

HX1T/1R

Wireless Switch

Transmitter and Receiver

Product Manual

SAFETY PRECAUTIONS

- Before using this product, please read this manual carefully and use it correctly.
- In this manual, safety precautions are categorized depending on the severity as Warning or Caution:

 WARNING	Warning notices are used to emphasize that improper operation may cause severe personal injury or death.
 CAUTION	Caution notices are used where inattention might cause personal injury or damage to machine.

WARNING

- When using this product in combination with other products, please check the applicable standards, laws, and regulations. Also, please check the compatibility of this product with the system in which it will be used.
- Regarding risk assessment, evaluate the entire facility and reduce the risk to an acceptable level.
- Please pay close attention to the following points.
 - Use this product under conditions that have a margin for its rating.
 - Consider safety design such as redundant design and malfunction prevention design to prevent personal injury, fire accidents, social damage, etc. as a result of failure or malfunction of this product.
 - Power is distributed and installed so that the product used in the customer's system, machine, device, etc. can perform in accordance with the specifications.
- Please understand all the prohibitions and handling precautions before using this product to prevent it from being used incorrectly and causing unexpected damage.
- Wireless communication does not always have a stable connection even if it is within communication range. If the stop operation does not work even after pushing the stop button on the wireless switch transmitter, immediately stop the target machine.
- Be sure to use the wireless switch transmitter with the communication LED (green) blinking (communication mode).
- Please perform operation verification in advance to confirm the functionality and performance of this product.
- The designer, installer, and user of the system using this product should be continuously educated on the proper use of this product. In addition, please make rules and display warnings on machine so that they can be careful.
- Do not disassemble, repair or modify this product. It may cause fire, electric shock, or malfunction.
- Use the product under the environment described in this manual. Use of the product in locations subject to high temperature, high humidity, condensation, corrosive gases, or excessive shock may result in electric shock, fire, or malfunction.
- The communication performance of this product varies greatly depending on the surrounding environment. Please pay attention to the following points and thoroughly verify the operation in the actual field before use.
 - The range of constant and stable communication from the wireless switch transmitter at all times is not equidistant in all directions.
 - Communication may become unstable due to the orientation of the wireless switch transmitter and the wireless switch receiver to each other, obstacles (human body, metal, walls, etc.), reflections, etc.
 - Communication may become unstable as surrounding conditions change depending on the work time.
 - Communication may become unstable if there are other wireless switch transmitters, wireless switch receivers, or other Bluetooth communication devices within communication range.
- Discontinue use in environments where communication between the wireless switch transmitter and wireless switch receiver is unstable.
- Install the product according to the instructions. Improper installation will result in falling, failure, electrical shock, fire hazard, or malfunction of the product.
- The wireless switch transmitter should be firmly attached to a part of the user that can be operated quickly, such as the user's arm.
- Turn off the power of the product before installation, removal, wiring, maintenance, and inspection of the product. Failure to turn power off may cause electrical shock or fire hazard.
- If you notice any abnormalities such as malfunctions while using this product, please stop using it immediately and contact us.

! WARNING

- Perform inspection and maintenance according to the inspection items listed in this manual.
- When changing the machine layout, etc., start over from the risk assessment of the entire system and restart the machine according to the instructions in this document. In particular, the communication status may change significantly depending on the presence of obstructions and the peripheral devices used, so please check carefully before using. For inspection items, refer to "Inspection items".
- Do not use or leave this product in an environment with temperature or humidity outside the specification range. It may cause malfunction or fire.
- Do not subject this product to strong impact or excessive force. It may cause malfunction or fire.
- Do not disassemble, modify, or repair the product. It may cause malfunction or fire.

! CAUTION

- This product is for indoor use only. Do not use outdoors.
- The wireless switch receiver has a built-in antenna. Before storing the wireless switch receiver inside the machine or covering it with a cover, etc., be sure to check the communication status thoroughly.
- When wiring, be careful not to allow water or oil to enter from the end of the cable.
- When wiring the wireless switch receiver to the push-in terminal block, be careful not to injure your fingers with the tip of the screwdriver.
- When wiring the wireless switch receiver to the push-in terminal block, do not push the screwdriver in under excessive force.
- Use a power supply of the rated value. Using a wrong power supply may cause the wireless switch receiver board to burn out.
- Please provide sufficient training to operators so that they can judge the status based on the lighting status of the lamp on the wireless switch receiver.
- If this product is dropped, or if a shock or load is applied to it, do not continue to use it and check that there is no damage and that all functions are safe and functioning properly.
- Avoid external shocks to the switch, as they will cause bounce on the contacts.
- The inspection items described in this document are the minimum necessary guidelines. Customers are responsible for adding items necessary for system operation and performing appropriate maintenance.
- When disposing of this product, treat it as industrial waste.
- This product has a built-in battery. Please dispose of batteries correctly in accordance with each country or local regulation. The following symbol is valid only in countries within the European Union. This symbol mark means that when disposing of batteries and storage batteries, they must be disposed of separately from general garbage.



- Please charge this product before using it for the first time.
- Do not use this product while charging.
- Battery life decreases due to charge/discharge cycles, temperature/humidity environment, and aging.
- Rechargeable batteries (lithium-ion polymer secondary batteries) are consumable items and will deteriorate over time even when used normally.
- Leaving the device with no remaining battery power for a long period of time will affect the battery life. Please charge it regularly.
- If charging is not completed even after the specified charging time has passed, or if the usable time is less than half of the time when purchased, the battery is nearing the end of its lifespan, so please consider replacing it with a new one.

Note

This product complies with the limits for Class A digital devices in accordance with FCC Part 15. Subpart B. This product may generate, use or radiate high-frequency energy and, if not installed or used in accordance with this document, may cause harmful interference to wireless communications. Use of this product in residential area is likely to areas may cause harmful radio interference, which must be corrected by the customer.

Revision history

January 2024	First Edition
July 2024	Second Edition

Caution

The contents of this manual, wireless switch transmitter, and wireless switch receiver are copyright, and all rights are reserved by IDEC Corporation. Unauthorized reproduction, reprint, sale, transfer, or rental is prohibited.

The contents of this manual are subject to change without notice.

The illustrations and screen examples included in this manual are for illustrative purposes only and may differ from the actual product.

IDEC Corporation bears no responsibility for the results of using this manual, wireless switch transmitter, or wireless switch receiver.

Please contact your vendor or IDEC Corporation with any problems regarding the operation of this product.

About trademarks

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

Preface

This manual describes the functions, installation, wiring, usage, maintenance and inspection work, and precautions for wireless switch transmitter and wireless switch receiver.

Read this manual carefully before use, fully understand the functions and performance of the wireless switch transmitter and wireless switch receiver and use them correctly. In addition, the person responsible for using this product should ensure that the installers, users, maintenance personnel, and other related parties fully understand the contents of this document and store this manual carefully so it can be read at any time.

Please use this product after conducting a risk assessment at your own risk and appropriately evaluating the effectiveness and risks of this product.

IDEC Corporation makes the latest product manual PDFs available on our website at no additional cost. Please download the latest product manual PDFs from our website.

Symbols Used in this Manual

This manual uses the following symbols to facilitate explanation.

 WARNING	Indicates information about items that carry the risk of death or serious injury if the product is used improperly.
 CAUTION	Indicates information about items that carry the risk of personal injury or physical damage if the product is used improperly.
	Information that requires special attention. Failure to operate the product in accordance with the information provided can lead to serious injury or damage.
	Information relating to requests or material to reference in the use of a function
	Useful information relating to a function

Abbreviations, Generic Terms, and Terminology Used in this Manual

Item	Description
Transmitter	Abbreviation for wireless switch transmitter HX1T-AB1.
Receiver	Abbreviation for wireless switch receiver HX1R-AB1.
AE-STOP	Abbreviation for an emergency stop switch with operation assist function XW1E-BS4B12PR.
Within communication range	The device is in a state where stable communication is possible.
Out of communication range	The device is unable to communicate stably.

Regarding Laws and Compatible Standards

The laws and standards of each country that this product complies with are as follows.

European laws and standards

- EMC directive
- RoHS Directive
- Radio Equipment Directive

In order to comply with these directives, this product has been designed and evaluated based on the international and European standards listed below.

- IEC62368-1:2018
- EN IEC 62368-1:2020/A11:2020
- EN61000-6-2 :2019
- EN61000-6-4 :2019
- EN IEC 63000 :2018
- EN300 328 V2.2.2
- EN301 489-1 V2.2.3
- EN301 489-17 V3.2.4

British laws and standards

This product complies with the following UK legislation:

- Electromagnetic Compatibility Regulations 2016
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- Radio Equipment Regulations 2017

North American laws and standards

- UL62368-1, 3rd Ed
- CSA C22.2 No.62368-1:19, 3rd Ed

Radio law certification

- FCC (USA)
- ISED (Canada)
- MIC (Japan)
- UKCA (UK)
- Radio Equipment Directive (Europe)
- SRRC (China)

Requirements for Wireless Standards

EU-CE

The HX1T-AB1 and HX1R-AB1 are in conformity with the essential requirements and other relevant requirements of the Radio Equipment Directive (RED) (2014/53/EU).

Please note that every application using the HX1T-AB1 and HX1R-AB1 will need to perform the radio EMC tests on the end product, according to EN 301 489-17.

It is ultimately the responsibility of the manufacturer to ensure the compliance of the end-product as a whole. The specific product assembly may have an impact to RF radiated characteristics, and manufacturers should carefully consider RF radiated testing with the end-product assembly.

USA - FCC

The HX1T-AB1 and HX1R-AB1 complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. The HX1T-AB1 and HX1R-AB1 may not cause harmful interference, and
2. The HX1T-AB1 and HX1R-AB1 must accept any interference received, including interference that may cause undesirable operation.

- **FCC RF Radiation Exposure Statement**

The available scientific evidence does not show that any health problems are associated with using low power wireless devices. There is no proof, however, that these low power wireless devices are absolutely safe. Low power wireless devices emit low levels of radio frequency energy (RF) in the microwave range while being used. While high levels of RF can produce health effects (by producing tissue), exposure of low-level RF that does not heating effects causes no known adverse health effects. Many studies of low-level RF exposures have not found any biological effects. Some studies have suggested that some biological effects might occur, but such findings have not been confirmed by additional research. This equipment (HX1T-AB1) has been tested and found to comply with FCC radiation exposure limits set forth for an uncontrolled environment.

- **OEM Responsibilities to comply with FCC Regulations**

The HX1T-AB1 and HX1R-AB1 have been tested for compliance to FCC Part 15.

OEM integrators are responsible for testing their end-product for any additional compliance requirements needed strongly with the HX1T-AB1 and HX1R-AB1 installed. Additionally, investigative measurements and spot checking are recommended to verify that the full system compliance is maintained when the module is integrated, in accordance with the "Host Product Testing Guidance" in FCC's KDB 996369 D04 Module Integration Guide V01.

- **End Product Labeling**

The HX1T-AB1 and HX1R-AB1 are labeled with their own FCC ID. If the FCC ID is not visible when the HX1T-AB1 and HX1R-AB1 are installed inside another device, then the outside of the device into which The HX1T-AB1 and HX1R-AB1 are installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

HX1T-AB1, HX1R-AB1:

"Contains Transmitter Module FCC ID: QOQ-GM220P"

Or

"Contains FCC ID: QOQ-GM220P"

Canada - ISED

The radio transmitter installed inside HX1T-AB1 and HX1R-AB1 has been approved by Innovation, Science and Economic Development Canada (ISED Canada, formerly Industry Canada) to operate with the embedded antenna.

This device complies with ISED's license-exempt RSS standards. Operation is subject to the following two conditions:

1. This device may not cause interference; and
2. This device must accept any interference, including interference that may cause undesired operation of the device

- **RF Exposure Statement**

The available scientific evidence does not show that any health problems are associated with using low power wireless devices. There is no proof, however, that these low power wireless devices are absolutely safe. Low power wireless devices emit low levels of radio frequency energy (RF) in the microwave range while being used. While high levels of RF can produce health effects (by producing tissue), exposure of low-level RF that does not heating effects causes no known adverse health effects. Many studies of low-level RF exposures have not found any biological effects. Some studies have suggested that some biological effects might occur, but such findings have not been confirmed by additional research. This equipment (HX1T-AB1) has been tested and found to comply with ISED radiation exposure limits set forth for an uncontrolled environment and meets RSS-102 of the ISED radio frequency (RF) Exposure rules.

- End Product Labeling

The HX1T-AB1 and HX1R-AB1 are labeled with its own IC ID. If the IC ID is not visible when the HX1T-AB1 and HX1R-AB1 are installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. In that case, the final end product must be labeled in a visible area with the following:

HX1T-AB1:

"Contains Transmitter Module IC: 26230-HX1"

or

"Contains IC: 26230-HX1"

HX1R-AB1:

"Contains Transmitter Module IC: 5123A-GM220P"

or

"Contains IC: 5123A-GM220P"

ISED (Français)

Le présent émetteur radio installé à l'intérieur du HX1T-AB1 et du HX1R-AB1 a été approuvé par Innovation, Sciences et Développement Économique Canada (ISED Canada, anciennement Industrie Canada) pour fonctionner avec l'antenne intégrée

Composant est conforme aux normes RSS, exonérées de licence d'ISED. Son mode de fonctionnement est soumis aux deux conditions suivantes:

1. Composant ne doit pas générer d'interférences.
2. Ce composant doit pouvoir être soumis à tout type de perturbation y compris celle pouvant nuire à son bon fonctionnement.

- Déclaration d'exposition RF

Les connaissances scientifiques dont nous disposons n'ont mis en évidence aucun problème de santé associé à l'usage des appareils sans fil à faible puissance. Les appareils sans fil à faible puissance émettent une énergie fréquence radioélectrique (RF) très faible dans le spectre des micro-ondes lorsqu'ils sont utilisés. L'exposition à de faibles RF qui ne produisent pas de chaleur n'a pas de mauvais effets connus sur la santé. Cet équipement (HX1T-AB1) a été testé et jugé conforme aux limites d'exposition aux rayonnements ISDE énoncées pour radioélectriques (RF) CNR-102 de l'ISDE.

- Étiquetage des produits finis

Les modules (HX1T-AB1 et HX1R-AB1) sont étiquetés avec leur propre ID IC. installé devra porter une étiquette faisant apparaître les référence du module intégré.

HX1T-AB1:

“Contient le module transmetteur: 26230-HX1”

or

“Contient le circuit: 26230-HX1”

HX1R-AB1:

“Contient le module transmetteur: 5123A-GM220P”

or

“Contient le circuit: 5123A-GM220P”

Japan – MIC

当該機器には電波法に基づく、技術基準適合証明等を受けた特定無線設備を装着している。

“This equipment contains specified radio equipment that has been certified to the Technical Regulation Conformity Certification under the Radio Law.”



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

Bluetooth Qualification

Type Number	HX1T-AB1, HX1R-AB1
Declaration	D065973
QDID	225769
Listing date	2023-12-01

China – SRRC

设备名称：蓝牙设备

设备型号：HX1T-AB1

CMIIT ID：24J99F5FA001

频率容限：≤20ppm

频率范围：2400-2483.5MHz

发射功率：≤20dBm(EIRP)

占用带宽：≤2MHz

杂散发射限制：≤-30dBm

注意事项：

- (1) 不得擅自改变频率或增加变送输出。
- (2) 未经允许，不得安装或改变天线。
- (3) 不得对其他无线电通信站造成有害无线电干扰。如果它发出有害的无线电干扰，请立即停止使用。
- (4) 在飞机上或机场、天文台、气象雷达站、卫星广播站附近使用时，必须遵守相关规定。

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Chapter 1 Overview

1 Aim of this system

Generally, to stop a device that is in operation, it is necessary to perform the stop operation via communication or physically push a stop switch attached to the device. Even if the machine to be operated is fixed in a nearby location, it may be difficult to approach the machine due to a malfunction, and pushing the stop switch itself may be dangerous to the operator. Additionally, if the machine to be operated is a moving object, it is difficult for the operator to follow the machine and push the attached stop switch. When stopping a mobile device via communication, wiring is required to match the communication specifications, and this wiring limits the movement range and operating area of the device.

This system "HX1T/1R wireless switch transmitter/receiver" consists of a transmitter that the operator pushes the stop switch on and a receiver that performs the stop processing and uses Bluetooth communication to stop devices located at a remote location. This prevents deterioration in work efficiency and at the same time ensures a sense of security for operators.

By setting groups for the Transmitters and the Receivers, those set in the same group will operate, so you can operate multiple Receivers from one Transmitter to stop multiple devices, or multiple Transmitters can operate one Receiver to stop one device.

Although this product is intended to stop the target machine, it can also sound an alarm or drive other devices by combining the output and the target machine. In addition, by operating this system in combination with AE-STOP, it is possible to assist in the operation of the emergency stop switch. For AE-STOP, please refer to the instruction manual for the emergency stop switch with operation assist function (QR code below).

Although this product is intended to stop the target machine, it can also sound an alarm or drive other devices by combining the output and the target machine. Additionally, by operating this system in combination with AE-STOP, it is possible to assist the operation of the emergency stop switch. For AE-STOP, please refer to the instruction manual for the emergency stop switch with operation support function (QR code below).



Emergency stop switch with operation assist function Instruction Manual



The operation of AE-STOP using the Transmitter and the Receiver is not an emergency stop operation based on international safety standards or communication specifications based on international safety standards, so please do not treat the Transmitter and the Receiver as a safety related part.

2 About this system

This system consists of the Transmitter and the Receiver, and when used in combination with AE-STOP, the emergency stop switch can be activated within communication range of the Transmitter and the Receiver. If you do not use AE-STOP with this system, refer to "Stopping the machine without using AE-STOP".

The Transmitter and the Receiver are linked in group settings. They use Bluetooth communication, but pairing is not required.

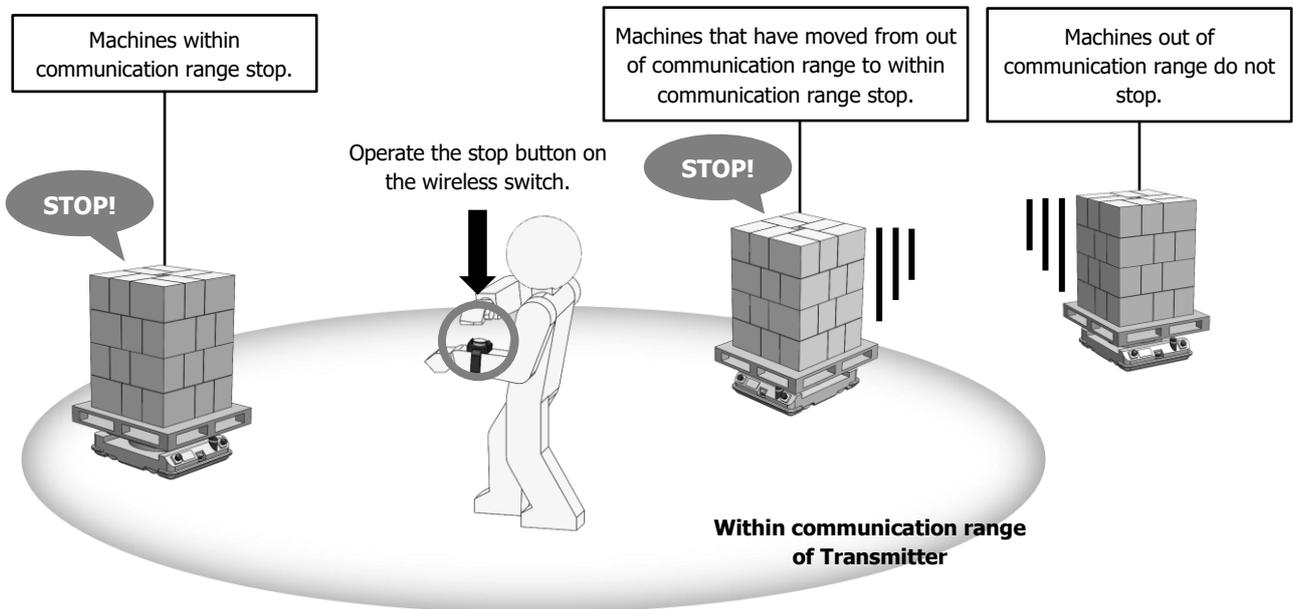


Diagram of the machine stopping within or out of communication range



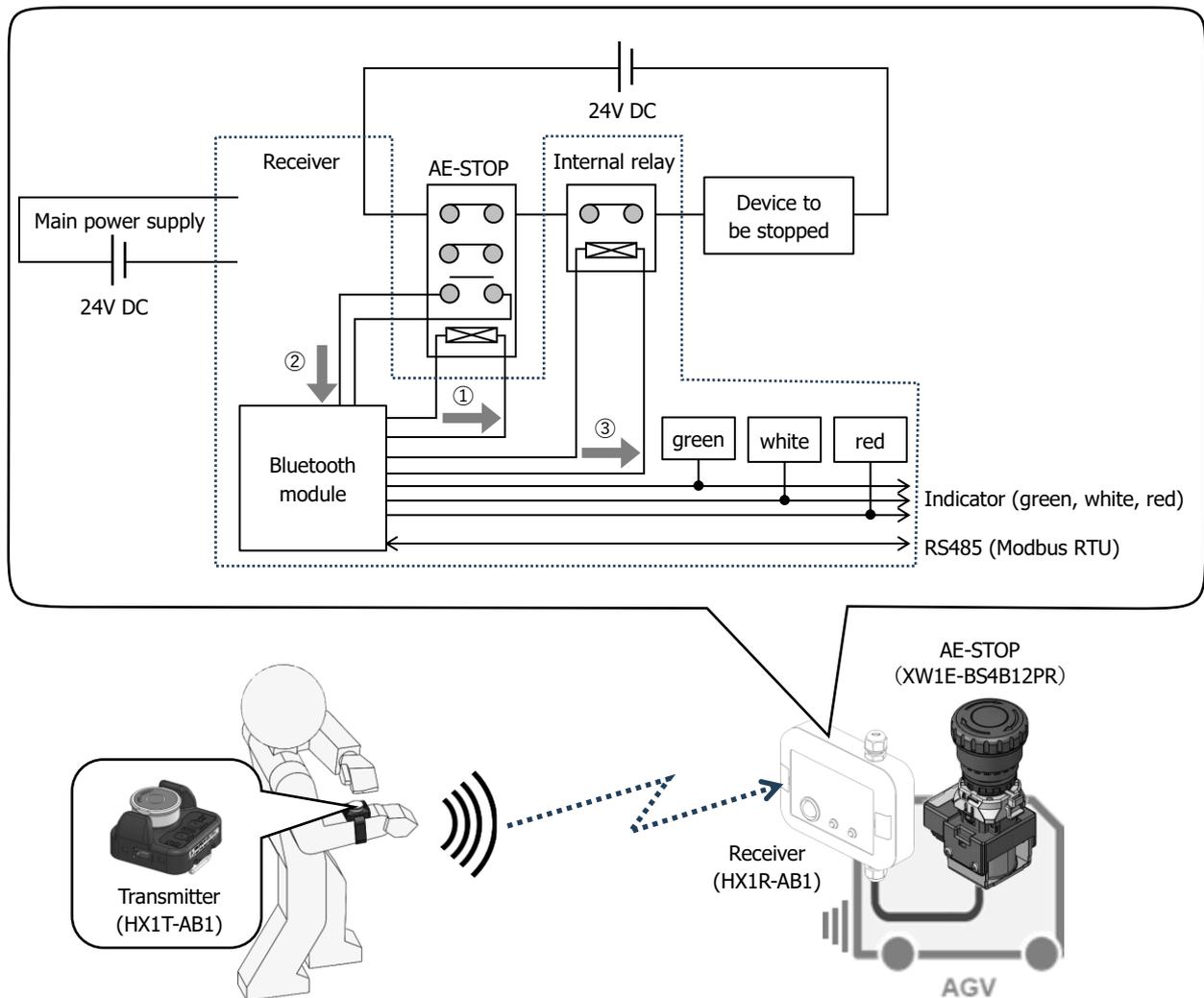
The communication range is an image and is not actually a perfect circle.

In wireless communications, the communication range varies depending on the mutual orientation of the Transmitter and the Receiver, obstacles (human bodies, metal, walls, etc.), the radio wave environment, etc. Please check the communication status before using this product.

When using AE-STOP, meet the following requirements.

- Must be valid in all operating modes and have the highest priority over any other controls. (ISO13850; Section 4.1, ISO60204-1; Section 9.2)
- By combining AE-STOP with this system, clarify the range in which the stop operation of the device can be performed. (ISO12100-2; Section 4.11.1)
- Install the product near each operation control panel or other work location so that it can be operated immediately in an emergency situation. (ISO12100-2; Section 5.5.2, ISO13850; Section 4.4, ISO60204-1; Section 10.7)
- Set the stop category to 0 or 1 to ensure a reliable stop state. (ISO13850; Section 4.4, ISO60204-1; Section 9.2)
- To prevent unexpected sudden startup, configure the system so that it does not restart by reset. (ISO13850; Section 4.4, ISO60204-1; Section 9.2)

● Transmitter/Receiver operation



- ① When the stop button of the Transmitter is pushed, the Receiver activates the AE-STOP solenoid.
- ② The Receiver receives information as to whether the AE-STOP monitor input is turned on.
- ③ If the Receiver does not receive the monitor input ON information, the contact of the internal relay connected in series with the b-contact of AE-STOP is opened.

The above action allows you to stop the target machine.



- The Receiver can receive stop signals from up to 20 Transmitters in the same group setting.
- The status of the Receiver's green, white, and red lamps can be output externally. Additionally, RS485 Modbus RTU communication allows access to the Receiver's internal data.

Chapter 2 Product Specifications

1 Type Number

- **Main body**

Product Name	Type Number
Transmitter	HX1T-AB1
Receiver	HX1R-AB1

- **Accessories**

Product Name	Type Number	Description
Transmitter strap 1	HX9Z-1TS1	Mountable outer circumference: approx. 14 to 22cm
Transmitter strap 2	HX9Z-1TS2	Mountable outer circumference: approx. 22 to 38cm

2 Specifications

● Environmental Specifications

Type Number	HX1T-AB1	HX1R-AB1
Ambient Operating Temperature	-10 to +35°C (for wearable use)	-10 to +50°C*1
	-10 to +40°C (for not wearable use)	
	0 to +40°C (while charged via USB)	
Ambient Operating Humidity	30 to 85%RH (no condensation)	
Ambient Storage Temperature	-20 to +45°C (no freezing)	
Ambient Storage Humidity	30 to 85%RH (no condensation)	
Altitude or Atmospheric Pressure	In use: 1013 to 795hPa (0 to 2000m)	
	During transportation: 1013 to 701hPa (0 to 3000m)	
Pollution Degree	3	2
Corrosion Resistance	Atmosphere free from corrosive gases	
Installation location	Indoor	

● Electrical Specifications

Type Number	HX1T-AB1	HX1R-AB1
Rated Voltage	Power source: Lithium ion polymer secondary battery (3.7V, 380mAh, 7.4mWh)	24V DC, 80 mA
	Charging: Type-C, 5V DC, 100 mA	
Allowable Power Voltage Range	-	21.6 to 26.4V DC
Allowable Momentary Power Interruption	-	10 ms minimum
Inrush Current	-	25 A maximum
Insulation Resistance	-	100MΩ or more (500V DC mega)
Withstand Voltage	-	500V AC

● Construction Specifications

Type Number	HX1T-AB1	HX1R-AB1
External wiring terminal	-	push-in terminal
Applicable cable	-	Cable outer diameter: φ4.5 to 8 mm Cable gland: AVC Corporation of Japan MG12A-08 Conductor: AWG16 to 24
Mechanical Durability	Stop button: more than 50,000 times	
Vibration Resistance	Frequency 5-8.4 Hz, single amplitude 3.5 mm Frequency 8.4 to 150 Hz, acceleration 9.8 m/s ² 3 directions, 2 hours each	Malfunction: Frequency 10 to 55 Hz, single amplitude 0.5 mm (0.2 to 6G) Durability: Frequency 30 Hz, single amplitude 1.5 mm (5.4G) 3 directions, 2 hours each
Shock Resistance	Malfunction: 147 m/s ² , 11 ms Endurance: 147 m/s ² , 11 ms 6 directions, 5 times each	Malfunction: 98 m/s ² , 11 ms Endurance: 147 m/s ² , 11 ms 6 directions, 5 times each
Degree of Protection	IP65*2	IP65

*1 The ambient operating temperature limit varies depending on the mounting orientation. For details, refer to "Restrictions due to mounting orientation".

*2 Protective structure in non-charging state. IP20 when connected with USB cable during charging.

● Performance Specifications

Type Number	HX1T-AB1	HX1R-AB1
Weight (approx.)	60 g	320 g

● Bluetooth Interface Specifications

Type Number	HX1T-AB1, HX1R-AB1
Version	5.2
Frequency Band	37CH(2402MHz), 38CH(2426MHz), 39CH(2480MHz)
Transmission Distance	Maximum approximately 70 m

● Serial Communication Port

Type Number	HX1R-AB1
Communication Type	RS485
Communication Speed	9600 bps (fixed)
Communication Function	Modbus RTU Slave
Cable	3 core unshielded cable
Maximum Cable Length	15 m
Isolation	Not isolated

● External I/O Specifications

■ Transistor Sink Output

Type Number	HX1R-AB1
Output Points	4 points ES: AE-STOP solenoid drive RE: Output/Error lamp (red) WT: Power/Stop signal lamp (white) GR: Communication lamp (green)
Rated Load Voltage	24V DC
Operating Input Voltage Range	21.6 to 26.4V DC
Rated Load Current	ES: 400 mA RE: 50 mA WT: 50 mA GR: 50 mA
Output Delay Time	300 μ s maximum
Voltage Drop (ON Voltage)	1V maximum
Leakage Current	0.1 mA maximum
Clamping Voltage	39V
Overcurrent Protection	None
Isolation	Photocoupler isolated

■ Relay Output

Type Number	HX1R-AB1	
Output Type	1 break contact	
Output Points	1 point	
Rated Load Current	2 A, 30V DC (resistive load)	
Minimum Switching Load	1 mA, 5V DC (reference value)	
Initial Contact Resistance	100 mΩ maximum	
Electrical Life	100,000 operations min. 2 A, 30V DC (resistive load)	
Mechanical Life	10,000,000 operation minimum (at no load)	
Maximum Allowable Inrush Current	2 A	
Output Delay Time	Turn ON Time	10 ms maximum (not including bounce)
	Turn OFF Time	10 ms maximum (not including bounce)

■ Sink/Source Input

Type Number	HX1R-AB1	
Input Type	Sink/Source input	
Input Points	1 point	
Rated Input Voltage	24V DC	
Usable Input Voltage Range	21.6 to 26.4V DC	
Rated Input Current	5 mA	
Input Impedance	4.4kΩ	
Input Delay Time	Turn ON Time	35μs + software processing
	Turn OFF Time	100μs + software processing
Input Threshold	Type 1 (IEC61131-2) ON voltage: 15V minimum, ON current: 3.2mA minimum OFF voltage: 5V minimum, OFF current: 0.9mA minimum	
Isolation	Photocoupler isolated	

● Battery Performance

Type Number	HX1T-AB1
Battery Type	Lithium ion polymer secondary battery
Charging System	USB Type-C connector connection (5V, 500 mA or less)
Maximum Charging Current	100 mA
Standard Charging Time	4 to 5h (charging time from complete discharge with main power slide switch turned OFF)
Recommended Charging Cycle	Fully charged once every 7 to 10 days with 8 to 12 hours of use per day (Up to 500 charge/discharge cycles)
Charging Method	After turning off the main power slide switch of the Transmitter, plug in the USB connector.
Replaceability	Not possible

For precautions regarding battery use, refer to "SAFETY PRECAUTIONS".



- Charging with the main power slide switch turned on may cause battery deterioration.
- When charging or storing for a long time, turn off the main power slide switch.

● Structural Specifications

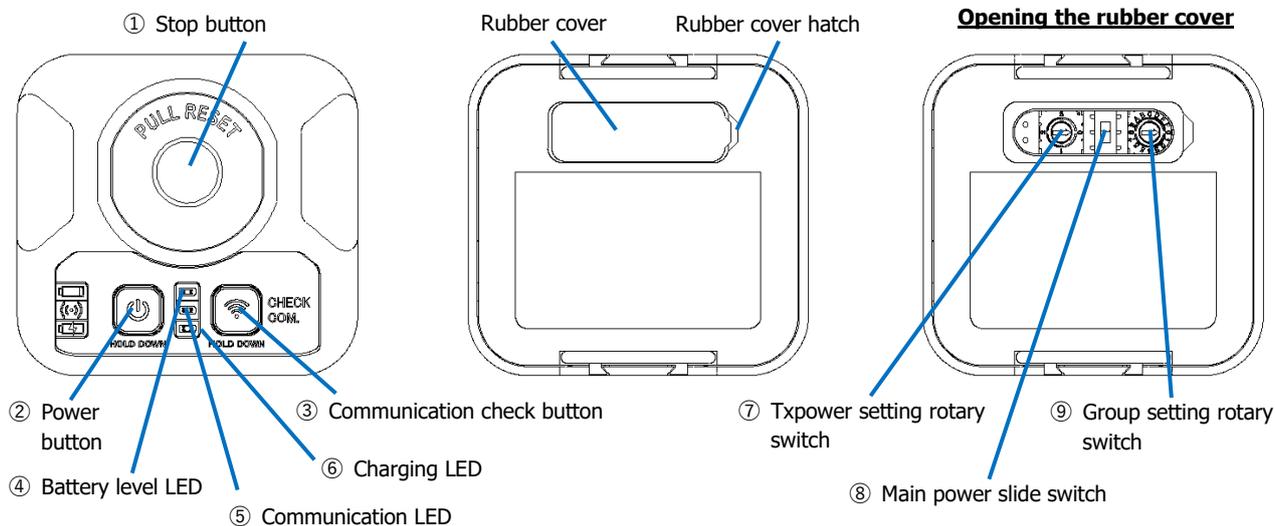
Type Number	HX1T-AB1
Operation Method	Push lock/Pull reset

3 Part Names



The  mark printed on the back of this product indicates that you can refer to the product manual using the QR code.

3.1 Transmitter



- Please remove the protective sheet on the operation parts ① to ⑥ before use.
- When opening the rubber cover, open from the rubber cover removal opening side. Otherwise, the rubber cover may be damaged.
- If the rubber cover is opened, close it tightly because waterproof performance may be impaired.

① Stop button (push lock/pull reset)

If you push the stop button during communication mode, a stop signal will be sent to the Receiver and the stop button will be locked. The Receiver that received the stop signal performs a stop operation. Pulling up the stop button stops sending a stop signal to the Receiver.

② Power button

Push and hold for 3 seconds in sleep mode to enter communication mode and start communication. Push and hold for 3 seconds in communication mode to stop communication and enter sleep mode.

③ Communication check button

When you push this button in communication mode, a communication check signal is sent to the Receiver while it is pushed. Among the Receivers operating within communication range, the communication lamp (green) of the Receivers set to the same group will blink.

④ Battery level LED

Label	LED	Status
	red	Off
		Blinking (1 second intervals)
		Battery level is greater than 20%.
		The battery level is below 20%.



- The Transmitter will work for about 8 hours after the battery level LED starts blinking. However, when the battery level LED starts blinking, stop using the Transmitter and charge it.
- The operating time is just a guideline and will vary depending on the surrounding environment such as temperature. Check the battery level LED display before use, and if the battery level LED is blinking, please charge the Transmitter.

⑤ **Communication LED**

label	LED	Status	
	green	Off	Sleep mode or main power slide switch is turned off.
		Blinking (1 second intervals)	Communication mode.
		Blinking (250 millisecond intervals)	The communication check button is pushed.
		On	The stop button is pushed.

⑥ **Charging LED**

label	LED	Status	
	orange	Off	Charging is complete or charging cable is not inserted.
		Blinking	The charging cable is inserted, but it cannot be charged properly.
		On	The device is being charged using the charging cable.



If the Charging LED blinks, check the charging cable you are using.

⑦ **Txpower setting rotary switch**

Switches the output of radio waves emitted from the Transmitter. The approximate communication distance depends on the switch settings.

- 0: 3 m maximum
- 1: 10 m maximum
- 2: 30 m maximum
- 3: 70 m maximum



- The approximate communication distance shown above is a reference value and is not a guaranteed value. In wireless communication, the communication distance varies depending on the mutual orientation of the Transmitter and Receiver, obstacles (human bodies, metal, walls, etc.), radio wave conditions, etc. Please check the communication status in the environment where you will be using this product before use.
- If you weaken the txpower, it will be more susceptible to the effects of the surrounding environment, and communication may be interrupted more easily.

⑧ **Main power slide switch**

When set to ON, the Transmitter turns on and switches to sleep mode.



In the following cases, turn off the Transmitter's main power slide switch.

- charging
- Not be used for a long time

⑨ Group setting rotary switch

Set up the Transmitter group. Receivers set in the same group will operate. The group to be set depends on the switch settings.

- 0: All groups
- 1: Group 1
- 2: Group 2
- 3: Group 3
- 4: Group 4
- 5: Group 5
- 6: Group 6
- 7: Group 7
- 8: Group 8
- 9: Group 1+2
- A: Group 1+2+3
- B: Group 4+5
- C: Group 4+5+6
- D: Group 1+2+3+4
- E: Group 5+6+7+8
- F: No group settings (all Receivers do not work)

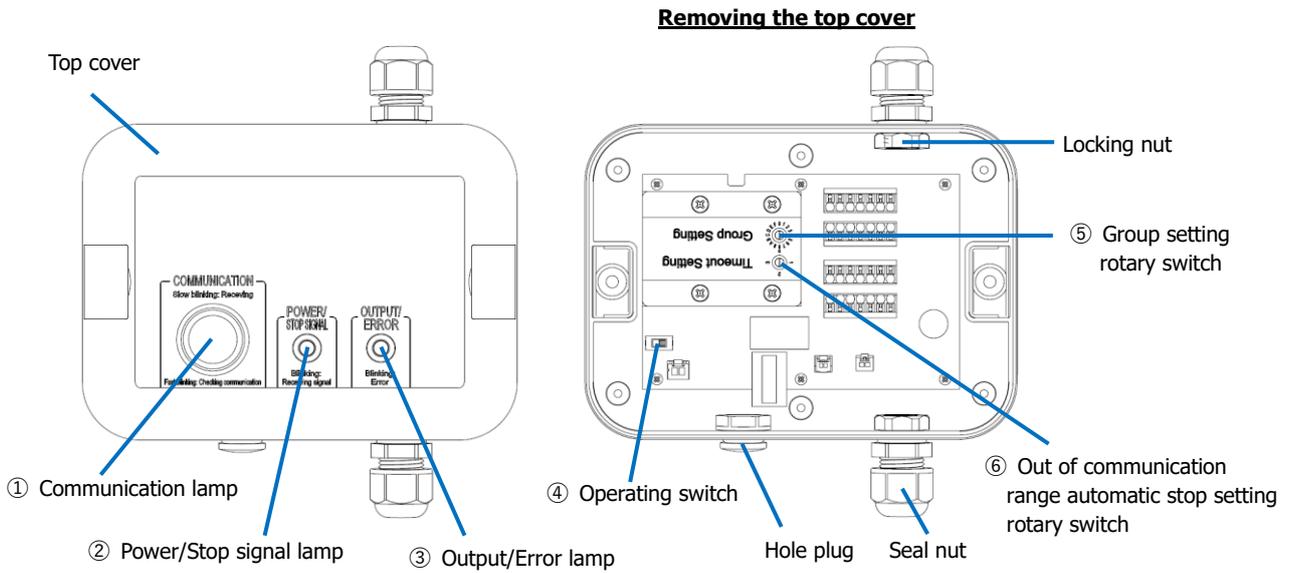
● Transmitter status and operation

Status	Operation
Sleep mode	<ul style="list-style-type: none"> • Immediately after turning on the main power, it goes into sleep mode. • Push and hold the power button for three seconds in communication mode to switch to sleep mode. • Reduces battery consumption.
Communication mode	<ul style="list-style-type: none"> • In sleep mode, push and hold the power button for three seconds to switch to communication mode. • The communication LED blinks (green) at one second intervals. • When you push the stop button, the communication LED lights up (green).



After use, please switch to sleep mode to reduce battery consumption.

3.2 Receiver



① Communication lamp

Lamp		Status
green	Off	Bluetooth communication is not being received from the Transmitters set in the same group.
	Blinking (1 second or 250 millisecond intervals)	Bluetooth communication is being received from the Transmitters set in the same group. The blinking interval varies depending on the signal received. Communication: 1 second Communication check signal: 250 milliseconds

② Power/Stop signal lamp

Lamp		Status
white	Off	Power is off.
	Blinking (1 second intervals)	A stop signal is being received from the Transmitter set in the same group.
	On	Power is on.

③ Output/Error lamp

Lamp		Status
red	Off	It is in a state where no stopping operation is performed.
	Blinking (250 millisecond intervals)	When operating in combination with AE-STOP, the emergency stop switch cannot be operated and is turned OFF by the internal relay*1.
	On	A stop signal sent by the Transmitter in the same group has been received, or a stop operation has been performed due to the out of communication range automatic stop setting.



- If the output/error lamp blinks, immediately operate the emergency stop switch part of the AE-STOP directly by hand.
- By breaking the emergency stop circuit with the relay contacts inside the Receiver, the target machine will be brought to a halt state, but this is not an emergency stop state based on international safety standards.

④ Operating switch

This switch enables or disables internal power supply. When the switch is set to ON, the Receiver starts operating, and when set to OFF, the Receiver stops operating.

*1 This is an abnormal condition in which the emergency stop switch part of AE-STOP does not operate even though a stop signal has been received.



Even if the switch is in the position OFF, the circuit board is still energized, so please handle it with care.

⑤ **Group setting rotary switch**

Set up a group of Receivers. Receivers set in the same group will operate. The group to be set depends on the switch settings.

- 0: All groups
- 1: Group 1
- 2: Group 2
- 3: Group 3
- 4: Group 4
- 5: Group 5
- 6: Group 6
- 7: Group 7
- 8: Group 8
- 9: Group 1+2
- A: Group 1+2+3
- B: Group 4+5
- C: Group 4+5+6
- D: Group 1+2+3+4
- E: Group 5+6+7+8
- F: Group specified using Modbus RTU communication



When the group setting rotary switch is set to "F", the group is set according to the value of the holding register. For details, refer to "Holding Register (HR)".

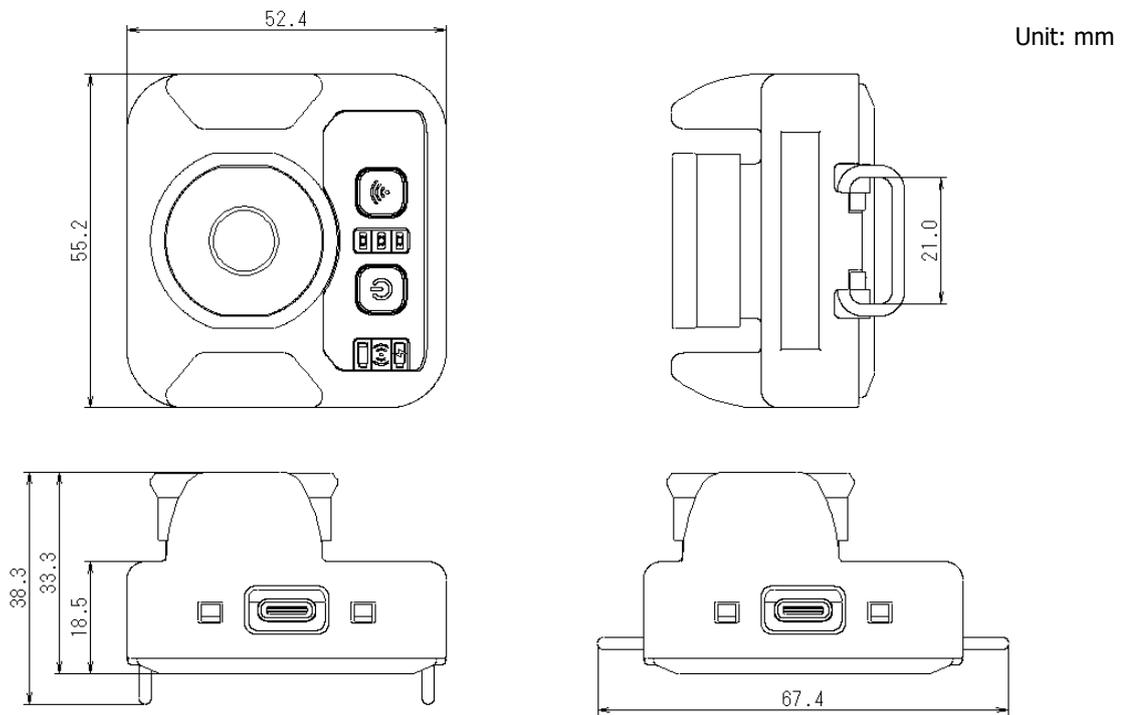
⑥ **Out of communication range automatic stop setting rotary switch**

If the Receiver is not receiving communication from the Transmitter in the same group, it will automatically stop. The conditions for performing a stop action vary depending on the switch settings.

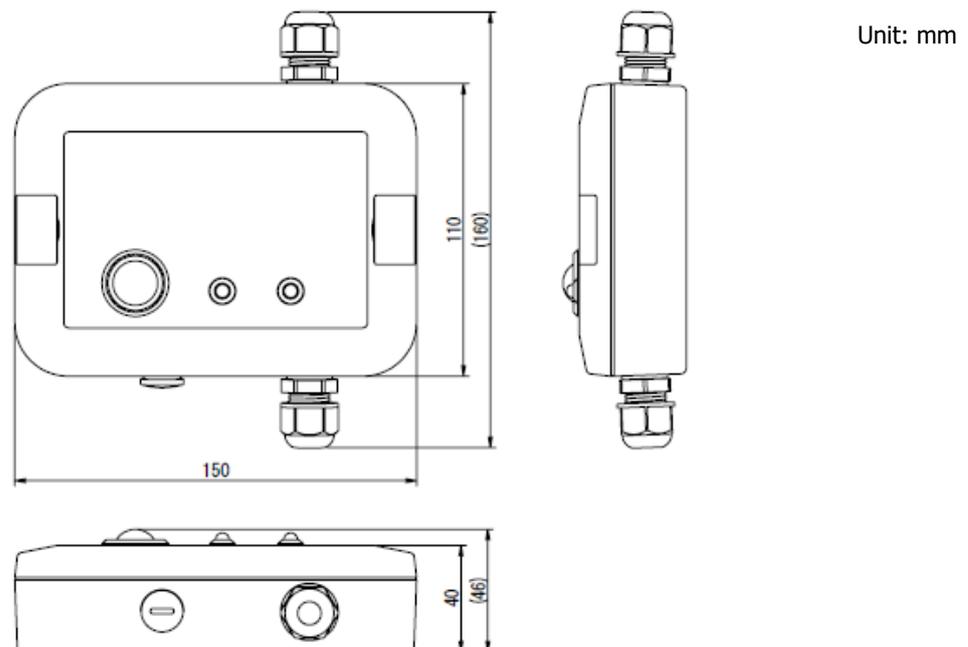
- 0: Function OFF (do not automatically execute stop operation)
- 1: No reception for 1 second
- 2: No reception for 5 seconds
- 3: No reception for 10 seconds

4 Dimensions

4.1 Transmitter



4.2 Receiver



Chapter 3 How to use and inspection items

1 Precautions regarding use location

Please use the Transmitter and Receiver indoors within the specifications.

To maintain the performance and safety of the Transmitter and Receiver, avoid using it in the following locations.

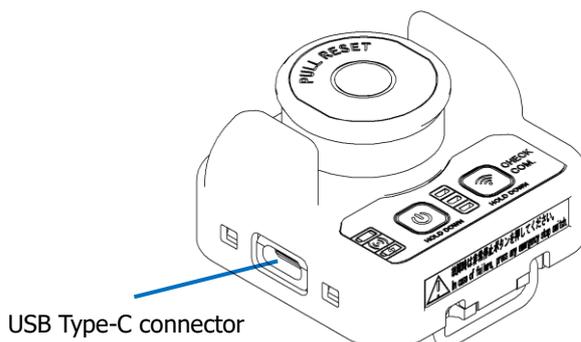
- Where dust, briny air, or iron powder exist.
- Where oil or chemical splashes for a long time.
- Where space is filled with oil mist.
- Where direct sunlight falls on the product.
- Where corrosive or flammable gasses exist.
- Where excessive vibration or shock is transmitted.
- Where condensation occurs due to rapid temperature change.
- Where high voltage lines, high voltage machine, power lines, or power machine exists in close proximity.
- Where strong magnetic fields or strong electric fields occur.

2 Preparation before starting operation

2.1 Charge the Transmitter

Insert the USB Type-C cable into the USB Type-C connector on the side of the Transmitter and charge it.

When you insert the USB Type-C cable, the charging LED (orange) lights up. There is no cover on the live part.



2.2 Set up the Transmitter and the Receiver

Set the following items using the rotary switch.

Device	item	Reference
Transmitter	Group settings, Txpower settings	"Transmitter"
Receiver	Group settings, out of communication range automatic stop settings	"Receiver"

If the group setting is set to "F", it is necessary to set the group using Modbus RTU communication after turning on the power. For details, refer to "Holding Register (HR)".

2.3 Install and wire the Receiver

- 1 Wire the Receiver.
- 2 Turn on the Receiver's operation switch.
- 3 Close the top cover and secure it with the supplied screws.
- 4 Install the Receiver.

For details, refer to "Installation and Wiring".

3 Turn on the Transmitter and the Receiver

- 1 Supply power to the Receiver.
When power is supplied, the power/stop signal lamp (white) lights up.
- 2 Open the rubber cover on the back of the Transmitter and turn on the main power slide switch.
- 3 Push and hold the power button on the Transmitter for three seconds to enter communication mode. When the Transmitter switches to communication mode, the communication LED (green) on the Transmitter will blink (at one second intervals). At this time, the communication lamp (green) of the Receiver that is within communication range of the Transmitter and whose group settings match that of the Transmitter will blink (at one second intervals).



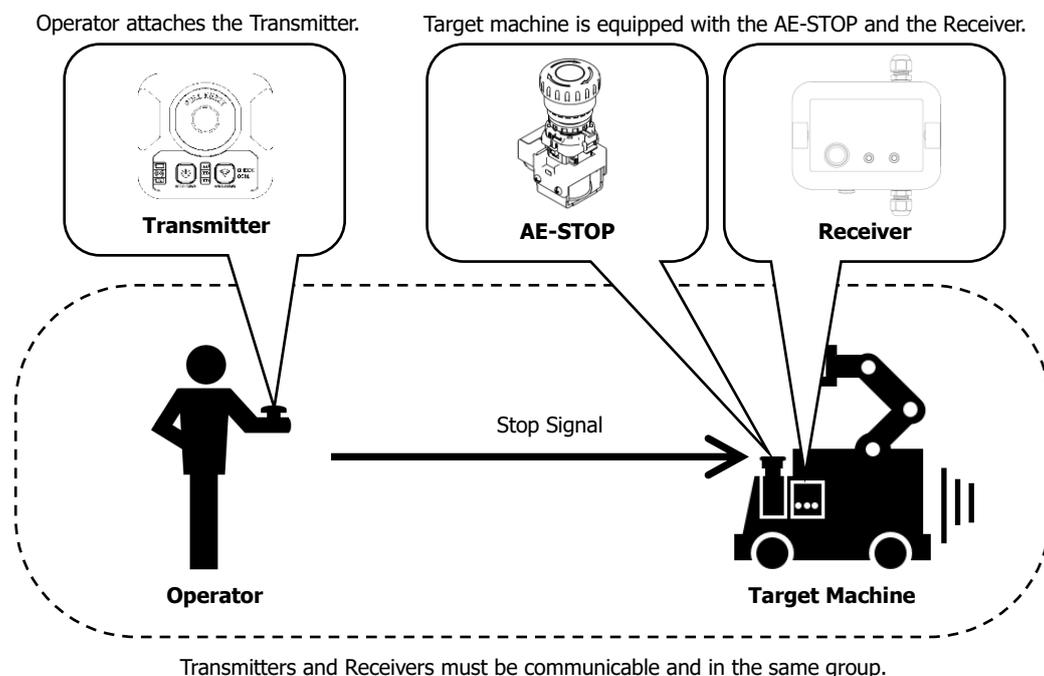
You can check which Receivers are in the same group by pushing the communication check button on the Transmitter. While pushing and holding the communication check button, the communication lamp (green) of Receivers with matching groups will blink (at 250 millisecond intervals).

4 Stopping and canceling stoppage of machine to be stopped

The stop operation by the Receiver operates in the following cases.

- The stop button on the Transmitter is pushed and the Receiver received the stop signal.
- All the Transmitters in the same group as the Receiver for which the out of communication range automatic stop function is set are out of communication range and the Receiver became in a no-communication state.

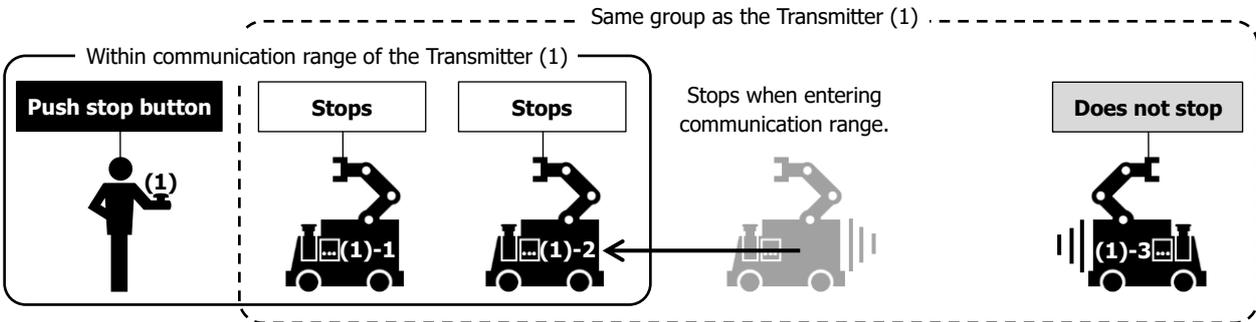
Each operating condition and cancellation are described below.



4.1 Stopping and canceling the stop using the stop button

● Stop operation by pushing the stop button

When the Transmitter stop button is pushed, the Transmitter sends a stop signal. When the receiver received stop signal, it performs a stop operation and stops the target machine.



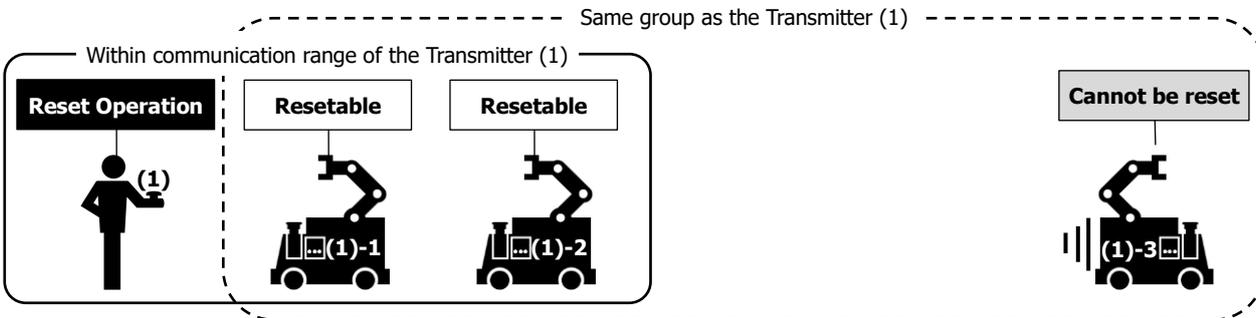
If the machine stops normally, the display for each device is as follows.

Device	LED and Lamp	Display
Transmitter	Communication LED (green)	On
Receiver	Communication lamp (green)	Blinking (1 second intervals)
	Power/Stop signal lamp (white)	Blinking (1 second intervals)
	Output/Error lamp (red)	On

● Stop cancel operation by pulling up the stop button

Pulling up (resetting) the stop button on the Transmitter stops sending the stop signal to the Receiver.

After resetting the stop button of the Transmitter, you can reset the emergency stop switch part of the AE-STOP to cancel the stoppage of the target machine.



When the stop is canceled normally, the display of each device is as follows.

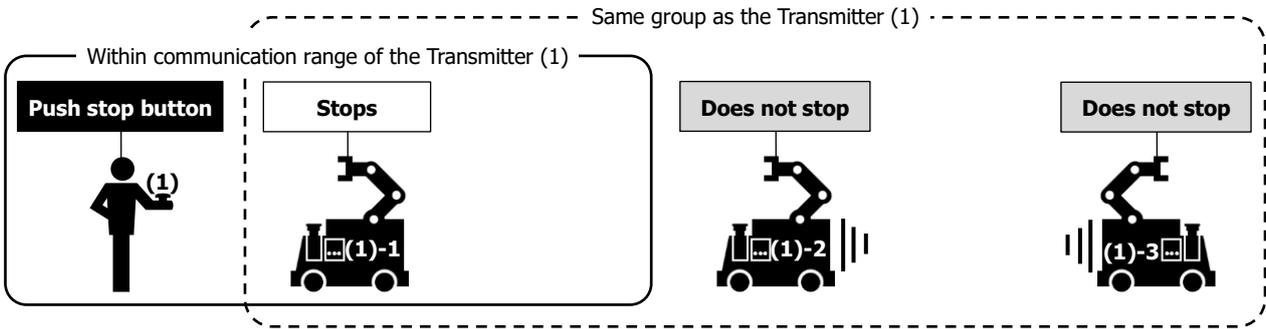
Device	LED and Lamp	Display
Transmitter	Communication LED (green)	Blinking (1 second intervals)
Receiver	Communication lamp (green)	Blinking (1 second intervals)
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	Off



If you try to reset the emergency stop switch part of the AE-STOP without resetting the stop button of the Transmitter, even if you forcefully pull up the emergency stop switch part, it will be pushed immediately and cannot be reset. Be sure to reset the Transmitter first, as this may cause damage to the emergency stop switch.

● **The operation when the stop button is pushed out of communication range and then enter the range.**

Even if the stop button of the Transmitter is pushed when it is out of communication range, the Receiver will not be able to receive the stop signal and will not perform the stop operation.



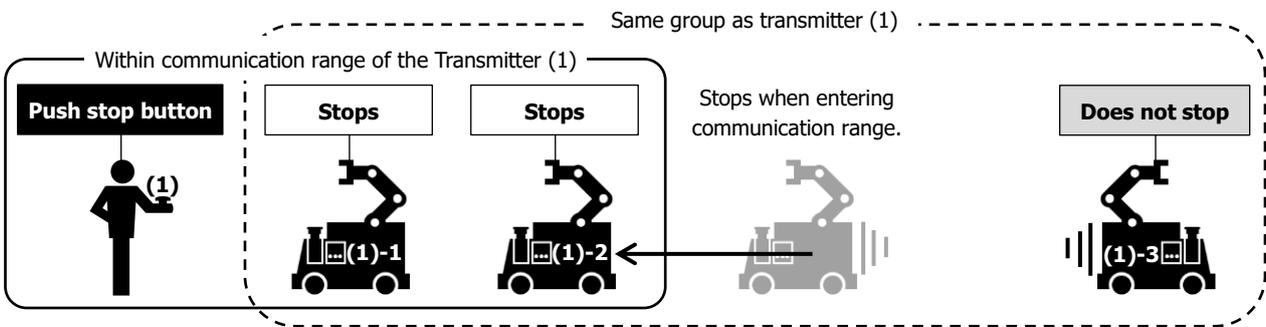
If the stop button is pushed while out of communication range, the display on each device is as follows.

Device	LED and Lamp	Display
Transmitter	Communication LED (green)	On
Receiver	Communication lamp (green)	Off
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	Off



From the viewpoint of safety, this product can set a function that automatically operates stop when it is out of communication range. For details about the out of communication range automatic stop function, refer to "Stop operation by out of communication range automatic stop function".

With the stop button of the Transmitter pushed, the Transmitter continues to send a stop signal. In this state, when the Transmitter comes into within communication range from out of communication range, the Receiver receives a stop signal and performs a stop operation.

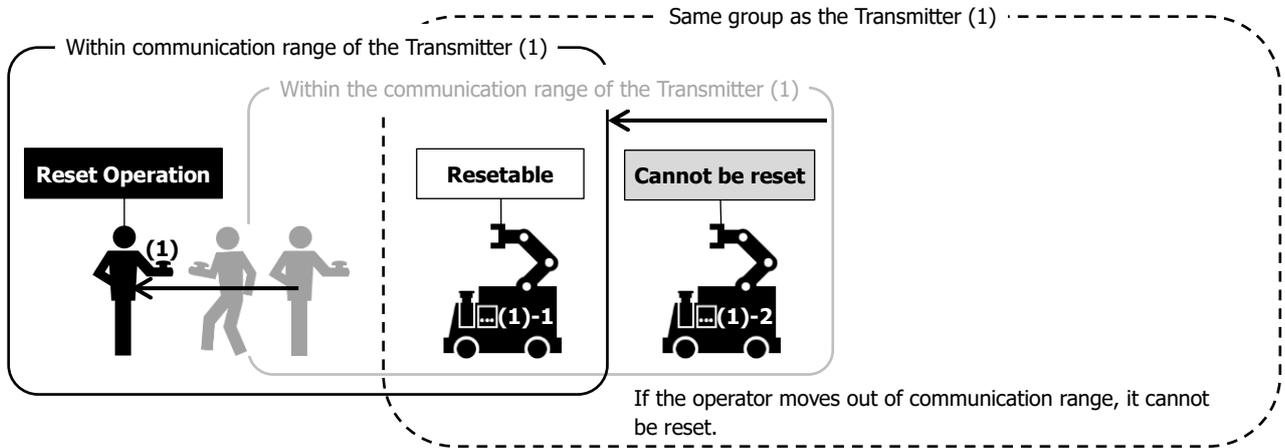


If the stop button is pushed when it is out of communication range and then come into within communication range, the display on each device is as follows.

Device	LED and Lamp	Display
Transmitter	Communication LED (green)	On
Receiver	Communication lamp (green)	Blinking (1 second intervals)
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	On

● **Operation when the stop button is pushed in the communication range and then move out of the communication range.**

When the stop button of the Transmitter is pushed within communication range, the emergency stop switch part of the AE-STOP is pushed and operated. Even if the stop button is reset while the Transmitter is out of communication range, the Receiver will not recognize that the transmission of the stop signal from the Transmitter has been canceled and will continue to stop the operation, so the emergency stop switch part of the AE-STOP cannot be reset.



If the stop button is pushed while within communication range and then move out of communication range, the display on each device is as follows.

Device	LED and Lamp	Display
Transmitter	Communication LED (green)	On
Receiver	Communication lamp (green)	Off
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	On



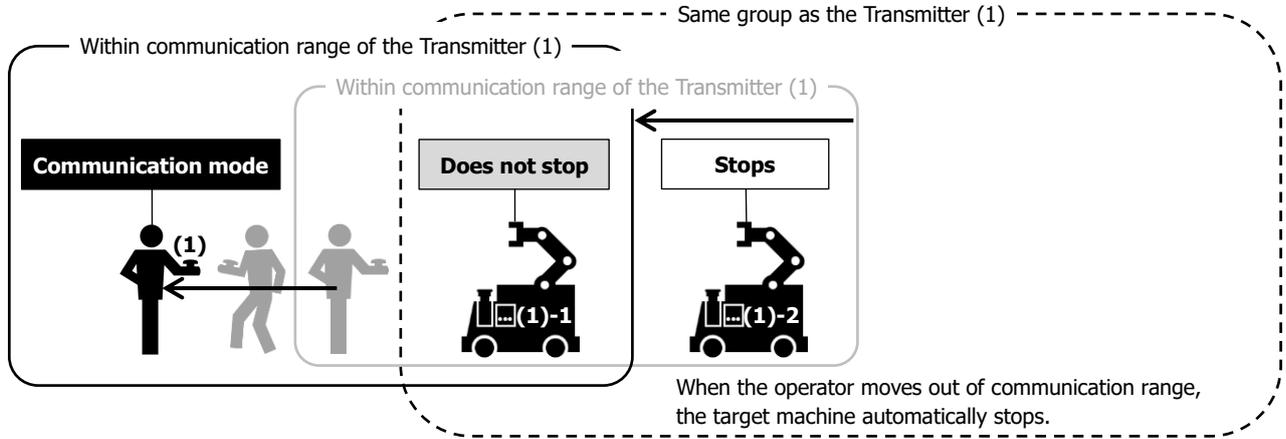
To reset the emergency stop switch part of AE-STOP on the Receiver that is out of communication range, do one of the following:

- Move the Receiver to a place within the communication range and reset the stop button of the Transmitter.
- Reset the stop button of the Transmitter and move to a place where the Receiver is within the communication range. Stopping and canceling the stop using the out of communication range automatic stop function

4.2 Stopping and canceling the stop using the out of communication range automatic stop function

● Stop operation by out of communication range automatic stop function

When the Transmitter that is set in the same group as the Receiver goes out of communication range for a certain period of time, the Receiver automatically performs a stop operation and can stop the target machine.



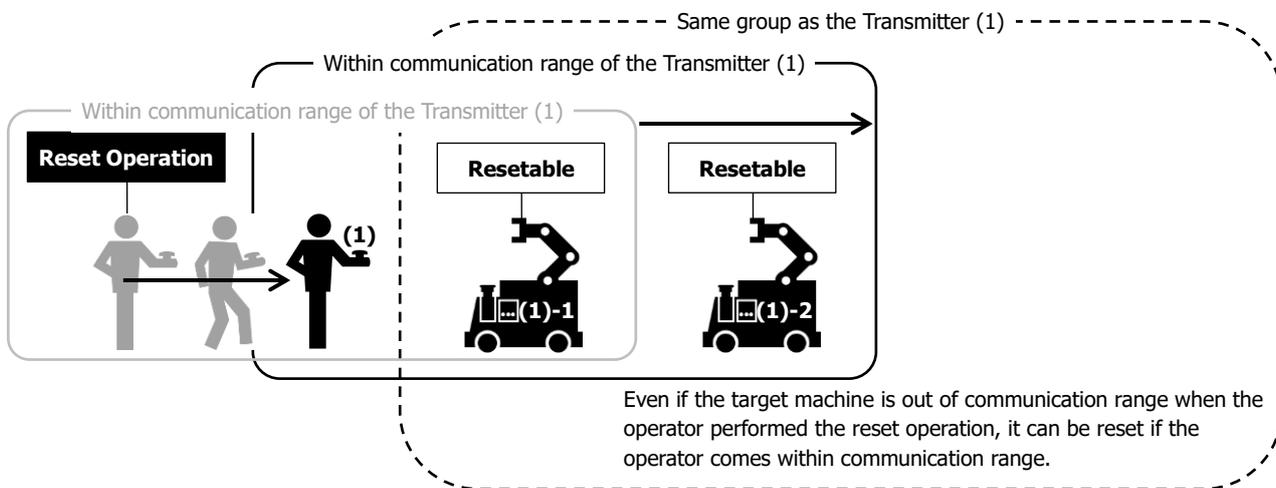
The time until automatic stop can be set using the rotary switch. For details about the rotary switch, refer to "Receiver".

When the out of communication range automatic stop function causes the target machine to stop, the display on each device is as follows.

Device	LED and Lamp	Display
Transmitter	Communication LED (green)	Blinking (1 second intervals)
Receiver	Communication lamp (green)	Off
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	On

● **Reset of the out of communication range automatic stop function**

If the stop button is reset while the Transmitter is within communication range, or if the Transmitter is brought into within communication range from out of communication range while the stop button of the Transmitter is reset, the Receiver will recognize that the stop signal from the Transmitter has been canceled and can reset the emergency stop switch part of AE-STOP.



If it is reset after being stopped by the out of communication range automatic stop function, the display on each device is as follows.

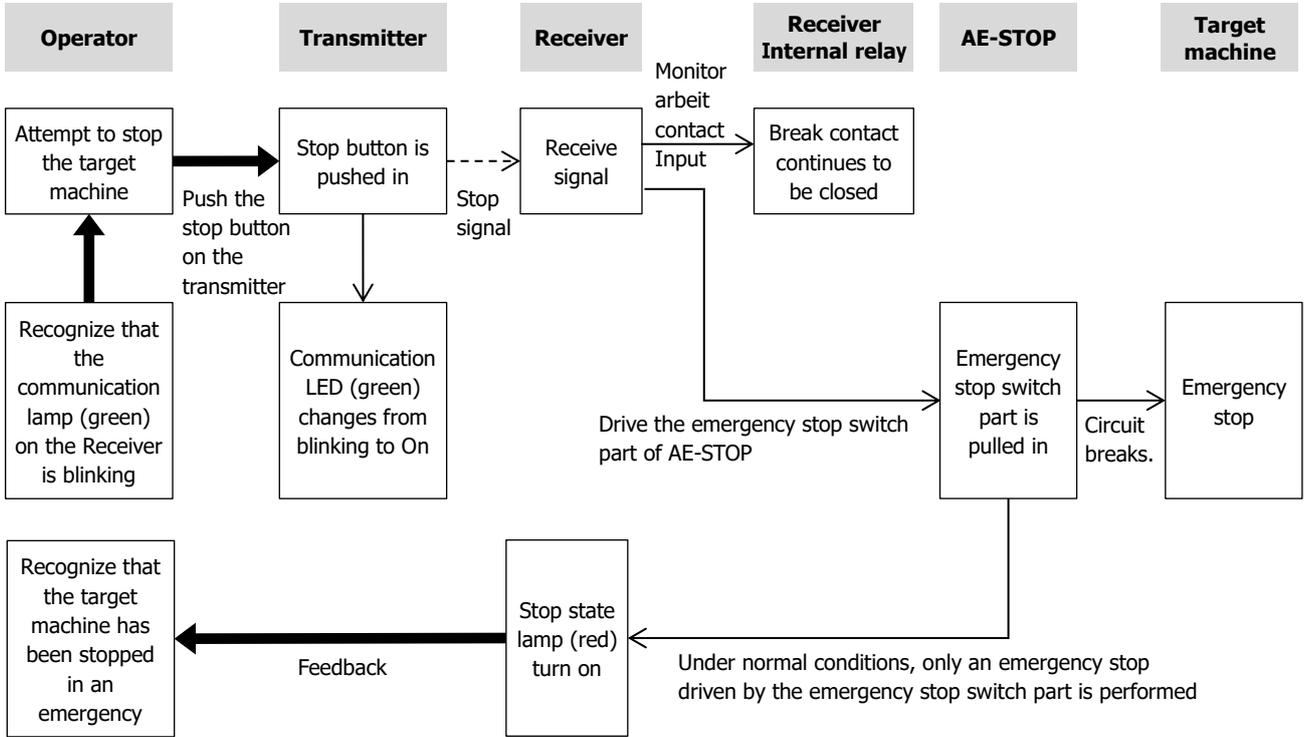
Device	LED and Lamp	Display
Transmitter	Communication LED (green)	Blinking (1 second intervals)
Receiver	Communication lamp (green)	Blinking (1 second intervals)
	Power/Stop signal lamp (white)	On
	Output/Error lamp (red)	Off

4.3 Operation flow

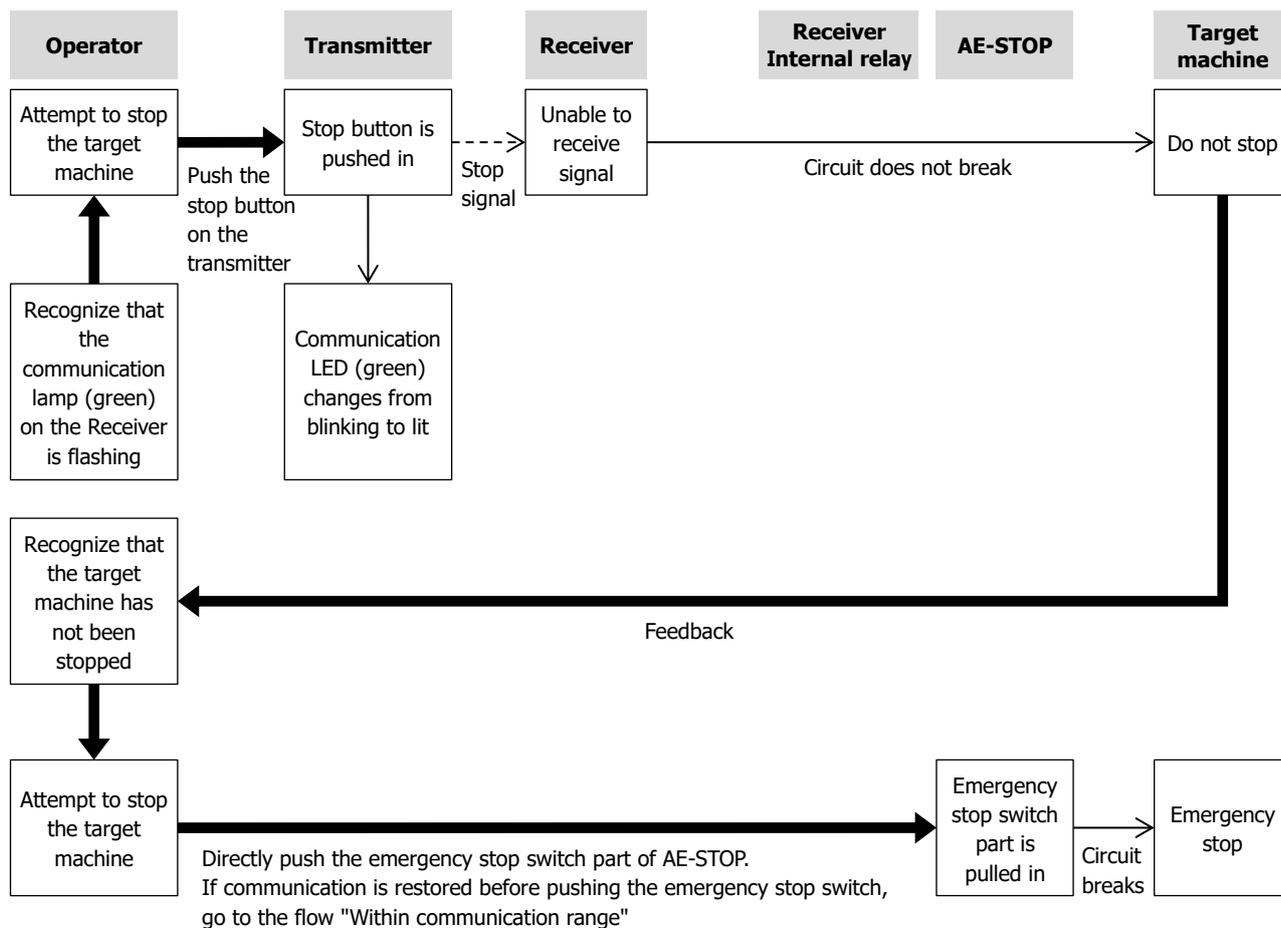
- Operator operations:
- Wireless communication:
- Wired communication:

● Push stop button

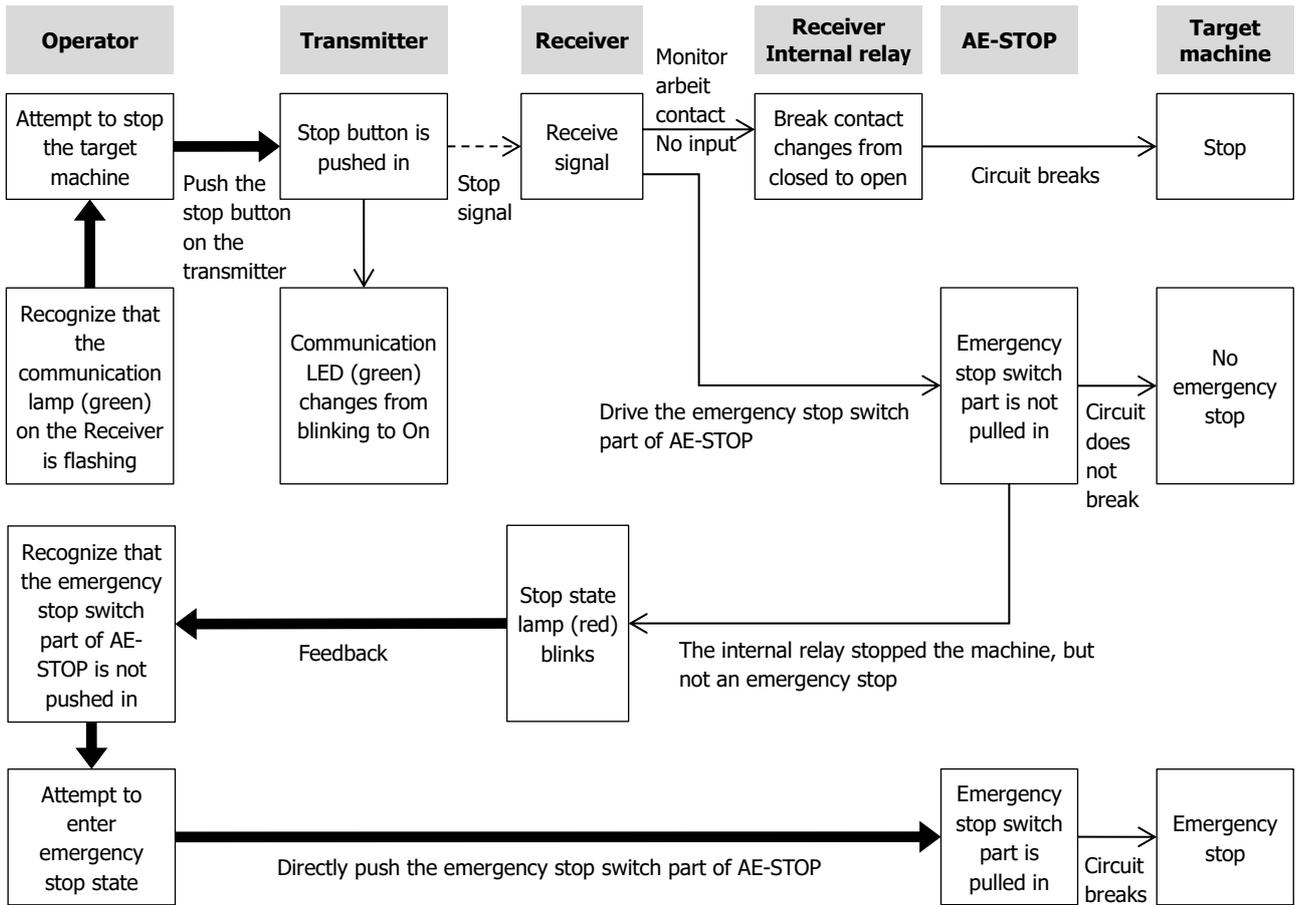
■ Within communication range



■ **Out of communication range**



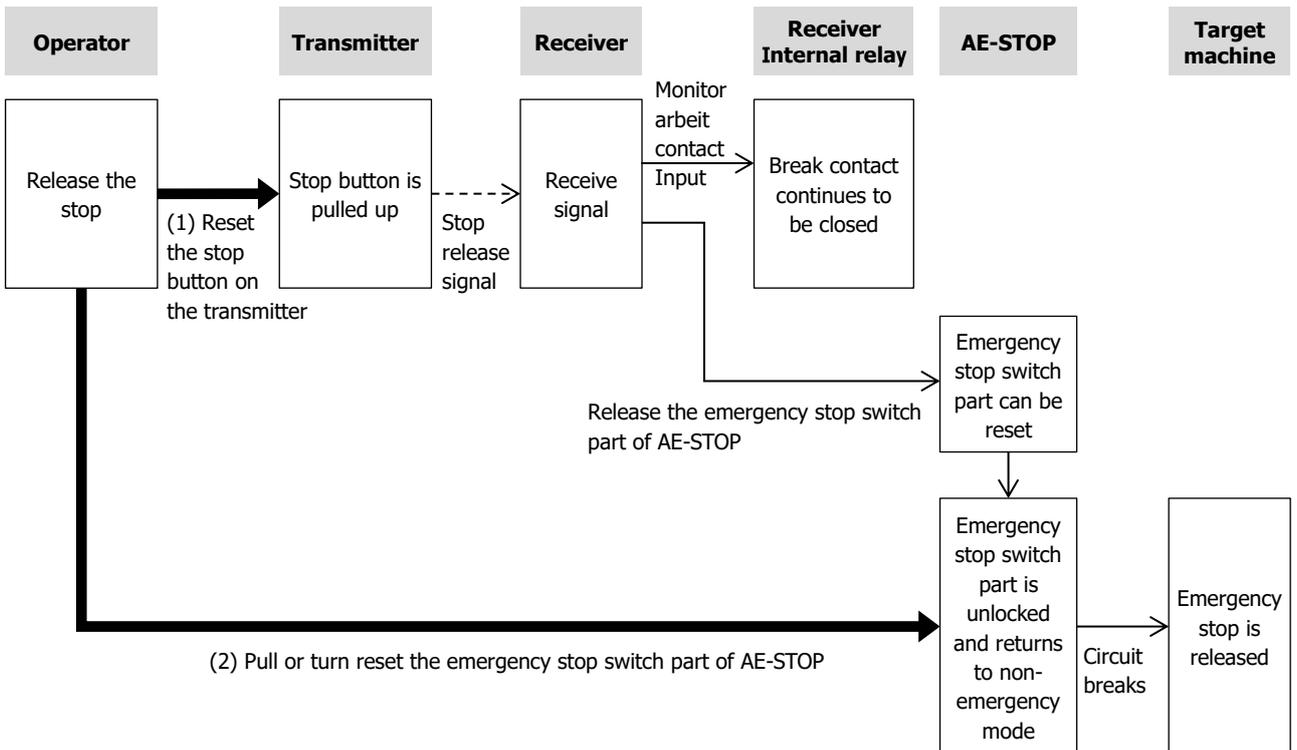
■ **AE-STOP malfunctions**



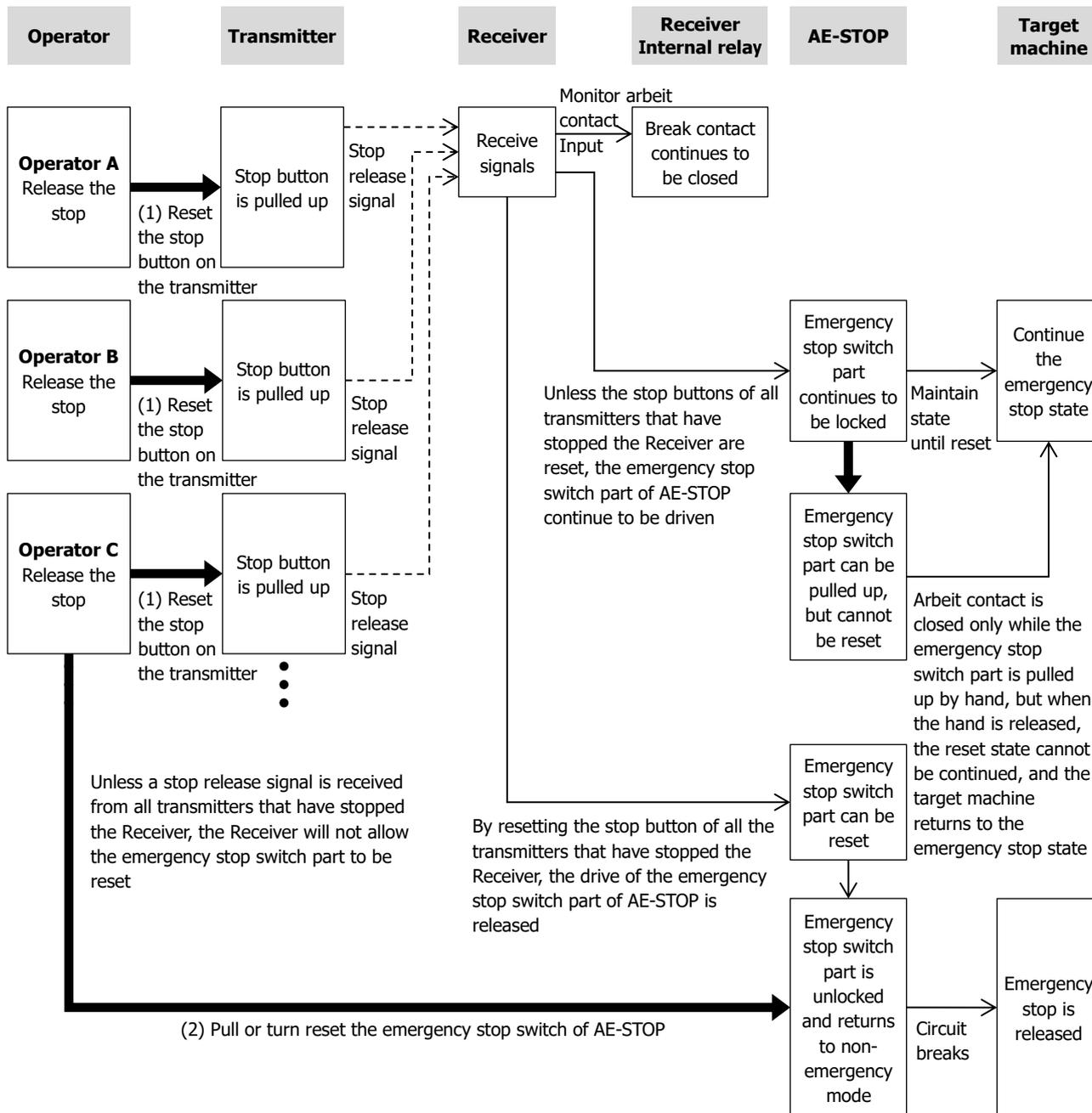
● **Stop cancellation operation**

After resetting the stop button on the Transmitter, reset the emergency stop switch part of AE-STOP.

■ **One Receiver for One Transmitter**



■ One Receiver for Two to Twenty Transmitters

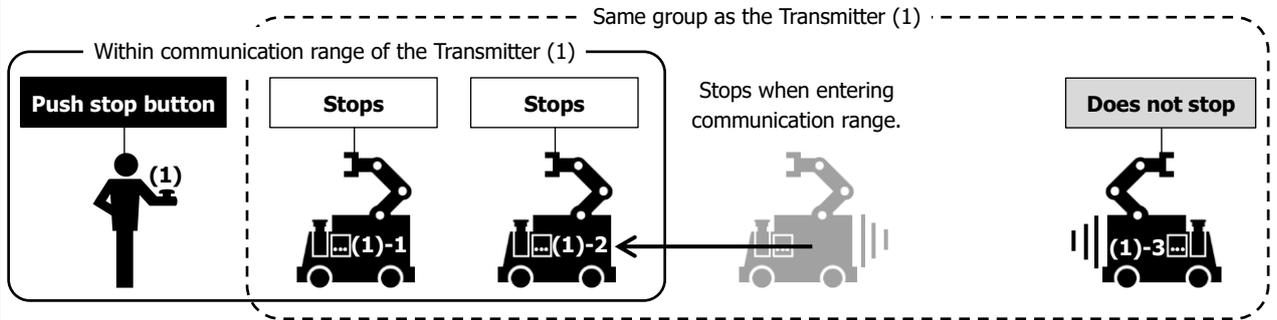


● **Push stop button and reset operations**

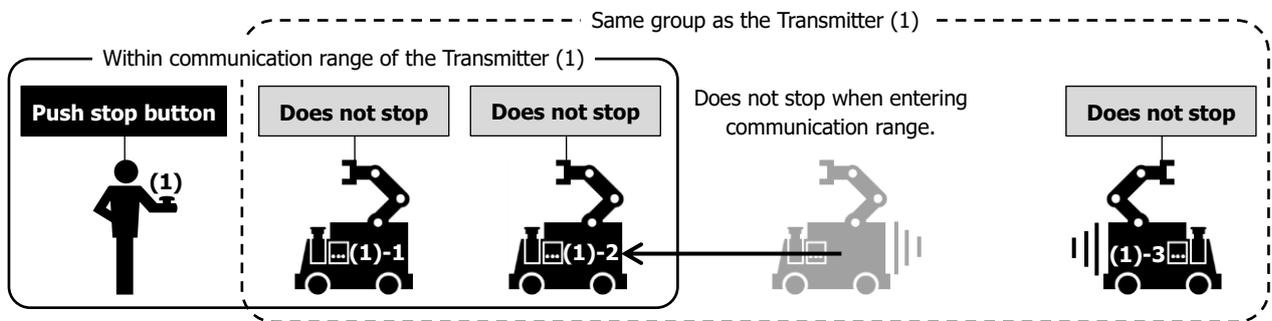
■ **When there is one Transmitter**

Push stop button

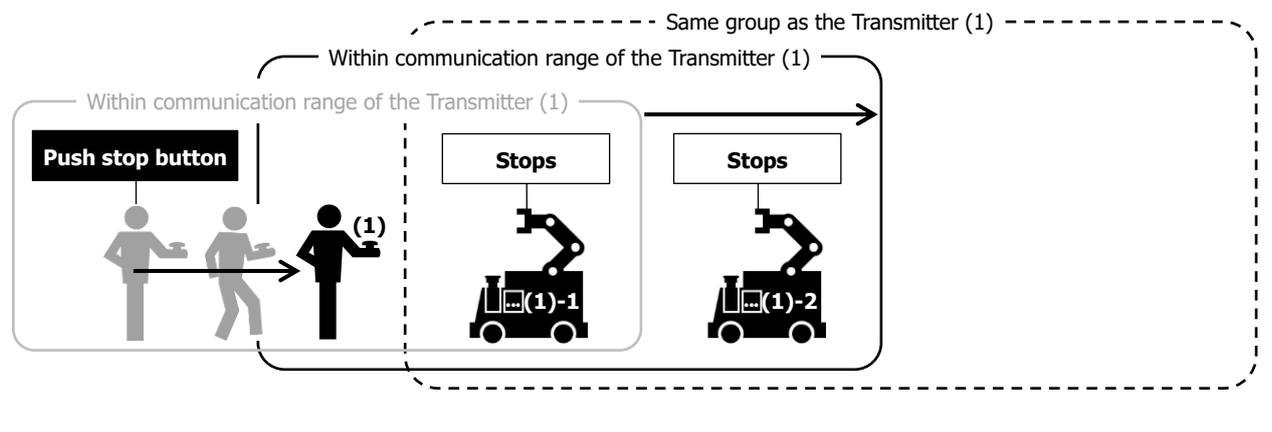
When the operator pushes stop button of the Transmitter, AE-STOP on all the target machine in the same group in the communication range operates and the target machine can be stopped.



Even if the operator pushes stop button of the Transmitter, the target machine cannot be stopped if it is out of communication range or in a different group.

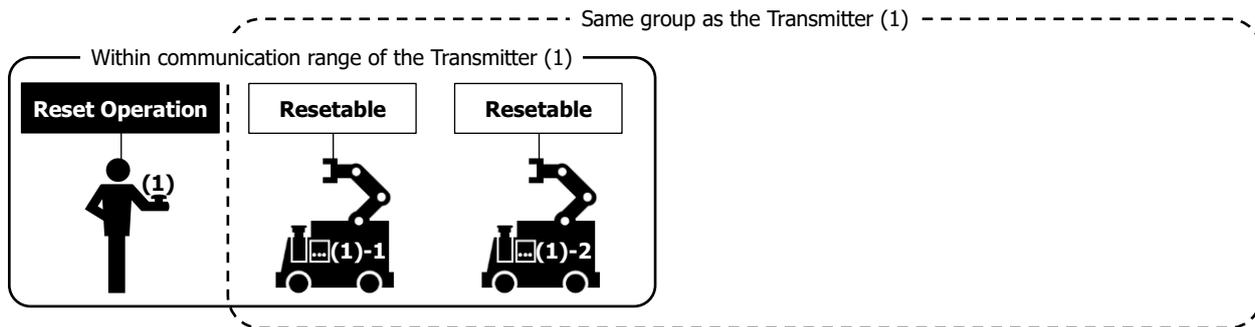


When the operator pushes stop button of the Transmitter, even if the target machine in the same group is located out of communication range, all the target machines will stop if the operator enters the communication range.

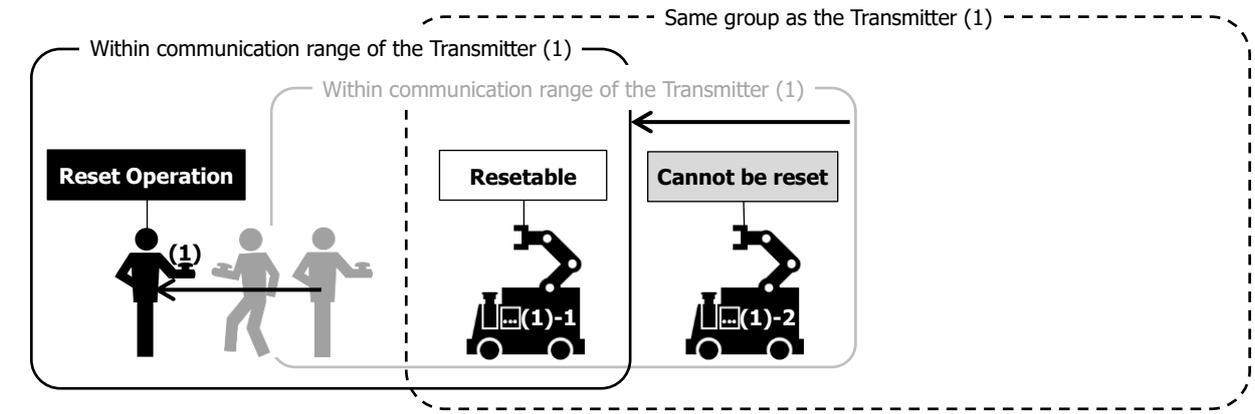


Reset operation

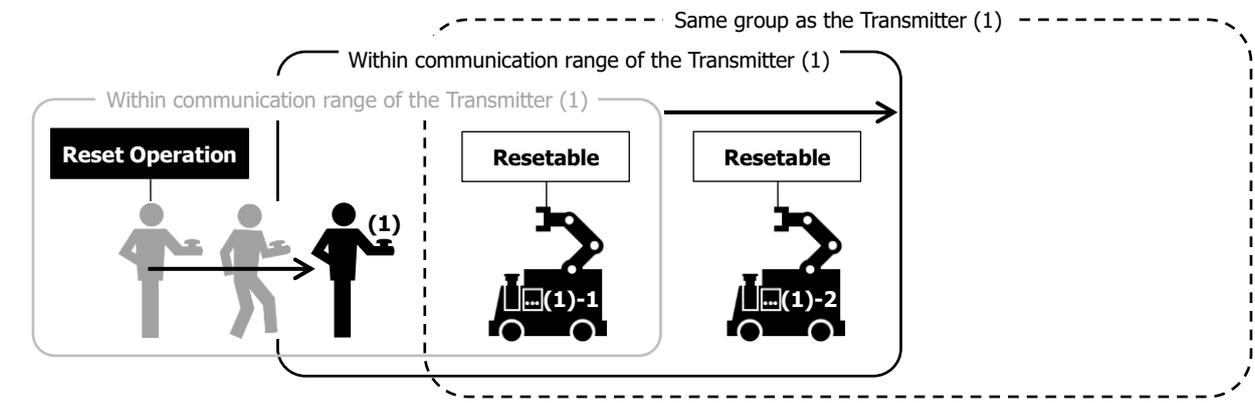
When the operator resets using the Transmitter, AE-STOP on all target machines in the same group within communication range can be reset.



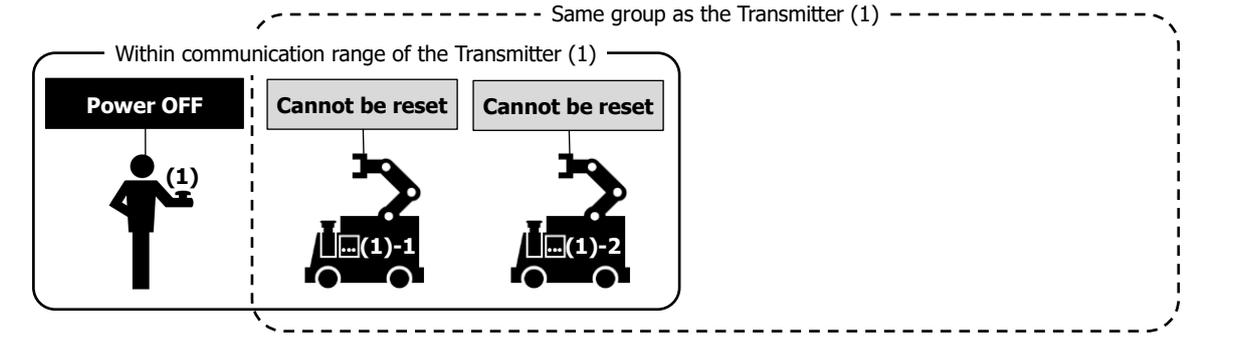
Even if the operator resets using the Transmitter, AE-STOP which is out of communication range cannot be reset.



Even if the target machine in the same group is out of communication range when the operator performs a stop operation with the Transmitter, all AE-STOPS can be reset if the operator then enters within communication range.



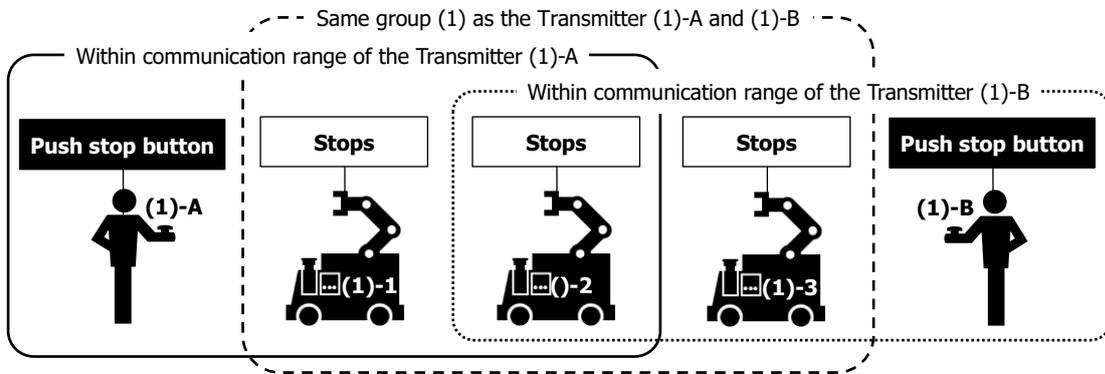
Even if the operator turns off the power to the Transmitter and stops the stop signal, the AE-STOP of the target machine cannot be reset.



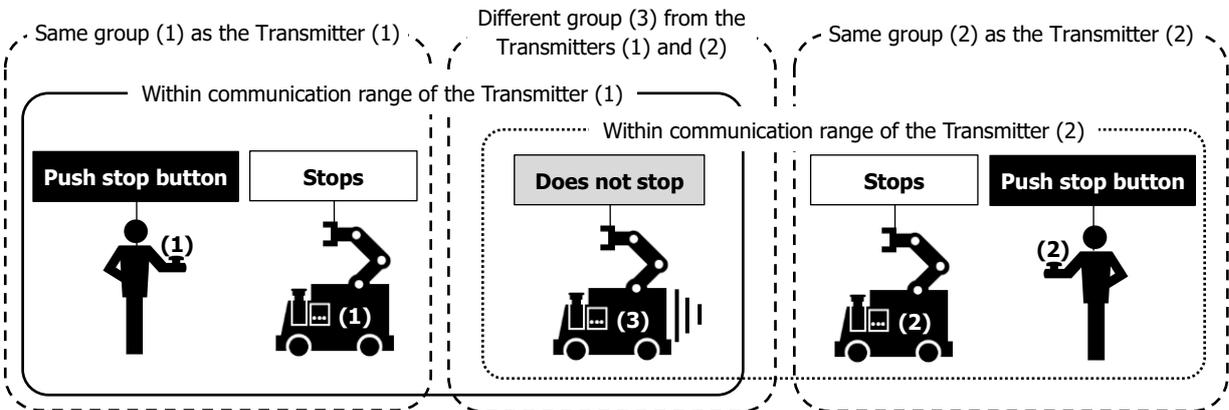
■ When there are multiple Transmitters

Push stop button

When the stop buttons of multiple Transmitters are pushed, AE-STOP on the target machine in the same group within communication range of each Transmitter is activated and the target machine can be stopped. The target machine (1)-2 to be operated within communication range of both the Transmitter (1)-A and the Transmitter (1)-B will stop upon receiving the stop signal from both the Transmitter (1)-A and the Transmitter (1)-B. The order doesn't matter.

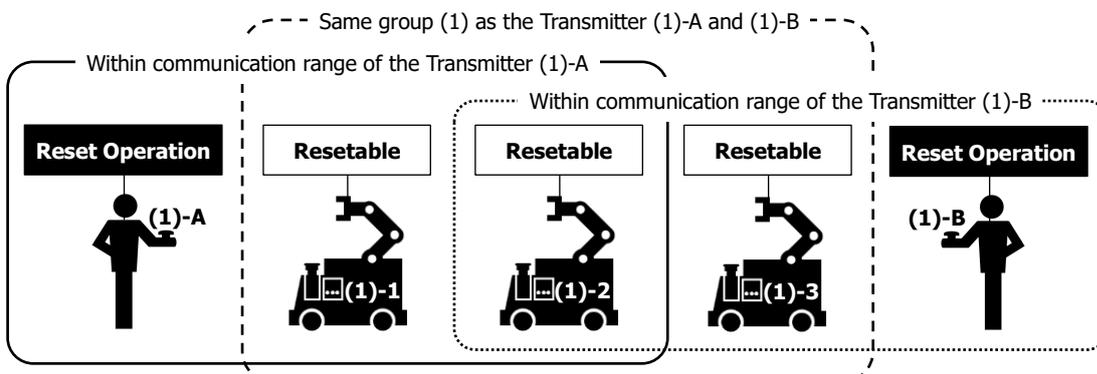


The target machine in group (3) receives the stop signal from both the Transmitter (1) and the Transmitter (2), but it does not stop because the groups are different.

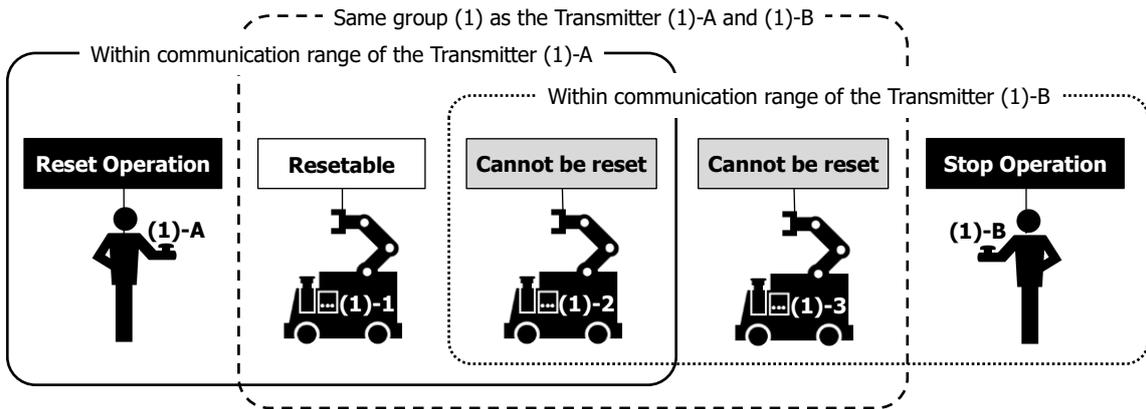


Reset operation

To reset AE-STOP on all target machines, reset all the Transmitters within communication range.

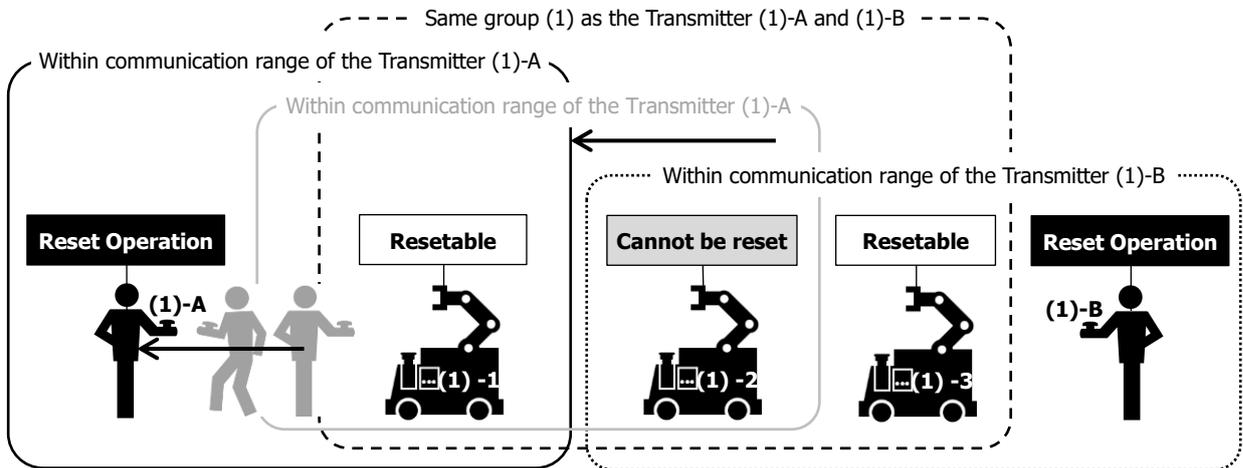


If only Transmitter (1)-A is operated to reset and the push stop button of Transmitter (1)-B is maintained, the AE-STOP of the target machine (1)-2 within communication range of both Transmitter (1)-A and Transmitter (1)-B cannot be reset.

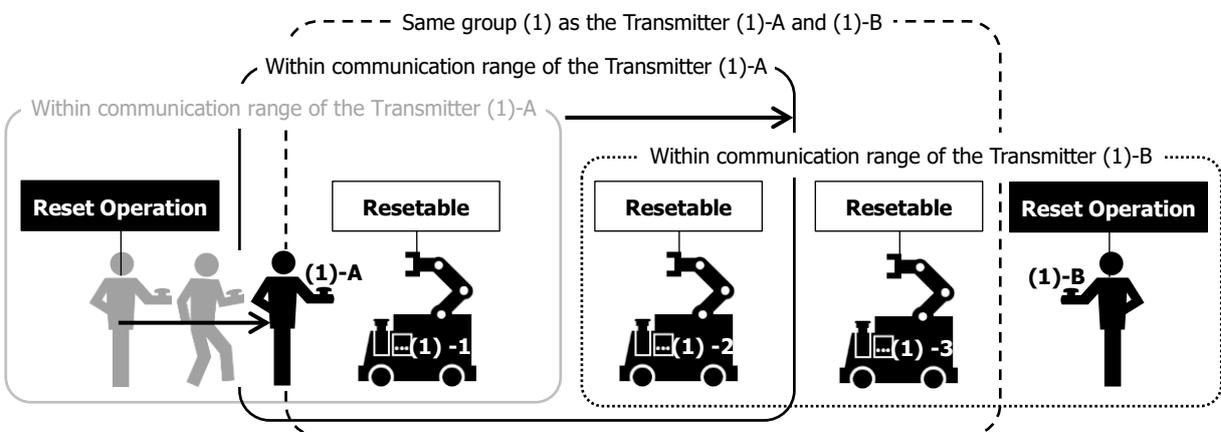


AE-STOP cannot be reset if it is out of communication range.

After the operator moved and went out of communication range, even if the Transmitter (1)-A was reset, the target machine (1)-2 was pushed stop button by both the Transmitter (1)-A and the Transmitter (1)-B cannot recognize this fact, so AE-STOP of target machine (1)-2 cannot be reset.



Even if the operator resets the Transmitter (1)-A out of communication range, if the operator moves and enters within communication range of the target machine (1)-2 that was pushed stop button from both Transmitter (1)-A and Transmitter (1)-B, AE-STOP of the target machine (1)-2 can also be reset.



5 LED and Lamp lighting status list

The status of the push in operation of the emergency stop switch part of AE-STOP can be confirmed by the LED on the Transmitter and the lamp on the Receiver. The table below shows the machine status and countermeasures for the lighting status of LEDs and lamps.

Transmitter			Receiver			Machine status	Workaround
Communication LED (green)	Battery level LED (red)	Charging LED (orange)	Communication lamp (green)	Power/Stop signal lamp (white)	Output/Error lamp (red)		
Off			-			The Transmitter is turned off or in sleep mode.	After turning on the main power slide switch of the Transmitter, push and hold the power button for 3 seconds.
-			Off			The Receiver is not powered on, or the group setting rotary switch is set to "F" and settings using Modbus RTU communication are not made.	Turn on the Receiver's main power slide switch. If the group setting rotary switch is set to "F", specify the group using Modbus RTU communication.
Blinking (1 s intervals)	Off	Off	-			The Transmitter can be used.	The Transmitter can be used normally.
-			Off	On	Off	Receiver can be used.	The Receiver can be used normally.
Blinking (1 s intervals)	-	Off	Off	On	Off	There are no Transmitters with the same group settings within communication range of the Receiver.	Move the Transmitter to within communication range of the Receiver. Whether it is within communication range or not can be checked by pushing the communication check button on the Transmitter.
Blinking (1 s intervals)	-	Off	Blinking (1 s intervals)	On	Off	There is the Transmitter with the same group setting within communication range of the Receiver.	It can be used normally.
Blinking (250 ms intervals)	-	Off	Off	On	Off	The communication check button on the Transmitter is pushed, but there are no Transmitters with the same group settings within communication range of the Receiver.	Move the Transmitter to within communication range of the Receiver.
Blinking (250 ms intervals)	-	Off	Blinking (1 s intervals)	On	Off	The communication check button on the Transmitter is pushed, but the Transmitter is not within communication range with the Receiver, and a Transmitter that is not in operation is within communication range.	Move the Transmitter which are operated to within communication range of the Receiver.
Blinking (250 ms intervals)	-	Off	Blinking (250 ms intervals)	On	Off	The communication check button of the Transmitter with the same group settings that is within communication range of the Receiver is pushed.	It can be used normally.

Transmitter			Receiver			Machine status	Workaround
Communication LED (green)	Battery level LED (red)	Charging LED (orange)	Communication lamp (green)	Power/Stop signal lamp (white)	Output/Error lamp (red)		
On	-	Off	Blinking (1 s intervals)	Blinking	On	The target machine is stopped because the stop button on the Transmitter is pushed, and the emergency stop switch part of AE-STOP is pulled in by the Receiver.	To cancel the Receiver's stop operation, first reset the stop button of the Transmitter, and then reset the emergency stop switch part of AE-STOP.
On	-	Off	Blinking (1 s intervals)	Blinking	Blinking	Even though the stop button of the Transmitter was pushed, the emergency stop switch part of AE-STOP is not pulled in properly.	Manually push in the emergency stop switch part of AE-STOP.
Off	-	Off	Off	On	On	Because the Transmitter was turned off, the Receiver's out of communications automatic stop function is activated, and the emergency stop switch part of AE-STOP is pulled in.	To cancel the Receiver's stop operation, turn on the Transmitter, make sure the Receiver is within the Transmitter's communication range and that the Transmitter's stop button has been reset, then reset the emergency stop switch part of AE-STOP.
						The stop button on the Transmitter was pressed, the emergency stop switch part of AE-STOP was pulled in, and then the Transmitter power was turned off.	
Blinking (1 s intervals)	-	Off	Off	On	On	Because the Receiver has moved out of range of the Transmitter, the out of communication range automatic stop function of the Receiver is activated, and the emergency stop switch part of AE-STOP is pulled in.	To cancel the Receiver's stop operation, make sure the Receiver is within the Transmitter's communication range and that the Transmitter's stop button has been reset, then reset the emergency stop switch part of AE-STOP.
On	-	Off	Off	On	On	After the stop button on the Transmitter was pressed and the emergency stop switch part of AE-STOP was pulled in, the Receiver moved out of the communication range of the Transmitter.	To cancel the Receiver's stop operation, make sure the Receiver is within the Transmitter's communication range and that the Transmitter's stop button has been reset, then reset the emergency stop switch part of AE-STOP.
Off	-	Off	Off	On	Blinking	Even though the Transmitter was turned off and the Receiver's automatic out of communications stop function was activated, the emergency stop switch part of AE-STOP was not pulled in properly.	Manually push in the emergency stop switch part of AE-STOP.
Blinking (1 s intervals)	-	Off	Off	On	Blinking	Although the Transmitter moved to out of communication range and the out of communications automatic stop function of the Receiver was activated, the emergency stop switch part of AE-STOP was not pulled in properly	
-	Blinking	-	-	-	-	The Transmitter's battery level is below 20%.	Stop using it and charge it.
-	-	Blinking	-	-	-	The Transmitter cannot be charged properly.	Make sure that there is no dirt or debris attached to the charging cable or charging terminal.
-	-	On	-	-	-	The Transmitter is charging.	Charge the battery until the charging LED (orange) turns off.

6 Stopping the operation of this system

The procedure to stop the operation of this system is as follows.

- 1** Check the status of the machine.
Transmitter: Stop button not pushed
Receiver: Communication lamp (green) is blinking at one second intervals, the output/error lamp (red) is off.
- 2** Push and hold the power button on the Transmitter for three seconds and make sure the Transmitter switches to sleep mode and the communication lamp (green) on the Receiver turns off.
- 3** Stop the power supply to the Receiver and check that the Receiver's power/stop signal lamp (white) is turned off.

7 Inspection items

Check items	Inspection details	Inspection time		
		At the start of operation	Each time	When changing settings
Situation	Check that each device is free of cracks, chips, or other damage.	YES		
	Push and hold the power button on the Transmitter to switch to communication mode and check the remaining battery power.	YES		
	Make sure the stop button of the Transmitter is reset before turning on the Receiver.	YES		
	Push the stop button on the Transmitter and confirm that the reset operation can be performed normally.	YES		
	If the device is subjected to excessive shock, such as by dropping the Transmitter, be sure to inspect the device and check its condition.		YES	
	At the end of work, push and hold the power button on the Transmitter to put it into sleep mode.		YES	
Installation	Make sure that the Transmitter belt is in normal usable state and does not fall off easily. (Whether there is any foreign matter adhering to the Velcro, etc.)	YES		
	Make sure that the Transmitter is fitted in a position that is easy for the operator to operate.	YES		
	Make sure the ground surface of the Receiver is smooth.			YES
	When using AE-STOP, install it in a location that is easy to operate based on the international safety standards for emergency stop switches.			YES
	Check that the connections and wiring of each device are correct. For details, refer to "Installation and Wiring".			YES
	Make sure that the six Receiver top cover mounting screws are not loose. (Reference tightening torque: 0.3N·m)			YES
	Make sure that the two Receiver mounting M4 screws are not loose. (Reference tightening torque: 0.5N·m)			YES
Setting	Check that the Transmitter's communication output settings and group settings are correct.	YES		
	Make sure that the Receiver's group settings and out of range automatic settings are correct.	YES		YES
	If the Receiver group setting is "F", please check the following points. <ul style="list-style-type: none"> Group settings can be changed using Modbus RTU communication Correct group settings are set at start up 		YES	YES
Communication	After switching the Transmitter to communication mode, push the stop button of the Transmitter and make sure that the emergency stop switch part of AE-STOP to be operated is pushed in before use.	YES		YES
	Make sure that there are no obstacles around the Transmitter and Receiver that may interfere with communication.	YES		
	When starting operation, check that the communication LED (green) on the Transmitter is blinking.	YES		
	If the emergency stop switch part of AE-STOP is pushed in, check that the output/error lamp (red) on the Receiver is lit.	YES		YES



If the installation location of each device, machine configuration, layout, etc. has changed, please conduct an inspection.

Chapter 4 Installation and Wiring

WARNING

- Turn off the power supply before wiring. Failure to turn power off may cause electrical shock or fire hazard.
- Special expertise is required to install, wire, configure, and operate this product. Person without such expertise must not use this product.

CAUTION

- Prevent metal fragments or wire chips from dropping inside the Receiver housing. Ingress of such fragments and chips may cause fire hazard, damage, and malfunction.
- To prevent static electricity damage, do not touch the pins of connectors directly with your hands.
- When handling the Receiver, take measures against discharge to the human body due to static electricity.
- Keep the wiring away from power lines to prevent electromagnetic induction.
- Wire the connectors and terminal blocks without applying force.

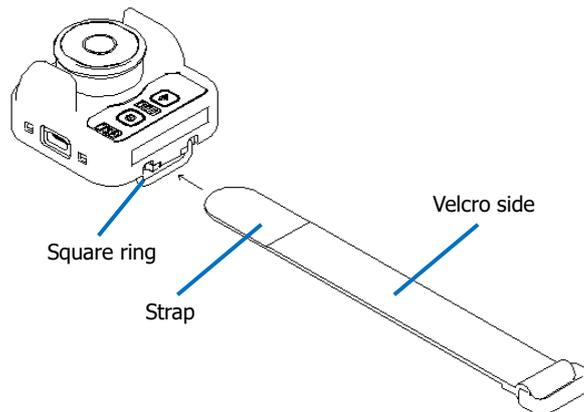
1 Installation



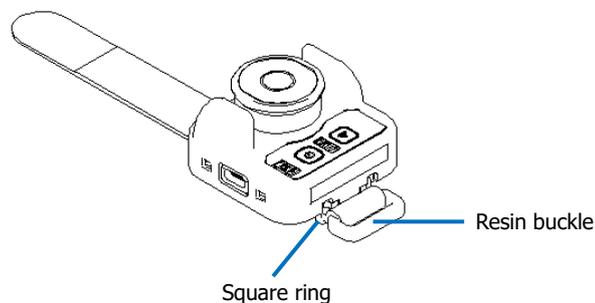
To ensure good ventilation, ensure sufficient space from surrounding fixtures, heating elements, and the panel surface when installing.

1.1 How to attach the Transmitter strap

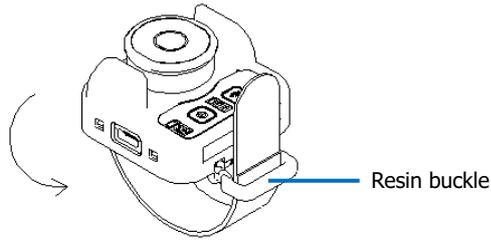
- 1 With the Velcro side of the strap facing the main body, pass the strap through the square ring.



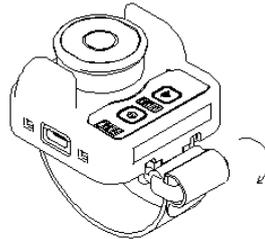
- 2 Pass the strap through until the resin buckle on the strap contacts the square ring.



- 3 Pass the tip of the strap between the resin buckles of the strap.

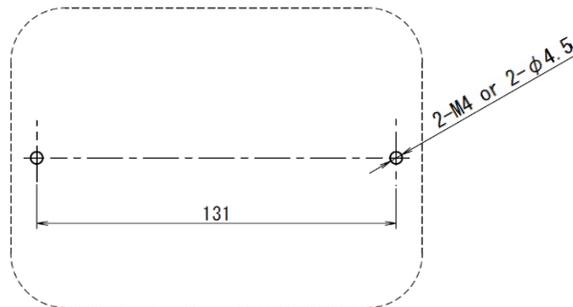


- 4 Fold back the ends of the straps and fasten the Velcro.



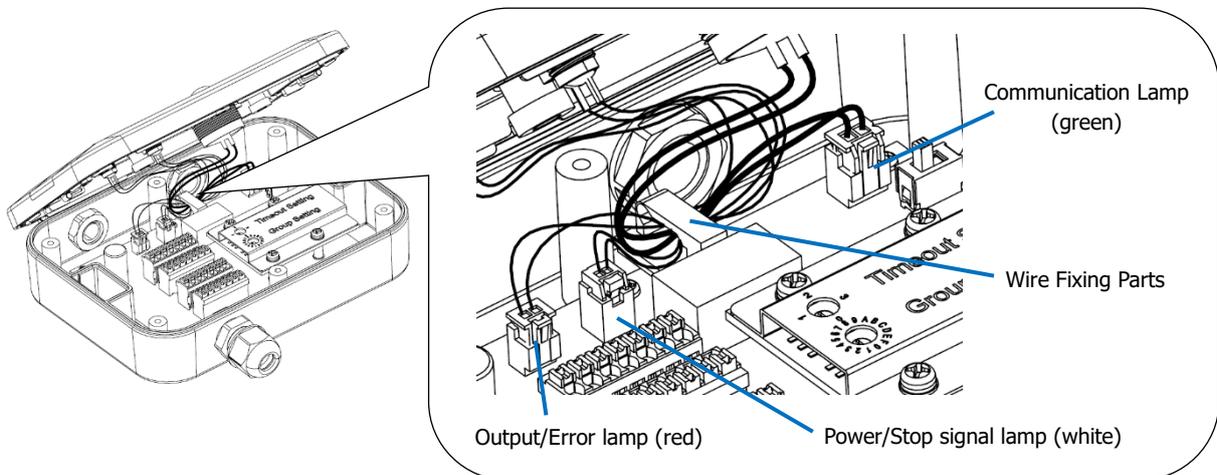
1.2 How to install the Receiver

- 1 Drill a mounting hole with the following dimensions on the mounting target.

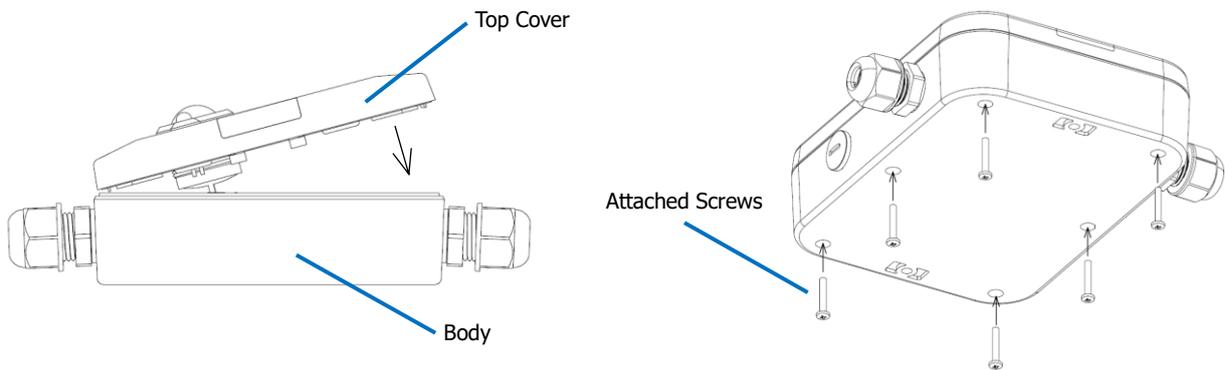


- 2 Remove the temporary fixing tape, open the top cover, and perform internal wiring. For details, refer to "Terminal Arrangement", "Internal equivalent circuit and external wiring", and "Terminal Block Wiring".

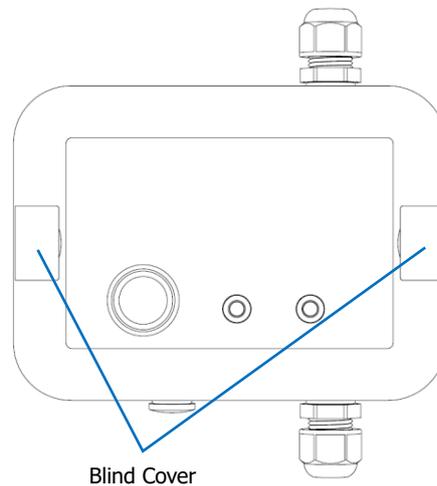
The electric wire of the lamp attached to the top cover is connected to the internal board with a connector, so be careful when opening the top cover. The top cover can be completely separated by removing the lamp connectors (3 locations) and the hooks of the wire fixing parts.



- 3** Attach the top cover to the body and tighten it from the back using the six included screws (M2.5X16) with a tightening torque of 0.3 N·m (reference).
If the top cover has been completely separated, connect the lamp connectors, bundle the wires with the wire fixing parts, then attach the top cover.

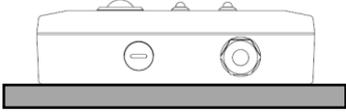
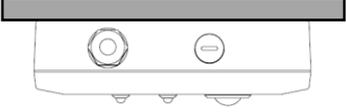


- 4** Open the blind covers and use two M4 screws to attach it to the installation target. Please use M4 screws with specifications that match the installation situation.
<Reference> M4 screw: Tightening torque 0.5 N·m, length (thickness of installation target + 8) mm or more.



1.3 Restrictions due to mounting orientation

The ambient operating temperature is limited as shown in the table below depending on the mounting orientation.

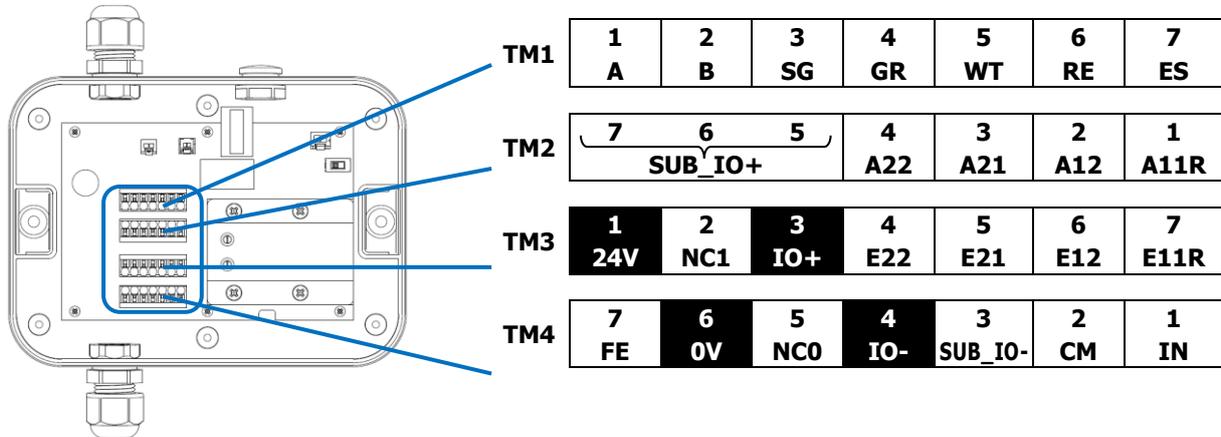
Orientation	Ambient Operating Temperature
<p data-bbox="331 315 616 344">Upward (fixed to the floor)</p> 	<p data-bbox="1050 378 1190 407">-10 to +50°C</p>
<p data-bbox="304 506 644 535">Downward (fixed to the ceiling)</p> 	<p data-bbox="1050 566 1190 595">-10 to +45°C</p>
<p data-bbox="300 752 649 781">Other than upward or downward</p>	<p data-bbox="1050 752 1190 781">-10 to +50°C</p>

2 Terminal Arrangement



Incorrect wiring can damage the internal circuit.

Especially, do not connect power input wires to anything other than 24V, 0V, IO+ and IO- with white text. In addition, do not connect the positive side of solenoids, relays, or lamps to ES, RE, WT, or GR terminal.



Terminal No.	Pin No.	Terminal Name	Feature Description		
TM1	7	ES	AE-STOP solenoid drive	Tr sink output signal	24V DC, 400 mA, resistive load
	6	RE	Output/Error lamp status output	Tr sink output signal	24V DC, 50 mA, resistive load
	5	WT	Power/Stop signal lamp status output	Tr sink output signal	24V DC, 50 mA, resistive load
	4	GR	Communication lamp status output	Tr sink output signal	24V DC, 50 mA, resistive load
	3	SG	Signal ground	RS485	
	2	B	Differential signal B	RS485	
	1	A	Differential signal A	RS485	
TM2	1	A11R	Stop target side: Break contact 1-1	Relay output (paired with E11R)	30V DC, 2 A, resistive load
	2	A12	Stop target side: Break contact 1-2	E12 and internal connection	30V DC, 2 A, resistive load
	3	A21	Stop target side: Break contact 2-1	Internal connection with E21	30V DC, 2 A, resistive load
	4	A22	Stop target side: Break contact 2-2	E22 and internal connection	30V DC, 2 A, resistive load
	5	SUB_IO+	Auxiliary terminal_I/O power supply (+)	IO+(TM3-3) and internal connection	
	6	SUB_IO+	Auxiliary terminal_I/O power supply (+)	IO+(TM3-3) and internal connection	
	7	SUB_IO+	Auxiliary terminal_I/O power supply (+)	IO+(TM3-3) and internal connection	
TM3	7	E11R	AE-STOP side: Break contact 1-1	Relay output (paired with A11R)	
	6	E12	AE-STOP side: Break contact 1-2	A12 and internal connection	
	5	E21	AE-STOP side: Break contact 2-1	A21 and internal connection	
	4	E22	AE-STOP side: Break contact 2-2	A22 and internal connection	
	3	IO+	I/O power supply (+)		24V DC supply (+24 V)
	2	NC1	Reserve_Main power (+)	Internal connection with 24V (TM3-1)	
	1	24V	Main power (+)		24V DC supply (+24 V)

Terminal No.	Pin No.	Terminal Name	Feature Description		
TM4	1	IN	AE-STOP monitor arbeit contact input (+ side)		24V DC, 5 mA
	2	CM	AE-STOP monitor arbeit contact input (COM side)		
	3	SUB_IO-	Auxiliary terminal_I/O power supply (-)	IO-(TM4-4) and internal connection	
	4	IO-	I/O power supply (-)		24V DC supply (0V)
	5	NC0	Reserve_Receiver power supply (-)	Internal connection with 0V (TM4-6)	
	6	0V	Main power (-)		24V DC supply (0V)
	7	FE	Functional Earth		

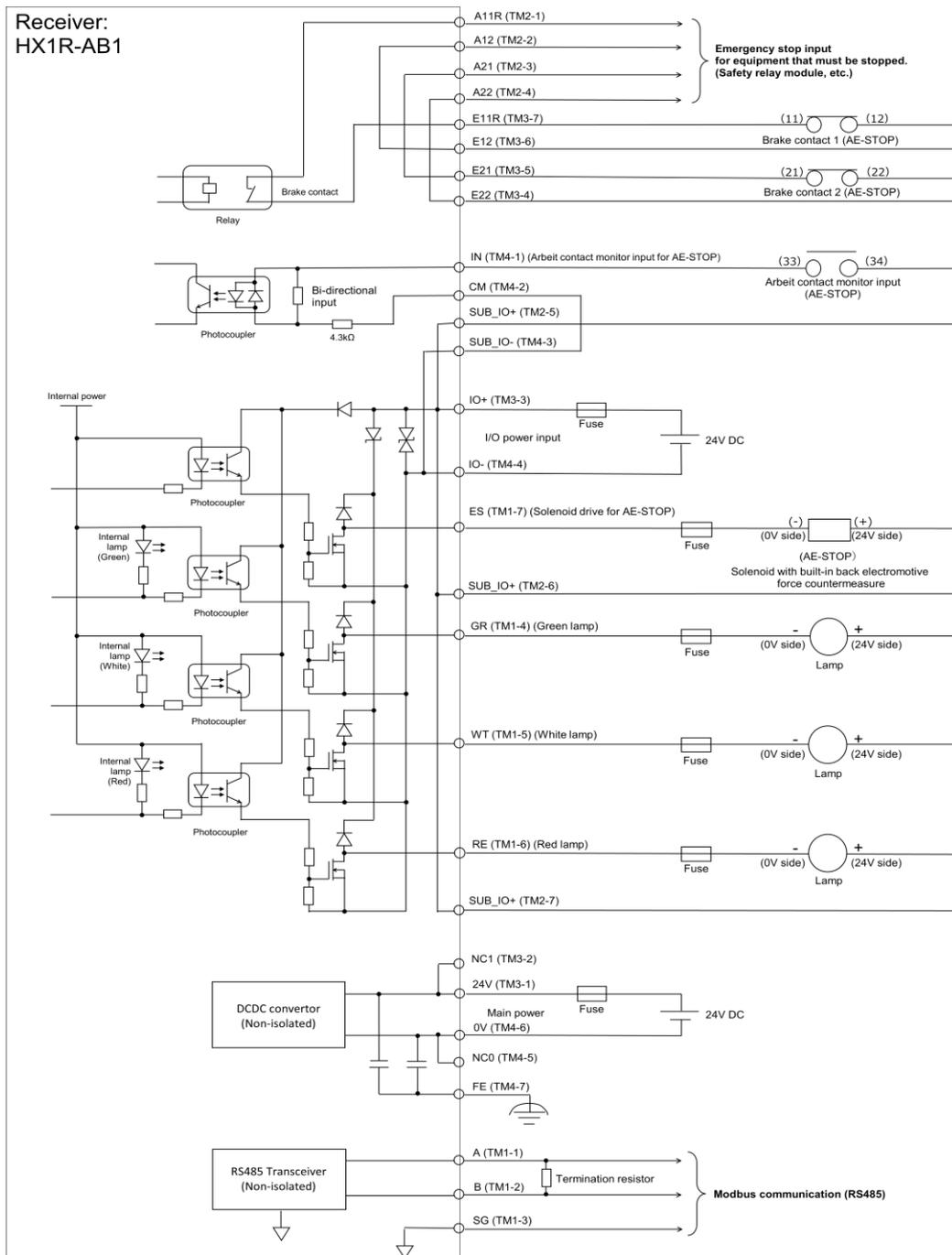
3 Internal equivalent circuit and external wiring



- Do not connect the +24V power supply directly to the ES, RE, WT, GR, SG, B, or A terminal. In addition, do not connect the positive side of solenoids, relays, or lamps to ES, RE, WT, or GR terminal. It may cause damage to the internal circuit.
- Incorrect wiring can damage the internal circuit. Especially, do not connect power input wires to anything other than 24V, 0V, IO+ or IO-.

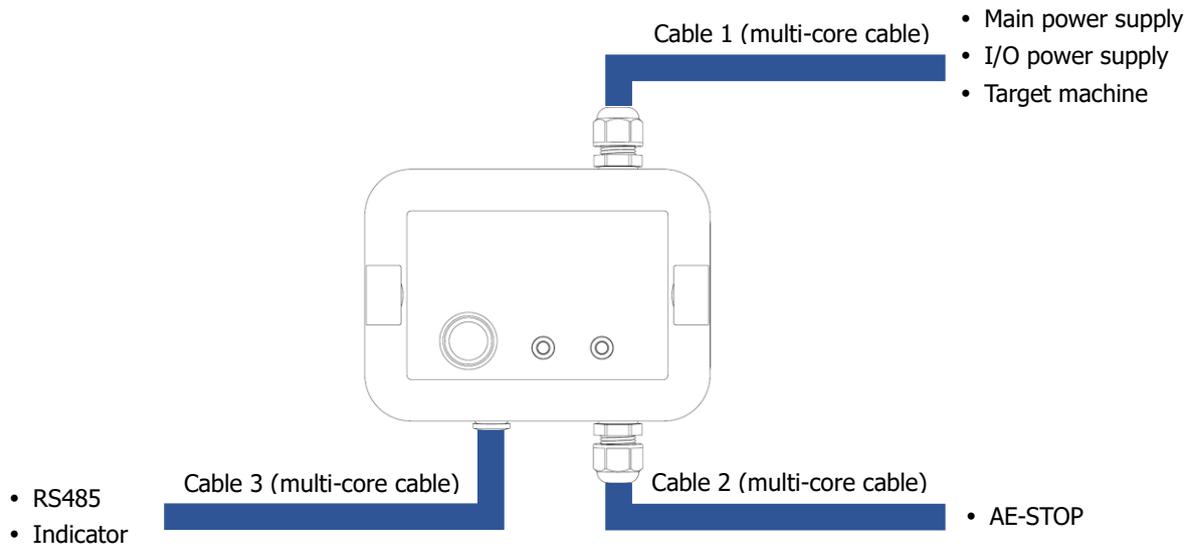


- The transistor output section (ES, GR, WT, RE) can only be used for resistive loads.
- Insert a fuse that corresponds to the load.
Please use an IEC60127 certified fuse. It is required when shipping an equipment with built-in receiver to Europe.
- If the Modbus communication (RS485) is unstable, insert the termination resistors that match the characteristic impedance to both ends of the cable. Use resistors with a rating of 0.5W or more.



3.1 Wiring example

- **Wiring image**



Cable glands are attached where cables 1 and 2 pass through, and a hole plug is attached where cable 3 passes through. Please use cables that match the cable gland listed below.

Cable gland

Manufacturer	AVC Corporation of Japan
Product number	MG12A-08
Applicable wire size	4.5 to 8mm
Tightening torque (reference value)	Lock nut: 1.0 to 1.5 N·m, Seal nut: 0.8 to 1.2 N·m

For details, refer to the manufacturer's website.



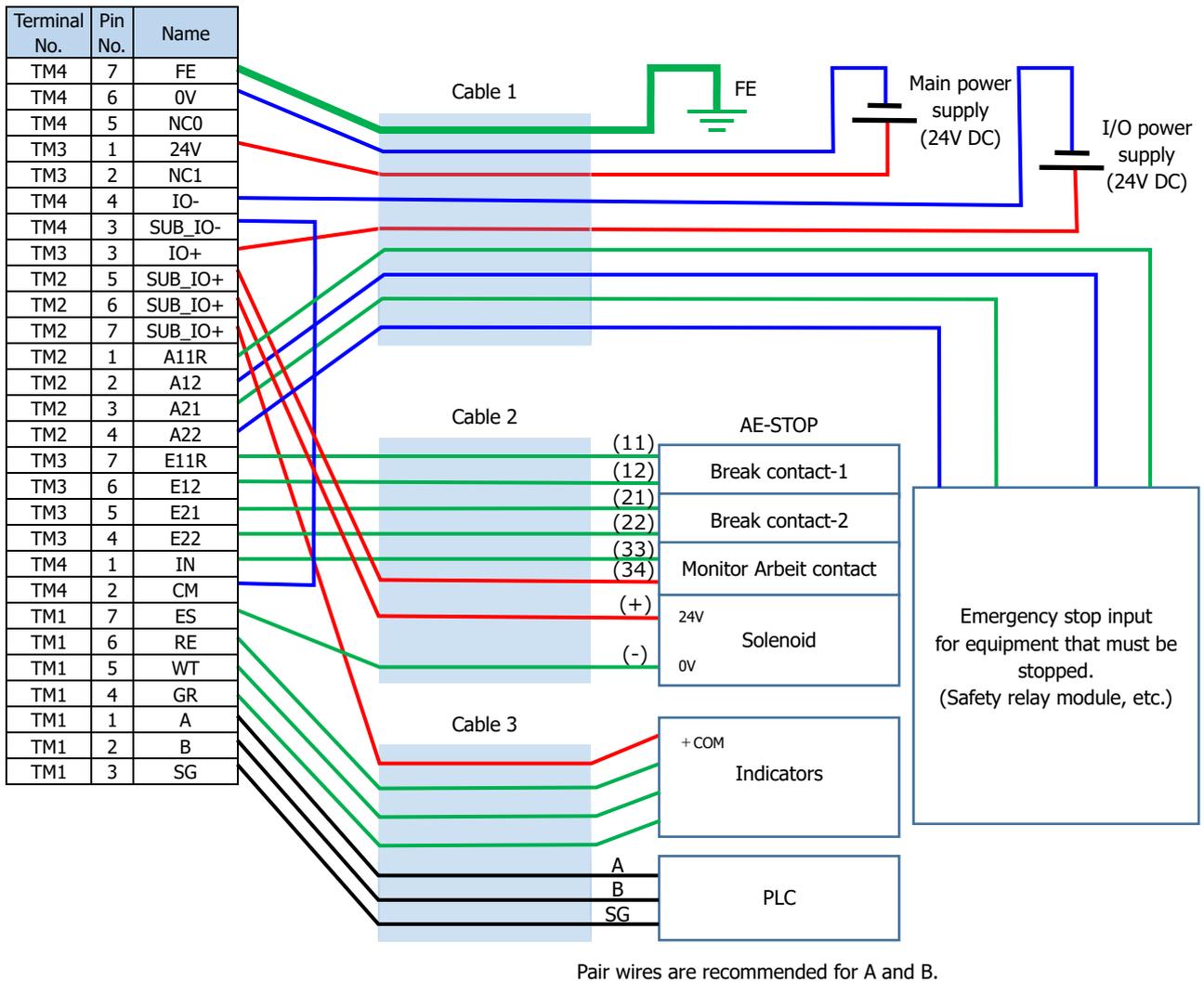
At the time of shipment, a hole plug is attached to the part through which cable 3 passes.

Cable 3 is used when connecting devices other than those to be operated.

When using cable 3, remove the hole plug and use a cable gland (MG12A-08 made by AVC Corporation of Japan).

Cable glands must be purchased separately.

● **Wiring diagram**



Connect the target machine to A11R, A12, A21, and A22, but use A11R and A12 first. A11R and A12 are via the built-in relay of the break contact that opens when an AE-STOP failure is detected, so they are in the open circuit state when a failure is detected.

4 Terminal Block Wiring



Turn off the power before wiring.

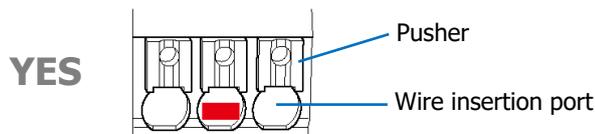
4.1 How to attach the wire

■ Stranded wires with ferrules or solid wire

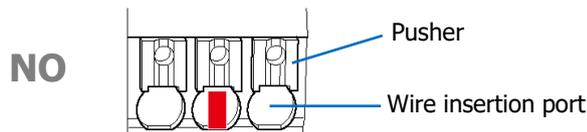
- 1 Insert the wire straight until it hits the back of the insertion slot, and then the wire will be connected.
- 2 After wiring, pull the wires lightly to make sure that the wire is properly connected.



- Crimping dimensions of the terminal hole side (Maximum connectable crimping size) is W2.1 x H1.48mm. Recommended crimping tool, refer to "Recommended Tools".
- Connect the ferrules to the terminal block so that the long side is horizontal as shown in the figure below.



The ferrule terminal cannot be inserted vertically in the longitudinal direction as shown in the figure below.



Doing so may damage the clamp or spring, causing it to no longer function.

■ Stranded wire

- 1 While pressing the pusher using a flat blade screwdriver, insert the wire fully in the wiring port. Wire is connected when the pusher is released.
- 2 After wiring, pull the wires lightly to make sure that the wire is properly connected.



- Operate the pusher with about 20 N of force. The product may break and no longer function if you press with excessive force.
- Only one wire can be inserted in one connector hole. Do not attach two or more wires to one connector hole.

4.2 How to remove the wire

Press the pusher with a flat blade screwdriver and pull the wire straight out.

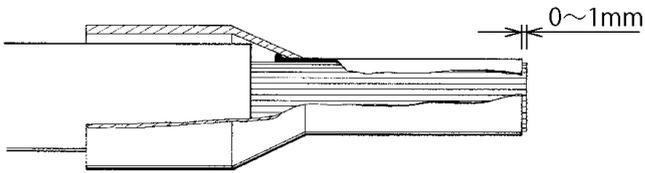


- Operate the pusher with about 20 N of force. The product may break and no longer function if it is pressed with excessive force.
- The product may be damaged and no longer function if the wire is pulled out without pressing the pusher or if the wire is pulled at an angle.

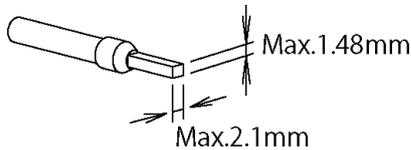
5 Terminals

5.1 Ferrules

- Choose an appropriate ferrule for the wire. For details, refer to “Wire Size and Recommended Ferrules”.
- Cut the wire carefully to get a flat end.
- Make sure that ferrule sleeve is completely filled by the conductor. Depending on the cross section, the conductor should protrude approx. 0 to 1 mm from the ferrule sleeve.



- When crimping, refer to the instructions of the crimping tool.
- Make sure that the finished size of the terminal after crimping is smaller than W2.1 x H1.48 mm. (For details about recommended crimping tool, refer to “Recommended Tools”.)



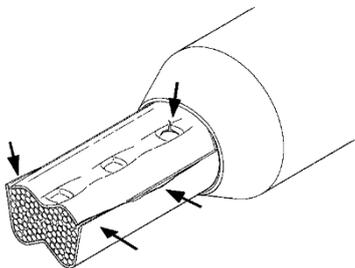
- If a tool other than the recommended crimping tool is used, the ferrule may not be crimped to the appropriate form and the Power supply terminals may be deformed and may not operate normally.
- Pin crimp terminals cannot be used.

● Precautions When Crimping Wires

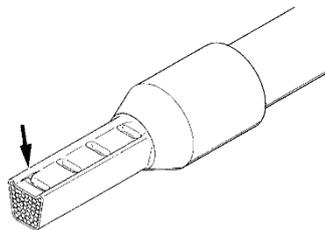
Problems that may occur during crimping.

- Cracks along the sides and die impressions.
- Splitting of the ferrules.
- Asymmetrical crimping shape.
- Extreme burrs formed along the sides.
- Ferrule not filled by conductor.
- Single conductors pushed back by protruding from the insulated cover.
- Single conductor squeezed off.
- Insulation covers damaged by the crimping jaw.
- Conductor insulation not pushed into the insulated cover.
- Ferrule bent longitudinally after crimping.

Cracks are formed along the sides.



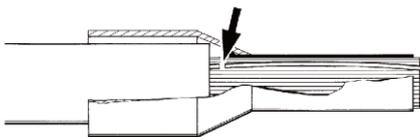
Cracks are formed after crimping.



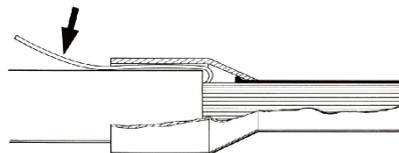
**Asymmetrical crimping shape.
Burr formation on one side.**



Single conductor squeezed off.



Single conductor pushed back.



5.2 Applicable Wire

When wiring, use the applicable wires shown below.

To crimp the ferrules shown below, use a special crimping tool.

When wiring to a terminal block, use the recommended screwdriver.

● Applicable Wire and Specifications

Applicable Wire	0.25 to 1.5 mm ² (AWG16 to 24)
Wire Strip Length* ¹	8±1 mm* ²
Ferrule Size* ¹	H0.5 to H1.5 (without insulation cover)
	H0.25 to H0.75 (with insulation cover)



Make sure that the stranded wires do not loosen when using wiring without ferrules.

● Wire Size and Recommended Ferrules

■ Ferrules without Insulated Covers (for one wire)

Applicable Wire (Stranded Wire)		Wire Strip Length	Type Number (Order Number)	Manufacturer
AWG	mm ²			
20	0.5	10 to 11 mm	H0.5/10 (9004050000)	Weidmüller
18	0.75		H0.75/10 (0542500000)	
17	1.00		H1.0/10 (0282800000)	
16	1.50		H1.5/10 (0186500000)	

■ Ferrules with Insulated Covers (for one wire)

Applicable Wire (Stranded Wire)		Wire Strip Length	Type Number (Order Number)	Manufacturer
AWG	mm ²			
24	0.25	10 to 11mm	S3TL-H025-12WJ	IDEC
			H0.25/12 HBL (9025760000)	Weidmüller
22	0.34		S3TL-H034-12WT	IDEC
			H0.34/12 TK (9025770000)	Weidmüller
20	0.5		S3TL-H05-14WA	IDEC
			H0.5/14 OR (0690700000)	Weidmüller
			H0.5/14S OR (9004560000)* ³	
			H0.5/14S W (9004590000)* ³	
18	0.75		S3TL-H075-14WW	IDEC
			H0.75/14 W (0462900000)	Weidmüller

*1 For ferrules, refer to "Wire Size and Recommended Ferrules".

*2 Strip 8±1mm of the wire end cover before use.



*3 With UL wire compatible insulation cover

■ **Ferrule terminal with insulation cover (for 2 wires)**

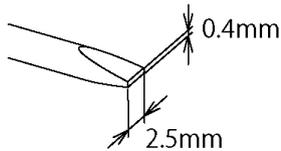
Applicable Wire (Stranded Wire)		Wire Strip Length	Type Number (Order Number)	Manufacturer
AWG	mm ²			
22	0.34	10 to 11mm	S3TL-J034-14WT	IDEC
			H0.34/15 ZH TK (1139070000)	Weidmüller
20	0.5		S3TL-J05-14WA	IDEC
			H0.5/14 ZH OR (9037200000)	Weidmüller
			H0.5/14D ZH W (9037380000)	
18	0.75		S3TL-J075-14WW* ⁴	IDEC
			H0.75/14 ZH W (9037230000)* ⁴	Weidmüller
			H0.75/14D ZH GR (9037410000)* ⁴	
			H0.75/14T ZH HBL (9037610000)* ⁴	

5.3 Recommended Tools

Tool Name		Type Number (Order Number)	Manufacturer
Flat blade screwdriver	Normal type	SDS 0.4×2.5×75 (2749320000)	Weidmüller
	With insulated cover	S3TL-D04-25-75	IDEC
		SDIS 0.4×2.5×75 (2749790000)	Weidmüller
Crimping tool	PZ6/5 (90011460000)		
Stripping tool	STRIPAX (9005000000)		



Use a flat blade screwdriver with a tip 2.5 mm wide and 0.4 mm high.



*⁴ When crimping the AWG18/0.75 mm² two-wire ferrule terminal, be careful not to point the plastic longitudinal direction of the ferrule terminal toward the pitch direction of the terminal block.

Chapter 5 Communication Function

1 Modbus RTU Communication

The Receiver performs RS485 (2-wire) communication as a Modbus RTU Slave.

Communication settings and station numbers are as follows.

Baud Rate: 9600 bps
Data Bits: 8 bits
Stop Bits: 1 bit
Parity: Even
Slave Number: 01h



Leave an interval of at least one second between Modbus RTU communications to the Receiver. If the communication interval is shorter than one second, it may affect Bluetooth reception.

● Compatible function code

Code	Name	Description
3	Read Holding Registers	Read the value of the holding register (HR)
6	Write Holding Registers	Write value to holding register (HR)
16	Preset Multiple Registers	Write values to multiple consecutive holding registers (HR)

● Exception code

Code	Name	Cause
0x01	ILLEGAL FUNCTION	An unsupported function code was received.
0x02	ILLEGAL DATA ADDRESS	A read or write was performed to a holding register (HR) that does not exist.
0x03	ILLEGAL DATA VALUE	The data size specified when reading and writing Modbus addresses is incorrect. A value outside the setting range was written to the holding register (HR).

● Holding Register (HR)

Address No.	R/W	Content
400001	R	0x0000: Group settings cannot be set externally (Modbus RTU) 0x0001: External setting possible and not set 0x0002: External setting possible and can be rewritten 0x0003: External setting possible and cannot be rewritten
400002	R	Current value of the Receiver group settings After the power is turned on, the group specified with the group setting rotary switch will be written. When the value of HR400003 changes, that value is written. 0x0000: All groups 0x0001: Group 1 0x0002: Group 2 0x0003: Group 3 0x0004: Group 4 0x0005: Group 5 0x0006: Group 6 0x0007: Group 7 0x0008: Group 8 0x0009: Group 1+2 0x000A: Group 1+2+3 0x000B: Group 4+5 0x000C: Group 4+5+6 0x000D: Group 1+2+3+4 0x000E: Group 5+6+7+8 0x000F: Initial value specified with the group setting rotary switch
400003	R/W	Register for rewriting the Receiver group setting Once the rewriting is complete, it will be reflected in HR400002
400004	R	Setting status of the Receiver's out of communication range automatic stop rotary switch 0x0000: Function OFF 0x0001: 1 second 0x0002: 5 seconds 0x0003: 10 seconds
400005	R	Receiver stopped state 0x0000: Communication not possible 0x0001: Received stop signal cancel from the Transmitter or no stop signal received 0x0002: Receives stop signal from the Transmitter Others: No state
400006	R	Receiver communication status 0x0000: Not receiving communication from the Transmitter 0x0001: Not used 0x0002: Communication check signal OFF was received from the Transmitter, or the time specified in the out of communication range automatic stop setting has passed since the last communication check signal ON was received. 0x0003: Received communication check signal ON from the Transmitter Others: Not used
400007	R	Receiver stop and AE-STOP status 0x0000: AE-STOP not working 0x0001: The emergency stop switch part of AE-STOP is pulled in. 0x0002: Not used 0x0003: AE-STOP can not be activated and the built-in relay was activated.
400008 to 400016	R	Reserve

Chapter 6 Troubleshooting

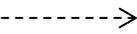
If a problem occurs when operating the Transmitter and the Receiver, please check the following and take measures. If the problem persists, please stop using it immediately and contact our support center.

Symptoms	Cause	Solution
The stop button on the Transmitter cannot be pushed.	A foreign object is stuck in the stop button of the Transmitter, preventing it from moving.	Remove foreign objects.
The stop button on the Transmitter does not lock.	The Transmitter stop button is malfunctioning.	Stop using the Transmitter immediately and contact our customer service center.
The target machine does not stop although the stop button on the Transmitter is pushed.	The distance from the Receiver is far, and wireless communication signals are not reaching the Receiver.	Approach until the Transmitter is within communication range.
	There are many obstacles in the surrounding area, and wireless communication signals are not reaching the Receiver.	Check the communication status and use the Transmitter and the Receiver in a place with good communication status.
	The group settings of the Transmitter and the Receiver is incorrect.	Check that the group settings of the Transmitter and the Receiver match.
No operation is accepted, or the communication lamp (green) on the Receiver does not change.	An abnormal condition has occurred in the device.	Stop using it immediately and contact our customer service center.
The power does not turn on even if the power button on the Transmitter is pushed and held.	The main power slide switch is turned OFF.	Turn on the main power slide switch, then push and hold the power button.
	There is no battery remaining.	Charge the Transmitter.
The charging LED (orange) indicated an error when charging the Transmitter.	There is a foreign object in the charging port.	Remove foreign objects
	An abnormal condition has occurred in the device.	Stop using the Transmitter immediately and contact our customer service center.
Although the stop button of the Transmitter is reset, the emergency stop switch part of AE-STOP cannot be reset.	The stop button on the Transmitters in the same group is pushed.	Reset the stop button on all the Transmitters in the same group within communication range.

Appendix

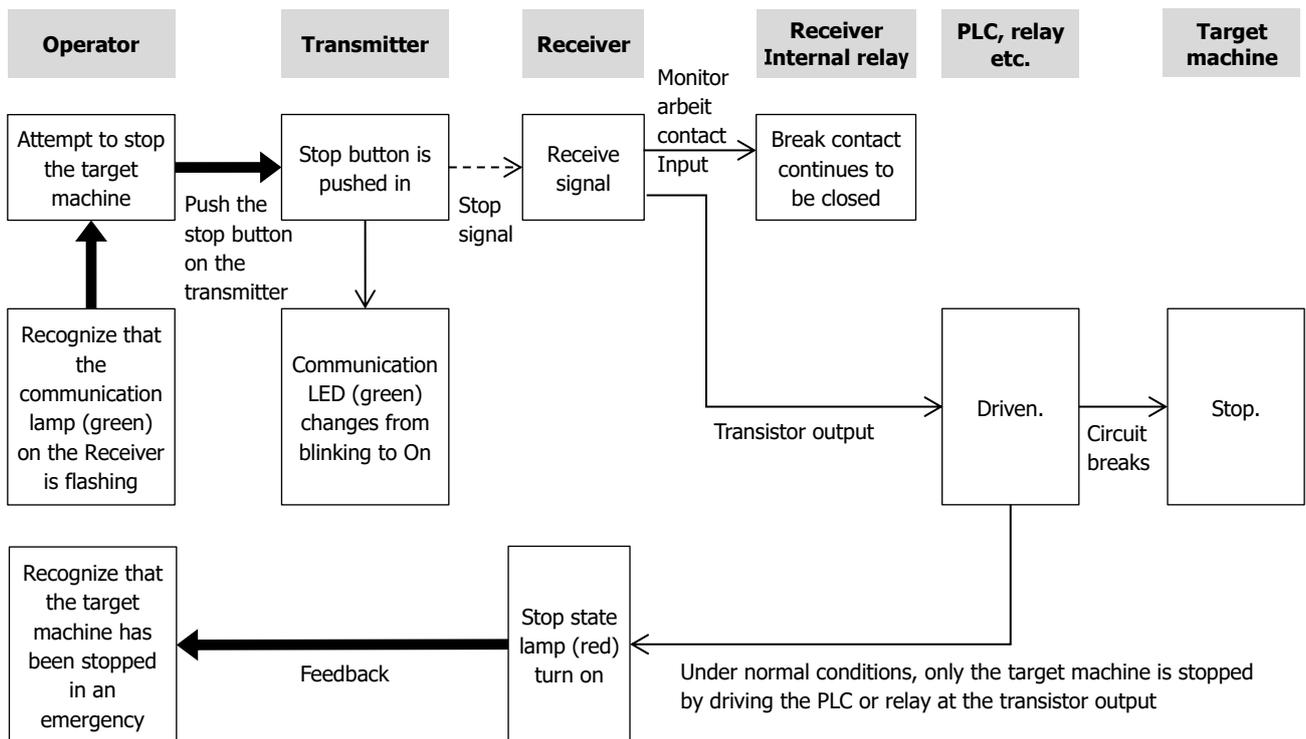
1 Stopping the machine without using AE-STOP

1.1 Operation flow

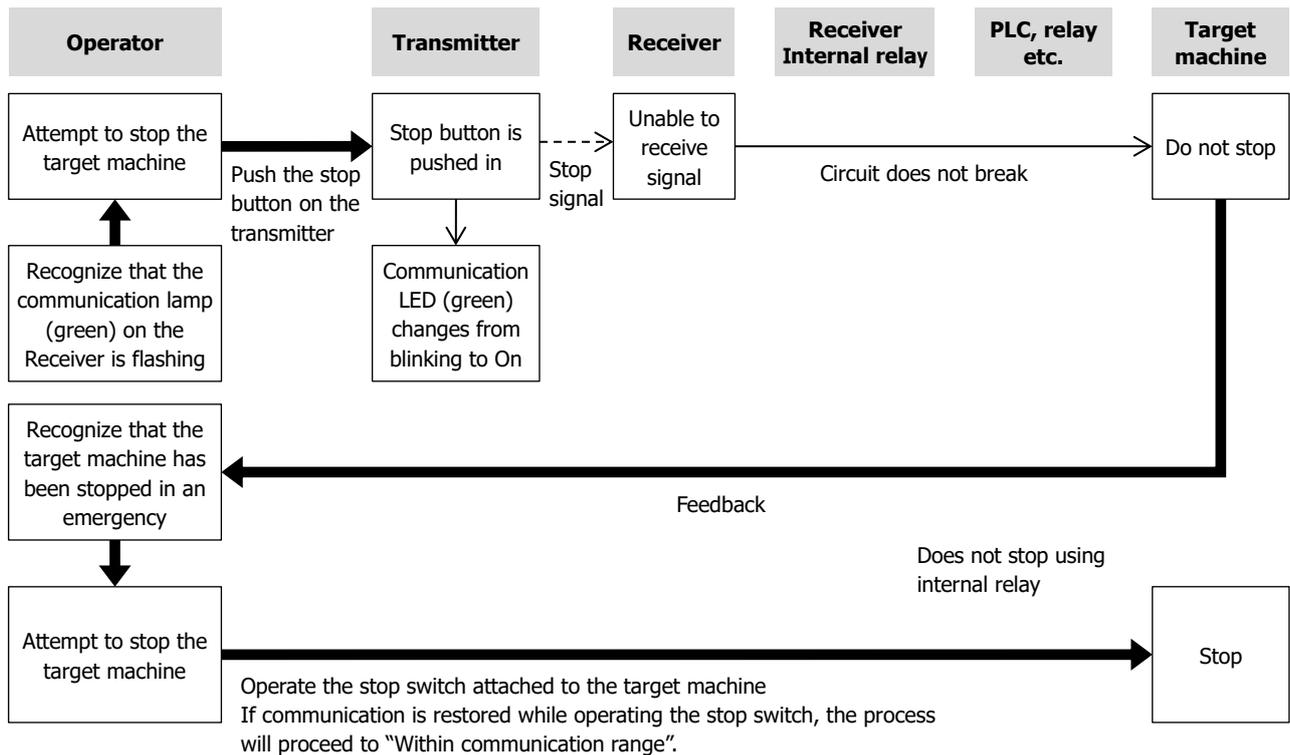
- Operator operations: 
- Wireless communication: 
- Wired communication: 

● Push stop button

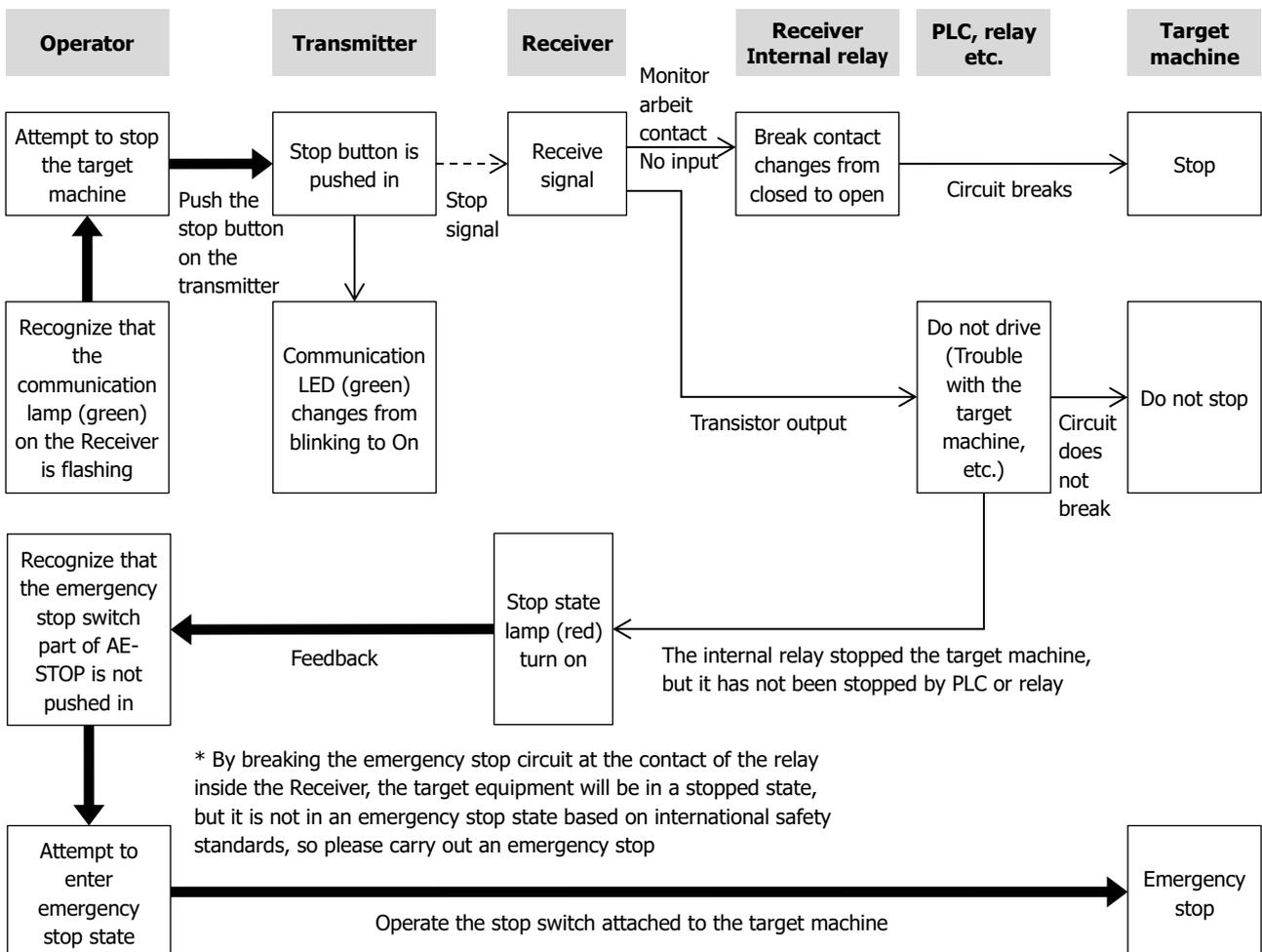
■ Within communication range



■ **Out of communication range**

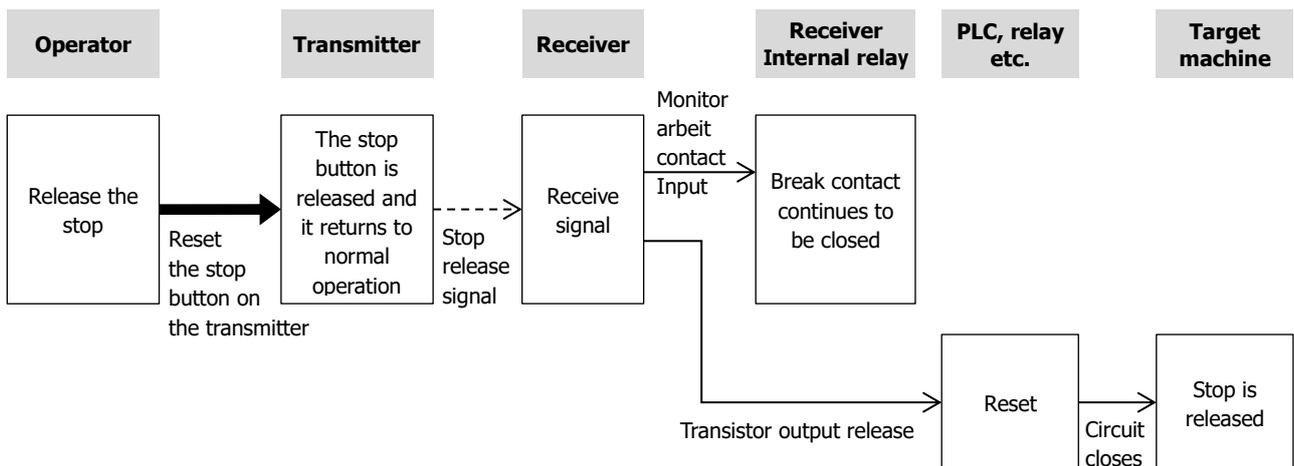


■ **The target machine does not stop due to an error**

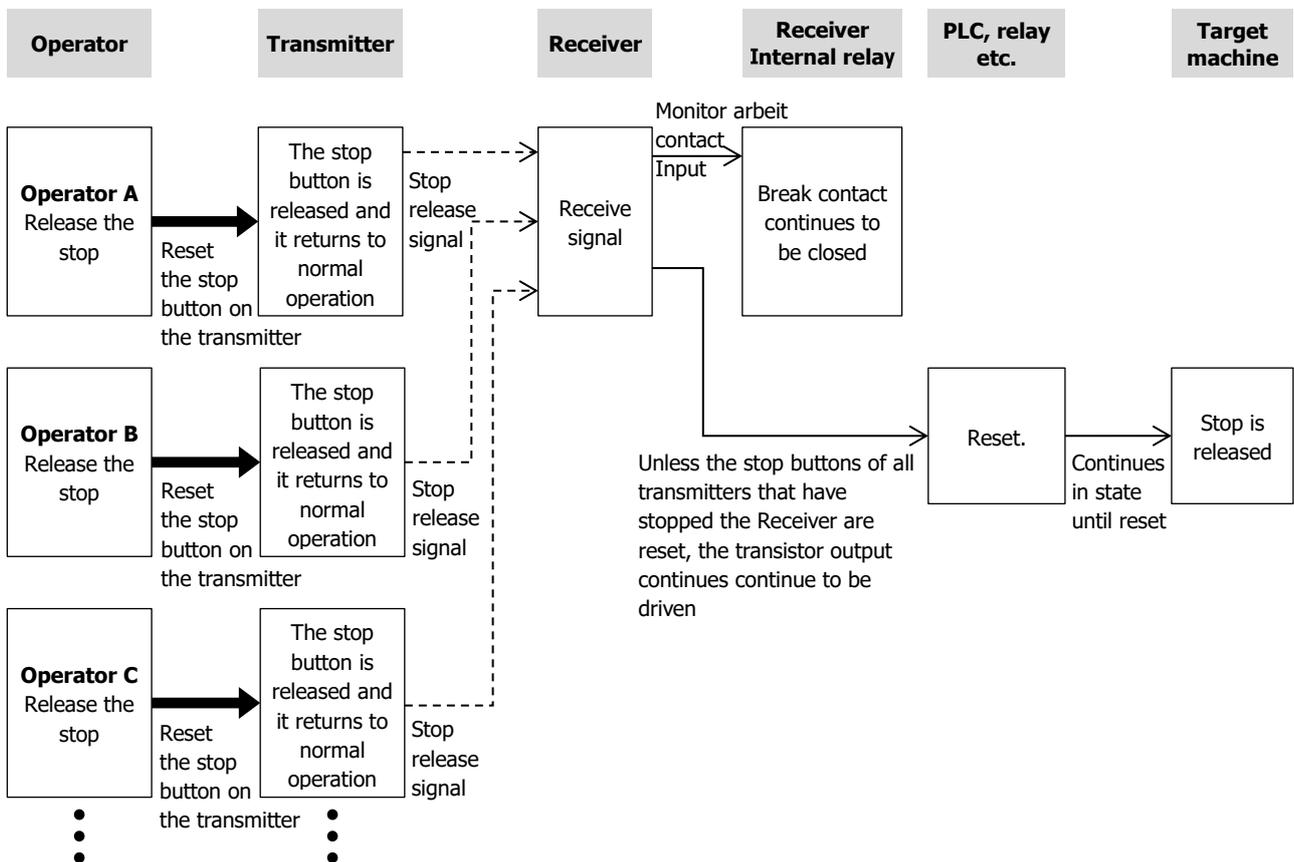


● **Stop cancellation operation**

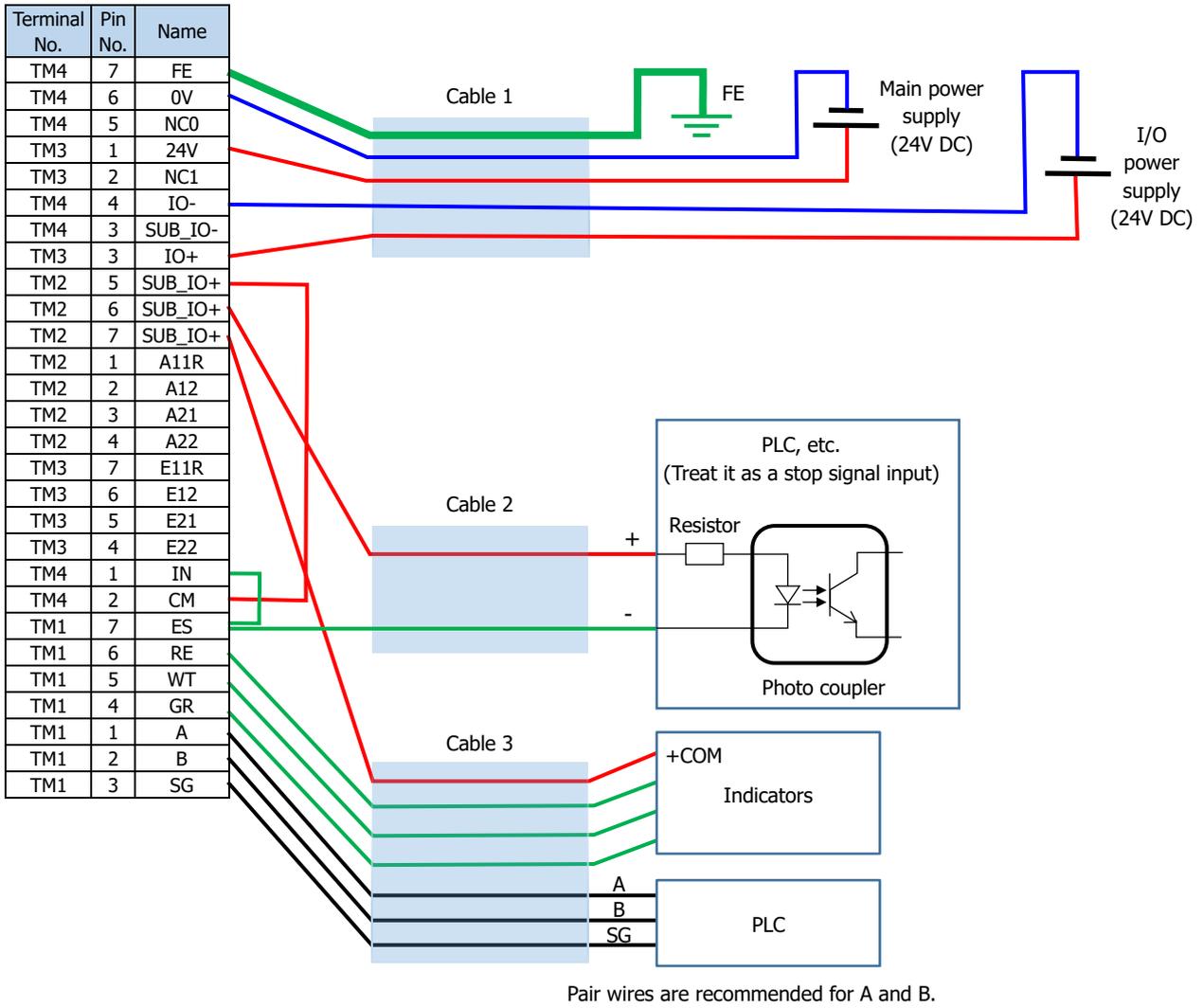
■ **One Receiver for One Transmitter**



■ **One Receiver for Two to Twenty Transmitters**



● **Wiring diagram**



1.3 When using a relay

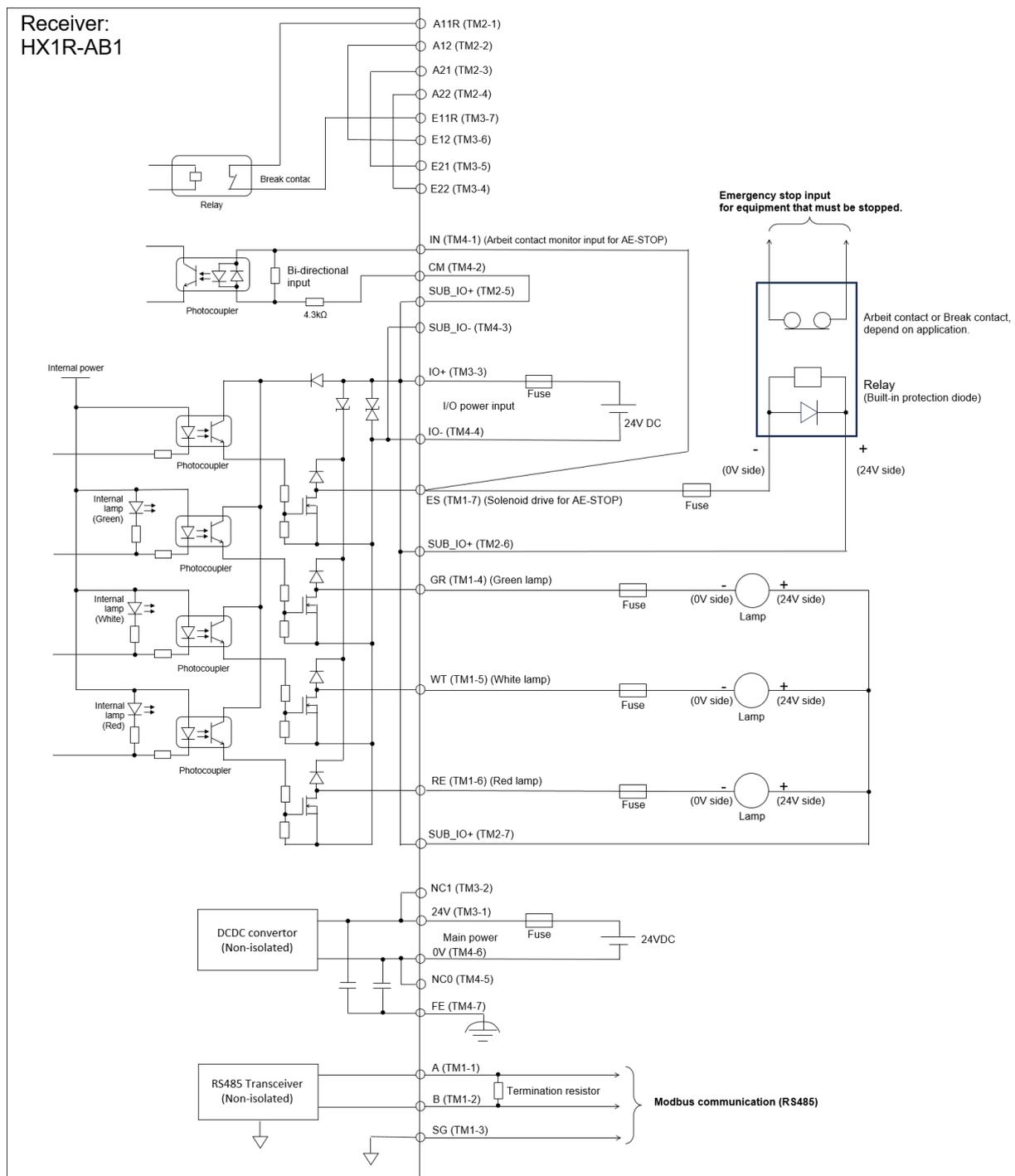
● Internal equivalent circuit and external wiring



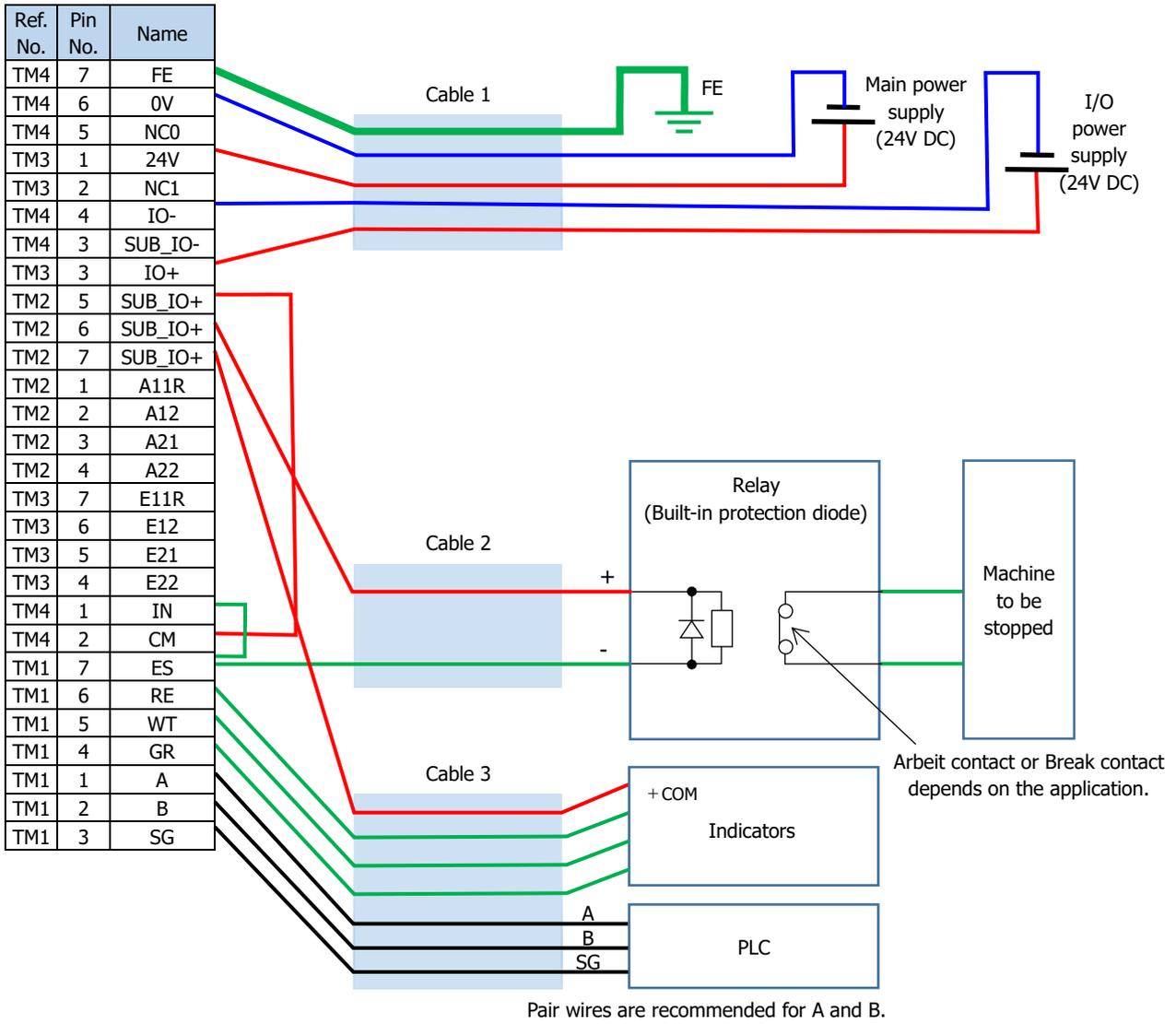
Incorrect wiring will destroy the internal circuit. In particular, do not connect power input lines other than 24V, 0V, IO+, and IO-. Also, do not connect the positive side of solenoids, relays, and lamps to ES, RE, WT, and GR.



- The transistor output section (ES, GR, WT, RE) only supports resistive loads.
- Insert a fuse that corresponds to the load.
Please use an IEC60127 certified fuse. Required when shipping machine with a built-in the Receiver to Europe.
- If Modbus communication (RS485) is unstable, insert a terminating resistor that matches the characteristic impedance at both ends of the cable. Use a resistor rated at 0.5W or higher.



● **Wiring diagram**



About the Warranty of the products

Warranty Period

The warranty period for IDEC products shall be one (1) year after purchase or delivery to the specified location.

However, this shall not apply in cases where there is a different specification in the Catalogs or there is another agreement in place between you and IDEC.

Warranty scope

Should a failure occur in an IDEC product during the above warranty period for reasons attributable to IDEC, then IDEC shall replace or repair that product, free of charge, at the purchase location/delivery location of the product, or an IDEC service base. However, failures caused by the following reasons shall be deemed outside the scope of this warranty.

- i. The product was handled or used deviating from the conditions/environment listed in the Catalogs
- ii. The failure was caused by reasons other than an IDEC product
- iii. Modification or repair was performed by a party other than IDEC
- iv. The failure was caused by a software program of a party other than IDEC
- v. The product was used outside of its original purpose
- vi. Replacement of maintenance parts, installation of accessories, or the like was not performed properly in accordance with the user's manual and Catalogs
- vii. The failure could not have been predicted with the scientific and technical standards at the time when the product was shipped from IDEC
- viii. The failure was due to other causes not attributable to IDEC (including cases of force majeure such as natural disasters and other disasters)

Furthermore, the warranty described here refers to a warranty on the IDEC product as a unit, and damages induced by the failure of an IDEC product are excluded from this warranty.

Service scope

The prices of IDEC products do not include the cost of services, such as dispatching technicians. Therefore, separate fees are required in the following cases.

- (1) Instructions for installation/adjustment and accompaniment at test operation (including creating application software and testing operation, etc.)
- (2) Maintenance inspections, adjustments, and repairs
- (3) Technical instructions and technical training
- (4) Product tests or inspections specified by you

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Specifications and other descriptions in this manual are subject to change without notice.

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