

## 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.



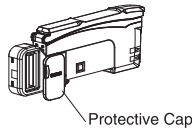
### PRECAUTIONS FOR SAFE USE

- 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 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.
  - When setting the Sensor, be sure to check safety such as by stopping the equipment.
  - To secure the safety of operation and maintenance, do not install the product close to high-voltage devices and power devices.
  - 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.
  - Do not install the product in locations subjected to strong magnetic field or electric field.

### 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

- 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.
- The sensor may require some time after it is turned ON to ensure a stable light reception intensity, depending on the operational environment.
- Output pulses may occur when the power supply is turned OFF. Turn OFF the power supply to the load or load line first.
- To prevent electric shock or short circuit, put a protection cap on unused connection power supply terminals.



- 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 Mobile Console E3X-MC11, E3X-MC11-SV2 and E3X-MC11-S cannot be connected.
- The Mobile Console E3C, E2C and E3X-SD cannot be connected.
- The E3X-DA-N, E3X-HD and E3X-DA-S/MDA cannot be connected.
- The Communication Unit E3X-DRT21-S, E3X-CRT, E3X-ECT and E3NW cannot be connected.
- Dor not use thinner, benzine, acetone, and lamp oil for cleaning.

### Checking the Package Content

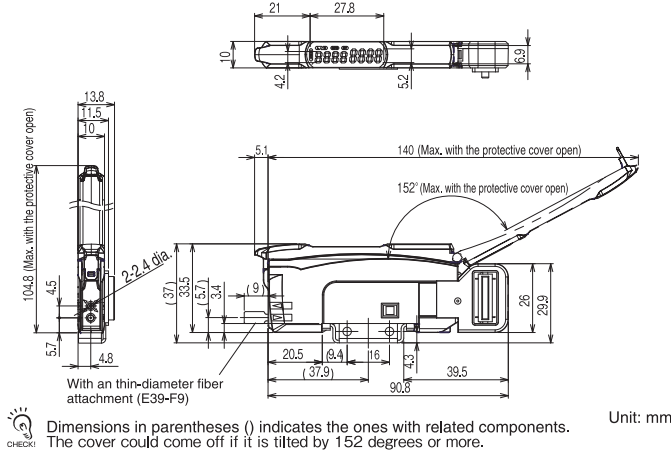
- Amplifier Unit: 1
- Instruction Sheet (this sheet): 1 (Japanese, English and Chinese)

### Compatible Communication Unit (Sold Separately)

EtherCAT compatible E3NW-ECT, Distribution unit E3NW-DS

## 1 Installation

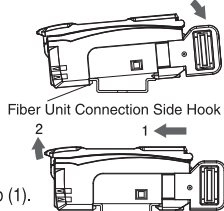
### 1-1 Dimensions



### 1-2 Mounting the Amplifier Unit

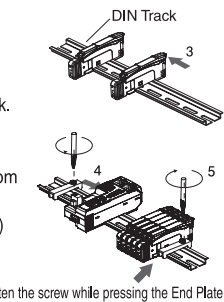
#### ■ Mounting on DIN Track

- Let the hook on the Amplifier Unit's Fiber Unit connection side catch the track.
- Push the unit until the hook clicks into place.



#### ■ Removing from DIN Track

- Push the unit in the direction 1.
- Lift the unit in the direction of arrow 2 while performing step (1).



#### ■ Connectng Amplifier Units with Communication Units

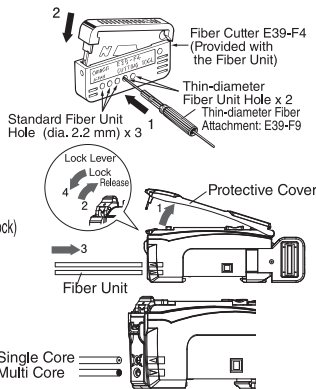
- Mount the Amplifier Units one at a time onto the DIN track. Insert the connector until it clicks.(Arrow 3)
- Use End Plates (PFP-M: separately sold) at the both ends of the grouped Amplifier Units to prevent them from separating due to vibration or other cause.(Arrow 4)
- Tighten the screw on the End Plates using a driver.(Arrow 5)

Up to 30 Amplifier Units can be connected to E3NW-ECT Communication Unit . Under environments such as vibration, use an End Plate even with a single amplifier unit.

### 1-3 Mounting Fiber Unit

#### ■ Use Fiber Cutter

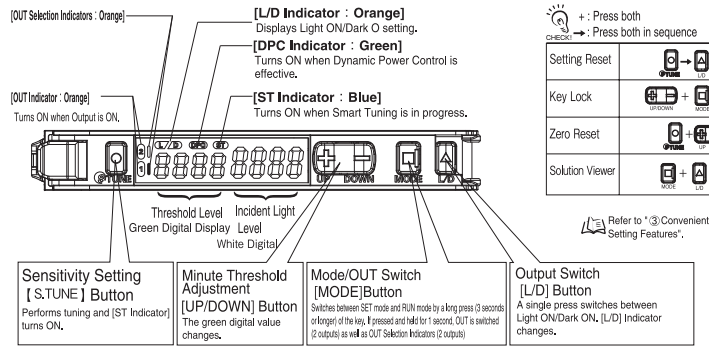
- Insert a Fiber Unit into a fiber cutter hole.
- Press down the blade at a single stroke to cut the Fiber Unit.



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



### 2-3 Smart Tuning [Easy Sensitivity Setting]

#### Basic Setting

##### ● 2-point Tuning



#### Enhancing Durability of the Fiber Head against Dust and Stain

##### ● Maximum Sensitivity Tuning



#### Setting for a Moving Workpiece

##### ● Full Auto Tuning



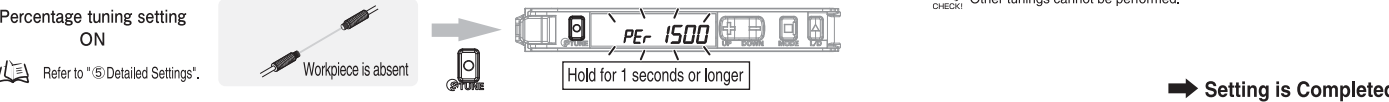
#### Setting to Detect by Workpiece Position

##### ● Position Tuning



#### Detecting a Transparent or Microscopic Object

##### ● Percentage Tuning



#### Initializing Light Intensity Changed Due to Dust or Dirt

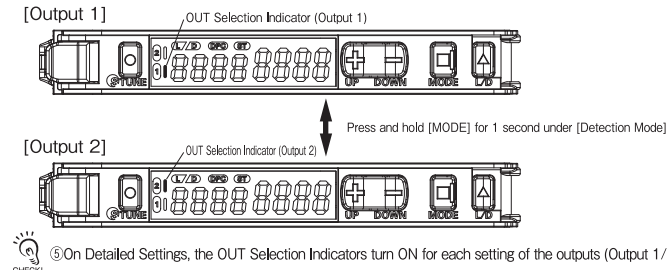
##### ● Power Tuning



### 2-4 Output switching

#### ■ OUT Selection Indicator switches to switch the settings.

- Hold the [MODE] button for 1 second in [Measurement Mode].
- OUT Selection Indicators (Output 1/Output 2) switch.



On Detailed Settings, the OUT Selection Indicators turn ON for each setting of the outputs (Output 1/Output 2).

### 2-2 Switching Control Output

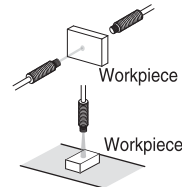
Press button.

Through-beam: Set to "Dark ON" to turn the output ON with a workpiece in the detection area.

[L/D Indicator] turns ON.

Reflective: Set to "Light ON" to turn the output ON with a workpiece in the detection area.

[L/D Indicator] turns ON.



##### ● Smart Tuning Error

Error / Display / Cause	Error Origin Tuning Type	Remedy
Near Error nEr Err	2-point Tuning Full Auto Tuning	•Change the detection function to the mode of slower response time. •Narrow the distance between emitter and receiver. (Through-beam model) •Move the Fiber Head closer to the sensing object. (Reflection model)
Over Error ouEr Err	All	•Widen the distance between emitter and receiver. (Through-beam model) •Move the Fiber Head away from the sensing object. (Reflection model) •Use a thin-diameter Fiber.
Low Error Lo Err	Other than maximum sensitivity tuning	•Make the distance between emitter and receiver closer. (Through-beam model) •Move the Fiber Head closer to the sensing object. (Reflection model)

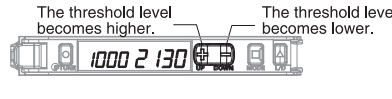
### 2-5 Minute Adjustment of Threshold Level

Press button to adjust the threshold level.

Hold the key for high-speed level adjustment.

The threshold level becomes higher.

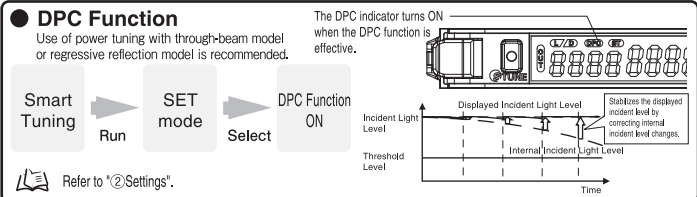
The threshold level becomes lower.



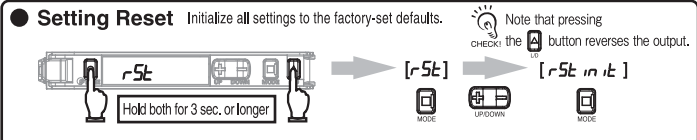


## 3 Convenient Setting Features

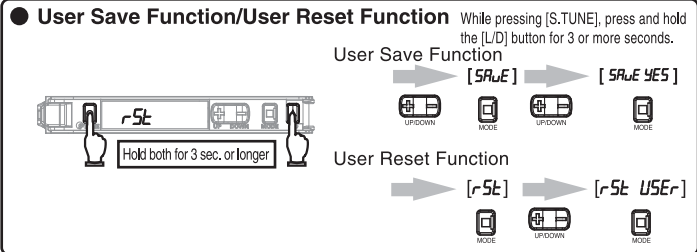
For Stable Detection Regardless of Received Light Intensity Changed due to Dust or Dirt



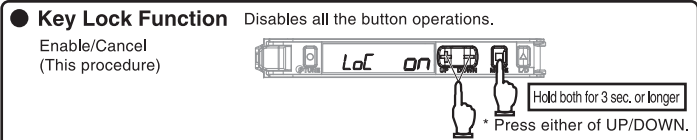
### Initializing Settings



### Saving/Reading Settings



### Preventing Malfunction



## 4 Maintenance

### 4-1 Troubleshooting

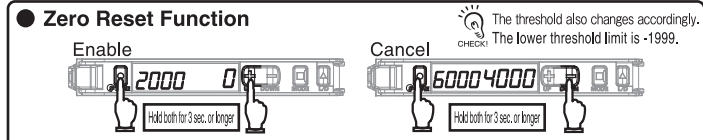
Problem	Cause	Remedy
Nothing is shown on the indication.	No power supplied or the cable broken	Check the wiring, connector connection, power supply voltage and power supply capacity again. Refer to "1-2 Input/Output Circuit Diagram"
Nothing is shown on the digital indication.	Eco mode is ON.	Turn OFF Eco mode. Refer to "5. Detailed Settings". Refer to "⑤ Detailed Settings".
Sensing/Detection not possible despite the minimum threshold level	Detection set to a small light level mode Dust or dirt influences	Setting GIGA Mode increases emission power and light intensity. Refer to "⑤ Detailed Settings".
The operation indicator blinking	Mutual interference or other reason	Check the Amplifier Units mounted in a group and turn ON the power again. Refer to "1-3 Mounting Amplifier Unit"
Incident light level displayed in a negative value	The zero reset function is enabled.	Cancel the zero reset function. Refer to "③ Convenient Setting Features"
Lost tracking of the settings made	-	Reset the settings. Refer to "③ Convenient Setting Features"

### ● Error Display

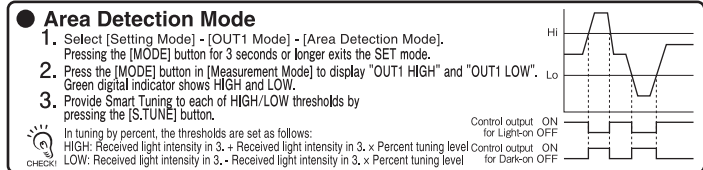
Error Name / Display	Cause	Remedy
DPC Error <sup>*)</sup> 2000 4000	The incident light level has deteriorated due to dust or dirt.	Wipe the dust off the Fiber Unit detection surface or other relevant areas and recover the original incident light level. Then, perform Smart Tuning. Refer to "2-3 Smart Tuning"
EEPROM time-out error E-rE 01	Failed internal data read/out	Turn ON the power again. Reset the settings if the error is not corrected. Refer to "③ Convenient Setting Features"
EEPROM checksum error E-rE 02	Failed internal data read/out	Turn ON the power again. Reset the settings if the error is not corrected. Refer to "③ Convenient Setting Features"
Lock ON LoC on	The key lock function enabled	Cancel the key lock function. Refer to "③ Convenient Setting Features"
Load short circuit detection error E-St 4000	Over current flowing to the control output	Check wiring and connector connection again. Refer to "1-2 Input/Output Circuit Diagram" and "4-2 Ratings and Specifications"

\* The DPC indicator blinks.

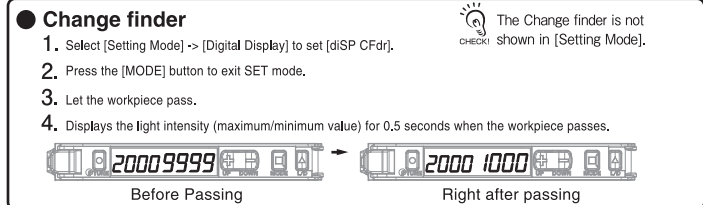
### Returning Received Light Intensity Display to "0"



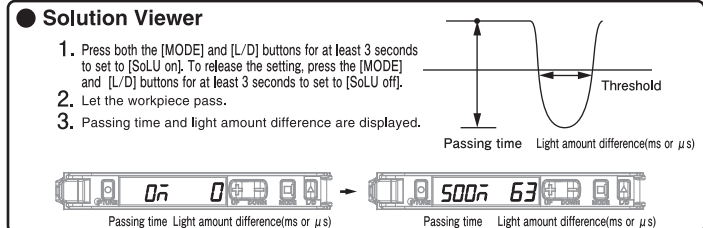
### For Output When Received Light Intensity is Within the Area



### Checking Received Light Intensity When Workpiece Passes at High Speed



### Determining If Workpiece is Detectable



### 4-2 Ratings and Specifications

Model	E3NX-FA0
Control output	2
Connection method	Communication Unit compatible wire-saving connector
Supported communications unit	EtherCAT supporting E3NX-ECT
Light source (Wavelength)	Red 4-element LED (625nm)
Power supply voltage	Supplied from the connector through the communications units.
Power consumption*1	Power supply voltage 24V: Normal mode: 960mW max.(Power consumption 40mA max.) Power saving ECO: 840mW max.(Power consumption 35mA max.)
Control output	Please refer to the specification of a communication unit.
Protection circuit	Power supply reverse polarity protection, output short-circuit protection and output incorrect connection protection
Maximum connectable Units	30 units
Number of units for mutual interference <sup>*)</sup>	0 Note: The communication and mutual interference prevention functions are disabled if the SHS mode is selected for detection function.
Standard mode (Std)	10
High-speed mode (HS)	10
Super-high-speed mode (SHS)	10
Prevention*2	10
Number of banks	4
Auto Power Control (APC)	Provided (Always effective)
Ambient illumination	Incandescent lamp: 20,000 lux max. / Sunlight: 30,000 lux max.
Ambient temperature range	Operating: 1 to 2 amplifiers connected: 0° C to 55° C, 3 to 10 amplifiers connected: 0° C to 50° C, 11 to 16 amplifiers connected: 0° C to 45° C, 17 to 30 amplifiers connected: 0° C to 40° C Storage: -30° C to 70° C (with no icing or condensation)
Ambient humidity range	Operating and storage: 35% to 85% RH (with no condensation)
Insulation resistance	20 MΩ min. (at 500 VDC)
Dielectric strength	1,000 VAC, 50/60 Hz, 1 minute
Vibration resistance	10 to 55 Hz with a 1.5-mm double amplitude for 2 hrs each in X and Y directions
Shock resistance	150 m/s <sup>2</sup> , for 3 times each in X, Y and Z directions
Weight (packed state/sensor)	Approx. 65 g/Approx. 25 g
Materials	Case and cover: Polycarbonate (PC), Cable: PVC

\*1. Power consumption

Power supply voltage 10V to 30V:  
Normal mode: 1080mW max./Power supply voltage 30V: Power consumption 36mA max./Power supply voltage 10V: Power consumption 108mA max.)  
Power saving ECO: 930mW max./Power supply voltage 30V: Power consumption 31mA max./Power supply voltage 10V: Power consumption 93mA max.)

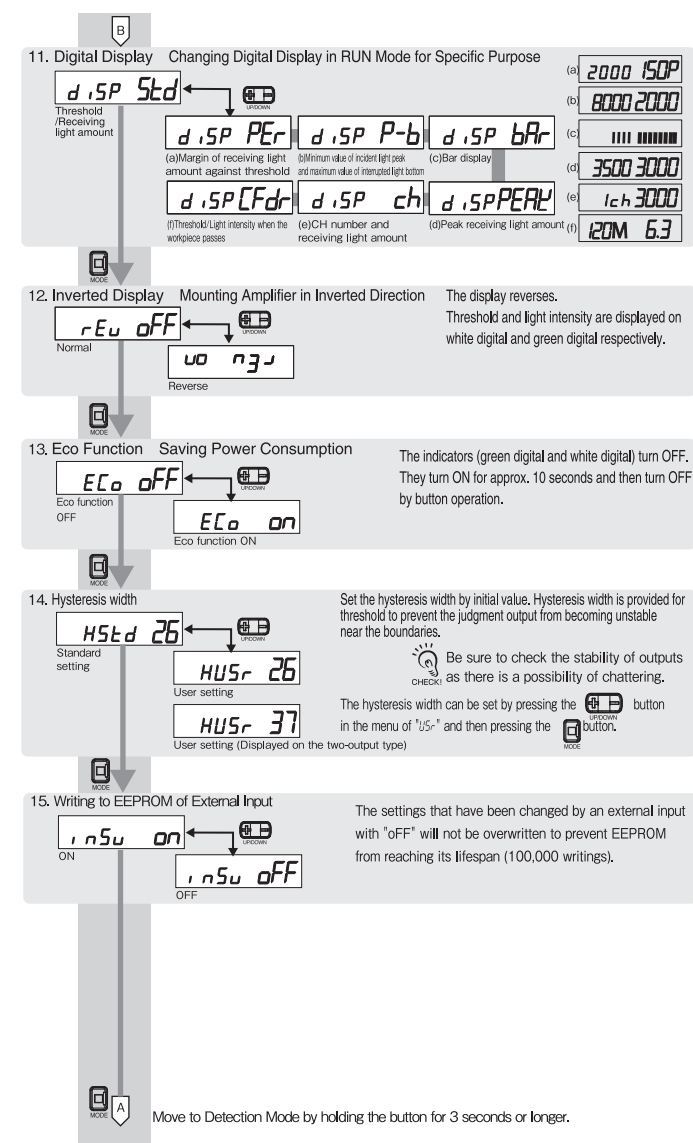
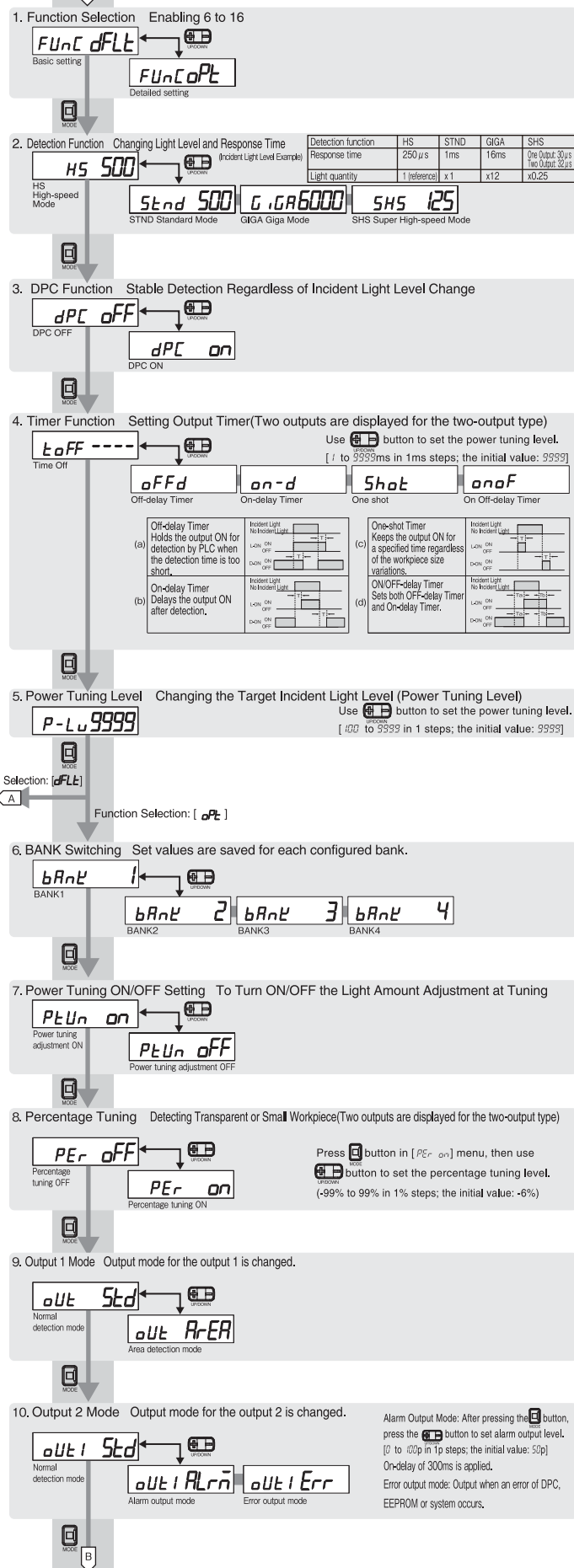
\*2. The tuning will not change the number of units.

The minimum number of units in the specifications is applied to the mutual interference between different amplifiers such as between fiber and laser.

## 5 Detailed Settings

Hold button for 3 seconds or longer to enter SET mode. The OUT Selection Indicators show items for Output1/Output 2 individually for each output.

SET mode provides the function settings described hereafter. The initial display shown after transition from one function to another represents the factory default.



### Suitability for Use

THE PRODUCTS CONTAINED IN THIS SHEET ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used. Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS 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 IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. See also Product catalog for Warranty and Limitation of Liability.

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