Photoelectric Sensor with Built-in Amplifier (Oil-resistant Models)
E3Z-K

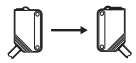
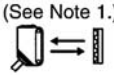
Lineup includes oil-resistant models that enable stable sensing in environments subject to oil mist.

- Special coating resists effects of harsh environments.
- IP67 1200 PSI washdown rated.
- High noise immunity.
- Select pre-wired or pig tail connector models.

Ordering Information

■ List of Models

Stock Note: Shaded models are normally stocked.

Sensing method	Appearance	Connection method	Sensing distance	Model	
				NPN output	PNP output
Through-beam		Pre-wired (2 m)	15 m Infrared Beam	E3Z-T61K	E3Z-T81K
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-T61K-M3J	E3Z-T81K-M3J
Retro-reflective (Polarized)	(See Note 1.) 	Pre-wired (2 m)	3m (100 mm) (See note 2.) Visible Beam	E3Z-R61K	E3Z-R81K
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-R61K-M3J	E3Z-R81K-M3J
Diffuse-reflective		Pre-wired (2 m)	5 to 100 mm (wide view) Infrared Beam	E3Z-D61K	E3Z-D81K
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-D61K-M3J	E3Z-D81K-M3J
		Pre-wired (2 m)	1 m Infrared Beam	E3Z-D62K	E3Z-D82K
		Pre-wired M8 4-pin connector (0.3 m)		E3Z-D62K-M3J	E3Z-D82K-M3J

Note: 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. Figure in parenthesis indicate the minimum required distance between the sensor and the reflector.

3. Use Omron standard XS3F connector sets to mate with M8 pigtail connector version.

Reflectors for Retroreflective Models

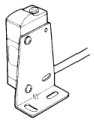
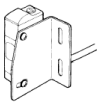
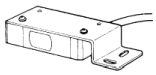
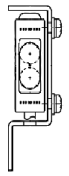
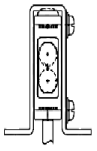
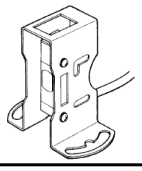
Stock Note: Shaded models are normally stocked.

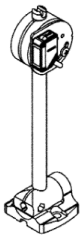
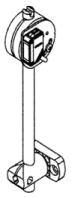
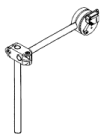
Name	Sensing distance (typical)	Model
Reflector	100 mm to 2 m	**E39-R1**
	100 mm to 3 m	**E39-R1S**
	100 mm to 5 m	**E39-R2**
	100 mm to 2.5 m	**E39-R9**
	100 mm to 3.5 m	**E39-R10**
Miniature reflector	50 mm to 1.5 m	**E39-R3**
Tape reflector	150 mm to 700 mm	**E39-RS1**
	150 mm to 1.1 m	**E39-RS2**
	150 mm to 1.4 m	**E39-RS3**

Note: The actual sensing distance may be reduced to approximately 70% of the typical sensing distance when using a reflector other than the E39-R1 or the E39-R1S.

Mounting Brackets

Stock Note: Shaded models are normally stocked.

Appearance	Description	Model
	L-bracket, horizontal	**E39-L104**
	L-bracket, vertical	**E39-L44**
	Open top, 20° angle adjustability	**E39-L43**
	Protected top 5° angle adjustability	**E39-L144**
	Compact vertical protective cover bracket	**E39-L142**
	Vertical protective cover bracket	**E39-L98**

Appearance	Description	Model
	Adjustable height and angle bracket for sensors; horizontal mounting rotates every 45 degrees Mounted to the aluminum frame rails of conveyors, easily adjustable	**E39-L93FH**
	Adjustable height and angle bracket for sensors; vertical mounting rotates every 45 degrees	**E39-L93FV**
	Adjustable height and angle bracket for sensors; fixed horizontal base mounting	**E39-L93H**
	Adjustable height and angle bracket for sensors; fixed vertical base mounting	**E39-L93V**
	Adjustable height and angle bracket for sensors; free range of X and Y axis positioning; no base included for vertical post	**E39-L93XY**

Specifications

■ Ratings/Characteristics

Sensing method		Through-beam	Retroreflective (Polarized)	Diffuse-reflective	
Model	NPN output	E3Z-T61K (-M3J)	E3Z-R16K (-M3J)	E3Z-D61K (-M3J)	E3Z-D62K (-M3J)
Item	PNP output	E3Z-T81K (-M3J)	E3Z-R81K (-M3J)	E3Z-D81K (-M3J)	E3Z-D82K (-M3J)
Sensing distance		15 m	3 m (100 mm)* (when using E39-R1S) 2 m (100 mm)* (when using E39-R1)	White paper (100 × 100 mm): 100 mm	White paper (300 × 300 mm): 1 m
Standard sensing object		Opaque:12 mm dia. min.	Opaque: 75 mm dia. min.	---	
Hysteresis		---		20% max. of sensing distance	
Directional angle		Both emitter and receiver: 3° to 15°	2° to 10°	---	
Light source (wave length)		Infrared LED (870 nm)	Red LED (660 nm)	Infrared LED (860 nm)	
Power supply voltage		12 to 24 VDC±10% including 10% (p-p) max. ripple			
Current consumption		Emitter: 15 mA Receiver: 20 mA	30 mA max.		
Control output		Load power supply voltage: 26.4 VDC max. Load current: 100 mA max. (Residual voltage: 1 V max. for a load currents less than 10 mA. and 2 V max. for load currents between 10 mA and 100 mA) Open collector output (NPN or PNP depending on model) L-ON/D-ON selectable			
Circuit protection		Protection from reversed power supply connection, output short-circuit, and reversed output connection	Protection from reversed power supply connection, output short-circuit, mutual interference, and reversed output connection		
Response time		Operation or reset: 1 ms max.			
Sensitivity adjustment		One-turn adjuster			
Ambient illumination (receiver side)		Incandescent lamp: 3,000 ℓx max. Sunlight: 10,000 ℓx max.			
Ambient temperature		Operating: −25°C to 55°C/Storage: −40°C to 70°C (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 between charged parts and case			
Dielectric strength		1,000 VAC, 50/60 Hz for 1 min between charged parts and case			
Vibration resistance		Destruction: 10 to 55 Hz, 1.5-mm double amplitude or 300 m/s^2 for 2 hours each in X, Y, and Z directions			
Shock resistance		Destruction: 500 m/s^2 3 times each in X, Y, and Z directions			
Degree of protection		IEC60529: IP67			
Connection method		Pre-wired cable (standard length: 2 m) or Pre-wired M8 4-pin connector (standard length: 0.3 m)			
Indicator		Operation indicator (orange) Stability indicator (green) Emitter has power indicator (orange) only.			
Weight (packed state)	**Pre-wired cable**	Approx. 120 g	Approx. 65 g		
	Pre-wired M8 4-pin connector	Approx. 50 g	Approx. 30 g		
Material	**Case**	PBT (polybutylene terephthalate)			
	Lens	Denatured polyarylate			
Accessories		Instruction manual (The Mounting Bracket is not provided with any of the above models.)			

* Figures in parentheses indicate the minimum required distances between the sensors and reflectors.

Oil Resistance

- Although the E3Z-□□□K Sensors have oil-resistant specifications, performance may be affected by certain types of oil. Refer to the table on the right.
- E3Z-□□□K Sensors are tested for resistance to the oils given in the table on the right. Refer to the information in the table when deciding which type of oil to use.

Testing oil classification	JIS classification	Product name	Dynamic viscosity (mm^2/s) at 40 °C	pH
Lubricant	---	Velocity No. 3	2.02	---
Water insoluble coolant	Class 2, No.5	Daphne Cut AS-30D	No less than 10 to less than 50	
	Class 2, No.11	Yushiron Oil No. 2 ac	Less than 10	
Water soluble coolant	Class W1, No. 1	Yushiroken EC50T-3	---	7 to 9.5
		Yushiron Lubic HWC68		7 to 9.9
	Class W1, No. 2	Gryton 1700D		7 to 9.2
	Class W2 , No. 1	Yushiroken S50N		7 to 9.8

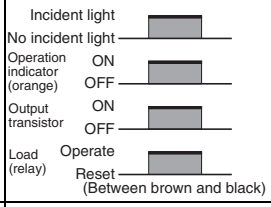
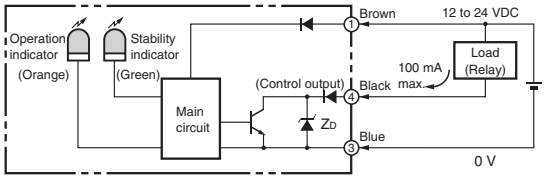
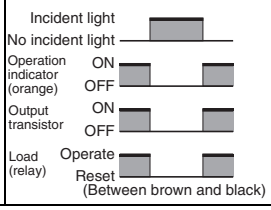
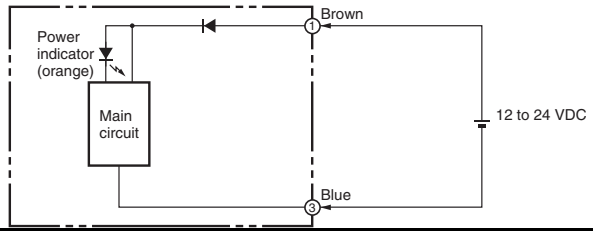
Note 1. The E3Z-□□□K maintained a minimum insulation resistance of 100 MΩ after the sensors were dripped in all the above oils for 240 hours.

2. When using the Sensors in environments subject to oils other than those listed above, use the figures for kinetic viscosity and pH as rough guides. Consideration of the effects of additives in the oil may also be required.

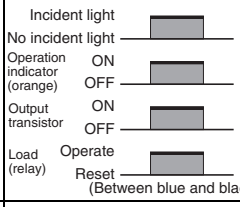
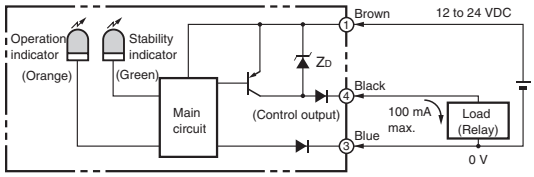
3. JIS: Japanese Industrial Standards

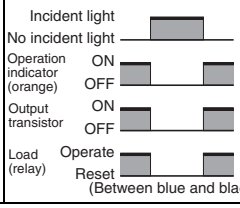
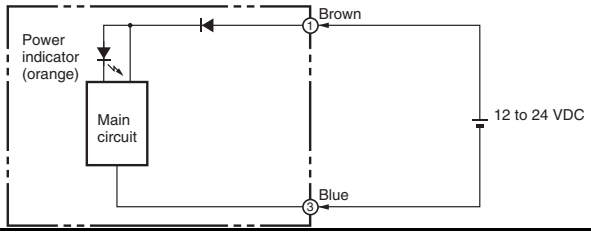
Output Circuit Diagram

■ NPN Output

Model	Operating mode	Timing chart	Mode selector	Output circuit
E3Z-T61K (-M3J) E3Z-R61K (-M3J) E3Z-D61K (-M3J) E3Z-D62K (-M3J)	Light ON		L (Light ON)	(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model)  Connector Pin Arrangement  Pin 2 is not used.
	Dark ON		D (Dark ON)	
	(Through-beam emitter) 			Connector Pin Arrangement  Pins 2 and 4 are not used.

■ PNP Output

<table>
<tr><th>Model</th><th>Operating mode</th><th>Timing chart</th><th>Mode selector</th><th>Output circuit</th></tr>
<tr><td rowspan="3">E3Z-T81K (-M3J)
E3Z-R81K (-M3J)
E3Z-D81K (-M3J)
E3Z-D82K (-M3J)</td><td>Light-ON</td><td> 
</td><td>L (Light ON)</td><td rowspan="2">(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model)
 

Connector Pin Arrangement
 
Pin 2 is not used.</td></tr>
<tr><td>Dark ON</td><td> 
</td><td>D (Dark ON)</td></tr>
<tr><td colspan="4">(Through-beam emitter)
 

Connector Pin Arrangement
 
Pins 2 and 4 are not used.</td></tr>
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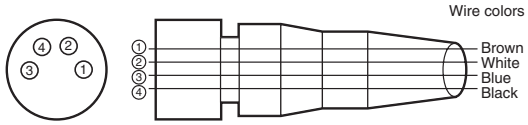
Structure of Sensor I/O Connector



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

Classification	Wire color	Connector pin No.	Use
DC	Brown	①	Power supply (+V)
	White	②	---
	Blue	③	Power supply (0 V)
	Black	④	Output

Note: Pin 2 is not used.

Dimensions

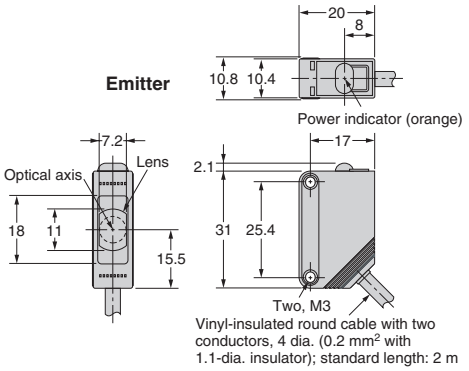
Units: mm (inch)

■ Sensor

Through-beam

E3Z-T61K (-M3J)
E3Z-T81K (-M3J)

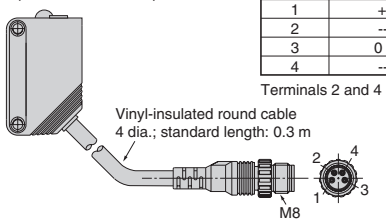
Pre-wired Models



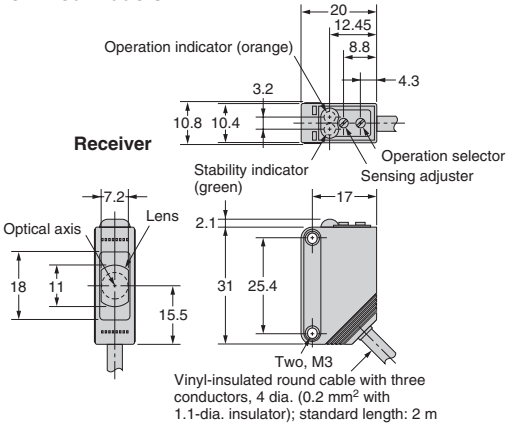
Connector Models
(E3Z-T□1K-M3J)

Terminal	Specifications
1	+V
2	---
3	0 V
4	---

Terminals 2 and 4 are not used.



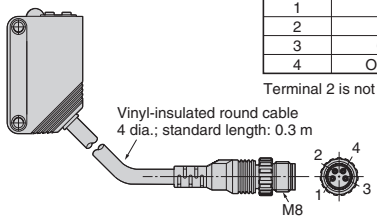
Pre-wired Models



Connector Models
(E3Z-T□1K-M3J)

Terminal	Specifications
1	+V
2	---
3	0 V
4	Output

Terminal 2 is not used.



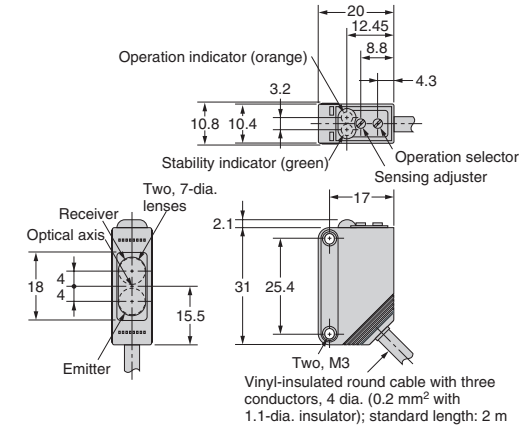
Retroreflective Models

E3Z-R61K (-M3J)
E3Z-R81K (-M3J)

Diffuse-reflective Models

E3Z-D61K (-M3J)
E3Z-D62K (-M3J)
E3Z-D81K (-M3J)
E3Z-D82K (-M3J)

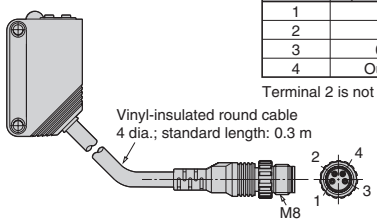
Pre-wired Models



Connector Models
(E3Z-D□□K-M3J)
(E3Z-R□□K-M3J)

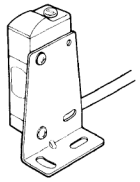
Terminal	Specifications
1	+V
2	---
3	0 V
4	Output

Terminal 2 is not used.

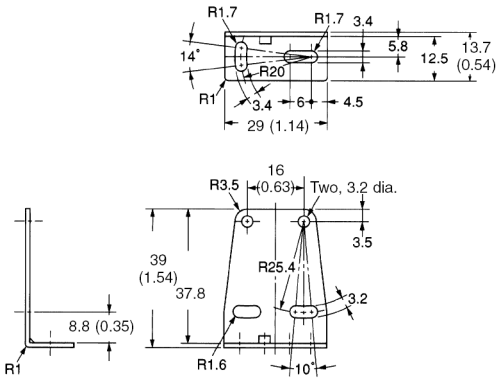


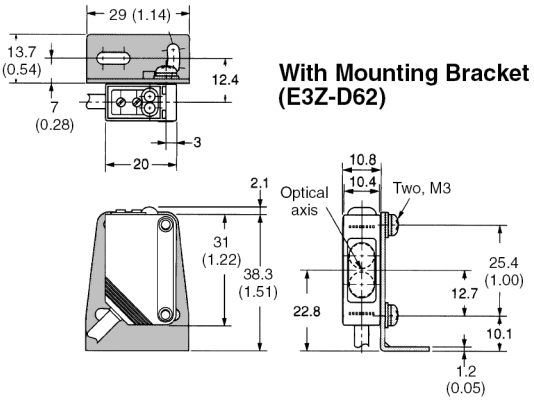
■ Mounting Brackets

E39-L104

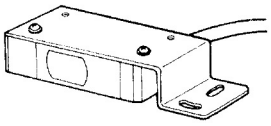


Material:
SUS304
stainless steel

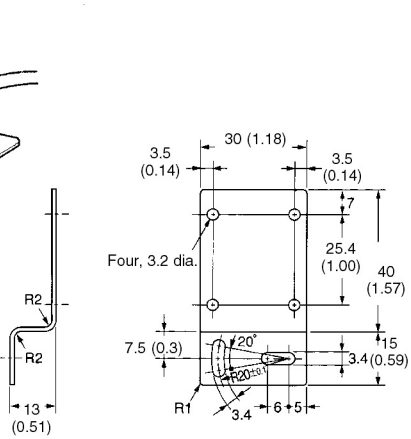


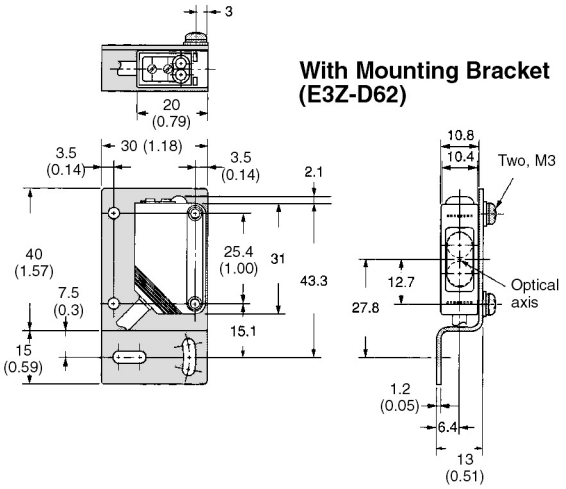


E39-L43

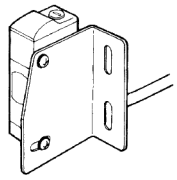


Material:
SUS304
stainless steel

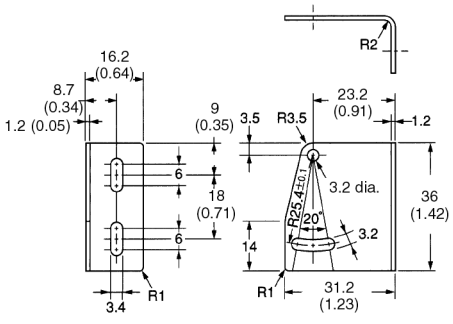


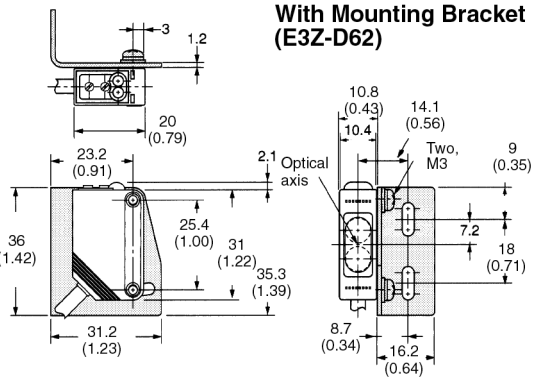


E39-L44

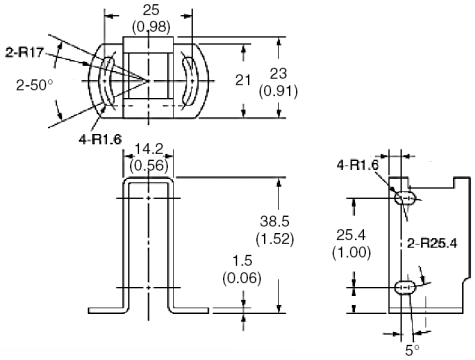


Material:
SUS304
stainless steel

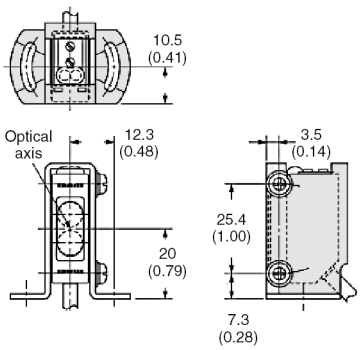




E39-L144

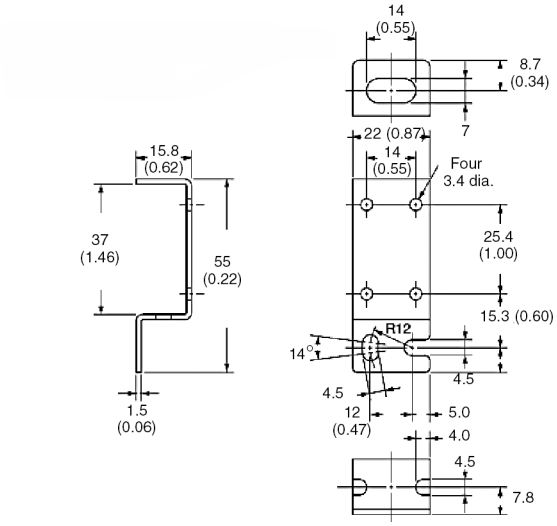


With Sensor (Example: E3Z-L61)

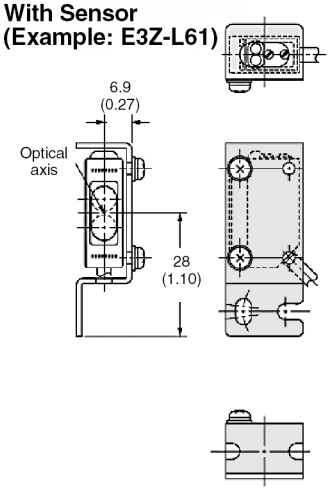


Material:
SUS304 stainless steel

E39-L142

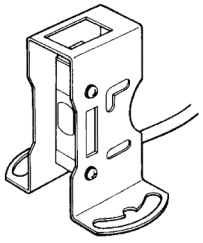


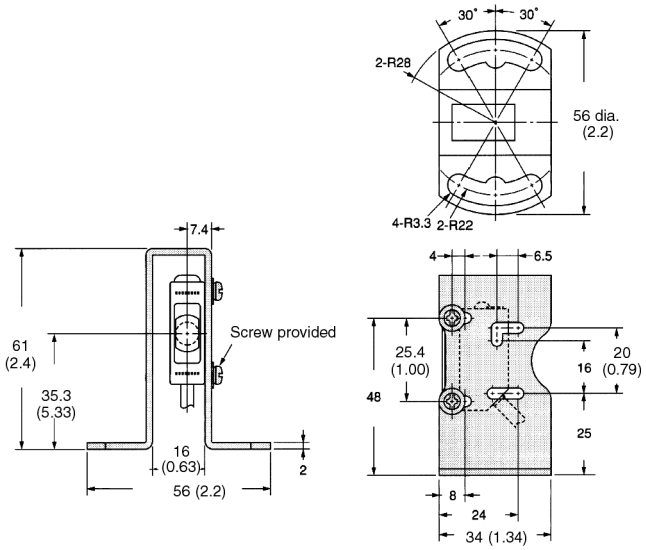
With Sensor (Example: E3Z-L61)



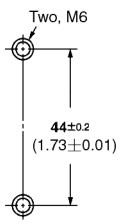
Material:
SUS304 stainless steel

E39-L98



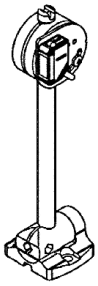


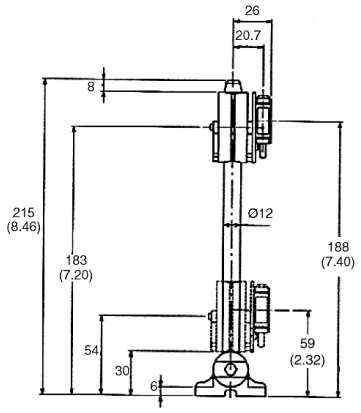
Mounting Holes

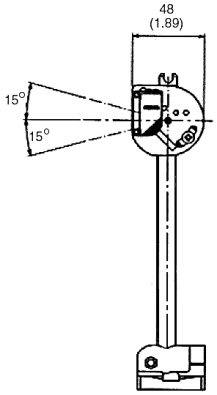


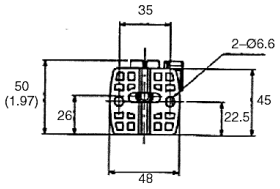
Material:
SUS304 stainless steel

E39-L93FH









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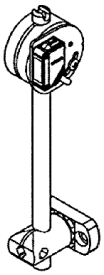
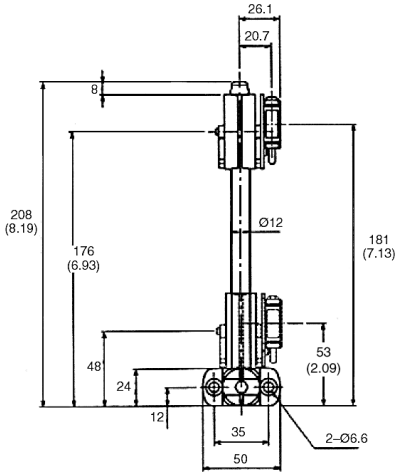
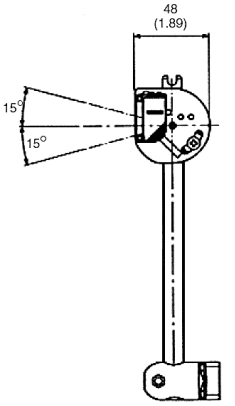
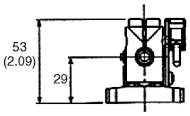
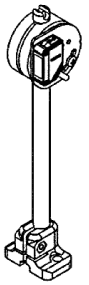


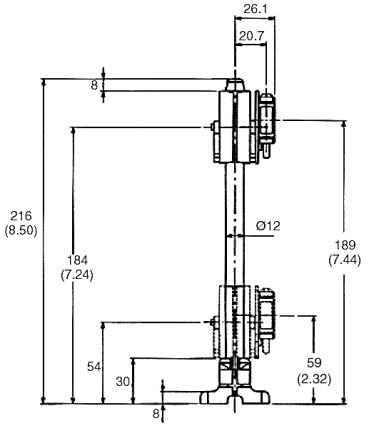


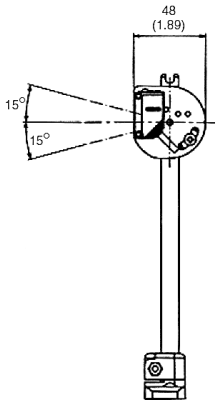


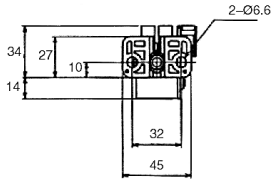


E39-L93H

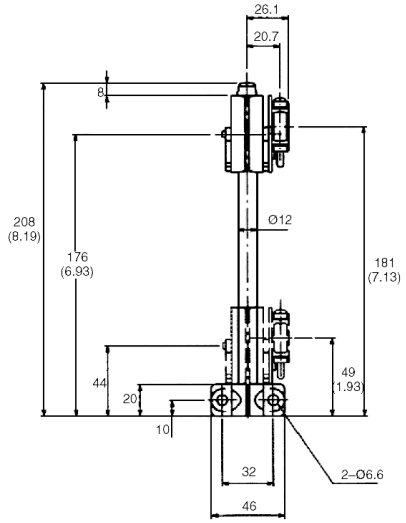


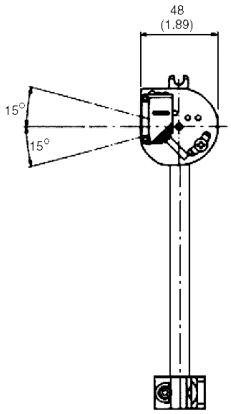


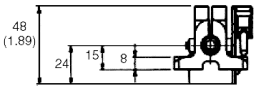




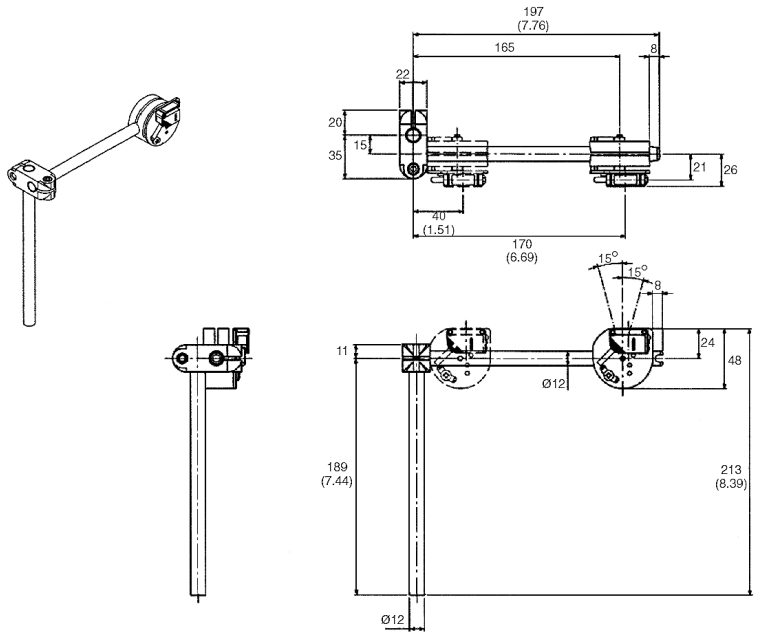
E39-L93V







E39-L93XY



Precautions

Be sure to abide by the following precautions for the safe operation of the Sensor.

■ Wiring

Power Supply Voltage

Make sure that the power supply to the Sensor is within the rated voltage range and do not apply 100 VAC or more if the Sensor is a DC model, or otherwise the Sensor may explode or burn.

Load Short-circuiting

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

Wiring Mistakes

Do not make mistakes in wiring, such as mistakes in polarity, otherwise the Sensor may be damaged.

Connection without Load

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

Operating Environment

Do not use the Sensor in locations with explosive or flammable gas.

■ Precautions for Safe Use

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

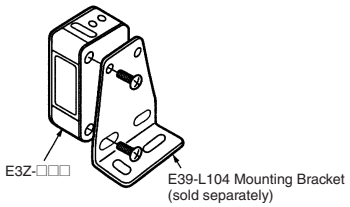
M8 Metal Connector

- Be sure to connect or disconnect the metal connector after turning OFF the Sensor.
- Hold the connector cover to connect or disconnect the metal connector.
- Secure the connector cover by hand. Do not use any pliers, otherwise 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, otherwise 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 0.5 N • m.



■ Precautions for Safe Use

Sensors

The sensor has a special coating that makes it more oil resistant. Handle it with care to avoid scratching the coating.

If you attach adhesive tape to the sensor, the coating may be damaged when you remove the tape.

Part of the coating around the adjuster may peel off when you adjust the sensitivity. This does not reduce the oil resistance of the sensor.

Cables

Part of the cable is coated and may wrinkle when bent.

Observe the following precautions when handling the cable because it is made of the same polyvinyl chloride (PVC) material as the cables for standard E3Z sensors.

- Keep the cable from direct contact with oil.
  If the cable is used in oily environments, provide a cover or other protective measure to keep the cable from direct contact with oil.
- Do not subject the cable to mechanical movements in oily environments.
  The sheath will lose its elasticity and harden over time. The cable may break as a result and cause faulty operation, or there may be damage to the sheath that leads to a short circuit.

Lens

The oil-resistant treatment on the lens may cause slight blurring, but this does not affect detection.

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