OMRON

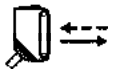
Narrow Beam Photoelectric Sensor with Built-in Amplifier | **E3Z-L**

Ideal for Detecting Minute Objects with a Small Precision Beam Spot

- 2.5 mm (0.098 in) beam spot diameter
- Precise detection of minute 0.1 mm (0.00397 in) objects at 90 mm (3.54 in) sensing distance
- Visible red (670 nm) narrow beam enables detection through small gaps or openings
- Integrated photo-IC improves noise immunity to interference from inverters or from other inductive devices
- New injection molding technology assures IP67 rating to withstand water and dust
- Mutual interference, reverse polarity and load short-circuit protection are standard features
- Switch selectable Light-ON/Dark-ON operation

Ordering Information

■ SENSORS

Sensing method	Appearance	Connection method	Sensing distance	**Part number**	
				NPN output	PNP output
Narrow-beam reflective		Pre-wired	90 ±30 mm	**E3Z-L61**	**E3Z-L81**
		Connector		**E3Z-L66**	**E3Z-L86**

Note: Standard pre-wired cable length is 2 meters. A 5 meter cable version is available (add suffix 5M to the part number). A 0.5 meter version is available (add suffix 0.5M to the part number). Contact customer service for pricing.

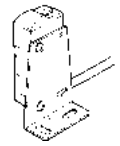
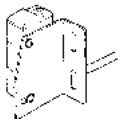
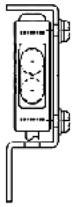
■ ACCESSORIES (ORDER SEPARATELY)

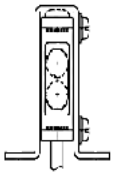
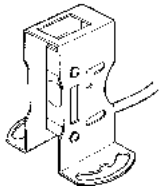
M8 Connector Cordsets

Appearance	Cable type (four-wire)	Part number
Straight	2 m (6.56 ft)	**XS3F-M421-402-A**
	5 m (16.40 ft)	**XS3F-M421-405-A**
Right angle	2 m (6.56 ft)	**XS3F-M422-402-A**
	5 m (16.40 ft)	**XS3F-M422-405-A**

Note: Connector cable types are four wire. Pin 2 is not used. (See connection diagram.)

■ MOUNTING BRACKETS

Appearance	Description	Part number
	L-bracket, horizontal	**E39-L104**
	L-bracket, vertical	**E39-L44**
	Open top, 20° angle adjustability	**E39-L43**
	Protected top 5° angle adjustability	**E39-L144**

Appearance	Description	Part number
	Compact vertical protective cover bracket	**E39-L142**
	Vertical protective cover bracket	**E39-L98**
	Adjustable height and angle bracket for sensors Mounted to the aluminum frame rails of conveyors, easily adjustable	**E39-L93**

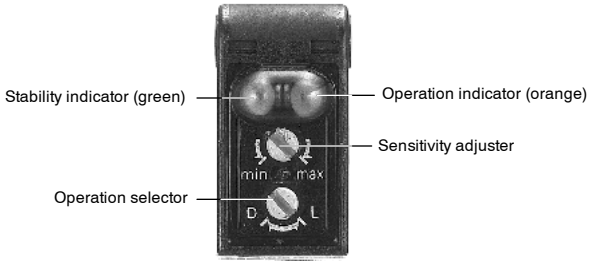
Specifications

Item	E3Z-L61/L81, pre-wired type	E3Z-L66/L86, connector type
Sensing distance	90 ±30 mm White paper (100 × 100 mm)	
Spot diameter (typical)	2.5 mm (0.098 in) diameter minimum at 90 mm sensing distance	
Minimum sensing object (typical)	0.1 mm (0.00397 in) diameter copper wire	
Hysteresis (typical)	Refer to the chart on the following page.	
Light source (emitted wavelength)	Red LED (670 nm)	
Power supply voltage	12 to 24 VDC ±10% including 10% (p-p) max. ripple	
Current consumption	30 mA max.	
Control output	NPN or PNP open collector (depending on model)	
Maximum load	100 mA at 24 VDC. Load power supply voltage: 26.4 V max. (Residual voltage 1 V max.)	
Operation mode	Light-ON/Dark-ON switch selectable	
Circuit protection	Reverse polarity, load short circuit and mutual interference	
Response time	1 ms max. on or off	
Sensitivity adjustment	One-turn potentiometer	
Ambient illumination	Incandescent lamp: 3,000 ℓx max.; Sunlight: 10,000 ℓx max.	
Ambient temperature	Operating: –25°C to 55°C (–13°F to 131°F) with no icing or condensation Storage: –40°C to 70°C (–40°F to 158°F) with no icing or condensation	
Ambient humidity	Operating: 35% to 85% Storage: 35% to 95% with no condensation	
Insulation resistance	20 MΩ min. at 500 VDC	
Dielectric strength	1,000 VAC, 50/60 Hz for one minute	
Vibration resistance	10 to 55 Hz, 1.5 mm double amplitude or 300 m/s^2 for 2 hours each in X, Y, and Z axes	
Shock resistance	500 m/s^2 3 times each in X, Y, and Z axes	
Enclosure rating	IP67 (IEC60529)	
Approvals	CE	
Connection method	Pre-wired cable (2 meter standard, 0.5 meter and 5 meter are available as options)	Connector type: with optional cordsets
Indicators	Operation indicator (orange); Stability indicator (green)	
Weight (packed state)	Pre-wired type: 2 m: Approx. 65 g (2.29 oz)	Connector type: approx. 20 g (0.70 oz)
Material	Case: PBT (polybutylene terephthalate) Lens: Methacylate resin	
Accessories	Instruction sheet included. (Order mounting brackets and connector cordsets separately.)	

Nomenclature

■ NARROW-BEAM REFLECTIVE MODELS

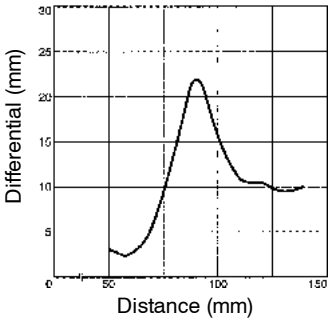
E3Z-L6 NPN Output
E3Z-L8 PNP Output



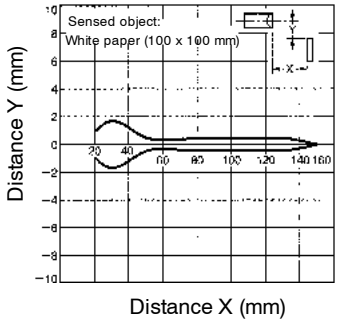
Engineering Data

■ CHARACTERISTICS (TYPICAL EXAMPLES)

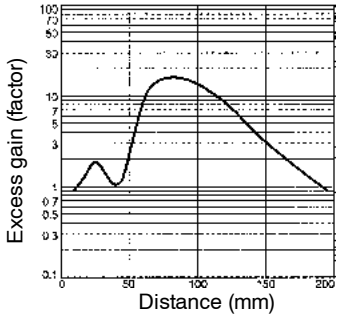
Hysteresis Differential vs. Sensing Distance



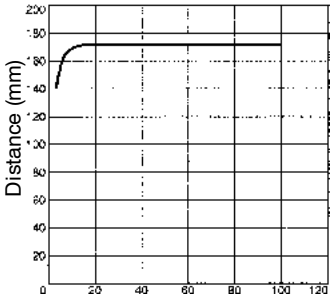
Operating Range



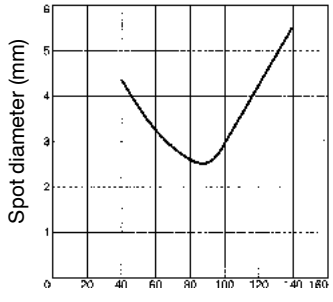
Excess Gain vs. Sensing Distance



Target Object Size vs. Sensing Distance

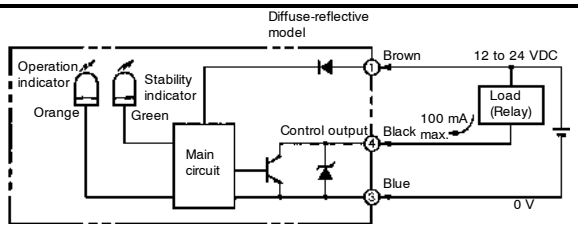
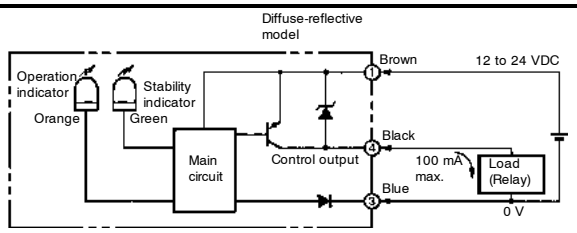


Spot Diameter vs. Sensing Distance



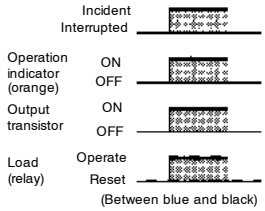
Operation

■ OUTPUT CIRCUITS

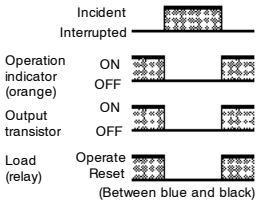
Model: E3Z-L61/E3Z-L66 (NPN Output)	Model: E3Z-L81/E3Z-L86 (PNP Output)
	
Connector Pin Arrangement  Pin 2 is open.	**Connector Pin Arrangement**  Pin 2 is open.

■ TIMING CHARTS

Light-ON (L-ON) Operation



Dark-ON (D-ON) Operation

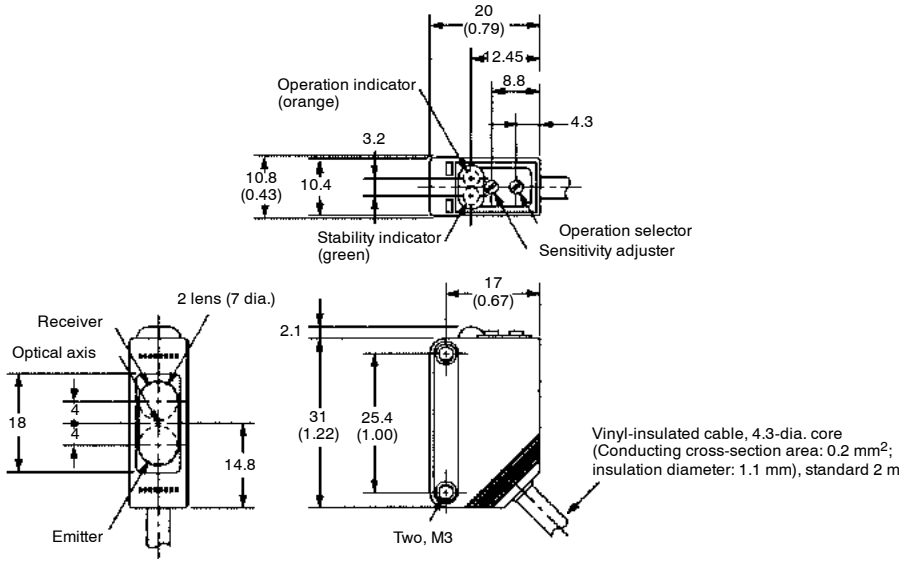


Dimensions

Unit: mm (inch)

■ PRE-WIRED MODELS

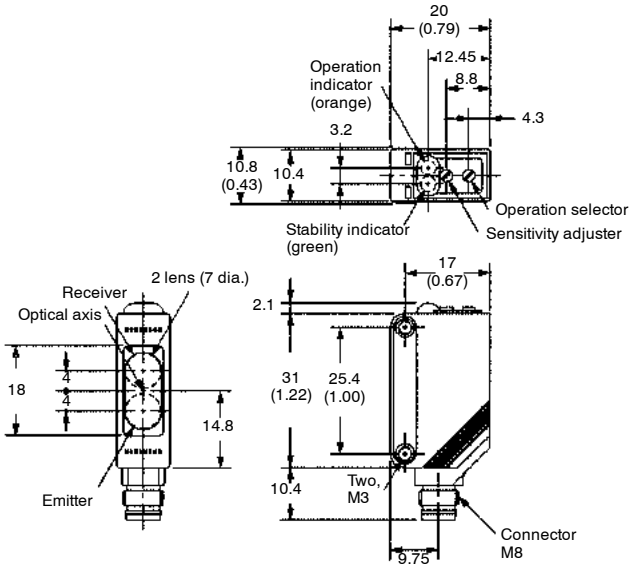
E3Z-L61
E3Z-L81



Unit: mm (inch)

■ CONNECTOR MODELS

E3Z-L66
E3Z-L86

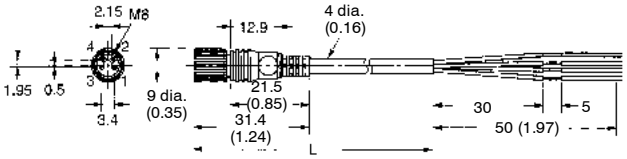


M8 Connector Cordsets

Straight

XS3F-M421-402-A
L = 2 m (6.56 ft)

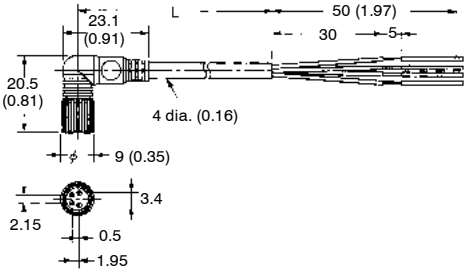
XS3F-M421-405-A
L = 5 m (16.41 ft)



Right Angle

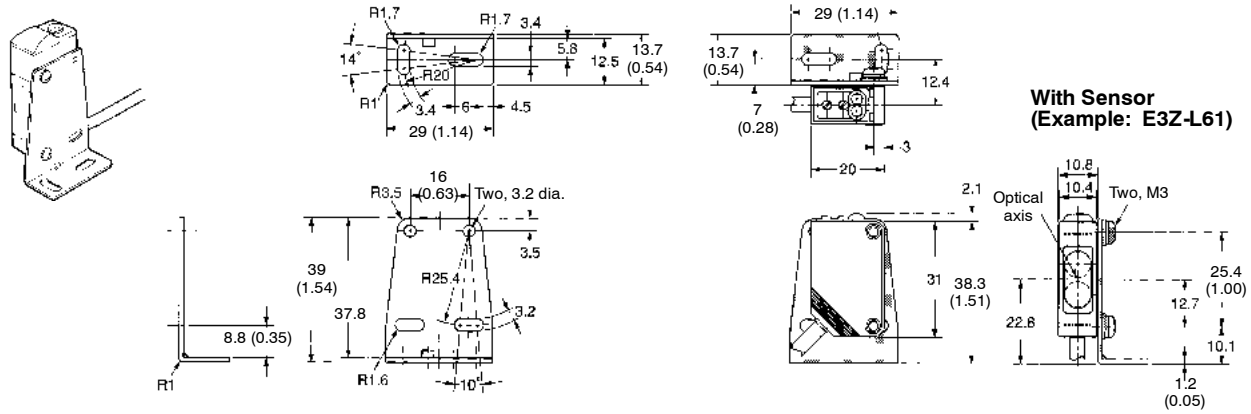
XS3F-M422-402-A
L = 2 m (6.56 ft)

XS3F-M422-405-A
L = 5 m (16.41 ft)



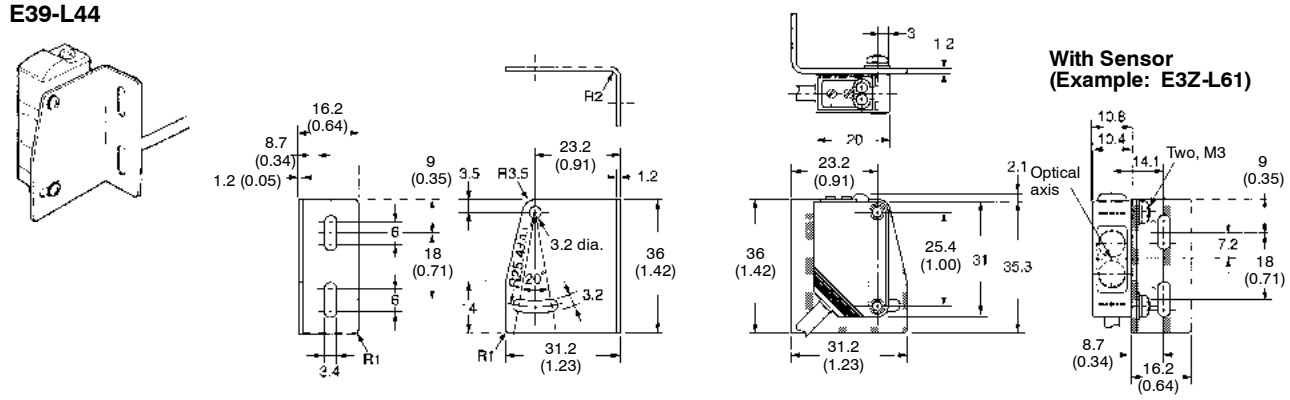
■ MOUNTING BRACKETS

E39-L104



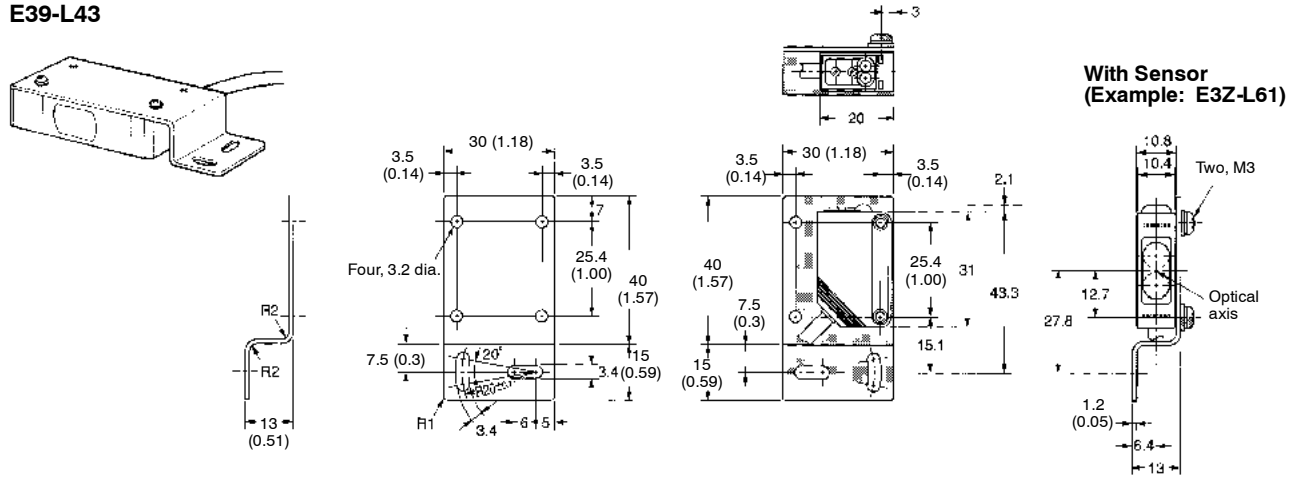
Material: SUS304 stainless steel

E39-L44



Material: SUS304 stainless steel

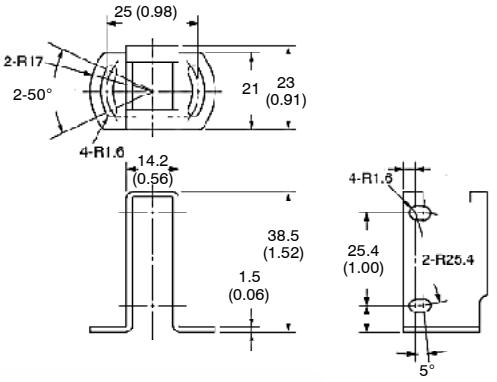
E39-L43



Material: SUS304 stainless steel

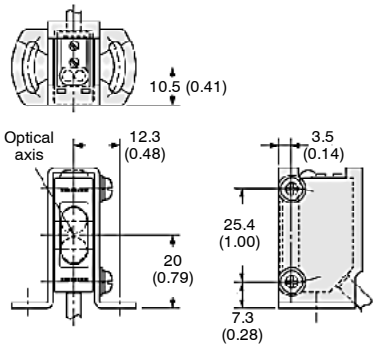
Unit: mm (inch)

E39-L144

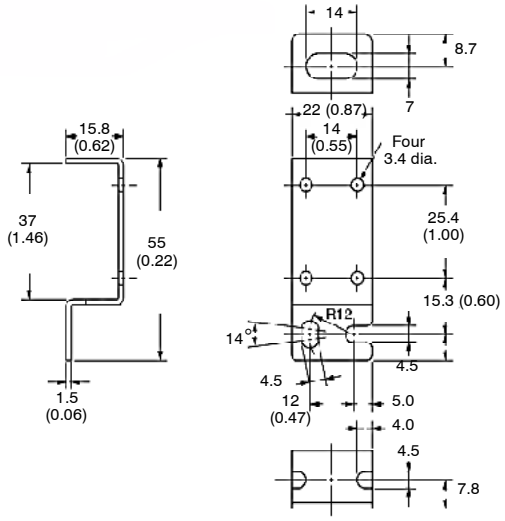


Material: SUS304 stainless steel

With Sensor (Example: E3Z-L61)

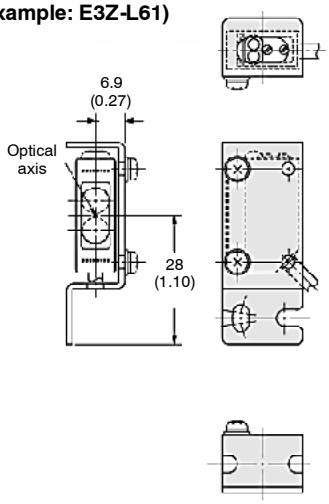


E39-L142

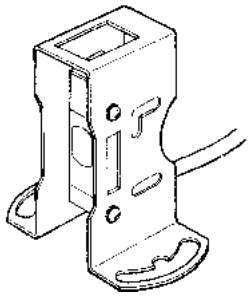


Material: SUS304 stainless steel

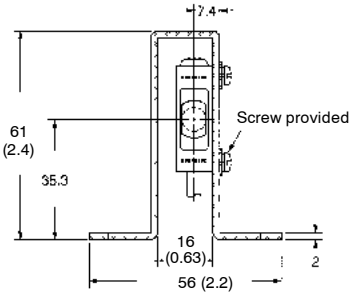
With Sensor (Example: E3Z-L61)

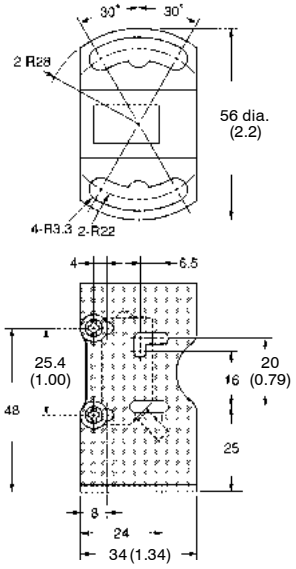


E39-L98

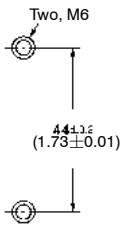


Material: SUS304 stainless steel

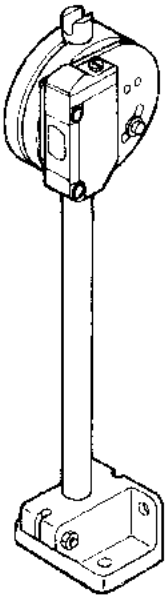


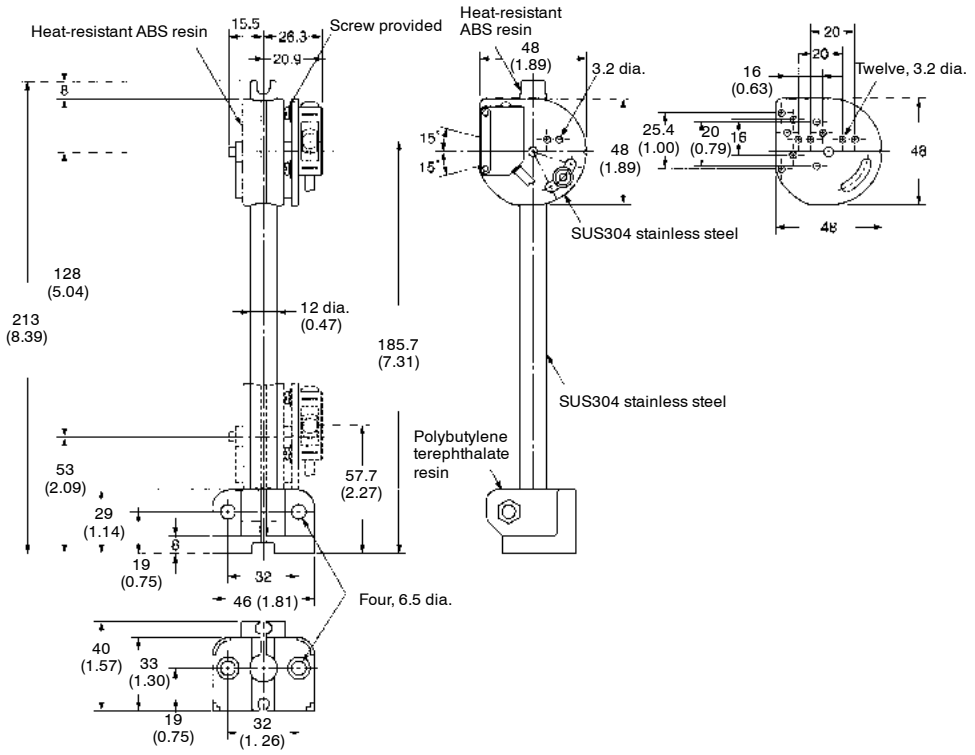


Mounting Holes



E39-L93

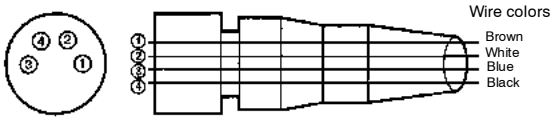



Heat-resistant ABS resin
15.5
26.3
20.9
Screw provided
8
128
(5.04)
213
(8.39)
12 dia.
(0.47)
185.7
(7.31)
53
(2.09)
29
(1.14)
19
(0.75)
57.7
(2.27)
32
46 (1.81)
Four, 6.5 dia.
40
(1.57)
33
(1.30)
19
(0.75)
32
(1. 26)
Heat-resistant
ABS resin
48
(1.89)
3.2 dia.
15
15
48
(1.89)
SUS304 stainless steel
SUS304 stainless steel
Polybutylene
terephthalate
resin
20
20
16
(0.63)
Twelve, 3.2 dia.
25.4
(1.00)
20
(0.79)
16
48
48

Installation

■ CONNECTOR PIN-OUT

XS3F-M421-402-A **XS3F-M421-405-A**
XS3F-M422-402-A **XS3F-M422-405-A**



Type	Wire color	Connector pin number	Use
DC	Brown	①	Power supply (+V)
	White	②	Pin 2 is not used.
	Blue	③	Power supply (0 V)
	Black	④	Output

Application Examples

- Detection of copper wire on coils or bobbins
- Detection of small pins or leads on electronic components
- Detection of broken drill bits or taps
- Detection of broken die tooling
- Detection of denier in the garment industry
- Orientation of parts with thru-holes
- Coil winding machinery
- Coil processing machinery and systems
- Printed circuit board detection on conveyors
- Part presence despite changing color
- Minute detail presence on assembly
- Detection of parts *looking through* small gaps or openings in tooling

Precautions

To ensure safe sensor operation, please follow the following precautions:

■ WIRING

Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range.

Load Short-circuiting

Do not short-circuit the load, or the Sensor may be damaged.

Proper Wiring

Correct polarity wiring is required in preventing damage to the sensor.

Connection Without Load

Do not connect power supply to the Sensor with no load connected, or the internal elements may fail.

■ OPERATING ENVIRONMENT

Do not use the Sensor near explosive or flammable gas.

■ SETTINGS

Power Reset Time

The Sensor is ready to operate 100 ms after the Sensor is turned ON. If the load and Sensor are connected to independent power supplies respectively, be sure to turn ON the Sensor before turning the load ON.

■ CONNECTIONS

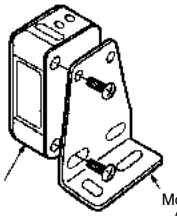
M8 Metal Connector

- Turn off power before disconnecting the sensor.
- Remove the connector cover before connecting or disconnecting the metal connector.
- Secure the connector cover by hand. Do not use any pliers, or the connector may be damaged.
- The proper tightening torque range is between 0.3 and 0.4 N • m. Be sure to tighten the connector securely, or the specified degree of protection may not be maintained or the connector may be disconnected due to vibration.

■ MOUNTING

Sensor Mounting

Use M3 screws to mount the sensor and tighten each screw to a maximum torque of 0.53 N • m.



NOTE: DIMENSIONS SHOWN ARE IN MILLIMETERS. To convert millimeters to inches divide by 25.4.

OMRON®

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