Type EB3N Relay Barrier

Associated Apparatus providing Intrinsically safe outputs

for use in the following hazardous(classified) locations.

      Class Ⅰ, Zone 0, [AExia]IIC

      Class Ⅰ,Ⅱ,Ⅲ, Div. 1.GrpsA,B,C,D,E,F and G

When installing an IDEC Type EB3N Relay Barrier, make sure it conforms to the following drawings and descriptions as well as all applicable requirements. ANSI/NFPA70.

- This associated apparatus may also be connected to simple apparatus as defined in Article 504.2 and installed and temperature classified in accordance with Article 504.10(B) of the National Electrical Code (ANSI/NFPA 70), or other local codes, as applicable.
- Capacitance and inductance of the field wiring from the intrinsically safe equipment to the associated apparatus shall be calculated and must be included in the system calculations as shown in Note 2 of Table 2 below. Cable capacitance, Ccable, plus intrinsically safe equipment capacitance, Ci must be less than the marked capacitance, Ca (or Co), shown on any associated apparatus used. The same applies for inductance (Lcable, Li and La or Lo, respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: Ccable = 60 pF/ft., Lcable = 0.2 µH/ft.
- Associated apparatus must be installed in an enclosure suitable for the application in accordance with the National Electrical Code (ANSI/NFPA 70) for installation in the United States, the Canadian Electrical Code for installations in Canada, or other local codes, as applicable.
- Where multiple circuits extend from the same piece of associated apparatus, they must be installed in separate cables or in one cable having suitable insulation. Refer to Article 504.30(B) of the National Electrical Code (ANSI/NFPA 70) and Instrument Society of America Recommended Practice ISA RP12.6 for installing intrinsically safe equipment.
- Intrinsically safe circuits must be wired and separated in accordance with Article 504.20 of the National Electrical Code (ANSI/NFPA 70) or other local codes, as applicable.
- This associated apparatus has not been evaluated for use in combination with another associated apparatus.
- Control equipment must not use or generate more than 120 V rms or dc with respect to earth.
- For installations in which both the Ci and Li of the intrinsically safe apparatus exceeds 1% of the Co and Lo parameters of the associated apparatus (excluding the cable), then 50% of Co and Lo parameters are applicable and shall not be exceeded.

- **Servicing – Replacement and Repairs:** Inspection and replacement of the Relay Barriers shall not be made until power is disconnected and shall not be connected again until all replacement Relay Barriers are properly re-assembled. All electrical components, including the interconnecting wiring, shall be kept in safe condition. Defective Relay Barriers should be returned to the factory for repair.

WARNING : Substitution of components or unauthorized repair may impair intrinsic safety of apparatus.
AVERTISSEMENT : La substitution de composants peut compromettre la sécurité intrinsèque de l'appareil.

- **Mounting** : All bolts, nuts, screws, and other means of fastening, including the unused wiring screws, shall be fastened in place, properly tightened and secured. Mount the Relay Barrier on a 35mm track or directly mount on a panel surface using screws.

- **Certified Relay Barrier**: Type EB3N-abc   "EB3N"= Series type
  a = Safety circuit   **A2** : for auto start, 2 I/O   **M2**: for manual start, 2 I/O
  b = Auxiliary circuit   **N** : without auxiliary circuit, **R5** :, relay output, 5 I/O
  c = Power supply   **D** : 24V DC

- **Table 1:Operations**

	Terminals		Ratings
Power Supply	Input:	+, -	24V DC (-15%,+10%) Class 2
Safe Circuit	Input:	11-12, 21-22	12V DC, 10 mA (source)
	Output	13-14, 23-24	2NO: DC-13 24V, 1A(Ind.) 30V DC, 1A(Res.)
Auxiliary Circuit	Input:	P-N	12V DC, 10mA (source)
	Output	A-C	5NO/common: 24V DC, 3A(Res.)
Reset Circuit	Input:	Y1-Y2	24V DC, 5 mA

・**Table2:Rating and Parameters of I.S**.
Ta= 40°C, Um= 125V   Uo=13.2V

Io(mA)	14.2	28.4	42.6	56.8	71.0	85.2	99.4	113.6	127.8	142.0	156.2	170.4	184.6	198.8	213.0	227.2	Combined Lo(mH)
Po(mW)	46.9	93.8	140.6	187.5	234.3	281.2	328.1	375.9	421.8	468.7	515.5	562.4	609.2	656.1	702.9	750	
Co(uF)	0.67	0.65	0.63	0.61	0.59	0.57	0.55	0.53	0.51	0.49	0.47	0.44	0.42	0.39	-	-	1.0
	0.79	0.77	0.76	0.75	0.73	0.72	0.70	0.69	0.67	0.66	0.64	0.62	0.61	0.59	0.57	0.55	0.5
	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.93	0.92	0.91	0.90	0.88	0.87	0.86	0.85	0.84	0.2
	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.1

Note 2 The intrinsic safe apparatus and wirings shall be accordance to following formulas; for examples,

$Ui \geq Uo$
$Ii \geq Io$
$Pi \geq Po$
$Ci+Cc \leq Co$
$Li+Lc \leq Lo$

Note 1 Added to above table, the next values combined Lo and Co are allowable;

Io(mA)	14.2						28.4						227.2					
Lo(mH)	175*	87.5	30.0	2.5	0.55	0.25	43.5*	21.5	20.0	3.5	0.43	0.25	0.68*	0.34	0.68	0.6	0.22	0.13
Co(nF)	900*	450	330	540	770	900	900*	450	300	480	800	900	900*	450	450	490	800	900

*:Therefore, only in combination with a cable this values are allowable at Li≤1%Lo and Ci≤1%Co of the intrinsic safe apparatus apparatus.

I.S rating of each terminal as follows.

	I.S. Terminal No.	
	11-12 and 21-22	11-12 21-22 (P1〜P5)-N
Uo(Vt)	13.2V	13.2V
Io(It)	28.4mA	14.2mA
Po	93.8mW	46.9mA

・**Typical Installation:** Install the Relay Barrier must be according to the following Ratings and Parameters of I.S. and descriptions.

To avoid electrical shock, install the Relay Barrier in a tool-accessible enclosure.

Layout and wiring must be done to prevent the inductive or capacitive induction to the intrinsically safe circuit.

For example, separate intrinsically safe circuits from non-intrinsically safe circuits, by a minimum space of 50mm or using a full height metal separator. If color-coding is required use for the intrinsic safe components and terminals, use only cables and terminals with light blue markings.

Common wiring : To set up common wiring, connect two " N " terminals between adjacent the Relay Barrier in parallel.

・**Connections:** Connect the wires to the Relay Barriers according to the following formula:

Intrinsically Safe Circuit   Intrinsically AUX Circuit

$$\boxed{28.4mA} \times \boxed{\text{Chanel (Max.8ch)}} + \boxed{14.2mA} \times \boxed{\text{Chanel}} \leq 227.2mA$$
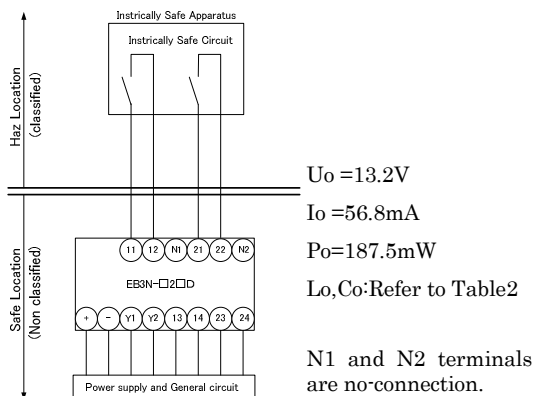
Also, refer to Table.3

Table 3

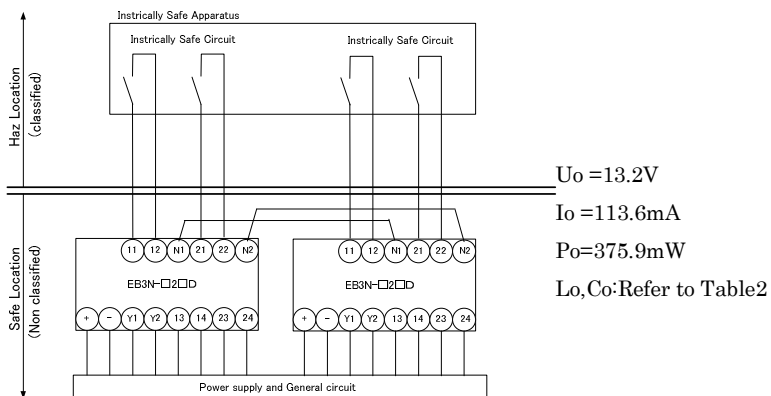| Connection Number	Type No.	Unit Number	Available Maximum Safe Circuit Channel	Available AUX Circuit Channel	Total Io [mA]
1	EB3N-□2□D	1	2	0	56.8
2		2	4	0	113.6
3		3	6	0	170.4
4		4	8	0	227.2
5	EB3N-□2□5□D	1	2	5	127.8
6		2	4	8	227.2
*		3	6	4	227.2
*		4	8	0	227.2
7	EB3N-□2□D	1	4	5	184.6
	EB3N-□2□5□D	1			
8	EB3N-□2□D	2	6	4	227.2
	EB3N-□2□5□D	1			
*	EB3N-□2□D	3	8	0	227.2
	EB3N-□2□5□D	1			
*	EB3N-□2□D	1	6	4	227.2
	EB3N-□2□5□D	2			
*	EB3N-□2□D	1	8	0	227.2
	EB3N-□2□5□D	3			

＊ : since these are included in the other connection number circuit, actual wiring does not need.

Note. The current for intrinsically safe circuit per channel is 28.4mA. The Lo and Co values given are the sums of the values that may be connected to each individual channel.

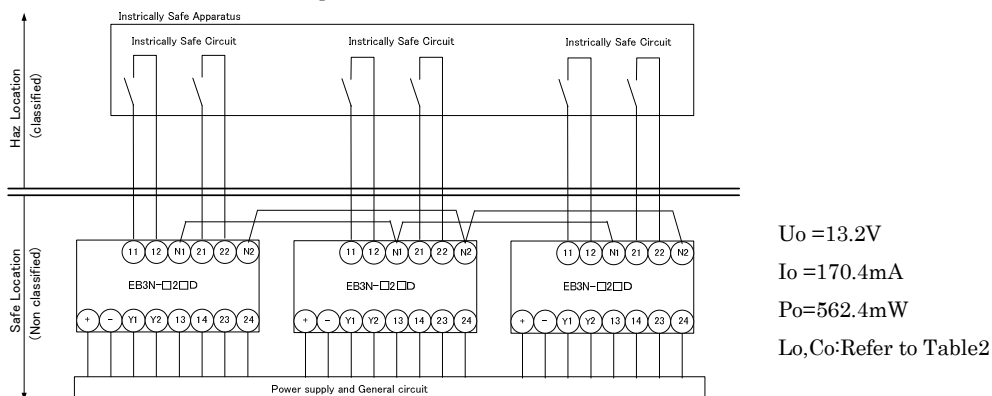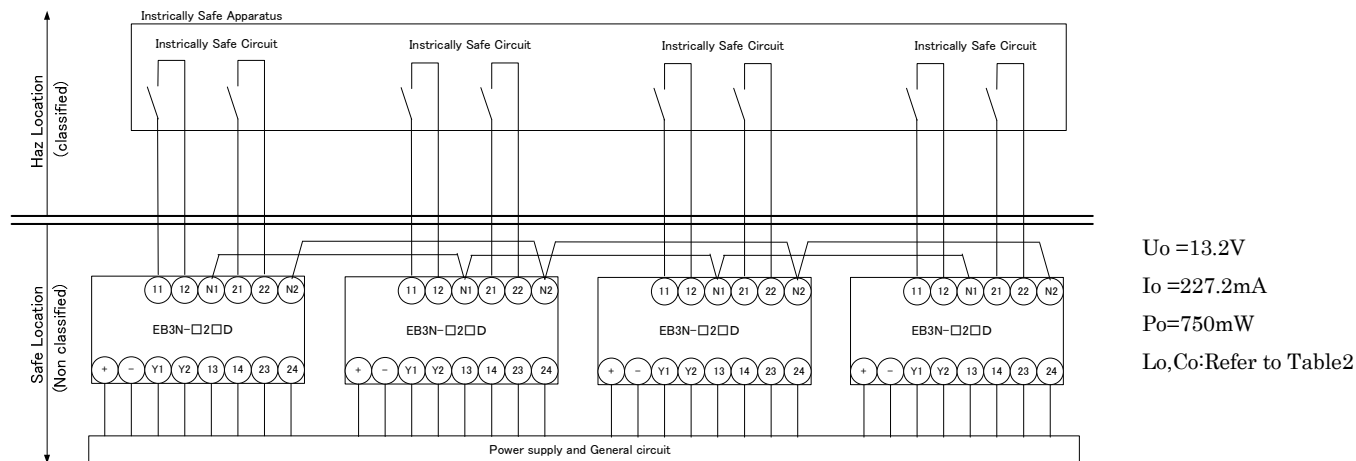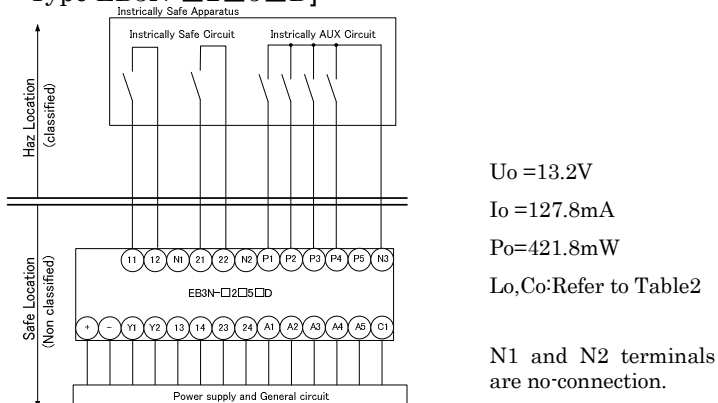[No.1 Type EB3N-□2□D]

U_o =13.2V
I_o =56.8mA
P_o=187.5mW
Lo,Co:Refer to Table2

N1 and N2 terminals are no-connection.

[No.2 Type EB3N-□2□D]

U_o =13.2V
I_o =113.6mA
P_o=375.9mW
Lo,Co:Refer to Table2

[No.3 Type EB3N-□2□D]

U_o =13.2V
I_o =170.4mA
P_o=562.4mW
Lo,Co:Refer to Table2

[No.4 Type EB3N-□2□D]

U_o =13.2V
I_o =227.2mA
P_o=750mW
Lo,Co:Refer to Table2

[No.5 Type EB3N-□2□5□D]

U_o =13.2V
I_o =127.8mA
P_o=421.8mW
Lo,Co:Refer to Table2

N1 and N2 terminals are no-connection.
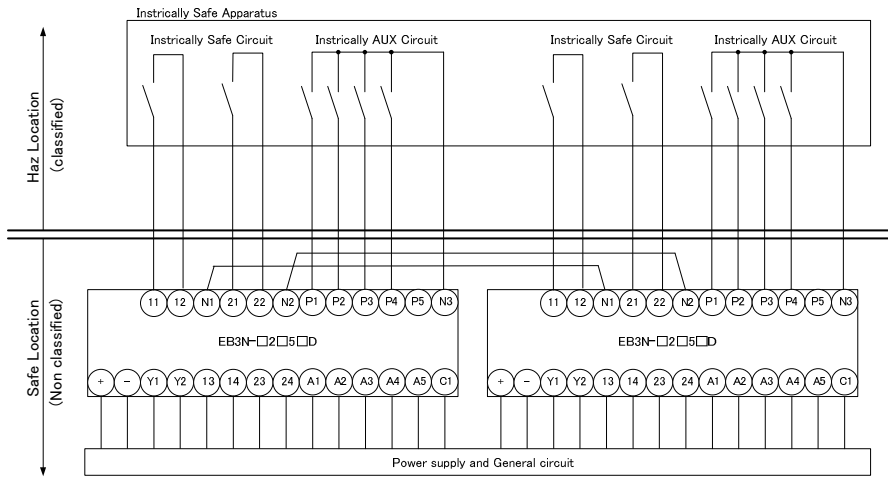
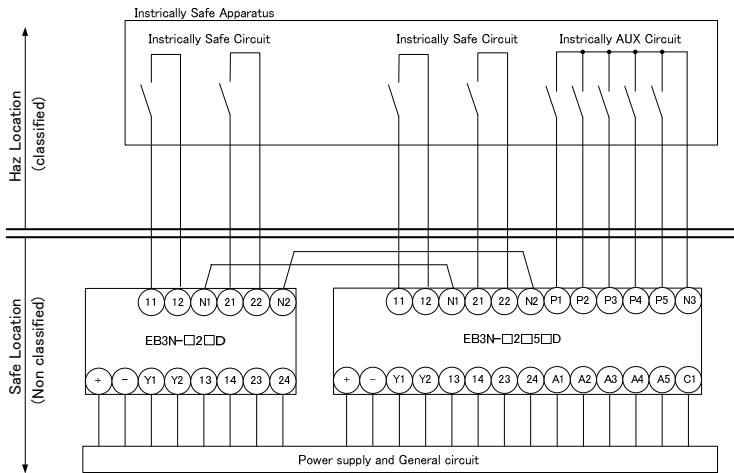## [No.6　Type EB3N-□2□5□D]
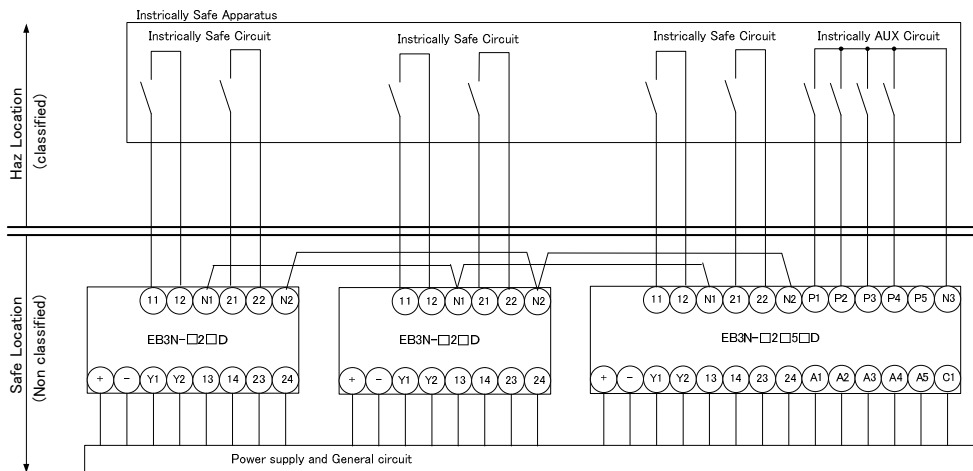

Uo =13.2V
Io =227.2mA
Po=750mW
Lo,Co:Refer to Table2

[No.7　Type EB3N-□2□D + EB3N-□2□5□D]

Uo =13.2V
Io =184.6mA
Po=609.2mW
Lo,Co:Refer to Table2

[No.8　Type EB3N-□2□D + EB3N-□2□5□D]

Uo =13.2V
Io =227.2mA
Po=750mW
Lo,Co:Refer to Table2