

Type EB3N-2 Relay Barrier

Draw. No. B-2284-7(0)
 Rev. D, NOV. 17, 2022

Associated Apparatus providing Intrinsically safe outputs for use in the following hazardous(classified) locations.

Certificate No.E234997

Class I , Zone 0, [AEx ia Ga]IIC

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

When installing an IDEC Type EB3N-2 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, C_{cable} , plus intrinsically safe equipment capacitance, C_i must be less than the marked capacitance, C_a (or C_o), shown on any associated apparatus used. The same applies for inductance (L_{cable} , L_i and L_a or L_o , respectively). Where the cable capacitance and inductance per foot are not known, the following values shall be used: $C_{cable} = 60 \text{ pF/ft.}$, $L_{cable} = 0.2 \text{ } \mu\text{H/ft.}$
- 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.

Warning ! *Substitution of components or unauthorized repair may impair intrinsic safety of apparatus. To maintain intrinsic safety, the Signal input terminal (n1-n2, Pn-N3) may only be connected to intrinsically safe circuits where both the wiring and the connected equipment maintain 500 V isolation to the hazardous area earthing/bonding connections.*

AVERTISSEMENT - *La substitution de composants peut compromettre la sécurité intrinsèque de l'appareil.*

• **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.

• **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-2 “EB3N-2”= 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

Table 2: 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	Note 2 The intrinsic safe apparatus and wirings shall be accordance to following formulas; for examples, $U_i \geq U_o$ $I_i \geq I_o$ $P_i \geq P_o$ $C_i + C_c \leq C_o$ $L_i + L_c \leq L_o$			
Po(mW)	46.9	93.8	140.6	187.5	234.3	281.2	328.1	374.9	421.8	468.6	515.5	562.4	609.2	656.1	702.9	750	Lo(mH)		1.0		
Co(μF)	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	-	-	0.5				
	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	0.2				
	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	0.1				
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)	176*	88.0	2.50	1.60	0.84	0.48	0.25	44.0*	22.0	3.50	1.40	0.76	0.45	0.25	0.68*	0.68	0.60	0.42	0.30	0.22	0.15
Co(μF)	0.94*	0.47	0.55	0.60	0.70	0.80	0.94	0.94*	0.47	0.48	0.60	0.70	0.80	0.93	0.94*	0.45	0.49	0.60	0.70	0.80	0.94
*: Therefore, the values are allowable only at $L_i < 1\% L_o$ or $C_i < 1\% C_o$ of the intrinsic safe 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	46.9mW

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:

$$\begin{matrix}
 \text{Intrinsically Safe Circuit} & & \text{Intrinsically AUX Circuit} \\
 \boxed{28.4\text{mA}} \times \boxed{\text{Chanel (Max.8ch)}} & + & \boxed{14.2\text{mA}} \times \boxed{\text{Chanel}} \leq 227.2\text{mA}
 \end{matrix}$$

Also, refer to Table.3

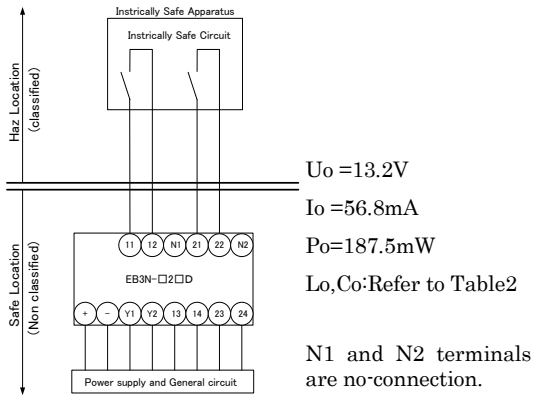
Table 3

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

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

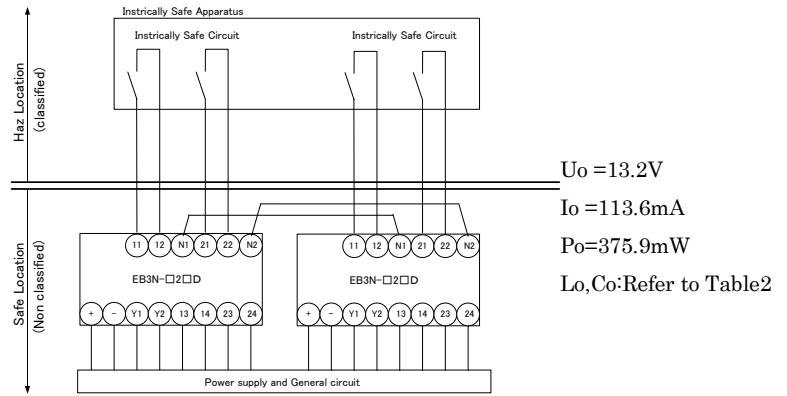
Note. The current for intrinsically safe circuit per channel is 28.4mA. The I_o and C_o values given are the sums of the values that may be connected to each individual channel.

[No.1 Type EB3N-□2□D-2]



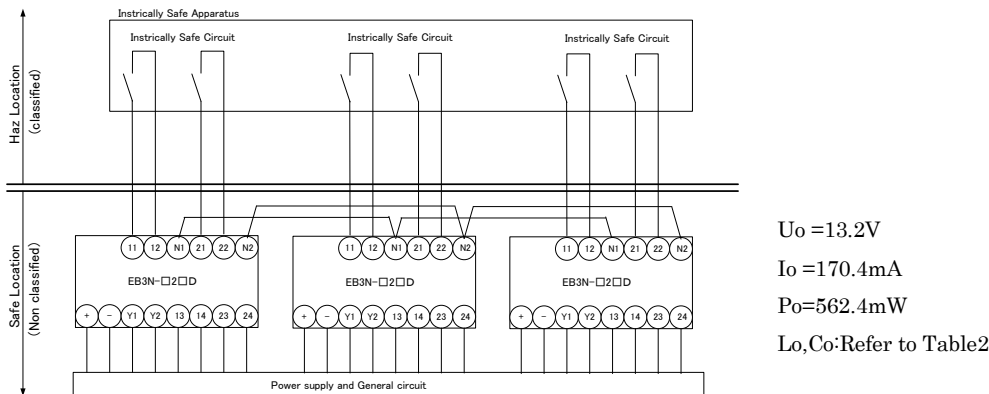
$U_o = 13.2V$
 $I_o = 56.8mA$
 $P_o = 187.5mW$
 L_o, C_o : Refer to Table2
 N1 and N2 terminals are no-connection.

[No.2 Type EB3N-□2□D-2]



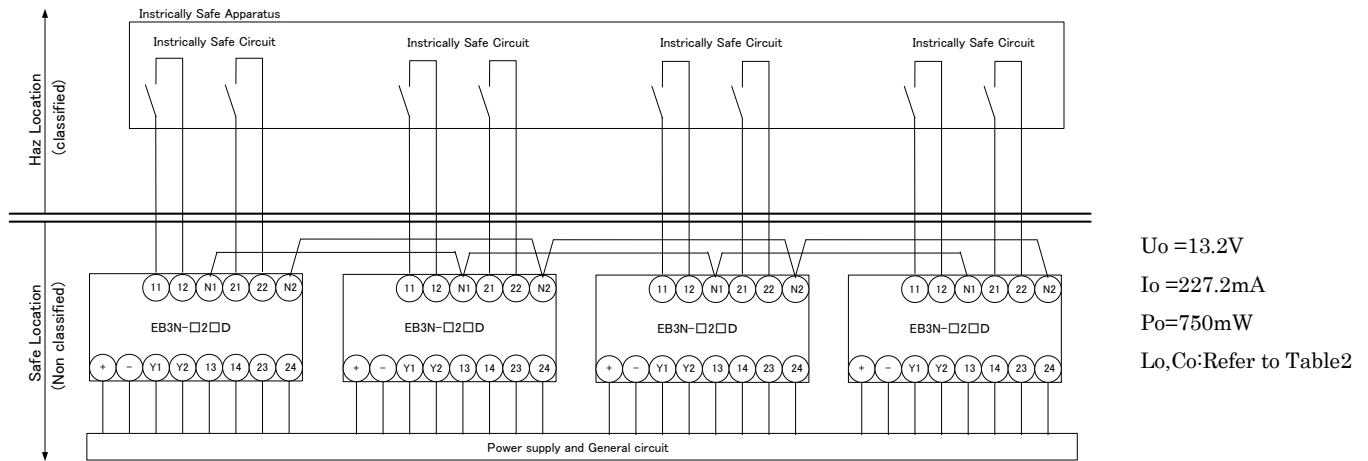
$U_o = 13.2V$
 $I_o = 113.6mA$
 $P_o = 375.9mW$
 L_o, C_o : Refer to Table2

[No.3 Type EB3N-□2□D-2]



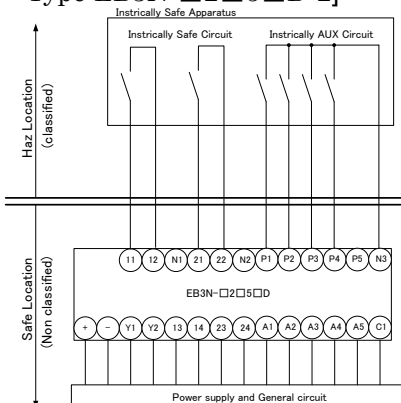
$U_o = 13.2V$
 $I_o = 170.4mA$
 $P_o = 562.4mW$
 L_o, C_o : Refer to Table2

[No.4 Type EB3N-□2□D-2]



$U_o = 13.2V$
 $I_o = 227.2mA$
 $P_o = 750mW$
 L_o, C_o : Refer to Table2

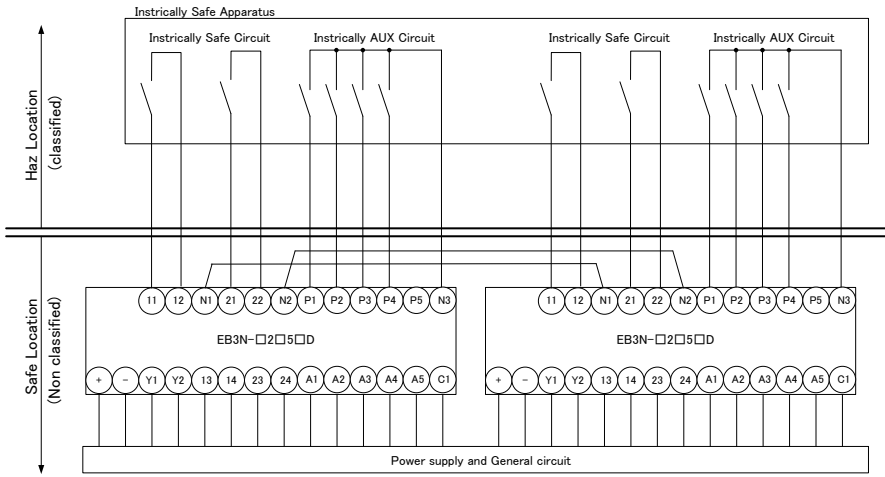
[No.5 Type EB3N-□2□5□D-2]



$U_o = 13.2V$
 $I_o = 127.8mA$
 $P_o = 421.8mW$
 L_o, C_o : Refer to Table2

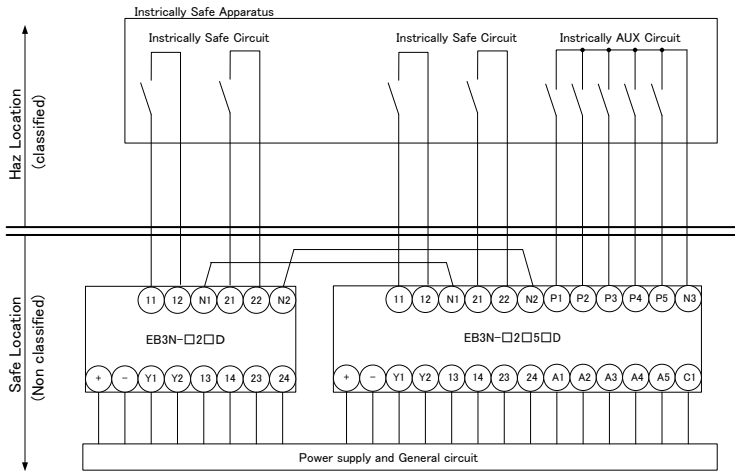
N1 and N2 terminals are no-connection.

[No.6 Type EB3N-□2□5□D-2]



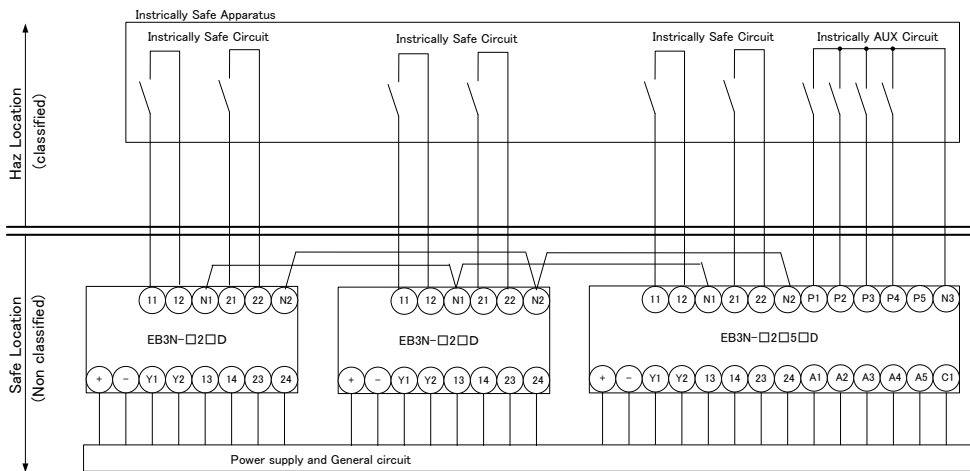
$U_o = 13.2V$
 $I_o = 227.2mA$
 $P_o = 750mW$
 L_o, C_o : Refer to Table2

[No.7 Type EB3N-□2□D-2 + EB3N-□2□5□D-2]



$U_o = 13.2V$
 $I_o = 184.6mA$
 $P_o = 609.2mW$
 L_o, C_o : Refer to Table2

[No.8 Type EB3N-□2□D-2 + EB3N-□2□5□D-2]



$U_o = 13.2V$
 $I_o = 227.2mA$
 $P_o = 750mW$
 L_o, C_o : Refer to Table2