

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

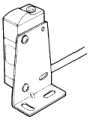
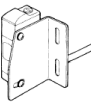
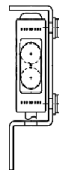
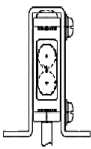
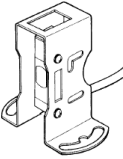
Stock Note: Shaded models are normally stocked.

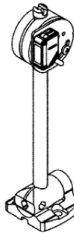
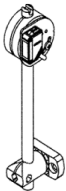
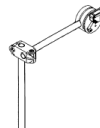
Name	Sensing distance (typical)	Model
Reflector	100 mm to 2 m	E39-R1
	100 mm to 3 m	E39-R1S
	100 mm to 5 m	E39-R2
	100 mm to 2.5 m	E39-R9
	100 mm to 3.5 m	E39-R10
Miniature reflector	50 mm to 1.5 m	E39-R3
Tape reflector	150 mm to 700 mm	E39-RS1
	150 mm to 1.1 m	E39-RS2
	150 mm to 1.4 m	E39-RS3

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

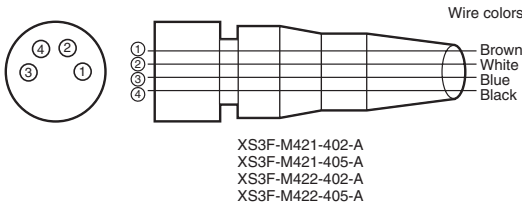
■ NPN Output

Model	Operating mode	Timing chart	Mode selector	Output circuit
E3Z-T61K (-M3J) E3Z-R61K (-M3J) E3Z-D61K (-M3J) E3Z-D62K (-M3J)	Light ON	Incident light No incident light Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Reset (Between brown and black)	L (Light ON)	(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model) Connector Pin Arrangement Pin 2 is not used.
	Dark ON	Incident light No incident light Operation indicator (orange) ON OFF Output transistor ON OFF Load (relay) Operate Reset (Between brown and black)	D (Dark ON)	(Through-beam emitter) Connector Pin Arrangement Pins 2 and 4 are not used.

■ PNP Output

Model	Operating mode	Timing chart	Mode selector	Output circuit
E3Z-T81K (-M3J) E3Z-R81K (-M3J) E3Z-D81K (-M3J) E3Z-D82K (-M3J)	Light-ON	Incident light	L (Light ON)	(Through-beam receiver) (Retroreflective model) (Diffuse-reflective model) Connector Pin Arrangement Pin 2 is not used.
	Dark ON	Incident light	D (Dark ON)	
(Through-beam emitter) Connector Pin Arrangement Pins 2 and 4 are not used.				

Structure of Sensor I/O Connector



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

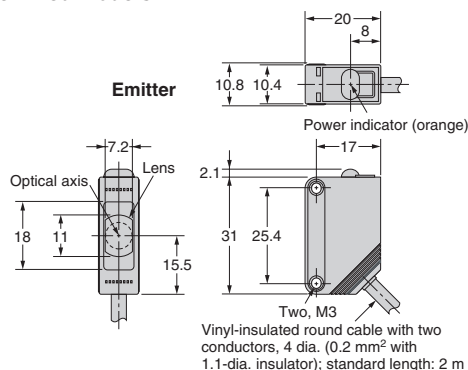
Units: mm (inch)

■ Sensor

Through-beam

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

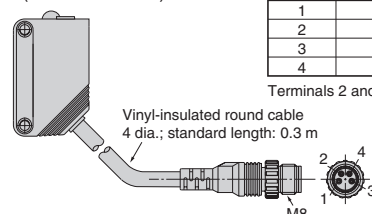
Pre-wired Models



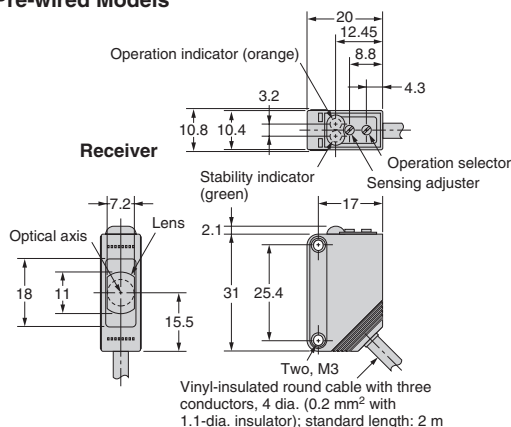
Connector Models (E3Z-T□1K-M3J)

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

Terminals 2 and 4 are not used.



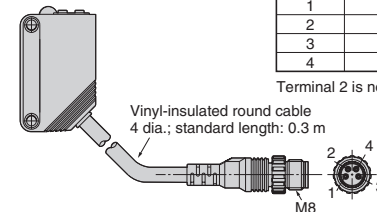
Pre-wired Models



Connector Models (E3Z-T□1K-M3J)

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

Terminal 2 is not used.



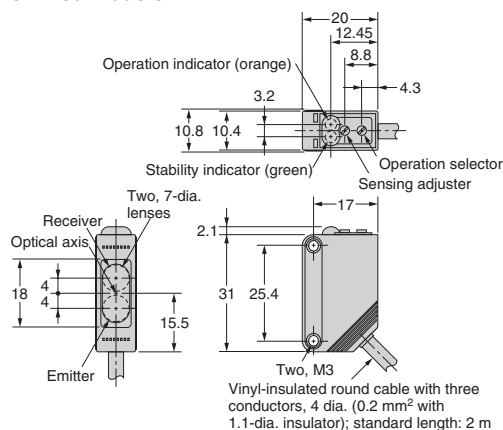
Retroreflective Models

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

Diffuse-reflective Models

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

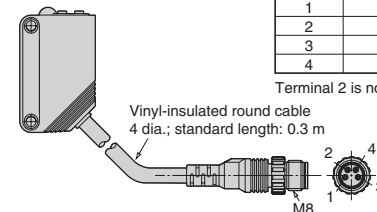
Pre-wired Models



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

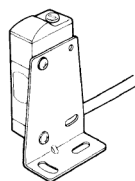
Terminal	Specifications
1	+V
2	---
3	0 V
4	Output

Terminal 2 is not used.

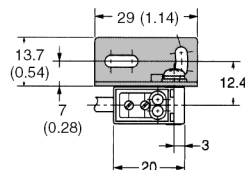
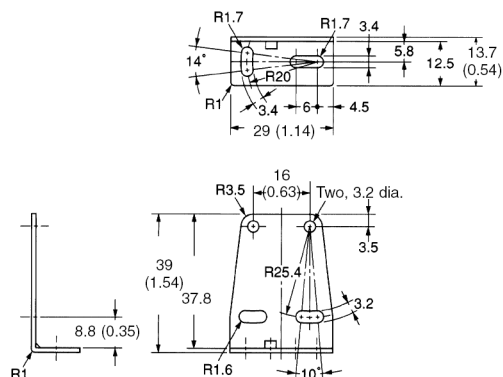


■ Mounting Brackets

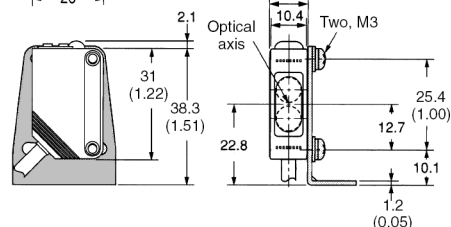
E39-L104



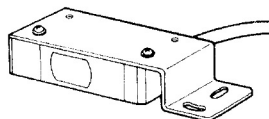
Material:
SUS304
stainless steel



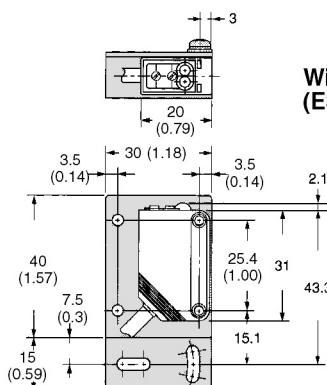
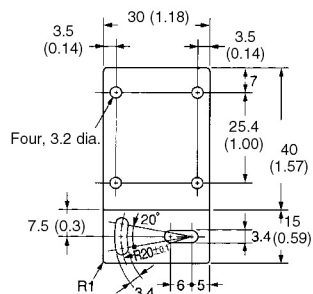
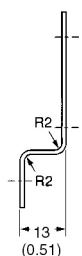
With Mounting Bracket
(E3Z-D62)



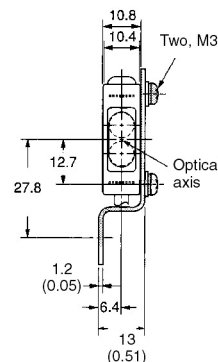
E39-L43



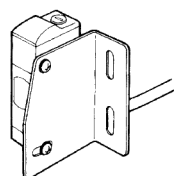
Material:
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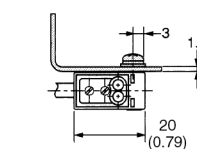
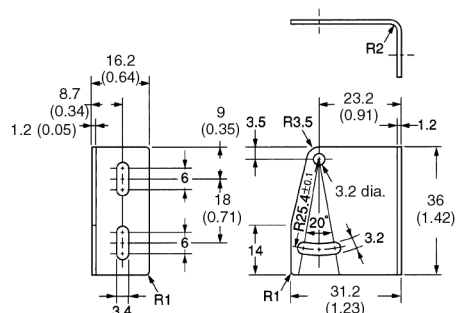
With Mounting Bracket
(E3Z-D62)



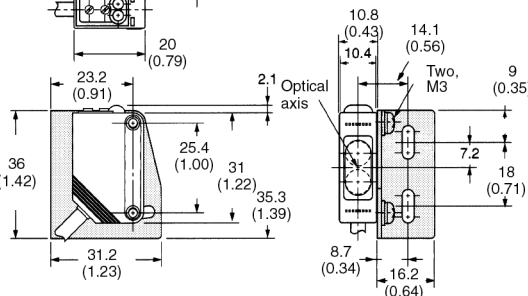
E39-L44



Material:
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stainless steel

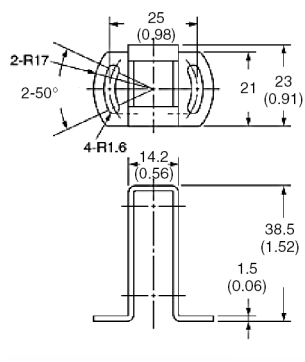


With Mounting Bracket
(E3Z-D62)

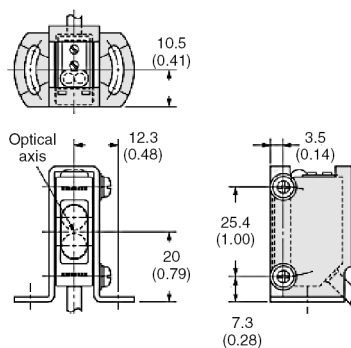


E39-L144

Material:
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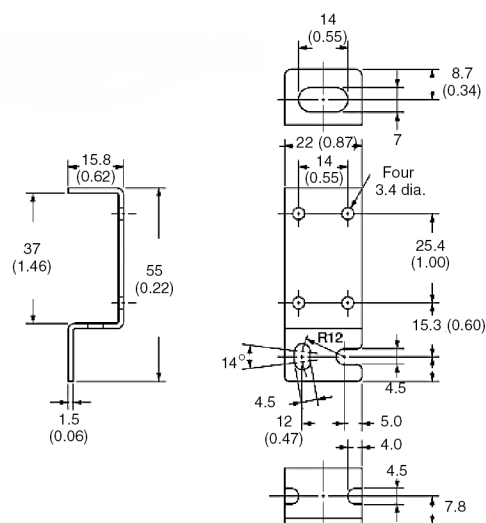


With Sensor
(Example: E3Z-L61)

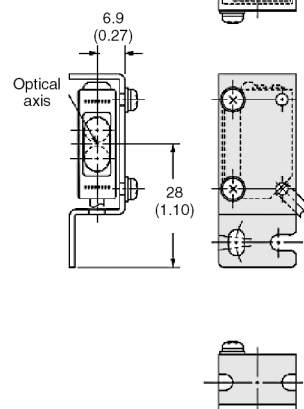


E39-L142

Material:
SUS304 stainless steel

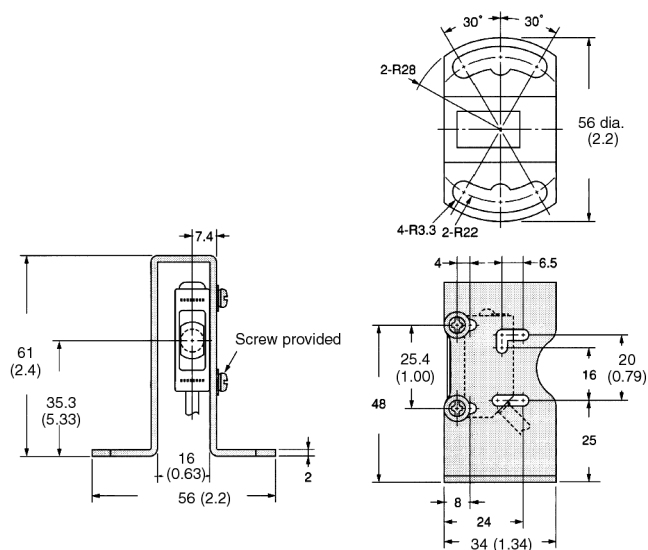
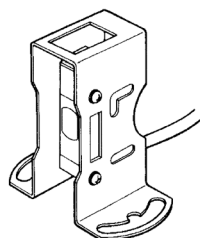


With Sensor
(Example: E3Z-L61)

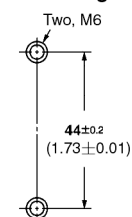


E39-L98

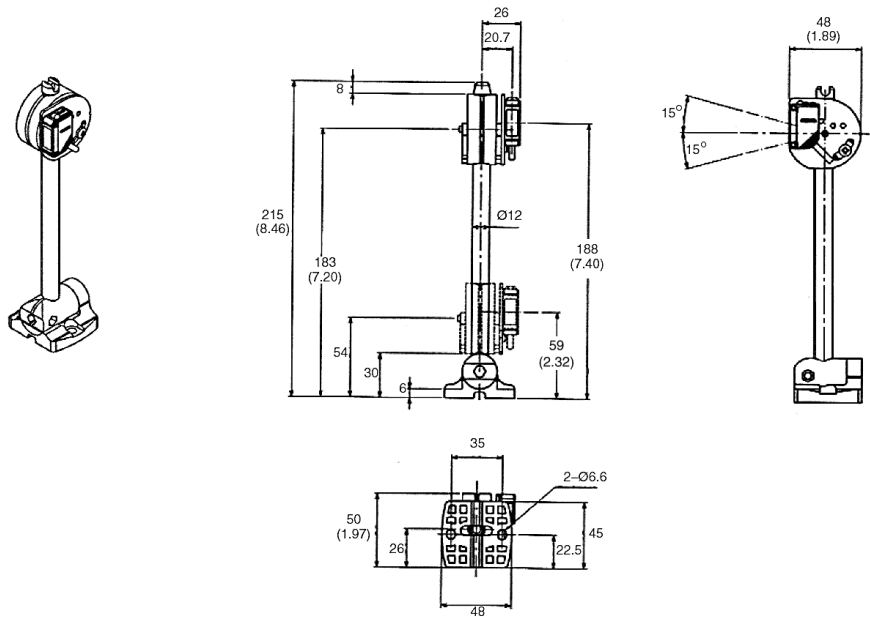
Material:
SUS304 stainless steel



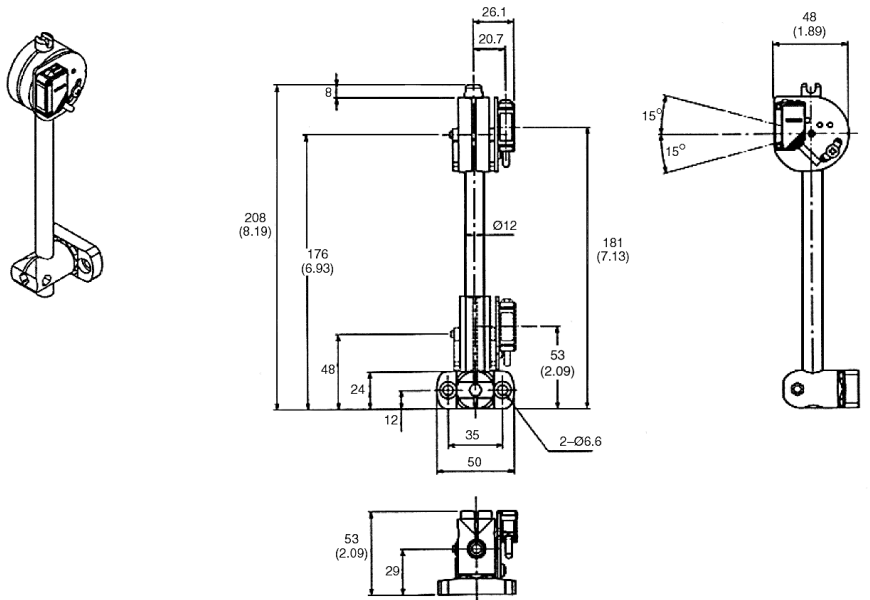
Mounting Holes



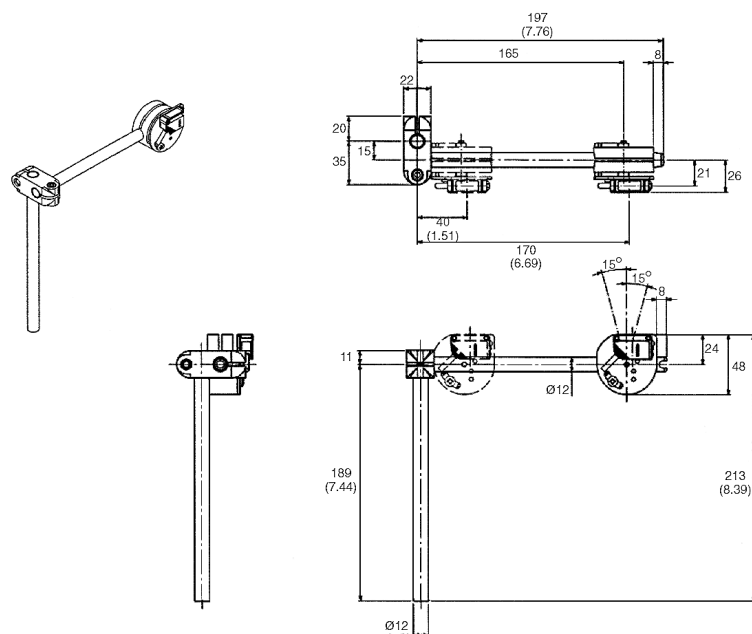
E39-L93FH



E39-L93FV



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

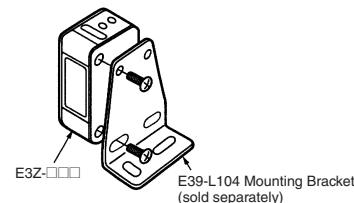
M8 Metal Connector

- 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.

Certain Terms and Conditions of Sale

1. **Offer; Acceptance.** These terms and conditions (these "Terms") are deemed part of all catalogs, manuals or other documents, whether electronic or in writing, relating to the sale of goods or services (collectively, the "Goods") by Omron Electronics LLC and its subsidiary companies ("Seller"). Seller hereby 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. Please contact your Omron representative to confirm any additional terms for sales from your Omron company.
2. **Prices.** All prices stated are current, subject to change without notice by Seller. Buyer agrees to pay the price in effect at time of shipment.
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 Seller's payment terms and (ii) Buyer has no past due amounts owing to Seller.
4. **Orders.** Seller will accept no order less than \$200 net billing.
5. **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 Goods.
6. **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 Seller or required to be collected directly or indirectly by Seller for the manufacture, production, sale, delivery, importation, consumption or use of the Goods sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Seller.
7. **Financial.** If the financial position of Buyer at any time becomes unsatisfactory to Seller, Seller 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, Seller may (without liability and in addition to other remedies) cancel any unshipped portion of Goods sold hereunder and stop any Goods 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.
8. **Cancellation; Etc.** Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Seller fully against all costs or expenses arising in connection therewith.
9. **Force Majeure.** Seller 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.
10. **Shipping; Delivery.** Unless otherwise expressly agreed in writing by Seller:
 - a. Shipments shall be by a carrier selected by Seller;
 - 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 Goods shall be FOB shipping point (unless otherwise stated in writing by Seller), at which point title to and all risk of loss of the Goods shall pass from Seller to Buyer, provided that Seller shall retain a security interest in the Goods until the full purchase price is paid by Buyer;
 - d. Delivery and shipping dates are estimates only.
 - e. Seller will package Goods as it deems proper for protection against normal handling and extra charges apply to special conditions.
11. **Claims.** Any claim by Buyer against Seller for shortage or damage to the Goods occurring before delivery to the carrier must be presented in writing to Seller within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Goods from Seller in the condition claimed.
12. **Warranties.** (a) **Exclusive Warranty.** Seller's exclusive warranty is that the Goods will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Seller (or such other period expressed in writing by Seller). Seller disclaims all other warranties, express or implied. (b) **Limitations.** SELLER MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE GOODS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE GOODS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Seller further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Goods or otherwise of any intellectual property right. (c) **Buyer Remedy.** Seller's sole obligation hereunder shall be to replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Good or, at Seller's election, to repay or credit Buyer an amount equal to the purchase price of the Good; provided that in no event shall Seller be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Goods unless Seller's analysis confirms that the Goods were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any goods by Buyer must be approved in writing by Seller before shipment. Seller shall not be liable for the suitability or unsuitability or the results from the use of Goods in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty.
13. **Damage Limits; Etc.** SELLER SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE GOODS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Seller exceed the individual price of the Good on which liability is asserted.
14. **Indemnities.** Buyer shall indemnify and hold harmless Seller, its affiliates and its employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Seller is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Goods. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Seller and defend or settle any action brought against Seller to the extent that it is based on a claim that any Good made to Buyer specifications infringed intellectual property rights of another party.
15. **Property; Confidentiality.** The intellectual property embodied in the Goods is the exclusive property of Seller and its affiliates and Buyer shall not attempt to duplicate it in any way without the written permission of Seller. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Seller. All information and materials supplied by Seller to Buyer relating to the Goods are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
16. **Miscellaneous.** (a) **Waiver.** No failure or delay by Seller in exercising any right and no course of dealing between Buyer and Seller shall operate as a waiver of rights by Seller. (b) **Assignment.** Buyer may not assign its rights hereunder without Seller's written consent. (c) **Amendment.** These Terms constitute the entire agreement between Buyer and Seller relating to the Goods, and no provision may be changed or waived unless in writing signed by the parties. (d) **Severability.** If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (e) **Setoff.** Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (f) As used herein, "including" means "including without limitation".

Certain Precautions on Specifications and Use

1. **Suitability of Use.** Seller shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Good in the Buyer's application or use of the Good. At Buyer's request, Seller will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Good. This information by itself is not sufficient for a complete determination of the suitability of the Good in combination with the end product, machine, system, or other application or use. The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of this Good, nor is it intended to imply that the uses listed may be suitable for this Good:
 - (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
 - (ii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
 - (iii) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Good.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE SELLER'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. **Programmable Products.** Seller shall not be responsible for the user's programming of a programmable Good, or any consequence thereof.
3. **Performance Data.** Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Seller's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Seller's Warranty and Limitations of Liability.
4. **Change in Specifications.** Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed or when significant construction changes are made. However, some specifications of the Good may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Seller's representative at any time to confirm actual specifications of purchased Good.
5. **Errors and Omissions.** The information in this catalog has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors, or omissions.

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.



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