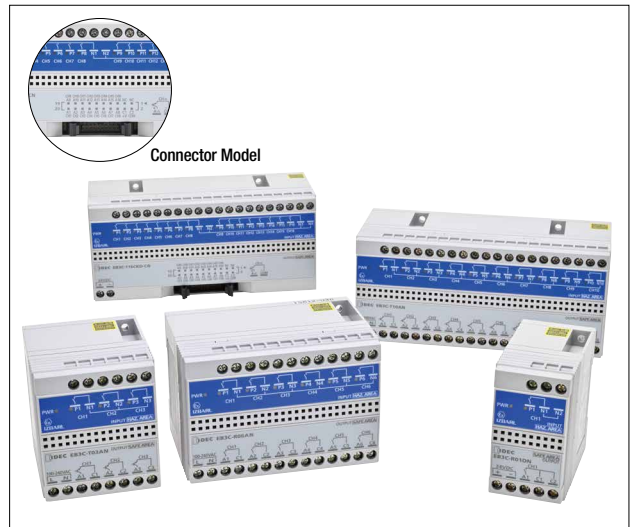


# EB3C Relay Barriers

Input contacts can be used in any explosive gas and Zone 0/Class I Div. 1 areas.

Explosion protection	Relay Barrier:	[Ex ia Ga] II C
	Switch (EB9Z-A):	Exia II CT6
	Switch (EB9Z-A1):	Exia II BT6

- IEC60079 compliant.
- Wide variety of models ranging from 1-circuit to 16 circuit models.
- 8- and 16-channel are available in common wiring, ideal for connection to PLCs. 16-circuit also available with a connector.
- No grounding required.
- IDEC's original spring-up terminal minimizes wiring time.
- 35-mm-wide DIN rail mounting or direct screw mounting.
- Global usage  
IECEX  
North America: FM, UL, c-UL      Europe: CE marking, ATEX, UKCA  
China: EX-CCC                      Korea: KCS  
Taiwan: TS  
Japan: DEKRA
- Ship class: NK (Japan), KR (Korea)



## Relay Barriers

Package quantity:1

Power Voltage	Connection to Non-intrinsically Safe Circuit	Output	Number of Channels	Part No.	Weight (g)
100 to 240V AC	Screw Terminal	Relay	1	EB3C-R01AN	150
			2	EB3C-R02AN	180
			3	EB3C-R03AN	190
			5	EB3C-R05AN	260
			6	EB3C-R06AN	270
			8 (*)	EB3C-R08AN	300
			10	EB3C-R10AN	380
			8	EB3C-R08CAN	280
		Transistor (Sink/Source)	1	EB3C-T01AN	140
			2	EB3C-T02AN	170
			3	EB3C-T03AN	180
			5	EB3C-T05AN	250
			6	EB3C-T06AN	260
			8	EB3C-T08AN	320
			10	EB3C-T10AN	340
			8 (*)	EB3C-T08CKAN	260
Transistor (Sink)	16 (*)	EB3C-T16CKAN	260		
	8 (*)	EB3C-T08CSAN	260		
Transistor (Source)	16 (*)	EB3C-T16CSAN	260		
	Relay	1	EB3C-R01DN	130	
2		EB3C-R02DN	170		
3		EB3C-R03DN	180		
5		EB3C-R05DN	250		
6		EB3C-R06DN	260		
8		EB3C-R08DN	260		
8 (*)		EB3C-R08CDN	270		
10		EB3C-R10DN	360		
16 (*)		EB3C-R16CDN	390		
Transistor (Sink/Source)		1	EB3C-T01DN	120	
		2	EB3C-T02DN	160	
		3	EB3C-T03DN	170	
		5	EB3C-T05DN	240	
		6	EB3C-T06DN	250	
		8	EB3C-T08DN	250	
		10	EB3C-T10DN	320	
	Transistor	Sink	8 (*)	EB3C-T08CKDN	250
			16 (*)	EB3C-T16CKDN	350
		Source	8 (*)	EB3C-T08CSDN	250
16 (*)			EB3C-T16CSDN	350	
Connector	Sink	16 (*)	EB3C-T16CKD-CN	330	
	Source	16 (*)	EB3C-T16CSD-CN	330	

Note: Models marked with (\*) are for common wiring only.

The transistor output sink model can be connected to a positive common PLC input module.

The transistor output source model can be connected to a negative common PLC input module.

Accessories

Name	Part No.	Ordering No.	Package Quantity	Description
DIN Rail	BAA1000	BAA1000PN10	10	Aluminum (1m long)
End Clip	BNL6	BNL6PN10	10	For fastening EB3C units on the DIN rail.
Static Electricity Caution Plate	EB9Z-N1	EB9Z-N1PN10	10	Polyester 20 (W) x 6 (H) mm

Explosion-Protection and Electrical Specifications

Explosion Protection		Intrinsic safety type		
Degree of Protection		IP20 (IEC 60529)		
Installation Location	Relay Barrier	Safe indoor place (safe area: non-hazardous area)		
	Switch	For zone 0, 1, 2		
Non-intrinsically Safe Circuit Maximum Voltage (Um)		250V AC (UL: 125V)		
Intrinsically Safe Circuits	Wiring Method	1-channel Separate Wiring	16-channel Common Wiring	
	Rated Operating Voltage	12V DC ±10%		
	Rated Operating Current	10 mA DC ±20%		
	Maximum Output Voltage (Uo)	13.2V DC		
	Maximum Output Current (Io)	14.2 mA	227.2 mA	
	Maximum Output Power (Po)	46.9 mW	750 mW	
	Maximum External Capacitance (Co)	470 nF	490 nF	
	Maximum External Inductance (Lo)	88.0 mH	0.6 mH	
	Allowable Wiring Resistance (Rc)	300Ω	600/(N+1)Ω (N = number of common channels)	
	Maximum Channels per Common Line	—	16	
Non-intrinsically Safe Circuits	Relay Output	Contact Configuration	1NO	
		Rated Insulation Voltage (Ui)	250V AC, 125V DC (UL: 125V AC, 24V DC)	
		Thermal Current (Ith)	3A (common terminal: 8A)	
		Contact Allowable Power	Resistive Load	AC: 750 VA (UL: 375 VA), DC: 72W
			Inductive Load	AC: 750 VA (UL: 375 VA) (cos φ = 0.3 to 0.4) DC: 48W (L/R = 7 ms)
		Rated Load	Resistive Load	250V AC (UL: 125V AC) 3A, 24V DC 3A
			Inductive Load	250V AC (UL: 125V AC) 3A (cos φ = 0.3 to 0.4) 24V DC 2A (L/R = 7 ms)
		Minimum Applicable Load	0.1V DC, 0.1mA (reference value)	
		Contact Resistance	50mΩ maximum (initial value)	
		Turn ON Time	12ms maximum (rated voltage)	
	Turn OFF Time	10ms maximum (rated voltage)		
	Mechanical Life	20,000,000 operations minimum (at 18,000 operations/hour, without load)		
	Electrical Life	100,000 operations minimum (at 1,800 operations/hour, at rated resistive load)		
	Short-circuit Protection	None		
	Transistor Output	Rated Voltage	24V DC	
		Maximum Voltage	30V DC	
		Maximum Current	100mA (connector model: 15 mA)	
Leakage Current		0.1mA maximum		
Voltage Drop		1.5V maximum (operating temperature: 25°C)		
Inrush Current		0.5A maximum (1 sec)		
Turn ON Time		0.1ms maximum (resistive load)		
Turn OFF Time	0.4ms (typical) (resistive load)			
Short-circuit Protection	None			

Certification No.

Certification Organization	Explosion Protection	Certification No.
FM	AIS Class I, II, III Division 1, Groups A, B, C, D, E, F, G	FM22US0085X
	AIS Zone 0, 1 [AEx ia Ga] II C, II B, II A	
UL c-UL	Class I, II, III Division 1, Groups A, B, C, D, E, F, G	E234997
	Class I, Zone 0 [AEx ia Ga] II C	
DEKRA (IECEx)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	IECEx DEK 21.0070
DEKRA (ATEX)	II (1) G [Ex ia Ga] II C: Gas, Vapour II (1) D [Ex ia Da] III C: Dust	DEKRA 21ATEX0103
CSA (UKCA)	II (1) G [Ex ia Ga] II C: Gas, Vapour II (1) D [Ex ia Da] III C: Dust	CSAE 22UKEX1312
CQC (Ex-CCC)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	2020012316310050
KCs (Korea)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	14-AV4B0-0373 14-AV4B0-0374
DEKRA (Japan)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	DEK21.0084
TS (Taiwan)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	TD04010Z
NK (Japan)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	TA22539M
KR (Korea)	[Ex ia Ga] II C: Gas, Vapour [Ex ia Da] III C: Dust	TKY17821-EL003
TIIS (Japan)	Switch (EB9Z-A): Ex ia IIC T6	TC15758
	Switch (EB9Z-A1): Ex ia IIB T6	TC15961

- Switches are not certified except by TIIS (Technology Institution of Industrial Safety, Japan). For details on switches, see "Switch Explosion-Protection Specifications" on page 3 and "3. Switches in the Hazardous Area" on page 7.
- Certification bodies, explosion-proof performance, and approval/certification numbers are subject to change due to revisions of standards or updates by certification bodies. For the latest information, contact IDEC.
- For FM, UL, and c-UL explosion-proof approved models, add "-2" to the end of the part number. "-2" is not added to the ordering number. Example of part numbers that represent FM, UL, and c-UL certification: EB3C-R01AN-2 Example of ordering part number: EB3C-R01AN

General Specifications

Power Voltage	AC Power	DC Power
Rated Power Voltage	100 to 240V AC (UL: 100 to 120V AC)	24V DC (UL: When using Class 2 power supply)
Allowable Voltage Range	-15 to +10%	±10%
Rated Frequency	50/60 Hz (allowable range: 47 to 63 Hz)	—
Inrush Current	10A (100V AC) 20A (200V AC)	10A (24V DC)
Dielectric Strength (1 minute, 1 mA)	Between intrinsically safe circuit and non-intrinsically safe circuit: 1527V AC	
	Between AC power and output terminal: 1500V AC	
	Between DC power and transistor output terminal: 1000V AC (screw terminal model only)	
Operating Temperature	-20 to +60°C (no freezing)	
Operating Humidity	45 to 85% RH (no condensation)	
Storage Temperature	-20 to +60°C (no freezing)	
Atmosphere	800 to 1100 hPa	
Pollution Degree	2 (IEC 60664)	
Insulation Resistance	10 MΩ minimum (500V DC megger, between the same poles as the dielectric strength)	
Vibration Resistance (damage limits)	Panel mounting: 10 to 55 Hz, amplitude 0.75mm	
	DIN rail mounting: 10 to 55 Hz, amplitude 0.35mm	
Shock Resistance (damage limits)	Panel mounting: 500 m/s <sup>2</sup> (3 times each on X, Y, Z)	
	DIN rail mounting: 300 m/s <sup>2</sup> (3 times each on X, Y, Z)	
Terminal Style	M3 screw terminal	
Mounting	35mm-wide DIN rail or panel mounting (M4 screw)	
Power Consumption (approx.)	9.6 VA (EB3C-R10AN at 200V AC)	
	4.8W (EB3C-R16CDN at 24V DC)	

### Switch Explosion-Protection Specifications (Japan only)

Simple apparatuses in accordance with relevant standards of each country can be installed in the hazardous area and connected to the EB3C located in the safe area. In Japan, any switches, though regarded as simple apparatuses, must be certified for explosion-proof devices. EB9Z-A and EB9Z-A1 are IDEC's generic Part No. of any single apparatuses certified by TIIS for use with the EB3C, therefore simple apparatuses with specifications shown below can be used as those approved by the Japanese explosion-proof certification.

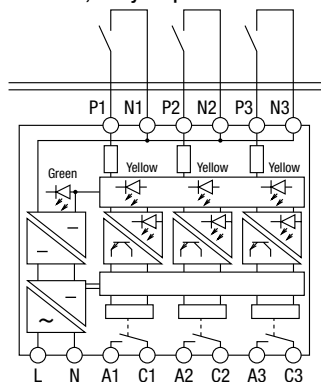
Switch Part No.	EB9Z-A	EB9Z-A1
Explosion Proof (Note 1)	Exia II CT6	Exia II BT6
Operating Temperature	-20 to +60°C (no freezing)	
Operating Humidity	45 to 85% RH (no condensation)	
Degree of Protection	IP20	
Dielectric Strength	500V AC, 1 mA	
Intrinsic Safety Ratings and Parameters	1-channel Separate Wiring Maximum input voltage (Ui): 13.2V Maximum input current (Ii): 14.2 mA Maximum input power (Pi): 46.9 mW Internal inductance (Li): ≤ 5 μH Internal capacitance (Ci): ≤ 2 nF	16-channel Common Wiring Maximum input voltage (Ui): 13.2V Maximum input current (Ii): 227.2 mA Maximum input power (Pi): 750 mW Internal inductance (Li): ≤ 80 μH Internal capacitance (Ci): ≤ 32 nF
Enclosure Material	Metallic: Magnesium content must be 7.5% or less (steel and aluminum are acceptable)  Plastic: Switch operator exposed area IIC: 20 cm <sup>2</sup> maximum IIB: 100 cm <sup>2</sup> maximum When the switch has a wider exposed area, attach a caution label as shown at right.	<div style="border: 1px solid black; padding: 5px;"> <p><b>Caution</b> To prevent electrostatic charges, do not rub the switch surface during operation. Use a soft cloth dipped with water for cleaning.</p> <p><b>Caution Label Example</b></p> </div>
Switch Ratings (Note 2)	Contact rating: Ui, Ii minimum Contact: With contact, no voltage Contact resistance: 0.5Ω maximum Cross sectional area of wire: 0.000962 mm <sup>2</sup> minimum Printed circuit board: Thickness 0.5mm minimum Copper foil width 0.15mm minimum Thickness 18μm minimum one/both side(s)  A resistor to prevent contact welding and an LED can be connected to 1-channel separate wiring circuits. Consult IDEC for details.	

Note 1: See "Operating Instructions" on page 7.

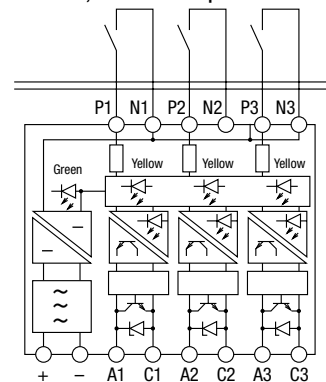
Note 2: For details, see "3. Switches in the Hazardous Area" on page 7.

### Internal Circuit Block Diagram

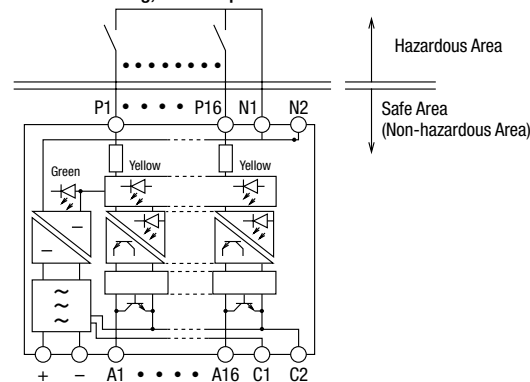
AC Power, Relay Output



DC Power, Transistor Output



Connector Wiring, Sink Output

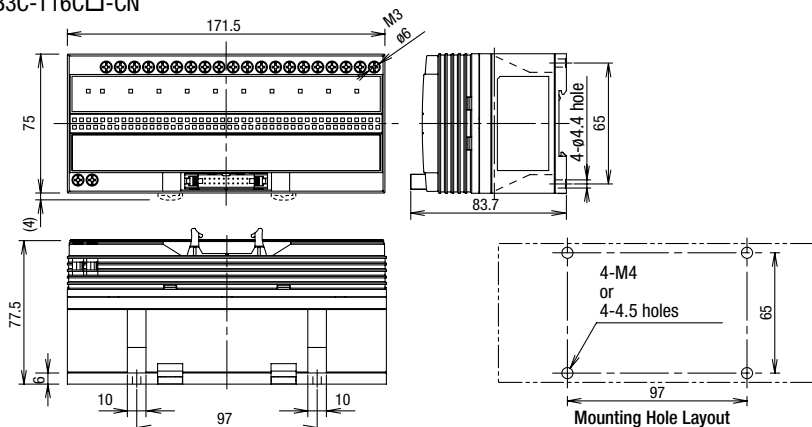


The power LED blinks in green at normal status. If the power LED blinks in red, replace the product.

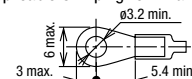
### Dimensions

#### Connector Model

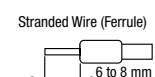
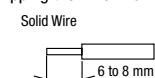
EB3C-T16C□-CN



Applicable Crimping Terminal

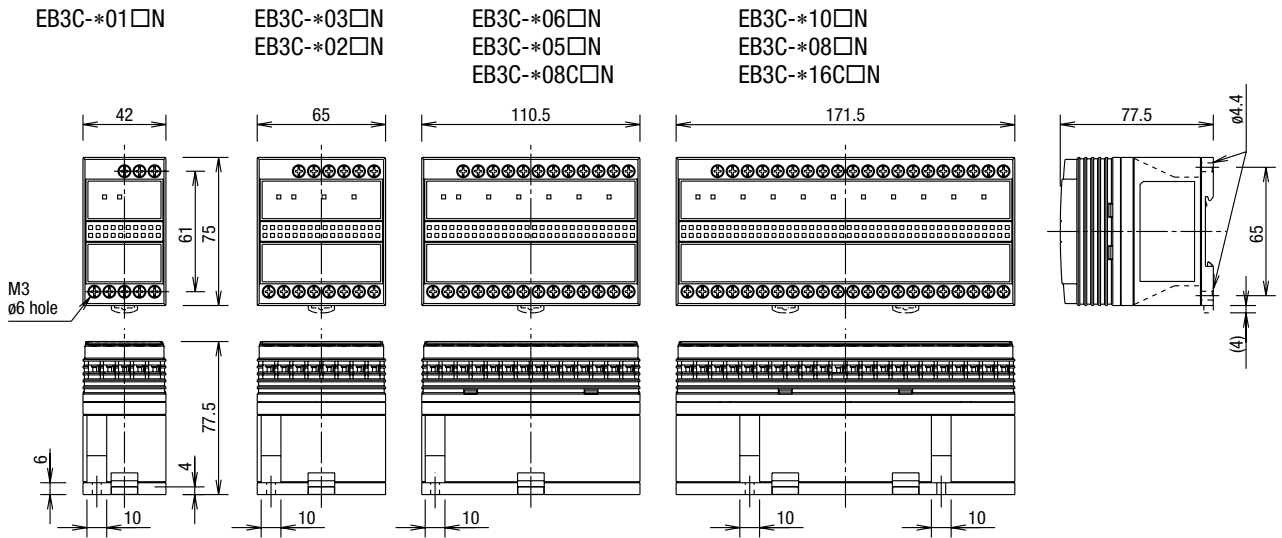


Stripping the Wire End

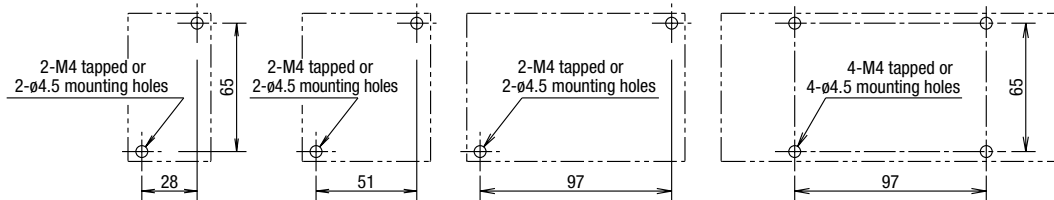


All dimensions in mm.

Screw Terminal

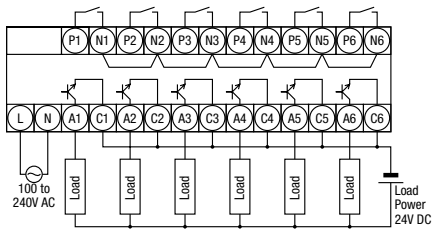


Mounting Hole Layout (Screw Mounting)



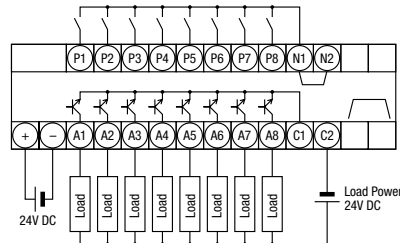
External Wiring Examples

Transistor Output  
(Ex.: EB3C-T06AN)

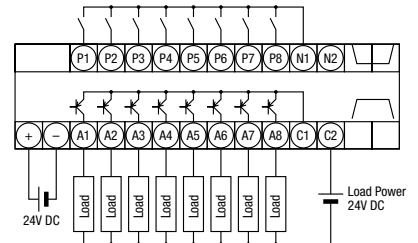


Note: On the sink/source transistor output model, terminals A can be used as a positive common line.

Transistor Sink Output  
(Ex.: EB3C-T08CKDN)

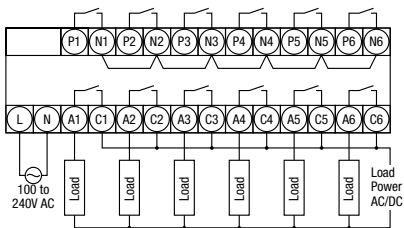


Transistor Source Output  
(Ex.: EB3C-T08CSDN)



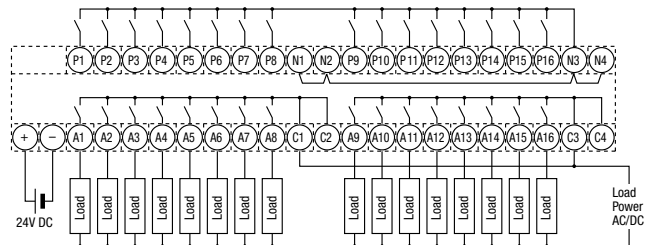
Relay Output

(Ex.: EB3C-R06AN)



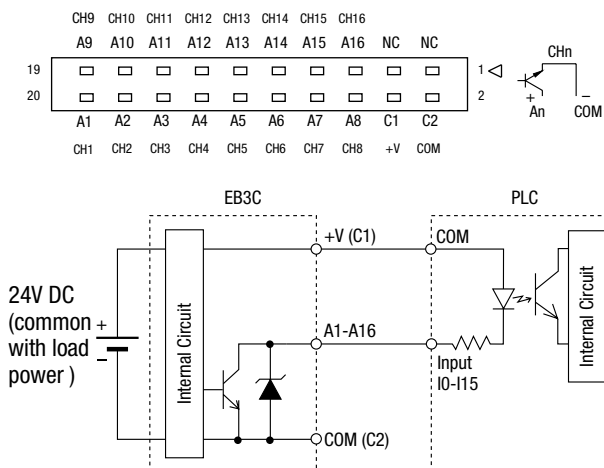
Relay Output Common Wiring

(Ex.: EB3C-R16CDN)

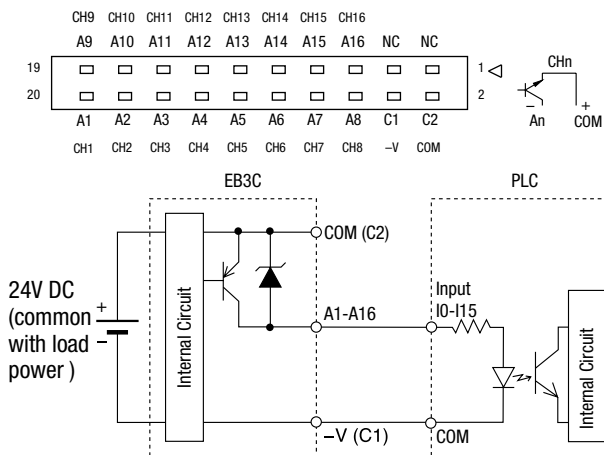


## Connector Model Output Wiring Diagram

### EB3C-T16CKD-CN (Sink)



### EB3C-T16CSD-CN (Source)



### Wiring Example with IDEC's MicroSmart FC6A PLC Input Modules

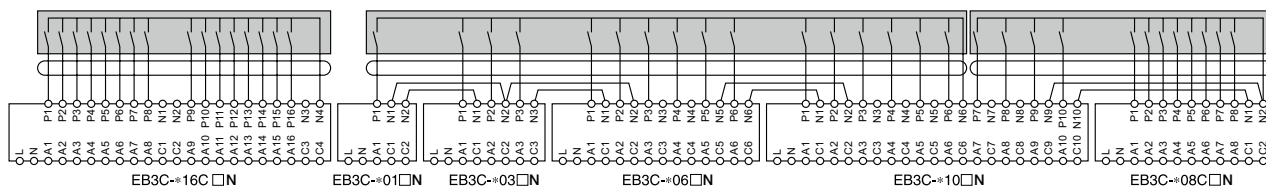
EB3C-T16CKD-CN		FC6A-N16B3		EB3C-T16CSD-CN		FC6A-N16B3	
Terminal	Output	Input	Terminal	Terminal	Output	Input	Terminal
20	A1	I0	20	20	A1	I0	20
19	A9	I10	19	19	A9	I10	19
18	A2	I1	18	18	A2	I1	18
17	A10	I11	17	17	A10	I11	17
16	A3	I2	16	16	A3	I2	16
15	A11	I12	15	15	A11	I12	15
14	A4	I3	14	14	A4	I3	14
13	A12	I13	13	13	A12	I13	13
12	A5	I4	12	12	A5	I4	12
11	A13	I14	11	11	A13	I14	11
10	A6	I5	10	10	A6	I5	10
9	A14	I15	9	9	A14	I15	9
8	A7	I6	8	8	A7	I6	8
7	A15	I16	7	7	A15	I16	7
6	A8	I7	6	6	A8	I7	6
5	A16	I17	5	5	A16	I17	5
4	+V	COM	4	4	-V	COM	4
3	NC	COM	3	3	NC	COM	3
2	COM	NC	2	2	COM	NC	2
1	NC	NC	1	1	NC	NC	1

Note: The wiring in dashed line does not affect the operation of the EB3C.  
 Applicable connector: FL20A2F0 (Oki Electric Cable) or XG4M-2030-T (Omron)  
 A separate power supply does not need to be connected to the PLC input module because the power to the PLC input module is supplied from the relay barrier.

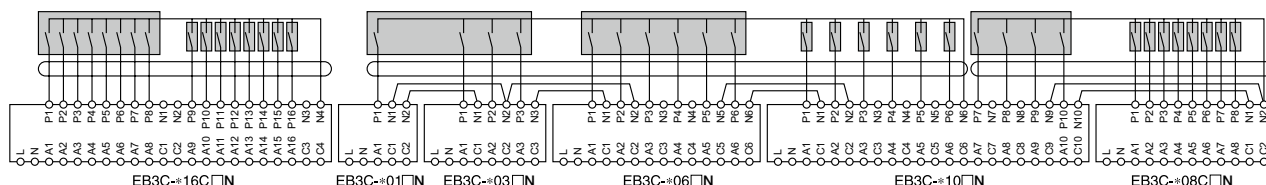
## Wiring Example of Intrinsically Safe External Inputs

### Common Wiring (Maximum 16 circuits)

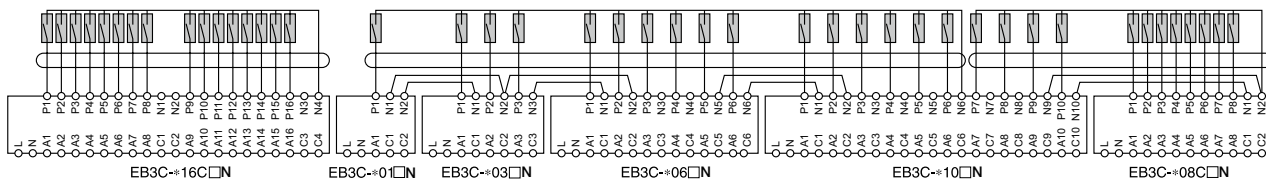
All input lines are wired to a common line inside the intrinsically safe switch (one common line per intrinsically safe circuit).



Some input lines are wired to a common line inside the intrinsically safe switches, while others are outside switches (one common line per intrinsically safe circuit).



All input lines are wired to a common line outside the intrinsically safe switch (one common line per intrinsically safe circuit).



2. Separate Wiring

Each input line of the EB3C makes up one independent intrinsically safe circuit.

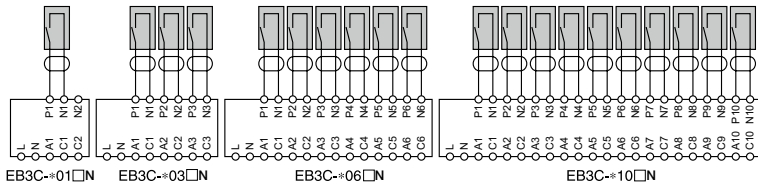
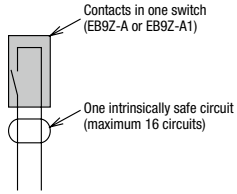
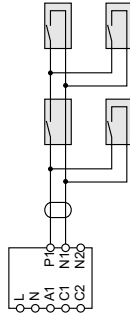


Diagram Symbols



Serial-Parallel Connection of Switches



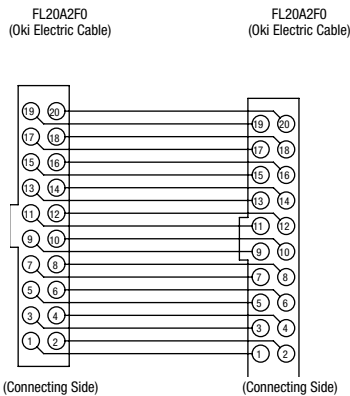
Notes

- As shown in the diagram on the left, a required number of “contacts in one switch” (3 contacts in the example at left) can be added to the “contacts in one switch” connected to one input channel.
- Similarly, a required number of “contacts in one switch” can be added to a common line connected to multiple input channels.
- The capacitance and inductance of the added “contacts in one switch” must be included in the calculation of the wiring capacitance and inductance in “Operating Instructions, 5. Wiring for Intrinsic Safety, (7)” on page 8.
- In addition, a required number of contacts can be added in the enclosure of “contacts in one switch.” In this case, however, do not include the capacitance and inductance in the calculation of the wiring capacitance and inductance on page 8. Instead, make sure that the internal capacitance (Ci) and internal inductance (Li) are within the values shown in the table “Switch Explosion-Protection Specifications (Japan only)” on page 3.

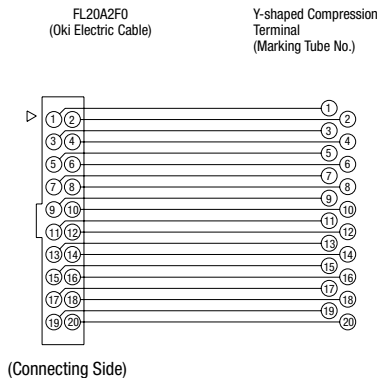
Recommended Connector Cable for Connector Models

Description		No. of Poles	Length (m)	Part No.	Shape	Applicable Model
I/O Terminal Cable	With Shield	20	0.5	FC9Z-H050A20		IDEC MicroSmart I/O Module
			1	FC9Z-H100A20		
			2	FC9Z-H200A20		
	Without Shield		0.5	FC9Z-H050B20		IDEC MicroSmart I/O Module
			1	FC9Z-H100B20		
			2	FC9Z-H200B20		
Cable with Crimping Terminal			1	BX9Z-H100E4		Screw Terminal
			2	BX9Z-H200E4		
			3	BX9Z-H300E4		
40-pin Cable for PLC			1	BX9Z-H100L		Mitsubishi A Series Input Module (positive common) ↓ EB3C-T16CKD-CN
			2	BX9Z-H200L		
			3	BX9Z-H300L		

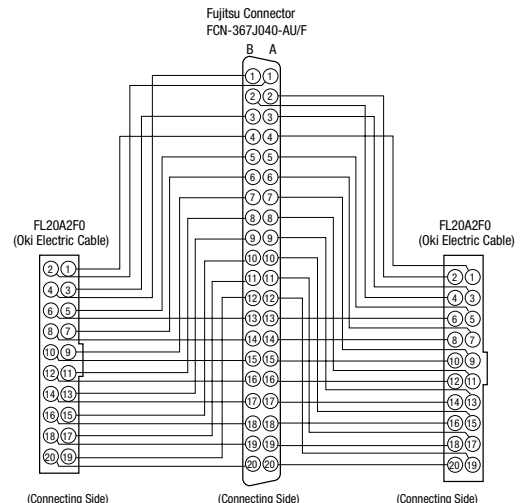
FC9Z-H□□□A, FC9Z-H□□□B Internal Connection



BX9Z□□□E4 Internal Connection



BX9Z-H□□□L Internal Connection



## Operating Instructions

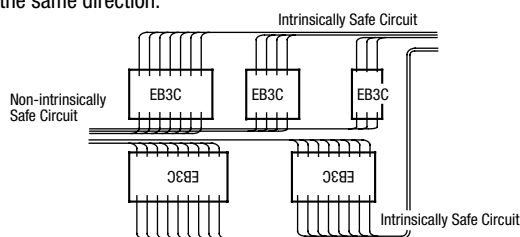
### 1. Installation of EB3C Relay Barriers

- (1) The EB3C can be installed in any direction.
- (2) Install the EB3C relay barrier in a safe area (non-hazardous area) in accordance with intrinsic safety ratings and parameters. To avoid mechanical shocks, install the EB3C in an enclosure which suppresses shocks.
- (3) When installing or wiring the EB3C, prevent electromagnetic and electrostatic inductions in the intrinsically safe circuit. Also prevent the intrinsically safe circuits from contacting with another intrinsically safe circuit and any other circuits.

Maintain at least 50 mm clearance, or provide a metallic separating board between the intrinsically safe circuit and non-intrinsically safe circuit. When providing a metallic separating board, make sure that the board fits closely to the enclosure (top, bottom, and both sides). Allowable clearance between the enclosure and board is 1.5 mm at the maximum.

The clearance of 50 mm between the intrinsically safe circuit and non-intrinsically safe circuit may not be sufficient when a motor circuit or high-voltage circuit is installed nearby. In this case, provide a wider clearance between the circuits referring to 5 (3) "Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits."

- (4) In order to prevent contact between intrinsically safe circuits and non-intrinsically safe circuits, mount EB3C units with terminals arranged in the same direction.



- (5) Maintain at least 6 mm (or 3 mm according to IEC60079-11: 1999) clearance between the terminal of intrinsically safe circuit and the grounded metal part of a metal enclosure, and between the relay terminal block of an intrinsically safe circuit and the grounded metal part of a metal enclosure.
- (6) For installing the EB3C, mount on a 35-mm-wide DIN rail or directly on a panel using screws. Make sure to install securely to withstand vibration. When mounting on a DIN rail, push in the clamp completely. Use the BNL6 end clips on both sides of the EB3C to prevent from moving sideways.
- (7) Excessive extraneous noise may cause malfunction and damage to the product. If the voltage limiting circuit (thyristor) inside the barrier activates due to noise, all LEDs turn off, and the output will turn off. When the voltage limit circuit activates, be sure to remove the noise source because it does not automatically reset after shutting off the power of the barrier. When the noise is removed, the barrier will return to normal operation before powering up again.
- (8) The power LED blinks in green at normal status. If the power LED blinks in red, replace the product.

### 2. Terminal Wiring

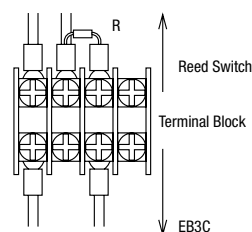
- (1) Using a  $\phi 5.5$  mm or smaller screw driver, tighten the terminal screws (including unused terminal screws) to a torque of 0.6 to 1.0 N·m (recommended value).
- (2) Make sure that IP20 is achieved when wiring. Use insulation tubes on bare crimping terminals.
- (3) To prevent disengaged wires from contacting with other intrinsically safe circuits, bind together the wires of one intrinsically safe circuit.
- (4) When the adjacent terminal is connected to another intrinsically safe circuit, provide an insulation distance of at least 6 mm.

### 3. Switches in the Hazardous Area

- (1) Switches (EB9Z-A, EB9Z-A1) contain the switch contact, enclosure, and internal wiring. A switch contact refers to an ordinary switching device which consists of contacts only (such as IDEC's ABN pushbuttons). (See Table 1)  
Switches other than non-voltage / switches with contacts (e.g., non-contact switches) cannot be used.
- (2) When the switch (EB9Z-A, EB9Z-A1) has internal wiring or lead wire, make sure that the values of internal capacitance ( $C_i$ ) and inductance ( $L_i$ ) are within the certified values.
- (3) Enclose the bare live part of the switch contact in an enclosure of IP20 or higher protection.
- (4) Depending on the explosion-protection specifications according to TIS, the exposed area of plastic switch operator is limited as follows:
  - Exia II CT6 (EB9Z-A): 20 cm<sup>2</sup> maximum
  - Exia II BT6 (EB9Z-A1): 100 cm<sup>2</sup> maximum
- (5) Attach the certification mark supplied with the EB3C on the switch (for Japan application).
- (6) When the switch operator of plastic enclosure has a wider exposed area than 20 cm<sup>2</sup> maximum limits at II C or 100 cm<sup>2</sup> maximum at II B, attach a caution label as shown below.  
Prevent electrostatic charge  
Do not rub the surface during operation  
Use a soft cloth dipped with water for cleaning
- (7) For the 1-circuit separate wiring, a resistor to prevent reed switch contact welding and an LED miniature pilot lights can be connected in series with the contact.

- (a) Applicable resistor rating
  - Resistance: 100 $\Omega$  maximum
  - Rated wattage: 1/2W to 3W
  - Type: Metal (oxide) film resistors
  - Model No. (example): KOA Corporation MOS, MOSX series

\*Use a M3 terminal screw or larger



- (b) Applicable LED  
IDEC's IPL1 series LED miniature pilot lights.

Table 1. Example of switches (EB9Z-A, EB9Z-A1) (contact part)

Control Switches	Push-pull Switches	Pushbutton, Foot, Trigger, Rocker, Grip
	Twisting Switches	Rotary, Selector, Cam, Drum, Thumb wheel
	Lever and Slide Switches	Toggle, Multidirectional, Wobble stick, Lever, Slide switch
Sensing Switches	Displacement Switches	Microswitch, Limit, Magnetic proximity, Door, Reed, Mercury
	Level Switches	Liquid level
	Others	Pressure, Temperature

Note: For installation in hazardous areas and connection to the EB3C, use switches which are certified, approved, or considered to be simple apparatus in relevant standards in each country.

- (8) Switches (EB9Z-A, EB9Z-A1) connected to the EB3C relay barrier must have an insulation performance of 500V minimum for hazardous location grounding for both the switch contacts and wiring.

## Operating Instructions

### 4. Output Specifications

(1) When wiring the output from the EB3C, connect the non-intrinsically safe circuit to terminals A and C. The EB3C output circuit is not equipped with short-circuit protection. If required, provide a protection in the external circuit.

#### (2) Relay Output

Some types of loads generate reverse emf (such as solenoids) or cause a large inrush current (incandescent lamps), resulting in a shorter operation life of output relay contacts. The operation life of contacts can be extended by preventing the reverse emf using a diode, RC, or varistor, or by suppressing the inrush current using a resistor or RL.

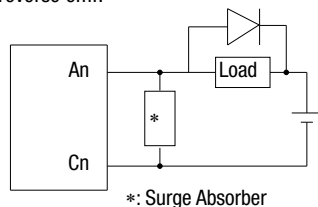
Contacts are made of gold-clad silver. When using at a small current and a low voltage (reference value: 0.1 mA, 0.1V), test the contact on the actual circuit in advance.

#### (3) Transistor Output

When connecting a small load, the load may not turn off because of a leakage current, even though the transistor output is turned off. If this is the case, connect a resistor in parallel with the load to bypass the leakage current.

When an excessively high voltage or a reverse voltage is applied to the output terminals, the clamping circuit or output transistor may be damaged.

When driving an inductive load, be sure to connect a diode across the load to absorb reverse emf.



Example of Overvoltage Absorption Circuit

- (4) In the common wiring only models, the output terminals are not isolated from each other.
- (5) When connecting the connector model EB3C's in parallel, use one power supply to power the EB3C's. Do not connect any wiring to the C1 and C2 terminals.

### 5. Wiring for Intrinsic Safety

- (1) The voltage applied on the general circuit connected to the non-intrinsically safe circuit terminals of the EB3C relay barrier must be 250V AC, 50/60Hz, or 250V DC at the maximum under any conditions, including the voltage of the input power and the internal circuit.
- (2) When wiring, take into consideration the prevention of electromagnetic and electrostatic charges on intrinsically safe circuits. Also, prevent intrinsically safe circuits from contacting with other circuits.
- (3) The intrinsically safe circuits must be separated from non-intrinsically safe circuits. Contain intrinsically safe circuits in a metallic tube or duct, or separate the intrinsically safe circuits referring to the table below.

Note: Cables with a magnetic shield, such as a metallic sheath, prevent electromagnetic induction and electrostatic induction, however, a non-magnetic shield prevents electrostatic induction only. For non-magnetic shields, take a preventive measure against electromagnetic induction.

Finely twisted pair cables prevent electromagnetic induction. Adding shields to the twisted pair cables provides protection against electrostatic induction.

### Minimum Parallel Distance between the Intrinsically Safe Circuit and Other Circuits (mm)

Voltage and Current of Other Circuits	Over 100A	100A or less	50A or less	10A or less
Over 440V	2000	2000	2000	2000
440V or less	2000	600	600	600
220V or less	2000	600	600	500
110V or less	2000	600	500	300
60V or less	2000	500	300	150

- (4) When identifying intrinsically safe circuits by color, use light blue terminal blocks and cables.
- (5) When using two or more EB3C's to set up one intrinsically safe circuit in the common wiring configuration, interconnect two neutral terminals (N1 through N10) on each EB3C between adjacent EB3C's in parallel.
- (6) Make sure that the power of the EB3C and contact are turned off before starting inspection or replacement.
- (7) When wiring the intrinsically safe circuit, determine the distance to satisfy the wiring parameters shown below. Note that parameters are different between separate wiring and common wiring.
- Wiring inductance (Lc):  $Lc \leq Lo - (Li + N \times 5 \mu H)$   
 Lo: Maximum external inductance of the EB3C  
 Li: Internal inductance of the switch  
 N: The number of switches connected in series or parallel (the number is infinite)
  - Wiring capacitance Cc:  $Cc \leq Co - (Ci + N \times 2 nF)$   
 Co: Maximum external capacitance of the EB3C  
 Ci: Internal capacitance of the switch  
 N: The number of switches connected in series or parallel (the number is infinite)
  - Wiring resistance  $\leq Rc$   
 Rw: Allowable wiring resistance
  - Allowable wiring distance T (km) is the smallest value of those calculated from the capacitance, inductance, and resistance.

$$T \leq Lc/L \quad L \text{ (mH/km): Inductance of cable per km}$$

$$T \leq Cc/C \quad C \text{ (nF/km): Capacitance of cable per km}$$

$$T \leq Rc/2R \quad R \text{ (\Omega/km): Resistance of cable per km}$$

Note: For the details of wiring the intrinsically safe circuits, refer to a relevant test guideline for explosion-proof electric equipment in each country.

- (8) Applicable Wire Size  
 0.5 to 2.1mm<sup>2</sup> (AWG20 to AWG14)

Be sure to read the instruction manual carefully before performing installation, wiring, or maintenance work.

For details on mounting, wiring, and maintenance, see the instruction manual from the below URL.  
 URL: <https://product.idec.com/?product=EB3C-N>





# Ordering Terms and Conditions

Thank you for using IDEC Products.

By purchasing products listed in our catalogs, datasheets, and the like (hereinafter referred to as "Catalogs") you agree to be bound by these terms and conditions. Please read and agree to the terms and conditions before placing your order.

## 1. Notes on contents of Catalogs

- (1) Rated values, performance values, and specification values of IDEC products listed in this Catalog are values acquired under respective conditions in independent testing, and do not guarantee values gained in combined conditions.  
Also, durability varies depending on the usage environment and usage conditions.
- (2) Reference data and reference values listed in Catalogs are for reference purposes only, and do not guarantee that the product will always operate appropriately in that range.
- (3) The specifications / appearance and accessories of IDEC products listed in Catalogs are subject to change or termination of sales without notice, for improvement or other reasons.
- (4) The content of Catalogs is subject to change without notice.

## 2. Note on applications

- (1) If using IDEC products in combination with other products, confirm the applicable laws / regulations and standards.  
Also, confirm that IDEC products are compatible with your systems, machines, devices, and the like by using under the actual conditions. IDEC shall bear no liability whatsoever regarding the compatibility with IDEC products.
- (2) The usage examples and application examples listed in Catalogs are for reference purposes only. Therefore, when introducing a product, confirm the performance and safety of the instruments, devices, and the like before use. Furthermore, regarding these examples, IDEC does not grant license to use IDEC products to you, and IDEC offers no warranties regarding the ownership of intellectual property rights or non-infringement upon the intellectual property rights of third parties.
- (3) When using IDEC products, be cautious when implementing the following.
  - i. Use of IDEC products with sufficient allowance for rating and performance
  - ii. Safety design, including redundant design and malfunction prevention design that prevents other danger and damage even in the event that an IDEC product fails
  - iii. Wiring and installation that ensures the IDEC product used in your system, machine, device, or the like can perform and function according to its specifications
- (4) Continuing to use an IDEC product even after the performance has deteriorated can result in abnormal heat, smoke, fires, and the like due to insulation deterioration or the like. Perform periodic maintenance for IDEC products and the systems, machines, devices, and the like in which they are used.
- (5) IDEC products are developed and manufactured as general-purpose products for general industrial products. They are not intended for use in the following applications, and in the event that you use an IDEC product for these applications, unless otherwise agreed upon between you and IDEC, IDEC shall provide no guarantees whatsoever regarding IDEC products.
  - i. Use in applications that require a high degree of safety, including nuclear power control equipment, transportation equipment (railroads / airplanes / ships / vehicles / vehicle instruments, etc.), equipment for use in outer space, elevating equipment, medical instruments, safety devices, or any other equipment, instruments, or the like that could endanger life or human health
  - ii. Use in applications that require a high degree of reliability, such as provision systems for gas / waterworks / electricity, etc., systems that operate continuously for 24 hours, and settlement systems
  - iii. Use in applications where the product may be handled or used deviating from the specifications or conditions / environment listed in the Catalogs, such as equipment used outdoors or applications in environments subject to chemical pollution or electromagnetic interference  
If you would like to use IDEC products in the above applications, be sure to consult with an IDEC sales representative.

## 3. Inspections

We ask that you implement inspections for IDEC products you purchase without delay, as well as thoroughly keep in mind management/maintenance regarding handling of the product before and during the inspection.

## 4. Warranty

- (1) 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.
- (2) 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.

## 5. Limitation of liability

The warranty listed in this Agreement is the full and complete warranty for IDEC products, and IDEC shall bear no liability whatsoever regarding special damages, indirect damages, incidental damages, or passive damages that occurred due to an IDEC product.

## 6. 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

The above content assumes transactions and usage within your region. Please consult with an IDEC sales representative regarding transactions and usage outside of your region. Also, IDEC provides no guarantees whatsoever regarding IDEC products sold outside your region.

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