

Digital Fiber Sensor (Color Sensing) E3X-DAC□□-S

OMRON

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:

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Manufacturer
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Industrial Sensors Division
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NOTICE:

This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to adequate measures.



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Precaution 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.

● Alert statements in this Manual

CAUTION

Do not use it exceeding the rated voltage. There is a possibility of failure and fire.



Do not connect sensor to AC power supply. Risk of explosion.



Hot surface may cause heat injury.



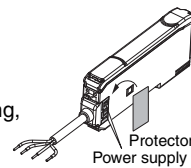
Precautions for Safe Use

- Do not use the Amplifier Unit in environments subject to flammable or explosive gases.
- Do not use the Amplifier Unit in environments subject to exposure to water, oil, chemicals, etc.
- Do not attempt to disassemble, repair, or modify the Amplifier Unit in any way.
- Do not apply voltages or currents that exceed the rated ranges.
- Do not use the Amplifier Unit in atmospheres or environments that exceed product ratings.
- Wire the Amplifier Unit correctly, e.g., do not reverse the polarity of the power supply.
- Connect the load correctly.
- Do not short both ends of the load.
- Do not use the Amplifier Unit if the case is damaged.
- When disposing of the Amplifier Unit, treat it as industrial waste.
- Do not use the sensor in the place exposed to the direct sunlight.
- The surface temperature of sensor rises depending on the use conditions such as ambient temperature and power supply voltage. Be careful when you operate or clean it. Hot surface may cause heat injury.

Precautions for Correct Use

- Do not use the Amplifier Unit under the following conditions.
 - In the place exposed to the direct sunlight.
 - In the place where humidity is high and condensation may occur.
 - In the place where corrosive gas exists.
 - In the place where vibration or shock is directly transmitted to the product.
- Wire the Amplifier Unit separately from power supply or high-voltage lines. If the Amplifier Unit wiring is wired together with or placed in the same duct as high-power lines, inductive noise may cause operating errors or damage the Amplifier Unit.
- Do not extend the cable to more than 100 m, and use a wire size of 0.3 mm² or larger for the extension cable.
- The Amplifier Unit is ready to operate 200 ms after the power supply is turned ON. If the Amplifier Unit and load are connected to power supplies separately, turn ON the power supply to the Amplifier Unit first.
- Depending on the application environment, time may be required for the conformity to stabilize after the power supply is turned ON.
- Output pulses may occur when the power is interrupted, so turn OFF the power to the load or load line before turning OFF the power to the Sensor.

- When you use the Amplifier Units with Connectors, to prevent electric shock or short-circuits, attach the protector seals provided with E3X-CN-series Connectors to the sides of power supply connectors that are not being used.
- Always turn OFF the power supply before connecting, separating, or adding Amplifier Units.
- Do not pull or apply excessive pressure or force (exceeding 9.8 N·m) on the Fiber Unit when it is mounted to the Amplifier Unit.
- Fiber amplifier sensor communication unit E3X-DRT21-S and mobile console E3X-MC11-SV2 cannot be used.
- Always keep the protective cover in place when using the Amplifier Unit.
- Do not use thinners, benzene, acetone, or kerosene for cleaning the Amplifier Unit.



Confirming the Package Contents

- Amplifier Unit: 1
- Instruction Sheet (this sheet): 1

1. Ratings and Specifications

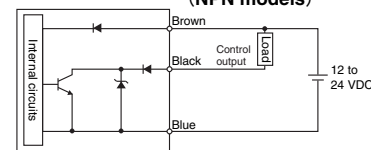
This amplifier unit is digital fiber sensor to be used in combination with fiber unit E32-□□, and detects white LED emission in RGB ratio.

Type	Standard models		Advanced models
Model	NPN E3X-DAC11-S	E3X-DAC6-S	E3X-DAC21-S
	PNP E3X-DAC41-S	E3X-DAC8-S	E3X-DAC51-S
Control output quantity	1		2
External input quantity	-		1
Connection method	Pre-wired	Separate connector	Pre-wired
Light source	White LED		
Power supply voltage	12 to 24 VDC ±10%, ripple (p-p) 10% max.		
Power consumption	960 mW max. (current consumption: 40 mA max. at power supply voltage of 24 VDC)		
Control output	Load power supply voltage: 26.4 VDC max.; NPN/PNP open collector; load current: 50 mA max.; residual voltage: 2 V max.		
External input *1	No-voltage input		
Protection circuits	Reverse power supply polarity protection, Output short-circuit protection and Reversed output polarity protection		
Response time *2	Super-high-speed mode *3	Operate or reset: 60 μs	Operate or reset: 120 μs *4
	High-speed mode	Operate or reset: 300 μs	Operate or reset: 600 μs
	Standard mode	Operate or reset: 1 ms	Operate or reset: 2 ms
	High-resolution mode	Operate or reset: 4 ms	Operate or reset: 8 ms
Sensitivity setting	Teaching (one point teaching or with and without a workpiece *5) or manual adjustment		
Functions	Timer	Selectable from OFF-delay, ON-delay, or one-shot timer, 1 ms to 5 s	
	Setting reset	Selectable from initial reset or user reset	
	Mutual interference prevention *6	Possible for up to 10 Units	
	External input settings	-	Selectable from one point teaching, with and without a workpiece, zero shift reset or light OFF
	Output setting	-	Selectable from output for each channel, AND or OR
Indicator	Operation indicator (orange), I mode indicator (orange)		
Digital display *7	Selectable from the following: conformity *8 + threshold, leeway + threshold, peak conformity + bottom conformity, conformity peak level + nonconformity bottom level, long bar display, conformity + peak incident light level, conformity + channel No.		
Display orientation	Switchable normal or reversed display		
Ambient illumination (Receiver side)	Incandescent lamp: 3,000 lux max., Sunlight: 10,000 lux max.		
Ambient temperature	Operating: Groups of 1 to 2 Amplifiers: -25°C to 55°C Groups of 3 to 10 Amplifiers: -25°C to 50°C Groups of 11 to 16 Amplifiers: -25°C to 45°C Storage: -30°C to 70°C (with no icing or condensation)		
Ambient humidity	Operating and storage: 35% to 85% (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 with a 1.5-mm double amplitude for 2 hours each in X, Y and Z directions		
Shock resistance	Destruction: 500 m/s ² for 3 times each in X, Y and Z directions		
Degree of protection	IEC 60529 IP50 (with Protective Cover attached)		
Weight (packed state)	Approx. 100 g	Approx. 55 g	Approx. 100 g
Materials	Case	Polybutylene terephthalate (PBT)	
	Cover	Polycarbonate (PC)	

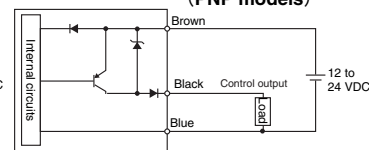
- *1: ON: NPN type: Short-circuited to 0V or 1.5V max.. PNP type: Short-circuited to Vcc or Vcc-1.5V to Vcc.
*2: It is the necessary time to detect a workpiece.
*3: Mutual interference prevention does not function in super-high-speed mode. And, the discrimination mode is only I mode.
*4: When AND or OR output is selected response time is 150 μs.
*5: C mode (detect in RGB ratio) or I mode (detect in any incident light level of RGB) is set automatically. However, I mode is set when difference of the conformity is small or in super-high-speed mode. The discrimination mode can be selected I mode and Black mode (detect in total incident light level of RGB).
*6: If the display value changes by light from other sensors, lower the threshold. Stabler detection can be done.
*7: When I mode and Black mode is set, the incident light level is displayed instead of the conformity.

2. I/O Circuits

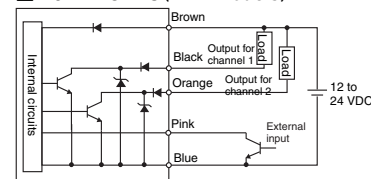
■ E3X-DAC11-S and E3X-DAC6-S (NPN models)



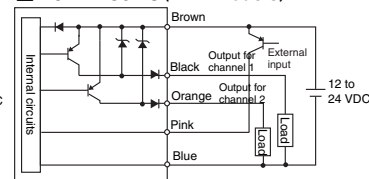
■ E3X-DAC41-S and E3X-DAC8-S (PNP models)



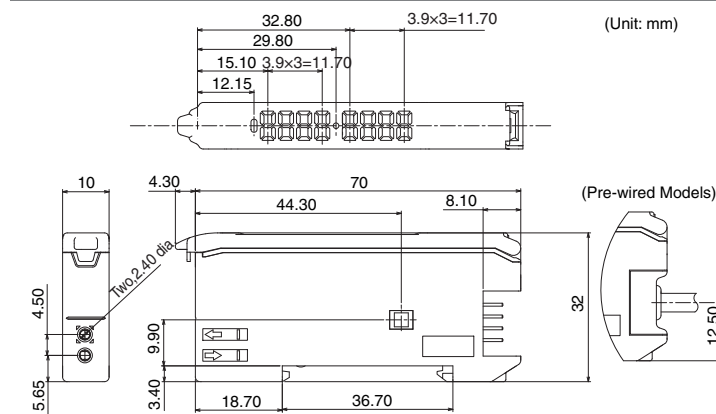
■ E3X-DAC21-S (NPN models)



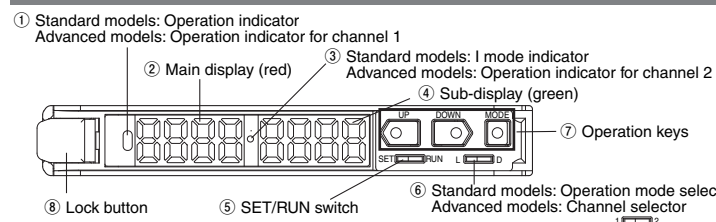
■ E3X-DAC51-S (PNP models)



3. Dimensions



4. Nomenclature



- Standard models: Operation indicator
Advanced models: Operation indicator for channel 1
- Main display (red)
- Standard models: I mode indicator
Advanced models: Operation indicator for channel 2
- Sub-display (green)
- Operation keys
- Lock button
- SET/RUN switch
- Standard models: Operation mode selector
Advanced models: Channel selector

- Standard models: Lit when the output is ON.
Advanced models: Lit when the output for channel 1 is ON.
- Display the conformity or the function name.
- Standard models: Lit when I mode is set.
Advanced models: Lit when the output for channel 2 is ON.
- Display the conformity or the setting of the function displayed on the main display.
- Used to switch the mode.

Mode	Description
SET	Select to set detection conditions or the threshold by teaching.
RUN	Select to detect actually or to set the following: Manual adjustment of threshold, teaching, zero shift reset, or key lock.

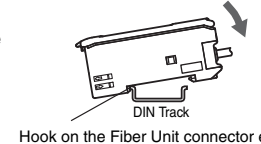
Key	Function	
	RUN mode	SET mode
UP key	Increase the threshold.	Depend on the setting. • Execute teaching. • Change the setting forward.
DOWN key	Decrease the threshold.	Depend on the setting. • Execute teaching. • Change the setting backward.
MODE key	Depend on the MODE key setting. • Execute teaching • Execute the zero shift reset.	Switch the function to be set on the display.

- Used to connect and disconnect the fiber unit.

5. Installing the Amplifier Unit

■ Mounting Units

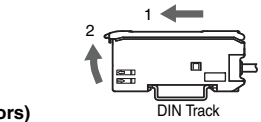
Catch the hook on the Fiber Unit connector end of the Unit on the DIN Track and then press down on the other end of the Unit until it locks into place.



Always attach the Fiber Unit connector end first. If the incorrect end is attached first, the mounting strength will be reduced.

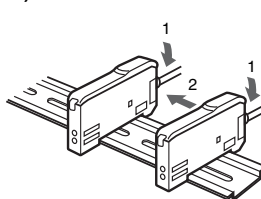
■ Removing Units

Press the Unit in the direction indicated by "1" and then lift up on the Fiber Unit connector end of the Unit in the direction indicated by "2."



■ Joining Amplifier Units (for Units with Connectors)

- Up to 16 Units can be joined.
- Mount the Amplifier Units one at a time onto the DIN Track.
 - Slide the Amplifier Units together and press the Amplifier Units together until they click into place.

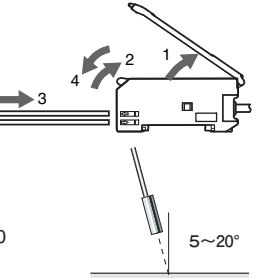


Secure the Units with an End Plate (PEP-M) if there is a possibility of the Amplifier Units moving, e.g., due to vibration.

Remove the Units in the reverse order.

6. Connecting the Fiber Unit

- Open the protective cover
- Press up the lock button.
- Insert the fibers all the way to the back of the connector insertion opening.
- Return the lock button to its original position to secure the fibers.



CHECK! If teaching or sensing is not well done because of shiny of workpieces, tilt the fiber unit by approximately 5 to 20 degrees.

7. Basic Settings

1. Setting the Operation Mode

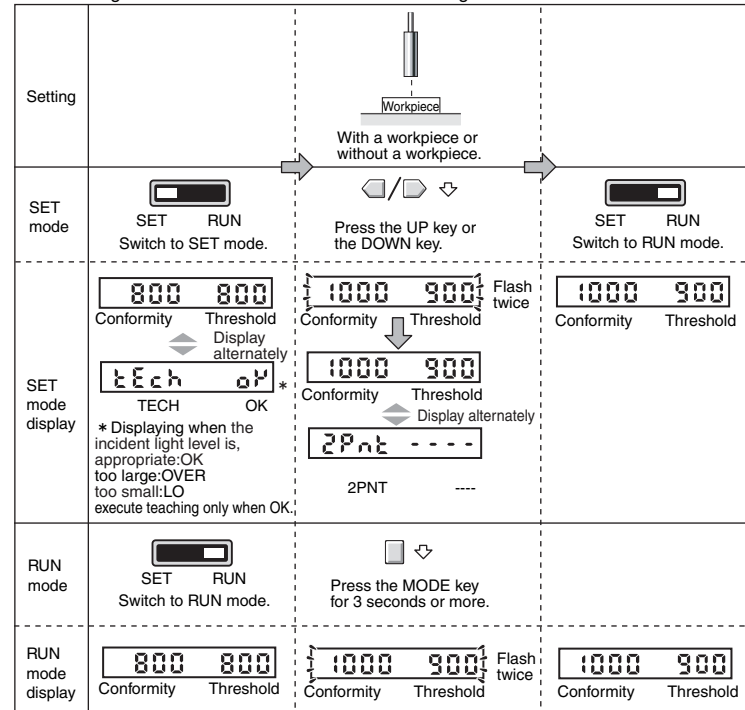
Select either conformity output or nonconformity output operation. Set as the operation mode in SET mode for advanced models. Refer to 8. Detailed Settings.

Selection	Description
LON (conformity output)	The output turns ON when the detected color coincides with the registered color or the incident light level is above the threshold.
DON (nonconformity output)	The output turns ON when the detected color does not coincide with the registered color or the incident light level is below the threshold.

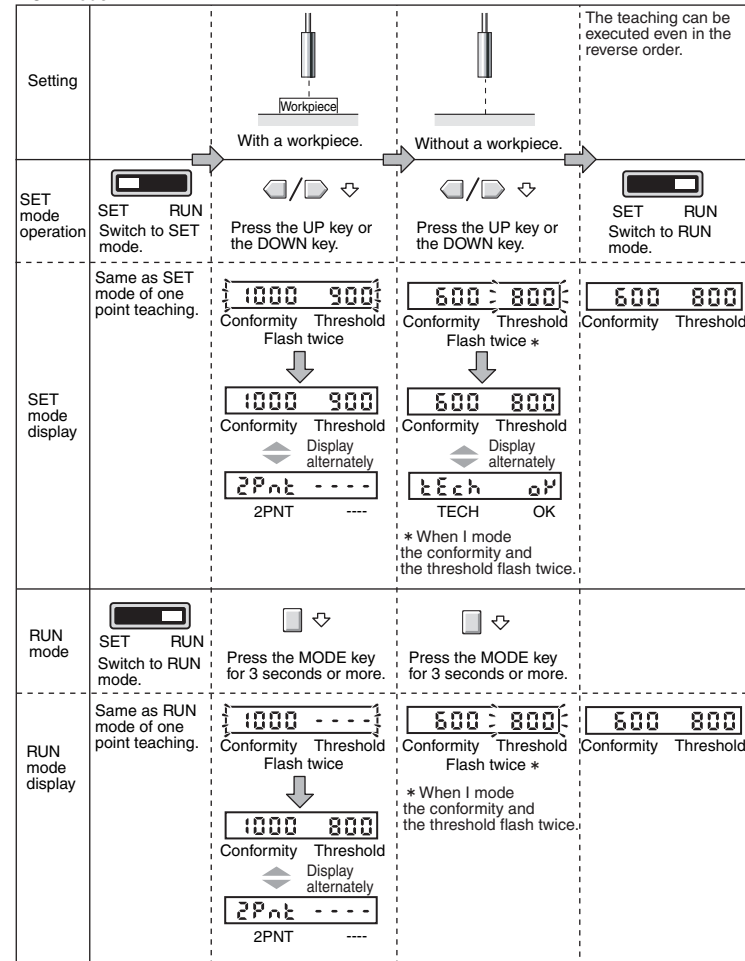
2. Setting Threshold

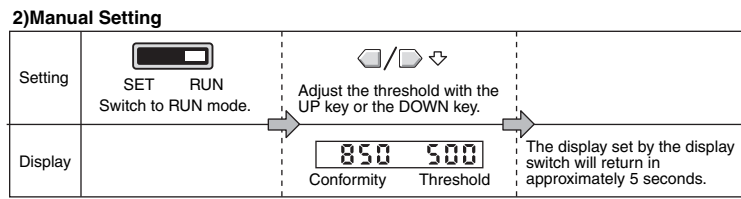
1) Teaching setting

① One Point Teaching (When setting easy)
Teaching can be performed with a workpiece or without a workpiece. RUN mode and SET mode – each mode can be set up. Confirm that the MODE key setting is 1PNT when setting in RUN mode. Refer to 8. Detailed Settings.



② Teaching With and Without a Workpiece (When detecting subtle color difference)
Teaching can be performed twice, once with and once without a workpiece, and the value between the two measured values is set as the threshold. RUN mode and SET mode – each mode can be set up. Confirm that the MODE key setting is 2PNT when setting in RUN mode.



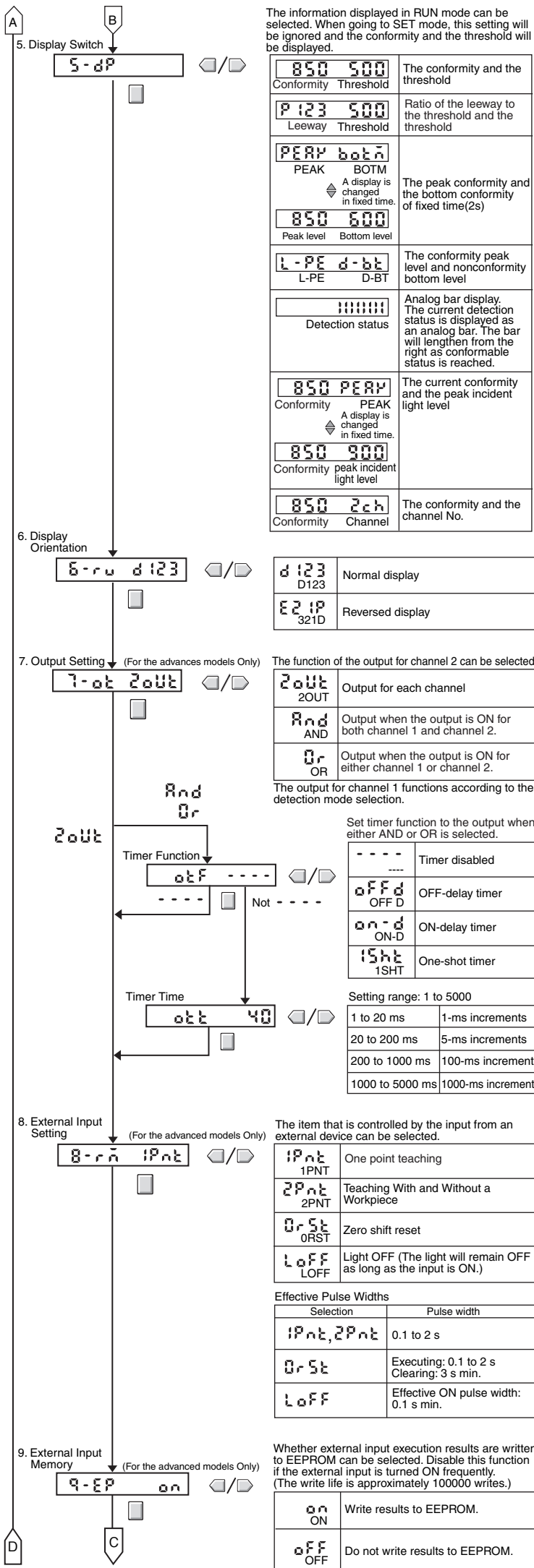
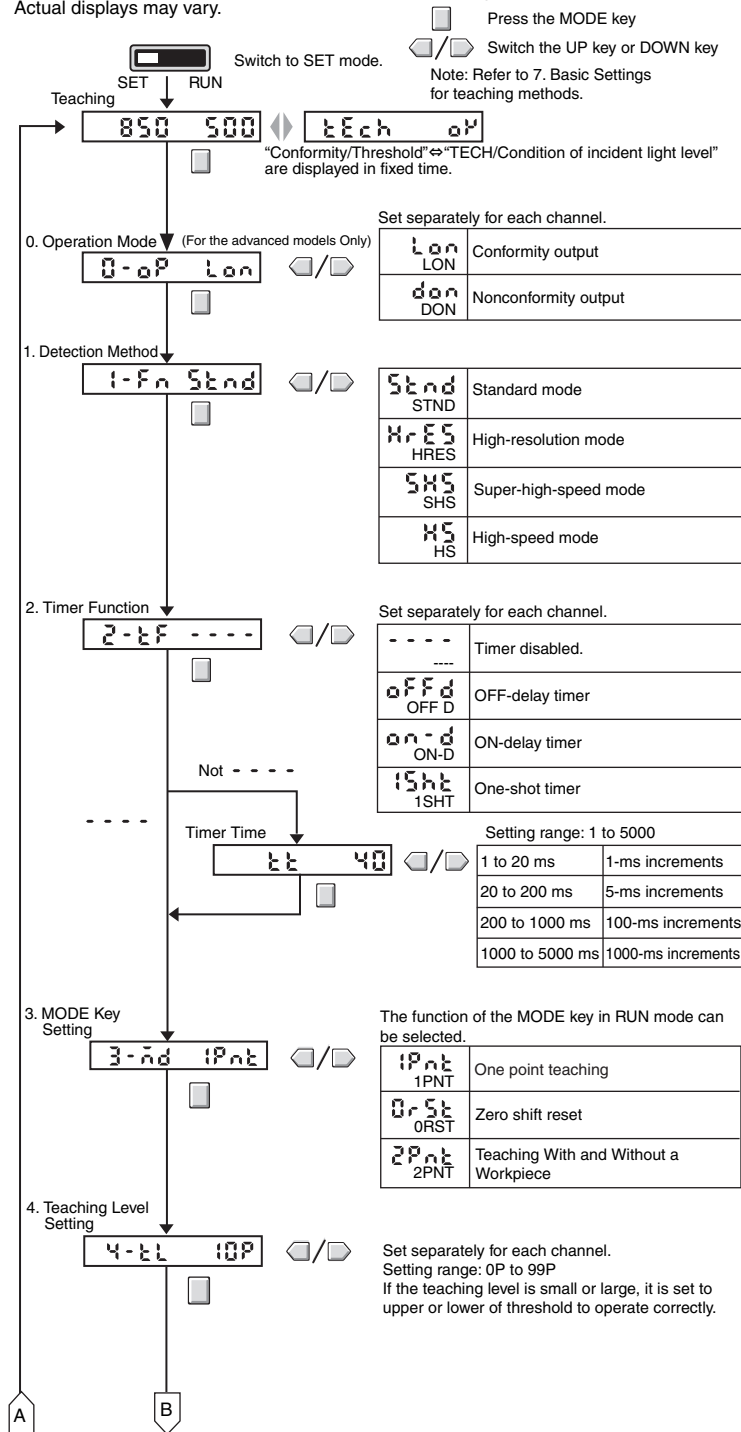


Teaching Error
After performing teaching, when the following is displayed on sub digital display, the error has occurred.

flash twice. LOW ER OVER	Over error The incident light level is too large. After adjust the Fiber Unit to decrease the incident light level, execute re-teaching.
flash twice. LO	Low error The incident light level is too small. After adjust the Fiber Unit to increase the incident light level, execute re-teaching.
flash twice. NEAR	Near error Change of the conformity is too small. After adjust the Fiber Unit to increase change of the conformity, execute re-teaching.

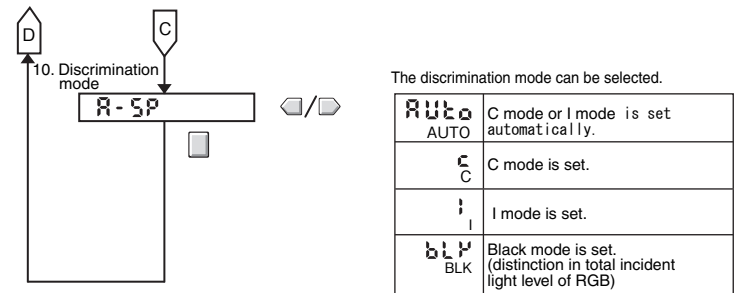
8. Detailed Settings

The following functions can be set in SET mode. The function displays are the default settings. All settings except for the operation mode, timer function and teaching level setting are the same for both channels for advanced models.
*: The values shown for thresholds, conformity, percentages, etc., are examples only. Actual displays may vary.

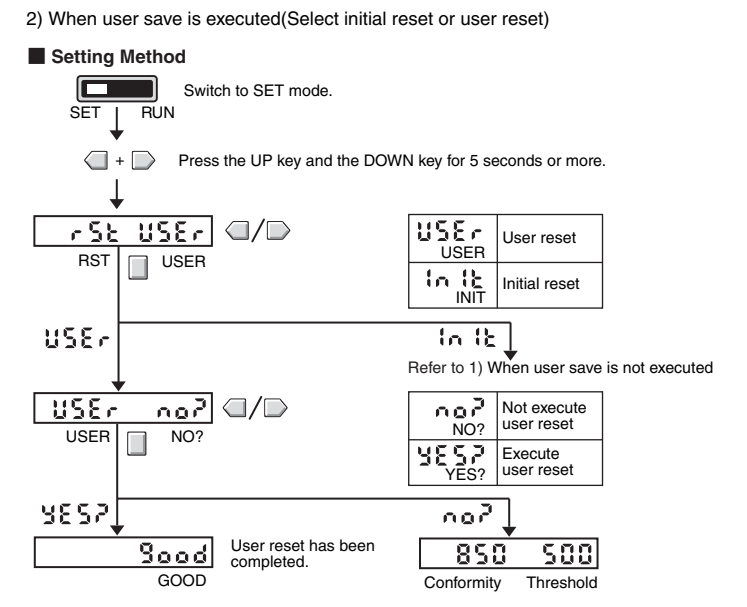
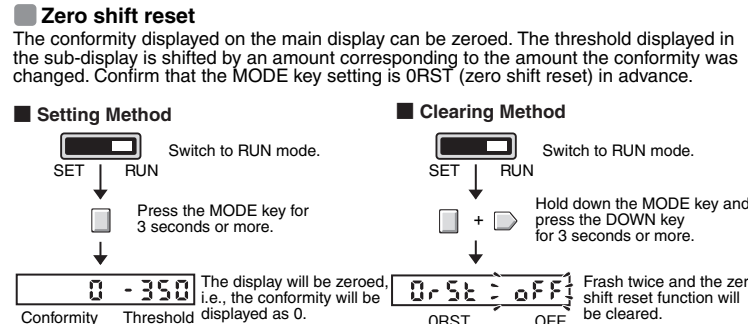


The information displayed in RUN mode can be selected. When going to SET mode, this setting will be ignored and the conformity and the threshold will be displayed.

850 500 Conformity Threshold	The conformity and the threshold
P123 500 Leeway Threshold	Ratio of the leeway to the threshold and the threshold
PEAK botm PEAK BOTM A display is changed in fixed time.	The peak conformity and the bottom conformity of fixed time(2s)
850 600 Peak level Bottom level	
L-PE d-bt L-PE D-BT	The conformity peak level and nonconformity bottom level
 Detection status	Analog bar display. The current detection status is displayed as an analog bar. The bar will lengthen from the right as conformable status is reached.
850 PEAK Conformity PEAK A display is changed in fixed time.	The current conformity and the peak incident light level
850 900 Conformity peak incident light level	
850 2ch Conformity Channel	The conformity and the channel No.



9. Convenient Functions



10. Error display

If the error occurs, the error messages are blinking as below. In these case Execute following procedures to restore.

ow ER cur OVER CUR	Overcurrent of control output Check an output load and keep current in rating. Check whether the load to be short-circuited.
Err EEP ERR EEP	EEPROM error Execute initial reset operation.

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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