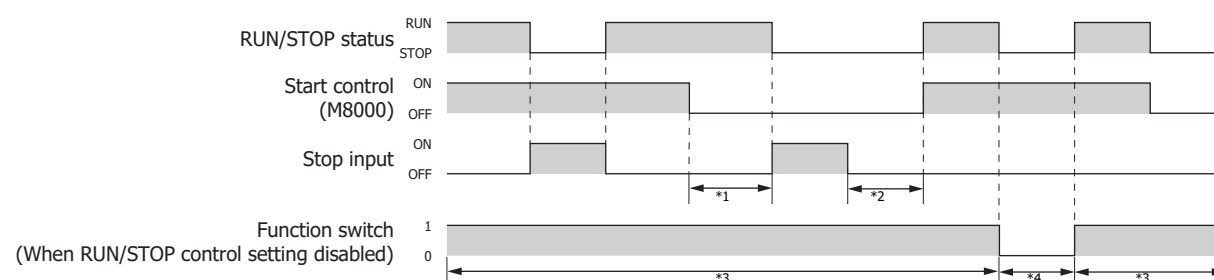
This section describes the stop input that stops execution of the FC6A user program with an external input.

#### Function Description

This function stops execution of the FC6A user program with an external input, such as a switch on a control panel.

Specify an FC6A normal external input for the stop input.

When the stop input is turned on, the user program that is being executed will stop. When the stop input is turned off, the user program will be executed from the beginning.



\*1 Even when M8000 (start control) is turned off, if the stop input is off, the FC6A maintains the RUN status.

\*2 Even when the stop input is off, M8000 (start control) is off, so the FC6A does not change to the RUN status.

\*3 When the function switch is set to the function to control FC6A RUN/STOP, the status changes to that corresponding to the stop input and M8000 when the function switch is 1.

\*4 When the function switch is set to the function to control FC6A RUN/STOP, the status will not change to the RUN status if M8000 is turned on when the function switch is 0.

The external inputs that can be specified as the stop input are as follows.

#### All-in-One CPU module

| Type           | 16-I/O type   | 24-I/O type          | 40-I/O type                      |
|----------------|---------------|----------------------|----------------------------------|
| External Input | I0 to I7, I10 | I0 to I7, I10 to I15 | I0 to I7, I10 to I17, I20 to I27 |

#### Plus CPU module

| Type           | Plus 16-I/O type | Plus 32-I/O type     |
|----------------|------------------|----------------------|
| External Input | I0 to I7         | I0 to I7, I10 to I17 |

#### Notes:

- The stop input operation has priority over the WindLDR RUN/STOP operation (M8000 ON/OFF).
- In addition to the FC6A stopping the user program with an external input, RUN/STOP operations can also be performed by operating the function switch and by changing the start control (M8000) value with WindLDR.
- While the reset input is on, user program execution stops. For details on the reset input, see "Reset Input" on page 5-5.

### Reset Input

This section describes the reset input that clears FC6A device values with an external input.

#### Function Description

This function clears FC6A device values with an external input, such as a switch on a control panel. Specify an FC6A normal external input for the reset input.

When the reset input is turned on, the user program that is being executed will stop, and all devices and general errors will be cleared except the special internal relays and special data registers. When the reset input is turned off, the user program will be executed from the beginning.

To turn off the reset input and execute the user program again, the following conditions must be met.

- M8000 is on
- The stop input is off (when the stop input has been configured)
- The function switch is 1 (when the function to control FC6A RUN/STOP has been configured)

If these conditions are not met, the user program will not be executed and the FC6A will remain stopped even if the reset input is turned off.

The external inputs that can be specified as the reset input are as follows.

All-in-One CPU module

|                |               |                      |                                  |
|----------------|---------------|----------------------|----------------------------------|
| Type           | 16-I/O type   | 24-I/O type          | 40-I/O type                      |
| External Input | I0 to I7, I10 | I0 to I7, I10 to I15 | I0 to I7, I10 to I17, I20 to I27 |

Plus CPU module

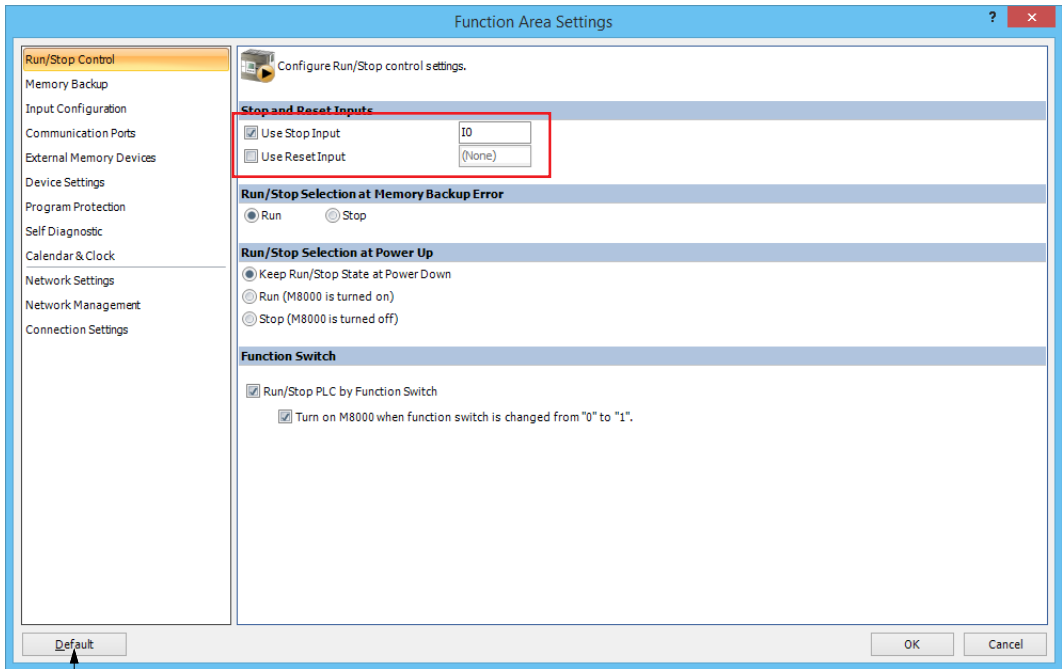
|                |                  |                      |
|----------------|------------------|----------------------|
| Type           | Plus 16-I/O type | Plus 32-I/O type     |
| External Input | I0 to I7         | I0 to I7, I10 to I17 |

Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Run/Stop Control**.  
The **Function Area Settings** dialog box for Run/Stop Control appears.

2. Click the check box under the Stop and Reset Inputs.

- Stop Input:** Click the check box on the left of Use Stop Input and type a desired input number available on the FC6A in the Stop Input field.
- Reset Input:** Click the check box on the left of Use Reset Input and type a desired reset number available on the FC6A in the Reset Input field.



Resets all Function Area Settings values to defaults.

- Default:** No stop and reset inputs are designated.

3. Click **OK**.

This concludes configuring the settings.  
After you download the user program, you can stop it by turning on I0.

When I1 is specified as the reset input and I1 is turned on, the user program is stopped and device values are cleared.  
Device values of FC6A at each status is as follows:

|   |                                     | During Run        | Stopped    | Stop to Run | During Reset | Power Off  |
|---|-------------------------------------|-------------------|------------|-------------|--------------|------------|
| <b>Outputs</b>  |                                     | Program operation | OFF        | Maintained  | OFF          | OFF        |
| <b>Internal Relays, Shift Registers, Counters, Data Registers</b> | <b>Range Specified as "Keep"*1</b>  | Program operation | Maintained | Maintained  | Cleared      | Maintained |
|   | <b>Range Specified as "Clear"*1</b> | Program operation | Maintained | Cleared     | Cleared      | Maintained |
| <b>Special Internal Relays</b>                                    |                                     | Program operation | *2         | Maintained  | Maintained   | *2         |
| <b>Special Data Registers</b>                                     |                                     | Program operation | Maintained | Maintained  | Maintained   | Maintained |
| <b>Non-retentive Data Registers</b>                               |                                     | Program operation | Maintained | Maintained  | Cleared      | Cleared    |
| <b>Timer Current Values</b>                                       |                                     | Program operation | Maintained | Initialized | Cleared      | Cleared    |

\*1 Keep and clear designations for internal relays, shift registers, counters, and data registers can be configured in the **Function Area Settings** dialog box in WindLDR. For details, see "Memory Backup" on page 5-12.

\*2 See "Special Internal Relay" on page 6-4.

### Run/Stop Selection at Keep Data Error

This section describes the function for specifying the run/stop status of the user program when the FC6A "keep" data is lost.

The keep data (data that is maintained by the FC6A), such as the device values and the current time, is lost when the FC6A power is turned off and left this way for a long time such that the backup battery dies. When the FC6A has lost its keep data and is turned on, a keep data error occurs. You can specify the run/stop status of the user program when this keep data error occurs.

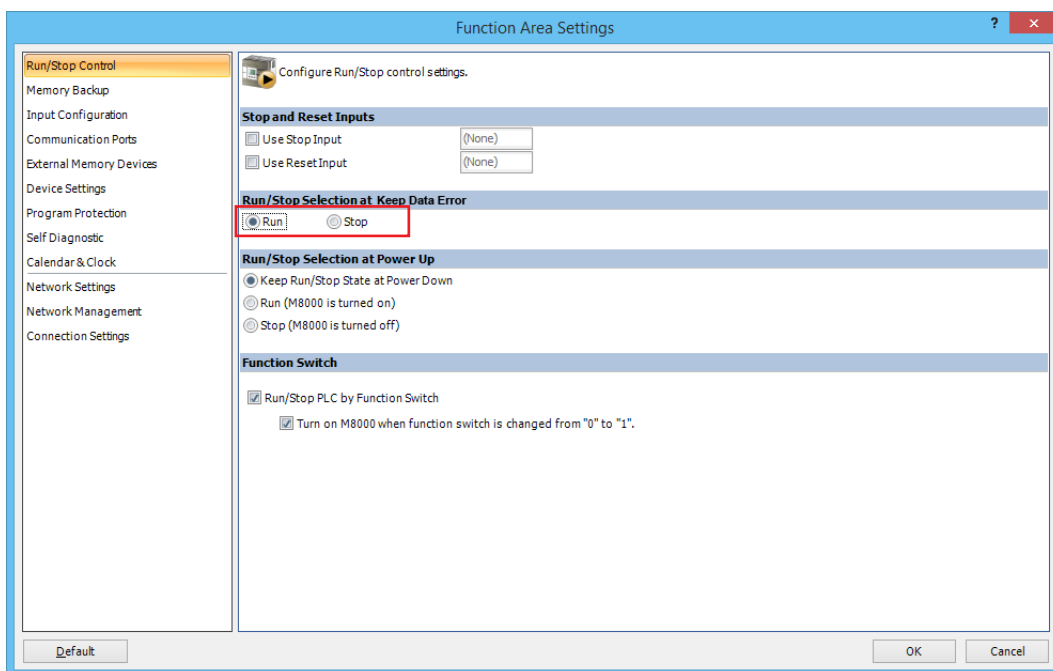
Specify **Stop** when unexpected operation may result due to running the FC6A when the keep data has been lost. Specify **Run** when you want to run the FC6A at all times regardless of whether a keep data error has occurred.

#### Notes:

- The FC6A uses the backup battery to maintain the run/stop status (status of M8000) immediately before the power is turned off. When the power is turned on, operation starts according to the maintained run/stop status.
- If you turn on the FC6A with its maintained data deleted, a keep data error will occur and the value of the special internal relay M8000 (start control) will be lost.
- If a keep data error occurs, the data kept by the FC6A will be lost.
- If you specify **Stop** for **Run/Stop Selection at Keep Data Error**, the FC6A will stop if a keep data error occurs. To run the FC6A, perform the appropriate operations from WindLDR, an HMI module, or the main unit's function switch. For details, see "Start/Stop Operation" on page 4-19.
- When a keep data error occurs, the error code is written to special data register D8005 (general error code). For details, see "General Error Codes" on page 13-3.

### Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Run/Stop Control**.  
The **Function Area Settings** dialog box is displayed.
2. Click **RUN** or **STOP** under **Run/Stop Selection at Keep Data Error**.



3. Click **OK**.

This concludes configuring the settings.

## Run/Stop Selection at Power Up

Start control special internal relay M8000 maintains its status when the FC6A is powered down. When powered up, the FC6A is started or stopped according to the M8000 status. The Run/Stop Selection at Power Up is used to select whether to start or stop the FC6A regardless of the M8000 status when the FC6A is powered up.

Stop and reset inputs and function switch have priority over **Run/Stop Selection at Power Up**. When the memory backup error occurs, the FC6A is started or stopped according to Run/Stop Selection at Memory Backup Error regardless of Run/Stop Selection at Power Up. For start/stop operation, see "Start/Stop Operation" on page 4-19.

Since this settings relate to the user program, the user program must be downloaded to the FC6A after changing this settings.

## Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Run/Stop Control**.

The **Function Area Settings** dialog box for Run/Stop Control appears.

2. Click the button under Run/Stop Selection at Power Up.

### Keep Run/Stop State at Power Down (Default):

Click this button to keep the run/stop status at power down when the FC6A is powered up.

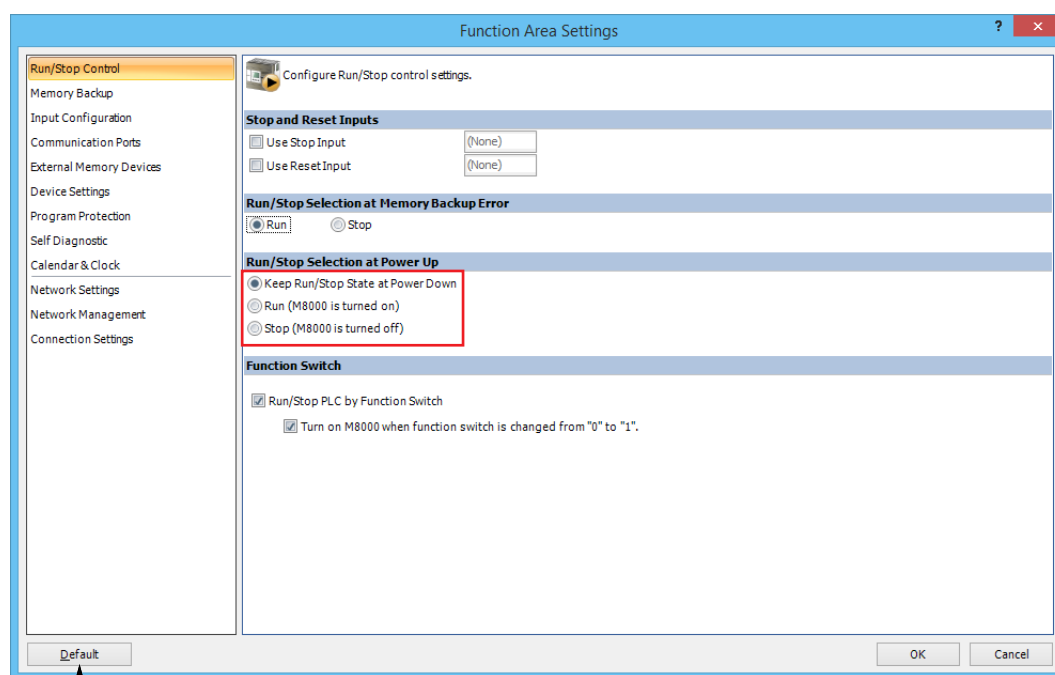
### Run (M8000 is turned on):

Click this button to always start the FC6A when the FC6A is powered up. However, when the function to control running and stopping the FC6A is set for the function switch, the function switch must be set to 1.

### Stop (M8000 is turned off):

Click this button to always stop the FC6A when the FC6A is powered up.

This example designates  
Keep Run/Stop Status at  
Power Down.



Resets all Function Area Settings  
values to defaults.

3. Click **OK**.

This concludes configuring the settings.

## Function Switch Configuration

This section describes the function of the function switch on the front of the FC6A.

### Function Description

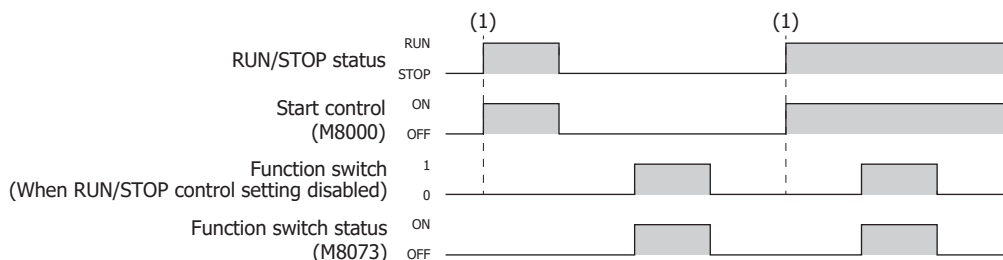
When Function switch is 0, special internal relay M8073 (Function switch status) turns off. When Function switch is 1, M8073 turns on. The function switch can be used as an external switch by using M8073.

When special internal relay M8000 (start control) is on, running and stopping the FC6A can be controlled with the function switch.

#### Notes:

- Stop input and reset input have priority over the status of M8000.
- Enabled is the default setting for **Run/Stop PLC by Function Switch** and **Turn on M8000 when function switch is changed from "0" to "1"**. in WindLDR.

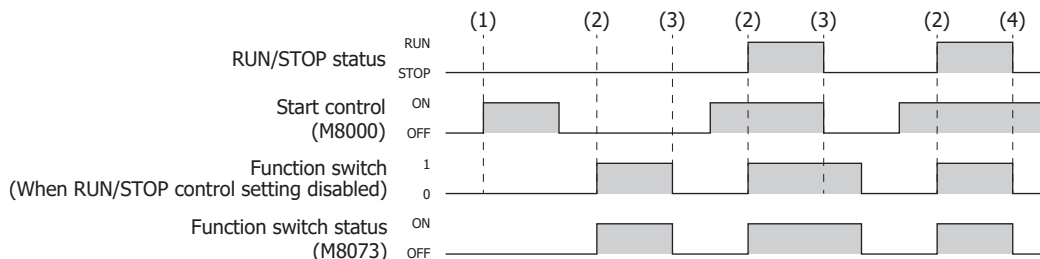
When **RUN/STOP PLC by Function Switch** is disabled



(1) The FC6A run/stop status is controlled by the status of M8000, regardless of the function switch.

\* M8073 turns on and off according to the status of the function switch.

When **RUN/STOP PLC by Function Switch** is enabled and **Turn on M8000 when function switch is changed from "0" to "1"** is disabled



(1) When the function switch is 0, the FC6A remains in the stopped state, even when M8000 is turned on.

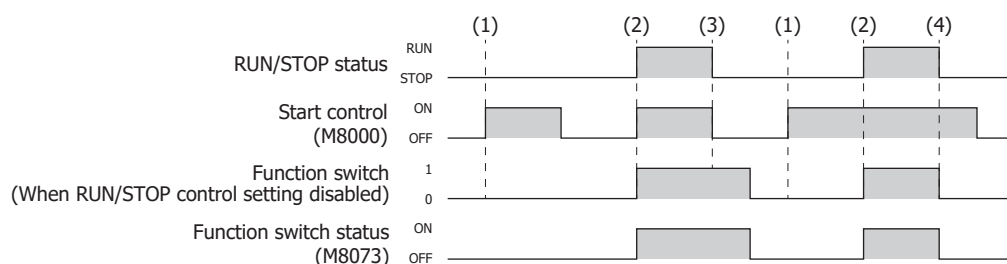
(2) When the function switch is changed from 0 to 1, the FC6A runs or stops according to the status of M8000.

(3) When the function switch is 1, the FC6A stops when M8000 is turned off.

(4) When the function switch is changed from 1 to 0, the FC6A stops.

\* M8073 turns on and off according to the status of the function switch.

When **Run/Stop PLC by Function Switch** and **Turn on M8000 when function switch is changed from "0" to "1"**. are enabled (For the default setting)



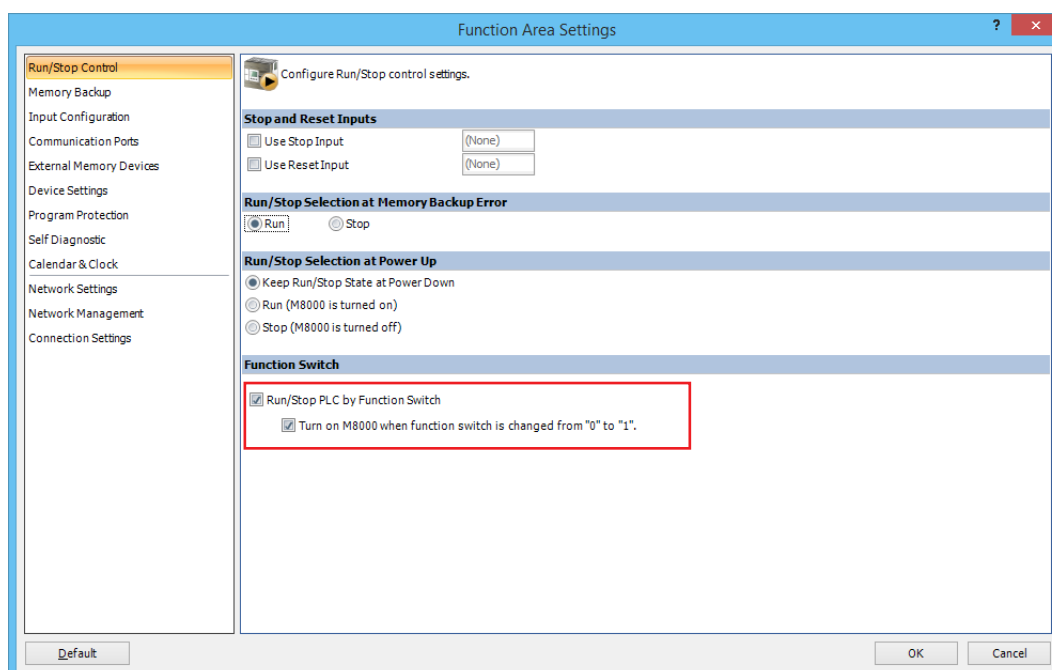
- (1) When the function switch is 0, the FC6A remains in the stopped state, even when M8000 is turned on.
  - (2) When the function switch is changed from 0 to 1, and when M8000 is off, it is turned on (remains on when on) and the FC6A runs.
  - (3) When the function switch is 1, the FC6A stops when M8000 is turned off.
  - (4) When the function switch is changed from 1 to 0, the FC6A stops.
- \* M8073 turns on and off according to the status of the function switch.

### WindLDR Settings

When assigning the function to control FC6A running and stopping to the function switch, you must configure **Run/Stop Control** under **Function Switch** in the WindLDR **Function Area Settings**.

#### Operation procedure

1. From the WindLDR menu bar, select **Configuration > Run/Stop Control**.  
The **Function Area Settings** dialog box is displayed.
2. Select the **Run/Stop PLC by Function Switch** check box.  
Select the **Turn on M8000 when function switch is changed from "0" to "1"**. check box.



3. Click **OK**.

This concludes configuring the settings.

## Memory Backup

The statuses of internal relays and shift register bits are usually cleared at startup. It is also possible to designate all or a block of consecutive internal relays or shift register bits as “keep” types. Counter current values and data register values are usually maintained at powerup. It is also possible to designate all or a block of consecutive counters and data registers as “clear” types. When the FC6A is stopped, these statuses and values are maintained. When the FC6A is reset by turning on a designated reset input, these statuses and values are cleared despite the settings in the Configure Keep/Clear Settings dialog box shown below. The keep/clear settings in this dialog box are not maintained when restarting the FC6A.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings. Device addresses that can be kept or cleared are as follows.

| Setting | Device                          | Internal Relay                      | Shift Register | Counter                         | Data Register                                     |
|---------|---------------------------------|-------------------------------------|----------------|---------------------------------|---|
|         |                                 | Specify device address to keep      |                | Specify device address to clear |   |
| Type    | All-in-One CPU module           | M0000-M7997,<br>M10000-M17497       | R000-R255      | C000-C511                       | D0000-D7999,<br>D10000-D55999                     |
|         | CAN J1939 All-in-One CPU module |                                     |                |                                 |   |
|         | Plus CPU module                 | M0000 to M7997,<br>M10000 to M21247 | R000 to R255   | C000 to C511                    | D0000 to D7999,<br>D10000 to D61999 <sup>*1</sup> |

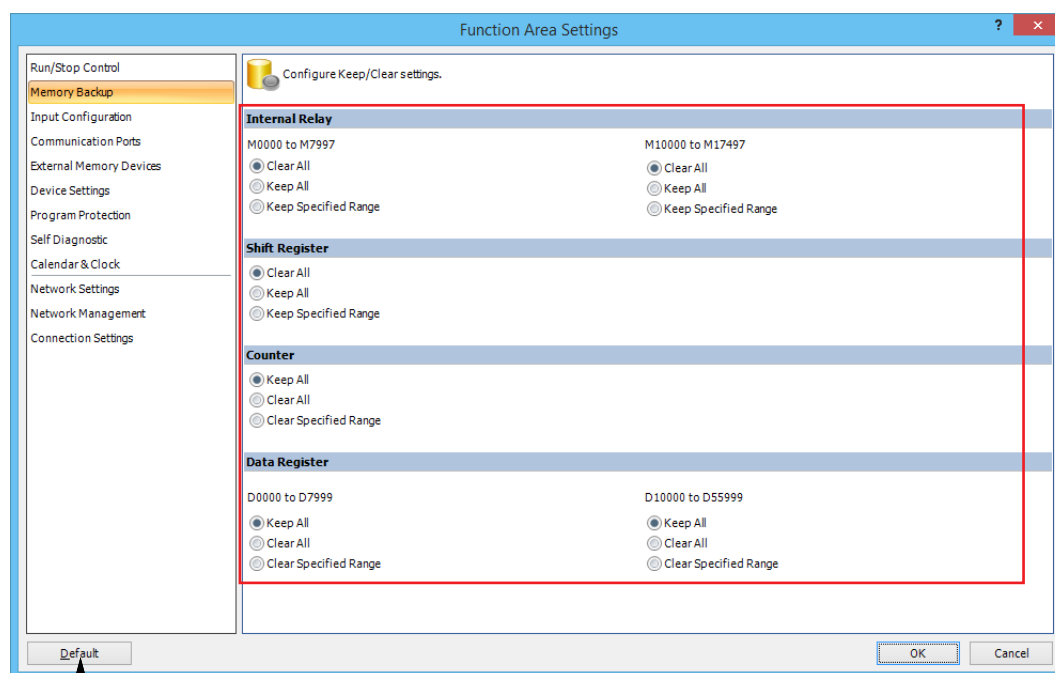
<sup>\*1</sup> Memory backup for the non-retentive data registers (D70000 to D269999) is not supported.

## Programming WindLDR

- From the WindLDR menu bar, select **Configuration > Memory Backup**.

The **Function Area Settings** dialog box for Configure Keep/Clear Settings appears.

- Click the buttons under Internal Relay, Shift Register, Counter, and Data Register to clear all, keep all, or keep/clear specified range as required.



Resets all Function Area Settings values to defaults.

- Click **OK**.

This concludes configuring the settings.



**Internal Relay 'Keep' Designation (M0000 to M7997)**

- Clear All:** Clears the internal relays (M0000 to M7997) when the FC6A starts operation.
- Keep All:** Keeps the status of the internal relays (M0000 to M7997) while the FC6A power is off.
- Keep Specified Range:** Keeps the status of the internal relays in the specified range while the FC6A power is off.

When a range of M50 through M100 is designated as shown in the example above, M50 through M100 are keep types, M0 through M47 and M101 through M7997 are clear types.

**Internal Relay 'Keep' Designation (All-in-One CPU module: M10000 to M17497, Plus CPU module: M10000 to M21247)**

- Clear All:** Clears the internal relays (All-in-One CPU module: M10000 to M17497, Plus CPU module: M10000 to M21247) when the FC6A starts operation.
- Keep All:** Keeps the status of the internal relays (All-in-One CPU module: M10000 to M17497, Plus CPU module: M10000 to M21247) while the FC6A power is off.
- Keep Specified Range:** Keeps the status of the internal relays in the specified range while the FC6A power is off.

**Shift Register 'Keep' Designation**

- Clear All:** All shift register bit statuses are cleared at startup (default).
- Keep All:** All shift register bit statuses are maintained at startup.
- Keep Specified Range:** A specified range of shift register bits are maintained at startup. Enter the start "keep" number in the left field and the end "keep" number in the right field. The start "keep" number must be smaller than or equal to the end "keep" number.

**Counter 'Clear' Designation**

- Clear All:** All counter current values are cleared at startup.
- Keep All:** Keeps all counter current values while the FC6A power is off.
- Clear Specified Range:** A specified range of counter current values are cleared at startup. Enter the start "clear" number in the left field and the end "clear" number in the right field. The start "clear" number must be smaller than or equal to the end "clear" number.

**Data Register 'Clear' Designation (D0000 to D7999)**

- Clear All:** Clears the values of the data registers (D0000 to D7999) when the FC6A starts operation.
- Keep All:** Keeps the values of the data registers (D0000 to D7999) while the FC6A power is off.
- Clear Specified Range:** A specified range of data register values are cleared at startup. Enter the start "clear" number in the left field and the end "clear" number in the right field. The start "clear" number must be smaller than or equal to the end "clear" number.

**Data Register 'Clear' Designation (All-in-One CPU module: D10000 to D55999, Plus CPU module: D10000 to D61999)**

- Clear All:** Clears the values of the data registers (All-in-One CPU module: D10000 to D55999, Plus CPU module: D10000 to D61999) when the FC6A starts operation.
- Keep All:** Keeps the values of the data registers (All-in-One CPU module: D10000 to D55999, Plus CPU module: D10000 to D61999) while the FC6A power is off.
- Clear Specified Range:** A specified range of data register values are cleared at startup. Enter the start "clear" number in the left field and the end "clear" number in the right field. The start "clear" number must be smaller than or equal to the end "clear" number.

**Notes:**

- When the FC6A has lost its keep data, the **Run/Stop Selection at Memory Backup Error** setting has priority over the **Run/Stop Selection at Power Up** setting.
- Relays and registers specified as **Clear All** or **Clear Specified Range** are cleared when the FC6A starts operation. The values while the power is off are retained until the power is turned on and operation is started.
- Keep/clear settings cannot be configured for special data registers. They operate the same as **Keep All**.
- Keep/clear settings cannot be configured for special internal relays. For operation when the power is shut off and when stopped, see "Devices" - "Special Internal Relay" on page 6-4.

High-Speed Counter

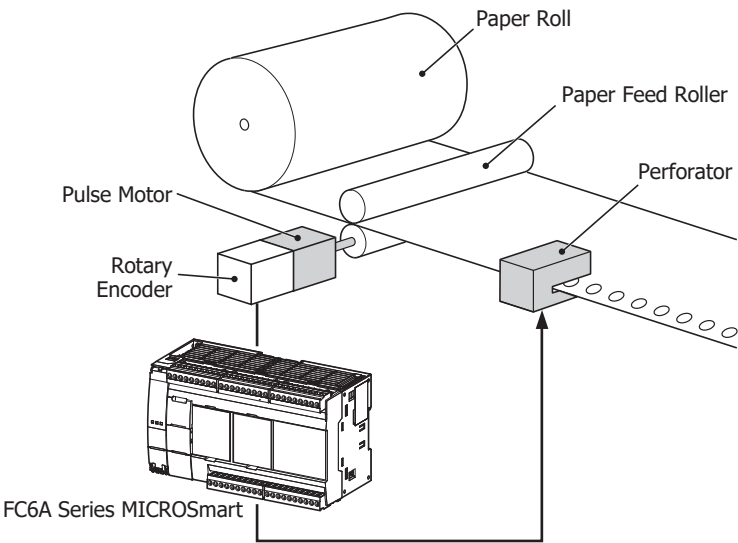
This section describes the high-speed counter for counting high-speed pulses from devices such as rotary encoders and proximity switches. The high-speed counter is a function that counts high-speed pulses with the FC6A hardware that cannot be read in the execution of a normal user program. The high-speed counter has a comparator function to compare the current value and a preset value (target value). When the current value and the preset value match, an external output is turned on or an interrupt program is executed.

The high-speed counter has a single-phase high-speed counter and a two-phase high-speed counter.

To use high-speed counters, WindLDR function area settings are required.

■ Application example

This application example punches holes into a roll of paper at a regular interval. The two pulses (A-phase, B-phase) that carry the phase difference output from the rotary encoder are counted by the FC6A two-phase high-speed counter. When the current value reaches the preset value, the specified external output turns on and the perforator punches a hole in the roll of paper.



High-speed counter operation modes

The high-speed counter has the following two operation modes:

- Single-phase high-speed counter
- Two-phase high-speed counter

High-speed counting modes

The high-speed counter has the following five counting modes:

- Adding counter (single-phase high-speed counter)
- Up/down selection reversible counter (single-phase high-speed counter)
- Dual-pulse reversible counter (single-phase high-speed counter)
- 2-edge count (two-phase high-speed counter)
- 4-edge count (two-phase high-speed counter)

Example: The input allocation when external input group 1 is specified as a two-phase high-speed counter

| External input     | I0      | I1      | I2                             |
|--------------------|---------|---------|--------------------------------|
|                    | ↓       | ↓       | ↓                              |
| High-speed counter | A-phase | B-phase | External reset input (Z-phase) |

## High-speed Counter External Inputs

The maximum points of the single-phase high-speed counter and two-phase high speed counter are as follows.

| Type  | 16-I/O type | 24-I/O type | 40-I/O type | Plus 16-I/O type | Plus 32-I/O type |
|---|-------------|-------------|-------------|------------------|------------------|
| <b>Single-phase High-speed Counter Points (maximum)</b> | 6           | 6           | 6           | 6                | 6                |
| <b>Two-phase High-speed Counter Points (maximum)</b>    | 2           | 2           | 2           | 3                | 3                |

## Single-phase high-speed counter

### All-in-One CPU module

| Group                                       | 1                         |                  | 2                                     | 3           | 4           | 5                         |                  | 6                                     |
|---|---------------------------|------------------|---------------------------------------|-------------|-------------|---------------------------|------------------|---------------------------------------|
| External Input                              | I2                        | I0               | I1                                    | I3          | I4          | I5                        | I6               | I7                                    |
| <b>Adding Counter</b>                       | Reset input* <sup>1</sup> | Pulse input      | Pulse input                           | Pulse input | Pulse input | Reset input* <sup>1</sup> | Pulse input      | Pulse input                           |
| <b>Up/Down Selection Reversible Counter</b> | Reset input* <sup>1</sup> | Pulse input      | Up/down selection input* <sup>2</sup> | —           | —           | Reset input* <sup>1</sup> | Pulse input      | Up/down selection input* <sup>2</sup> |
| <b>Dual-pulse Reversible Counter</b>        | Reset input* <sup>1</sup> | Pulse input (up) | Pulse input (down)* <sup>3</sup>      | —           | —           | Reset input* <sup>1</sup> | Pulse input (up) | Pulse input (down)* <sup>3</sup>      |

\*1 If I2 or I5 is not used as reset inputs, they can be used as normal inputs.

\*2 If Group 1 and Group 5 are used as **Up/Down Selection Reversible Counter**, use I1 as the Group 1 input (up/down selection input) and use I7 as the Group 5 input (up/down selection input).

\*3 If Group 1 and Group 5 are used as **Dual-Pulse Reversible Counter**, use I1 as the Group 1 input (pulse input) and I7 as Group 5 input (pulse input).

### Plus CPU module

| Group                                       | 1                         |                  | 2                                     | 3                         |                  | 4                                     | 5                         |                  | 6                                     |
|---|---------------------------|------------------|---------------------------------------|---------------------------|------------------|---------------------------------------|---------------------------|------------------|---------------------------------------|
| External Input                              | I2                        | I0               | I1                                    | I13* <sup>1</sup>         | I3               | I4                                    | I5                        | I6               | I7                                    |
| <b>Adding Counter</b>                       | Reset input* <sup>2</sup> | Pulse input      | Pulse input                           | Reset input* <sup>2</sup> | Pulse input      | Pulse input                           | Reset input* <sup>2</sup> | Pulse input      | Pulse input                           |
| <b>Up/Down Selection Reversible Counter</b> | Reset input               | Pulse input      | Up/down selection input* <sup>3</sup> | Reset input               | Pulse input      | Up/down selection input* <sup>3</sup> | Reset input               | Pulse input      | Up/down selection input* <sup>3</sup> |
| <b>Dual-pulse Reversible Counter</b>        | Reset input               | Pulse input (up) | Pulse input (down)* <sup>4</sup>      | Reset input               | Pulse input (up) | Pulse input (down)* <sup>4</sup>      | Reset input               | Pulse input (up) | Pulse input (down)* <sup>4</sup>      |

\*1 Can be used only with the Plus 32-I/O type.

\*2 If I2, I5 or I13 is not used as reset inputs, they can be used as normal inputs.

\*3 If Group 1, Group 3, or Group 5 is used as **Up/Down Selection Reversible Counter**, I1 is used as the up/down selection input of Group 1, I4 is used as the up/down selection input of Group 3, and I7 is used as the up/down selection input of Group 5, respectively.

\*4 If Group 1, Group 3, or Group 5 is used as **Dual-Pulse Reversible Counter**, I1 is used as the pulse input of Group 1, I4 is used as the pulse input of Group 3, and I7 is used as the pulse input of Group 5, respectively.

## Two-phase high-speed counter

### All-in-One CPU module

External inputs I0/I1 (Group 1-2) and I6/I7 (Group 5-6) can be used as two-phase high-speed counters.

External inputs I2 and I5 can be used as reset inputs for Group 1-2 and Group 5-6.

| Group                               | 1                                   |                       | 2                     | 3  | 4  | 5                                   |                       | 6                     |
|-------------------------------------|-------------------------------------|-----------------------|-----------------------|----|----|-------------------------------------|-----------------------|-----------------------|
| External Input                      | I2                                  | I0                    | I1                    | I3 | I4 | I5                                  | I6                    | I7                    |
| <b>Two-phase High-speed Counter</b> | Reset input (Z-phase)* <sup>1</sup> | Pulse input (A-phase) | Pulse input (B-phase) | —  | —  | Reset input (Z-phase)* <sup>1</sup> | Pulse input (A-phase) | Pulse input (B-phase) |

\*1 If I2 or I5 is not used as reset inputs, they can be used as normal inputs.

## 5: FUNCTIONS AND SETTINGS

### Plus CPU module

External inputs I0/I1 (Group 1-2), external inputs I3/I4 (Group 3-4), and external inputs I6/I7 (Group 5-6) can be used as two-phase high-speed counters.

External inputs I2, I13 (Plus 32-I/O type only), and I5 can be used as reset inputs for Group 1-2, Group 3-4, and Group 5-6 respectively.

| Group                        | 1                                   |                       | 2                     | 3                                   |                       | 4                     | 5                                   |                       | 6                     |
|------------------------------|-------------------------------------|-----------------------|-----------------------|-------------------------------------|-----------------------|-----------------------|-------------------------------------|-----------------------|-----------------------|
| External Input               | I2                                  | I0                    | I1                    | I13 <sup>*1</sup>                   | I3                    | I4                    | I5                                  | I6                    | I7                    |
| Two-phase High-speed Counter | Reset input (Z-phase) <sup>*2</sup> | Pulse input (A-phase) | Pulse input (B-phase) | Reset input (Z-phase) <sup>*2</sup> | Pulse input (A-phase) | Pulse input (B-phase) | Reset input (Z-phase) <sup>*2</sup> | Pulse input (A-phase) | Pulse input (B-phase) |

\*1 Can be used only with the Plus 32-I/O type.

\*2 If I2, I13 (Plus 32-I/O type only), or I5 is not used as reset inputs (Z-phase), they can be used as normal inputs.

## High-Speed Counter Operation

The high-speed counter turns on an external output or executes an interrupt program when the current value matches the preset value (target value).

For how to configure the function to turn on an external output, see "Comparison Actions" on page 5-20.

### All-in-One CPU module

#### ■ Single-phase high-speed counter

##### Group 1, group 2, group 5, group 6 single-phase high-speed counter

- The high-speed counter has three operation modes, the adding counter, the up/down selection reversible counter, and the dual-pulse reversible counter.
- The up/down selection reversible counter and the dual-pulse reversible counter which can count in both directions are supported.
- These groups support 100 kHz maximum pulse input and are capable of counting in a range from 0 to 4,294,967,295 (32 bits).
- When the current value and the preset value match or an overflow or underflow occurs, a comparison output turns on or an interrupt program is executed.
- These groups support resetting the current value by the reset special internal relay or external reset input. When the reset is executed, the current value returns to the reset value specified by the special data registers. For the reset input details, see "Reset input" on page 5-27.

| Counting Mode                        | Frequency           | Reset Input |
|--------------------------------------|---------------------|-------------|
| Adding counter                       | Group 2, 6: 100 kHz | —           |
|                                      | Group 1: 100 kHz    | I2          |
|                                      | Group 5: 100 kHz    | I5          |
| Up/down selection reversible counter | Group 1-2: 100 kHz  | I2          |
|                                      | Group 5-6: 100 kHz  | I5          |
| Dual-pulse reversible counter        | Group 1-2: 100 kHz  | I2          |
|                                      | Group 5-6: 100 kHz  | I5          |

##### Group 3, group 4 single-phase high-speed counter

- These groups only support the adding counter.
- These groups support 5 kHz maximum pulse input and are capable of counting in a range from 0 to 4,294,967,295 (32 bits).
- When the current value and the preset value match or an overflow or underflow occurs, an external output turns on or an interrupt program is executed.
- These groups only support the reset input via a special internal relay. When the reset is executed, the current value returns to the reset value specified by the special data registers.

| Counting Mode  | Frequency         | Reset Input |
|----------------|-------------------|-------------|
| Adding counter | Group 3, 4: 5 kHz | —           |

#### ■ Two-phase high-speed counter

##### Group 1-2, group 5-6 two-phase high-speed counter

- The two-phase high-speed counter counts by the phase difference between the A-phase and B-phase pulse input.
- These groups support 50 kHz maximum pulse input and are capable of counting in a range from 0 to 4,294,967,295 (32 bits).
- Even higher speed counting is possible by specifying 2-edge count or 4-edge count.
- When the current value and the preset value match or an overflow or underflow occurs, an external output turns on or an interrupt program is executed.
- These groups support resetting the current value by the reset special internal relay or external reset input (Z-phase). When the reset is executed, the current value returns to the reset value specified by the special data registers.

| Counting Mode | Frequency         | Reset Input (Z-phase) |
|---------------|-------------------|-----------------------|
| 2-edge count  | Group 1-2: 50 kHz | I2                    |
|               | Group 5-6: 50 kHz | I5                    |
| 4-edge count  | Group 1-2: 25 kHz | I2                    |
|               | Group 5-6: 25 kHz | I5                    |

### Plus CPU module

#### ■ Single-phase high-speed counter

- The single-phase high-speed counter has three operation modes, the adding counter, the up/down selection reversible counter, and the dual-pulse reversible counter.
- The up/down selection reversible counter and the dual-pulse reversible counter which can count in both directions are supported.
- This counter support 100 kHz (pulse width  $\geq 5 \mu\text{s}$ ) maximum pulse input and is capable of counting in a range from 0 to 4,294,967,295 (32 bits).
- When the current value and preset value match or an overflow or underflow occurs, a comparison output turns on or an interrupt program is executed.
- This counter support resetting the current value by special internal relay reset input and reset input. When the reset input is turned on or when the current value reset is executed, the current value becomes the reset value specified by special data registers. For details on the reset input, see "Reset input" on page 5-27.

| Counting Mode                        | Frequency              | Reset Input |
|--------------------------------------|------------------------|-------------|
| Adding counter                       | Group 2, 4, 6: 100 kHz | —           |
|                                      | Group 1: 100 kHz       | I2          |
|                                      | Group 3: 100 kHz       | *1          |
|                                      | Group 5: 100 kHz       | I5          |
| Up/down selection reversible counter | Group 1 to 2: 100 kHz  | I2          |
|                                      | Group 3 to 4: 100 kHz  | *1          |
|                                      | Group 5 to 6: 100 kHz  | I5          |
| Dual-pulse reversible counter        | Group 1 to 2: 100 kHz  | I2          |
|                                      | Group 3 to 4: 100 kHz  | *1          |
|                                      | Group 5 to 6: 100 kHz  | I5          |

\*1 The Plus 16-I/O type supports only reset input by special internal relay.  
The Plus 32-I/O type can use I13 as an external reset input.

#### ■ Two-phase high-speed counter

##### Group 1 to 2, group 3 to 4, group 5 to 6 two-phase high-speed counter

- The two-phase high-speed counter counts with the phase difference between A-phase and B-phase pulse inputs.
- These groups support 50 kHz maximum pulse input and are capable of counting in a range from 0 to 4,294,967,295 (32 bits).
- Even higher speed counting is possible by specifying 2-edge count or 4-edge count.
- When the current value and preset value match or an overflow or underflow occurs, a comparison output turns on or an interrupt program is executed.
- These groups support resetting the current value by special internal relay reset input and external reset input (Z-phase). When the reset input is turned on or the current value reset is executed, the current value becomes the reset value specified by special data registers.

| Counting Mode | Frequency            | Reset Input (Z-phase) |
|---------------|----------------------|-----------------------|
| 2-edge count  | Group 1 to 2: 50 kHz | I2                    |
|               | Group 3 to 4: 50 kHz | *1                    |
|               | Group 5 to 6: 50 kHz | I5                    |
| 4-edge count  | Group 1 to 2: 25 kHz | I2                    |
|               | Group 3 to 4: 25 kHz | *1                    |
|               | Group 5 to 6: 25 kHz | I5                    |

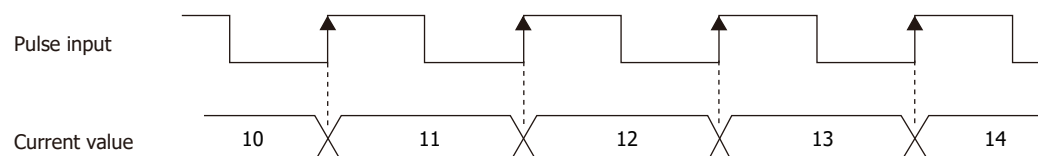
\*1 The Plus 16-I/O type supports only reset input by special internal relay.  
The Plus 32-I/O type can use I13 as an external reset input.

## Counting mode

The high-speed counter as the following five counting modes.

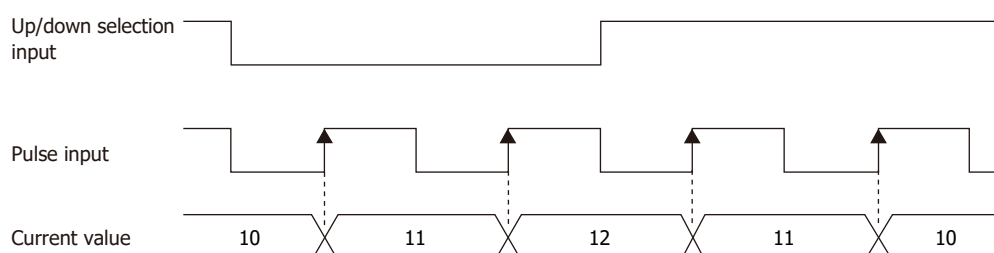
### ■ Adding counter (single-phase high-speed counter)

The adding counter counts up with the rise in pulse input.



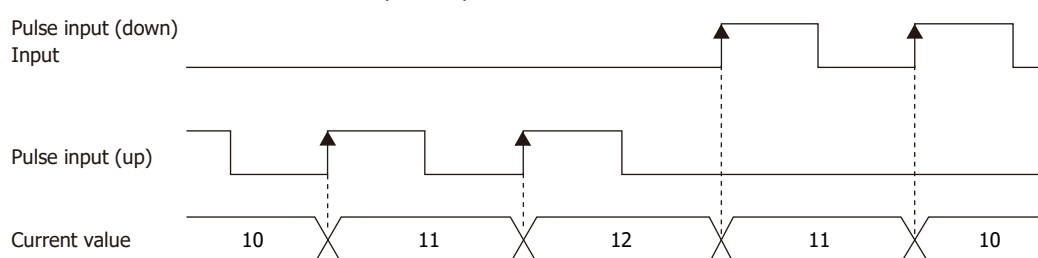
### ■ Up/down selection reversible counter (single-phase high-speed counter)

Up/down selection reversible counter can switch between addition and subtraction by pulse input with the up/down selection input. When the up/down selection input is on, the counter counts up with the rise in pulse input. When the up/down selection input is off, the counter counts down with the rise in pulse input.



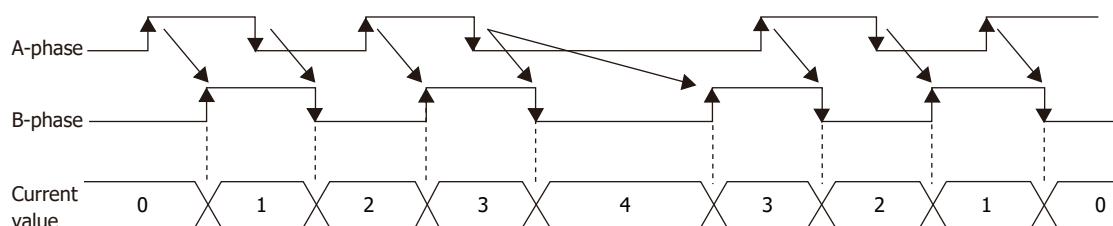
### ■ Dual-pulse reversible counter (single-phase high-speed counter)

This counter switches between the up count and the down count with pulse input (up) and pulse input (down). When a pulse is input to pulse input (up), the counter counts up with the rise in pulse input. When a pulse is input to pulse input (down), the counter counts down with the rise in pulse input.



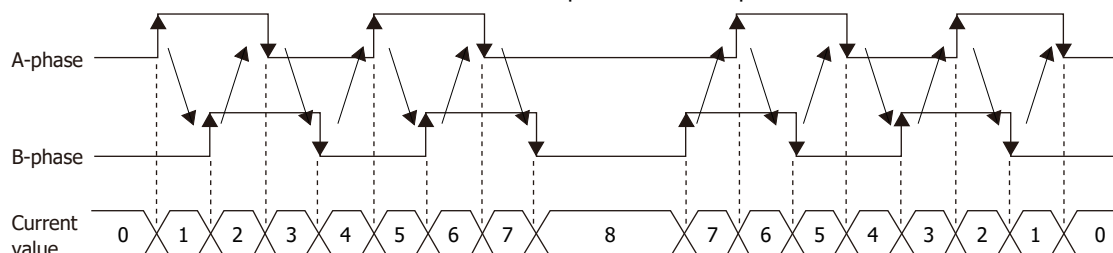
### ■ 2-edge count (two-phase high-speed counter)

This counter counts by the phase difference between the A-phase and B-phase pulse input. When the A-phase precedes the B-phase, the counter counts up with the rise and fall of the B-phase. When the B-phase precedes the A-phase, the counter counts down with the rise and fall of the B-phase.



### ■ 4-edge count (two-phase high-speed counter)

This counter counts by the phase difference between the A-phase and B-phase pulse input. When the A-phase precedes the B-phase, the counter counts up with the rise and fall of the A-phase and the B-phase. When the B-phase precedes the A-phase, the counter counts down with the rise and fall of the A-phase and the B-phase.



## Comparison Actions

The operating condition when comparing values is configured in the WindLDR **High-speed Counter Settings**, under **Comparison Action**.

The action when comparing values is **Comparison Output** or **Interrupt Program**, so specify an external output number or label number when comparing.

### Operation

When the preset value and the current value are compared and the values match, the specified output is turned on or the interrupt program is executed.

A maximum of six high-speed counter preset values can be configured. For one preset value, the current value is compared with the same preset value each time.

When multiple preset values are configured, the preset value is changed each time the current value and preset value match.

For example, if four preset values are configured, when preset value 1 matches the current value, the comparison subject changes to preset value 2 → 3 → 4 in order.

When the final preset value 4 matches the current value, the preset value returns to preset value 1 and the values are compared.

### ■ Preset value storage locations

The preset values during high-speed counter operation are stored as 2 words in special data registers.

#### Single-phase high-speed counter (Adding counter)

| Group        |            | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|--------------|------------|-------|-------|-------|-------|-------|-------|------------|
| Preset Value | Upper Word | D8212 | D8194 | D8220 | D8224 | D8228 | D8200 | R          |
|              | Lower Word | D8213 | D8195 | D8221 | D8225 | D8229 | D8201 |            |

#### Single-phase high-speed counter (Up/down selection reversible counter, dual-pulse reversible counter), two-phase high-speed counter

##### All-in-One CPU module

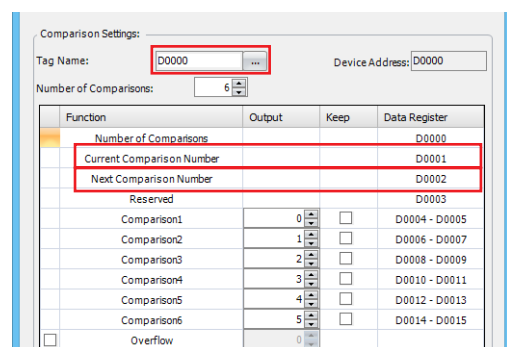
| Group        |            | 1     | 2 | 3 | 4 | 5     | 6 | Read/Write |
|--------------|------------|-------|---|---|---|-------|---|------------|
| Preset Value | Upper Word | D8212 | — | — | — | D8228 | — | R          |
|              | Lower Word | D8213 | — | — | — | D8229 | — |            |

##### Plus CPU module

| Group        |            | 1     | 2 | 3     | 4 | 5     | 6 | Read/Write |
|--------------|------------|-------|---|-------|---|-------|---|------------|
| Preset Value | Upper Word | D8212 | — | D8220 | — | D8228 | — | R          |
|              | Lower Word | D8213 | — | D8221 | — | D8229 | — |            |

**Note:** In the WindLDR **Function Area Settings**, when **32-bit Data Storage Setting** is set to **From Lower Word**, the lower word is stored in the first device.

Specify the data registers to store the preset values in WindLDR and store those preset values in the user program. Specify the start address of the data registers to allocate the data registers to the individual settings in the comparison settings. When the high-speed counter is executed, the preset value with the number stored in **Current Comparison Number** is active. The active preset value number for each comparison is stored in **Current Comparison Number** and the next active preset value number is automatically stored in **Next Comparison Number**. By changing the value of **Next Comparison Number** in the user program, the next active preset value number can be changed. The active preset value is stored for each group in the special data registers shown in the table above.



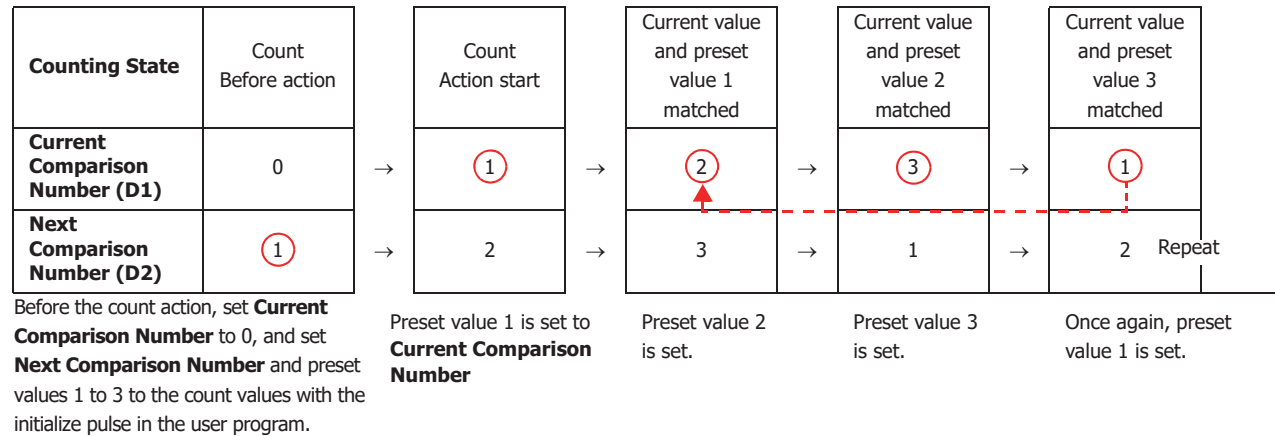


**Example: Group 1, number of comparisons is 3, set to device address D0**

When the current value matches preset value 1, **Current Comparison Number** becomes 2 and 3 is stored in **Next Comparison Number**.

When the device address is configured as D0, **Current Comparison Number** is stored in D1 and **Next Comparison Number** is stored in D2.

For the group 1 preset value, the value of the data registers (D4, D5) allocated to preset value number 1 is stored in D8212 and D8213 as shown in the table above and it is compared to the current value.



**Note:** When the **Next Comparison Number** preset value becomes active, the high-speed counter preset value during execution does not change, even when the preset value for that preset value number is changed. When the current value and the current preset value match, the preset value with the number stored in **Next Comparison Number** becomes active. Changes to the **Next Comparison Number** data register must be performed before the preset value becomes active.

Comparison operation flow

The comparison operation flow is as follows.

- 1. Start (run) the FC6A.

For the first scan, **Current Comparison Number** is set to 0, and **Next Comparison Number** is set to the number for preset value 1 with the initialize pulse.

For the second scan, an I/O refresh is performed in END processing and the value of **Next Comparison Number** is transferred to **Current Comparison Number**.

The content of **Next Comparison Number** becomes the preset value n + 1 ("2" in this example).

When **Number of Comparisons** is 1, **Next Comparison Number** is always "1".

Comparison Settings:

Tag Name: D0000 Device Address: D0000

Number of Comparisons: 6

| Function                  | Output | Keep                     | Data Register |
|---------------------------|--------|--------------------------|---------------|
| Number of Comparisons     |        |                          | D0000         |
| Current Comparison Number |        |                          | D0001         |
| Next Comparison Number    |        |                          | D0002         |
| Reserved                  |        |                          | D0003         |
| Comparison1               | 0      | <input type="checkbox"/> | D0004 - D0005 |
| Comparison2               | 1      | <input type="checkbox"/> | D0006 - D0007 |
| Comparison3               | 2      | <input type="checkbox"/> | D0008 - D0009 |
| Comparison4               | 3      | <input type="checkbox"/> | D0010 - D0011 |
| Comparison5               | 4      | <input type="checkbox"/> | D0012 - D0013 |
| Comparison6               | 5      | <input type="checkbox"/> | D0014 - D0015 |
| Overflow                  | 0      |                          |               |
| Underflow                 | 0      |                          |               |

☐ Use HSC Reset Input

☒ Keep the current value when PLC is powered up

OK Cancel

The data register that stores the preset value (target value). Specify the starting address.

The outputs (external outputs) when the values match.

Transfer

The preset value with the number that became active is the comparison subject with the current value and is stored in the special data registers.

Example: For group 1

Storage destination for the preset value that became active.

Stored by group.

| Group                     | 1     | Read/Write |
|---------------------------|-------|------------|
| Preset Value (Upper word) | D8212 | R/W        |
| Preset Value (Lower word) | D8213 |            |

- 2. Start the high-speed counter count operation.  
Turn on the gate input to start the count operation.
- 3. Compare the **Current Comparison Number** preset value and the current value. When the current value and the preset value match, the next number for the preset value becomes active and the high-speed counter continues counting.  
Execute **Comparison Output** or **Interrupt Program**. (**Comparison Output** in this example)
  - Turn on the comparison (special internal relay) for only one scan.
  - Overwrite **Current Comparison Number** with **Next Comparison Number** and start the count with the preset value for **Current Comparison Number**.
  - Add 1 to **Next Comparison Number**.
- 4. When the procedure is executed up to preset value 6, repeat again from the beginning with preset value 1.

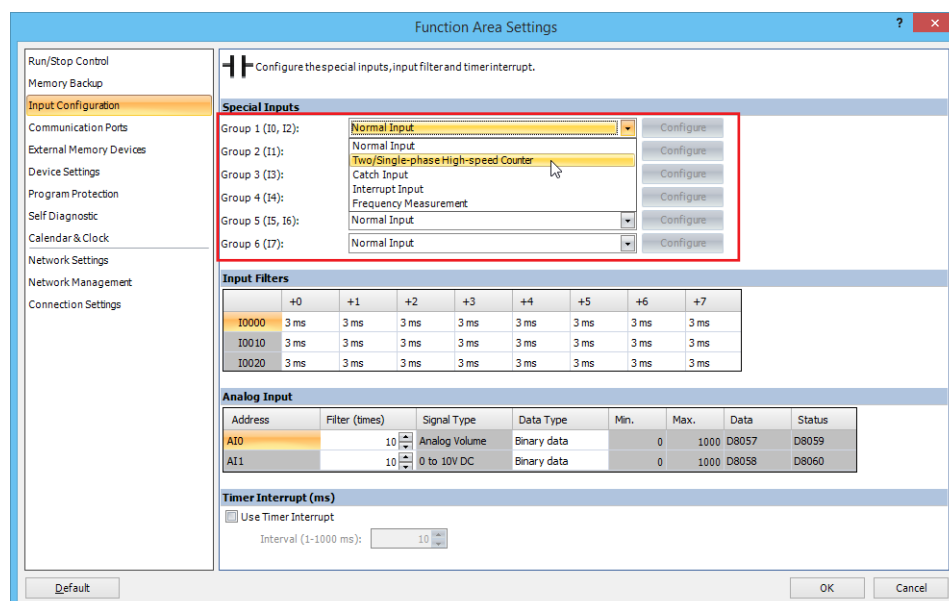
**Note:** The **Current Comparison Number** data register cannot be written to during the count action. It is read-only. **Next Comparison Number** and **Comparison 1** to **Comparison 6** can be read and written to.

## Programming WindLDR

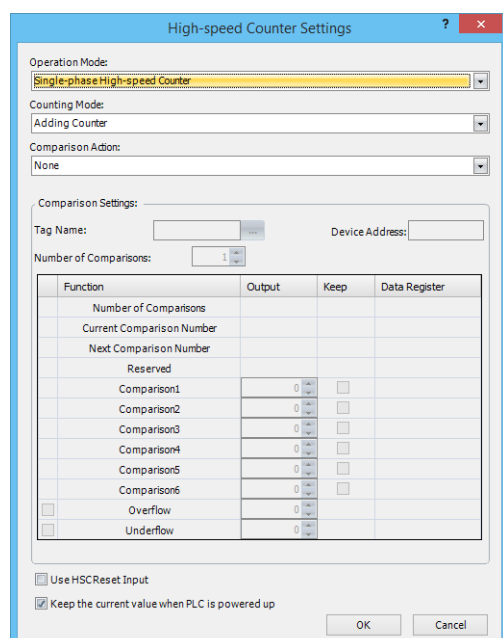
To use the high-speed counter, a normal external input must be specified as **Two/Single-phase High-speed Counter** in the WindLDR **Function Area Settings**. The function for external input groups on the FC6A can be selected as normal input, high-speed counter, catch input, interrupt input, and frequency measurement.

When using normal input, catch input, interrupt input, or frequency measurement, the high-speed counter cannot be used. However, the interrupt program can only be used when ladder program is selected as the programming language.

1. From the WindLDR menu bar, select **Configuration > Input Configuration**.  
The **Function Area Settings** dialog box is displayed.
2. Select **Two/Single-phase High-speed Counter** for the group to use the high-speed counter.



The **High-speed Counter Settings** dialog box is displayed.



3. Configure the operation mode and the counting mode.  
To use comparison actions, configure the comparison settings.
4. Click **OK**.

This concludes configuring the settings.

### Settings

#### ■ Operation mode

For group 1 and group 5, you can select **Single-phase High-speed Counter** or **Two-phase High-speed Counter**.

Only **Single-phase High-speed Counter** can be selected for Group 2, Group 4, and Group 6.

The operation mode that can be selected for Group 3 depends on the type of FC6A.

Only **Single-phase High-speed Counter** can be selected for the All-in-One CPU module. **Single-phase High-speed Counter** and **Two-phase High-speed Counter** can be selected for the Plus CPU module.

#### ■ Counting mode (single-phase high-speed counter)

When the **Single-phase High-speed Counter** is specified for **Operation Mode** of Group 1 or Group 5, **Counting Mode** can be selected as **Adding Counter**, **Up/Down Selection Reversible Counter**, or **Dual-Pulse Reversible Counter**.

Only **Adding Counter** can be selected for Group 2, Group 4, and Group 6 high-speed counters.

The counting mode that can be selected for Group 3 depends on the type of FC6A.

Only **Adding Counter** can be selected for the All-in-One CPU module. **Adding Counter**, **Up/Down Selection Reversible Counter**, and **Dual-Pulse Reversible Counter** can be selected for the Plus CPU module.

#### Adding counter

The adding counter counts up with the rise in pulse input.

#### Up/down selection reversible counter

Up/down selection reversible counter can switch between addition and subtraction with the up/down selection input. When the up/down selection input is on, the counter counts up with the rise in pulse input. When the up/down selection input is off, the counter counts down with the rise in pulse input.

#### Dual-pulse reversible counter

This counter switches between the up count and the down count with pulse input (up) and pulse input (down) pulses. When a pulse is input to pulse input (up), the counter counts up with the rise in the pulse. When a pulse is input to pulse input (down), the counter counts down with the rise in pulse input.

**Note:** When Group 1, Group 3 (Plus CPU module), or Group 5 is set to **Up/Down Selection Reversible Counter**, **Dual-Pulse Reversible Counter**, or **Two-phase High-speed Counter**, Group 2, Group 4, or Group 6 has the same setting.

#### ■ Counting mode (two-phase high-speed counter)

When the two-phase high-speed counter is specified for **Operation mode** for group 1, group 3 (Plus CPU module), or group 5, the counting mode can be selected as **2-edge count** or **4-edge count**.

#### 2-edge count

This counter counts at double the frequency of the input pulse.

This counter counts by the phase difference between the A-phase and B-phase pulse input. When the A-phase precedes the B-phase, the counter counts up with the rise and fall of the B-phase. When the B-phase precedes the A-phase, the counter counts down with the rise and fall of the B-phase.

#### 4-edge count

This counter counts at quadruple the frequency of the input pulse.

This counter counts by the phase difference between the A-phase and B-phase pulse input. When the A-phase precedes the B-phase, the counter counts up with the rise and fall of the A-phase and the B-phase. When the B-phase precedes the A-phase, the counter counts down with the rise and fall of the A-phase and the B-phase.

#### ■ Comparison action

The comparison action is a function that compares the high-speed counter's current value with a preset value (target value).

It can use either the comparison output or an interrupt program. However, the interrupt program can only be used when ladder program is selected as the programming language.

- When **Comparison Output** is selected, the specified external output is turned on when the current value and the preset value match.
- When **Interrupt Program** is selected, the subroutine program with the specified label number is executed as the interrupt program when the current value and the preset value match.

Overflow and underflow can also be used for the comparison conditions.

For details on the comparison actions, see "Comparison Actions" on page 5-20.

### ■ Comparison settings

When using the comparison output or the interrupt program as the comparison action for the high-speed counter, configure the external output number or the label number when there is a match. A maximum of six preset values can be specified for **Number of Comparisons** (preset value number 1 to 6).

#### Tag name

This setting specifies the starting address of the data register region to store the preset values.

#### Device address

This item shows the address of the data register specified by the tag name.

#### Number of Comparisons

You can configure a maximum of six preset values (target values) for the comparison action.

#### Notes:

- The preset value becomes active by the END processing in the second scan after the FC6A starts operation. Store **Preset Value** in the data registers with initialize pulse M8120 input.
- When the preset value (special data register) is changed before the comparison, the preset value currently being used for the comparison is discarded in the program's END processing, and the comparison is performed with the newly configured preset value.
- Configure the settings so that an interval of 1 ms or more is present between instances of the preset value and the current value matching. If this interval is less than 1 ms in length, the next Comparison ON status may be missed.

#### Output

When a comparison action is selected, these are the external outputs specified for preset value 1 to 6.

The external outputs that can be used as comparison outputs are listed by model as follows. Remote outputs cannot be configured.

| Model Number     | Comparison Output |
|------------------|-------------------|
| 16-I/O type      | Q0 to Q6          |
| 24-I/O type      | Q0 to Q11         |
| 40-I/O type      | Q0 to Q17         |
| Plus 16-I/O type | Q0 to Q7          |
| Plus 32-I/O type | Q0 to Q17         |

#### Overflow

Select this check box to use overflow in the comparison action conditions (when the current value exceeds 4,294,967,295).

#### Underflow

Select this check box to use underflow in the comparison action conditions (when the current value falls below 0).

**Note:** When the comparison action is **Comparison Output** and either a preset value, overflow, or underflow has been enabled as a comparison condition, the text box to enter the comparison output is enabled. The comparison output can be specified for each of these match conditions.

### ■ Keep

After the current value matches the preset value, select to reset the current value to a reset value or to keep the value. Select this check box to keep the current value.

### ■ Use HSC Reset Input

Select this check box to reset the current value to the reset value with an external input (high-speed counter reset input).

High-speed counter reset input can only be specified for group 1, group 3 (Plus 32-I/O type), and group 5.

| Group   | External Input |
|---------|----------------|
| Group 1 | I2             |
| Group 3 | *1             |
| Group 5 | I5             |

\*1 The All-in-One CPU module and Plus 16-I/O type support only reset input by special internal relay.

The Plus 32-I/O type can use I13 as an external reset input.

When the high-speed counter reset input is turned on, the current value is reset to the reset value.

If the high-speed counter reset input is not used, I2, I13, and I5 are normal inputs.

### ■ Keep current values at power on

Select this check box to maintain the current values that have been kept with the backup battery at power on.

If this check box is cleared, the current values are initialized to 0.

## 5: FUNCTIONS AND SETTINGS

### High-speed counter devices

The high-speed counter operates according to special internal relay and special data register settings. While the high-speed counter is operating, the current value, control output, and operating status value are reflected in the special internal relays and special data registers with each scan.

The high-speed counter start and stop control signals and the current value, preset values, and reset values are allocated to the special internal relays and special data registers.

### Device allocation table

The devices used by the high-speed counter are as follows.

#### Special internal relay list

| Group                   | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|-------------------------|-------|-------|-------|-------|-------|-------|------------|
| Comparison Output Reset | M8030 | M8051 | M8034 | M8040 | M8044 | M8057 | R/W        |
| Gate Input              | M8031 | M8052 | M8035 | M8041 | M8045 | M8060 |            |
| Reset Input             | M8032 | M8053 | M8036 | M8042 | M8046 | M8061 |            |
| Reset Status            | M8130 | —     | M8600 | —     | M8135 | —     | R          |
| Comparison ON Status    | M8131 | M8054 | M8133 | M8134 | M8136 | M8062 |            |
| Overflow                | M8161 | M8055 | M8165 | M8166 | M8163 | M8063 |            |
| Underflow               | M8162 | —     | M8601 | —     | M8164 | —     |            |
| Count Direction Flag    | M8027 | —     | M8602 | —     | M8043 | —     |            |

#### Special data register list

| Group                      | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|----------------------------|-------|-------|-------|-------|-------|-------|------------|
| Current Value (Upper word) | D8210 | D8192 | D8218 | D8222 | D8226 | D8198 | R          |
| Current Value (Lower word) | D8211 | D8193 | D8219 | D8223 | D8227 | D8199 |            |
| Preset Value (Upper word)  | D8212 | D8194 | D8220 | D8224 | D8228 | D8200 |            |
| Preset Value (Lower word)  | D8213 | D8195 | D8221 | D8225 | D8229 | D8201 |            |
| Reset Value (Upper word)   | D8216 | D8196 | D8234 | D8236 | D8232 | D8202 | R/W        |
| Reset Value (Lower word)   | D8217 | D8197 | D8235 | D8237 | D8233 | D8203 |            |

When using the devices above with instructions where the data type unit can be specified, specify the data type as double word (D). In the WindLDR **Function Area Settings**, when **32-bit Data Storage Setting** is set to **From Lower Word**, the lower word is stored in the first device.

#### ■ Start/stop high-speed counter

The high-speed counter can be started and stopped per group by turning the gate input on or off.

| Group      | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|------------|-------|-------|-------|-------|-------|-------|------------|
| Gate Input | M8031 | M8052 | M8035 | M8041 | M8045 | M8060 | R/W        |

#### ■ Current value storage locations

The current value for the single-phase high-speed counter is stored in special data registers as 2 words per group.

| Group                      | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|----------------------------|-------|-------|-------|-------|-------|-------|------------|
| Current Value (Upper word) | D8210 | D8192 | D8218 | D8222 | D8226 | D8198 | R          |
| Current Value (Lower word) | D8211 | D8193 | D8219 | D8223 | D8227 | D8199 |            |

In the WindLDR **Function Area Settings**, when **32-bit Data Storage Setting** is set to **From Lower Word**, the lower word is stored in the first device.

#### ■ Comparison ON status

When the current value and the preset value match, the special internal relay turns on for only one scan.

| Group                | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|----------------------|-------|-------|-------|-------|-------|-------|------------|
| Comparison ON Status | M8131 | M8054 | M8133 | M8134 | M8136 | M8062 | R          |

### ■ Overflow

When **Overflow** is enabled, if the current value exceeds 4,294,967,295, the special internal relay turns on for only one scan. When the current value overflows, it becomes 0.

| Group           | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|-----------------|-------|-------|-------|-------|-------|-------|------------|
| <b>Overflow</b> | M8161 | M8055 | M8165 | M8166 | M8163 | M8063 | R          |

### ■ Underflow

When **Underflow** is enabled, if the current value falls below 0, the special internal relay turns on for only one scan. When the current value underflows, it becomes 4,294,967,295.

| Group            | 1     | 2 | 3     | 4 | 5     | 6 | Read/Write |
|------------------|-------|---|-------|---|-------|---|------------|
| <b>Underflow</b> | M8162 | — | M8601 | — | M8164 | — | R          |

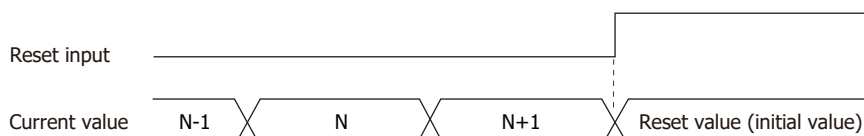
### ■ Comparison output reset

When the special internal relay turns on, the comparison output selected on **High-speed Counter Settings** turns off.

| Group                          | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|--------------------------------|-------|-------|-------|-------|-------|-------|------------|
| <b>Comparison Output Reset</b> | M8030 | M8051 | M8034 | M8040 | M8044 | M8057 | R/W        |

### ■ Reset input

When reset input is turned on, the current value returns to the reset value.



| Group              | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|--------------------|-------|-------|-------|-------|-------|-------|------------|
| <b>Reset Input</b> | M8032 | M8053 | M8036 | M8042 | M8046 | M8061 | R/W        |

### ■ Preset value, reset value storage locations

The preset value and the reset value for the high-speed counter are stored in special data registers as 2 words.

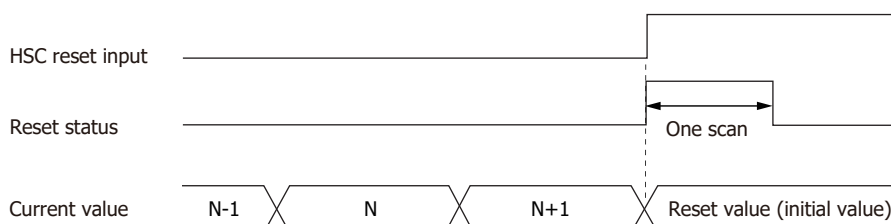
| Group                            | 1     | 2     | 3     | 4     | 5     | 6     | Read/Write |
|----------------------------------|-------|-------|-------|-------|-------|-------|------------|
| <b>Preset Value (Upper word)</b> | D8212 | D8194 | D8220 | D8224 | D8228 | D8200 | R          |
| <b>Preset Value (Lower word)</b> | D8213 | D8195 | D8221 | D8225 | D8229 | D8201 |            |
| <b>Reset Value (Upper word)</b>  | D8216 | D8196 | D8234 | D8236 | D8232 | D8202 | R/W        |
| <b>Reset Value (Lower word)</b>  | D8217 | D8197 | D8235 | D8237 | D8233 | D8203 |            |

In the WindLDR **Function Area Settings**, when **32-bit Data Storage Setting** is set to **From Lower Word**, the lower word is stored in the first device.

### ■ HSC reset input and reset status

When the HSC reset input is enabled in group 1, group 3 (Plus 32-I/O type), or group 5, turn on HSC reset input I2, I13, or I5 to return the current value to the reset value.

In this situation, reset status turns on for only one scan.



| Group                  | 1     | 2 | 3     | 4 | 5     | 6 | Read/Write |
|------------------------|-------|---|-------|---|-------|---|------------|
| <b>HSC Reset Input</b> | I2    | — | I13   | — | I5    | — | —          |
| <b>Reset Status</b>    | M8130 | — | M8600 | — | M8135 | — | R          |

To use the reset input with the group 1, group 3, or group 5 single-phase high-speed counter, use I2, I13, or I5. When not using I2, I13, or I5 as an external reset input, they can be used as normal input.

### ■ Count direction flag

These special internal relays maintain whether the Group 1, Group 3, or Group 5 current value is being added or subtracted. When these special internal relays are on, they indicate addition. When they are off, they indicate subtraction.

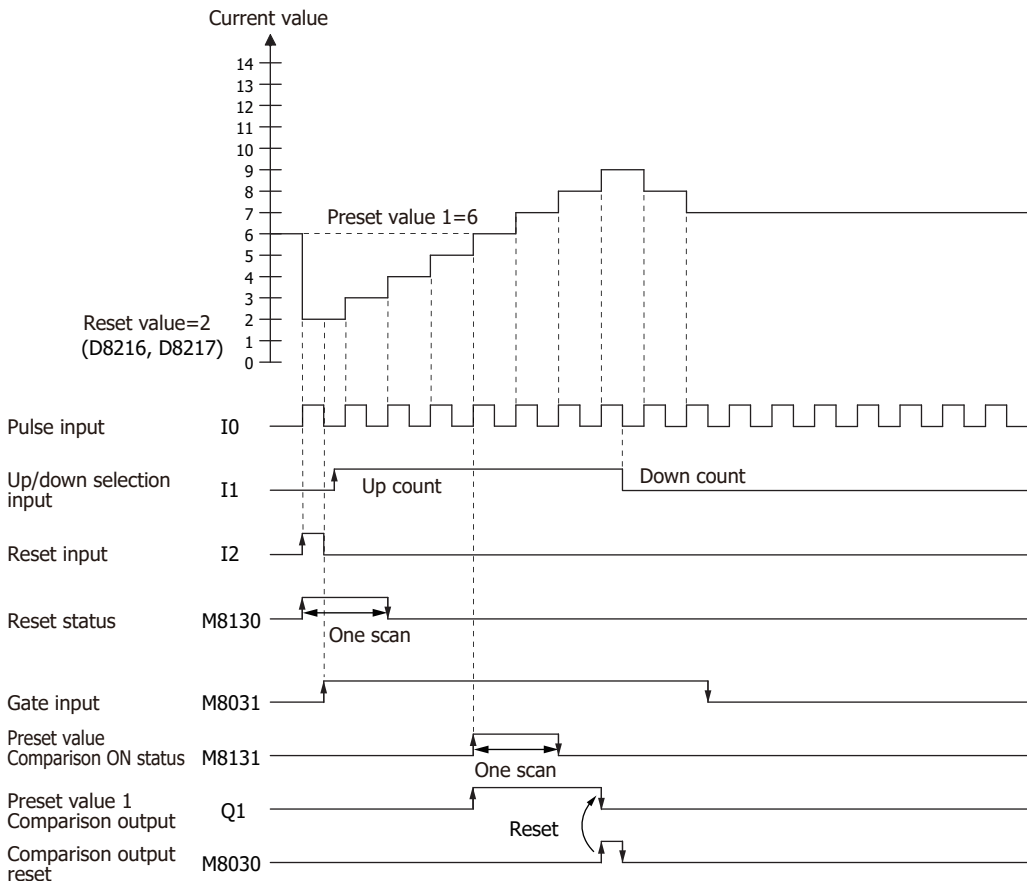
| Group                       | 1     | 2 | 3     | 4 | 5     | 6 | Read/Write |
|-----------------------------|-------|---|-------|---|-------|---|------------|
| <b>Count Direction flag</b> | M8027 | — | M8602 | — | M8043 | — | —          |

### Timing chart 1

Single-phase high-speed counter (group 1) timing chart

#### Operating conditions

The counting mode is set to **Up/down selection reversible counter** and reset input (I2) is used. One preset value is used, and when the values match, output Q1 turns on and the current value is kept. Overflow and underflow are not used.



1. When reset input (I2) turns on, the reset value (D8216, D8217) is stored in the current value (D8210, D8211). In this situation, reset status (M8130) turns on for only one scan.
2. When gate input (M8031) turns on, the counting begins.
3. The counting direction (count up/count down) is determined by the on/off state of the up/down selection input (I1), and the pulse input (I0) is counted. The current value is updated with each scan.
4. When the current value and preset value 1 (D8212, D8213) match, the preset value 1 comparison output (Q1) and Comparison ON status (M8131) turn on. When the **Keep** check box is selected in the settings in the WindLDR **High-speed Counter Settings**, the current value is kept.
5. Q1 maintains the on state until comparison output reset (M8030) turns on. M8131 turns on for only one scan.
6. When the gate output turns off, counting stops.

#### Note: High-speed counter usage precautions

The high-speed counter starts the count operation with the following two conditions:

- The FC6A starts operation
- The gate input is turned on

To start the count operation, turn the gate input on from off while the FC6A is running. When the gate input is already on and the FC6A is stopped, the count operation starts when the FC6A is switched from stop to run.

If run-time download is performed on the program when the gate input is on, the count operation stops.

When the PLC is in the RUN state (the PLC must be operating in RUN for three or more scans), the count operation is possible by turning the gate input off and then on or by stopping and then running the PLC. When performing run-time download on the program, we recommend doing so with the gate inputs off.



**Timing chart 2**

Two-phase high-speed counter (group 1) timing chart

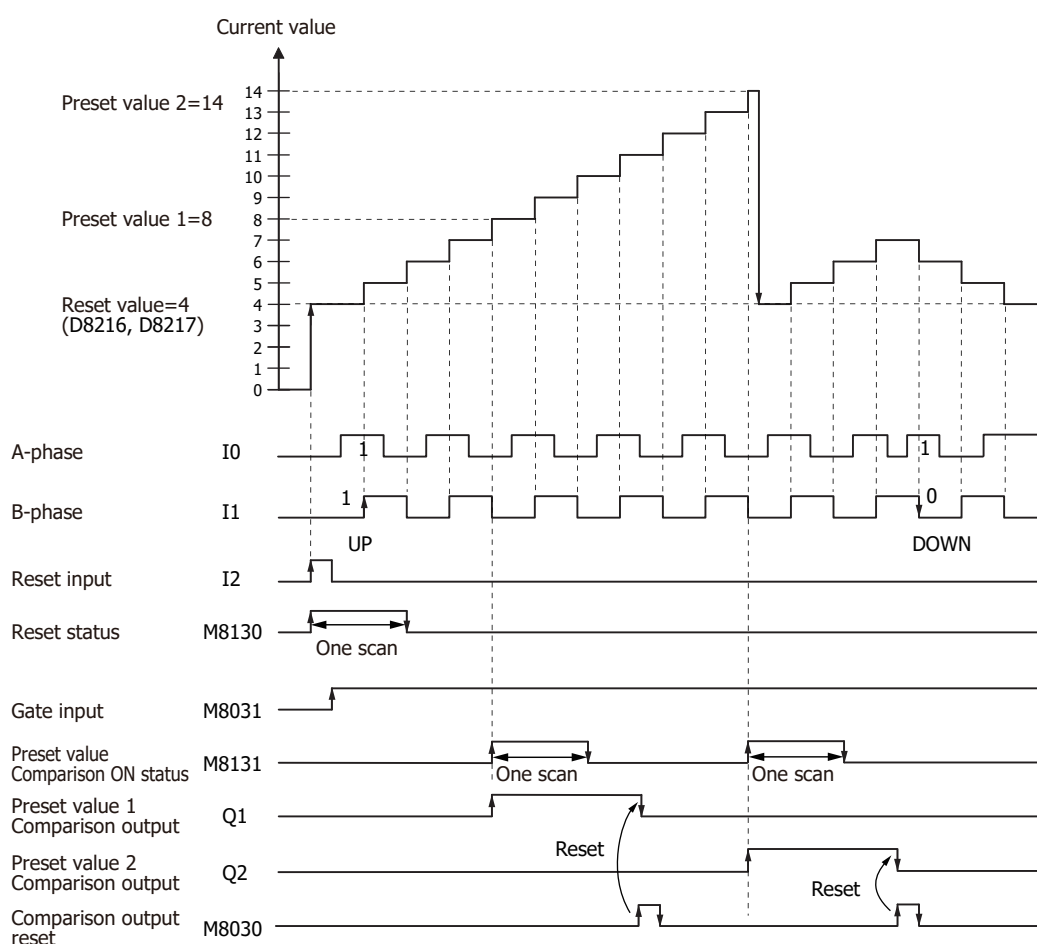
**Operating conditions**

The counting mode is set to **2-edge count** and reset input (I2) is used.

Two preset values are used, and when preset value 1 matches, output Q1 turns on and the current value is kept.

When preset value 2 matches, output Q2 turns on and the current value is cleared.

Overflow and underflow are not used.



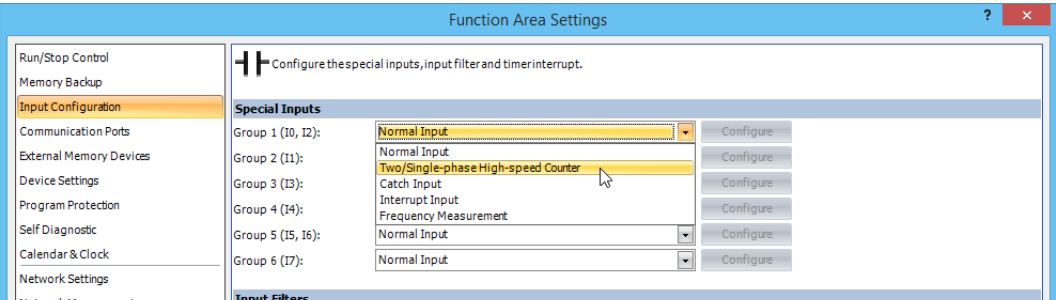
1. When reset input (I2) turns on, the reset value (D8216, D8217) is stored in the current value (D8210, D8211). In this situation, reset status (M8130) turns on for only one scan.
2. When gate input (M8031) turns on, the counting begins.
3. When the A-phase pulse (I0) precedes the B-phase pulse (I1), the count goes up. When the B-phase pulse (I1) precedes the A-phase pulse (I0), the count goes down.
4. When the current value and preset value 1 (D8212, D8213) match, the preset value 1 comparison output (Q1) and setting value match (M8131) turn on.
5. When preset value 1 matches, preset value 2 is stored in the preset value (D8212, D8213) as the new preset value and counting continues.
6. The preset value 1 comparison output (Q1) maintains the on state until comparison output reset (M8030) turns on. M8131 turns on for only one scan.

Example program 1

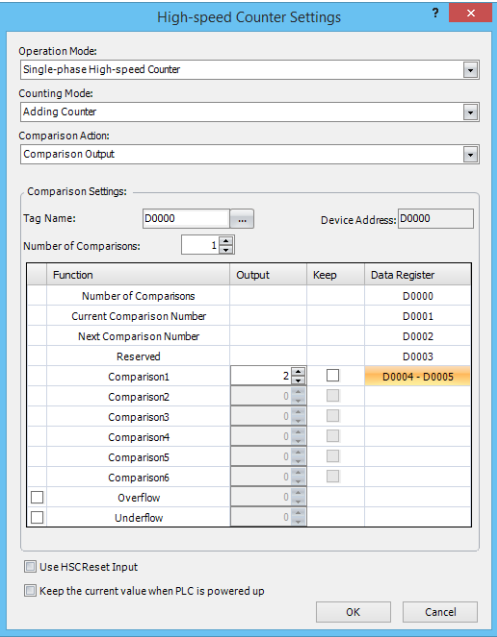
Using the single-phase high-speed counter on the ladder program, this example program turns on external output Q2 when 1,000 pulses are counted.

Application description

When pulses are input to external input I0 and the count reaches 1,000, external output Q2 is turned on.  
In the WindLDR **Function Area Settings**, select **Two/Single-phase High-speed Counter** for **Group 1**.



In the **High-speed Counter Settings** dialog box, configure the settings as follows.



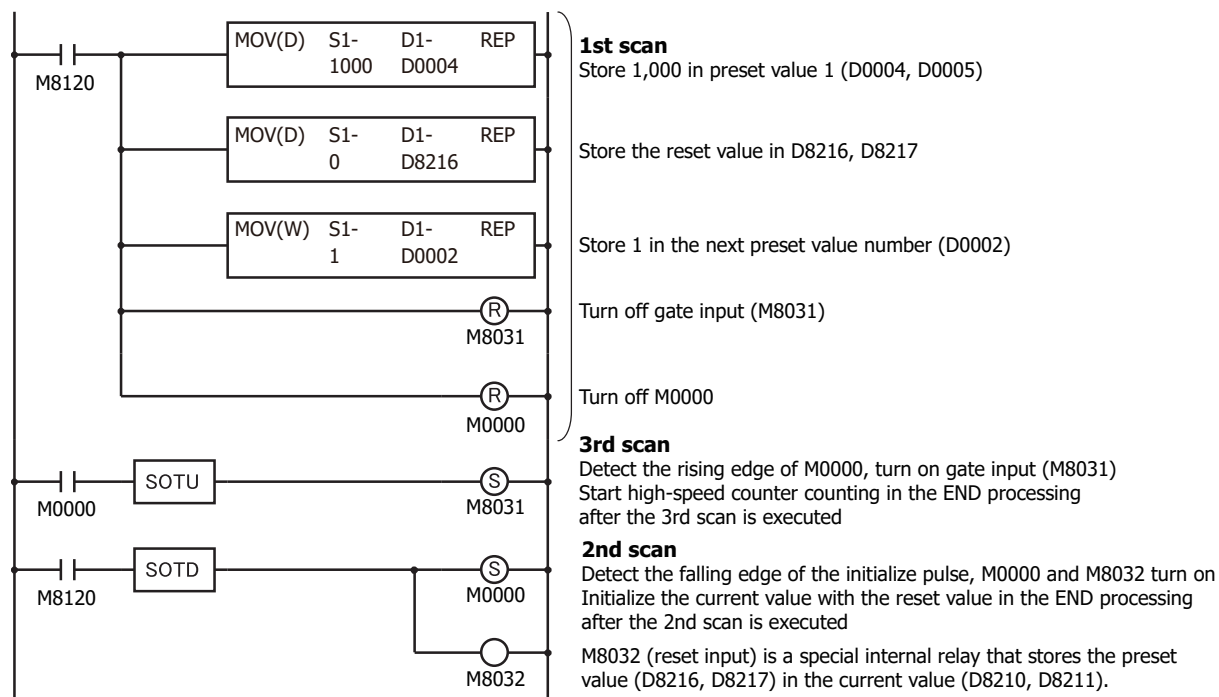
- External Input : Group 1
- Operation Mode : Single-phase High-speed Counter
- Counting Mode : Adding Counter
- Comparison Action : Comparison Output

Comparison settings

- Tag Name/Device Address : D0000 (data register)
- Number of Comparisons : 1
- Comparison Output : Q2 (external output when matched)
- Comparison1 (D0004) : 0 (upper word)
- Comparison1 (D0005) : 1,000 (lower word)
- Keep : Cleared
- Reset value (D8216) : 0 (upper word)
- Reset value (D8217) : 0 (lower word)
- Overflow : Cleared
- Underflow : Cleared
- Use HSC Reset Input : Cleared
- Keep the current value when PLC is powered up : Cleared

**Program**

M8120 (initialize pulse) is a special internal relay that turns on when the FC6A runs.

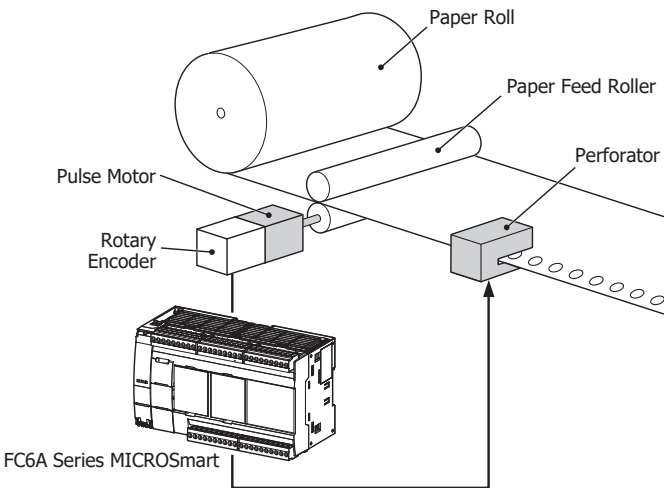


Example program 2

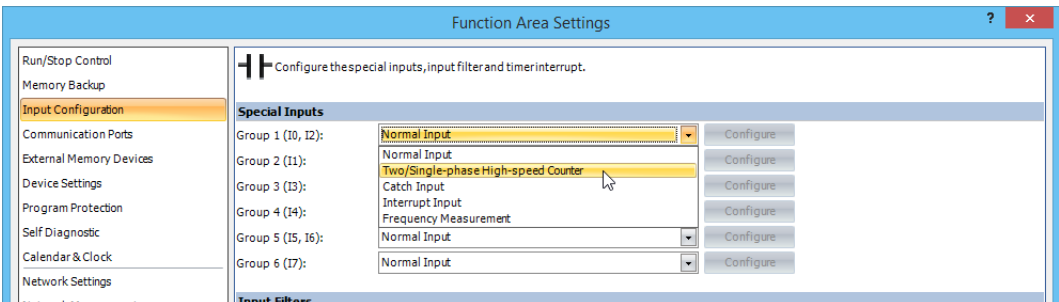
Using the two-phase high-speed counter, the pulses from a rotary encoder are input to the FC6A and a continuous workpiece is marked at a regular interval.

Application description

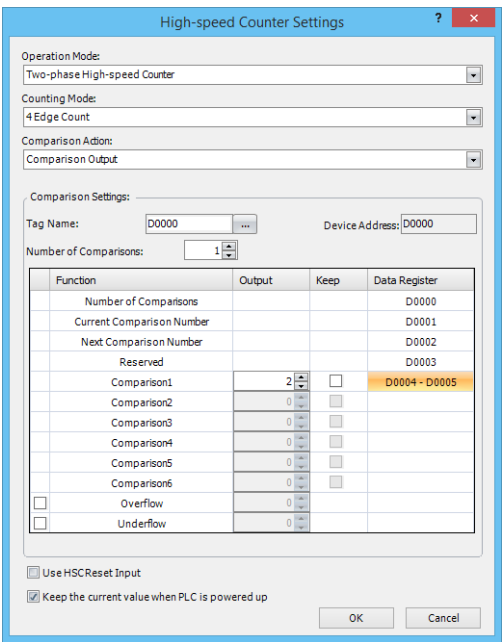
- The rotary encoder pulses are input to external input I0. A continuous sheet of paper is marked (holes are punched) at a regular interval (every 2,700 pulses).
- The rotary encoder is directly connected to the paper feed roller, and output pulses are counted by the high-speed counter and controlled.
- The cycle time is the time to count 2,700 pulses. When the hole punch time is 0.5 seconds, the operation condition is 2,700 pulse count time > 0.5 seconds.



In the WindLDR **Function Area Settings**, select **Two/Single-phase High-speed Counter** for **Group 1**.



In the **High-speed Counter Settings** dialog box, configure the settings as follows.



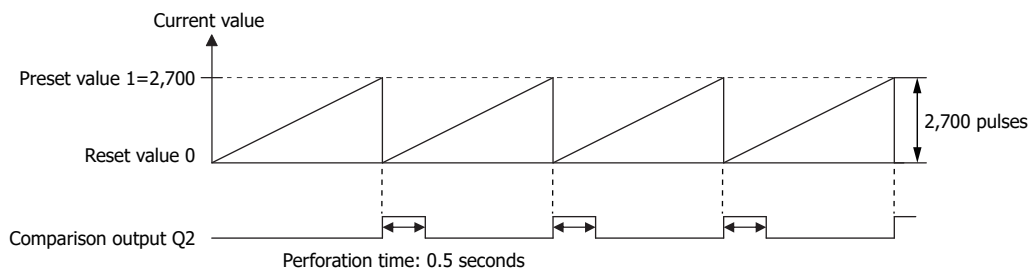
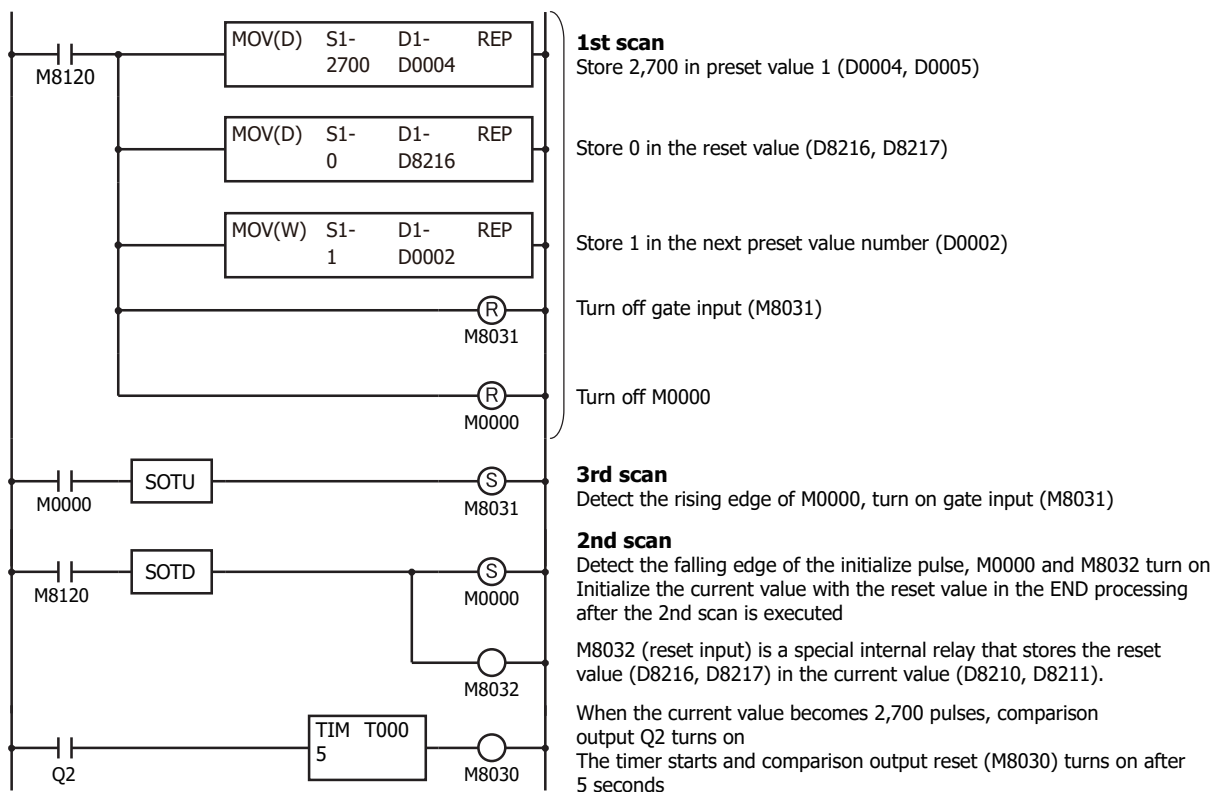
- External Input : Group 1  
Operation Mode : Two-phase High-speed Counter  
Counting Mode : 4-edge Count  
Comparison Action : Comparison Output

Comparison settings

- Tag Name/Device Address : D0000 (data register)  
Number of Comparisons : 1  
Comparison Output : Q2 (external output when matched)  
Comparison1 (D0004) : 0 (upper word)  
Comparison1 (D0005) : 2,700 (lower word)  
Keep : OFF  
Reset value (D8216) : 0 (upper word)  
Reset value (D8217) : 0 (lower word)  
Overflow : OFF  
Underflow : OFF  
Use HSC Reset Input : OFF  
Keep the current value when PLC is powered up : Checked

**Program**

M8120 (initialize pulse) is a special internal relay that turns on when the FC6A runs.



**Note:** In this example, Z-phase reset input is not used.

### Catch Input

The catch input function is used to receive short pulses from sensor outputs regardless of the scan time. Input pulses shorter than one scan time can be received. When using catch input, the on/off status according to the status of the external inputs during one scan is stored in the special internal relays (M8153 to M8157, M8160) that correspond to each external input group, and those signals can be used as input conditions.

The **Function Area Settings** dialog box is used to designate inputs I0, I1, I3, I4, I6 and I7 as a catch input.

Normal input signals to input terminals are read when the END instruction is executed at the end of a scan.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings.

### Catch Input Specifications

|                              |           |
|------------------------------|-----------|
| Minimum Turn ON Pulse Width  | 5 $\mu$ s |
| Minimum Turn OFF Pulse Width | 5 $\mu$ s |

**Note:** Input filter settings have no effect on the catch inputs. For the input filter function, see "Input Filter" on page 5-41.

### External Inputs

External inputs on the FC6A can be switched between and used as normal inputs, high-speed counters, catch inputs, interrupt inputs, and frequency measurements. To use catch inputs, specify the corresponding group as **Catch Input** in the **Function Area Settings** of WindLDR.

The status of external inputs that are assigned to catch inputs are stored in the following special internal relays by group (read-only).

#### All-in-One CPU module

| Group                    | 1   | 2     | 3     | 4     | 5     | 6     |
|--------------------------|-----|-------|-------|-------|-------|-------|
| External Input           | I2  | I0    | I1    | I3    | I4    | I5    |
| Catch Input              | —*1 | Yes   | Yes   | Yes   | Yes   | —*1   |
| Special Internal Relay*2 | —   | M8153 | M8154 | M8155 | M8156 | M8157 |

\*1 Can be used as a normal input.

\*2 Read-only.

#### Plus CPU module

| Group                    | 1   | 2     | 3     | 4     | 5     | 6     |
|--------------------------|-----|-------|-------|-------|-------|-------|
| External Input           | I2  | I0    | I1    | I3    | I4    | I5    |
| Catch Input              | —*1 | Yes   | Yes   | Yes   | Yes   | —*1   |
| Special Internal Relay*3 | —   | M8153 | M8154 | M8155 | M8156 | M8157 |

\*1 Can be used as a normal input.

\*2 Can be used only with the Plus 32-I/O type.

\*3 Read-only.

### Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Input Configuration**.

The **Function Area Settings** dialog box for Input Configuration appears.

**Function Area Settings**

Configure the special inputs, input filter and timer interrupt.

**Special Inputs**

|                   |                                     |           |
|-------------------|-------------------------------------|-----------|
| Group 1 (I0, I2): | Normal Input                        | Configure |
| Group 2 (I1):     | Two/Single-phase High-speed Counter | Configure |
| Group 3 (I3):     | Catch Input                         | Configure |
| Group 4 (I4):     | Interrupt Input                     | Configure |
| Group 5 (I5, I6): | Normal Input                        | Configure |
| Group 6 (I7):     | Normal Input                        | Configure |

**Input Filters**

|       | +0   | +1   | +2   | +3   | +4   | +5   | +6   | +7   |
|-------|------|------|------|------|------|------|------|------|
| 10000 | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms |
| 10010 | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms |
| 10020 | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms | 3 ms |

**Analog Input**

| Address | Filter (times) | Signal Type    | Data Type   | Min. | Max. | Data  | Status |
|---------|----------------|----------------|-------------|------|------|-------|--------|
| A10     | 10             | Analog Voltage | Binary data | 0    | 1000 | D8057 | D8059  |
| A11     | 10             | 0 to 10V DC    | Binary data | 0    | 1000 | D8058 | D8060  |

**Timer Interrupt (ms)**

☐ Use Timer Interrupt

Interval (1-1000 ms): 10

**Catch Input**

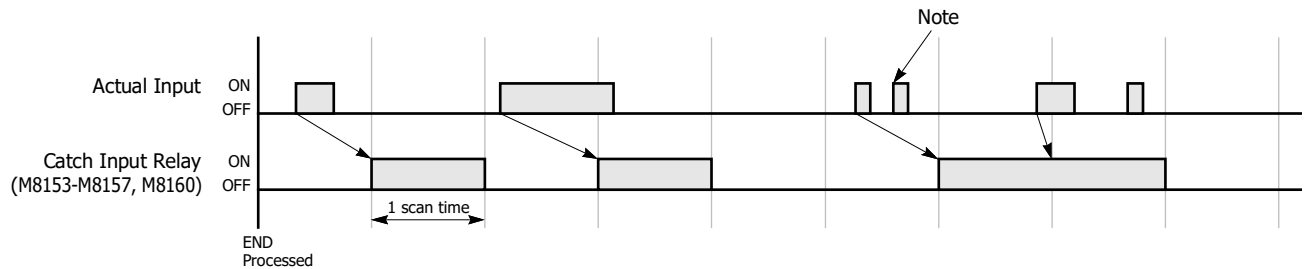
Catch Input Rising/Falling Edge Selection

Catch Input Rising Edge

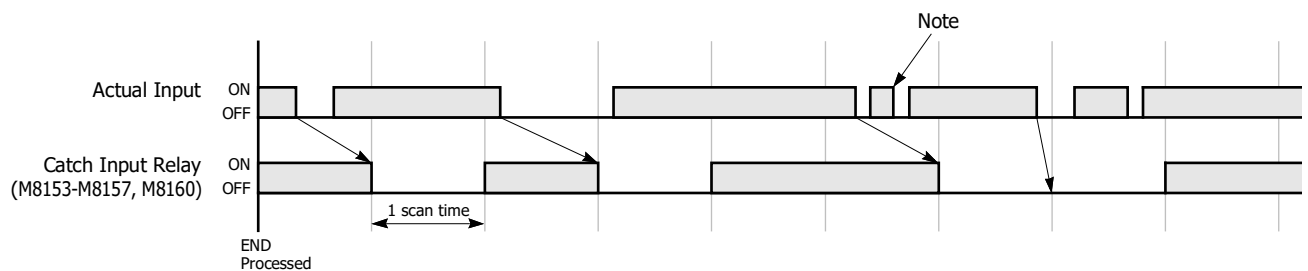
Catch Input Falling Edge

2. Select **Catch Input** in the Groups 1 through 4 pull-down list boxes. The Catch Input dialog box appears.
3. Select **Catch Input Rising Edge** or **Catch Input Falling Edge** in the pull-down list.

#### Catching Rising Edge of Input Pulse



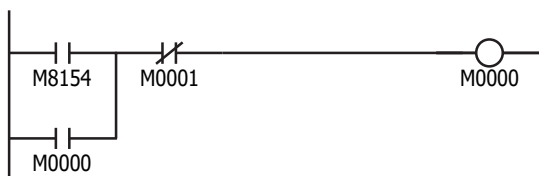
#### Catching Falling Edge of Input Pulse



**Note:** When two or more pulses enter within one scan, subsequent pulses are ignored.

#### Example: Maintaining Catch Input

When a catch input is received, the catch input relay assigned to a catch input is turned on for only one scan. This example demonstrates a program to maintain a catch input status for more than one scan.



Input I1 is designated as a catch input using the Function Area Settings.

When input I1 is turned on, special internal relay M8154 is turned on, and M0000 is maintained in the self-holding circuit.

When NC input M0001 is turned off, the self-holding circuit is unlatched, and M0000 is turned off.

M0000 is used as an input condition for the subsequent program instructions.

### Interrupt Input

When a quick response to an external input is required, such as positioning control, the interrupt input can call a subroutine to execute an interrupt program.

Six inputs I0, I1, I3, I4, I6, and I7 can be designated to execute interrupt at a rising and/or falling edge of input pulses. When an interrupt is initiated by inputs I0, I1, I3, I4, I6 and I7, program execution immediately jumps to a predetermined label number stored in special data registers D8215, D8032 through D8035, and D8214 respectively. The **Function Area Settings** dialog box is used to designate inputs I0, I1, I3, I4, I6 and I7 as an interrupt input, normal input, high-speed counter input, or catch input. Normal input signals to input terminals are read when the END instruction is executed at the end of a scan.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings.

### Interrupt Input Terminals, Special Data Registers, and Special Internal Relays for Interrupt Inputs

#### All-in-One CPU module

| Group  | 1   |       | 2     | 3     | 4     | 5   |       | 6     |
|--|-----|-------|-------|-------|-------|-----|-------|-------|
| External Input                                     | I2  | I0    | I1    | I3    | I4    | I5  | I6    | I7    |
| Interrupt Input                                    | —*1 | Yes   | Yes   | Yes   | Yes   | —*1 | Yes   | Yes   |
| Special Data Register (Jump Destination Label No.) | —   | D8215 | D8032 | D8033 | D8034 | —   | D8035 | D8214 |
| Special Internal Relay (Interrupt Input Status)    | —   | M8137 | M8140 | M8141 | M8142 | —   | M8143 | M8167 |
| Special Internal Relay (Interrupt Input Edge)      |     | M8192 | M8197 | M8193 | M8194 | —   | M8195 | M8196 |

\*1 Can be used as a normal input.

#### Plus CPU module

| Group  | 1   |       | 2     | 3     |       | 4     | 5   |       | 6     |
|--|-----|-------|-------|-------|-------|-------|-----|-------|-------|
| External Input                                     | I2  | I0    | I1    | I13*2 | I3    | I4    | I5  | I6    | I7    |
| Interrupt Input                                    | —*1 | Yes   | Yes   | —*1   | Yes   | Yes   | —*1 | Yes   | Yes   |
| Special Data Register (Jump Destination Label No.) | —   | D8215 | D8032 | —     | D8033 | D8034 | —   | D8035 | D8214 |
| Special Internal Relay (Interrupt Input Status)    | —   | M8137 | M8140 | —     | M8141 | M8142 | —   | M8143 | M8167 |
| Special Internal Relay (Interrupt Input Edge)      | —   | M8192 | M8197 | —     | M8193 | M8194 | —   | M8195 | M8196 |

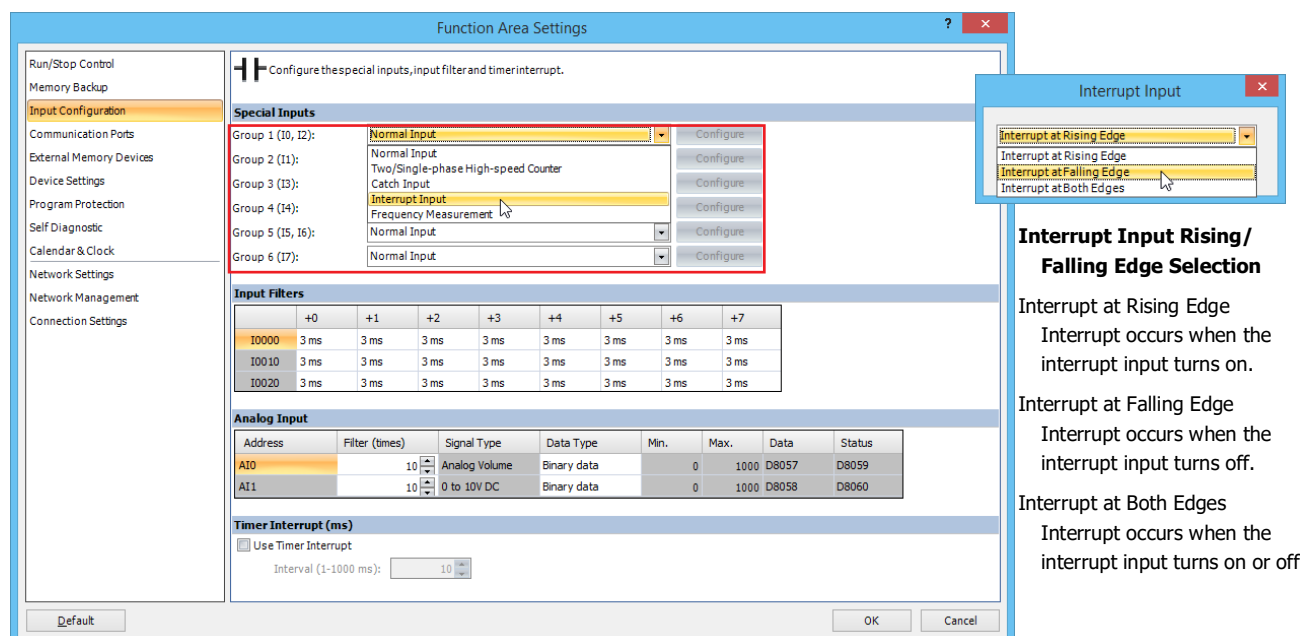
\*1 Can be used as a normal input.

\*2 Can be used only with the Plus 32-I/O type.



## Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Input Configuration**.  
The **Function Area Settings** dialog box for Input Configuration appears.



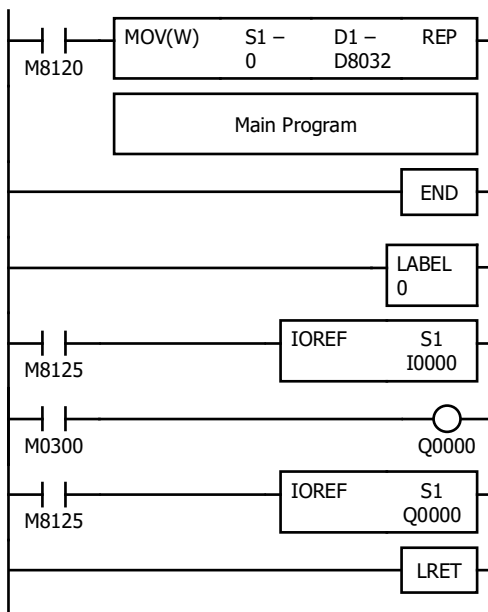
2. Select **Interrupt Input** in the Groups 1 through 6 pull-down list boxes. the Interrupt Input dialog box appears.
3. Select an interrupt edge in the pull-down list for each group.

## Disable and Enable Interrupts

The interrupt inputs I0, I1, I3, I4, I6, and I7 and timer interrupt are normally enabled while the FC6A is running, and can also be individually disabled using the DI instruction or enabled using the EI instruction. When interrupt inputs I0, I1, I3, I4, I6, and I7 are enabled, special internal relay M8137 through M8143, and M8167 are turned on, respectively. See Chapter 14 "Refresh Instructions" in the "Ladder Programming Manual".

### Example: Interrupt Input

The following example demonstrates a program using the interrupt input function, with input I1 designated as an interrupt input. When the interrupt input is turned on, the input I0 status is immediately transferred to output Q0 using the IOREF (I/O refresh) instruction before the END instruction is executed. For the IOREF instruction, See Chapter 14 "Refresh Instructions" in the "Ladder Programming Manual".



M8120 is the initialize pulse special internal relay.

D8032 stores 0 to designate jump destination label 0 for interrupt input I1.

The interrupt program is separated from the main program by the END instruction.

When input I1 is on, program execution jumps to label 0.

M8125 is the in-operation output special internal relay.

IOREF immediately reads input I0 status to internal relay M0300.

M0300 turns on or off the output Q0 internal memory.

Another IOREF immediately writes the output Q0 internal memory status to actual output Q0.

Program execution returns to the main program.

Insert LRET at the end of the subroutine to return to the main program.

### Notes for Using Interrupt Inputs and Timer Interrupt:

- When using an interrupt input or timer interrupt, separate the interrupt program from the main program using the END instruction at the end of the main program.
- When an interrupt program calls another subroutine, a maximum of 3 subroutine calls can be nested. If more than 3 calls are nested, a user program execution error occurs, turning on special internal relay M8004 and the ERR LED.
- When using an interrupt input or timer interrupt, include the label number of the interrupt program to be executed when an interrupt occurs. The label numbers stored in data registers D8214, D8215, and D8032 through D8035 specify the interrupt programs for interrupt inputs I0, I1, I3, I4, I6, and I7 and timer interrupt, respectively.
- When more than one interrupt input is turned on at the same time, interrupt program execution is given priority to inputs I0, I1, I3, I4, I6, and I7, in that order. If an interrupt is initiated while another interrupt program is executed, the subsequent interrupt program is executed after the prior interrupt is completed. Multiple interrupt programs cannot be executed simultaneously.
- Make sure that the execution time of the interrupt program is shorter than interrupt intervals sufficiently.
- Interrupt programs cannot use the following instructions: SOTU, SOTD, TML, TIM, TMH, TMS, TML0, TIMO, TMHO, TMSO, CNT, CDP, CUD, CNTD, CDPD, CUDD, SFR, SFRN, WKTIM, WJTBL, WEEK, YEAR, MSG, DISP, DGRD, COMRF, DI, EI, XYFS, CVXTY, CVYTX, AVRG, PULS, PWM, RAMP, ZRN, ARAMP, ABS, JOG, PID, PIDA, DTML, DTIM, DTMH, DTMS, TTIM, FIFO, NDSRC, HOUR, SCALE, FLWA, FLWP, PING, EMAIL, TXD, RXD, ETXD, ERXD, DLOG, and TRACE.

## Frequency Measurement

This section describes frequency measurement, which measures the frequency of pulses input to an external input. Frequency measurement is a function that measures the frequency of pulses input to an external input.

These input pulses are processed with dedicated hardware device in FC6A, so frequencies can be measured with no relation to the scan time. The measurement results are stored in special data registers and they are updated with each scan.

### Function Specification

The FC6A external inputs are used by switching between normal input, high-speed counters, catch input, interrupt input, and frequency measurement. To use frequency measurement, specify the relevant group as **Frequency Measurement** in the WindLDR **Function Area Settings**.

Frequency measurement can be used with the following external inputs.

The frequency measurement results are stored in the following special data registers for each external input group.

#### All-in-One CPU module

| Group                                 |            | 1  |       | 2     | 3             | 4     | 5               |       | 6     |
|---------------------------------------|------------|--|-------|-------|---------------|-------|-----------------|-------|-------|
| External Input                        |            | I2   | I0    | I1    | I3            | I4    | I5              | I6    | I7    |
| Frequency Measurement Value           |            | —*1  | Yes   | Yes   | Yes           | Yes   | —*1             | Yes   | Yes   |
| Frequency Measurement Range           |            | 4 Hz to 100 kHz  |       |       | 4 Hz to 5 kHz |       | 4 Hz to 100 kHz |       |       |
| Measurement Error                     |            | Less than ±10% (4 Hz or higher and less than 4 kHz), less than ±0.1% (4 kHz or higher) |       |       |               |       |                 |       |       |
| Calculation Cycle                     |            | Within 1 s (less than 4 kHz), within 250 ms (4 kHz or higher)                          |       |       |               |       |                 |       |       |
| Frequency Measurement Value (32 bits) | Upper Word | —  | D8210 | D8192 | D8218         | D8222 | —               | D8226 | D8198 |
|                                       | Lower Word | —  | D8211 | D8193 | D8219         | D8223 | —               | D8227 | D8199 |

\*1 Can be used as a normal input.

#### Plus CPU module

| Group                                 |            | 1  |       | 2     | 3     |       | 4     | 5   |       | 6     |
|---------------------------------------|------------|--|-------|-------|-------|-------|-------|-----|-------|-------|
| External Input                        |            | I2   | I0    | I1    | I13*2 | I3    | I4    | I5  | I6    | I7    |
| Frequency Measurement Value           |            | —*1  | Yes   | Yes   | —*1   | Yes   | Yes   | —*1 | Yes   | Yes   |
| Frequency Measurement Range           |            | 4 Hz to 100 kHz  |       |       |       |       |       |     |       |       |
| Measurement Error                     |            | Less than ±10% (4 Hz or higher and less than 4 kHz), less than ±0.1% (4 kHz or higher) |       |       |       |       |       |     |       |       |
| Calculation Cycle                     |            | Within 1 s (less than 4 kHz), within 250 ms (4 kHz or higher)                          |       |       |       |       |       |     |       |       |
| Frequency Measurement Value (32 bits) | Upper Word | —  | D8210 | D8192 | —     | D8218 | D8222 | —   | D8226 | D8198 |
|                                       | Lower Word | —  | D8211 | D8193 | —     | D8219 | D8223 | —   | D8227 | D8199 |

\*1 Can be used as a normal input.

\*2 Can be used only with the Plus 32-I/O type.

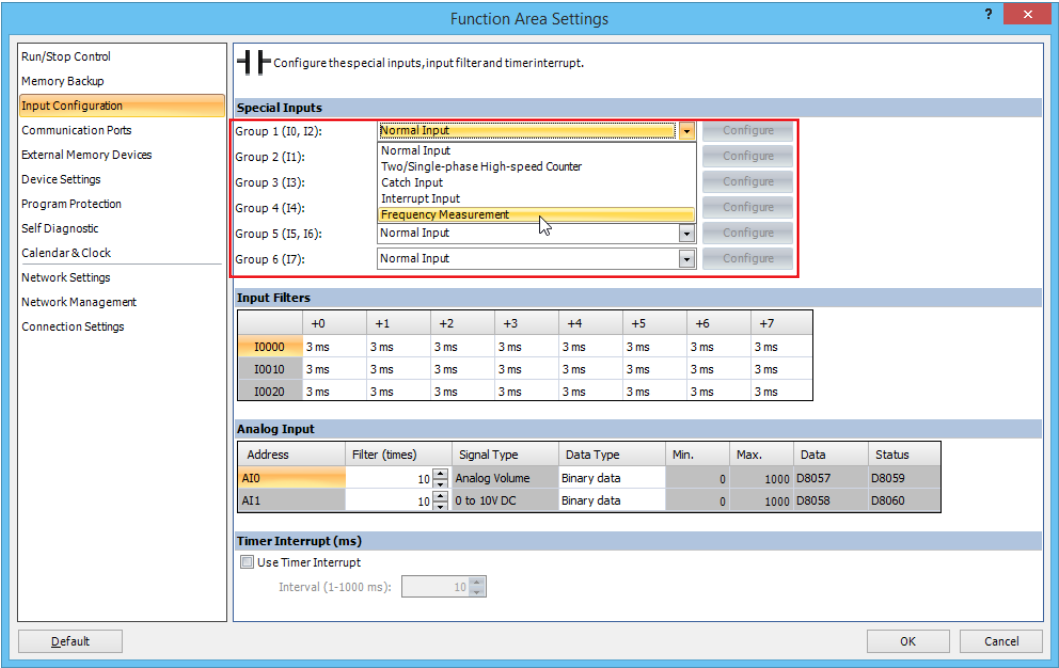
#### Notes:

- To reflect the measurement results in the special data registers, a maximum of calculation cycle + scan time is required. However, when the FRQRF instruction is used during ladder processing, the frequency value of the special data registers can be updated to the latest value. The latest calculation result can be read within 250 ms regardless of the input frequency.
- The data registers for the upper word and the lower word of the measurement value change according to the 32-bit data storage method specified. For details, see "32-bit Data Storage Setting" on page 5-55.

Programming WindLDR

To use frequency measurement, you must configure the **Function Area Settings** in WindLDR and download the user program to the FC6A. Frequency measurements will start when you download the user program and set the FC6A to run.

- 1. From the WindLDR menu bar, select **Configuration > Input Configuration**.  
The **Function Area Settings** dialog box is displayed.
- 2. Specify **Frequency Measurement** for the group to use frequency measurement.



- 3. Click **OK**.  
This concludes configuring the settings.

## Input Filter

The input filter function is used to reject input noises. The catch input function described in the preceding section is used to read short input pulses to special internal relays. To the contrary, the input filter rejects short input pulses when the FC6A is used with input signals containing noises.

Different input filter values can be selected for inputs I0 through I27 in four groups using the **Function Area Settings**. Selectable input filter values to pass input signals are 0 ms, and 3 through 15 ms in 1 ms increments. Default value is 3 ms for all inputs I0 through I27. Input I30 and above on all expansion input modules have a fixed filter of 3 ms. The input filter rejects inputs shorter than the selected input filter value minus 2 ms.

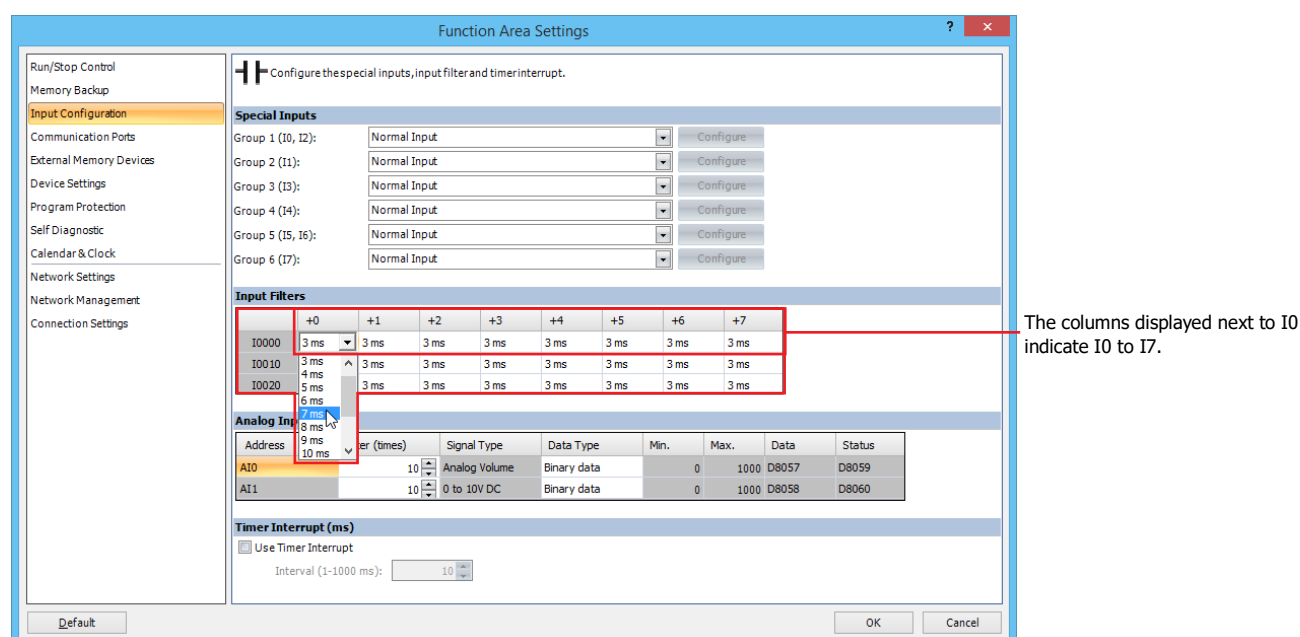
Normal inputs require a pulse width of the filter value plus one scan time to receive input signals. When using the input filter function, select **Normal Input** under Special Inputs on the Input Configuration dialog box in the **Function Area Settings**.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings.

## Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > Input Configuration**.

The **Function Area Settings** dialog box for Input Configuration appears.



2. Select an input filter value for each group of inputs.

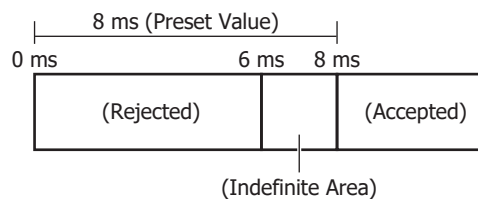
## Input Filter Values and Input Operation

Depending on the selected values, the input filter has three response areas to reject or pass input signals.

- Reject area:** Input signals do not pass the filter (selected filter value minus 2 ms).
- Indefinite area:** Input signals may be rejected or passed.
- Pass area:** Input signals pass the filter (selected filter value).

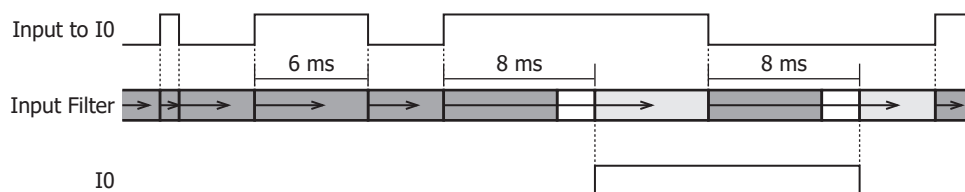
### Example: Input Filter 8 ms

To reject input pulses of 6 ms or less, select input filter value of 8 ms. Then input pulses of 8 ms plus one scan time are accepted correctly at the END processing.



When there is a change in the input, the input filter starts measuring the time.

Once the measured time exceeds the preset value, the change in the input is acquired internally.



#### Notes:

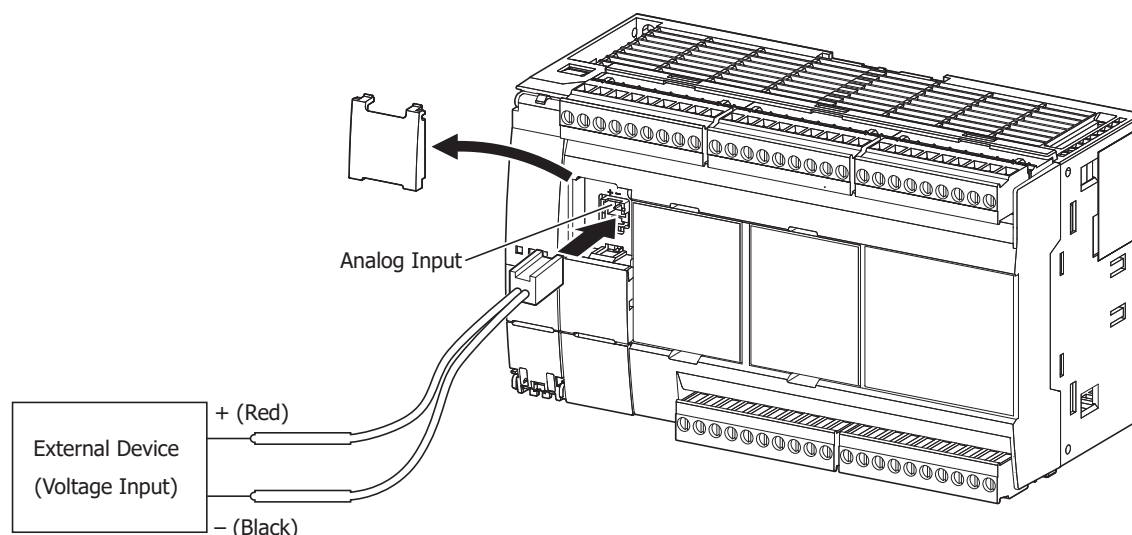
- Signals that pass through the input filter cannot always be acquired as input. To acquire a signal as normal input, a maximum pulse width of input filter value + 1 scan time is required.
- When an external input (I0, I2, I3, I5, I6, I7) is set to a high-speed counter, catch input, interrupt input, frequency measurement, or the interrupt input for an ARAMP instruction or a ZRN instruction, the input filter is disabled.
- The filter for digital I/O module external inputs (starting from I30) are fixed at 3 ms. This filter value cannot be changed.

## Analog Voltage Input

The section describes the analog input built into the FC6A.

### Function Description

The FC6A is equipped with a built-in analog voltage input function. This function acquires 0 to 10V DC voltage analog input by converting it to a digital value. The converted analog signal is stored in a special data register. Only one analog input can be used.



### Analog input value storage location

The converted analog signal is stored in a special data register (D8058: read-only) as a digital value. This digital value is updated with each scan. The range of the value that is stored in the special data register (D8058: read-only) can be specified with the data type.

### Analog input status (D8060)

The analog input status code is stored in special data register D8060 (analog input status).

| Status code       | Details   | Analog Input Value         |
|-------------------|---|----------------------------|
| 0                 | Normal operation  | Current analog input value |
| 1                 | Converting data<br>(occurs only once during the initial conversion when the power is turned on) | Undefined                  |
| 2                 | Initializing  | 0                          |
| 5                 | Wiring fault (out of maximum range)<br>When the analog input value exceeds 11 V                 | Upper limit value          |
| 3, 4, 6 to 65,535 | Reserved  | —                          |

### Analog Input Filter

The analog input data is averaged by the specified filter count. This can reduce rapid fluctuations in analog input.

The larger this value is set, the slower the tracking of the change in analog input becomes.

| Count    | Details   |
|----------|---|
| 1 to 255 | The input value is set as the average value of n samples of analog input data. (n: Count) |

When filtering, the input value is calculated with the equation below.

$$\text{Analog input value after filtering} = \frac{\text{Total analog input values for filter count (n) worth of scans}}{\text{Filter count n}}$$

### Analog input data types

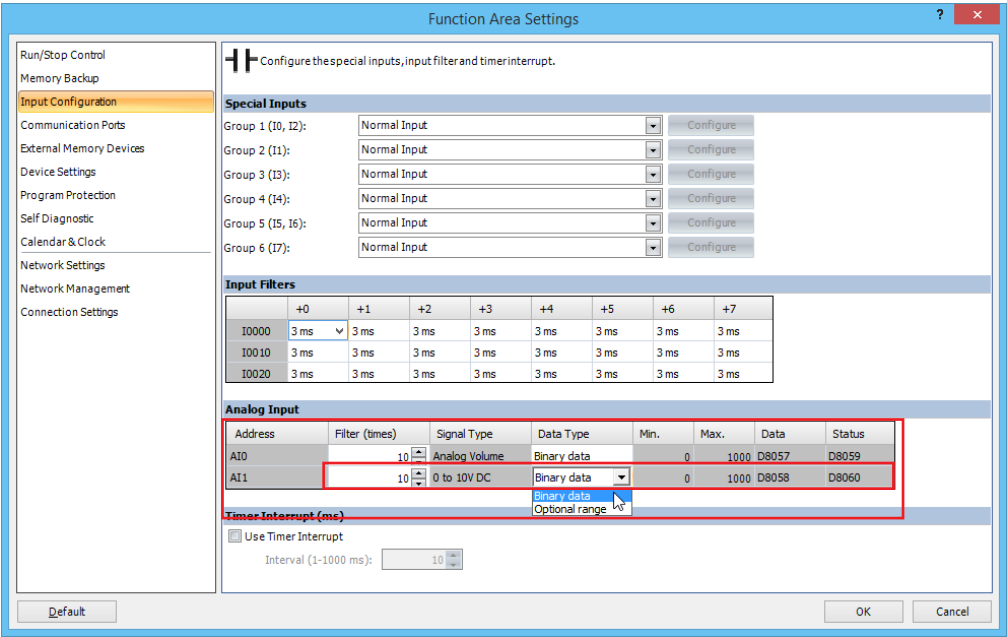
The range of analog values that can be handled with the specified data types are as follows.

| Data type      | Details   |  |
|----------------|---|--|
|                | All-in-One CPU Module   | Plus CPU Module  |
| Binary data    | 0 to 1,000  | 0 to 4,000   |
| Optional range | Minimum to maximum<br>(The minimum and maximum in a range between 0 to 1,000 where minimum ≤ maximum) | Minimum to maximum<br>(The minimum and maximum in a range between -32,768 to 32,767 where minimum ≤ maximum) |

Programming WindLDR

To use analog input, you must configure the **Function Area Settings** in WindLDR and download the user program to the FC6A.

- 1. On the **Configuration** tab, in the **Function Area Settings** group, click **Input Configuration**.  
The **Function Area Settings** dialog box is displayed.
- 2. For AI1, configure the filter count and data type for the analog input.  
The AI1 signal type is fixed as "0 to 10V DC".



- 3. Click **OK**.

This concludes configuring the settings.

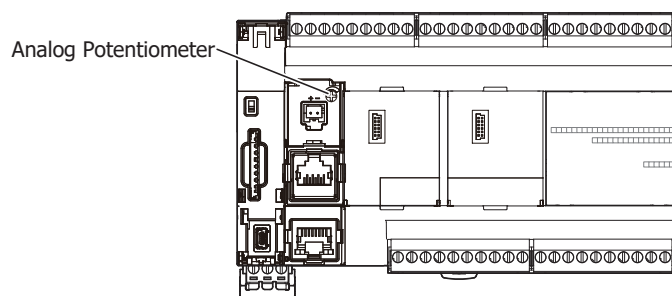


## Analog Potentiometer

This section describes the analog potentiometer that changes the analog value used in the user program without the use of an external device.

### Function Description

The analog potentiometer has a minimum value of 0 and a maximum value of 1,000. An analog value of 0 to 1,000 is acquired according to the position of the analog potentiometer and without the use of any special external devices, and that value is stored in a special data register.



### Analog potentiometer value storage location

The analog potentiometer value is stored in a special data register (D8057: read-only) as a value between 0 and 1,000. This value is updated with each scan.

### Analog potentiometer status (D8059)

The analog potentiometer status code is stored in special data register D8059 (analog potentiometer status).

| Status code | Details  | Analog Potentiometer Value         |
|-------------|--|------------------------------------|
| 0           | Normal operation   | Current analog potentiometer value |
| 1           | Converting data (occurs only once during the initial conversion when the power is turned on) | Undefined                          |
| 2           | Initializing   | 0                                  |
| 3 to 65,535 | Reserved   | —                                  |

### Analog Potentiometer Filter

The analog potentiometer data is averaged by the specified filter count. This can reduce rapid fluctuations in the analog potentiometer.

The larger this value is set, the slower the tracking of the change in analog potentiometer becomes.

| Count    | Details   |
|----------|---|
| 0        | No filtering  |
| 1 to 255 | The input value is set as the average value of n samples of analog potentiometer data. (n: Count) |

When filtering, the input value is calculated with the equation below.

$$\text{Analog potentiometer value after filtering} = \frac{\text{Total analog potentiometer values for filter count (n) worth of scans}}{\text{Filter count n}}$$

### Analog potentiometer data types

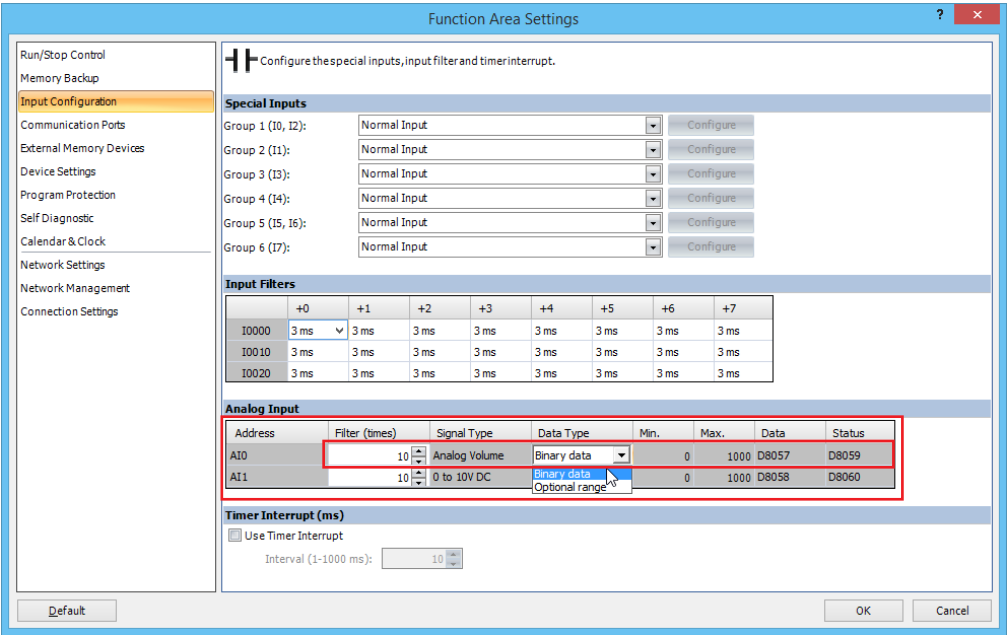
The range of analog potentiometer values that can be handled with the specified data types are as follows.

| Data type      | Details   |
|----------------|---|
| Binary data    | 0 to 1,000  |
| Optional range | Minimum to maximum<br>(The minimum and maximum in a range between 0 to 1,000 where minimum ≤ maximum) |

Programming WindLDR

To use the analog potentiometer, you must configure the **Function Area Settings** in WindLDR and download the user program to the FC6A.

- 1. On the **Configuration** tab, in the **Function Area Settings** group, click **Input Configuration**.  
The **Function Area Settings** dialog box is displayed.
- 2. For AI0, configure the filter count and data type for the analog Potentiometer.  
The AI0 signal type is fixed as "Analog Potentiometer".

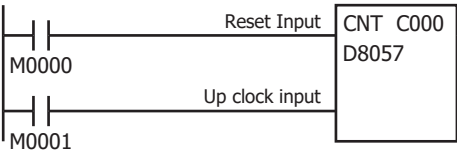


- 3. Click **OK**.

This concludes configuring the settings.

Example program

This program uses the analog potentiometer value for the counter preset value.



When reset input M0000 turns on, the current value is reset to "0".  
While reset input M0000 is off, the counter can count.  
While the counter is in the state where it can count, it increments +1 with each rise in up clock input M0001.  
When the current value reaches analog potentiometer value D8057, counting ends, and the counter output is maintained until reset input M0000 is turned on.

## Timer Interrupt

In addition to the interrupt input as described in the preceding section, all FC6A have a timer interrupt function. When a repetitive operation is required, the timer interrupt can be used to call a subroutine repeatedly at predetermined intervals of 1 through 1,000 ms.

The **Function Area Settings** dialog box is used to enable the timer interrupt and to specify the interval, from 1 to 140 ms, to execute the timer interrupt. When the timer interrupt is enabled, the program execution repeatedly jumps to the jump destination label number stored in special data register D8036, while the FC6A is running. When the interrupt program is completed, the program execution returns to the main program at the address where the interrupt occurred.

Since these settings relate to the user program, the user program must be downloaded to the FC6A after changing any of these settings.

### Special Data Register and Special Internal Relay for Timer Interrupt

| Interrupt       | Special Data Register for Timer Interrupt Jump Destination Label No. | Special Internal Relay for Timer Interrupt Status |
|-----------------|--|---|
| Timer Interrupt | D8036  | M8144   |

**Note:** A label is the starting address of the program branch to jump to, and it is specified by the LABEL instruction.

## Programming WindLDR

- From the WindLDR menu bar, select **Configuration > Input Configuration**.  
The **Function Area Settings** dialog box for Input Configuration appears.

The screenshot shows the 'Function Area Settings' dialog box with the 'Input Configuration' tab selected. The 'Timer Interrupt (ms)' section is highlighted with a red box, indicating the 'Use Timer Interrupt' checkbox is checked and the 'Interval (1-1000 ms)' is set to 10 ms.

- Under the Timer Interrupt, click the check box to use the timer interrupt function.
- Select an interval to execute the timer interrupt, from 1 to 140 ms.
- Click **OK**.

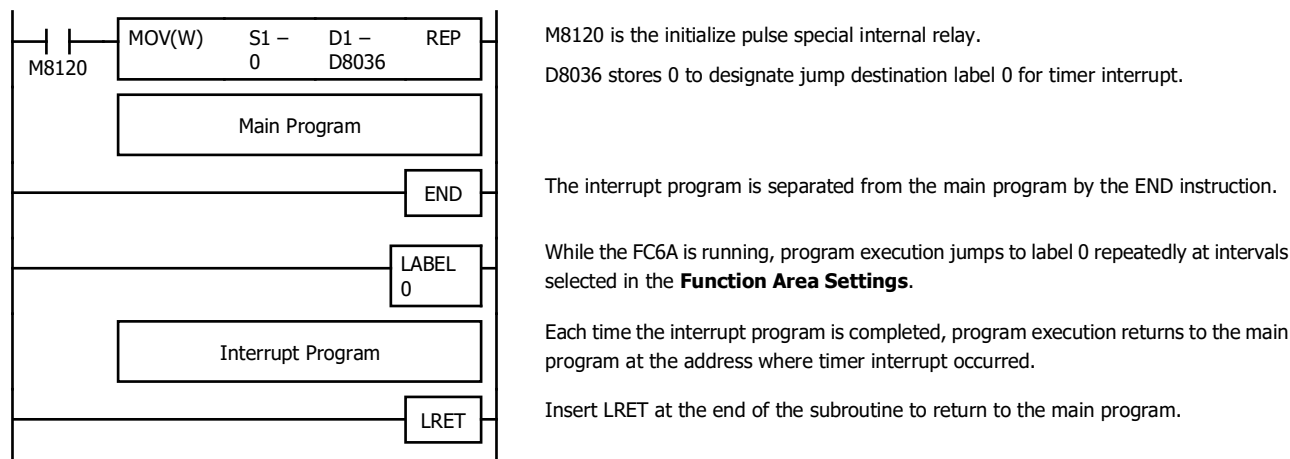
This concludes configuring the settings.

### Disable and Enable Interrupts

The timer interrupt and interrupt inputs I0, I1, I3, I4, I6 and I7 are normally enabled while the FC6A is running, and can also be individually disabled using the DI instruction or enabled using the EI instruction. When timer interrupt is enabled, M8144 is turned on. When disabled, M8144 is turned off. See Chapter 15 "Interrupt Control Instructions" in the "Ladder Programming Manual".

### Example: Timer Interrupt

The following example demonstrates a program of using the timer interrupt function. The Function Area Settings must also be completed to use the timer interrupt function as described on the preceding page.



### Notes for Using Timer Interrupt and Interrupt Inputs:

- When using a timer interrupt or interrupt input, separate the interrupt program from the main program using the END instruction at the end of the main program.
- When an interrupt program calls another subroutine, a maximum of 3 subroutine calls can be nested. If more than 3 calls are nested, a user program execution error occurs, turning on special internal relay M8004 and the ERR LED.
- When using a timer interrupt or interrupt input, include the label number of the interrupt program to be executed when an interrupt occurs. The label numbers stored in data registers D8214, D8215, D8032 through D8035 specify the interrupt programs for interrupt inputs I0, I1, I3, I4, I6 and I7 and timer interrupt, respectively.
- If an interrupt is initiated while another interrupt program is executed, the subsequent interrupt program is executed after the prior interrupt is completed. Multiple interrupt programs cannot be executed simultaneously.
- Make sure that the execution time of the interrupt program is shorter than interrupt intervals sufficiently.
- Interrupt programs cannot use the following instructions: SOTU, SOTD, TML, TIM, TMH, TMS, TMLO, TIMO, TMHO, TMSO, CNT, CDP, CUD, CNTD, CDPD, CUDD, SFR, SFRN, WKTIM, WKTBL, WEEK, YEAR, MSG, DISP, DGRD, COMRF, DI, EI, XYFS, CVXTY, CVYTX, AVRG, PULS, PWM, RAMP, ZRN, ARAMP, ABS, JOG, PID, PIDA, DTML, DTIM, DTMH, DTMS, TTIM, FIFO, NDSRC, HOUR, SCALE, FLWA, FLWP, PING, EMAIL, TXD, RXD, ETXD, ERXD, DLOG, TRACE, and SCRPT.

## Forced I/O Function

Inputs can be forced on/off regardless of the status of physical inputs, and outputs can be forced on/off regardless of the ladder logic using the forced I/O function in WindLDR. The force input function can be used to monitor or online edit mode to test the ladder logic without the need of wiring the input terminals or turning on the actual inputs. The force output function can be used to turn on/off the outputs to the external devices.



**Caution** The forced I/O may cause unexpected operation of the FC6A. Make sure of safety before forcing inputs or outputs.

### Devices

All the inputs and outputs of the FC6A can be forced on/off individually.

#### All-in-One CPU module

| Type        | Device Range                         |                                       |
|-------------|--------------------------------------|---------------------------------------|
|             | Inputs                               | Outputs                               |
| 16-I/O type | I0 to I10, I30 to I627, I630 to I633 | Q0 to Q6, Q30 to Q627, Q630 to Q633   |
| 24-I/O type | I0 to I15, I30 to I627, I630 to I633 | Q0 to Q11, Q30 to Q627, Q630 to Q633  |
| 40-I/O type | I0 to I27, I30 to I627, I630 to I637 | Q0 to Q617, Q30 to Q627, Q630 to Q637 |

#### Plus CPU module

| Type             | Device Range   |  |
|------------------|--|--|
|                  | Inputs   | Outputs  |
| Plus 16-I/O type | I0 to I7, I30 to I627, I630 to I643,<br>I1000 to I1597, I2000 to I2597, I3000 to I3597,<br>I4000 to I4597, I5000 to I5597, I6000 to I6597,<br>I7000 to I7597, I8000 to I8597, I9000 to I9597,<br>I10000 to I10597  | Q0 to Q7, Q30 to Q627, Q630 to Q643,<br>Q1000 to Q1597, Q2000 to Q2597, Q3000 to Q3597,<br>Q4000 to Q4597, Q5000 to Q5597, Q6000 to Q6597,<br>Q7000 to Q7597, Q8000 to Q8597, Q9000 to Q9597,<br>Q10000 to Q10597  |
| Plus 32-I/O type | I0 to I17, I30 to I627, I630 to I643,<br>I1000 to I1597, I2000 to I2597, I3000 to I3597,<br>I4000 to I4597, I5000 to I5597, I6000 to I6597,<br>I7000 to I7597, I8000 to I8597, I9000 to I9597,<br>I10000 to I10597 | Q0 to Q17, Q30 to Q627, Q630 to Q643,<br>Q1000 to Q1597, Q2000 to Q2597, Q3000 to Q3597,<br>Q4000 to Q4597, Q5000 to Q5597, Q6000 to Q6597,<br>Q7000 to Q7597, Q8000 to Q8597, Q9000 to Q9597,<br>Q10000 to Q10597 |

### Forced I/O Status

Events of the FC6A and effects on the forced I/O settings are shown below.

| Events   | Forced I/O Status  |
|--|--|
| When the FC6A starts running   | The force settings are retained. The forced inputs and outputs are kept on/off even after the FC6A is stopped, regardless of the status of M8025 (maintain outputs while FC6A is stopped). |
| When the FC6A is stopped.  |  |
| When the FC6A is powered up  | The force settings are retained, but the force is suspended. If the battery is dead, the force settings are cleared.   |
| When user program download is executed                                     | The force settings are retained, and whether the force will be suspended or not can be selected in the Download Program dialog box.  |
| When Reset Input is turned on  | The force settings are cleared.  |
| When Clear All Devices is executed in the PLC Status dialog box of WindLDR |  |
| When the system software download is executed                              |  |

**Note:** Force function has no effect on high-speed counters, catch inputs, or interrupt inputs. The stop or reset input can be initiated using the force function, but the force settings will be cleared as soon as the reset input is turned on.

### Checking Forced I/O Function Execution State

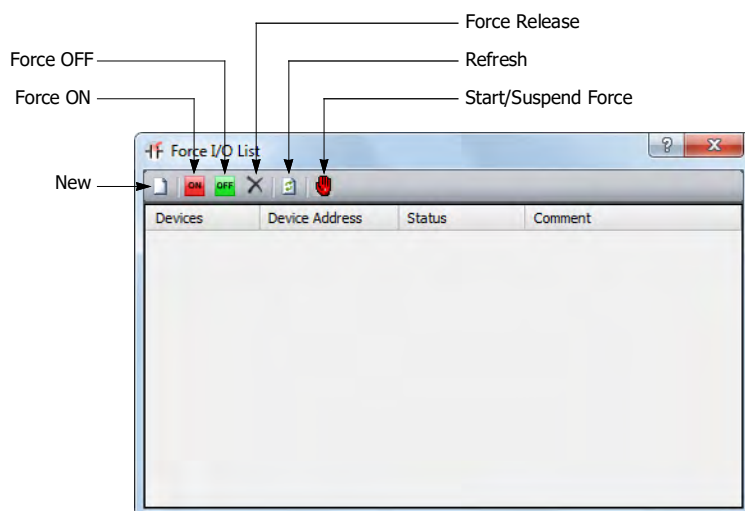
The forced I/O function status (running or stopped) can be checked with WindLDR or with the FC6A run LED [RUN].

Details on the run LED [RUN] that shows the forced I/O function status are as follows.

| LED                           | Status   |
|-------------------------------|--|
| ON                            | When the forced I/O function is stopped while the CPU module is running the user program |
| Slow flashing (1 s cycle)     | When executing the forced I/O function while the user program is running                 |
| Quick flashing (100 ms cycle) | When executing the forced I/O function while the user program is stopped                 |

### Forced I/O List

The forced I/O function is controlled with the Force I/O List in WindLDR.



**(1) New**

Register an I/O device to the list that will be set for forced I/O.

**(2) Force On**

Switches the status to on.

**(3) Force Off**

Switches the status to off.

**(4) Force Release**

Cancels the status of the I/O device set for forced I/O.

**(5) Refresh**

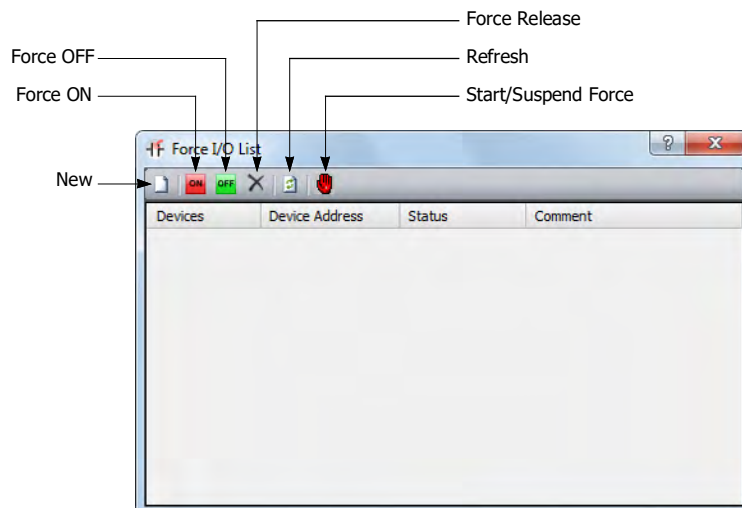
Updates the list.




**(6) Start/Suspend Force**

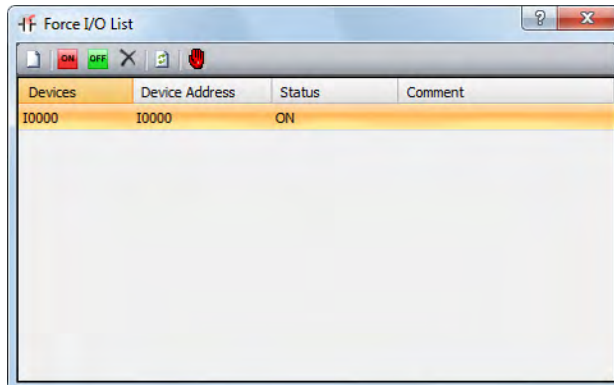
Starts and stops the forced I/O function.

### Programming WindLDR


1. From the WindLDR menu bar, select **Online > Monitor > Monitor**.  
Online mode is activated.
2. From the WindLDR menu bar, select **Online > Forced I/O**.  
The Forced I/O List dialog box appears and shows a list of forced inputs and outputs. I/O numbers and force I/O statuses can be specified in this dialog box.

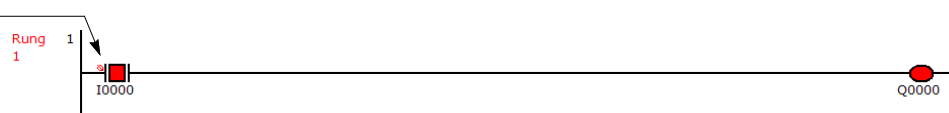



3. Click the New button  and type an input or output number under Device in the list.  
Click the Force On button  or Force Off button  to force on or off the designated input or output.




4. To start the forced I/O function, click the Start/Suspend Force button .

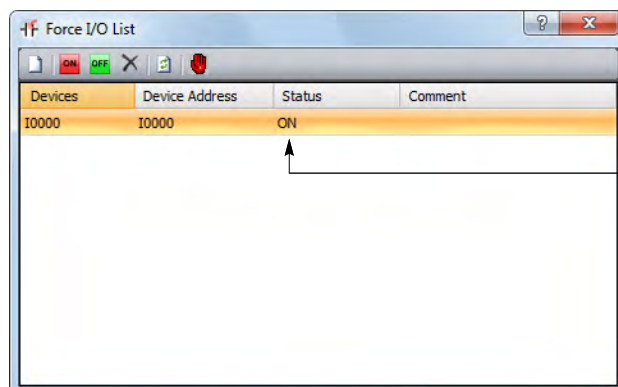
A sign  is displayed to show input I0 is forced.



The forced I/O can be suspended temporarily by clicking the Start/Suspend Force button  again.


## 5: FUNCTIONS AND SETTINGS

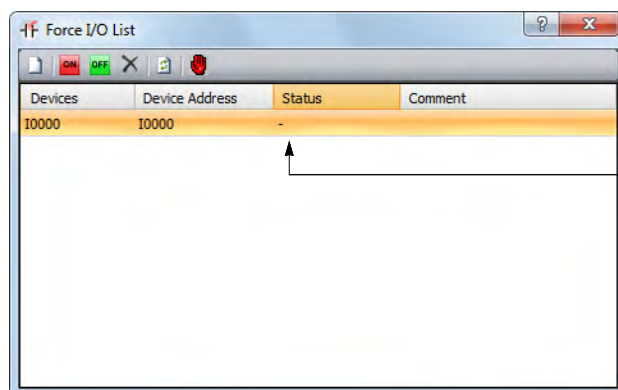
5. To suspend the forced I/O, click the Start/Suspend Force button .



Even though I0 is designated, forced I/O is suspended and actual input status is read to the FC6A.

The forced inputs or outputs remain designated until the forced I/O designation is released.

6. To release the forced I/O designation, click the Force Release button .



Input I0 is released from the forced I/O designation. Even when forced I/O is enabled, actual input status is read to the FC6A.

Now input I0 works as a normal input.

**Note:** Make sure that all the forced inputs and outputs are released when the test using the forced I/O function is finished. Select **Delete All** from the right click menu in the Forced I/O List dialog box to release all the forced inputs and outputs at once.



## External Memory Devices

This section describes the CSV file format of log data that is saved to the SD memory card.

### Function Description

Specify the CSV file format when saving specific device values as log data (CSV file) using the DLOG (data log) instruction and the TRACE (data trace) instruction.

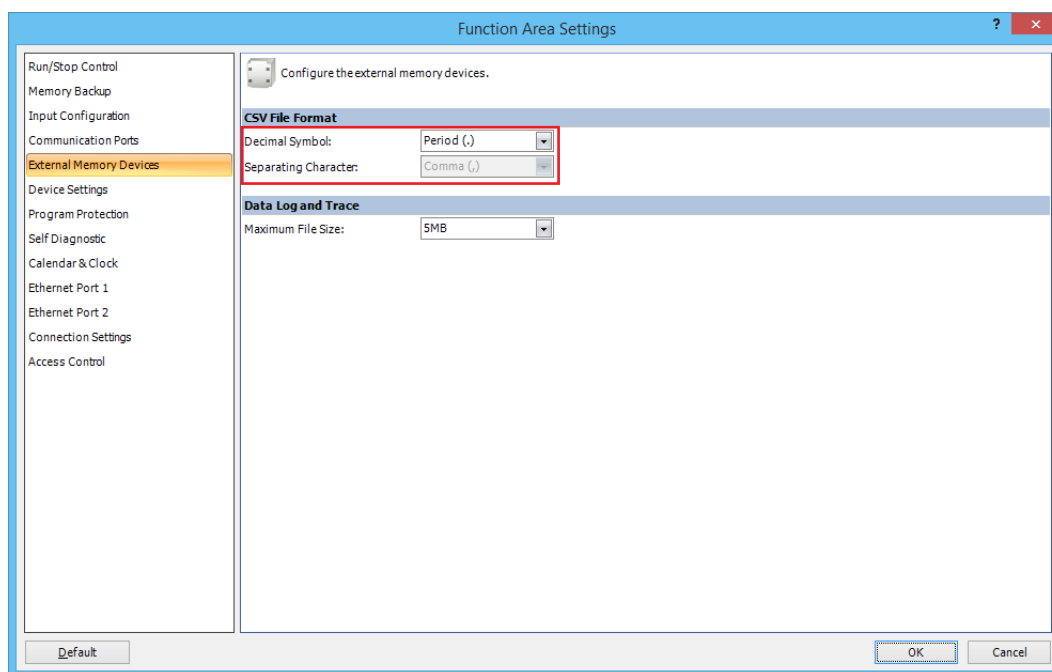
For **Decimal Symbol**, select either **Period (.)** or **Comma (,)**.

**Separating Character** is determined by the symbol that is selected for **Decimal Symbol**.

| Decimal Symbol | Separating Character |
|----------------|----------------------|
| Period (.)     | Comma (,)            |
| Comma (,)      | Semicolon (;)        |

## Programming WindLDR

1. From the WindLDR menu bar, select **Configuration > External Memory Devices**.  
The **Function Area Settings** dialog box appears.
2. Under **CSV File Format**, select the symbols for **Decimal Symbol**.



3. Click **OK**.

This concludes configuring the settings.

### Log Data File Size

This section provides an explanation of the maximum file size for log data that is saved to the SD memory card.

#### Function Description

Set the maximum file size for when saving specific device values to the SD memory card as log data (CSV file) using the DLOG (data log) instruction and the TRACE (data trace) instruction.

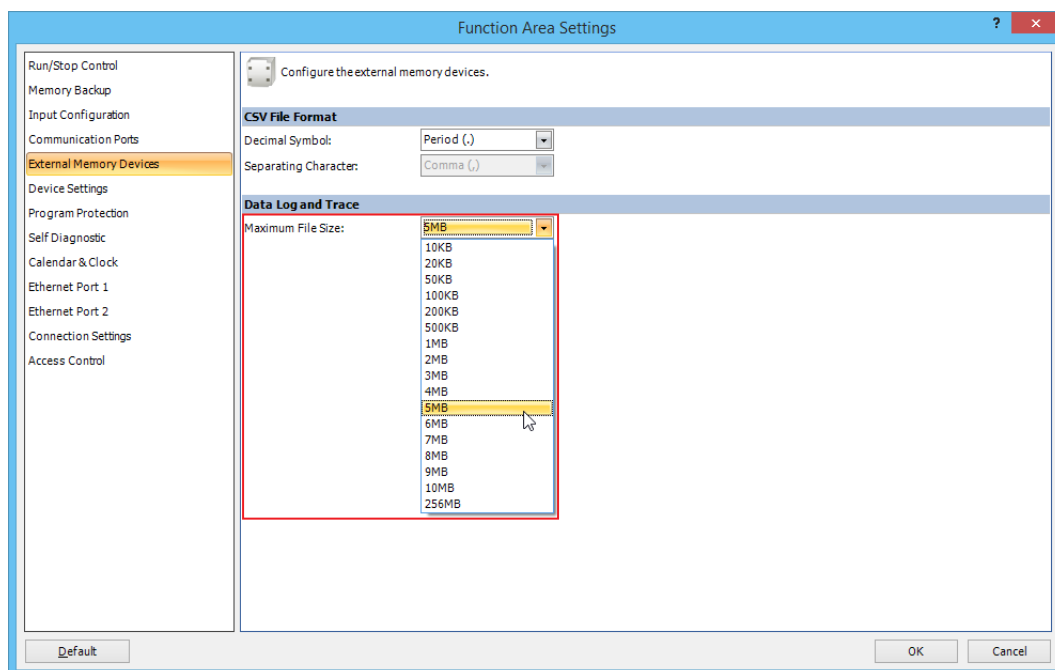
This value can be selected from 10 KB, 20 KB, 50 KB, 100 KB, 200 KB, 500 KB, 1 MB to 10 MB (in increments of 1 MB), or 256 MB. The default is 5 MB.

#### Notes:

- If the file size exceeds the maximum when saving the log data in basic mode of the DLOG instruction or with the TRACE instruction, the file is saved with "\_" + "2 digit number (01 to 99)" appended to the file name.  
Example: 20170401\_01.csv
- The file size is not checked while the log data is being saved, so log data will be saved to the same file, even if it exceeds the log data file size. The maximum file size is the log data file size + 1,024 bytes (maximum value of one entry of log data).

### Programming WindLDR

1. On the **Configuration** tab, in the **Function Area Settings** group, click **External Memory Devices**.  
The **Function Area Settings** dialog box is displayed.
2. Under **Data Log and Trace**, select the maximum file size (10 KB, 20 KB, 50 KB, 100 KB, 200 KB, 500 KB, 1 MB to 10 MB, 256 MB).



3. Click **OK**.

This concludes configuring the settings.

## 32-bit Data Storage Setting

This section describes the methods of storing 32-bit data in data registers.

### Function Specification

When the double-word, long, or float data type is selected for the source or destination device, the data is loaded from or stored to two consecutive data registers. The order of the two devices can be selected from the following two settings in the **Function Area Settings**.

| Setting                          | Description  |
|----------------------------------|--|
| <b>From Upper Word (Default)</b> | When a data register, timer, or counter is used as a double-word device, the high-word data is loaded from or stored to the first device selected. The low-word data is loaded from or stored to the subsequent device.<br>This is identical with the 32-bit data storage of OpenNet Controller and FC4A/FC5A. |
| <b>From Lower Word</b>           | When a data register, timer, or counter is used as a double-word device, the low-word data is loaded from or stored to the first device selected. The high-word data is loaded from or stored to the subsequent device.  |

### Devices

When the devices listed below are used as a double-word device, two consecutive devices are processed according to the 32-bit data storage settings.

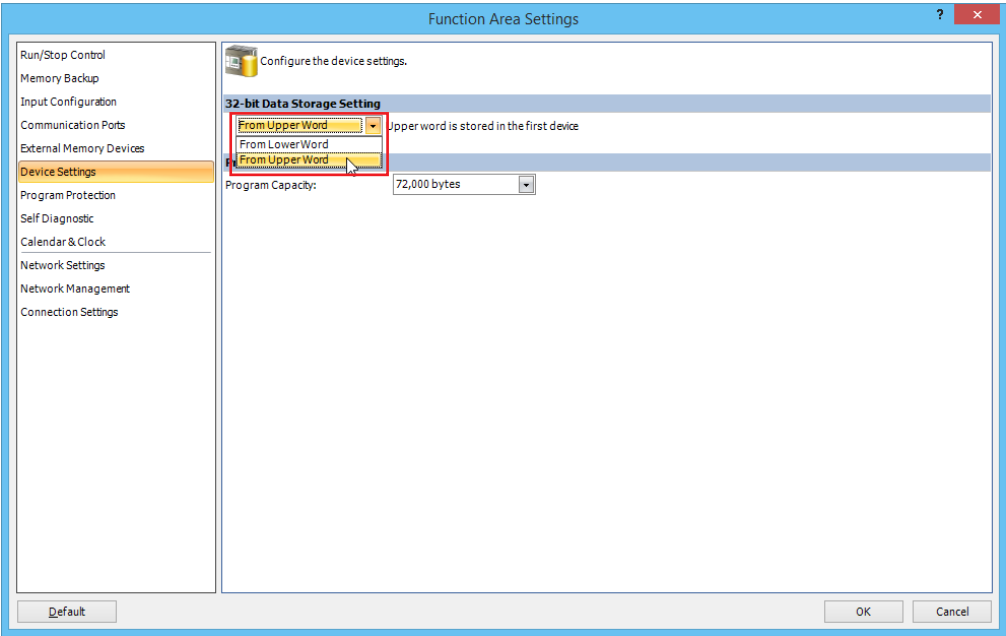
| Device                             | Device Address              |
|------------------------------------|-----------------------------|
| <b>Data Register</b>               | D0 - D7999, D10000 - D61999 |
| <b>Special Data Register</b>       | D8000 - D8899               |
| <b>Non-retentive Data Register</b> | D70000 - D269999            |
| <b>Counter</b>                     | C0 - C511                   |

Data: The following data composed of 32 bits is subject to this setting.

- Device values of advanced instructions with the data processing units D (double word), L (long), F (float)
- Pulse output preset values and current values
- High-speed counter function current values, preset values, and reset values
- Frequency measurement values in frequency measurement
- Double word counter instruction preset values

Programming WindLDR

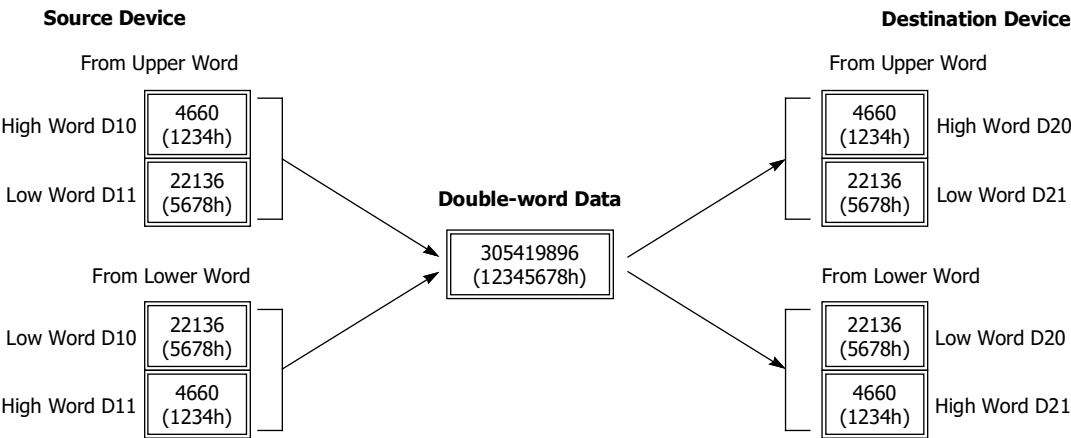
- 1. From the WindLDR menu bar, select **Configuration > Device Settings**.  
The **Function Area Settings** dialog box for Device Settings appears.



- 2. Under **32-bit Data Storage Setting**, select **From Upper Word** or **From Lower Word** in the pull-down list.

Example: 32-bit Data Storage Setting

When data register D10 is designated as a double-word source device and data register D20 is designated as a double word destination device, the data is loaded from or stored to two consecutive devices according the 32-bit data storage setting as illustrated below.



## User Program Protection

This function protects the FC6A user program from being modified, erased, or stolen by a third party.

You can configure the protection individually for uploading and downloading the user program in **User Program Protection** under **Program Protection**. You can also configure the protection level for user programs in **Security Mode** under **Program Protection**.

| Mode                      | Description  |
|---------------------------|--|
| <b>Unprotected</b>        | The user program is unprotected.   |
| <b>Password Protected</b> | A password must be entered when downloading or uploading the user program.<br>The password is six to eight single-width alphanumeric characters, and it must include a minimum of one number and one character.<br>One password can be set for one user program.<br>When applying password protection to both user program uploads and downloads, the same password is used. |
| <b>Prohibited</b>         | The user program cannot be uploaded. <b>Prohibited</b> protection can only be configured for user program uploads. User program downloads cannot be prohibited.  |

For enhanced security, if the entered password does not match the user program password in the FC6A, the FC6A will not verify a new password for one second. Therefore, even if the correct password is entered within one second after a mismatch, that is a mismatch. If the password does not match, wait one second or longer and then enter the password again.

**Note:** When the user program is password protected, there are restrictions on uploading and downloading the user program using the SD memory card. For details, see "Download from SD Memory Card" on page 11-27.

| Security Mode                              | Description  |
|--|--|
| Enhanced protection mode SV2 <sup>*1</sup> | This mode generates a user program with higher protection level.<br>It is recommended to select a mode with a high SV value.       |
| Enhanced protection mode SV1 <sup>*1</sup> |  |
| Compatibility mode                         | This mode generates a user program that can operate in the system software that does not support <b>Enhanced protection mode</b> . |

<sup>\*1</sup> SV stands for security version. The higher the SV number, the stronger the security.

**Note:** User program with Enhanced protection mode can only be downloaded to a CPU module with the following system software versions.

| CPU module                      | Security Mode                | System Software       |
|---------------------------------|------------------------------|-----------------------|
| All-in-One CPU module           | Enhanced protection mode SV2 | Version 2.70 or later |
|                                 | Enhanced protection mode SV1 | Version 2.40 or later |
| CAN J1939 All-in-One CPU module | Enhanced protection mode SV2 | Version 2.70 or later |
|                                 | Enhanced protection mode SV1 | Version 2.40 or later |
| Plus CPU module                 | Enhanced protection mode SV2 | Version 2.50 or later |
|                                 | Enhanced protection mode SV1 | Version 2.00 or later |

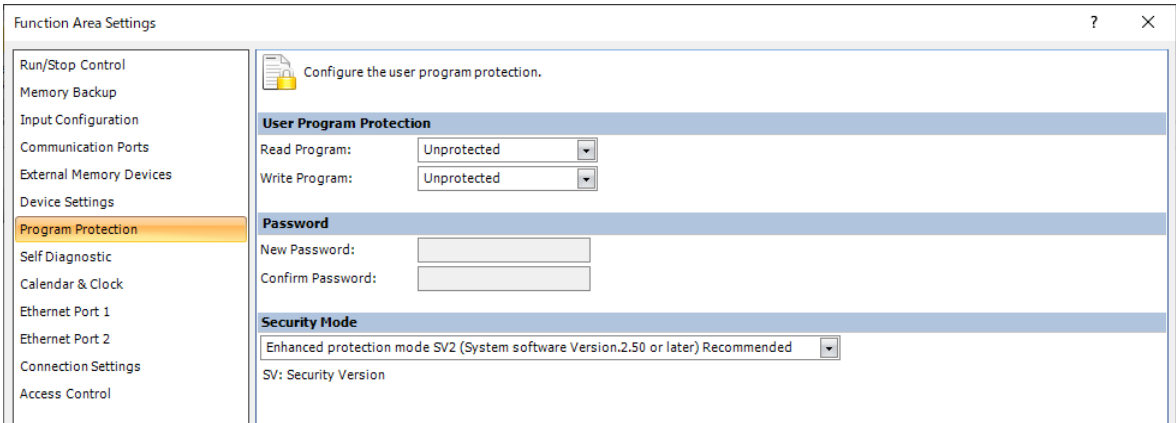
Configure **Compatibility mode** when you use a CPU module with a system software version lower than the one listed above.

### Notes:

- Before proceeding with the following steps, make sure to note the protect code, which is needed to disable the user program protection. If the user program in the FC6A is write- or read/write-protected, the user program cannot be changed without the protect code.
- If the user program is read-protected without using a password, the read protection cannot be temporarily disabled using the password, thus the user program cannot be read out by any means. To disable the read protection, download another user program without user program protection.
- When the user program is protected, even if you enter the correct password and download the program, if protection is set for the downloaded user program, the protection will be once again enabled.
- If you do not download or upload the user program within 10 seconds of unlocking the protection, the protection will once again be enabled.

Programming WindLDR

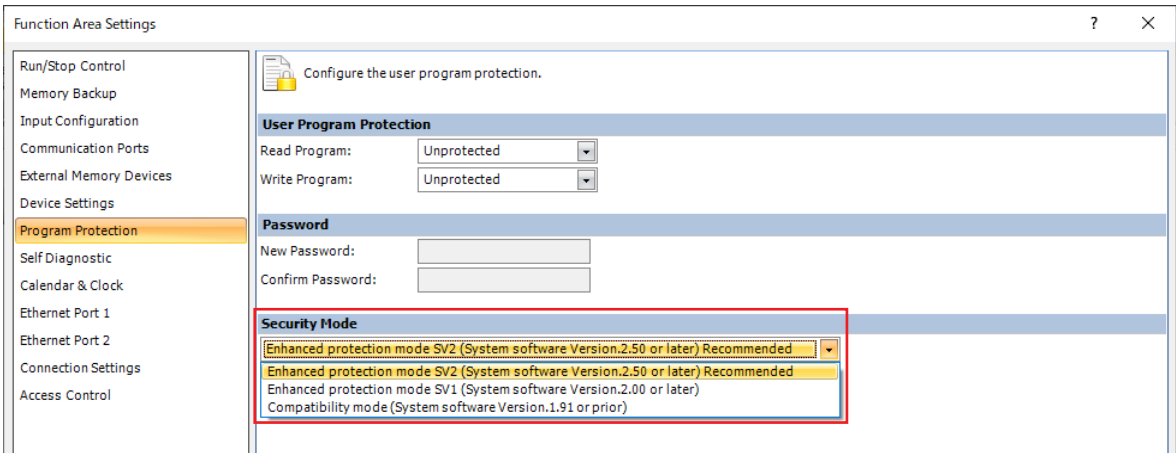
1. From the WindLDR menu bar, select **Configuration > Program Protection**.  
The **Function Area Settings** dialog box for Program Protection appears.



2. Under **User Program Protection**, select required protect modes for **Read Program** and **Write Program** in the pull-down list.

- Unprotected:** The user program in the FC6A can be read and written without a password.
- Password Protected:** Prevents unauthorized copying or inadvertent replacement of the user program.  
This protection can be temporarily disabled using a predetermined password.
- Prohibited:** Prevents copying of the user program completely.  
This option is available for read protection only and can not be temporarily disabled using a password.

3. After selecting a required protect mode, enter a password of 6 through 8 ASCII characters from the key board in the **New Password** field, and enter the same password in the **Confirm Password** field.
4. Configure **Security Mode**.



5. Click **OK** and download the user program to the FC6A after changing any of these settings.

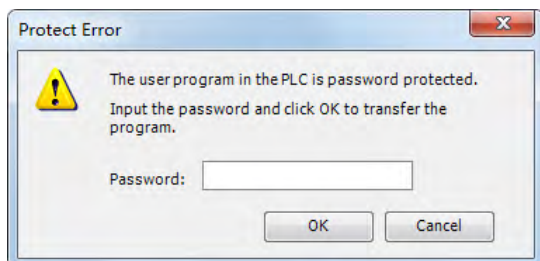
### Disabling Protection

When the user program is password-protected against read and/or write, the protection can be temporarily disabled using WindLDR.

If the user program is read-prohibited, the read protection cannot be disabled, thus the user program cannot be read by any means. To disable the read protection, download another user program without user program protection.

1. From the WindLDR menu bar, select **Online > Download or Upload**.

When the user program in the FC6A is read and/or write protected, the Protect Error dialog box appears. When program verification or online edit is attempted, the Protect Error dialog box appears.



2. Enter the password and click **OK**.

The user program protection is disabled only temporarily. When the FC6A is powered up again, the protection designated in the user program takes effect again.

To disable or change the protection permanently, change the protection settings and download the user program.

### Watchdog Timer Setting

This section describes watchdog timer setting.

A watchdog error occurs when the processing time for one scan exceeds the allowed time while the user program is running.

If a watchdog error occurs, the system is reset with the purpose of returning the system to normal operation.

If the watchdog error occurs frequently, you can assume that there is a hardware problem and that the FC6A requires replacement.

Some of the reasons why a watchdog timer will occur are problems with the FC6A hardware and length of the processing time in the program. If the processing time for one scan of the ladder program exceeds the time configured for the watchdog timer on the ladder program, place an NOP (no operation) instruction in the ladder program. The watchdog timer is reset when the NOP instruction is executed.

#### Watchdog timer setting time

The watchdog timer setting time can be changed in the **Function Area Settings**. Decide on the watchdog timer setting time in either of the following two ways.

- **Decide by user system specification**

Determine the maximum on time (milliseconds) so the output signals do not stay on if the FC6A loses control and set that value as the watchdog timer setting time. However, if the ladder program processing time takes longer than the design specification, use an NOP (no operation) instruction in the ladder program. For example, when the watchdog timer is set to 100 ms and the maximum value for one scan is 120 ms on the ladder program, insert an NOP instruction in the ladder program to ensure that the error does not occur.

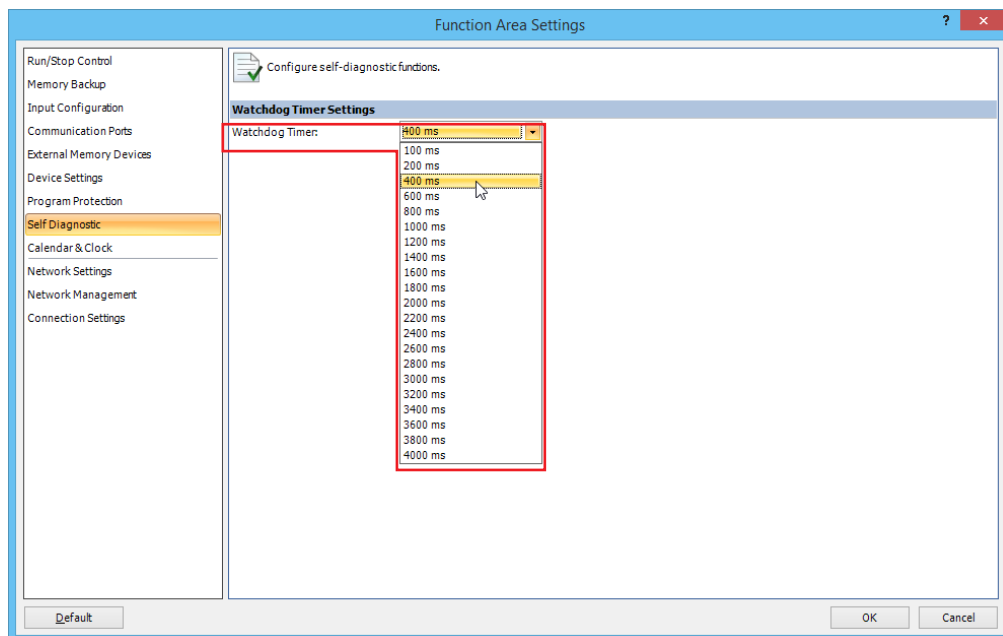
- **Match the program processing time**

Check the maximum value for one scan (D8024) and set the watchdog timer value as a value with a safety margin added to the maximum value.

**Note:** When changing the watchdog timer setting value, select an appropriate value that fully takes into consideration the safety of the system. The maximum value of one scan while the FC6A is running can be checked with special data register D8024.

#### Programming WindLDR

1. Select **Configuration** from the WindLDR menu bar, and then click **Self Diagnostic**.  
The **Function Area settings** dialog box appears.
2. Select the watchdog timer setting value.



3. Click **OK**.

This concludes configuring the settings.

#### Watchdog Timer Settings

Select the watch dog timer setting between 100 ms and 4,000 ms. The default time is 400 ms.



## Constant Scan Time

The scan time may vary whether basic and advanced instructions are executed or not depending on input conditions to these instructions. The scan time can be made constant by entering a required scan time preset value into special data register D8022 reserved for constant scan time. When performing accurate repetitive control, make the scan time constant using this function. The constant scan time preset value can be between 1 to 1,000 ms.

The scan time error is  $\pm 1$  ms of the preset value normally. When the data link or other communication functions are used, the scan time error may be increased to several milliseconds.

When the actual scan time is longer than the scan time preset value, the scan time cannot be reduced to the constant value.

### Special Data Registers for Scan Time

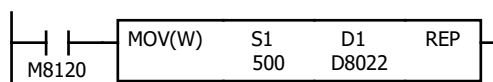
In addition to D8022, three more special data registers are reserved to indicate current, maximum, and minimum scan time values.

**Note:** R/W is the abbreviation for read/write. When R/W, it can be read and written. When R, it can only be read. When W, it can only be written.

|              |   |     |
|--------------|---|-----|
| <b>D8022</b> | Constant Scan Time Preset Value (1 to 1,000 ms) | R/W |
| <b>D8023</b> | Scan Time Current Value (ms)                    | R   |
| <b>D8024</b> | Scan Time Maximum Value (ms)                    |     |
| <b>D8025</b> | Scan Time Minimum Value (ms)                    |     |

## Example: Constant Scan Time

This example sets the scan time to a constant value of 500 ms.



M8120 is the initialize pulse special internal relay.

When the FC6A starts operation, the MOV (move) instruction stores 500 to special data register D8022.

The scan time is set to a constant value of 500 ms.

### Time Zone

This section describes the time zone function on the FC6A.

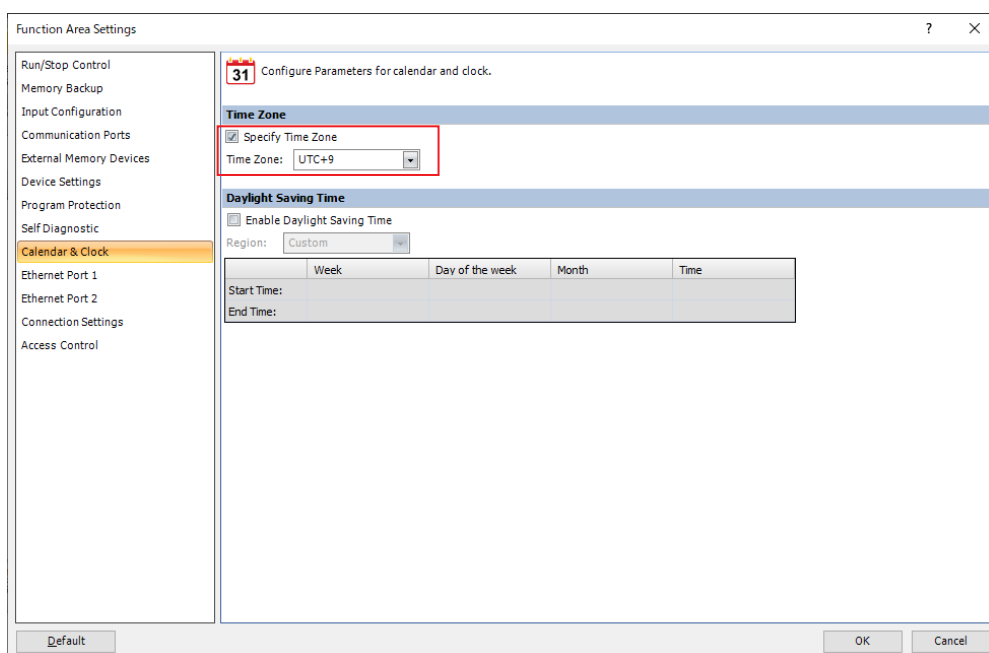
This function enables you to set the time zone as the difference between the FC6A internal clock and Universal Coordinated Time (UTC). The time zone can be set from UTC-12:00 to UTC+14:00.

**Note:** The time zone can be adjusted in 15 minute increments using special data register D8413. For example, when UTC+09:00 is selected, storing +1 in D8413 advances the time by 15 minutes to make the time zone "UTC+09:15". Storing -2 in D8413 sets the time back by -30 minutes to make the time zone "UTC+08:30".

### Programming WindLDR

Configure time zone on the FC6A.

1. From the WindLDR menu bar, select **Configuration > Calendar & Clock**.  
The **Function Area Settings** dialog box is displayed.
2. Select the **Specify Time Zone** check box and set the time zone.



3. Click **OK**.

This concludes configuring the settings.

## Daylight Savings Time

This section describes the function that automatically adjusts the FC6A time according to daylight savings time settings.

For regions where the FC6A is used that implement daylight savings time, this function can automatically adjust the FC6A clock using the daylight savings time settings. When the time reaches the daylight savings start time, the clock is set an hour forward. When the time reaches the the daylight savings time end, the clock is set an hour back.

The FC6A adjusts the clock for daylight savings time on the start day and the end day. However, the clock is also adjusted for daylight savings time under the following conditions.

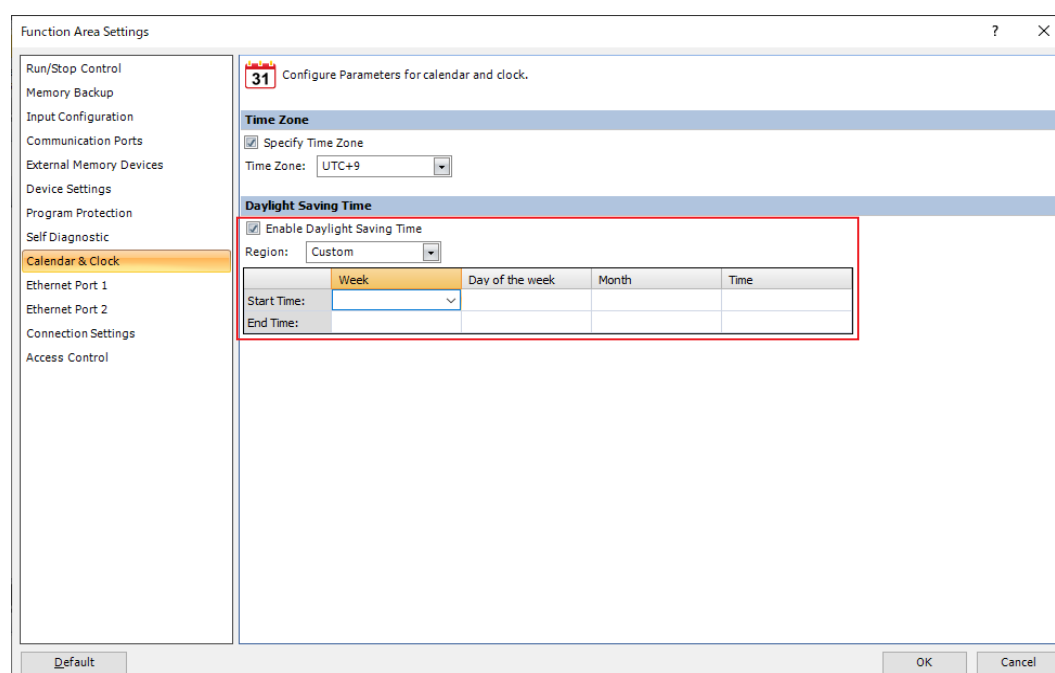
- When a user program was downloaded to the FC6A.
- When the FC6A power was turned on.

When the current time of the FC6A' internal clock is set using WindLDR or the operator interface, the time is not adjusted for daylight savings time, even if the time after it was set is within the daylight savings time period. Set the time to the time adjusted for daylight savings time. The set date and time becomes the date and time after being adjusted for daylight savings time.

## Programming WindLDR

Configure daylight savings time on the FC6A.

1. From the WindLDR menu bar, select **Configuration > Calendar & Clock**.  
The **Function Area Settings** dialog box is displayed.
2. Select the **Enable Daylight Savings Time** check box.



3. Configure the start time and the end time. Specify the region using the **Region** list box.  
If you select **Custom**, you are able to select any desired start time and end time.

| Region        | Start Time                   | End Time                      |
|---------------|------------------------------|-------------------------------|
| Custom        | User specified               | User specified                |
| USA or Canada | March, 2nd Sunday, 2:00 AM   | November, 1st Sunday, 2:00 AM |
| Europe        | March, last Sunday, 1:00 AM  | October, last Sunday, 1:00 AM |
| Australia     | October, 1st Sunday, 2:00 AM | April, 1st Sunday, 3:00 AM    |

4. Click **OK**.

This concludes configuring the settings.

### Clock Function

This section describes the internal clock function on the FC6A.

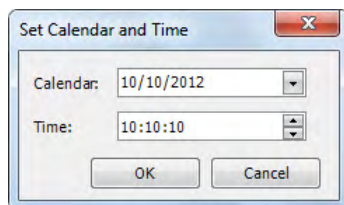
This function enables you to control the time schedule for lighting or air conditioning equipment using the current time data stored in special data registers. The internal clock data is backed up by a backup battery. The current time is reset when the backup data is lost, so the current time will need to be set again.

| Function                    | Description  |
|-----------------------------|--|
| <b>Read clock</b>           | The current time (calendar, clock) is updated every 500 ms and automatically stored in the special data registers.   |
| <b>Set clock</b>            | Sets the current time (calendar, clock). Set the current time with WindLDR or a user program that uses the special data registers.   |
| <b>Adjust function</b>      | When clock data adjust flag M8021 is turned on from off, the seconds for the current time are rounded up or rounded down based on 30 seconds to correct the seconds data for the internal clock.<br>If the current seconds are between 0 and 29 seconds, the seconds are set to 0 when M8021 is turned on from off.<br>If the current seconds are between 30 and 59 seconds, the minutes are set to + 1 and the seconds are set to 0 when M8021 is turned on from off. |
| <b>Calendar/clock error</b> | M8013: This relay turns on if clock write processing or a clock adjust processing could not be executed normally.<br>M8014: This relay turns on if an error occurs while calendar/clock data is read from the internal clock to the special data registers (D8008 to D8014).   |

#### Setting the Clock with WindLDR

Set the current time on the FC6A with WindLDR.

1. From the WindLDR menu bar, select **Online > Monitor > Monitor**.  
WindLDR enters monitor mode.
2. Select **Online > PLC > Status**.  
The PLC Status dialog box is displayed.
3. Click **Change** for **Calendar**.  
The Calendar Settings dialog box is displayed. The current time on the computer is displayed in the dialog box as the initial value. The settings can also be changed as necessary.



4. Click **OK**.

The date and time configured in the dialog box is written to the FC6A.

#### Setting the Clock with a User Program

A user program can write the clock data from an operator interface without using WindLDR by using special data registers D8015 to D8021. Undefined values are stored in special data registers D8015 to D8021. Always store an appropriate value before turning on M8016, M8017, or M8020.

##### Calendar Data Write Flag (M8016)

After writing data to the write calendar special data registers (D8015 to D8018), turn M8016 off to on to set the internal clock with the data in D8015 to D8018 as the calendar data (year, month, day, day of the week). If the day of the week is wrong, the correct day of the week is automatically written according to the date.

##### Clock Data Write Flag (M8017)

After writing data to the write clock special data registers (D8019 to D8021), turn M8017 off to on to set the internal clock with the data in D8019 to D8021 as the clock data (hour, minute, second).

##### Calendar/Clock Data Write Flag (M8020)

After writing data to the write calendar/clock special data registers (D8015 to D8021), turn M8020 off to on to set the internal clock with the data in D8015 to D8021 as the calendar data (year, month, day, day of the week) and the clock data (hour, minute, second). If the day of the week is wrong, the correct day of the week is automatically written according to the date.

**Calendar and clock data storage locations**

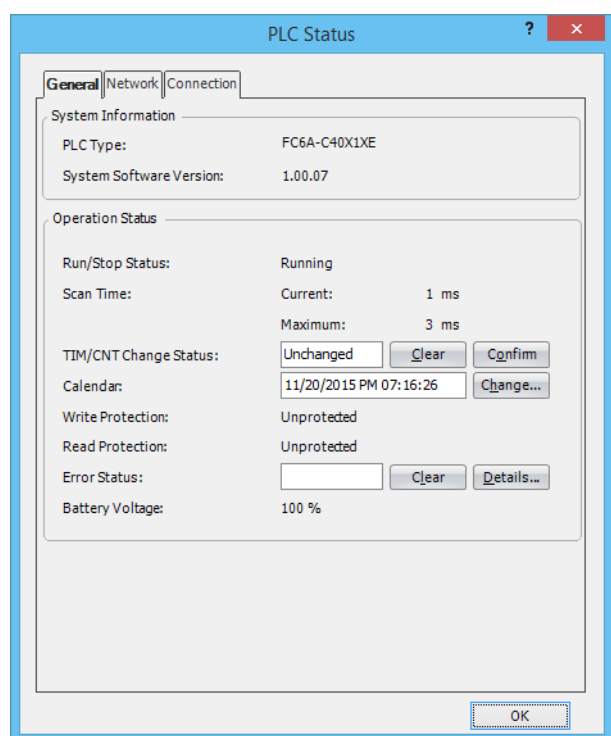
The calendar/clock data is stored in the following special data registers.

| Special Data Register | Description                                   | Range           | Setting Timing             |
|-----------------------|---|-----------------|----------------------------|
| D8008                 | Calendar/Clock<br>Current Data<br>(Read only) | Year            | Every 500 ms <sup>*1</sup> |
| D8009                 |   | Month           |                            |
| D8010                 |   | Day             |                            |
| D8011                 |   | Day of the week |                            |
| D8012                 |   | Hour            |                            |
| D8013                 |   | Minute          |                            |
| D8014                 |   | Second          |                            |
| D8015                 | Calendar/Clock<br>New Data<br>(Write only)    | Year            | —                          |
| D8016                 |   | Month           |                            |
| D8017                 |   | Day             |                            |
| D8018                 |   | Day of the week |                            |
| D8019                 |   | Hour            |                            |
| D8020                 |   | Minute          |                            |
| D8021                 |   | Second          |                            |

\*1 If the scan time is 500 ms or longer, D8008 to D8014 are updated with each scan.

For the day of the week data, the values below are stored in the special data registers.

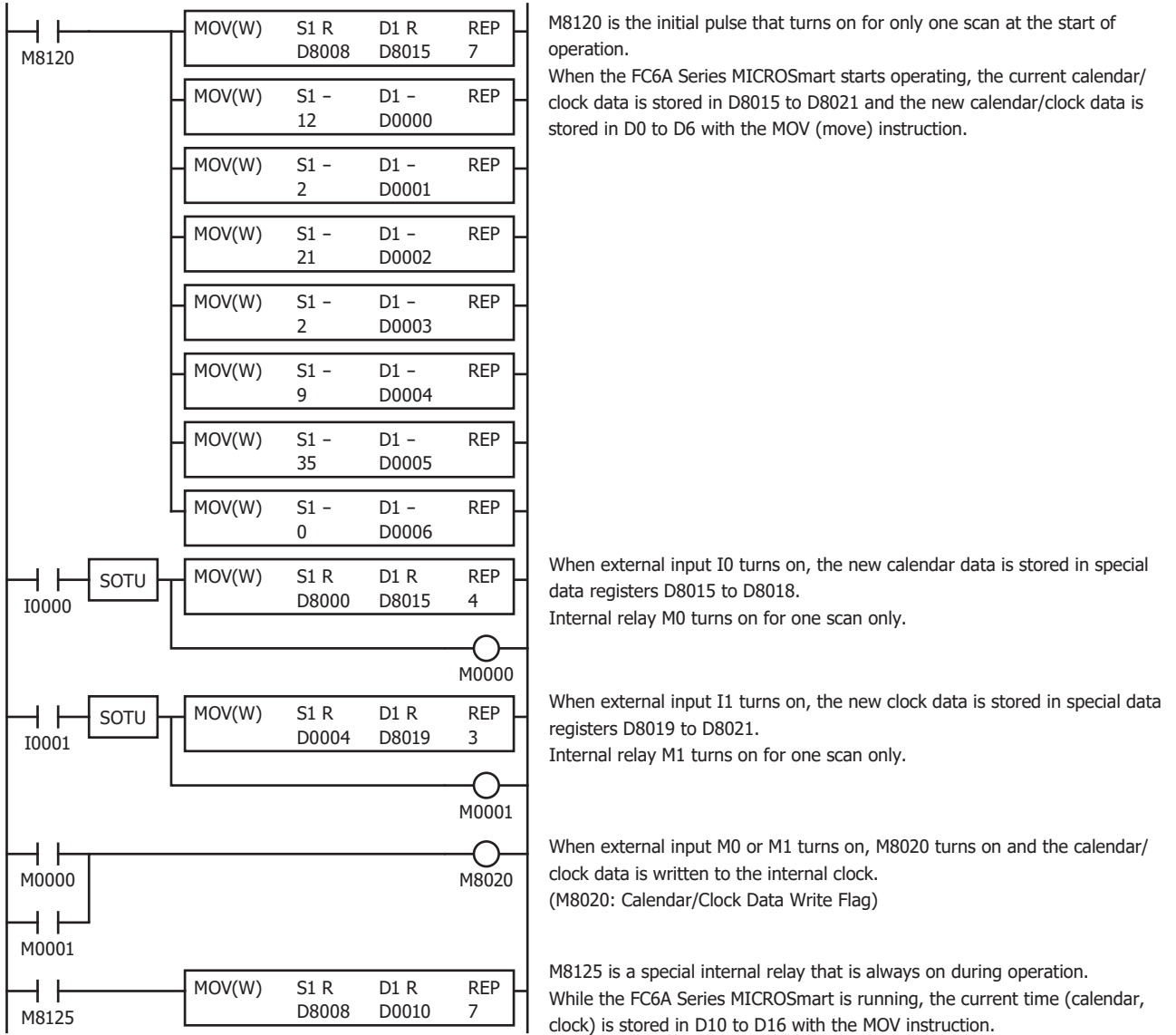
| Day of the week | Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|-----------------|--------|--------|---------|-----------|----------|--------|----------|
| Value           | 0      | 1      | 2       | 3         | 4        | 5      | 6        |



Example ladder program 1

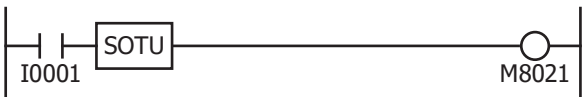
This example sets the calendar and clock in a user program.

If you turn on M8020 with the new calendar/clock data set in the write-only data registers D8015 to D8021, the internal clock on the FC6A is updated with the current time (calendar, clock). In this example, the FC6A internal clock is set to 9:35:00 on Tuesday February 21, 2012.



Example ladder program 2

When I1 turns off to on, the seconds on the internal clock are corrected to 0 seconds.



When input I1 turns on, clock data adjust flag M8021 turns on to correct the seconds on the internal clock.

**Note:** The internal clock backup time is guaranteed for one year. If the backup time is exceeded, the retained clock data is lost and the current time is initialized as 00:00:00 on January 1, 2000. For details on the battery, see "Battery Monitor" on page 5-67.

## Battery Monitor

This section describes the battery monitor function that monitors the voltage of the FC6A backup battery.

### Function Description

You can know when to change the backup battery before it dies by monitoring its voltage. The battery voltage in **mV** as measured after the FC6A power is turned on is stored in a special data register (D8056), and the battery level status is displayed on the battery status LED [BAT]. The battery voltage can also be measured at any time.

If the battery dies, device values are reset to their initial values when the power is turned off. Replace the backup battery before it dies.

### Battery voltage (D8056)

Stores the measured battery voltage in **mV**. The range of the value is 0 to 3,000. If the value is greater than 3,000, this value is 3,000. The battery voltage fluctuates according to the usage environment.

When the power is turned on, this value is 65,535 until the initial battery voltage measurement has completed.

This value is 0 when there is a measurement error or when there is no battery.

### Battery voltage measurement (M8074)

Shows the battery voltage measurement status.

0: Battery voltage measurement completed

1: Battery voltage being measured

The battery voltage can also be measured by writing 1. The measured value in **mV** is stored in D8056. The value is reset to 0 when the measurement has completed. The battery voltage is automatically measured once when the power is turned on and stored in D8056. For this reason, Battery Voltage Measurement Flag (M8074) does not normally need to be used.



#### Caution

When Battery Voltage Measurement Flag (M8074) is used to measure the battery voltage, current will temporarily flow through the battery for A/D conversion processing inside the PLC. This consumes the battery, so minimize the use of Battery Voltage Measurement Flag (M8074). In particular, do not use Battery Voltage Measurement Flag (M8074) in ladder programs that perform constant measurements while running.

### Battery level indicator

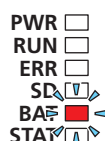
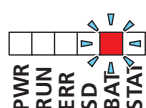
The status of the battery level is displayed on the battery status LED [BAT] according to the battery voltage value.

Replacing the battery on a regular schedule is recommended, regardless of whether the battery status LED is blinking or on. For details on the battery life, see "Backup Function" on page 2-17 and "Backup Function" on page 2-55.

Replace the battery immediately when the battery status LED is blinking (1-s cycle).

All-in-One CPU module

Plus CPU module



| Battery Status LED [BAT] | Condition   | Battery Status |  |
|--------------------------|---|----------------|--|
| Off                      | Battery voltage (D8056) > 2,300                     | Normal         | Sufficient battery level.                  |
| Blinking (1 s cycle)     | $2,300 \geq \text{battery voltage (D8056)} > 2,000$ | Warning        | Low battery level. Replace the battery.    |
| On                       | $2,000 \geq \text{battery voltage (D8056)}$         | Dead battery   | The battery is almost dead. Or no battery. |



#### Caution

- When the main power supply is off and the product is started with USB bus power, the monitoring of Battery Voltage (D8056) is performed in the same manner as in the above table.
- A general guide for the time it takes Battery Voltage (D8056) to decrease from 2300 to 2000 is approximately 10 days including the effect of the ambient environment (temperature and humidity) while unpowered and powered. Replace the battery immediately when the battery status LED is blinking (1-s cycle).
- The final voltage of the coin cell is 2000. If a battery that has reached its final voltage (battery status LED is on) is left in the product for a long period of time, the product may be damaged or malfunction.

### General Errors Related to the Battery

When the power is turned on with a battery that is almost dead or without a battery, a keep data error and a clock error will occur.

#### Keep Data Error

When the power is turned off with a battery that is almost dead or without a battery, the data that is supposed to be backed up in RAM (keep data) cannot be backed up. A keep data error will occur and the keep data will be cleared in the following case:

- The status of keep data when the power supply was turned on has changed from when the power supply was previously turned off

#### Clock Error

When the power is turned off with a battery that is almost dead or without a battery, the clock data cannot be backed up. A clock error will occur and the clock data will be initialized in either of the following cases:

- Battery Voltage (D8056) measured when the power supply is turned ON is less than 2000<sup>\*1</sup>
- A keep data error occurs<sup>\*2</sup>

<sup>\*1</sup> Applicable to the following versions. For versions before the following versions, the clock error will occur when Battery Voltage (D8056) is less than 2300.

|                                  |                         |
|----------------------------------|-------------------------|
| All-in-One CPU module:           | Version 2.10 and higher |
| CAN J1939 All-in-One CPU module: | Version 2.10 and higher |
| Plus CPU module:                 | Version 1.00 and higher |

<sup>\*2</sup> Applicable to the following versions. For versions before the following versions, a clock error caused by a keep data error will not occur.

|                                  |                         |
|----------------------------------|-------------------------|
| All-in-One CPU module:           | Version 2.10 and higher |
| CAN J1939 All-in-One CPU module: | Version 2.10 and higher |
| Plus CPU module:                 | Version 1.50 and higher |



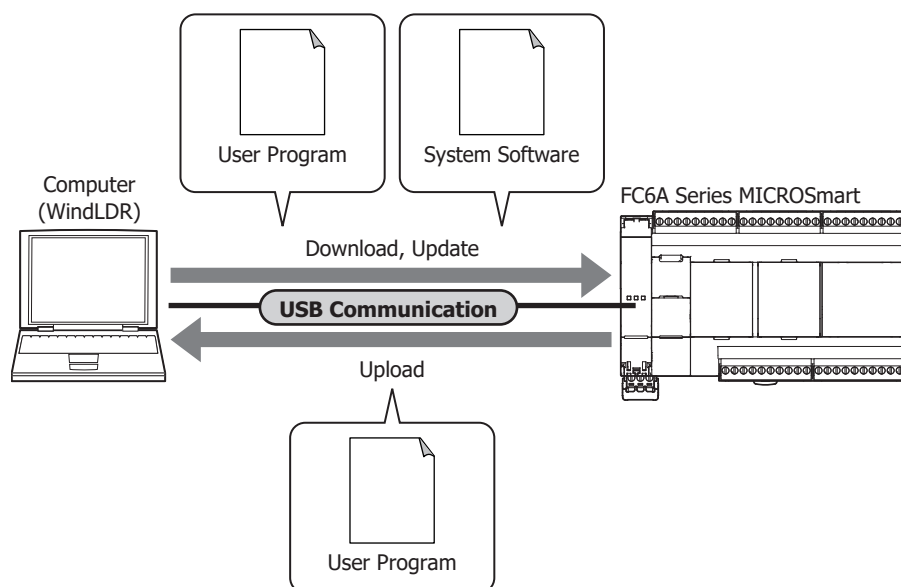
## USB Boot

This section describes USB boot startup that starts the FC6A using only USB bus power (5 V).

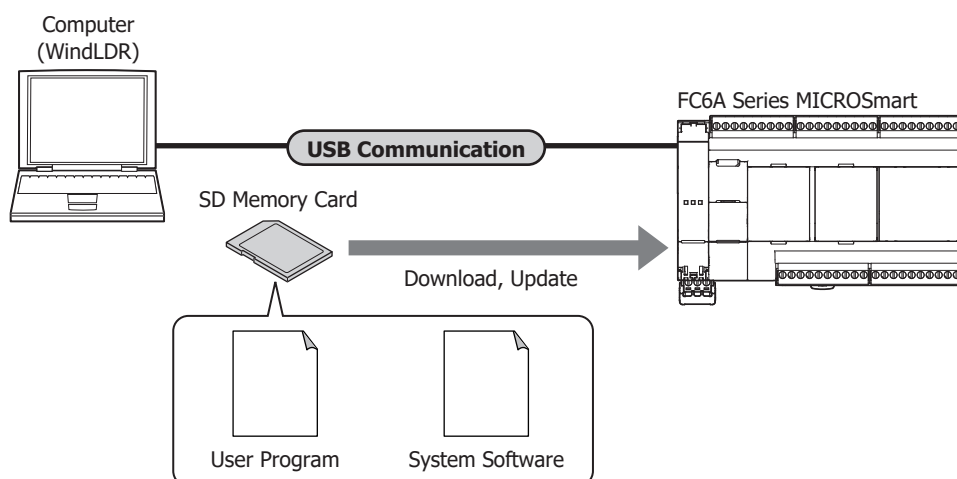
### What USB boot can do

The function that starts the FC6A using only USB bus power (5 V) is called USB boot. USB boot enables the following.

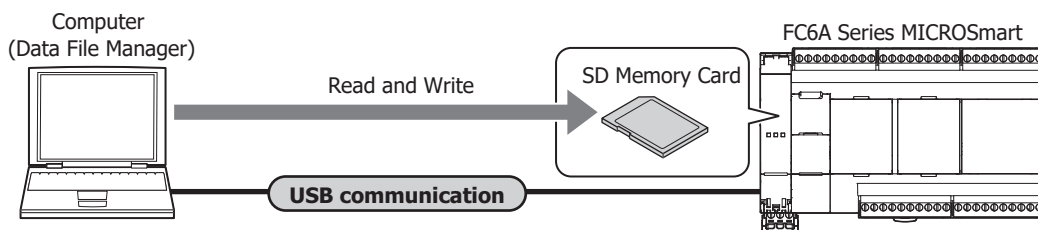
- **Communicate with the FC6A using WindLDR and a USB connection to update the user program and system software**



- **Overwrite the user program or system software on the FC6A with a user program and system software saved to an SD memory card**



- **Read and write files on the SD memory card using WindLDR's Data File Manager**



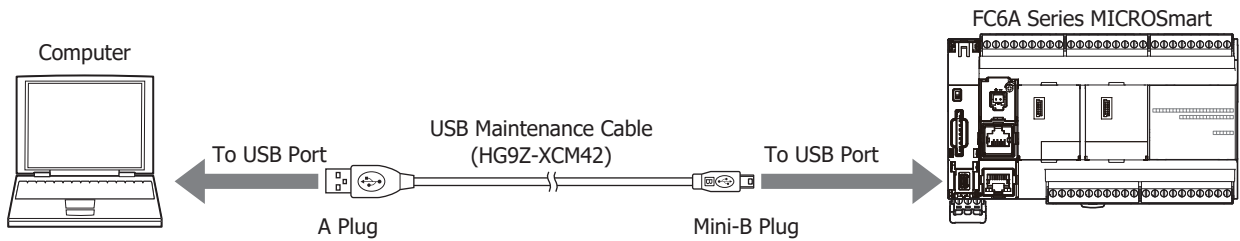
- **Other operations**

- Set the time and calendar
- Change the content of keep devices (D, M, R, C)
- Update data by recipe

Starting and stopping USB boot

Starting USB boot

- 1. Connect a USB cable to the USB port of a computer.
- 2. When the FC6A's power is not supplied, plug the USB cable (5 V) into the USB port of the FC6A.



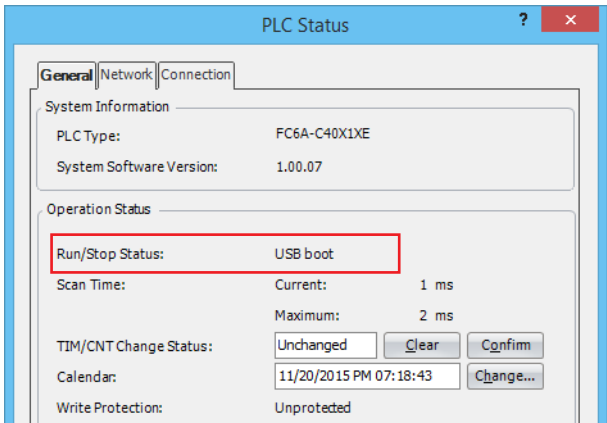
When the FC6A is started by the USB bus, the power indicator LED [PWR] is off and the operation indicator LED [RUN] is blinking.

All-in-One CPU module      Plus CPU module



The operation indicator LED [RUN] blinks at an interval of 100 ms.

**Note:** The FC6A operating status can be checked with the PLC Status dialog box. During USB boot, **USB boot** is displayed for **Run/Stop Status**.



Stopping USB boot

USB boot can be stopped by unplugging the USB cable from the FC6A. USB boot also stops when power (24V DC, 12V DC, 100-240V AC) is supplied during USB boot, and operation switches to that power (24V DC, 12V DC, 100-240V AC).

Restrictions

During USB boot, peripheral functions other than the USB port and SD memory card do not operate.

## User Program Capacity

This section describes the function to select the user program capacity on the FC6A.

### Function Description

If the default FC6A user program capacity is insufficient, you can secure a larger user program capacity. However, Online Edit can no longer be used.

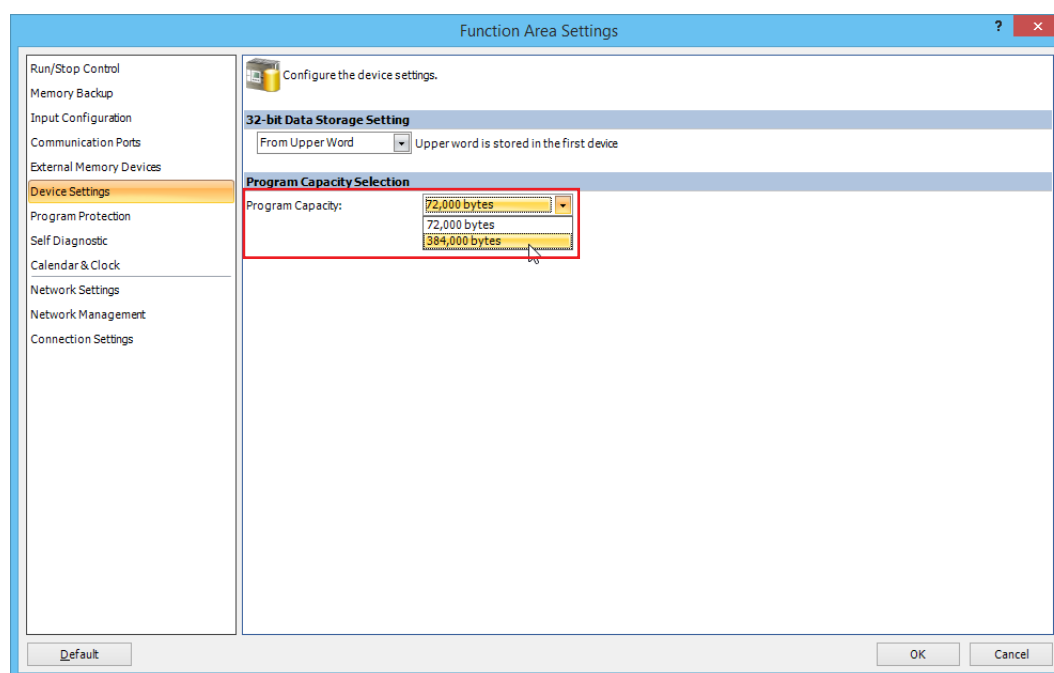
| CPU Module Type                 | User Program Capacity         |  |
|---------------------------------|-------------------------------|--|
|                                 | Default Capacity              | When Securing a Larger User Program Capacity |
| All-in-One CPU Module           | 72,000 bytes (9,000 steps)    | 384,000 bytes (48,000 steps)                 |
| CAN J1939 All-in-One CPU Module |                               | 640,000 bytes (80,000 steps)                 |
| Plus CPU Module                 | 800,000 bytes (100,000 steps) |  |

### Programming WindLDR

You can set the user program capacity of the All-in-One CPU module and CAN J1939 All-in-One CPU module.

The Plus CPU module is fixed to 800,000 bytes.

1. On the **Configuration** tab, in the **Function Area Settings** group, click **Device Settings**.  
The **Function Area Settings** dialog box is displayed.
2. For **Program Capacity Selection**, select 72,000 bytes, 384,000 bytes (All-in-One CPU module), or 640,000 bytes (CAN J1939 All-in-One CPU module).



3. Click **OK**.

This concludes configuring the settings.

### Online Edit

This section describes the Online Edit function that allows rewriting user programs and checking operation after rewriting without stopping FC6A operation.

### Run-time download function

This section describes the run-time download function that rewrites the user program without stopping FC6A operation.



#### Warning

- Rewriting the program during operation is extremely dangerous. Carefully read and understand the function description and precautions before using the function.
- If a user program syntax error or a user program download error occurs, the FC6A will stop operation (STOP) and all outputs will be cleared. Depending on the subject being controlled, this may be extremely dangerous.
- When run-time download is executed, the FC6A immediately switches to the new program when the program has finished being transferred, but it may take a maximum of 30 seconds to save the program to ROM. During this period, the scan time for each scan increases in length about 10 to 400 ms.
- When using Online Edit, under no circumstances should you turn off the FC6A power or unplug the communication cable. The result may be a serious error such as a user program download error, and depending on the subject being controlled, this may be extremely dangerous.
- Device Q values are kept before and after run-time download. Therefore, when OUT/OUTN instructions are deleted or device numbers are changed, device Q before the change keep their status before run-time download. Depending on the subject being controlled, this may be extremely dangerous.

### Function Description

A program can be downloaded and changed at the next ladder scan during FC6A operation.

During run-time download, devices Q, M, R, T (current value), C (current value), and D keep their status before run-time download. TP (preset value) and CP (preset value) are overwritten with the preset values of the newly written user program.

#### Notes:

- Before executing run-time download, always check the changed content and the program operation after it is written. There are no restrictions on the scope of editing with run-time download, but if many changes are made at one time, the possibility of triggering unexpected actions will increase. Keep program changes with run-time download to a minimum.
- If PID, PIDA, AVRG, DGRD, DISP, PULS, PWM, RAMP, ARAMP, JOG, or ZRN instructions are created or edited, the instructions are not initialized unless the input to the instruction is turned off for one or more scans. When copied instructions are pasted in the program, and when instructions that have been commented out are enabled, these are regarded as new instructions.
- SOTU/SOTD instructions are initialized at the first scan after the run-time download has completed.
- For user communication instructions (TXD, RXD, ETXD, ERXD), if instruction information remains in the instruction setup area, communication is performed according to the information before run-time download until all of the instructions in the setup area have sent or received their data, even when the instruction information is overwritten by run-time download. All RXD instructions in the setup area can be deleted by turning on the receive cancel flag assigned to each communication port.
- Run-time download can only be executed when the FC6A is operating (RUN).

Run-time download can only be executed when WindLDR is in Online Edit mode. To start Online Edit mode, the user program opened in WindLDR and the user program running on the FC6A must be the same.

During Online Edit, **Function Area Settings** and expansion data register settings cannot be changed. Only the ladder program can be edited.

#### Notes:

- If run-time download is performed when FC6A timer and counter preset values have been changed by the online monitor or HMI module, the changed values are overwritten by the values of the program that is newly written. To keep the FC6A timer preset values and counter preset values before and after run-time download, confirm the timer and counter preset value changes, upload the program, and then start Online Edit. To confirm timer and counter preset value changes, on the **Online** tab, in the **PLC** group, click **Status**, and then click **Confirm** under **TIM/CNT preset value**.
- During Online Edit, function area settings and expansion data register settings cannot be changed. To change these, download the entire user program with a normal download.
- If communication was lost during run-time download, the program being executed in RAM and the program saved to ROM may not be the same. In this situation, exit Online Edit and download the program.
- After downloading or uploading the user program, start Online Edit when the WindLDR user program and the program running on the FC6A are the same. Online Edit cannot start if the programs are different.

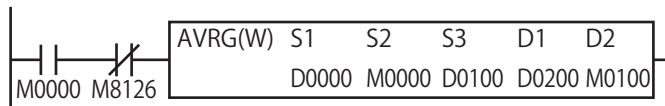
### Initialize pulse after run-time download (M8126)

M8126 is a special internal relay that turns on for only one scan after run-time download has completed.

This is effective when you want to reliably initialize instructions after run-time download.

**Example: A user program that initializes the AVR instruction during run-time download**

Even if the status of M0 is on during run-time download, the input to the AVR instruction turns off for only one scan time by normally-closed M8126, and the instruction is initialized.



**Example: A user program that cancels RXD instructions in standby during run-time download**

The user communication receive instruction cancel flag (port 1) turns on for only one scan during run-time download and all RXD instructions in standby are canceled.



## WindLDR Online Edit and run-time download operations

### Program to create

Add rung 4 with the following specification to the program created in Chapter 4.

When input I0 and input I1 are both off, output Q3 turns on.

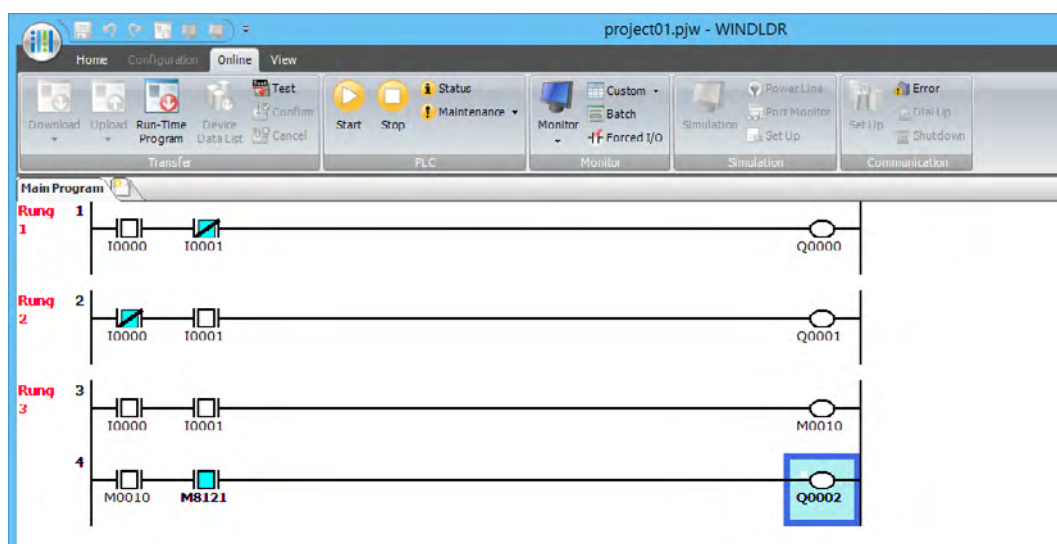
| Rung Number | I0  | I1  | Operation       |
|-------------|-----|-----|-----------------|
| 4           | OFF | OFF | Output Q3 is ON |

### • Operation procedure

#### 1. Start Online Edit.

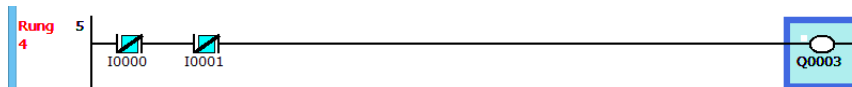
After downloading or uploading the user program, when the FC6A and WindLDR programs are the same, on the **Online** tab, in the **Monitor** group, click **Online Edit** under **Monitor**.

Online Edit mode starts and a program can be edited with FC6A's operation being monitored.



#### 2. Create a program.

Add rung 4 and insert the instructions according to the specification.



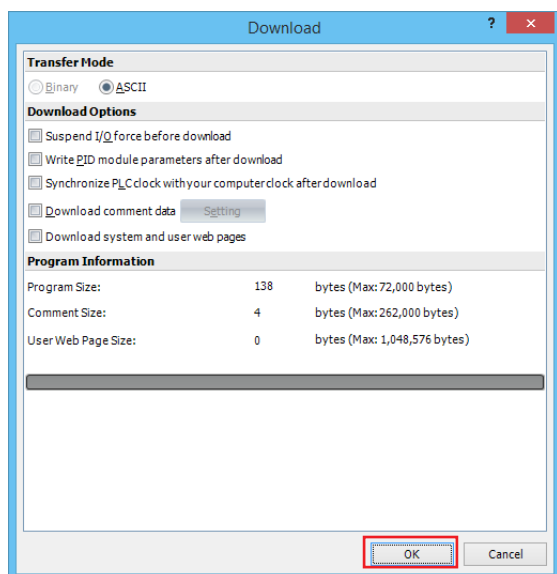
## 5: FUNCTIONS AND SETTINGS

### 3. Execute run-time download.

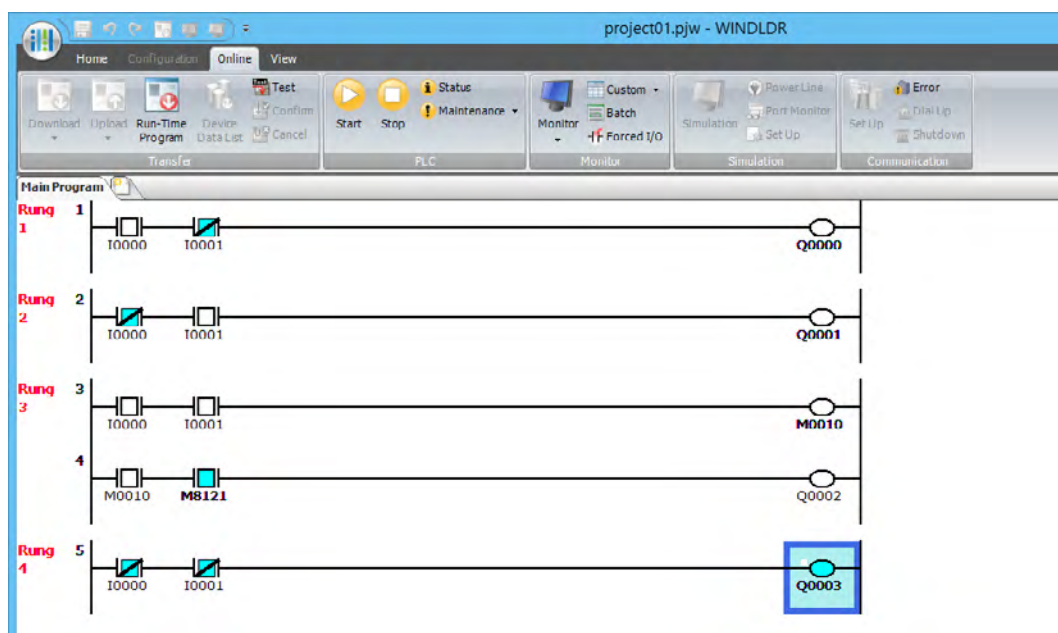
On the **Online** tab, in the **Transfer** group, click **Run-Time Program Download**.

The Download dialog box is displayed.

The user program is written to the FC6A when you click OK.



### 4. Check the operation of the program.



Rung 4: When both input I0 and I1 are off, output Q3 turns on.

### 5. Exit Online Edit.

On the **Online** tab, in the **Monitor** group, click **Online Edit** under **Monitor**.

This exits Online Edit.

## Test Programming Function

This section describes the test programming function that rewrites the user program without stopping FC6A operation and allows you confirm or cancel those changes after checking the operation of the program.



### Warning

- Rewriting the program during operation is extremely dangerous. Carefully read and understand the function description and precautions before using the function.
- Before executing test programming, confirming test programming, or canceling test programming, always check and double check the changed content and the operation of the program. There are no restrictions on the scope of editing with test programming, but if many changes are made at one time, the possibility of triggering unexpected actions will increase. Keep program changes with test programming to a minimum.
- If a user program syntax error or a user program download error occurs, the FC6A will stop operation (STOP) and all outputs will be cleared. Depending on the subject being controlled, this may be extremely dangerous.
- Test programming can be repeatedly executed, but when the test programming is canceled, all test programming is canceled at once, and the FC6A is restored to the program before test programming. When the test programming is canceled after repeated test programming, the changed content will be difficult to understand when the FC6A is restored to the original program and the possibility of trigger unexpected actions will increase. Keep the number of times test programming is performed to a minimum.
- When exiting Online Edit after test programming, always confirm or cancel the test programming, or perform run-time download. When the test programming is not confirmed or canceled and run-time download is not performed after test programming, the program stored in ROM and the program being executed in RAM will not be the same. The program in RAM will be cleared when the CPU module power is turned off, and then it will be overwritten by the program saved in ROM when the power is turned on. Unexpected actions may be triggered in this situation, and depending on the subject being controlled, this may be extremely dangerous.
- When using Online Edit, under no circumstances should you turn off the FC6A power or unplug the communication cable. The result may be a serious error such as a user program download error, and depending on the subject being controlled, this may be extremely dangerous.
- Device Q values are kept before and after test programming and cancel test programming. Therefore, when OUT/OUTN instructions are deleted or device numbers are changed, device Q before the change keeps the status. Depending on the subject being controlled, this may be extremely dangerous.

## Function Description

With test programming, a program can be downloaded and changed at the next ladder scan during FC6A operation. Next, after checking the operation of the changed program, you can select to confirm or cancel the test programming. If the test programming is confirmed, the program that was overwritten by the test programming is written to ROM and it becomes permanent. If the test programming is canceled, the program that was overwritten by the test programming is restored to the program saved in ROM.

During test programming and cancel test programming, devices Q, M, R, T (current value), C (current value), and D keep their previous status. TP (preset value) and CP (preset value) are overwritten with the preset values of the user program after it is changed.

### Notes:

- When the test programming is canceled, only the user program is restored. The contents of the devices are not restored.
- When test programming is executed, the FC6A immediately switches to the new program when the program has finished being transferred.
- It takes a maximum of 30 seconds to save the program being executed in RAM to ROM by confirming the test programming. During this period, the scan time for each scan increases in length about 10 to 130 ms.
- When the test programming is canceled, the program is restored to the program before test programming, but the device values are kept and not restored.
- After test programming and cancel test programming are completed, M8126 turns on for only one scan.
- If test programming is performed and the test programming is confirmed when FC6A timer or counter preset values have been changed by communication or advanced instructions, the preset values of the program being executed in RAM are overwritten. When test programming is canceled, the preset values are restored to the values before test programming.
- If PID, PIDA, PIDD, AVRG, DGRD, DISP, PULS, PWM, RAMP, RAMPL, ARAMP, JOG, or ZRN instructions are created or edited, the instructions are not initialized unless the input to the instruction is turned off for one or more scans. When instructions are pasted in the program, and when instructions that have been commented out are enabled, these are regarded as new instructions.
- SOTU/SOTD instructions are initialized at the first scan after test programming and cancel test programming have completed.
- For user communication instructions (TXD, RXD, ETXD, ERXD), if instruction information remains in the instruction setup area, communication is performed according to the information before the program was overwritten until all of the instructions in the setup area have sent or received their data, even when the instruction information is overwritten by test programming and cancel test programming. All RXD instructions in the setup area can be deleted by turning on the receive cancel flag assigned to each communication port.
- Test programming, test programming confirmation, and test programming cancellation can only be executed when the FC6A is operating (RUN).

Test programming, test programming confirmation, and test programming cancellation can only be executed during Online Edit mode. These are all executed during FC6A operation (RUN).

**Notes:**

- During Online Edit, function area settings and expansion data register settings cannot be changed. To change these, download the entire user program with a normal download.
- If communication was lost during test programming, test programming confirmation, or test programming cancellation, the program being executed in RAM and the program saved to ROM may not be the same. In this situation, exit Online Edit and download the program.
- After downloading or uploading the user program, start Online Edit when the WindLDR user program and the program running on the FC6A are the same. Online Edit cannot start if the programs are different.



## WindLDR Online Edit and test programming operations

### Program to create

Add rung 4 with the following specification to the program created in Chapter 4, and after testing operation with the test program, confirm or cancel the test programming.

When input I0 and input I1 are both off, output Q3 turns on.

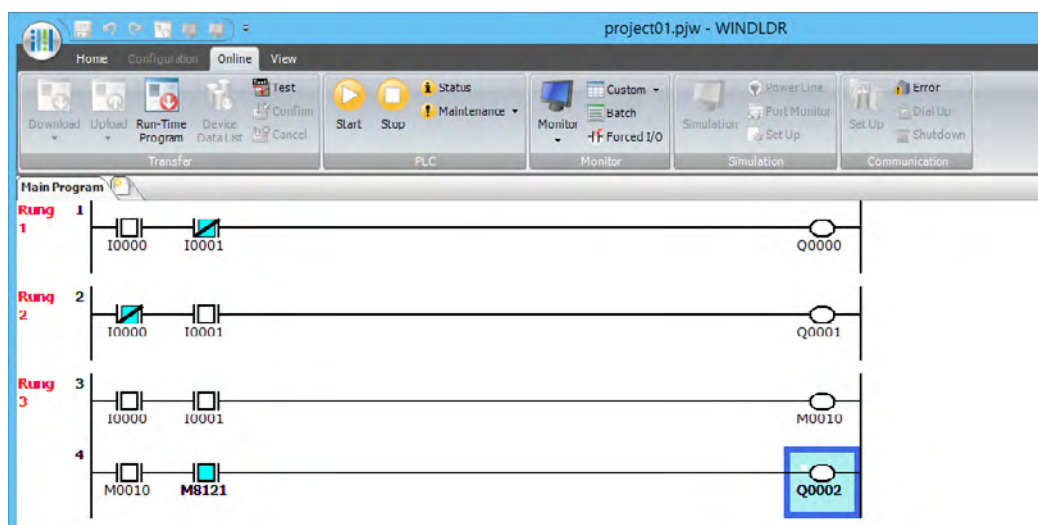
| Rung Number | I0  | I1  | Operation       |
|-------------|-----|-----|-----------------|
| 4           | OFF | OFF | Output Q3 is ON |

### • Operation procedure

#### 1. Start Online Edit.

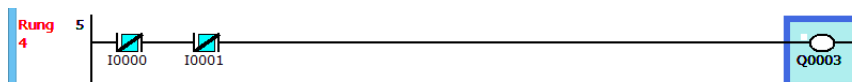
After downloading or uploading the user program, when the FC6A and WindLDR programs are the same, on the **Online** tab, in the **Monitor** group, click **Online Edit** under **Monitor**.

Online Edit mode starts and the operation of the FC6A is monitored and the program can be edited.



#### 2. Create a program.

Add rung 4 and insert the instructions according to the specification.

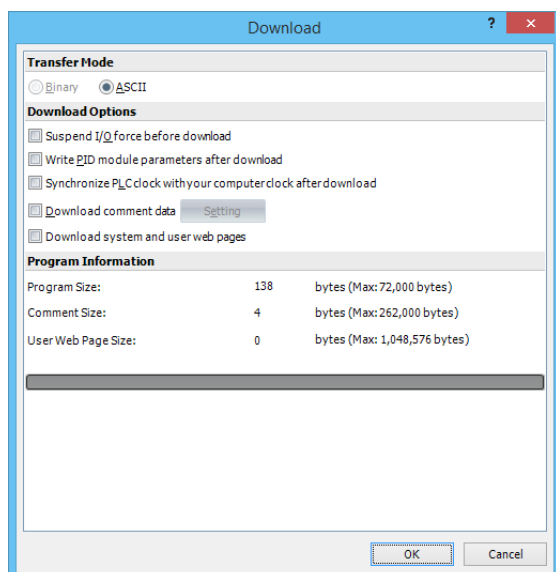


#### 3. Execute the test programming.

On the **Online** tab, in the **Transfer** group, click **Test**.

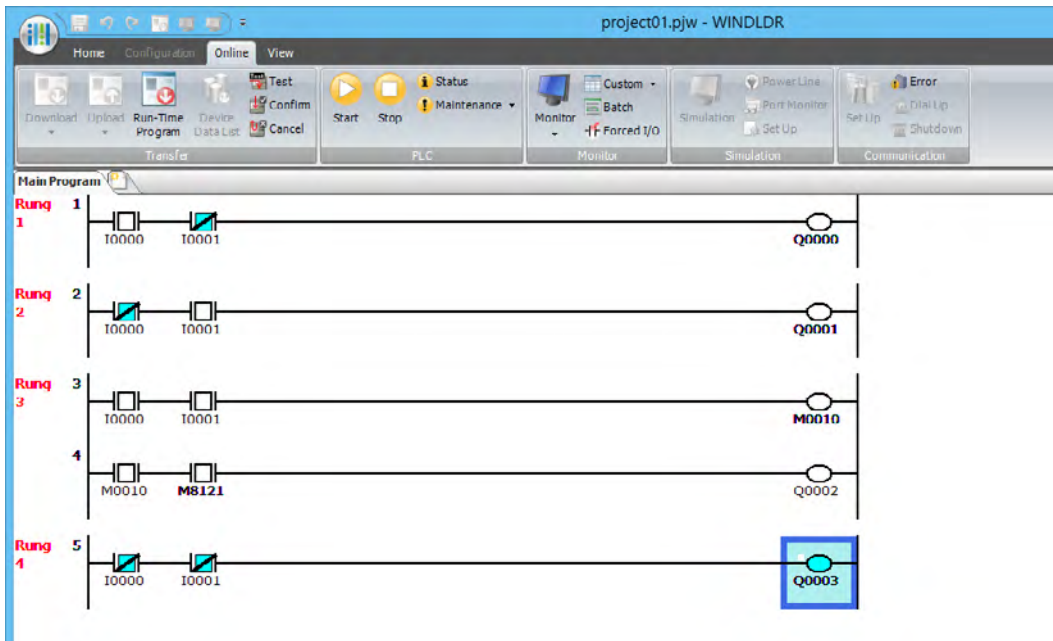
The **Download** dialog box is displayed.

The user program is written to the FC6A when you click **OK**.



## 5: FUNCTIONS AND SETTINGS

4. Check the operation of the program.



Rung 4: When both input I0 and I1 are off, output Q3 turns on.

5. To confirm the test programming, on the **Online** tab, in the **Transfer** group, click **Confirm**.  
A confirmation message is displayed. Click **Yes** to save the program overwritten by the test programming to ROM and to make it permanent.
6. To cancel the test programming, on the **Online** tab, in the **Transfer** group, click **Cancel**.  
A confirmation message is displayed. Click **Yes** to restore the program that was overwritten by the test programming to the program saved in ROM.

**Note:** Devices overwritten by checking operation after test programming are also kept after test programming is canceled. For the above example, if the test programming is canceled when Q3 is on, it keeps the on status. Depending on the subject being controlled, this may be extremely dangerous.

7. Exit Online Edit.  
On the **Online** tab, in the **Monitor** group, click **Online Edit** under **Monitor**.  
This exits Online Edit.

**Note:** You cannot exit Online Edit if the test programming has not been confirmed or canceled after test programming, or if run-time download has not been executed.

## Initialize PLC

This section describes the function to initialize the CPU module to the factory default settings.

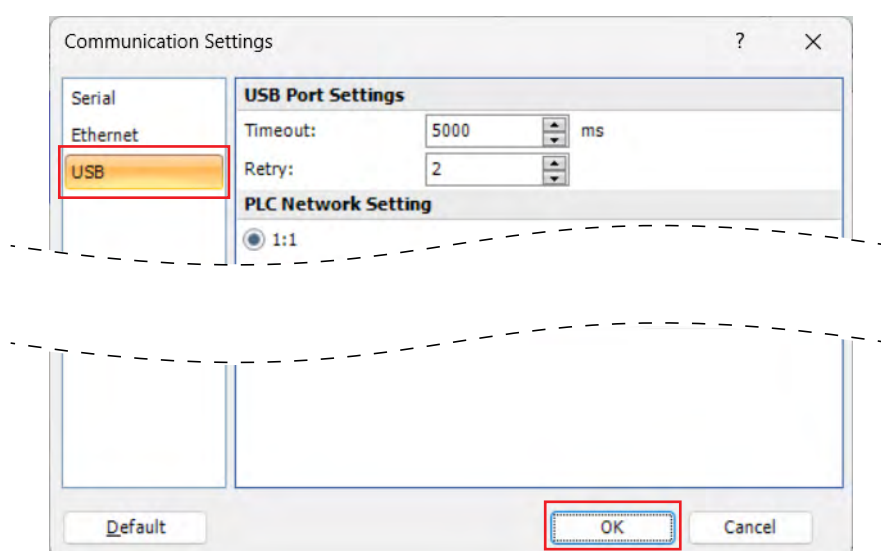
### Function Description

This function clears the following data in the CPU module.

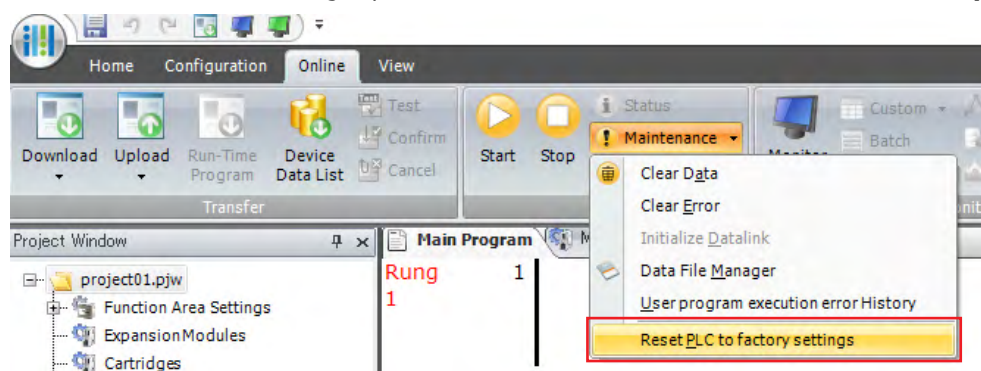
- User program (program data and comment data)
- Device data
- Web page data (user web page data and custom web page data)
- Recipe data
- MQTT basic setting data downloaded from the SD memory card to the CPU module
- Files for server function downloaded from the SD memory card to the CPU module

### Operating Procedure

1. Remove the SD memory card from the CPU module and connect the power supply to the power supply terminal of the CPU module.  
For details, see "Power Supply and Power Supply Wiring" on page 3-20.
2. Connect the CPU module and computer with a USB cable.
3. On the **Online** tab, in the **Communication** group, click **Set Up**.  
The **Communication Settings** dialog box is displayed.
4. Select **USB** and click **OK**.



5. On the **Online** tab, in the **PLC** group, click **Maintenance**, and then click **Reset PLC to factory settings**.



The **Reset PLC to factory settings** dialog box is displayed.

6. Click **OK**.  
Initialize the CPU module.

7. Power the CPU module off and then on.

This completes the initialization.

**Notes:**

- Any expansion modules and cartridges connected to the CPU module are not initialized.
- The CPU module is initialized even when the user program in the CPU module itself is password protected.
- The device data is cleared regardless of the **Memory Backup** setting.
- After the initialization completes, a keep data error, user program syntax error, and clock error occur. For information on how to clear the error, see "Reading and Clearing Errors" on page 13-1.

## 6: DEVICES

This chapter provides detailed descriptions of the allocations of devices such as inputs, outputs, internal relays, registers, timers, and counters that are used in the basic and advanced instructions, as well as details about the allocations of special internal relays and special data registers.

Please use this chapter as a reference for the devices.

**Note:** The programming and operation of FC6A user programs requires specialist knowledge.

Take the time to develop a thorough understanding of the contents and programs in this manual before using the FC6A.

### Device Addresses

#### All-in-One CPU Module/J1939 All-in-One CPU Module

| Device                               | Symbol | Unit     | Range (Points)   |  |  |
|--------------------------------------|--------|----------|--|--|--|
|                                      |        |          | 16-I/O Type  | 24-I/O Type  | 40-I/O Type  |
| Inputs* <sup>1</sup>                 | I      | Bit      | I0 - I10<br>(9 points)   | I0 - I15<br>(14 points)  | I0 - I27<br>(24 points)  |
| Expansion Inputs* <sup>1</sup>       | I      | Bit      | I30 - I187<br>(128 points)<br>I190 - I507* <sup>2</sup><br>(256 points)<br>I630 - I633* <sup>4</sup><br>(4 points) | I30 - I307<br>(224 points)<br>I310 - I627* <sup>3</sup><br>(256 points)<br>I630 - I633* <sup>4</sup><br>(4 points) | I30 - I307<br>(224 points)<br>I310 - I627* <sup>3</sup><br>(256 points)<br>I630 - I637* <sup>4</sup><br>(8 points) |
| Output* <sup>1</sup>                 | Q      | Bit      | Q0 - Q6<br>(7 points)  | Q0 - Q11<br>(10 points)  | Q0 - Q17<br>(16 points)  |
| Expansion Outputs* <sup>1</sup>      | Q      | Bit      | Q30 - Q187<br>(128 points)<br>Q190 - Q507* <sup>2</sup><br>(256 points)<br>Q630 - Q633* <sup>4</sup><br>(4 points) | Q30 - Q307<br>(224 points)<br>Q310 - Q627* <sup>3</sup><br>(256 points)<br>Q630 - Q633* <sup>4</sup><br>(4 points) | Q30 - Q307<br>(224 points)<br>Q310 - Q627* <sup>3</sup><br>(256 points)<br>Q630 - Q637* <sup>4</sup><br>(8 points) |
| Internal Relay* <sup>1</sup>         | M      | Bit      | M0 - M7997<br>(6,400 points)<br>M10000 - M17497<br>(6,000 points)  |  |  |
| Special Internal Relay* <sup>1</sup> | M      | Bit      | M8000 - M8317<br>(256 points)  |  |  |
| Shift Register                       | R      | Bit      | R0 - R255<br>(256 points)  |  |  |
| Timer                                | T      | Bit/Word | T0 - T1023<br>(1,024 points)   |  |  |
| Counter                              | C      | Bit/Word | C0 - C511<br>(512 points)  |  |  |
| Data Register                        | D      | Bit/Word | D0000 - D7999<br>(8,000 points)<br>D10000 to D55999<br>(46,000 points)   |  |  |
| Special Data Register                | D      | Bit/Word | D8000 - D8499<br>(500 points)  |  |  |
| Index Register* <sup>5</sup>         | P      | 2 words  | P0 - P15<br>(16 points)  |  |  |

\*<sup>1</sup> The least significant digit of the device address is an octal number (0 to 7).

\*<sup>2</sup> I190 to I507 and Q190 to Q507 are devices that can only be used when expansion modules are connected at the expansion interface side using the expansion interface module (expander).

\*<sup>3</sup> I310 to I627 and Q310 to Q627 are devices that can only be used when expansion modules are connected at the expansion interface side using the expansion interface module (expander).

\*<sup>4</sup> I630 to I637 and Q630 to Q637 are devices that can be used only when I/O cartridges are connected.

\*<sup>5</sup> The data type that can be used is L (Long) only.

## Plus CPU module

| Device                               | Symbol | Unit                    | Range (Points)  |                         |
|--------------------------------------|--------|-------------------------|---|-------------------------|
|                                      |        |                         | Plus 16-I/O Type  | Plus 32-I/O Type        |
| Inputs <sup>*1</sup>                 | I      | Bit                     | I0 - I7<br>(8 points)   | I0 - I17<br>(16 points) |
| Expansion Inputs <sup>*1</sup>       | I      | Bit                     | I30 - I307<br>(224 points)<br>I310 - I627 <sup>*2</sup><br>(256 points)<br>I630 - I643 <sup>*3</sup><br>(12 points)<br>I1000 - I10597 <sup>*4</sup><br>(2,016 points) |                         |
| Output <sup>*1</sup>                 | Q      | Bit                     | Q0 - Q7<br>(8 points)   | Q0 - Q17<br>(16 points) |
| Expansion Outputs <sup>*1</sup>      | Q      | Bit                     | Q30 - Q307<br>(224 points)<br>Q310 - Q627 <sup>*2</sup><br>(256 points)<br>Q630 - Q643 <sup>*3</sup><br>(12 points)<br>Q1000 - Q10597 <sup>*4</sup><br>(2,016 points) |                         |
| Internal Relay <sup>*1</sup>         | M      | Bit                     | M0 - M7997<br>(6,400 points)<br>M10000 - M21247<br>(9,000 points)   |                         |
| Special Internal Relay <sup>*1</sup> | M      | Bit                     | M8000 - M9997<br>(1,600 points)   |                         |
| Shift Register                       | R      | Bit                     | R0 - R255<br>(256 points)   |                         |
| Timer                                | T      | Bit/Word                | T0 - T1999<br>(2,000 points)  |                         |
| Counter                              | C      | Bit/Word                | C0 - C511<br>(512 points)   |                         |
| Data Register                        | D      | Bit/Word                | D0000 - D7999<br>(8,000 points)<br>D10000 - D61999<br>(52,000 points)   |                         |
| Non-retentive Data Register          | D      | Bit <sup>*7</sup> /Word | D70000 - D269999 <sup>*5</sup><br>(200,000 points)  |                         |
| Special Data Register                | D      | Bit/Word                | D8000 - D8899<br>(900 points)   |                         |
| Index Register <sup>*6</sup>         | P      | 2 words                 | P0 - P15<br>(16 points)   |                         |

\*1 The least significant digit of the device address is an octal number (0 to 7).

\*2 I1310 to I627 and Q310 to Q627 are devices that can only be used when expansion modules are connected at the expansion interface side using the expansion interface module (expander). (Node 0)

\*3 I630 to I643 and Q630 to Q643 are devices that can be used only when I/O cartridges are connected.

\*4 I1000 to I10597 and Q1000 to Q10597 are devices that can be used only when expansion modules are connected using the expansion interface modules (remote master and slaves) and the expansion interface modules (expander). (Node 1 to 10)

\*5 D70000 to D269999 cannot be designated as "Keep." Data register values are kept when you switch the PLC from Stop to Run, but those values are cleared at power up.

\*6 The data type that can be used is L (Long) only.

\*7 Usable only in scripts executed by the SCRPT instruction and as argument devices used in UMACRO instructions.

### ■ Inputs (I), Expansion Inputs (I)

Devices that input on/off information from external devices to the FC6A.

### ■ Outputs (Q), Expansion Outputs (Q)

Devices that output on/off information from the FC6A to external devices.

### ■ Internal Relays (M)

Bit devices used internally on the FC6A.

### ■ Special Internal Relays (M)

Bit devices used internally on the FC6A. Special functions are assigned to each bit.

### ■ Shift Registers (R)

Bit devices that are used with the SFR instruction and the SFRN instruction. The bit sequence of the data is shifted according to pulse input.

### ■ Timer (T)

Timers used internally in the FC6A. There are three devices: Timer bits (symbol: T, unit: bit), timer preset values (symbol: TP, unit: word), and timer current values (symbol: TC, unit: word).

These can be used as an on-delay timer or an off-delay timer. For details on timers (T), see "Using Timer or Counter as Source Device" on page 8-6.

### ■ Counters (C)

Counters used internally in the FC6A. There are three devices: Counter bits (symbol: C, unit: bit), counter preset values (symbol: CP, unit: word), and counter current values (symbol: CC, unit: word). These can be used as an adding counter or a reversible counter. For details on counters (C), see "Using Timer or Counter as Source Device" on page 8-6.

### ■ Data Registers (D)

Word devices that are used for writing numerical data internally in the FC6A. These can also be used as bit devices.

### ■ Special Data Registers (D)

Word devices that are used for writing numerical data internally in the FC6A. Special functions are assigned to each data register. These can also be used as bit devices.

#### Notes:

- Although the device symbol for internal relays (M0000 to M7997, M10000 to M21247) and special internal relays (M8000 to M9997) is the same ("M"), the device characteristics are different. Special functions are assigned to each bit of the special internal relays.
- Although the device symbol for the data registers (D0000 to D7999, D10000 to D61999, D70000 to D269999) and special data registers (D8000 to D8899) is the same ("D"), the device characteristics are different. Special functions are assigned to each special data register.

## Special Internal Relay

### Special Internal Relay Device Addresses


**Warning**

Do not write to data in the area marked as reserved in the special internal relays list. Otherwise the system may not operate correctly.

**Note:** R/W is an abbreviation for read/write.

The notation for the R/W field is as follows.

R/W: The device can be both read from and written to

R: Read-only

W: Write-only

| Device Address | Description  |                         | When Stopped | Power OFF  | R/W |
|----------------|--|-------------------------|--------------|------------|-----|
| M8000          | Start Control  |                         | Maintained   | Maintained | R/W |
| M8001          | 1-s Clock Reset  |                         | Cleared      | Cleared    | R/W |
| M8002          | All Outputs OFF  |                         | Cleared      | Cleared    | R/W |
| M8003          | Carry (Cy) or Borrow (Bw)  |                         | Cleared      | Cleared    | R/W |
| M8004          | User Program Execution Error   |                         | Cleared      | Cleared    | R/W |
| M8005          | Communication Error  |                         | Maintained   | Cleared    | R/W |
| M8006          | Communication Prohibited Flag (When Data Link Master)                                      |                         | Maintained   | Maintained | R/W |
| M8007          | Initialization Flag (When Data Link Master)/Stop Communication Flag (When Data Link Slave) |                         | Cleared      | Cleared    | R/W |
| M8010          | Status LED Operation   |                         | Operating    | Cleared    | R/W |
| M8011<br>M8012 | — Reserved —   |                         | —            | —          | —   |
| M8013          | Calendar/Clock Data Write/Adjust Error Flag  |                         | Operating    | Cleared    | R/W |
| M8014          | Calendar/Clock Data Read Error Flag  |                         | Operating    | Cleared    | R/W |
| M8015          | — Reserved —   |                         | —            | —          | —   |
| M8016          | Calendar Data Write Flag   |                         | Operating    | Cleared    | R/W |
| M8017          | Clock Data Write Flag  |                         | Operating    | Cleared    | R/W |
| M8020          | Calendar/Clock Data Write Flag   |                         | Operating    | Cleared    | R/W |
| M8021          | Clock Data Adjust Flag   |                         | Operating    | Cleared    | R/W |
| M8022          | User Communication Receive Instruction Cancel Flag (Port 1)                                |                         | Cleared      | Cleared    | R/W |
| M8023          | User Communication Receive Instruction Cancel Flag (Port 2)                                |                         | Cleared      | Cleared    | R/W |
| M8024          | BMOV/WSFT Executing Flag   |                         | Maintained   | Maintained | R/W |
| M8025          | Maintain Outputs While Stopped   |                         | Maintained   | Cleared    | R/W |
| M8026          | User Communication Receive Instruction Cancel Flag (Port 3)                                |                         | Cleared      | Cleared    | R/W |
| M8027          | High-speed Counter (Group 1/I0)  | Count Direction Flag    | Maintained   | Cleared    | R/W |
| M8030          |  | Comparison Output Reset | Cleared      | Cleared    | R/W |
| M8031          |  | Gate Input              | Maintained   | Cleared    | R/W |
| M8032          |  | Reset Input             | Maintained   | Cleared    | R/W |
| M8033          | User Communication Receive Instruction Cancel Flag (Port 4)                                |                         | Cleared      | Cleared    | R/W |
| M8034          | High-speed Counter (Group 3/I3)  | Comparison Output Reset | Cleared      | Cleared    | R/W |
| M8035          |  | Gate Input              | Maintained   | Cleared    | R/W |
| M8036          |  | Reset Input             | Maintained   | Cleared    | R/W |
| M8037          | — Reserved —   |                         | —            | —          | —   |
| M8040          | High-speed Counter (Group 4/I4)  | Comparison Output Reset | Cleared      | Cleared    | R/W |
| M8041          |  | Gate Input              | Maintained   | Cleared    | R/W |
| M8042          |  | Reset Input             | Maintained   | Cleared    | R/W |
| M8043          | High-speed Counter (Group 5/I6)  | Count Direction Flag    | Maintained   | Cleared    | R/W |
| M8044          |  | Comparison Output Reset | Cleared      | Cleared    | R/W |
| M8045          |  | Gate Input              | Maintained   | Cleared    | R/W |
| M8046          |  | Reset Input             | Maintained   | Cleared    | R/W |
| M8047<br>M8050 | — Reserved —   |                         | —            | —          | —   |



| Device Address | Description   | When Stopped            | Power OFF  | R/W |
|----------------|---|-------------------------|------------|-----|
| M8051          | High-speed Counter (Group 2/I1)   | Comparison Output Reset | Cleared    | R/W |
| M8052          |   | Gate Input              | Maintained | R/W |
| M8053          |   | Reset Input             | Maintained | R/W |
| M8054          |   | Comparison ON Status    | Maintained | R   |
| M8055          |   | Overflow                | Maintained | R   |
| M8056          | — Reserved —  |                         | —          | —   |
| M8057          | High-speed Counter (Group 6/I7)   | Comparison Output Reset | Cleared    | R/W |
| M8060          |   | Gate Input              | Maintained | R/W |
| M8061          |   | Reset Input             | Maintained | R/W |
| M8062          |   | Comparison ON Status    | Maintained | R   |
| M8063          |   | Overflow                | Maintained | R   |
| M8064 to M8067 | — Reserved —  |                         | —          | —   |
| M8070          | SD Memory Card Mount Status   |                         | Maintained | R   |
| M8071          | Accessing SD Memory Card  |                         | Maintained | R   |
| M8072          | Unmount SD Memory Card  |                         | Operating  | R/W |
| M8073          | Function Switch Status  |                         | Operating  | R   |
| M8074          | Battery Voltage Measurement Flag  |                         | Operating  | R/W |
| M8075 to M8077 | — Reserved —  |                         | —          | —   |
| M8080          | Data Link Slave 1 Communication Completed Relay (When Data Link Master) |                         | Operating  | R   |
| M8081          | Data Link Slave 2 Communication Completed Relay                         |                         | Operating  | R   |
| M8082          | Data Link Slave 3 Communication Completed Relay                         |                         | Operating  | R   |
| M8083          | Data Link Slave 4 Communication Completed Relay                         |                         | Operating  | R   |
| M8084          | Data Link Slave 5 Communication Completed Relay                         |                         | Operating  | R   |
| M8085          | Data Link Slave 6 Communication Completed Relay                         |                         | Operating  | R   |
| M8086          | Data Link Slave 7 Communication Completed Relay                         |                         | Operating  | R   |
| M8087          | Data Link Slave 8 Communication Completed Relay                         |                         | Operating  | R   |
| M8090          | Data Link Slave 9 Communication Completed Relay                         |                         | Operating  | R   |
| M8091          | Data Link Slave 10 Communication Completed Relay                        |                         | Operating  | R   |
| M8092          | Data Link Slave 11 Communication Completed Relay                        |                         | Operating  | R   |
| M8093          | Data Link Slave 12 Communication Completed Relay                        |                         | Operating  | R   |
| M8094          | Data Link Slave 13 Communication Completed Relay                        |                         | Operating  | R   |
| M8095          | Data Link Slave 14 Communication Completed Relay                        |                         | Operating  | R   |
| M8096          | Data Link Slave 15 Communication Completed Relay                        |                         | Operating  | R   |
| M8097          | Data Link Slave 16 Communication Completed Relay                        |                         | Operating  | R   |
| M8100          | Data Link Slave 17 Communication Completed Relay                        |                         | Operating  | R   |
| M8101          | Data Link Slave 18 Communication Completed Relay                        |                         | Operating  | R   |
| M8102          | Data Link Slave 19 Communication Completed Relay                        |                         | Operating  | R   |
| M8103          | Data Link Slave 20 Communication Completed Relay                        |                         | Operating  | R   |
| M8104          | Data Link Slave 21 Communication Completed Relay                        |                         | Operating  | R   |
| M8105          | Data Link Slave 22 Communication Completed Relay                        |                         | Operating  | R   |
| M8106          | Data Link Slave 23 Communication Completed Relay                        |                         | Operating  | R   |
| M8107          | Data Link Slave 24 Communication Completed Relay                        |                         | Operating  | R   |
| M8110          | Data Link Slave 25 Communication Completed Relay                        |                         | Operating  | R   |
| M8111          | Data Link Slave 26 Communication Completed Relay                        |                         | Operating  | R   |
| M8112          | Data Link Slave 27 Communication Completed Relay                        |                         | Operating  | R   |
| M8113          | Data Link Slave 28 Communication Completed Relay                        |                         | Operating  | R   |
| M8114          | Data Link Slave 29 Communication Completed Relay                        |                         | Operating  | R   |
| M8115          | Data Link Slave 30 Communication Completed Relay                        |                         | Operating  | R   |
| M8116          | Data Link Slave 31 Communication Completed Relay                        |                         | Operating  | R   |
| M8117          | Data Link All Slaves Communication Completed Relay                      |                         | Operating  | R   |
| M8120          | Initialize Pulse  |                         | Cleared    | R   |
| M8121          | 1-s Clock   |                         | Operating  | R   |
| M8122          | 100-ms Clock  |                         | Operating  | R   |

## 6: DEVICES

| Device Address | Description   |                                | When Stopped | Power OFF | R/W |
|----------------|---|--------------------------------|--------------|-----------|-----|
| M8123          | 10-ms Clock   |                                | Operating    | Cleared   | R   |
| M8124          | Timer/Counter Preset Value Changed                          |                                | Maintained   | Cleared   | R   |
| M8125          | In-operation Output   |                                | Cleared      | Cleared   | R   |
| M8126          | 1 Scan ON After Run-Time Download Completes                 |                                | Cleared      | Cleared   | R   |
| M8127          | — Reserved —  |                                | —            | —         | —   |
| M8130          | High-speed Counter (Group 1/I0)                             | Reset Status                   | Maintained   | Cleared   | R   |
| M8131          |   | Comparison ON Status           | Maintained   | Cleared   | R   |
| M8132          | — Reserved —  |                                | —            | —         | —   |
| M8133          | High-speed Counter (Group 3/I3)                             | Comparison ON Status           | Maintained   | Cleared   | R   |
| M8134          | High-speed Counter (Group 4/I4)                             | Comparison ON Status           | Maintained   | Cleared   | R   |
| M8135          | High-speed Counter (Group 5/I6)                             | Reset Status                   | Maintained   | Cleared   | R   |
| M8136          |   | Comparison ON Status           | Maintained   | Cleared   | R   |
| M8137          | Interrupt Input I0 Status (Group 1/I0)                      | (ON: Allowed, OFF: Prohibited) | Cleared      | Cleared   | R   |
| M8140          | Interrupt Input I1 Status (Group 2/I1)                      |                                | Cleared      | Cleared   | R   |
| M8141          | Interrupt Input I3 Status (Group 3/I3)                      |                                | Cleared      | Cleared   | R   |
| M8142          | Interrupt Input I4 Status (Group 4/I4)                      |                                | Cleared      | Cleared   | R   |
| M8143          | Interrupt Input I6 Status (Group 5/I6)                      |                                | Cleared      | Cleared   | R   |
| M8144          | Timer Interrupt Status                                      |                                | Cleared      | Cleared   | R   |
| M8145          | User Communication Receive Instruction Cancel Flag (Port 5) |                                | Cleared      | Cleared   | R/W |
| M8146          | User Communication Receive Instruction Cancel Flag (Port 6) |                                | Cleared      | Cleared   | R/W |
| M8147          | User Communication Receive Instruction Cancel Flag (Port 7) |                                | Cleared      | Cleared   | R/W |
| M8150          | Comparison Result 1   |                                | Maintained   | Cleared   | R   |
| M8151          | Comparison Result 2   |                                | Maintained   | Cleared   | R   |
| M8152          | Comparison Result 3   |                                | Maintained   | Cleared   | R   |
| M8153          | Catch Input ON/OFF Status                                   | Group 1/I0                     | Maintained   | Cleared   | R   |
| M8154          |   | Group 2/I1                     | Maintained   | Cleared   | R   |
| M8155          |   | Group 3/I3                     | Maintained   | Cleared   | R   |
| M8156          |   | Group 4/I4                     | Maintained   | Cleared   | R   |
| M8157          |   | Group 5/I6                     | Maintained   | Cleared   | R   |
| M8160          |   | Group 6/I7                     | Maintained   | Cleared   | R   |
| M8161          | High-speed Counter (Group 1/I0)                             | Overflow                       | Maintained   | Cleared   | R   |
| M8162          |   | Underflow                      | Maintained   | Cleared   | R   |
| M8163          | High-speed Counter (Group 5/I6)                             | Overflow                       | Maintained   | Cleared   | R   |
| M8164          |   | Underflow                      | Maintained   | Cleared   | R   |
| M8165          | High-speed Counter (Group 3/I3)                             | Overflow                       | Maintained   | Cleared   | R   |
| M8166          | High-speed Counter (Group 4/I4)                             | Overflow                       | Maintained   | Cleared   | R   |
| M8167          | Interrupt Input I7 Status (Group 6/I7)                      | (ON: Allowed, OFF: Prohibited) | Maintained   | Cleared   | R   |
| M8170          | User Communication Receive Instruction Cancel Flag (Port 8) |                                | Cleared      | Cleared   | R/W |
| M8171          | — Reserved —  |                                | —            | —         | —   |
| M8172          | Transistor Source Output Overcurrent Detection              | Group 1                        | Operating    | Cleared   | R   |
| M8173          |   | Group 2                        | Operating    | Cleared   | R   |
| M8174          |   | Group 3                        | Operating    | Cleared   | R   |
| M8175          |   | Group 4                        | Operating    | Cleared   | R   |
| M8176          | User Communication Receive Instruction Cancel Flag (Port 9) |                                | Cleared      | Cleared   | R/W |
| M8177 to M8183 | — Reserved —  |                                | —            | —         | —   |
| M8184          | Change HMI Module Network Settings Trigger                  |                                | Operating    | Cleared   | R/W |
| M8185          | In Daylight Saving Time Period                              |                                | Operating    | Cleared   | R   |
| M8186          | Ethernet Port 1 Executing Auto Ping                         |                                | Operating    | Cleared   | R   |
| M8187          | Ethernet Port 1 Auto Ping Stop Flag                         |                                | Operating    | Cleared   | R/W |
| M8190          | Change CPU Module Ethernet Port 1 Network Settings Trigger  |                                | Operating    | Cleared   | R/W |
| M8191          | SNTP Acquisition Flag                                       |                                | Operating    | Cleared   | R/W |

| Device Address | Description   |                                      | When Stopped | Power OFF | R/W |
|----------------|---|--------------------------------------|--------------|-----------|-----|
| M8192          | Interrupt Input I0 Edge   | On: Rising Edge<br>Off: Falling Edge | Cleared      | Cleared   | R   |
| M8193          | Interrupt Input I3 Edge   |                                      | Cleared      | Cleared   | R   |
| M8194          | Interrupt Input I4 Edge   |                                      | Cleared      | Cleared   | R   |
| M8195          | Interrupt Input I6 Edge   |                                      | Cleared      | Cleared   | R   |
| M8196          | Interrupt Input I7 Edge   |                                      | Cleared      | Cleared   | R   |
| M8197          | Interrupt Input I1 Edge   |                                      | Cleared      | Cleared   | R   |
| M8200          | User Communication Receive Instruction Cancel Flag                          | Connection 1                         | Cleared      | Cleared   | R/W |
| M8201          |   | Connection 2                         | Cleared      | Cleared   | R/W |
| M8202          |   | Connection 3                         | Cleared      | Cleared   | R/W |
| M8203          |   | Connection 4                         | Cleared      | Cleared   | R/W |
| M8204          |   | Connection 5                         | Cleared      | Cleared   | R/W |
| M8205          |   | Connection 6                         | Cleared      | Cleared   | R/W |
| M8206          |   | Connection 7                         | Cleared      | Cleared   | R/W |
| M8207          |   | Connection 8                         | Cleared      | Cleared   | R/W |
| M8210          | — Reserved —  |                                      | —            | —         | —   |
| M8211          | HMI Module Send E-mail Server Settings Initialization                       |                                      | Operating    | Cleared   | R/W |
| M8212          | Connection Status<br>(ON: Connected, OFF: Not Connected)                    | Connection 1                         | Operating    | Cleared   | R   |
| M8213          |   | Connection 2                         | Operating    | Cleared   | R   |
| M8214          |   | Connection 3                         | Operating    | Cleared   | R   |
| M8215          |   | Connection 4                         | Operating    | Cleared   | R   |
| M8216          |   | Connection 5                         | Operating    | Cleared   | R   |
| M8217          |   | Connection 6                         | Operating    | Cleared   | R   |
| M8220          |   | Connection 7                         | Operating    | Cleared   | R   |
| M8221          |   | Connection 8                         | Operating    | Cleared   | R   |
| M8222          | Disconnect User Communication Connection                                    | Connection 1                         | Operating    | Cleared   | R/W |
| M8223          |   | Connection 2                         | Operating    | Cleared   | R/W |
| M8224          |   | Connection 3                         | Operating    | Cleared   | R/W |
| M8225          |   | Connection 4                         | Operating    | Cleared   | R/W |
| M8226          |   | Connection 5                         | Operating    | Cleared   | R/W |
| M8227          |   | Connection 6                         | Operating    | Cleared   | R/W |
| M8230          |   | Connection 7                         | Operating    | Cleared   | R/W |
| M8231          |   | Connection 8                         | Operating    | Cleared   | R/W |
| M8232          | HMI Module Connection Information Reference Connection Status               |                                      | Operating    | Cleared   | R   |
| M8233 to M8247 | — Reserved —  |                                      | —            | —         | —   |
| M8250          | Download from SD Memory Card Execution Flag                                 |                                      | Operating    | Cleared   | R/W |
| M8251          | Upload to SD Memory Card Execution Flag                                     |                                      | Operating    | Cleared   | R/W |
| M8252          | Executing SD Memory Card Download   |                                      | Operating    | Cleared   | R   |
| M8253          | Executing SD Memory Card Upload   |                                      | Operating    | Cleared   | R   |
| M8254          | SD Memory Card Download/Upload Execution Completion Output                  |                                      | Operating    | Cleared   | R   |
| M8255          | SD Memory Card Download/Upload Execution Error Output                       |                                      | Operating    | Cleared   | R   |
| M8256<br>M8257 | — Reserved —  |                                      | —            | —         | —   |
| M8260          | Write Recipe Execution Flag   |                                      | Operating    | Cleared   | R/W |
| M8261          | Read Recipe Execution Flag  |                                      | Operating    | Cleared   | R/W |
| M8262          | Executing Write Recipe  |                                      | Operating    | Cleared   | R/W |
| M8263          | Executing Read Recipe   |                                      | Operating    | Cleared   | R/W |
| M8264          | Recipe Channel Execution Completed Output                                   |                                      | Operating    | Cleared   | R/W |
| M8265          | Recipe Execution Error Output   |                                      | Operating    | Cleared   | R/W |
| M8266          | Recipe Block Execution Completed Output                                     |                                      | Operating    | Cleared   | R/W |
| M8267          | Read Restriction for Recipe Internal Memory (ROM-Range)                     |                                      | Operating    | Cleared   | R   |
| M8270          | — Reserved —  |                                      | —            | —         | —   |
| M8271          | Download MQTT Basic Settings from SD Memory Card Execution Flag             |                                      | Operating    | Cleared   | R/W |
| M8272          | Download MQTT Basic Settings from SD Memory Card Execution Completed Output |                                      | Operating    | Cleared   | R   |

## 6: DEVICES

| Device Address | Description   |                   | When Stopped | Power OFF | R/W |
|----------------|---|-------------------|--------------|-----------|-----|
| M8273          | Download MQTT Basic Settings from SD Memory Card Error Output |                   | Operating    | Cleared   | R   |
| M8274 to M8297 | — Reserved —  |                   | —            | —         | —   |
| M8300          | J1939 Communication Permitted Flag                            |                   | Cleared      | Cleared   | R/W |
| M8301          | J1939 Online Status   |                   | Cleared      | Cleared   | R   |
| M8302          | J1939 Local Station Address Confirmation Status               |                   | Cleared      | Cleared   | R   |
| M8303          | J1939 Communication Error Output                              |                   | Cleared      | Cleared   | R   |
| M8304          | J1939 Communication Bus Off Occurrence Output                 |                   | Cleared      | Cleared   | R   |
| M8305 to M8310 | — Reserved —  |                   | —            | —         | —   |
| M8311          | ESC+Key Input (Up)  | ESC+Key Input (↶) | Cleared      | Cleared   | R   |
| M8312          | ESC+Key Input (Down)  | ESC+Key Input (↷) | Cleared      | Cleared   | R   |
| M8313          | ESC+Key Input (Left)  | ESC+Key Input (↵) | Cleared      | Cleared   | R   |
| M8314          | ESC+Key Input (Right)   | ESC+Key Input (↶) | Cleared      | Cleared   | R   |
| M8315 to M8319 | — Reserved —  |                   | —            | —         | —   |
| M8320          | Initialize Expansion Interface Remote Master/Slave            |                   | Operating    | Cleared   | R/W |
| M8321 to M8330 | — Reserved —  |                   | —            | —         | —   |
| M8331          | Ethernet Port 2 Executing Auto Ping                           |                   | Operating    | Cleared   | R   |
| M8332          | Ethernet Port 2 Auto Ping Stop Flag                           |                   | Operating    | Cleared   | R/W |
| M8333          | Change CPU Module Ethernet Port 2 Network Settings Trigger    |                   | Operating    | Cleared   | R/W |
| M8334          | User Communication Receive Instruction Cancel Flag            | Connection 9      | Cleared      | Cleared   | R/W |
| M8335          |   | Connection 10     | Cleared      | Cleared   | R/W |
| M8336          |   | Connection 11     | Cleared      | Cleared   | R/W |
| M8337          |   | Connection 12     | Cleared      | Cleared   | R/W |
| M8340          |   | Connection 13     | Cleared      | Cleared   | R/W |
| M8341          |   | Connection 14     | Cleared      | Cleared   | R/W |
| M8342          |   | Connection 15     | Cleared      | Cleared   | R/W |
| M8343          |   | Connection 16     | Cleared      | Cleared   | R/W |
| M8344          | Ethernet Port 1 Send E-mail Server Settings Initialization    |                   | Operating    | Cleared   | R/W |
| M8345          | Connection Status<br>(ON: Connected, OFF: Not Connected)      | Connection 9      | Operating    | Cleared   | R   |
| M8346          |   | Connection 10     | Operating    | Cleared   | R   |
| M8347          |   | Connection 11     | Operating    | Cleared   | R   |
| M8350          |   | Connection 12     | Operating    | Cleared   | R   |
| M8351          |   | Connection 13     | Operating    | Cleared   | R   |
| M8352          |   | Connection 14     | Operating    | Cleared   | R   |
| M8353          |   | Connection 15     | Operating    | Cleared   | R   |
| M8354          |   | Connection 16     | Operating    | Cleared   | R   |
| M8355          | Disconnect User Communication Connection                      | Connection 9      | Operating    | Cleared   | R/W |
| M8356          |   | Connection 10     | Operating    | Cleared   | R/W |
| M8357          |   | Connection 11     | Operating    | Cleared   | R/W |
| M8360          |   | Connection 12     | Operating    | Cleared   | R/W |
| M8361          |   | Connection 13     | Operating    | Cleared   | R/W |
| M8362          |   | Connection 14     | Operating    | Cleared   | R/W |
| M8363          |   | Connection 15     | Operating    | Cleared   | R/W |
| M8364          |   | Connection 16     | Operating    | Cleared   | R/W |
| M8365          | User Communication Receive Instruction Cancel Flag (Port 10)  |                   | Cleared      | Cleared   | R/W |
| M8366          | User Communication Receive Instruction Cancel Flag (Port 11)  |                   | Cleared      | Cleared   | R/W |
| M8367          | User Communication Receive Instruction Cancel Flag (Port 12)  |                   | Cleared      | Cleared   | R/W |
| M8370          | User Communication Receive Instruction Cancel Flag (Port 13)  |                   | Cleared      | Cleared   | R/W |
| M8371          | User Communication Receive Instruction Cancel Flag (Port 14)  |                   | Cleared      | Cleared   | R/W |
| M8372          | User Communication Receive Instruction Cancel Flag (Port 15)  |                   | Cleared      | Cleared   | R/W |
| M8373          | User Communication Receive Instruction Cancel Flag (Port 16)  |                   | Cleared      | Cleared   | R/W |
| M8374          | User Communication Receive Instruction Cancel Flag (Port 17)  |                   | Cleared      | Cleared   | R/W |

| Device Address | Description  | When Stopped         | Power OFF  | R/W |
|----------------|--|----------------------|------------|-----|
| M8375          | User Communication Receive Instruction Cancel Flag (Port 18)                       | Cleared              | Cleared    | R/W |
| M8376          | User Communication Receive Instruction Cancel Flag (Port 19)                       | Cleared              | Cleared    | R/W |
| M8377          | User Communication Receive Instruction Cancel Flag (Port 20)                       | Cleared              | Cleared    | R/W |
| M8380          | User Communication Receive Instruction Cancel Flag (Port 21)                       | Cleared              | Cleared    | R/W |
| M8381          | User Communication Receive Instruction Cancel Flag (Port 22)                       | Cleared              | Cleared    | R/W |
| M8382          | User Communication Receive Instruction Cancel Flag (Port 23)                       | Cleared              | Cleared    | R/W |
| M8383          | User Communication Receive Instruction Cancel Flag (Port 24)                       | Cleared              | Cleared    | R/W |
| M8384          | User Communication Receive Instruction Cancel Flag (Port 25)                       | Cleared              | Cleared    | R/W |
| M8385          | User Communication Receive Instruction Cancel Flag (Port 26)                       | Cleared              | Cleared    | R/W |
| M8386          | User Communication Receive Instruction Cancel Flag (Port 27)                       | Cleared              | Cleared    | R/W |
| M8387          | User Communication Receive Instruction Cancel Flag (Port 28)                       | Cleared              | Cleared    | R/W |
| M8390          | User Communication Receive Instruction Cancel Flag (Port 29)                       | Cleared              | Cleared    | R/W |
| M8391          | User Communication Receive Instruction Cancel Flag (Port 30)                       | Cleared              | Cleared    | R/W |
| M8392          | User Communication Receive Instruction Cancel Flag (Port 31)                       | Cleared              | Cleared    | R/W |
| M8393          | User Communication Receive Instruction Cancel Flag (Port 32)                       | Cleared              | Cleared    | R/W |
| M8394          | User Communication Receive Instruction Cancel Flag (Port 33)                       | Cleared              | Cleared    | R/W |
| M8395 to M8400 | — Reserved —   | —                    | —          | —   |
| M8401          | Download Files for Server Functions from SD Memory Card Execution Flag             | Operating            | Cleared    | R/W |
| M8402          | Download Files for Server Functions from SD Memory Card Execution Completed Output | Operating            | Cleared    | R   |
| M8403          | Download Files for Server Functions from SD Memory Card Error Output               | Operating            | Cleared    | R   |
| M8404          | Plus CPU Module Web Server Operation Status  | Operating            | Cleared    | R   |
| M8405 to M8447 | — Reserved —   | —                    | —          | —   |
| M8450          | BACnet Communication Bit   | Operating            | Cleared    | R/W |
| M8451 to M8457 | — Reserved —   | —                    | —          | —   |
| M8460          | EtherNet/IP Communication Bit  | Cleared              | Cleared    | R/W |
| M8461 to M8597 | — Reserved —   | —                    | —          | —   |
| M8600          | High-speed Counter (Group 3/I3)  | Reset Status         | Maintained | R   |
| M8601          |  | Underflow            | Maintained | R   |
| M8602          |  | Count Direction Flag | Maintained | R   |
| M8603 to M8997 | — Reserved —   | —                    | —          | —   |

### Supplementary Descriptions of the Special Internal Relays

#### ■ M8000: Start Control

M8000 controls the run/stop status of the FC6A. The CPU is set to run when M8000 is turned on, and the CPU is set to off when M8000 is turned off. See "Start/Stop Operation" on page 4-19. However, the function switch, stop input, and reset input have precedence over start control. M8000 maintains its status when the CPU is powered down. When data to be maintained during a power failure disappears after the CPU has been off for a period longer than the battery backup duration, the CPU restarts operation as selected in Configuration > Run/Stop Control > Run/Stop Selection at Keep Data Error. For details, see "Run/Stop Selection at Keep Data Error" on page 5-8.

#### ■ M8001: 1-s Clock Reset

While M8001 is on, M8121 (1-s clock) is always off.

#### ■ M8002: All Outputs OFF

While M8002 is on, all outputs are off. The self-holding circuit created in the ladder program is also off.

#### ■ M8003: Carry/Borrow

When a carry (Cy) or borrow (Bw) results from executing an addition or subtraction instruction, M8003 is turned on. For details, see "Carry and Borrow" on page 8-10".

### ■ M8004: User Program Execution Error

When an error occurs while executing a user program, M8004 is turned on. For details on user program execution errors, see the appendix "User Program Execution Error and Ladder Program Execution Error" in the "Ladder Programming Manual".

### ■ M8005: Communication Error

When an error occurs during data link communication, M8005 is turned on. The state is retained even when the error is cleared.

### ■ M8006: Communication Prohibited Flag (When Data Link Master)

During data link communication, communication is stopped while M8006 is on.

### ■ M8007: Initialization Flag (When Data Link Master)/Stop Communication Flag (When Data Link Slave)

When data link master: When this flag is turned on in the run status, the data link is initialized just once to check the connection status. Use this when the slave configured in the data link is powered at a timing slower than the master.

When data link slave : This flag is turned on when communication from the master is interrupted for 10 s or longer. This flag is turned off when communication can be normally received.

### ■ M8010: Status LED Operation

While M8010 is on, the status LED [STAT] is turned on. While off, the status LED [STAT] is turned off.

### ■ M8013: Calendar/Clock Data Write/Adjust Error Flag

When the clock writing or clock adjustment processing could not be executed normally, M8013 is turned on. It is turned off when the processing completes normally.

### ■ M8014: Calendar/Clock Data Read Error Flag

When an error occurs while calendar/clock data is read from the internal clock to the special data registers (D8008 to D8021), M8014 is turned on. It is turned off when reading completes normally.

### ■ M8016: Calendar Data Write Flag

When M8016 is turned on after writing data to the calendar data (write-only) special data registers (D8015 to D8018), the calendar data (year, month, day, day of the week) is written to the internal clock.

### ■ M8017: Clock Data Write Flag

When M8017 is turned on after writing data to the clock data (write-only) special data registers (D8019 to D8021), the clock data (hours, minutes, seconds) is written to the internal clock.

### ■ M8020: Calendar/Clock Data Write Flag

When M8020 is turned on after writing data to the calendar/clock data (write-only) special data registers (D8015 to D8021), the calendar data (year, month, day, day of the week) and the clock data (hours, minutes, seconds) is written to the internal clock.

### ■ M8021: Clock Data Adjust Flag

When M8021 is turned on, the clock is adjusted with respect to seconds.

- When M8021 is turned on, if the seconds are between 0 and 29, the seconds will be set to 0 and the minutes remain the same.
- When M8021 is turned on, if the seconds are between 30 and 59, the seconds will be set to 0 and 1 will be added to the minutes.

### ■ M8022: User Communication Receive Instruction Cancel Flag (Port 1)

While M8022 is on, user communication (receive instruction) executing on Port 1 is canceled.

### ■ M8023: User Communication Receive Instruction Cancel Flag (Port 2)

While M8023 is on, user communication (receive instruction) executing on Port 2 is canceled.

### ■ M8024: BMOV/WSFT Executing Flag

While the WSFT (word shift) instruction or the BMOV (block move) instruction is executing, M8024 is turned on. When completed, M8024 is turned off.

### ■ M8025: Maintain Outputs While Stopped

When the FC6A is stopped while running with M8025 turned on, the outputs maintain their runtime status. When set to run again, M8025 is automatically turned off.

For the parameter settings (Q) of safety relay module during STOP, see Chapter 4 "Special Data Register" D8463 in the "FC6A Series MICROSmart Safety Relay Module User's Manual".

### ■ M8026: User Communication Receive Instruction Cancel Flag (Port 3)

While M8026 is on, user communication (receive instruction) executing on Port 3 is canceled.



■ **M8033, M8145 to M8147, M8170, M8176, M8365 to M8394: User Communication Receive Instruction Cancel Flag (Port 4 to 33)**

While these flags are on, user communication (receive instruction) being executed on the corresponding port is canceled.

M8033 = User Communication Receive Instruction Cancel Flag (Port 4)

M8145 = User Communication Receive Instruction Cancel Flag (Port 5)

M8146 = User Communication Receive Instruction Cancel Flag (Port 6)

M8147 = User Communication Receive Instruction Cancel Flag (Port 7)

M8170 = User Communication Receive Instruction Cancel Flag (Port 8)

M8176 = User Communication Receive Instruction Cancel Flag (Port 9)

M8365 = User Communication Receive Instruction Cancel Flag (Port 10)

M8366 = User Communication Receive Instruction Cancel Flag (Port 11)

M8367 = User Communication Receive Instruction Cancel Flag (Port 12)

M8370 = User Communication Receive Instruction Cancel Flag (Port 13)

M8371 = User Communication Receive Instruction Cancel Flag (Port 14)

M8372 = User Communication Receive Instruction Cancel Flag (Port 15)

M8373 = User Communication Receive Instruction Cancel Flag (Port 16)

M8374 = User Communication Receive Instruction Cancel Flag (Port 17)

M8375 = User Communication Receive Instruction Cancel Flag (Port 18)

M8376 = User Communication Receive Instruction Cancel Flag (Port 19)

M8377 = User Communication Receive Instruction Cancel Flag (Port 20)

M8380 = User Communication Receive Instruction Cancel Flag (Port 21)

M8381 = User Communication Receive Instruction Cancel Flag (Port 22)

M8382 = User Communication Receive Instruction Cancel Flag (Port 23)

M8383 = User Communication Receive Instruction Cancel Flag (Port 24)

M8384 = User Communication Receive Instruction Cancel Flag (Port 25)

M8385 = User Communication Receive Instruction Cancel Flag (Port 26)

M8386 = User Communication Receive Instruction Cancel Flag (Port 27)

M8387 = User Communication Receive Instruction Cancel Flag (Port 28)

M8390 = User Communication Receive Instruction Cancel Flag (Port 29)

M8391 = User Communication Receive Instruction Cancel Flag (Port 30)

M8392 = User Communication Receive Instruction Cancel Flag (Port 31)

M8393 = User Communication Receive Instruction Cancel Flag (Port 32)

M8394 = User Communication Receive Instruction Cancel Flag (Port 33)

■ **M8027 to M8032, M8034 to M8036, M8040 to M8046, M8051 to M8055, M8057 to M8063, M8130, M8131, M8133 to M8136, M8161 to M8167, M8600 to M8602: Special Internal Relays for High-speed Counter**

Special internal relays used for the high-speed counter. For details, see "High-Speed Counter" on page 5-14.

M8027 to M8032, M8130, M8131, M8161, M8162 = High-speed counter (group 1/I0)

M8034 to M8036, M8133, M8165, M8600 to M8602 = High-speed counter (group 3/I3)

M8040 to M8042, M8134, M8166 = High-speed counter (group 4/I4)

M8043 to M8046, M8135, M8136, M8163, M8164 = High-speed counter (group 5/I6)

M8051 to M8055 = High-speed counter (group 2/I1)

M8057 to M8063 = High-speed counter (group 6/I7)

■ **M8070: SD Memory Card Mount Status**

When an SD memory card is inserted in the FC6A and it has been recognized and can be used, M8070 is turned on. M8070 is turned off if no SD memory card has been inserted or if it is not recognized.

■ **M8071: Accessing SD Memory Card**

M8071 is turned on while the SD memory card is being accessed. It is turned off when access has finished.

■ **M8072: Unmount SD Memory Card**

When M8072 is turned on, access to the SD memory card is stopped. To make an SD memory card accessible that has had access to it stopped, insert the card once again.

■ **M8073: Function Switch Status**

This relay indicates the status of the function switch on the front of the CPU module.

M8073 is on when the function switch is 1. M8073 is off when the function switch is 0.

■ **M8074: Battery Voltage Measurement Flag**

This relay indicates the battery voltage measurement status of the backup battery.

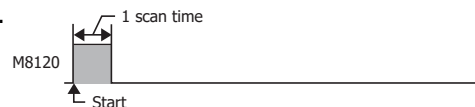
When M8074 is turned on, the battery voltage starts being measured, and it is turned off when the measurement has finished.

### ■ M8080 to M8117: Data Link Communication Completed Relay

Special internal relays used for data link communication. For details, see Chapter 7 "Data Link Communication" in the "FC6A Series MICROSmart Communication Manual".

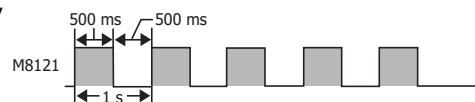
### ■ M8120: Initialize Pulse

When operation (RUN) starts, M8120 is turned on for a period of one scan.



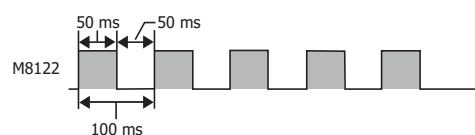
### ■ M8121: 1-s Clock

While M8001 is off, M8121 generates clock pulses in a 1 s cycle, with a duty ratio of 1:1 (500 ms on and 500 ms off).



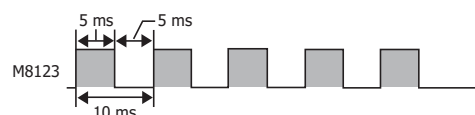
### ■ M8122: 100-ms Clock

M8122 generates clock pulses in a 100 ms cycle, with a duty ratio of 1:1 (50 ms on and 50 ms off).



### ■ M8123: 10-ms Clock

M8123 generates clock pulses in a 10 ms cycle, with a duty ratio of 1:1 (5 ms on and 5 ms off).



### ■ M8124: Timer/Counter Preset Value Changed

When timer or counter preset values are changed, M8124 is turned on. When a user program is transferred or when the changed data is cleared, M8124 is turned off.

### ■ M8125: In-operation Output

M8125 is on during the run status.

### ■ M8126: Scan ON After Run-Time Download Completes

When the user program is changed during the run status (run-time download), after the download completes, M8126 is turned on for one scan only when the user program starts operation.

### ■ M8137 to M8143, M8167: Interrupt Input Status

These relays are turned on when the corresponding user interrupt is allowed. These relays are turned off when the user interrupt is prohibited.

M8137 = Interrupt input I0 status

M8140 = Interrupt input I1 status

M8141 = Interrupt input I3 status

M8142 = Interrupt input I4 status

M8143 = Interrupt input I6 status

M8167 = Interrupt input I7 status

### ■ M8144: Timer Interrupt Status

When the timer interrupt is allowed, M8144 is turned on. When the timer interrupt is prohibited, M8144 is turned off.

### ■ M8150 to M8152: Comparison Result

M8150 to M8152 turn on according to the comparison results of the CMP= (Compare=) instruction and the ICMP>= (Interval Compare) instruction.

For details, see Chapter 6 "Special Internal Relays M8150, M8151, and M8152 in ICMP>=" in the "Ladder Programming Manual".



#### ■ **M8153 to M8160: Catch Input ON/OFF Status**

When the rising or falling input edge of the input contact specified as the catch input is detected during a scan, the input contact status is captured. The detectable edges are once per scan.

M8153 = Group 1/I0 status

M8154 = Group 2/I1 status

M8155 = Group 3/I3 status

M8156 = Group 4/I4 status

M8157 = Group 5/I6 status

M8160 = Group 6/I7 status

#### ■ **M8172 to M8175: Transistor Source Output Overcurrent Detection**

When overcurrent output occurs in a transistor protection source output on the CPU module, a special internal relay (M8172 to M8175) is turned on. The following special internal relays have been allocated with four outputs set as one group. If overcurrent output occurs in any of the special internal relays, it is turned on.

Even if the overcurrent output has been cleared, these special internal relays are not reset to off. To reset a special internal relay to off, create programming to do so in the ladder program.

M8172 = Group 1 (Q0 to Q3) status

M8173 = Group 2 (Q4 to Q7) status

M8174 = Group 3 (Q10 to Q13) status

M8175 = Group 4 (Q14 to Q17) status

#### ■ **M8184: Change HMI Module Network Settings Trigger**

When M8184 is turned on, the values stored in D8437 to D8456 are set as the HMI module IP address.

The IP address is not set just by changing the values of D8437 to D8456. For details on changing the HMI module network settings, see Chapter 3 "Network settings by HMI module special data registers" in the "FC6A Series MICROSmart Communication Manual".

#### ■ **M8185: In Daylight Saving Time Period**

When the daylight saving time function is enabled, M8185 is on during the daylight saving time period. When outside of the daylight saving time period, M8185 is off.

When the daylight saving time function is disabled, M8185 is off.

#### ■ **M8186: Ethernet Port 1 Executing Auto Ping**

M8186 is on when the auto ping on Ethernet port 1 is operating. M8186 is off when auto ping is stopped. For details on auto ping, see Chapter 3 "Auto Ping Function" in the "FC6A Series MICROSmart Communication Manual".

#### ■ **M8187: Ethernet Port 1 Auto Ping Stop Flag**

While M8187 is on, the auto ping on Ethernet port 1 is stopped. While M8187 is off, auto ping is executed. At that time, auto ping is executed from the smallest remote host number specified in the remote host list, regardless of the previous end status.

#### ■ **M8190: Change CPU Module Ethernet Port 1 Network Settings Trigger**

When M8190 is turned on, the values stored in D8303 to D8323 are set as the IP Settings/DNS Settings of Ethernet port 1 on the CPU module.

The IP address is not set just by changing the values of D8303 to D8323. For details on changing the IP Settings/DNS Settings of Ethernet port 1 on the CPU module, see Chapter 3 "Network settings by special data registers" in the "FC6A Series MICROSmart Communication Manual".

#### ■ **M8191: SNTP Acquisition Flag**

When M8191 is turned on, the time information is acquired from the SNTP server.

#### ■ **M8192 to M8197: Interrupt Input Edge**

These relays turn on when an interrupt occurs with the rising edge of an interrupt input. They turn off when an interrupt occurs with the falling edge of an interrupt input.

M8192 = Interrupt input I0 edge

M8193 = Interrupt input I3 edge

M8194 = Interrupt input I4 edge

M8195 = Interrupt input I6 edge

M8196 = Interrupt input I7 edge

M8197 = Interrupt input I1 edge

### ■ M8200 to M8207, M8334 to M8343: User Communication Receive Instruction Cancel Flag

When M8200 to M8207 or M8334 to M8343 are turned on, the user communication receive instruction being executed is stopped.

- M8200 = User communication receive instruction being executed on client connection 1
- M8201 = User communication receive instruction being executed on client connection 2
- M8202 = User communication receive instruction being executed on client connection 3
- M8203 = User communication receive instruction being executed on client connection 4
- M8204 = User communication receive instruction being executed on client connection 5
- M8205 = User communication receive instruction being executed on client connection 6
- M8206 = User communication receive instruction being executed on client connection 7
- M8207 = User communication receive instruction being executed on client connection 8
- M8334 = User communication receive instruction being executed on client connection 9
- M8335 = User communication receive instruction being executed on client connection 10
- M8336 = User communication receive instruction being executed on client connection 11
- M8337 = User communication receive instruction being executed on client connection 12
- M8340 = User communication receive instruction being executed on client connection 13
- M8341 = User communication receive instruction being executed on client connection 14
- M8342 = User communication receive instruction being executed on client connection 15
- M8343 = User communication receive instruction being executed on client connection 16

### ■ M8211: HMI Module Send E-mail Server Settings Initialization

When M8211 is turned on, the settings for the send E-mail server on the HMI-Ethernet port are initialized.

### ■ M8212 to M8221, M8345 to M8354: Connection Status

While connected to a network device via the maintenance communication server, user communication server/client, or Modbus TCP server/client, the connection status is turned on. While not connected to a network device, the connection status is turned off.

- M8212 = Connection 1
- M8213 = Connection 2
- M8214 = Connection 3
- M8215 = Connection 4
- M8216 = Connection 5
- M8217 = Connection 6
- M8220 = Connection 7
- M8221 = Connection 8
- M8345 = Connection 9
- M8346 = Connection 10
- M8347 = Connection 11
- M8350 = Connection 12
- M8351 = Connection 13
- M8352 = Connection 14
- M8353 = Connection 15
- M8354 = Connection 16

### ■ M8222 to M8231, M8355 to M8364: Disconnect User Communication Connection

When connected to a remote host via user communication, the corresponding connection is disconnected when M8222 to M8231 is turned on.

- M8222 = Connection 1
- M8223 = Connection 2
- M8224 = Connection 3
- M8225 = Connection 4
- M8226 = Connection 5
- M8227 = Connection 6
- M8230 = Connection 7
- M8231 = Connection 8
- M8355 = Connection 9
- M8356 = Connection 10
- M8357 = Connection 11
- M8360 = Connection 12
- M8361 = Connection 13

M8362 = Connection 14

M8363 = Connection 15

M8364 = Connection 16

These relays are enabled only when a user communication client is used.

■ **M8232: HMI Module Connection Information Reference Connection Status**

M8232 is turned on when there is a connection with the connection number specified by D8429. M8232 is turned off when there is no connection.

■ **M8250: Download from SD Memory Card Execution Flag**

When M8250 is turned on, a ZLD file is downloaded from the SD memory card. The file that will be downloaded is the ZLD file specified in the autoexec.ini file.

■ **M8251: Upload to SD Memory Card Execution Flag**

When M8251 is turned on, a ZLD file is uploaded to the SD memory card.

A ZLD file is created with the file name specified in the autoexec.ini file.

■ **M8252: Executing SD Memory Card Download**

M8252 is turned on when starting execution of the download from the SD memory card, and when the download has completed, it is turned off.

■ **M8253: Executing SD Memory Card Upload**

M8253 is turned on when starting execution of the upload to the SD memory card, and when the upload has completed, it is turned off.

■ **M8254: SD Memory Card Download/Upload Execution Completed Output**

M8254 is turned off when starting execution of the download from the SD memory card or the upload to the SD memory card, and when the download or upload has completed, it is turned on.

■ **M8255: SD Memory Card Download/Upload Execution Error Output**

M8255 is updated when execution of the download from the SD memory card or the upload to the SD memory card has completed. M8255 is turned on when D8255 (Download/Upload Execution Status) is a value other than 0.

■ **M8260: Write Recipe Execution Flag**

When M8260 is turned on from off, write recipe is executed for all channels of the block number specified by D8260 (Recipe Block Number).

■ **M8261: Read Recipe Execution Flag**

When M8261 is turned on from off, read recipe is executed for all channels of the block number specified by D8260 (Recipe Block Number).

■ **M8262: Executing Write Recipe**

M8262 is turned on when the write recipe processing starts, and it is turned off when the processing has completed. M8262 also is turned off when read recipe processing starts.

■ **M8263: Executing Read Recipe**

M8263 is turned on when the read recipe processing starts, and it is turned off when the processing has completed. M8263 also is turned off when write recipe processing starts.

■ **M8264: Recipe Channel Execution Completed Output**

M8264 is turned off when starting to read or write a recipe channel, and it is turned on when reading or writing a recipe channel has completed.

■ **M8265: Recipe Execution Error Output**

M8265 is turned on when recipe execution has completed and D8264 (Recipe Execution Status) is a value other than 0. For details on recipes, see "Recipe Function" on page 11-8.

■ **M8266: Recipe Block Execution Completed Output**

M8266 is turned off when starting to read or write a recipe block, and it is turned on when reading or writing a recipe block has completed.

■ **M8267: Read Restriction for Recipe Internal Memory (ROM-Range)**

M8267 is turned on when reading or writing to a recipe block in internal memory (ROM-Range) has completed. When M8267 is on, recipes cannot be read to internal memory (ROM-Range 1) and internal memory (ROM-Range 2). When reading recipes, turn off M8267.

### ■ **M8271: Download MQTT Basic Settings from SD Memory Card Execution Flag**

When M8271 is turned on, the files for MQTT Basic Settings are downloaded. For details, see Chapter 3 "Download the MQTT Basic Settings" in the "Network User's Manual".

### ■ **M8272: Download MQTT Basic Settings from SD Memory Card Execution Completed Output**

M8272 is turned off when downloading the files for MQTT Basic Settings is started, and it is turned on once the download is finished.

### ■ **M8273: Download MQTT Basic Settings from SD Memory Card Error Output**

M8273 is turned off when downloading the files for MQTT Basic Settings is started, and it is turned on if an error occurs during the process.

### ■ **M8300 to M8304: J1939 Communication**

Special internal relays used in J1939 communication. For details, see Chapter 8 "J1939 Communication" in the "FC6A Series MICROSmart Communication Manual".

### ■ **M8311 to M8314: Key Input Status**

While the ESC button and direction buttons on the HMI module are simultaneously pressed, the corresponding special internal relays are turned on. When the keys are not pressed, the relays are turned off.

M8311 = ESC key + Up (⬆) key

M8312 = ESC key + Down (⬇) key

M8313 = ESC key + Left (⬅) key

M8314 = ESC key + Right (➡) key

### ■ **M8320: Initialize Expansion Interface Remote Master/Slave**

When M8320 is turned on, expansion interface remote master and slave modules along with the expansion modules that are connected to the expansion interface remote slave modules are initialized. Once the initialization is finished, M8320 is automatically turned off and the I/O refresh at the expansion interface remote slave modules will resume.

### ■ **M8331: Ethernet Port 2 Executing Auto Ping**

M8331 is on when the auto ping on Ethernet port 2 is operating. M8331 is off when auto ping is stopped. For details on auto ping, see Chapter 3 "Auto Ping Function" in the "FC6A Series MICROSmart Communication Manual".

### ■ **M8332: Ethernet Port 2 Auto Ping Stop Flag**

While M8332 is on, the auto ping on Ethernet port 2 is stopped. While M8332 is off, auto ping is executed. At that time, auto ping is executed from the smallest remote host number specified in the remote host list, regardless of the previous end status.

### ■ **M8333: Change CPU Module Ethernet Port 2 Network Settings Trigger**

When M8333 is turned on, the values stored in D8630 to D8650 are set as the IP Settings/DNS Settings of Ethernet port 2 on the CPU module. The IP address is not set just by changing the values of D8630 to D8650. For details on changing the IP Settings/DNS Settings of Ethernet port 2 on the CPU module, see Chapter 3 "Network settings by special data registers" in the "FC6A Series MICROSmart Communication Manual".

### ■ **M8344: Ethernet Port 1 Send E-mail Server Settings Initialization**

When M8344 is turned on, the settings for the send E-mail server on the Ethernet port 1 are initialized.

### ■ **M8401: Download Files for Server Functions from SD Memory Card Execution Flag**

When M8401 is turned on, the files for Server Functions are downloaded. For details on the files for Server Functions, see "SD Memory Card Folder Structure and Files" on page 11-4.

### ■ **M8402: Download Files for Server Functions from SD Memory Card Execution Completed Output**

M8402 is turned off when downloading the files for Server Functions is started, and it is turned on once the download is finished.

### ■ **M8403: Download Files for Server Functions from SD Memory Card Error Output**

M8403 is turned off when downloading the files for Server Functions is started, and it is turned on if an error occurs during the process.

### ■ **M8404: Plus CPU Module Web Server Operation Status**

M8404 turns on when the Plus CPU module web server starts, and it is turned off in the following cases.

- When the Plus CPU module power is turned on
- At the start of downloading the user program
- At the start of downloading system software
- At the start of downloading the files for the Server Functions

**Note:** Even if D8303 (CPU Module Ethernet Port 1 IP Settings / DNS Settings Switching) is changed, M8404 is not turned off.

■ **M8450: BACnet Communication Bit**

While M8450 is on, BACnet communication is performed.

■ **M8460: EtherNet/IP Communication Bit**

This special internal relay enables or disables EtherNet/IP communication.

OFF: Disable EtherNet/IP communication

ON: Enable EtherNet/IP communication

## Special Data Register

### Special Data Register Device Addresses


**Warning**

Do not write to data in the area marked as reserved in the special data registers list. Otherwise the system may not operate correctly.

**Note:** R/W is an abbreviation for read/write.

The notation for the R/W field is as follows.

R/W: The device can be both read from and written to

R: Read-only

W: Write-only

| Device Address | Description                                       |   | Update Timing        | R/W |
|----------------|---|---|----------------------|-----|
| D8000          | Quantity of Inputs                                |   | When I/O initialized | R   |
| D8001          | Quantity of Outputs                               |   | When I/O initialized | R   |
| D8002          | CPU Module Type Information                       |   | Power-up             | R   |
| D8003<br>D8004 | — Reserved —                                      |   | —                    | -   |
| D8005          | General Error Code                                |   | When error occurred  | R/W |
| D8006          | User Program Execution Error Code                 |   | When error occurred  | R   |
| D8007          | — Reserved —                                      |   | —                    | -   |
| D8008          | Calendar/Clock Current Data<br>(Read only)        | Year  | Every 500 ms         | R   |
| D8009          |   | Month   | Every 500 ms         | R   |
| D8010          |   | Day   | Every 500 ms         | R   |
| D8011          |   | Day of the Week                                 | Every 500 ms         | R   |
| D8012          |   | Hour  | Every 500 ms         | R   |
| D8013          |   | Minute  | Every 500 ms         | R   |
| D8014          |   | Second  | Every 500 ms         | R   |
| D8015          | Calendar/Clock New Data<br>(Write only)           | Year  | —                    | W   |
| D8016          |   | Month   | —                    | W   |
| D8017          |   | Day   | —                    | W   |
| D8018          |   | Day of the Week                                 | —                    | W   |
| D8019          |   | Hour  | —                    | W   |
| D8020          |   | Minute  | —                    | W   |
| D8021          |   | Second  | —                    | W   |
| D8022          | Scan Time Data                                    | Constant Scan Time Preset Value (1 to 1,000 ms) | —                    | W   |
| D8023          |   | Scan Time Current Value (ms)                    | Every scan           | R   |
| D8024          |   | Scan Time Maximum Value (ms)                    | At occurrence        | R   |
| D8025          |   | Scan Time Minimum Value (ms)                    | At occurrence        | R   |
| D8026          | Communication Mode Information (Port 1 to Port 3) |   | Every scan           | R   |
| D8027<br>D8028 | — Reserved —                                      |   | —                    | -   |
| D8029          | System Software Version                           |   | Power-up             | R   |
| D8030          | Communication Cartridge Information               |   | Power-up             | R   |
| D8031          | Optional Device Connection Information            |   | Power-up             | R   |
| D8032          | Interrupt Input Jump Destination Label No. (I1)   |   | —                    | R/W |
| D8033          | Interrupt Input Jump Destination Label No. (I3)   |   | —                    | R/W |
| D8034          | Interrupt Input Jump Destination Label No. (I4)   |   | —                    | R/W |
| D8035          | Interrupt Input Jump Destination Label No. (I6)   |   | —                    | R/W |
| D8036          | Timer Interrupt Jump Destination Label No.        |   | —                    | R/W |
| D8037          | Number of Connected I/O Modules                   |   | When I/O initialized | R   |
| D8038<br>D8039 | — Reserved —                                      |   | —                    | —   |
| D8040          | Slave Number (Port 4)                             |   | —                    | R/W |
| D8041          | Slave Number (Port 5)                             |   | —                    | R/W |
| D8042          | Slave Number (Port 6)                             |   | —                    | R/W |
| D8043          | Slave Number (Port 7)                             |   | —                    | R/W |

| Device Address | Description   | Update Timing       | R/W |
|----------------|---|---------------------|-----|
| D8044          | Slave Number (Port 8)   | —                   | R/W |
| D8045          | Slave Number (Port 9)   | —                   | R/W |
| D8046 to D8051 | — Reserved —  | —                   | —   |
| D8052          | J1939 Communication Error Code  | Every scan          | R/W |
| D8053 to D8055 | — Reserved —  | —                   | —   |
| D8056          | Battery Voltage   | —                   | R   |
| D8057          | Analog Volume (AI0)   | Every scan          | R   |
| D8058          | Built-in Analog Input (AI1)   | Every scan          | R   |
| D8059          | Analog Input Status AI0   | Every scan          | R   |
| D8060          | Analog Input Status AI1   | Every scan          | R   |
| D8061 to D8066 | — Reserved —  | —                   | —   |
| D8067          | Backlight ON Time   | —                   | R/W |
| D8068          | — Reserved —  | —                   | —   |
| D8069          | Slave 1 Communication Status/Error (When Data Link Master Mode)<br>Slave Communication Status/Error (When Data Link Slave Mode) | When error occurred | R   |
| D8070          | Slave 2 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8071          | Slave 3 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8072          | Slave 4 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8073          | Slave 5 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8074          | Slave 6 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8075          | Slave 7 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8076          | Slave 8 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8077          | Slave 9 Communication Status/Error (When Data Link Master Mode)   | When error occurred | R   |
| D8078          | Slave 10 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8079          | Slave 11 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8080          | Slave 12 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8081          | Slave 13 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8082          | Slave 14 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8083          | Slave 15 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8084          | Slave 16 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8085          | Slave 17 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8086          | Slave 18 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8087          | Slave 19 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8088          | Slave 20 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8089          | Slave 21 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8090          | Slave 22 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8091          | Slave 23 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8092          | Slave 24 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8093          | Slave 25 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8094          | Slave 26 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8095          | Slave 27 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8096          | Slave 28 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8097          | Slave 29 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8098          | Slave 30 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8099          | Slave 31 Communication Status/Error (When Data Link Master Mode)  | When error occurred | R   |
| D8100          | Slave Number (Port 1)   | —                   | R/W |
| D8101          | — Reserved —  | —                   | —   |
| D8102          | Slave Number (Port 2)   | —                   | R/W |
| D8103          | Slave Number (Port 3)   | —                   | R/W |
| D8104          | Control Signal Status (Port 1 to 5)   | Every scan          | R   |
| D8105          | RS232C DSR Input Control Signal Option (Port 1 to 5)  | Every scan          | R/W |
| D8106          | RS232C DTR Output Control Signal Option (Port 1 to 5)   | Every scan          | R/W |

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| Device Address | Description   |                         |  | Update Timing | R/W |
|----------------|---|-------------------------|--|---------------|-----|
| D8107 to D8119 | — Reserved —  |                         |  | —             | —   |
| D8120          | HMI Module Information                                | Type ID/Status          |  | —             | R   |
| D8121          |   | System Software Version |  | —             | R   |
| D8122          | Cartridge Slot 1 Information                          | Type ID/Status          |  | —             | R   |
| D8123          |   | System Software Version |  | —             | R   |
| D8124          | Cartridge Slot 2 Information                          | Type ID/Status          |  | —             | R   |
| D8125          |   | System Software Version |  | —             | R   |
| D8126          | Cartridge Slot 3 Information                          | Type ID/Status          |  | —             | R   |
| D8127          |   | System Software Version |  | —             | R   |
| D8128 to D8169 | — Reserved —  |                         |  | —             | —   |
| D8170          | Analog I/O Cartridge I/O AI2/AQ2                      |                         |  | Every scan    | R   |
| D8171          | Analog I/O Cartridge I/O AI3/AQ3                      |                         |  | Every scan    | R   |
| D8172          | Analog I/O Cartridge Status AI2/AQ2                   |                         |  | Every scan    | R   |
| D8173          | Analog I/O Cartridge Status AI3/AQ3                   |                         |  | Every scan    | R   |
| D8174          | Analog I/O Cartridge I/O AI4/AQ4                      |                         |  | Every scan    | R   |
| D8175          | Analog I/O Cartridge I/O AI5/AQ5                      |                         |  | Every scan    | R   |
| D8176          | Analog I/O Cartridge Status AI4/AQ4                   |                         |  | Every scan    | R   |
| D8177          | Analog I/O Cartridge Status AI5/AQ5                   |                         |  | Every scan    | R   |
| D8178          | Analog I/O Cartridge I/O AI6/AQ6                      |                         |  | Every scan    | R   |
| D8179          | Analog I/O Cartridge I/O AI7/AQ7                      |                         |  | Every scan    | R   |
| D8180          | Analog I/O Cartridge Status AI6/AQ6                   |                         |  | Every scan    | R   |
| D8181          | Analog I/O Cartridge Status AI7/AQ7                   |                         |  | Every scan    | R   |
| D8182 to D8191 | — Reserved —  |                         |  | —             | —   |
| D8192          | High-speed Counter (Group 2/I1)                       | High Word               | Current Value/Frequency Measurement (I1) Current Value | Every scan    | R   |
| D8193          |   | Low Word                |  | Every scan    | R   |
| D8194          |   | High Word               | Preset Value   | —             | R/W |
| D8195          |   | Low Word                |  | —             | R/W |
| D8196          |   | High Word               | Reset Value  | —             | R/W |
| D8197          |   | Low Word                |  | —             | R/W |
| D8198          | High-speed Counter (Group 6/I7)                       | High Word               | Current Value/Frequency Measurement (I7) Current Value | Every scan    | R   |
| D8199          |   | Low Word                |  | Every scan    | R   |
| D8200          |   | High Word               | Preset Value   | —             | R/W |
| D8201          |   | Low Word                |  | —             | R/W |
| D8202          |   | High Word               | Reset Value  | —             | R/W |
| D8203          |   | Low Word                |  | —             | R/W |
| D8204          | Control Signal Status (Port 6 to 9)                   |                         |  | Every scan    | R   |
| D8205          | RS232C DSR Input Control Signal Option (Port 6 to 9)  |                         |  | Every scan    | R/W |
| D8206          | RS232C DTR Output Control Signal Option (Port 6 to 9) |                         |  | Every scan    | R/W |
| D8207 to D8209 | — Reserved —  |                         |  | —             | —   |
| D8210          | High-speed Counter (Group 1/I0)                       | High Word               | Current Value/Frequency Measurement (I0) Current Value | Every scan    | R   |
| D8211          |   | Low Word                |  | Every scan    | R   |
| D8212          |   | High Word               | Preset Value   | —             | R/W |
| D8213          |   | Low Word                |  | —             | R/W |
| D8214          | Interrupt Input Jump Destination Label No. (I7)       |                         |  | —             | R/W |
| D8215          | Interrupt Input Jump Destination Label No. (I0)       |                         |  | —             | R/W |
| D8216          | High-speed Counter (Group 1/I0)                       | High Word               | Reset Value  | —             | R/W |
| D8217          |   | Low Word                |  | —             | R/W |
| D8218          | High-speed Counter (Group 3/I3)                       | High Word               | Current Value/Frequency Measurement (I3) Current Value | Every scan    | R   |
| D8219          |   | Low Word                |  | Every scan    | R   |
| D8220          |   | High Word               | Preset Value   | —             | R/W |
| D8221          |   | Low Word                |  | —             | R/W |



| Device Address    | Description  |           |  | Update Timing                       | R/W |
|-------------------|--|-----------|--|-------------------------------------|-----|
| D8222             | High-speed Counter<br>(Group 4/I4)   | High Word | Current Value/Frequency Measurement (I4) Current Value | Every scan                          | R   |
| D8223             |  | Low Word  |  | Every scan                          | R   |
| D8224             |  | High Word | Preset Value   | —                                   | R/W |
| D8225             |  | Low Word  |  | —                                   | R/W |
| D8226             | High-speed Counter<br>(Group 5/I6)   | High Word | Current Value/Frequency Measurement (I6) Current Value | Every scan                          | R   |
| D8227             |  | Low Word  |  | Every scan                          | R   |
| D8228             |  | High Word | Preset Value   | —                                   | R/W |
| D8229             |  | Low Word  |  | —                                   | R/W |
| D8230<br>D8231    | — Reserved —   |           |  | —                                   | —   |
| D8232             | High-speed Counter<br>(Group 5/I6)   | High Word | Reset Value  | —                                   | R/W |
| D8233             |  | Low Word  |  | —                                   | R/W |
| D8234             | High-speed Counter<br>(Group 3/I3)   | High Word | Reset Value  | —                                   | R/W |
| D8235             |  | Low Word  |  | —                                   | R/W |
| D8236             | High-speed Counter<br>(Group 4/I4)   | High Word | Reset Value  | —                                   | R/W |
| D8237             |  | Low Word  |  | —                                   | R/W |
| D8238             | — Reserved —   |           |  | —                                   | —   |
| D8239             | Absolute Position Control Status   |           |  | Every scan                          | R   |
| D8240             | Absolute Position Counter 1  | High Word | Absolute Position                                      | Every scan                          | R   |
| D8241             |  | Low Word  |  | Every scan                          | R   |
| D8242             | Absolute Position Counter 2  | High Word | Absolute Position                                      | Every scan                          | R   |
| D8243             |  | Low Word  |  | Every scan                          | R   |
| D8244             | Absolute Position Counter 3  | High Word | Absolute Position                                      | Every scan                          | R   |
| D8245             |  | Low Word  |  | Every scan                          | R   |
| D8246             | Absolute Position Counter 4  | High Word | Absolute Position                                      | Every scan                          | R   |
| D8247             |  | Low Word  |  | Every scan                          | R   |
| D8248<br>D8249    | — Reserved —   |           |  | —                                   | —   |
| D8250             | Read SD Memory Card Capacity   |           |  | Every scan                          | R   |
| D8251             | Read SD Memory Card Free Capacity  |           |  | Every scan                          | R   |
| D8252<br>D8253    | — Reserved —   |           |  | —                                   | —   |
| D8254             | SD Memory Card Download/Upload Execution Information                         |           |  | When processing has completed       | R   |
| D8255             | SD Memory Card Download/Upload Execution Status                              |           |  | When processing has completed       | R   |
| D8256             | Download MQTT Basic Settings from SD Memory Card Execution Information       |           |  | When processing has completed       | R   |
| D8257             | Download MQTT Basic Settings from SD Memory Card Execution Error Information |           |  | When processing has completed       | R   |
| D8258 to<br>D8259 | — Reserved —   |           |  | —                                   | —   |
| D8260             | Recipe Block Number  |           |  | —                                   | R/W |
| D8261             | Recipe Execution Block Number  |           |  | When recipe execution has completed | R   |
| D8262             | Recipe Execution Channel No.   |           |  | When recipe execution has completed | R   |
| D8263             | Recipe Execution Operation   |           |  | When recipe execution has completed | R   |
| D8264             | Recipe Execution Status  |           |  | When recipe execution has completed | R   |
| D8265             | Recipe Execution Error Information   |           |  | When recipe execution has completed | R   |
| D8266             | Recipe Internal Memory (ROM-Range 1) Read Count                              |           |  | When recipe execution has completed | R   |

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| Device Address    | Description  |                       | Update Timing                       | R/W |
|-------------------|--|-----------------------|-------------------------------------|-----|
| D8267             | Recipe Internal Memory (ROM-Range 2) Read Count                  |                       | When recipe execution has completed | R   |
| D8268             | Remote Host Number of Connection 1 (1 to 255)                    |                       | —                                   | R/W |
| D8269             | Remote Host Number of Connection 2 (1 to 255)                    |                       | —                                   | R/W |
| D8270             | Remote Host Number of Connection 3 (1 to 255)                    |                       | —                                   | R/W |
| D8271             | Remote Host Number of Connection 4 (1 to 255)                    |                       | —                                   | R/W |
| D8272             | Remote Host Number of Connection 5 (1 to 255)                    |                       | —                                   | R/W |
| D8273             | Remote Host Number of Connection 6 (1 to 255)                    |                       | —                                   | R/W |
| D8274             | Remote Host Number of Connection 7 (1 to 255)                    |                       | —                                   | R/W |
| D8275             | Remote Host Number of Connection 8 (1 to 255)                    |                       | —                                   | R/W |
| D8276<br>D8277    | — Reserved —   |                       | —                                   | —   |
| D8278             | Communication Mode Information                                   | Connection 1 to 4     | —                                   | R   |
| D8279             |  | Connection 5 to 8     | —                                   | R   |
| D8280 to<br>D8283 | — Reserved —   |                       | —                                   | —   |
| D8284             | Communication Mode Information<br>(HMI Connection)               | HMI Connection 1 to 4 | —                                   | R   |
| D8285             |  | HMI Connection 5 to 8 | —                                   | R   |
| D8286 to<br>D8302 | — Reserved —   |                       | —                                   | —   |
| D8303             | CPU Module Ethernet Port 1 IP Settings/DNS Settings Switching    |                       | —                                   | R/W |
| D8304             | CPU Module Ethernet Port 1 IP Address (Write-only)               |                       | —                                   | W   |
| D8305             |  |                       | —                                   | W   |
| D8306             |  |                       | —                                   | W   |
| D8307             |  |                       | —                                   | W   |
| D8308             |  |                       | —                                   | W   |
| D8309             | CPU Module Ethernet Port 1 Subnet Mask (Write-only)              |                       | —                                   | W   |
| D8310             |  |                       | —                                   | W   |
| D8311             |  |                       | —                                   | W   |
| D8312             |  |                       | —                                   | W   |
| D8313             |  |                       | —                                   | W   |
| D8314             | CPU Module Ethernet Port 1 Default Gateway (Write-only)          |                       | —                                   | W   |
| D8315             |  |                       | —                                   | W   |
| D8316             |  |                       | —                                   | W   |
| D8317             |  |                       | —                                   | W   |
| D8318             |  |                       | —                                   | W   |
| D8319             | CPU Module Ethernet Port 1 Preferred DNS Server (Write-only)     |                       | —                                   | W   |
| D8320             |  |                       | —                                   | W   |
| D8321             |  |                       | —                                   | W   |
| D8322             |  |                       | —                                   | W   |
| D8323             |  |                       | —                                   | W   |
| D8324             | CPU Module Ethernet Port 1 MAC Address (Current Value Read-only) |                       | Every 1 s                           | R   |
| D8325             |  |                       | Every 1 s                           | R   |
| D8326             |  |                       | Every 1 s                           | R   |
| D8327             |  |                       | Every 1 s                           | R   |
| D8328             |  |                       | Every 1 s                           | R   |
| D8329             |  |                       | Every 1 s                           | R   |
| D8330             | CPU Module Ethernet Port 1 IP Address (Current Value Read-only)  |                       | Every 1 s                           | R   |
| D8331             |  |                       | Every 1 s                           | R   |
| D8332             |  |                       | Every 1 s                           | R   |
| D8333             |  |                       | Every 1 s                           | R   |
| D8334             | CPU Module Ethernet Port 1 Subnet Mask (Current Value Read-only) |                       | Every 1 s                           | R   |
| D8335             |  |                       | Every 1 s                           | R   |
| D8336             |  |                       | Every 1 s                           | R   |
| D8337             |  |                       | Every 1 s                           | R   |

| Device Address | Description   | Update Timing | R/W |
|----------------|---|---------------|-----|
| D8338          | CPU Module Ethernet Port 1 Default Gateway (Current Value Read-only)      | Every 1 s     | R   |
| D8339          |   | Every 1 s     | R   |
| D8340          |   | Every 1 s     | R   |
| D8341          |   | Every 1 s     | R   |
| D8342          | CPU Module Ethernet Port 1 Preferred DNS Server (Current Value Read-only) | Every 1 s     | R   |
| D8343          |   | Every 1 s     | R   |
| D8344          |   | Every 1 s     | R   |
| D8345          |   | Every 1 s     | R   |
| D8346          | CPU Module Ethernet Port 1 Alternate DNS Server (Current Value Read-only) | Every 1 s     | R   |
| D8347          |   | Every 1 s     | R   |
| D8348          |   | Every 1 s     | R   |
| D8349          |   | Every 1 s     | R   |
| D8350          | Connection 1 Connected IP Address   | Every 1 s     | R   |
| D8351          |   | Every 1 s     | R   |
| D8352          |   | Every 1 s     | R   |
| D8353          |   | Every 1 s     | R   |
| D8354          | Connection 2 Connected IP Address   | Every 1 s     | R   |
| D8355          |   | Every 1 s     | R   |
| D8356          |   | Every 1 s     | R   |
| D8357          |   | Every 1 s     | R   |
| D8358          | Connection 3 Connected IP Address   | Every 1 s     | R   |
| D8359          |   | Every 1 s     | R   |
| D8360          |   | Every 1 s     | R   |
| D8361          |   | Every 1 s     | R   |
| D8362          | Connection 4 Connected IP Address   | Every 1 s     | R   |
| D8363          |   | Every 1 s     | R   |
| D8364          |   | Every 1 s     | R   |
| D8365          |   | Every 1 s     | R   |
| D8366          | Connection 5 Connected IP Address   | Every 1 s     | R   |
| D8367          |   | Every 1 s     | R   |
| D8368          |   | Every 1 s     | R   |
| D8369          |   | Every 1 s     | R   |
| D8370          | Connection 6 Connected IP Address   | Every 1 s     | R   |
| D8371          |   | Every 1 s     | R   |
| D8372          |   | Every 1 s     | R   |
| D8373          |   | Every 1 s     | R   |
| D8374          | Connection 7 Connected IP Address   | Every 1 s     | R   |
| D8375          |   | Every 1 s     | R   |
| D8376          |   | Every 1 s     | R   |
| D8377          |   | Every 1 s     | R   |
| D8378          | Connection 8 Connected IP Address   | Every 1 s     | R   |
| D8379          |   | Every 1 s     | R   |
| D8380          |   | Every 1 s     | R   |
| D8381          |   | Every 1 s     | R   |
| D8382          | HMI Module MAC Address (Current Value Read-only)                          | Every 1 s     | R   |
| D8383          |   | Every 1 s     | R   |
| D8384          |   | Every 1 s     | R   |
| D8385          |   | Every 1 s     | R   |
| D8386          |   | Every 1 s     | R   |
| D8387          |   | Every 1 s     | R   |
| D8388          | HMI Module IP Address (Current Value Read-only)                           | Every 1 s     | R   |
| D8389          |   | Every 1 s     | R   |
| D8390          |   | Every 1 s     | R   |
| D8391          |   | Every 1 s     | R   |

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| Device Address | Description  |                      | Update Timing | R/W |
|----------------|--|----------------------|---------------|-----|
| D8392          | HMI Module Subnet Mask (Current Value Read-only)                 |                      | Every 1 s     | R   |
| D8393          |  |                      | Every 1 s     | R   |
| D8394          |  |                      | Every 1 s     | R   |
| D8395          |  |                      | Every 1 s     | R   |
| D8396          | HMI Module Default Gateway (Current Value Read-only)             |                      | Every 1 s     | R   |
| D8397          |  |                      | Every 1 s     | R   |
| D8398          |  |                      | Every 1 s     | R   |
| D8399          |  |                      | Every 1 s     | R   |
| D8400          | HMI Module Preferred DNS Server (Current Value Read-only)        |                      | Every 1 s     | R   |
| D8401          |  |                      | Every 1 s     | R   |
| D8402          |  |                      | Every 1 s     | R   |
| D8403          |  |                      | Every 1 s     | R   |
| D8404          | HMI Module Alternate DNS Server (Current Value Read-only)        |                      | Every 1 s     | R   |
| D8405          |  |                      | Every 1 s     | R   |
| D8406          |  |                      | Every 1 s     | R   |
| D8407          |  |                      | Every 1 s     | R   |
| D8408 to D8412 | — Reserved —   |                      | —             | —   |
| D8413          | Time Zone Offset   |                      | —             | R/W |
| D8414          | SNTP Operation Status  |                      | —             | R   |
| D8415          | SNTP Access Elapsed Time   |                      | —             | R   |
| D8416 to D8428 | — Reserved —   |                      | —             | —   |
| D8429          | HMI Module Connection Information Reference                      | Connection No.       | —             | R/W |
| D8430          |  | Connected IP Address | Every 1 s     | R   |
| D8431          |  |                      | Every 1 s     | R   |
| D8432          |  |                      | Every 1 s     | R   |
| D8433          |  |                      | Every 1 s     | R   |
| D8434          |  | Connected Port No.   | Every 1 s     | R   |
| D8435<br>D8436 | — Reserved —   |                      | —             | —   |
| D8437          | HMI Module IP Address (Write-only)                               |                      | —             | W   |
| D8438          |  |                      | —             | W   |
| D8439          |  |                      | —             | W   |
| D8440          |  |                      | —             | W   |
| D8441          | HMI Module Subnet Mask (Write-only)                              |                      | —             | W   |
| D8442          |  |                      | —             | W   |
| D8443          |  |                      | —             | W   |
| D8444          |  |                      | —             | W   |
| D8445          | HMI Module Default Gateway (Write-only)                          |                      | —             | W   |
| D8446          |  |                      | —             | W   |
| D8447          |  |                      | —             | W   |
| D8448          |  |                      | —             | W   |
| D8449          | HMI Module Preferred DNS Server (Write-only)                     |                      | —             | W   |
| D8450          |  |                      | —             | W   |
| D8451          |  |                      | —             | W   |
| D8452          |  |                      | —             | W   |
| D8453          | HMI Module Alternate DNS Server (Write-only)                     |                      | —             | W   |
| D8454          |  |                      | —             | W   |
| D8455          |  |                      | —             | W   |
| D8456          |  |                      | —             | W   |
| D8457          | EMAIL Instruction Detailed Error Information (HMI-Ethernet Port) |                      | —             | R   |
| D8458 to D8469 | — Reserved —   |                      | —             | —   |

| Device Address | Description                             |  | Update Timing | R/W |
|----------------|---|--|---------------|-----|
| D8470          | Expansion Module Slot 1<br>Information  | Type ID/Status                               | —             | R   |
| D8471          |   | System Software Version/Position Information | —             | R   |
| D8472          | Expansion Module Slot 2<br>Information  | Type ID/Status                               | —             | R   |
| D8473          |   | System Software Version/Position Information | —             | R   |
| D8474          | Expansion Module Slot 3<br>Information  | Type ID/Status                               | —             | R   |
| D8475          |   | System Software Version/Position Information | —             | R   |
| D8476          | Expansion Module Slot 4<br>Information  | Type ID/Status                               | —             | R   |
| D8477          |   | System Software Version/Position Information | —             | R   |
| D8478          | Expansion Module Slot 5<br>Information  | Type ID/Status                               | —             | R   |
| D8479          |   | System Software Version/Position Information | —             | R   |
| D8480          | Expansion Module Slot 6<br>Information  | Type ID/Status                               | —             | R   |
| D8481          |   | System Software Version/Position Information | —             | R   |
| D8482          | Expansion Module Slot 7<br>Information  | Type ID/Status                               | —             | R   |
| D8483          |   | System Software Version/Position Information | —             | R   |
| D8484          | Expansion Module Slot 8<br>Information  | Type ID/Status                               | —             | R   |
| D8485          |   | System Software Version/Position Information | —             | R   |
| D8486          | Expansion Module Slot 9<br>Information  | Type ID/Status                               | —             | R   |
| D8487          |   | System Software Version/Position Information | —             | R   |
| D8488          | Expansion Module Slot 10<br>Information | Type ID/Status                               | —             | R   |
| D8489          |   | System Software Version/Position Information | —             | R   |
| D8490          | Expansion Module Slot 11<br>Information | Type ID/Status                               | —             | R   |
| D8491          |   | System Software Version/Position Information | —             | R   |
| D8492          | Expansion Module Slot 12<br>Information | Type ID/Status                               | —             | R   |
| D8493          |   | System Software Version/Position Information | —             | R   |
| D8494          | Expansion Module Slot 13<br>Information | Type ID/Status                               | —             | R   |
| D8495          |   | System Software Version/Position Information | —             | R   |
| D8496          | Expansion Module Slot 14<br>Information | Type ID/Status                               | —             | R   |
| D8497          |   | System Software Version/Position Information | —             | R   |
| D8498          | Expansion Module Slot 15<br>Information | Type ID/Status                               | —             | R   |
| D8499          |   | System Software Version/Position Information | —             | R   |
| D8500          | Expansion Module Slot 16<br>Information | Type ID/Status                               | —             | R   |
| D8501          |   | System Software Version/Position Information | —             | R   |
| D8502          | Expansion Module Slot 17<br>Information | Type ID/Status                               | —             | R   |
| D8503          |   | System Software Version/Position Information | —             | R   |
| D8504          | Expansion Module Slot 18<br>Information | Type ID/Status                               | —             | R   |
| D8505          |   | System Software Version/Position Information | —             | R   |
| D8506          | Expansion Module Slot 19<br>Information | Type ID/Status                               | —             | R   |
| D8507          |   | System Software Version/Position Information | —             | R   |
| D8508          | Expansion Module Slot 20<br>Information | Type ID/Status                               | —             | R   |
| D8509          |   | System Software Version/Position Information | —             | R   |
| D8510          | Expansion Module Slot 21<br>Information | Type ID/Status                               | —             | R   |
| D8511          |   | System Software Version/Position Information | —             | R   |
| D8512          | Expansion Module Slot 22<br>Information | Type ID/Status                               | —             | R   |
| D8513          |   | System Software Version/Position Information | —             | R   |
| D8514          | Expansion Module Slot 23<br>Information | Type ID/Status                               | —             | R   |
| D8515          |   | System Software Version/Position Information | —             | R   |
| D8516          | Expansion Module Slot 24<br>Information | Type ID/Status                               | —             | R   |
| D8517          |   | System Software Version/Position Information | —             | R   |
| D8518          | Expansion Module Slot 25<br>Information | Type ID/Status                               | —             | R   |
| D8519          |   | System Software Version/Position Information | —             | R   |
| D8520          | Expansion Module Slot 26<br>Information | Type ID/Status                               | —             | R   |
| D8521          |   | System Software Version/Position Information | —             | R   |
| D8522          | Expansion Module Slot 27<br>Information | Type ID/Status                               | —             | R   |
| D8523          |   | System Software Version/Position Information | —             | R   |

## 6: DEVICES

| Device Address | Description              |  | Update Timing | R/W |
|----------------|--------------------------|--|---------------|-----|
| D8524          | Expansion Module Slot 28 | Type ID/Status                               | —             | R   |
| D8525          |                          | System Software Version/Position Information | —             | R   |
| D8526          | Expansion Module Slot 29 | Type ID/Status                               | —             | R   |
| D8527          |                          | System Software Version/Position Information | —             | R   |
| D8528          | Expansion Module Slot 30 | Type ID/Status                               | —             | R   |
| D8529          |                          | System Software Version/Position Information | —             | R   |
| D8530          | Expansion Module Slot 31 | Type ID/Status                               | —             | R   |
| D8531          |                          | System Software Version/Position Information | —             | R   |
| D8532          | Expansion Module Slot 32 | Type ID/Status                               | —             | R   |
| D8533          |                          | System Software Version/Position Information | —             | R   |
| D8534          | Expansion Module Slot 33 | Type ID/Status                               | —             | R   |
| D8535          |                          | System Software Version/Position Information | —             | R   |
| D8536          | Expansion Module Slot 34 | Type ID/Status                               | —             | R   |
| D8537          |                          | System Software Version/Position Information | —             | R   |
| D8538          | Expansion Module Slot 35 | Type ID/Status                               | —             | R   |
| D8539          |                          | System Software Version/Position Information | —             | R   |
| D8530          | Expansion Module Slot 36 | Type ID/Status                               | —             | R   |
| D8541          |                          | System Software Version/Position Information | —             | R   |
| D8542          | Expansion Module Slot 37 | Type ID/Status                               | —             | R   |
| D8543          |                          | System Software Version/Position Information | —             | R   |
| D8544          | Expansion Module Slot 38 | Type ID/Status                               | —             | R   |
| D8545          |                          | System Software Version/Position Information | —             | R   |
| D8546          | Expansion Module Slot 39 | Type ID/Status                               | —             | R   |
| D8547          |                          | System Software Version/Position Information | —             | R   |
| D8548          | Expansion Module Slot 40 | Type ID/Status                               | —             | R   |
| D8549          |                          | System Software Version/Position Information | —             | R   |
| D8550          | Expansion Module Slot 41 | Type ID/Status                               | —             | R   |
| D8551          |                          | System Software Version/Position Information | —             | R   |
| D8552          | Expansion Module Slot 42 | Type ID/Status                               | —             | R   |
| D8553          |                          | System Software Version/Position Information | —             | R   |
| D8554          | Expansion Module Slot 43 | Type ID/Status                               | —             | R   |
| D8555          |                          | System Software Version/Position Information | —             | R   |
| D8556          | Expansion Module Slot 44 | Type ID/Status                               | —             | R   |
| D8557          |                          | System Software Version/Position Information | —             | R   |
| D8558          | Expansion Module Slot 45 | Type ID/Status                               | —             | R   |
| D8559          |                          | System Software Version/Position Information | —             | R   |
| D8560          | Expansion Module Slot 46 | Type ID/Status                               | —             | R   |
| D8561          |                          | System Software Version/Position Information | —             | R   |
| D8562          | Expansion Module Slot 47 | Type ID/Status                               | —             | R   |
| D8563          |                          | System Software Version/Position Information | —             | R   |
| D8564          | Expansion Module Slot 48 | Type ID/Status                               | —             | R   |
| D8565          |                          | System Software Version/Position Information | —             | R   |
| D8566          | Expansion Module Slot 49 | Type ID/Status                               | —             | R   |
| D8567          |                          | System Software Version/Position Information | —             | R   |
| D8568          | Expansion Module Slot 50 | Type ID/Status                               | —             | R   |
| D8569          |                          | System Software Version/Position Information | —             | R   |
| D8570          | Expansion Module Slot 51 | Type ID/Status                               | —             | R   |
| D8571          |                          | System Software Version/Position Information | —             | R   |
| D8572          | Expansion Module Slot 52 | Type ID/Status                               | —             | R   |
| D8573          |                          | System Software Version/Position Information | —             | R   |
| D8574          | Expansion Module Slot 53 | Type ID/Status                               | —             | R   |
| D8575          |                          | System Software Version/Position Information | —             | R   |
| D8576          | Expansion Module Slot 54 | Type ID/Status                               | —             | R   |
| D8577          |                          | System Software Version/Position Information | —             | R   |

| Device Address | Description   |  | Update Timing | R/W |
|----------------|---|--|---------------|-----|
| D8578          | Expansion Module Slot 55 Information  | Type ID/Status   | —             | R   |
| D8579          |   | System Software Version/Position Information   | —             | R   |
| D8580          | Expansion Module Slot 56 Information  | Type ID/Status   | —             | R   |
| D8581          |   | System Software Version/Position Information   | —             | R   |
| D8582          | Expansion Module Slot 57 Information  | Type ID/Status   | —             | R   |
| D8583          |   | System Software Version/Position Information   | —             | R   |
| D8584          | Expansion Module Slot 58 Information  | Type ID/Status   | —             | R   |
| D8585          |   | System Software Version/Position Information   | —             | R   |
| D8586          | Expansion Module Slot 59 Information  | Type ID/Status   | —             | R   |
| D8587          |   | System Software Version/Position Information   | —             | R   |
| D8588          | Expansion Module Slot 60 Information  | Type ID/Status   | —             | R   |
| D8589          |   | System Software Version/Position Information   | —             | R   |
| D8590          | Expansion Module Slot 61 Information  | Type ID/Status   | —             | R   |
| D8591          |   | System Software Version/Position Information   | —             | R   |
| D8592          | Expansion Module Slot 62 Information  | Type ID/Status   | —             | R   |
| D8593          |   | System Software Version/Position Information   | —             | R   |
| D8594          | Expansion Module Slot 63 Information  | Type ID/Status   | —             | R   |
| D8595          |   | System Software Version/Position Information   | —             | R   |
| D8596          | Expansion Interface Remote Master Module Slot Information                     | Type ID/Status   | —             | R   |
| D8597          |   | System Software Version/<br>Number of Connected Expansion Interface Remote Slave Modules | —             | R   |
| D8598          | Expansion Interface Remote Slave Module (Node 1) Slot Information             | Type ID/Status   | —             | R   |
| D8599          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8600          | Expansion Interface Remote Slave Module (Node 2) Slot Information             | Type ID/Status   | —             | R   |
| D8601          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8602          | Expansion Interface Remote Slave Module (Node 3) Slot Information             | Type ID/Status   | —             | R   |
| D8603          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8604          | Expansion Interface Remote Slave Module (Node 4) Slot Information             | Type ID/Status   | —             | R   |
| D8605          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8606          | Expansion Interface Remote Slave Module (Node 5) Slot Information             | Type ID/Status   | —             | R   |
| D8607          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8608          | Expansion Interface Remote Slave Module (Node 6) Slot Information             | Type ID/Status   | —             | R   |
| D8609          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8610          | Expansion Interface Remote Slave Module (Node 7) Slot Information             | Type ID/Status   | —             | R   |
| D8611          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8612          | Expansion Interface Remote Slave Module (Node 8) Slot Information             | Type ID/Status   | —             | R   |
| D8613          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8614          | Expansion Interface Remote Slave Module (Node 9) Slot Information             | Type ID/Status   | —             | R   |
| D8615          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8616          | Expansion Interface Remote Slave Module (Node 10) Slot Information            | Type ID/Status   | —             | R   |
| D8617          |   | System Software Version/<br>Expansion Module Connection Information                      | —             | R   |
| D8618          | Refresh Time of Expansion Interface Remote Master/Slave Modules Current Value |  | Every scan    | R   |
| D8619          | Refresh Time of Expansion Interface Remote Master/Slave Modules Maximum Value |  | Every scan    | R   |
| D8620 to D8629 | — <b>Reserved</b> —   |  | —             | —   |
| D8630          | CPU Module Ethernet Port 2 IP Settings/DNS Settings Switching                 |  | —             | R/W |

## 6: DEVICES

| Device Address | Description   | Update Timing | R/W |
|----------------|---|---------------|-----|
| D8631          | CPU Module Ethernet Port 2 IP Address (Write-only)                        | —             | W   |
| D8632          |   | —             | W   |
| D8633          |   | —             | W   |
| D8634          |   | —             | W   |
| D8635          | CPU Module Ethernet Port 2 Subnet Mask (Write-only)                       | —             | W   |
| D8636          |   | —             | W   |
| D8637          |   | —             | W   |
| D8638          |   | —             | W   |
| D8639          | CPU Module Ethernet Port 2 Default Gateway (Write-only)                   | —             | W   |
| D8640          |   | —             | W   |
| D8641          |   | —             | W   |
| D8642          |   | —             | W   |
| D8643          | CPU Module Ethernet Port 2 Preferred DNS Server (Write-only)              | —             | W   |
| D8644          |   | —             | W   |
| D8645          |   | —             | W   |
| D8646          |   | —             | W   |
| D8647          | CPU Module Ethernet Port 2 Alternate DNS Server (Write-only)              | —             | W   |
| D8648          |   | —             | W   |
| D8649          |   | —             | W   |
| D8650          |   | —             | W   |
| D8651          | CPU Module Ethernet Port 2 MAC Address (Current Value Read-only)          | Every 1 s     | R   |
| D8652          |   | Every 1 s     | R   |
| D8653          |   | Every 1 s     | R   |
| D8654          |   | Every 1 s     | R   |
| D8655          |   | Every 1 s     | R   |
| D8656          |   | Every 1 s     | R   |
| D8657          | CPU Module Ethernet Port 2 IP Address (Current Value Read-only)           | Every 1 s     | R   |
| D8658          |   | Every 1 s     | R   |
| D8659          |   | Every 1 s     | R   |
| D8660          |   | Every 1 s     | R   |
| D8661          | CPU Module Ethernet Port 2 Subnet Mask (Current Value Read-only)          | Every 1 s     | R   |
| D8662          |   | Every 1 s     | R   |
| D8663          |   | Every 1 s     | R   |
| D8664          |   | Every 1 s     | R   |
| D8665          | CPU Module Ethernet Port 2 Default Gateway (Current Value Read-only)      | Every 1 s     | R   |
| D8666          |   | Every 1 s     | R   |
| D8667          |   | Every 1 s     | R   |
| D8668          |   | Every 1 s     | R   |
| D8669          | CPU Module Ethernet Port 2 Preferred DNS Server (Current Value Read-only) | Every 1 s     | R   |
| D8670          |   | Every 1 s     | R   |
| D8671          |   | Every 1 s     | R   |
| D8672          |   | Every 1 s     | R   |
| D8673          | CPU Module Ethernet Port 2 Alternate DNS Server (Current Value Read-only) | Every 1 s     | R   |
| D8674          |   | Every 1 s     | R   |
| D8675          |   | Every 1 s     | R   |
| D8676          |   | Every 1 s     | R   |
| D8677          | Connection 9 Connected IP Address   | Every 1 s     | R   |
| D8678          |   | Every 1 s     | R   |
| D8679          |   | Every 1 s     | R   |
| D8680          |   | Every 1 s     | R   |
| D8681          | Connection 10 Connected IP Address  | Every 1 s     | R   |
| D8682          |   | Every 1 s     | R   |
| D8683          |   | Every 1 s     | R   |
| D8684          |   | Every 1 s     | R   |



| Device Address | Description   | Update Timing | R/W |
|----------------|---|---------------|-----|
| D8685          | Connection 11 Connected IP Address                      | Every 1 s     | R   |
| D8686          |   | Every 1 s     | R   |
| D8687          |   | Every 1 s     | R   |
| D8688          |   | Every 1 s     | R   |
| D8689          | Connection 12 Connected IP Address                      | Every 1 s     | R   |
| D8690          |   | Every 1 s     | R   |
| D8691          |   | Every 1 s     | R   |
| D8692          |   | Every 1 s     | R   |
| D8693          | Connection 13 Connected IP Address                      | Every 1 s     | R   |
| D8694          |   | Every 1 s     | R   |
| D8695          |   | Every 1 s     | R   |
| D8696          |   | Every 1 s     | R   |
| D8697          | Connection 14 Connected IP Address                      | Every 1 s     | R   |
| D8698          |   | Every 1 s     | R   |
| D8699          |   | Every 1 s     | R   |
| D8700          |   | Every 1 s     | R   |
| D8701          | Connection 15 Connected IP Address                      | Every 1 s     | R   |
| D8702          |   | Every 1 s     | R   |
| D8703          |   | Every 1 s     | R   |
| D8704          |   | Every 1 s     | R   |
| D8705          | Connection 16 Connected IP Address                      | Every 1 s     | R   |
| D8706          |   | Every 1 s     | R   |
| D8707          |   | Every 1 s     | R   |
| D8708          |   | Every 1 s     | R   |
| D8709 to D8716 | — Reserved —  | —             | —   |
| D8717          | Control Signal Status (Port 10 to 13)                   | Every scan    | R   |
| D8718          | RS232C DSR Input Control Signal Option (Port 10 to 13)  | Every scan    | R/W |
| D8719          | RS232C DTR Output Control Signal Option (Port 10 to 13) | Every scan    | R/W |
| D8720          | Control Signal Status (Port 14 to 17)                   | Every scan    | R   |
| D8721          | RS232C DSR Input Control Signal Option (Port 14 to 17)  | Every scan    | R/W |
| D8722          | RS232C DTR Output Control Signal Option (Port 14 to 17) | Every scan    | R/W |
| D8723          | Control Signal Status (Port 18 to 21)                   | Every scan    | R   |
| D8724          | RS232C DSR Input Control Signal Option (Port 18 to 21)  | Every scan    | R/W |
| D8725          | RS232C DTR Output Control Signal Option (Port 18 to 21) | Every scan    | R/W |
| D8726          | Control Signal Status (Port 22 to 25)                   | Every scan    | R   |
| D8727          | RS232C DSR Input Control Signal Option (Port 22 to 25)  | Every scan    | R/W |
| D8728          | RS232C DTR Output Control Signal Option (Port 22 to 25) | Every scan    | R/W |
| D8729          | Control Signal Status (Port 26 to 29)                   | Every scan    | R   |
| D8730          | RS232C DSR Input Control Signal Option (Port 26 to 29)  | Every scan    | R/W |
| D8731          | RS232C DTR Output Control Signal Option (Port 26 to 29) | Every scan    | R/W |
| D8732          | Control Signal Status (Port 30 to 33)                   | Every scan    | R   |
| D8733          | RS232C DSR Input Control Signal Option (Port 30 to 33)  | Every scan    | R/W |
| D8734          | RS232C DTR Output Control Signal Option (Port 30 to 33) | Every scan    | R/W |
| D8735          | Slave Number (Port 10)                                  | —             | R/W |
| D8736          | Slave Number (Port 11)                                  | —             | R/W |
| D8737          | Slave Number (Port 12)                                  | —             | R/W |
| D8738          | Slave Number (Port 13)                                  | —             | R/W |
| D8739          | Slave Number (Port 14)                                  | —             | R/W |
| D8740          | Slave Number (Port 15)                                  | —             | R/W |
| D8741          | Slave Number (Port 16)                                  | —             | R/W |
| D8742          | Slave Number (Port 17)                                  | —             | R/W |
| D8743          | Slave Number (Port 18)                                  | —             | R/W |
| D8744          | Slave Number (Port 19)                                  | —             | R/W |
| D8745          | Slave Number (Port 20)                                  | —             | R/W |

| Device Address | Description   | Update Timing                 | R/W |
|----------------|---|-------------------------------|-----|
| D8746          | Slave Number (Port 21)  | —                             | R/W |
| D8747          | Slave Number (Port 22)  | —                             | R/W |
| D8748          | Slave Number (Port 23)  | —                             | R/W |
| D8749          | Slave Number (Port 24)  | —                             | R/W |
| D8750          | Slave Number (Port 25)  | —                             | R/W |
| D8751          | Slave Number (Port 26)  | —                             | R/W |
| D8752          | Slave Number (Port 27)  | —                             | R/W |
| D8753          | Slave Number (Port 28)  | —                             | R/W |
| D8754          | Slave Number (Port 29)  | —                             | R/W |
| D8755          | Slave Number (Port 30)  | —                             | R/W |
| D8756          | Slave Number (Port 31)  | —                             | R/W |
| D8757          | Slave Number (Port 32)  | —                             | R/W |
| D8758          | Slave Number (Port 33)  | —                             | R/W |
| D8759          | EMAIL Instruction Detailed Error Information (Ethernet Port 1)                      | —                             | R   |
| D8760          | Communication Mode Information  | Connection 9 to 12            | R   |
| D8761          |   | Connection 13 to 16           | R   |
| D8762 to D8773 | — Reserved —  | —                             | —   |
| D8774          | Remote Host Number of Connection 9 (1 to 255)                                       | —                             | R/W |
| D8775          | Remote Host Number of Connection 10 (1 to 255)                                      | —                             | R/W |
| D8776          | Remote Host Number of Connection 11 (1 to 255)                                      | —                             | R/W |
| D8777          | Remote Host Number of Connection 12 (1 to 255)                                      | —                             | R/W |
| D8778          | Remote Host Number of Connection 13 (1 to 255)                                      | —                             | R/W |
| D8779          | Remote Host Number of Connection 14 (1 to 255)                                      | —                             | R/W |
| D8780          | Remote Host Number of Connection 15 (1 to 255)                                      | —                             | R/W |
| D8781          | Remote Host Number of Connection 16 (1 to 255)                                      | —                             | R/W |
| D8782          | BACnet Operation Status   | —                             | R   |
| D8783          | BACnet Error Information  | —                             | R   |
| D8784 to D8789 | — Reserved —  | —                             | —   |
| D8790          | EtherNet/IP Operation Status  | —                             | R   |
| D8791          | EtherNet/IP Error Information   | —                             | R   |
| D8792 to D8819 | — Reserved —  | —                             | —   |
| D8820          | Download Files for Server Functions from SD Memory Card Execution Information       | When processing has completed | R   |
| D8821          | Download Files for Server Functions from SD Memory Card Execution Error Information | When processing has completed | R   |
| D8822          | Web Server Current Number of Connections (Plus CPU Module)                          | Every 1 s                     | R   |
| D8823 to D8899 | — Reserved —  | —                             | —   |

### Supplementary Descriptions of the Special Data Registers

#### ■ D8000: Quantity of Inputs

The number of FC6A inputs is written to this register.

The total number of inputs for the CPU module and the expansion modules is written to this register.

#### ■ D8001: Quantity of Outputs

The number of FC6A outputs is written to this register.

The total number of outputs for the CPU module and the expansion modules is written to this register.

#### ■ D8002: CPU Module Type Information

CPU module type information is written this register.

0 (00h): 16-I/O type

1 (01h): 24-I/O type

2 (02h): 40-I/O type (All-in-One CPU module)

18 (12h): 40-I/O type (CAN J1939 All-in-One CPU module)

32 (20h): Plus 16-I/O type

33 (21h): Plus 32-I/O type

#### ■ D8005: General Error Code

FC6A general error information is written to this register. When a general error occurs, the bit corresponding to the error occurred turns on. The general error and user program execution error can be cleared by writing "1" to the most significant bit of D8005. For details on general error codes, see "General Error Codes" on page 13-3.

#### ■ D8006: User Program Execution Error Code

FC6A user program execution error information is written to this register. When a user program execution error occurs, the error code corresponding to the error that occurred is written to this register. For details on user program execution errors, see the appendix "User Program Execution Error and Ladder Program Execution Error" in the "Ladder Programming Manual".

#### ■ D8008 to D8021: Calendar/Clock Data

D8008 through D8021 are used for reading calendar/clock data from the internal clock and for writing calendar/clock data to the internal clock. For details on the calendar/clock data, see "Clock Function" on page 5-64.

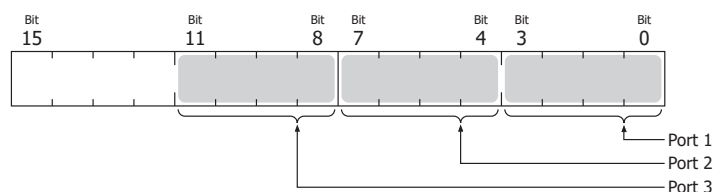
#### ■ D8022 to D8025: Scan Time Data

D8022 through D8025 are special data registers for checking the scan time and configuring the constant scan time. For details on the scan time, see "Constant Scan Time" on page 5-61.

#### ■ D8026: Communication Mode Information (Port 1 to 3)

This register indicates communication mode information for Port 1 to Port 3.

The allocation of communication ports in the device (bit assignment) is as follows.



0 (0000): Maintenance communication

1 (0001): User communication

2 (0010): Modbus RTU master

3 (0011): Modbus RTU slave

4 (0100): Data link communication

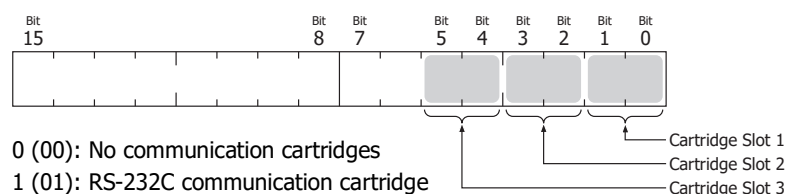
#### ■ D8029: System Software Version

The CPU module system software version number is written to this register.

#### ■ D8030: Communication Cartridge Information

This register indicates information about the communication cartridges in Port 2 and Port 3.

The allocation of communication ports in the device (bit assignment) is as follows.



0 (00): No communication cartridges

1 (01): RS-232C communication cartridge

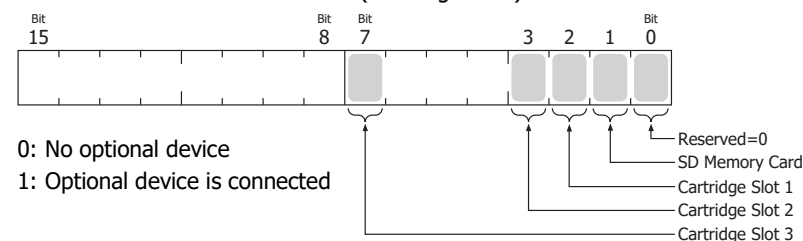
2 (10): RS-485 communication cartridge

3 (11): Bluetooth communication cartridge

#### ■ D8031: Optional Device Connection Information

Optional device connection information is written to this register.

The allocation of bits in the device (bit assignment) is as follows.



### ■ **D8032 to D8035, D8214, D8215: Interrupt Input Jump Destination Label No.**

Jump destination label numbers for interrupt inputs are written to these registers. When using interrupt inputs, write the label number that corresponds to the special data register that has been allocated to the interrupt input. For details on interrupt inputs, see "Interrupt Input" on page 5-36.

D8032 = I1

D8033 = I3

D8034 = I4

D8035 = I6

D8214 = I7

D8215 = I0

### ■ **D8036: Timer Interrupt Jump Destination Label No.**

The jump destination label number when the timer interrupt occurs is written to this register. When using the timer interrupt, store the corresponding label number.

For details on the timer interrupt, see "Timer Interrupt" on page 5-47.

### ■ **D8037: Number of Connected Expansion Modules**

The number of expansion modules connected to the CPU module (I/O modules, PID modules, and communication modules) is written to this register.

### ■ **D8052: J1939 Communication Error Code**

When an error occurs in J1939 communication, the error code is written to this register. For details on J1939 communication error codes, see Chapter 8 "J1939 Communication Error Code (D8052)" in the "FC6A Series MICROSmart Communication Manual".

### ■ **D8056: Battery Voltage**

The measurement result of the backup battery voltage is written to this register in 1 mV units.

0: Measurement error

### ■ **D8057: Analog Volume (AI0)**

The analog volume value is converted to a digital value and written to this register. For details, see "Analog Potentiometer" on page 5-45.

### ■ **D8058: Built-in Analog Input (AI1)**

The analog input's analog value (0 to 10V DC) is converted to a digital value and written to this register. For details, see "Analog Voltage Input" on page 5-43.

### ■ **D8059: Analog Input Status AI0**

The analog volume's analog input status is written to this register. For details, see "Analog Potentiometer" on page 5-45.

### ■ **D8060: Analog Input Status AI1**

The analog input's analog input status is written to this register. For details, see "Analog Voltage Input" on page 5-43.

### ■ **D8067: Backlight ON Time**

The backlight on time for the HMI module is written to this register. The backlight on time can be set by modifying the value of D8067 in a range between 1 and 65,535 s. When D8067 is 0 s, the backlight is always on. The backlight on time can also be changed with the HMI environment settings. For details, see "Setting the LCD Backlight ON Time" on page 7-13.

### ■ **D8069 to D8099: Slave (1 to 31) Communication Status/Error**

Special data registers used in data link communication. For details, see Chapter 7 "Master Station" in the "FC6A Series MICROSmart Communication Manual".

### ■ D8040 to D8045, D8100, D8102, D8103, D8735 to D8758: Slave Number (Port 1 to 33)

The slave number is written to these registers when the Port 1 to 33 communication mode is maintenance communication, Modbus RTU slave, or data link communication. The slave number can be changed by changing the value of the corresponding device in **Function Area Settings**.

D8100 = Port 1 Slave No.  
D8102 = Port 2 Slave No.  
D8103 = Port 3 Slave No.

D8040 = Port 4 Slave No.  
D8041 = Port 5 Slave No.  
D8042 = Port 6 Slave No.  
D8043 = Port 7 Slave No.  
D8044 = Port 8 Slave No.  
D8045 = Port 9 Slave No.  
D8735 = Port 10 Slave No.  
D8736 = Port 11 Slave No.  
D8737 = Port 12 Slave No.  
D8738 = Port 13 Slave No.  
D8739 = Port 14 Slave No.  
D8740 = Port 15 Slave No.  
D8741 = Port 16 Slave No.

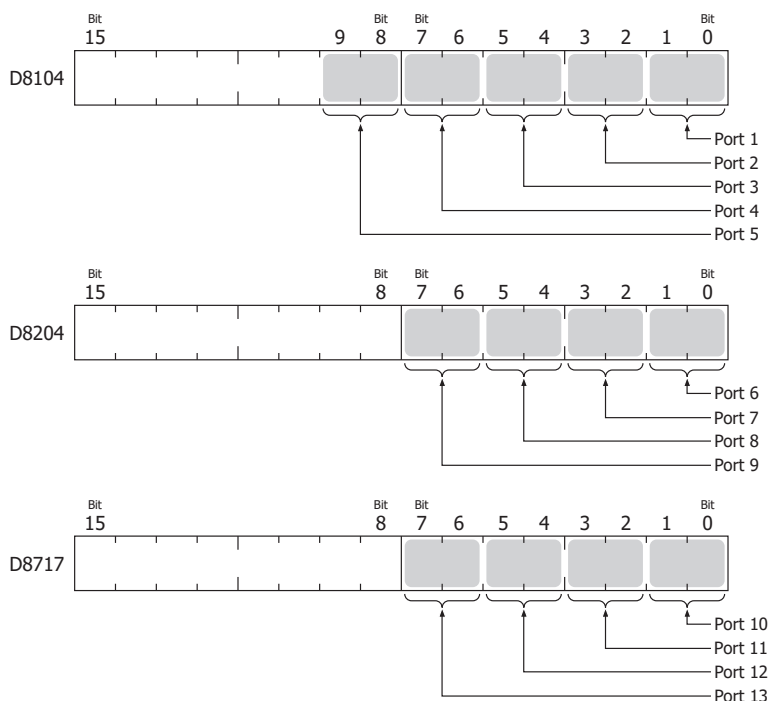
D8742 = Port 17 Slave No.  
D8743 = Port 18 Slave No.  
D8744 = Port 19 Slave No.  
D8745 = Port 20 Slave No.  
D8746 = Port 21 Slave No.  
D8747 = Port 22 Slave No.  
D8748 = Port 23 Slave No.  
D8749 = Port 24 Slave No.  
D8750 = Port 25 Slave No.  
D8751 = Port 26 Slave No.  
D8752 = Port 27 Slave No.  
D8753 = Port 28 Slave No.  
D8754 = Port 29 Slave No.  
D8755 = Port 30 Slave No.  
D8756 = Port 31 Slave No.  
D8757 = Port 32 Slave No.  
D8758 = Port 33 Slave No.

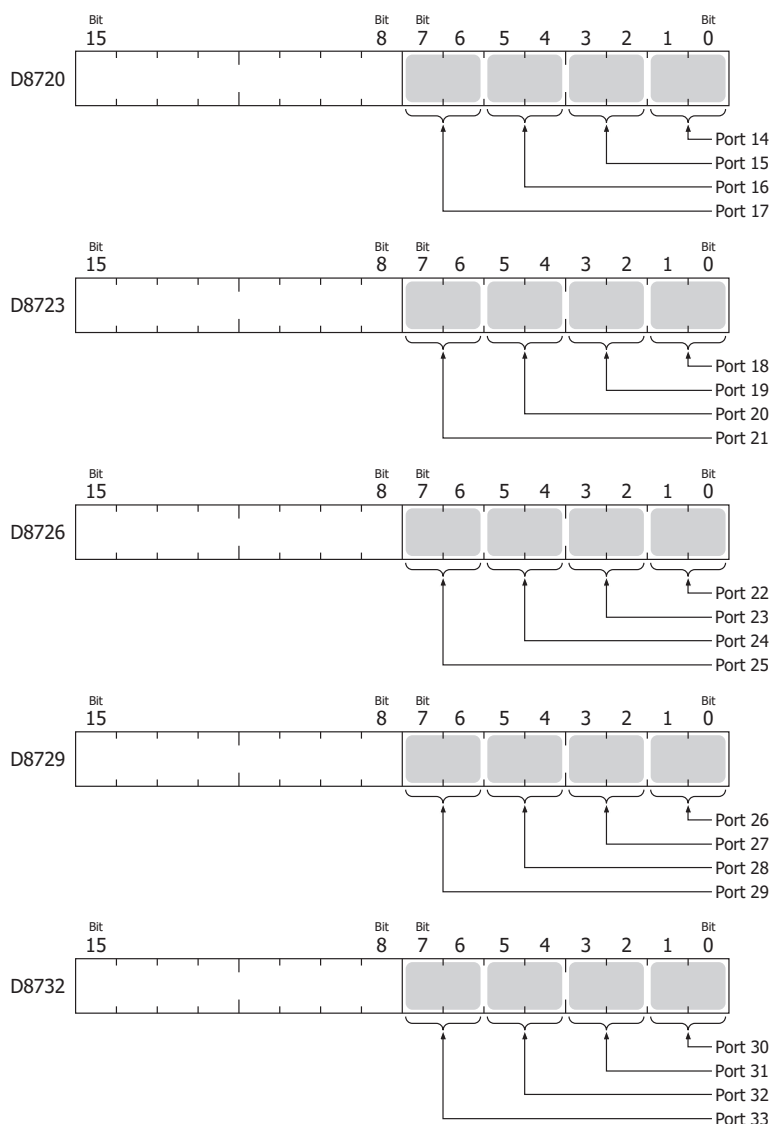
For details on communication modes, see the following in the "FC6A Series MICROSmart Communication Manual".

- Maintenance communication: Chapter 4 "Maintenance Communication"
- Modbus RTU slave: Chapter 6 "Modbus Communication"
- Data link communication: Chapter 7 "Data Link Communication"

### ■ D8104, D8204, D8717, D8720, D8723, D8726, D8729, D8732: Control Signal Status (Port 1 to 33)

The signal statuses of the DSR and DTR controls lines are written to this register. This register is updated in END processing when stopped and while running. The allocation of communication ports in the device (bit assignment) is as follows.

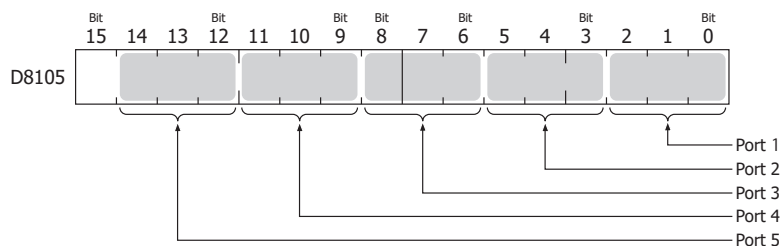


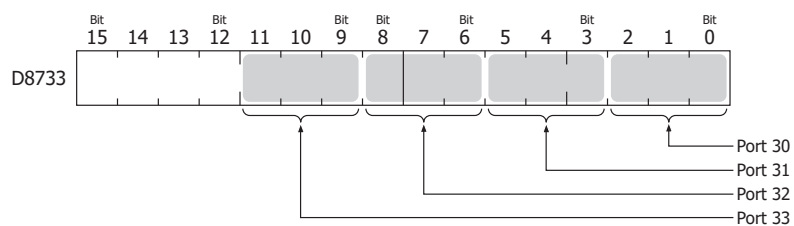
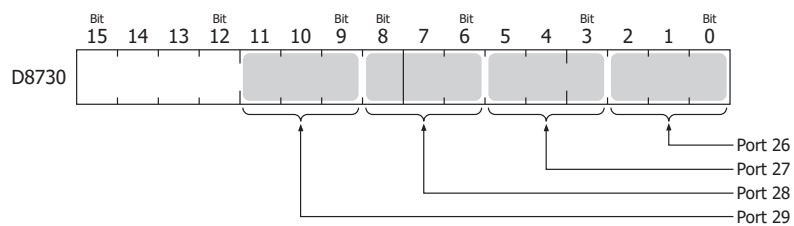
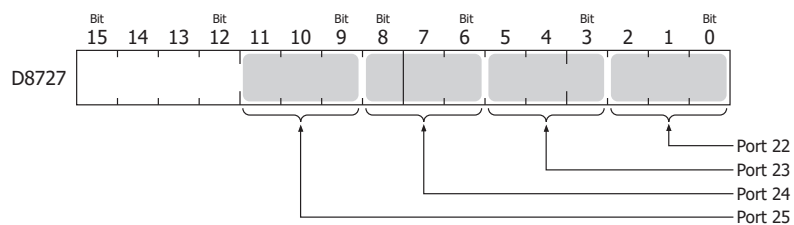
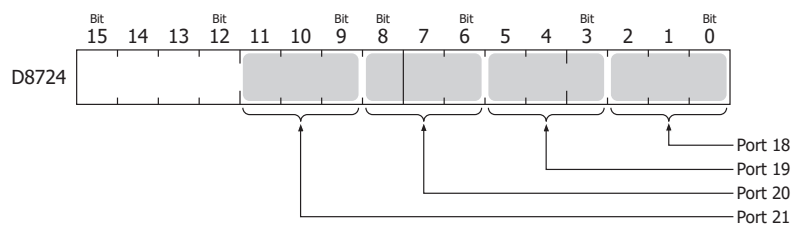
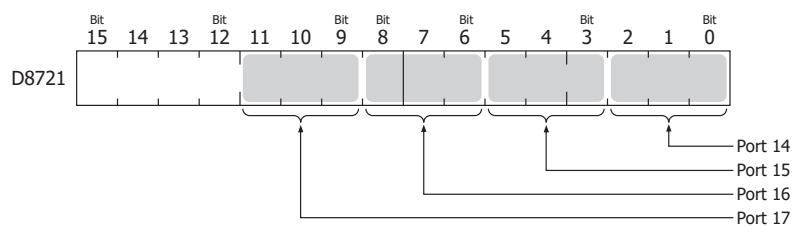
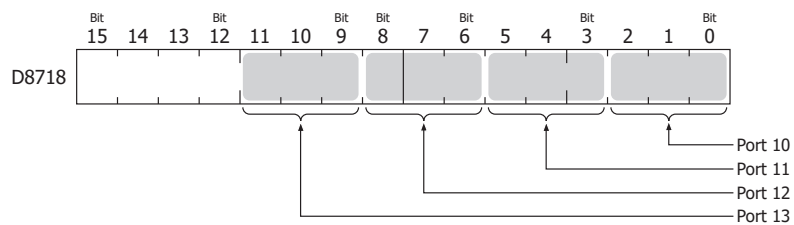
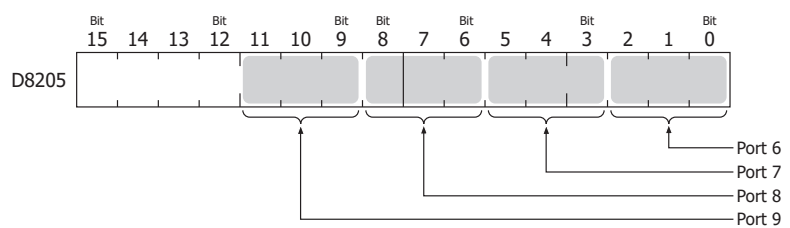


- 0 (00): DTR and DSR are both off.  
 1 (01): DTR is off and DSR is on.  
 2 (10): DTR is on and DSR is off.  
 3 (11): DTR and DSR are both on.

### ■ D8105, D8205, D8718, D8721, D8724, D8727, D8730, D8733: RS232C DSR Input Control Signal Option (Port 1 to 33)

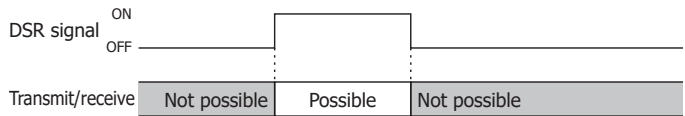
The signal statuses of the DSR and DTR controls lines are written to this register. This register is updated in END processing when stopped and while running. The allocation of communication ports in the device (bit assignment) is as follows.



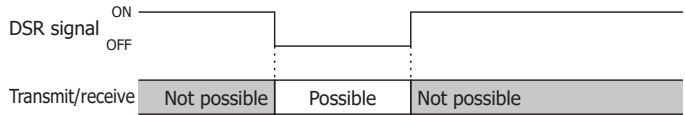


0 (000): The DSR signal status is not used for FC6A transmission control.  
Use this status when DSR signal control is not required.

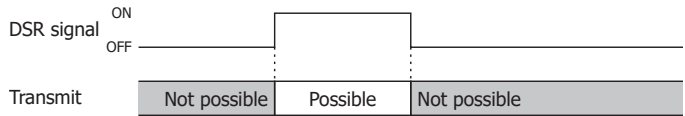
1 (001): When the DSR signal is on, the FC6A can transmit and receive.



2 (010): When the DSR signal is off, the FC6A can transmit and receive.



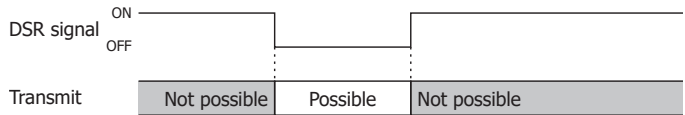
3 (011): When the DSR signal is on, transmission is possible (reception is always possible).



This is normally called "busy control" and is used for transmission control for devices with a slow processing speed such as printers.

(As viewed from the connected device, there is a limit on the data that can be input.)

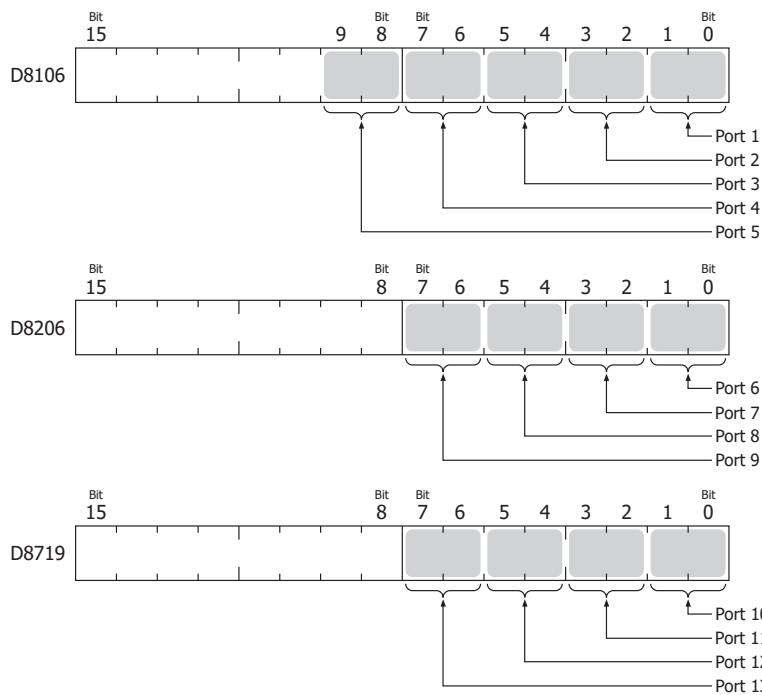
4 (100): When the DSR signal is off, transmission is possible.



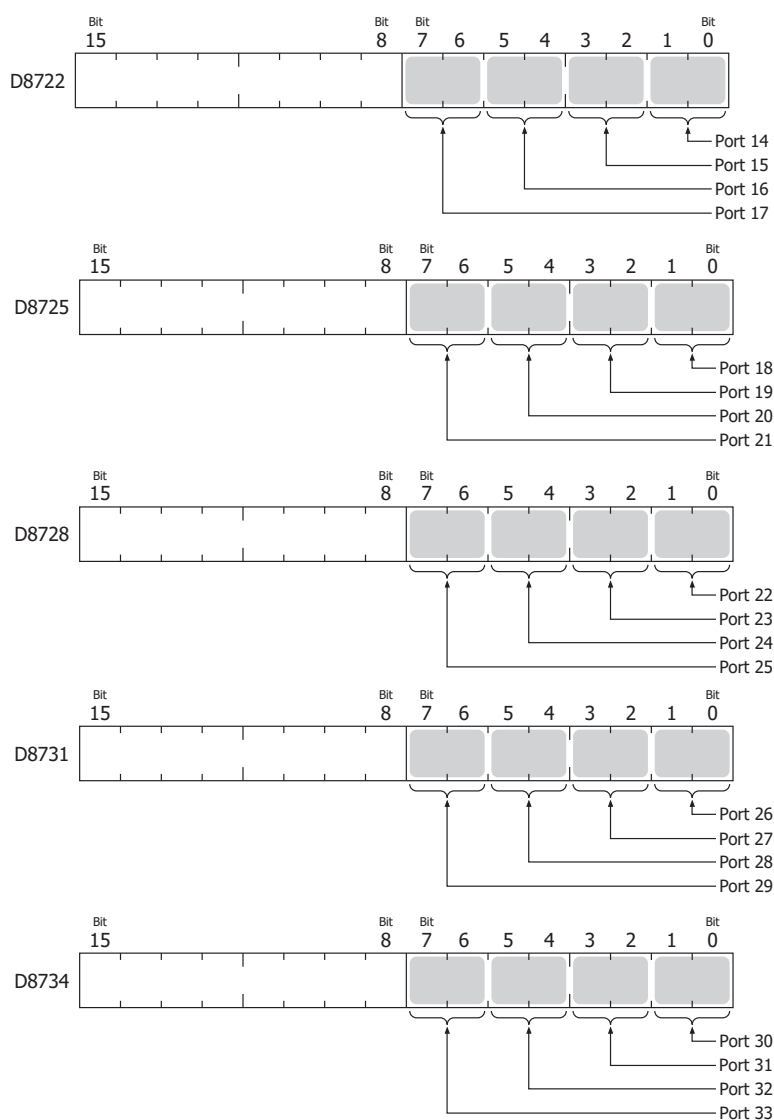
5 or higher: The operation is the same as the setting "000".

■ **D8106, D8206, D8719, D8722, D8725, D8728, D8731, D8734: RS232C DTR Output Control Signal Option (Port 1 to 33)**

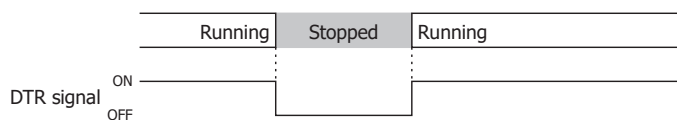
This register is used when indicating the FC6A control status and the transmit/receive status to the connected device. This control line is an output signal from the FC6A to the connected device. This register is only valid during user communication. The allocation of communication ports in the device (bit assignment) is as follows.







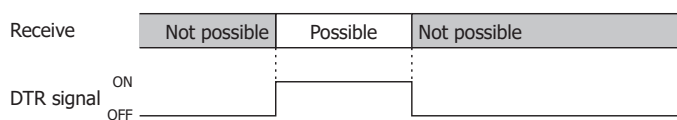
- 0 (00): The signal is on when the FC6A is set to run and off when stopped. While running, the signal is always on regardless of transmitting or receiving data. Set this value when it is necessary to indicate the run status.



- 1 (01): Always off.

- 2 (10): Set this value when performing flow control for received data. The signal is on when data from the connected device can be received.

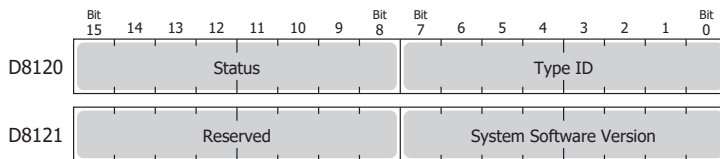
The signal is off when data cannot be received.



- 3 (11): The operation is the same as the setting "0".

### ■ D8120, D8121: HMI Module Information

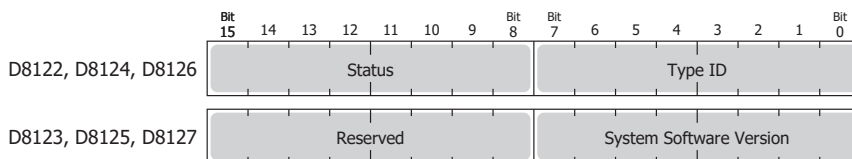
HMI module type information is written to these registers.  
The allocation of information (bit assignment) is as follows.



The system software version displays the version of the software written to the device.  
For details on the type IDs and statuses, see "List of Type IDs and Status" on page 6-50.

### ■ D8122 to D8127: Cartridge Slot Information

Cartridge Slot 1 to 3 information is written to these registers.  
The allocation of information (bit assignment) is as follows.



D8122, D8123 = Cartridge Slot 1 Information  
D8124, D8125 = Cartridge Slot 2 Information  
D8126, D8127 = Cartridge Slot 3 Information

For details on the type IDs and statuses, see "List of Type IDs and Status" on page 6-50.

### ■ D8170, D8171, D8174, D8175, D8178, D8179: Analog I/O Cartridge I/O

Analog I/O values for the analog I/O cartridges are written to these registers.

For the analog input type : The analog values input to the analog I/O cartridge are converted to digital values and written to the registers.

For the analog output type : The digital values stored as digital values are converted to analog values and output from the analog I/O cartridges.

For details, see "Analog I/O Cartridge" on page 10-7.

D8170 = AI2/AQ2  
D8171 = AI3/AQ3  
D8174 = AI4/AQ4  
D8175 = AI5/AQ5  
D8178 = AI6/AQ6  
D8179 = AI7/AQ7

### ■ D8172, D8173, D8176, D8177, D8180, D8181: Analog I/O Cartridge Status

The analog status of analog I/O cartridges is written to these registers.

For details, see "Analog I/O Cartridge" on page 10-7.

D8172 = AI2/AQ2  
D8173 = AI3/AQ3  
D8176 = AI4/AQ4  
D8177 = AI5/AQ5  
D8180 = AI6/AQ6  
D8181 = AI7/AQ7

### ■ D8192 to D8203, D8210 to D8213, D8216 to D8229, D8232 to D8237: High-speed Counter

These special data registers are used with the high-speed counter function and the frequency measurement function.

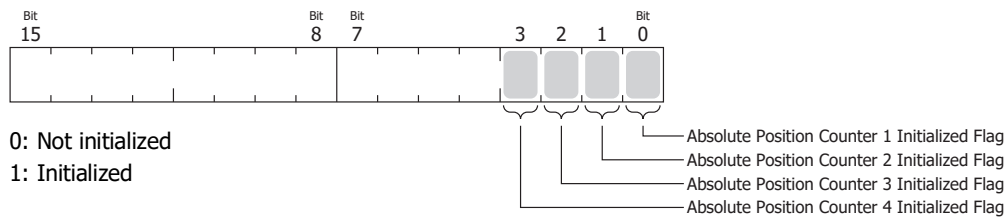
For details on high-speed counters, see "High-Speed Counter" on page 5-14.

D8210 to D8213, D8216, D8217 = High-speed counter (group 1/I0)  
D8218 to D8221, D8234, D8235 = High-speed counter (group 3/I3)  
D8222 to D8225, D8236, D8237 = High-speed counter (group 4/I4)  
D8226 to D8229, D8232, D8233 = High-speed counter (group 5/I6)  
D8192 to D8197 = High-speed counter (group 2/I1)  
D8198 to D8203 = High-speed counter (group 6/I7)

### ■ D8239: Absolute Position Control Status

This register indicates the status of absolute position control.

The allocation of the absolute position counter initialized flags in the device (bit assignment) is as follows. For details on the absolute position control status, see Chapter 18 "ABS (Set Absolute Position)" in the "Ladder Programming Manual".



### ■ D8240 to D8247: Absolute Position Counter 1 to 4

The absolute position is written to these registers according to pulse output. The absolute position can be initialized with the ABS instruction.

When reversible control is set in the pulse output instructions (RAMP/ARAMP/ZRN/JOG), the absolute position is incremented or decremented according to the output result. For details on absolute position counters, see Chapter 18 "ABS (Set Absolute Position)" in the "Ladder Programming Manual".

D8240, D8241 = Absolute position counter 1

D8242, D8243 = Absolute position counter 2

D8244, D8245 = Absolute position counter 3

D8246, D8247 = Absolute position counter 4

### ■ D8250: Read SD Memory Card Capacity

This register indicates the capacity of the recognized SD or SDHC (maximum size 32 GB) memory card in megabytes.

It is 0 when no SD memory card has been inserted or if it is not recognized.

### ■ D8251: Read SD Memory Card Free Capacity

This register indicates the free capacity of the SD memory card in megabytes.

It is 0 when no SD memory card has been inserted or if it is not recognized.

### ■ D8254: SD Memory Card Download/Upload Execution Information

Information about the SD memory card download/upload that was executed.

For details, see "SD Memory Card" on page 11-1.

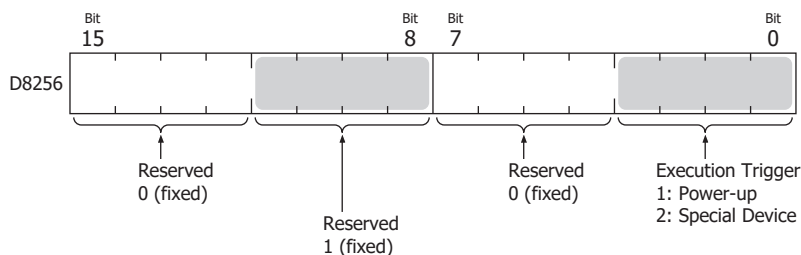
### ■ D8255: SD Memory Card Download/Upload Execution Status

The status of the SD memory card download/upload that was executed.

For details, see "SD Memory Card" on page 11-1.

### ■ D8256: Download MQTT Basic Settings from SD Memory Card Execution Information

Information in executing the download of the files for MQTT Basic Settings. The allocation of bits in the device (bit assignment) is as follows.



### ■ D8257: Download MQTT Basic Settings from SD Memory Card Execution Error Information

Error information in executing the download of the files for MQTT Basic Settings. For details, see Chapter 3 "Special Devices" in the "Network User's Manual".

### ■ D8260: Recipe Block Number

The recipe block number to read or write using special internal relays.

All channels for the specified block number are applicable.

### ■ D8261: Recipe Execution Block Number

The recipe block number of the recipe that was executed.

This is updated when the recipe block starts, and the status is retained when completed.

### ■ D8262: Recipe Execution Channel No.

The channel number of the recipe that was executed.

This is updated when the channel processing starts, and the status is retained when completed.

### ■ D8263: Recipe Execution Operation

Information about the operation of the recipe that was executed.

For details on recipes, see "Recipe Function" on page 11-8.

### ■ D8264: Recipe Execution Status

The status of the recipe that was executed.

For details on recipes, see "Recipe Function" on page 11-8.

### ■ D8265: Recipe Execution Error Information

Error information about the recipe that was executed.

For details on recipes, see "Recipe Function" on page 11-8.

### ■ D8266: Recipe Internal Memory (ROM-Range 1) Read Count

The number of times device values are read to internal memory (ROM-Range 1) as recipe data is stored in this register in units of 100.

### ■ D8267: Recipe Internal Memory (ROM-Range 2) Read Count

The number of times device values are read to internal memory (ROM-Range 2) as recipe data is stored in this register in units of 100.

### ■ D8268 to D8275, D8774 to D8781: Remote Host Number 1 to 255 (connection 1 to 16)

Special data registers that change the communications device when user communications client is set. For details, see Chapter 5 "Switching Remote Host Numbers" in the "FC6A Series MICROSmart Communication Manual".

### ■ D8278, D8279, D8760, D8761: Communication Mode Information (Connection 1 to 16)

D8278 = Indicates the communication mode of connections 1 through 4.

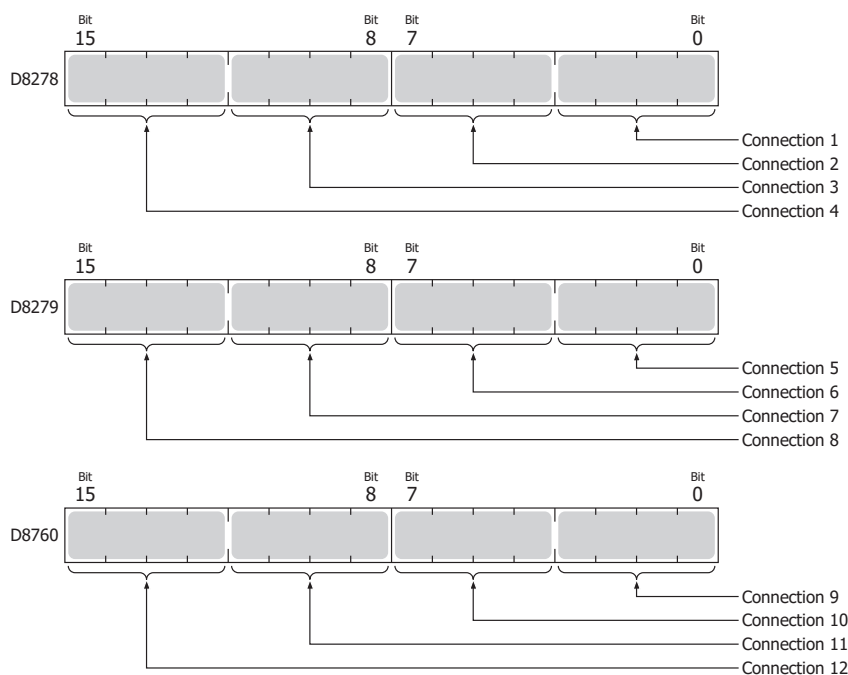
D8279 = Indicates the communication mode of connections 5 through 8.

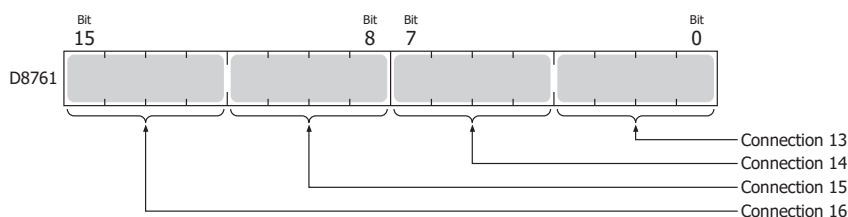
D8760 = Indicates the communication mode of connections 9 through 12.

D8761 = Indicates the communication mode of connections 13 through 16.

The allocation of connections in the device (bit assignment) is as follows.

Connections are allocated in 4-bit units from the lowest digit in ascending order of connection number.





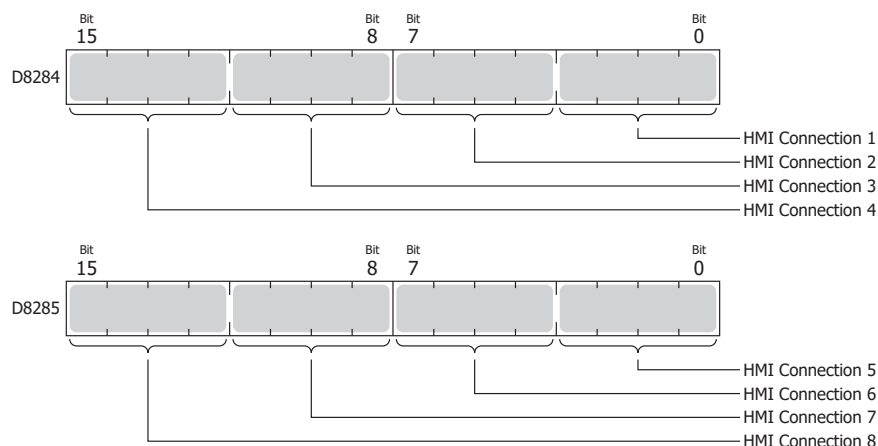
- Client connection (most significant bit = 0)
  - 0000: Unused
  - 0001: User Communication
  - 0010: Modbus TCP client
  - 0011: MC Protocol client
  - 0100: User communication UDP
- Server connection (most significant bit = 1)
  - 1000: Maintenance Communication
  - 1001: User Communication
  - 1010: Modbus TCP server

#### ■ D8284, D8285: Communication Mode Information (HMI Connection) (HMI Connection 1 to 8)

D8284: Indicates the communication mode of HMI connections 1 through 4.

D8285: Indicates the communication mode of HMI connections 5 through 8.

The allocation of connections in the device (bit assignment) is as follows.



- Client connection (most significant bit = 0)
  - 0000: Unused
- Server connection (most significant bit = 1)
  - 1000: Maintenance Communication

#### ■ D8303: CPU Module Ethernet Port 1 IP Settings/DNS Settings Switching

The IP settings/DNS settings for Ethernet Port 1 can be changed by writing one of the setting values in the table on the next page to D8303 and then turning on M8190.

To use this function, enable the following items in **Function Area Settings** of WindLDR.

- All-in-One CPU module/CAN J1939 All-in-One CPU module  
**Enable D8303 (IP Settings / DNS Settings switching) on Network Settings in Function Area Settings**
- Plus CPU module  
**Enable D8303 (IP Settings / DNS Settings switching) on Ethernet Port 1 in Function Area Settings**

The meanings of the setting values are as follows.

| Setting Value | IP Settings/DNS Settings                                    |
|---------------|---|
| 0             | Conform to function area settings.                          |
| 1             | Enable DHCP.  |
| 2             | Conform to special data register (D8304 to D8323) settings. |

**■ D8304 to D8307: CPU Module Ethernet Port 1 IP Address (Write-only)**

These registers are used to write the CPU module's IP address.

IP address: To set as aaa.bbb.ccc.ddd, write the following.

D8304=aaa, D8305=bbb, D8306=ccc, D8307=ddd

**■ D8308 to D8311: CPU Module Ethernet Port 1 Subnet Mask (Write-only)**

These registers are used to write the CPU module's subnet mask.

Subnet mask: For aaa.bbb.ccc.ddd, write the following.

D8308=aaa, D8309=bbb, D8310=ccc, D8311=ddd

**■ D8312 to D8315: CPU Module Ethernet Port 1 Default Gateway (Write-only)**

These registers are used to write the CPU module's default gateway.

Default gateway: For aaa.bbb.ccc.ddd, write the following.

D8312=aaa, D8313=bbb, D8314=ccc, D8315=ddd

**■ D8316 to D8319: CPU Module Ethernet Port 1 Preferred DNS Server (Write-only)**

These registers are used to write the CPU module's preferred DNS server.

Preferred DNS server: For aaa.bbb.ccc.ddd, write the following.

D8316=aaa, D8317=bbb, D8318=ccc, D8319=ddd

**■ D8320 to D8323: CPU Module Ethernet Port 1 Alternate DNS Server (Write-only)**

These registers are used to write the CPU module's alternate DNS server.

Alternate DNS server: For aaa.bbb.ccc.ddd, write the following.

D8320=aaa, D8321=bbb, D8322=ccc, D8323=ddd

**■ D8324 to D8329: CPU Module Ethernet Port 1 MAC Address (Current Value Read-only)**

The CPU module's MAC address is written to the special data registers as follows.

Example: MAC address: AA-BB-CC-DD-EE-FF

D8324=AA, D8325=BB, D8326=CC, D8327=DD, D8328=EE, D8329=FF

**■ D8330 to D8333: CPU Module Ethernet Port 1 IP Address (Current Value Read-only)**

The CPU module's IP address is written to the special data registers as follows.

Example: The CPU module's own IP address aaa.bbb.ccc.ddd

D8330=aaa, D8331=bbb, D8332=ccc, D8333=ddd

**■ D8334 to D8337: CPU Module Ethernet Port 1 Subnet Mask (Current Value Read-only)**

The CPU module's subnet mask value is written to the special data registers as follows.

Example: Subnet mask: aaa.bbb.ccc.ddd

D8334=aaa, D8335=bbb, D8336=ccc, D8337=ddd

**■ D8338 to D8341: CPU Module Ethernet Port 1 Default Gateway (Current Value Read-only)**

The CPU module's default gateway address is written to the special data registers as follows.

Example: Default gateway: aaa.bbb.ccc.ddd

D8338=aaa, D8339=bbb, D8340=ccc, D8341=ddd

**■ D8342 to D8345: CPU Module Ethernet Port 1 Preferred DNS Server (Current Value Read-only)**

The CPU module's preferred DNS server address is written to the special data registers as follows.

Example: Preferred DNS server: aaa.bbb.ccc.ddd

D8342=aaa, D8343=bbb, D8344=ccc, D8345=ddd

**■ D8346 to D8349: CPU Module Ethernet Port 1 Alternate DNS Server (Current Value Read-only)**

The CPU module's alternate DNS server address is written to the special data registers as follows.

Example: Alternate DNS server: aaa.bbb.ccc.ddd

D8346=aaa, D8347=bbb, D8348=ccc, D8349=ddd

**■ D8350 to D8381, D8677 to D8708: Connection Connected IP Address**

The IP address of the connected device that is being accessed through a connection is written as follows.

Connection 1 Connected IP Address: For aaa.bbb.ccc.ddd

D8350=aaa, D8351=bbb, D8352=ccc, D8353=ddd

Connection 2 Connected IP Address: For aaa.bbb.ccc.ddd

D8354=aaa, D8355=bbb, D8356=ccc, D8357=ddd

Connection 3 Connected IP Address: For aaa.bbb.ccc.ddd

D8358=aaa, D8359=bbb, D8360=ccc, D8361=ddd

Connection 4 Connected IP Address: For aaa.bbb.ccc.ddd  
D8362=aaa, D8363=bbb, D8364=ccc, D8365=ddd

Connection 5 Connected IP Address: For aaa.bbb.ccc.ddd  
D8366=aaa, D8367=bbb, D8368=ccc, D8369=ddd

Connection 6 Connected IP Address: For aaa.bbb.ccc.ddd  
D8370=aaa, D8371=bbb, D8372=ccc, D8373=ddd

Connection 7 Connected IP Address: For aaa.bbb.ccc.ddd  
D8374=aaa, D8375=bbb, D8376=ccc, D8377=ddd

Connection 8 Connected IP Address: For aaa.bbb.ccc.ddd  
D8378=aaa, D8379=bbb, D8380=ccc, D8381=ddd

Connection 9 Connected IP Address: For aaa.bbb.ccc.ddd  
D8677=aaa, D8678=bbb, D8679=ccc, D8680=ddd

Connection 10 Connected IP Address: For aaa.bbb.ccc.ddd  
D8681=aaa, D8682=bbb, D8683=ccc, D8684=ddd

Connection 11 Connected IP Address: For aaa.bbb.ccc.ddd  
D8685=aaa, D8686=bbb, D8687=ccc, D8688=ddd

Connection 12 Connected IP Address: For aaa.bbb.ccc.ddd  
D8689=aaa, D8690=bbb, D8691=ccc, D8692=ddd

Connection 13 Connected IP Address: For aaa.bbb.ccc.ddd  
D8693=aaa, D8694=bbb, D8695=ccc, D8696=ddd

Connection 14 Connected IP Address: For aaa.bbb.ccc.ddd  
D8697=aaa, D8698=bbb, D8699=ccc, D8700=ddd

Connection 15 Connected IP Address: For aaa.bbb.ccc.ddd  
D8701=aaa, D8702=bbb, D8703=ccc, D8704=ddd

Connection 16 Connected IP Address: For aaa.bbb.ccc.ddd  
D8705=aaa, D8706=bbb, D8707=ccc, D8708=ddd

#### ■ **D8382 to D8387: HMI Module MAC Address (Current Value Read-only)**

The MAC address is written to the special data registers as follows.

Example: MAC address: AA-BB-CC-DD-EE-FF

D8382=AA, D8383=BB, D8384=CC, D8385=DD, D8386=EE, D8387=FF

#### ■ **D8388 to D8391: HMI Module IP Address (Current Value Read-only)**

The HMI module's IP address is written to the special data registers as follows.

Example: HMI module IP address: aaa.bbb.ccc.ddd

D8388=aaa, D8389=bbb, D8390=ccc, D8391=ddd

#### ■ **D8392 to D8395: HMI Module Subnet Mask (Current Value Read-only)**

The HMI module's subnet mask value is written to the special data registers as follows.

Example: HMI module subnet mask: aaa.bbb.ccc.ddd

D8392=aaa, D8393=bbb, D8394=ccc, D8395=ddd

#### ■ **D8396 to D8399: HMI Module Default Gateway (Current Value Read-only)**

The HMI module's default gateway address is written to the special data registers as follows.

Example: HMI module default gateway: aaa.bbb.ccc.ddd

D8396=aaa, D8397=bbb, D8398=ccc, D8399=ddd

#### ■ **D8400 to D8403: HMI Module Preferred DNS Server (Current Value Read-only)**

The HMI module's preferred DNS server address is written to the special data registers as follows.

Example: HMI module preferred DNS server: aaa.bbb.ccc.ddd

D8400=aaa, D8401=bbb, D8402=ccc, D8403=ddd

#### ■ **D8404 to D8407: HMI Module Alternate DNS Server (Current Value Read-only)**

The HMI module's alternate DNS server address is written to the special data registers as follows.

Example: HMI module alternate DNS server: aaa.bbb.ccc.ddd

D8404=aaa, D8405=bbb, D8406=ccc, D8407=ddd

#### ■ **D8413: Time Zone Offset**

The time zone configured in the function area settings can be finely adjusted in 15-minute increments.

For details, see Chapter 3 "SNTP Settings" in the "FC6A Series MICROSmart Communication Manual".

#### ■ D8414: SNTP Operation Status

The operation status is written to this register when the time information is acquired through operation of M8191 (SNTP Time Acquisition Flag) or when time information acquisition was executed by automatic acquisition.

For details, see Chapter 3 "SNTP Settings" in the "FC6A Series MICROSmart Communication Manual".

#### ■ D8415: SNTP Access Elapsed Time

The elapsed time in minutes from when the time information was last acquired from the SNTP server.

For details, see Chapter 3 "SNTP Settings" in the "FC6A Series MICROSmart Communication Manual".

#### ■ D8429: HMI Module Connection Information Reference Connection Number

The connection information for the specified connection number is reflected in D8430 to D8434. When 0 is written, 0 is written to D8430 to D8434. If a connection number that does not exist is specified, 0 is written to D8430 to D8434.

#### ■ D8430 to D8433: HMI Module Connection Information Reference Connected IP Address

The IP address of the terminal being accessed through the connection is written to the special data registers as follows.

Example: IP address to read: aaa.bbb.ccc.ddd

D8430=aaa, D8431=bbb, D8432=ccc, D8433=ddd

#### ■ D8434: HMI Module Connection Information Reference Connected Port No.

The port number of the terminal being accessed through the connection is written to this register.

#### ■ D8437 to D8440: HMI Module IP Address (Write-only)

These registers are used to write the HMI module's IP address.

HMI module IP address: To set as aaa.bbb.ccc.ddd, write the following.

D8437=aaa, D8438=bbb, D8439=ccc, D8440=ddd

#### ■ D8441 to D8444: HMI Module Subnet Mask (Write-only)

These registers are used to write the HMI module's subnet mask.

HMI module subnet mask: For aaa.bbb.ccc.ddd, write the following.

D8441=aaa, D8442=bbb, D8443=ccc, D8444=ddd

#### ■ D8445 to D8448: HMI Module Default Gateway (Write-only)

These registers are used to write the HMI module's default gateway.

HMI module default gateway: For aaa.bbb.ccc.ddd, write the following.

D8445=aaa, D8446=bbb, D8447=ccc, D8448=ddd

#### ■ D8449 to D8452: HMI Module Preferred DNS Server (Write-only)

These registers are used to write the HMI module's preferred DNS server.

HMI module preferred DNS server: For aaa.bbb.ccc.ddd, write the following.

D8449=aaa, D8450=bbb, D8451=ccc, D8452=ddd

#### ■ D8453 to D8456: HMI Module Alternate DNS Server (Write-only)

These registers are used to write the HMI module's alternate DNS server.

HMI module alternate DNS server: For aaa.bbb.ccc.ddd, write the following.

D8453=aaa, D8454=bbb, D8455=ccc, D8456=ddd

#### ■ D8457: EMAIL Instruction Detailed Error Information (HMI-Ethernet Port)

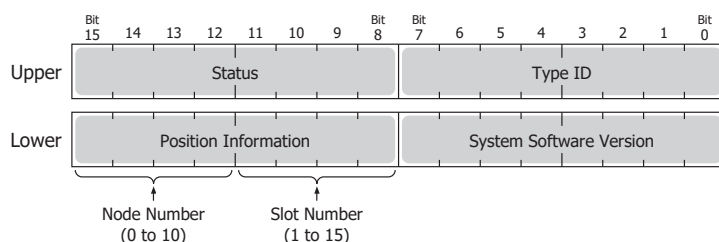
Detailed error information for the EMAIL instruction is written to this register.

For details, see Chapter 12 "Confirm the error detail of EMAIL instruction" in the "FC6A Series MICROSmart Communication Manual".

#### ■ D8470 to D8595: Expansion Module Slot Information

Expansion module type information is written to these registers.

The allocation of information (bit assignment) is as follows.





Upper    Lower

D8470, D8471 = Expansion Module Slot 1 Information  
 D8472, D8473 = Expansion Module Slot 2 Information  
 D8474, D8475 = Expansion Module Slot 3 Information  
 D8476, D8477 = Expansion Module Slot 4 Information  
 D8478, D8479 = Expansion Module Slot 5 Information  
 D8480, D8481 = Expansion Module Slot 6 Information  
 D8482, D8483 = Expansion Module Slot 7 Information  
 D8484, D8485 = Expansion Module Slot 8 Information  
 D8486, D8487 = Expansion Module Slot 9 Information  
 D8488, D8489 = Expansion Module Slot 10 Information  
 D8490, D8491 = Expansion Module Slot 11 Information  
 D8492, D8493 = Expansion Module Slot 12 Information  
 D8494, D8495 = Expansion Module Slot 13 Information  
 D8496, D8497 = Expansion Module Slot 14 Information  
 D8498, D8499 = Expansion Module Slot 15 Information  
 D8500, D8501 = Expansion Module Slot 16 Information  
 D8502, D8503 = Expansion Module Slot 17 Information  
 D8504, D8505 = Expansion Module Slot 18 Information  
 D8506, D8507 = Expansion Module Slot 19 Information  
 D8508, D8509 = Expansion Module Slot 20 Information  
 D8510, D8511 = Expansion Module Slot 21 Information  
 D8512, D8513 = Expansion Module Slot 22 Information  
 D8514, D8515 = Expansion Module Slot 23 Information  
 D8516, D8517 = Expansion Module Slot 24 Information  
 D8518, D8519 = Expansion Module Slot 25 Information  
 D8520, D8521 = Expansion Module Slot 26 Information  
 D8522, D8523 = Expansion Module Slot 27 Information  
 D8524, D8525 = Expansion Module Slot 28 Information  
 D8526, D8527 = Expansion Module Slot 29 Information  
 D8528, D8529 = Expansion Module Slot 30 Information  
 D8530, D8531 = Expansion Module Slot 31 Information  
 D8532, D8533 = Expansion Module Slot 32 Information  
 D8534, D8535 = Expansion Module Slot 33 Information  
 D8536, D8537 = Expansion Module Slot 34 Information  
 D8538, D8539 = Expansion Module Slot 35 Information  
 D8540, D8541 = Expansion Module Slot 36 Information  
 D8542, D8543 = Expansion Module Slot 37 Information  
 D8544, D8545 = Expansion Module Slot 38 Information  
 D8546, D8547 = Expansion Module Slot 39 Information  
 D8548, D8549 = Expansion Module Slot 40 Information  
 D8550, D8551 = Expansion Module Slot 41 Information  
 D8552, D8553 = Expansion Module Slot 42 Information  
 D8554, D8555 = Expansion Module Slot 43 Information  
 D8556, D8557 = Expansion Module Slot 44 Information  
 D8558, D8559 = Expansion Module Slot 45 Information  
 D8560, D8561 = Expansion Module Slot 46 Information

Upper Lower

D8562, D8563 = Expansion Module Slot 47 Information  
 D8564, D8565 = Expansion Module Slot 48 Information  
 D8566, D8567 = Expansion Module Slot 49 Information  
 D8568, D8569 = Expansion Module Slot 50 Information  
 D8570, D8571 = Expansion Module Slot 51 Information  
 D8572, D8573 = Expansion Module Slot 52 Information  
 D8574, D8575 = Expansion Module Slot 53 Information  
 D8576, D8577 = Expansion Module Slot 54 Information  
 D8578, D8579 = Expansion Module Slot 55 Information  
 D8580, D8581 = Expansion Module Slot 56 Information  
 D8582, D8583 = Expansion Module Slot 57 Information  
 D8584, D8585 = Expansion Module Slot 58 Information  
 D8586, D8587 = Expansion Module Slot 59 Information  
 D8588, D8589 = Expansion Module Slot 60 Information  
 D8590, D8591 = Expansion Module Slot 61 Information  
 D8592, D8593 = Expansion Module Slot 62 Information  
 D8594, D8595 = Expansion Module Slot 63 Information

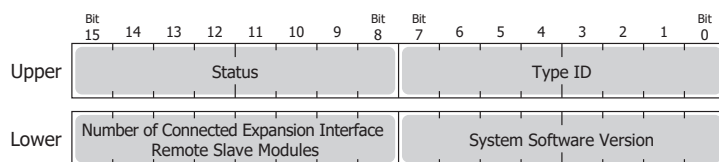
The system software version displays the version of the software written to the device.

For details on the type IDs and statuses, see "List of Type IDs and Status" on page 6-50.

### ■ D8596, D8597: Expansion Interface Remote Master Module Slot Information

Expansion interface remote master module type information is written to these registers.

The allocation of information (bit assignment) is as follows.



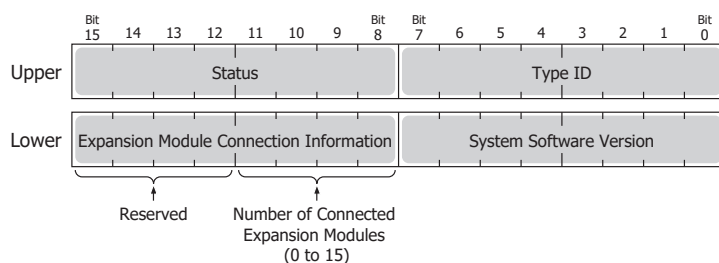
The system software version displays the version of the software written to the device.

For details on the type IDs and statuses, see "List of Type IDs and Status" on page 6-50.

### ■ D8598 to D8617: Expansion Interface Remote Slave Module Slot Information

Expansion interface remote slave module type information is written to these registers.

The allocation of information (bit assignment) is as follows.



Upper Lower

D8598, D8599 = Expansion Interface Remote Slave Module (Unit 1) Slot Information  
 D8600, D8601 = Expansion Interface Remote Slave Module (Unit 2) Slot Information  
 D8602, D8603 = Expansion Interface Remote Slave Module (Unit 3) Slot Information  
 D8604, D8605 = Expansion Interface Remote Slave Module (Unit 4) Slot Information  
 D8606, D8607 = Expansion Interface Remote Slave Module (Unit 5) Slot Information

Upper Lower

D8608, D8609 = Expansion Interface Remote Slave Module (Unit 6) Slot Information

D8610, D8611 = Expansion Interface Remote Slave Module (Unit 7) Slot Information

D8612, D8613 = Expansion Interface Remote Slave Module (Unit 8) Slot Information

D8614, D8615 = Expansion Interface Remote Slave Module (Unit 9) Slot Information

D8616, D8617 = Expansion Interface Remote Slave Module (Unit 10) Slot Information

The system software version displays the version of the software written to the device.

For details on the type ID and status, see "List of Type IDs and Status" on page 6-50.

■ **D8618: Refresh Time of Expansion Interface Remote Master/Slave Modules Current Value**

The current value of the I/O refresh time of the expansion modules connected with the expansion interface remote master/slave modules is stored in increments of 1 ms.

■ **D8619: Refresh Time of Expansion Interface Remote Master/Slave Modules Maximum Value**

The maximum value of the I/O refresh time of the expansion modules connected with the expansion interface remote master/slave modules is stored in increments of 1 ms.

■ **D8630: CPU Module Ethernet Port 2 IP Settings/DNS Settings Switching**

The IP settings/DNS settings for Ethernet Port 2 can be changed by writing one of the setting values in the following table to D8630 and then turning on M8333.

To use this function, enable **Enable D8630 (IP Settings / DNS Settings switching)** on **Ethernet Port 2** in **Function Area Settings** of WindLDR.

The meanings of the setting values are as follows.

| Setting Value | IP Settings/DNS Settings                                    |
|---------------|---|
| 0             | Conform to function area settings.                          |
| 1             | Enable DHCP.  |
| 2             | Conform to special data register (D8631 to D8650) settings. |

■ **D8631 to D8634: CPU Module Ethernet Port 2 IP Address (Write-only)**

These registers are used to write the IP address of Ethernet port 2 on the Plus CPU module.

IP address: To set as aaa.bbb.ccc.ddd, write the following.

D8631 = aaa, D8632 = bbb, D8633 = ccc, D8634 = ddd

■ **D8635 to D8638: CPU Module Ethernet Port 2 Subnet Mask (Write-only)**

These registers are used to write the subnet mask of Ethernet port 2 on the Plus CPU module.

Subnet mask: For aaa.bbb.ccc.ddd, write the following.

D8635 = aaa, D8636 = bbb, D8637 = ccc, D8638 = ddd

■ **D8639 to D8642: CPU Module Ethernet Port 2 Default Gateway (Write-only)**

These registers are used to write the default gateway of Ethernet port 2 on the Plus CPU module.

Default gateway: For aaa.bbb.ccc.ddd, write the following.

D8639 = aaa, D8640 = bbb, D8641 = ccc, D8642 = ddd

■ **D8643 to D8646: CPU Module Ethernet Port 2 Preferred DNS Server (Write-only)**

These registers are used to write the preferred DNS server of Ethernet port 2 on the Plus CPU module.

Preferred DNS server: For aaa.bbb.ccc.ddd, write the following.

D8643 = aaa, D8644 = bbb, D8645 = ccc, D8646 = ddd

■ **D8647 to D8650: CPU Module Ethernet Port 2 Alternate DNS Server (Write-only)**

These registers are used to write the alternate DNS server of Ethernet port 2 on the Plus CPU module.

Alternate DNS server: For aaa.bbb.ccc.ddd, write the following.

D8647 = aaa, D8648 = bbb, D8649 = ccc, D8650 = ddd

■ **D8651 to D8656: CPU Module Ethernet Port 2 MAC Address (Current Value Read-only)**

The MAC address of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: MAC address: AA-BB-CC-DD-EE-FF

D8651 = AA, D8652 = BB, D8653 = CC, D8654 = DD, D8655 = EE, D8656 = FF

### ■ D8657 to D8660: CPU Module Ethernet Port 2 IP Address (Current Value Read-only)

The IP address of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: The CPU module's own IP address: aaa.bbb.ccc.ddd

D8657 = aaa, D8658 = bbb, D8659 = ccc, D8660 = ddd

### ■ D8661 to D8664: CPU Module Ethernet Port 2 Subnet Mask (Current Value Read-only)

The subnet mask value of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: Subnet mask: aaa.bbb.ccc.ddd

D8661 = aaa, D8662 = bbb, D8663 = ccc, D8664 = ddd

### ■ D8665 to D8668: CPU Module Ethernet Port 2 Default Gateway (Current Value Read-only)

The default gateway address of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: Default gateway: aaa.bbb.ccc.ddd

D8665 = aaa, D8666 = bbb, D8667 = ccc, D8668 = ddd

### ■ D8669 to D8672: CPU Module Ethernet Port 2 Preferred DNS Server (Current Value Read-only)

The preferred DNS server address of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: Preferred DNS server: aaa.bbb.ccc.ddd

D8669 = aaa, D8670 = bbb, D8671 = ccc, D8672 = ddd

### ■ D8673 to D8676: CPU Module Ethernet Port 2 Alternate DNS Server (Current Value Read-only)

The alternate DNS server address of Ethernet port 2 on the Plus CPU module is written to the special data registers as follows.

Example: Alternate DNS server: aaa.bbb.ccc.ddd

D8673 = aaa, D8674 = bbb, D8675 = ccc, D8676 = ddd

### ■ D8759: EMAIL Instruction Detailed Error Information (Ethernet Port 1)

Detailed error information for the EMAIL instruction (Ethernet port 1) is written to this register.

For details, see Chapter 12 "Confirm the error detail of EMAIL instruction" in the "FC6A Series MICROSmart Communication Manual".

### ■ D8782: BACnet Operation Status

The operating status of BACnet/IP communication is written to this special data register.

For details, see Chapter 1 "Special Devices" in the "Network User's Manual".

### ■ D8783: BACnet Error Information

Information for the error that last occurred in BACnet/IP communication is written to this special data register.

For details, see Chapter 1 "Special Devices" in the "Network User's Manual".

### ■ D8790: EtherNet/IP Operation Status

The operating status of EtherNet/IP communication is written to this special data register.

For details, see Chapter 2 "Special Devices" in the "Network User's Manual".

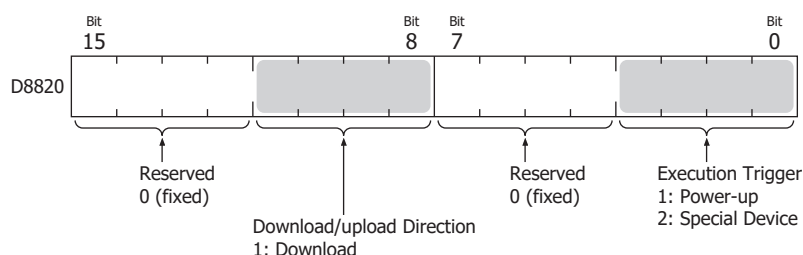
### ■ D8791: EtherNet/IP Error Information

Information for the error that last occurred in EtherNet/IP communication is written to this special data register.

For details, see Chapter 2 "Special Devices" in the "Network User's Manual".

### ■ D8820: Download Files for Server Functions from SD Memory Card Execution Information

Information in executing the download of the files for Server Functions. The allocation of bits in the device (bit assignment) is as follows.



■ **D8821: Download Files for Server Functions from SD Memory Card Execution Error Information**

Error information in executing the download of the files for Server Functions. For details, see "D8821: Download Files for Server Functions from SD Memory Card Execution Error Information" on page 11-48.

■ **D8822: Web Server Current Number of Connections (Plus CPU Module)**

The current number of connections for the web server function. D8822 is only supported on Plus CPU module. On the Plus CPU module web server, the current number of connections is written at regular intervals. If the **Allow only secure connection (SSL/TLS) to connect** check box is cleared, the approximate number of connections is written.

## List of Type IDs and Status

## ■ Type ID

## Expansion module and HMI module

| Type ID     |           | Type No.  |
|-------------|-----------|---|
| Hexadecimal | Binary    |   |
| 00h         | 0000 0000 | FC6A-N16B1, FC6A-N16B4, FC6A-N16B3  |
| 01h         | 0000 0001 | FC6A-R161, FC6A-R164, FC6A-T16K1, FC6A-T16K4, F6A-T16P1, FC6A-T16P4, F6A-T16K3, FCA-T16P3 |
| 02h         | 0000 0010 | FC6A-N32B3  |
| 03h         | 0000 0011 | FC6A-T32K3, FC6A-T32P3  |
| 04h         | 0000 0100 | FC6A-N08B1, FC6A-N08B4, FC6A-N08A11, FC6A-N08A14  |
| 05h         | 0000 0101 | FC6A-R081, FC6A-R084, FC6A-T08K1, FC6A-T08K4, FC6A-T08P1, FC6A-T08P4                      |
| 06h         | 0000 0110 | FC6A-M08BR1, FC6A-M08BR4  |
| 07h         | 0000 0111 | FC6A-M24BR1, FC6A-M24BR4  |
| 18h         | 0001 1000 | FC6A-PH1  |
| 19h         | 0001 1001 | FC6A-EXM2, FC6A-EXM24   |
| 1Ah         | 0001 1010 | FC6A-EXM1S, FC6A-EXM1S4   |
| 20h         | 0010 0000 | FC6A-J2C1, FC6A-J2C4  |
| 21h         | 0010 0001 | FC6A-J4A1, FC6A-J4A4  |
| 22h         | 0010 0010 | FC6A-J8A1, FC6A-J8A4  |
| 23h         | 0010 0011 | FC6A-K2A1, FC6A-K2A4  |
| 24h         | 0010 0100 | FC6A-K4A1, FC6A-K4A4  |
| 25h         | 0010 0101 | FC6A-L06A1, FC6A-L06A4  |
| 26h         | 0010 0110 | FC6A-L03CN1, FC6A-L03CN4  |
| 27h         | 0010 0111 | FC6A-J4CN1, FC6A-J4CN4  |
| 28h         | 0010 1000 | FC6A-J8CU1, FC6A-J8CU4  |
| 29h         | 0010 1001 | FC6A-F2M1, FC6A-F2M4  |
| 2Ah         | 0010 1010 | FC6A-F2MR1, FC6A-F2MR4  |
| 2Bh         | 0010 1011 | FC6A-J4CH1Y, FC6A-J4CH4Y  |
| 2Ch         | 0010 1100 | FC6A-EXM1M  |
| 2Eh         | 0010 1110 | FC6A-SIF52, FC6A-SIF524   |
| 40h         | 0100 0000 | FC6A-SAK64  |
| FFh         | 1111 1111 | Not connected   |

## Cartridge

| Type ID     |           | Type No.             |
|-------------|-----------|----------------------|
| Hexadecimal | Binary    |                      |
| 00h         | 0000 0000 | FC6A-PJ2A            |
| 01h         | 0000 0001 | FC6A-PK2AV           |
| 02h         | 0000 0010 | FC6A-PK2AW           |
| 03h         | 0000 0011 | FC6A-PJ2CP           |
| 06h         | 0000 0110 | FC6A-PC1             |
| 07h         | 0000 0111 | FC6A-PC3             |
| 09h         | 0000 1001 | FC6A-PTS4, FC6A-PTK4 |
| 0Ah         | 0000 1010 | FC6A-PN4             |
| 0Ch         | 0000 1100 | FC6A-PC4             |
| FFh         | 1111 1111 | Not connected        |

## ■ Status

| Status      |           | Description  |
|-------------|-----------|--|
| Hexadecimal | Binary    |  |
| 00h         | 0000 0000 | Normal   |
| 81h         | 1000 0001 | Communication error (An error has occurred in the communication between the CPU module and an expansion module, HMI module, or cartridge.)                                 |
| 82h         | 1000 0010 | Unknown device detected (A device other than the FC6A is connected.)   |
| 83h         | 1000 0011 | Device setting error (No device is connected or the connected device is different from that set in the user program.)  |
| 84h         | 1000 0100 | Device writing error (The attempt to set the operation of the device failed.)  |
| 85h         | 1000 0101 | System update error (The system update failed.)  |
| 86h         | 1000 0110 | Expansion interface remote master module communication error (An error is occurring in the communication between the expansion interface remote master and slave modules.) |





# 7: HMI FUNCTION

## Introduction

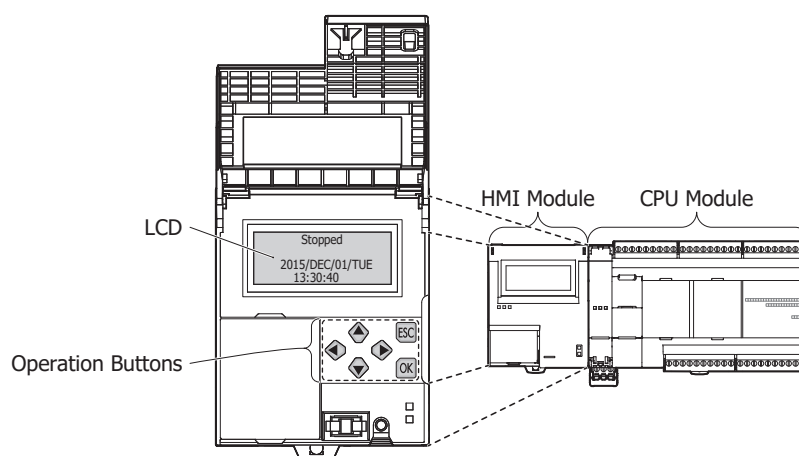
This chapter describes the functions that can be used with the HMI module connected to the CPU module and their operating procedures.

## HMI Function Overview

This section describes an overview of the HMI module and functions that can be used.

### The HMI Module

With the HMI module, you can run and stop the user program, monitor and modify device values, and configure the environment settings on the FC6A without using WindLDR by using the HMI module LCD and operation buttons on the module. With Ethernet communication, the web server function and the send e-mail function can be used. The HMI module can also relay CPU module Ethernet communication using a maximum of eight connections.



## HMI Functions List

### ■ System menu functions

The following functions can be used with the HMI module's LCD display function and button operations.

| Type               | Function  |   | Description   | Reference |
|--------------------|---|---|---|-----------|
| Run/stop Operation | Switching run/stop                                      |   | Switches the program run status (RUN/STOP).   | 7-9       |
| Edit Program       | Confirming/Clearing changed timer/counter preset values |   | Change timer/counter preset values or writes them to the user program in the ROM.   | 7-10      |
| Configurations     | Environment Settings                                    | Slave Number/<br>Network Settings/<br>Message Scroll/Blink<br>Menu Language/<br>LCD Backlight ON Time | Some of the function area settings (slave number, network settings, message scroll speed, scroll unit, blinking speed, and LCD backlight ON time) can be modified.<br>The system menu language can also be changed. | 7-12      |
|                    | Calendar/Clock  |   | Configures the calendar/time for the internal clock.  | 7-31      |
| Monitors           | Device Monitor  |   | Displays/modifies the specified device values.  | 7-32      |
|                    | Status Monitor  |   | Displays the system software version, operating status, scan time, protection status, and network settings.   | 7-35      |
|                    | Error Monitor   |   | Allows you to check errors that have occurred.  | 7-38      |
| Message Display    | Message Display   |   | Displays the screen configured by the MSG instruction on the LCD.   | 7-40      |
| SD Memory Card     | Stop Access   |   | Stops access to the SD memory card in order to remove it.   | 7-41      |
|                    | Format  |   | Formats the SD memory card.   | 7-42      |
|                    | Recipe Operations                                       |   | Recipe files can be read from and written to the SD memory card.  | 7-43      |
|                    | Downloading/Uploading User Programs                     |   | The user program can be downloaded and uploaded.  | 7-45      |

## 7: HMI FUNCTION

### ■ Communication Functions

| Type                   | Function            | Details   | Reference |
|------------------------|---------------------|---|-----------|
| Ethernet Communication | Connection Settings | CPU module communication can be relayed using a maximum of eight connections.                       | 7-48      |
|                        | Send E-mail         | E-mails can be sent with the EMAIL instruction.   | 7-48      |
|                        | Web Server          | The HMI module status can be checked and the content of devices can be changed using a web browser. | 7-48      |

### ■ Cartridges

| Function                | Details   | Reference |
|-------------------------|---|-----------|
| Digital I/O Cartridge   | One digital I/O cartridge can be installed in the HMI module.                         | 10-1      |
| Analog I/O Cartridge    | One analog I/O cartridge can be installed in the HMI module.                          | 10-7      |
| Communication Cartridge | One communication cartridge can be installed in the HMI module. Plus CPU module only. | 2-172     |

## LCD Settings

You can change the HMI module LCD settings in the module configuration editor.

For details on the module configuration editor, see "Module Configuration Editor Overview" on page 12-1.

### Backlight Settings

If you select **Always On** in the **Backlight Settings**, the LCD backlight will remain on at all times. If you select **Turn off in**, the LCD backlight turns on when an HMI module operation button is pressed and automatically turns off if no operation buttons are pressed for a certain amount of time. Set the time until the backlight automatically turns off to a value in the range of 1 to 65,535 seconds.

The backlight on time can also be changed with the system menu environment settings. If you set the time to 0, the backlight will remain on at all times in the same manner as when **Always On** is selected. For details, see "Setting the LCD Backlight ON Time" on page 7-13.

### Message Settings

These are settings related to the messages displayed on the LCD.

When you execute the MSG instruction, the set message is displayed on the LCD. Set the character set, scroll unit, scroll speed, and blink speed of the displayed message.

For details on MSG Instruction, see Chapter 12 "MSG Instruction Common Settings" in the "Ladder Programming Manual".

#### ■ Character Set

This is the character set used in the messages displayed with the MSG instruction. Select from the following.

| Selection | Character Set        | Languages Usable in the MSG Instruction          |
|-----------|----------------------|--|
| European  | ISO-8859-1 (Latin 1) | Italian, English, Dutch, Spanish, German, French |
| Japanese  | Shift-JIS            | Japanese (level 1)                               |
| Chinese   | GB2312               | Chinese (simplified)                             |
| Cyrillic  | ANSI1251             | Russian  |

#### ■ Scroll Unit

This is the unit with which the messages displayed with the MSG instruction are scrolled. Select from the following.

| Selection   | Description                            |
|-------------|--|
| 1 character | Scrolls the text in 1 character units. |
| 1 dot       | Scrolls the text in 1 dot units.       |

#### ■ Scroll Speed

This is the speed with which the messages displayed with the MSG instruction are scrolled. Select from the following.

"500 ms", "600 ms", "700 ms", "800 ms", "900 ms", "1000 ms"

#### ■ Blink Speed

This is the speed with which the messages displayed with the MSG instruction blink or inverted. Select from the following.

"500 ms", "600 ms", "700 ms", "800 ms", "900 ms", "1000 ms"

### Options

These are settings related to the overall display of the HMI module.

#### ■ Menu Language

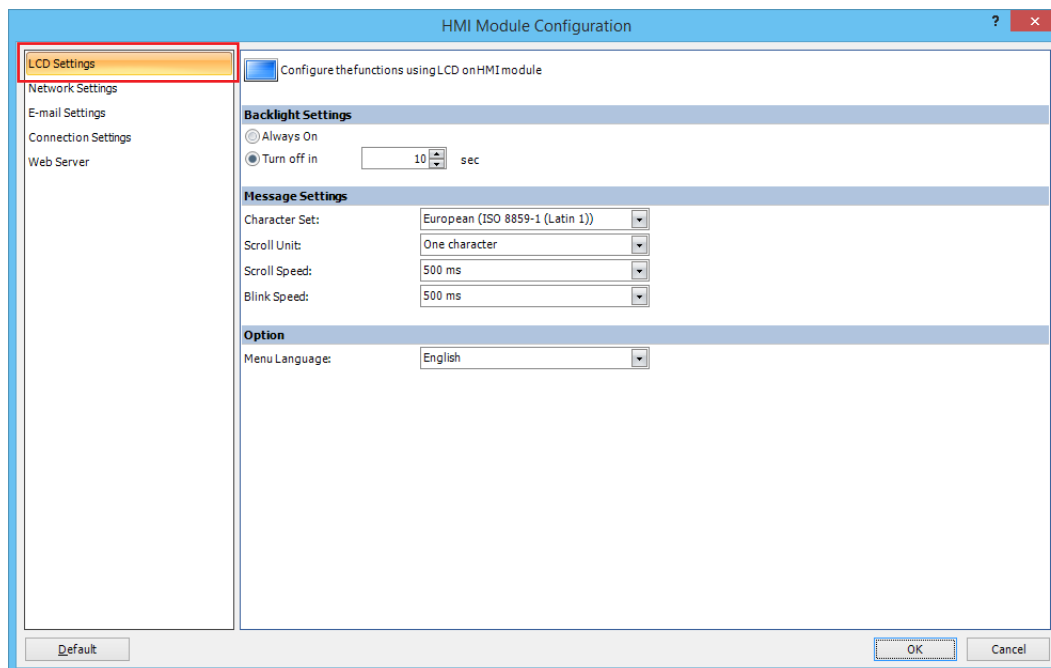
This is the language of the menus displayed on the LCD. Select from the following.

"Japanese", "English", "Chinese"

### Programming WindLDR

This section describes how to use the WindLDR module configuration editor to set the LCD.

1. From the WindLDR menu bar, select **Configuration > Expansion Modules**.
2. Click the inserted HMI module in the module configuration area and click **Configure**.  
The **HMI Module Configuration** dialog box is displayed.
3. Click **LCD Settings**.



4. Configure the settings in **Backlight Settings**, **Message Settings**, and **Options**.
5. Click **OK**.

This concludes configuring the settings.

## About the Menu Screen

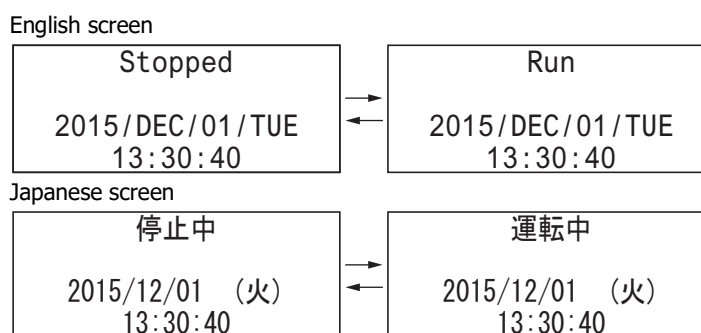
This section describes the menu screen displayed on the HMI module LCD.

When switching from the standard screen to the system menu screen, the menu items are displayed on the LCD.

### Standard Screen

The standard screen is the screen that is displayed after the FC6A is turned on. It displays the operation status (run/stopped) and the current date and time.

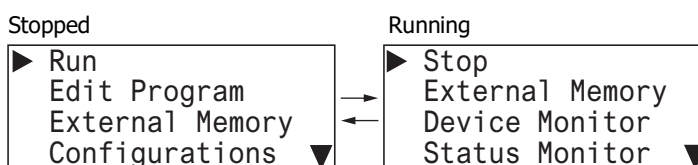
In the initial state, the English screen in the following diagram is displayed when the power is first turned on. To switch to the Japanese menu, see "Changing the Menu Language" on page 7-12.



### System Menu

On the standard screen, press the **ESC** (ESC) button while pressing the **OK** (OK) button to display the system menu.

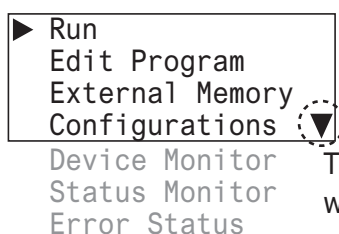
You can execute operations, such as running and stopping the user program, monitoring devices, and modifying the settings, on the system menu. The menu items displayed on the LCD differ according to the operating status (running/stopped) of the user program.



#### ■ System Menu when FC6A is stopped

The menu items displayed while the user program is stopped are as follows.

- Run
- Edit Program
- External Memory
- Configurations
- Device Monitor
- Status Monitor
- Error Status

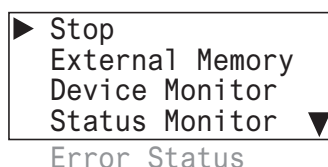


The ▼ symbol is displayed when menu items continue below.

#### ■ System Menu while FC6A is running

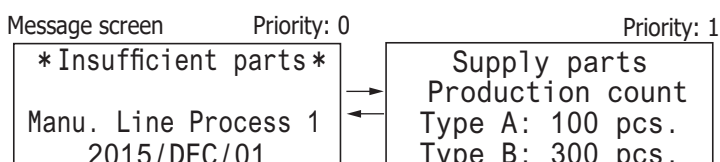
The menu items displayed while the user program is running are as follows.

- Stop
- External Memory
- Device Monitor
- Status Monitor
- Error Status









### Message Screen

The FC6A can display messages on the HMI module LCD using the MSG (message) instruction. While the user program is running, the message is displayed when the input conditions of MSG (message) instructions are ON. Multiple message screens with different priorities can be switched and displayed with the **▲** (up) and **▼** (down) buttons.



Basic Operations



This section describes basic operation methods for the HMI module buttons.

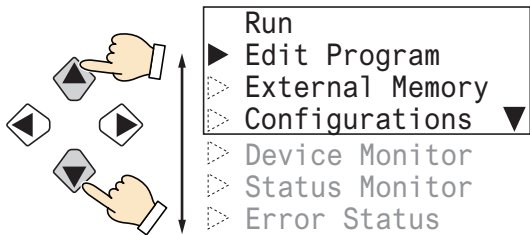
The HMI module has the  (up),  (down),  (left),  (right),  (ESC), and  (OK) buttons, and these buttons are used to operate the screens displayed on the LCD.



Pushing the Switches

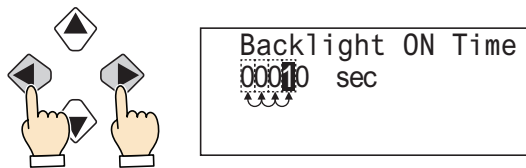
The operation of the buttons differs by how they are pressed. There are two ways to push the buttons, which are detailed below.





| Press/Hold     | Operation  |
|----------------|--|
| Press          | The switch is pressed for 0.1 seconds or more and less than three seconds and then released. |
| Press and hold | The switch is pressed for three seconds or more and then released.                           |

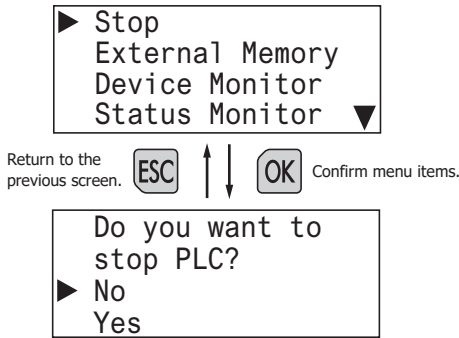
-  (up),  (down) buttons  
Moves the cursor up and down to select menu items. These buttons are also used to change numeric values.



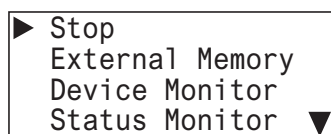
-  (left),  (right) buttons  
Moves the cursor left and right. These buttons are also used to move the digit.



-  (ESC),  (OK) buttons  
Confirm menu items with the  (OK) button. Return to the previous screen with the  (ESC) button.



### List of Button Operations on the System Menu Screen



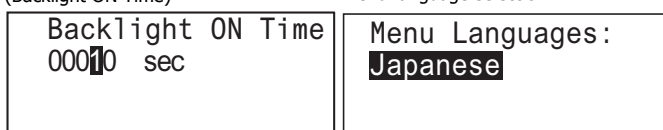
| Switch | Press/Hold     | Basic Operation  |
|--------|----------------|--|
|        | Press          | Moves the cursor up one line. If the cursor is at the start of the item list, nothing happens.           |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Moves the cursor down one item. If the cursor is at the end of the item list, nothing happens.           |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Nothing happens.   |
|        | Press and hold |  |
|        | Press          |  |
|        | Press and hold |  |
|        | Press          | Executes the function selected with the cursor (depending on the function, displays additional menus).   |
|        | Press and hold | Nothing happens.   |
|        | Press          | Returns to the previous screen (the calling screen).   |
|        | Press and hold | While pressing the  (ESC) button, press the  (OK) button to return to the top screen of the system menu. |

### List of Button Operations after Executing a System Menu Item

System menu

(Backlight ON Time)





Menu language selection

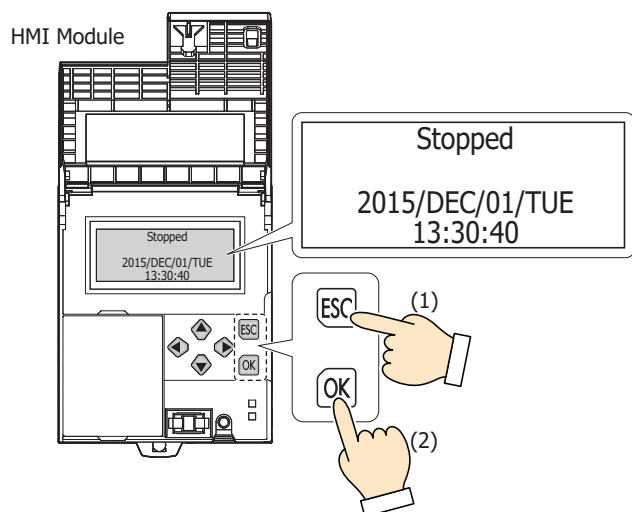


| Switch | Press/Hold     | Basic Operation  |
|--------|----------------|--|
|        | Press          | Adds 1 to the number selected with the cursor.<br>Shows the item above the item selected with the cursor. If the top of the item list is displayed, nothing happens.           |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Subtracts 1 from the number selected with the cursor.<br>Shows the item below the item selected with the cursor. If the bottom of the item list is displayed, nothing happens. |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Moves the cursor once to the left.   |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Moves the cursor once to the right.  |
|        | Press and hold | Repeats the press operation.   |
|        | Press          | Confirms the modification.   |
|        | Press and hold | Nothing happens.   |
|        | Press          | Discards the modification.   |
|        | Press and hold | While pressing the  (ESC) button, press the  (OK) button to discard the modification and return to the top screen of the system menu.  |

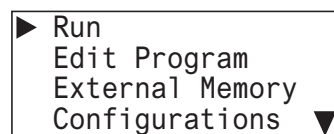
### Switching to the System Menu

This section describes how to switch to the system menu from the standard screen.



1. On the standard screen, while pressing the  (ESC) button, press the  (OK) button.  
In further descriptions, this is explained as " (ESC) +  (OK) buttons". (1) and (2) in the diagram indicate the order to push the switches.



The system menu is displayed.



While the user program is running, the top screen for the running system menu is displayed.

On the system menu screen, press the  (ESC) +  (OK) buttons to return to the standard screen.





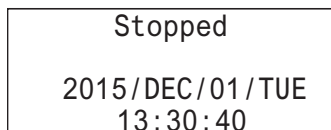
## Switching Run/Stop

This section describes how to run and stop the user program using the HMI module buttons.

### Running the User Program

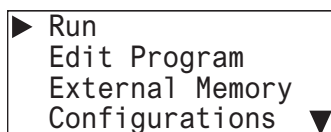
This section describes the steps to run the user program.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

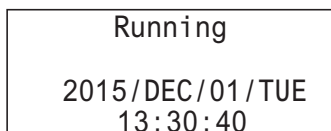


The system menu is displayed.

2. Select **Run** and press the  (OK) button.



The user program is set to run.





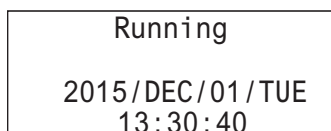
#### Caution

When setting the user program to run by using the buttons on the HMI module, fully ensure the safety before doing so.

### Stopping the User Program

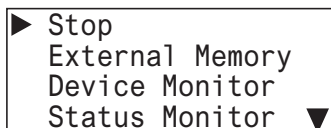
This section describes the steps to stop the user program.



1. On the standard screen, press the  (ESC) +  (OK) buttons.

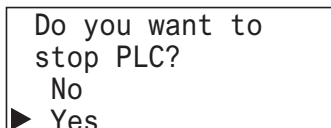


The system menu is displayed.

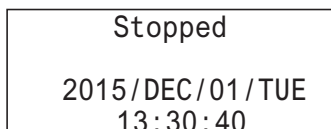
2. Select **Stop** and press the  (OK) button.



3. Select **Yes** with the  (down) button and press the  (OK) button.



The user program is set to stop.



### Editing Programs



This section describes how to reflect TP (timer preset values) and CP (counter preset values) in the user program and how to clear them.

#### Reflecting TP (Timer Preset Values) and CP (Counter Preset Values) in the User Program

**Note:** Even if you modify TP (timer preset values) and CP (counter preset values) using the function in "Monitoring Device Values" on page 7-32, those changes are not reflected in the user program at that time. To reflect the changed preset values in the user program, you must stop the user program and confirm the changes.

When you change TP (timer preset values) and CP (counter preset values) with the function in "Monitoring Device Values" on page 7-32 and attempt to leave device monitor mode, the following message is displayed.

Timer/counter preset  
values are changed.

1. Press the  (ESC) button or the  (OK) button to display the standard screen.

When the user program is running

Running  
T/C is changed  
2015/DEC/01/TUE  
13:30:40



When the user program is stopped

Stopped  
T/C is changed  
2015/DEC/01/TUE  
13:30:40

When TP (timer preset values) and CP (counter preset values) differ from the device values in the ROM, **T/C is changed** is displayed on the standard screen.

To reflect or clear preset value changes, stop the user program. For the steps to stop the user program, see "Switching Run/Stop" on page 7-9.

Stopped  
T/C is changed  
2015/DEC/01/TUE  
13:30:40

2. On the standard screen, press the  (ESC) +  (OK) buttons to display the system menu.




► Run  
Edit Program  
External Memory  
Configurations ▼

3. Select **Edit Program** with the  (up) and  (down) buttons and press the  (OK) button.

Run  
► Edit Program  
External Memory  
Configurations ▼

4. Select **T/C Preset Values** and press the  (OK) button.




► T/C Preset Values

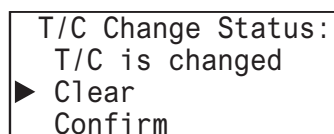
5. Select **Confirm** with the  (up) and  (down) buttons and press the  (OK) button.

T/C Change Status:  
T/C is changed  
Clear  
► Confirm

The changed preset values are written to the user program in the ROM.

**Clearing TP (Timer Preset Values) and CP (Counter Preset Values)**

1. In step 5 of "Reflecting TP (Timer Preset Values) and CP (Counter Preset Values) in the User Program" on page 7-10, select **Clear** with the  (up) and  (down) buttons, and press the  (OK) button.



The changes made to the timer and counter preset values are deleted. The preset values of the user program in the ROM remain as they are before those values are modified. The device values return to the values before they are modified.

**Note:** The preset values can also be reflected to the user program in ROM using WindLDR. Select **Online > Monitor > Start Monitor**. Select **Online > PLC > Status** to display the PLC Status dialog box, and click the **Confirm** button under **TIM/CNT Change Status**. Once preset values are confirmed, they cannot be restored to their previous values, even if they are cleared.



### FC6A Environment Settings

This section describes the operating procedures for environment settings such as the menu language, internal clock, slave number, and the scroll unit, speed, and blinking speed of messages displayed with the message (MSG) instruction.

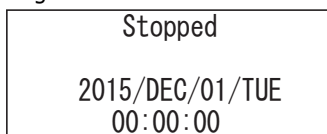
These settings can be configured when the user program is stopped. These cannot be configured while the user program is running.

#### Changing the Menu Language

The menu language (English, Japanese, Chinese) can be changed. These settings can be configured when the user program is stopped. This cannot be changed while the user program is running.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

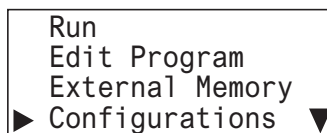
English






The system menu is displayed.

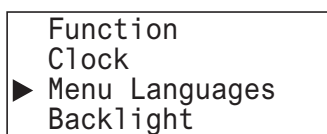
2. Select **Configurations** (When Japanese, 設定) with the  (up) and  (down) buttons and press the  (OK) button.



English



3. Select **Menu Languages** (When Japanese, メニュー言語) with the  (up) and  (down) buttons and press the  (OK) button.

English



4. Select **Japanese** (To switch from Japanese to English, 英語) with the  (down) button, and then press the  (OK) button to confirm.

English



- **Selectable menu languages**

The menu languages that can be selected are as follows.

English/Japanese/Chinese



**Notes:**

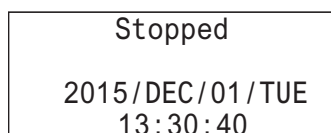
- The initial setting of the menu language is English.
- The initial setting of the menu language can be changed in the expansion modules configuration. For details, see "LCD Settings" on page 7-3.

## Setting the LCD Backlight ON Time

When the HMI module operation buttons are pressed, the backlight turns on. After an operation button is pressed and the backlight turns on, the backlight automatically turns off if the operation buttons are not pressed for a certain amount of time. On the system menu, you can set the time from when the backlight turns on until it turns off. These cannot be configured while the user program is running.

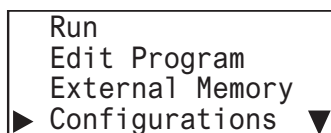
These settings can be configured when the user program is stopped.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

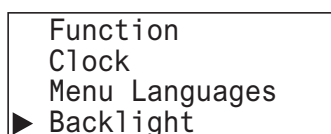


The system menu is displayed.

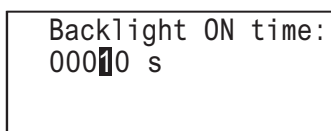
2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.






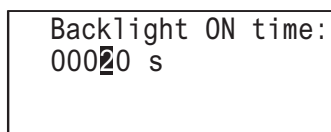
3. Select **Backlight** with the  (up) and  (down) buttons and press the  (OK) button.



4. Move the cursor (digit) with the  (left) and  (right) buttons.



5. Select the value with the  (up) and  (down) buttons, and then press the  (OK) button to set the backlight ON time.



### • Backlight ON time configuration range

The backlight ON time configuration range is as follows.



0 to 65,535 seconds

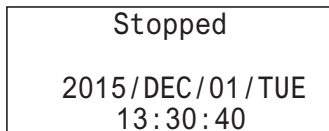
### Notes:

- The default backlight ON time is 10 seconds. The default value can be changed in the expansion modules configuration. For details, see "LCD Settings" on page 7-3.
- The backlight ON time can be changed by modifying the value of D8067.
- When the backlight ON time is set from the system menu, the value of D8067 is modified.
- The value of D8067 returns to the default value when the battery backup dies.
- If the backlight ON time is 0, the backlight is always on.

### Configuring the Slave Number

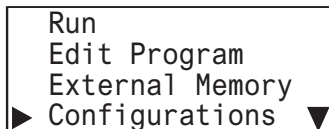
The slave number used in maintenance communication, Modbus RTU communication, and data link slave can be configured. These settings can be configured when the user program is stopped. This cannot be configured while the user program is running.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

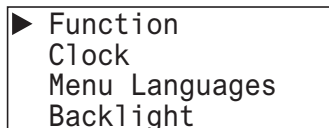





The system menu is displayed.

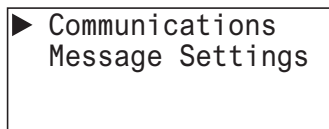
2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.



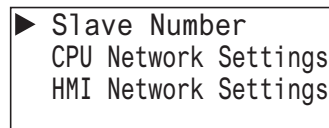
3. Select **Function** with the  (up) and  (down) buttons and press the  (OK) button.






4. Select **Communications** with the  (up) and  (down) buttons and press the  (OK) button.

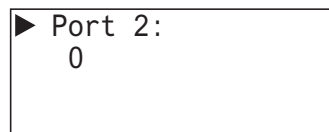


5. Select **Slave Number** with the  (up) and  (down) buttons and press the  (OK) button.

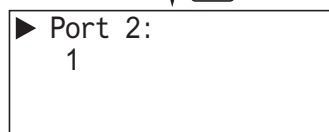
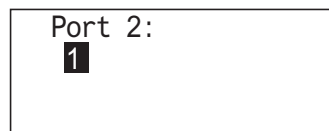


The port selection screen is displayed.

6. Select **Port 2** with the  (up) and  (down) buttons and press the  (OK) button.  
For example, change the slave number of the port 2 to **1**.



7. Specify **1** with the  (up) and  (down) buttons and press the  (OK) button.






You can set the slave number of port 2 to 1.

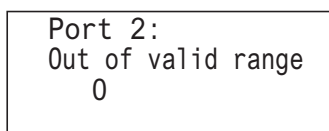
#### • Selectable slave numbers

The slave numbers that can be selected are as follows. (Depending on the communication mode)

- Maintenance communication: 0 to 31
- Modbus RTU slave: 1 to 247
- Data link slave: 1 to 31

**Notes:**

- When the slave number is modified from the system menu, the value in the slave number type (constant/special data register) configured with WindLDR is modified. The slave number type cannot be changed from the system menu.
- If the slave number type configured with WindLDR is **Constant**, when the slave number is modified from the system menu and the  button is pressed, the modified slave number is reflected in the function area settings for the user program. If **Special Data Register**, the values of D8100, D8102 and D8103 are modified. (The modification is not reflected in the function area settings for the user program.)
- The values of D8100, D8102 and D8103 return to the default values when the battery backup dies.
- The slave number range differs according to the communication mode (maintenance communication/Modbus RTU slave/data link slave). If a value outside the configuration range is set, the following message is displayed. Press the  (ESC) button or the  button to return to the configuration screen, and then set the correct slave number again.





Port 2:  
Out of valid range  
0

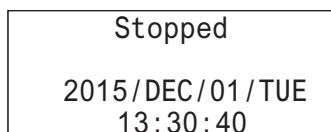
- For maintenance communication, see Chapter 4 "Maintenance Communication via Port 1" in the "FC6A Series MICROSmart Communication Manual". For Modbus RTU slave/Modbus TCP slave, see Chapter 6 "Modbus RTU Communication via RS232C/RS485" in the "FC6A Series MICROSmart Communication Manual".

**Configuring the Network Settings**

The CPU module and HMI module network settings can be configured. These settings are configured when the user program is stopped. These cannot be configured while the user program is running.

**Changing the CPU module network settings****■ Changing the setting**

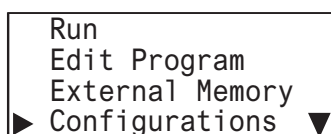
1. On the standard screen, press the  (ESC) +  (OK) buttons.



Stopped  
2015/DEC/01/TUE  
13:30:40

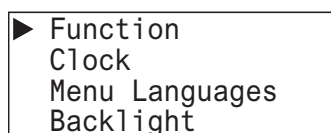
The system menu is displayed.

2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.






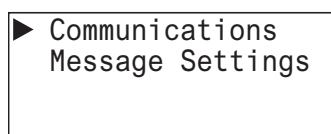
Run  
Edit Program  
External Memory  
▶ Configurations ▼

3. Select **Function** with the  (up) and  (down) buttons and press the  (OK) button.






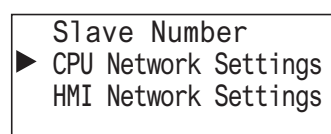
▶ Function  
Clock  
Menu Languages  
Backlight

4. Select **Communications** with the  (up) and  (down) buttons and press the  (OK) button.



▶ Communications  
Message Settings

5. Select **CPU Network Settings** with the  (up) and  (down) buttons and press the  (OK) button.






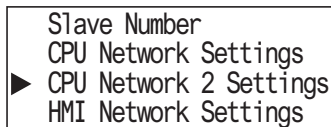
Slave Number  
▶ CPU Network Settings  
HMI Network Settings

The CPU network settings screen is displayed.

## 7: HMI FUNCTION




**Note:** When the Plus CPU module is used, **CPU Network 2 Settings** is displayed.

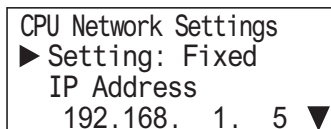
Select **CPU Network 2 Settings** with the  (up) and  (down) buttons and press the  (OK) button.



Slave Number  
CPU Network Settings  
▶ CPU Network 2 Settings  
HMI Network Settings

The following operations are the same with **CPU Network Settings**.

6. Select **Setting** with the  (up) and  (down) buttons and press the  (OK) button.



CPU Network Settings  
▶ Setting: Fixed  
IP Address  
192.168. 1. 5 ▼


7. With the  (up) and  (down) buttons, select **ON** or **OFF**.



Setting:  
**Fixed**  
Data Register:  
DHCP

### Notes:

- If you specify **Data Register**, the network settings cannot be configured because they are acquired from the data registers.
- The current network settings can be checked from the status monitor.




8. Press the  (OK) button to change the CPU module's DHCP setting and to display the CPU Network Settings 1 screen.

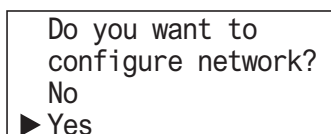


CPU Network Settings  
▶ Setting: Fixed  
IP Address  
192.168. 1. 5 ▼

Next, to change the IP address, subnet mask, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the IP address" on page 7-17, from step 2
- "Changing the subnet mask" on page 7-18, from step 2
- "Changing the gateway" on page 7-25, from step 2
- "Changing the preferred DNS server" on page 7-20, from step 2
- "Changing the alternate DNS server" on page 7-21, from step 2




9. Press the  (ESC) button to display the screen in the following diagram. Select **Yes** with the  (down) button and press the  (OK) button.



Do you want to  
configure network?  
No  
▶ Yes







### ■ Changing the IP address

1. Display the CPU Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-15.
2. Select **IP Address** with the  (up) and  (down) buttons and press the  (OK) button.

```


CPU Network Settings
Setting: Fixed
▶ IP Address
  192.168.  1.  5 ▼
  
```

The range is 000.000.000.000 to 255.255.255.255.  
For example, change the IP address to 192.168.1.6.

3. Move the cursor with the  (left) and  (right) buttons and modify the value with the  (up) and  (down) buttons.

```

IP Address:
192.168.  1.  6
  
```




4. Press the  (OK) button to change the CPU module's IP address to 192.168.1.6 and to display the CPU Network Settings screen.

```

CPU Network Settings
Setting: Fixed
▶ IP Address
  192.168.  1.  6 ▼
  
```

Next, to change the setting, subnet mask, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-15, from step **6**
- "Changing the subnet mask" on page 7-18, from step **2**
- "Changing the gateway" on page 7-19, from step **2**
- "Changing the preferred DNS server" on page 7-20, from step **2**
- "Changing the alternate DNS server" on page 7-21, from step **2**

5. Press the  (ESC) button to display the screen in the following diagram.  
Select Yes with the  (down) button and press the  (OK) button.

```

Do you want to
configure network?
No
▶ Yes
  
```

### ■ Changing the subnet mask

1. Display the CPU Network Settings screen with the same procedure as steps 1 through 5 in "Changing the setting" on page 7-15.

```

CPU Network Settings
▶ Setting: Fixed
  IP Address
  192.168.  1.  6 ▼
    
```

2. Select **Subnet Mask** with the ◀ (up) and ▶ (down) buttons and press the  (OK) button.

```

▶ Subnet Mask: ▲
  255.255.255.  0
  Default Gateway
  0.  0.  0.  0 ▼
    
```

The range is 000.000.000.000 to 255.255.255.255.

For example, change the subnet mask to 255.255.254.0.

3. Move the cursor with the ◀ (left) and ▶ (right) buttons and modify the value with the ◀ (up) and ▶ (down) buttons.

```

Subnet Mask
255.255.254. 0
    
```

4. Press the  (OK) button to change the CPU module's subnet mask to 255.255.254.0 and to display the following screen.

```

▶ Subnet Mask: ▲
  255.255.254.  0
  Default Gateway
  0.  0.  0.  0 ▼
    
```

Next, to change the setting, IP address, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-15, from step 6
- "Changing the subnet mask" on page 7-18, from step 2
- "Changing the gateway" on page 7-25, from step 2
- "Changing the preferred DNS server" on page 7-20, from step 2
- "Changing the alternate DNS server" on page 7-21, from step 2

5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ▶ (down) button and press the  (OK) button.

```

Do you want to
configure network?
No
▶ Yes
    
```

### ■ Changing the gateway

1. Display the CPU Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-15.

CPU Network Settings  
 ▶ Setting: Fixed  
 IP Address  
 192.168. 1. 6 ▼

2. Select **Default Gateway** with the ▲ (up) and ▼ (down) buttons and press the  (OK) button.

Subnet Mask ▲  
 255.255.254.0  
 ▶ Default Gateway:  
 0. 0. 0. 0 ▼

The range is 000.000.000.000 to 255.255.255.255.

For example, change the default gateway to 192.168.1.3.

3. Move the cursor with the ◀ (left) and ▶ (right) buttons and modify the value with the ▲ (up) and ▼ (down) buttons.

Default Gateway  
 192.168. 1. 3

4. Press the  (OK) button to change the CPU module's default gateway to 192.168.1.3 and to display the following screen.

Subnet Mask ▲  
 255.255.254.0  
 ▶ Default Gateway:  
 192.168. 1. 3

Next, to change the setting, IP address, subnet mask, preferred DNS server, and alternate DNS server, see the following pages.


- "Changing the setting" on page 7-15, from step **6**
- "Changing the IP address" on page 7-23, from step **2**
- "Changing the subnet mask" on page 7-18, from step **2**
- "Changing the preferred DNS server" on page 7-20, from step **2**
- "Changing the alternate DNS server" on page 7-21, from step **2**

5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ▼ (down) button and press the  (OK) button.




Do you want to  
 configure network?  
 No  
 ▶ Yes

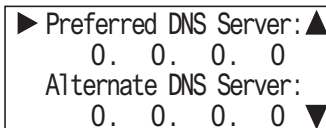
### ■ Changing the preferred DNS server

1. Display the CPU Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-15.







```
CPU Network Settings
▶ Setting: Fixed
  IP Address
  192.168. 1. 6 ▼
```

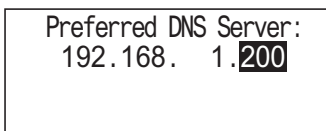
2. Select **Preferred DNS Server** with the  (up) and  (down) buttons and press the  (OK) button.




```
▶ Preferred DNS Server: ▲
  0. 0. 0. 0
Alternate DNS Server:
  0. 0. 0. 0 ▼
```

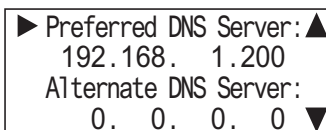
The range is 000.000.000.000 to 255.255.255.255.  
For example, change the preferred DNS server to 192.168.1.200.

3. Move the cursor with the  (left) and  (right) buttons and modify the value with the  (up) and  (down) buttons.






```
Preferred DNS Server:
192.168. 1. 200
```

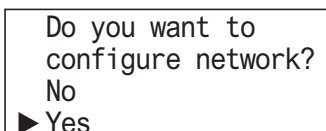
4. Press the  (OK) button to change the CPU module's preferred DNS server to 192.168.1.200 and to display the following screen.



```
▶ Preferred DNS Server: ▲
  192.168. 1. 200
Alternate DNS Server:
  0. 0. 0. 0 ▼
```

Next, to change the setting, IP address, subnet mask, gateway, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-15, from step **6**
  - "Changing the IP address" on page 7-23, from step **2**
  - "Changing the subnet mask" on page 7-18, from step **2**
  - "Changing the preferred DNS server" on page 7-20, from step **2**
  - "Changing the alternate DNS server" on page 7-21, from step **2**
5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the  (down) button and press the  (OK) button.






```
Do you want to
configure network?
No
▶ Yes
```

### ■ Changing the alternate DNS server

1. Display the CPU Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-15.

```

CPU Network Settings
▶ Setting: Fixed
  IP Address
    192.168.  1.  6 ▼
  
```





2. Select **Alternate DNS Server** with the  (up) and  (down) buttons and press the  (OK) button.

```

Preferred DNS Server:▲
    192.168.  1.200
▶ Alternate DNS Server:
    0.  0.  0.  0 ▼
  
```

The range is 000.000.000.000 to 255.255.255.255.

For example, change the alternate DNS server to 192.168.1.201.

3. Move the cursor with the  (left) and  (right) buttons and modify the value with the  (up) and  (down) buttons.

```




Alternate DNS Server:
    192.168.  1.201
  
```

4. Press the  (OK) button to change the CPU module's alternate DNS server to 192.168.1.201 and to display the following screen.

```

Preferred DNS Server:▲
    192.168.  1.200
▶ Alternate DNS Server:
    192.168.  1.201 ▼
  
```

Next, to change the setting, IP address, subnet mask, gateway, and preferred DNS server, see the following pages.



- "Changing the setting" on page 7-15, from step **6**
  - "Changing the IP address" on page 7-17, from step **2**
  - "Changing the subnet mask" on page 7-18, from step **2**
  - "Changing the gateway" on page 7-19, from step **2**
  - "Changing the preferred DNS server" on page 7-20, from step **2**
5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the  (down) button and press the  (OK) button.

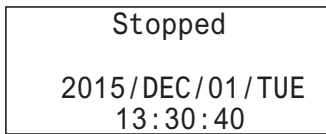
```

Do you want to
configure network?
No
▶ Yes
  
```

### Changing the HMI module network settings

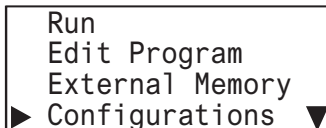
#### ■ Changing the setting

1. On the standard screen, press the  (ESC) +  (OK) buttons.

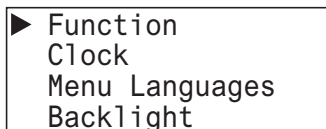





The system menu is displayed.

2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.






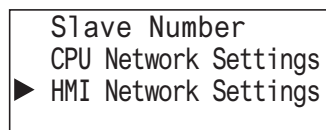
3. Select **Function** with the  (up) and  (down) buttons and press the  (OK) button.






4. Select **Communications** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **HMI Network Settings** with the  (up) and  (down) buttons and press the  (OK) button.



6. Select **Setting** with the  (up) and  (down) buttons and press the  (OK) button.



7. With the  (up) and  (down) buttons, select **ON** or **OFF**.



#### Notes:

- If you specify **Data Register**, the network settings cannot be configured because they are acquired from the data registers.
- The current network settings can be checked from the status monitor.




8. Press the  (OK) button to change the HMI module's **Setting** and to display the HMI Network Settings 1 screen.

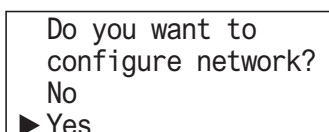


HMI Network Settings ▲  
Setting: Fixed  
▶ IP Address  
192.168. 1. 10 ▼

Next, to change the IP address, subnet mask, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the IP address" on page 7-23, from step 2
- "Changing the subnet mask" on page 7-24, from step 2
- "Changing the gateway" on page 7-25, from step 2
- "Changing the preferred DNS server" on page 7-26, from step 2
- "Changing the alternate DNS server" on page 7-27, from step 2

9. Press the  (ESC) button to display the screen in the following diagram. Select **Yes** with the  (down) button and press the  (OK) button.



Do you want to  
configure network?  
No  
▶ Yes

### ■ Changing the IP address

1. Display the HMI Network Settings screen with the same procedure as steps 1 through 5 in "Changing the setting" on page 7-22.







HMI Network Settings  
▶ Setting: Fixed  
IP Address  
192.168. 1. 10 ▼

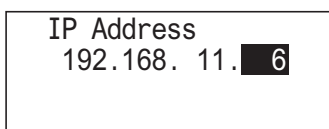
2. Select **IP Address** on HMI Network Settings with the  (up) and  (down) buttons and press the  (OK) button.




HMI Network Settings ▲  
Setting: Fixed  
▶ IP Address  
192.168. 1. 10 ▼

The range is 000.000.000.000 to 255.255.255.255.  
For example, change the IP address to 192.168.11.6.

3. Move the cursor with the  (left) and  (right) buttons and modify the value with the  (up) and  (down) buttons.



IP Address  
192.168. 11. 6

4. Press the  (OK) button to change the HMI module's IP address to 192.168.11.6 and to display the following screen.

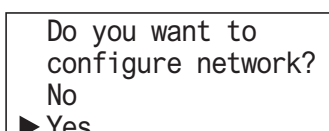


HMI Network Settings ▲  
Setting: Fixed  
▶ IP Address  
192.168. 11. 6 ▼

Next, to change the setting, subnet mask, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-22, from step 5
- "Changing the subnet mask" on page 7-24, from step 2
- "Changing the gateway" on page 7-25, from step 2
- "Changing the preferred DNS server" on page 7-26, from step 2
- "Changing the alternate DNS server" on page 7-27, from step 2

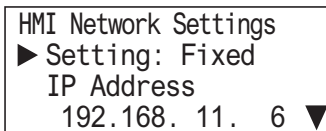
5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the  (down) button and press the  (OK) button.



Do you want to  
configure network?  
No  
▶ Yes

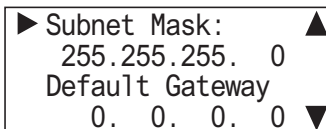
### ■ Changing the subnet mask

1. Display the HMI Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-22.



HMI Network Settings  
▶ Setting: Fixed  
IP Address  
192.168.11.6 ▼

2. Select **Subnet Mask** with the ▲ (up) and ▼ (down) buttons and press the  (OK) button.

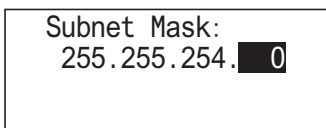


▶ Subnet Mask: ▲  
255.255.255.0  
Default Gateway  
0.0.0.0 ▼

The range is 000.000.000.000 to 255.255.255.255.

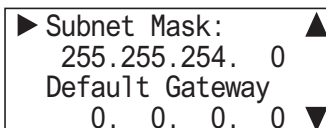
For example, change the subnet mask to 255.255.254.0.

3. Move the cursor with the ◀ (left) and ▶ (right) buttons and modify the value with the ▲ (up) and ▼ (down) buttons.



Subnet Mask:  
255.255.254.0

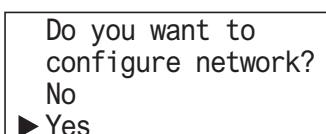
4. Press the  (OK) button to change the HMI module's subnet mask to 255.255.254.0 and to display the following screen.



▶ Subnet Mask: ▲  
255.255.254.0  
Default Gateway  
0.0.0.0 ▼

Next, to change the setting, IP address, gateway, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-22, from step **5**
  - "Changing the IP address" on page 7-23, from step **2**
  - "Changing the gateway" on page 7-25, from step **2**
  - "Changing the preferred DNS server" on page 7-26, from step **2**
  - "Changing the alternate DNS server" on page 7-27, from step **2**
5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ▼ (down) button and press the  (OK) button.



Do you want to  
configure network?  
No  
▶ Yes



### ■ Changing the gateway

1. Display the HMI Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-22.

|                      |   |
|----------------------|---|
| HMI Network Settings |   |
| ▶ Setting: Fixed     |   |
| IP Address           |   |
| 192.168. 11. 6       | ▼ |

2. Select **Default Gateway** with the ◀ (up) and ▶ (down) buttons and press the  (OK) button.

|                   |   |
|-------------------|---|
| Subnet Mask: ▲    |   |
| 255.255.254. 0    |   |
| ▶ Default Gateway |   |
| 0. 0. 0. 0        | ▼ |

The range is 000.000.000.000 to 255.255.255.255.

For example, change the gateway to 192.168.11.3.

3. Move the cursor with the ◀ (left) and ▶ (right) buttons and modify the value with the ▲ (up) and ▼ (down) buttons.

|                 |  |
|-----------------|--|
| Default Gateway |  |
| 192.168. 11. 3  |  |

4. Press the  (OK) button to change the HMI module's gateway to 192.168.11.3 and to display the following screen.

|                    |   |
|--------------------|---|
| Subnet Mask: ▲     |   |
| 255.255.254. 0     |   |
| ▶ Default Gateway: |   |
| 192.168. 11. 3     | ▼ |

Next, to change the setting, IP address, subnet mask, preferred DNS server, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-22
- "Changing the IP address" on page 7-23
- "Changing the subnet mask" on page 7-24
- "Changing the preferred DNS server" on page 7-26, from step **2**
- "Changing the alternate DNS server" on page 7-27, from step **2**

5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ▶ (down) button and press the  (OK) button.

|                                      |  |
|--------------------------------------|--|
| Do you want to<br>configure network? |  |
| No                                   |  |
| ▶ Yes                                |  |

### ■ Changing the preferred DNS server

1. Display the HMI Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-22.

HMI Network Settings  
▶ Setting: Fixed  
IP Address  
192.168. 11. 6 ▼

2. Select **Preferred DNS Server** with the ◀ (up) and ▶ (down) buttons and press the [OK] (OK) button.

▶ Preferred DNS Server: ▲  
0. 0. 0. 0  
Alternate DNS Server:  
0. 0. 0. 0 ▼

The range is 000.000.000.000 to 255.255.255.255.  
For example, change the preferred DNS server to 192.168.11.200.

3. Move the cursor with the ◀ (left) and ▶ (right) buttons and modify the value with the ▲ (up) and ▼ (down) buttons.

Preferred DNS Server:  
192.168. 11. **200**

4. Press the [OK] (OK) button to change the HMI module's preferred DNS server to 192.168.11.200 and to display the following screen.

▶ Preferred DNS Server: ▲  
192.168. 11.200  
Alternate DNS Server:  
0. 0. 0. 0 ▼

Next, to change the setting, IP address, subnet mask, gateway, and alternate DNS server, see the following pages.

- "Changing the setting" on page 7-22, from step **6**
  - "Changing the IP address" on page 7-23, from step **2**
  - "Changing the subnet mask" on page 7-24, from step **2**
  - "Changing the preferred DNS server" on page 7-26, from step **2**
  - "Changing the alternate DNS server" on page 7-27, from step **2**
5. Press the [ESC] (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ▼ (down) button and press the [OK] (OK) button.

Do you want to  
configure network?  
No  
▶ Yes

### ■ Changing the alternate DNS server

1. Display the HMI Network Settings screen with the same procedure as steps **1** through **5** in "Changing the setting" on page 7-22.

HMI Network Settings  
 ▶ Setting: Fixed  
 IP Address  
 192.168. 11. 6 ▼

2. Select **Alternate DNS Server** with the ⬆ (up) and ⬇ (down) buttons and press the  (OK) button.

Preferred DNS Server: ▲  
 192.168. 11.200  
 ▶ Alternate DNS Server:  
 0. 0. 0. 0 ▼

The range is 000.000.000.000 to 255.255.255.255.

For example, change the alternate DNS server to 192.168.11.201.

3. Move the cursor with the ⬅ (left) and ➡ (right) buttons and modify the value with the ⬆ (up) and ⬇ (down) buttons.

Alternate DNS Server:  
 192.168. 11.201

4. Press the  (OK) button to change the HMI module's alternate DNS server to 192.168.11.201 and to display the following screen.

Preferred DNS Server: ▲  
 192.168. 11.200  
 ▶ Alternate DNS Server:  
 192.168. 11.201 ▼

Next, to change the setting, IP address, subnet mask, gateway, and preferred DNS server, see the following pages.

- "Changing the setting" on page 7-22, from step **6**
  - "Changing the IP address" on page 7-23, from step **2**
  - "Changing the subnet mask" on page 7-24, from step **2**
  - "Changing the gateway" on page 7-25, from step **2**
  - "Changing the preferred DNS server" on page 7-26, from step **2**
5. Press the  (ESC) button to display the screen in the following diagram.  
Select **Yes** with the ⬇ (down) button and press the  (OK) button.



Do you want to  
 configure network?  
 No  
 ▶ Yes

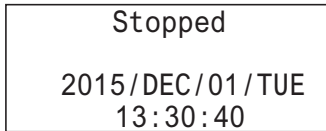
### Changing the Message Display Settings

#### Modifying the Scroll Speed

The scroll speed for messages displayed with the message (MSG) instruction can be configured.

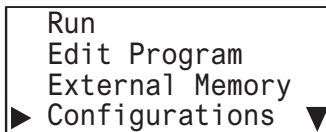
These settings can be configured when the user program is stopped. This cannot be configured while the user program is running.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

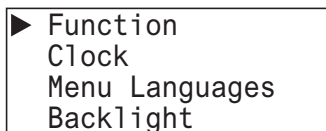





The system menu is displayed.

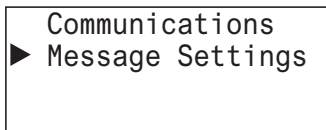
2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.



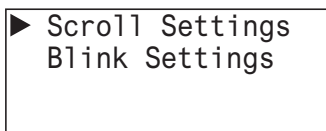
3. Select **Function** with the  (up) and  (down) buttons and press the  (OK) button.



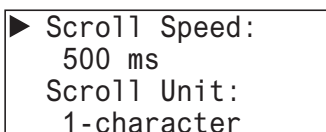
4. Select **Message Settings** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Scroll Settings** with the  (up) and  (down) buttons and press the  (OK) button.

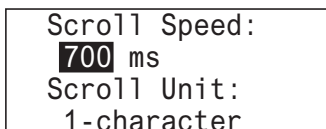


6. Select **Scroll Speed** with the  (up) and  (down) buttons and press the  (OK) button.



7. Modify the value with the  (up) and  (down) buttons and press the  (OK) button.

For example, change the value to 700 ms.



- **Selectable scroll speeds**

The scroll speeds that can be selected are as follows.

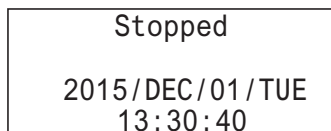
500/600/700/800/900/1000 ms

### Configuring the Scroll Unit

The scroll unit for messages displayed with the message (MSG) instruction can be configured.

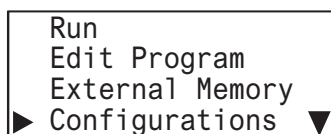
These settings can be configured when the user program is stopped. This cannot be configured while the user program is running.

1. On the standard screen, press the (ESC) + (OK) buttons.

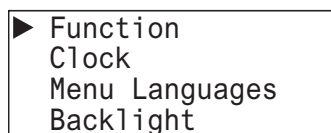


The system menu is displayed.

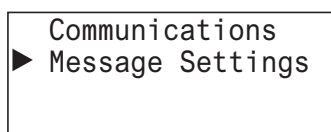
2. Select **Configurations** with the (up) and (down) buttons and press the (OK) button.



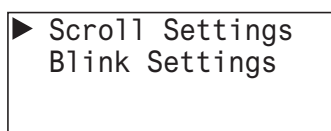
3. Select **Function** with the (up) and (down) buttons and press the (OK) button.



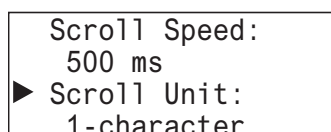
4. Select **Message Settings** with the (up) and (down) buttons and press the (OK) button.



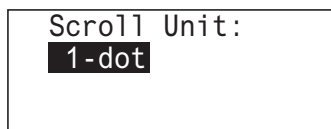
5. Select **Scroll Settings** with the (up) and (down) buttons and press the (OK) button.



6. Select Scroll Unit with the (up) and (down) buttons and press the (OK) button.



7. Modify the scroll unit with the (up) and (down) buttons and press the (OK) button.



- **Selectable scroll units**



The scroll units that can be selected are as follows.

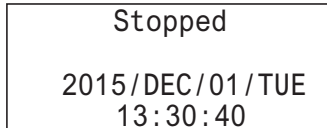
1 character/1-dot

### Configuring the Blinking Speed

The blinking speed for messages displayed with the message (MSG) instruction can be configured.

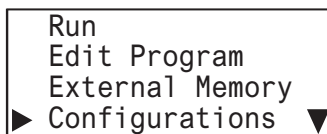
These settings can be configured when the user program is stopped. This cannot be configured while the user program is running.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

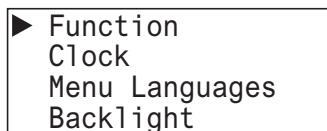





The system menu is displayed.

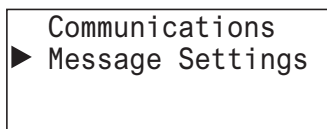
2. Select **Configurations** with the  (up) and  (down) buttons and press the  (OK) button.



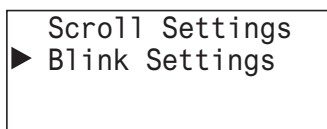
3. Select **Function** with the  (up) and  (down) buttons and press the  (OK) button.



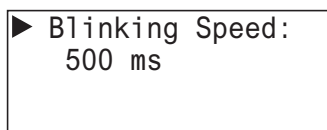
4. Select **Message Settings** with the  (up) and  (down) buttons and press the  (OK) button.



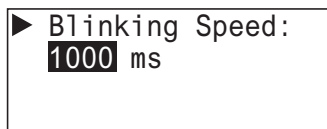
5. Select **Blink Settings** with the  (up) and  (down) buttons and press the  (OK) button.



6. Select **Blinking Speed** with the  (up) and  (down) buttons and press the  (OK) button.



7. Modify the value with the  (up) and  (down) buttons and press the  (OK) button. For example, change the value to 1,000 ms.



- **Selectable blinking speeds**

The blinking speeds that can be selected are as follows.

500/600/700/800/900/1000 ms

## Setting the Calendar/Clock

This section describes how to adjust the internal clock in the CPU module.

These settings can be configured when the user program is stopped. This cannot be adjusted while the user program is running.

1. On the standard screen, press the **ESC** (ESC) + **OK** (OK) buttons.

Stopped  
  
 2015/DEC/01/TUE  
 13:30:40

The system menu is displayed.

2. Select **Configurations** with the **▲** (up) and **▼** (down) buttons and press the **OK** (OK) button.

Run  
 Edit Program  
 External Memory  
**► Configurations ▼**

3. Select **Clock** with the **▲** (up) and **▼** (down) buttons and press the **OK** (OK) button.

Function  
**► Clock**  
 Menu Languages  
 Backlight

4. Move the cursor (year⇄month⇄day⇄hour⇄minute⇄second) with the **◀** (left) and **▶** (right) buttons and modify the value with the **▲** (up) and **▼** (down) buttons.

For example, modify **Day**. Move the cursor to **Day** with the **◀** (left) and **▶** (right) buttons.

2015/12/**01**  
  
 13: 30: 40

5. Modify **Day** with the **▲** (up) and **▼** (down) buttons.

2015/12/**04**  
  
 13: 30: 40

6. From **Day** position, press the **▶** (right) button to next move to the (hour:minute:second) row.

For example, modify **Minute**. Move the cursor to **Minute** with the **◀** (left) and **▶** (right) buttons.

2015/12/04  
  
 13: **30**: 40

7. Modify **Minute** with the **▲** (up) and **▼** (down) buttons.

2015/12/04  
  
 13: **35**: 40

8. Press the **OK** (OK) button to confirm the modifications to the calendar/clock.

### • Calendar/clock configuration range

The calendar/clock configuration range is as follows.

| Year         | Month    | Day      | Hour     | Minute   | Second   |
|--------------|----------|----------|----------|----------|----------|
| 2000 to 2099 | 01 to 12 | 01 to 31 | 00 to 23 | 00 to 59 | 00 to 59 |

### Notes:

- When the date is modified, the day of the week automatically changes. The day of the week is not displayed on the configuration screen.
- If an invalid date is set, an error message is displayed. When the error message is displayed, press the **ESC** (ESC) button or the **OK** (OK) button to return to the configuration screen, and then set a valid date.

Monitoring the FC6A

Monitoring Device Values

You can check device values on the FC6A. The HMI module features two types of device monitors.

Going to device monitor mode from the standard screen

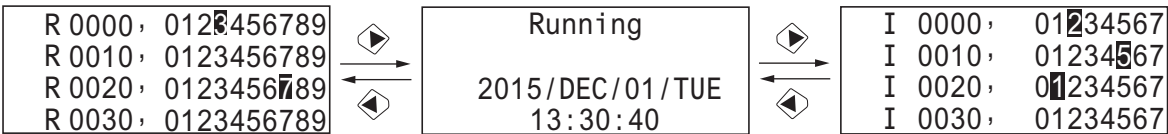
Device values can be checked but not modified.

Running **Device Monitor** on the system menu

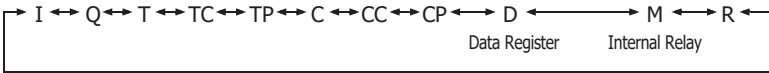
Device values can be checked and modified.

Device values can be monitored regardless of the user program operating status (run/stop). This section describes the device monitor mode when the user program is running.

- 1. If you press the ◀ (left) and ▶ (right) buttons on the standard screen, the FC6A switches to the device monitor mode and the device values can be monitored (Device values cannot be modified). Continue to press the ◀ (left) and ▶ (right) buttons to change the device type.



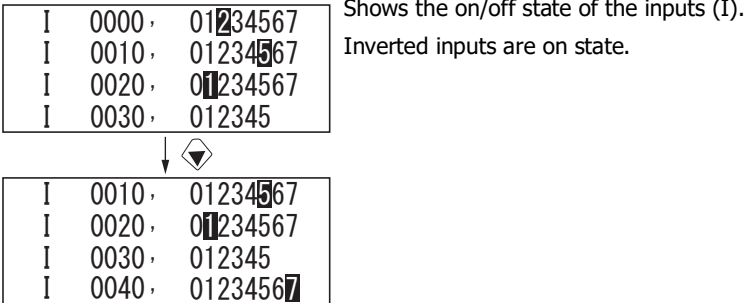
The device type changes in the order below.



I, Q, T, C, M, and R are bit devices.  
TC, TP, CC, CP, and D are word devices.

**Note:** I1000 or greater, Q1000 or greater, and non-retentive data registers are not displayed in the Device Monitor.

- 2. Press the ▲ (up) and ▼ (down) buttons to change the device number.





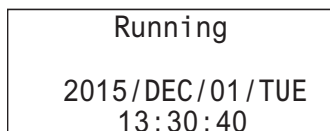
## Modifying Device Values

This section describes how to specify a device and modify that device value.

### Modifying a Bit Device Value

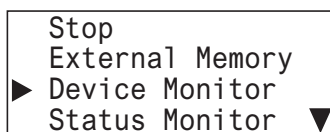
This section describes an example of switching on M0012 while the user program is running.

1. On the standard screen, press the (ESC) + (OK) buttons.

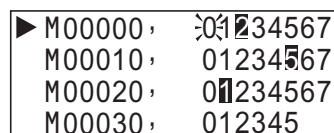


The system menu is displayed.

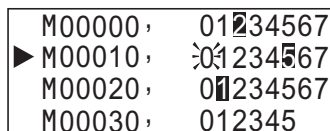
2. Select **Device Monitor** with the (up) and (down) buttons and press the (OK) button.  
The FC6A switches to the Device Monitor mode.



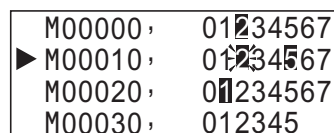
3. Select device type: M (internal relay) with the (left) and (right) buttons and press and hold the (OK) button.  
**0** flashes to indicate the focus is on M0000.



4. With the (up) and (down) buttons, select M0010.  
**0** flashes to indicate the focus is on M0010.





5. Move the cursor to **2** with the (right) button and press the (OK) button.



M0012 turns on.

### Modifying a Word Device Value

This section describes an example of changing D0002 to 500 while the user program is running.




1. On the standard screen, press the  (ESC) +  (OK) buttons.

Running

2015/DEC/01/TUE

13:30:40

The system menu is displayed.




2. Select **Device Monitor** with the  (up) and  (down) buttons and press the  (OK) button.  
The FC6A switches to the Device Monitor mode.

Stop

External Memory

▶ Device Monitor ▼

Status Monitor ▼




3. Select device type: D (Data Register) with the  (left) and  (right) buttons and press and hold the  (OK) button.

▶ D00000: 0

D00001: 0

D00002: 0

D00003: 0

4. Select D0002 with the  (up) and  (down) buttons and press the  (OK) button.

D00000: 0

D00001: 0

▶ D00002: 0

D00003: 0

5. Move the digit with the  (right) button and modify the value with the  (up) and  (down) buttons.

Change Device Val.:

D 00002:00500

DEC (W)

6. Press the  (OK) button to confirm.

D00000: 0



D00001: 0

▶ D00002: 500

D00003: 0

## Monitoring the FC6A Status

You can check the FC6A system software version, scan time, protection status, CPU network settings, and HMI network settings.

1. On the standard screen, press the  (ESC) +  (OK) buttons.

When the user program is running

Running  
2015/DEC/01/TUE  
13:30:40

When the user program is stopped

Stopped  
2015/DEC/01/TUE  
13:30:40

The system menu is displayed.

2. Select **Status Monitor** with the  (up) and  (down) buttons and press the  (OK) button.

When the user program is running

Stop  
External Memory  
Device Monitor  
▶ Status Monitor ▼

When the user program is stopped

External Memory ▲  
Configurations  
Device Monitor  
▶ Status Monitor ▼


3. The system version is displayed. Press the  (down) button.

When the user program is running


System Version:  
1.00  
Run/Stop Status:  
Running ▼

When the user program is stopped


System Version:  
1.00  
Run/Stop Status:  
Stopped ▼

4. The scan time is displayed. Press the  (down) button.

Scan Time: ▲  
Current: 2 ms  
Maximum: 4 ms  
Minimum: 2 ms ▼

5. The upload protection status is displayed. Press the  (down) button.

Protection Status: ▲  
Read Program:  
None ▼

6. The download protection status is displayed. Press the  (down) button.

Write Program: ▲  
None ▼

7. CPU Network Settings 1 is displayed. Press the  (down) button.

CPU Network Settings ▲  
Setting: Fixed  
IP Address  
192.168. 1. 6 ▼

8. CPU Network Settings 2 is displayed. Press the  (down) button.

CPU Network Settings 2 ▲  
Subnet Mask:  
255.255.254. 0 ▼

## 7: HMI FUNCTION

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9. CPU Network Settings 3 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| CPU Network Settings 3 ▲            |
| Default Gateway:<br>192.168. 1. 3 ▼ |

10. CPU Network Settings 4 is displayed. Press the  (down) button.

|   |
|---|
| CPU Network Settings 4 ▲                  |
| Preferred DNS Server:<br>192.168. 1.200 ▼ |

11. CPU Network Settings 5 is displayed. Press the  (down) button.

|   |
|---|
| CPU Network Settings 5 ▲                  |
| Alternate DNS Server:<br>192.168. 1.201 ▼ |

12. CPU Network Settings 6 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| CPU Network Settings 6 ▲            |
| MAC Address:<br>FF-FF-FF-FF-FF-FF ▼ |

When the connected PLC is All-in-One CPU module or CAN J1939 All-in-One CPU module, the screen goes to the step 19.

13. CPU Network Settings 7 is displayed. Press the  (down) button.

|   |
|---|
| CPU Network Settings 7 ▲                        |
| Setting: Fixed<br>IP Address<br>192.168. 2. 6 ▼ |

14. CPU Network Settings 8 is displayed. Press the  (down) button.

|                                  |
|----------------------------------|
| CPU Network Settings 8 ▲         |
| Subnet Mask:<br>255.255.254. 0 ▼ |

15. CPU Network Settings 9 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| CPU Network Settings 9 ▲            |
| Default Gateway:<br>192.168. 2. 3 ▼ |

16. CPU Network Settings 10 is displayed. Press the  (down) button.

|   |
|---|
| CPU Network Settings 10 ▲                 |
| Preferred DNS Server:<br>192.168. 2.200 ▼ |

17. CPU Network Settings 11 is displayed. Press the  (down) button.

|   |
|---|
| CPU Network Settings 11 ▲                 |
| Alternate DNS Server:<br>192.168. 2.201 ▼ |

18. CPU Network Settings 12 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| CPU Network Settings 12 ▲           |
| MAC Address:<br>FF-FF-FF-FF-FF-FF ▼ |

19. HMI Network Settings 1 is displayed. Press the  (down) button.

|                                |
|--------------------------------|
| HMI Network Settings 1 ▲       |
| Setting: Fixed                 |
| IP Address<br>192.168. 11. 6 ▼ |

20. HMI Network Settings 2 is displayed. Press the  (down) button.

|                                  |
|----------------------------------|
| HMI Network Settings 2 ▲         |
| Subnet Mask:<br>255.255.254. 0 ▼ |

21. HMI Network Settings 3 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| HMI Network Settings 3 ▲            |
| Default Gateway<br>192.168. 11. 3 ▼ |

22. HMI Network Settings 4 is displayed. Press the  (down) button.

|  |
|--|
| HMI Network Settings 4 ▲                   |
| Preferred DNS Server:<br>192.168. 11.200 ▼ |

23. HMI Network Settings 5 is displayed. Press the  (down) button.

|  |
|--|
| HMI Network Settings 5 ▲                   |
| Alternate DNS Server:<br>192.168. 11.201 ▼ |

24. HMI Network Settings 6 is displayed. Press the  (down) button.

|                                     |
|-------------------------------------|
| HMI Network Settings 6 ▲            |
| MAC Address:<br>FF-FF-FF-FF-FF-FF ▼ |

### Checking/Clearing Error Information

This section describes how to check error details and how to clear the error when an error occurs while the user program is running and an error message is displayed on the LCD.

#### Checking the Error Details and Clearing the Error


1. When an error occurs, the following message is displayed.

When an error occurs while user program is running and the user program stops

Error!  
PLC is stopped.  
Press OK button for  
more details.




When an error occurs while user program is running and the user program continues running

Error!  
PLC is running.  
Press OK button for  
more details.




2. Press and hold the  (OK) button. The error code is displayed.

▶General Error: 3  
Execution Error:0  
Clear Error



Error details can also be checked from **Error Status** on the system menu.

3. Select the error type with the  (up) and  (down) buttons and press the  (OK) button.  
Only errors that have occurred are displayed.

▶General Error: 3  
Power failure  
Watchdog Timer

4. Press the  (ESC) button.
5. Select **Clear Error** with the  (down) button and press the  (OK) button.

General Error: 3  
Execution Error:0  
▶Clear Error

6. Select **Yes** with the  (down) button and press the  (OK) button.




Do you want to  
clear error code?  
No  
▶Yes

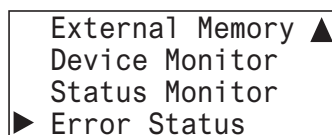
General errors and user program execution error are cleared.

**Note:** For details on error information, see "General Error Codes" on page 13-3.

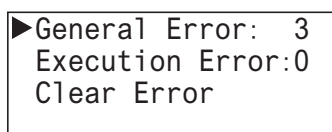
### Checking Error Information from the System Menu




You can check error information from the system menu.

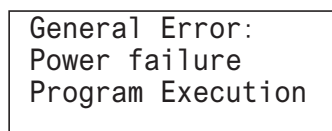
1. On the standard screen, press the  (ESC) +  (OK) buttons.  
The system menu is displayed.
2. Select **Error Status** with the  (up) and  (down) buttons and press the  (OK) button.



3. The error code is displayed.



4. Select the error type with the  (up) and  (down) buttons and press the  (OK) button.  
Only errors that have occurred are displayed.





### Displaying Arbitrary Messages


This section describes how to switch the message displayed on the LCD by executing the message (MSG) instruction.

#### Switching between Multiple Message Screens

When the display conditions for multiple MSG instructions are satisfied, the messages are displayed according to the priorities set for the MSG instructions.

The message with the highest priority is displayed, out of all the MSG instructions with the inputs on, by pressing the  (up) button on the standard screen.

By further pressing the  (up) button, the message with the next highest priority is displayed.

1. On the standard screen, press the  (up) button.

Running

2015/DEC/01/TUE


13:30:40

The message with the highest priority is displayed out of all the MSG instructions with the inputs on.

Today's production count

Type A: 10000 pcs.

Type B: 30000 pcs.

2. Press the  (up) button.  
The message with the next highest priority is displayed.

\*Insufficient parts\*

Manu. Line Process 1


2015/06/01

3. Press the  (down) button.

Today's production count

Type A: 10000 pcs.

Type B: 30000 pcs.

4. Press the  (ESC) button to return to the standard screen.

Running

2015/DEC/01/TUE

13:30:40

For details on the MSG instruction, see Chapter 12 "Display Instructions" in the "Ladder Programming Manual".



## SD Memory Card Maintenance

This section describes how to stop access to the SD memory card inserted into the CPU module and how to format the SD memory card.

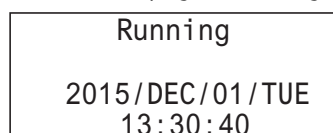
### Stopping Access to the SD Memory Card

Access to the SD memory card inserted into the CPU module is stopped using the HMI module buttons.

Access to the SD memory card can be stopped regardless of whether the user programming is running or stopped.

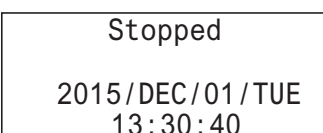
1. On the standard screen, press the (ESC) + (OK) buttons.

When the user program is running



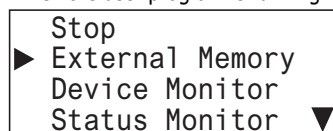
The system menu is displayed.

When the user program is stopped

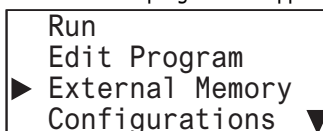


2. Select **External Memory** with the (up) and (down) buttons and press the (OK) button.

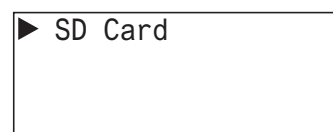
When the user program is running



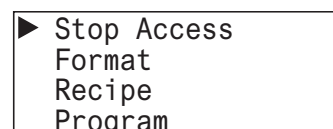
When the user program is stopped



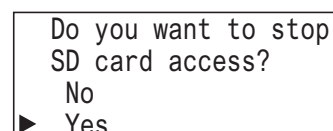
3. Select **SD Card** with the (up) and (down) buttons and press the (OK) button.



4. Select **Stop Access** with the (up) and (down) buttons and press the (OK) button.



5. Select **Yes** with the (down) button and press the (OK) button.



6. While the access to the SD memory card is being stopped, the screen below is displayed. When stopping the access is finished, the screen in step 4 is displayed.





#### Notes:

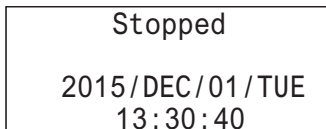
- Set the write-protect switch on the SD memory card to insert into the CPU module to the off position.
- Insert and remove the SD memory card in the direction indicated on the CPU module.
- Do not remove the SD memory card while the access to it is being stopped. There is a risk of damage to the SD memory card and the data stored on it. Check that the SD memory card status indicator LED [SD] is off and then remove the SD memory card from the CPU module.

### Format SD memory card with the FC6A




The SD memory card inserted into the CPU module is formatted using the HMI module buttons. In order to save the log data, format the SD memory card with the CPU module.

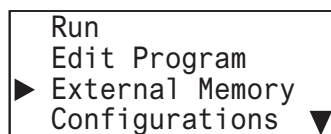
The SD memory card can be formatted when the user program is stopped. The SD memory card cannot be formatted when the user program is running.




1. On the standard screen, press the  (ESC) +  (OK) buttons.

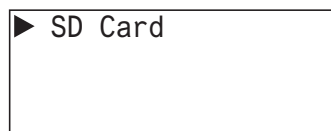





The system menu is displayed.

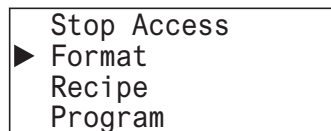
2. Select **External Memory** with the  (up) and  (down) buttons and press the  (OK) button.





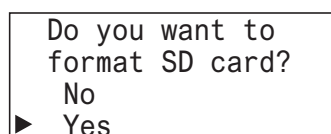
3. Select **SD Card** with the  (up) and  (down) buttons and press the  (OK) button.



4. Select **Format** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Yes** with the  (down) button and press the  (OK) button.





6. While the SD memory card is being formatted, the screen below is displayed. When the format is finished, the screen in step 4 is displayed.

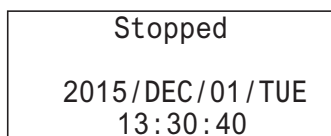


## Reading and Writing Recipe Files




This section describes how to write recipe files to the SD memory card and how to read recipe files from the SD memory card.

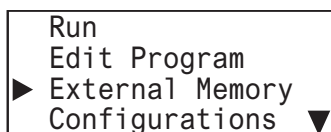
### Writing Recipe Files (SD memory card → CPU module)




1. On the standard screen, press the  (ESC) +  (OK) buttons.

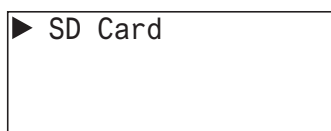





The system menu is displayed.

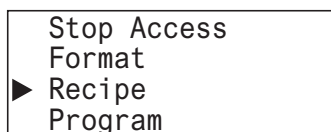
2. Select **External Memory** with the  (up) and  (down) buttons and press the  (OK) button.



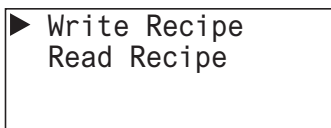
3. Select **SD Card** with the  (up) and  (down) buttons and press the  (OK) button.



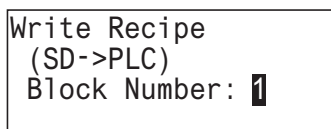
4. Select **Recipe** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Write Recipe** with the  (up) and  (down) buttons and press the  (OK) button.





6. Select **Block Number** with the  (up) and  (down) buttons and press the  (OK) button.

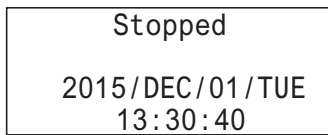


7. While the recipe is being written, the screen below is displayed. When finished, the screen in step 5 is displayed.






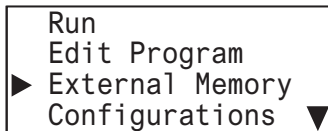
### Reading Recipe Files (CPU module → SD memory card)


1. On the standard screen, press the  (ESC) +  (OK) buttons.

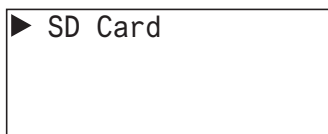





The system menu is displayed.

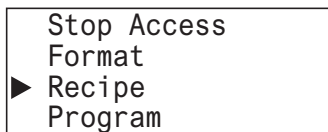
2. Select **External Memory** with the  (up) and  (down) buttons and press the  (OK) button.



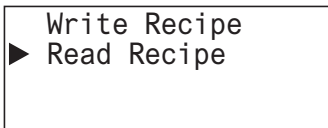
3. Select **SD Card** with the  (up) and  (down) buttons and press the  (OK) button.



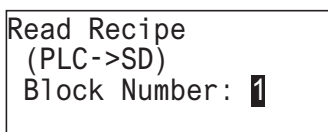
4. Select **Recipe** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Read Recipe** with the  (up) and  (down) buttons and press the  (OK) button.



6. Select **Block Number** with the  (up) and  (down) buttons and press the  (OK) button.



7. While the recipe is being read, the screen below is displayed. When finished, the screen in step 5 is displayed.





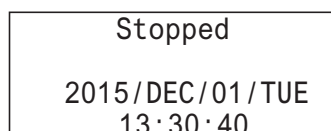
## Uploading/Downloading the User Program

This section describes how to download the user program on the SD memory card to the CPU module and how to upload the user program on the CPU module to the SD memory card when the user program is stopped.

### Downloading the User Program (SD memory card → CPU module)

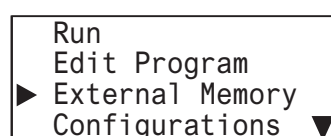
Download the user program on the SD memory card to the CPU module.



1. On the standard screen, press the  (ESC) +  (OK) buttons.

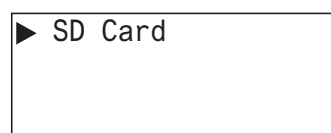


The system menu is displayed.

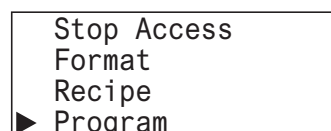
2. Select **External Memory** with the  (up) and  (down) buttons and press the  (OK) button.



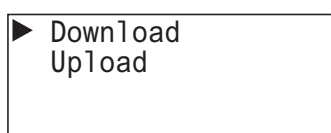
3. Select **SD Card** with the  (up) and  (down) buttons and press the  (OK) button.






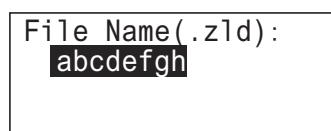
4. Select **Program** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Download** with the  (up) and  (down) buttons and press the  (OK) button.



6. Select the zld file to download with the  (up) and  (down) buttons and press the  (OK) button.<sup>\*1</sup>



<sup>\*1</sup> Files that can be selected to download are zld files stored in the PROGRAM folder on the SD memory card.



7. The following screen is displayed when the user program is being downloaded<sup>\*2</sup>. When finished, the screen in step 4 is displayed.

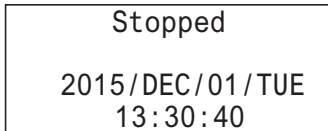


<sup>\*2</sup> When downloading the system software, the system is reset during the download and the screen is reset to the standard screen.




### Uploading the User Program (CPU module → SD memory card)

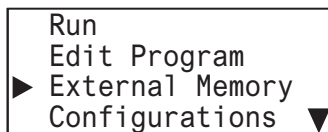
Upload the user program on the CPU module to the SD memory card.




1. On the standard screen, press the  (ESC) +  (OK) buttons.

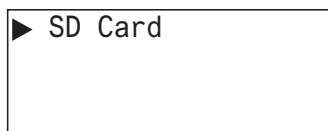


The system menu is displayed.

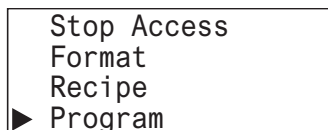
2. Select **External Memory** with the  (up) and  (down) buttons and press the  (OK) button.






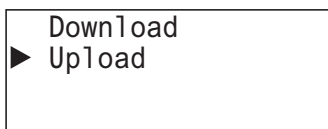
3. Select **SD Card** with the  (up) and  (down) buttons and press the  (OK) button.








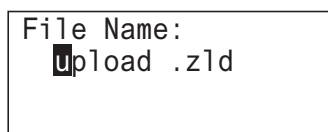
4. Select **Program** with the  (up) and  (down) buttons and press the  (OK) button.



5. Select **Upload** with the  (up) and  (down) buttons and press the  (OK) button.



6. Enter the file name to create by the upload with the  (up),  (down),  (left), and  (right) buttons and press the  (OK) button.\*1



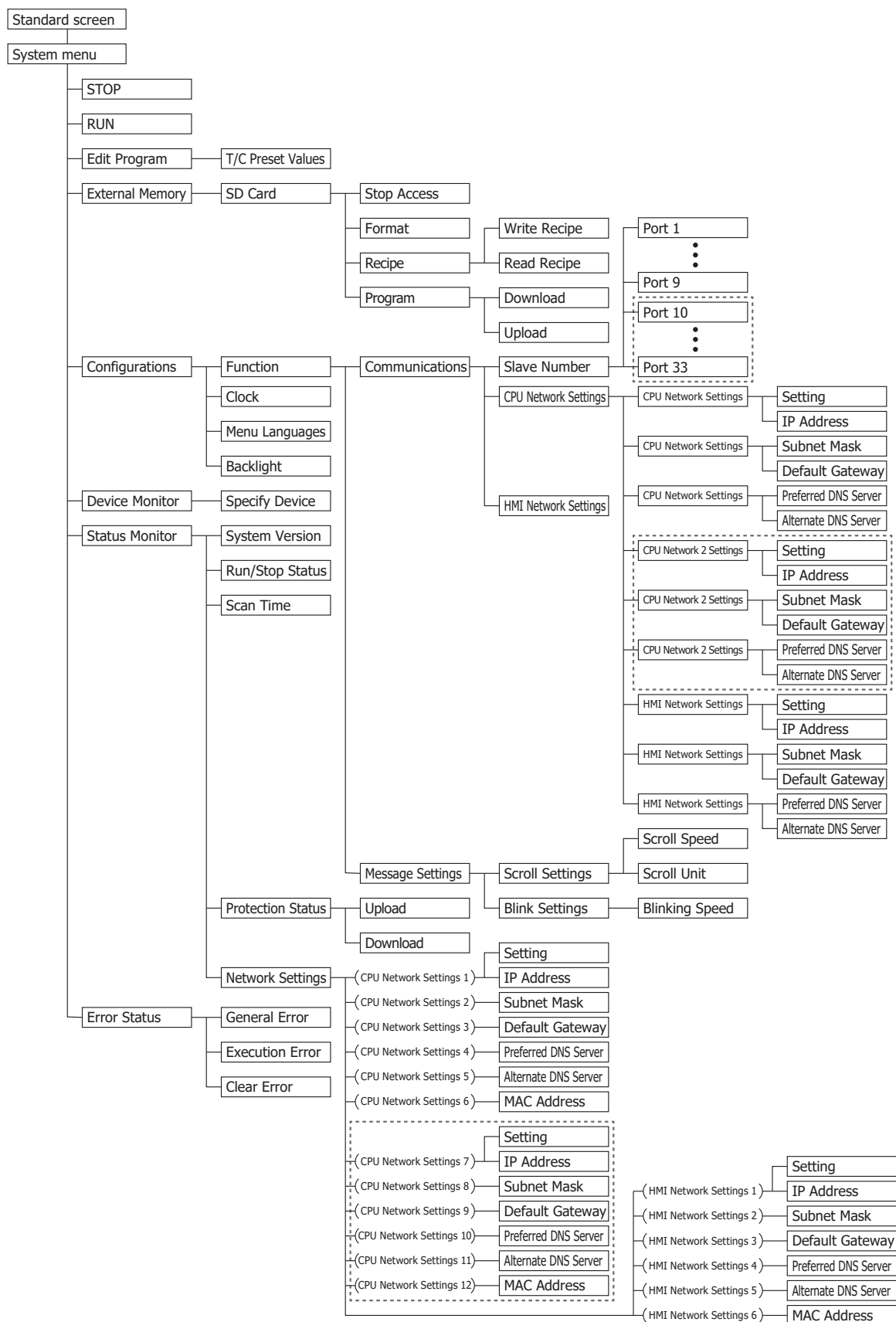
\*1 The file name that can be entered is between one and eight characters in length. The file name is the entered value from the beginning to the space. The uploaded file is stored in the PROGRAM folder on the SD memory card.

7. The screen below is displayed while the user program is uploaded. When the upload is finished, the screen in step 4 is displayed.



## System Menu Hierarchy Diagram

The HMI module system menu hierarchy is as follows. [ ] is displayed only when the Plus CPU module is connected.



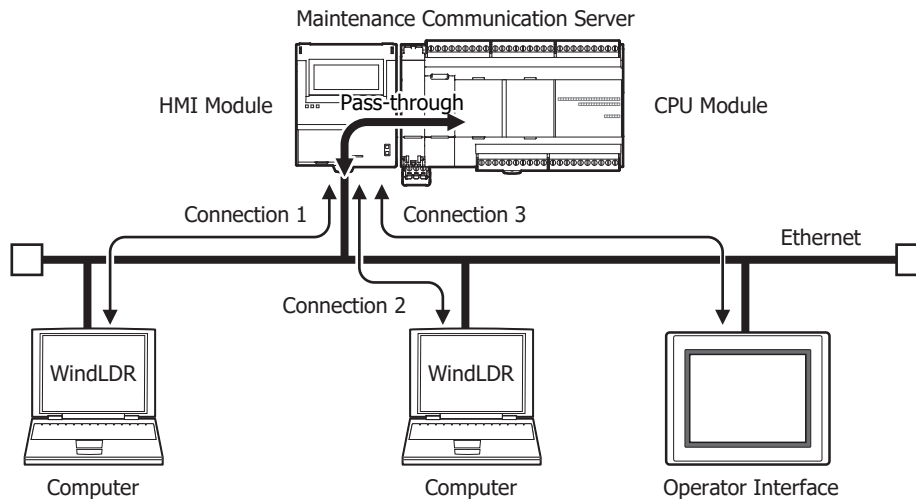
### Communication Functions

This section describes the communication functions that can be used with the HMI module connected to the CPU module.

#### Connection Settings

The HMI module can relay (pass through) CPU module Ethernet communication using a maximum of eight connections.

The usable communication mode is maintenance communication server.



#### Notes:

- For details on the HMI module's network settings and connection settings, see Chapter 3 "Network Settings" in the "FC6A Series MICROSmart Communication Manual".
- For details on the maintenance communication server function, see Chapter 4 "Maintenance Communication via Ethernet Port 1" in the "FC6A Series MICROSmart Communication Manual".

#### Send e-mail function

Up to 255 types of e-mails can be sent by using the HMI module and executing the EMAIL instruction in the user program.

The character sets that can be used are ASCII, Japanese (ISO-2022-JP), Chinese (GB2312), Western European languages (ISO-8859-1), and Unicode (UTF-8).

For Japanese, the title can be set to 100 double-byte characters and the body can be set to around 1,600 characters. The values of data registers can also be embedded in the body of an e-mail.

**Note:** For details on the send e-mail function, see Chapter 12 "Send E-mail Function" in the "FC6A Series MICROSmart Communication Manual".

#### Web server function

Using the HMI module, the status of the CPU module can be checked and device values can be checked and modified with a web browser on a computer.

Web page data created by the user can also be downloaded to the HMI module. The HMI module can store a maximum of 5 MB of data.

Access controls can also be applied by using password authentication.

**Note:** For details on the web server function, see Chapter 13 "Web Server" in the "FC6A Series MICROSmart Communication Manual".



## 8: INSTRUCTIONS REFERENCE

### Introduction

This chapter provides a list of FC6A instructions and describes their functions.

The instructions are divided into basic instructions, which perform sequencing, and advanced instructions, which perform moves, comparisons, Boolean computations, binary arithmetic operations, bit shifts, and other operations.

### Basic Instruction List

| Symbol  | Name   | Function   | See Page<br>(Ladder<br>Programming<br>Manual) |
|---------|--|--|---|
| AND     | And  | Series connection of NO contact  | 4: Basic<br>Instructions                      |
| AND LOD | And Load   | Series connection of circuit blocks                                      |   |
| ANDN    | And Not  | Series connection of NC contact  |   |
| BPP     | Bit Pop  | Restores the result of bit logical operation which was saved temporarily |   |
| BPS     | Bit Push   | Saves the result of bit logical operation temporarily                    |   |
| BRD     | Bit Read   | Reads the result of bit logical operation which was saved temporarily    |   |
| CC=     | Counter Comparison (=)                           | Equal to comparison of counter current value                             |   |
| CC>=    | Counter Comparison (>=)                          | Greater than or equal to comparison of counter current value             |   |
| CDP     | Dual Pulse Reversible Counter                    | Dual pulse reversible counter (0 to 65,535)                              |   |
| CDPD    | Double-Word Dual Pulse Reversible Counter        | Double-word dual pulse reversible counter (0 to 4,294,967,295)           |   |
| CNT     | Adding Counter                                   | Adding counter (0 to 65,535)   |   |
| CNTD    | Double-Word Adding Counter                       | Double-word adding counter (0 to 4,294,967,295)                          |   |
| CUD     | Up/Down Selection Reversible Counter             | Up/down selection reversible counter (0 to 65,535)                       |   |
| CUDD    | Double-Word Up/Down Selection Reversible Counter | Double-word up/down selection reversible counter (0 to 4,294,967,295)    |   |
| DC=     | Data Register Comparison (=)                     | Equal to comparison of data register value                               |   |
| DC>=    | Data Register Comparison (>=)                    | Greater than or equal to comparison of data register value               |   |
| END     | End  | Ends a program   |   |
| JEND    | Jump End   | Ends a jump instruction  |   |
| JMP     | Jump   | Jumps a designated program area  |   |
| LOD     | Load   | Stores intermediate results and reads contact status                     |   |
| LODN    | Load Not   | Stores intermediate results and reads inverted contact status            |   |
| MCR     | Master Control Reset                             | Ends a master control  |   |
| MCS     | Master Control Set                               | Starts a master control  |   |
| OR      | Or   | Parallel connection of NO contact  |   |
| OR LOD  | Or Load  | Parallel connection of circuit blocks                                    |   |
| ORN     | Or Not   | Parallel connection of NC contact  |   |
| OUT     | Output   | Outputs the result of bit logical operation                              |   |
| OUTN    | Output Not                                       | Outputs the inverted result of bit logical operation                     |   |
| RST     | Reset  | Resets output, internal relay, or shift register bit                     |   |
| SET     | Set  | Sets output, internal relay, or shift register bit                       |   |
| SFR     | Shift Register                                   | Forward shift register   |   |
| SFRN    | Shift Register Not                               | Reverse shift register   |   |
| SOTD    | Single Output Down                               | Falling-edge differentiation output                                      |   |
| SOTU    | Single Output Up                                 | Rising-edge differentiation output                                       |   |

## 8: INSTRUCTIONS REFERENCE

| Symbol | Name                   | Function  | See Page<br>(Ladder<br>Programming<br>Manual) |
|--------|------------------------|---|---|
| TIM    | 100-ms Timer           | Subtracting 100-ms timer (0 to 6,553.5 s)           | 4: Basic<br>Instructions                      |
| TIMO   | 100-ms Off-delay Timer | Subtracting 100-ms off-delay timer (0 to 6,553.5 s) |   |
| TMH    | 10-ms Timer            | Subtracting 10-ms timer (0 to 655.35 s)             |   |
| TMHO   | 10-ms Off-delay Timer  | Subtracting 10-ms off-delay timer (0 to 655.35 s)   |   |
| TML    | 1-s Timer              | Subtracting 1-s timer (0 to 65,535 s)               |   |
| TMLO   | 1-s Off-delay Timer    | Subtracting 1-s off-delay timer (0 to 65,535 s)     |   |
| TMS    | 1-ms Timer             | Subtracting 1-ms timer (0 to 65,535 s)              |   |
| TMSO   | 1-ms Off-delay Timer   | Subtracting 1-ms off-delay timer (0 to 65,535 s)    |   |

## Advanced Instruction List

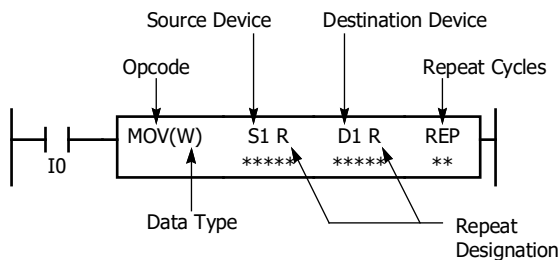
| Group                      | Symbol | Name                                      | Valid Data Type |   |   |   |   | See Page<br>(Ladder<br>Programming<br>Manual) |
|----------------------------|--------|---|-----------------|---|---|---|---|---|
|                            |        |   | W               | I | D | L | F |   |
| <b>NOP</b>                 | NOP    | No Operation                              |                 |   |   |   |   | 3: Instructions<br>Reference                  |
| <b>Move</b>                | MOV    | Move                                      | X               | X | X | X | X | 5: Move<br>Instructions                       |
|                            | MOVN   | Move Not                                  | X               | X | X | X |   |   |
|                            | IMOV   | Indirect Move                             | X               |   | X |   | X |   |
|                            | IMOVN  | Indirect Move Not                         | X               |   | X |   |   |   |
|                            | MOVC   | Move Characters                           |                 |   |   |   |   |   |
|                            | BMOV   | Block Move                                | X               |   |   |   |   |   |
|                            | IBMV   | Indirect Bit Move                         | X               |   |   |   |   |   |
|                            | IBMVN  | Indirect Bit Move Not                     | X               |   |   |   |   |   |
|                            | NSET   | N Data Set                                | X               | X | X | X | X |   |
|                            | NRS    | N Data Repeat Set                         | X               | X | X | X | X |   |
|                            | XCHG   | Exchange                                  | X               |   | X |   |   |   |
|                            | TCCST  | Timer/Counter Current Value Store         | X               |   | X |   |   |   |
| <b>Data Comparison</b>     | CMP=   | Compare Equal To                          | X               | X | X | X | X | 6: Data<br>Comparison<br>Instructions         |
|                            | CMP<>  | Compare Unequal To                        | X               | X | X | X | X |   |
|                            | CMP<   | Compare Less Than                         | X               | X | X | X | X |   |
|                            | CMP>   | Compare Greater Than                      | X               | X | X | X | X |   |
|                            | CMP<=  | Compare Less Than or Equal To             | X               | X | X | X | X |   |
|                            | CMP>=  | Compare Greater Than or Equal To          | X               | X | X | X | X |   |
|                            | ICMP>= | Interval Compare Greater Than or Equal To | X               | X | X | X | X |   |
|                            | LC=    | Load Compare Equal To                     | X               | X | X | X | X |   |
|                            | LC<>   | Load Compare Unequal To                   | X               | X | X | X | X |   |
|                            | LC<    | Load Compare Less Than                    | X               | X | X | X | X |   |
|                            | LC>    | Load Compare Greater Than                 | X               | X | X | X | X |   |
|                            | LC<=   | Load Compare Less Than or Equal To        | X               | X | X | X | X |   |
|                            | LC>=   | Load Compare Greater Than or Equal To     | X               | X | X | X | X |   |
|                            |        |   |                 |   |   |   |   |   |
| <b>Binary Arithmetic</b>   | ADD    | Addition                                  | X               | X | X | X | X | 7: Binary<br>Arithmetic<br>Instructions       |
|                            | SUB    | Subtraction                               | X               | X | X | X | X |   |
|                            | MUL    | Multiplication                            | X               | X | X | X | X |   |
|                            | DIV    | Division                                  | X               | X | X | X | X |   |
|                            | INC    | Increment                                 | X               | X | X | X |   |   |
|                            | DEC    | Decrement                                 | X               | X | X | X |   |   |
|                            | ROOT   | Root                                      | X               |   | X |   | X |   |
|                            | SUM    | Sum (ADD)                                 | X               | X | X | X | X |   |
|                            |        | Sum (XOR)                                 | X               |   |   |   |   |   |
| <b>Boolean Computation</b> | RNDM   | Random                                    | X               |   |   |   |   | 8: Boolean<br>Computation<br>Instructions     |
|                            | ANDW   | AND Word                                  | X               |   | X |   |   |   |
|                            | ORW    | OR Word                                   | X               |   | X |   |   |   |
| <b>Shift and Rotate</b>    | XORW   | Exclusive OR Word                         | X               |   | X |   |   | 9: Shift / Rotate<br>Instructions             |
|                            | SFTL   | Shift Left                                |                 |   |   |   |   |   |
|                            | SFTR   | Shift Right                               |                 |   |   |   |   |   |
|                            | BCDLS  | BCD Left Shift                            |                 |   | X |   |   |   |
|                            | WSFT   | Word Shift                                | X               |   |   |   |   |   |
|                            | ROTL   | Rotate Left                               | X               |   | X |   |   |   |
| <b>Shift and Rotate</b>    | ROTR   | Rotate Right                              | X               |   | X |   |   |   |

## 8: INSTRUCTIONS REFERENCE

| Group                 | Symbol | Name                          | Valid Data Type |   |   |   |   | See Page<br>(Ladder<br>Programming<br>Manual) |
|-----------------------|--------|-------------------------------|-----------------|---|---|---|---|---|
|                       |        |                               | W               | I | D | L | F |   |
| Data Conversion       | HTOB   | Hex to BCD                    | X               |   | X |   |   | 10: Data<br>Conversion<br>Instructions        |
|                       | BTOH   | BCD to Hex                    | X               |   | X |   |   |   |
|                       | HTOA   | Hex to ASCII                  | X               |   |   |   |   |   |
|                       | ATOH   | ASCII to Hex                  | X               |   |   |   |   |   |
|                       | BTOA   | BCD to ASCII                  | X               |   | X |   |   |   |
|                       | ATOB   | ASCII to BCD                  | X               |   | X |   |   |   |
|                       | ENCO   | Encode                        |                 |   |   |   |   |   |
|                       | DECO   | Decode                        |                 |   |   |   |   |   |
|                       | BCNT   | Bit Count                     |                 |   |   |   |   |   |
|                       | ALT    | Alternate Output              |                 |   |   |   |   |   |
|                       | CVDT   | Convert Data Type             | X               | X | X | X | X |   |
|                       | DTDV   | Data Divide                   | X               |   |   |   |   |   |
|                       | DTCB   | Data Combine                  | X               |   |   |   |   |   |
|                       | SWAP   | Data Swap                     | X               |   | X |   |   |   |
| Week Programmer       | WKTIM  | Week Timer                    |                 |   |   |   |   | 11: Week<br>Programmer<br>Instructions        |
|                       | WKTBL  | Week Table                    |                 |   |   |   |   |   |
|                       | WEEK   | Weekly Timer                  |                 |   |   |   |   |   |
|                       | YEAR   | Yearly Timer                  |                 |   |   |   |   |   |
| Interface             | MSG    | Message                       |                 |   |   |   |   | 12: Display<br>Instructions                   |
|                       | DISP   | Display                       |                 |   |   |   |   |   |
|                       | DGRD   | Digital Read                  |                 |   |   |   |   |   |
| Program Branching     | LABEL  | Label                         |                 |   |   |   |   | 13: Program<br>Branching<br>Instructions      |
|                       | LJMP   | Label Jump                    |                 |   |   |   |   |   |
|                       | LCAL   | Label Call                    |                 |   |   |   |   |   |
|                       | LRET   | Label Return                  |                 |   |   |   |   |   |
|                       | DJNZ   | Decrement Jump Non-zero       |                 |   |   |   |   | 15: Interrupt<br>Control Instructions         |
|                       | DI     | Disable Interrupt             |                 |   |   |   |   |   |
|                       | EI     | Enable Interrupt              |                 |   |   |   |   | 14: Refresh<br>Instructions                   |
|                       | IOREF  | I/O Refresh                   |                 |   |   |   |   |   |
|                       | HSCRF  | High-speed Counter Refresh    |                 |   |   |   |   |   |
|                       | FRQRF  | Frequency Measurement Refresh |                 |   |   |   |   |   |
| Coordinate Conversion | COMRF  | Communication Refresh         |                 |   |   |   |   | 16: Coordinate<br>Conversion<br>Instructions  |
|                       | XYFS   | XY Format Set                 | X               | X |   |   |   |   |
|                       | CVXTY  | Convert X to Y                | X               | X |   |   |   |   |
|                       | CVYTX  | Convert Y to X                | X               | X |   |   |   | 17: Average<br>Instructions                   |
| Pulse                 | AVRG   | Average                       | X               | X | X | X | X | 18: Pulse Output<br>Instructions              |
|                       | PULS1  | Pulse Output 1                |                 |   |   |   |   |   |
|                       | PULS2  | Pulse Output 2                |                 |   |   |   |   |   |
|                       | PULS3  | Pulse Output 3                |                 |   |   |   |   |   |
|                       | PULS4  | Pulse Output 4                |                 |   |   |   |   |   |
|                       | PWM1   | Pulse Width Modulation 1      |                 |   |   |   |   |   |
|                       | PWM2   | Pulse Width Modulation 2      |                 |   |   |   |   |   |
|                       | PWM3   | Pulse Width Modulation 3      |                 |   |   |   |   |   |
|                       | PWM4   | Pulse Width Modulation 4      |                 |   |   |   |   |   |
|                       | RAMP1  | Ramp Pulse Output 1           |                 |   |   |   |   |   |
|                       | RAMP2  | Ramp Pulse Output 2           |                 |   |   |   |   |   |
|                       | RAMPL  | Linear Interpolation Control  |                 |   |   |   |   |   |
|                       | ZRN1   | Zero Return 1                 |                 |   |   |   |   |   |
|                       | ZRN2   | Zero Return 2                 |                 |   |   |   |   |   |
|                       | ARAMP1 | Advanced Ramp 1               |                 |   |   |   |   |   |
|                       | ARAMP2 | Advanced Ramp 2               |                 |   |   |   |   |   |
|                       | ABS    | Set Absolute Position         |                 |   |   |   |   |   |
|                       | JOG    | JOG Operation                 |                 |   |   |   |   |   |

| Group                          | Symbol | Name                          | Valid Data Type |   |   |   |   | See Page<br>(Ladder<br>Programming<br>Manual)                       |
|--------------------------------|--------|-------------------------------|-----------------|---|---|---|---|---|
|                                |        |                               | W               | I | D | L | F |   |
| <b>PID Control</b>             | PID    | PID Control (FC5A compatible) |                 |   |   |   |   | 19: PID Control<br>Instructions                                     |
|                                | PIDA   | PID Control                   |                 |   |   |   |   |   |
|                                | PIDD   | PID with Derivative Decay     |                 |   |   |   |   |   |
| <b>Dual / Teaching Timer</b>   | DTML   | 1-s Dual Timer                |                 |   |   |   |   | 20: Dual /<br>Teaching Timer<br>Instructions                        |
|                                | DTIM   | 100-ms Dual Timer             |                 |   |   |   |   |   |
|                                | DTMH   | 10-ms Dual Timer              |                 |   |   |   |   |   |
|                                | DTMS   | 1-ms Dual Timer               |                 |   |   |   |   |   |
|                                | TTIM   | Teaching Timer                |                 |   |   |   |   |   |
| <b>Trigonometric Function</b>  | RAD    | Degree to Radian              |                 |   |   |   | X | 21: Trigonometric<br>Function<br>Instructions                       |
|                                | DEG    | Radian to Degree              |                 |   |   |   | X |   |
|                                | SIN    | Sine                          |                 |   |   |   | X |   |
|                                | COS    | Cosine                        |                 |   |   |   | X |   |
|                                | TAN    | Tangent                       |                 |   |   |   | X |   |
|                                | ASIN   | Arc Sine                      |                 |   |   |   | X |   |
|                                | ACOS   | Arc Cosine                    |                 |   |   |   | X |   |
|                                | ATAN   | Arc Tangent                   |                 |   |   |   | X |   |
| <b>Logarithm / Power</b>       | LOGE   | Natural Logarithm             |                 |   |   |   | X | 22: Logarithm /<br>Power<br>Instructions                            |
|                                | LOG10  | Common Logarithm              |                 |   |   |   | X |   |
|                                | EXP    | Exponent                      |                 |   |   |   | X |   |
|                                | POW    | Power                         |                 |   |   |   | X |   |
| <b>File Data Processing</b>    | FIFO   | FIFO Format                   | X               |   |   |   |   | 23: File Data<br>Processing<br>Instructions                         |
|                                | FIEX   | First-In Execute              | X               |   |   |   |   |   |
|                                | FOEX   | First-Out Execute             | X               |   |   |   |   |   |
|                                | NDSRC  | N Data Search                 | X               | X | X | X | X |   |
| <b>Clock</b>                   | TADD   | Time Addition                 |                 |   |   |   |   | 24: Clock<br>Instructions   |
|                                | TSUB   | Time Subtraction              |                 |   |   |   |   |   |
|                                | HTOS   | HMS to S                      |                 |   |   |   |   |   |
|                                | STOH   | S to HMS                      |                 |   |   |   |   |   |
|                                | HOURL  | Hour Meter                    |                 |   |   |   |   |   |
| <b>Data Logging</b>            | DLOG   | Data Logging                  |                 |   |   |   |   | 25: Data Log<br>Instructions  |
|                                | TRACE  | Data Trace                    |                 |   |   |   |   |   |
| <b>Script</b>                  | SCRPT  | Script                        | X               | X | X | X | X | 26: Script  |
| <b>Flow Volume Calculation</b> | SCALE  | Convert Analog Input          | X               | X |   |   |   | 27: Flow<br>Calculation<br>Instructions                             |
|                                | FLWA   | Analog Flow Totalizer         |                 |   |   |   |   |   |
|                                | FLWP   | Pulse Flow Totalizer          | X               |   | X |   |   |   |
| <b>User-defined Macro</b>      | UMACRO | User-defined Macro            |                 |   |   |   |   | 28: User-defined<br>Macro Instruction                               |
| <b>User Communication</b>      | TXD    | Transmit                      |                 |   |   |   |   | Communication<br>Manual<br>5: User<br>Communication<br>Instructions |
|                                | ETXD   | Transmit over Ethernet        |                 |   |   |   |   |   |
|                                | RXD    | Receive                       |                 |   |   |   |   |   |
|                                | ERXD   | Receive over Ethernet         |                 |   |   |   |   |   |
| <b>PING</b>                    | PING   | Ping                          |                 |   |   |   |   | Communication<br>Manual<br>11: Send PING<br>Function                |
| <b>E-mail</b>                  | EMAIL  | Send E-mail                   |                 |   |   |   |   | Communication<br>Manual<br>12: Send E-mail<br>Function              |

### Structure of an Advanced Instruction



#### Repeat Designation

Specifies whether repeat is used for the device or not.

#### Repeat Cycles

Specifies the quantity of repeat cycles: 1 through 99.

#### Opcode

The opcode is a symbol used to identify the advanced instruction.

#### Data Type

Specifies word (W), integer (I), double word (D), long (L), or float (F) data.

#### Source Device

The source device specifies the 16- or 32-bit data to be processed by the advanced instruction. Some advanced instructions require two source devices.

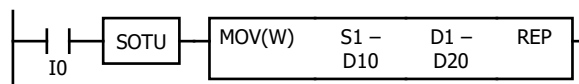
#### Destination Device

The destination device specifies the 16- or 32-bit data to store the result of the advanced instruction. Some advanced instructions require two destination devices.

### Input Condition for Advanced Instructions

Almost all advanced instructions must be preceded by a contact, except NOP (no operation), LABEL (label), and LRET (label return) instructions. The input condition can be programmed using a bit device such as input, output, internal relay, or shift register. Timer and counter can also be used as an input condition to turn on the contact when the timer times out or the counter counts out.

While the input condition is on, the advanced instruction is executed in each scan. To execute the advanced instruction only at the rising or falling edge of the input, use the SOTU or SOTD instruction.



While the input condition is off, the advanced instruction is not executed and device statuses are held.

### Source and Destination Devices

The source and destination devices specify 16- or 32-bit data, depending on the selected data type. When a bit device such as input, output, internal relay, or shift register is designated as a source or destination device, 16 or 32 points starting with the designated number are processed as source or destination data. When a word device such as timer or counter is designated as a source device, the current value is read as source data. When a timer or counter is designated as a destination device, the result of the advanced instruction is set to the preset value for the timer or counter. When a data register is designated as a source or destination device, the data is read from or written to the designated data register.

### Using Timer or Counter as Source Device

Since all timer instructions—TML (1-s timer), TIM (100-ms timer), TMH (10-ms timer), and TMS (1-ms timer)—subtract from the preset value, the current value is decremented from the preset value and indicates the remaining time. As described above, when a timer is designated as a source device of an advanced instruction, the current value, or the remaining time, of the timer is read as source data. Adding counters CNT start counting at 0, and the current value is incremented up to the preset value. Reversible counters CDP and CUD start counting at the preset value and the current value is incremented or decremented from the preset value. When any counter is designated as a source device of an advanced instruction, the current value is read as source data.

### Using Timer or Counter as Destination Device

As described above, when a timer or counter is designated as a destination device of an advanced instruction, the result of the advanced instruction is set to the preset value of the timer or counter. Timer and counter preset values can be 0 through 65,535. When a timer or counter preset value is designated using a data register, the timer or counter cannot be designated as a destination of an advanced instruction. When executing such an advanced instruction, a user program execution error will result. For details of user program execution error, see Appendix "User Program Execution Error and Ladder Program Execution Error" in the "Ladder Programming Manual".

**Note:** When a user program execution error occurs, the result is not set to the destination.

## Data Types for Advanced Instructions

When using move, data comparison, binary arithmetic, Boolean computation, bit shift/rotate, data conversion, and coordinate conversion instructions, data types can be selected from word (W), integer (I), double word (D), long (L), or float (F). For other advanced instructions, the data is processed in units of 16-bit word.

| Data Type                             | Symbol   | Bits    | Quantity of Data Registers Used | Range of Decimal Values                                 |                          |
|---------------------------------------|----------|---------|---------------------------------|---|--------------------------|
|                                       |          |         |                                 | Decimal   | Hexadecimal              |
| <b>Word (Unsigned 16 bits)</b>        | <b>W</b> | 16 bits | 1                               | 0 to 65,535   | \$0000 to \$FFFF         |
| <b>Integer (Signed 16 bits)</b>       | <b>I</b> | 16 bits | 1                               | –32,768 to 32,767                                       | \$8000 to \$7FFF         |
| <b>Double Word (Unsigned 32 bits)</b> | <b>D</b> | 32 bits | 2                               | 0 to 4,294,967,295                                      | \$00000000 to \$FFFFFFFF |
| <b>Long (Signed 32 bits)</b>          | <b>L</b> | 32 bits | 2                               | –2,147,483,648 to 2,147,483,647                         | \$80000000 to \$7FFFFFFF |
| <b>Float (Floating point)</b>         | <b>F</b> | 32 bits | 2                               | –3.402823×10 <sup>38</sup> to 3.402823×10 <sup>38</sup> | —                        |

- When a constant is set in WindLDR, it can be set as decimal or hexadecimal number. Prefix the number with "\$" to set it as a hexadecimal number.

## Decimal Values and Hexadecimal Storage (Word, Integer, Double, and Long Data)

The following table shows hexadecimal equivalents which are stored in the CPU, as a result of addition and subtraction of the decimal values shown:

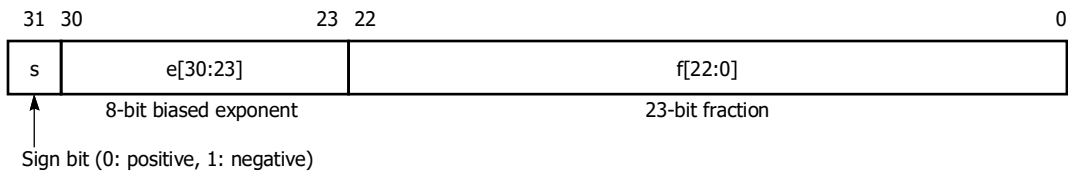
| Data Type          | Result of Addition | Hexadecimal Storage | Result of Subtraction | Hexadecimal Storage |
|--------------------|--------------------|---------------------|-----------------------|---------------------|
| <b>Word</b>        | 0                  | 0000                | 65,535                | FFFF                |
|                    | 65,535             | FFFF                | 0                     | 0000                |
|                    | 131,071            | (CY) FFFF           | –1                    | (BW) FFFF           |
|                    |                    |                     | –65,535               | (BW) 0001           |
|                    |                    |                     | –65,536               | (BW) 0000           |
| <b>Integer</b>     | 65,534             | (CY) 7FFE           | 65,534                | (BW) 7FFE           |
|                    | 32,768             | (CY) 0000           | 32,768                | (BW) 0000           |
|                    | 32,767             | 7FFF                | 32,767                | 7FFF                |
|                    | 0                  | 0000                | 0                     | 0000                |
|                    | –1                 | FFFF                | –1                    | FFFF                |
|                    | –32,767            | 8001                | –32,767               | 8001                |
|                    | –32,768            | 8000                | –32,768               | 8000                |
|                    | –32,769            | (CY) FFFF           | –32,769               | (BW) FFFF           |
|                    | –65,535            | (CY) 8001           | –65,535               | (BW) 8001           |
| <b>Double Word</b> | 0                  | 00000000            | 4,294,967,295         | FFFFFFFF            |
|                    | 4,294,967,295      | FFFFFFFF            | 0                     | 00000000            |
|                    | 8,589,934,591      | (CY) FFFFFFFF       | –1                    | (BW) FFFFFFFF       |
|                    |                    |                     | –4,294,967,295        | (BW) 00000001       |
| <b>Long</b>        |                    |                     | –4,294,967,296        | (BW) 00000000       |
|                    | 4,294,967,294      | (CY) 7FFFFFFE       | 4,294,967,294         | (BW) 7FFFFFFE       |
|                    | 2,147,483,648      | (CY) 00000000       | 2,147,483,648         | (BW) 00000000       |
|                    | 2,147,483,647      | 7FFFFFFF            | 2,147,483,647         | 7FFFFFFF            |
|                    | 0                  | 00000000            | 0                     | 00000000            |
|                    | –1                 | FFFFFFFF            | –1                    | FFFFFFFF            |
|                    | –2,147,483,647     | 80000001            | –2,147,483,647        | 80000001            |
|                    | –2,147,483,648     | 80000000            | –2,147,483,648        | 80000000            |
|                    | –2,147,483,649     | (CY) FFFFFFFF       | –2,147,483,649        | (BW) FFFFFFFF       |
|                    | –4,294,967,295     | (CY) 80000001       | –4,294,967,295        | (BW) 80000001       |

Floating-Point Data Format

The FC6A can specify floating-point data (F) for advanced instructions. Like double word (D) and long integer (L) data, floating-point data also uses two consecutive data registers to execute advanced instructions. The FC6A supports the floating-point data based on the single storage format of the IEEE (The Institute of Electrical and Electronics Engineers) Standard 754.

Single Storage Format

The IEEE single storage format consists of three fields: a 23-bit fraction, f; an 8-bit biased exponent, e; and 1-bit sign, s. These fields are stored contiguously in one 32-bit word, as shown in the figure below. Bits 0:22 contain the 23-bit fraction, f, with bit 0 being the least significant bit of the fraction and bit 22 being the most significant; bits 23:30 contain the 8-bit biased exponent, e, with bit 23 being the least significant bit of the biased exponent and bit 30 being the most significant; and the highest-order bit 31 contains the sign bit, s.



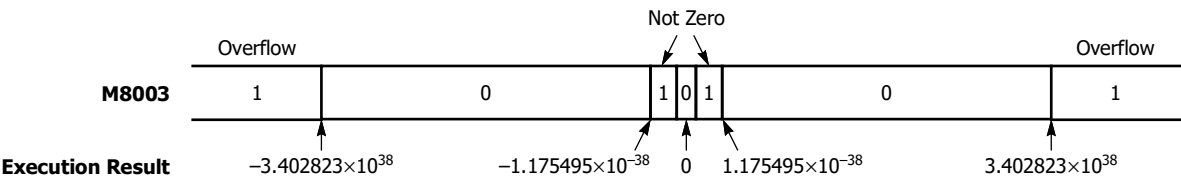
The table below shows the correspondence between the values of the three constituent fields s, e, and f and the value represented by the single storage format bit pattern. When any value out of the bit pattern is entered to the advanced instruction or when execution of advanced instructions, such as division by zero, has produced any value out of the bit pattern, a user program execution error will result, turning on special internal relay M8004 and the ERR LED on the FC6A.

| Value                      | Exponent Field e | Fraction Field f | Representation in WindLDR                                      |
|----------------------------|------------------|------------------|--|
| ±0                         | e=0              | f=0              | 0.0  |
| Denormal numbers           | e=0              | f≠0              | -1.175494E-38 to 1.175494E-38                                  |
| Normal numbers             | 0<e<255          | Arbitrary        | -3.402823E+38 to -1.175494E-38<br>1.175494E-38 to 3.402823E+38 |
| ±∞ (± infinities)          | e=255            | f=0              | INF  |
| NaNs (Not a number values) |                  | f≠0              | NAN  |

Carry and Borrow in Floating-Point Data Processing

When advanced instructions involving floating-point data are executed, special internal relay M8003 (carry and borrow) is updated.

| M8003 | Execution Result | Value   |
|-------|------------------|---|
| 1     | ≠ 0              | Overflow (exceeds the range between $-3.402823 \times 10^{38}$ and $3.402823 \times 10^{38}$ )  |
| 1     | 0                | Not zero (within the range between $-1.175495 \times 10^{-38}$ and $1.175495 \times 10^{-38}$ ) |
| 0     | 0                | Zero  |





### 32-bit Data Storage

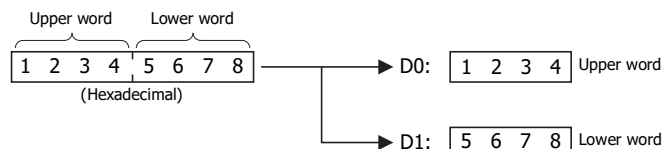
The 32-bit data for D (double word) and L (long word) is stored in devices according to the method selected in WindLDR under **Device Settings** in **Function Area Settings**.

For applicable devices and instructions, see "32-bit Data Storage Setting" on page 5-55.

Word devices<sup>\*1</sup>: The data storage when **From Upper Word** is selected under **Device Settings**

When D0 is specified as the source or destination device, the upper word is stored in D0 and the lower word is stored in D1.

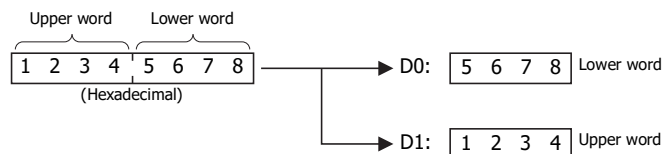
Double word data (constant)



The data storage when **From Lower Word** is selected under **Device Settings**

When D0 is specified as the source or destination device, the lower word is stored in D0 and the upper word is stored in D1.

Double word data (constant)

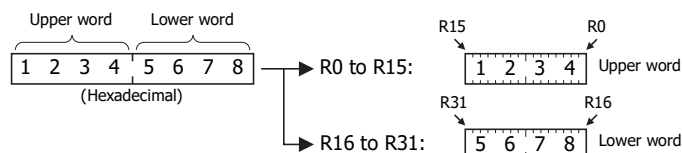


Bit devices<sup>\*1</sup>:

The data storage when **From Upper Word** is selected under **Device Settings**

When R0 is specified as the source or destination device, the upper word is stored in R0 to R15 and the lower word is stored in R16 to R31.

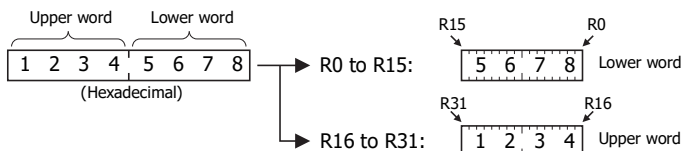
Double word data (constant)



The data storage when **From Lower Word** is selected under **Device Settings**

When R0 is specified as the source or destination device, the lower word is stored in R0-R15 and the upper word is stored in R16-R31.

Double word data (constant)



<sup>\*1</sup> For bit devices and word devices, see "Devices" on page 6-1.

### User Program Execution Errors

When an advanced instruction is executed, a user program execution error occurs when any of the following conditions are met.

- the result of the advanced instruction is invalid
- source or destination device that is indirectly specified in the advanced instruction exceeds the valid device range
- the advanced instruction does not operate correctly

For example, the data in the source device does not comply with the normal floating-point format when the data type is Float (F). For details about device ranges, see "Devices" on page 6-1.

When a user program execution error occurs, special internal relay M8004 turns on and the corresponding error code is stored in special data register D8006. For details about the error codes, see Appendix "User Program Execution Error and Ladder Program Execution Error" in the "Ladder Programming Manual".

When a user program execution error occurs, instructions operate as follows:

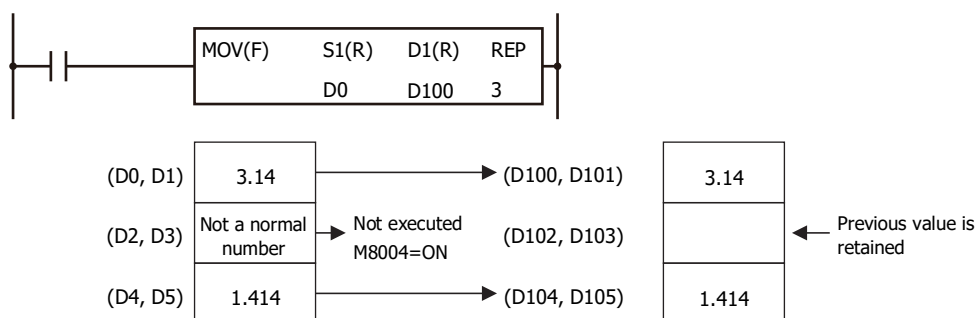
- When the source data is invalid, the execution of the advanced instruction is canceled and the data in the destination device is not changed.
- When the execution result is invalid, a value is stored in the destination device.  
For details on stored values, see the descriptions of relevant instructions.
- If a user program execution error occurred during a repeat operation, the operation is canceled and the next repeat operation is executed. M8004 is retained even when no further user program execution errors occur during subsequent repeat operations.

#### Example: User program execution error during a repeat operation

When the source data does not comply with the normal floating-point format.

When the second repeat operation is executed, special internal relay M8004 turns on because the source data is not a normal number in floating-point format.

The second repeat operation is canceled and the third repeat operation is executed.



### Carry and Borrow

When the result of an operation exceeds the valid device range, a carry (CY) or borrow (BW) occurs.

Carrying and borrowing occur in the following conditions according to the data type:

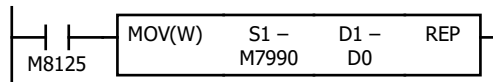
| Data Type   | Status   |
|-------------|--|
| Word        | Exceeds range between 0 and 65,535   |
| Integer     | Exceeds range between -32,768 and 32,767   |
| Double Word | Exceeds range between 0 and 4,294,967,295  |
| Long        | Exceeds range between -2,147,483,648 and 2,147,483,647   |
| Float       | If an overflow or underflow occurs<br>For details on overflow and underflow, see "Carry and Borrow in Floating-Point Data Processing" on page 8-8. |

When a carry or borrow occurs, special internal relay M8003 (carry and borrow) turns on.

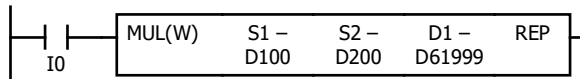
For example, when D0 has a value of FFFF (hex) and +1 is added using an INC instruction, the result is 10000 (hex), but when the data type is Word (W), 0000 (hex) is stored in D0 and 1 is stored in M8003.

## Discontinuity of Device Areas

Each device area is discrete and does not continue, for example, from input to output or from output to internal relay. In addition, special internal relays M8000 through M8997 are in a separate area from internal relays M0 through M7997 and M10000 through M21247. Data registers D0 through D7999, D10000 through D61999, and D70000 through D269999, and special data registers D8000 through D8899 are in separate areas and do not continue with each other.

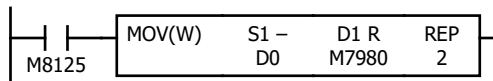


The internal relay ends at M7997. Since the MOV (move) instruction reads 16 internal relays, the last internal relay exceeds the valid range, resulting in a user program syntax error.



This program results in a user program syntax error. The destination of the MUL (multiplication) instruction requires two data registers D61999 and D62000. Since D62000 exceeds the valid range, a user program syntax error occurs.

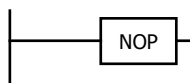
Advanced instructions execute operation only on the available devices in the valid area. If a user program syntax error is found during programming, WindLDR rejects the program instruction and shows an error message.



The MOV (move) instruction sets data of data register D0 to 16 internal relays M7980 through M7997 in the first repeat cycle. The destination of the second cycle is the next 16 internal relays M8000 through M8017, which are invalid, resulting in a user program syntax error.

For details about repeat operations of each advanced instruction, see "Advanced Instruction List" on page 8-3.

## NOP (No Operation)



No operation is executed by the NOP instruction.

The NOP instruction may serve as a place holder. It can also be used to add a delay to the CPU scan time, in order to simulate communication with a machine or application, for debugging purposes.

The NOP instruction does not require an input and device.

Details of the other advanced instructions are described in the following chapters.

Device Addressing for Instruction Execution

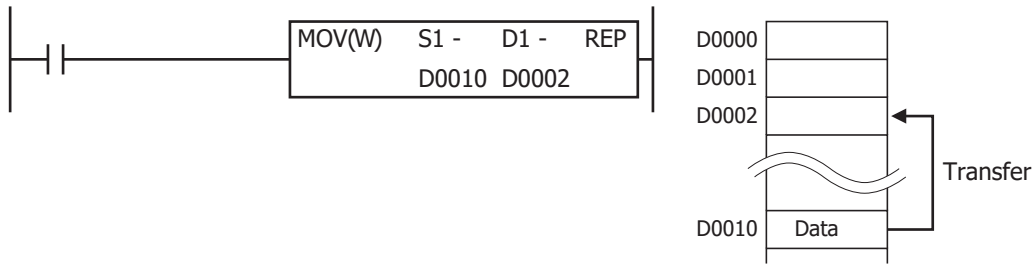
This section provides an explanation about how source and destination devices used by instructions for the execution can be specified. There are two ways to specify the device to use: Direct Addressing and Indirect Addressing.

Direct Addressing

In direct addressing, source and destination devices are specified with the devices to use.

■ Direct Addressing Operation

Example: When the source device (D0010) of the MOV(W) is directly specified.  
The data in D0010 is transferred to D0002.



■ Devices that can be directly addressed

| I | Q | M | R | T | C | D | P | Constant |
|---|---|---|---|---|---|---|---|----------|
| X | X | X | X | X | X | X | X | X        |

■ Instructions supporting the direct addressing

All basic and advanced instructions support the direct addressing.

Indirect Addressing

Indirect Addressing Format

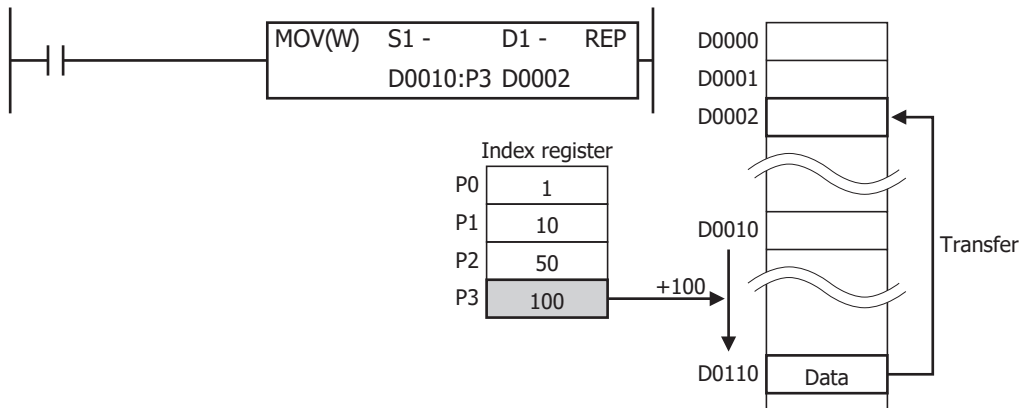
The index register Pn indicates the offset from the base device. Indirect addressing is possible by specifying source devices and destination devices with the base device and the index register. The format of the indirect addressing is as follows:

"Base Device" + ":" + "Pn (Address n of the index register)"

Example: When the base device is D0010 and the index register P3 is used.  
After D0010, add ":" and "P3".  
D0010:P3

Indirect Addressing Operation

Example: When the source device (D0010) of the MOV(W) instruction is indirectly specified with P3.  
The data in P3 is added to the address of D0010, so  $D(10 + (P3)) = D(10 + (100)) = D0110$ , and the data in D0110 is transferred to D0002.



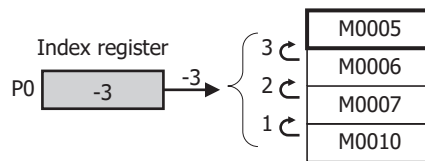
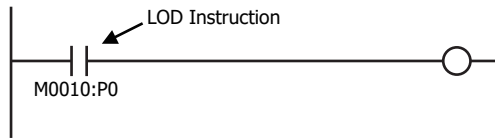
## Index Registers

16 index registers (P0 to P15) can be used, and the data type of the index register is L (long).

Example: LOD M10:P0

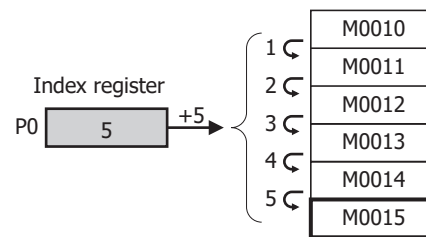
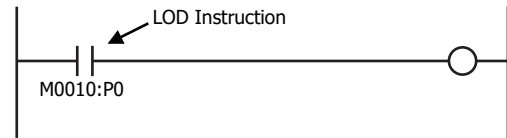
- P0=-3

This indirect addressing indicates M0005, which is 3 bits behind of M0010.



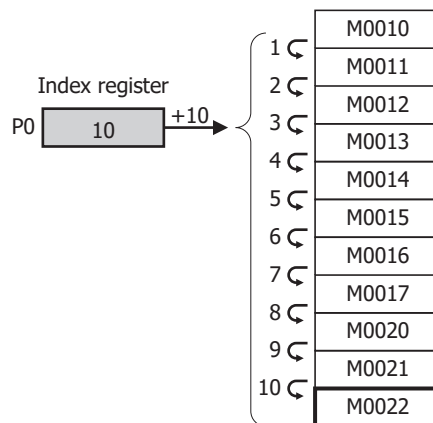
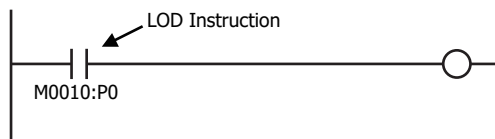
- P0=5

This indirect addressing indicates M0015, which is five bits ahead of M0010.



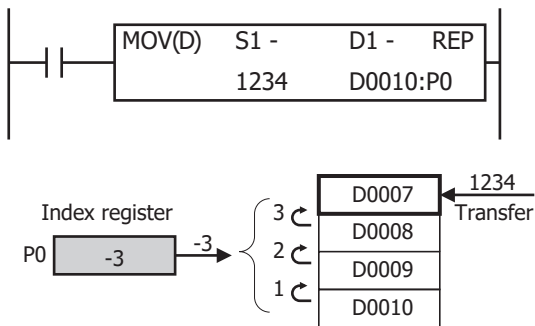
- P0=10

This indirect addressing indicates M0022, which is 10 bits ahead of M0010.

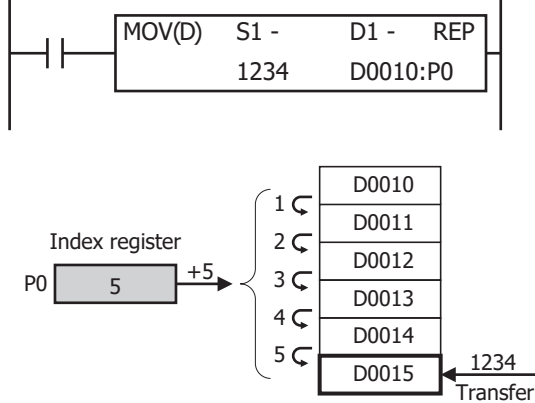


Example: MOV(D) 1234 D10:P0

- P0=-3  
This indirect addressing indicates D0007, which is 3 words behind of D0010.



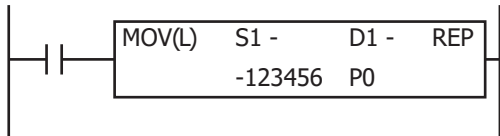
- P0=5  
This indirect addressing indicates D0015, which is 5 words ahead of D0010.



Values stored in the index registers is 32-bit and its data type is L (long). Index registers can directly specified as source and destination devices in MOV(L), ADD(L), SUB(L), and MUL(L) instructions and values in index registers can be moved or manipulated.

Example: MOV(L) -123456 P0

- -123456 is transferred to P0.



Notes:

- Index registers cannot be used in scripts.
- Indirect addressing to a different device type is not possible.
- If indirectly specified devices are beyond the device range, a user program execution error (1: Source/destination device exceeds range) will occur.
- When the indirect addressing is used, the base device and index register cannot be specified with the tag names.
- Indirect addressing for data register bits is not supported.
- The four instructions that can be used to modify the values of the index registers are MOV(L), ADD(L), SUB(L), and MUL(L). Specify P (index register) directly in those instructions.

Devices that can be indirectly addressed

| I | Q | M | R | T | C | D | P | Constant |
|---|---|---|---|---|---|---|---|----------|
| X | X | X | X | X | X | X | — | —        |

Instructions supporting the indirect addressing

■ Basic Instructions

| Command       | Indirect Addressing | Comments   |
|---------------|---------------------|--|
| LOD, LODN     | X                   | Not possible when specifying a bit in a data register. |
| OUT, OUTN     | X                   | Not possible when specifying a bit in a data register. |
| SET, RST      | X                   | Not possible when specifying a bit in a data register. |
| AND, ANDN     | X                   | Not possible when specifying a bit in a data register. |
| OR, ORN       | X                   | Not possible when specifying a bit in a data register. |
| AND LOD       | —                   |  |
| OR LOD        | —                   |  |
| BPS, BRD, BPP | —                   |  |

| Command                                     | Indirect Addressing | Comments   |
|---|---------------------|--|
| TML, TIM, TMH, TMS, TMLO, TIMO, TMHO, TIMSO | —                   | Indirect addressing is not supported because unique numbers are allocated. |
| CNT, CDP, CUD, CNTD, CDPD, CUDD             | —                   | Indirect addressing is not supported because unique numbers are allocated. |
| CC=, CC>=, DC=, DC>=                        | —                   |  |
| SFR, SFRN                                   | —                   |  |
| SOTU, SOTD                                  | —                   |  |
| MCS, MCR                                    | —                   |  |
| JMP, JEND                                   | —                   |  |
| END   | —                   |  |

#### ■ Advanced Instructions

| Instruction                           | Indirect Addressing | Comments |
|---------------------------------------|---------------------|----------|
| NOP                                   | —                   |          |
| MOV, MOVN                             | X                   |          |
| IMOV, IMOVN                           | —                   |          |
| MOVC                                  | X                   |          |
| BMOV                                  | X                   |          |
| IBMV, IBMVN                           | —                   |          |
| NSET                                  | X                   |          |
| NRS                                   | X                   |          |
| XCHG                                  | X                   |          |
| TCCST                                 | X                   |          |
| CMP=, CMP<>, CMP<, CMP>, CMP<=, CMP>= | X                   |          |
| ICMP>=                                | X                   |          |
| LC=, LC<>, LC<, LC>, LC<=, LC>=       | X                   |          |
| ADD                                   | X                   |          |
| SUB                                   | X                   |          |
| MUL                                   | X                   |          |
| DIV                                   | X                   |          |
| INC                                   | X                   |          |
| DEC                                   | X                   |          |
| ROOT                                  | X                   |          |
| SUM                                   | X                   |          |
| RNDM                                  | X                   |          |
| ANDW                                  | X                   |          |
| ORW                                   | X                   |          |
| XORW                                  | X                   |          |
| SFTL, SFTR                            | X                   |          |
| BCDLS                                 | X                   |          |
| WSFT                                  | X                   |          |
| ROTL, ROTR                            | X                   |          |
| HTOB                                  | X                   |          |
| BTOH                                  | X                   |          |
| HTOA                                  | X                   |          |
| ATOH                                  | X                   |          |
| BTOA                                  | X                   |          |
| ATOB                                  | X                   |          |
| ENCO                                  | —                   |          |
| DECO                                  | —                   |          |
| BCNT                                  | X                   |          |
| ALT                                   | X                   |          |
| CVDT                                  | X                   |          |

## 8: INSTRUCTIONS REFERENCE

| Instruction            | Indirect Addressing | Comments |
|------------------------|---------------------|----------|
| DTDV                   | X                   |          |
| DTCB                   | X                   |          |
| SWAP                   | X                   |          |
| WKTIM                  | —                   |          |
| WKTBL                  | —                   |          |
| WEEK                   | —                   |          |
| YEAR                   | —                   |          |
| MSG                    | —                   |          |
| DISP                   | —                   |          |
| DGRD                   | —                   |          |
| LABEL                  | —                   |          |
| LJMP                   | —                   |          |
| LCAL                   | —                   |          |
| LRET                   | —                   |          |
| DJNZ                   | —                   |          |
| IOREF                  | —                   |          |
| HSCRF                  | —                   |          |
| FRQRF                  | —                   |          |
| COMRF                  | —                   |          |
| DI                     | —                   |          |
| EI                     | —                   |          |
| XYFS                   | —                   |          |
| CVXTY                  | —                   |          |
| CVYTX                  | —                   |          |
| AVRG                   | —                   |          |
| PULS                   | —                   |          |
| PWM                    | —                   |          |
| RAMP                   | —                   |          |
| RAMPL                  | —                   |          |
| ZRN                    | —                   |          |
| ARAMP                  | —                   |          |
| ABS                    | —                   |          |
| JOG                    | —                   |          |
| PID                    | —                   |          |
| PIDA                   | —                   |          |
| PIDD                   | —                   |          |
| DTML, DTIM, DTMH, DTMS | —                   |          |
| TTIM                   | —                   |          |
| RAD                    | X                   |          |
| DEG                    | X                   |          |
| SIN                    | X                   |          |
| COS                    | X                   |          |
| TAN                    | X                   |          |
| ASIN                   | X                   |          |
| ACOS                   | X                   |          |
| ATAN                   | X                   |          |
| LOGE                   | X                   |          |
| LOG10                  | X                   |          |
| EXP                    | X                   |          |
| POW                    | X                   |          |
| FIFO                   | —                   |          |
| FIEX                   | —                   |          |
| FOEX                   | —                   |          |
| NDSRC                  | —                   |          |
| TADD                   | —                   |          |



| Instruction          | Indirect Addressing | Comments   |
|----------------------|---------------------|--|
| TSUB                 | —                   |  |
| HOUR                 | —                   |  |
| HTOS                 | —                   |  |
| STOH                 | —                   |  |
| DLOG                 | —                   |  |
| TRACE                | —                   |  |
| SCRPT                | —                   | Index registers cannot be used in scripts.   |
| SCALE                | —                   |  |
| FLWA                 | —                   |  |
| FLWP                 | —                   |  |
| UMACRO               | —                   | Indirect addressing is possible in the instructions programmed in user-defined macros. |
| TXD, RXD, ETXD, ERXD | —                   |  |
| PING                 | —                   |  |
| EMAIL                | —                   |  |



## 9: ANALOG I/O MODULES

This chapter describes the configuration of the analog I/O modules, as well as their parameters, device allocations, and WindLDR configuration methods.

### Analog I/O Module Overview

This section provides an overview of the analog I/O modules and describes their types and the maximum number of modules that can be connected to the CPU module.

Analog I/O modules are available that allow the FC6A to directly handle analog data such as voltage, current, and temperature. There are ten types of analog I/O modules that differ by the number of analog inputs and outputs and the operation mode. These analog I/O modules can be used by connecting them to the right side of the CPU module. Analog I/O module inputs support voltage, current, thermocouples, resistance thermometers, and thermistors. Analog I/O module outputs support voltage and current.

To use an analog I/O module, it must be configured in the Module Configuration Editor. For detailed configuration methods, see "Module Configuration Editor" on page 12-1. For details on the analog I/O module parameter settings, see "Analog I/O Module Parameter Settings" on page 9-4.

### Analog I/O Module List

This section shows a list of the analog I/O modules.

| Module Type             | Type No.                   | Points |         | Input Type                      |                                |                       |  |            |                        | Output Type                |                           |
|-------------------------|----------------------------|--------|---------|---------------------------------|--------------------------------|-----------------------|--|------------|------------------------|----------------------------|---------------------------|
|                         |                            | Inputs | Outputs | Voltage                         | Current                        | Thermocouple          | Resistance Thermometer                 | Thermistor | Resistance measurement | Voltage                    | Current                   |
| Analog input module     | FC6A-J2C1<br>FC6A-J2C4     | 2      | —       | 0 to 10 V/<br>-10 to +10 V      | 0 to 20 mA/<br>4 to 20 mA      | —                     | —                                      | —          | —                      | —                          | —                         |
|                         | FC6A-J4A1<br>FC6A-J4A4     | 4      | —       | 0 to 10 V/<br>-10 to +10 V      | 0 to 20 mA/<br>4 to 20 mA      | —                     | —                                      | —          | —                      | —                          | —                         |
|                         | FC6A-J8A1<br>FC6A-J8A4     | 8      | —       | 0 to 10 V/<br>-10 to +10 V      | 0 to 20 mA/<br>4 to 20 mA      | —                     | —                                      | —          | —                      | —                          | —                         |
|                         | FC6A-J4CN1<br>FC6A-J4CN4   | 4      | —       | 0 to 10 V/<br>-10 to +10 V      | 0 to 20 mA/<br>4 to 20 mA      | K/J/R/S/B/<br>E/T/N/C | Pt100/<br>Pt1000/<br>Ni100/<br>Ni1000/ | —          | —                      | —                          | —                         |
|                         | FC6A-J4CH1Y<br>FC6A-J4CH4Y | 4      | —       | —                               | —                              | K/J/R/S/B/<br>E/T/N/C | —                                      | —          | —                      | —                          | —                         |
|                         | FC6A-J8CU1<br>FC6A-J8CU4   | 8      | —       | —                               | —                              | K/J/R/S/B/<br>E/T/N/C | —                                      | NTC/PTC    | 100 to<br>10,000 Ω     | —                          | —                         |
|                         | FC6A-K2A1<br>FC6A-K2A4     | —      | 2       | —                               | —                              | —                     | —                                      | —          | —                      | 0 to 10V/<br>-10 to +10V   | 0 to 20mA/<br>4 to 20mA   |
| Analog output module    | FC6A-K4A1<br>FC6A-K4A4     | —      | 4       | —                               | —                              | —                     | —                                      | —          | —                      | 0 to 10 V/<br>-10 to +10 V | 0 to 20 mA/<br>4 to 20 mA |
|                         | FC6A-L06A1<br>FC6A-L06A4   | 4<br>— | —<br>2  | 0 to 10 V/<br>-10 to +10 V<br>— | 0 to 20 mA/<br>4 to 20 mA<br>— | —<br>—                | —<br>—                                 | —<br>—     | —<br>—                 | 0 to 10 V/<br>-10 to +10 V | 0 to 20 mA/<br>4 to 20 mA |
| Mixed analog I/O module | FC6A-L03CN1<br>FC6A-L03CN4 | 2      | —       | 0 to 10 V/<br>-10 to +10 V      | 0 to 20 mA/<br>4 to 20 mA      | K/J/R/S/B/<br>E/T/N/C | Pt100/<br>Pt1000/<br>Ni100/<br>Ni1000/ | —          | —                      | —                          | —                         |
|                         |                            | —      | 1       | —                               | —                              | —                     | —                                      | —          | —                      | 0 to 10 V/<br>-10 to +10 V | 0 to 20 mA/<br>4 to 20 mA |
|                         |                            | —      | —       | —                               | —                              | —                     | —                                      | —          | —                      | —                          | —                         |
|                         |                            | —      | —       | —                               | —                              | —                     | —                                      | —          | —                      | —                          | —                         |

## 9: ANALOG I/O MODULES

### Quantity of Applicable Analog I/O Modules

The maximum number of analog I/O modules that can be connected to the CPU module depends on the CPU module.

| CPU Module            |                                 | Type No.                     | Quantity of Applicable Analog I/O Modules |
|-----------------------|---------------------------------|------------------------------|---|
| All-in-One CPU module | All-in-One CPU module           | FC6A-C16R1AE, FC6A-C16R4AE   | 4 modules + 8 modules <sup>*1</sup>       |
|                       |                                 | FC6A-C16R1CE, FC6A-C16R4CE   |   |
|                       |                                 | FC6A-C16K1CE, FC6A-C16K4CE   |   |
|                       |                                 | FC6A-C16P1CE, FC6A-C16P4CE   |   |
|                       |                                 | FC6A-C16R1DE, FC6A-C16R4DE   |   |
|                       |                                 | FC6A-C16K1DE, FC6A-C16K4DE   |   |
|                       |                                 | FC6A-C16P1DE, FC6A-C16P4DE   |   |
|                       |                                 | FC6A-C24R1AE, FC6A-C24R4AE   | 7 modules + 8 modules <sup>*1</sup>       |
|                       |                                 | FC6A-C24R1CE, FC6A-C24R4CE   |   |
|                       |                                 | FC6A-C24K1CE, FC6A-C24K4CE   |   |
|                       |                                 | FC6A-C24P1CE, FC6A-C24P4CE   |   |
|                       |                                 | FC6A-C40R1AE, FC6A-C40R4AE   |   |
|                       |                                 | FC6A-C40R1CE, FC6A-C40R4CE   |   |
|                       |                                 | FC6A-C40K1CE, FC6A-C40K4CE   |   |
|                       |                                 | FC6A-C40P1CE, FC6A-C40P4CE   |   |
|                       |                                 | FC6A-C40R1DE, FC6A-C40R4DE   |   |
|                       |                                 | FC6A-C40K1DE, FC6A-C40K4DE   |   |
|                       |                                 | FC6A-C40P1DE, FC6A-C40P4DE   |   |
|                       | CAN J1939 All-in-One CPU module | FC6A-C40R1AEJ, FC6A-C40R4AEJ |   |
|                       |                                 | FC6A-C40R1CEJ, FC6A-C40R4CEJ |   |
|                       |                                 | FC6A-C40K1CEJ, FC6A-C40K4CEJ |   |
|                       |                                 | FC6A-C40P1CEJ, FC6A-C40P4CEJ |   |
|                       |                                 | FC6A-C40R1DEJ, FC6A-C40R4DEJ |   |
|                       |                                 | FC6A-C40K1DEJ, FC6A-C40K4DEJ |   |
|                       |                                 | FC6A-C40P1DEJ, FC6A-C40P4DEJ |   |
|                       |                                 |                              |   |
| Plus CPU module       |                                 | FC6A-D16R1CEE                | 63 modules <sup>*2</sup>                  |
|                       |                                 | FC6A-D16R4CEE                |   |
|                       |                                 | FC6A-D16K1CEE                |   |
|                       |                                 | FC6A-D16K4CEE                |   |
|                       |                                 | FC6A-D16P1CEE                |   |
|                       |                                 | FC6A-D16P4CEE                |   |
|                       |                                 | FC6A-D32K3CEE                |   |
|                       |                                 | FC6A-D32K4CEE                |   |
|                       |                                 | FC6A-D32P3CEE                |   |
|                       |                                 | FC6A-D32P4CEE                |   |

\*1 When the expansion interface module (expander) is used, eight analog I/O modules can be connected to the right side of the expansion interface module (expander). The number of modules that can be connected does not include the expansion interface module (expander).

\*2 A maximum of 63 analog I/O modules can be connected using expansion interface modules (expander and remote master/slave). The number of modules that can be connected does not include the expansion interface module.

### Checking the Hardware Version Number

The analog I/O module hardware version number is printed on the side of the analog I/O module. The performance and functionality of the analog I/O module will differ by its version, so check the version number before use.

S/N:XXXX-XXXX  
 IDEC CORPORATION

V100

Version Number

**Precautions When Using the Product**

Do not use an analog I/O module with hardware version number V200 in combination with the system software for analog I/O modules version 1.01 or lower. The operation mode of the analog I/O module will be indefinite and analog input values cannot be acquired correctly.

System software version 1.02 is written to V200 analog I/O modules when they are shipped from the factory. Do not download system software version 1.00 or 1.01 to these analog I/O modules.

If system software version 1.01 or lower is written to a V200 analog I/O module, download the system software for analog I/O modules version 1.02 included with WindLDR Ver. 8.6.1 or higher to the analog I/O module again.

| Hardware Version Number | System Software Version |                        |
|-------------------------|-------------------------|------------------------|
|                         | Version 1.01 or Lower   | Version 1.02 or Higher |
| Lower than V200         | Yes                     | Yes                    |
| V200 or Higher          | No                      | Yes                    |

### Analog I/O Module Parameter Settings

This section describes the analog I/O module parameter settings.

The parameter settings are configured for each channel. The parameters to configure differ according to the analog I/O module type and I/O type. In Expansion Modules Configuration, configure the parameter settings according to the application.

For detailed configuration methods, see "Module Configuration Editor" on page 12-1.

### Analog Input Type

The following parameters are for configuring the analog inputs on the analog input modules and the mixed analog I/O modules.

Yes: Parameters, —: No parameters

| No. | Parameter                                 | FC6A-J2C1<br>FC6A-J2C4 | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4 | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|-----|---|------------------------|------------------------|------------------------|--------------------------|----------------------------|--------------------------|--------------------------|----------------------------|
| (1) | Signal Type                               | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (2) | Data Type                                 | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (3) | Minimum and maximum values<br>(Data type) | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (4) | Filter                                    | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (5) | Sample Time                               | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (6) | Thermistor Settings                       | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| (7) | Data                                      | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| (8) | Status                                    | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |

Type: FC6A-J8CU1

DR Allocation:

☐ FC4A Compatible Mode 
  
☒ Use data register for setting parameters D0016 - D0079

| Channel | (4) Filter (ms) | (5) Sampling Time | (1) Signal Type | (2) Data Type | R0 | (6) T0 | B | Min. | (3) Max. | (7) Data | (8) Status |
|---------|-----------------|-------------------|-----------------|---------------|----|--------|---|------|----------|----------|------------|
| AI0     | 0               | 104ms             | Type K          | Binary data   |    |        |   | 0    | 65535    | D0000    | D0001      |
| AI1     | 0               | 104ms             | NTC Thermistor  | Binary data   | 0  | 0      | 0 | 0    | 65535    | D0002    | D0003      |
| AI2     |                 |                   | Unused          |               |    |        |   |      |          | D0004    | D0005      |
| AI3     |                 |                   | Unused          |               |    |        |   |      |          | D0006    | D0007      |
| AI4     |                 |                   | Unused          |               |    |        |   |      |          | D0008    | D0009      |
| AI5     |                 |                   | Unused          |               |    |        |   |      |          | D0010    | D0011      |
| AI6     |                 |                   | Unused          |               |    |        |   |      |          | D0012    | D0013      |
| AI7     |                 |                   | Unused          |               |    |        |   |      |          | D0014    | D0015      |

Relay for writing parameters:

Write parameters in the analog module to data registers: M0000

Store initial parameters in data registers: M0001

Write parameters in data registers to the analog module: M0002

Device Allocation

OK

Cancel

**(1) Signal Type**

The signal type that can be set differs according to the analog I/O module model. Select the analog I/O module that corresponds to the user application and set the signal type. The signal type is the type of analog input to measure. There are 24 signal types for the analog inputs, which are detailed as follows.

Yes: Supported, —: Not supported

| Signal Type                  | FC6A-J2C1<br>FC6A-J2C4 | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4 | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|------------------------------|------------------------|------------------------|------------------------|--------------------------|----------------------------|--------------------------|--------------------------|----------------------------|
| Unused*1                     | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| 0 to 10 V                    | Yes                    | Yes                    | Yes                    | Yes                      | —                          | —                        | Yes                      | Yes                        |
| -10 to +10 V                 | Yes                    | Yes                    | Yes                    | Yes                      | —                          | —                        | Yes                      | Yes                        |
| 0 to 20 mA                   | Yes                    | Yes                    | Yes                    | Yes                      | —                          | —                        | Yes                      | Yes                        |
| 4 to 20 mA                   | Yes                    | Yes                    | Yes                    | Yes                      | —                          | —                        | Yes                      | Yes                        |
| Type K thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type J thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type R thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type S thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type B thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type E thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type T thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type N thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Type C thermocouple          | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Pt100                        | —                      | —                      | —                      | Yes                      | —                          | —                        | —                        | Yes                        |
| Pt1000                       | —                      | —                      | —                      | Yes                      | —                          | —                        | —                        | Yes                        |
| Ni100                        | —                      | —                      | —                      | Yes                      | —                          | —                        | —                        | Yes                        |
| Ni1000                       | —                      | —                      | —                      | Yes                      | —                          | —                        | —                        | Yes                        |
| NTC thermistor               | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| PTC thermistor               | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| PTC thermistor (threshold)*2 | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| Resistance measurement       | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| Expansion 0 to 20 mA         | —                      | —                      | Yes                    | —                        | —                          | —                        | —                        | —                          |
| Expansion 4 to 20 mA         | —                      | —                      | Yes                    | —                        | —                          | —                        | —                        | —                          |

\*1 Channels that are set to unused are not scanned.

The circuit is setup the same as when signal type: 0 to 10 V is selected.

0 is always stored in the analog data storage data registers for channels that are set to unused.

\*2 For details on PTC thermistor (threshold), see "PTC Thermistor (Threshold)" on page 9-11.

### (2) Data Type

The analog input value can be handled as the set data type. There are seven data types for the analog inputs.

Yes: Supported, —: Not supported

| Data Type                    | FC6A-J2C1<br>FC6A-J2C4 | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4 | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|------------------------------|------------------------|------------------------|------------------------|--------------------------|----------------------------|--------------------------|--------------------------|----------------------------|
| Binary data <sup>*1</sup>    | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| Optional range <sup>*1</sup> | Yes                    | Yes                    | Yes                    | Yes                      | Yes                        | Yes                      | Yes                      | Yes                        |
| Celsius <sup>*2</sup>        | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Fahrenheit <sup>*2</sup>     | —                      | —                      | —                      | Yes                      | Yes                        | Yes                      | —                        | Yes                        |
| Resistance <sup>*3</sup>     | —                      | —                      | —                      | —                        | —                          | Yes                      | —                        | —                          |
| Binary data<br>(16 bits)     | —                      | —                      | Yes <sup>*4</sup>      | —                        | —                          | —                        | —                        | —                          |
| Optional range<br>(16 bits)  | —                      | —                      | Yes <sup>*4</sup>      | —                        | —                          | —                        | —                        | —                          |

\*1 For only the FC6A-J8A1 and FC6A-J8A4, binary data (12 bits) and optional range (12 bits) are displayed.

\*2 Can only be set when the signal type is thermocouple, resistance thermometer or NTC thermistor.

\*3 Resistance when using the FC6A-J8CU1/FC6A-J8CU4 and the signal type is set to PTC thermistor or Resistance measurement.

\*4 Binary data (16 bits) and optional range (16 bits) can be used with the following versions.

FC6A-J8A1, FC6A-J8A4: Version 200 or later

WindLDR: Version 8.6.0 or later

If an FC6A-J8A1 or FC6A-J8A4 that does not correspond to the above version numbers is set to binary data (16 bits) or optional range (16 bits), an error will occur and the module will operate as binary data (12 bits).

### (3) Minimum and maximum values

Set the minimum and maximum values for linear conversion of the input analog value. The minimum and maximum values are determined by the set signal type (1) and data type (2).

The minimum and maximum values that correspond to the signal type and data types are as follows.

| Signal Type                              | Data Type                              |  |                  |                  |               |                          |                                |
|--|--|--|------------------|------------------|---------------|--------------------------|--------------------------------|
|  | Binary Data<br>(12 Bits) <sup>*1</sup> | Optional<br>Range<br>(12 Bits) <sup>*1*2</sup> | Celsius          | Fahrenheit       | Resistance    | Binary Data<br>(16 Bits) | Optional<br>Range<br>(16 Bits) |
| 0 to 10 V                                | 0 to 65,535                            | -32,768 to 32,767                              | —                | —                | —             | 0 to 65,535              | -32,768 to 32,767              |
| -10 to +10 V                             | -32,768 to 32,767                      | -32,768 to 32,767                              | —                | —                | —             | -32,768 to 32,767        | -32,768 to 32,767              |
| 0 to 20 mA                               | 0 to 65,535                            | -32,768 to 32,767                              | —                | —                | —             | 0 to 65,535              | -32,768 to 32,767              |
| 4 to 20 mA                               | 0 to 65,535                            | -32,768 to 32,767                              | —                | —                | —             | 0 to 65,535              | -32,768 to 32,767              |
| Type K thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 13,000 | -3,280 to 23,720 | —             | —                        | —                              |
| Type J thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 10,000 | -3,280 to 18,320 | —             | —                        | —                              |
| Type R thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | 0 to 17,600      | 320 to 32,000    | —             | —                        | —                              |
| Type S thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | 0 to 17,600      | 320 to 32,000    | —             | —                        | —                              |
| Type B thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | 0 to 18,200      | 320 to 33,080    | —             | —                        | —                              |
| Type E thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 8,000  | -3,280 to 14,720 | —             | —                        | —                              |
| Type T thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 4,000  | -3,280 to 7,520  | —             | —                        | —                              |
| Type N thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 13,000 | -3,280 to 23,720 | —             | —                        | —                              |
| Type C thermocouple                      | 0 to 65,535                            | -32,768 to 32,767                              | 0 to 23,150      | 320 to 41,990    | —             | —                        | —                              |
| Pt100                                    | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 8,500  | -3,280 to 15,620 | —             | —                        | —                              |
| Pt1000                                   | 0 to 65,535                            | -32,768 to 32,767                              | -2,000 to 6,000  | -3,280 to 11,120 | —             | —                        | —                              |
| Ni100                                    | 0 to 65,535                            | -32,768 to 32,767                              | -600 to 1,800    | -760 to 3,560    | —             | —                        | —                              |
| Ni1000                                   | 0 to 65,535                            | -32,768 to 32,767                              | -600 to 1,800    | -760 to 3,560    | —             | —                        | —                              |
| NTC thermistor                           | 0 to 65,535                            | -32,768 to 32,767                              | -900 to 1,500    | -1,300 to 3,020  | —             | —                        | —                              |
| PTC thermistor                           | 0 to 65,535                            | -32,768 to 32,767                              | —                | —                | 100 to 10,000 | —                        | —                              |
| PTC thermistor (threshold) <sup>*3</sup> | 100 to 10,000                          | 100 to 10,000                                  | —                | —                | —             | —                        | —                              |
| Resistance measurement                   | 0 to 65,535                            | -32,768 to 32,767                              | —                | —                | 100 to 32,000 | —                        | —                              |
| Expansion 0 to 20 mA                     | 0 to 4,095                             | -32,768 to 32,767                              | —                | —                | —             | 0 to 65,535              | -32,768 to 32,767              |
| Expansion 4 to 20 mA                     | 0 to 4,095                             | -32,768 to 32,767                              | —                | —                | —             | 0 to 65,535              | -32,768 to 32,767              |

\*1 For only the FC6A-J8A1 and FC6A-J8A4, binary data (12 bits) and optional range (12 bits).

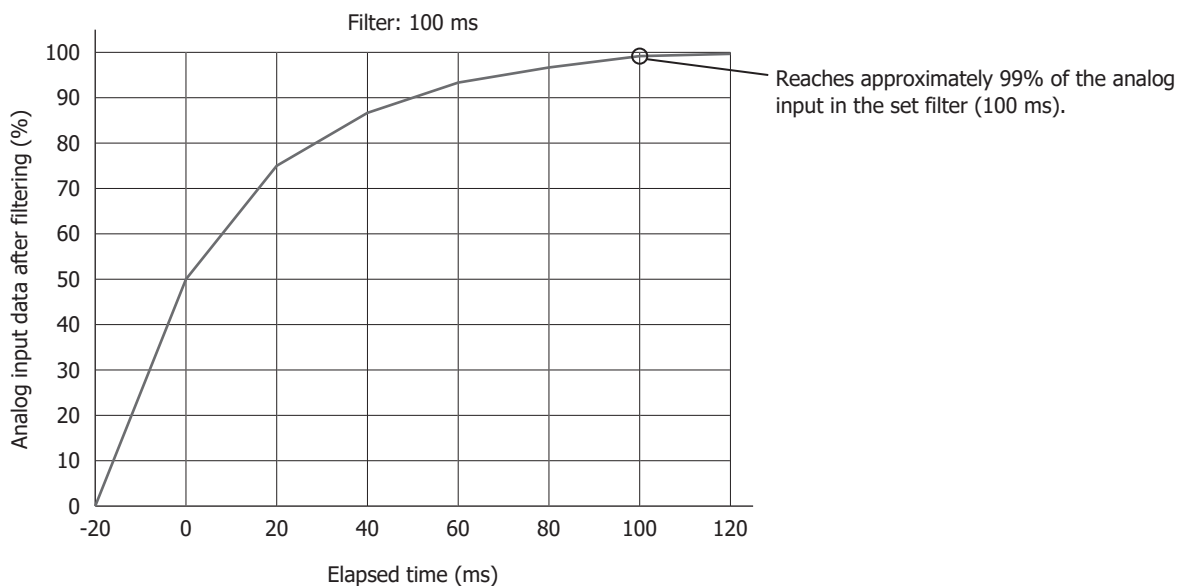
\*2 The minimum and maximum values can be set only when the data type is set to optional range. Set the minimum and maximum values between -32,768 and 32,767. However, when the signal type is set to PTC thermistor (threshold), set the minimum and maximum values between 100 and 10,000. For the arbitrary setting, see \*4 in "Analog Input Module" on page 2-108.

\*3 For details on PTC thermistor (threshold), see "PTC Thermistor (Threshold)" on page 9-11.



**(4) Filter**

The analog input is filtered so it reaches approximately 99% of the analog input in the set time. Rapid fluctuations in the analog input can be reduced by setting the filter, but increasing the filter slows down the tracking of fluctuations in the analog input. The filter must be set for each channel.

**Input filter example**

| Filter (ms)  | Description   |
|--------------|---|
| 0            | The value is not filtered.  |
| 50 to 50,000 | The analog input filter can be set in 50 ms increments.<br>The analog input is filtered so that approximately 99% of the analog input is reached in the specified filter. |

### (5) Sampling Time

Analog values are converted to digital values at the interval of the sampling time. Depending on the analog I/O module, you may be able to change the sampling time setting.

| Type                       | Signal Type                | Sample Time    |
|----------------------------|----------------------------|----------------|
| FC6A-J2C1<br>FC6A-J2C4     | 0 to 10 V                  | 1 ms           |
|                            | -10 to +10 V               | 1 ms           |
|                            | 0 to 20 mA                 | 1 ms           |
|                            | 4 to 20 mA                 | 1 ms           |
| FC6A-J4A1<br>FC6A-J4A4     | 0 to 10 V                  | 1 ms/10 ms     |
|                            | -10 to +10 V               | 1 ms/10 ms     |
|                            | 0 to 20 mA                 | 1 ms/10 ms     |
|                            | 4 to 20 mA                 | 1 ms/10 ms     |
| FC6A-J8A1<br>FC6A-J8A4     | 0 to 10 V                  | 1 ms/10 ms     |
|                            | -10 to +10 V               | 1 ms/10 ms     |
|                            | 0 to 20 mA                 | 1 ms/10 ms     |
|                            | 4 to 20 mA                 | 1 ms/10 ms     |
|                            | Expansion 0 to 20 mA       | 1 ms/10 ms     |
|                            | Expansion 4 to 20 mA       | 1 ms/10 ms     |
| FC6A-J4CN1<br>FC6A-J4CN4   | 0 to 10 V                  | 100 ms/10 ms   |
|                            | -10 to +10 V               | 100 ms/10 ms   |
|                            | 0 to 20 mA                 | 100 ms/10 ms   |
|                            | 4 to 20 mA                 | 100 ms/10 ms   |
|                            | Thermocouple               | 104 ms         |
|                            | Resistance thermometer     | 104 ms         |
| FC6A-J4CH1Y<br>FC6A-J4CH4Y | Thermocouple               | 120 ms/30 ms*1 |
|                            | Thermocouple               | 104 ms         |
| FC6A-J8CU1<br>FC6A-J8CU4   | NTC/PTC thermistor         | 104 ms         |
|                            | PTC thermistor (threshold) | 104 ms         |
|                            | Resistance measurement     | 104 ms         |
|                            | Resistance measurement     | 104 ms         |
| FC6A-L06A1<br>FC6A-L06A4   | 0 to 10 V                  | 1 ms/10 ms     |
|                            | -10 to +10 V               | 1 ms/10 ms     |
|                            | 0 to 20 mA                 | 1 ms/10 ms     |
|                            | 4 to 20 mA                 | 1 ms/10 ms     |
| FC6A-L03CN1<br>FC6A-L03CN4 | 0 to 10 V                  | 100 ms/10 ms   |
|                            | -10 to +10 V               | 100 ms/10 ms   |
|                            | 0 to 20 mA                 | 100 ms/10 ms   |
|                            | 4 to 20 mA                 | 100 ms/10 ms   |
|                            | Thermocouple               | 104 ms         |
|                            | Resistance thermometer     | 104 ms         |

\*1 When the sampling time is set to 30 ms, the modules may be more easily affected by commercial power supply noise (50/60 Hz noise) and fluctuations in input values may become larger. If there are large fluctuations in input values, change the sampling time to 120 ms.

### (6) Thermistor settings

When NTC thermistor is selected for the FC6A-J8CU1/FC6A-J8CU4 signal type, the following parameters must be set.

| Parameter | Description  | Range             |
|-----------|--|-------------------|
| R0        | The thermistor resistance in "T0"°C ( $\Omega$ )*1 | 0 to 65,535       |
| T0        | Temperature (°C)*1                                 | -32,768 to 32,767 |
| B         | Thermistor B constant*1                            | -32,768 to 32,767 |

\*1 Information are described in the instruction sheet for the thermistor to use.

The characteristic of NTC thermistor is that the resistance decreases as the temperature rises. The analog modules measure the resistance of the thermistor and calculate the temperature based on above three parameters.

The measurable range of the resistance of NTC thermistor is 100  $\Omega$  to 200,000  $\Omega$ . The range of temperature that can be calculated is -90°C to 150°C. Select NTC thermistor that functions within those ranges.

**(7) Data**

Data is the value (digital value) obtained by linearly converting the input analog value with the minimum value and maximum value (3) at each sampling time (5).

The data is written to data registers in the END processing of each scan. The analog input data is updated regardless of whether the FC6A is stopped or running. The data is not guaranteed when the status (8) is a value other than "0".

For details on when PTC thermistor (threshold) is selected for the signal type, see "PTC Thermistor (Threshold)" on page 9-11. When Celsius or Fahrenheit is set in the data type (2), the analog input value is linearly converted within the range shown in the table below.

| Signal Type         | Celsius             |                    | Fahrenheit          |                    |
|---------------------|---------------------|--------------------|---------------------|--------------------|
|                     | Temperature (0.1°C) | Analog Input Value | Temperature (0.1°F) | Analog input value |
| Type K thermocouple | -200.0 to 1,300.0   | -2,000 to 13,000   | -328.0 to 2,3720.0  | -3,280 to 23,720   |
| Type J thermocouple | -200.0 to 1,000.0   | -2,000 to 10,000   | -328.0 to 1,832.0   | -3,280 to 18,320   |
| Type R thermocouple | 0.0 to 1,760.0      | 0 to 17,600        | 32.0 to 3,200.0     | 320 to 32,000      |
| Type S thermocouple | 0.0 to 1,760.0      | 0 to 17,600        | 32.0 to 3,200.0     | 320 to 32,000      |
| Type B thermocouple | 0.0 to 1,820.0      | 0 to 18,200        | 32.0 to 3,308.0     | 320 to 33,080      |
| Type E thermocouple | -200.0 to 800.0     | -2,000 to 8,000    | -328.0 to 1,472.0   | -3,280 to 14,720   |
| Type T thermocouple | -200.0 to 400.0     | -2,000 to 4,000    | -328.0 to 752.0     | -3,280 to 7,520    |
| Type N thermocouple | -200.0 to 1,300.0   | -2,000 to 13,000   | -328.0 to 2,372.0   | -3,280 to 23,720   |
| Type C thermocouple | 0.0 to 2,315.0      | 0 to 23,150        | 32.0 to 4,199.0     | 320 to 41,990      |
| Pt100               | -200.0 to 850.0     | -2,000 to 8,500    | -328.0 to 1,562.0   | -3,280 to 15,620   |
| Pt1000              | -200.0 to 600.0     | -2,000 to 6,000    | -328.0 to 1,112.0   | -3,280 to 11,120   |
| Ni100               | -60.0 to 180.0      | -600 to 1,800      | -76.0 to 356.0      | -760 to 3,560      |
| Ni1000              | -60.0 to 180.0      | -600 to 1,800      | -76.0 to 356.0      | -760 to 3,560      |

### (8) Status

The status of the analog input data (7) is stored in data registers.

| Status       | Description   |
|--------------|---|
| 0            | Operating normally  |
| 1            | Converting data   |
| 2            | Initializing  |
| 3            | Parameter setting error   |
| 4            | Hardware fault (external power supply error)  |
| 5            | Wiring fault (out of maximum range) <sup>*1</sup>   |
| 6            | Wiring fault (out of minimum range) <sup>*1</sup>   |
| 7            | Reserved  |
| 8            | When the analog input value is greater than 20 mA and less than the upper limit value <sup>*2</sup> |
| 9            | When the analog input value is greater than the lower limit value and less than 4 mA <sup>*3</sup>  |
| 10 to 65,535 | Reserved  |

\*1 When the analog input value is the upper limit value in the below table or higher, the out of maximum range error occurs. When the analog input value is the lower limit value in the below table or lower, the out of minimum range error occurs.

| Signal Type                | Lower Limit Value               | Upper Limit Value              |
|----------------------------|---------------------------------|--------------------------------|
| 0 to 10 V                  | -0.2 V                          | 10.2 V                         |
| -10 to +10 V               | -10.4 V                         | 10.4 V                         |
| 0 to 20 mA                 | -0.4 mA                         | 20.4 mA                        |
| 4 to 20 mA                 | 3.68 mA                         | 20.32 mA                       |
| Type K thermocouple        | -200.0°C                        | 1,300.0°C                      |
| Type J thermocouple        | -200.0°C                        | 1,000.0°C                      |
| Type R thermocouple        | 0.0°C                           | 1,760.0°C                      |
| Type S thermocouple        | 0.0°C                           | 1,760.0°C                      |
| Type B thermocouple        | 0.0°C                           | 1,820.0°C                      |
| Type E thermocouple        | -200.0°C                        | 800.0°C                        |
| Type T thermocouple        | -200.0°C                        | 400.0°C                        |
| Type N thermocouple        | -200.0°C                        | 1,300.0°C                      |
| Type C thermocouple        | 0.0°C                           | 2,315.0°C                      |
| Pt100                      | -200.0°C                        | 850.0°C                        |
| Pt1000                     | -200.0°C                        | 600.0°C                        |
| Ni100                      | -60.0°C                         | 180.0°C                        |
| Ni1000                     | -60.0°C                         | 180.0°C                        |
| NTC thermistor             | -90.0°C or 200 kΩ <sup>*4</sup> | 150.0°C or 100 Ω <sup>*5</sup> |
| PTC thermistor             | 100 Ω                           | 10 kΩ                          |
| PTC thermistor (threshold) | 100 Ω                           | 10 kΩ                          |
| Resistance measurement     | 100 Ω                           | 32 kΩ                          |
| Expansion 0 to 20 mA       | -0.4 mA                         | 23.54 mA                       |
| Expansion 4 to 20 mA       | 1.20 mA                         | 23.17 mA                       |

\*2 Expansion 0 to 20 mA or expansion 4 to 20 mA only

\*3 Expansion 4 to 20 mA only

\*4 Out of minimum range error occurs when a resistance of 200 kΩ or higher is connected.

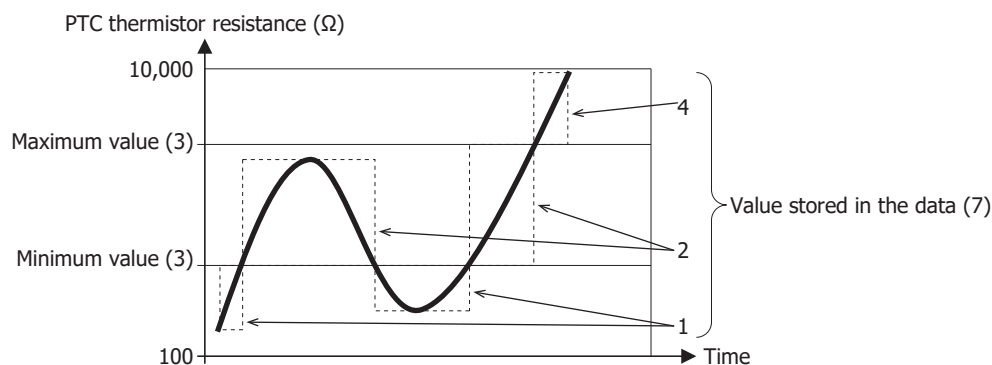
\*5 Out of maximum range error occurs when a resistance of 100 Ω or lower is connected.

### PTC Thermistor (Threshold)

This section describes details on PTC thermistor (threshold).

The value is stored in the data (7) according to the resistance of the PTC thermistor and the minimum and maximum values (3).

The relationship between the resistance of the PTC thermistor, the minimum and maximum values (3), and the data (7) is as follows.



Value stored in the data (7): 1      Minimum value (3) > PTC thermistor resistance

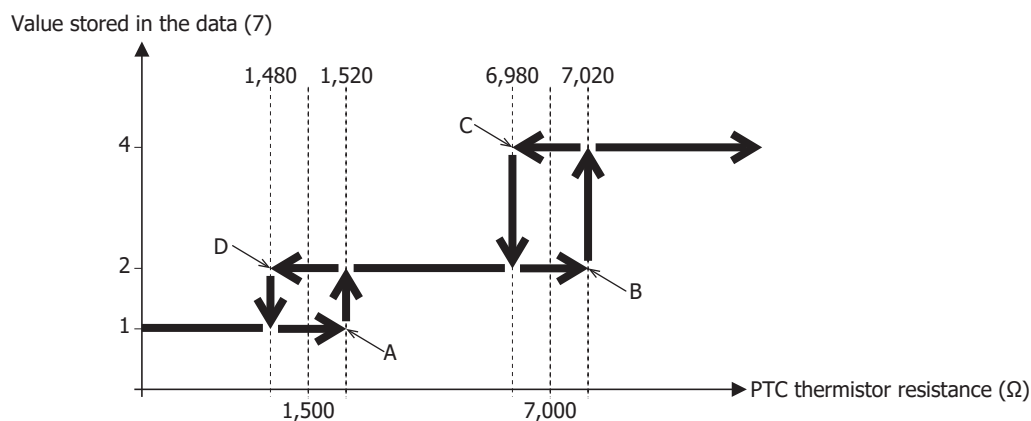
Value stored in the data (7): 2      Minimum value (3) ≤ PTC thermistor resistance ≤ Maximum value (3)

Value stored in the data (7): 4      Maximum value (3) < PTC thermistor resistance

For the operation when the resistance of the PTC thermistor matches the minimum or maximum value, see "Hysteresis" below.

### Hysteresis

The system has a hysteresis of  $\pm 20 \Omega$  for the minimum and maximum values that are set (3). For example, if the minimum value is set to 1,500 and the maximum value is set to 7,000, the operation is shown as follows.



A: The value of the data (7) changes from 1 to 2 when the resistance of the PTC thermistor is greater than or equal to 1,520  $\Omega$

B: The value of the data (7) changes from 2 to 4 when the resistance of the PTC thermistor exceeds 7,020  $\Omega$

C: The value of the data (7) changes from 4 to 2 when the resistance of the PTC thermistor is less than or equal to 6,980  $\Omega$

D: The value of the data (7) changes from 2 to 1 when the resistance of the PTC thermistor is less than 1,480  $\Omega$

**Note:** When setting the minimum and maximum values (3), ensure that the difference between the two values is 41 or greater. If the difference between the minimum and maximum values (3) is less than or equal to 40, status 3 (parameter setting error) is stored in the status (8).

### Behavior of the Status

If the resistance of the PTC thermistor is out of range, the following values are stored in status (8).

If the resistance of the PTC thermistor is less than 100  $\Omega$ , status 6 (wiring fault (out of minimum range)) is stored in status (8).

If the resistance of the PTC thermistor is greater than 10,000  $\Omega$ , status 5 (wiring fault (out of maximum range)) is stored in status (8).

### Analog Output Type

The following parameters are for configuring the analog outputs on the analog output modules and the mixed analog I/O modules.

Yes: Parameters, —: No parameters

| No. | Parameter                                 | FC6A-K2A1<br>FC6A-K2A4 | FC6A-K4A1<br>FC6A-K4A4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|-----|---|------------------------|------------------------|--------------------------|----------------------------|
| (1) | Signal Type                               | Yes                    | Yes                    | Yes                      | Yes                        |
| (2) | Data Type                                 | Yes                    | Yes                    | Yes                      | Yes                        |
| (3) | Minimum and maximum values<br>(Data type) | Yes                    | Yes                    | Yes                      | Yes                        |
| (4) | Data                                      | Yes                    | Yes                    | Yes                      | Yes                        |
| (5) | Status                                    | Yes                    | Yes                    | Yes                      | Yes                        |

#### (1) Signal Type

The signal type that can be set differs according to the analog I/O module model. Select the analog I/O module that corresponds to the user application and set the signal type. There are five types of signal types for the analog outputs, which are detailed as follows.

Yes: Supported, -: Not supported

| Signal Type  | FC6A-K2A1<br>FC6A-K2A4 | FC6A-K4A1<br>FC6A-K4A4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|--------------|------------------------|------------------------|--------------------------|----------------------------|
| Unused*1     | Yes                    | Yes                    | Yes                      | Yes                        |
| 0 to 10 V    | Yes                    | Yes                    | Yes                      | Yes                        |
| -10 to +10 V | Yes                    | Yes                    | Yes                      | Yes                        |
| 0 to 20 mA   | Yes                    | Yes                    | Yes                      | Yes                        |
| 4 to 20 mA   | Yes                    | Yes                    | Yes                      | Yes                        |

\*1 Channels that are set to unused are not scanned.

The circuit is setup the same as when signal type: 0 to 10 V is selected.

A channel set to unused always outputs 0 V.



#### Caution

The device connected to the analog I/O module may be damaged if the analog output signal type is mistakenly set and used. Please use caution when setting the analog output signal type.

**(2) Data Type**

The analog output value can be handled as the set data type. There are two data types for the analog outputs.

Yes: Supported, —: Not supported

| Data Type      | FC6A-K2A1<br>FC6A-K2A4 | FC6A-K4A1<br>FC6A-K4A4 | FC6A-L06A1<br>FC6A-L06A4 | FC6A-L03CN1<br>FC6A-L03CN4 |
|----------------|------------------------|------------------------|--------------------------|----------------------------|
| Binary data    | Yes                    | Yes                    | Yes                      | Yes                        |
| Optional range | Yes                    | Yes                    | Yes                      | Yes                        |

**(3) Minimum and maximum values**

The value written to the data register is output from the analog output. The minimum and maximum values that can be written are determined by the set signal type and data type. A parameter setting error occurs when a value is set that exceeds the minimum or maximum value.

The minimum and maximum values that correspond to the signal types and data types are as follows.

| Signal Type  | Data Type       |                              |
|--------------|-----------------|------------------------------|
|              | Binary Data     | Optional Range <sup>*1</sup> |
| 0 to 10 V    | 0 to 4,095      | -32,768 to 32,767            |
| -10 to +10 V | -2,048 to 2,047 | -32,768 to 32,767            |
| 0 to 20 mA   | 0 to 4,095      | -32,768 to 32,767            |
| 4 to 20 mA   | 0 to 4,095      | -32,768 to 32,767            |

<sup>\*1</sup> The minimum and maximum values can be set only when the data type is set to optional range. Set the minimum and maximum values between -32,768 and 32,767.

**(4) Data**

The analog output data for the analog output set with signal type (1) to minimum and maximum values (3) is stored in the data registers in the END progressing of each scan. The actual analog output data is not guaranteed when the analog output status (5) is a value other than "0". When M8025 (Maintain Outputs While Stopped) is on while stopped, the analog output value immediately before stopping is output. When M8025 is off, the minimum value of the analog output is output. However, 0 V is output when the signal type is -10 V to +10 V.

**(5) Status**

The status of the analog output data (4) is stored in data registers.

| Status      | Description                                  |
|-------------|--|
| 0           | Operating normally                           |
| 1           | Reserved                                     |
| 2           | Initializing                                 |
| 3           | Parameter setting error                      |
| 4           | Hardware fault (external power supply error) |
| 5 to 65,535 | Reserved                                     |

Control Registers

Data registers are set as the devices to store the parameters for the analog I/O module.

Analog Module Configuration (Slot 1)

Type: FC6A-J8CU1

DR Allocation: D0000 D0000-D0015

FC4A Compatible Mode: FC4A-J8AT1

☒ Use data register for setting parameters D0016 - D0079

| Channel | Filter (ms) | Sampling Time | Signal Type    | Data Type   | R0 | T0 | B | Min. | Max.  | Data  | Status |
|---------|-------------|---------------|----------------|-------------|----|----|---|------|-------|-------|--------|
| AI0     | 0 104ms     |               | Type K         | Binary data |    |    |   | 0    | 65535 | D0000 | D0001  |
| AI1     | 0 104ms     |               | NTC Thermistor | Binary data | 0  | 0  | 0 | 0    | 65535 | D0002 | D0003  |
| AI2     |             |               | Unused         |             |    |    |   |      |       | D0004 | D0005  |
| AI3     |             |               | Unused         |             |    |    |   |      |       | D0006 | D0007  |
| AI4     |             |               | Unused         |             |    |    |   |      |       | D0008 | D0009  |
| AI5     |             |               | Unused         |             |    |    |   |      |       | D0010 | D0011  |
| AI6     |             |               | Unused         |             |    |    |   |      |       | D0012 | D0013  |
| AI7     |             |               | Unused         |             |    |    |   |      |       | D0014 | D0015  |

Relay for writing parameters: M0000

Write parameters in the analog module to data registers: M0000

Store initial parameters in data registers: M0001

Write parameters in data registers to the analog module: M0002

Device Allocation OK Cancel

Multiple words are used starting from the set data register. The number of words of data registers that are used differs according to the analog I/O module model and the "Use data register for setting parameters" setting.

| "Use Data Register for Setting Parameters" | Used Data Registers (words) |           |           |            |             |            |           |           |            |             |
|--|-----------------------------|-----------|-----------|------------|-------------|------------|-----------|-----------|------------|-------------|
|  | FC6A-J2C1                   | FC6A-J4A1 | FC6A-J8A1 | FC6A-J4CN1 | FC6A-J4CH1Y | FC6A-J8CU1 | FC6A-K2A1 | FC6A-K4A1 | FC6A-L06A1 | FC6A-L03CN1 |
|  | FC6A-J2C4                   | FC6A-J4A4 | FC6A-J8A4 | FC6A-J4CN4 | FC6A-J4CH4Y | FC6A-J8CU4 | FC6A-K2A4 | FC6A-K4A4 | FC6A-L06A4 | FC6A-L03CN4 |
| Disabled                                   | 4                           | 8         | 16        | 8          | 8           | 16         | 4         | 8         | 12         | 6           |
| Enabled                                    | 14                          | 28        | 56        | 28         | 28          | 80         | 12        | 24        | 40         | 20          |

When "Use data register for setting parameters" is disabled

Only the data and status are stored in control registers.

**Note:** At the first scan when stop changes to run, the analog I/O module is set with the parameters (initial values) configured in WindLDR. While the parameters are being set, the analog I/O module status is initializing. After the parameters are finished being set, the analog I/O module operates normally.

When "Use data register for setting parameters" is enabled

In addition to the data and status, the operation mode, data type, minimum value, and maximum value are stored in control registers. For analog inputs, the filter value and thermistor settings are also stored.

Notes:

- When the CPU module is switched from stop to run, the analog I/O module is set with the values of the operation setting data registers.
- The parameters (initial values) configured in WindLDR are transferred to the operation setting data registers when the user program is updated or when a keep data error occurs.
- When the "Write operation setting parameters" input changes from off to on, the analog I/O module is set with the content of the operation setting data registers in the END processing of the same scan.
- While the parameters are being set, the analog I/O module status is initializing. After the parameters are finished being set, the analog I/O module operates normally.



## Control Relays

When "Use data register for setting parameters" is enabled, internal relays can be set as control relays.

Dialog: Analog Module Configuration (Slot 1)

Type: FC6A-J8CU1

DR Allocation: D0000 D0000-D0015

☒ FC4A Compatible Mode FC4A-J8AT1

☒ Use data register for setting parameters D0016 ~ D0079

| Channel | Filter (ms) | Sampling Time | Signal Type    | Data Type   | R0 | T0 | B | Min. | Max.  | Data  | Status |
|---------|-------------|---------------|----------------|-------------|----|----|---|------|-------|-------|--------|
| A10     | 0           | 104ms         | Type K         | Binary data |    |    |   | 0    | 65535 | D0000 | D0001  |
| A11     | 0           | 104ms         | NTC Thermistor | Binary data | 0  | 0  | 0 | 0    | 65535 | D0002 | D0003  |
| A12     |             |               | Unused         |             |    |    |   |      |       | D0004 | D0005  |
| A13     |             |               | Unused         |             |    |    |   |      |       | D0006 | D0007  |
| A14     |             |               | Unused         |             |    |    |   |      |       | D0008 | D0009  |
| A15     |             |               | Unused         |             |    |    |   |      |       | D0010 | D0011  |
| A16     |             |               | Unused         |             |    |    |   |      |       | D0012 | D0013  |
| A17     |             |               | Unused         |             |    |    |   |      |       | D0014 | D0015  |

Relay for writing parameters: M0000

Write parameters in the analog module to data registers: M0000

Store initial parameters in data registers: M0001

Write parameters in data registers to the analog module: M0002

Buttons: Device Allocation, OK, Cancel

3 bits are used starting from the internal relay that was set, and each bit has the following function.

| Position from Starting Bit | Description   | R/W |
|----------------------------|---|-----|
| +0                         | Read parameters (analog I/O module → operation setting data registers)                    | R/W |
| +1                         | Read initial parameter values (WindLDR settings → operation setting data registers)       | R/W |
| +2                         | Write operation setting parameters (operation setting data registers → analog I/O module) | R/W |

### Notes:

- Starting internal relay address +0: Read parameters  
When changed from off to on, the analog I/O module setting values are read into the operation setting data registers.
- Starting internal relay address +1: Read initial parameter values  
When changed from off to on, the initial values (the parameters that were saved when the user program download was executed) are read into the operation setting data registers.
- Starting internal relay address +2: Write operation setting parameters  
When changed from off to on, the data stored in the data registers is written to the analog I/O module as the parameters.
- After a control relay is changed from off to on, it automatically turns off.
- If all of the control relays are changed from off to on in the same scan, they are executed in +0, +1, +2 order, and the analog I/O module is set with the initial values.

## Device Allocation

This section describes the allocation of analog I/O module devices.

### Analog Input Module

The detailed device allocation for analog input modules is as follows.

For the parameter setting values, see "Analog Input Parameter Setting Values" on page 9-18.

| Channel |   | Parameter                | R/W | FC6A-J2C1 | FC6A-J4A1 | FC6A-J8A1 | FC6A-J4CN1 | FC6A-J4CH1Y | FC6A-J8CU1 |
|---------|---|--------------------------|-----|-----------|-----------|-----------|------------|-------------|------------|
| I/O     | No.   |                          |     | FC6A-J2C4 | FC6A-J4A4 | FC6A-J8A4 | FC6A-J4CN4 | FC6A-J4CH4Y | FC6A-J8CU4 |
| Input   | CH0   | Analog input data        | R   | +0        | +0        | +0        | +0         | +0          | +0         |
|         |   | Analog input status      | R   | +1        | +1        | +1        | +1         | +1          | +1         |
|         | CH1   | Analog input data        | R   | +2        | +2        | +2        | +2         | +2          | +2         |
|         |   | Analog input status      | R   | +3        | +3        | +3        | +3         | +3          | +3         |
|         | CH2   | Analog input data        | R   | —         | +4        | +4        | +4         | +4          | +4         |
|         |   | Analog input status      | R   | —         | +5        | +5        | +5         | +5          | +5         |
|         | CH3   | Analog input data        | R   | —         | +6        | +6        | +6         | +6          | +6         |
|         |   | Analog input status      | R   | —         | +7        | +7        | +7         | +7          | +7         |
|         | CH4   | Analog input data        | R   | —         | —         | +8        | —          | —           | +8         |
|         |   | Analog input status      | R   | —         | —         | +9        | —          | —           | +9         |
|         | CH5   | Analog input data        | R   | —         | —         | +10       | —          | —           | +10        |
|         |   | Analog input status      | R   | —         | —         | +11       | —          | —           | +11        |
|         | CH6   | Analog input data        | R   | —         | —         | +12       | —          | —           | +12        |
|         |   | Analog input status      | R   | —         | —         | +13       | —          | —           | +13        |
|         | CH7   | Analog input data        | R   | —         | —         | +14       | —          | —           | +14        |
|         |   | Analog input status      | R   | —         | —         | +15       | —          | —           | +15        |
|         | When use data register for setting parameters, the following data registers are used. |                          |     |           |           |           |            |             |            |
|         | CH0   | Signal type              | R/W | +4        | +8        | +16       | +8         | +8          | +16        |
|         |   | Data type                | R/W | +5        | +9        | +17       | +9         | +9          | +17        |
|         |   | Minimum value            | R/W | +6        | +10       | +18       | +10        | +10         | +18        |
|         |   | Maximum value            | R/W | +7        | +11       | +19       | +11        | +11         | +19        |
|         |   | Filter value             | R/W | +8        | +12       | +20       | +12        | +12         | +20        |
|         |   | Thermistor constant (R0) | R/W | —         | —         | —         | —          | —           | +21        |
|         |   | Thermistor constant (T0) | R/W | —         | —         | —         | —          | —           | +22        |
|         |   | Thermistor constant (B)  | R/W | —         | —         | —         | —          | —           | +23        |
|         | CH1   | Signal type              | R/W | +9        | +13       | +21       | +13        | +13         | +24        |
|         |   | Data type                | R/W | +10       | +14       | +22       | +14        | +14         | +25        |
|         |   | Minimum value            | R/W | +11       | +15       | +23       | +15        | +15         | +26        |
|         |   | Maximum value            | R/W | +12       | +16       | +24       | +16        | +16         | +27        |
|         |   | Filter value             | R/W | +13       | +17       | +25       | +17        | +17         | +28        |
|         |   | Thermistor constant (R0) | R/W | —         | —         | —         | —          | —           | +29        |
|         |   | Thermistor constant (T0) | R/W | —         | —         | —         | —          | —           | +30        |
|         |   | Thermistor constant (B)  | R/W | —         | —         | —         | —          | —           | +31        |
|         | CH2   | Signal type              | R/W | —         | +18       | +26       | +18        | +18         | +32        |
|         |   | Data type                | R/W | —         | +19       | +27       | +19        | +19         | +33        |
|         |   | Minimum value            | R/W | —         | +20       | +28       | +20        | +20         | +34        |
|         |   | Maximum value            | R/W | —         | +21       | +29       | +21        | +21         | +35        |
|         |   | Filter value             | R/W | —         | +22       | +30       | +22        | +22         | +36        |
|         |   | Thermistor constant (R0) | R/W | —         | —         | —         | —          | —           | +37        |
|         |   | Thermistor constant (T0) | R/W | —         | —         | —         | —          | —           | +38        |
|         |   | Thermistor constant (B)  | R/W | —         | —         | —         | —          | —           | +39        |

| Channel |     | Parameter                | R/W | FC6A-J2C1<br>FC6A-J2C4 | FC6A-J4A1<br>FC6A-J4A4 | FC6A-J8A1<br>FC6A-J8A4 | FC6A-J4CN1<br>FC6A-J4CN4 | FC6A-J4CH1Y<br>FC6A-J4CH4Y | FC6A-J8CU1<br>FC6A-J8CU4 |
|---------|-----|--------------------------|-----|------------------------|------------------------|------------------------|--------------------------|----------------------------|--------------------------|
| I/O     | No. |                          |     |                        |                        |                        |                          |                            |                          |
| Input   | CH3 | Signal type              | R/W | —                      | +23                    | +31                    | +23                      | +23                        | +40                      |
|         |     | Data type                | R/W | —                      | +24                    | +32                    | +24                      | +24                        | +41                      |
|         |     | Minimum value            | R/W | —                      | +25                    | +33                    | +25                      | +25                        | +42                      |
|         |     | Maximum value            | R/W | —                      | +26                    | +34                    | +26                      | +26                        | +43                      |
|         |     | Filter value             | R/W | —                      | +27                    | +35                    | +27                      | +27                        | +44                      |
|         |     | Thermistor constant (R0) | R/W | —                      | —                      | —                      | —                        | —                          | +45                      |
|         |     | Thermistor constant (T0) | R/W | —                      | —                      | —                      | —                        | —                          | +46                      |
|         |     | Thermistor constant (B)  | R/W | —                      | —                      | —                      | —                        | —                          | +47                      |
|         | CH4 | Signal type              | R/W | —                      | —                      | +36                    | —                        | —                          | +48                      |
|         |     | Data type                | R/W | —                      | —                      | +37                    | —                        | —                          | +49                      |
|         |     | Minimum value            | R/W | —                      | —                      | +38                    | —                        | —                          | +50                      |
|         |     | Maximum value            | R/W | —                      | —                      | +39                    | —                        | —                          | +51                      |
|         |     | Filter Value             | R/W | —                      | —                      | +40                    | —                        | —                          | +52                      |
|         |     | Thermistor constant (R0) | R/W | —                      | —                      | —                      | —                        | —                          | +53                      |
|         |     | Thermistor constant (T0) | R/W | —                      | —                      | —                      | —                        | —                          | +54                      |
|         |     | Thermistor constant (B)  | R/W | —                      | —                      | —                      | —                        | —                          | +55                      |
|         | CH5 | Signal type              | R/W | —                      | —                      | +41                    | —                        | —                          | +56                      |
|         |     | Data type                | R/W | —                      | —                      | +42                    | —                        | —                          | +57                      |
|         |     | Minimum value            | R/W | —                      | —                      | +43                    | —                        | —                          | +58                      |
|         |     | Maximum value            | R/W | —                      | —                      | +44                    | —                        | —                          | +59                      |
|         |     | Filter value             | R/W | —                      | —                      | +45                    | —                        | —                          | +60                      |
|         |     | Thermistor constant (R0) | R/W | —                      | —                      | —                      | —                        | —                          | +61                      |
|         |     | Thermistor constant (T0) | R/W | —                      | —                      | —                      | —                        | —                          | +62                      |
|         |     | Thermistor constant (B)  | R/W | —                      | —                      | —                      | —                        | —                          | +63                      |
|         | CH6 | Signal type              | R/W | —                      | —                      | +46                    | —                        | —                          | +64                      |
|         |     | Data type                | R/W | —                      | —                      | +47                    | —                        | —                          | +65                      |
|         |     | Minimum value            | R/W | —                      | —                      | +48                    | —                        | —                          | +66                      |
|         |     | Maximum value            | R/W | —                      | —                      | +49                    | —                        | —                          | +67                      |
|         |     | Filter Value             | R/W | —                      | —                      | +50                    | —                        | —                          | +68                      |
|         |     | Thermistor constant (R0) | R/W | —                      | —                      | —                      | —                        | —                          | +69                      |
|         |     | Thermistor constant (T0) | R/W | —                      | —                      | —                      | —                        | —                          | +70                      |
|         |     | Thermistor constant (B)  | R/W | —                      | —                      | —                      | —                        | —                          | +71                      |
|         | CH7 | Signal type              | R/W | —                      | —                      | +51                    | —                        | —                          | +72                      |
|         |     | Data type                | R/W | —                      | —                      | +52                    | —                        | —                          | +73                      |
|         |     | Minimum value            | R/W | —                      | —                      | +53                    | —                        | —                          | +74                      |
|         |     | Maximum value            | R/W | —                      | —                      | +54                    | —                        | —                          | +75                      |
|         |     | Filter value             | R/W | —                      | —                      | +55                    | —                        | —                          | +76                      |
|         |     | Thermistor constant (R0) | R/W | —                      | —                      | —                      | —                        | —                          | +77                      |
|         |     | Thermistor constant (T0) | R/W | —                      | —                      | —                      | —                        | —                          | +78                      |
|         |     | Thermistor constant (B)  | R/W | —                      | —                      | —                      | —                        | —                          | +79                      |

### Analog Input Parameter Setting Values

The parameter setting values are as follows.

#### Signal type

| Setting Value | Signal Type                |
|---------------|----------------------------|
| 0             | Unused                     |
| 1             | 0 to 10 V                  |
| 2             | -10 to +10 V               |
| 3             | 0 to 20 mA                 |
| 4             | 4 to 20 mA                 |
| 5             | Type K thermocouple        |
| 6             | Type J thermocouple        |
| 7             | Type R thermocouple        |
| 8             | Type S thermocouple        |
| 9             | Type B thermocouple        |
| 10            | Type E thermocouple        |
| 11            | Type T thermocouple        |
| 12            | Type N thermocouple        |
| 13            | Type C thermocouple        |
| 14            | Pt100                      |
| 15            | Pt1000                     |
| 16            | Ni100                      |
| 17            | Ni1000                     |
| 18            | NTC thermistor             |
| 19            | PTC thermistor             |
| 20            | PTC thermistor (threshold) |
| 21            | Resistance measurement     |
| 22            | Expansion 0 to 20 mA       |
| 23            | Expansion 4 to 20 mA       |

If the setting value is outside the range, a parameter setting error will occur.

#### Data type

| Setting Value | Data type                                |
|---------------|--|
| 0             | Binary data/Binary data (12 bits)        |
| 1             | Optional range/Optional range (12 bits)  |
| 2             | Celsius/resistance/Binary data (16 bits) |
| 3             | Fahrenheit/Optional range (16 bits)      |

If the setting value is 4 to 65,535, a parameter setting error will occur.

#### Minimum and maximum values

The minimum and maximum values can be set only when the data type is set to optional range. Set the minimum and maximum values between -32,768 and 32,767. However, when the signal type is set to PTC thermistor (threshold), set the minimum and maximum values between 100 and 10,000.

**Filter**

| Setting Value | Filter    |
|---------------|-----------|
| 0             | 0 ms      |
| 50            | 50 ms     |
| 100           | 100 ms    |
| 150           | 150 ms    |
| ...           | ...       |
| 50,000        | 50,000 ms |

The setting value is rounded by 50.

When 50,001 to 65,535 is stored for the setting value, the filter operates as the maximum value of 50,000 ms.

**Thermistor constant**

| Range             | Thermistor Constant |
|-------------------|---------------------|
| 0 to 65,535       | R0                  |
| -32,768 to 32,767 | T0                  |
| -32,768 to 32,767 | B                   |

**Analog Output Module**

The detailed device allocation for analog output modules is as follows.

For the parameter setting values, see "Analog Output Parameter Setting Values" on page 9-20.

| Channel |  | Parameter            | R/W | FC6A-K2A1<br>FC6A-K2A4 | FC6A-K4A1<br>FC6A-K4A4 |
|---------|--|----------------------|-----|------------------------|------------------------|
| I/O     | No.  |                      |     |                        |                        |
| Output  | CH0  | Analog output data   | R   | +0                     | +0                     |
|         |  | Analog output status | R   | +1                     | +1                     |
|         | CH1  | Analog output data   | R   | +2                     | +2                     |
|         |  | Analog output status | R   | +3                     | +3                     |
|         | CH2  | Analog output data   | R   | —                      | +4                     |
|         |  | Analog output status | R   | —                      | +5                     |
|         | CH3  | Analog output data   | R   | —                      | +6                     |
|         |  | Analog output status | R   | —                      | +7                     |
|         | When use the operation setting data registers,<br>the following data registers are used. |                      |     |                        |                        |
|         | CH0  | Signal type          | R/W | +4                     | +8                     |
|         |  | Data type            | R/W | +5                     | +9                     |
|         |  | Minimum value        | R/W | +6                     | +10                    |
|         |  | Maximum value        | R/W | +7                     | +11                    |
|         | CH1  | Signal type          | R/W | +8                     | +12                    |
|         |  | Data type            | R/W | +9                     | +13                    |
|         |  | Minimum value        | R/W | +10                    | +14                    |
|         |  | Maximum value        | R/W | +11                    | +15                    |
|         | CH2  | Signal type          | R/W | —                      | +16                    |
|         |  | Data type            | R/W | —                      | +17                    |
|         |  | Minimum value        | R/W | —                      | +18                    |
|         |  | Maximum value        | R/W | —                      | +19                    |
|         | CH3  | Signal type          | R/W | —                      | +20                    |
|         |  | Data type            | R/W | —                      | +21                    |
|         |  | Minimum value        | R/W | —                      | +22                    |
|         |  | Maximum value        | R/W | —                      | +23                    |

### Analog Output Parameter Setting Values

The parameter setting values are as follows.

#### Signal type

| Setting Value | Signal Type  |
|---------------|--------------|
| 0             | Unused       |
| 1             | 0 to 10 V    |
| 2             | -10 to +10 V |
| 3             | 0 to 20 mA   |
| 4             | 4 to 20 mA   |

If the setting value is outside the range, a parameter setting error will occur.

#### Data type

| Setting Value | Data type      |
|---------------|----------------|
| 0             | Binary data    |
| 1             | Optional range |

If the setting value is 2 to 65,535, a parameter setting error will occur.

#### Minimum and maximum values

The minimum and maximum values can be set only when the data type is set to optional range. Set the minimum and maximum values between -32,768 and 32,767.

### Mixed Analog I/O Module

The detailed device allocation for mixed analog I/O modules is as follows. For the parameter setting values for analog inputs, see "Analog Input Parameter Setting Values" on page 9-18. For analog outputs, see "Analog Output Parameter Setting Values" on page 9-20.

| Channel   | Parameter     | R/W | FC6A-L06A1<br>FC6A-L06A4 |     | FC6A-L03CN1<br>FC6A-L03CN4 |     |
|---|---------------|-----|--------------------------|-----|----------------------------|-----|
| No.   |               |     | I/O                      |     | I/O                        |     |
| CH0   | Analog data   | R   | Input                    | +0  | Input                      | +0  |
|   | Analog status | R   |                          | +1  |                            | +1  |
| CH1   | Analog data   | R   |                          | +2  |                            | +2  |
|   | Analog status | R   |                          | +3  | +3                         |     |
| CH2   | Analog data   | R   |                          | +4  | Output                     | +4  |
|   | Analog status | R   |                          | +5  |                            | +5  |
| CH3   | Analog data   | R   |                          | +6  | —                          | —   |
|   | Analog status | R   |                          | +7  | —                          | —   |
| CH4   | Analog data   | R   | Output                   | +8  | —                          | —   |
|   | Analog status | R   |                          | +9  | —                          | —   |
| CH5   | Analog data   | R   |                          | +10 | —                          | —   |
|   | Analog status | R   |                          | +11 | —                          | —   |
| When use the operation setting data registers, the following data registers are used. |               |     |                          |     |                            |     |
| CH0   | Signal type   | R/W | Input                    | +12 | Input                      | +6  |
|   | Data type     | R/W |                          | +13 |                            | +7  |
|   | Minimum value | R/W |                          | +14 |                            | +8  |
|   | Maximum value | R/W |                          | +15 |                            | +9  |
|   | Filter value  | R/W |                          | +16 |                            | +10 |
| CH1   | Signal type   | R/W |                          | +17 | Input                      | +11 |
|   | Data type     | R/W |                          | +18 |                            | +12 |
|   | Minimum value | R/W |                          | +19 |                            | +13 |
|   | Maximum value | R/W |                          | +20 |                            | +14 |
|   | Filter value  | R/W |                          | +21 |                            | +15 |
| CH2   | Signal type   | R/W |                          | +22 | Output                     | +16 |
|   | Data type     | R/W |                          | +23 |                            | +17 |
|   | Minimum value | R/W |                          | +24 |                            | +18 |
|   | Maximum value | R/W |                          | +25 |                            | +19 |
|   | Filter value  | R/W |                          | +26 |                            | —   |
| CH3   | Signal type   | R/W |                          | +27 | —                          | —   |
|   | Data type     | R/W |                          | +28 | —                          | —   |
|   | Minimum value | R/W |                          | +29 | —                          | —   |
|   | Maximum value | R/W |                          | +30 | —                          | —   |
|   | Filter value  | R/W |                          | +31 | —                          | —   |
| CH4   | Signal type   | R/W | Output                   | +32 | —                          | —   |
|   | Data type     | R/W |                          | +33 | —                          | —   |
|   | Minimum value | R/W |                          | +34 | —                          | —   |
|   | Maximum value | R/W |                          | +35 | —                          | —   |
|   | Filter value  | R/W |                          | —   | —                          | —   |
| CH5   | Signal type   | R/W |                          | +36 | —                          | —   |
|   | Data type     | R/W |                          | +37 | —                          | —   |
|   | Minimum value | R/W |                          | +38 | —                          | —   |
|   | Maximum value | R/W |                          | +39 | —                          | —   |
|   | Filter value  | R/W |                          | —   | —                          | —   |

FC4A compatibility mode

If FC4A Compatible Mode is enabled, device allocations, such as those for data and statuses, can be set to be compatible with the specified FC4A analog module.

Analog Module Configuration (Slot 1)

Type: FC6A-J8CU1

DR Allocation: D0000

☒ FC4A Compatible Mode

FC4A-J8AT1

☒ Use data register for setting parameters

| Channel | Filter (ms) | Sampling Time | Signal Type    | Data Type   | R0 | T0 | B | Min. | Max.  | Data  | Status |
|---------|-------------|---------------|----------------|-------------|----|----|---|------|-------|-------|--------|
| AI0     | 0           | 104ms         | Type K         | Binary data |    |    |   | 0    | 65535 | D0046 | D0054  |
| AI1     | 0           | 104ms         | NTC Thermistor | Binary data | 0  | 0  | 0 | 0    | 65535 | D0047 | D0055  |
| AI2     |             |               | Unused         |             |    |    |   |      |       | D0048 | D0056  |
| AI3     |             |               | Unused         |             |    |    |   |      |       | D0049 | D0057  |
| AI4     |             |               | Unused         |             |    |    |   |      |       | D0050 | D0058  |
| AI5     |             |               | Unused         |             |    |    |   |      |       | D0051 | D0059  |
| AI6     |             |               | Unused         |             |    |    |   |      |       | D0052 | D0060  |
| AI7     |             |               | Unused         |             |    |    |   |      |       | D0053 | D0061  |

Relay for writing parameters: M0000

Write parameters in the analog module to data registers: M0000

Store initial parameters in data registers: M0001

Write parameters in data registers to the analog module: M0002

Device Allocation

OK

Cancel

FC4A Compatible Mode is automatically enabled if the model setting is changed to FC6A in a ladder program that uses an FC4A analog module.



# 10: I/O CARTRIDGES

This chapter provides an overview of the cartridge slot, as well as an overview of I/O cartridges and their specifications, parameters, and configuration methods.

## Digital I/O Cartridge

### Digital I/O Cartridge Overview

This section provides an overview of digital I/O cartridges and describes the compatible cartridge slots.

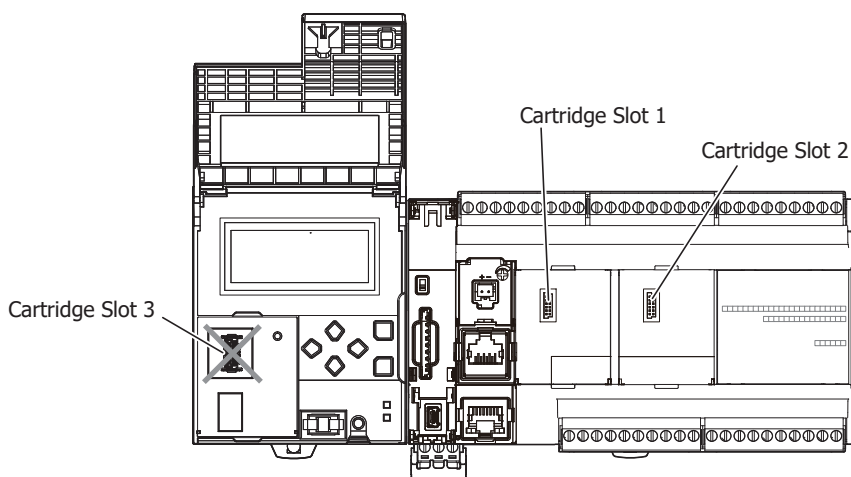
Digital I/O cartridges are used to expand the digital inputs or digital outputs. Digital I/O cartridges are available in two types of cartridges: digital input cartridges equipped with input terminals and digital output cartridges equipped with output terminals.

To use a digital I/O cartridge, it must be configured in the Module Configuration Editor. For detailed configuration methods, see "Module Configuration Editor" on page 12-1. For details on digital I/O cartridge parameters, see "Digital I/O Cartridge Parameters" on page 10-4.

### Cartridge Slots

#### All-in-One CPU module/CAN J1939 All-in-One CPU module

The All-in-One CPU module/CAN J1939 All-in-One CPU module are equipped with a maximum of two cartridge slots for connecting cartridges. These can be used to connect up to two cartridges. Furthermore, the FC6A can be expanded with a maximum of eight digital inputs or digital outputs by connecting the HMI module to the left side of the All-in-One CPU module/CAN J1939 All-in-One CPU module and connecting one digital I/O cartridge.



| CPU Module                      |             |                  |                  | HMI Module        |
|---------------------------------|-------------|------------------|------------------|-------------------|
|                                 |             | Cartridge Slot 1 | Cartridge Slot 2 | Cartridge Slot 3  |
| All-in-One CPU module           | 16-I/O type | Yes              | —                | Yes <sup>*1</sup> |
|                                 | 24-I/O type | Yes              | —                | Yes <sup>*1</sup> |
|                                 | 40-I/O type | Yes              | Yes              | Yes <sup>*1</sup> |
| CAN J1939 All-in-One CPU module |             | Yes              | Yes              | Yes <sup>*1</sup> |

\*1 For the All-in-One CPU module/CAN J1939 All-in-One CPU module, the maximum I/O refresh time of the digital I/O cartridge connected to cartridge slot 3 is calculated with the following calculation.

Maximum I/O refresh time = 90 ms + (number of connections being used × 30 ms) + input filter settings + scan time of one scan

For details on the number of connections being used, see "Connection Settings" on page 7-48.

For details on the input filter settings, see "Digital I/O Cartridge Parameters" on page 10-4. The input filter settings item is used only for a digital input cartridge.

Select the digital I/O cartridges for the connected devices and configure the signal types.

10: I/O CARTRIDGES

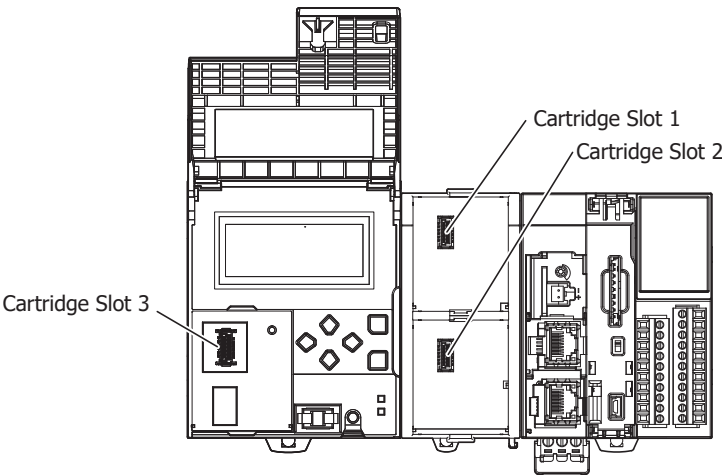
Notes:

- Always install and remove the digital I/O cartridges in the FC6A when the power is turned off. If a digital I/O cartridge is installed in or removed from the FC6A when the power is on, the product may be damaged. There is also a risk that the digital I/O cartridge may not operate correctly.
- The digital I/O cartridge may be damaged when dropped, so take great care not to drop it when removing it.
- Correctly connect the digital I/O cartridges to the cartridge slots.
- For details on how to install and remove the digital I/O cartridges, see "Assembling the CPU Module and a Cartridge" on page 3-6.

Plus CPU module

To use digital I/O cartridges with the Plus CPU module, connect a cartridge base module or the HMI module to the Plus CPU module. These can be used to connect up to three digital I/O cartridges.

Digital inputs or digital outputs can be increased to a maximum of 12 points by installing digital I/O cartridges in the cartridge slots.



| CPU Module      | Cartridge Base Module |                  | HMI Module       |
|-----------------|-----------------------|------------------|------------------|
|                 | Cartridge Slot 1      | Cartridge Slot 2 | Cartridge Slot 3 |
| Plus CPU module | Yes                   | Yes              | Yes              |

Select the digital I/O cartridges for the connected devices and configure the signal type.

Notes:

- Always install and remove the digital I/O cartridges in the FC6A when the power is turned off. If a digital I/O cartridge is installed in or removed from the FC6A when the power is on, the product may be damaged. There is also a risk that the digital I/O cartridge may not operate correctly.
- The digital I/O cartridge may be damaged when dropped, so take great care not to drop it when removing it.
- Correctly connect the digital I/O cartridges to the cartridge slots.
- For details on how to install and remove the digital I/O cartridges, see "Assembling the Cartridge Base Module and a Cartridge" on page 3-8.

## Digital Input and Output Assignments

The digital inputs or digital outputs are assigned as follows.

|                     | Digital I/O Cartridge |                  |  |
|---------------------|-----------------------|------------------|--|
|                     | Cartridge Slot 1      | Cartridge Slot 2 | Cartridge Slot 3   |
| Input Device Range  | I630 to I633          | I634 to I637     | I624 to I627* <sup>1</sup> (All-in-One CPU module/CAN J1939 All-in-One CPU module)<br>I640 to I643 (Plus CPU module) |
| Output Device Range | Q630 to Q633          | Q634 to Q637     | Q624 to Q627* <sup>1</sup> (All-in-One CPU module/CAN J1939 All-in-One CPU module)<br>Q640 to Q643 (Plus CPU module) |

\*1 As given below, certain digital I/O cartridges cannot be used in cartridge slot 3 depending on the configuration of expansion modules.  
Limitations on Using Digital I/O Cartridges

| Configuration of Expansion Modules | Digital I/O Cartridges That Cannot Be Used in Cartridge Slot 3 |
|------------------------------------|--|
| FC6A-N32B3×15                      | FC6A-PN4   |
| FC6A-T32K3 and FC6A-T32P3×15       | FC6A-PTK4, FC6A-PTS4   |

### Assignment Example

When a digital input cartridge is installed in Cartridge Slot 1 and a digital output cartridge is installed in Cartridge Slot 2 of a 40-I/O type CPU module

|                     | CPU Modules<br>40-I/O Type | Digital I/O Cartridge |                  |
|---------------------|----------------------------|-----------------------|------------------|
|                     |                            | Cartridge Slot 1      | Cartridge Slot 2 |
| Input Device Range  | I0 to I27                  | I630 to I633          | —                |
| Output Device Range | Q0 to Q27                  | —                     | Q634 to Q637     |

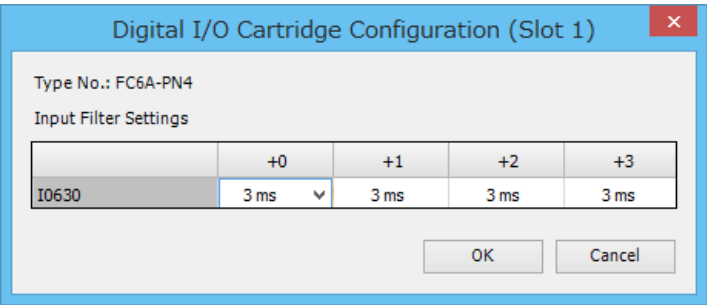
Digital I/O Cartridge Parameters

Input filter settings are the only parameters available.  
Parameters can be configured for only digital input cartridges.  
Input filter settings can be configured for each digital input.

Input Filter

The input filter is used to adjust the filter width according to the width of the input signal in order to decrease the effects of input contact bounce and noise.  
The filter width can be adjusted to a value of 0 ms (no input filter) and 3 to 15 ms (1-ms increments) for each digital input.  
For details on the input filter, see "Input Filter" on page 5-41.

Setting Details



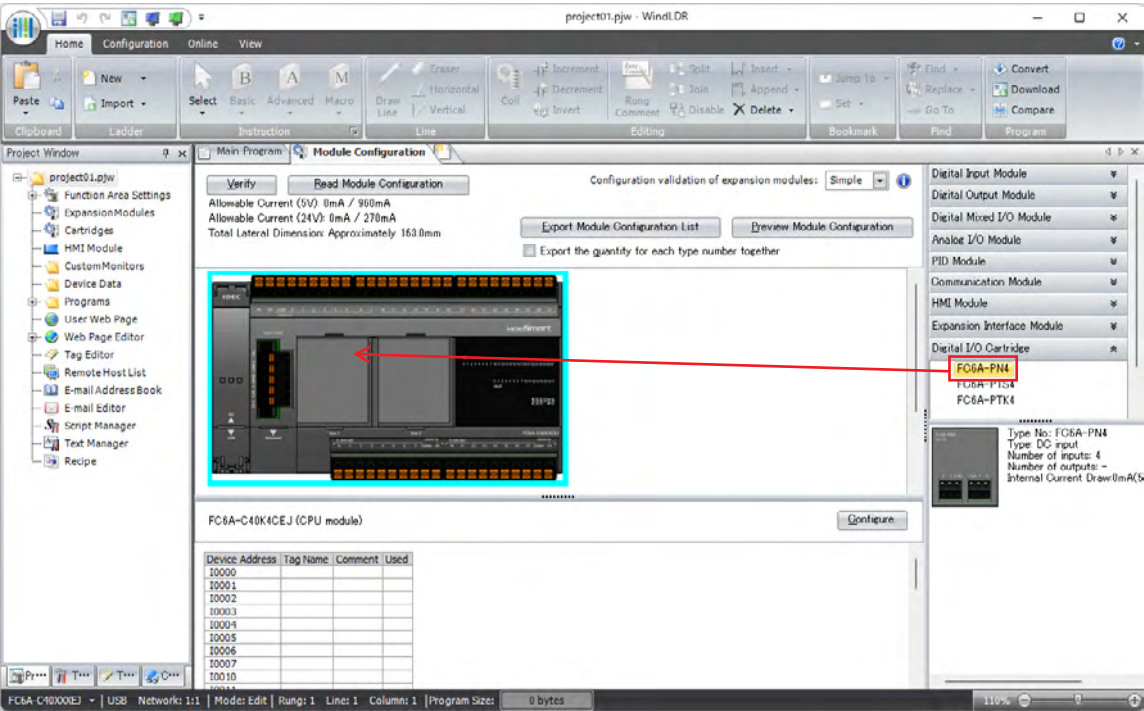
| Filter Time (ms) | Description   |
|------------------|---|
| 0                | No input filtering                                    |
| 3 to 15          | Set the digital input filter time in 1-ms increments. |

Setting Procedure

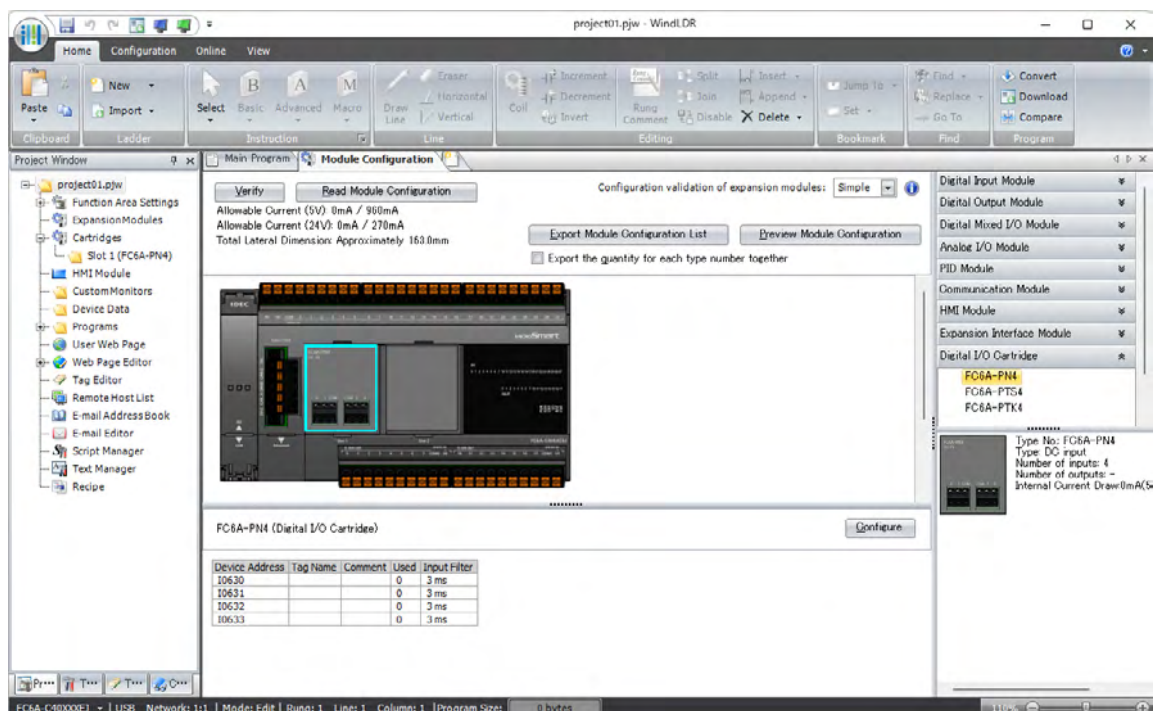
To use digital I/O cartridges, you must configure the digital I/O cartridges that will be used with the Module Configuration Editor in WindLDR and download the user program to the FC6A.  
For basic Module Configuration Editor operations, see "Module Configuration Editor" on page 12-1.

This section describes how to insert digital I/O cartridges into the module configuration area and how to configure the input filter.

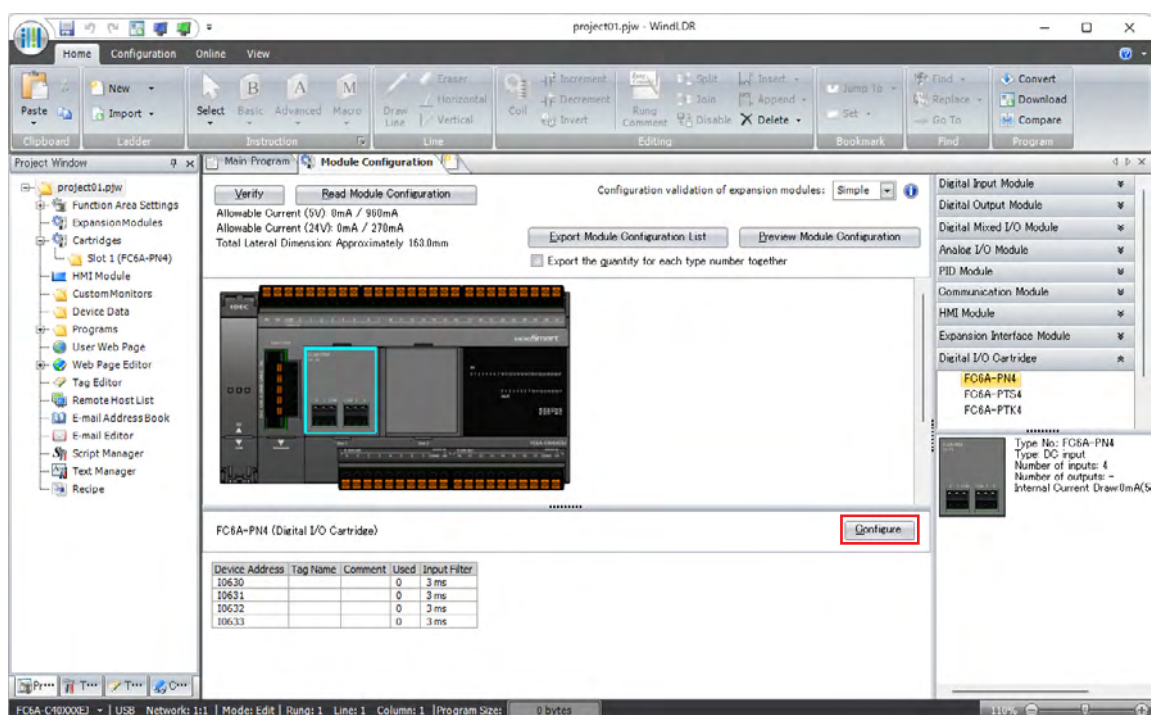
- 1. Select the digital I/O cartridge in the expansion modules and cartridges list and drag and drop it to the module configuration area.



The applicable cartridge is inserted into the module configuration area.



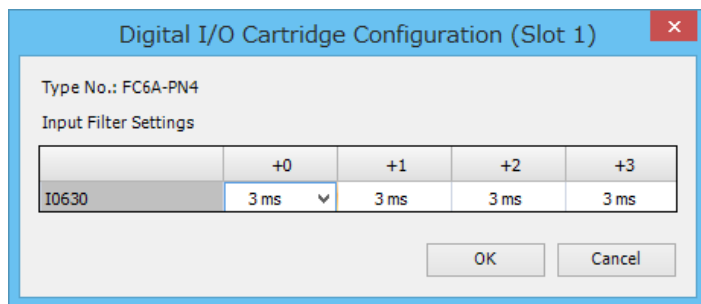
- Click the inserted digital I/O cartridge in the module configuration area and click **Configure**. The configuration dialog box that corresponds to the digital I/O cartridge is displayed.



## 10: I/O CARTRIDGES

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3. Enter the filter settings.



The dialog box is titled "Digital I/O Cartridge Configuration (Slot 1)" and has a red close button in the top right corner. It displays "Type No.: FC6A-PN4" and "Input Filter Settings". Below this is a table with four columns labeled "+0", "+1", "+2", and "+3". The first column is labeled "I0630". Each of the four columns contains a dropdown menu showing "3 ms". At the bottom right are "OK" and "Cancel" buttons.

|       | +0   | +1   | +2   | +3   |
|-------|------|------|------|------|
| I0630 | 3 ms | 3 ms | 3 ms | 3 ms |

4. Click **OK** to close the **Digital I/O Cartridge Configuration** dialog box.

5. Click **OK**.

This concludes configuring the settings in the application.  
Download the user program to the FC6A to enable the settings.

## Analog I/O Cartridge

### Analog I/O Cartridge Overview

This section provides an overview of the analog I/O cartridges and describes the compatible cartridge slots.

Analog I/O cartridges are used to expand the analog inputs or analog outputs. They are available in the analog input type and the analog output type. The analog input type is called the analog input cartridge, and the analog output type is called the analog output cartridge. The analog data and analog status of the analog I/O cartridge is stored in special data registers. For details, see "(6) Data" on page 10-13.

To use an analog I/O cartridge, it must be configured in the Module Configuration Editor. For detailed configuration methods, see "Module Configuration Editor" on page 12-1. For details on the analog parameter settings, see "Analog Parameter Settings" on page 10-11.

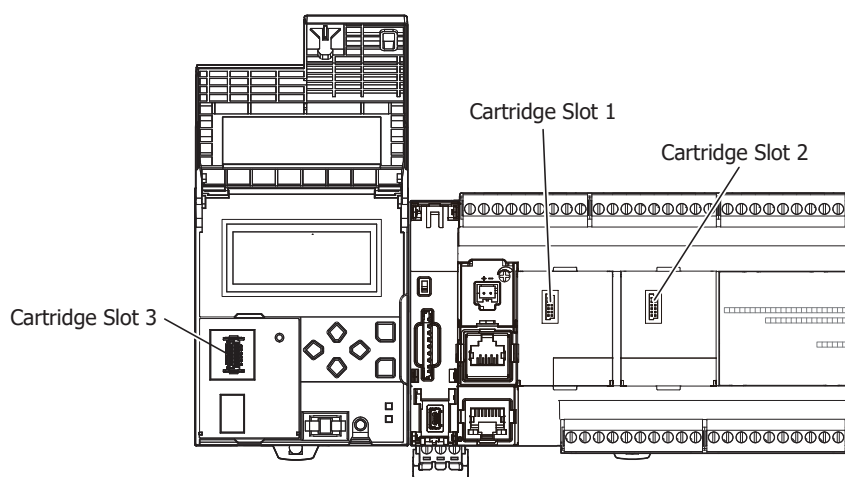
### Cartridge Slots

#### All-in-One CPU module/CAN J1939 All-in-One CPU module

The All-in-One CPU module/CAN J1939 All-in-One CPU module are equipped with a maximum of two cartridge slots that are used to install the analog I/O cartridges. The FC6A can be expanded with a maximum of four analog inputs or analog outputs by installing a maximum of two analog I/O cartridges.

Furthermore, the FC6A can be expanded with a maximum of two analog inputs or analog outputs by connecting the HMI module to the left side of the All-in-One CPU module/CAN J1939 All-in-One CPU module and installing an analog I/O cartridge.

For example, when the HMI module is connected to the 40-I/O type, the FC6A can be expanded with a maximum of six analog inputs or analog outputs by installing a maximum of three analog I/O cartridges.



| CPU Module                      |             |                  |                  | HMI Module       |
|---------------------------------|-------------|------------------|------------------|------------------|
|                                 |             | Cartridge Slot 1 | Cartridge Slot 2 | Cartridge Slot 3 |
| All-in-One CPU module           | 16-I/O type | Yes              | —                | Yes              |
|                                 | 24-I/O type | Yes              | —                | Yes              |
|                                 | 40-I/O type | Yes              | Yes              | Yes              |
| CAN J1939 All-in-One CPU module |             | Yes              | Yes              | Yes              |

Select the analog I/O cartridges for the connected devices and configure the signal type.



#### Caution

- Always install or remove the analog I/O cartridges in the FC6A when the power is turned off. If an analog I/O cartridge is installed or removed in the FC6A when the power is on, the product may be damaged. There is also a risk that the analog I/O cartridge may not operate correctly.
- The analog I/O cartridge may be damaged when dropped, so take great care not to drop it when removing it.
- Correctly install the analog I/O cartridges in the analog I/O cartridge slots.
- For details on how to install and remove the analog I/O cartridge, see "Assembling the CPU Module and a Cartridge" on page 3-6 and "Assembling the HMI Module and a Cartridge" on page 3-7.



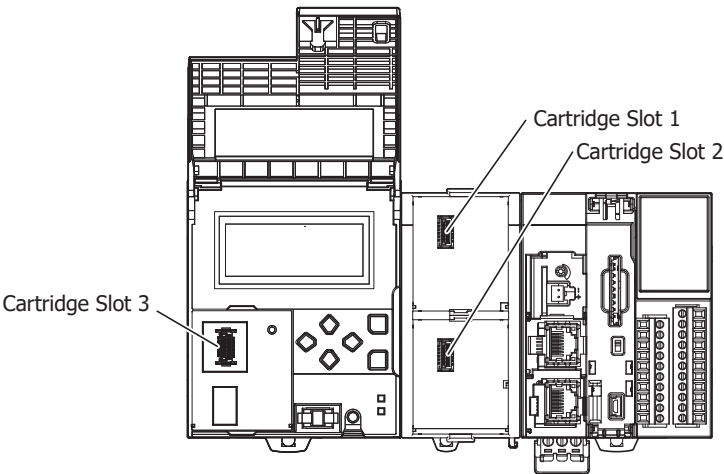
10: I/O CARTRIDGES

Plus CPU module

To use analog I/O cartridges with the Plus CPU module, connect a cartridge base module equipped with two cartridge slots to the left side of the Plus CPU module. The Plus CPU module can be expanded with a maximum of four analog inputs or analog outputs by connecting a maximum of two analog I/O cartridges.

Furthermore, the Plus CPU module can be expanded with a maximum of two analog inputs or analog outputs by connecting the HMI module to the left side of the cartridge base module and connecting one analog I/O cartridge.

For example, when the cartridge base module is connected to the Plus CPU module and the HMI module is connected to the cartridge base module, the Plus CPU module can be expanded with a maximum of six analog inputs or analog outputs by connecting a maximum of three analog I/O cartridges.



| CPU Module      | Cartridge Base Module |                  | HMI Module       |
|-----------------|-----------------------|------------------|------------------|
|                 | Cartridge Slot 1      | Cartridge Slot 2 | Cartridge Slot 3 |
| Plus CPU module | Yes                   | Yes              | Yes              |

Select the analog I/O cartridges for the connected devices and configure the signal type.



Caution

- Always install or remove the analog I/O cartridges in the FC6A when the power is turned off. If an analog I/O cartridge is installed or removed in the FC6A when the power is on, the product may be damaged. There is also a risk that the analog I/O cartridge may not operate correctly.
- The analog I/O cartridge may be damaged when dropped, so take great care not to drop it when removing it.
- Correctly install the analog I/O cartridges in the analog I/O cartridge slots.
- For details on how to install and remove the analog I/O cartridge, see "Assembling the HMI Module and a Cartridge" on page 3-7 and "Assembling the Cartridge Base Module and a Cartridge" on page 3-8.



## Analog I/O Cartridge Specifications

This section describes analog I/O cartridge types, how to check the version number, and the analog input and output assignments.

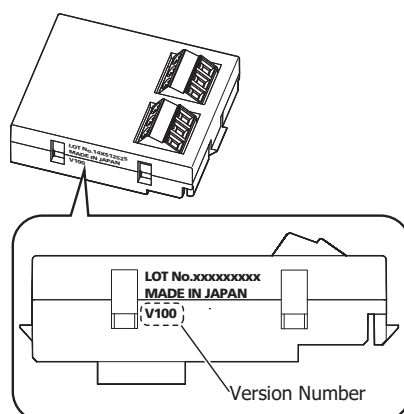
### Type Number Configuration

The I/O type, the number of analog inputs or outputs, and the signal types according to the analog I/O cartridge type number are as follows.

| Type No.   | I/O Type      | Number of Analog Points | Signal Type         |
|------------|---------------|-------------------------|---------------------|
| FC6A-PJ2A  | Analog input  | 2 points                | 0 to 10 V           |
|            |               |                         | 0 to 20 mA          |
|            |               |                         | 4 to 20 mA          |
| FC6A-PJ2CP | Analog input  | 2 points                | Type K thermocouple |
|            |               |                         | Type J thermocouple |
|            |               |                         | Type R thermocouple |
|            |               |                         | Type S thermocouple |
|            |               |                         | Type B thermocouple |
|            |               |                         | Type E thermocouple |
|            |               |                         | Type T thermocouple |
|            |               |                         | Type N thermocouple |
|            |               |                         | Type C thermocouple |
|            |               |                         | Pt100               |
|            |               |                         | Pt1000              |
|            |               |                         | Ni100               |
|            |               |                         | Ni1000              |
| FC6A-PK2AV | Analog output | 2 points                | 0 to 10 V           |
| FC6A-PK2AW | Analog output | 2 points                | 4 to 20 mA          |

### Checking the Version Number

The analog I/O cartridge version number is printed on the side of the analog I/O cartridge in the location in the following diagram. The performance and functionality of the analog I/O cartridge will differ by its version, so check the version number before use. For details, see "(7) Status" on page 10-14.



## 10: I/O CARTRIDGES

### Analog I/O Assignments

The analog inputs or analog outputs are assigned as follows.

|                    | All-in-One CPU Module/<br>Plus CPU Module | CAN J1939 All-in-One CPU Module | Analog I/O Cartridge |          |                  |          |                  |          |
|--------------------|---|---------------------------------|----------------------|----------|------------------|----------|------------------|----------|
|                    |   |                                 | Cartridge Slot 1     |          | Cartridge Slot 2 |          | Cartridge Slot 3 |          |
| Channel            | —   | —                               | IN0/OUT0             | IN1/OUT1 | IN0/OUT0         | IN1/OUT1 | IN0/OUT0         | IN1/OUT1 |
| Analog No. (AI/AQ) | AI1                                       | —                               | AI2/AQ2              | AI3/AQ3  | AI4/AQ4          | AI5/AQ5  | AI6/AQ6          | AI7/AQ7  |

**Notes:**

- AI1 is an analog input of All-in-One CPU module and Plus CPU module. For details, see "Analog Voltage Input" on page 5-43.
- AI0 is an analog potentiometer of All-in-One CPU module and Plus CPU module. For details, see "Analog Potentiometer" on page 5-45.

### Assignment Example

- Example 1) The assignments for the 40-I/O type when an analog input cartridge is installed in cartridge slot 1, an analog output cartridge is installed in cartridge slot 2, and an analog output cartridge is installed in cartridge slot 3 on the HMI module

|               | All-in-One CPU Module | Analog I/O Cartridge |                  |      |                  |      |                  |
|---------------|-----------------------|----------------------|------------------|------|------------------|------|------------------|
|               |                       | 40-I/O Type          | Cartridge Slot 1 |      | Cartridge Slot 2 |      | Cartridge Slot 3 |
| Channel       | —                     | IN0                  | IN1              | OUT0 | OUT1             | OUT0 | OUT1             |
| Analog input  | AI1                   | AI2                  | AI3              | —    | —                | —    | —                |
| Analog output | —                     | —                    | —                | AQ4  | AQ5              | AQ6  | AQ7              |

- Example 2) The assignments for the CAN J1939 All-in-One CPU module when an analog input cartridge is installed in cartridge slot 1

|               | CAN J1939 All-in-One CPU Module | Analog I/O Cartridge |     |                  |   |                  |   |
|---------------|---------------------------------|----------------------|-----|------------------|---|------------------|---|
|               |                                 | Cartridge Slot 1     |     | Cartridge Slot 2 |   | Cartridge Slot 3 |   |
| Channel       | —                               | IN0                  | IN1 | —                | — | —                | — |
| Analog input  | —                               | AI2                  | AI3 | —                | — | —                | — |
| Analog output | —                               | —                    | —   | —                | — | —                | — |

## Analog Parameter Settings

This section describes the analog parameter settings required to use the analog I/O cartridges.

The analog parameter settings are performed for each channel. In **Expansion Modules Configuration**, configure the parameter settings according to the application.

For detailed configuration methods, see "Module Configuration Editor" on page 12-1.

## Setting Details

The analog parameter settings include the filter, signal type, data type, minimum value, maximum value, data, and status.

| Channel  | Filter (ms) | Signal Type | Data Type   | Min. | Max. | Data  | Status |
|----------|-------------|-------------|-------------|------|------|-------|--------|
| IN0: AI2 | 0           | 0 to 10V DC | Binary data | 0    | 4095 | D8170 | D8172  |
| IN1: AI3 | 0           | 0 to 10V DC | Binary data | 0    | 4095 | D8171 | D8173  |

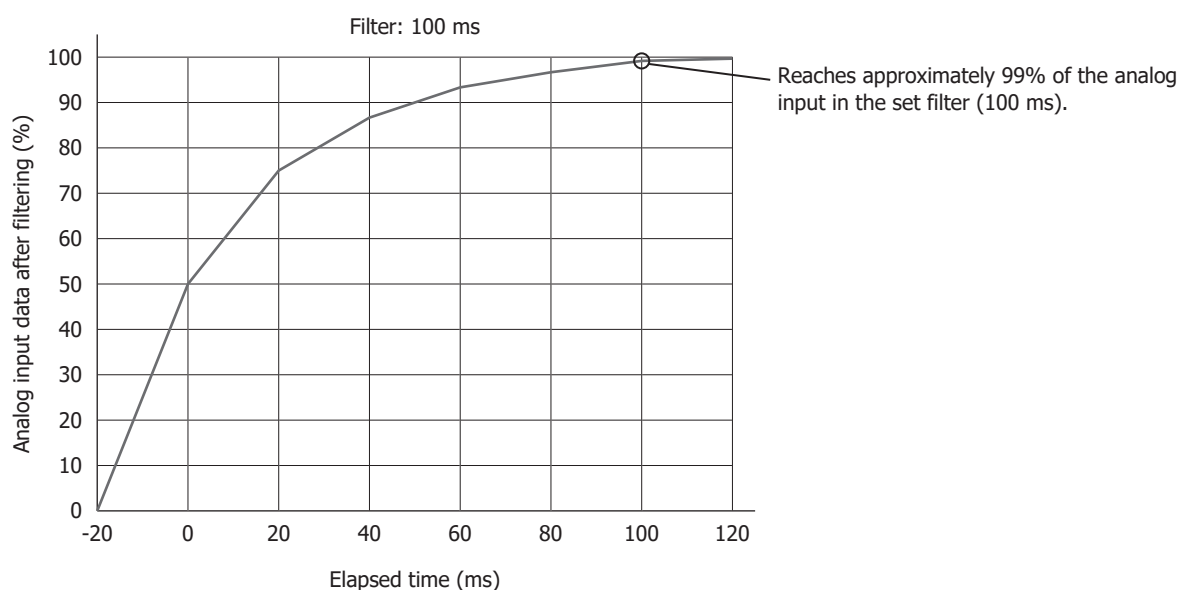
### (1) Filter

The analog I/O cartridge's analog input is filtered so it reaches approximately 99% of the analog input in the specified filter.

Even when the analog input varies rapidly, the filtered analog input value can be made to vary smoothly by setting the filter.

When the filter is set to a large value, the tracking of the filtered analog input value becomes slower in regard to the fluctuations in analog input.

### Input filter example



| Filter (ms)  | Description   |
|--------------|---|
| 0            | The value is not filtered.  |
| 50 to 50,000 | The analog input filter can be set in 50 ms increments.<br>The analog input is filtered so it reaches 99% of the analog input in the specified filter time. |

**(2) Signal Type**

The signal type that can be set differs according to the analog I/O cartridge model. Select the analog I/O cartridge that corresponds to the user application and set the signal type.

For details on signal type, see "Analog I/O Cartridge Specifications" on page 10-9.

**(3) Data Type**

The analog value can be handled in the range of the specified data type (minimum value to maximum value). The data types are as follows.

| Data Type      | Description  |
|----------------|--|
| Binary data    | The analog value can be stored in the range of 0 to 4,095.   |
| Optional range | The analog value can be stored in the range of minimum value to maximum value. The minimum and maximum values can be set in the range of -32,768 to 32,767. For the minimum and maximum values, see "(4) Minimum, maximum values of analog value linear conversion" on page 10-12. |
| Celsius        | The analog value can be stored in the linear conversion range of the temperature sensor set as the data type.  |
| Fahrenheit     | For details, see the analog input value linear conversion range when set to Celsius or Fahrenheit.   |

**(4) Minimum, maximum values of analog value linear conversion**

When **Data Type** is set to "Optional range", these values set the minimum and maximum when performing a linear conversion of the analog value. The minimum and maximum values can be set to any value in the range of -32,768 to 32,767. However, the minimum value must be set to a value smaller than the maximum value.

**(5) Linear conversion range of analog input value when set to Celsius or Fahrenheit**

When the data type is set to Celsius or Fahrenheit, the analog input value is linearly converted in the range of the following table.

| Signal Type         | Celsius             |                    | Fahrenheit          |                    |
|---------------------|---------------------|--------------------|---------------------|--------------------|
|                     | Temperature (0.1°C) | Analog Input Value | Temperature (0.1°F) | Analog input value |
| Type K thermocouple | -200.0 to 1,300.0   | -2,000 to 13,000   | -328.0 to 2,3720.0  | -3,280 to 23,720   |
| Type J thermocouple | -200.0 to 1,000.0   | -2,000 to 10,000   | -328.0 to 1,832.0   | -3,280 to 18,320   |
| Type R thermocouple | 0.0 to 1,760.0      | 0 to 17,600        | 32.0 to 3,200.0     | 320 to 32,000      |
| Type S thermocouple | 0.0 to 1,760.0      | 0 to 17,600        | 32.0 to 3,200.0     | 320 to 32,000      |
| Type B thermocouple | 0.0 to 1,820.0      | 0 to 18,200        | 32.0 to 3,308.0     | 320 to 33,080      |
| Type E thermocouple | -200.0 to 800.0     | -2,000 to 8,000    | -328.0 to 1,472.0   | -3,280 to 14,720   |
| Type T thermocouple | -200.0 to 400.0     | -2,000 to 4,000    | -328.0 to 752.0     | -3,280 to 7,520    |
| Type N thermocouple | -200.0 to 1,300.0   | -2,000 to 13,000   | -328.0 to 2,372.0   | -3,280 to 23,720   |
| Type C thermocouple | 0.0 to 2,315.0      | 0 to 23,150        | 32.0 to 4,199.0     | 320 to 41,990      |
| Pt100               | -200.0 to 850.0     | -2,000 to 8,500    | -328.0 to 1,562.0   | -3,280 to 15,620   |
| Pt1000              | -200.0 to 600.0     | -2,000 to 6,000    | -328.0 to 1,112.0   | -3,280 to 11,120   |
| Ni100               | -60.0 to 180.0      | -600 to 1,800      | -76.0 to 356.0      | -760 to 3,560      |
| Ni1000              | -60.0 to 180.0      | -600 to 1,800      | -76.0 to 356.0      | -760 to 3,560      |

**(6) Data**

The special data registers that store the analog value and analog status for the analog inputs or analog outputs expanded using analog I/O cartridges are assigned as follows. These values are updated with each scan.

| Special Data Register | Description                           |
|-----------------------|---------------------------------------|
| D8170                 | Analog I/O cartridge data (AI2/AQ2)   |
| D8171                 | Analog I/O cartridge data (AI3/AQ3)   |
| D8172                 | Analog I/O cartridge status (AI2/AQ2) |
| D8173                 | Analog I/O cartridge status (AI3/AQ3) |
| D8174                 | Analog I/O cartridge data (AI4/AQ4)   |
| D8175                 | Analog I/O cartridge data (AI5/AQ5)   |
| D8176                 | Analog I/O cartridge status (AI4/AQ4) |
| D8177                 | Analog I/O cartridge status (AI5/AQ5) |
| D8178                 | Analog I/O cartridge data (AI6/AQ6)   |
| D8179                 | Analog I/O cartridge data (AI7/AQ7)   |
| D8180                 | Analog I/O cartridge status (AI6/AQ6) |
| D8181                 | Analog I/O cartridge status (AI7/AQ7) |

**Notes:**

- The values of special data registers for channels that are not used are undefined.
- If the filter is enabled on an analog input, the filtered value is stored in the special data register.
- The analog value and analog status are updated in the scan end processing. The special data register values are updated regardless of whether the FC6A is stopped or running.

## 10: I/O CARTRIDGES

### (7) Status

The analog status shows the status of the analog input or analog output for each channel. If the status is 0, this means the value is normal as an analog value.

#### Analog input

| Status       | Description  |   |                             |  | Analog Input Value         |
|--------------|--|---|-----------------------------|--|----------------------------|
| 0            | Operating normally   |   |                             |  | Current analog input value |
| 1            | Converting data (occurs for approximately 500 ms after the power is turned on and after the program is downloaded) |   |                             |  | Undefined                  |
| 2            | Initializing   |   |                             |  | 0                          |
| 3 to 4       | Reserved   |   |                             |  | —                          |
| 5            | Wiring fault (out of maximum range)  |   |                             |  | Upper limit value          |
|              | Signal type  | Voltage                                 | 0 to 10 V                   | For V100 <sup>*1</sup> : 10.0 V or higher<br>For V201 <sup>*1</sup> and later: 10.2 V or higher    |                            |
|              |  | Current                                 | 4 to 20 mA                  | For V100 <sup>*1</sup> : 20.0 mA or higher<br>For V201 <sup>*1</sup> and later: 20.32 mA or higher |                            |
|              |  |   | 0 to 20 mA                  | For V100 <sup>*1</sup> : 20.0 mA or higher<br>For V201 <sup>*1</sup> and later: 20.4 mA or higher  |                            |
|              |  | Thermocouple/<br>resistance thermometer | Upper limit value or higher |  |                            |
| 6            | Wiring fault (out of minimum range, open current loop)   |   |                             |  | Lower limit value          |
|              | Signal type  | Voltage                                 | 0 to 10 V                   | For V100 <sup>*1</sup> : 0 V or lower<br>For V201 <sup>*1</sup> and later: -0.2 V or lower         |                            |
|              |  | Current                                 | 4 to 20 mA                  | For V100 <sup>*1</sup> : 4.0 mA or lower<br>For V201 <sup>*1</sup> and later: 3.68 mA or lower     |                            |
|              |  |   | 0 to 20 mA                  | For V100 <sup>*1</sup> : 0 mA or lower<br>For V201 <sup>*1</sup> and later: -0 mA or lower         |                            |
|              |  | Thermocouple/<br>resistance thermometer | Lower limit value or higher |  |                            |
| 7            | Reserved (analog I/O cartridge correction value error)   |   |                             |  | —                          |
| 8            | There is a difference in the configured content for the installed analog I/O cartridge and the user program        |   |                             |  | Undefined                  |
| 9            | The analog I/O cartridge has not been installed  |   |                             |  | Undefined                  |
| 10           | The analog I/O cartridge has been installed, but the type has been set to unused                                   |   |                             |  | Undefined                  |
| 11 to 65,535 | Reserved   |   |                             |  | —                          |

\*1 The analog I/O cartridge version number is printed on the side of the analog I/O cartridge. For details, see "Checking the Version Number" on page 10-9.

#### Analog output

| Status       | Description   | Analog Output Signal                                      |
|--------------|---|---|
| 0            | Operating normally  | Current analog output value                               |
| 1            | Reserved  | —   |
| 2            | Initializing  | 0 V / 4 mA  |
| 3            | Parameter setting error   | Analog output value immediately before the error occurred |
| 4 to 7       | Reserved  | —   |
| 8            | There is a difference in the configured content for the installed analog I/O cartridge and the user program | 0 V / 4 mA  |
| 9            | The analog I/O cartridge has not been installed   | —   |
| 10           | The analog I/O cartridge has been installed, but the type has been set to unused                            | 0 V / 4 mA  |
| 11 to 65,535 | Reserved  | —   |

# 11: SD MEMORY CARD

This chapter provides an overview of the SD memory card, describes its specifications, and describes the functions that can use the SD memory card.

## SD Memory Card Overview

The CPU module is equipped with one SD memory card slot which can use a FAT16 formatted SD memory card and a FAT32 formatted SDHC memory card.

### Notes:

- This manual does not distinguish between SD memory cards and SDHC memory cards, both are referred to as "SD memory card".
- For accessing the SD memory card cover and for how to install or eject the SD memory card, see "Using an SD Memory Card" on page 3-30.

## SD Memory Card Functions List

The functions that can use SD memory cards are as follows.

| Function  | Overview  | Reference |
|---|---|-----------|
| Save Log Data                                     | Specified device values can be saved to the SD memory card as CSV files using the DLOG and TRACE instructions.<br>When using Plus CPU module, the SD memory card can be replaced while the DLOG and TRACE instructions are being executed.  | 11-7      |
| Recipe Function                                   | Values that have been prepared in advanced can be batch written to specified devices and specified device values can be batch read according to the state of a device.  | 11-8      |
| Download from SD Memory Card                      | The user programs, program comments, and CPU module system software can be downloaded to the CPU module using the SD memory card. The basic settings for MQTT communication and the certificate and private key for web server function can also be downloaded to the CPU module. | 11-27     |
| Upload to SD Memory Card                          | The user programs, program comments, and CPU module system software written to the CPU module can be uploaded to the SD memory card.  | 11-43     |
| SD Memory Card Maintenance with Data File Manager | The data on the SD memory card inserted in the SD memory card slot can be managed and checked using Data File Manager. Data on the SD memory card can also be saved to a PC or deleted.   | 11-49     |

### SD Memory Card Specifications

#### Specifications

| Item                      |                      | Specifications  |
|---------------------------|----------------------|---|
| Compatible SD Memory Card |                      | SD memory cards (max 2 GB), SDHC memory cards (max 32 GB)   |
| File System               |                      | FAT16/FAT32<br>Note, SD memory cards are supported only when formatted as FAT16. SDHC memory cards are supported only when formatted as FAT32. Malfunctions may occur if a different format type is used.                       |
| File Specifications       | Format               | CSV file, ZLD file  |
|                           | File size            | 5 MB maximum (Plus CPU module 256 MB maximum)   |
|                           | Supported Characters | Single-byte alphanumeric characters<br>The following characters cannot be used in drive names:<br>\" & ( ) * + , . / : ; < > [ ] =   ^<br>The following characters cannot be used in file or folder names:<br>\\ / : * ? \" < > |
| Maximum Number of Files   |                      | Dependant on file system:<br><ul style="list-style-type: none"> <li>FAT16<br/>Subdirectory and below: Maximum 65,534</li> <li>FAT32<br/>Subdirectory and below: Maximum 65,534</li> </ul>                                       |

#### Recommended SD Memory Card


|                            |                                  |
|----------------------------|----------------------------------|
| Recommended SD Memory Card | SDHC memory card (32 GB maximum) |
|----------------------------|----------------------------------|

**Note:** We recommend using SD memory cards that have been formatted on the FC6A.

**Note:** We recommend that important data is regularly backed up on separate media such as CDs or DVDs.

### SD Memory Card Status

The status of the SD memory card can be checked with the SD memory card status LED [SD] and the special internal relays.

|  |   |  |
|--|---|--|
|  <b>Caution</b> | The SD memory card data may be corrupted by doing the following during access to the SD memory card.  |  |
|  | <ul style="list-style-type: none"> <li>Turning the FC6A power OFF.</li> <li>Ejecting the SD memory card.</li> </ul>                                 |  |
|  | When ejecting the SD memory card, do so when the FC6A power has been turned off, or when the SD memory card has been unmounted by turning on M8072. |  |

#### SD Memory Card Status LED [SD] and SD Memory Card Status

The SD memory card status LED [SD] turns on or flashes when the SD memory card has been recognized, while it is being formatted, and while it is being read from or written to.

| SD Memory Card Status LED [SD] Display | SD Memory Card Status  | Operation   |
|--|--|---|
| On                                     | <ul style="list-style-type: none"> <li>Standby status where the SD memory card can be read from or written to</li> </ul>   | The SD memory card can be ejected.                    |
| Slow flashing (1 s cycle)              | <ul style="list-style-type: none"> <li>While the FC6A is recognizing the SD memory card</li> <li>The FC6A is unmounting the SD memory card because unmount SD memory card (M8072) was turned on</li> </ul>   | Do not eject the SD memory card.                      |
| Quick flashing (100 ms cycle)          | <ul style="list-style-type: none"> <li>Reading or writing the SD memory card</li> </ul>  |   |
| Off                                    | <ul style="list-style-type: none"> <li>The SD memory card is not inserted</li> <li>An unsupported or unformatted SD memory card was inserted</li> <li>Unmount SD memory card (M8072) is on, so the SD memory card has been unmounted</li> <li>The FC6A power is off</li> </ul> | If the SD memory card is inserted, it can be ejected. |



### Special Internal Relays for the SD Memory Card

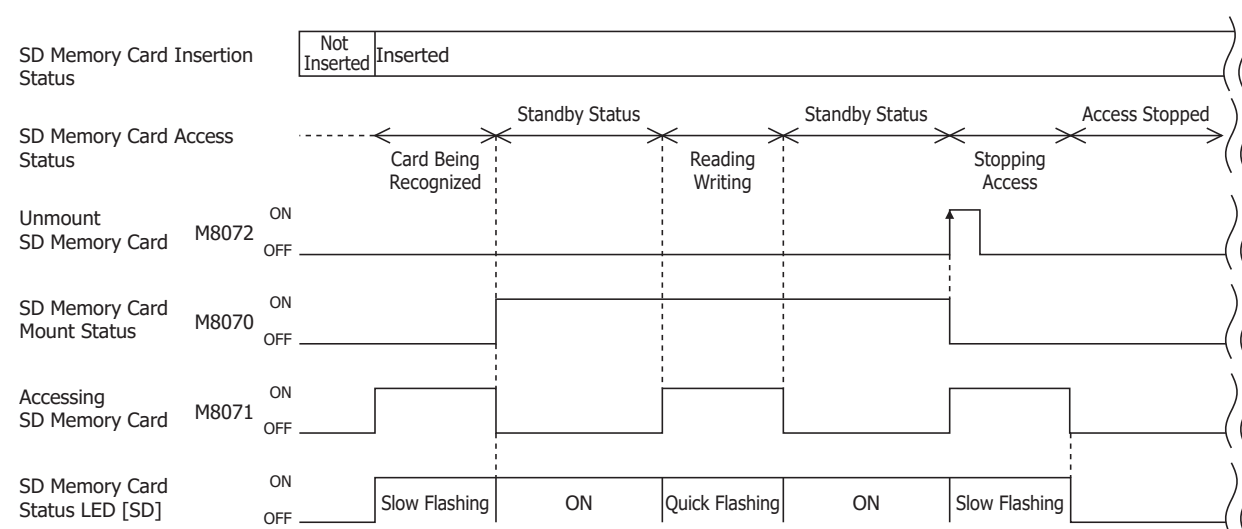
The special internal relays (M8070, M8071) are turned on and off according to the SD memory card insertion status and access status. When special internal relay M8072 is turned on, access to the SD memory card is stopped.

| Device Address | Function                    | Description   | R/W |
|----------------|-----------------------------|---|-----|
| M8070          | SD Memory Card Mount Status | When an SD memory card is inserted in the FC6A and it has been recognized and can be used, M8070 is turned on. M8070 is turned off if no SD memory card has been inserted or if it is not recognized. | R   |
| M8071          | Accessing SD Memory Card    | M8071 is turned on while the SD memory card is being accessed. It is turned off when access has finished.   |     |
| M8072          | Unmount SD Memory Card      | When M8072 is turned on, access to the SD memory card is stopped. To make an SD memory card accessible that has had access to it stopped, insert the card once again.                                 | R/W |

**Note:** R/W stands for read/write and allows reading and writing. R is read-only. W is write-only.

### Timing Chart

The special internal relays are turned on and off in the following manner according to the SD memory card insertion status and access status.



### Special Data Registers for the SD Memory Card

The capacity and free space of the SD memory card inserted in the FC6A can be checked with special data registers.

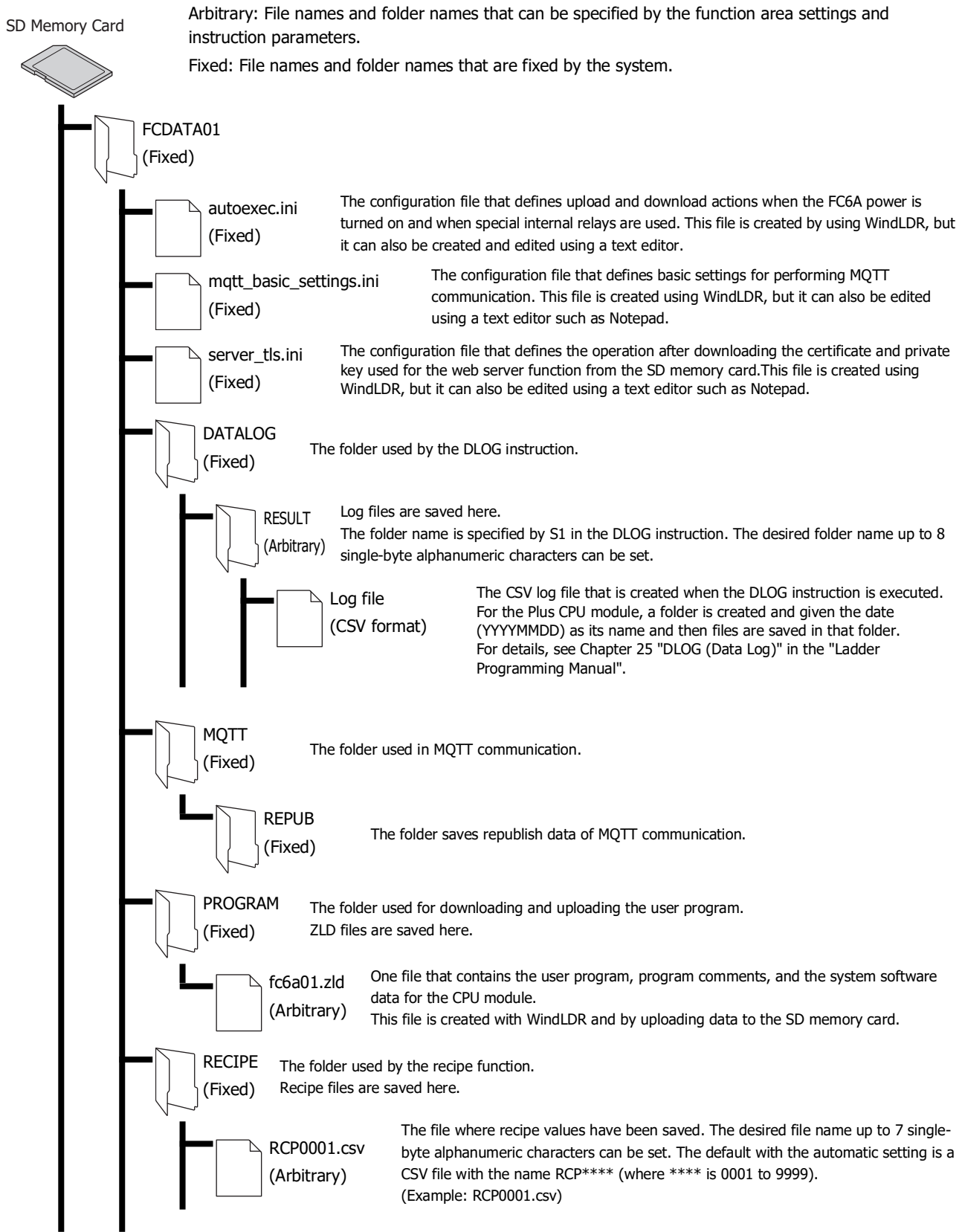
| Device Address | Function                          | Description   | R/W |
|----------------|-----------------------------------|---|-----|
| D8250          | Read SD Memory Card Capacity      | This register indicates the capacity of the recognized SD or SDHC (maximum size 32 GB) memory card in megabytes. It is 0 when no SD memory card has been inserted or if it is not recognized. | R   |
| D8251          | Read SD Memory Card Free Capacity | This register indicates the free capacity of the SD memory card in megabytes. It is 0 when no SD memory card has been inserted or if it is not recognized.                                    |     |

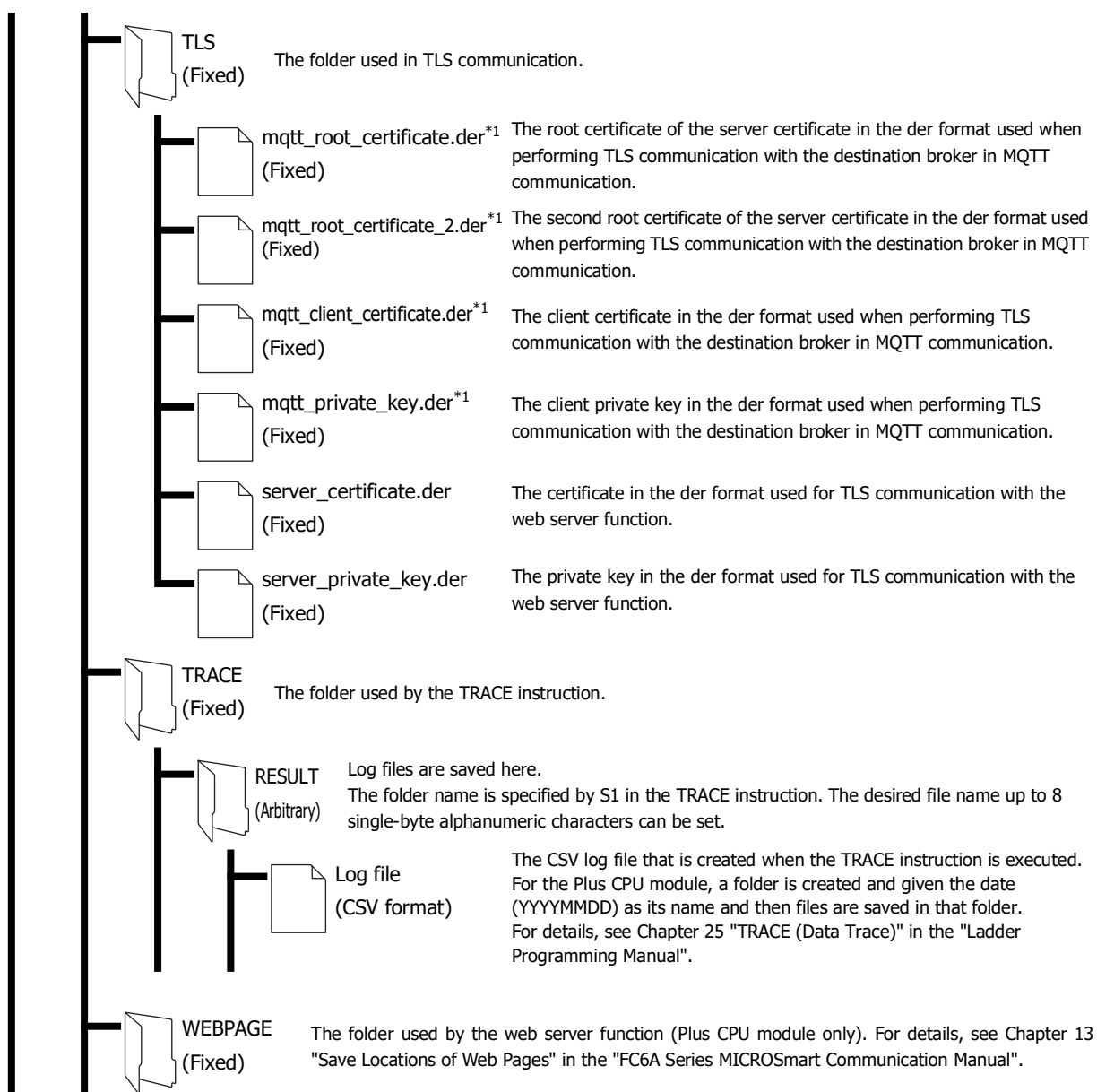
**Note:** R/W stands for read/write and allows reading and writing. R is read-only. W is write-only.

SD Memory Card Folder Structure and Files

Folder Structure

When downloading or uploading data using the FC6A or WindLDR, the following files and folders are accessible.





<sup>\*1</sup> For details, see Chapter 3 "Files for MQTT Basic Settings" in the "Network User's Manual".

## 11: SD MEMORY CARD

### ZLD Files

Downloads and uploads with the SD memory card use ZLD files that contain the user program, program comments, and system software data in a single file.

ZLD files are created with WindLDR or by uploading to the SD memory card. Data can be reused and edited by opening the ZLD file in WindLDR.

When creating a ZLD file with WindLDR, the data other than the user program can be optionally set. The version of the CPU module system software can also be specified and set.

When downloading from the SD memory card, the data in the ZLD file cannot be partially selected and downloaded. To change the data that will be download according to the application, create it as a separate ZLD file.

The data that is written to the ZLD file is as follows.

| ZLD File Data              | When Creating ZLD Files in WindLDR                                   | When the CPU Module Creates ZLD Files by Uploading Data to the SD Memory Card |
|----------------------------|--|---|
| User program               | Set from a created user program.                                     | The user program running on the CPU module is written.                        |
| Program comments           | Set the user program comments. (Optional)*1                          | The program comments running on the CPU module are written.                   |
| CPU module system software | Specify and set the CPU module system software version. (Optional)*1 | The system software running on the CPU module is written.                     |

\*1 If the applicable data is not set in the ZLD file, the corresponding data will not be downloaded.

The created ZLD file is saved to the \FCDATA01\PROGRAM\ folder on the SD memory card. ZLD files can be saved to folders other than the \FCDATA01\PROGRAM\ folder, but these will not be downloaded from the SD memory card. Alpha-numeric characters, "-" (hyphens), "\_" (underscores), and spaces can be used for the file name.

### autoexec.ini File

Using the autoexec.ini file, the file name and action can be changed when downloading or uploading a ZLD file when the FC6A power is turned on and by special internal relay operations. The autoexec.ini file is created by using WindLDR or a text editor. Only the autoexec.ini file saved to \FCDATA01\ on the SD memory card is valid.

For the autoexec.ini file format, see "autoexec.ini File Format" on page 11-36.

### mqtt\_basic\_settings.ini File

The basic settings for performing MQTT communication, root certificate of the server certificate, client certificate, and client private key can be downloaded to the CPU module by using an mqtt\_basic\_settings.ini file when the FC6A power is turned on and by special internal relay operations. The mqtt\_basic\_settings.ini file is created by using WindLDR or a text editor. Only the mqtt\_basic\_settings.ini file saved to \FCDATA01\ on the SD memory card is valid.

For the mqtt\_basic\_settings.ini file format, see "mqtt\_basic\_settings. ini File Format" in the "Network User's Manual".

### server\_tls.ini File

Using the server\_tls.ini file, you can define the operation after downloading the certificate and private key used for the web server function to the Plus CPU module. The server\_tls.ini file is created by using WindLDR or a text editor. Only the server\_tls.ini file saved to \FCDATA01\ on the SD memory card is valid.

For the server\_tls.ini file format, see "server\_tls. ini File Format" on page 11-42.

## Formatting the SD Memory Card

The SD memory card inserted in the CPU module can be formatted by operations with Data File Manager and by menu operations on the HMI module.

For details, see "Formatting the SD Memory Card" on page 11-57 and "Format SD memory card with the FC6A" on page 7-42.

### Notes:

- When an SD memory card is formatted with the CPU module, the FCDATA01 folder and folders directly under it are automatically created.
- When the SD memory card is formatted without using the CPU module, it may take some time before the CPU module is activated depending on the operation after formatting. After formatting, first create the FCDATA01 folder.

## Save Log Data

Using the DLOG (data log) instruction and the TRACE (data trace) instruction, specified device values will be saved to the SD memory card as log data (CSV files). The DLOG instruction outputs the date and time and specified device information to the CSV file in the specified folder. The TRACE instruction outputs the date and time and the values for the previous number of scans for the specified devices to the CSV file in the specified folder. For details on the DLOG and TRACE instructions, refer to Chapter 25 "Data Log Instructions" in Ladder Programming Manual.

**Note:** The following operations are possible with the Plus CPU module.

- When using FC6A Plus CPU module, log data is acquired while the DLOG instruction and the TRACE instructions are executed without an inserted SD memory card. When the SD memory card is inserted, the acquired log data is saved to file and operation of the instruction continues as is.
- If FC6A operation is stopped or if the power is cycled without inserting an SD memory card, the acquired log data is entirely cleared.

**Note:** The FC6A cannot write data to the SD memory card when its write-protect switch is on. Always set the SD memory card's write-protect switch to off before inserting it in the FC6A.

## Output sample

### CSV file output sample with the DLOG instruction

| Time                | D0010 | D0011 |
|---------------------|-------|-------|
| 2011/09/07 15:40:00 | 12345 | 1     |
| 2011/09/07 15:41:00 | 1212  | 3     |
| 2011/09/07 15:42:00 | 345   | 4     |

### CSV file output sample with the TRACE instruction

|               |                  |       |       |
|---------------|------------------|-------|-------|
| Triggered at: | 2011/09/07 15:40 |       |       |
| Scan          | D0010            | D0011 | D0012 |
| Old           | 1                | 9     | 17    |
|               | 2                | 10    | 18    |
| New           | 3                | 11    | 19    |

## Replacing the SD Memory Card While Saving Log Data

When using the Plus CPU module, the SD memory card can be replaced while the DLOG (Data Log) and TRACE (Data Trace) instructions are being executed because the Plus CPU module is equipped with 1 MB of internal memory to temporarily save the log data.

### SD Memory Card Replacement Procedure

1. Change M8072 (Unmount SD Memory Card) from off to on.
2. Confirm that M8070 (SD Memory Card Mount Status) is off.
3. Eject the SD memory card from the SD memory card slot.
4. Insert the replacement SD memory card into the SD memory card slot.

#### Notes:

- Format the replacement SD memory card in advance.
- If the power supply for the Plus CPU module is turned OFF while the SD memory card is being replaced, the log data saved to the internal memory will be erased.
- If the log data saved to the internal memory exceeds 1 MB while the SD memory card is being replaced, the execution status of the DLOG (Data Log) instruction or the TRACE (Data Trace) instruction will be "11: RAM overflow", and then subsequent log data are not saved until the SD memory card is inserted.

Recipe Function

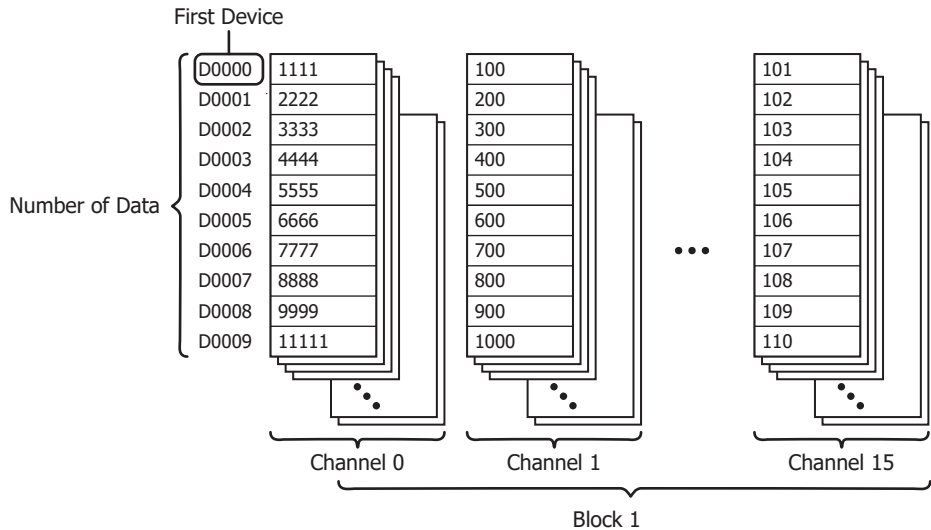
This section provides an overview of the recipe function and describes the WindLDR settings.

Recipe Function Overview

The recipe function (or recipes) batch writes values prepared in advanced to specified devices and batch reads the values of specified devices according to the state of a device. Use this function for situations such as configuring the initial values of an external device when starting operation.

Recipe Settings Configuration

The settings that are used with the recipe function are called recipe settings. The recipe settings configuration is as follows.



| Terminology    | Description  |
|----------------|--|
| Block          | The operation that uses recipe data is configured in blocks. A maximum of 64 blocks (1 to 64) can be configured, and each block is made up of 16 channels (0 to 15). (There are locations where these blocks are referred to as recipe blocks in order to avoid confusion with other expressions.) |
| Channel        | The devices and data that are the write destination or read source are set in channels. One first device can be set per channel.   |
| First device   | The device that is the start of the read source or write destination devices for recipe values.  |
| Number of Data | The amount of data configured for one channel. Data can be set for device addresses a maximum of 8,192 continuous words from the first device that was set.  |

**Note:** If number of data is set to the maximum value (8,192 words), a user program capacity of approximately 16,000 bytes per channel is used. For the capacity of user programs that can be used, see Chapter 5 "User Program Capacity" on page 5-71.

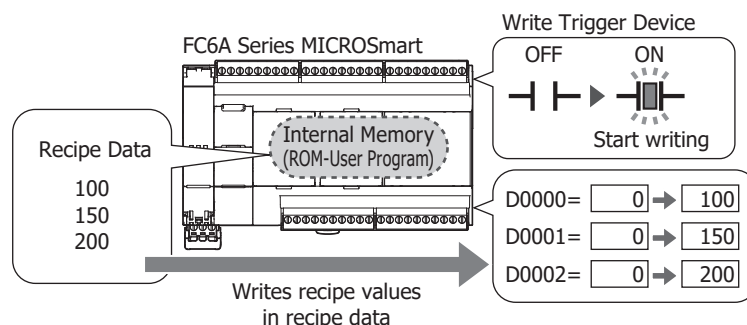
## Reading and Writing Data

The data used by the recipe function is called recipe data for data saved in FC6A internal memory and recipe files for data saved to the SD memory card, and recipe values for the values written to FC6A devices that were saved in recipe data and recipe files.

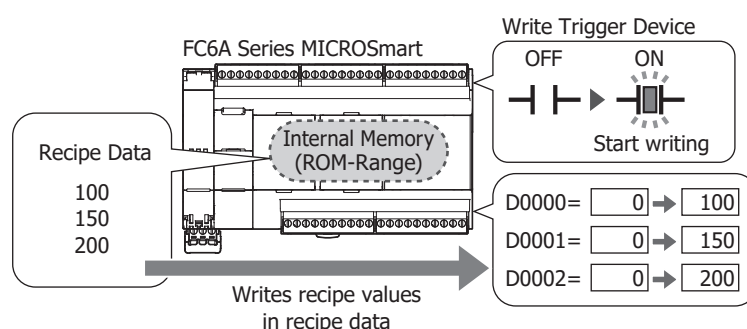
### ■ Write Recipe

Recipe values can be written to FC6A devices according to recipe data or recipe files. Writing starts when the bit of the set device is turned on. The device that serves as the condition to start this writing is called the write trigger device.

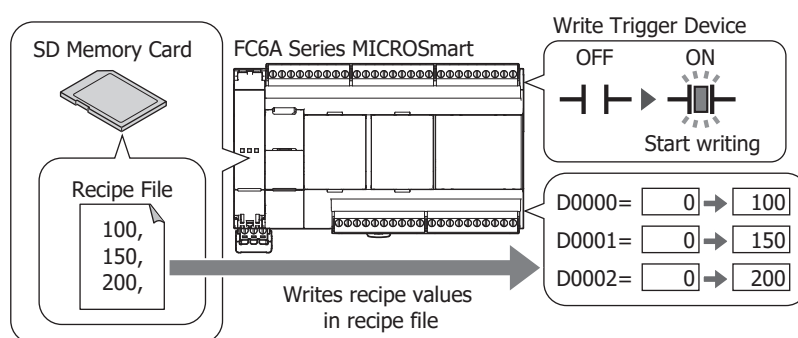
#### To write the recipe values in recipe data saved in FC6A internal memory (ROM-user program) to devices



#### To write the recipe values in recipe data saved in FC6A internal memory (ROM-Range) to devices

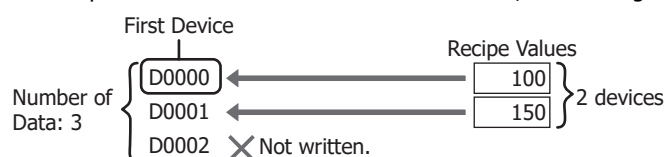


#### To write the recipe values in a recipe file saved on the SD memory card to devices



If there are fewer recipe values described in a recipe file than the number of data set for that channel, nothing is written to devices that do not have recipe values to be written.

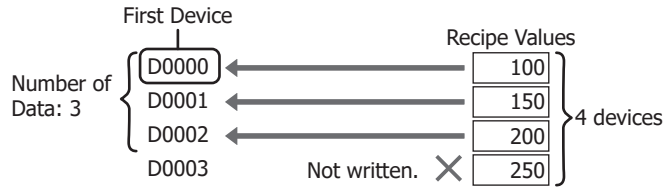
Example: When the first device is D0000, the number of data to write is 3, and the recipe file describes 2 devices of recipe values. The recipe values are written to D0000 and D0001, but nothing is written to D0002.



If there are more recipe values described in a recipe file than the number of data set for that channel, nothing is written to devices in the area that exceeds number of data.

## 11: SD MEMORY CARD

Example: When the first device is D0000, the number of data to write is 3, and the recipe file describes 4 devices of recipe values. The recipe values are written to from D0000 to D0002, but nothing is written to D0003.

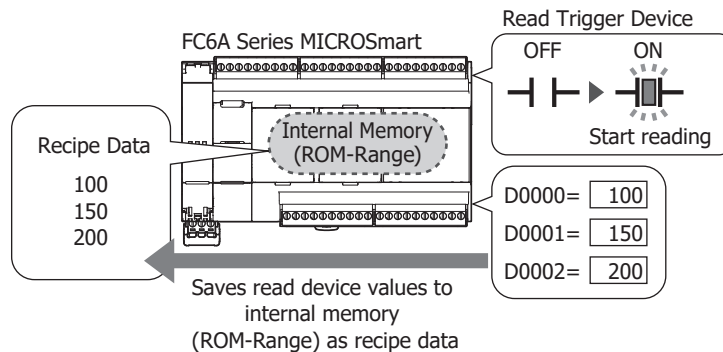


### ■ Read Recipe

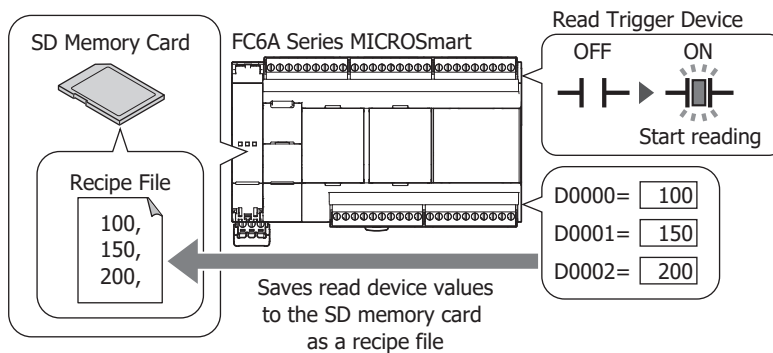
FC6A device values can be read and saved to the internal memory (ROM-Range) as recipe data or saved to the SD memory card as a recipe file according to the FC6A recipe settings. Reading starts when the bit of the set device is turned on. The device that serves as the condition to start this reading is called the read trigger device.

The file is overwritten when there is already a recipe file with the same name.

#### To read the device values to FC6A internal memory as recipe data



#### Reads out device values to the SD memory card as a recipe file



#### Note:

- When read recipe is executed, a recipe file with the same name on the SD memory card is overwritten. Use caution not to execute a read using the recipe file for writing the initial values.
- Do not turn off the power to the FC6A when reading and writing recipes.  
If the power to the FC6A is turned off when reading and writing recipes, the recipe data or recipe file may be corrupted. Use Recipe Block Execution Completed Output (M8266) to check completion of the execution of recipe block reads and writes.  
Use Recipe Channel Execution Completed Output (M8264) to check completion of the execution of channel reads and writes.
- When the number of times recipe data is read to internal memory (ROM-Range) exceeds 50,000 times, the recipe data save time may increase or the recipe data may not be saved. Consider reading the data to the SD memory card.



### ■ Auto Write

This function writes recipe values for the specified block numbers at specific times. The write timing can be set as a combination of the following four times.

- When the FC6A power is turned on
- When a user program is downloaded to the FC6A
- When FC6A operation starts
- When the keep data error occurs

A range of block numbers can be specified and all of the channels in the specified block numbers are applicable.

### Reading and Writing to Internal Memory (ROM-Range)

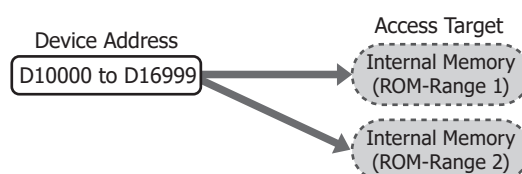
If the backup battery dies, the device values are cleared to 0.

The device values can be restored to when the recipe was last read (PLC to recipe) by periodically reading recipes (PLC to recipe) to internal memory (ROM-Range) and then writing recipes (recipe to PLC) after recovering from a power loss.

Internal memory (ROM-Range) is split into two areas. Use these areas according to the intended usage.

### ■ Configure the same recipe settings in the two internal memory (ROM-Range) areas and use for backups

If the CPU module power is turned off while reading the recipe (PLC to recipe), the recipe cannot be read correctly. If the same recipe settings are configured in internal memory (ROM-Range 1) and internal memory (ROM-Range 2), even if reading the recipe (PLC to recipe) fails for one recipe, the other area stores the device values when the recipe was last read (PLC to recipe). In this case, the two internal memory (ROM-Range) areas are configured with the same recipe settings, and this allows a maximum of 7,000 words of data to be stored.



### ■ Configure each internal memory (ROM-Range) with different recipe settings to save more device values

Configure internal memory (ROM-Range 1) and internal memory (ROM-Range 2) each with different recipe settings.

This allows a maximum of 14,000 words of data to be stored. (Each of the two internal memory (ROM-Range) areas can store a maximum of 7,000 words of data.)



#### Note:

- The limit on the number of times to read a recipe (PLC to recipe) to internal memory (ROM-Range) is 50,000 times.
- Internal memory (ROM-Range) can be written and read in blocks. It cannot be written and read in channels.
- The amount of data that can be set for 1 block of internal memory (ROM-Range) is a maximum of 7,000 words.
- When reading and writing to internal memory (ROM-Range), **Data Type** on the **Data Editor** dialog box is fixed to **Word (W)**.
- When reading and writing to internal memory (ROM-Range), **Data** on the **Data Editor** dialog box cannot be entered.
- To execute reading recipes (PLC to recipe) to internal memory (ROM-Range), first turn off Read Restriction for Recipe Internal Memory (ROM-Range) (M8267). If recipes are read while M8267 remains on, an error will not occur.
- Internal memory (ROM-Range 1) and internal memory (ROM-Range 2) cannot be set to multiple blocks. Each area can be set to only 1 block each.

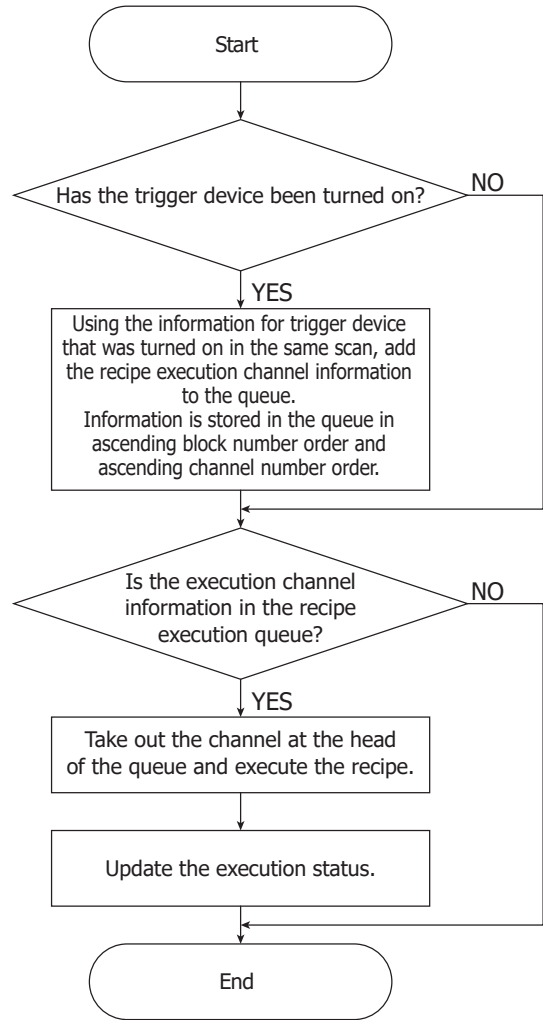
### Recipe Execution and FC6A Status

- Read and write recipe can be executed when the FC6A is running or stopped.
- If the FC6A is stopped while reading or writing the recipe, reading or writing the recipe continues after stopping.
- If the FC6A is set to run while reading or writing the recipe, the FC6A automatically runs after reading or writing the recipe has finished.
- Read and write recipe operate in user program END processing regardless of whether the FC6A is running or stopped.

Recipe Execution Example

The following shows the processing flow and execution example for when the write trigger device or the read trigger device is on in user program END processing.

■ Processing flow



Notes:

- When the auto write function is executed, the first scan starts after recipe block writing has finished.
- If an error occurs during recipe block processing, the recipe function is not executed for subsequent channels.
- If reading and writing are simultaneously executed for the same channel, reading has priority.

■ Execution example

When the trigger devices are simultaneously turned on for multiple channels in the same recipe block

Processing is executed in order from the lowest channel number.

| Scan     | Block Number | Trigger Device |           |            | Recipe Execution Status |
|----------|--------------|----------------|-----------|------------|-------------------------|
|          |              | Channel 1      | Channel 8 | Channel 15 |                         |
| 1st scan | 1            | OFF            | OFF       | OFF        | No operation            |
| 2nd scan |              | OFF -> ON      | OFF -> ON | OFF -> ON  | Execute channel 1       |
| 3rd scan |              | ON             | ON        | ON         | Execute channel 8       |
| 4th scan |              | ON             | ON        | ON         | Execute channel 15      |
| 5th scan |              | ON             | ON        | ON         | No operation            |

**When the trigger devices are simultaneously turned on for multiple recipe blocks**

Processing is executed in order from the lowest recipe block number. However, if a new trigger device is turned on for the recipe block being executed, it will be executed as the new recipe block after reading or writing of the recipe block being executed has finished.

| Scan     | Block Number | Trigger Device      |           |            | Recipe Execution Status       |
|----------|--------------|---------------------|-----------|------------|-------------------------------|
|          |              | Channel 1           | Channel 8 | Channel 15 |                               |
| 1st scan | 1            | OFF                 | OFF       | OFF        | No operation                  |
|          | 30           | OFF                 | OFF       | OFF        |                               |
| 2nd scan | 1            | <b>OFF -&gt; ON</b> | OFF       | OFF -> ON  | Execute channel 1 in block 1  |
|          | 30           | OFF -> ON           | OFF       | OFF        |                               |
| 3rd scan | 1            | ON                  | OFF -> ON | <b>ON</b>  | Execute channel 15 in block 1 |
|          | 30           | ON                  | OFF       | OFF        |                               |
| 4th scan | 1            | ON                  | ON        | ON         | Execute channel 1 in block 30 |
|          | 30           | <b>ON</b>           | OFF       | OFF        |                               |
| 5th scan | 1            | ON                  | <b>ON</b> | ON         | Execute channel 8 in block 1  |
|          | 30           | ON                  | OFF       | OFF        |                               |

**Used Special Devices**

The special internal relays and the special data registers used by the recipe function are as follows.

**Special Internal Relays**

| Device Address | Function  | Description  |
|----------------|---|--|
| M8260          | Write Recipe Execution Flag                             | When M8260 is turned on from off, write recipe is executed for all channels of the block number specified by D8260 (Recipe Block Number).  |
| M8261          | Read Recipe Execution Flag                              | When M8261 is turned on from off, read recipe is executed for all channels of the block number specified by D8260 (Recipe Block Number).   |
| M8262          | Executing Write Recipe                                  | M8262 is turned on when the write recipe processing starts, and it is turned off when the processing has completed. M8262 also is turned off when read recipe processing starts.   |
| M8263          | Executing Read Recipe                                   | M8263 is turned on when the read recipe processing starts, and it is turned off when the processing has completed. M8263 also is turned off when write recipe processing starts.   |
| M8264          | Recipe Channel Execution Completed Output               | M8264 is turned off when starting to read or write a recipe channel, and it is turned on when reading or writing a recipe channel has completed.   |
| M8265          | Recipe Execution Error Output                           | M8265 is turned on when recipe execution has completed and D8264 (Recipe Execution Status) is a value other than 0.  |
| M8266          | Recipe Block Execution Completed Output                 | M8266 is turned off when starting to read or write a recipe block, and it is turned on when reading or writing a recipe block has completed.   |
| M8267          | Read Restriction for Recipe Internal Memory (ROM-Range) | M8267 is turned on when reading or writing to a recipe block in internal memory (ROM-Range) has completed. When M8267 is on, recipes cannot be read to internal memory (ROM-Range). When M8267 is off, recipes can be read to internal memory (ROM-Range). |

**Special Data Registers**

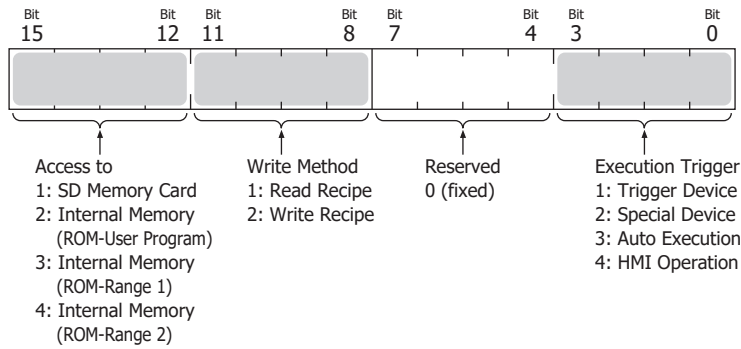
| Device Address | Function  | Description  |
|----------------|---|--|
| D8260          | Recipe Block Number                             | The recipe block number to read or write using special internal relays. All channels for the specified block number are applicable.  |
| D8261          | Recipe Execution Block Number                   | The recipe block number of the recipe that was executed. This is updated when the recipe block starts, and the status is retained when completed.  |
| D8262          | Recipe Execution Channel No.                    | The channel number of the recipe that was executed. This is updated when the channel processing starts, and the status is retained when completed.   |
| D8263          | Recipe Execution Operation                      | Information about the operation of the recipe that was executed. For details, see "Recipe Execution Operation (D8263)" on page 11-14.  |
| D8264          | Recipe Execution Status                         | The status of the recipe that was executed. This is 0 when normally terminated. For details, see "Recipe Execution Status (D8264) and Recipe Execution Error Information (D8265)" on page 11-15. M8264 turns on when this device is updated. M8265 also turns on if this device is a value other than 0. |
| D8265          | Recipe Execution Error Information              | Error information about the recipe that was executed. This device is updated at the same time as D8264. For details, see "Recipe Execution Status (D8264) and Recipe Execution Error Information (D8265)" on page 11-15.   |
| D8266          | Recipe Internal Memory (ROM-Range 1) Read Count | The number of times device values are read to internal memory (ROM-Range 1) as recipe data is stored in this register in units of 100. An error occurs when the actual read count exceeds 50,000 times (value of D8266 > 500).   |

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| Device Address | Function  | Description  |
|----------------|---|--|
| D8267          | Recipe Internal Memory (ROM-Range 2) Read Count | The number of times device values are read to internal memory (ROM-Range 2) as recipe data is stored in this register in units of 100. An error occurs when the actual read count exceeds 50,000 times (value of D8267 > 500). |

Recipe Execution Operation (D8263)

Details about information on the write recipe or read recipe operation that was executed is written to special data register D8263 (Recipe Execution Operation) are as follows.



**Recipe Execution Status (D8264) and Recipe Execution Error Information (D8265)**

Details about the status code that is written to special data register D8264 (Recipe Execution Status) when write recipe or read recipe is executed and details about the error information that is written to special data register D8265 (Recipe Execution Error Information) are as follows.

| <b>D8264<br/>(Status Code)</b> | <b>Write Recipe (Recipe to PLC)</b>                          | <b>Read Recipe (PLC to Recipe)</b>  | <b>D8265<br/>(Error Information)</b>   |
|--------------------------------|--|---|--|
| 0                              | Normal termination   | Normal termination  | 0 (fixed)  |
| 1                              | No SD memory card is inserted.                               | No SD memory card is inserted.  | 0 (fixed)  |
| 2                              | —  | The SD memory card is write protected.  | 0 (fixed)  |
| 3                              | Invalid SD memory card format.                               | Invalid SD memory card format.  | 0 (fixed)  |
| 4                              | —  | The SD memory card is full and no folders or files can be created.  | The channel number where file creation failed is written to the device.  |
| 5                              | The specified recipe block number is invalid.*1              | The specified recipe block number is invalid.   | The invalid recipe block number that was specified is written.   |
| 6                              | Failed to read the recipe file on the SD memory card.*2      | Failed to read the recipe file on the SD memory card.*2   | The channel number where the recipe file read failed is written to the device.   |
| 7                              | There is no recipe file on the SD memory card.               | —   | The channel number where there is no recipe file is written to the device.   |
| 10                             | There is no recipe data in internal memory (ROM-Range).      | —   | The channel number where there is no recipe data is written to the device.   |
| 11                             | —  | A read to internal memory (ROM-Range) was executed while reading to internal memory (ROM-Range) was restricted (when M8267 is on).  | The block number set with internal memory (ROM-Range 1) or internal memory (ROM-Range 2) for the access target is written to the device. |
| 12                             | —  | <ul style="list-style-type: none"> <li>The write limit to internal memory (ROM-Range) was exceeded.</li> <li>The number of times device values were read to internal memory (ROM-Range 1) as recipe data exceeded 50,000 times. Or the number of times device values were read to internal memory (ROM-Range 2) exceeded 50,000 times.</li> </ul> | 0 (fixed)  |
| 13                             | Writing recipe data to internal memory (ROM-Range) failed.*3 | —   | 0 (fixed)  |

\*1 This occurs when a block number was accessed that has no settings in the special data registers and special internal relays.

\*2 This occurs when file data cannot be normally written or read due to the data in the file becoming corrupted or a failure of a specific area of the SD memory card.

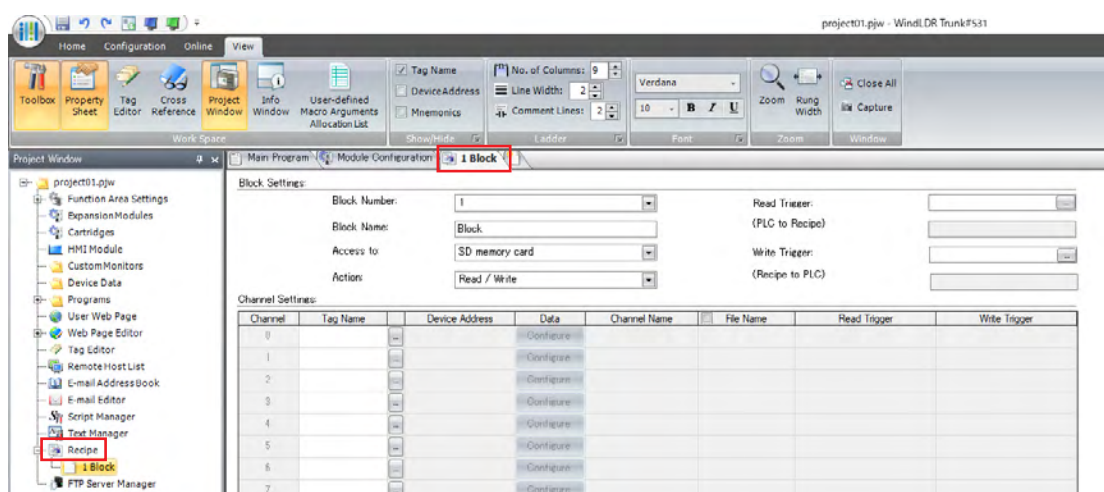
\*3 This occurs when recipe data cannot be normally written due to the data in the recipe data in internal memory (ROM-Range) becoming corrupted or a failure of a specific area of internal memory (ROM-Range).



## Programming WindLDR

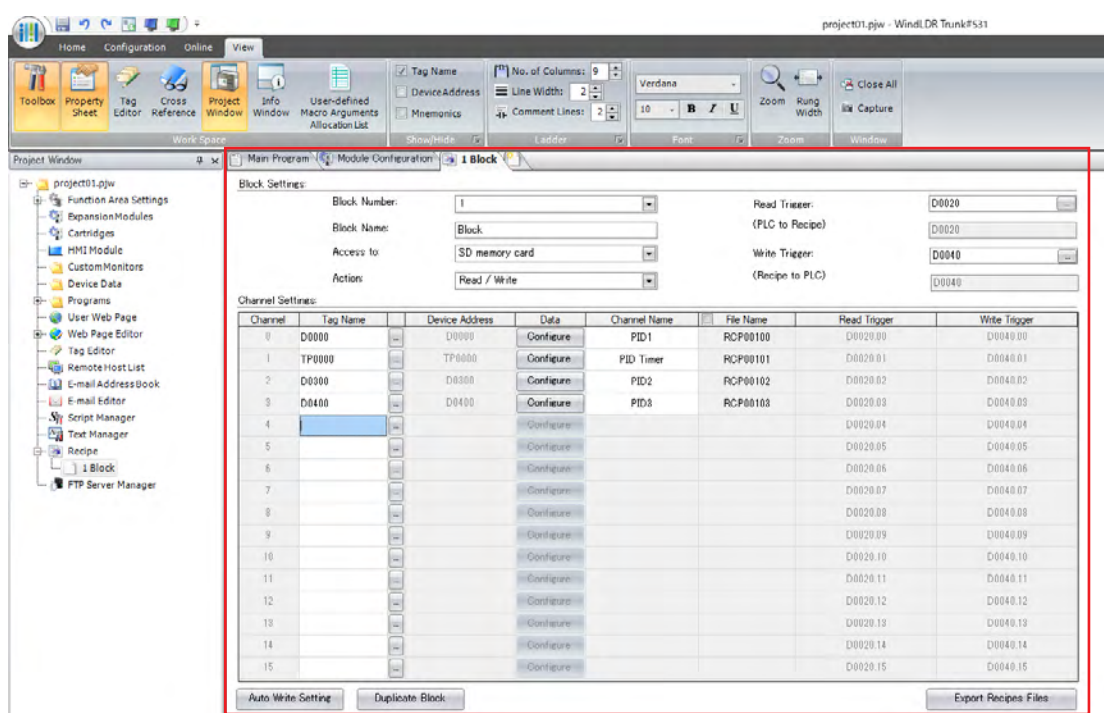
The recipe settings are configured with the following operation procedure.

1. On the **View** tab, in the **Work Space** group, click **Project Window**.  
The Project Window is displayed in the left portion of the screen.
2. Double-click **Recipe**.  
Recipe Editor starts.
  - If no blocks are registered, block number 1 recipe settings are created and can be edited.
  - If blocks have already been registered, recipe settings for the lowest block number that has not been registered are created and can be edited.
  - Double-click a registered block number and the recipe settings for that block number can be edited.



**Note:** To delete recipe settings that have been created, right-click on the block number and click **Delete** on the menu.

3. Configure the recipe setting parameters.  
The recipe settings are saved when the project data is saved.



This concludes configuring the recipe settings.



## Recipe Function Parameters

This section describes the dialog box parameter settings required to use the recipe function.

### Recipe Editor

Use Recipe Editor to collectively manage the save destination for recipe data, the devices for writing recipe values and reading device values, and those execution conditions.

**Block Settings:**

(2) Block Number: 1 (6) Read Trigger: D0020  
 (3) Block Name: Block (PLC to Recipe)  
 (4) Access to: SD memory card (7) Write Trigger: D0040  
 (5) Action: Read / Write (Recipe to PLC)

**Channel Settings:**

| Channel | Tag Name | Device Address | Data      | Channel Name | File Name | Read Trigger | Write Trigger |
|---------|----------|----------------|-----------|--------------|-----------|--------------|---------------|
| 0       | D0000    | D0000          | Configure | PID1         | RCP00100  | D0020.00     | D0040.00      |
| 1       | TP0000   | TP0000         | Configure | PID Timer    | RCP00101  | D0020.01     | D0040.01      |
| 2       | D0300    | D0300          | Configure | PID2         | RCP00102  | D0020.02     | D0040.02      |
| 3       | D0400    | D0400          | Configure | PID3         | RCP00103  | D0020.03     | D0040.03      |
| 4       |          |                | Configure |              |           | D0020.04     | D0040.04      |
| 5       |          |                | Configure |              |           | D0020.05     | D0040.05      |
| 6       |          |                | Configure |              |           | D0020.06     | D0040.06      |
| 7       |          |                | Configure |              |           | D0020.07     | D0040.07      |
| 8       |          |                | Configure |              |           | D0020.08     | D0040.08      |
| 9       |          |                | Configure |              |           | D0020.09     | D0040.09      |
| 10      |          |                | Configure |              |           | D0020.10     | D0040.10      |
| 11      |          |                | Configure |              |           | D0020.11     | D0040.11      |
| 12      |          |                | Configure |              |           | D0020.12     | D0040.12      |
| 13      |          |                | Configure |              |           | D0020.13     | D0040.13      |
| 14      |          |                | Configure |              |           | D0020.14     | D0040.14      |
| 15      |          |                | Configure |              |           | D0020.15     | D0040.15      |

(9) Auto Write Setting Duplicate Block (10) (11) Export Recipes Files

### (1) Recipe Editor tab

Displayed as "Block Number Block Name".

Multiple tabs can be opened and switched between to edit settings.

### (2) Block Number

Displays the block number of the block being edited.

The block number of the block being edited can be changed by selecting and changing the number in the list. A confirmation message is displayed when the number is changed. Click **OK**. Already registered block numbers are not displayed in the list.

### (3) Block Name

Enter the block name. The name entered here is displayed under **Recipe** on the Project Window.

### (4) Access to

Select the save destination for recipe data that is used when the block is executed from the following four options. Internal memory (ROM-Range 1) and internal memory (ROM-Range 2) can be set to only 1 block number each.

- SD Memory Card
- Internal Memory (ROM-User Program)
- Internal Memory (ROM-Range 1)
- Internal Memory (ROM-Range 2)

### (5) Action Setting

Select the action that uses the recipe data as the following.

- Read/Write : Saves batch read device values to the SD memory card as a recipe file and writes recipe values to devices. This option can only be configured when **SD Memory Card**, **Internal Memory (ROM-Range 1)**, or **Internal Memory (ROM-Range 2)** is selected under **Access to**.
- Read : Saves batch read device values to the SD memory card as a recipe file. This option can only be configured when **SD memory card** is selected under **Access to**.
- Write : Writes recipe values to devices.



**(6) Read Trigger (PLC to Recipe)**

Sets the device that triggers batch reading device values and saving them to the SD memory card as a recipe file. This parameter can be configured when **SD Memory Card** is selected under **Access to** and **Read/Write** or **Read Only** is selected under **Action**.

**(7) Write Trigger (Recipe to PLC)**

Sets the device that triggers batch writing recipe values to devices by block.

This parameter can be configured when **SD Memory Card** or **Internal Memory (ROM-User Program)** is selected under **Access to** and **Read/Write** or **Write Only** is selected under **Action**.

**(8) Channel Settings**

Configures the channels.

- Channel : Displays the channel numbers.
- Tag Name : Sets the tag name for the recipe value write destination device and the device value read source device and the first device.  
The set devices are continuously set starting from number 1 in the Data Settings Table in the **Data Editor** dialog box.
- Device Address : Displays the tag name set under **Tag Name** or the device address of the first device.
- Data button : Click this button to display the **Data Editor** dialog box. The recipe data for the selected channel is configured on this dialog box. For details, see "Data Editor dialog box" on page 11-20.
- Channel Name : Enter the channel name.
- File Name : Sets the CSV file names when batch saving device values to the SD memory card with read recipe.  
When the **File Name** check box is cleared, the file names are the default RCPn (n: 5-digit sequential number). When selected, the name can be entered.
- Read Trigger : Displays the read trigger device for each channel. The triggers are automatically allocated starting from the device set for Read Trigger (PLC to Recipe) (6).
- Write Trigger : Displays the write trigger device for each channel. The triggers are automatically allocated starting from the device set for Write Trigger (Recipe to PLC) (7).

**(9) Auto Write Recipe Setting button**

Click this button to display the **Auto Write Settings** dialog box. The execution timing and the range of blocks for the auto write function are configured on this dialog box. For details, see "Auto Write Settings Dialog Box" on page 11-21.

**(10) Duplicate Block button**

Click this button to display the **Duplicate Block** dialog box. The settings of registered blocks can be copied to other blocks or used to overwrite other blocks. For details, see "Duplicate Block dialog box" on page 11-22.

**(11) Export Recipe File button**

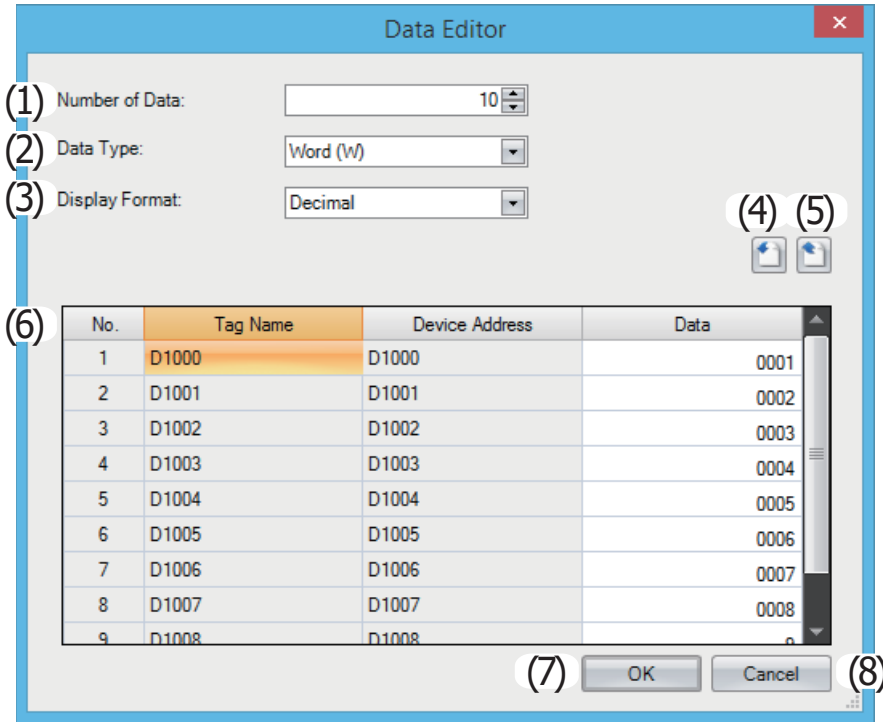
Saves all Recipe Editor settings in every channel to the SD memory card as a recipe file.

Click this button to display the **Select Drive** dialog box. Specify the SD memory card drive, then click **OK**.

Only channels with **Access to** set to **SD memory card** are saved.

### Data Editor dialog box

The recipe data for the channel selected in the Recipe Editor channel settings is configured on this dialog box.



**(1) Number of Data**

Sets the number of write destination or read source devices starting with the device address of the channel selected in the Recipe Editor channel settings.

The continuous devices from the starting address for the number of configured devices is displayed in the Data Settings Table (6).

**(2) Data Type**

Selects the type of data for recipe values to write and device values that are read. This option can be configured only when **SD Memory Card** or **Internal Memory (ROM-User Program)** is selected under **Access to** in Recipe Editor.

**(3) Display Format**

Selects the display format for **Data** in the Data Settings Table as Decimal or Hexadecimal.

Values when saving data to a recipe file are Decimal.

**(4) (import) button**

Click this button to display the **Open** dialog box.

Select a recipe file and click **Open** to overwrite the data in the Data Settings Table with the selected recipe file.

**(5) (export) button**

Click this button to display the **Save As** dialog box.

Select the location to save the recipe file, enter a file name, and then click **Save** to save the recipe file for the channel selected in the Recipe Editor channel settings.

The saved recipe file can be edited using Notepad, commercially available text editors, and spreadsheet software.

**(6) Data Settings Table**

Enter the recipe values to write to the device address for each number of the channel selected in the Recipe Editor channel settings.

No. : Displays the data numbers for the amount of data specified by **Number of Data**.

Tag Name : Displays the device address tag names set under **Tag Name** for the channel selected in the Recipe Editor channel settings. If no tag name is set, the device address is displayed.

Device Address : Continuously set starting from the device address set under **Device Address** for the channel selected in the Recipe Editor channel settings.

Data : Double-click a cell to enter a recipe value. The value that can be configured varies based on the configured **Data Type** and **Display Format**.

The recipe value cannot be entered when **Read Only** is selected under **Action Setting** in Recipe Editor.

The recipe value also cannot be entered when **Internal Memory (ROM-Range 1)** or **Internal Memory (ROM-Range 2)** is selected under **Access to** in Recipe Editor.

**(7) OK button**

Saves the Data Editor content and returns to Recipe Editor.

**(8) Cancel button**

Discards the Data Editor content and returns to Recipe Editor.

**Auto Write Settings Dialog Box**

The execution timing and the range of blocks for the auto write function are configured on this dialog box.

Auto Write Settings

You can specify the recipe block numbers for each event. When an event occurs, the data of the specified blocks are written to the PLC device addresses.

(1) ☒ When PLC is powered on  
Start Number:   
End Number:

(2) ☒ When user program download is completed  
Start Number:   
End Number:

(3) ☒ When PLC starts running  
Start Number:   
End Number:

(4) ☒ When keep data error occurs  
Start Number:   
End Number:

(5) OK (6) Cancel

The timing to write the recipe values for the block numbers specified for the auto write function can be set by selecting the check boxes.

A range for the block numbers can be specified with **Start Number** and **End Number**. All channels for the specified block numbers are applicable.

**(1) When PLC is powered on**

The auto write function is executed when the FC6A is turned on.

**(2) When user program download is completed**

The auto write function is executed when the user program has finished downloading to the FC6A.

**(3) When PLC starts running**

The auto write function is executed when the FC6A is set to run.

**(4) When keep data error occurs**

The auto write function is executed when the keep data error occurs.

**(5) OK button**

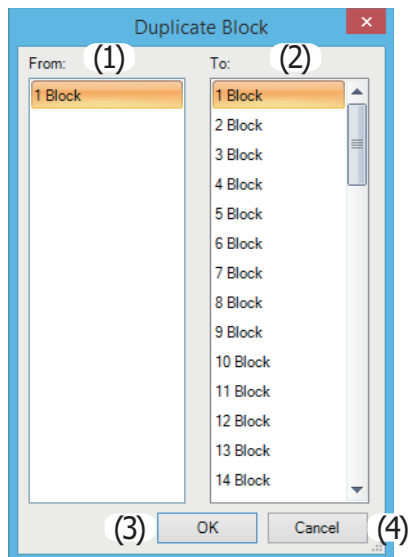
Saves the **Auto Write Settings** dialog box content and returns to Recipe Editor.

### (6) Cancel button

Discards the **Auto Write Settings** dialog box content and returns to Recipe Editor.

### Duplicate Block dialog box

The settings of registered blocks can be copied to other blocks or used to overwrite other blocks.



### (1) From

Select the block number to copy. Only the block names of block numbers that have finished being configured will be displayed.

### (2) To

Select the block numbers where the data in the block number selected under From will be copied to.  
Multiple block numbers can be selected.

### (3) OK button

Click this button to copy the data in the block number selected under **From** to the data in the block numbers selected under **To**, and then to return to Recipe Editor.

The copied blocks are displayed under **Recipe** on the Project Window.

Block numbers that already exist are also overwritten. However, the block number displayed in Recipe Editor will not be overwritten.

### (4) Cancel button

Cancels copying the block and returns to Recipe Editor.

## SD Memory Card Configuration Dialog Box

Use the **SD Memory Card Configuration** dialog box to configure the parameters required to create the autoexec.ini file, ZLD file, files for MQTT Basic Settings, and files for Server Functions.

### (1) button

Click this button and select the file to import.

Import autoexec.ini : Restores the contents of the selected autoexec.ini file.

Import mqtt\_basic\_settings.ini : Restores the contents of the selected mqtt\_basic\_settings.ini file.

**Note:** Import mqtt\_basic\_settings.ini is valid only if the **Specify with SD memory card** check box is selected on the **MQTT Settings** dialog box.

## General Tab

On the **General** tab, configure the settings to create the necessary folder and files for **Action**.

### (2) Action

#### Download

This parameter can be set from the following three targets.

| Target                    | Description   |
|---------------------------|---|
| ZLD Project               | Downloads a ZLD file to the CPU module.<br>For this setting, specify "download" in "loading_direction" key under the [COMMON_SETTING] section in the autoexec.ini file. |
| MQTT Basic Settings       | Downloads files for MQTT Basic Settings to the CPU module.  |
| Files for Server function | Downloads files for Server Functions to the CPU module.   |
| All                       | Downloads a ZLD file, files for MQTT Basic Settings and files for Server Functions to the CPU module.   |

#### Upload

Uploads the ZLD file from the CPU module.

For this setting, specify "upload" in "loading\_direction" key under the [COMMON\_SETTING] section in the autoexec.ini file.

### • Download a ZLD File

When Download is selected for Action, (3) and (4) are displayed.

#### (3) ZLD Project

|                                 |  |
|---------------------------------|--|
| File Name                       | : Specify the file name of the ZLD file that will be downloaded.<br>Specify the file name in "src_file" key in the [PROGRAM_DOWNLOAD] section of the autoexec.ini file.  |
| Create from current project     | : Creates a ZLD file from the currently opened project. Click <b>Configure</b> to display the <b>ZLD Project Configuration</b> dialog box. Configure the details of the ZLD file to download and click <b>OK</b> . For details on the parameters, see "ZLD Project Configuration Dialog Box Parameters" on page 11-35.                 |
| Upload from PLC (1-time upload) | : Enables the 1-time upload to the SD memory card.<br>The project downloaded to the CPU module can be uploaded to the SD memory card and then downloaded to other CPU modules. Specify the setting in "onetime_upload" key in the autoexec.ini file. For details, see "ZLD Project Configuration Dialog Box Parameters" on page 11-35. |

#### (4) Download Options

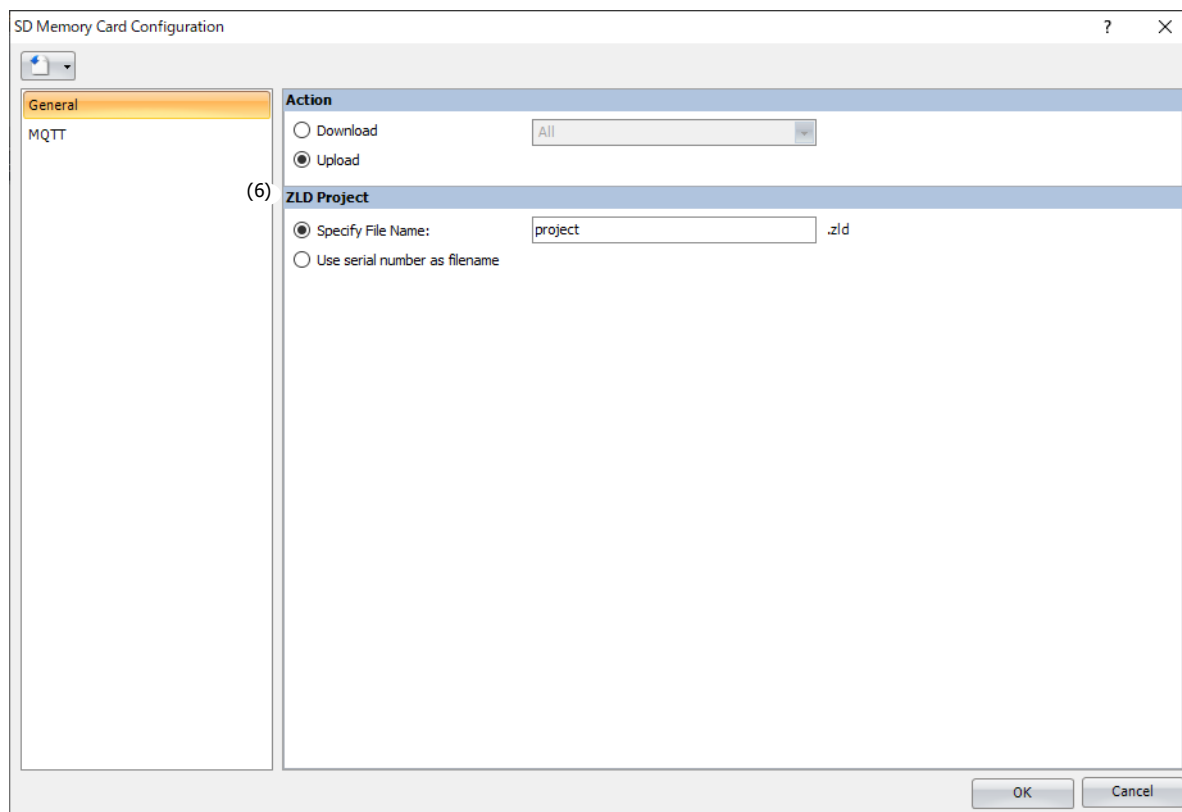
|                                    |  |
|------------------------------------|--|
| Keep output during download        | : Select this check box to keep output while the ZLD file is downloaded.<br>Specify the setting in "keep_output" key in the autoexec.ini file.                     |
| Automatic start after download     | : Select this check box to automatically set the run status after the ZLD file is downloaded.<br>Specify the setting in "auto_start" key in the autoexec.ini file. |
| Clear device values after download | : Select this check box to clear the data after the ZLD file is downloaded.<br>Specify the setting in "clear_data" key in the autoexec.ini file.                   |
| Clear error after download         | : Select this check box to clear the error information after the ZLD file is downloaded.<br>Specify the setting in "clear_error" key in the autoexec.ini file.     |

#### (5) User web page and custom web page

|  |   |
|--|---|
| Save user web pages and custom web pages to SD memory card | : Select this check box to save the user web pages and custom web pages to the SD memory card. The user web pages and custom web pages saved in the SD memory card can be used with the web server. For details on the web server function, see Chapter 13 "Web Server" in the FC6A Series MICROSmart Communication Manual.<br>The setting is not written in the autoexec.ini file. |
|--|---|

- Upload a ZLD File

When Upload is selected for Action, (6) is displayed.



### (6) ZLD Project

Specify File Name

: Specify the file name of the ZLD file that will be uploaded.  
Specify the file name in "dst\_file" key in the [PROGRAM\_UPLOAD] section of the autoexec.ini file.

Use serial number as filename

: The serial number of the CPU module is used as the file name of the uploaded ZLD file. If the serial number is "12A3456", "12A3456.zld" is created.  
Specify the setting in "filename\_option" key in the [PROGRAM\_UPLOAD] section of the autoexec.ini file.

**Note:** The file name can be set only if the **Specify File Name** radio button is selected.

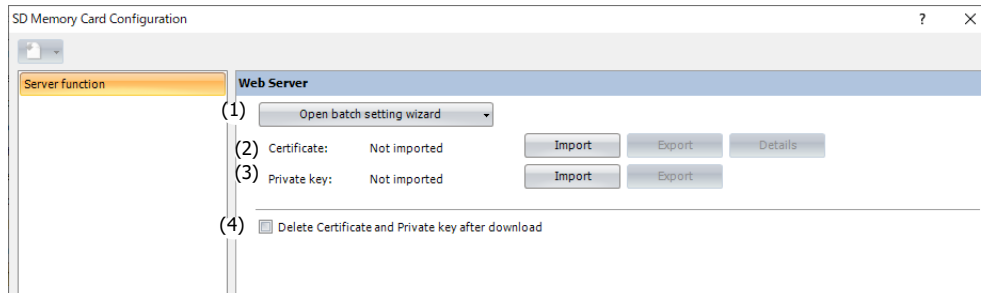
### MQTT Tab

On the **MQTT** tab, configure the settings to create the files for MQTT Basic Settings.

**Note:** Before creating the files for MQTT Basic Settings on the MQTT tab, check the **Enable MQTT** check box in the **MQTT Settings** dialog box to set the connection target and MQTT connection method. For details, see Chapter 3 "MQTT Settings Dialog Box" in the "Network User's Manual".

### Server function Tab

On the **Server function** tab, configure the settings to create the files for Server Functions.



#### (1) Open batch setting wizard

**Batch setting of certificate and private key** wizard can be opened and a certificate and private key can be set in a wizard format. Follow the displayed procedure to set.

**Note:** In this wizard, set the root certificate of the certificate authority and import it into the Windows certificate store. In addition, set the certificate and private key used for the web server function of the Plus CPU module, and import them into Function Area Settings. For details, see Chapter 13 "Web Server" in the "FC6A Series MICROSmart Communication Manual".

#### (2) Certificate

Click the **Import** button to import the certificate used for SSL/TLS communication. A pem or der file can be imported. WindLDR converts the pem file to a der file and saves it to the \FCDATA01\TLS folder on the SD memory card. Der files larger than 2K bytes cannot be imported. If the certificate is imported, a server\_certificate.der file will be generated.

Click the **Export** button to export the imported certificate.

Click the **Details** button to display the **Certificate Information** dialog box, which displays the information of the imported certificate.

#### (3) Private key

Click the **Import** button to import the private key (encryption method RSA, key length up to 2048 bit) used for SSL/TLS communication.

WindLDR supports files in the following formats:

- PKCS#1 format pem or der file
- PKCS#8 format (no encryption) pem or der file

If the private key is imported, a server\_private\_key.der file will be generated.

Click the **Export** button to export the imported private key.

#### (4) Delete Certificate and Private key after download

Set whether to delete the certificate and private key after downloading. If this check box is selected, delete the server\_certificate.der file and server\_private\_key.der file after downloading. The default setting is unselected.

This setting is specified in the delete\_files key in the **DELETE\_FILES** section of the server\_tls.ini file.

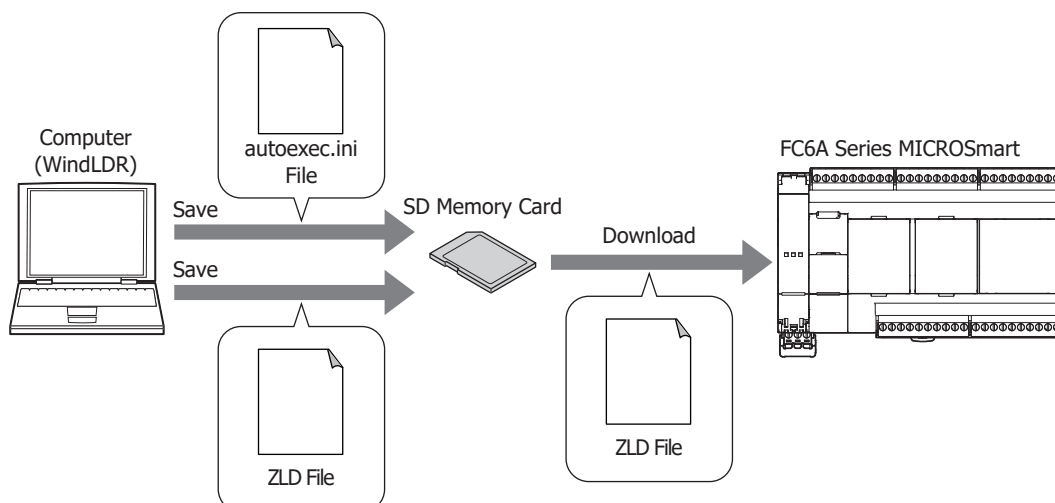


## Download from SD Memory Card

The user programs, program comments, and CPU module system software can be downloaded to the CPU module using the SD memory card. The basic settings for MQTT communication can also be downloaded to the CPU module.

### Download the Project Being Edited as a ZLD File

A ZLD file can be created from the project opened in WindLDR, and it can be downloaded to the CPU module.



While the ZLD file saved to the SD memory card is being downloaded, CPU module operation stops. When the ZLD file is set to download the CPU module system software, the software is reset in order to rewrite the system software.

The ZLD file saved to the SD memory card can be downloaded by performing the following operations.

| Operation   | Action  | When the CPU Module is Write Protected  |
|---|---|---|
| The CPU module power is turned on when an SD memory card with an autoexec.ini file that executes a download has been inserted in the SD memory card slot.         | The ZLD file specified by the autoexec.ini file is downloaded to the CPU module.<br>The ZLD files saved to the \FCDATA01\PROGRAM\ folder are eligible to be downloaded.   | The download is performed if the password matches the write protection password set for the ZLD file to be downloaded specified by the autoexec.ini file.       |
| Special internal relay M8250 is turned on when an SD memory card with an autoexec.ini file that executes a download has been inserted in the SD memory card slot. |   | The download is not performed if the passwords do not match.  |
| An SD memory card with an autoexec.ini file that executes a download is inserted in the SD memory card slot.  | The download is not performed.  | The download is not performed.  |
| A download is executed with the system menu on the HMI module.<br>For details, see "Downloading the User Program (SD memory card → CPU module)" on page 7-45.     | The ZLD file specified with the system menu on the HMI module is downloaded to the CPU module.<br>The ZLD files saved to the \FCDATA01\PROGRAM\ folder are eligible to be downloaded.*1 <ul style="list-style-type: none"> <li>The download is executed even if there is no autoexec.ini file on the SD memory card.</li> <li>Even if there is an autoexec.ini file on the SD memory card, the parameters are not read from it. For details, see "Creating the autoexec.ini File" on page 11-31.</li> </ul> | The download is performed if the password matches the password entered with the HMI module.<br><br>The download is not performed if the passwords do not match. |

\*1 The ZLD files that can be selected with the system menu on the HMI module are only those in the PROGRAM folder, and the maximum is 20 files. If there are 21 or more files in the PROGRAM folder, no ZLD file can be selected.

Data that is not saved to a ZLD file will not be downloaded. If the same data as the ZLD file is already in the CPU module, that data will not be downloaded.

## 11: SD MEMORY CARD

Example 1: When all of the data in the CPU module matches the ZLD file

The download is not executed.

| Download                   | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | CPU Module Data after Download |
|----------------------------|-----------------|---|--------------------------------|
| CPU Module System Software | Ver1.23         | Ver1.23   | Ver1.23                        |
| User program               | Project1        | Project1  | Project1                       |
| Program comments           | Comment1        | Comment1  | Comment1                       |

Example 2: When the system software versions are different

Only the system software will be downloaded.

| Download                   | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | CPU Module Data after Download |
|----------------------------|-----------------|---|--------------------------------|
| CPU Module System Software | Ver1.23         | Ver1.30   | Ver1.30                        |
| User program               | Project1        | Project1  | Project1                       |
| Program comments           | Comment1        | Comment1  | Comment1                       |

Example 3: When the user program and program comments are different

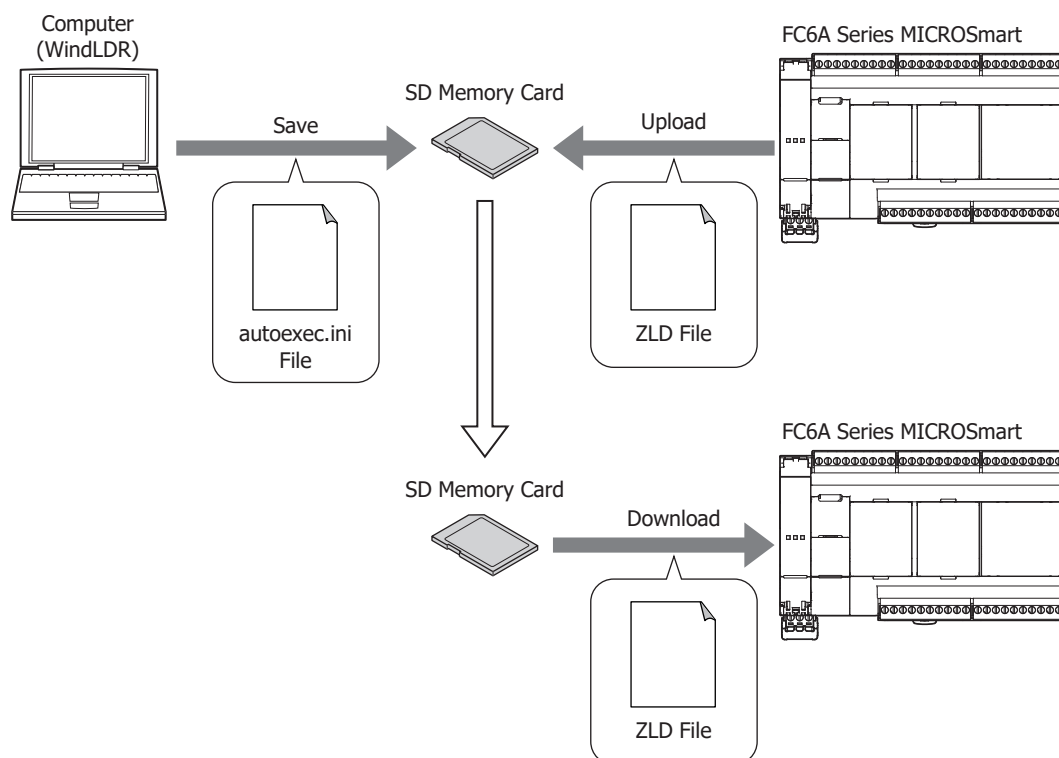
The user program and program comments will be downloaded.

| Download                   | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | CPU Module Data after Download |
|----------------------------|-----------------|---|--------------------------------|
| CPU Module System Software | Ver1.30         | Ver1.30   | Ver1.30                        |
| User program               | Project1        | Project2  | Project2                       |
| Program comments           | Comment1        | Comment2  | Comment2                       |

### Download a ZLD File Uploaded from the PLC (1-Time Upload)

When there is no ZLD file to download on an SD memory card with an autoexec.ini file that executes a download, an upload can be executed instead of a download.

By using the auto upload function, the data uploaded from the CPU module can be copied to other CPU modules without having to edit the SD memory card or autoexec.ini file during the process.



**Note:** To perform the 1-time upload, it must be enabled in the autoexec.ini file that executes a download. For details, see "autoexec.ini File Format" on page 11-36.

The 1-time upload function can be executed by using the following operations.

| Operation  | Action   | When the CPU Module is Read Protected |
|--|--|---------------------------------------|
| The CPU module power is turned on when an SD memory card with an autoexec.ini file that executes an auto upload has been inserted in the SD memory card slot.<br>Special internal relay M8251 is turned on when an SD memory card with an autoexec.ini file that executes an auto upload has been inserted in the SD memory card slot.<br>An SD memory card with an autoexec.ini file that executes an auto upload is inserted in the SD memory card slot. | The data is uploaded from the CPU module with the ZLD file name specified by the autoexec.ini file.<br>A ZLD file is saved to the \FCDATA01\PROGRAM\ folder. | The upload is not performed.          |

### Download the MQTT Basic Settings

The MQTT basic settings can be downloaded to the Plus CPU module.

For details, see Chapter 3 "Download Files for MQTT Basic Settings" in the "Network User's Manual".

### Download Files for Server Functions

Files for Server Functions can be downloaded to the Plus CPU module.

Files for Server Functions can be downloaded by performing the following operations.

| Operation   | Action   |
|---|--|
| The Plus CPU module power is turned on when an SD memory card to which a sever_tls.ini file was saved in the \FCDATA01\ folder is inserted in the SD memory card slot.  | The server_certificate.der file and server_private_key.der file stored in the \FCDATA01\TLS\ folder are downloaded to the Plus CPU module. |
| While the Plus CPU module is running, special internal relay M8401 is turned on when an SD memory card to which a sever_tls.ini file was saved in the \FCDATA01\ folder is inserted in the SD memory card slot. |  |
| An SD memory card to which a sever_tls.ini file was saved in the \FCDATA01\ folder is inserted in the SD memory card slot.  | The download is not performed.   |

#### Notes:

- Files for Server Functions can be downloaded even if the Plus CPU Module is write protected.
- If you select **Use data that are downloaded from SD memory card** check box in **Web Server Settings** of **Ethernet port 1** tab on the **Function Area Settings** dialog box, and download that user program, make sure to download the files for Server Functions from the SD memory card.
- If you clear **Use data that are downloaded from SD memory card** check box in **Web Server Settings** of **Ethernet port 1** tab on the **Function Area Settings** dialog box, and download that user program, the files for Server Functions set in the user program are used, even if files for Server Functions are downloaded from an SD memory card.
- The certificate and private key downloaded from the SD memory card cannot be uploaded.
- The web sever communication does not work if you saved the pem-formatted certificate or private key in the SD memory card and downloaded to the CPU module. Convert the files to the der format and save them to the \FCDATA01\TLS\ folder on the SD memory card. (Save the private key in PKCS#1 format.) You can use the **SD Memory Card Configuration** dialog box in WindLDR and the Data File Manager to convert pem files to der files. For details on the Data File Manager, see Chapter 4 "Command Line" in the Data File Manager User's Manual.
- For details on web server function, see Chapter 13 "Web Sever" in the FC6A Series MICROSmart Communication Manual.

## Creating the autoexec.ini File

To download a ZLD file to the CPU module using an SD memory card, save an autoexec.ini file to the SD memory card.

**Note:** The autoexec.ini file is created according to the file format described in this section. By using WindLDR, the autoexec.ini file can be created by configuring a dialog box and without needing to be aware of the file format. To create the autoexec.ini file using Notepad or another text editor, type in the sections, keys, and parameters according to the file format and save the file as "autoexec.ini".

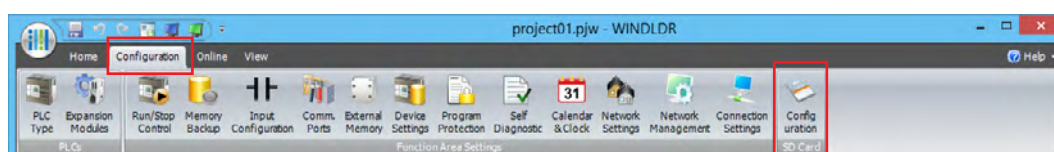
## Creating the autoexec.ini File Using WindLDR

This section describes the operation procedure to create an autoexec.ini file using WindLDR.

### • Operation procedure

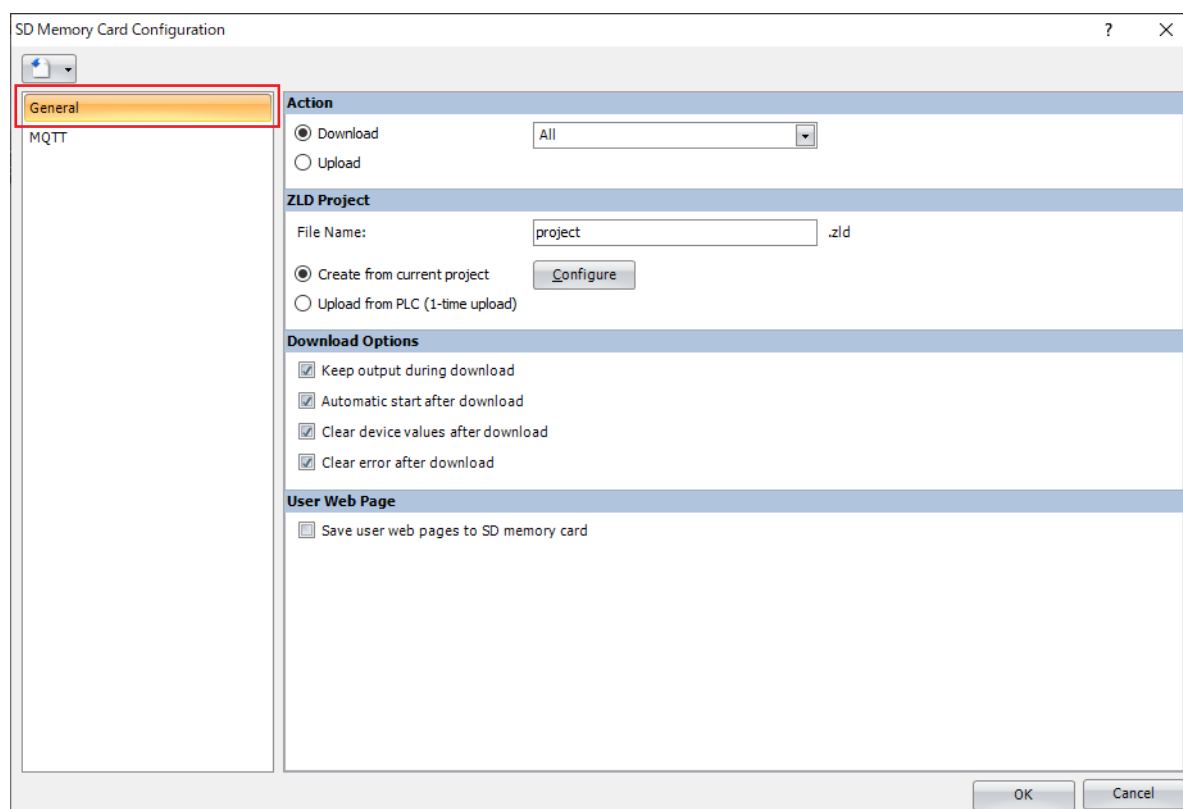
1. On the **Configuration** tab, in the **SD Card** group, select **Configuration**.

The **SD Memory Card Configuration** dialog box is displayed.



2. Click the **General** tab.

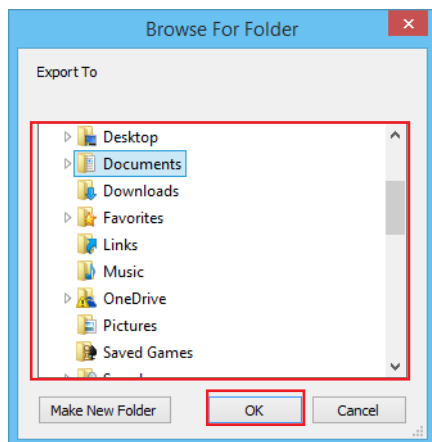
Configure the contents and operation of the autoexec.ini file on this tab.



3. Under **Action**, select **Download** and select **ZLD Project**.
4. Under **ZLD Project**, set the file name and creation method of the ZLD file to download.  
For the parameter settings, see "General Tab" on page 11-23 for the **SD Memory Card Configuration** dialog box.
5. Set the download options.  
For the parameter settings, see "General Tab" on page 11-23 for the **SD Memory Card Configuration** dialog box.
6. Set whether to save user web pages to SD memory card.

7. Click **OK**.

The **Browse For Folder** dialog box is displayed.



8. Select the drive where the SD memory card is inserted and then click **OK**.


The \FCDATA01\ folder is created on the SD memory card. The autoexec.ini file is saved directly under the \FCDATA01\ folder. If a ZLD file is created from the current project, the ZLD file is saved to the \FCDATA01\PROGRAM\ folder.

This concludes creating an autoexec.ini file.

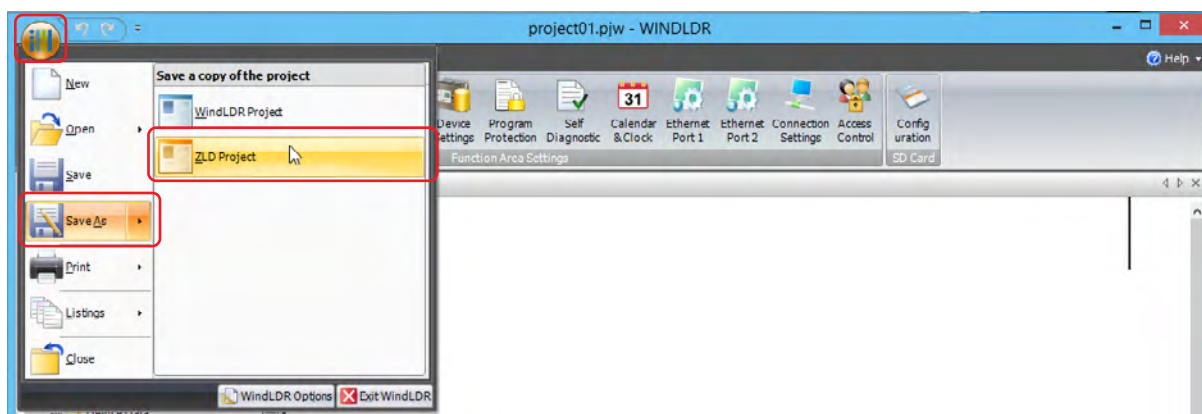
**Note:** A standalone ZLD file can be created and edited using WindLDR. For details, see "Creating a ZLD File Using WindLDR" on page 11-33

### Creating a ZLD File Using WindLDR

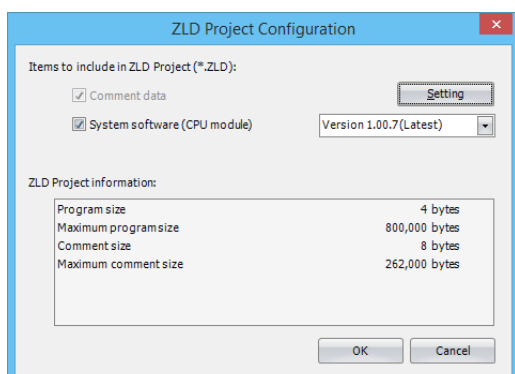
ZLD files are created with the following procedure.

1. Click  (application) > **Save As** > **ZLD Project**.

The **ZLD Project Configuration** dialog box is displayed.



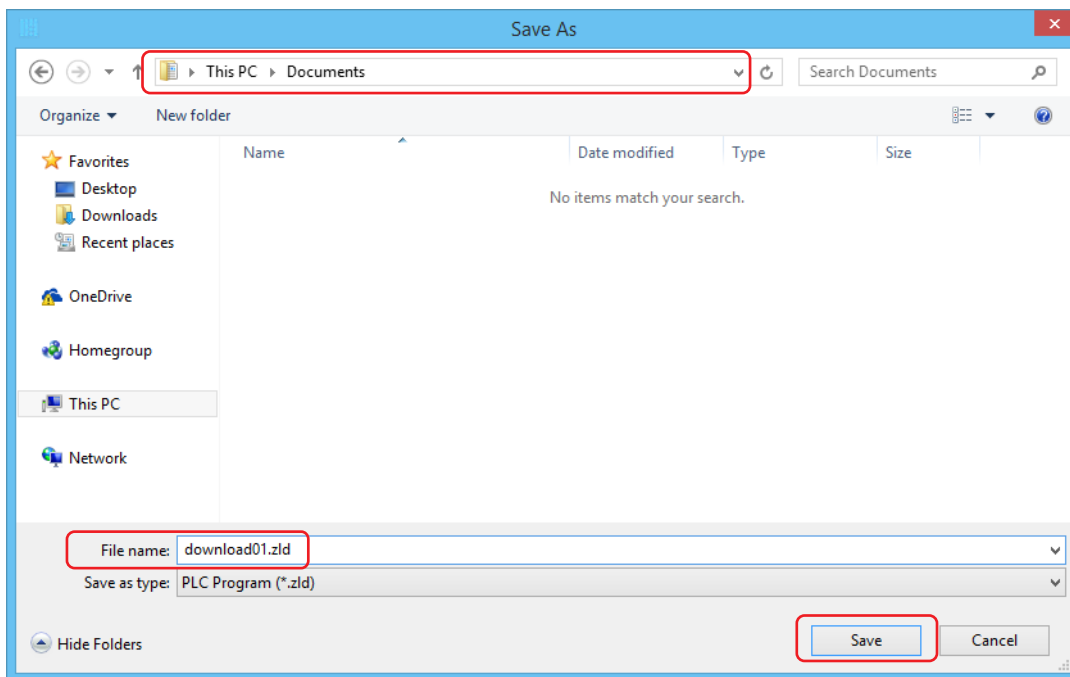
2. Configure the ZLD file details.



3. Click **OK**.  
The **Save As** dialog box is displayed.

## 11: SD MEMORY CARD

4. Enter the file name in **File name**, specify the folder to save to, and click **Save**.



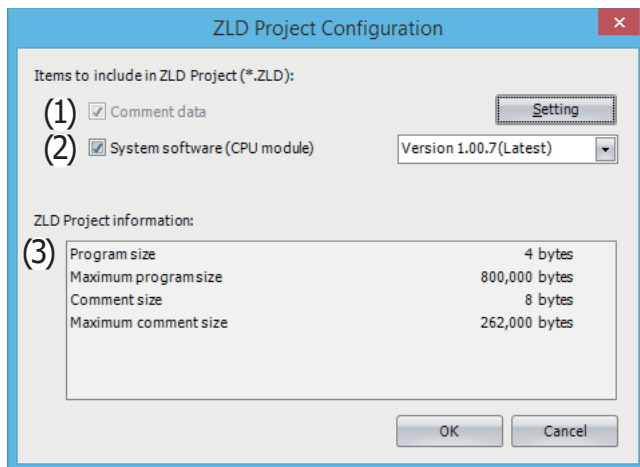
This concludes creating a ZLD file.



### ZLD Project Configuration Dialog Box Parameters

This section describes the dialog box parameter settings required to create a ZLD file.

#### ■ ZLD File tab



#### (1) Comment data

Select this check box to include program comments in the ZLD file.

Click **Setting** to display the **Comment Download Settings** dialog box. Select the comments to download and click **OK**. For details on the **Comment Download Settings** dialog box, see "Comment Download Settings dialog box" on page 11-35.

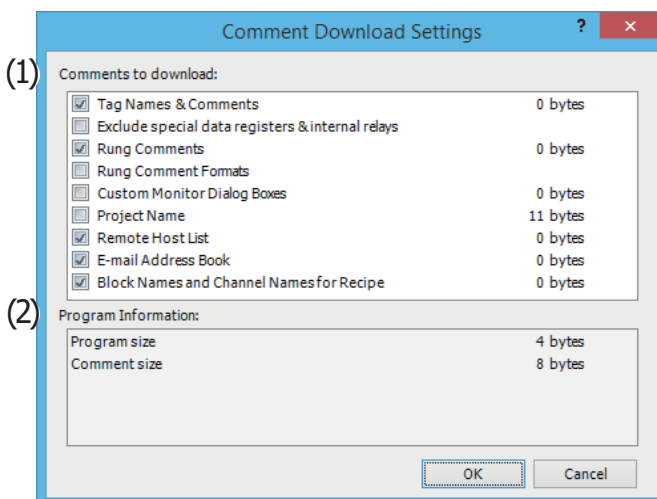
#### (2) System software (CPU module)

To include the system software in the ZLD file, select this check box and select the version of the system software.

#### (3) ZLD Project information

This area displays the current user program size, maximum user program size, current comment size, and maximum comment size.

#### ■ Comment Download Settings dialog box



#### (1) Comments to download

Select the check boxes for comments to download.

#### (2) Program Information

This area displays the size of the current user program and comments.

## 11: SD MEMORY CARD

### autoexec.ini File Format

The autoexec file is made up of the following three sections.

| Section            | Description   |
|--------------------|---|
| [COMMON_SETTING]   | The section that describes the autoexec.ini file action.                                |
| [PROGRAM_DOWNLOAD] | The section that describes the operation when downloading data from the SD memory card. |
| [PROGRAM_UPLOAD]   | The section that describes the operation when uploading data to the SD memory card.     |

The keys and parameters are described for each section.

If there is no key or if the specified parameter is not applicable, the default value is used for operation.

#### ■ [COMMON\_SETTING] section keys and parameters

| Key               | Description                         | Parameter |  | Default Value |
|-------------------|-------------------------------------|-----------|--|---------------|
| loading_direction | Specifies the autoexec file action. | none      | No download or upload is performed.  | none          |
|                   |                                     | download  | A download is performed from the SD memory card according to the [PROGRAM_DOWNLOAD] section. |               |
|                   |                                     | upload    | An upload is performed to the SD memory card according to the [PROGRAM_UPLOAD] section.      |               |

#### ■ [PROGRAM\_DOWNLOAD] section keys and parameters

| Key         | Description  | Parameter  |  | Default Value  |
|-------------|--|--|--|----------------|
| src_file    | Specifies the file name of the ZLD file that will be downloaded from the SD memory card.   | Specify the name of a ZLD file in the \FCDATA01\PROGRAM\ folder. <ul style="list-style-type: none"><li>The file name is enclosed in quotation marks (" ").</li><li>The file name is a maximum of 128 characters.</li></ul> However, when downloading the CPU module system software, output is turned off regardless of this option's setting. |  | "download.zld" |
| auto_start  | Specifies the operation status after the download is executed.   | true   | Set to run after the download is executed.   | false          |
|             |  | false  | Set to stop after the download is executed.  |                |
| clear_data  | Specifies whether or not to clear all device data including keep data after the user program download is executed.<br>The data that will be cleared is inputs, outputs, internal relays, shift registers, data registers, timer current values, and counter current values.<br>Timer present values, counter preset values, special internal relays, and special data registers will not be cleared. | true   | Clears all device data including keep data after the download is executed.   | false          |
|             |  | false  | Does not clear all device data including keep data after the download is executed.   |                |
| clear_error | Specifies whether or not to clear error information after the download is executed.  | true   | Clears error information after the download is executed.   | false          |
|             |  | false  | Does not clear error information after the download is executed.   |                |
| auto_upload | Specifies whether or not to use the auto upload function when there is no ZLD file.  | true   | If the ZLD file specified by src_file does not exist, an upload is executed instead of a download. The file name of the ZLD file to upload is specified by src_file. | false          |
|             |  | false  | If the ZLD file specified by src_file does not exist, a download is not executed.  |                |
| keep_output | Specifies whether or not to keep output while the user program is downloading.   | true   | Keeps output while executing the download.   | false          |
|             |  | false  | Does not keep output while executing the download.   |                |

## ■ [PROGRAM\_UPLOAD] section keys and parameters

| Key             | Description   | Parameter  |   | Default Value |
|-----------------|---|--|---|---------------|
| dst_file        | Specifies the name of the ZLD file that will be uploaded to the SD memory card. | Specify the name of a ZLD file in the \FCDATA01\PROGRAM\ folder.<br><ul style="list-style-type: none"> <li>The file name is enclosed in quotation marks (" ").</li> <li>The file name is a maximum of 128 characters.</li> </ul> However, when downloading the CPU module system software, output is turned off regardless of this option's setting. |   | "upload.zld"  |
| filename_option | Specify to dynamically generate the file name.                                  | sn   | The file will be created using the serial number of the CPU module instead of the dst_file file name.<br>If the serial number is "12A3456", "12A3456.zld" is created.*1 | none          |
|                 |   | none   | Creates the file using the name specified by dst_file.  |               |

\*1 If the CPU module serial number cannot be correctly read, filename\_option operates as if none was specified.

**Restrictions**

- The maximum number of characters per line is 512 single-byte characters including line feed codes. All the text on the line will be ignored if there are more than 512 single-byte characters on the line.
- Each item must be described as a single line. If a line feed occurs before the end of the line, all characters after the line feed are ignored.
- Only line feed codes of the format generally supported by Windows (CR+LF) are supported. If any other line feed format is used, the autoexec.ini file will fail to run properly.
- Data from a semicolon (;) to the line feed code is ignored. The space after the semicolon can be freely used for comments. However, if the autoexec.ini file is opened in WindLDR and then saved again, comments written after the semicolon will be deleted and the file will only contain standard comments.
- Only strings with single-byte characters can be used.
- If the same key appears multiple times, only the bottom key is valid.

### ■ autoexec.ini file example

```
[COMMON_SETTING]
;; loading_direction
;; "download" : download to PLC, with [PROGRAM_DOWNLOAD] section's settings.
;; "upload" : upload to SD card, with [PROGRAM_UPLOAD] section's settings.
;; "none" : no operation, ignore both [PROGRAM_DOWNLOAD] and [PROGRAM_UPLOAD] sections' settings.
loading_direction=download

[PROGRAM_DOWNLOAD]
;; src_file
;; zld file's name for download in \FCDATA01\PROGRAM\ folder.
src_file="download.zld"

;; auto_start
;; "true" : start PLC after downloading user program.
;; "false" : keep stop PLC after downloading user program.
auto_start=false

;; clear_data
;; "true" : clear all devices' data includes keep data after downloading user program.
;; "false" : not clear all devices' data includes keep data after downloading user program.
clear_data=false

;; clear_error
;; "true" : clear error status after downloading user program.
;; "false" : not clear error status after downloading user program.
clear_error=false

;; auto_upload
;; "true" : upload alternatively, if not exist ZLD file pointed by 'src_file' when downloading.
;; "false" : do nothing, if not exist ZLD file pointed by 'src_file' when downloading.
auto_upload=false

;; keep_output
;; "true" : keep output while downloading the user program.
;; "false" : not keep output while downloading the user program.
keep_output=false

[PROGRAM_UPLOAD]
;; dst_file
;; zld file's name for upload into \FCDATA01\PROGRAM\ folder.
dst_file="upload.zld"

;; filename_option
;; name zld file automatically
;; "sn" : use serial number of CPU module as zld filename for uploading
;; "none" : use 'dst_file' as zld filename for uploading
filename_option=none
```

## Creating the mqtt\_basic\_settings.ini File

To download the files for MQTT Basic Settings to the Plus CPU module using an SD memory card, save the mqtt\_basic\_settings.ini and certificates (der format) to the SD memory card.

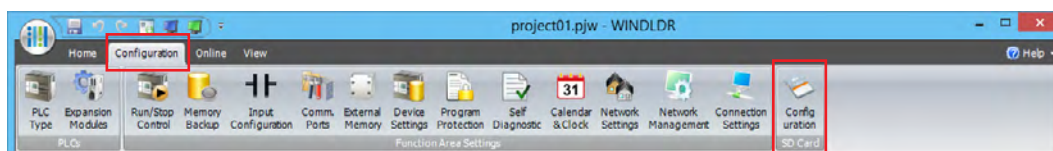
**Note:** The mqtt\_basic\_settings.ini file is created according to the file format described in this section. By using WindLDR, the mqtt\_basic\_settings.ini file can be created by configuring a dialog box and without needing to be aware of the file format. To create the mqtt\_basic\_settings.ini file using Notepad or another text editor, type in the sections, keys, and parameters according to the file format and save the file as "mqtt\_basic\_settings.ini".

## Creating the mqtt\_basic\_settings.ini File Using WindLDR

This section describes the procedure to create an mqtt\_basic\_settings.ini file using WindLDR.

### • Operation procedure

1. Select the **Enable MQTT** in the **MQTT Settings** dialog box.
2. Configure the **Connect to** and **MQTT Connection Method**.
3. Configure the other necessary settings, and then click **OK**.  
The **MQTT Settings** dialog box is closed.
4. On the **Configuration** tab, in the **SD Card** group, select **Configuration**.  
The **SD Memory Card Configuration** dialog box is displayed.



5. Under **Action**, select **Download** and select **MQTT Basic Settings**.
6. Click the **MQTT** tab.

Set the contents of the mqtt\_basic\_settings.ini file on this tab.

For the parameter settings, see Chapter 3 "MQTT Settings" in the "Network User's Manual".

**SD Memory Card Configuration**

General  
MQTT

**MQTT Basic Settings**

Broker

☒ Host Name:

☐ IP Address:

Port Number:

Keep Alive:  sec

Client ID:

☐ MAC Address:

☒ Fixed value:

☐ Data Register:

☒ Authentication is required to connect to Broker

Account Name:

Password:

☒ Use secure connection (SSL/TLS)

Root Certificate: Not imported

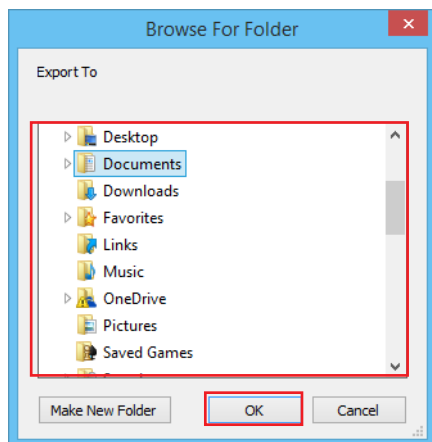
Client Certificate: Not imported

Client Private Key: Not imported

☒ Delete files for MQTT Basic Settings after download

7. Click **OK**.

The **Browse For Folder** dialog box is displayed.



8. Select the drive where the SD memory card is inserted and then click **OK**.

The \FCDATA01\ folder is created on the SD memory card. The mqtt\_basic\_settings.ini file is saved directly under the \FCDATA01\ folder. The root certificate, client certificate, and client private key are saved in the \FCDATA01\TLS\ folder.

This concludes creating the mqtt\_basic\_settings.ini file.

## Creating the server\_tls.ini File

To download the files for Server Functions to the Plus CPU module using an SD memory card, save the server\_tls.ini, certificate (der format) and private key (der format) to the SD memory card.

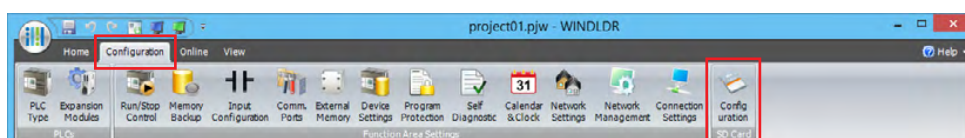
**Note:** The server\_tls.ini file is created according to the file format described in this section. By using WindLDR, the server\_tls.ini file can be created by configuring a dialog box and without needing to be aware of the file format. To create the server\_tls.ini file using Notepad or another text editor, type in the sections, keys, and parameters according to the file format and save the file as "server\_tls.ini".

## Creating the server\_tls.ini File Using WindLDR

This section describes the procedure to create an server\_tls.ini file using WindLDR.

### • Operation procedure

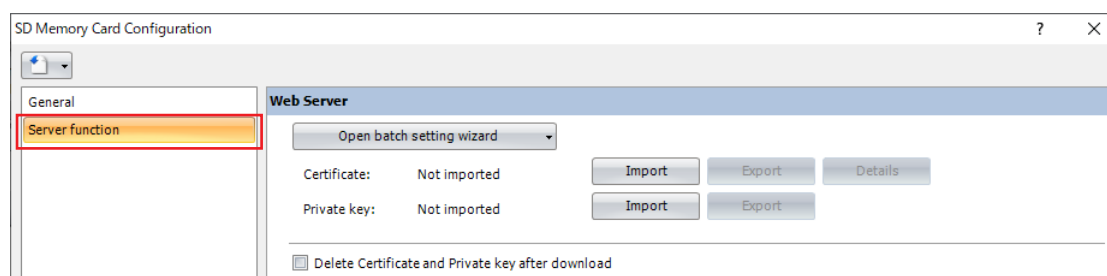
1. Select **Use data that are downloaded from SD memory card** check box in **Web Server Settings** of **Ethernet port 1** tab on the **Function Area Settings** dialog box.
2. Configure the other necessary settings, and then click **OK**.  
The **Function Area Settings** dialog box is closed.
3. On the **Configuration** tab, in the **SD Card** group, select **Configuration**.  
The **SD Memory Card Configuration** dialog box is displayed.



4. Click the **Server function** tab.

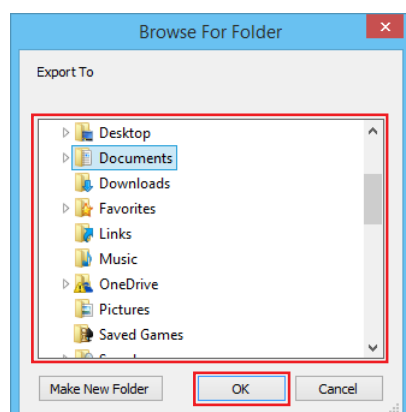
Set the contents of the server\_tls.ini file on this tab.

For the parameter settings, see "Server function Tab" on page 11-26 for the **SD Memory Card Configuration** dialog box.



5. Click **OK**.

The **Browse For Folder** dialog box is displayed.



6. Select the drive where the SD memory card is inserted and then click **OK**.

The \FCDATA01\ folder is created on the SD memory card. The server\_tls.ini file is saved directly under the \FCDATA01\ folder. The certificate and private key are saved in the \FCDATA01\TLS\ folder.

This concludes creating the server\_tls.ini file.

**server\_tls.ini File Format**

The server\_tls.ini file is made up of the following 1 section.

| Section        | Description  |
|----------------|--|
| [DELETE_FILES] | The section that describes whether to delete the server_certificate.der file and server_private_key.der file after the download. |

■ [DELETE\_FILES] section keys and parameters

| Key          | Description   | Parameter |  | Default Value |
|--------------|---|-----------|--|---------------|
| delete_files | Specifies whether to delete the server_certificate.der file and server_private_key.der file after the download. | true      | Deletes server_certificate.der file and server_private_key.der file.         | false         |
|              |   | false     | Does not delete server_certificate.der file and server_private_key.der file. |               |

**Restrictions**

- The maximum number of characters per line is 512 single-byte characters including line feed codes. All the text on the line will be ignored if there are more than 512 single-byte characters on the line.
- Each item must be described as a single line. If a line feed occurs before the end of the line, all characters after the line feed are ignored.
- Only line feed codes of the format generally supported by Windows (CR+LF) are supported. If any other line feed format is used, the mqtt\_basic\_settings.ini file will fail to run properly.
- Data from a semicolon (;) to the line feed code is ignored. The space after the semicolon can be freely used for comments.
- Only strings with single-byte characters can be used.
- If the same key appears multiple times, only the bottom key is valid.

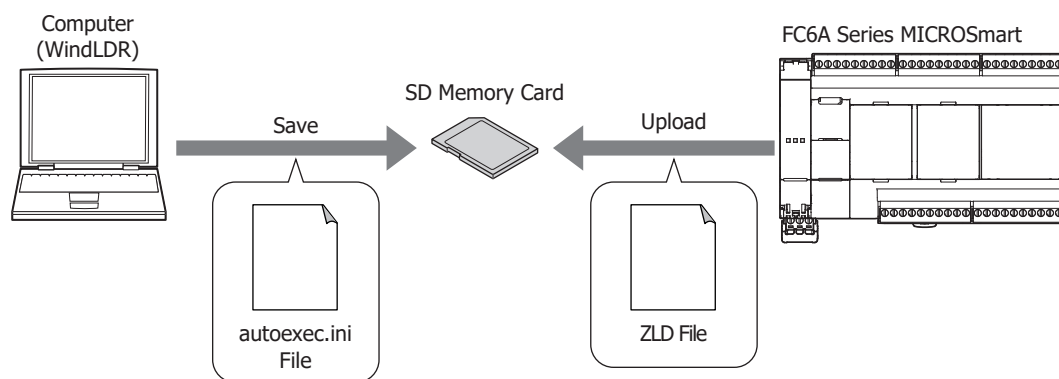


## Upload to SD Memory Card

The user program and system software written to the CPU module can be uploaded to the SD memory card.

### Upload a ZLD File

The user programs and system software written to the CPU module can be uploaded to the SD memory card.



Data can be uploaded while the CPU module is running.

By performing the following operations, the CPU module's user program and system software can be uploaded to the SD memory card as a ZLD file.

| Operation  | Action   | When the CPU Module is Read Protected  |
|--|--|--|
| <p>The CPU module power is turned on when an SD memory card with an autoexec.ini file that executes an upload has been inserted in the SD memory card slot.</p> <p>Special internal relay M8251 is turned on when an SD memory card with an autoexec.ini file that executes an upload has been inserted in the SD memory card slot.</p> <p>An SD memory card with an autoexec.ini file that executes an upload is inserted in the SD memory card slot.</p> | <p>The data is uploaded from the CPU module with the ZLD file name specified by the autoexec.ini file.</p> <p>The ZLD file is uploaded to the \FCDATA01\PROGRAM\ folder.</p>   | <p>The upload is not performed.</p>  |
| <p>An upload is executed with the system menu on the HMI module.</p> <p>For details, see "Uploading the User Program (CPU module → SD memory card)" on page 7-46.</p>  | <p>The data is uploaded with the file name specified by the system menu on the HMI module.</p> <p>The ZLD file is uploaded to the \FCDATA01\PROGRAM\ folder.</p> <ul style="list-style-type: none"> <li>The upload is executed even if there is no autoexec.ini file on the SD memory card.</li> <li>Even if there is an autoexec.ini file on the SD memory card, it will not be read. For details, see "Creating the autoexec.ini File" on page 11-31.</li> </ul> | <p>The upload is performed if the password matches the password entered with the HMI module.</p> <p>The upload is not performed if the passwords do not match.</p> |

An upload is not performed for data that has not been written to the CPU module. If a ZLD file that contains the same data as the CPU module data already exists on the SD memory card, it will not be overwritten by the upload. If any of the data is different, all of the data will be uploaded and the file will be overwritten with a new ZLD file.

## 11: SD MEMORY CARD

Example 1: When there is no ZLD file on the SD memory card  
All data will be uploaded and a ZLD file will be created.

| Upload                     | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | ZLD File Data on the SD Memory Card after Upload |
|----------------------------|-----------------|---|--|
| CPU Module System Software | Ver1.30         | None<br>(No ZLD file on the SD memory card)       | Ver1.30  |
| User program               | Project1        |   | Project1   |
| Program comments           | Comment1        |   | Comment1   |

Example 2: When the system software versions are different  
The ZLD file will be overwritten with a new ZLD file.

| Upload                     | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | ZLD File Data on the SD Memory Card after Upload |
|----------------------------|-----------------|---|--|
| CPU Module System Software | Ver1.30         | Ver1.23   | Ver1.30  |
| User program               | Project1        | Project1  | Project1   |
| Program comments           | Comment1        | Comment1  | Comment1   |

Example 3: When the user program and program comments are different  
The ZLD file will be overwritten with a new ZLD file.

| Upload                     | CPU Module Data | Data Stored in the ZLD File on the SD Memory Card | ZLD File Data on the SD Memory Card after Upload |
|----------------------------|-----------------|---|--|
| CPU Module System Software | Ver1.30         | Ver1.30   | Ver1.30  |
| User program               | Project2        | Project1  | Project2   |
| Program comments           | Comment2        | Comment1  | Comment2   |

## Used Special Devices

### Download and Upload a ZLD File

The special internal relays and the special data registers used by uploads and downloads that use the SD memory card are as follows.

**Note:** R/W stands for read/write and allows reading and writing. R is read-only. W is write-only.

### Special Internal Relays

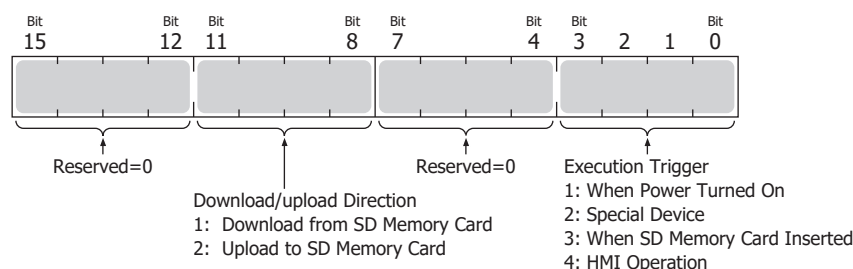
| Device Address | Function  | Description  | R/W |
|----------------|---|--|-----|
| M8250          | Download from SD Memory Card Execution Flag               | When M8250 is turned on, a ZLD file is downloaded from the SD memory card. The file that will be downloaded is the ZLD file specified in the autoexec.ini file.  | R/W |
| M8251          | Upload to SD Memory Card Execution Flag                   | When M8251 is turned on, a ZLD file is uploaded to the SD memory card.<br>A ZLD file is created with the file name specified in the autoexec.ini file.   | R/W |
| M8252          | Executing SD Memory Card Download                         | M8252 is turned on when starting execution of the download from the SD memory card, and when the download has completed, it is turned off.   | R   |
| M8253          | Executing SD Memory Card Upload                           | M8253 is turned on when starting execution of the upload to the SD memory card, and when the upload has completed, it is turned off.   | R   |
| M8254          | SD Memory Card Download/Upload Execution Completed Output | M8254 is turned off when starting execution of the download from the SD memory card or the upload to the SD memory card, and when the download or upload has completed, it is turned on.   | R   |
| M8255          | SD Memory Card Download/Upload Execution Error Output     | M8255 is updated when execution of the download from the SD memory card or the upload to the SD memory card has completed.<br>M8255 is turned off when the SD memory card download or upload has normally ended or when the user program was not uploaded or downloaded.<br>M8255 is turned on when an error occurs during the SD memory card download or upload.<br>For details, see "D8255: SD Memory Card Download/Upload Execution Error Information" on page 11-46. | R   |

### Special Data Registers

| Device Address | Function   | Description   | R/W |
|----------------|--|---|-----|
| D8254          | SD Memory Card Download/Upload Execution Information | Information about the SD memory card download/upload that was executed. For details, see "D8254: SD Memory Card Download/Upload Execution Status" on page 11-45.        | R   |
| D8255          | SD Memory Card Download/Upload Execution Status      | The status of the SD memory card download/upload that was executed. For details, see "D8255: SD Memory Card Download/Upload Execution Error Information" on page 11-46. | R   |

#### ■ D8254: SD Memory Card Download/Upload Execution Status

The allocation of bits in the device (bit assignment) is as follows.



## 11: SD MEMORY CARD

### ■ D8255: SD Memory Card Download/Upload Execution Error Information

| Status | Download   | Upload   | M8255 |
|--------|--|--|-------|
| 0      | Normal termination   | Normal termination   | OFF   |
| 1      | No SD memory card is inserted.   | No SD memory card is inserted.   | ON    |
| 2      | —  | The SD memory card is write protected.   | ON    |
| 3      | Invalid SD memory card format.   | Invalid SD memory card format.   | ON    |
| 4      | —  | The SD memory card is full and no folders or files can be created.   | ON    |
| 5      | The ZLD file name specified by src_file is invalid.* <sup>1</sup>  | The ZLD file name specified by dst_file is invalid.* <sup>1</sup>  | OFF   |
| 6      | Failed to read the ZLD file saved to the SD memory card.* <sup>2</sup>   | Failed to write the ZLD file to the SD memory card.* <sup>2</sup>  | OFF   |
| 7      | No ZLD file on the SD memory card.   | —  | ON    |
| 8      | —  | A program syntax error occurred and the ZLD file could not be created.   | ON    |
| 9      | <ul style="list-style-type: none"> <li>No autoexec.ini file.</li> <li>The autoexec.ini could not be read.</li> </ul>   | <ul style="list-style-type: none"> <li>No autoexec.ini file.</li> <li>The autoexec.ini could not be read.</li> </ul>   | ON    |
| 10     | The program download is password protected* <sup>3</sup> .   | The program upload is password protected* <sup>3</sup> .   | ON    |
| 11     | —  | —  | —     |
| 12     | The ZLD file saved on the SD memory card has an invalid file size.   | —  | ON    |
| 13     | The target model of the ZLD file saved on the SD memory card is different.   | —  | ON    |
| 14     | Other download processing is being executed.   | —  | ON    |
| 15     | The download was not executed because the user program written to the FC6A was the same as the data in the ZLD file saved to the SD memory card.                     | —  | OFF   |
| 16     | The download was not executed because the system software and user program written to the FC6A was the same as the data in the ZLD file saved to the SD memory card. | The download was not executed because the system software and user program written to the FC6A was the same as the data in the ZLD file saved to the SD memory card. | OFF   |

\*1 Double-byte characters and the single-byte characters \ / : , ; \* ? " < > | cannot be used in the file name.

\*2 When file data cannot be normally written or read due to the data in the file becoming corrupted or a failure of a specific area of the SD memory card.

\*3 Except when the password has been canceled using the HMI module.

### Download files for MQTT Basic Settings

For details of the special internal relays and the special data registers used to download the files for MQTT Basic Settings, see Chapter 3 "Download Files for MQTT Basic Settings" in the "Network User's Manual".

## Download files for Server Function

The special internal relays and the special data registers used to download Files for Server Functions are as follows.

**Note:** R/W stands for read/write and allows reading and writing. R is read-only. W is write-only.

### Special Internal Relay

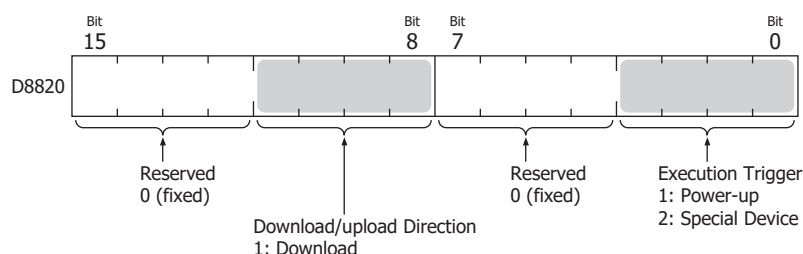
| Address | Description  |  | R/W |
|---------|--|--|-----|
| M8401   | Download Files for Server Functions from SD Memory Card Execution Flag             | When M8401 is turned on, Files for Server Functions are downloaded.  | R/W |
| M8402   | Download Files for Server Functions from SD Memory Card Execution Completed Output | M8402 is turned off when downloading Files for Server Functions is started, and it is turned on once the download is finished.         | R   |
| M8403   | Download Files for Server Functions from SD Memory Card Error Output               | M8403 is turned off when downloading Files for Server Functions is started, and it is turned on if an error occurs during the process. | R   |

### Special Data Registers

| Address | Description   |   | R/W |
|---------|---|---|-----|
| D8820   | Download Files for Server Functions from SD Memory Card Execution Information       | Information in executing the download of Files for Server Functions. For details, see "D8820: Download Files for Server Functions from SD Memory Card Execution Information" on page 11-47.             | R   |
| D8821   | Download Files for Server Functions from SD Memory Card Execution Error Information | Error information in executing the download of Files for Server Functions. For details, see "D8821: Download Files for Server Functions from SD Memory Card Execution Error Information" on page 11-48. | R   |

#### ■ D8820: Download Files for Server Functions from SD Memory Card Execution Information

The allocation of bits in the device (bit assignment) is as follows.



## 11: SD MEMORY CARD

### ■ D8821: Download Files for Server Functions from SD Memory Card Execution Error Information

| D8821<br>(Error Code) | Description  | M8403 | ROM Status    |
|-----------------------|--|-------|---------------|
| 0                     | Normal termination   | OFF   | Refreshed     |
| 1                     | M8401 (Download Files for Server Functions from SD Memory Card Execution Flag) was turned on when an SD memory card was not inserted.                    | ON    | Not refreshed |
| 2                     | The SD memory card is write protected.   | ON    | Not refreshed |
| 3                     | Invalid SD memory card format.   | ON    | Not refreshed |
| 4                     | M8401 (Download Files for Server Functions from SD Memory Card Execution Flag) was turned on when there is no server_tls.ini file on the SD memory card. | ON    | Not refreshed |
| 5                     | There is no server_certificate.der file on the SD memory card or reading the file failed.*1  | ON    | Not refreshed |
| 6                     | There is no server_private.der file on the SD memory card or reading the file failed.*1  | ON    | Not refreshed |
| 7                     | -  | -     | -             |
| 8                     | Attempted to save server_certificate.der file to the SD memory card, but the file size is invalid.   | ON    | Not refreshed |
| 9                     | Attempted to save server_private_key.der file to the SD memory card, but the file size is invalid.   | ON    | Not refreshed |
| 10                    | -  | -     | -             |
| 11                    | Writing Files for Server Functions failed.   | ON    | Undefined     |
| 12                    | Reading the server_tls.ini file failed.*1  | ON    | Not refreshed |

\*1 Status when the data in Files for Server Functions cannot be read properly from the SD memory card for a reason such as an error in the data in Files for Server Functions or a specific area on the SD memory card has malfunctioned.

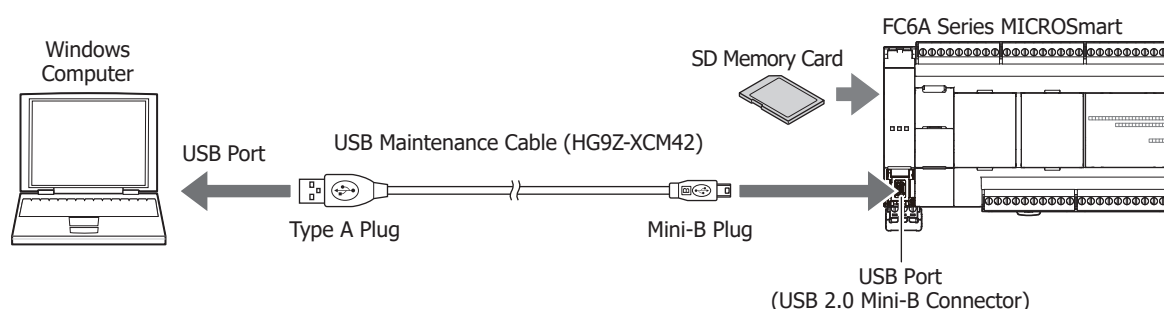
## SD Memory Card Maintenance with Data File Manager

The following operations can be performed on the SD memory card inserted in the FC6A by using Data File Manager.

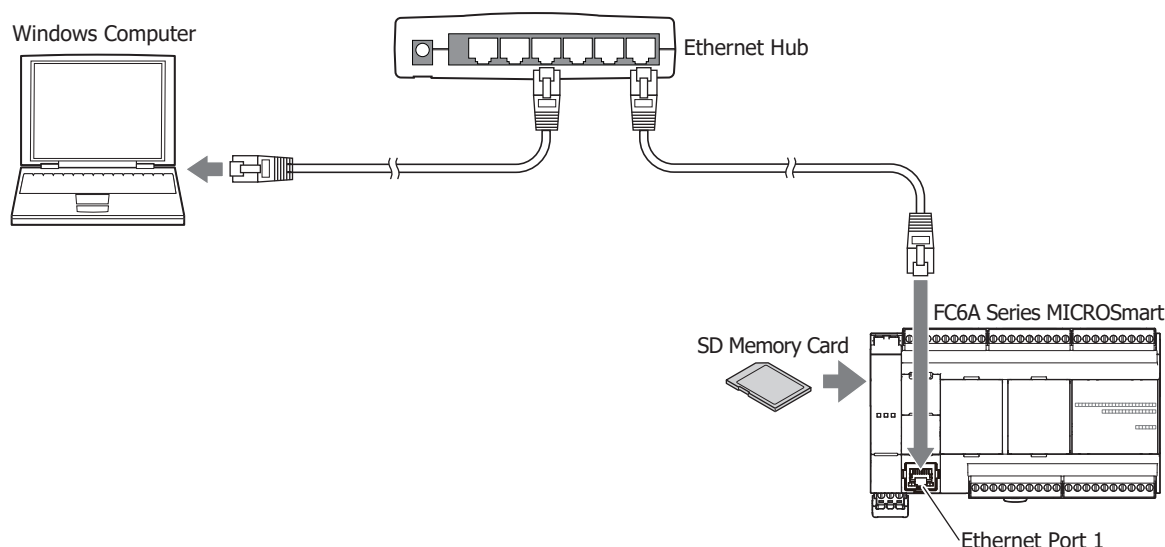
- Display file list
- Download files and folders
- Upload files and folders
- Delete files and folders
- Format SD memory card

These operations are called SD memory card maintenance. To use SD memory card maintenance, connect the FC6A to a PC with either of the following methods.

- Connect the FC6A and a PC using a USB cable.  
Example of using the USB port



- Connect the FC6A and a PC over Ethernet.  
Example of using Ethernet Port 1



### Notes:

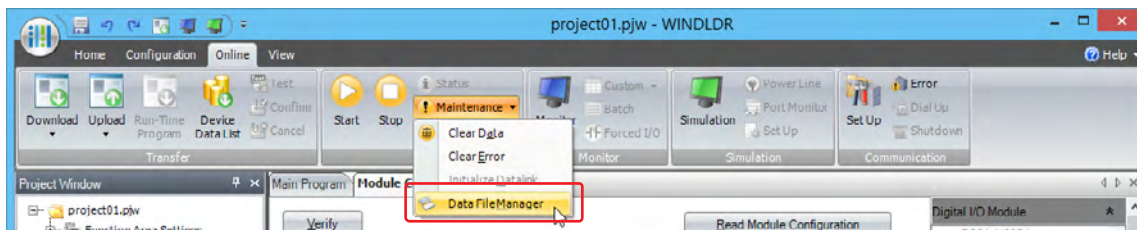
- Data File Manager uses the maintenance communication protocol, so it will not operate if the environment cannot perform maintenance communication (for example, with Ethernet communication, communication is not possible if the port numbers are different).
- The operating speed varies according to the communication status with the FC6A and the capacity of the SD memory card.
- The basic SD memory card and file system restrictions are the same as the restrictions for the DLOG instruction and the TRACE instruction.
- Device Manager functions other than SD memory card maintenance can be used with serial communication over Serial Port 1 or a communication cartridge. For details, see "Other Data File Manager Functions" on page 11-58.
- SD memory card maintenance using the Data File Manager can also be done with the command line. You can download the files for MQTT Basic Settings and the files for Server Functions with the command line. For details, refer to "Chapter 4 Command Line" of Data File Manager User's Manual.

### Starting and Exiting Data File Manager

#### ■ Starting Data File Manager

When a CPU module with an inserted SD memory card is connected to a PC, Data File Manager can be started for editing.

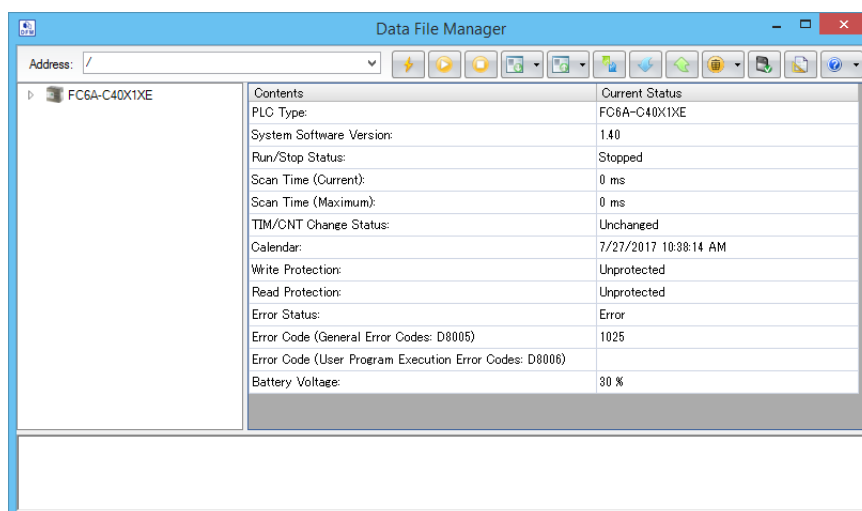
1. On the **Online** tab, in the **PLC** group, click **Maintenance** and then **Data File Manager**.



#### Notes:

- A connection cannot be made using the pass-through function. Clear the **Use HGxG Pass-Through** check box.
- A connection cannot be made using the maintenance function over Modbus TCP. When the communication method is **Serial**, clear the **Use maintenance communication over Modbus TCP** check box.
- The standalone Data File Manager application can be downloaded from the IDEC homepage (at the following URL) free of charge.  
<http://jp.idec.com/ja/download/search.aspx?category=&tab=software>

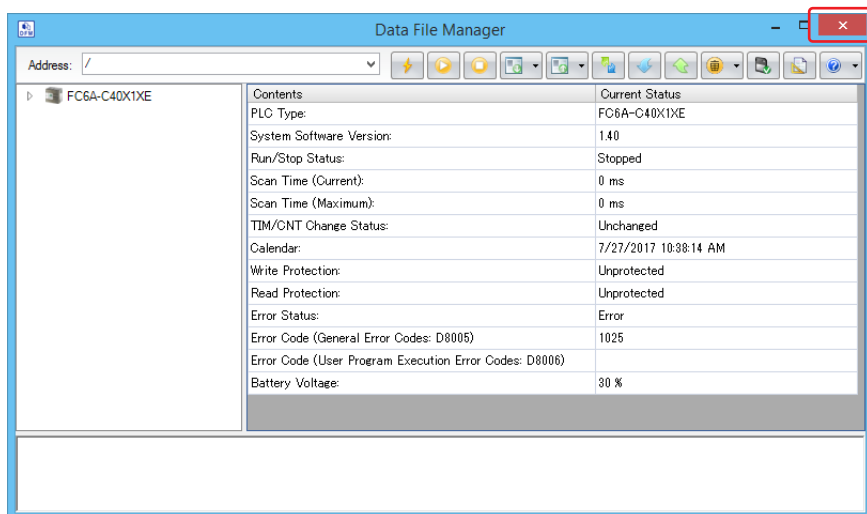
Data File Manager starts.





**Exiting Data File Manager**

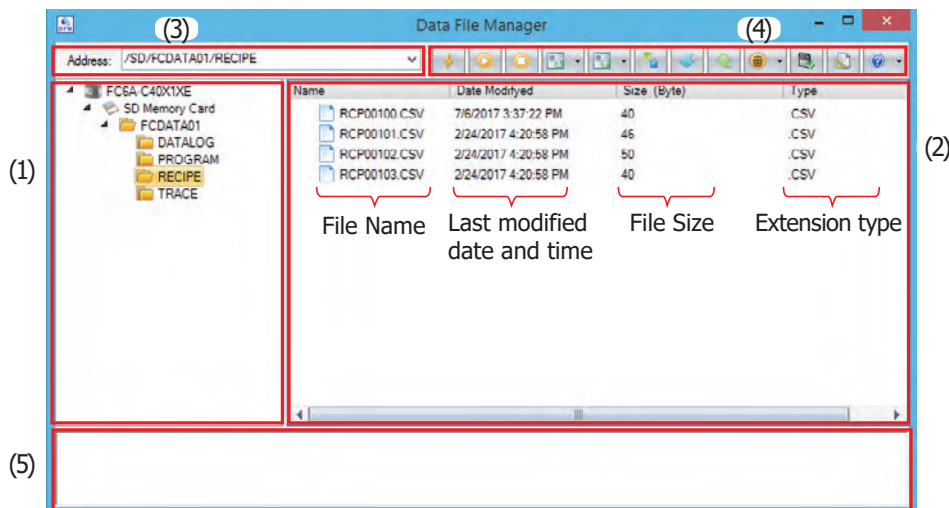
1. Click **X** at the upper-right corner of Data File Manager.  
Data File Manager exits.



### SD Memory Card Maintenance

#### Display file list

Data File Manager acquires the list of files and folders from the SD memory card inserted in the FC6A and displays them in a tree view (1) and a folder details view (2).



#### (1) Tree view

Displays the folder structure as a tree. Double-click a folder to move to the level in that folder (up or down).

1st level (root) : Displays the connected FC6A as an icon and a string.

2nd level : Displays the connected FC6A SD memory card as an icon and a string.

3rd level and lower: Displays the SD memory card folders as a tree.

#### (2) Folder details view

Displays a list of the files and folders in the folder selected on the tree view.

Displayed files and folder can be renamed and new folders can be created.

#### To rename files and folders

Select a file or folder and select **Rename** on the right-click menu or press the **F2** key. It will then be possible to edit the name, so rename the file or folder.

#### To create a folder

Click **Create Folder** on the right-click menu or click **Create Folder**. The **Create Folder** dialog box is displayed. Enter the name and click **OK**.

#### (3) Address field

Displays the path of the folder selected in the tree view from the 3rd level and lower.

However, when the CPU module and PC are connected over Ethernet, the IP address and port number are displayed at the beginning of the path.

#### When connected to the PC over USB

/SD memory card name/folder path













Example: /SD/FCDATA01/

#### When connected to the PC over Ethernet

IP address:port number/SD memory card name/folder path

Example: 192.168.1.100:80/SD/FCDATA01/

**(4) Toolbar**

| Button  | Command                             |                                      | Description  |
|---|-------------------------------------|--------------------------------------|--|
|    | Connect                             |                                      | The <b>Connection Settings</b> dialog box is displayed.  |
|    | Start                               |                                      | Changes the FC6A status from stop to run.  |
|    | Stop                                |                                      | Changes the FC6A status from run to stop.  |
|    | Download                            |                                      | ZLD project file (.zld) saved in the computer can be downloaded to the CPU module.   |
|   |                                     | Download ZLD project file (.zld)     | The same behavior with when Download icon is clicked.  |
|   |                                     | Download system software             | The system software of FC6A can be updated.  |
|   |                                     | Download file                        | Files stored in the computer can be downloaded to the SD memory card inserted in FC6A.   |
|   |                                     | Download folder                      | Folder stored in the computer can be downloaded to the SD memory card inserted in FC6A.  |
|    | Upload                              |                                      | The user program stored in the CPU module can be saved in the computer as a ZLD project file (.zld).   |
|   |                                     | Upload ZLD project file (.zld)       | The same behavior with when Upload icon is clicked.  |
|   |                                     | Upload file/folder                   | Files and folders shown in the folder details view can be saved in the computer.   |
|    | Refresh                             |                                      | The latest status is acquired from the CPU module and the view is updated.   |
|    | Download device address data (.csv) |                                      | Device address data (.csv) that is stored in the computer can be written to the device addresses of the connected target.  |
|    | Upload device address data (.csv)   |                                      | The values of the device addresses of FC6A can be read and saved in the computer as a csv file.  |
|    | Clear                               | Clear values in all device addresses | Device values stored in the internal memory of FC6A can be cleared. Types of the devices that are cleared are as follows: inputs, outputs, internal relays, shift registers, data registers, timer current values, and counter current values. |
|   |                                     | Clear Error                          | Error information stored in the internal memory of FC6A can be cleared.  |
|  | Format SD memory card               |                                      | SD memory card inserted in FC6A can be formatted.  |
|  | Option                              |                                      | Optional functions of Data File Manager can be configured.   |
|   |                                     |                                      | Help for Data File Manager is displayed.   |
|  | Help                                | Help                                 | The same behavior with when Help icon is clicked.  |
|   |                                     | About Data File Manager              | <b>About Data File Manager</b> dialog box is displayed.  |

**(5) Execution log view**


The operation log is displayed by executing the following operations.

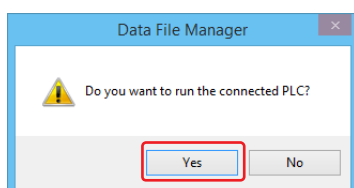
| Operation | Description  | Log format  |
|-----------|--|---|
| Delete    | Displays the number of files that were successfully deleted and the number of files that failed to be deleted.       | Delete<br>Success: {0} file(s), Failed: {1} file(s)   |
| Upload    | Displays the number of files that were successfully uploaded and the number of files that failed to be uploaded.     | Upload<br>Success: {0} file(s), Failed: {1} file(s)   |
| Download  | Displays the number of files that were successfully downloaded and the number of files that failed to be downloaded. | Download<br>Success: {0} file(s), Failed: {1} file(s) |

**Run/stop operations using Data File Manager**

The FC6A can be set to run or stop using Data File Manager operations.

- Run procedure**


- Click the toolbar  button.  
A confirmation message is displayed.
- Click **Yes**.

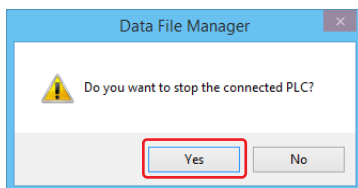


This concludes the run operation using Data File Manager.

- Stop procedure**

## 11: SD MEMORY CARD

1. Click the toolbar  button.  
A confirmation message is displayed.
2. Click **Yes**.



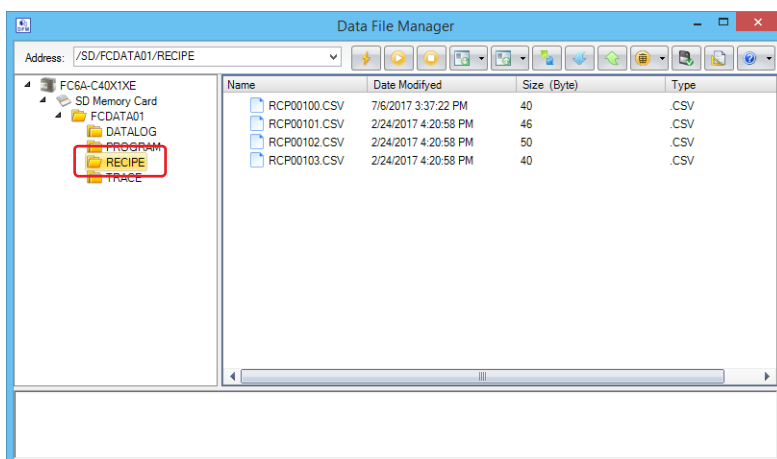
This concludes the stop operation using Data File Manager.


### Download files and folders

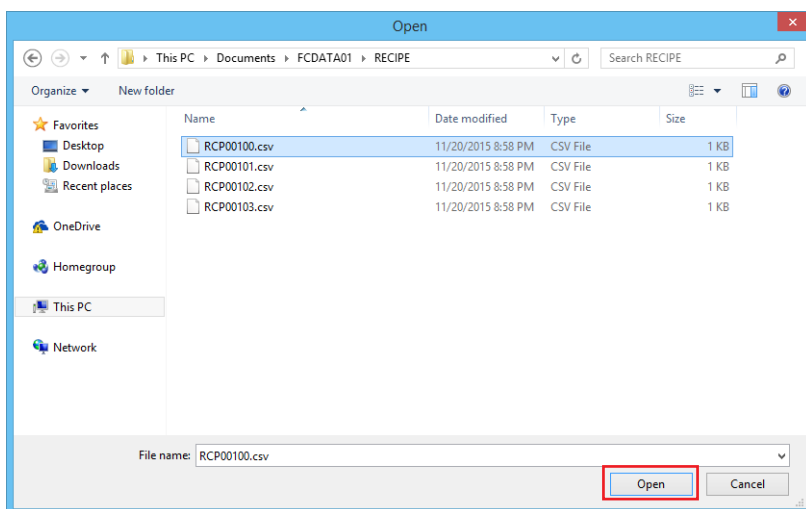
Files and folders saved on the PC will be written to the SD memory card inserted in the FC6A.

#### • Operation procedure to download a file

1. Select the target folder for the download in the Tree View.



2. Click on the down-pointing triangle button on the right of the  (Download) button and click **Download File**.  
The **Open** dialog box is displayed.
3. Select the files to download and click **Open**.  
The download starts.

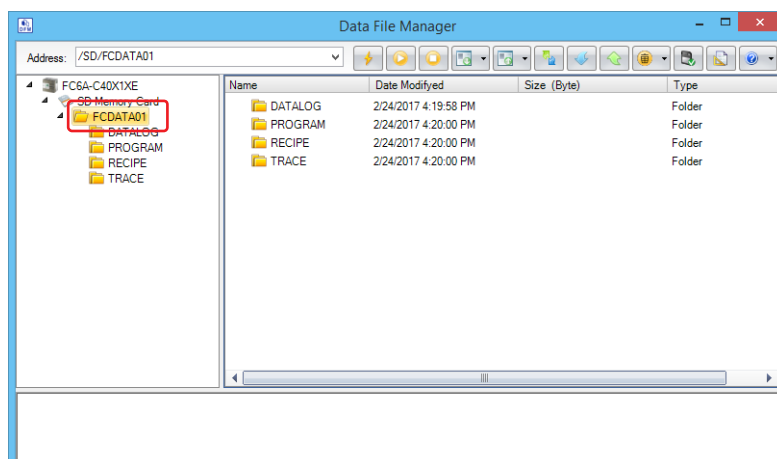


This concludes downloading files.

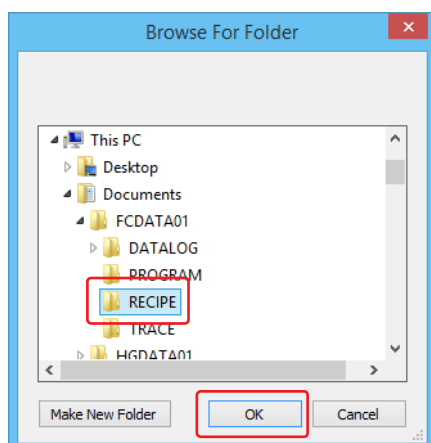
**Note:** The selected files can be downloaded by selecting files in Explorer of the PC and dragging and dropping them into the folder detailed view.

#### • Operation procedures to download a folder

1. Select the target folder for the download in the Tree View.



2. Click on the down-pointing triangle button on the right of the (Download) button and click **Download Folder**. The **Browse For Folder** dialog box is displayed.
3. Select the folder to download and click **Open**. The download starts.



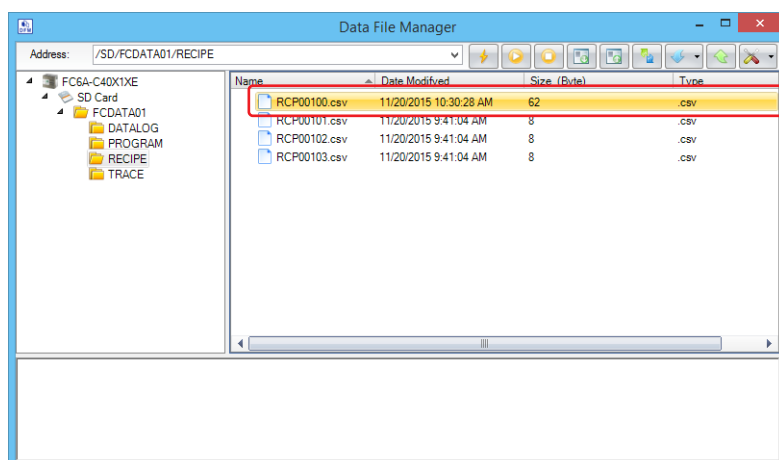
This concludes downloading folders.


**Note:** The selected folder can be downloaded by selecting folder in Explorer of the PC and dragging and dropping it into the folder detailed view.

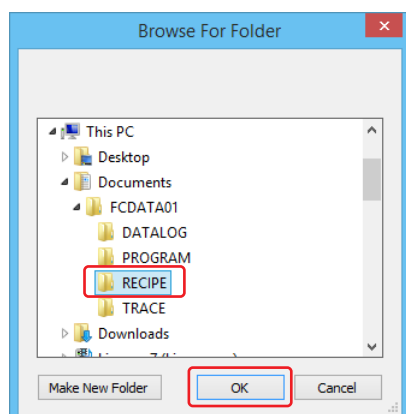
### Upload files and folders

Files and folders displayed in the folder details view will be saved to the PC.

1. Select the files and folders to upload in the folder details view.



2. Click on the down-pointing triangle button on the right of the  (Upload) button and click Upload File/Folder. The **Browse For Folder** dialog box is displayed.
3. Select the destination and then click **OK**. The upload starts.



This concludes uploading files and folders.

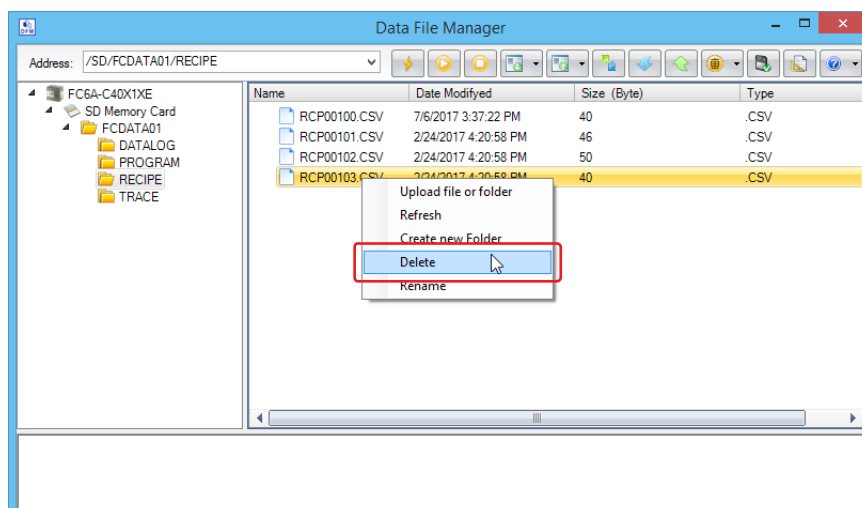
**Note:** The selected files/folders can be uploaded by selecting folder in the folder detailed view and dragging and dropping them into the Explorer of the PC.

### Delete files and folders

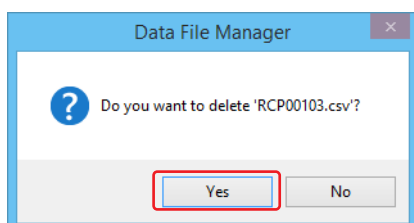
Files and folders displayed in the folder details view will be deleted.

### Operation Procedures

1. Select a file or folder in the folder details view and select **Delete** on the right-click menu or press the **Delete** key.  
A delete confirmation message is displayed.




2. Click **Yes**.

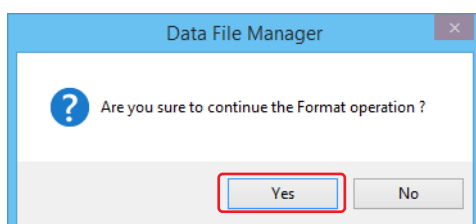


This concludes deleting files and folders.

### Formatting the SD Memory Card

The SD memory card inserted in the FC6A will be formatted.

1. Click  (Format SD Memory Card) on the toolbar.  
A format confirmation message is displayed.
2. Click **Yes**.  
The format is executed.



This concludes formatting the SD memory card.

**Note:** Formatting the SD memory card on the FC6A is comparable to formatting it with the quick format option in Windows.

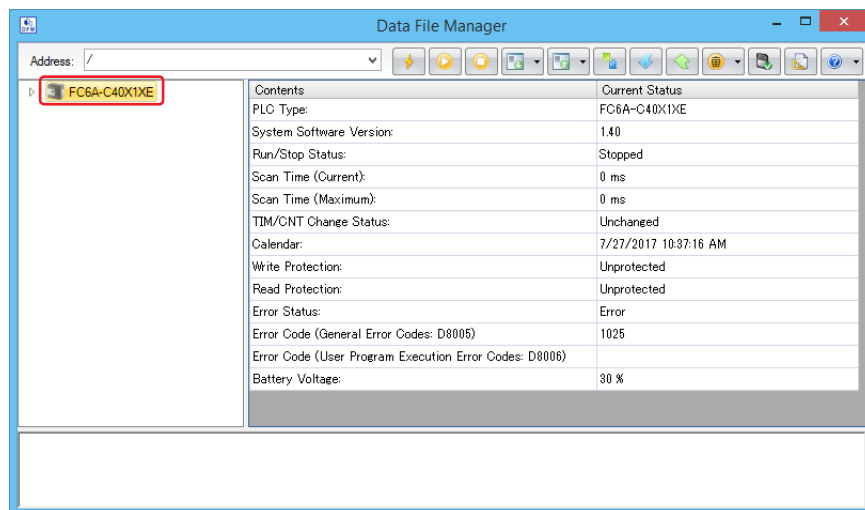
### Other Data File Manager Functions

In addition to SD memory card maintenance, the follow operations can be performed with Device Manager. These operations can be used with serial communication over Serial Port 1 or a communication cartridge.

- Display status
- Downloading and uploading user programs
- Update system software

### Display status

Click the 1st level (root) in the tree view to display the FC6A status.



When displaying the status, the address field is displayed as follows.

### When connected to the PC over USB

Slash (/)

Example: /

### When connected to the PC over Ethernet


IP address: Port number

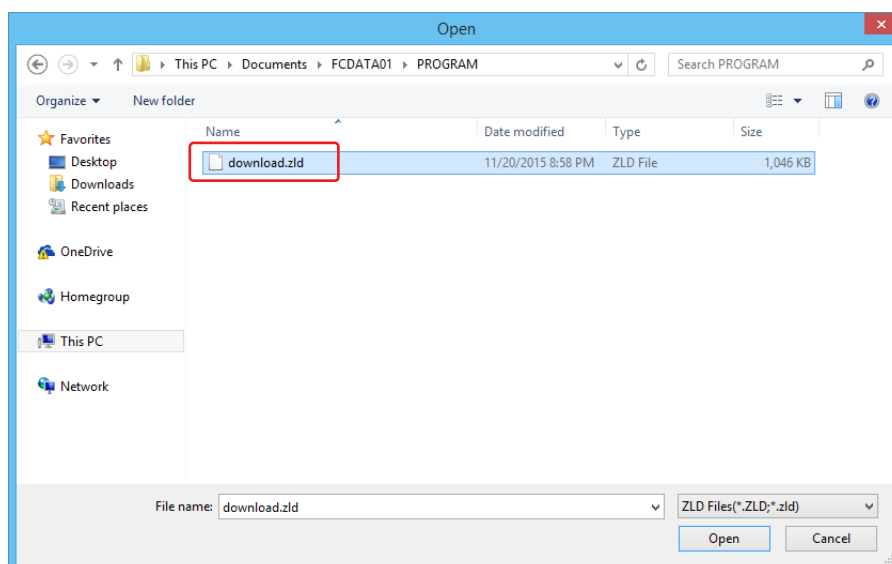
Example: 192.168.1.100:80/



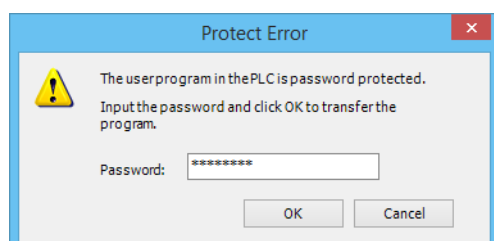
### Downloading user program

A user program (ZLD file) saved on the PC will be written to the CPU module.

1. Click  on the toolbar.  
The **Open** dialog box is displayed.
2. Select the ZLD file to download and click **Open**.  
The download starts.




**Note:** If the user program is protected, the **Password Error** dialog box is displayed. Enter the correct password and click **OK**. For details, see "User Program Protection" on page 5-57.

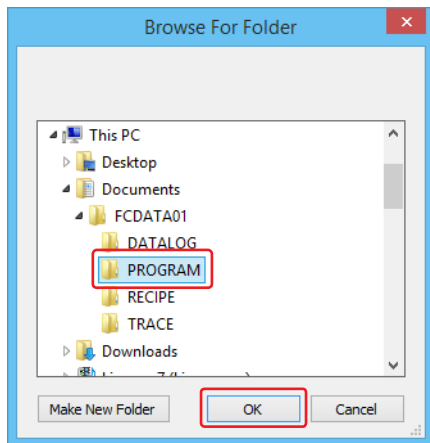


This concludes downloading the user program.

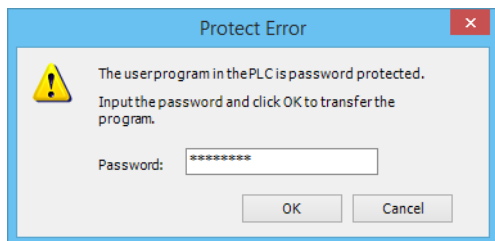
### Uploading user program

The user program on the CPU module will be saved to the PC.

1. Click  on the toolbar.  
The **Browse For Folder** dialog box is displayed.
2. Enter the destination and the file name and then click **OK**.  
The upload starts.




**Note:** If the user program is protected, the **Password Error** dialog box is displayed. Enter the correct password and click **OK**. For details, see "User Program Protection" on page 5-57.



This concludes uploading the user program.

### Update system software

The CPU module system software will be updated.

1. Click on the down-pointing triangle button on the right of the  (Download) button and click **Download System Software**.  
The **Download system software** dialog box is displayed.  
The rest of the operation procedure is the same as downloading system software in WindLDR. For details, see the procedure from step 3 in "Upgrade FC6A System Software" on page A-10.

This concludes updating the system software.

## Downloading and Uploading Device Address Data

### Device Address Data

#### Device Address Data Format

The device address data consists of group of values. The number of values is specified with **Number of Data** in **Device Address Data Setting** dialog box.

```
"(Value of device address)",
"(Value of device address number + 1)",
"(Value of device address number + 2)",
.
.
.
"(Value of device address number + (n-1))",
```

} Number of data (n)

#### Creating Device Address Data with Text Editor

The device address data can be created with software tool such as Notepad, text editor from the third party, or spread sheet software.

1. Describe "Device Address Value", comma (,), and line feed as many as the number of data.

Example: When the number of data is 5 and values are 1111, 2222, 3333, 4444, 5555 in this order

```
1111,
2222,
3333,
4444,
5555,
```

2. Save the file with the extension (.csv).

#### Supported Device Address


The range of device addresses that can be read or written and the maximum number of data are as follows.

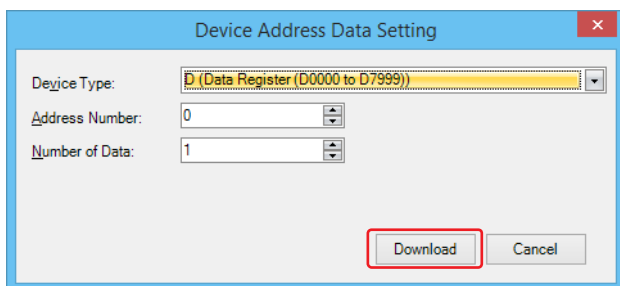
| Device Name                 | FC6A-C16/-C24/-C40/-C40XEJ |                    | FC6A-D16/-D32     |                    |
|-----------------------------|----------------------------|--------------------|-------------------|--------------------|
|                             | Device Address             | Max Number of Data | Device Address    | Max Number of Data |
| Internal relay              | M0 to M7997                | 6,400              | M0 to M7997       | 6,400              |
|                             | M10000 to M17497           | 6,000              | M10000 to M21247  | 9,000              |
| Special internal relay      | M8000 to M8317             | 256                | M8000 to M9997    | 1,600              |
| Shift register              | R0 to R255                 | 256                | R0 to R255        | 256                |
| Timer preset value          | TP0 to TP1023              | 1,024              | TP0 to TP1999     | 2,000              |
| Counter preset value        | CP0 to CP511               | 512                | CP0 to CP511      | 512                |
| Data register               | D0 to D7999                | 8,000              | D0 to D7999       | 8,000              |
|                             | D10000 to D55999           | 46,000             | D10000 to D61999  | 52,000             |
| Special data register       | D8000 to D8499             | 500                | D8000 to D8899    | 900                |
| Non-retentive data register | -                          | -                  | D70000 to D269999 | 200,000            |

### Downloading Device Address Data

The device address data (.csv) that is stored in the computer can be written to the device addresses of the FC6A.

#### Operation Procedure

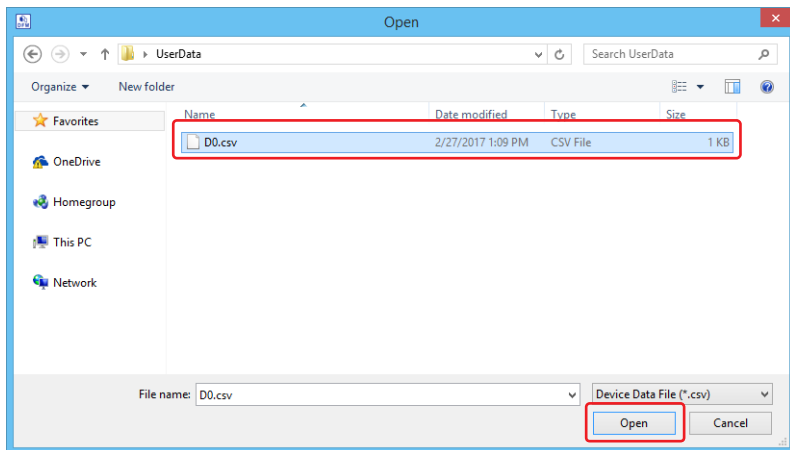
1. Click on the  (Download Device Address Data (.csv)) on the toolbar.  
The **Device Address Data Setting** dialog box is displayed.
2. Configure the device address to which data is written and click **Download** button.  
The **Open** dialog box is displayed.



- Device Type  
Specify the device type of the device address to which the data is written.
- Address Number  
Specify the device address number of the device address to which the data is written.
- Number of Data  
Number of data to write to the target device addresses.

**Note:** For details on available device addresses of FC6A, see "Supported Device Address" on page 11-61.

3. Select a device address data (.csv) and click **Open** button.  
Downloading the device address data starts.



This concludes downloading the device address data.


#### Notes:

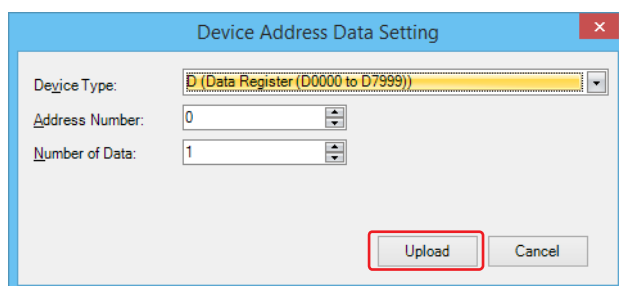
- Do not turn off the FC6A while downloading the device address data.
- Cycle the power to the FC6A and download ZLD project file again in the following cases:
  - Downloading device address data fails and the communication with FC6A becomes not possible.
  - Communication troubles such as cable disconnection or power fail occur and FC6A does not respond.

### Uploading Device Address Data

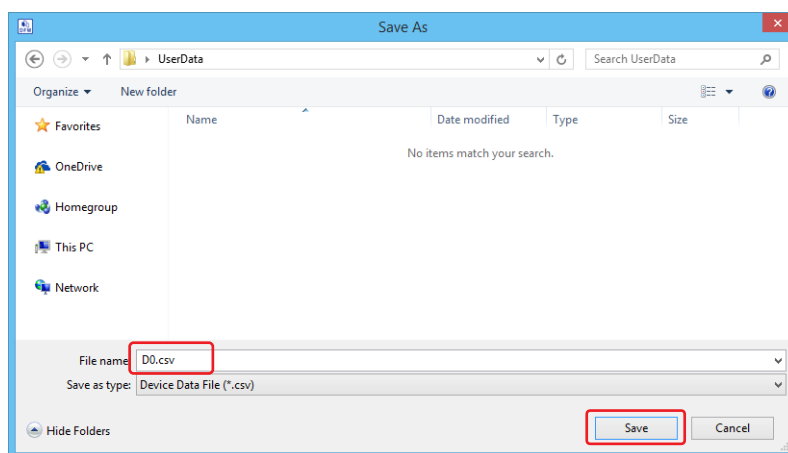
The device address data (.csv) can be read from FC6A and saved as a CSV file in the computer.

#### Operation Procedure

1. Click on the  (Upload Device Address Data (.csv)) on the toolbar.  
The **Device Address Data Setting** dialog box is displayed.
2. Configure the device address from which data is read and click **Upload** button.  
The **Save As** dialog box is displayed.



- Device Type  
Specify the device type of the device address from which the data is read.
  - Address Number  
Specify the device address number of the device address from which the data is read.
  - Number of Data  
Number of data to read from the target device addresses.
3. Enter the filename and click **Save** button.  
Uploading the device address data starts.




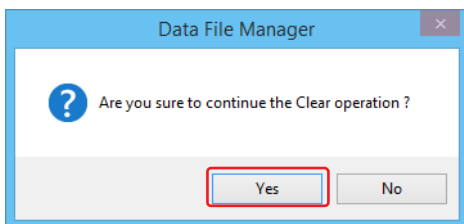
This concludes uploading the device address data.

### Clearing Data of FC6A

Data stored in the internal memory of FC6A can be cleared.

#### Operation Procedure

1. Click on the down-pointing triangle button on the right of the  (Clear) button and click the menu for the data to clear.  
A confirmation message is displayed.
  - Clear values in all device addresses  
Device values stored in the internal memory of FC6A can be cleared. Types of the devices that are cleared are as follows: inputs, outputs, internal relays, shift registers, data registers, timer current values, and counter current values.
  - Clear Error  
Error information stored in the internal memory of FC6A can be cleared.
2. Click **Yes** button.



This concludes clearing data.

# 12: MODULE CONFIGURATION EDITOR

This chapter provides a description of the Module Configuration Editor that can be used to configure expansion modules and cartridges.

## Module Configuration Editor Overview

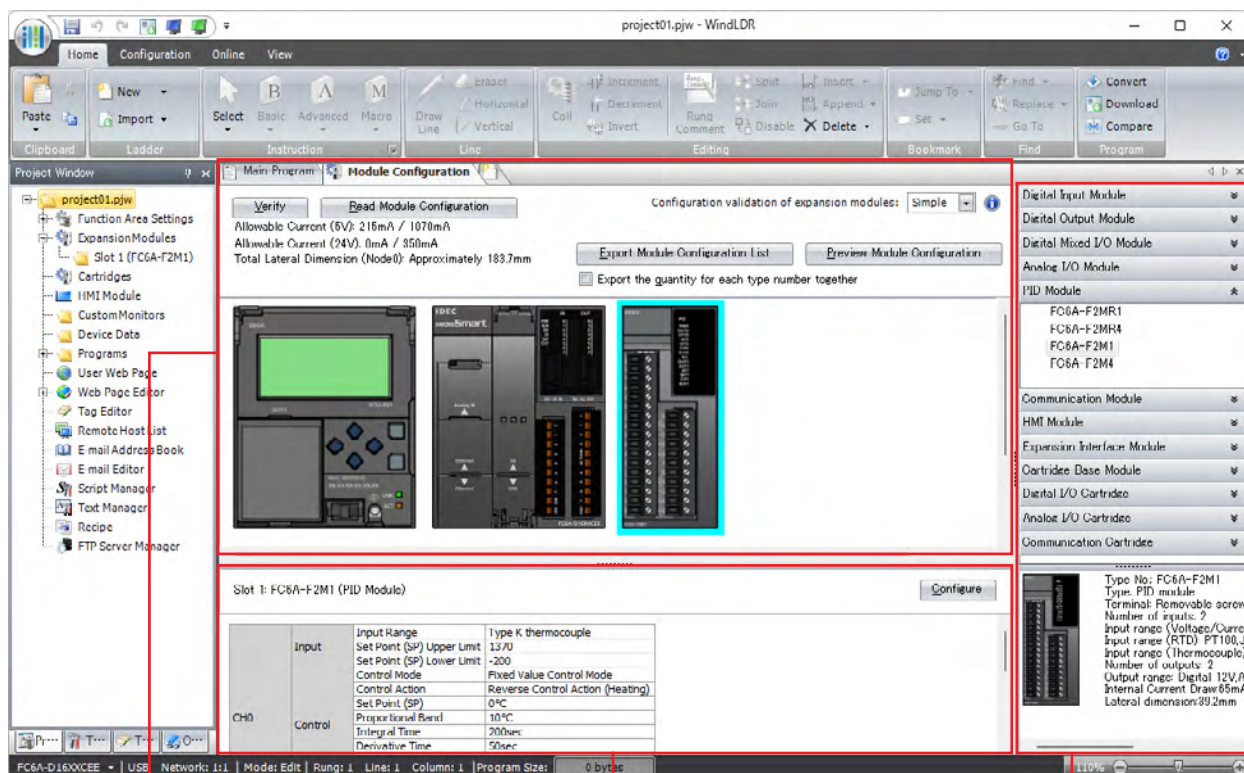
The FC6A is capable of using the expansion modules and cartridges described in "Product Specifications" on page 2-1. To use expansion modules and cartridges, they must be configured to connect to the FC6A using the WindLDR Module Configuration Editor.

## Module Configuration Editor Structure

The Module Configuration Editor is composed of the following three areas.

- Module configuration area : Displays the configuration of connected expansion modules and cartridges.
- Expansion modules and cartridges list : Displays a list of expansion modules and cartridges that can be connected to the FC6A.
- Parameter reference area : Displays the parameters that are configured for the expansion modules and cartridges.

The module configuration that will be used is created by selecting the expansion modules and cartridges to use in the expansion modules and cartridges list and dragging and dropping them to the module configuration area.



Module Configuration Area

Parameter Reference Area

Expansion Modules and Cartridges List

### Module Configuration Editor Functions

The Module Configuration Editor functions are as follows. For the operating procedures of the functions, see "Basic Module Configuration Editor Operations" on page 12-3.

| Function                                      | Details  |
|---|--|
| Insert expansion modules and cartridges       | Expansion modules and cartridges can be inserted into the module configuration area by dragging and dropping them from the expansion modules and cartridges list.<br>By inserting expansion interface remote master and remote slave modules, the nodes can be configured. |
| Delete expansion modules and cartridges       | Inserted expansion modules and cartridges can be deleted.<br>When an expansion module is deleted, all of the modules placed on the right side of the deleted module are shifted to the left.   |
| Swap expansion modules and cartridges         | Inserted expansion modules and cartridges can be moved to a different position.  |
| System software version upgrade               | The system software on the CPU module, analog I/O module, PID module, expansion interface remote master module, expansion interface remote slave module, HMI module, and Bluetooth communication cartridge can be upgraded.  |
| Read module configuration                     | Information about the expansion modules and cartridges connected to the CPU module is stored in special data registers. The configuration of expansion modules and cartridges connected to the CPU module is automatically displayed by acquiring this information.        |
| Configuration validation of expansion modules | You can select the behavior when the configuration of expansion modules connected to the CPU module differs from the Module Configuration Editor Settings.   |



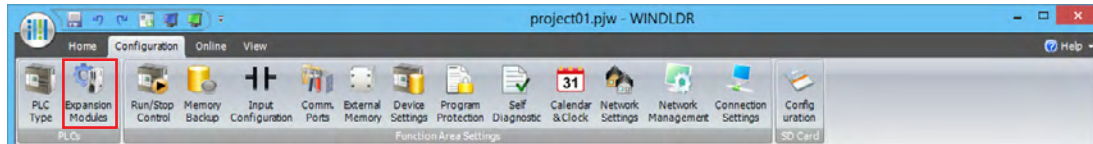
## Basic Module Configuration Editor Operations

This section describes the operating procedures for functions in the Module Configuration Editor.

### Starting the Module Configuration Editor

This section describes how to start the Module Configuration Editor.

1. On the **Configuration** tab, in the **PLCs** group, select **Expansion Modules**.  
The Module Configuration Editor is displayed.



### Inserting Expansion Modules and Cartridges

This section describes how to insert expansion modules and cartridges into the module configuration area.

1. Select the expansion module or cartridge to insert in the expansion modules and cartridges list and drag and drop it to the module configuration area.



The expansion module or cartridge is inserted into the module configuration area.



2. Click the inserted expansion module or cartridge in the module configuration area and click **Configure**.  
The configuration dialog box that corresponds to the expansion module or cartridge is displayed.



12: MODULE CONFIGURATION EDITOR

3. In the configuration dialog box, configure the parameters for the expansion module or cartridge.

PID Module Configuration (Slot 1)

Module Type No.: FC6A-F2M1

Data Register: D0000 (D0000 to D0189)

Internal Relay: M0000 (M0000 to M0007)

InputParameters (CH0)

Input CH0

ControlParameters (CH0)

Output CH0

OutputParameters (CH0)

Type K thermocouple - Celsius

Reverse Control Action (Heating)

Voltage Output

InputParameters (CH1)

Input CH1

ControlParameters (CH1)

Output CH1

OutputParameters (CH1)

Type K thermocouple - Celsius

Reverse Control Action (Heating)

Voltage Output

Input (CH0) | Control (CH0) | Output (CH0) | Input (CH1) | Control (CH1) | Output (CH1) | Monitor

Input Range: Type K thermocouple Celsius (-200 to 1370) °C

PV Correction: 0.0 (-100.0 to 100.0) °C

PV Filter Time Constant: 0.0 (0.0 to 10.0) sec

Set Point (SP) Upper Limit: 1370 (-200 to 1370) °C

Set Point (SP) Lower Limit: -200 (-200 to 1370) °C

External PV Mode: Disable

Alarms:

|         | Alarm Type      | Alarm Value | Hysteresis (0.1 to 100.0) °C | Delay Time (0 to 10000 sec) |
|---------|-----------------|-------------|------------------------------|-----------------------------|
| Alarm 1 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 2 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 3 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 4 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 5 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 6 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 7 | No Alarm Action | 0           | 1                            | 0                           |
| Alarm 8 | No Alarm Action | 0           | 1                            | 0                           |

Write all parameters

Read all parameters

Monitor

OK

Cancel

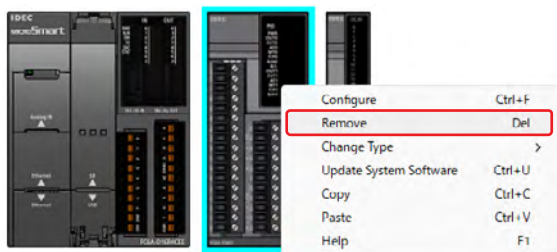
## Removing Expansion Modules and Cartridges

This section describes how to remove expansion modules and cartridges that have been inserted into the module configuration area.

1. Click the expansion module or cartridge to remove in the module configuration area.



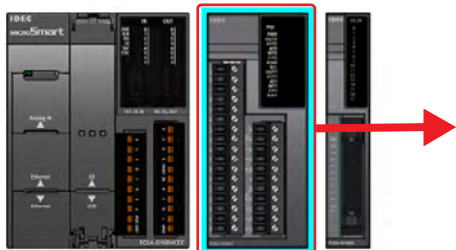
2. Right-click the expansion module or cartridge to delete and click **Remove**.  
The selected expansion module or cartridge is removed.  
All of the modules placed on the right side of the removed module are automatically shifted to the left.



### Swapping Expansion Modules and Cartridges

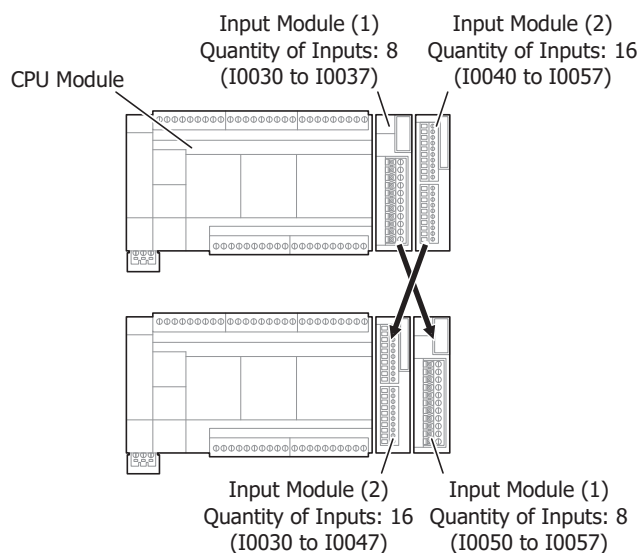
This section describes how to change the position of expansion modules and cartridges that have been inserted into the module configuration area.

1. Select the expansion module or cartridge to move and drag and drop it onto the destination expansion module or cartridge.



#### Notes:

- When the position of an I/O module is changed, the device addresses are automatically changed. For example, when the position of digital input module (1) and (2) are changed as shown below, the device addresses I0030 to I0037 for digital input module (1) are changed to I0050 to I0057. However, please note that the device addresses in the program are not replaced.



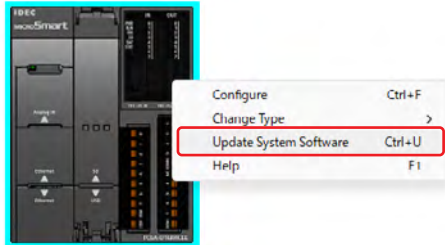
- When the positions of an analog I/O module or analog I/O cartridge are changed, the configured parameters are also moved. However, the device addresses in the program are not replaced.

## Upgrading the System Software Version

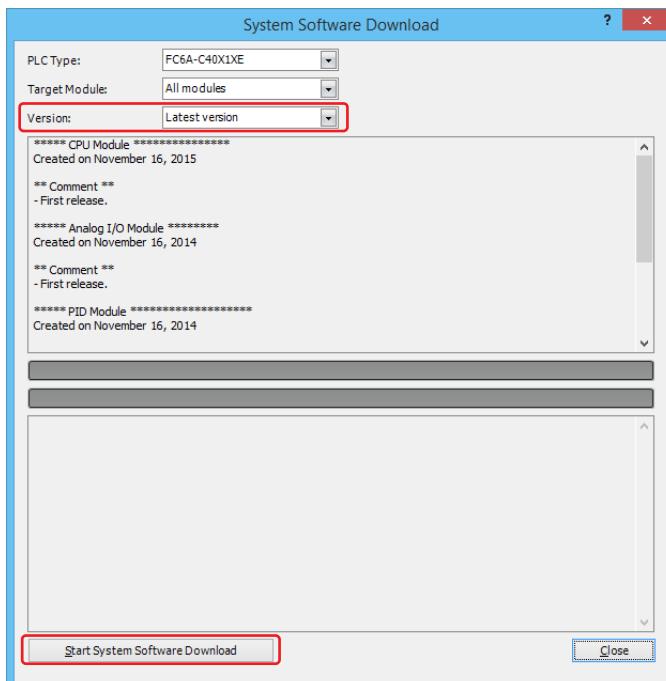
This section describes how to upgrade the system software on the CPU module, analog I/O module, PID module, expansion interface remote master module, expansion interface remote slave module, HMI module, and Bluetooth communication cartridge.

1. Right-click the CPU module or expansion module that you will perform the system software upgrade on and click **Update System Software**.

The **System Software Download** dialog box is displayed.



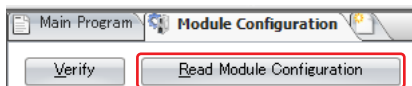
2. Select the system software version number and click **Start System Software Download**.  
The system software download begins.



### Reading the Module Configuration

This section describes how to acquire the information about expansion modules and cartridges connected to the CPU module and automatically display the configuration.

1. Connect a PC to the USB port, Ethernet Port 1, Ethernet Port 2, HMI-Ethernet Port, or Serial Port 1 on the FC6A.  
For details, see the "FC6A Series MICROSmart Communication Manual".
2. Click **Read Module Configuration** in the module configuration area.



The configuration of expansion modules and cartridges connected to the CPU module is displayed in the module configuration area.

#### Notes:

- Read module configuration only reads the connection status of expansion modules and cartridges. It does not read the configured parameters. Therefore, the expansion module and cartridge parameters are the default values. Configure the parameters as necessary.
- If digital I/O modules are connected, the actual model number such as FC6A-N08B1 cannot be distinguished by reading the module configuration. The model number will be a general term for number of I/O points such as 16 inputs or 16 outputs. Change the model number to the actual model number after reading the module configuration.
- On the Online tab, in the Monitor group, click Monitor and Start Monitor. The status and current values of expansion modules and cartridges can be checked in the Parameter Reference area.
- If an expansion module or cartridge has an error status, the corresponding module is shown in a red box in the Module Configuration area.

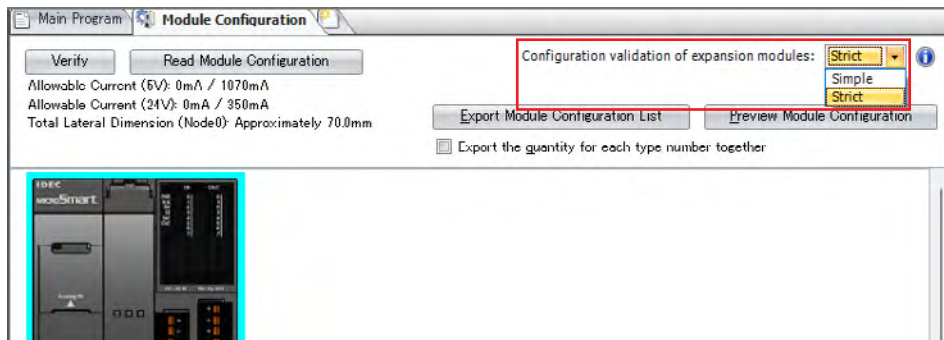
## Configuration Validation of Expansion Modules

You can set the behavior when the configuration of expansion modules connected to the CPU module differs from the Module Configuration Editor Settings from the following two modes.

| Setting | Description  |
|---------|--|
| Simple  | The digital I/O modules and communication modules operate in a configuration connected to the CPU module. Other expansion modules operate when their connection positions match the configuration set in the <b>Module Configuration</b> tab. When they do not match, stop. In addition, 83h (Device setting error) is stored in the status of the Expansion Module Slot Information (D8470 to D8595).   |
| Strict  | When the configuration of the expansion modules connected to the CPU module differs from the Module Configuration Editor Settings, all of the expansion modules connected to the CPU module stop. It also operates as follows. <ul style="list-style-type: none"> <li>Expansion bus initialization error occurs.</li> <li>83h (Device setting error) is stored in the status of an expansion module that differs from the Module Configuration Editor Settings.</li> </ul> |

This section describes how to set up configuration verification for expansion modules.

1. In the Module Configuration Area, select **Simple** or **Strict** in **Configuration validation of expansion modules**.



2. Download the user program.  
For details, see Chapter 4 "Download Program" on page 4-11.

This concludes configuring the settings.

### Notes:

- For information on checking the error status and clearing the error, see Chapter 13 "Reading and Clearing Errors" on page 13-1.
- The status of the expansion module is written to the Expansion Module Slot Information (D8470 to D8595). For details, see Chapter 6 "D8470 to D8595: Expansion Module Slot Information" on page 6-44.
- We recommend that you select **Strict** in **Configuration validation of expansion modules**.





# 13: TROUBLESHOOTING

## Introduction

This chapter describes the procedures to determine the cause of problem and actions to be taken when any problem occurs while operating the FC6A.

The FC6A has self-diagnostic functions to prevent the spread of problems if any should occur. In case of any problem, follow the troubleshooting procedures to determine the cause and to correct the error.

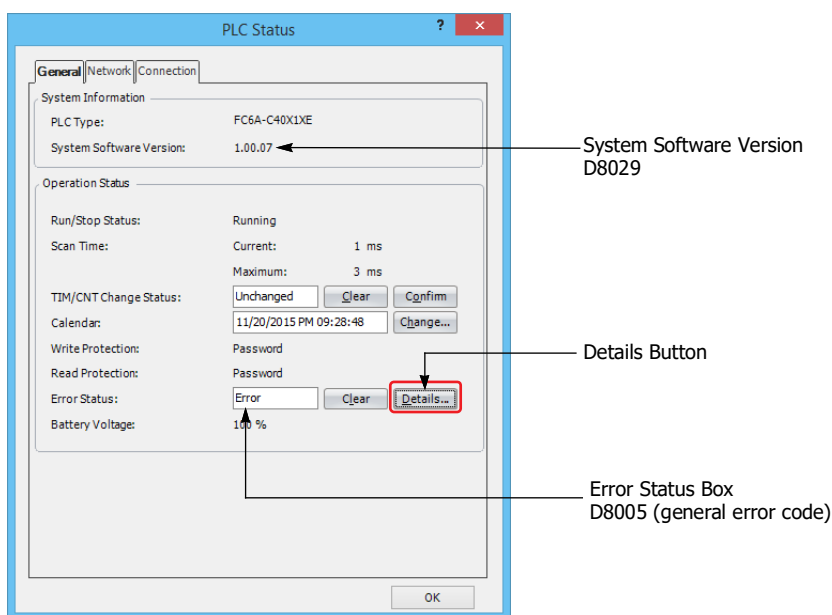
Errors are checked in various stages. While editing a user program on WindLDR, incorrect devices and other data are rejected. User program syntax errors are found during compilation on WindLDR. When an incorrect program is downloaded to the FC6A, user program syntax errors are still checked. Errors are also checked at starting and during operation of the FC6A. When an error occurs, the error is reported by turning on the ERR LED on the FC6A and an error message can be viewed on WindLDR. For the procedure to check the error status and clear the error by operating the HMI module connected to the CPU module, see "Checking/Clearing Error Information" on page 7-38.

## Reading and Clearing Errors

When any error occurs during the FC6A operation, "Error" is indicated and error details can be read using WindLDR.

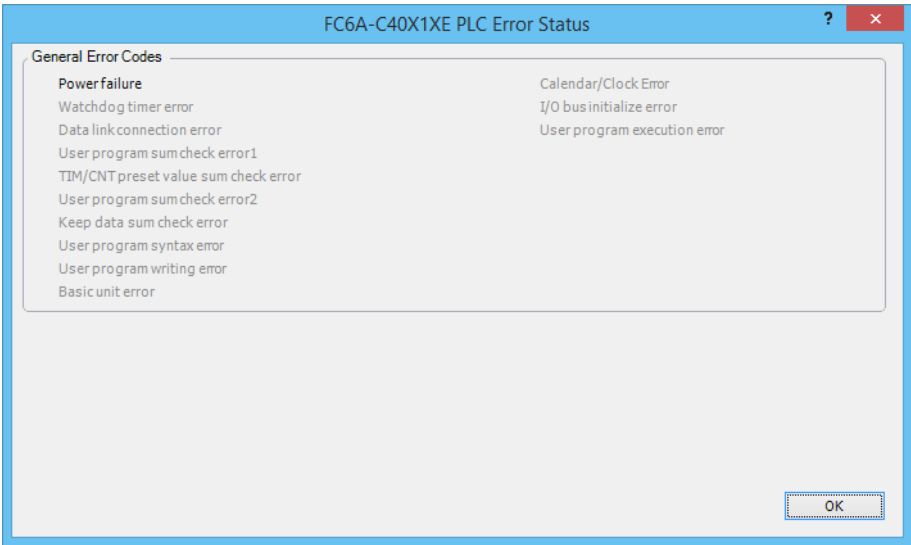
### Monitoring WindLDR

1. From the WindLDR menu bar, select **Online > Monitor > Monitor**. The monitor mode is enabled.
2. From the WindLDR menu bar, select **Online > Status**. The PLC Status dialog box appears.  
When any error exists, "Error" is displayed in the error status box.
3. On the right of the Error Status in the PLC Status dialog box, click the **Details** button.  
The PLC Error Status screen appears.



13: TROUBLESHOOTING

- 4. Check the errors that are currently occurring.



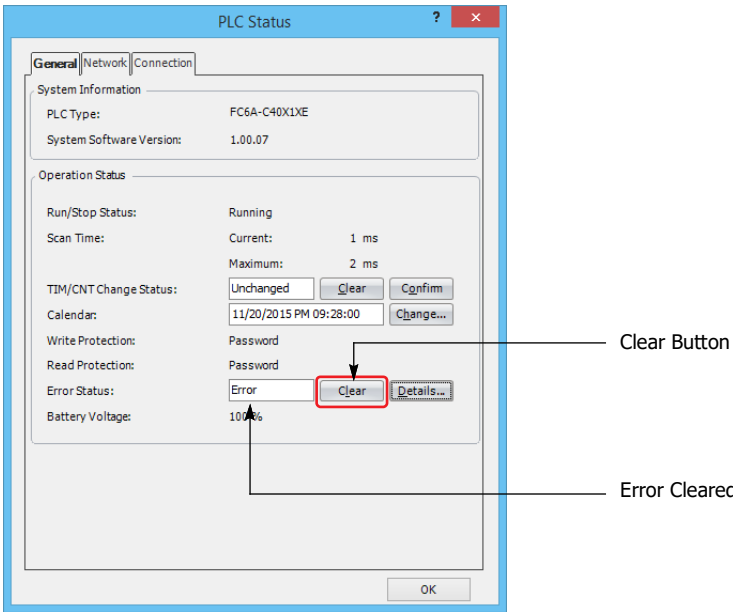
- 5. After you have checked the errors, click **OK**.

Clearing Error Codes from WindLDR

After removing the cause of the error, clear the error code using the following procedure:

- 6. From the WindLDR menu bar, select **Online > Monitor > Monitor**. The monitor mode is enabled.
- 7. From the WindLDR menu bar, select **Online > Status**. The PLC Status dialog box appears.
- 8. On the right of the **Error Status** in the PLC Status dialog box, click the **Clear** button.

This procedure clears the error code from special data register D8005 (general error code), and the error is cleared from the PLC Status dialog box.



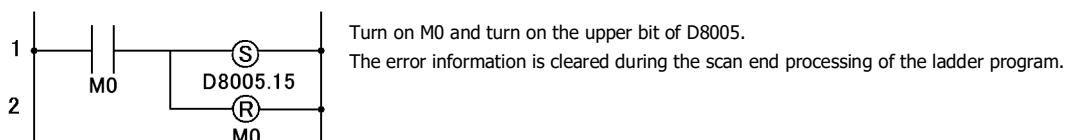
- 9. Click **OK**.

## Special Data Registers for Error Information

Two data registers are assigned to store information on errors.

|              |                                   |
|--------------|-----------------------------------|
| <b>D8005</b> | General Error Code                |
| <b>D8006</b> | User Program Execution Error Code |

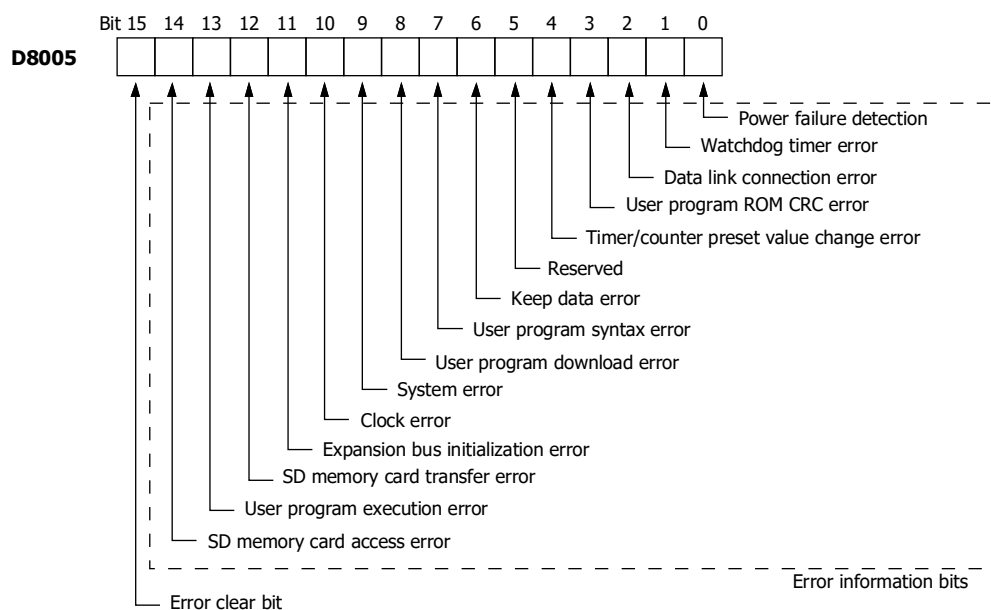
Example: This ladder program clears the error information using the error clear bit of special data register D8005.



## General Error Codes

The general error status is written to special data register D8005. If "1" is stored in each bit of D8005, the corresponding error is occurring.

The general error (D8005) and user program execution error (D8006) can be cleared by writing "1" to the most significant bit of special data register D8005 in a user program. The most significant bit of D8005 then changes to 0 automatically. Errors are not cleared if the most significant bit of D8005 is turned on by WindLDR over communications or by the operator interface.



**FC6A Operating Status, Output, and ERR LED during Errors**

| Error Items                        | Operating Status                     | Output                              | Error LED [ERR] | Checked at                                       |
|------------------------------------|--------------------------------------|-------------------------------------|-----------------|--|
| Power failure detection            | Stop                                 | OFF                                 | —               | Any time   |
| Watchdog timer error               | Stop                                 | OFF                                 | ON              | Any time   |
| Data link connection error         | Stop                                 | OFF                                 | ON              | When initializing the data link                  |
| User program ROM CRC error         | Stop                                 | OFF                                 | ON              | Starting operation                               |
| TIM/CNT preset value change error  | Maintained                           | Maintained                          | ON              | When checking a change in timer/counter settings |
| Keep data error                    | Maintained/Stop <sup>*1</sup>        | OFF                                 | —               | Turning power on                                 |
| User program syntax error          | Stop                                 | OFF                                 | ON              | Downloading user program                         |
| User program download error        | Stop                                 | OFF                                 | ON              | Downloading user program                         |
| System error                       | Stop                                 | OFF                                 | ON              | Turning power on                                 |
| Clock error                        | Maintained                           | Maintained                          | ON              | Turning power on                                 |
| Expansion bus initialization error | Maintained                           | Maintained                          | ON              | Turning power on/<br>downloading user program    |
| SD memory card transfer error      | Download: Stop<br>Upload: Maintained | Download: OFF<br>Upload: Maintained | ON              | When executing an SD memory card download/upload |
| User program execution error       | Maintained                           | Maintained                          | ON              | Executing user program                           |
| SD memory card access error        | Maintained                           | Maintained                          | ON              | When an SD memory card is inserted               |

\*1 Operation starts to run and outputs are turned on or off according to the user program as default, but it is also possible to stop operation and turn off outputs using the Function Area Settings on WindLDR. See "Run/Stop Selection at Keep Data Error" on page 5-8.

**Error Causes and Actions****0001h: Power Failure Detection**

This error indicates when the power supply is lower than the specified voltage. This error is also recorded when the power is turned off. Clear the error code using WindLDR.

If this error occurs frequently even though the power supply voltage is within the specified voltage range, the power supply or FC6A has to be replaced.

**0002h: Watchdog Timer Error**

The watchdog timer monitors the time required for one program cycle (scan time). When the time exceeds the allowed time, the watchdog timer indicates an error. Clear the error code using WindLDR. If this error occurs frequently, the FC6A has to be replaced.

**0004h: Data Link Connection Error**

A data link function area settings are incorrect or the cable is not connected correctly. Correct the data link function area settings or connect the cable correctly, and then turn the power off and on or initialize the data link.

**0008h: User Program ROM CRC Error**

The user program stored in the FC6A ROM is corrupted. Download a correct user program to the FC6A, and clear the error code using WindLDR. If an SD memory card is inserted, the user program in the SD memory card is checked.

**0010h: Timer/Counter Preset Value Change Error**

The execution data of timer/counter preset values is corrupted. The timer/counter preset values are initialized to the values of the user program automatically. Note that changed preset values are cleared and that the original values are restored. Clear the error code using WindLDR.

**0040h: Keep Data Error**

If you have initialized the CPU module, download the user program. The keep data error is cleared when a correct user program is downloaded.

Otherwise, replace the backup battery. For details on replacing the backup battery, see "Replacing the Backup Battery" on page 3-34. When a keep data error occurs, the "keep" data of internal relays and other devices are cleared.

**0080h: User Program Syntax Error**

This error indicates that the user program has a syntax error. Correct the user program, and download the corrected user program to the FC6A. The error code is cleared when a correct user program is transferred.

**0100h: User Program Download Error**

This error indicates a failure of writing into the FC6A ROM when downloading a user program. The error code is cleared when writing into the ROM is completed successfully. If this error occurs frequently, the FC6A has to be replaced.

When a memory cartridge is installed on the FC6A, writing into the memory cartridge is checked.

**0200h: System Error**

This error is issued when ROM is not found. When this error occurred, turn power off and on. Clear the error code using WindLDR. If this error occurs frequently, the FC6A has to be replaced.

**0400h: Clock Error**

If you have initialized the CPU module, download the user program. The clock error is cleared when a correct user program is downloaded.

Otherwise, replace the backup battery. For details on replacing the backup battery, see "Replacing the Backup Battery" on page 3-34. When a clock error occurs, the clock data has disappeared.

**0800h: Expansion Bus Initialization Error**

This error occurs when communication could not be performed between the CPU module and the cartridges, expansion modules, and/or HMI module when the power is turned on or during a download.

Cycle the power or update the system software. If this error frequently occurs or it cannot be recovered from, replace the cartridges, expansion modules, and/or HMI module.

**1000h: SD Memory Card Transfer Error**

This error indicates that the user program cannot be downloaded to/uploaded from FC6A using the SD memory card. Check the error details in D8255.

For details, see "D8255: SD Memory Card Download/Upload Execution Error Information" on page 11-46.

**2000h: User Program Execution Error**

This error indicates that invalid data is found during execution of a user program. When this error occurs, special internal relay M8004 (user program execution error) is turned on.

Referring to the next page to fix and clear the error code.

**4000h: SD Memory Card Access Error**

This error indicates that the SD memory card could not be written to.

If the status of M8070 was checked and the SD memory card was not recognized, reinsert a formatted SD memory card into the FC6A.

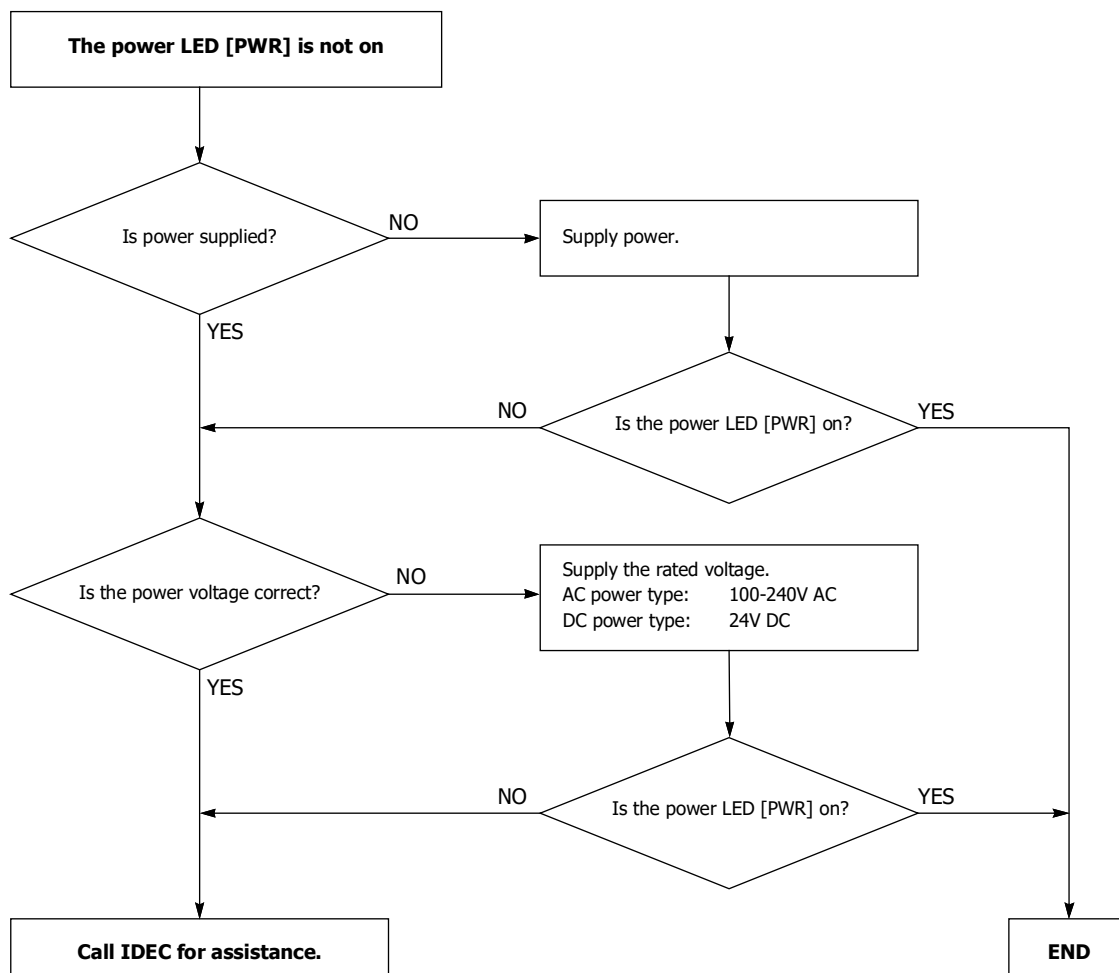
**Troubleshooting Diagrams**

**When one of the following problems is encountered, see the following trouble shooting diagrams:**

| <b>Problem</b>   | <b>Reference</b> |
|--|------------------|
| The power is not on.   | 13-7             |
| Operation has not started.   | 13-8             |
| An error has occurred.   | 13-9             |
| Input does not operate normally.   | 13-10            |
| Output does not operate normally.  | 13-11            |
| Cannot stop or reset operation.  | 13-12            |
| Watchdog timer error occurs and the CPU does not run.  | 13-13            |
| The interrupt/catch input cannot receive short pulses.   | 13-13            |
| Frequency measurement does not work.   | 13-14            |
| Data is not transmitted at all in the user communication mode.                                   | 13-15            |
| Data is not transmitted correctly in the user communication mode.                                | 13-16            |
| Data is not received at all in the user communication mode.                                      | 13-17            |
| Data is not received correctly in the user communication mode.                                   | 13-18            |
| Modbus master communication does not work.   | 13-19            |
| Long communication cycle for Modbus RTU master communication or Modbus TCP client communication. | 13-20            |
| WindLDR and the FC6A cannot communicate.   | 13-20            |
| WindLDR does not communicate with PLC via USB.   | 13-21            |
| Modbus master communication request is slow.   | 13-22            |
| You forget the user program password in the FC6A.  | 13-23            |

**Troubleshooting 1****• The Power LED [PWR] is not On**

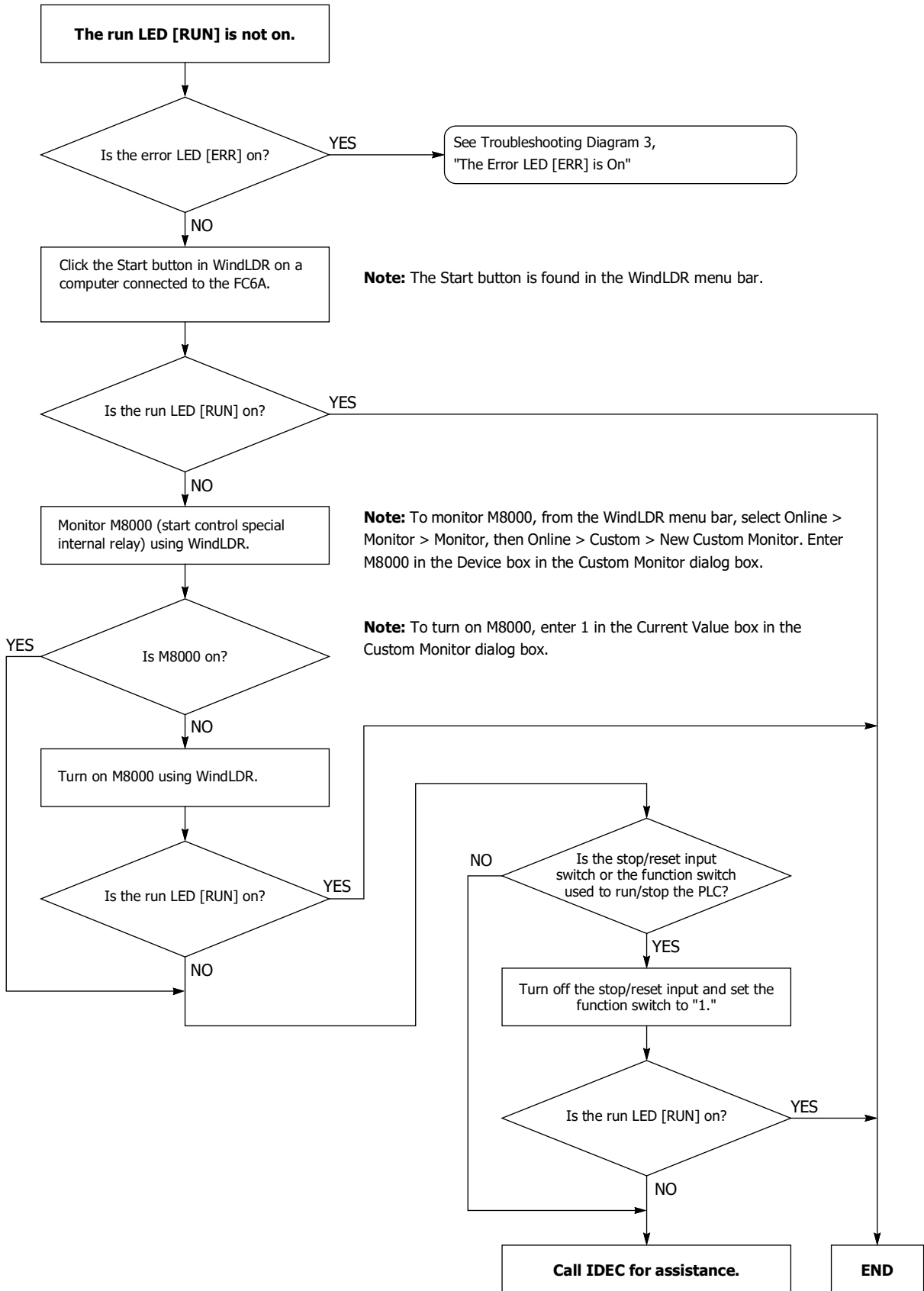
When the USB bus is operating, the power LED [PWR] does not turn on.



Troubleshooting 2

• The Run LED [RUN] is not On

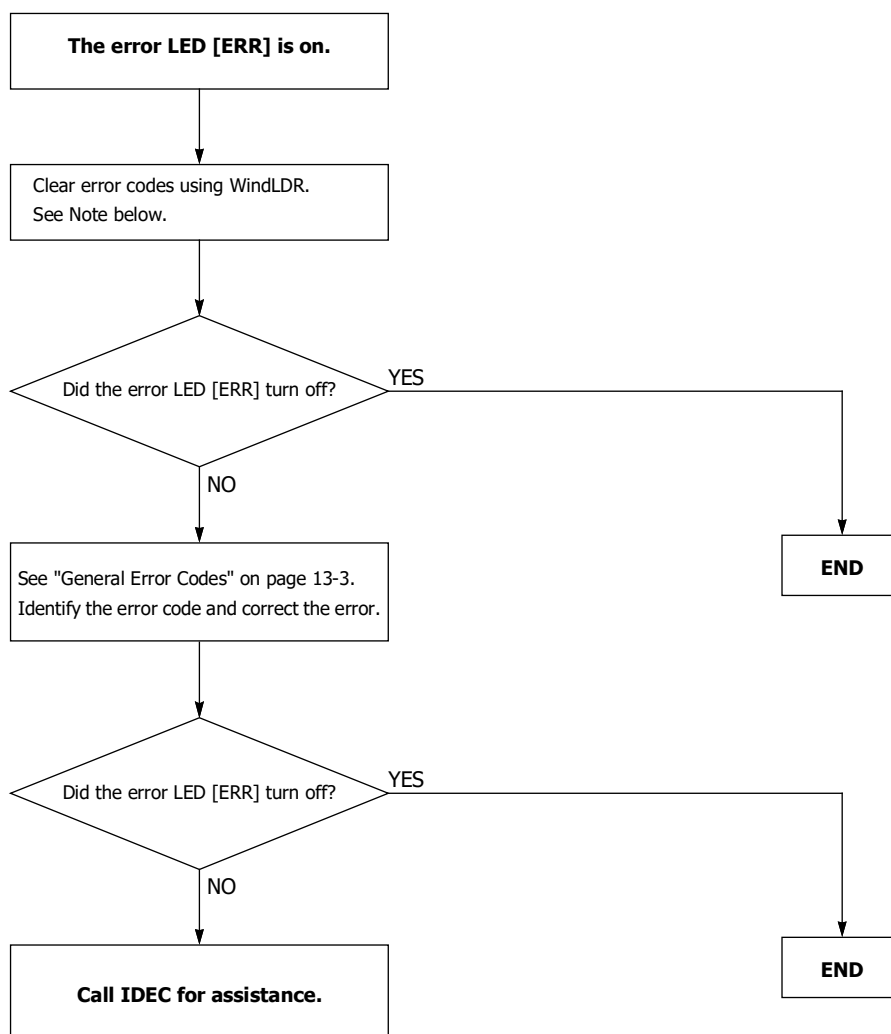
The run LED [RUN] turns on when the PLC is running.





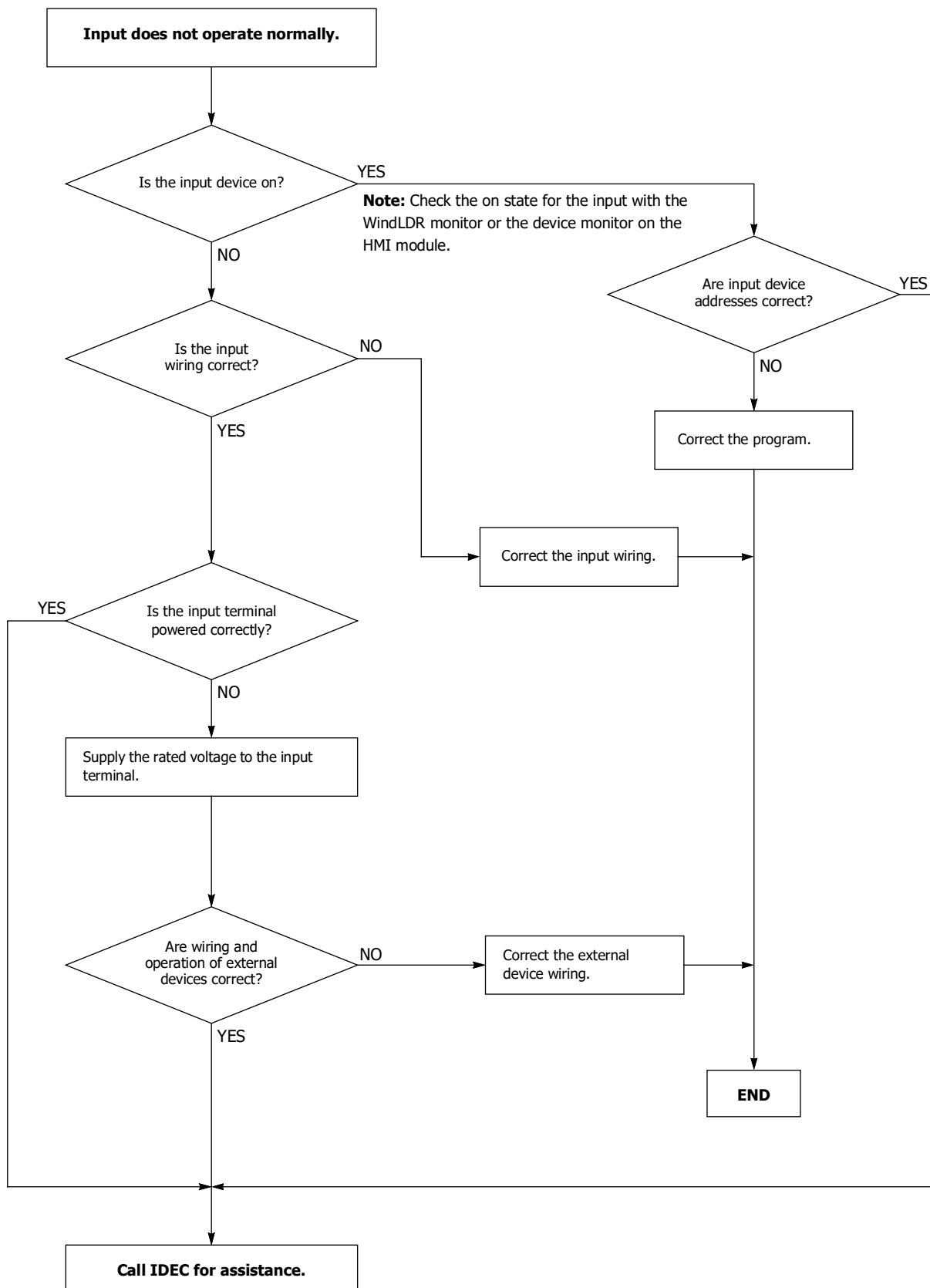
**Troubleshooting 3**

- The Error LED [ERR] is On

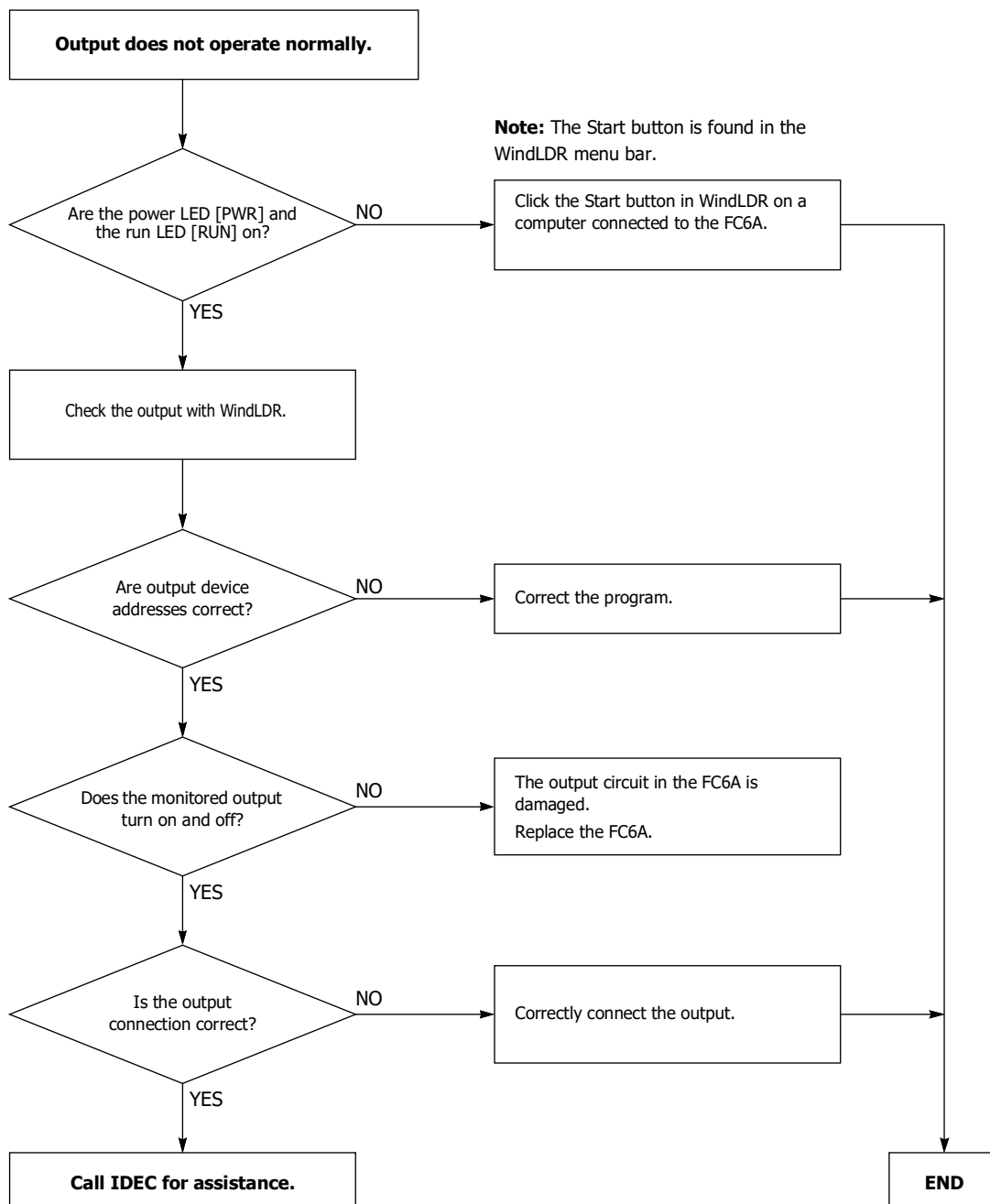


**Note:** Temporary errors can be cleared to restore normal operation by clearing error codes from WindLDR. See "Clearing Error Codes from WindLDR" on page 13-2.

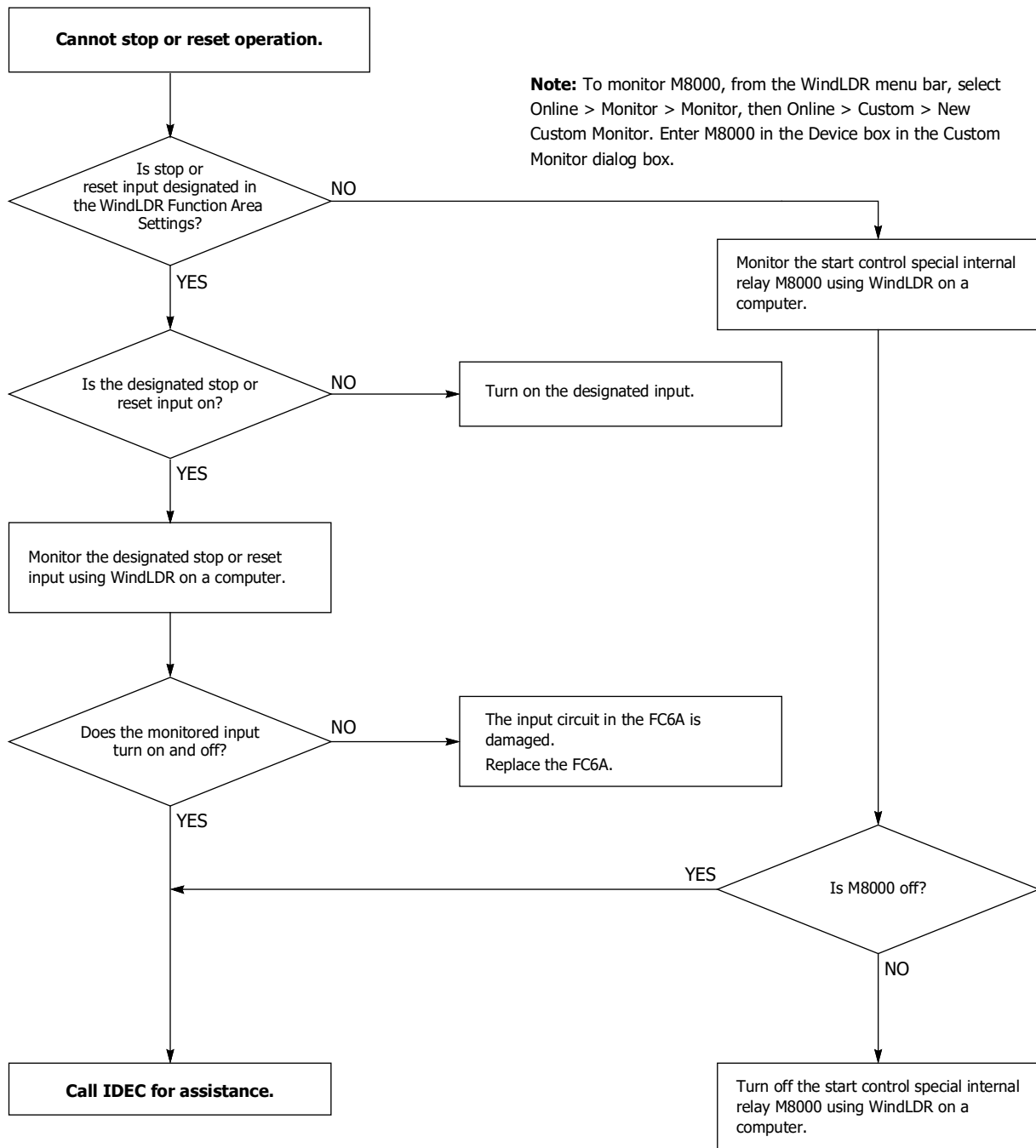
## Troubleshooting 4



## Troubleshooting 5

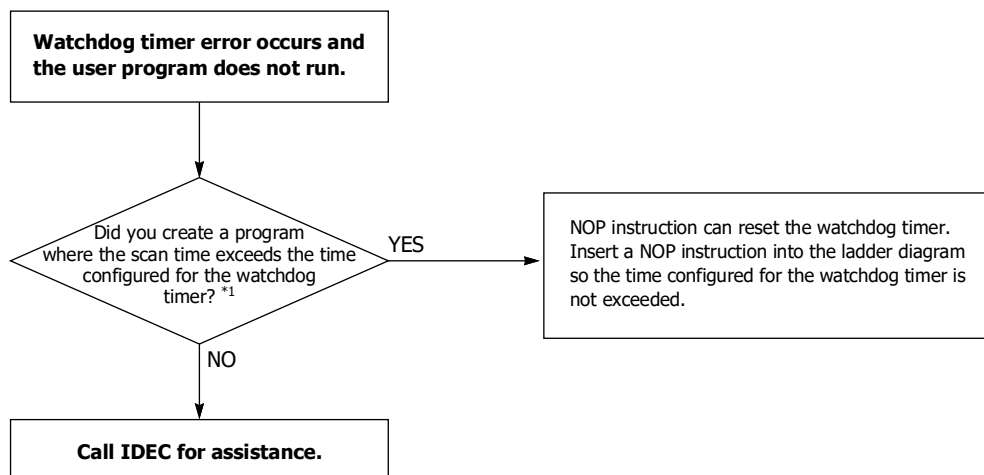


## Troubleshooting 6



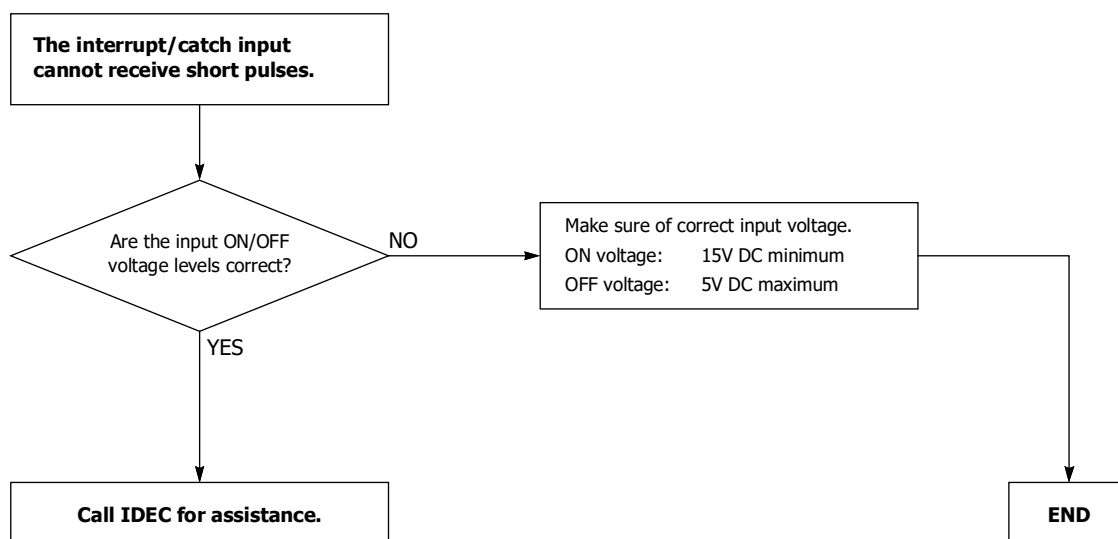
**Note:** To turn off M8000, enter 0 in the Current Value box in the Custom Monitor dialog box. For details on special internal relay M8000, see "M8000: Start Control" on page 6-9.

### Troubleshooting 7

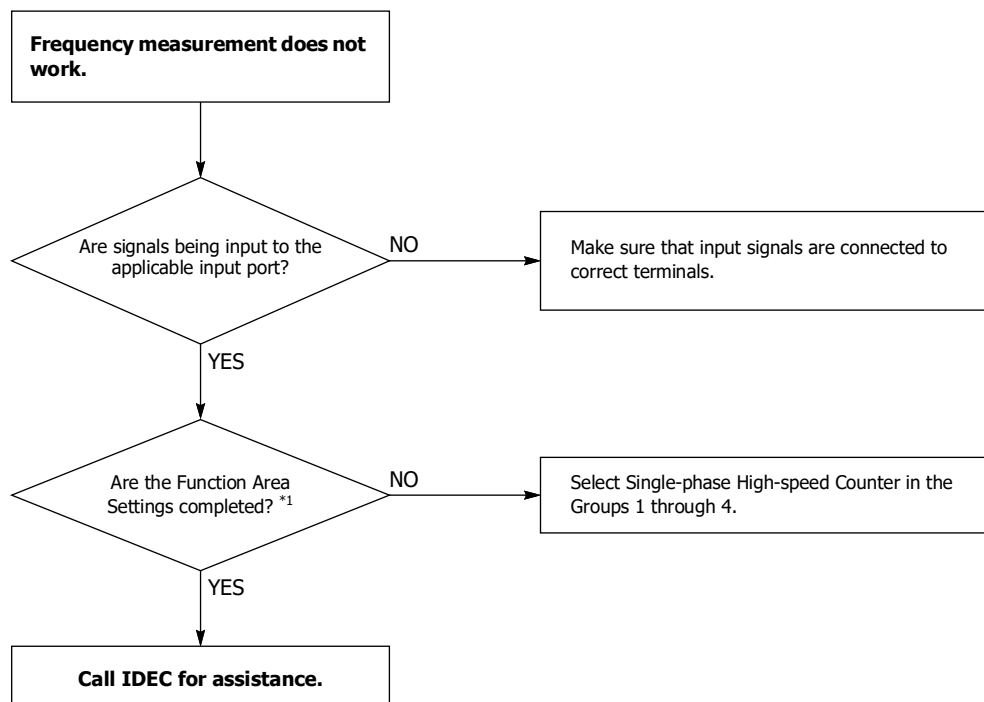


\*1 See "Watchdog Timer Setting" on page 5-60.

### Troubleshooting 8

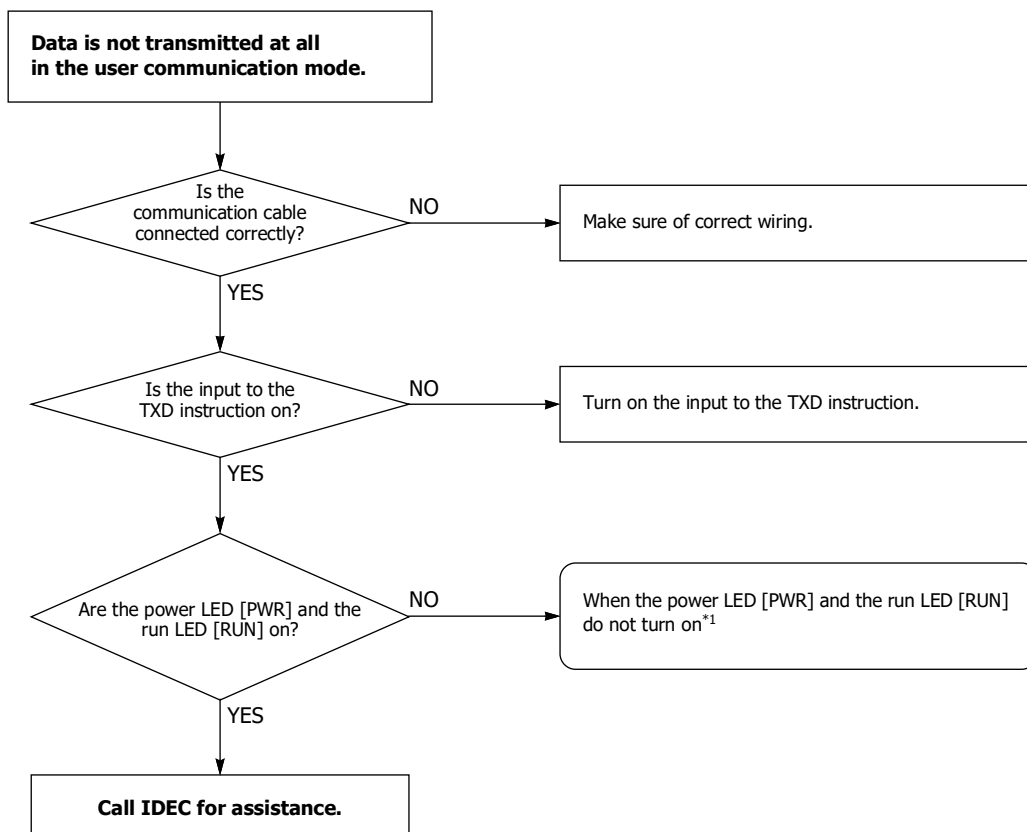


### Troubleshooting 9



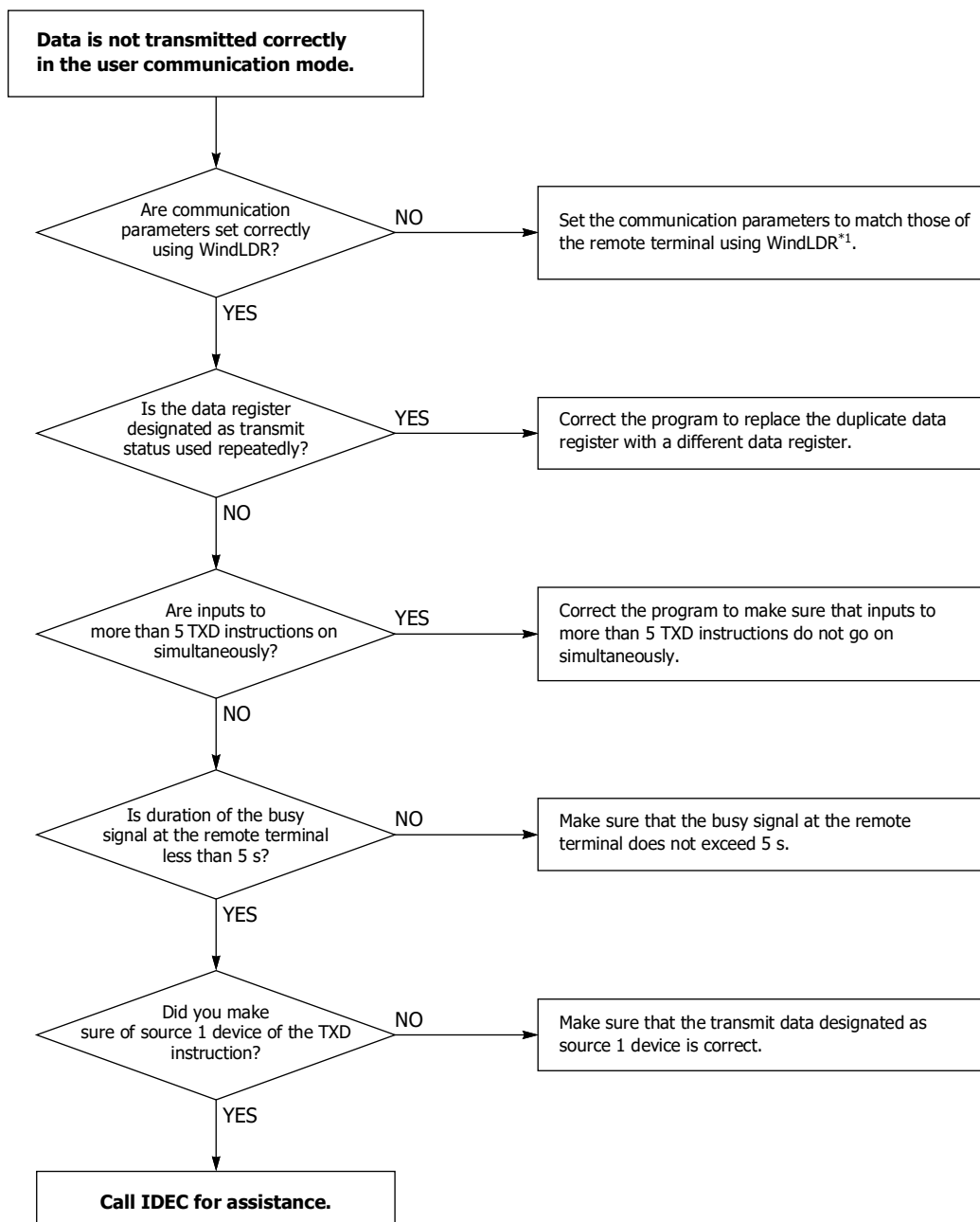
\*1 See "Frequency Measurement" on page 5-39.

## Troubleshooting 10



\*1 See "The Power LED [PWR] is not On" on page 13-7 or "The Run LED [RUN] is not On" on page 13-8.

## Troubleshooting 11

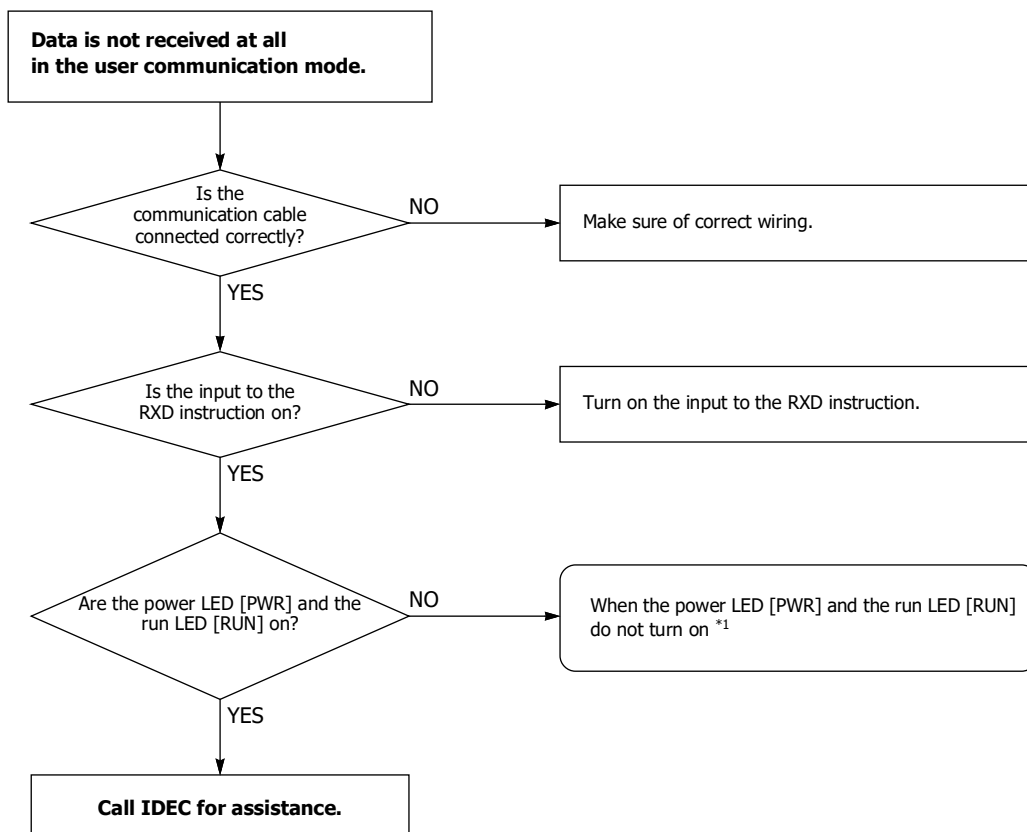


\*1 See Chapter 5 "User Communication via Serial Communication" - "Programming WindLDR" in the "FC6A Series MICROSmart Communication Manual".

**If the user communication still has a problem after completing the above procedure, also perform the procedure of Diagram 10, described on the preceding page.**

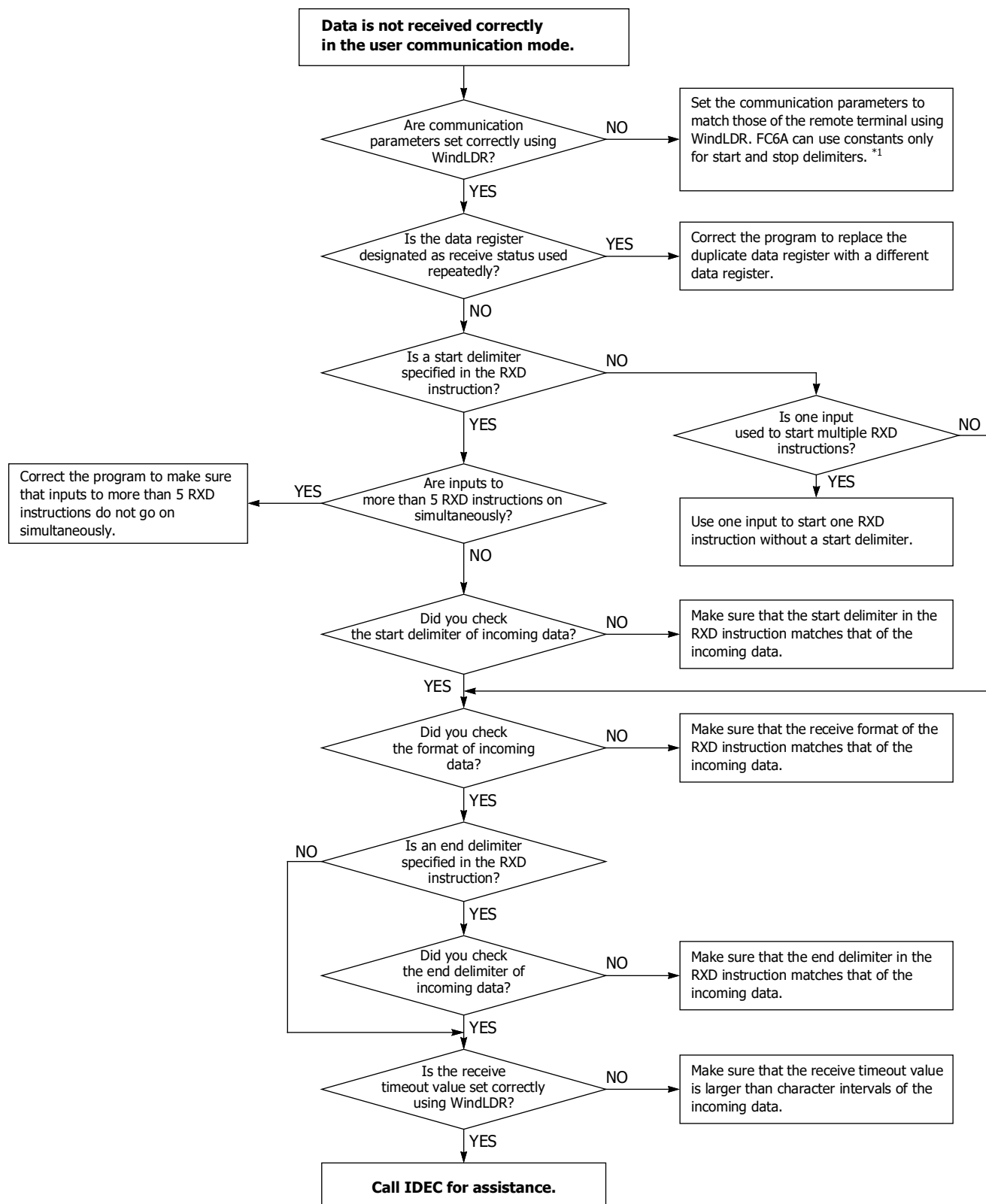


## Troubleshooting 12



\*1 See "The Power LED [PWR] is not On" on page 13-7 or "The Run LED [RUN] is not On" on page 13-8.

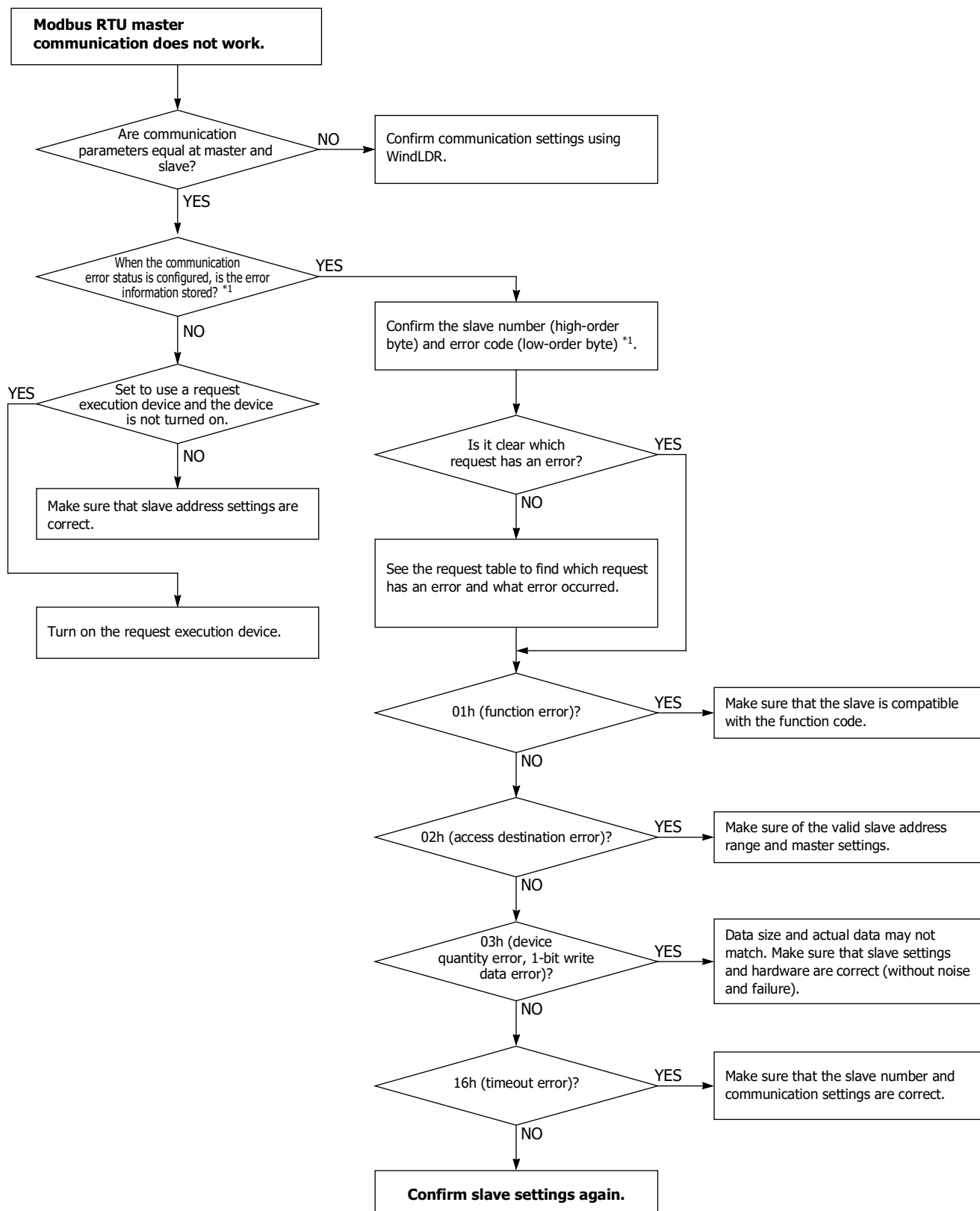
## Troubleshooting 13



\*1 See Chapter 5 "User Communication via Serial Communication" - "Programming WindLDR" in the "FC6A Series MICROSmart Communication Manual".

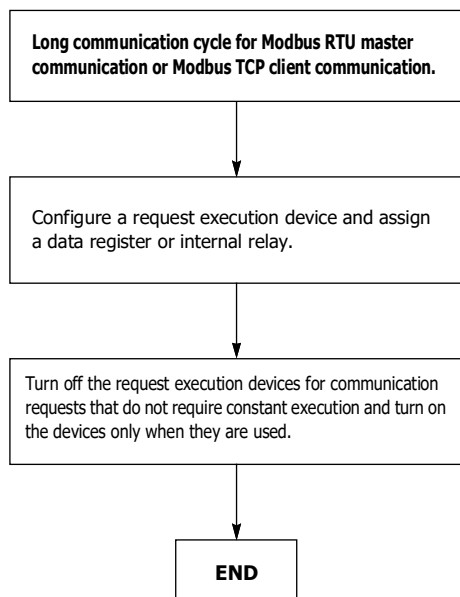
If the user communication still has a problem after completing the above procedure, also perform the procedure of Troubleshooting 12 described on the preceding page.

## Troubleshooting 14

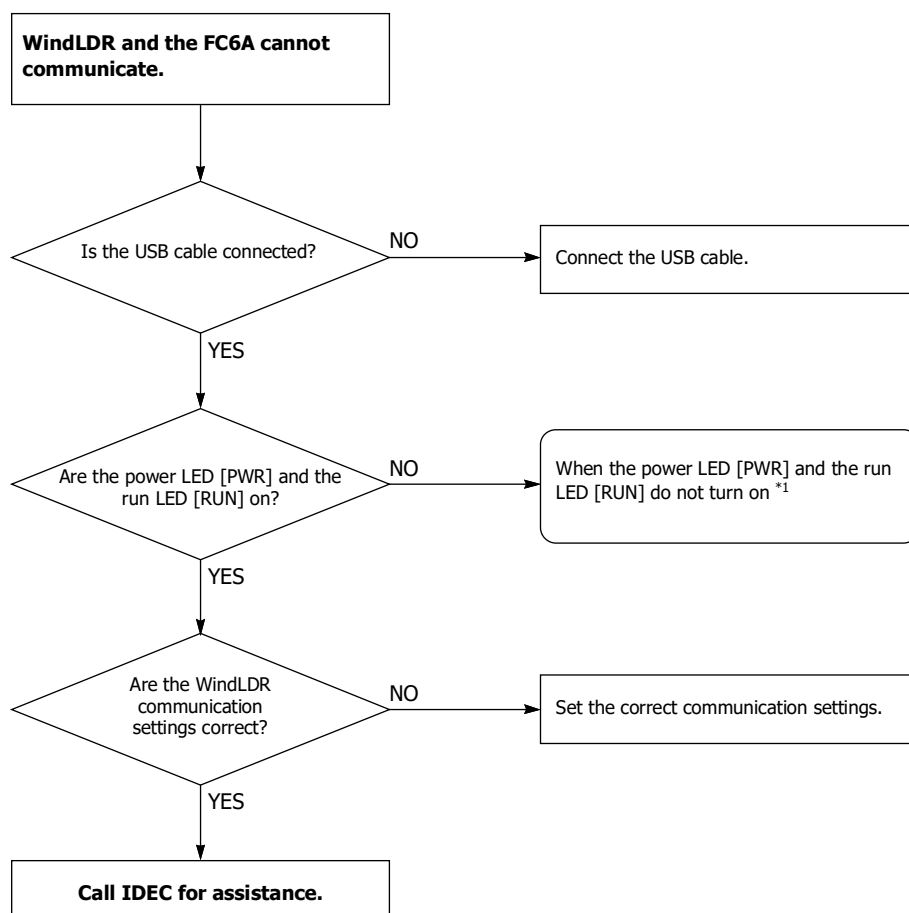


\*1 See Chapter 6 "Modbus RTU Master Communication" - "Communication Completion and Communication Error" in the "FC6A Series MICROSmart Communication Manual".

### Troubleshooting 15

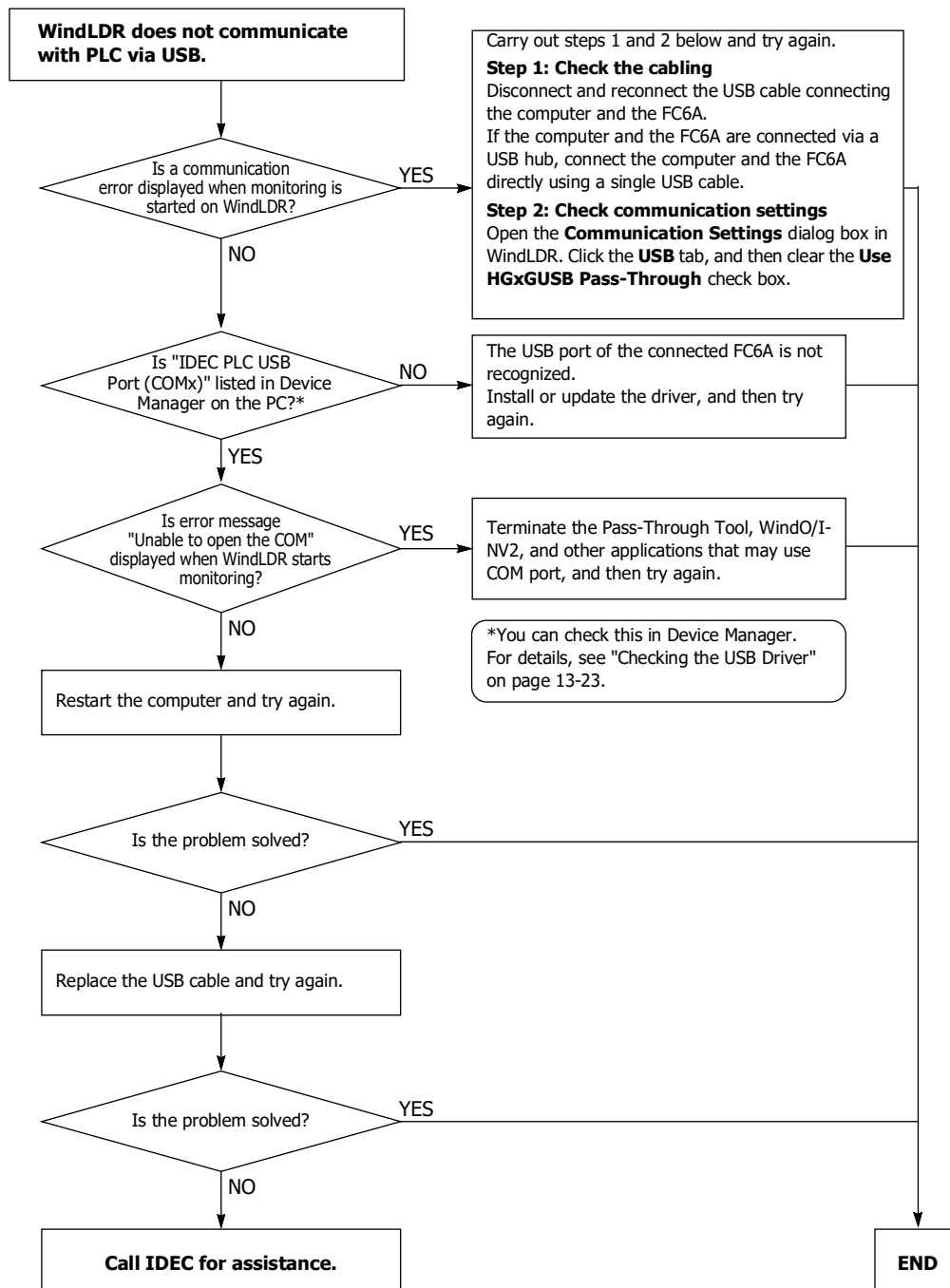


### Troubleshooting 16

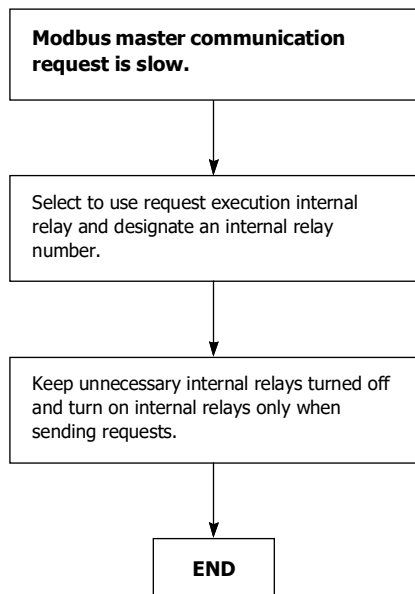


\*1 See "The Power LED [PWR] is not On" on page 13-7 or "The Run LED [RUN] is not On" on page 13-8.

## Troubleshooting 17



### Troubleshooting 18



### Checking the USB Driver

You can use the following procedure to check whether the USB driver has been installed correctly and whether the FC6A has been recognized correctly.

1. Display Device Manager.

- **Windows 11/10**

Right-click the **Start** button, and then click **Control Panel > Hardware and Sound**.

Under **Devices and Printers**, click **Device Manager**.

2. Click **Ports (COM & LPT)**.

If the following device name is displayed, the USB driver has been installed correctly and the FC6A has been recognized correctly.

"IDEC PLC USB Port (COMx)"

**Notes:**

- The device name will disappear if you disconnect the USB cable or turn off the FC6A.
- If "Unknown device" is displayed for the device name or if a question mark is displayed when the FC6A is on and the USB cable is connected, the USB driver may not have been recognized correctly. Remove the USB cable, turn the FC6A off, turn the FC6A on again and connect it, and then check if the USB driver is recognized. If the USB driver still is not recognized, use Device Manager to delete the USB driver, and then reinstall it.

## Troubleshooting 19

### When you forget the user program password in the FC6A

- **When you forget your Write Program password**

See Chapter 5 "Initialize PLC" on page 5-79 to initialize the CPU module.

- **When you forget your Read Program password**

User program in the FC6A cannot be uploaded to a computer.

**Note:** Keep your password safe and do not disclose it to third parties.





# APPENDIX

This appendix describes information such as a list of FC6A types, how to update the software, and how to install the USB driver.

## Type List

This section describes the types of FC6A modules, maintenance parts, manuals, asnd optional cables (sold separately).

### CPU Modules

#### All-in-One CPU Modules

| Power Voltage  | Input Type                         | Output Type  | I/O Points<br>(Input Points/<br>Output Points) | Type No.     | Terminal Specification |
|----------------|------------------------------------|--|--|--------------|------------------------|
| 100-240V<br>AC | 24V DC input<br>shared sink/source | Relay output, 2 A/point                                    | 16 (9/7)                                       | FC6A-C16R1AE | *1                     |
|                |                                    |  |  | FC6A-C16R4AE | *2                     |
|                |                                    |  | 24 (14/10)                                     | FC6A-C24R1AE | *1                     |
|                |                                    |  |  | FC6A-C24R4AE | *2                     |
|                |                                    |  | 40 (24/16)                                     | FC6A-C40R1AE | *1                     |
|                |                                    |  |  | FC6A-C40R4AE | *2                     |
|                |                                    |  | 16 (9/7)                                       | FC6A-C16R1CE | *1                     |
|                |                                    |  |  | FC6A-C16R4CE | *2                     |
| 24V DC         | 24V DC input<br>shared sink/source | Relay output, 2 A/point                                    | 24 (14/10)                                     | FC6A-C24R1CE | *1                     |
|                |                                    |  |  | FC6A-C24R4CE | *2                     |
|                |                                    |  | 40 (24/16)                                     | FC6A-C40R1CE | *1                     |
|                |                                    |  |  | FC6A-C40R4CE | *2                     |
|                | 24V DC input<br>shared sink/source | Transistor sink output<br>24V DC, 0.5 A/point              | 16 (9/7)                                       | FC6A-C16K1CE | *1                     |
|                |                                    |  |  | FC6A-C16K4CE | *2                     |
|                |                                    |  | 24 (14/10)                                     | FC6A-C24K1CE | *1                     |
|                |                                    |  |  | FC6A-C24K4CE | *2                     |
|                |                                    | Transistor protection source output<br>24V DC, 0.5 A/point | 40 (24/16)                                     | FC6A-C40K1CE | *1                     |
|                |                                    |  |  | FC6A-C40K4CE | *2                     |
|                |                                    |  | 16 (9/7)                                       | FC6A-C16P1CE | *1                     |
|                |                                    |  |  | FC6A-C16P4CE | *2                     |
| 12V DC         | 12V DC input<br>shared sink/source | Relay output, 2 A/point                                    | 16 (9/7)                                       | FC6A-C16R1DE | *1                     |
|                |                                    |  |  | FC6A-C16R4DE | *2                     |
|                |                                    |  | 40 (24/16)                                     | FC6A-C40R1DE | *1                     |
|                |                                    |  |  | FC6A-C40R4DE | *2                     |
|                |                                    | Transistor sink output<br>12V DC, 0.5 A/point              | 16 (9/7)                                       | FC6A-C16K1DE | *1                     |
|                |                                    |  |  | FC6A-C16K4DE | *2                     |
|                |                                    |  | 40 (24/16)                                     | FC6A-C40K1DE | *1                     |
|                |                                    |  |  | FC6A-C40K4DE | *2                     |
|                |                                    | Transistor protection source output<br>12V DC, 0.5A/point  | 16 (9/7)                                       | FC6A-C16P1DE | *1                     |
|                |                                    |  |  | FC6A-C16P4DE | *2                     |
|                |                                    |  | 40 (24/16)                                     | FC6A-C40P1DE | *1                     |
|                |                                    |  |  | FC6A-C40P4DE | *2                     |

\*1 Screw fastened type

\*2 Push-in type

## CAN J1939 All-in-One CPU Modules

| Power Voltage | Input Type                      | Output Type                                | I/O Points<br>(Input Points/<br>Output Points) | Type No.      | Terminal Specification                   |    |
|---------------|---------------------------------|--|--|---------------|--|----|
| 100-240V AC   | 24V DC input shared sink/source | Relay output, 2 A/point                    | 40 (24/16)                                     | FC6A-C40R1AEJ | Removable terminal block (5.08 mm pitch) | *1 |
| 24V DC        |                                 |  |  | FC6A-C40R4AEJ |  | *2 |
|               |                                 | FC6A-C40R1CEJ                              |  | *1            |  |    |
|               |                                 | FC6A-C40R4CEJ                              |  | *2            |  |    |
|               |                                 | FC6A-C40K1CEJ                              |  | *1            |  |    |
|               |                                 | FC6A-C40K4CEJ                              |  | *2            |  |    |
| FC6A-C40P1CEJ |                                 | *1   |  |               |  |    |
| FC6A-C40P4CEJ | *2                              |  |  |               |  |    |
| 12V DC        | 12V DC input shared sink/source | Relay output, 2 A/point                    | 40 (24/16)                                     | FC6A-C40R1DEJ | Removable terminal block (5.08 mm pitch) | *1 |
|               |                                 | Transistor sink output 12V DC, 0.5 A/point |  | FC6A-C40R4DEJ |  | *2 |
|               |                                 |  |  | FC6A-C40K1DEJ |  | *1 |
|               |                                 |  |  | FC6A-C40K4DEJ |  | *2 |
|               |                                 |  |  | FC6A-C40P1DEJ |  | *1 |
|               | FC6A-C40P4DEJ                   | *2   |  |               |  |    |

\*1 Screw fastened type

\*2 Push-in type

## Plus CPU Modules

| Power Voltage | Input Type                         | Output Type  | I/O Points<br>(Input Points/<br>Output Points) | Type No.      | Terminal Specification   |    |
|---------------|------------------------------------|--|--|---------------|--|----|
| 24V DC        | 24V DC input<br>shared sink/source | Relay output, 2 A/point                                    | 16 (8/8)                                       | FC6A-D16R1CEE | Removable<br>terminal block<br>(3.81 mm pitch)                       | *1 |
|               |                                    |  |  | FC6A-D16R4CEE |  | *2 |
|               |                                    | Transistor sink output<br>24V DC, 0.5 A/point              |  | FC6A-D16K1CEE |  | *1 |
|               |                                    |  |  | FC6A-D16K4CEE |  | *2 |
|               |                                    | Transistor protection source output<br>24V DC, 0.5 A/point |  | FC6A-D16P1CEE |  | *1 |
|               |                                    |  |  | FC6A-D16P4CEE |  | *2 |
|               |                                    | Transistor sink output<br>24V DC, 0.5 A/point              | 32 (16/16)                                     | FC6A-D32K3CEE | 20-pin MIL<br>connector (Input<br>terminals,<br>output<br>terminals) | *3 |
|               |                                    |  |  | FC6A-D32K4CEE |  | *4 |
|               |                                    | Transistor protection source output<br>24V DC, 0.5 A/point |  | FC6A-D32P3CEE |  | *3 |
|               |                                    |  |  | FC6A-D32P4CEE |  | *4 |

\*1 Screw fastened type

\*2 Push-in type

\*3 Screw fastened type (Power supply terminals)

\*4 Push-in type (Power supply terminals)

## Expansion Modules

## Digital I/O Modules

| Input Type                              | Output Type  | I/O Points<br>(Input Points/<br>Output Points) | Type No.    | Terminal Specification                   |    |
|---|--|--|-------------|--|----|
| 12/24V DC input*1<br>shared sink/source | —  | 8 (8/0)  | FC6A-N08B1  | Removable terminal block (5.08 mm pitch) | *2 |
|   |  |  | FC6A-N08B4  |  | *3 |
|   |  | 16 (16/0)                                      | FC6A-N16B1  | Removable terminal block (3.81 mm pitch) | *2 |
|   |  |  | FC6A-N16B4  |  | *3 |
|   |  | 16 (16/0)                                      | FC6A-N16B3  | 20-pin MIL connector                     |    |
|   |  | 32 (32/0)                                      | FC6A-N32B3  |  |    |
| 100-120V AC input                       | —  | 8 (8/0)  | FC6A-N08A11 | Removable terminal block (5.08 mm pitch) | *2 |
|   |  |  | FC6A-N08A14 |  | *3 |
| —                                       | Relay output, 2 A/point                                    | 8 (0/8)  | FC6A-R081   | Removable terminal block (5.08 mm pitch) | *2 |
|   |  |  | FC6A-R084   |  | *3 |
|   |  | 16 (0/16)                                      | FC6A-R161   | Removable terminal block (3.81 mm pitch) | *2 |
|   |  |  | FC6A-R164   |  | *3 |
|   | Transistor sink output<br>12/24V DC, 0.5 A/point*1         | 8 (0/8)  | FC6A-T08K1  | Removable terminal block (5.08 mm pitch) | *2 |
|   |  |  | FC6A-T08K4  |  | *3 |
|   | Transistor protection source output<br>24V DC, 0.5 A/point | 8 (0/8)  | FC6A-T08P1  |  | *2 |
|   |  |  | FC6A-T08P4  |  | *3 |
|   | Transistor sink output<br>12/24V DC, 0.5 A/point*1         | 16 (0/16)                                      | FC6A-T16K1  | Removable terminal block (3.81 mm pitch) | *2 |
|   |  |  | FC6A-T16K4  |  | *3 |
|   |  | 16 (0/16)                                      | FC6A-T16P1  |  | *2 |
|   |  |  | FC6A-T16P4  |  | *3 |
|   | Transistor sink output<br>12/24V DC, 0.1 A/point*1         | 16 (0/16)                                      | FC6A-T16K3  | 20-pin MIL connector                     |    |
|   |  |  | FC6A-T16P3  |  |    |
|   |  | 32 (0/32)                                      | FC6A-T32K3  |  |    |
|   |  |  | FC6A-T32P3  |  |    |
| 24V DC input<br>shared sink/source      | Relay output, 2 A/point                                    | 8 (4/4)  | FC6A-M08BR1 | Removable terminal block (5.08 mm pitch) | *2 |
|   |  |  | FC6A-M08BR4 |  | *3 |
|   |  | 24 (16/8)                                      | FC6A-M24BR1 | Removable terminal block (3.81 mm pitch) | *2 |
|   |  |  | FC6A-M24BR4 |  | *3 |

\*1 24V DC input for products with a version number lower than V400. For details on the version number of modules, see "Checking the Version Number" on page 2-1.

\*2 Screw fastened type

\*3 Push-in type

## Analog I/O Modules

| Power Voltage | Input Type   | Output Type                        | I/O Points<br>(Input Points/<br>Output Points) | Type No.    | Terminal Specification                      |    |
|---------------|--|------------------------------------|--|-------------|---|----|
| 12/24V<br>DC  | Analog input<br>(voltage/current)  | —                                  | 2 (2/0)  | FC6A-J2C1   | Removable terminal block<br>(5.08 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J2C4   |   | *2 |
|               |  |                                    | 4 (4/0)  | FC6A-J4A1   | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J4A4   |   | *2 |
|               |  |                                    | 8 (8/0)  | FC6A-J8A1   | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J8A4   |   | *2 |
|               | —  | Analog output<br>(voltage/current) | 2 (0/2)  | FC6A-K2A1   | Removable terminal block<br>(5.08 mm pitch) | *1 |
|               |  |                                    |  | FC6A-K2A4   |   | *2 |
| 24V DC        | —  | Analog output<br>(voltage/current) | 4 (0/4)  | FC6A-K4A1   | Removable terminal block<br>(5.08 mm pitch) | *1 |
|               |  |                                    |  | FC6A-K4A4   |   | *2 |
|               | Analog input<br>(voltage/current)  | Analog output<br>(voltage/current) | 6 (4/2)  | FC6A-L06A1  | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-L06A4  |   | *2 |
| 12/24V<br>DC  | Analog input<br>(voltage/current/<br>thermocouple/resistance<br>thermometer) | Analog output<br>(voltage/current) | 3 (2/1)  | FC6A-L03CN1 | Removable terminal block<br>(5.08 mm pitch) | *1 |
|               |  |                                    |  | FC6A-L03CN4 |   | *2 |
|               | Analog input<br>(voltage/current/<br>thermocouple/resistance<br>thermometer) | —                                  | 4 (4/0)  | FC6A-J4CN1  | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J4CN4  |   | *2 |
|               | Analog input<br>(thermocouple)   |                                    | 4 (4/0)  | FC6A-J4CH1Y | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J4CH4Y |   | *2 |
|               | Analog input<br>(thermocouple/<br>thermistor/resistance)                     |                                    | 8 (8/0)  | FC6A-J8CU1  | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |                                    |  | FC6A-J8CU4  |   | *2 |

\*1 Screw fastened type

\*2 Push-in type

## Safety Relay Module

| Power Voltage | Input Type   | Output Type                              | I/O Points<br>(Input Points/<br>Output Points) | Type No.   | Terminal Specification   |    |
|---------------|--------------|--|--|------------|--|----|
| 24V DC        | Safety input | Relay output<br>230V AC, 6 A/24V DC, 6 A | 5 (1 or 2/3)                                   | FC6A-SAK64 | Removable terminal block<br>(Input: 3.81 mm pitch,<br>Output: 5.08 mm pitch) | *1 |

\*1 Push-in type

## PID Modules

| Power Voltage | Input Type   | Output Type   | I/O Points<br>(Input Points/<br>Output Points) | Type No.   | Terminal Specification                      |    |
|---------------|--|---|--|------------|---|----|
| 24V DC        | Analog input<br>(voltage/current/<br>thermocouple/resistance<br>thermometer) | Relay output<br>240V AC, 2 A/30V DC, 2 A                      | 4 (2/2)  | FC6A-F2MR1 | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |   |  | FC6A-F2MR4 |   | *2 |
|               | Analog input<br>(voltage/current/<br>thermocouple/resistance<br>thermometer) | Transistor source output<br>12V DC/analog output<br>(current) | 4 (2/2)  | FC6A-F2M1  | Removable terminal block<br>(3.81 mm pitch) | *1 |
|               |  |   |  | FC6A-F2M4  |   | *2 |

\*1 Screw fastened type

\*2 Push-in type

## Communication Module

| Name                 | Function/purpose           | I/O Points<br>(Input Points/<br>Output Points) | Type No.    | Terminal Specification                         |    |
|----------------------|----------------------------|--|-------------|--|----|
| Communication module | RS232C/RS485 communication | —  | FC6A-SIF52  | Direct-mounting terminal block (3.81 mm pitch) | *1 |
|                      |                            |  | FC6A-SIF524 |  | *2 |

\*1 Screw fastened type

\*2 Push-in type

## Expansion Interface Modules

| Power Voltage | Name          | Function/purpose  | I/O Points<br>(Input Points/<br>Output Points) | Type No.    | Terminal Specification                   |    |
|---------------|---------------|---|--|-------------|--|----|
| 24V DC        | Expander      | Increases the number of expansion modules that can be connected | —  | FC6A-EXM2   | Removable terminal block (5.08 mm pitch) | *1 |
|               |               |   |  | FC6A-EXM24  |  | *2 |
|               | Remote master |   | —  | FC6A-EXM1M  | —  |    |
|               | Remote slave  |   |  | FC6A-EXM1S  |  | *1 |
|               |               |   |  | FC6A-EXM1S4 | Removable terminal block (5.08 mm pitch) | *2 |

\*1 Screw fastened type

\*2 Push-in type

## HMI Module

| Name       | Function/purpose                    | I/O Points<br>(Input Points/<br>Output Points) | Type No. | Terminal Specification |
|------------|-------------------------------------|--|----------|------------------------|
| HMI module | HMI module with web server function | —  | FC6A-PH1 | —                      |

## Cartridge Base Module

| Name                  | Function/purpose                                | I/O Points<br>(Input Points/<br>Output Points) | Type No.  | Terminal Specification |
|-----------------------|---|--|-----------|------------------------|
| Cartridge base module | Expands cartridge slots for the Plus CPU module | —  | FC6A-HPH1 | —                      |

## Cartridges

| Name                    | Function/purpose   | I/O Points<br>(Input Points/<br>Output Points) | Type No.   | Terminal Specification                         |
|-------------------------|--|--|------------|--|
| Digital I/O cartridge   | 12/24V DC input shared sink/source                         | 4 (4/0)  | FC6A-PN4   | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Transistor sink output 12/24V DC, 0.1 A/point              | 4 (0/4)  | FC6A-PTK4  | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Transistor protection source output 12/24V DC, 0.1 A/point | 4 (0/4)  | FC6A-PTS4  | Direct-mounting terminal block (3.81 mm pitch) |
| Analog I/O cartridge    | Analog input (voltage/current)                             | 2 (2/0)  | FC6A-PJ2A  | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Analog input (thermocouple/resistance thermometer)         | 2 (2/0)  | FC6A-PJ2CP | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Analog output (voltage)                                    | 2 (0/2)  | FC6A-PK2AV | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Analog output (current)                                    | 2 (0/2)  | FC6A-PK2AW | Direct-mounting terminal block (3.81 mm pitch) |
| Communication cartridge | RS232C communication                                       | —  | FC6A-PC1   | Direct-mounting terminal block (3.81 mm pitch) |
|                         | RS485 communication  | —  | FC6A-PC3   | Direct-mounting terminal block (3.81 mm pitch) |
|                         | Bluetooth communication                                    | —  | FC6A-PC4   | —  |

## Maintenance Parts

| Type  | Type No.      | Specifications  |
|---|---------------|---|
| FC6A Series CPU module connector with analog input cable  | FC4A-PMAC2    | Cable length: 1 m (3.28 feet) (2 items)<br>Compatible with the FC4A Slim Type, the FC5A Slim Type, and the FC6A |
| FC6A Series CPU module mounting hook<br>FC6A Series HMI module mounting hook                          | FC6A-PSP1     | Direct/DIN-rail mounting hook (5 items)   |
| FC6A Series expansion module mounting hook<br>FC6A Series expansion interface module mounting hook    | FC6A-PSP2     | Direct/DIN-rail mounting hook (5 items)   |
| FC6A Series CPU module power supply terminal block connector  | FC6A-PMTD03   | 5.08 mm pitch, 3-pin, screw fastened type (2 items)* <sup>1</sup>   |
| FC6A Series expansion interface module power supply terminal block connector                          | FC6A-PMTB03   | 5.08 mm pitch, 3-pin, screw fastened type (2 items)* <sup>1</sup>   |
| FC6A Series CPU module, CAN J1939 All-in-One CPU module<br>CAN communication terminal block connector | FC6A-PMTE05   | 5.08 mm pitch, 5-pin, screw fastened type (2 items)* <sup>1</sup>   |
| FC6A Series CPU module removable terminal block   | FC6A-PMTA08   | 5.08 mm pitch, 8-pin, screw fastened type (2 items)* <sup>1</sup>   |
|   | FC6A-PMTA09   | 5.08 mm pitch, 9-pin, screw fastened type (2 items)* <sup>1</sup>   |
|   | FC6A-PMTA10   | 5.08 mm pitch, 10-pin, screw fastened type (2 items)* <sup>1</sup>  |
|   | FC6A-PMTA12   | 5.08 mm pitch, 12-pin, screw fastened type (2 items)* <sup>1</sup>  |
|   | FC6A-PMTA13   | 5.08 mm pitch, 13-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series Plus CPU module inputs removable terminal block   | FC6A-PMSCN10  | 3.81 mm pitch, 10-pin, push-in type (2 items)   |
|   | FC6A-PMTCN10  | 5.08 mm pitch, 10-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series Plus CPU module relay outputs removable terminal block                                    | FC6A-PMSCR11  | 3.81 mm pitch, 11-pin, push-in type (2 items)   |
|   | FC6A-PMTCR11  | 5.08 mm pitch, 11-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series Plus CPU module sink outputs removable terminal block                                     | FC6A-PMSCK11  | 3.81 mm pitch, 11-pin, push-in type (2 items)   |
|   | FC6A-PMTCCK11 | 5.08 mm pitch, 11-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series Plus CPU module protection source outputs removable terminal block                        | FC6A-PMSCP11  | 3.81 mm pitch, 11-pin, push-in type (2 items)   |
|   | FC6A-PMTCP11  | 5.08 mm pitch, 11-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series Plus CPU module power supply removable terminal block                                     | FC6A-PMSDC03  | 5.08 mm pitch, 3-pin, push-in type (2 items)  |
| FC6A Series expansion module removable terminal block   | FC6A-PMSB11   | 5.08 mm pitch, 11-pin, push-in type (2 items)   |
|   | FC6A-PMSC10   | 3.81 mm pitch, 10-pin, push-in type (2 items)   |
|   | FC6A-PMSC11   | 3.81 mm pitch, 11-pin, push-in type (2 items)   |
|   | FC6A-PMSC17   | 3.81 mm pitch, 17-pin, push-in type (2 items)   |
| FC6A Series expansion interface module removable terminal block                                       | FC6A-PMTB11   | 5.08 mm pitch, 11-pin, screw fastened type (2 items)* <sup>1</sup>  |
|   | FC6A-PMTC10   | 3.81 mm pitch, 10-pin, screw fastened type (2 items)* <sup>1</sup>  |
|   | FC6A-PMTC11   | 3.81 mm pitch, 11-pin, screw fastened type (2 items)* <sup>1</sup>  |
|   | FC6A-PMTC17   | 3.81 mm pitch, 17-pin, screw fastened type (2 items)* <sup>1</sup>  |
| FC6A Series expansion interface module power supply removable terminal block                          | FC6A-PMSB03   | 5.08 mm pitch, 3-pin, push-in type (2 items)  |
| FC6A Series CPU module battery holder   | FC6A-BH1      | Battery holder (2 items)  |

\*1 Appropriate screw fastened type removable terminal blocks are contained in the purchased modules.

## Manuals

| Type   | Specifications             |
|--|----------------------------|
| FC6A Series MICROSmart User's Manual                     | Japanese, English, Chinese |
| Ladder Programming Manual                                | Japanese, English, Chinese |
| FC6A Series MICROSmart Communication Manual              | Japanese, English, Chinese |
| FC6A Series MICROSmart PID Module User's Manual          | Japanese, English, Chinese |
| FC6A Series MICROSmart Safety Relay Module User's Manual | English                    |

## Application Software

| Product Name         | Type No. | Specifications   |
|----------------------|----------|--|
| Automation Organizer | SW1A-W1C | Package software containing the programming software "WindLDR" |

## Option Cables (Sold Separately)

| Product Name                                    | Type No.     | Function   |
|---|--------------|--|
| Shielded flat I/O cable (0.5 m [1.64 feet])     | FC9Z-H050A20 | Shielded, 20-pin straight cable for use with I/O modules<br>This can be used with IDEC I/O terminals.<br>The type numbers of the supported I/O terminals are shown below.<br>BX1D-□20A,* <sup>1</sup> BX1F-□20A,* <sup>1</sup> BX7D-BT16A1T<br>(16-point relay output)         |
| Shielded flat I/O cable (1 m [3.28 feet])       | FC9Z-H100A20 |  |
| Shielded flat I/O cable (2 m [6.56 feet])       | FC9Z-H200A20 |  |
| Shielded flat I/O cable (3 m [9.84 feet])       | FC9Z-H300A20 |  |
| Non-shielded flat I/O cable (0.5 m [1.64 feet]) | FC9Z-H050B20 | Non-shielded, 20-pin straight cable for use with I/O modules<br>This can be used with IDEC I/O terminals.<br>The type numbers of the supported I/O terminals are shown below.<br>BX1D-□20A,* <sup>1</sup> , BX1F-□20A,* <sup>1</sup> , BX7D-BT16A1T<br>(16-point relay output) |
| Non-shielded flat I/O cable (1 m [3.28 feet])   | FC9Z-H100B20 |  |
| Non-shielded flat I/O cable (2 m [6.56 feet])   | FC9Z-H200B20 |  |
| Non-shielded flat I/O cable (3 m [9.84 feet])   | FC9Z-H300B20 |  |
| External device/O/I communication cable         | FC6A-KC1C    | Cable for connecting external devices, IDEC displays (HG4G/3G/2G), and general-purpose display devices (cable length: 5 m [16.4 feet])<br>RJ45 connector/loose wires (1 item)  |
| O/I communication cable                         | FC6A-KC2C    | Cable dedicated for connecting IDEC displays (HG4G/3G/2G* <sup>2</sup> ) (cable length: 5 m [16.4 feet])<br>RJ45 connector/D-sub 9-pin connector (1 item)  |

\*1 The "□" in the I/O terminal type numbers indicates the terminal shape.

T: Touch-down terminal block, S: Captive screw terminal block

\*2 Use the FC6A-KC1C for products other than the HG2G-5FT22TF Series.

## Options (Sold Separately)

| Product Name   | Function  | Type No.   | Comments             |
|--|---|------------|----------------------|
| 35 mm wide DIN rail (length: 1,000 mm)                             | Aluminum, used when mounting on DIN rail                              | BAA1000    | 10 items             |
| 35 mm wide DIN rail (length: 1,000 mm)                             | Steel, used when mounting on DIN rail                                 | BAP1000    | 10 items             |
| Bracket  | Used to fix CPU modules, expansion modules, and HMI modules on a rail | BNL6       | 10 items             |
| 20-pin connector   | 20-pin MIL connector for an expansion module                          | FC4A-PMC20 | 2 items              |
| USB maintenance cable<br>Cable length: 2 m (6.7 feet)              | USB cable used to connect the PC and the PLC<br><Connector> A: mini B | HG9Z-XCM42 | 1 item               |
| USB-mini B port extension cable<br>(cable length: 1 m [3.28 feet]) | USB cable used to extend the USB-mini B port to the panel surface     | HG9Z-XCE21 | 1 item               |
| USB cable retention pin  | Used to keep the USB cable constantly connected                       | HG9Z-XU1   | 5 items              |
| Replacement battery for CPU module                                 | CR2032W backup battery<br>(1 battery is included with the PLC unit.)  | HG9Z-XR2   | 1 item* <sup>1</sup> |

\*1 Sold in Japan only.

**Recommended Products (Sold Separately)**

| Product Name   | Function                                    | Reference |
|--|---|-----------|
| Panasonic: BR2032/CR2032A/CR2032B,<br>Murata: CR2032X/CR2032W    | Backup battery                              | —         |
| Ferrule manufactured by Phoenix Contact or Weidmüller (1 cable)  | Ferrule used to wire the terminal block     | 3-46      |
| Ferrule manufactured by Phoenix Contact or Weidmüller (2 cables) | Ferrule used to wire the terminal block     |           |
| Ferrule tool manufactured by Phoenix Contact or Weidmüller       | Ferrule crimping tool                       |           |
| Screwdriver  | Screwdriver used to wire the terminal block |           |



## System Software

This section explains how to update the FC6A to the latest system software.

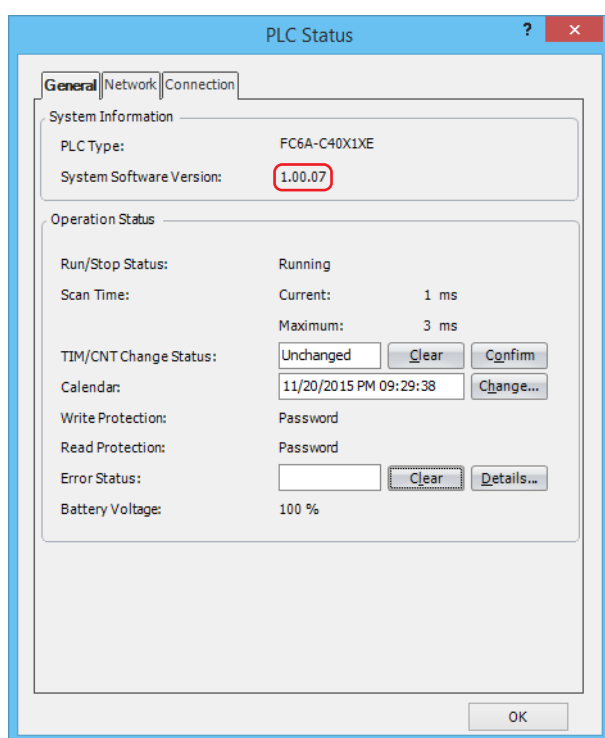
### Getting the Latest Version of the System Software

When you install or upgrade to the latest version of Automation Organizer, the latest system software is also available along with the software.

### Checking the Version

You can check the FC6A system software version with the following steps.

1. Connect the computer to the FC6A USB port with the USB maintenance cable (HG9Z-XCM42).  
For details, see the "FC6A Series MICROSmart Communication Manual".
2. From the WindLDR menu bar, select **Online > Monitor > Start Monitor**.  
WindLDR enters monitor mode.
3. Select **Online > PLC > Status**.  
The **PLC Status** dialog box is displayed.



You can check the FC6A system software version with **System Software Version**.

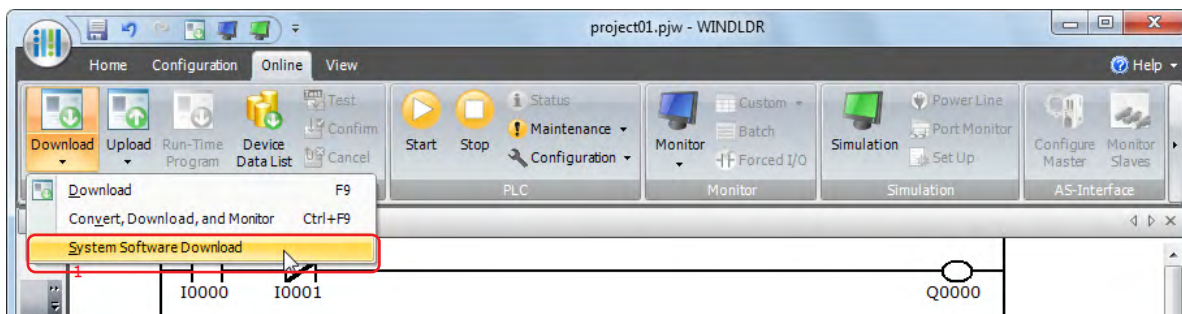
**Note:** FC6A system software downloads can be executed from WindLDR.

For how to download the system software, see "Upgrade FC6A System Software" on page A-10.

## Upgrade FC6A System Software

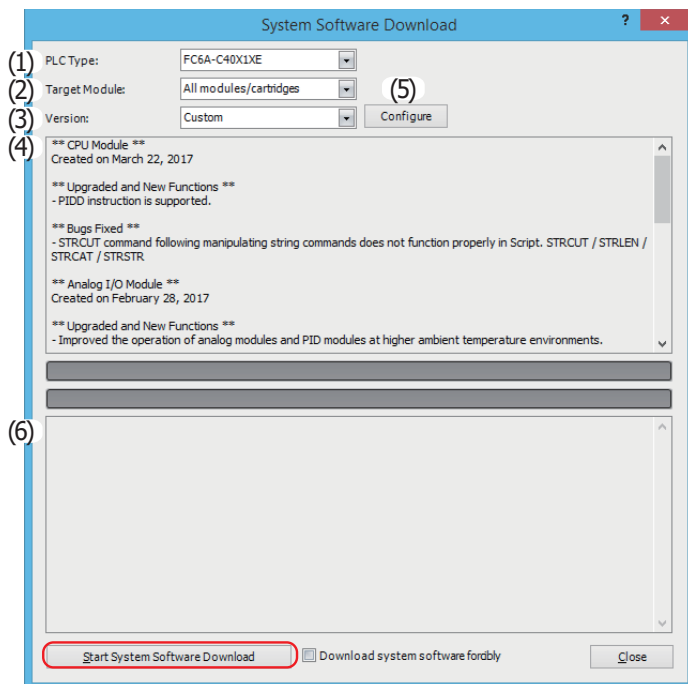
The system software of FC6A can be upgraded using WindLDR. If the system software of your FC6A is old, upgrade the system software with the following procedure:

1. Connect the computer to the system software downloadable interface of the FC6A.  
For details, see the "FC6A Series MICROSmart Communication Manual".
2. From the WindLDR menu bar, select **Online > Download > System Software Download**.

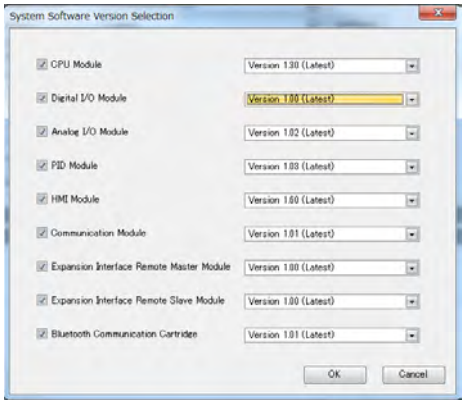


The System Software Download dialog box appears.

3. Select the PLC type of the CPU module that will perform the download, the target module, and the system software version to download, and then click **Start System Software Download**.



| No. | Item Name        | Description  |
|-----|------------------|--|
| (1) | PLC Type         | Select the PLC type of the CPU module.   |
| (2) | Target Module    | Select the module for downloading the system software from those shown below.<br><b>All modules, CPU module, Digital I/O module<sup>*1</sup>, Analog I/O module, PID module, HMI module, Communication module, Expansion interface remote master module, Expansion interface remote slave module, Bluetooth communication cartridge.</b><br><b>All modules</b> is selected by default. |
| (3) | Version          | Select the system software version.<br>If you have selected <b>All modules</b> for <b>Target Module</b> , select from <b>Update all</b> and <b>Custom</b> .<br>If you have selected a value other than <b>All modules</b> for <b>Target Module</b> , select the version to download to the selected module.  |
| (4) | Revision history | The revision history related to the system software of the CPU module selected in the <b>System Software Version Selection</b> dialog box is displayed here.   |

| No. | Item Name        | Description   |
|-----|------------------|---|
| (5) | Configure button | <p>If you select <b>Custom</b> for <b>Version</b>, click this button to display the <b>System Software Version Selection</b> dialog box, which you can use to specify the module to download the system software to and the system software version. Select all the check boxes for the modules to download the system software to. Select the system software version for each module, and then click <b>OK</b>.</p>  |
| (6) | Status display   | <p>The success or failure of the system software download for each target module is displayed here. The slot position and the PLC type are both displayed for analog I/O modules and PID modules.</p>   |

\*1 In the following cases, the system software cannot be downloaded to the digital I/O module.

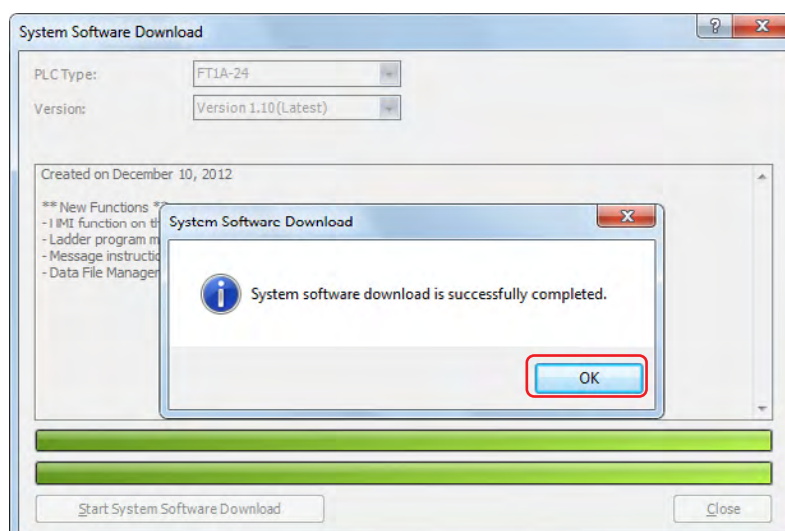
- If the hardware version of the digital I/O module is V110 or earlier  
For details on the hardware version, see "Checking the Hardware Version Number" on page 9-2.
- If the digital I/O module is connected after the FC6A-EXM1S or FC6A-EXM1S4
- If the system software version of the FC6A All-in-One CPU module or CAN J1939 All-in-One CPU module is 1.90 or earlier, or if the system software version of the FC6A Plus CPU module is 1.31 or earlier

#### Notes:

- If the FC6A is running, it is stopped automatically before the system software download starts.
- Older system software can also be downloaded to the FC6A if required.
- The system software download takes about one minute.

4. A confirmation message is displayed. Click **Yes** to start downloading the system software.

5. System software download status is shown by a progress bar. A completion message appears when the system software has been downloaded successfully. Click **OK** to close the System Software Download dialog box.



#### Notes:

- For the FC6A, its backlight will flash while the system software is downloading.
- After the system software has downloaded, the FC6A will be in the STOP state. Use WindLDR operations, FC6A function switch operations, or HMI module LCD operations to run the FC6A.
- The user program stored in the FC6A before downloading the system software remains and is executed when the FC6A is restarted. A user program execution error may occur if an older system software is downloaded to the FC6A.
- If the system software download fails, download it again.

## Fonts

This section describes the fonts that can be displayed on the HMI module LCD.

## Supported Languages

The HMI module is equipped with fonts for multiple languages as standard. Messages in the language selected with the MSG instruction can be displayed on the LCD.

The menu can be displayed in English, Chinese, or Japanese, and messages can be displayed in a desired language out of the following languages: German, English, Italian, Spanish, Dutch, French, Cyrillic, Chinese, and Japanese.

## Installed Fonts List

| Setting name     | Character code system | Supported languages  |
|------------------|-----------------------|--|
| Western European | ISO8859-1 (Latin-1)   | English, German, Italian, Spanish, Dutch (Note), French (Note) |
| Japanese         | Shift-JIS             | Japanese (level 1)   |
| Chinese          | GB2312                | Chinese (simplified)   |
| Cyrillic         | ANSI1251              | Russian  |

**Note:** Some of the characters cannot be input.

## Character Code Table

### Using the Character Code Table

Example: Finding the character code for the character "a" in the table.

|   | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |  |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|--|
| 0 |   |   | 0 | @ | P |   | p |   |   |   | ° | À | Ð | à | ä |   |  |
| 1 |   |   | 1 | ^ | Q |   | a | q |   |   | i | ± | Á | Ñ | á | ñ |  |
| 2 |   |   | " | 2 | B | R | b | r |   |   | ø | ² | Â | Ò | â | ò |  |
| : |   |   | # | 3 | C | S | c | s |   |   | £ | ³ | Ã | Ó | ã | ó |  |

Upper 4 bits of the code (hexadecimal)

Lower 4 bits of the code (hexadecimal)

The upper 4 bits of the code are hexadecimal 6.

The lower 4 bits of the code are hexadecimal 1.

Therefore, the character code for "a" is as follows.

"a": 6 1

Lower 4 bits

Upper 4 bits

**Note:** For other fonts and two-byte characters, refer to the table of the relevant code system.

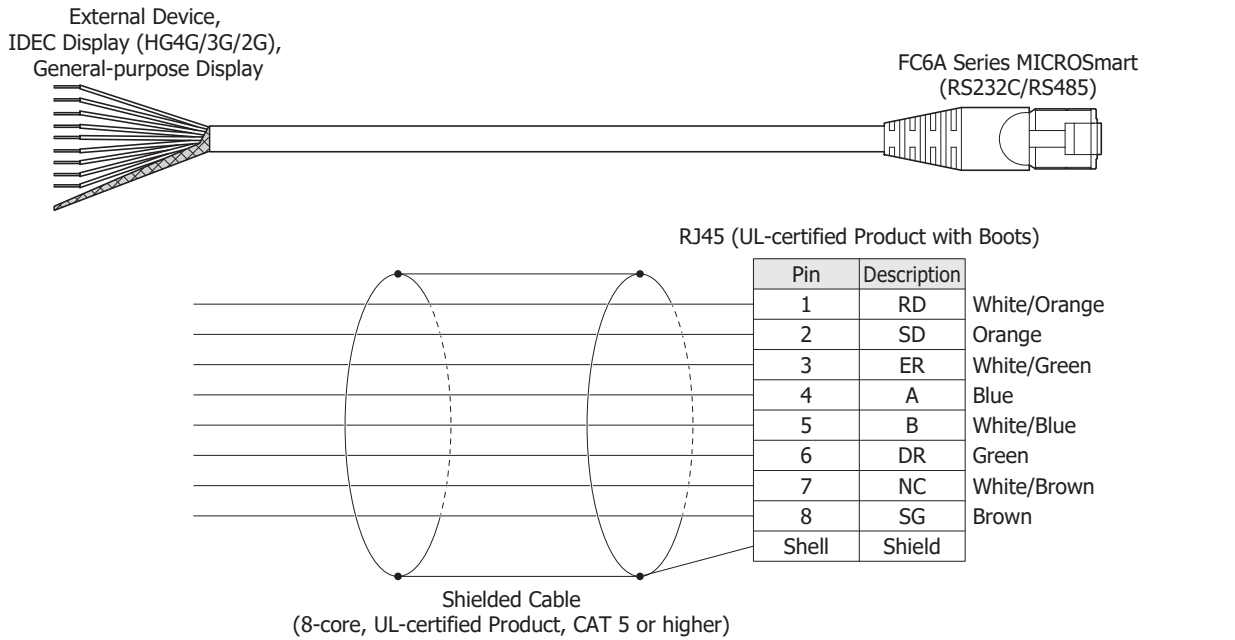
ASCII Character Code Table

|   | 0 | 1 | 2  | 3 | 4 | 5 | 6 | 7 |
|---|---|---|----|---|---|---|---|---|
| 0 |   |   |    | 0 | @ | P | ` | p |
| 1 |   |   | !  | 1 | Â | Q | a | q |
| 2 |   |   | "  | 2 | B | R | b | r |
| 3 |   |   | #  | 3 | C | S | c | s |
| 4 |   |   | \$ | 4 | D | T | d | t |
| 5 |   |   | %  | 5 | E | U | e | u |
| 6 |   |   | &  | 6 | F | V | f | v |
| 7 |   |   | '  | 7 | G | W | g | w |
| 8 |   |   | (  | 8 | H | X | h | x |
| 9 |   |   | )  | 9 | I | Y | i | y |
| A |   |   | *  | : | J | Z | j | z |
| B |   |   | +  | ; | K | [ | k | { |
| C |   |   | ,  | < | L | \ | l |   |
| D |   |   | -  | = | M | ] | m | } |
| E |   |   | .  | > | N | ^ | n | ~ |
| F |   |   | /  | ? | O | _ | o |   |

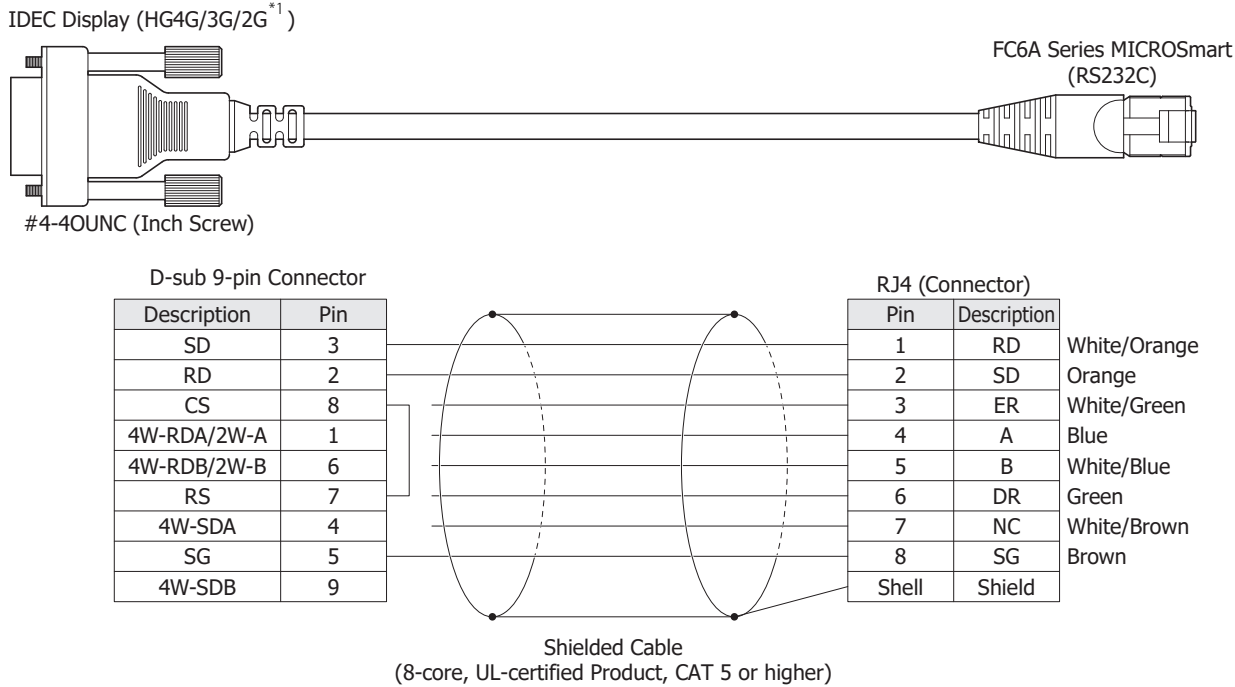
Cables

This section describes the wiring of external device/O/I communication cables and of O/I communication cables. When using external device/O/I communication cables and O/I communication cables to connect the FC6A to external devices and operator interfaces, refer to the following wiring diagrams.

External Device/O/I Communication Cable (Type No.: FC6A-KC1C, Cable Length: 5 m [16.4 Feet])



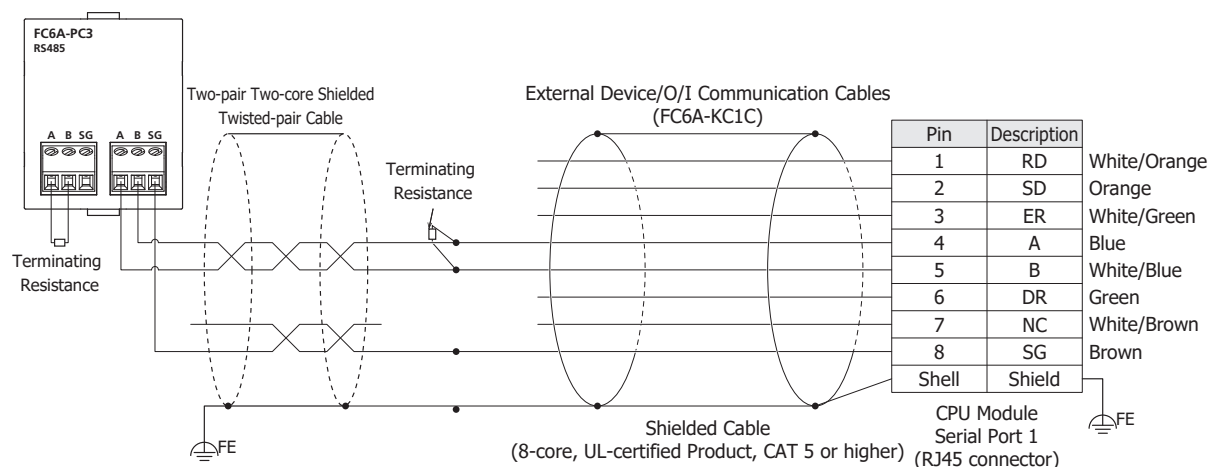
O/I Communication Cable (Type No.: FC6A-KC2C, Cable Length: 5 m [16.4 Feet])



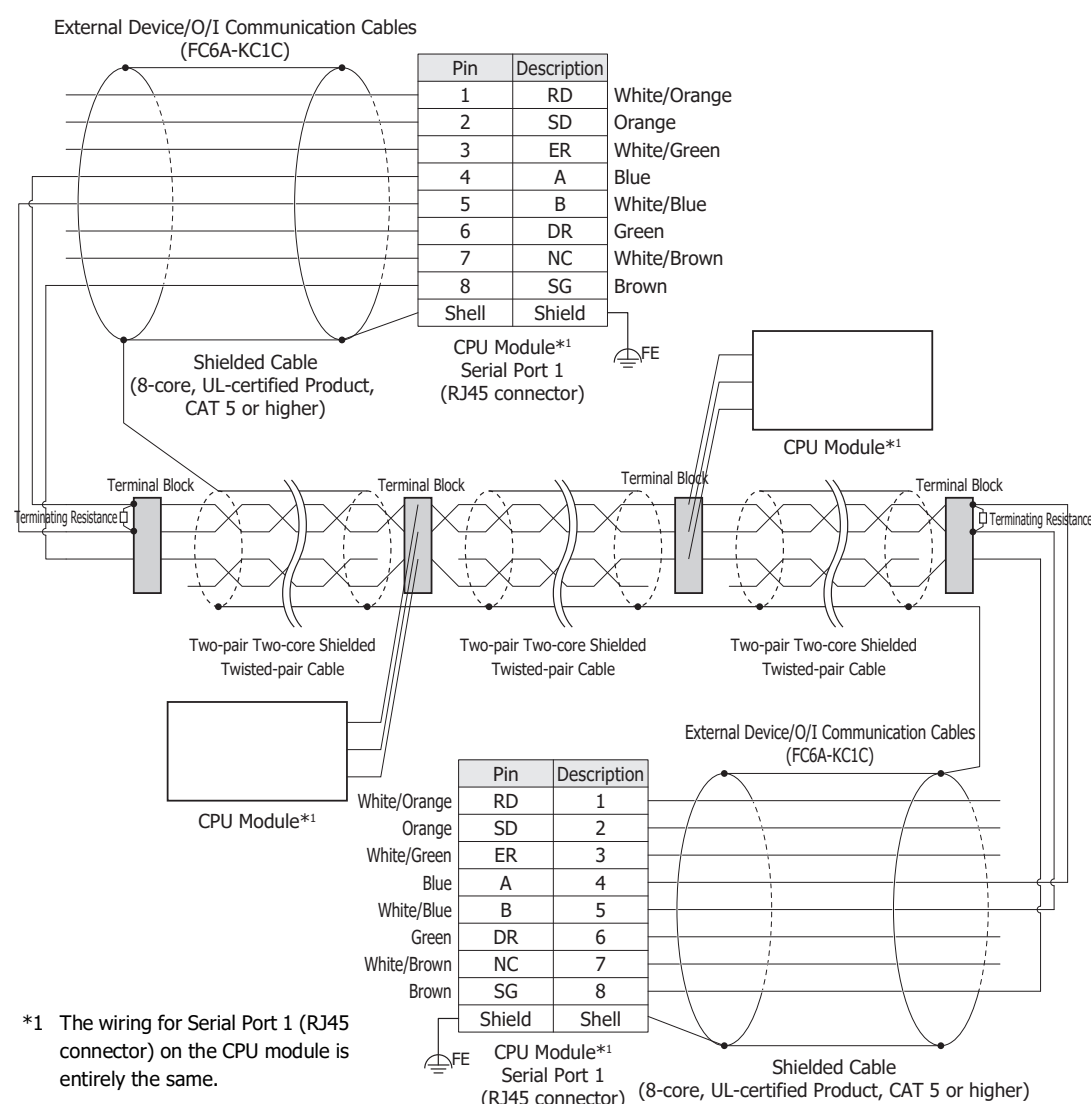
\*1 Use the FC6A-KC1C for products other than the HG2G-5FT22TF Series.

## Wiring Example

When Connecting the CPU Module via RS485



## Wiring example when connecting CPU modules via RS485



We do not recommend connecting the SG line using a shielded cable.

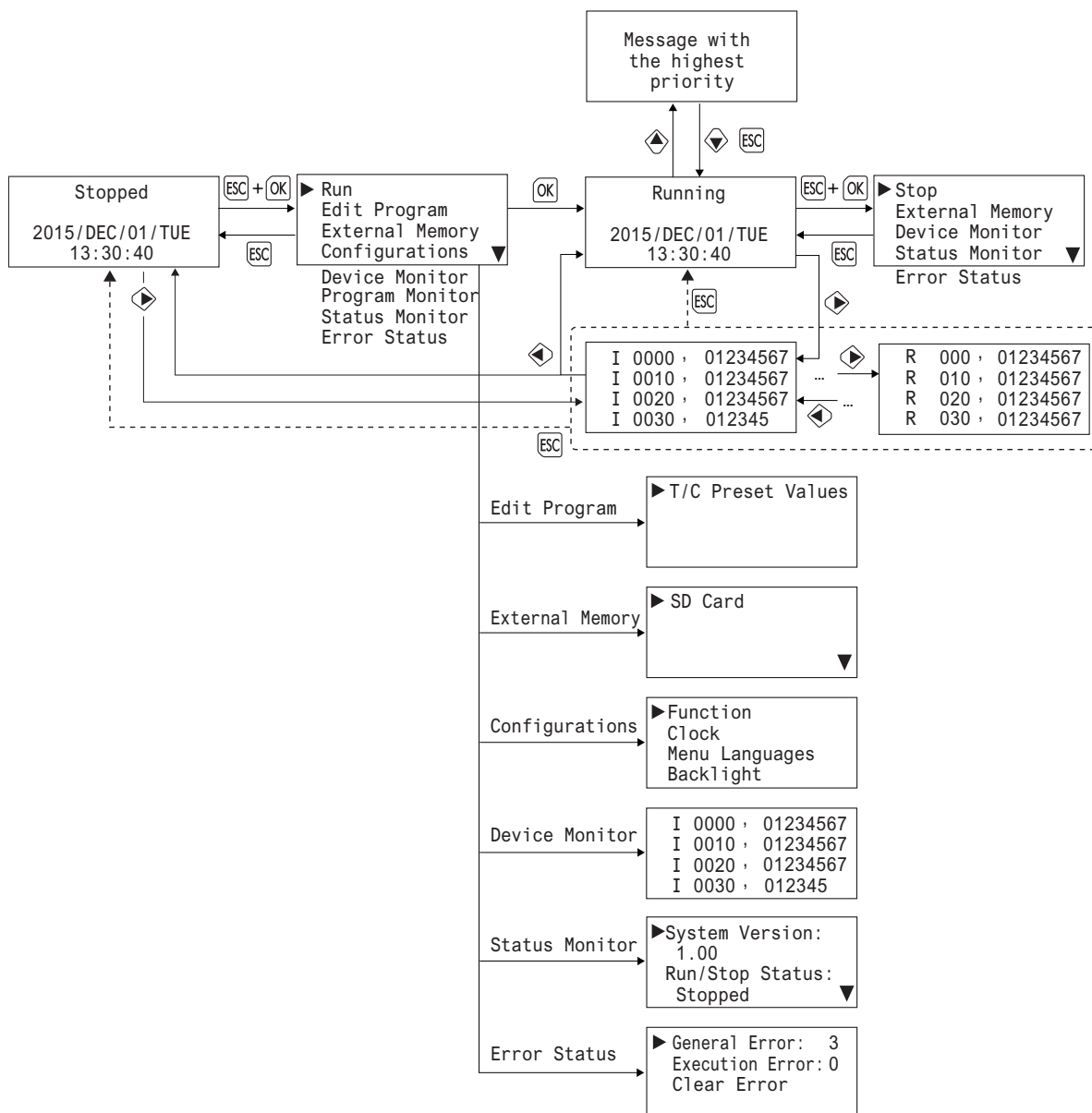
Since the shield of the "FC6A-KC1C external device/O/I connection cable" will be connected to FE (or PE) of the CPU module, one end of the shield will be grounded when connected to FE (or PE) of the CPU module.

When communication quality is unstable, add terminating resistance matched to the characteristic impedance to both ends of the cable. Use resistance with a rating of 1/2 W or higher.

## HMI Screen Transition Diagram

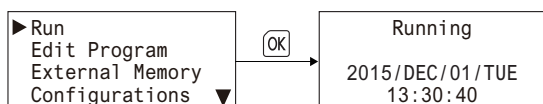
This section describes the transitions between the screens displayed on the HMI module LCD.

### System menu overall transition diagram

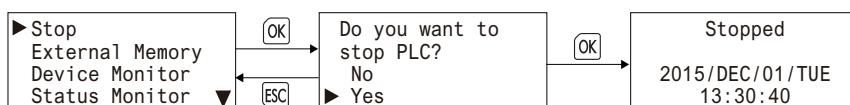


### Switching run/stop

#### Running the user program

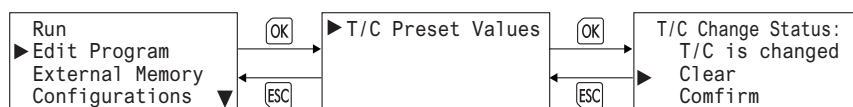


#### Stopping the user program

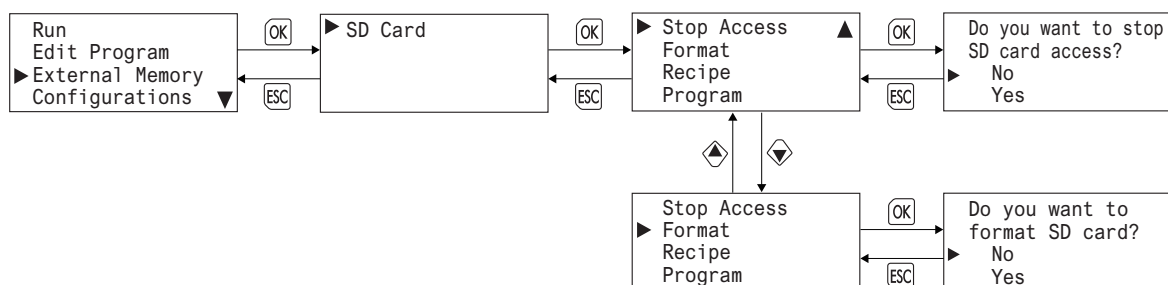




## Writing/Clearing TP (Timer Preset Values) and CP (Counter Preset Values) in the User Program

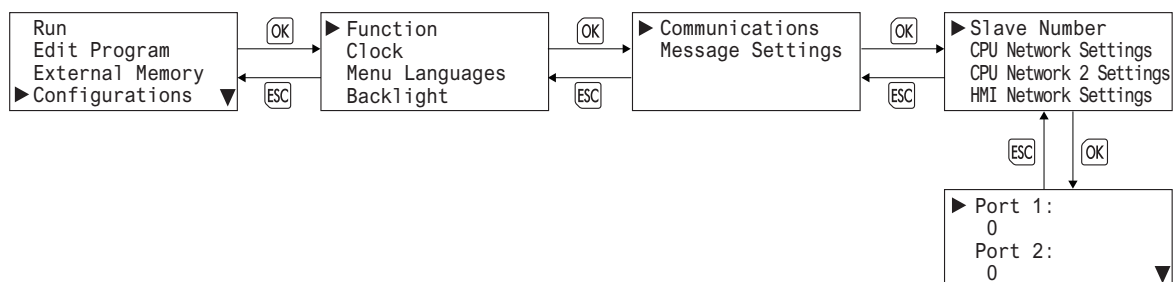


## Stopping Access to the SD Memory Card/Formatting the SD Memory Card



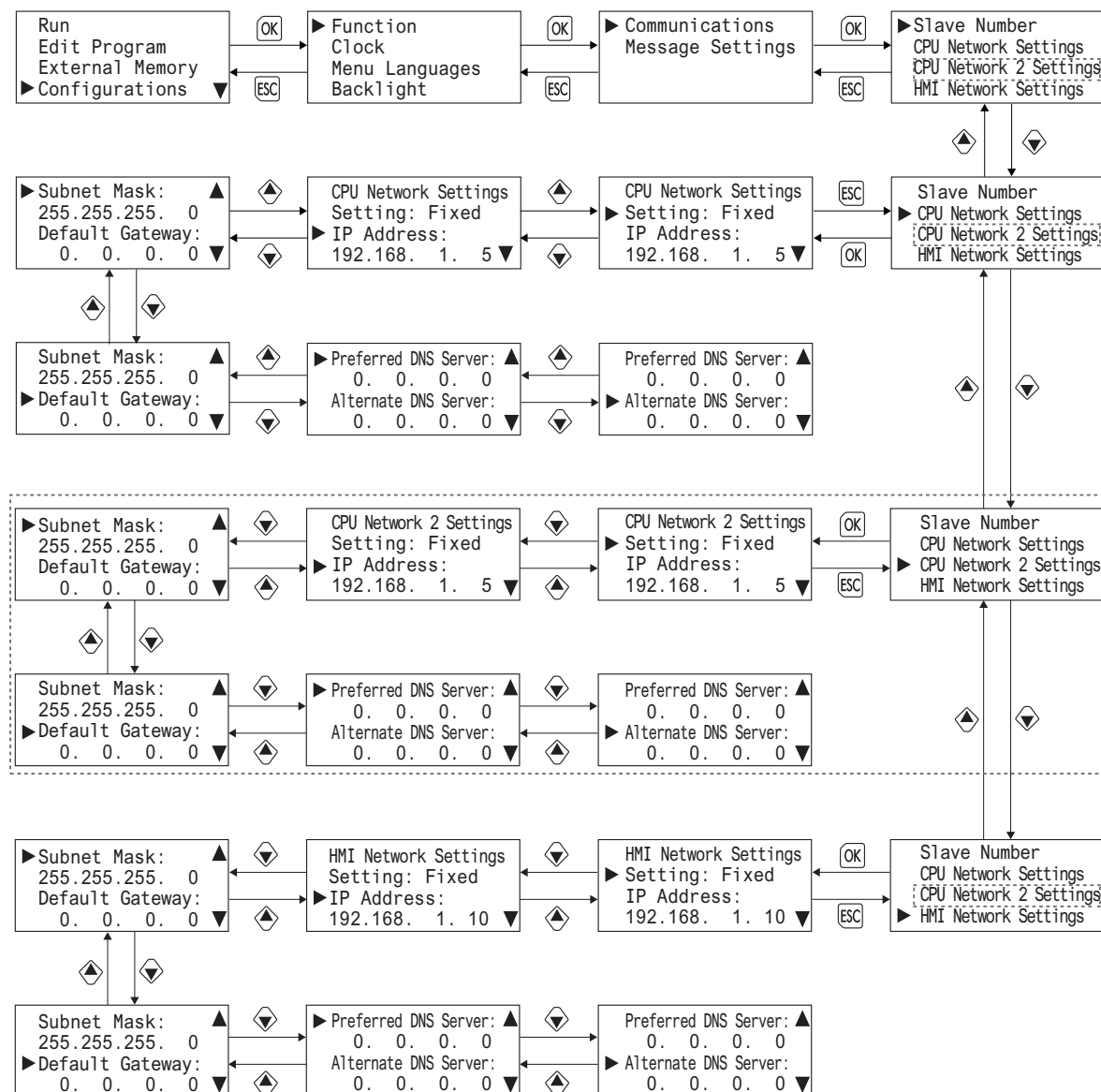
## Configuring the Slave Number

[ ] is displayed only when the Plus CPU module is connected.

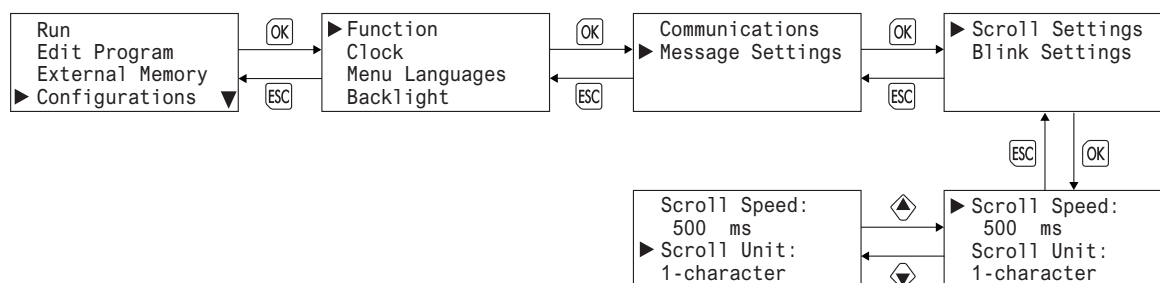


## Configuring the Network Settings

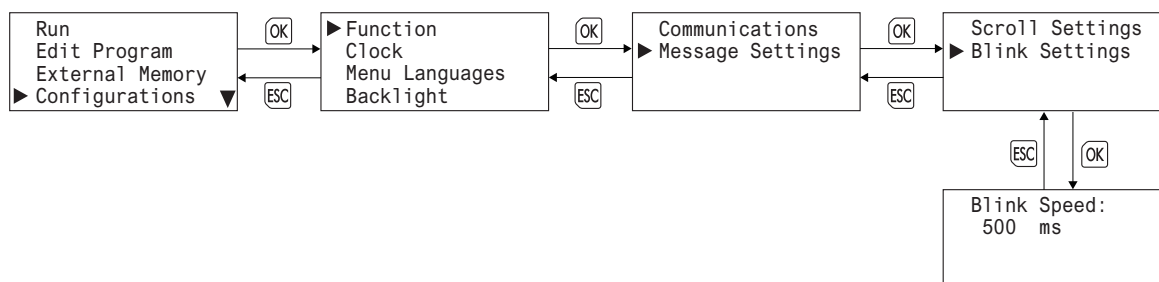
is displayed only when the Plus CPU module is connected.



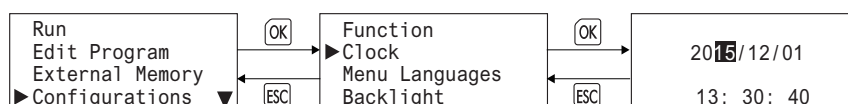
## Modifying the Scroll Speed/Configuring the Scroll Unit



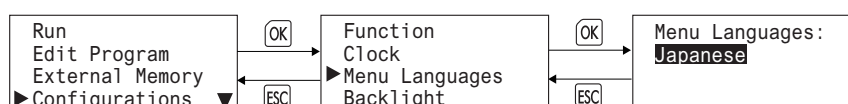
## Configuring the Blinking Speed



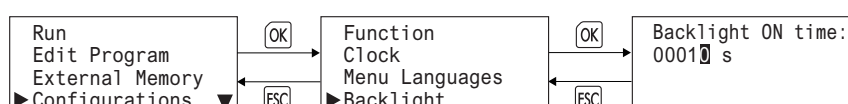
## Setting the Calendar/Clock



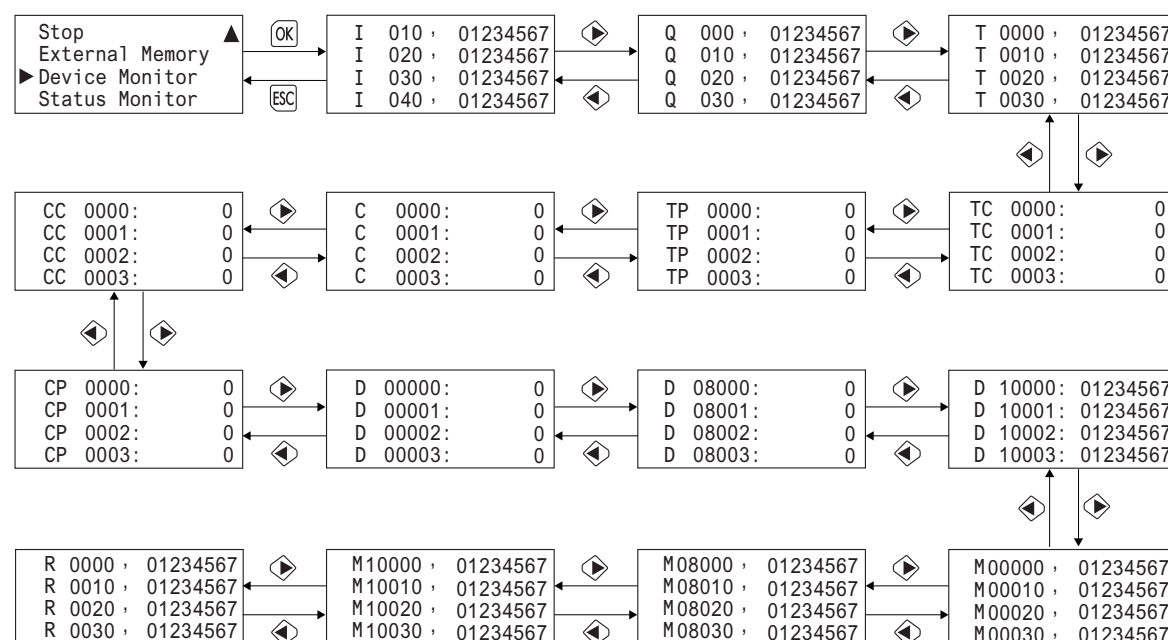
## Changing the Menu Language



## Setting the LCD Backlight ON Time

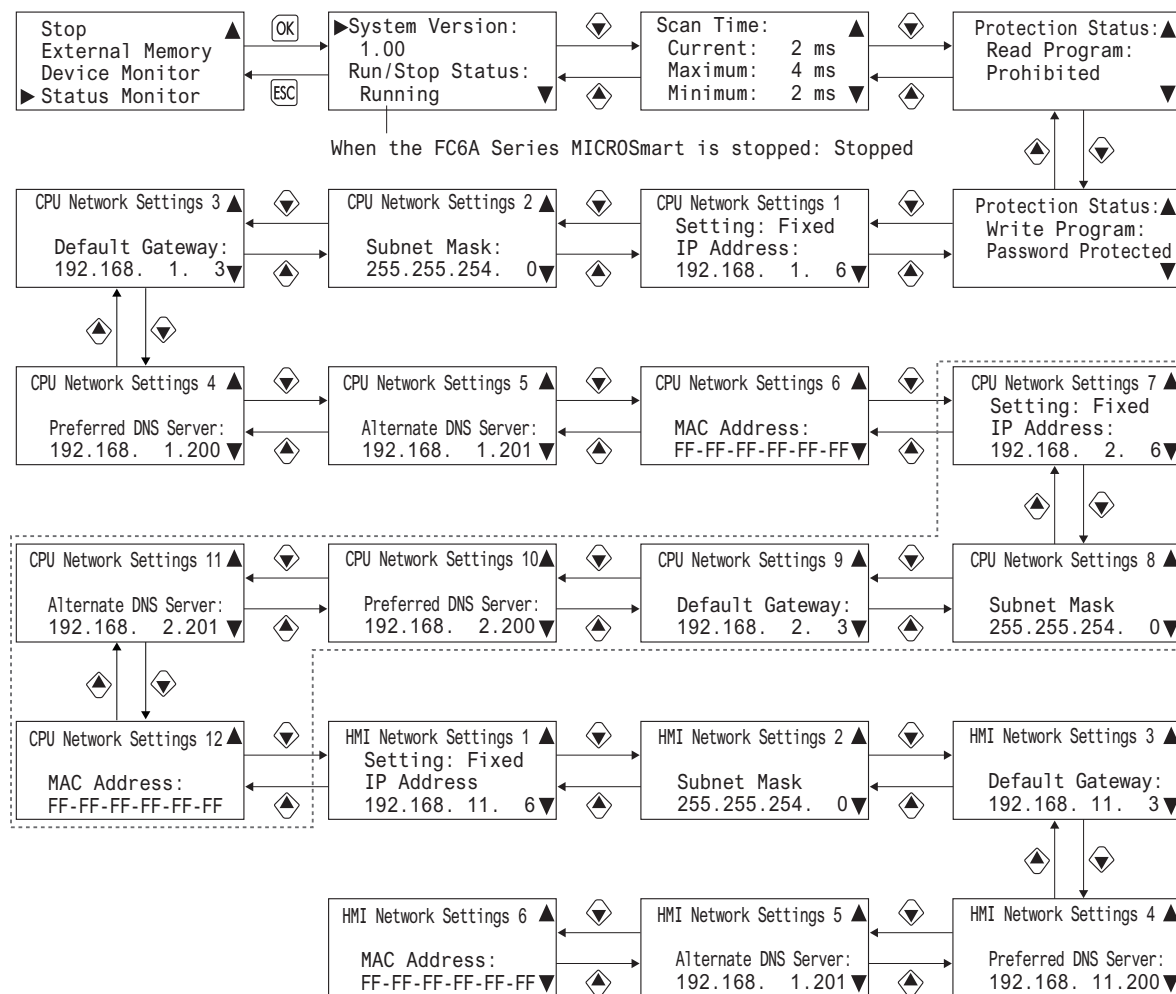


## Monitoring Device Values

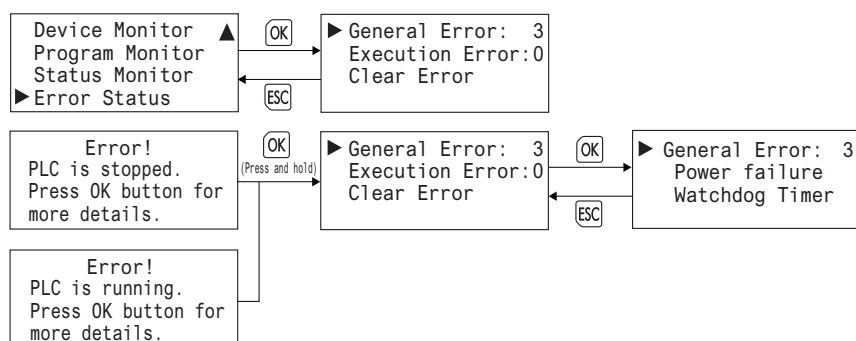


## Monitoring the FC6A Status

is displayed only when the Plus CPU module is connected.



## Checking/clearing error information





# ABOUT THE WARRANTY OF THE PRODUCTS

## 1. Warranty Period

The Products are warranted for 3 years from the date of purchase, or from the date of delivery completion.

\* Consumable/maintenance parts such as batteries and relays if the operation exceeds 100,000 times are excluded from the 3-year warranty.

## 2. Extent of Warranty

IDEC CORPORATION is responsible for failures or defects of the Products during the above warranty period, either a replacement part will be provided or the defective parts of the Products will be repaired free of charge. If such failure or defects should occur, please offer them to the distributor, dealer or IDEC CORPORATION with the materials in which the date of purchase is specified.

\* The expenses for installation and construction at the time of repair will not be borne.

## 3. Indemnification

IDEC CORPORATION will not be liable under this Warranty and be indemnified and held harmless from any and all demands, suits, expenses, claims, damages and liabilities in the following event that:

- 1) The Products are used or operated beyond the conditions or environment range as described in catalog, specifications or instruction; or
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- 3) The Products are improved, modified or altered by the party other than IDEC; or
- 4) The failure or defects and damages of the Products arise from the usage of the Product in the way that is not intended; or
- 5) The failure or defects and damages of the Products arise from the cause beyond IDEC's control including, but not limited to, fire, earthquake, flood, lightning, other natural disasters, and acts of God; or
- 6) The failure or defects and damages of the Products arise from the relocation, transportation or drop after you purchase the Products; or
- 7) The failure or defects and damages of the Products arise from improper installation; or
- 8) Maintenance and inspection are not carried out in accordance with instruction.

\* Customers assume their own risk in programming products, Company will not be held liable for damages as a result of improper programming.

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## 4. Extent of Service

The price of the Products will not include the fee for any service such as sending technicians and engineers, IDEC CORPORATION will charge you the fee for the following:

- 1) Instruction for installment and visiting for test operation, including, but not limited to creating application software and operation tests; and
- 2) Maintenance and inspection, arrangement and repair; and
- 3) Technical assistance and technical education; and
- 4) Product test and inspection based on you request.

## IDEC CORPORATION

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| <b>EMEA</b> | APEM SAS         | <b>Thailand</b>  | IDEC Asia (Thailand) Co., Ltd.   |               | IDEC Hong Kong Co. Ltd.     |              |                  |
|             |                  | <b>India</b>     | IDEC Controls India Private Ltd. | <b>Taiwan</b> | IDEC Taiwan Corporation     |              |                  |

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B-1722(24)

