

## IO-Link Makes Sensor Level Information Visible and Solves the Three Major Issues at Manufacturing Sites!



- Downtime can be reduced.
- Notifies you of faulty parts and changing conditions in the Sensor in real time.
- The frequency of sudden failure can be decreased.
- Notifies you of objects being too far or too close.
- The efficiency of changeover can be improved.
- The batch check for individual sensor IDs significantly decreases commissioning time.
- Standard Sensor for detecting ferrous metals.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

Be sure to read *Safety Precautions* on page 5.

## Ordering Information

### Sensors [Refer to *Dimensions* on page 6.]

#### DC 3-wire IO-Link Models

Appearance	Sensing distance			Connection method	Cable specifications	Operation mode	Pin arrangement	Baud rate	Model
									PNP
Shielded 	M12	3 mm		Pre-wired Models (2 m)	PVC (oil-resistant)	NO/NC switching	-	COM2	E2E-X3B4-IL2 2M
				M12 Pre-wired Smartclick Connector Models (0.3 m)				COM3	E2E-X3B4-IL3 2M
	M18	7 mm		Pre-wired Models (2 m)			1: +V 3: 0 V 4: C/Q output	COM2	E2E-X3B4-M1TJ-IL2 0.3M
				M12 Pre-wired Smartclick Connector Models (0.3 m)				COM3	E2E-X3B4-M1TJ-IL3 0.3M
	M30	10 mm		Pre-wired Models (2 m)			-	COM2	E2E-X7B4-IL2 2M
				M12 Pre-wired Smartclick Connector Models (0.3 m)				COM3	E2E-X7B4-IL3 2M
					1: +V 3: 0 V 4: C/Q output	COM2	E2E-X7B4-M1TJ-IL2 0.3M		
						COM3	E2E-X7B4-M1TJ-IL3 0.3M		

**Note:** Please contact your OMRON sales representative regarding the IO-Link setup file (IODD file).

## Accessories (Sold Separately)

### Sensor I/O Connectors

(Models with Pre-wired Connectors: A Connector is not provided with the Sensor. Be sure to order a Connector separately.)

Type	Appearance	Cable length	Sensor I/O Connector model number	Applicable Proximity Sensor model number
Socket on one cable end	Straight 	2 m	XS5F-D421-D80-F	E2E-X□B4-M1TJ-IL□
		5 m	XS5F-D421-G80-F	
	L-shape 	2 m	XS5F-D422-D80-F	
		5 m	XS5F-D422-G80-F	
Socket and plug on cable ends *	Straight/straight 	2 m	XS5W-D421-D81-F	
		5 m	XS5W-D421-G81-F	
	L-shape/L-shape 	2 m	XS5W-D422-D81-F	
		5 m	XS5W-D422-G81-F	

**Note:** Refer to *Sensor I/O Connector/Sensor Controller* on your OMRON website for details.

\* There are also straight type/L-shape type combinations available.

# Ratings and Specifications

## DC 3-wire IO-Link Models (E2E-X□B4-IL□)

Item	Size Shielded Model	M12	M18	M30
		Shielded		
		E2E-X3B4-IL□	E2E-X7B4-IL□	E2E-X10B4-IL□
Sensing distance		3 mm ±10%	7 mm ±10%	10 mm ±10%
Set distance *1		0 to 2.4 mm	0 to 5.6 mm	0 to 8 mm
Differential travel		10% max. of sensing distance		
Detectable object		Ferrous metal (The sensing distance decreases with non-ferrous metal. Refer to <i>Engineering Data</i> on page 3.)		
Standard sensing object		Iron, 12 × 12 × 1 mm	Iron, 18 × 18 × 1 mm	Iron, 30 × 30 × 1 mm
Response frequency *2		1 kHz	0.5 kHz	0.4 kHz
Power supply voltage		10 to 30 VDC (including 10% ripple (p-p))		
Current consumption		20 mA max.		
Control output	Load current	100 mA max.		
	Residual voltage	2 V max. (Load current: 100 mA, Cable length: 2 m)		
Indicators *1		In the Standard I/O mode (SIO mode): Operation indicator (orange, lit) and stability indicator (green, lit) In the IO-Link mode: Operation indicator (orange, lit) and communication indicator (green, blinking at 1 s intervals)		
Operation mode		PNP NO/NC switching type (Factory setting: NO) Refer to the timing charts under <i>I/O Circuit Diagrams</i> on page 64 for details.		
Protection circuits		Power supply reverse polarity protection, output reverse polarity protection, surge suppressor, and output short-circuit protection		
Ambient temperature range		Operating/Storage: -25 to 70°C (with no icing or condensation)		
Ambient humidity range		Operating/Storage: 35% to 95% (with no condensation)		
Temperature influence		±10% max. of sensing distance at 23°C in the temperature range of -25 to 70°C		
Voltage influence		±1% max. of sensing distance at rated voltage in the rated voltage ±15% range		
Insulation resistance		50 MΩ min. (at 500 VDC) between current-carrying parts and case		
Dielectric strength		1,000 VAC, 50/60 Hz for 1 minute between current-carrying parts and case		
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y, and Z directions		
Shock resistance		Destruction: 1,000 m/s <sup>2</sup> 10 times each in X, Y, and Z directions		
Degree of protection		IEC 60529 IP67, in-house standards: oil-resistant *3		
Connection method		Pre-wired Models (Standard cable length: 2 m), Pre-wired Connector Models (Standard cable length: 0.3 m)		
Materials	Case	Nickel-plated brass		
	Sensing surface	PBT		
	Clamping nuts	Nickel-plated brass		
	Toothed washer	Zinc-plated iron		
Main IO-Link functions		Operation mode switching between NO and NC, self diagnosis enabling, excessive proximity judgment distance selecting, timer function of the control output and timer time selecting, instability output (IO-Link mode) ON delay timer time selecting function, monitor output, operating hours read-out, and initial reset		
Communication specifications	IO-Link specification	Ver 1.1		
	Baud rate	-IL3: COM3 (230.4 kbps), -IL2: COM2 (38.4 kbps)		
	Data length	PD size: 2 bytes, OD size: 1 byte (M-sequence type: TYPE_2_2)		
	Minimum cycle time	-IL3 (COM3): 1 ms, -IL2 (COM2): 2.3 ms		
Accessories		Instruction manual		

**Note:** Please contact your OMRON sales representative regarding the IO-Link setup file (IODD file).

\*1. In the Standard I/O mode (SIO mode), use the product in a range that the green stability indication lamp is lit. (Although the lamp is turned off when the object detected has approached excessively, the detection performance is stable.)

In the IO-Link mode, use the product in a range that the Byte1\_bit4 for instability detection is zero. (Although the Byte1\_bit5 for excessive proximity detection is one if the object detected has approached excessively, the detection performance is stable.)

Please contact your OMRON sales representative regarding assignment of data.

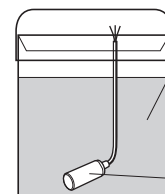
\*2. The response frequency is an average value. Measurement conditions are as follows: standard sensing object, a distance of twice the standard sensing object, and a set distance of half the sensing distance.

\*3. Oil resistance in-house standard: Performance with respect to water insoluble oil.  
(Test at right)

#### Oil resistance test

After the test time elapses, the characteristics below are checked for problems.

- (1) Visual appearance (no damage that affects product characteristics)
- (2) Operation check (ON/OFF)
- (3) Insulation resistance (50 MΩ min. at 500 VDC)
- (4) Dielectric strength (500 VAC, 1 min.)
- (5) Water resistance (IP67)



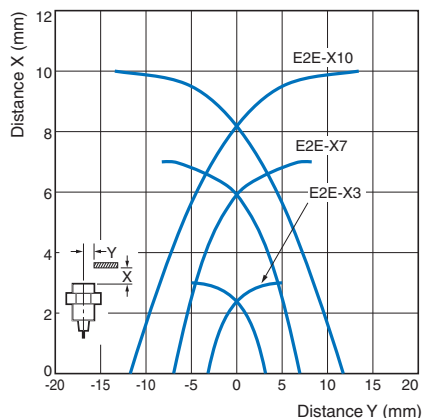
Test oil: Water insoluble oil  
Velocite No. 3  
(manufactured by  
Exxon Mobil)  
50°C x 250 hours  
Depth 10 cm

Sensor

# Engineering Data (Reference Value)

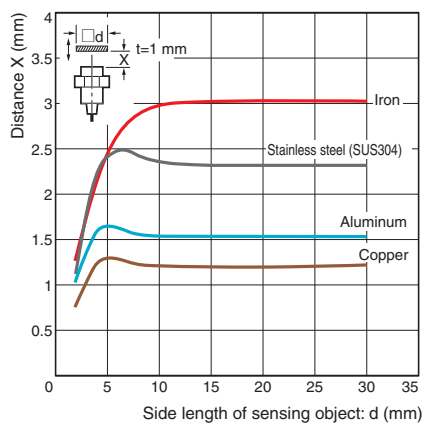
## Sensing Area

### E2E-X□B4 (-M1TJ) -IL□

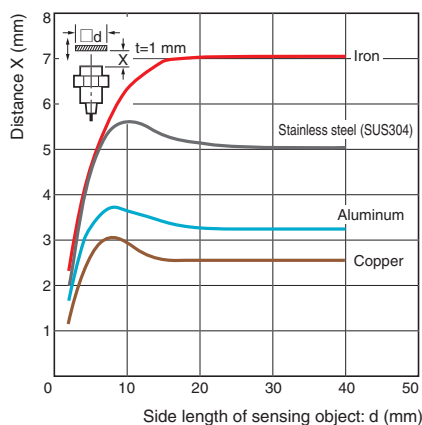


## Influence of Sensing Object Size and Material

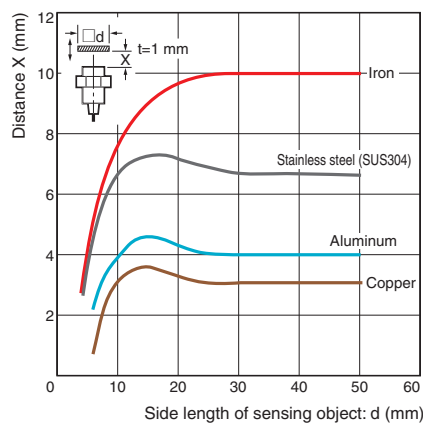
### E2E-X3B4 (-M1TJ) -IL□



### E2E-X7B4 (-M1TJ) -IL□

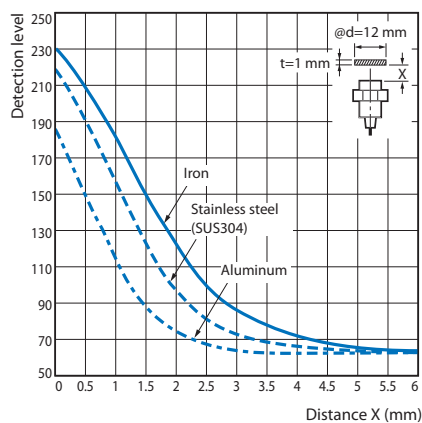


### E2E-X10B4 (-M1TJ) -IL□

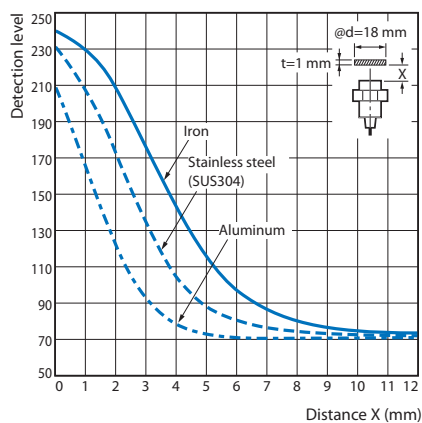


## Monitor Output

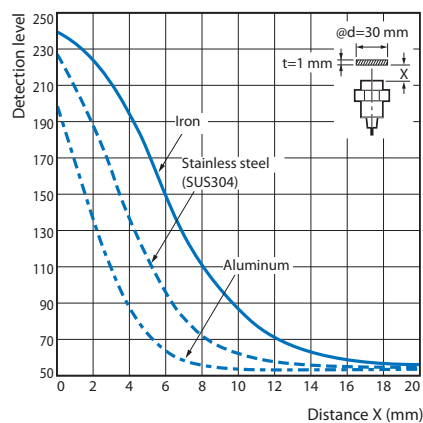
### E2E-X3B4 (-M1TJ) -IL□



### E2E-X7B4 (-M1TJ) -IL□



### E2E-X10B4 (-M1TJ) -IL□



# I/O Circuit Diagrams

Timing Chart

The timing chart illustrates the sensor's response to a sensing object. It is divided into three zones: Non-sensing zone, Unstable sensing zone, and Stable sensing zone. The 'Rated sensing distance (%)' is shown as 100, 80, 20, and 0. Key points include 'Set position', 'Excessive proximity judgment distance \*7', and 'Sensing object'. The chart shows the state of various outputs: Stability indicator (green), Operation indicator (orange), and Control output \*5 (yellow) for both Standard I/O mode (SIO mode) and IO-Link mode in NO and NC configurations. In IO-Link mode, it also shows the state of the Communication indicator (flashing green), Control output \*5 (Byte1\_bit0), Instability detection \*6 (Byte1\_bit4), and Excessive proximity detection (Byte1\_bit5).

\*1. The operation mode can be changed by the IO-Link communications.

\*2. If the excessive proximity diagnosis function using the IO-Link communications is disabled, the lamp is lit in this zone, too, in the Standard I/O mode (SIO mode). In the IO-Link mode, diagnosis is disabled (fixed to zero).

\*3. If the instability detection diagnosis function using the IO-Link communications is disabled, the lamp is lit in this zone, too, in the Standard I/O mode (SIO mode). In the IO-Link mode, diagnosis is disabled (fixed to zero).

\*4. If both the diagnosis functions of excessive proximity and instability detection using the IO-Link communications are disabled, the lamp is not lit in all the zones.

\*5. The timer function of the control output can be set up by the IO-Link communications. (It is able to select ON delay, OFF delay, or one-shot function and select a timer time of 1 to 4000 ms (T).)

	ON-delay	OFF-delay	One Shot
Present	ON	ON	ON
Not present	OFF	OFF	OFF
NO	ON 1	ON 1	ON 1
NO	OFF 0	OFF 0	OFF 0
NC	ON 1	ON 1	ON 1
NC	OFF 0	OFF 0	OFF 0

\*6. The judgment time for the instability detection diagnosis can be selected by the IO-Link communications. (For the ON delay timer function, the setting can be selected from 0 (invalid), 10, 50, 100, 300, 500, or 1000 ms.)

\*7. The judgment distance of the excessive proximity diagnosis function can be selected by the IO-Link communications. (The distance can be selected as a combination of the material of the object detected, such as iron, aluminum, or SUS and the judgment distance of approximately 10, 20, or 30%. However, it is not allowed to select a combination of aluminum and 30%.)

\*8. If using the product as a general sensor, it operates in the Standard I/O mode (SIO mode).

Note: Please contact your OMRON sales representative regarding assignment of data.

Output circuit

**When using as a general sensor**

**When using the Sensor connected to IO-Link Master Unit**

## Pre-wired Connector Model Connections


Model	Connections
<b>E2E-X□B4-M1TJ-IL□</b>	<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>E2E</p> </div> <div style="text-align: center;"> <p>XS5F</p> </div> <div style="font-size: x-small;"> <p>*                      ○ Brown (+V)                      ○ White (not used)                      ○ Blue (0V)                      ○ Black (Output)</p> </div> </div>

\* If the XS5W-D42□-□81-F Connector which has a socket and plug on the cable ends is connected to the Sensor, this part will be a plug.



## Safety Precautions

Be sure to read the precautions for all models in the website at: [www.omron247.com](http://www.omron247.com).

### Warning Indications

 <b>Warning</b>	<b>Warning level</b> Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.
<b>Precautions for Safe Use</b>	Supplementary comments on what to do or avoid doing, to use the product safely.
<b>Precautions for Correct Use</b>	Supplementary comments on what to do or avoid doing, to prevent failure to operate, malfunction or undesirable effect on product performance.

### Meaning of Product Safety Symbols

	<b>General prohibition</b> Indicates the instructions of unspecified prohibited action.
	<b>Caution, explosion</b> Indicates the possibility of explosion under specific conditions.

### Warning

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purposes.



#### Risk of explosion.

Do not connect sensor to AC power supply.



### Precautions for Safe Use

The following precautions must be observed to ensure safe operation.

- Do not use the product in an environment where flammable or explosive gas is present.
- Do not attempt to disassemble, repair, or modify the product.
- Power Supply Voltage**  
Do not use a voltage that exceeds the rated operating voltage range. Applying a voltage that is higher than the operating voltage range may result in damage or burnout.
- Incorrect Wiring**  
Be sure that the power supply polarity and other wiring is correct. Incorrect wiring may cause explosion or burnout.
- Connection without a Load**  
If the power supply is connected directly without a load, the internal elements may explode or burn. Be sure to insert a load when connecting the power supply.
- Dispose of this product as industrial waste.

### Precautions for Correct Use

Do not use this product under ambient conditions that exceed the ratings.

#### ● Operating Environment

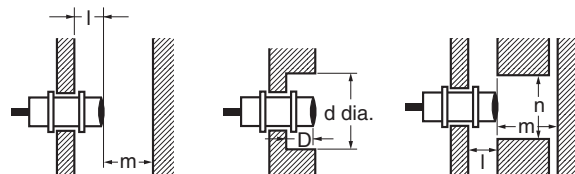
- Do not install the product in the following locations. Doing so may result in product failure or malfunction.
  - Outdoor locations directly subject to sunlight, rain, snow, water droplets, or oil.
  - Locations subject to atmospheres with chemical vapors, in particular solvents and acids.
  - Locations subject to corrosive gases.
- The Sensor may malfunction if used near ultrasonic cleaning equipment, high-frequency equipment, transceivers, cellular phones, inverters, or other devices that generate a high-frequency electric field. Please refer to the Precautions for Correct Use on the OMRON website ([www.ia.omron.com](http://www.ia.omron.com)) for typical measures.
- Laying the Proximity Sensor wiring in the same conduit or duct as high-voltage wires or power lines may result in incorrect operation and damage due to induction. Wire the Sensor using a separate conduit or independent conduit.

- Never use thinner or other solvents. Otherwise, the Sensor surface may be dissolved.

#### ● Design

##### Influence of Surrounding Metal

When mounting the Sensor within a metal panel, ensure that the clearances given in the following table are maintained. Failure to maintain these distances may cause deterioration in the performance of the Sensor.

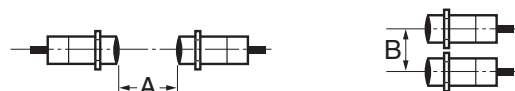


(Unit: mm)

Model	Item	l	d	D	m	n
E2E-X3B4 (-M1TJ) -IL□	0		12		8	18
E2E-X7B4 (-M1TJ) -IL□			18	0	20	27
E2E-X10B4 (-M1TJ) -IL□			30		40	45

##### Mutual Interference

When installing Sensors face-to-face or side-by-side, ensure that the minimum distances given in the following table are maintained.



(Unit: mm)

Model	Item	A	B
E2E-X3B4 (-M1TJ) -IL□		30	20
E2E-X7B4 (-M1TJ) -IL□		50	35
E2E-X10B4 (-M1TJ) -IL□		100	70

#### ● Mounting

##### Tightening Force

Do not tighten the nut with excessive force. A washer must be used with the nut. Do not use tightening force that exceeds the values in the following table.



Model	Item	Torque
E2E-X3B4 (-M1TJ) -IL□		30 N·m
E2E-X7B4 (-M1TJ) -IL□		70 N·m
E2E-X10B4 (-M1TJ) -IL□		180 N·m

#### ● Wiring

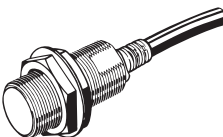
In the IO-Link mode, the cable between the IO-link Master and Sensor must have a length of 20m or less.

# E2E-□-IL□

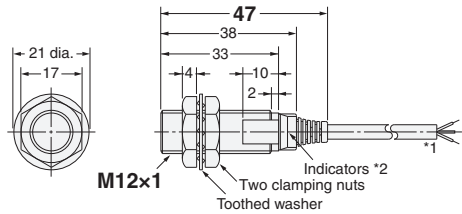
## Dimensions

(Unit: mm)  
Tolerance class IT16 applies to dimensions in this data sheet unless otherwise specified.

### Pre-wired Models

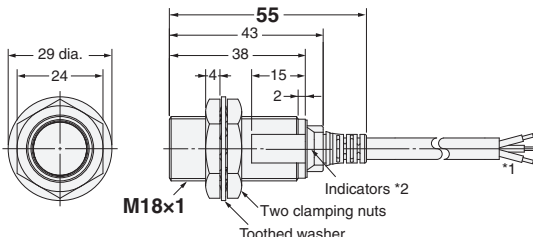


#### E2E-X3B4-IL□



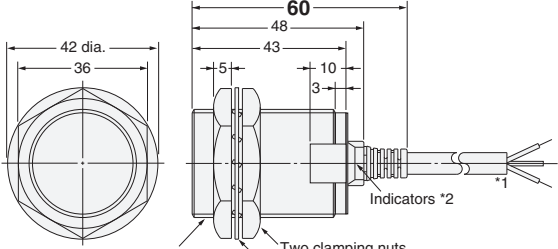
\*1. 4-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.3 mm<sup>2</sup>, Insulator diameter: 1.3 mm), Standard length: 2 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

#### E2E-X7B4-IL□



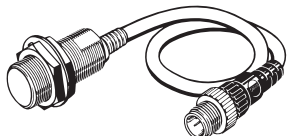
\*1. 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

#### E2E-X10B4-IL□

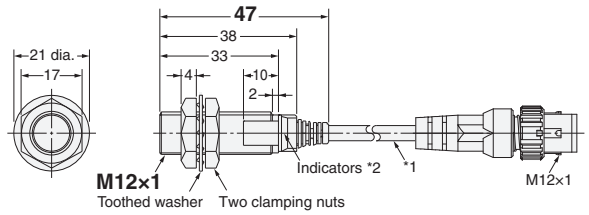


\*1. 6-dia. vinyl-insulated round cable with 3 conductors (Conductor cross section: 0.5 mm<sup>2</sup>, Insulator diameter: 1.9 mm), Standard length: 2 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

### Pre-wired Connector Models

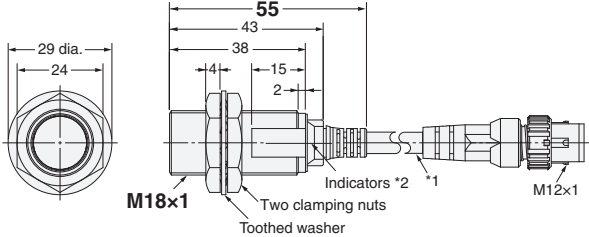


#### E2E-X3B4-M1TJ-IL□



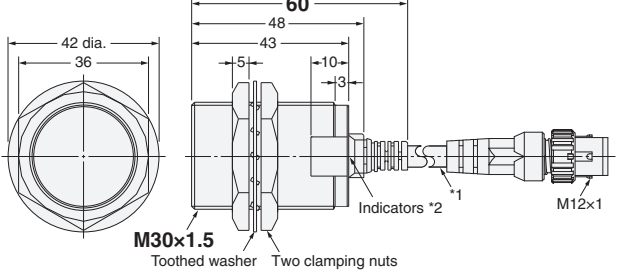
\*1. 4-dia. vinyl-insulated round cable Standard length: 0.3 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

#### E2E-X7B4-M1TJ-IL□



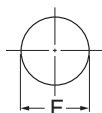
\*1. 6-dia. vinyl-insulated round cable Standard length: 0.3 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

#### E2E-X10B4-M1TJ-IL□



\*1. 6-dia. vinyl-insulated round cable Standard length: 0.3 m  
\*2. Operation indicator (orange), stability indicator/communication indicator (green)

### Mounting Hole Dimensions



Dimension	M12	M18	M30
F (mm)	12.5 <sup>+0.5</sup> dia.	18.5 <sup>+0.5</sup> dia.	30.5 <sup>+0.5</sup> dia.

# Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "**Terms**") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "**Products**") by Omron Electronics LLC and its subsidiary companies ("**Omron**"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. **Prices; Payment Terms.** All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. **Discounts.** Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. **Interest.** Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. **Orders.** Omron will accept no order less than \$200 net billing.
6. **Governmental Approvals.** Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. **Taxes.** All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. **Force Majeure.** Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Omron:
  - a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
  - b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
  - c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
  - d. Delivery and shipping dates are estimates only; and
  - e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. **Claims.** Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
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