# E3Z-IL

CSM\_E3Z-\_-IL\_\_DS\_E\_3\_2

**IO-Link Makes Sensor Level Information Visible and Solves the Three Major Issues at Manufacturing Sites!** Standard Photoelectric Sensor.

CE

- Downtime can be reduced. Notifies you of faulty parts and such phenomena in the Sensor in real time.
- The frequency of sudden failure can be decreased. The light incident level monitor prevents false detection before it happens.
- The efficiency of changeover can be improved. The batch check for individual sensor IDs significantly decreases commissioning time.
- Three types of sensing methods and three types of connection methods are available.



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

## **Ordering Information**

## IO-I ink Model / Sensors (Pefer to Dimensions on page 10.)

IO-Link Mode	I / Sensors	[Refer to Dimensions of	n page 10.]		Red light Infrared light
Sensing method	Appearance	Connection method	Sensing distance	IO-Link baud rate	Model
				Daud rate	PNP
		Pre-wired (2 m)			E3Z-T81-IL2 2M Emitter E3Z-T81-L-IL2 2M Receiver E3Z-T81-D-IL2 2M
		Pre-wired M12 connector		COM2 (38.4 kbps)	E3Z-T81-M1TJ-IL2 0.3M Emitter E3Z-T81-L-M1TJ-IL2 0.3M Receiver E3Z-T81-D-M1TJ-IL2 0.3M
Through-beam (Emitter + Receiver)		Standard M8 connector			E3Z-T86-IL2 Emitter E3Z-T86-L-IL2 Receiver E3Z-T86-D-IL2
*3		Pre-wired (2 m)	∫15 m	COM3 (230.4 kbps)	E3Z-T81-IL3 2M Emitter E3Z-T81-L-IL3 2M Receiver E3Z-T81-D-IL3 2M
		Pre-wired M12 connector			E3Z-T81-M1TJ-IL3 0.3M Emitter E3Z-T81-L-M1TJ-IL3 0.3M Receiver E3Z-T81-D-M1TJ-IL3 0.3M
		Standard M8 connector			E3Z-T86-IL3 Emitter E3Z-T86-L-IL3 Receiver E3Z-T86-D-IL3
Retro-reflective with		Pre-wired (2 m)		COM2	E3Z-R81-IL2 2M
	*1	Pre-wired M12 connector	*2	(38.4 kbps)	E3Z-R81-M1TJ-IL2 0.3M
		Standard M8 connector	4 m	(00111111111111111111111111111111111111	E3Z-R86-IL2
MSR function		Pre-wired (2 m)	(100 mm) (When using E39-R1S)	COM3	E3Z-R81-IL3 2M
		Pre-wired M12 connector		(230.4 kbps)	E3Z-R81-M1TJ-IL3 0.3M
	Standard M8 connector			. ,	E3Z-R86-IL3

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

- \*1. The Reflector is sold separately. Select the Reflector model most suited to the application.
- \*2. The sensing distance specified is possible when the E39-R1S is used. Values in parentheses indicate the minimum required distance between the Sensor and Reflector.
- \*3. Through-beam Sensors are normally sold in sets that include both the Emitter and Receiver.

Red light Infrared light IO-Link Model Sensing method Connection method Sensing distance **Appearance** baud rate PNP Pre-wired (2 m) E3Z-D82-IL2 2M COM2 Pre-wired M12 connector E3Z-D82-M1TJ-IL2 0.3M (38.4 kbps) Standard M8 connector E3Z-D87-IL2 1 m Pre-wired (2 m) E3Z-D82-IL3 2M COM3 Pre-wired M12 connector E3Z-D82-M1TJ-IL3 0.3M (230.4 kbps) Standard M8 connector E3Z-D87-IL3 Diffuse-reflective Pre-wired (2 m) E3Z-L81-IL2 2M COM<sub>2</sub> Pre-wired M12 connector E3Z-L81-M1TJ-IL2 0.3M (38.4 kbps) Standard M8 connector E3Z-L86-IL2 90 mm Pre-wired (2 m) E3Z-L81-IL3 2M (narrow beam) COM3 Pre-wired M12 connector E3Z-L81-M1TJ-IL3 0.3M (230.4 kbps) Standard M8 connector E3Z-L86-IL3

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

## **Accessories (Sold Separately)**

Slit (A Slit is not provided with Through-beam Sensors) Order a Slit separately if required.

Slit width	Sensing distance E3Z-T□□	Minimum detectable object (Reference value)	Model	Contents
0.5-mm dia.	50 mm	0.2-mm dia.	E39-S65A	
1-mm dia.	200 mm	0.4-mm dia.	E39-S65B	_
2-mm dia.	800 mm	0.7-mm dia.	E39-S65C	One set (contains Slits for both the
0.5 × 10 mm	1 m	0.2-mm dia.	E39-S65D	Emitter and Receiver)
1 × 10 mm	2.2 m	0.5-mm dia.	E39-S65E	
2 × 10 mm	5 m	0.8-mm dia.	E39-S65F	

#### Reflectors (Reflector required for Retroreflective Sensors) A Reflector is not provided with the Sensor. Be sure to order a Reflector separately.

	Sensing	distance *			
Name	E	Model	Quantity	Remarks	
	Rated value	Reference value			
	3 m (100 mm)		E39-R1	1	
	4 m (100 mm)		E39-R1S	1	
Reflector		5 m (100 mm)	E39-R2	1	<ul> <li>Reflectors are not</li> </ul>
		2.5 m (100 mm)	E39-R9	1	provided with
		3.5 m(100 mm)	E39-R10	1	Retro-reflective models.
Fog Preventive Coating		3 m (100 mm)	E39-R1K	1	The MSR function of
Small Reflector		1.5 m (50 mm)	E39-R3	1	the E3Z-R□ is
		700 mm (150 mm)	E39-RS1	1	enabled.
Tape Reflector		1.1 m (150 mm)	E39-RS2	1	
		1.4 m (150 mm)	E39-RS3	1	

Note:1. If you use the Reflector at any distance other than the rated distance, make sure that the stability indicator lights properly when you install the Sensor.

<sup>2.</sup> Refer to Reflectors on E39-L/E39-S/E39-R on your OMRON website for details.

<sup>\*</sup> Values in parenthese indicate the minimum required distance between the Sensor and Reflector.

## Mounting Brackets A Mounting Bracket is not enclosed with the Sensor. Order a Mounting Bracket separately if required.

Appearance	Model (material)	Quantity	Remarks	Appearance	Model (material)	Quantity	Remarks
	E39-L153 (SUS304) *1	1	Mounting Brackets		E39-L98 (SUS304) *2	1	Metal Protective Cover Bracket
No.	E39-L104 (SUS304) *1	1		*	E39-L150 (SUS304)	1	(Sensor adjuster)
6	E39-L43 (SUS304) *2	1	Horizontal Mounting Brackets		E39-L151 (SUS304)	1	Easily mounted to the aluminum frame rails of conveyors and easily adjusted.
6	E39-L142 (SUS304) *2	1	Horizontal Protective Cover Bracket			'	For left to right adjust- ment
	E39-L44 (SUS304)	1	Rear Mounting Bracket		E39-L144 (SUS304) *2	1	Compact Protective Cover Bracket (For E3Z only)

Note: 1. When using Through-beam models, order one bracket for the Receiver and one for the Emitter.

#### **Sensor I/O Connectors**

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

Size	Туре	Appearanc	е	Cable length	Model
		Smartclick connector Straight *2		2 m	XS5F-D421-D80-F
	Socket on one cable	Straight 2		5 m	XS5F-D421-G80-F
	end	Smartclick connector L-shape *2 *3		2 m	XS5F-D422-D80-F
M12		L-Shape 2 0		5 m	XS5F-D422-G80-F
		Smartclick connector	Smartclick connector Straight/ Straight *2	2 m	XS5W-D421-D81-F
	Socket and plug on			5 m	XS5W-D421-G81-F
	cable ends *1	Smartclick connector L-shape/L-shape *2 *3	2 m	XS5W-D422-D81-F	
				5 m	XS5W-D422-G81-F
		Straight *3	Straight *3	2 m	XS3F-M421-402-A
M8	Socket on one cable			5 m	XS3F-M421-405-A
	end L-shape *3			2 m	XS3F-M422-402-A
		L-Sitapo o 4		5 m	XS3F-M422-405-A
M8 socket/ M12 plug	Socket and plug on cable ends	M8-M12 (Smartclick) conversion cable *2		0.2 m	XS3W-M42C-4C2-A

Note:1. When using Through-beam models, order one connector for the Receiver and one for the Emitter.

2. Refer to Sensor I/O Connectors/Sensor Controllers on your OMRON website for details.

Refer to Mounting Brackets on E39-L/E39-S/E39-R on your OMRON website for details.
 Cannot be used for Standard Connector models with mounting surface on the bottom. In that case, use Pre-wired Connector models.

<sup>\*2.</sup> Cannot be used for Standard Connector models.

<sup>\*1.</sup> Straight type/L-shape type combinations are also available.
\*2. The connectors will not rotate after they are connected.
\*3. The cable is fixed at an angle of 180° from the sensor emitter/receiver surface.

## **Ratings and Specifications**

## **IO-Link Model**

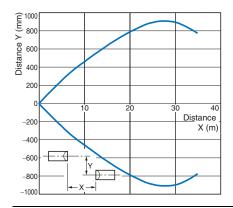
		Sensing method	Through-beam	Retro-reflective with MSR function	Diffuse-reflective	Narrow-beam Models		
		Pre-wired	E3Z-T81-IL□	E3Z-R81-IL□	E3Z-D82-IL□	E3Z-L81-IL□		
Model	PNP output	Pre-wired connector (M12)	E3Z-T81-M1TJ-IL□	E3Z-R81-M1TJ-IL	E3Z-D82-M1TJ-IL□	E3Z-L81-M1TJ-IL□		
ltem		Connector (M8)	E3Z-T86-IL□	E3Z-R86-IL□	E3Z-D87-IL□	E3Z-L86-IL□		
Sensing d	listance		15 m	4 m (100 mm) * (when using E39-R1S) 3 m (100 mm) * (when using E39-R1)	1 m (white paper: 300 × 300 mm)	90 + 30 mm (white paper: 100 × 100 mm)		
Spot diam	eter (re	eference value)		_	-1	2.5 dia. and sensing distance of 90 mm		
Standard	sensing	g object	Opaque: 12-mm dia. min.	Opaque: 75-mm dia. min.	-	_		
Minimum (reference		ible object				0.1 mm (copper wire)		
Differentia (represer		=			20% max. of setting distance	Refer to Engineering data on page 6.		
Directiona	al angle		Both emitter and receiver: 3 to 15°	2 to 10°	-			
Light sou	rce (wa	velength)	Infrared LED (870 nm)	Red LED (660 nm)	Infrared LED (870 nm)	Red LED (650 nm)		
Power su	pply vo	Itage	10 to 30 VDC (including 1	0% ripple (p-p))	, ,	, ,		
Current co	onsump	otion	50 mA max. (Emitter: 25 mA max., Receiver: 25 mA max.)	30 mA max.				
Control o	utput		Load power supply voltage: 30 VDC max., Load current: 100 mA max. Residual voltage: Load current of less than 10 mA: 1 V max. Load current of 10 to 100 mA: 2 V max. PNP open collector output Light-ON/Dark-ON selectable					
Indicators	;		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)					
Protection circuits		ts	Reversed power supply polarity protection, out- put short-circuit protec- tion, and reversed output polarity protection	olarity protection, out- out short-circuit protec- on, and reversed output  Reversed power supply polarity protection, output short-circuit protection, reversed output polarity protection, and mutual interference prevention				
Response	time		Operate or reset: 1 ms ma	ax.				
Sensitivity	y adjus	tment	Sensitivity adjuster / IO-Li	ink communications				
Ambient i (Receiver		tion	Incandescent lamp: 3,000 lx max. Sunlight: 10,000 lx max.					
Ambient t	empera	ture range	Operating: -25 to 55°C (with no icing or condensation) Storage: -40 to 70°C (with no icing or condensation)  Operating: 35% to 85%, Storage: 35% to 95% (with no condensation)					
Ambient h		<u> </u>			no condensation)			
Insulation	resista	ance	20 M $\Omega$ min. at 500 VDC					
Dielectric			1,000 VAC, 50/60 Hz for 1 min  Destruction: 10 to 55 Hz, 1.5 mm double amplitude for 2 hours each in X, Y, and Z directions					
Vibration						nd Z directions		
Shock res			Destruction: 500 m/s <sup>2</sup> 3 times each in X, Y, and Z directions					
Degree of	protec	tion	IEC 60529 IP67					
Connection			Pre-wired cable (standard cable length 2 m), M12 pre-wired connector (standard cable length 0.3 m), M8 connector					
Weight		red cable (2 m)	Approx. 120 g	Approx. 65 g				
(packed		ed connector (M12)	Approx. 60 g	Approx. 30 g				
state)	Conne	ctor (M8)	Approx. 30 g	Approx. 20 g				
		Case	Polybutylene terephthalate (PBT)					
Material Display			Modified polyarylate					
		Lens	Modified polyarylate	Methacrylate resin (PMMA)	. , ,			
Main IO-Link functions		ctions	Operation mode switching between Light ON and Dark ON, setup of the instability detection level for light receiving and non-light receiving, timer function of the control output and timer time selecting, instability output (IO-Link mode) ON delay timer time selecting, setup of a teaching level and execution of teaching, setup of light receiving sensitivity level, monitor output, operating hours read-out, and initial reset					
		IO-Link specification	Ver 1.1					
Communic		Baud rate	-IL3: COM3 (230.4 kbps),	-IL2: COM2 (38.4 kbps)				
specification	אוס	Data length	PD size: 2 bytes, OD size	: 1 byte (M-sequence type	e: TYPE_2_2)			
		Minimum cycle time	-IL3 (COM3): 1 ms, -IL2 (	COM2): 2.3 ms				
MTTFd (Y	ear)		194	374				
Accessor	ies		Instruction manual (Neithe	er Reflectors nor Mounting	Brackets are provided with	any of the above models.		

<sup>\*</sup> Values in parentheses indicate the minimum required distance between the Sensor and Reflector.

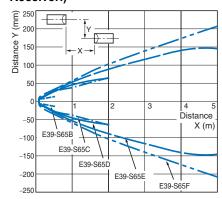
## **Engineering Data (Reference Value)**

### **Parallel Operating Range**

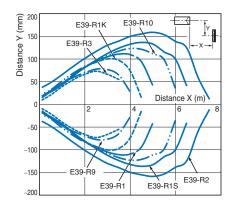
## Through-beam Models E3Z-T8□-IL□



## Through-beam Models E3Z-T8□-IL□ and Slit (A Slit is mounted to the Emitter and Receiver.)

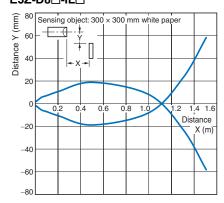


## Retro-reflective Models E3Z-R8□-IL□ and Reflector

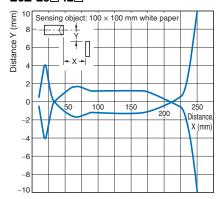


## **Operating Range**

## Diffuse-reflective Models E3Z-D8□-IL□

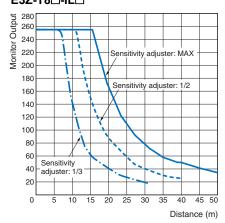


## Narrow-beam Reflective Models E3Z-L8□-IL□

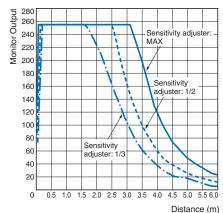


## **Monitor Output vs. Sensing Distance**

## Through-beam Models E3Z-T8□-IL□

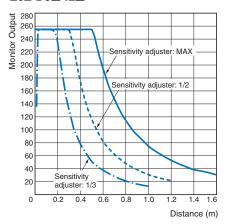


### Retro-reflective Models E3Z-R8□-IL□ and E39-R1 Reflector

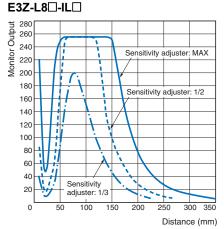


### **Monitor Output vs. Sensing Distance**

## Diffuse-reflective Models E3Z-D8□-IL□

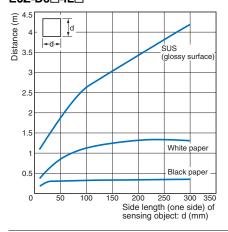


## Narrow-beam Reflective Models

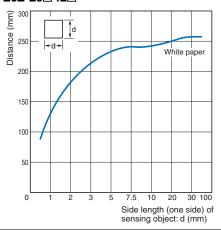


### **Sensing Object Size vs. Sensing Distance**

## Diffuse-reflective Models E3Z-D8□-IL□

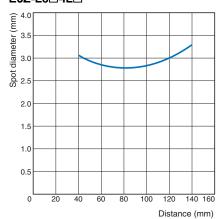


## Narrow-beam Reflective Models E3Z-L8□-IL□



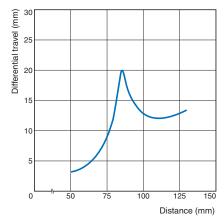
## **Spot Diameter vs. Sensing Distance**

## Narrow-beam Reflective Models E3Z-L8□-IL□

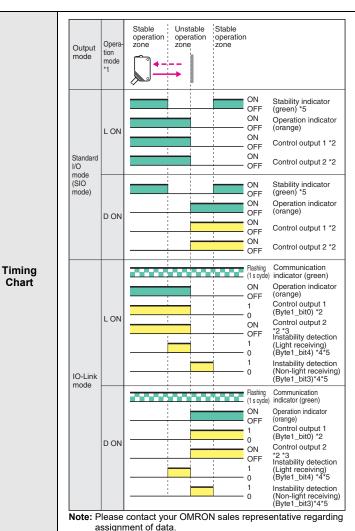


## **Differential Travel vs. Sensing Distance**

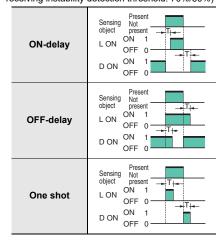
## Narrow-beam Reflective Models E3Z-L8□-IL□



## I/O Circuit Diagrams



- \*1. The operation mode can be changed by the IO-Link communications.
  \*2. The timer function can be set up using the IO-Link communications for control output 1 and 2 separately. (It is able to select ON delay, OFF delay, or one-shot function and select a timer time of 1 to 4000
- \*3. In the IO-Link mode, if the ON/OFF speed of the sensor is slow, high-speed response of 1 ms or less can be realized using control output
- \*4. The judgment time for the instability detection diagnosis can be selected using the IO-Link communications. (For the ON delay timer function to detect instability, the setting can be selected from 0 (invalid), 10, 50, 100, 300, 500, or 1000 ms.
- \*5. The judgment condition for the light receiving/non-light receiving instability detection function can be selected using the IO-Link communications. (Setting of light receiving instability detection threshold: 500%/400%/300%/200%/140%, setting of non-light receiving instability detection threshold: 70%/50%)



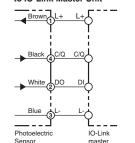
#### Reflective / Receiver of Through-beam Model

E3Z-\[ 8 \[ -IL \[ \]

## sensor Brown 10 to 30VDC Black Load Load Blue 0V

When using as a general

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



## **Connector Pin Arrangement**

Pre-wired M12 connector F37-□81-M1T.J-II □ F37-□82-M1T.I-II □ E3Z-T81-D-M1TJ-IL



#### Standard M8 connector F37-□86-II □

F37-□87-II □ E3Z-T86-D-IL



#### Output circuit

## **Emitter of Through-beam Model**

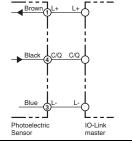
E3Z-T8 -L-IL

Photoelectric

sensor Brown 10 to 30VDC Black 4 Blue 0V Photoelectric Sensor

When using as a general

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



#### Connector Pin Arrangement

E3Z-T81-L-M1TJ-IL



Note: Pins 2 is not used.

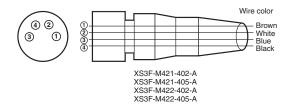
#### E3Z-T86-L-IL□



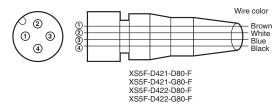
Note: Pins 2 is not used.

## Plugs (Sensor I/O Connectors)

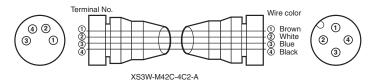
### M8 connector



#### M12 connector



## M8-M12 (Smartclick) conversion cable



### **Through-beam Models (Emitter)**

### Pin arrangement

Classifi- cation	Wire color	Connector pin No.	Application
	Brown	1	Power supply (+V)
	White	2	-
DC	Blue	3	Power supply (0 V)
	Black	4	Output C/Q

Note: Pins 2 is not used.

## Through-beam Models (Receiver) Retro-reflective Models Diffuse-reflective Models

## Pin arrangement

Classifi- cation	Wire color	Connector pin No.	Application
	Brown	1	Power supply (+V)
	White	2	Output DO
DC	Blue	3	Power supply (0 V)
	Black	4	Output C/Q

## **Nomenclature**

Through-beam Models E3Z-T8□-IL□ (Receiver)

**Retro-reflective Models** 

E3Z-R8□-IL□

**Diffuse-reflective Models** 

E3Z-D8 -IL E3Z-L8 -IL

In the Standard I/O mode (SIO mode):
Stability indicator (green)
In the IO-Link mode:
IO-Link communication indicator (green)
Operation selector



Operation indicator (orange)Sensitivity adjuster

## **Safety Precautions**

Be sure to read the precautions for all models in the website at: http://www.ia.omron.com/.

## **Warning Indications**

<b>!</b> WARNING	Warning level 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.
Precautions for Safe Use	Supplementary comments on what to do or avoid doing, to use the product safely.
Precautions for Correct Use	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**



#### General prohibition

Indicates the instructions of unspecified prohibited action.



#### Caution, explosion

Indicates the possibility of explosion under specific conditions.



#### Caution, fire

Indicates the possibility of fires 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.



The maximum power supply voltage is 30 VDC. Before turning the power ON, make sure that the power supply voltage does not exceed the maximum voltage.



Never use the product with an AC power supply. Otherwise, explosion may result.



Do not use the product with voltage in excess of the rated voltage.

Excess voltage may result in malfunction or fire.



Do not use the product above rated load.



#### **Precautions for Safe Use**

Be sure to follow the safety precautions below for added safety.

- 1. Do not use the sensor under the environment with explosive or ignition gas.
- 2. Never disassemble, repair nor tamper with the product.

#### **Precautions for Correct Use**

- 1. Do not use the product under the following conditions.
  - (1) In the place exposed to the direct sunlight.
  - (2) In the place where humidity is high and condensation may
  - (3) In the place where vibration or shock is directly transmitted to the product.
- 2. Connection and Mounting
  - (1) If the sensor wiring is placed in the same conduits or ducts as high-voltage or high-power lines, inductive noise may cause malfunction or damage. Wire the cables separately or use a shielded cable.
  - (2) Use an extension cable less than 100 m long for Standard I/O mode and less than 20 m for IO-Link mode.
  - (3) Do not exceed the following force values applied to the cable. Tensile: 80 N max., torque: 0.1 Nm max., pressure: 20 N max., flexure: 3 kg max.

#### M8 metal connectors

- (4) Fasten a fixed implement by hand. If you use pliers, it may cause malfunction or damage to it.
- 3. Cleaning

Do not use thinner, alcohol, or other organic solvents. Otherwise, the optical properties and degree of protection may be degraded.

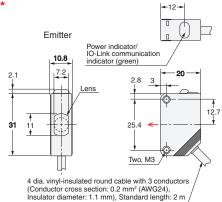
- 4. Power supply
  - When using a commercially available switching regulator, be sure to ground the FG (Frame Ground) terminals.
- 5. Power supply reset time
  - The photoelectric sensor will begin sensing no later than 100 ms after the power is turned on. If the load and the photoelectric sensor is connected to different power supply, the photoelectric sensor must be always turned on first.
- 6. Turning off the power supply
  - When turning off the power, output pulse may be generated. We recommend turning off the power supply of the load or load line first
- 7. Water resistance
  - Though this is type IP67, do not use in the water, rain or outdoors.
- 8. Please process it as industrial waste.

## **Dimensions**

### Sensors

## Through-beam Models \*

Pre-wired Models E3Z-T81-IL□



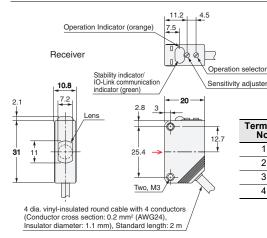
Terminal No.	Specifi- cations
1	+V
2	
3	0V
4	Output C/Q

Pins 2 is not used.

Pre-wired M12 connector (E3Z-T□□-M1TJ)





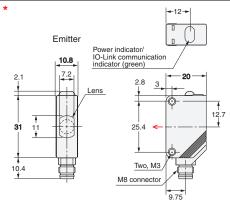


Terminal No.	Specifi- cations
1	+V
2	Output DO
3	0V
4	Output C/Q

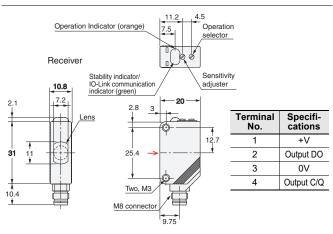
## Through-beam Models \* Connector Models

Connector Models E3Z-T86-IL□





Terminal No.	Specifi- cations	
1	+V	
2		
3	0V	
4	Output C/Q	
Pins 2 is not used.		



<sup>\*</sup> Models numbers for Through-beam Sensors (E3Z-T□□) are for sets that include both the Emitter and Receiver.

The model number of the Emitter is expressed by adding "-L" to the set model number (example: E3Z-T81-IL□-L 2M), the model number of the Receiver, by adding "-D" (example: E3Z-T81-IL□-D 2M.) Refer to Ordering Information to confirm model numbers for Emitter and Receivers.

#### **Retro-reflective Models**

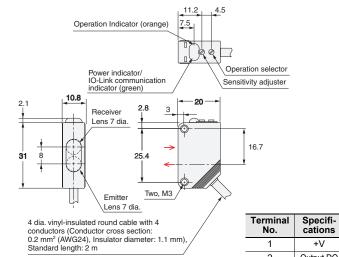
### **Pre-wired Models**

E3Z-R81-IL□

E3Z-D82-IL□

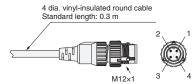
E3Z-L81-IL□





Pre-wired M12 connector (E3Z-□8□-M1TJ)

4 dia. vinyl-insulated r Standard length: 0.3 r



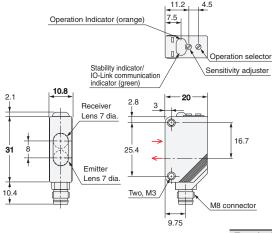
## **Retro-reflective Models**

**Connector Models** 

E3Z-R86-IL□ E3Z-D87-IL□

E3Z-L86-IL





Terminal No.	Specifi- cations
1	+V
2	Output DO
3	0V
4	Output C/Q

2

3

4

Output DO

0V

Output C/Q

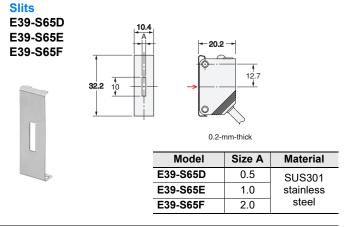
Note: The lens for the E3Z-D□2/D□7 is black.

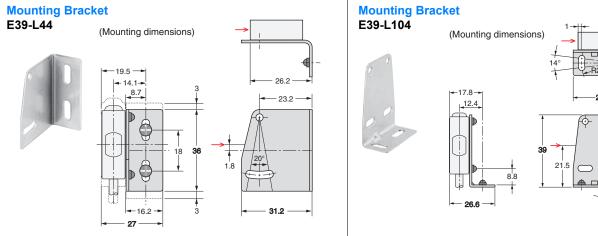
## **Accessories (Order Separately)**

## Slits E39-S65A E39-S65B - 20.2 → E39-S65C Model Size A Material E39-S65A 0.5 dia. SUS301 E39-S65B 1.0 dia. stainless steel

E39-S65C

2.0 dia.





#### **Reflectors**

Refer to E39-R on your OMRON website for details.

## **Sensor I/O Connectors**

Refer to XS3 or XS5 on your OMRON website for details.

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