

Smart Fiber Sensor E3X-HD Series

INSTRUCTION SHEET

Thank you for selecting an OMRON product. This sheet primarily describes precautions required in installing and operating the product.

- A specialist who has the knowledge of electricity must treat the product.
- Please read this manual carefully, and use it correctly after thoroughly understanding the product.
- Please keep this manual properly for future reference whenever it is necessary.



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PRECAUTIONS ON SAFETY

● Meanings of Signal Words

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

● Warning Indications

PRECAUTIONS

Do not use the product with voltage in excess of the rated voltage. Excess voltage may result in malfunction or fire.

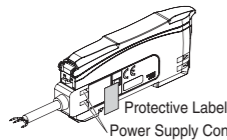
Never use the product with an AC power supply. Otherwise, explosion may result.

PRECAUTIONS FOR SAFE USE

- The following precautions must be observed to ensure safe operation of the Sensor.
- Do not use the Sensor in environments subject to flammable or explosive gases.
 - Do not use the Sensor in environments subject to exposure to water, oil, chemicals, etc.
 - Do not install the Sensor in environments subject to intense electric field or ferromagnetic field.
 - Do not attempt to disassemble, repair, or modify the Sensor Unit in any way.
 - Do not apply voltages or currents that exceed the rated ranges.
 - Do not use the Sensor in any atmosphere or environment that exceeds the ratings.
 - Do not miswire such as the polarity of the power supply.
 - Connect the load correctly.
 - Do not short both ends of the load.
 - Do not use the Sensor if the case is damaged.
 - When disposing of the Sensor, treat it as industrial waste.
 - Burn injury may occur. The Sensor surface temperature rises depending on application conditions, such as the ambient temperature and the power supply voltage. Use caution when operating or cleaning the Sensor.
 - High-Voltage lines and power lines must be wired separately from this product. Wiring them together or placing them in the same duct may cause induction, resulting in malfunction or damage.
 - When setting the Sensor, be sure to check safety such as by stopping the equipment.

PRECAUTIONS FOR CORRECT USE

- Do not install the Sensor in the following locations.
 - Locations subject to direct sunlight
 - Locations subject to condensation due to high humidity
 - Locations subject to corrosive gas
 - Locations subject to vibration or mechanical shocks exceeding the rated values
- Use an extension cable with a minimum thickness of 0.3 mm² and less than 100 m long.
- Do not apply the forces on the cord exceeding the following limits: Pull: 40N; torque: 0.1N·m; pressure: 20N; bending: 3 kg
- The Sensor is ready to operate 200 ms after the power supply is turned ON. If the Sensor and load are connected to power supplies separately, turn ON the power supply to the Sensor first.
- When using a connector type product, place a protective label (provided with the E3X-CN series connectors) on the power supply connecting terminals that are not used, to prevent electric shock or short circuit.



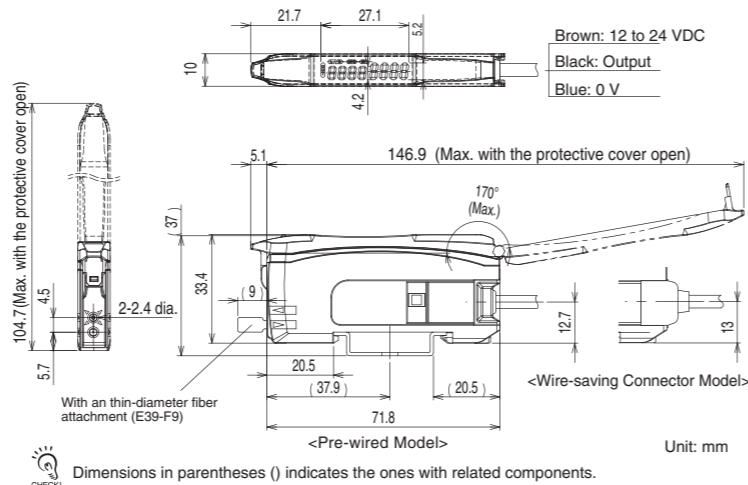
- Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.
- Excessive incident light cannot be sufficiently handled by the mutual interference prevention function and may cause malfunction. To prevent this, set a higher threshold level.
- Make sure that the power supply is turned OFF before connecting, separating or adding Amplifier Units.
- Do not pull or apply excessive pressure or force (exceeding 9.8N) on the Fiber Unit when it is mounted on the Amplifier Unit.
- The E3X-MC11-SV2 and E3X-MC11-S Mobile Consoles cannot be used.
- Mutual interference prevention does not function among the E3X-DA-N/SD/NA amplifiers. It functions among E3X-DA-S/MDA models.
- The E3X-DRT21-S, E3X-CRT and E3X-ECT Communication Units cannot be used.
- Always keep the protective cover in place when using the Amplifier Unit.
- Do not use thinner, benzene, acetone, and lamp oil for cleaning.

Checking the Package Content

- Amplifier Unit: 1
- Instruction Sheet (this sheet): 1 (Japanese, English and Chinese)

1 Installation

1-1 Dimensions



1-2 Mounting the Amplifier Unit

■ Mounting on DIN Track

- Let the hook on the Amplifier Unit's Fiber Unit connection side catch the track and push the unit until it clicks.

■ Removing from DIN Track

- Push the unit in the direction 1.
- Lift it up in the direction 2.

Refer to "1-1. Dimensions" or check the side of the unit for wire color and role indications.

■ Mounting Amplifier Units in Group (Connector Type Models)

- Mount the Amplifier Units one at a time onto the DIN track and push them until they click. Use E3X-CN11 (Master connector) for the master Amplifier Unit and E3X-CN12 (Slave connector) for the slave Amplifier Units.
- Slide the Amplifier Units in the direction 2.
- Use End Plates (PFP-M: separately sold) at the both ends of the grouped Amplifier Units to prevent them from separating due to vibration or other cause.
- Tighten the screw on the End Plates using a driver.

Up to 16 Amplifier Units can be mounted in a group. Under environments such as vibration, use an end plate even with a single amplifier unit.

1-3 Mounting Fiber Unit

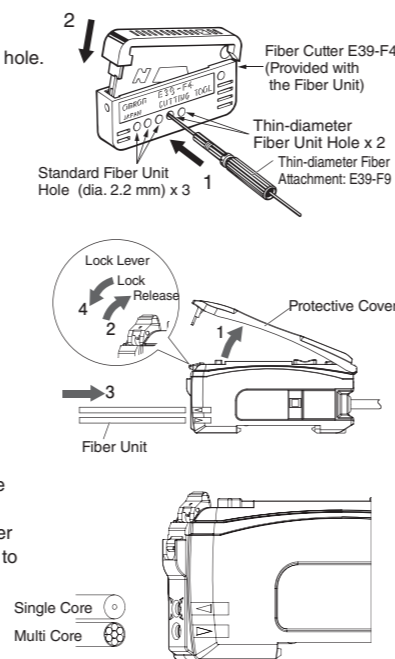
■ Use Fiber Cutter

- Insert a Fiber Unit into a fiber cutter hole. Insert a standard Fiber Unit up to the position in which it is cut; and a thin-diameter Fiber Unit to the bottom of the hole.
- Press down the blade at a single stroke to cut the Fiber Unit.

■ Mount Fiber Unit

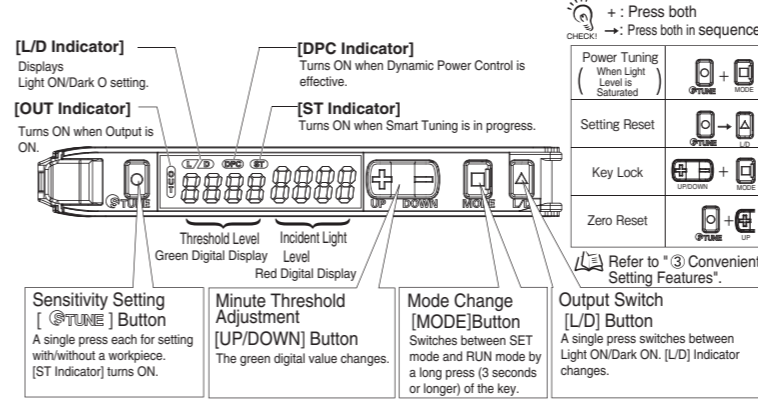
- Open the protective cover.
- Raise the lock lever.
- Insert the Fiber Unit in the fiber unit hole to the bottom.
- Return the lock lever to the original position and fix the Fiber Unit.

When mounting a coaxial reflective Fiber Unit, insert the single-core Fiber Unit to the upper hole (Emitter side) and the multi-core Fiber Unit to the lower hole (Receiver side).



2 Settings

2-1 Setting and Display Overview



2-2 Switching Control Output

- Press [L/D] button.

Through-beam: Set to "Dark ON" to turn the output ON with a workpiece in the detection area. [L/D Indicator] turns \overline{D} /ON.

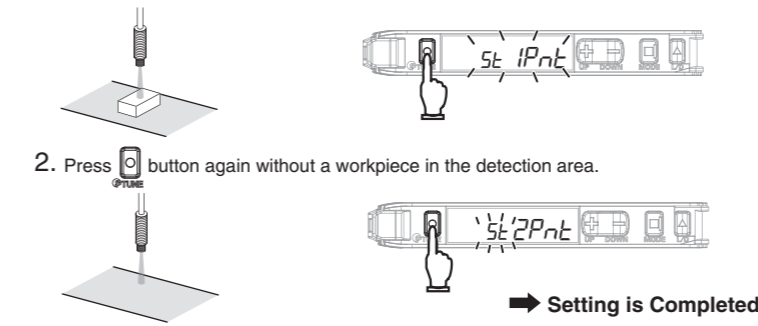
Reflective: Set to "Light ON" to turn the output ON with a workpiece in the detection area. [L/D Indicator] turns \overline{L} /ON.

2-3 Smart Tuning [Easy Sensitivity Setting]

① Detect for Workpiece Presence/Absence

● 2-point Tuning

- Press [TUNE] button with a workpiece in the detection area.



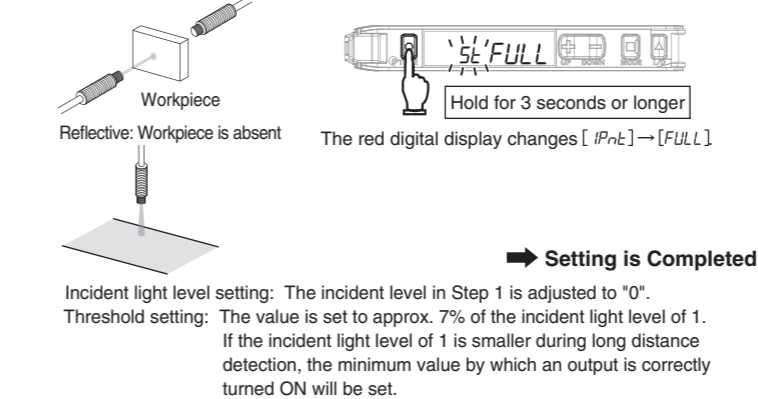
Incident light level setting: The larger incident level of the Step 1 and 2 values is adjusted to the power tuning level. Threshold setting: Set to the middle between the Step 1 and 2 incident light levels.

Step 1 and Step 2 can be reversed.

② Detect for Workpiece Presence/Absence

● Maximum Sensitivity Tuning

- Hold [TUNE] button for 3 seconds or longer with/without workpiece as shown below. Release the button when [St FULL] is displayed. Through-beam: Workpiece is present

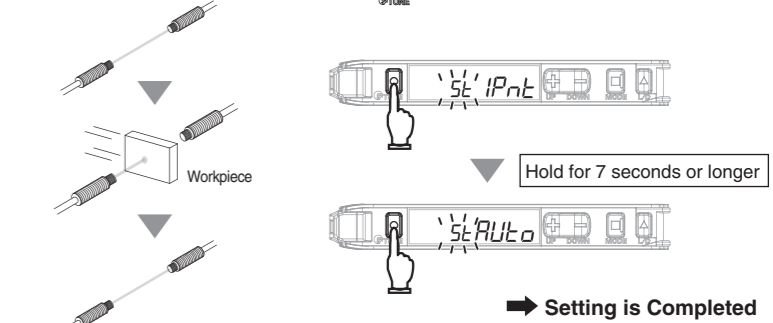


Incident light level setting: The incident level in Step 1 is adjusted to "0". Threshold setting: The value is set to approx. 7% of the incident light level of 1. If the incident light level of 1 is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

③ Adjust for Moving Workpiece without Stopping Line

● Full Auto Tuning

- Hold the [TUNE] button without the presence of a workpiece, and pass the workpiece through while [IPnt] -> [FULL] -> [Auto] is displayed in red digital. (Keep holding the [TUNE] button while the workpiece passes through, and hold 7 seconds or longer until [Auto] is displayed in red digital. After the workpiece passes through, release your finger from the [TUNE] button.)

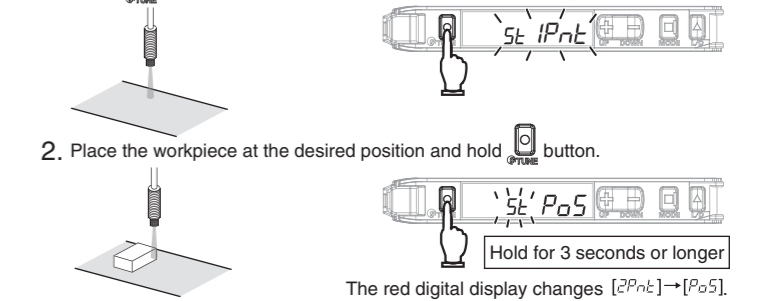


Incident light level setting: Adjust the max. incident light level on Step 1 as the power tuning level. Threshold setting: Set to the middle between max. and min. incident light levels on Step 1.

④ Determine Workpiece Position

● Position Tuning

- Press [TUNE] button without a workpiece in the area.

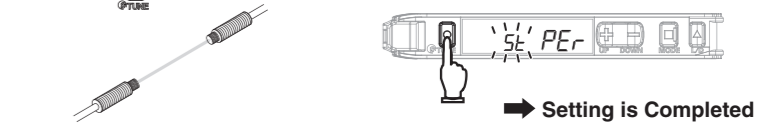


Incident light level setting: The Step 2 incident level is adjusted to half the power tuning level. Threshold setting: Set to the same value as the Step 2 incident level.

⑤ Detect Transparent or Small Workpiece (Set Threshold by incident light level percentage)

● Percentage Tuning

- Turn ON Percentage Tuning in SET mode. Refer to "5 Detailed Settings".
- Press [TUNE] button without a workpiece in the area.



Incident light level setting: The Step 2 incident light level is adjusted to the power tuning level. Threshold setting: Set to the value obtained by [Incident Level at Step 2 x Percentage Tuning Level + Incident Level at Step 2].

No Smart Tuning other than Power Tuning can be used if Percentage Tuning is set.

● Smart Tuning Error

Error / Display / Cause	Error Origin Tuning Type	Remedy
Near Error nEr Err The light level difference between Points 1 and 2 are extremely small.	2-point Tuning Full Auto Tuning Positioning Tuning	<ul style="list-style-type: none"> Change the detection function mode to a slower response time mode. Narrow the emitter and receiver distance (Through-beam) Mount the sensor closer to the workpiece (Reflective)
Over Error ouEr Err Incident light level is too high.	All	<ul style="list-style-type: none"> Enhance the power tuning level. Use a thin-diameter fiber. Widen the emitter and receiver distance (Through-beam) Distance the sensor from the workpiece (Reflective)
Low Error Lo Err Incident light level is too low.	Tuning other than Maximum Sensitivity Tuning	<ul style="list-style-type: none"> Decrease the power tuning level. Narrow the emitter and receiver distance (Through-beam) Locate the sensor closer to the workpiece (Reflective)

The adjustment range of smart tuning is approx. 20 to 1/100 times. When selecting giga mode as detection function, the range will be approx. 2 to 1/100 times due to the large initial value. Refer to "5 Detailed Settings" to change the power tuning level.

2-4 Minute Adjustment of Threshold Level

- Press [UP/DOWN] button to adjust the threshold level.

