OMRON

Model E3AS-F1000I□□/1500I□□

TOF Laser Sensor

INSTRUCTION SHEET

Thank you for selecting OMRON product. This sheet primarily describes precautions required in installing and operating the product.
Before operating the product, read the sheet thoroughly to acquire sufficient knowledge of the product. For your convenience, keep the sheet at your disposal.

TRACEABILITY INFORMATION:
Importer in EU:
Omron Europe B.V.
Wegalaan 67-69
NL-2132 JD Hoofddorp,
The Netherlands

Manufacturer:
Omron Corporation,
Shiokoji Horikawa, Shimogyo-ku,
Kyoto 600-8530 JAPAN

The following notice applies only to products that carry the CE mark.
Notice:
In a residential environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

4610279-1I

PRECAUTIONS ON SAFETY

●Meaning 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.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage.

⚠WARNING

This product is not designed or rated for ensuring safety of persons either directly or indirectly. Do not use it for such purpose.	
Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.	

⚠CAUTION

Its component may be damaged and/or degree of protection may be degraded. Please do not apply high pressure water intensively at one place during cleaning.	

To safely use laser products

⚠WARNING

Looking into the Outgoing light continuously may cause visual impairment. Do not look directly into the Outgoing light. Caution-Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure Attention-L'utilisation des commandes ou réglages ou l'exécution des procédures autres que celles spécifiées dans les présentes exigences peuvent être la cause d'une exposition à un rayonnement dangereux	
Do not disassemble this product.Doing so may cause exposure to the built-in light source which can damage eyes and skin. Never disassemble it.	

Laser safety measures for laser equipment are stipulated in Japan and other countries.
For usage in Japan and for export to other countries combined with other products, follow the instructions described below categorized in three cases respectively.
1. Usage in Japan
The JIS C6802:2014 standard stipulates the safety precautions that users must take according to the class of the laser product. This product is classified into class 1 defined by this standard.
2. Usage in U.S.
When this product is installed in a device and exported to the U.S., it is subjected to the U.S. FDA (Food and Drug Administration) laser regulations. This product is classified into Class 1 by the IEC 60825-1:2014 standard according to the provisions of Laser Notice No. 56 of the FDA standard. This product is already reported to CDRH (Center for Devices and Radiological Health).
Accession Number: 1920014
Because the product is small, we can not attach an FDA certification label on the main body, so we enclose it in the packing box. When exporting a device equipped with the product to the U.S., attach an FDA certification label near the sensor mounting of customer equipment.

This laser product complies with 21 CFR 1040. 10 and 1040. 11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
OMRON Corporation
Shiokoji Horikawa,Shimogyo-ku,
Kyoto 600-8530 JAPAN
Place of manufacture:
Shanghai Factory, OMRON Corp.
Manufactured in

FDA certification label

3. Usage in China
This product is classified into Class 1 by the GB/T 7247.1-2024(IEC60825-1:2014) standard.
4. Usage in a country other than U.S. and China.
This product is classified into Class 1 by the IEC60825-1:2014/EN60825-1:2014+A11:2021 standard.

Precautions for Safe Use

Please observe the following precautions for safe use of the products.
•Do not reverse connection of DC power supply polarity. Do not connect to AC power supply.
•Do not short-circuit the load.
•Never use this product with AC power supply. Otherwise it may explode.
•The maximum power supply voltage is 30 VDC. Before turning on the product's power, make sure that the supply voltage does not exceed the maximum power supply voltage.
•Do not use the product in environments where flammable or explosive gases are present.
•Please assess the safety beforehand when using the product in chemicals and/or oil environments.
•Do not remodel the product.

Precautions for Correct Use

•Do not hit the product using a hammer for installation.
•The product must be installed with the specified torque or less.
For M8 connector and Pre-wired M8 connector the proper tightening torque is from 0.3 to 0.4 N×m.
In case of M12 smartclick connector, manually tighten the connector.
•Do not use the product in ambient atmosphere or environment exceeding the rating.
•Output pulses may be generated when the power is turned off. It is recommended to turn off the power of the load or load line first.
•The extension of the cord under the standard I/O mode should be 100m or less.Under the IO-Link mode, the length should be 20m or less.
•Do not pull the cord too strongly.
•Please wait for at least 500 ms after turning on the product's power until it is available for use.
•The product is rated as IP67 but please avoid using the product underwater, under rain, and outdoors.
•If wiring product's cables and/or cords in the same piping or duct of high voltage cables or power lines may cause malfunction or breakdown due to induced noise. In principle the cables and cords of the product must be separately wired from the power lines, or otherwise shielded.
•Do not use the product in direct sunlight.
•Do not use the product where humidity is high and dew condensation may occur.
•Do not use the product where corrosive gases may exist.
•If high-pressure washing water and so on hits the teach button, it might lead to malfunctioning. So, consider use of the key lock function.
• Do not apply high-pressure washing water directly to the sensor's light emitting / receiving surface from a short distance. As the antifouling feature may be impaired, keep a sufficient distance from the light emitting / receiving surface.
•Do not use the product at a location subject to shock or vibration.
•To use a commercially available switching regulator, FG (frame ground) must be grounded.
•This product cannot be used as a detection device for human body protection.
•Do not use organic solvents (e.g. paint thinner and alcohol) for cleaning. Otherwise optical properties and protective structure may deteriorate.
•Be sure to check the influence caused by surrounding environments such as background objects and/or LED lighting before using the product.
•Please discard the product as industrial waste at the time of disposal.

Dispose in accordance with applicable regulations.

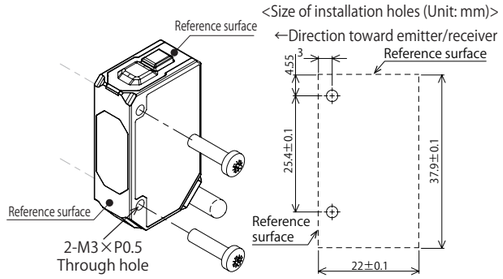
Package contents

Instruction sheet（this sheet）, compliance sheet, index list (attached for IO-Link type only), FDA certification label

1 Installation

1-1 Installation of the sensor

<Size of installation holes (Unit: mm)>



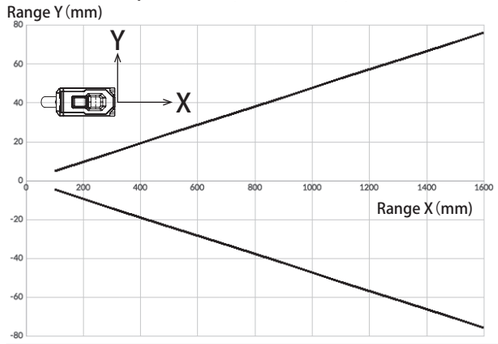
Mounting brackets are sold separately.
Tightening torque for the mounting hole is 0.5 N×m or less (M3 screw).

CHECK!
•Do not touch the emitter and/or receiver block of the sensor.Fingerprint deposits may result in improper measurement.If accidentally touched, please wipe gently with a dry cloth.Do not use organic solvent (e.g. paint thinner and alcohol).
•If the object to be detected has a mirror surface, please install the product so that specular reflection light does not directly enter the light receiving block.

1-2 Constraints on sensor installation

•This product does not have any functions to prevent mutual interference.
•If using sensors adjacent to each other, be careful so that the spot diameters of emission do not duplicate each other.
•When detecting a gloss thing, please tilt and install a sensor for stable detection.
•If the influence of distant objects is considered, it can be used stably by placing a low reflection background within the setting range.

Characteristics of spot diameter (reference value)



2 Connection

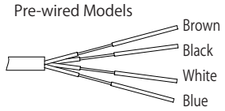
2-1 I / O stage circuit diagram

Model	Output	Output circuit
E3AS- □□N□	NPN	+V ① Brown OUT1 ④ Black — Load — 100 mA max. OUT2 ② White — Load — 100 mA max. 0V ③ Blue — 10 to 30 VDC
E3AS- □□D□ or E3AS- □□T□	PNP/COM□ Standard I/O Mode	+V ① Brown — 10 to 30 VDC OUT1 ④ Black OUT2 ② White — Load — 100 mA max. 0V ③ Blue — Load — 100 mA max.
	PNP/COM□ IO-Link Mode	+V ① Brown — ① +V C/Q ④ Black — ④ C/Q DO ② White — ② DI/DO 0V ③ Blue — ③ 0V IO-Link Master

•Standard I/O mode is used as PNP ON/OFF output.
•IO-Link mode is used for communications with the IO-Link master.
C/Q performs IO-Link communications. sensor output DO performs ON/OFF output.
•Detailed information of model and specification are described in 5.Model Standard and 6.Ratings and Specification

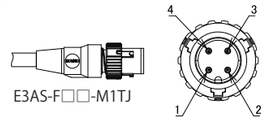
2-2 Connection method

Pre-wired Models



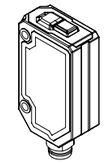
E3AS-F□□ □M

Pre-wired M12 Smartclick Connector Models



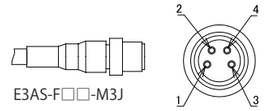
E3AS-F□□-M1TJ

M8 Connector Models



E3AS-F□□ M3

Pre-wired M8 Connector Models



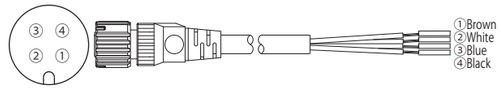
E3AS-F□□-M3J

CHECK!
•The extension of the cord under the standard I/O mode should be 100m or less. The extension of the cord under the IO-Link mode should be 20m or less.

2-3 Sensor I/O connector cord

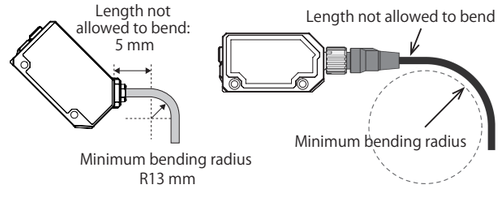
M8 socket connector cord XS3F/W-M8PVCseries(screw type)

M12 socket connector cord XS5F/W-D4□-□80-F/-X/-XR(smart click)
XS2F/W-M12PVCseries(screw type)



•The connection of the connctor type uses in combination a sensor I/O cord.
E3AS-F□□-M1TJ (smart click) can be connected with connector cord XS2F series by screwing.
•The connector cords shown here are UL certified products.Connector cords that are not UL certified are also usable.But in this case,sensor/-cord combination is not UL certified product.

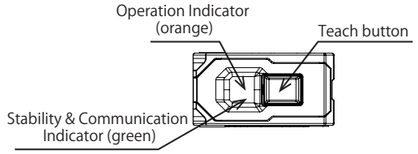
2-4 About minimum bending radius of cord



Bending for Pre-wired and Pre-wired Connector Models				
Material		External diameter	Minimum bending radius: mm	Length not allowed to bend: mm
PVC		Φ4	13	5
Bending of sensor I/O connector cord				
Model	Material	External diameter	Minimum bending radius: mm	Length not allowed to bend: mm
XS3F-M8PVC	PVC	Φ5	36	0
XS2F/W-D4-F	Incombustible robot	Φ6	40	0
XS5F/W-D4-F	Incombustible robot	Φ6	40	0
XS5F/W-D4-X	Highly oil-resistant PVC	Φ6	40	0
XS5F/W-D4-XR	Highly oil-resistant robot PVC	Φ6	40	0

3 Setting

3-1 Component Name & Function



The indicators work differently depending on sensor status.

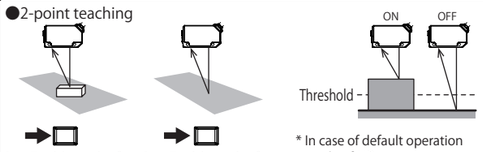
3-2 Key lock（Button lock）

It prevents accidental button operation.
[To lock] Press and hold the Teach button for over 5 seconds but less than 10 seconds.
[To unlock] Press and hold the Teach button for over 5 seconds but less than 10 seconds.
*When the Teach button is pressed under the button lock status, the orange and green indicators continue to flash quickly (0.2 second cycle) and simultaneously for 3 seconds.

3-3 About teaching function (for output 1)

①To specify a threshold value for presence and non-presence of an object

●2-point teaching

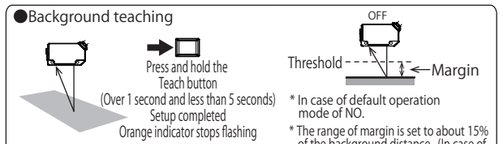


* In case of default operation mode of NO.

- Specify a threshold as a distance in the middle between the presence and non-presence of an object.
- The setting is available regardless of the order of presence and non-presence of an object.
- Make sure to press the button for less than 1 second.

②To specify a threshold value for non-presence of an object

●Background teaching



- Specify a threshold using the background as the base while there is no object to detect.

* In case of default operation mode of NO.
* The range of margin is set to about 15% of the background distance. (In case of the background distance is 250mm or less, it is set to about 30mm.)
* Depending on the background object and the ambient illumination, there might be some delay in response time.In that case, two point teaching is recommended.

Initial value of set point 1：F1000□/350, F1500□/700

Indicators' behavior when the button is operated

	State	Orange indicator	Green indicator
NPN, PNP/COM Standard I/O Mode	Teaching in progress	Flashing (1 second cycle)	ON
	Teaching succeeded	Flashing (0.6 second cycle)*1	
	Teaching error	High-speed flashing (0.2 second cycle) *2	
PNP/COM IO-Link Mode	Teaching in progress	Output 1 state continues.	Flashing
	Teaching succeeded		
	Teaching error		

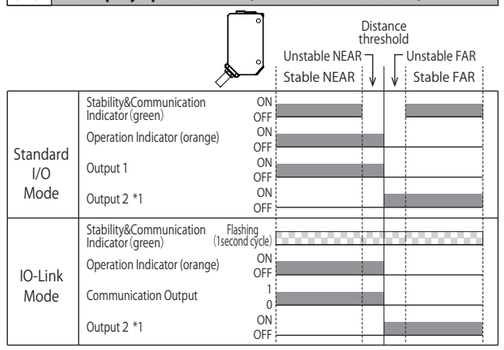
* 1 1.2seconds two times flashing
* 2 3seconds fifteen times flashing

CHECK!
- When the button is operated,the output state continues.
- It is not possible to teach OUT2,DO by button operation.By using a communication command in the IO-Link mode,The PNP/COM output Teaching can executed for OUT2,DO.
- If teaching is performed by the command, indicators do not change.
- When performing teaching, threshold values are recording in EEPROM(non-volatile memory) in the sensor. The writing life of EEPROM is 100,000 times. Be careful of writing life when performing measurement-by-measurement teaching.

3-4 If a teaching error occurred

Confirm the following two items.
1. Confirm that the object is within the measurement range.
2. Widen the distance between the first and second points of two-point teaching.

3-5 Display specification (measurement status)



Shown above are the factory settings. Refer to the index list for the default settings at time of shipment from factory.
PNP/COM output logic can be reversed by IO-Link communication.
The operation indicator (orange) lights up when output 1 is ON or communication output is 1.
*1 The initial value of output 2 is reverse of output 1.

4 Errors and Actions

Indicator		Error details	Possible causes	Action and correction
Orange	Green			
Quick flashing	OFF	Load short-circuit error	The output line is short-circuited.	Check the wiring
OFF	Quick flashing	EEPROM error	Sensor's setting memory is abnormal.	Initialize the setting values. Press and hold the Teach button for over 5 seconds.*1
Orange and green indicators alternately flash quickly		Breakdown error	The sensor itself may be out of order.	Restart the sensor (turn the power off and on again). If the error remains, replace the sensor.

Quick flashing cycle is 0.2 seconds.
*1 This operation is valid only when an EEPROM error occurs. Normally, it functions as a key lock (section 3-2).

5 Model standard

E3AS-F□□I□□□ □□
①②③④⑤⑥⑦ ⑧⑨

①Sensing method	F：Time of flight(TOF)
②Sensing distance	1000: Sensing distance of 1000 mm 1500: Sensing distance of 1500 mm
③Emission spot shape	Blank: Spot
④Light source	I: Infrared
⑤Case material	P: Plastic M: Metal
⑥Output method	N: NPN open collector D: PNP open collector/COM2 T: PNP open collector/COM3
⑦Connection method	Blank: Pre-wired -M1TJ: Pre-wired M12 Smartclick Connector -M3J: Pre-wired M8 Connector M3: M8 Conncter
⑧Optional suffix	Special specification (alphanumerical character)
⑨Code length	Blank: M8 Connector 2M、5M、0.3M（unit：m)

6 Ratings and Specifications

Sensing method		Time of flight	
Model	NPN output	E3AS-F1500I□N series	E3AS-F1000I□N series
	PNP output/COM2	E3AS-F1500I□D series	E3AS-F1000I□D series
	PNP output/COM3	E3AS-F1500I□T series	E3AS-F1000I□T series
Sensing distance		White or black paper (200 × 200mm) : 50 to set distance	White or black paper (200 × 200mm) : 50 to set distance
Setting range		White paper (200 × 200mm): 100 to 1,500mm Black paper (200 × 200mm): 100 to 1,000mm	White paper (200 × 200mm): 100 to 1,000mm Black paper (200 × 200mm): 100 to 500mm
Differential travel		15% max. of set distance (Set distance 200mm or more)	
B/W Error		10% max. of set distance (Set distance 200mm or more)	
Spot diameter (reference value)		DIA 95mm at distance of 1,000mm	
Light source		Infrared laser (940nm) Class 1（IEC60825-1:2014/EN60825-1:2014+A11:2021）	
Power supply voltage		10 to 30 VDC, (including ripple (p-p) 10%), Class2	
Current consumption		30mA max.	
Input/Output	Output	Load current: 100mA max. (Load power supply voltage: 30VDC max., Class2) Residual voltage: Load current less than 10mA: 1V max. Load current 10mA to 100mA: 2V max. Open collector output (NPN/PNP depending on model)	
	NPN	OUTPUT 1 :NO, OUTPUT 2 :NC	
	PNP/COM2 PNP/COM3	OUTPUT 1 :NO /COM□, OUTPUT 2 :NC	
Protection circuits		Reversed power supply polarity protection, Output short-circuit protection, and Reversed output polarity protection	
Response time		Operate or reset: 150ms max.	Operate or reset: 90ms max.
Distance setting		Teaching method/IO-Link communication	
Ambient illumination		Illumination on received light surface: Incandescent lamp: 3000 lx max., Sunlight: 10000 lx max.	
Ambient temperature range		Operationg: -20 to +55℃ (with no icing or condensation) Storage: -40 to +70℃ (with no icing or condensation)	
Ambient humidity range		Operating: 35 to 85%RH, Storage: 35～95%RH (with no condensation)	
Insulation resistance		20 MΩ min. at 500 VDC	
Dielectric strength		1,000 VAC at 50 / 60 Hz for 1 minute	
Vibration resistance		Destruction: 10 to 55 Hz, 1.5mm double amplitude for 2 hours each in X, Y, and Z directions	
Shock resistance		Destruction: 500 m/s2 for 3 times each in X, Y, and Z directions	
Enclosure ratings		IP67 (IEC60529), IP69K (ISO20653)	
Indicator		Stability/Communication indicator (Green*1), Operation indicator (Orange) *1：I/O-Link mode: Blinking	
Size		H39.4mm×D22mm×W11.4mm Mounting hole pitch 25.4mm	
Material	Case	Metal case type: Main unit/Mounting part/Connector part SUS316L Plastic case type: Main unit Polybutylene terephthalate (PBT) /polycarbonate (PC), Mounting part /connector part Brass Ni plating	
	Indicator	Metal case type: Polyamide 11 (PA11) Plastic case type: Polyethersulfone（PES）	
	Lens Cover	Methacrylic resin (PMMA)	
Communication specifications	IO-Link specification	Ver1.1	
	Baud rate	COM3:230.4kbps ,COM2:38.4kbps	
	Data length	PD size: 4byte, OD size: 1byte (M-sequence type: TYPE_2_V)	
	Minimum cycle time	COM3:1.2ms ,COM2:3.5ms	
Accessories		Instruction manual (this sheet), compliance sheet, index list(attached for IO-Link type only) and FDA certification label	

* Altitude: Up to 2000m, Pollution degree: 3, Enclosure type: type1.

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 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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D① Jun, 2019