

Original instructions

OMRON

Model E3ZS-T81A

SINGLE BEAM SAFETY SENSOR

INSTRUCTION SHEET

Thank you for selecting OMRON product. This sheet primarily describes precautions required in installing and operating the product. Only qualified personnel trained in professional electrical technique should handle the E3ZS. For your convenience, keep the sheet at your disposal. The E3ZS is an electro-sensitive protective equipment intended to be used for humans protection.

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Instructions in the EU languages and a signed EU Declaration of Conformity are available on our website at www.industrial.omron.eu/safety.

Declaration of Conformity

OMRON declares that the E3ZS-T81A is in conformity with the requirements of following EU Directives and UK Legislations:
 EU: Machinery Directive 2006/42/EC, EMC Directive 2014/30/EU, RoHS Directive 2011/65/EU
 UK: 2008 No. 1597 machinery (Safety), 2016 No. 1091 EMC, 2012 No. 3032 RoHS

Safety Standards

The E3ZS-T81A is designed and manufactured according to the following standards.
 EN61496-1/-2 (Type 2 ESPE)*, EN60947-5-3 (PDDDB), EN55011, EN50178, EN61000-6-2, EN ISO 13849-1:2005 (Category 1 for PLC and PDDDB, Category 2 for PLC and Type 2 ESPE)*
 UL 61496-1/-2 (Type 2 ESPE used with G9SP), UL 508, UL 1998 (used with G9SP)
 CAN/CSA C22.2 No. 142
 * When using the E3ZS as Type 2 ESPE, an appropriate safety controller complied with the requirements of the relevant standards (Cat. 2/PL c according to EN ISO 13849-1, Type 2 according to EN 61496-1/2) must be used.

Safety Precautions

Meanings of Signal Words

WARNING 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.

WARNING

When the single beam safety sensor model E3ZS is used as a safety device or a part of safety systems for ensuring safety of personnel, be sure to use it with an appropriate safety controller. See "Standards" section for an appropriate safety controller.

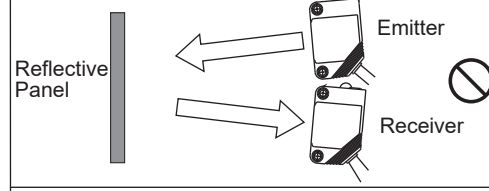
WARNING

If the mode selection input line of the receiver is connected to 0V, the output turns ON when light is interrupted (Dark ON), which no longer configures the safety system. Be sure to connect the mode selection input line to 24V DC to make the sensor output ON when light is incident (Light ON).

Always maintain a safe distance between the E3ZS and a hazardous part of a machine. Be sure to refer to the related standards (ISO 13855) for the calculation of safety distance.

Use an opaque test rod with 18mm in diameter and 200mm or greater in effective length to check the detection capability. The E3ZS cannot detect transparent materials.

Do not use the E3ZS in a reflective configuration, otherwise detection may fail.



Do not install the E3ZS in a location where it can be affected by wall reflections to avoid detection failure, which may result in serious injury.

When using multiple sets of E3ZS, arrange them to prevent mutual interference. Failure to do so may cause the sensor not to detect, resulting in serious injury.

The E3ZS does not offer protection to the operator's body from projectiles existing in the hazardous area. Proper means of mechanical guarding must be provided to ensure protection from these potentially hazardous projectiles.

Wiring must be done while the power is turned OFF. Doing it with the power ON may cause an electric shock.

Do not connect the E3ZS to an AC or DC power supply with higher voltage than nominal DC24V. Otherwise the sensor may explode, burn, or cause electric shock. The power supply must conform to regulatory requirements and standards, regarding EMC and electrical equipment safety, of the country where the E3ZS is installed. For example, the power supply must fulfill EN60742 requirements for double insulation and must conform to EMC Directive and Low Voltage Directive in EU.

To meet the Category 2, at least 100 diagnostic-tests must be undertaken between two requests for a safety-related reaction from the E3ZS. For diagnostic-test intervals, refer to user's manuals of safety controllers to be connected.

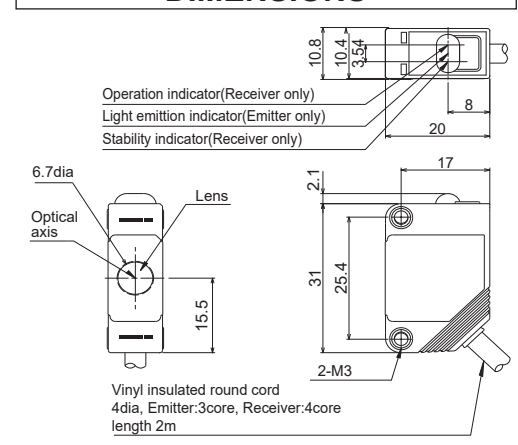
Precautions for Safe Use

- When used in combination with a safety controller, also refer to the user's manual of the safety controller for proper connection.
- A load must not be shorted. A load must not be used with current higher than the rating. Do not apply the reversed supplied voltage. Be sure to route the E3ZS cable separated from high-potential power line or through an exclusive conduit.
- Do not remove the label (yellow) from the sensor. Doing so may violate the specifications.
- Wire the cable so that it has some slack and does not prevent personnel or object passage. Allow some leeway for the wires and do not tight the wires when connection cable to G9SP, and confirm that any cable may not block the movements of workers or objects.
- Do not disassemble, repair or modify the E3ZS.
- Be sure to dispose of the E3ZS as industrial waste.

Precautions for Correct Use

- Do not install the E3ZS in the following environments:
 - Areas exposed to intense interference light, such as direct sunlight;
 - Areas with high-humidity where condensation is likely to occur;
 - Areas exposed to corrosive, flammable or explosive gases;
 - Areas in the presence of substances, such as heavy smoke or particulate matter, that may deteriorate product quality;
 - Areas exposed to vibration or shock levels higher than specification provisions;
 - Areas where the product may come in direct contact with water, oil, and chemicals;
- Do not install the E3ZS in water.
- To extend the cable, use a wire of cross-sectional area 0.3mm² or more. However do not extend it more than 30m.
- Be careful not to exceed a tightening torque of 0.5 Nm. Also, if it is not tight enough, vibration may cause it to come loose.
- When cleaning, avoid using thinner, benzene or acetone.
- Power supply specifications
 - Do not connect to DC distribution network.
 - For combined DC power supply, use the following UL certified products:
 - (1) Limited voltage current circuit that conforms to UL508
 - Circuit with a power supply that consists of a secondary coil of an insulated transformer that satisfies the following conditions:
 - Maximum voltage (with no load) : 30Vrms (42.4V peak) or less, and
 - Maximum current : 8A or less (including short-circuit), or
 - ① When limited by a circuit
 - ② protector (fuse, etc.) with the ratings shown in the table below
 - (2) Class 2 power supply unit that conforms to UL 1310
 - (3) Circuit (class 2 circuit) with 30Vrms (42.4V peak) or less of maximum voltage, and which uses a class 2 transformer that conforms to UL1585 as its power supply
 - In a residential environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

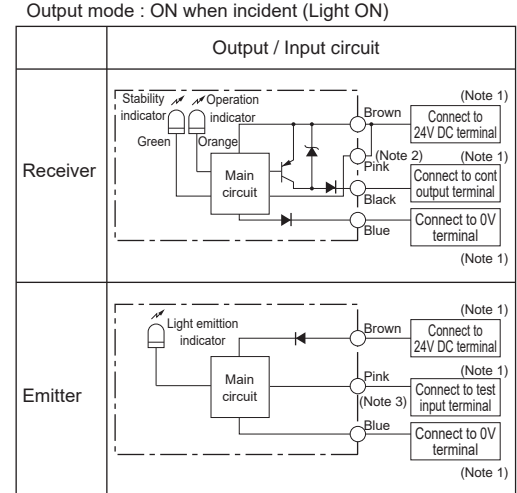
DIMENSIONS



RATINGS / PERFORMANCE

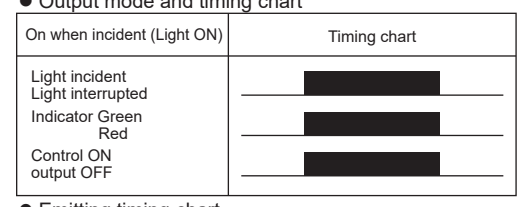
Detection method		Through beam type
Power supply voltage		12 to 24V DC±10% (ripple p-p 10% max)
Operating angle		±5° max (at 3m)
Current consumption		Emitter : 15mA max. Receiver : 20mA max.
Sensing distance		0.2 to 3m
Standard object		Opaque object of φ18mm or more.
Response time (Risk time, according to IEC 60947-5-3)		1.0ms max (E3ZS only) Response time depends on a safety controller. For the details, see the users manual of a safety controller.
Switching frequency		500Hz max. (E3ZS only)
Control output		Transistor output PNP, Load current 100mA max, OFF-state current 0.5mA max., Operational current 1mA min., Output residual voltage of 1V or less (when load current is less than 10mA) Output residual voltage of 2V or less (with load current is from 10 to 100mA)(except for voltage drop due to cable extension)
Utilization categories for switching elements		DC-13 (Control of electromagnets)
Test Input (Emitter)	E3ZS	22.5 to 24V DC : Emitting OFF (Source current : 3mA max) Open or 0 to 2.5V DC : Emitting ON (Leakage current : 0.1mA max)
Power reset time		100ms
Ambient illumination		Illumination intensity Incandescent lamp : 3000 lx max. Sunlight : 10000 lx max.
Ambient temperature		Operating : -10 to 55°C, Storage : -10 to 70°C (not freezing or condensation)
Ambient humidity		Operating : 35 to 85% RH, Storage : 35 to 95% RH (not freezing or condensation)
Insulation resistance		20MΩ or more (by 500V DC megger)
Dielectric strength voltage		1000V AC, 50/60Hz for 1 min.
Impulse withstand voltage		1kV
Pollution degree		2
Vibration resistance	Durability	10 to 55Hz, 1.5mm double amplitude, 2 hours for each direction of X, Y and Z.
	Operation Limit	5 to 150Hz, 7mm double amplitude / 1G acceleration, 10 sweeps for each direction of X, Y and Z. (IEC TR 60721-4-3 Class 3M4)
Shock resistance	Durability	500m/s ² (approx. 50G), 3 times for each direction of X, Y and Z.
	Operation Limit	15G acceleration, 8ms pulse duration, 100 time for each direction of 3 mutually perpendicular axes. (600 in total). (IEC TR 60721-4-3 Class 3M4)
Enclosure ratings		IEC standard IP67
Light source		Red LED
Indicators		Emitter : Orange / Light emission Receiver : Green / Stability, Orange / Operation
Circuit protection		Output short-circuit and power supply reverse polarity
Weight		Approx. 120g (1set)
Reliability data (ISO 13849-1)		When using E3ZS by itself: MTTFd = 100 year, DC = 0%, TM = 20 year When using E3ZS as TYPE 2 ESPE*: MTTFd = 100 year, DC = 90%, TM = 20 year *This data does not include the values of a safety controller.
Accessories		• Instruction sheet

CIRCUIT DIAGRAM

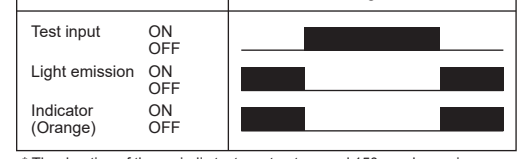


- (Note 1) • To meet the Category 2 (EN ISO 13849-1) or TYPE 2 ESPE (EN 61496-1/-2), connect the E3ZS to the appropriate safety controller. For the details see user's manual of the safety controller and "Standards" section in this instruction.
- (Note 2) • Be sure to connect the "Mode selection input" to 24V DC terminal.
- (Note 3) • When the E3ZS is used without being connected to a safety controller, test input should be connected to 0V.

TIMING CHART

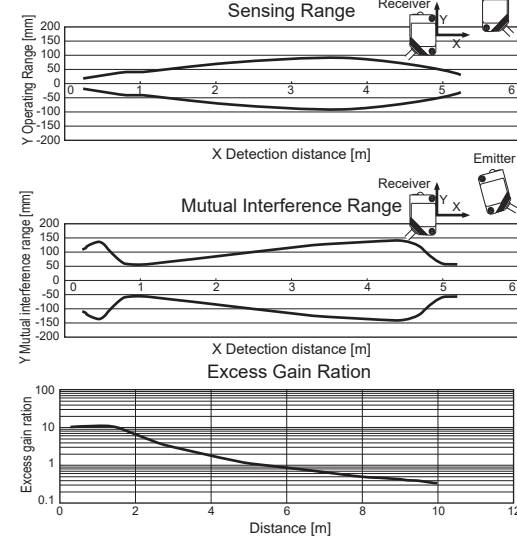


Emitting timing chart



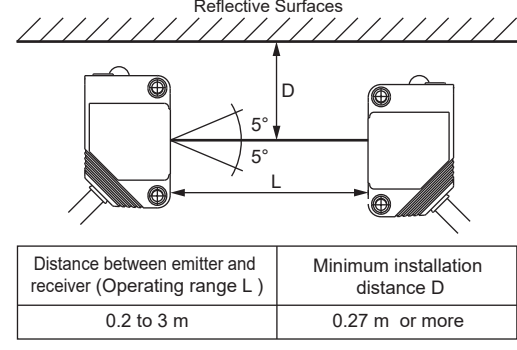
* The duration of the periodic test must not exceed 150ms when using as the TYPE 2 ESPE.

ENGINEERING DATA



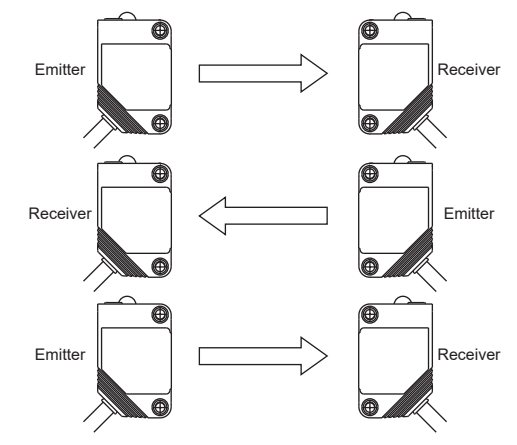
INFLUENCE OF REFLECTIVE SURFACES

Install the E3ZS with minimum distance D (given below) away from reflective surfaces (highly reflective surfaces) such as metal walls, floors, ceilings, and work pieces



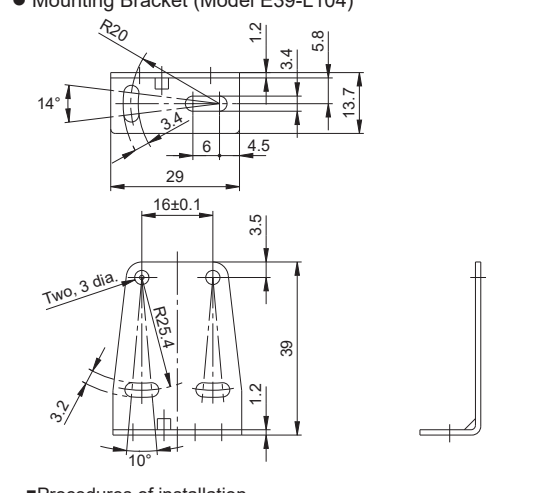
INFLUENCE OF MUTUAL INTERFERENCE

When installing two or more E3ZSs to each other, considerations must be made to prevent mutual interference.
 • Install so that any E3ZSs emit in the opposite directions (See below).



- Install a light interrupting wall in between sensors.
 - Install the E3ZSs facing away from the one another to eliminate mutual interference.
- Note : When using multiple sets of E3ZSs, be sure to confirm that mutual interference is not occurred.

ACCESSORY (OPTIONAL)



Procedures of installation
 After mounting and wiring the devices, perform beam alignment of the E3ZS in the following procedures.
 • Turn the power ON.
 • Align the emitter and receiver so that stability indicator (green) can turn on.

Final check
 • Confirm that no object exists in the detection zone of the E3ZS.
 • Confirm that safety output of safety controller turns OFF when an object exists in the detection zone of the E3ZS. The machine is in the stop state (OSSD OFF state).

(Note) Inspect every 6 months or when installation settings are changed.

Suitability for Use

Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases.

NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT(S) IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

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