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3 便利な設定編

① ほこりや汚れによる受光量変化を元に戻したい！

● パワーチューニング

- 検出体がない状態で  ボタンと  ボタンを 1 秒以上長押しします。



受光量設定 : 1 のときの受光量をパワーチューニングレベルに調整します。
しきい値設定 : 変更されません。しきい値が小さい場合、出力が正しく ON/OFF する最小の値に設定されます。

- 反射形の場合は、検出体がある状態にて実施してください。
- 位置決めチューニング実施後の場合、透過形・反射形ともに検出体ありの状態で実施してください。

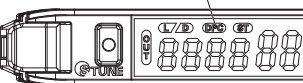
 エラー表示については、「2-3」のスマートチューニングエラー表を参照してください。

② ほこりや汚れで受光量が変化しても安定して検出したい！

● DPC 機能

- スマートチューニングを実行してください。

DPC 機能有効時は
DPC 表示灯が点灯します



Smart Fiber Sensor

E3X-HD0

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

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

● Warning Indications

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.
 - 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.
 - (1) Locations subject to direct sunlight
 - (2) Locations subject to condensation due to high humidity
 - (3) Locations subject to corrosive gas
 - (4) 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.
- 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.
- Attach a protective cap on the power supply connecting terminals that are not used to prevent electric shock or short circuit.

Protective Cap

- 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 on the Fiber Unit when it is mounted on the Amplifier Unit.
- The E3X-MC11, 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 Communication Unit cannot be used.
- Always keep the protective cover in place when using the Amplifier Unit.
- Do not use thinner, benzine, acetone, and lamp oil for cleaning.

Checking the Package Content

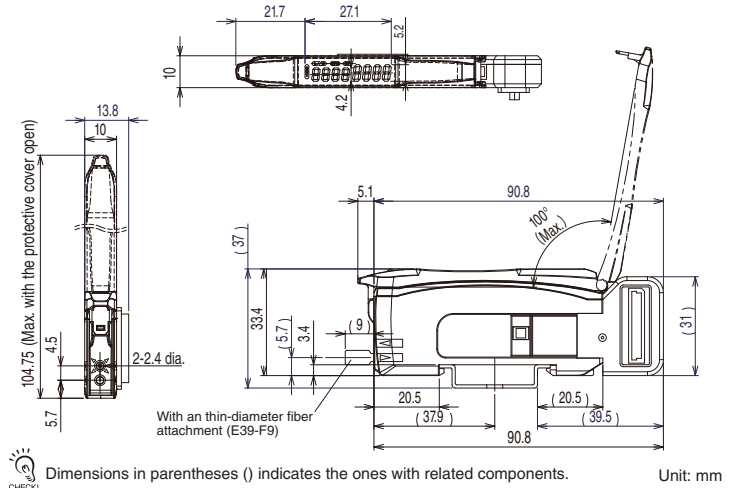
- Amplifier Unit: 1
- Instruction Sheet (this sheet): 1 (Japanese, English and Chinese)

Compatible Communication Unit (Sold Separately)

EtherCAT compatible E3X-ECT, CompoNet compatible E3X-CRT

1 Installation

1-1 Dimensions



1-2 Mounting the Amplifier Unit

■ Mounting on DIN Track

1. 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

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

■ Connecting Amplifier Units with Communication Units

1. Mount the Communication Unit and Amplifier Unit on each DIN track and slide them in the direction of arrow 1 and insert the connector until it clicks.
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.
3. Tighten the screw on the End Plates using a driver.

Up to 30 Amplifier Units can be connected to E3X-ECT Communication Unit .
Up to 16 Amplifier Units can be connected to E3X-CRT Communication Unit.
Under environments such as vibration, use an End Plate even with a single amplifier unit.

Tighten the screw while pressing the End Plate.

1-3 Mounting Fiber Unit

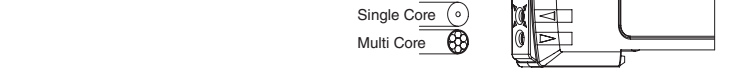
■ Use Fiber Cutter

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

■ Mount Fiber Unit

1. Open the protective cover.
2. Raise the lock lever.
3. Insert the Fiber Unit in the fiber unit hole to the bottom.
4. 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

● If you want to set with the Communication Unit, refer to the User's Manual provided with the Communication Unit. See below to set with Amplifier Unit.

2-1 Setting and Display Overview

[L/D Indicator] Displays Light ON/Dark O setting.

[OUT Indicator] Turns ON when Output is ON.

[DPC Indicator] Turns ON when Dynamic Power Control is effective.

[ST Indicator] Turns ON when Smart Tuning is in progress.

Sensitivity Setting [TUNE] Button A single press each for setting with/without a workpiece. [ST Indicator] turns ON.

Minute Threshold Adjustment [UP/DOWN] Button The green digital value changes.

Mode Change [MODE] Button Switches between SET mode and RUN mode by a long press (3 seconds or longer) of the key.

Output Switch [L/D] Button A single press switches between Light ON/Dark ON. [L/D] Indicator changes.

+ : Press both
→: Press both in sequence

Power Tuning When Light Level is Saturated

Setting Reset

Key Lock

Zero Reset

Refer to "③ Convenient Setting Features".

Threshold Level Green Digital Display

Incident Light Level Red Digital Display

2-2 Switching Control Output

1. 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 [D] ON.

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

[L/D Indicator] turns [L] ON.

2-3 Smart Tuning [Easy Sensitivity Setting]

① Detect for Workpiece Presence/Absence

● 2-point Tuning

1. 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.

Setting is Completed

② Detect for Workpiece Presence/Absence

● Maximum Sensitivity Tuning

1. Hold [TUNE] button for 3 seconds or longer with/without workpiece as shown below. Release the button when [SE FULL] is displayed.

Reflective: Workpiece is absent

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 etection, the minimum value by which an output is correctly turned ON will be set.

Setting is Completed

③ Adjust for Moving Workpiece without Stopping Line

● Full Auto Tuning

1. 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.

Setting is Completed

④ Determine Workpiece Position

● Position Tuning

1. 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.

Setting is Completed

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

● Percentage Tuning

1. Turn ON Percentage Tuning in SET mode. Refer to "⑤ Detailed Settings".
2. 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.

Setting is Completed

● Smart Tuning Error

Error / Display / Cause	Error Origin Tuning Type	Remedy
Near Error The light level difference between Points 1 and 2 are extremely small.	2-point Tuning Full Auto Tuning Positioning Tuning	• 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 Incident light level is too high.	All	• 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 Incident light level is too low.	Tuning other than Maximum Sensitivity Tuning	• 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 powr tuning level.

2-4 Minute Adjustment of Threshold Level

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

The threshold level becomes higher.

The threshold level becomes lower.

Hold the key for high-speed level adjustment.

-1-

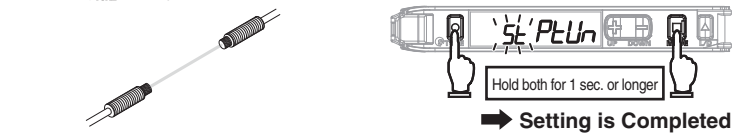
-2-

3 Convenient Setting Features

1 Restore from the Incident Level Changed due to Dust and Dirt

● Power Tuning

1. Hold and buttons for 1 second or longer without a workpiece in the area.



Incident light level setting: The Step 1 incident level is adjusted to the power tuning level. Threshold setting: Not changed. If the value is low, it will be set to the minimum value in which an output is turned ON/OFF correctly.

Perform the procedure with a workpiece in the area for reflective model setting. If the setting is made after position tuning, set both the through-beam model and reflective model with a workpiece.

Refer to "2-3 Smart Tuning Error" for error displays.

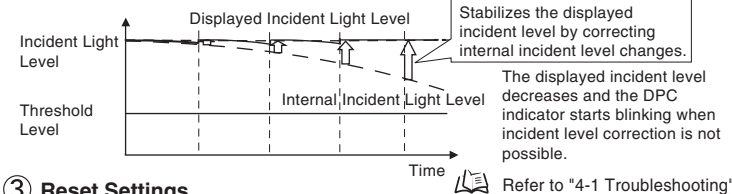
2 Stable Detection Regardless of Incident Level Change due to Dust and Dirt

● DPC Function

1. Perform Smart Tuning.
Refer to "2-3 Smart Tuning"
Refer to "③ Convenient Setting Features - Power Tuning"
2. Set the DPC function ON in SET mode.
Refer to "⑤ Detailed Settings".

The DPC indicator turns ON when the DPC function is effective.

- Steps 1 and 2 can be reversed.
- The DPC function will be disabled when a smart tuning error occurs, differential function with maximum sensitivity tuning is performed, or the first incident light level of the positioning tuning is low.
- The incident light level is corrected to the power tuning level to maintain stable threshold and incident light levels. This provides stable detection regardless of the incident level changes caused by dirty sensor head, position error, or temperature changes.



Refer to "4-1 Troubleshooting"

3 Reset Settings

● Setting Reset

Initializes all the settings by returning them to the factory defaults.

1. Hold button and then hold button for 3 seconds or longer.

Item	Initial Value
Threshold Value	55
Control Output	L-on

*Settings for other functions are returned to the detailed setting initial values. User-saved settings are retained. Smart Tuning is canceled.

Caution is required; the output is inverted if button is pressed first.

4 Save or Read Settings

1. Hold button and then hold button for 3 seconds or longer.

● User Save Function

Saves the current settings.

2. Select [] in and press .

3. Select [] in and press .

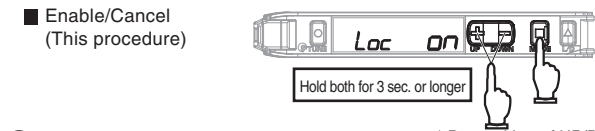
Caution is required; the output is inverted if button is pressed first.

5 Prevent Mis-operation

● Key Lock Function

Disables all button operations. [] is displayed when the button is pressed.

- Enable/Cancel (This procedure)



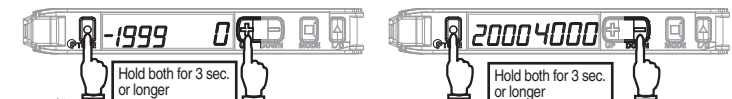
* Press either of UP/DOWN.

6 Reset Incident Light Level to "0"

● Zero Reset Function

Changes the incident light level to "0". The threshold level is also shifted accordingly.

- Enable



The zero reset function is canceled when either of the DPC function/differential function/Smart Tuning is performed.

CHECK!

4 Maintenance

4-1 Troubleshooting

● Troubleshooting

Problem	Cause	Remedy
Blank display	No power supplied or the cable broken	Check the connector connection between Communication Unit and Amplifier. Refer to "4-2 Input/Output Circuit Diagram"
No digital display	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	The GIGA mode setting enhances the light level and a larger incident level is displayed. Refer to "⑤ Detailed Settings".
Incident light level display fluctuation	Dust or dirt, temperature changes or vibration	Use the DPC function to stabilize the incident light level display. Refer to "③ Convenient Setting Features"
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 "1-2 Mounting Amplifier Unit"
Incident light level displayed in a negative value	The zero reset function is enabled. The differential function is enabled.	Cancel the zero reset function. Refer to "③ Convenient Setting Features" Turn OFF the differential function. Refer to "⑤ Detailed Settings".
Lost tracking of the settings made	-	Reset the settings. Refer to "③ Convenient Setting Features"

For information on troubleshooting with Communication Unit, refer to the User's Manual provided with the Communication Unit.

● Error Display

Error Name / Display	Cause	Remedy
DPC Error*	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 Error	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	The key lock function enabled	Cancel the key lock function. Refer to "③ Convenient Setting Features"
Current Over	Over current flowing to the control output	Check the control output load and adjust it within the rated value. Check for a load short-circuit. Refer to "4-2 Ratings and Specifications"

* The DPC indicator blinks.

4-2 Ratings and Specifications

Model	E3X-HD0
Number of Control Outputs	1 (Inside the wire-saving connector)
Connection Method	Communication Unit compatible wire-saving connector
Compatible Communication Unit	EtherCAT compatible E3X-ECT, CompoNet compatible E3X-CRT
Light Source (Wavelength)	Red 4-element LED (625 nm)
Power Supply Voltage	12 to 24 VDC $\pm 10\%$, ripple (p-p) 10% max. (Power is supplied from Communication Unit.)
Power Consumption	Normal: 720 mW max. (30 mA max. at power supply voltage of 24 VDC; 60 mA max. at power supply voltage of 12 VDC) Power-saving ECO: 530 mW max. (current consumption: 22 mA max. at power supply voltage of 24 VDC; 44 mA max. at power supply voltage of 12 VDC)
Maximum connectable units	E3X-ECT 30 units E3X-CRT 16 units
Control Output	Refer to the specifications of the Communication Unit.
Protection Circuits	Power supply reverse polarity protection, output short-circuit protection and output reverse polarity protection
APC (Auto Power Control)	Always ON
Mutual Interference Prevention	Possible for up to 10 units *1
Ambient Illumination	Receiver side: Incandescent lamp: 20,000 lux max. / Sunlight: 30,000 lux max.
Ambient Temperature Range	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 Groups of 17 to 30 Amplifiers: -25°C to 40°C Storage: -30°C to 70°C (with no icing or condensation)
Ambient Humidity Range	Operating and storage: 35% to 85% (with no condensation)
Insulation Resistance	20 M Ω min. (at 500 VDC megger)
Dielectric Strength	1,000 VAC at 50/60 Hz for 1 minute
Vibration Resistance	10 to 55 Hz with a 1.5-mm double amplitude for 2 hours each in X, Y and Z directions
Shock Resistance	500 m/s ² , for 3 times each in X, Y and Z directions
Weight (Main Unit Only)	Approx. 25 g
Materials	Case Heat resistant ABS (ABS) Cover Polycarbonate (PC) Connector Polybutylene Terephthalate (PBT)

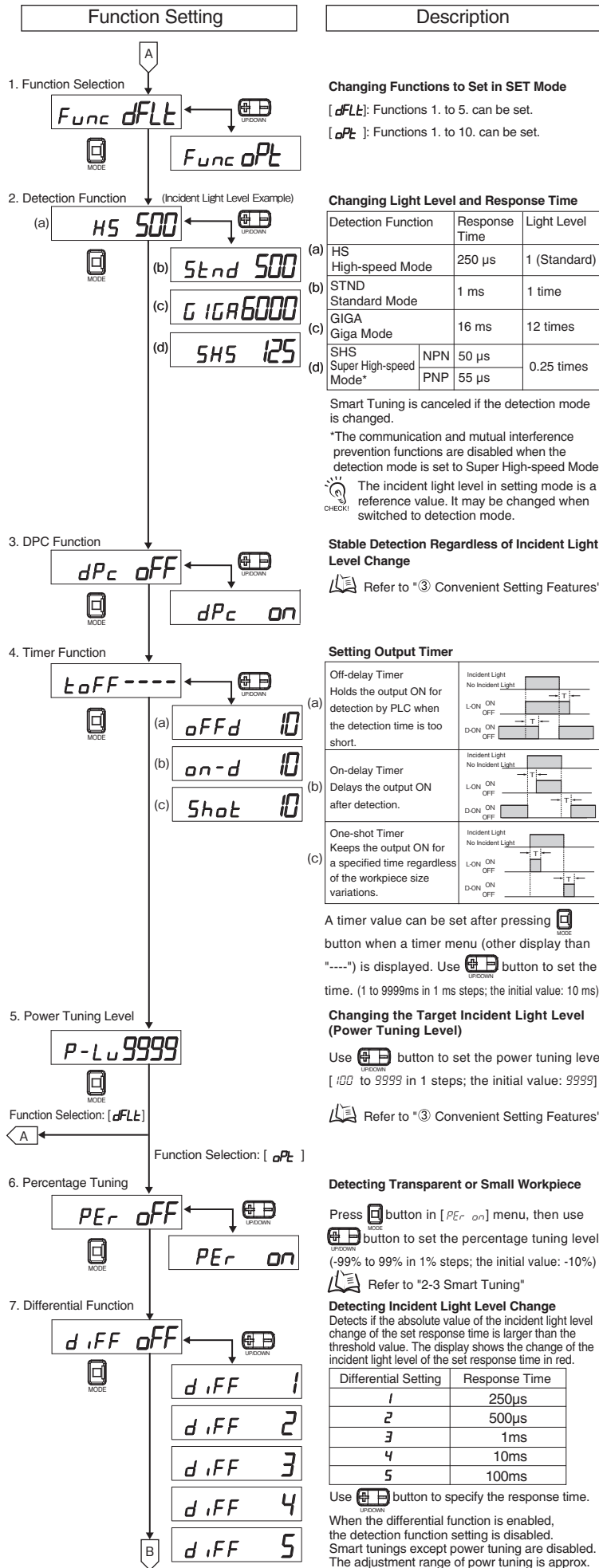
*1: Mutual interference prevention is only possible for up to 6 units, if the E3X-DA-S/MDA sensors applied with power tuning are grouped with this sensor.

*2: Communication function and mutual interference prevention function are disabled when selecting Super High-speed Mode.

5 Detailed Settings

Hold button for 3 seconds or longer to enter SET mode.

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



Changing Functions to Set in SET Mode

[]: Functions 1. to 5. can be set.

[]: Functions 1. to 10. can be set.

Changing Light Level and Response Time

Detection Function	Response Time	Light Level
(a) HS High-speed Mode	250 μs	1 (Standard)
(b) STND Standard Mode	1 ms	1 time
(c) GIGA Giga Mode	16 ms	12 times
(d) SHS Super High-speed Mode*	NPN 50 μs PNP 55 μs	0.25 times

Smart Tuning is canceled if the detection mode is changed.

*The communication and mutual interference prevention functions are disabled when the detection mode is set to Super High-speed Mode.

The incident light level in setting mode is a reference value. It may be changed when switched to detection mode.

Stable Detection Regardless of Incident Light Level Change

Refer to "③ Convenient Setting Features"

Setting Output Timer

Off-delay Timer	Incident Light No Incident Light
Holds the output ON for detection by PLC when the detection time is too short.	L-ON ON OFF D-ON ON OFF
On-delay Timer	Incident Light No Incident Light
Delays the output ON after detection.	L-ON ON OFF D-ON ON OFF
One-shot Timer	Incident Light No Incident Light
Keeps the output ON for a specified time regardless of the workpiece size variations.	L-ON ON OFF D-ON ON OFF

A timer value can be set after pressing button when a timer menu (other display than "----") is displayed. Use to set the time. (1 to 9999ms in 1 ms steps; the initial value: 10 ms)

Changing the Target Incident Light Level (Power Tuning Level)

Use to set the power tuning level.

[to 9999 in 1 steps; the initial value: 9999]

Refer to "③ Convenient Setting Features"

Detecting Transparent or Small Workpiece

Press button in [] menu, then use to set the percentage tuning level.

(-99% to 99% in 1% steps; the initial value: -10%)

Refer to "2-3 Smart Tuning"

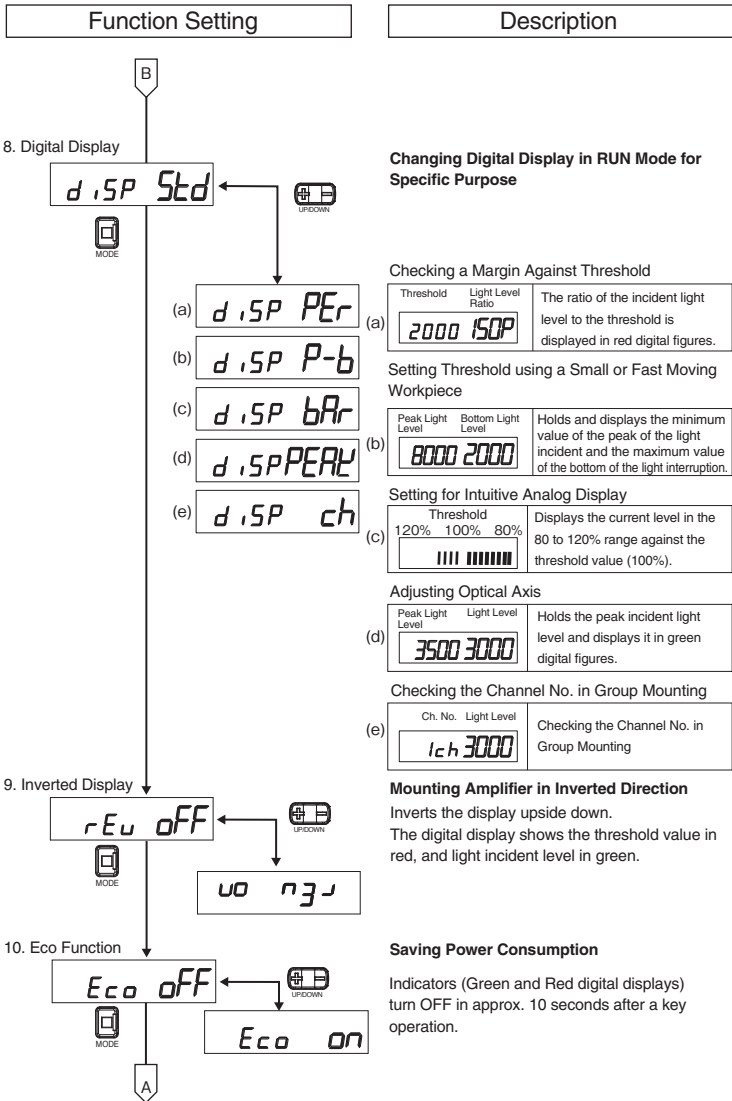
Detecting Incident Light Level Change

Detects if the absolute value of the incident light level change of the set response time is larger than the threshold value. The display shows the change of the incident light level of the set response time in red.

Differential Setting	Response Time
1	250 μs
2	500 μs
3	1ms
4	10ms
5	100ms

Use to specify the response time.

When the differential function is enabled, the detection function setting is disabled. Smart tunings except power tuning are disabled. The adjustment range of power tuning is approx. 1 to 1/100 times.



Changing Digital Display in RUN Mode for Specific Purpose

Checking a Margin Against Threshold

Threshold Light Level Ratio

The ratio of the incident light level to the threshold is displayed in red digital figures.

Setting Threshold using a Small or Fast Moving Workpiece

Peak Light Level Bottom Light Level

Holds and displays the minimum value of the peak of the light incident and the maximum value of the bottom of the light interruption.

Setting for Intuitive Analog Display

Threshold 120% 100% 80%

Displays the current level in the 80 to 120% range against the threshold value (100%).

Adjusting Optical Axis

Peak Light Level Light Level

Holds the peak incident light level and displays it in green digital figures.

Checking the Channel No. in Group Mounting

Ch. No. Light Level

Checking the Channel No. in Group Mounting

Mounting Amplifier in Inverted Direction

Inverts the display upside down. The digital display shows the threshold value in red, and light incident level in green.

Saving Power Consumption

Indicators (Green and Red digital displays) turn OFF in approx. 10 seconds after a key operation.

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. See also Product catalog for Warranty and Limitation of Liability.

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D Sep, 2013

智能光纤传感器

型号E3X-HD0

使用说明书

本次承蒙惠购本产品，谨致谢意。
使用时，请务必遵守以下内容。

- 请具有电气知识的专家进行操作。
- 请仔细阅读本使用说明书，并在充分理解的基础上正确使用。
- 请妥善保管本使用说明书，以便随时参阅。

欧姆龙公司

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安全注意事项

警告标识的含义

注意

若使用不当，则可能会造成轻伤、中等程度伤害或者财物损失。

警告标示

注意

有引发故障或者起火的危险。
使用时，请不要超过额定电压。

有引发破裂的危险。
请绝对不要使用AC电源。

安全要点

为了确保您的安全，请务必遵守以下内容。

- 请勿在有易燃、易爆气体的环境下使用。
- 请勿在有水、油、化学药品飞沫的环境、及接触到蒸汽的环境下使用。
- 请勿设置于有强电场、强磁场的场所。
- 请勿擅自拆卸、修理、改造本产品。
- 使用时请勿超出额定电压、电流。
- 请勿在超出额定范围的环境下使用。
- 请注意电源的极性等，勿接错线。
- 请勿在外壳破损的状态下使用。
- 废弃时，请作为工业废弃物处理。
- 有导致烧伤的危险。根据使用条件（周围温度、电源电压等），传感器表面温度会升高。操作或清洗时请多加注意。
- 请对高压线、电线、输电线和本产品的配线分别配线。
- 若进行同一配线或在同一管道中配线则可能相互感应，从而导致误操作或产品损坏。
- 进行传感器设定时，请采取停止装置运行等安全措施后再执行操作。

使用注意事项

- 请勿在下述设置场所使用。
 - ① 阳光直射的场所
 - ② 湿度高、易结露的场所
 - ③ 含腐蚀性气体的场所
 - ④ 振动或冲击超出额定范围的场所
- 接通电源并经过200ms后即可检测。若负载和本产品非同电源，则请务必先接通本产品电源。
- 电源切断时可能会发生输出脉冲，故请先切断负载或负载线的电源。
- 接收了过大感应光量时，可能会导致防止相互干扰功能无法充分发挥效力而引发误动作。这种情况下，请增大设定阈值。
- 为了防止触电或短路，请在不使用的连接用电源端子上盖上保护盖。

保护盖

• 装卸、增设放大器时，请务必先切断电源。

• 在将光纤单元固定于放大器单元的状态下，请勿对其强行施加拉伸力、压缩力等。

• 手持式控制器型号 E3X-MC11、型号 E3X-MC11-SV2、型号 E3X-MC11-S 不可使用。

• 与型号 E3X-DA-N/SD/NA 之间无法启用防止相互干扰功能。与型号 E3X-DA-S/MDA 之间可以启用防止相互干扰功能。

• 型号 E3X-DRT21-S、通信单元不可使用。

• 请务必安装保护罩后再使用。

• 请勿使用稀释剂、汽油、丙酮、煤油类溶剂进行清理。

包装内容确认

• 放大器单元 1 台 • 使用说明书（本说明书）各 1 份（日文版 英文版 中文版）

支持通信单元（另售）

EtherCAT 支持型号 E3X-ECT，ComPonet 支持型号 E3X-CRT

1 设置

1-1 外形尺寸图

1-2 放大器单元的安装

■安装至 DIN 导轨

1. 将光纤单元插入部侧的卡槽卡在导轨上，一直将锁钩插入至听到咔嚓声为止。

■从 DIN 导轨上拆卸

1. 将主机朝方向 1 按下。
2. 朝方向 2 提起。

■关于和通信单元的连接

1. 将通信单元和放大器单元分别安装至DIN导轨，并使其朝向1滑动，将连接器插入至听到咔嚓声。

2. 请使用另售的终端架（型号 PFP-M）夹紧放大器和通信单元，以防因振动等原因而移动。

3. 请使用螺丝刀紧固终端架的螺钉。

最多可与型号E3X-ECT通信单元连接的台数为30台。
最多可与型号E3X-CRT通信单元连接的台数为16台。
有振动等现象时，也请在放大器单元单体上使用终端架。

1-3 光纤单元的安装

■光纤切断器的使用方法

1. 将光纤单元插入光纤切断器的剪切孔。
标准光纤单元请插入至想要切断的位置。
细径光纤单元请插入至深处。

2. 将切刀一口气按下进行切断。

■光纤单元的安装

1. 打开保护罩。
2. 提起按键锁定杆。
3. 将光纤单元牢牢插入光纤单元插入口深处。
4. 将按键锁定杆压回原来的方向，按键锁定光纤单元。

- 将同轴反射型光纤单元安装至主机时，请将单芯光纤单元安装至安装孔上侧（投光）、将多芯光纤单元安装至下侧（受光）。

2 设定

想要通过通信单元进行设定的用户，则请查看通信单元附带的用户操作手册。
想要通过放大器单元进行设定的用户，请浏览这里。

2-1 操作・显示一览表

[L/D 指示灯]
显示 Light ON/Dark ON 的设定状态。

[OUT 指示灯]
输出为 ON 时亮灯。

[DPC 指示灯]
启用 DynamicPowerControl 功能时亮灯。

[ST 指示灯]
执行 SmartTuning 时亮灯。

阈值
绿色数字

受光量
红色数字

灵敏度设定
【@TUNE】按钮
检测物体有和无时，各按 1 次 [ST 指示灯] 亮灯。

阈值微调
【UP/DOWN】按钮
绿色数字的阈值发生变化。

模式切换
【MODE】按钮
按住持续 3 秒以上，即可在设定模式和检测模式之间进行切换

输出切换
【L/D】按钮
按 1 次即可进行 Light ON/Dark ON 的切换。
[L/D] 指示灯作亮灯切换。

光量调整
(光量已饱和状态时)

设定初始化

按键锁定

归零重置

“⑤ 便利的设定”

2-2 控制输出切换方法

1. 按 [L/D] 按钮

对射型：有检测物体时，想使产品进入 ON 状态，则设定为“Dark ON”。
[[L/D 指示灯] 的 [D] 灯亮。

反射型：有检测物体时，想使产品进入 ON 状态，则设定为“Light ON”。
[L/D 指示灯] 的 [L] 灯亮。

检测物体

检测物体

2-3 智能调整【简单灵敏度调整】

① 想要检测有 / 无检测物体！

●2 点调整

1. 在有检测物体的状态下按 [OPTUNE] 按钮。
2. 在无检测物体的状态下再次按 [OPTUNE] 按钮。

受光量设定：将 1、2 的受光量大的一方调整为光量调整等级。
阈值设定：设定为 1 和 2 时的受光量的中间值。

1. 和 2. 的顺序可以相反。

② 想要加强防尘抗污力！

●最大灵敏度调整

1. 检测物体在以下状态下，持续按 [OPTUNE] 按钮 3 秒以上，待 [L/D] 指示灯后放开按钮。

对射型：有检测物体状态

反射型：无检测物体状态

持续按3秒以上

红色数字显示为 [1]。切换为 []。FULL

设定完毕

受光量设定：将 1 时的受光量调整为“0”。
阈值设定：被设定为 1 时受光量的约 7% 的数值。
在长距离检测等 1 时受光量较小的情况下，被设定为可正确执行输出 ON 的最小值。

设定完毕

③ 想要不停止运行、通过移动的检测物体进行调整！

●全自动调整

1. 在无检测物体的状态下持续按 [OPTUNE] 按钮，并在红色数字依次显示为 [1]、[FULL] → [FULL] 间使检测物体通过。（在通过检测物体过程中持续按 [OPTUNE] 按钮 7 秒以上，直至红色数字显示为 [FULL] 完全通过检测物体后，请将手指从 [OPTUNE] 按钮上放开。）

检测物体

持续按7秒以上

设定完毕

受光量设定：将 1 时的最大受光量调整为光量调整等级。
阈值设定：被设定为 1 时最大受光量和最小受光量的中间值。

④ 想要确定检测物体的位置！

●定位调整

1. 在无检测物体的状态下按 [OPTUNE] 按钮。
2. 将检测物体放置于想要定位的位置并持续按 [OPTUNE] 按钮。

红色数字显示为 [2]。切换为 []。Po5

设定完毕

受光量设定：将 2 时的受光量调整为光量调整等级的一半。
阈值设定：设定为与 2 时的受光量相同的数值。

⑤ 想要检测透明物体或微小物体！（想要通过受光量比率设定阈值！）

●百分比调整

1. 在设定模式下将百分比调整设定为 ON。
2. 在无检测物体的状态下按 [OPTUNE] 按钮。

设定为百分比调整后则无法执行光量调整以外的智能调整

设定完毕

错误名称 / 显示 / 原因	发生调整种类	对策
Near Error nEr Err 第 1 点和第 2 点的受光量差值太小。	2 点调整 全自动调整 定位调整	• 请切换为检测功能响应时间较慢的模式。 • 请缩小小投受光间距。（对射型） • 请使传感器接近工件。（反射型）
Over Error ouEr Err 受光量太大。	所有	• 请提高光量调整的等级。 • 请使用细径光纤。 • 请扩大小投受光间距。（对射型） • 请使传感器远离工件（反射型）
Low Error Lo Err 受光量太小。	最大灵敏度调整以外	• 请降低光量调整的等级。 • 请缩小小投受光间距。（对射型） • 请使传感器接近工件。（反射型）

智能调整的调整范围约为 20~1/100 倍。将检测功能选择为 GIGA 模式时，由于初始值较大，故调整范围约为 2~1/100 倍。
要改变光量调整等级，请浏览“⑤ 详细设定”。

2-4 阈值的微调

1. [UP/DOWN] 按钮进行设定。

阈值变大。

阈值变小。

可持续按按钮进行高速调整。

-1-

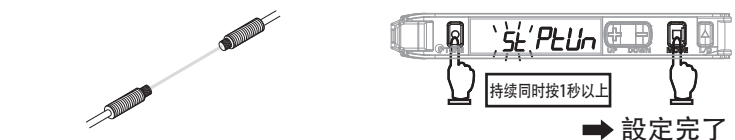
-2-

3 便利的设定

① 想要将灰尘或污垢导致的受光量变化还原！

● 光量调整

1. 无检测物体状态下，持续按  按钮和  按钮 1 秒以上。



→ 設定完了

受光量设定：将 1 时的受光量调整为光量调整等级。
阈值设定：不会变更。阈值较小时，输出将被设定为可正确执行 ON/OFF 的最小值。

 反射型时，请在有工件的状态下执行。
若在定位调整执行后，那么对射型・反射型均请在有检测物体的状态下执行。

 错误显示请查看“2-3”的智能调整错误列表。

② 即使受光量因灰尘或污垢而发生变化，也想要在稳定的状态下进行检测！

● DPC 功能

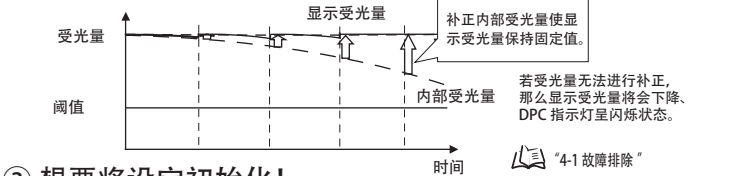
1. 请执行智能调整。

 “2-3 智能调整”
“③ 便利的设定 光量调整”

2. 在设定模式下开启 DPC 功能。

 「⑤ 詳細設定編」

- 1、2 的步骤可以相反。
 - 在智能调整发生错误 / 执行微分功能・最大灵敏度调整时 / 定位调整的第 1 点受光量较小时，DPC 功能将被关闭。
 - 将受光量补正为光量调整等级，以确保阈值和受光量始终保持固定值。
- 因此，即使因探头污垢、位置偏移、温度变化而使受光量发生变化也可在稳定的状态下进行检测。



 “4-1 故障排除”

③ 想要将设定初始化！

● 设定初始化

将所有设定内容初始化，恢复至出厂状态。

1. 按下  按钮后立即持续按  按钮 3 秒以上。
2. 通过  选择 [rSt]，按  按钮。
3. 通过  选择 [1,5Hz] 按钮。

 请注意，若先按  按钮则会导致输出反转。

④ 想要保存 / 读取设定！

1. 按下  按钮后立即持续按  按钮 3 秒以上。

● 用户保存

保存当前的设定。

2. 通过  选择 [] 并按  按钮。
3. 通过  选择 [yes] 并按  按钮。

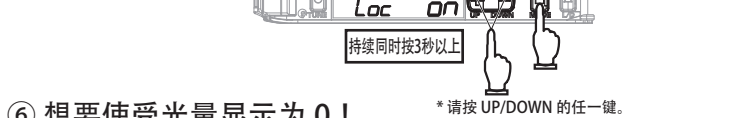
 请注意，若先按  按钮则会导致输出反转。

⑤ 想要防止误操作！

● 按键锁定

关闭所有按钮的操作功能。按下按钮后即会显示 [Loc. on]

■ 执行 / 解除（相同步骤）



* 请按 UP/DOWN 的任一键。

⑥ 想要使受光量显示为 0！

● 归零重置

将受光量显示设定为 0。阈值也相应变化。

■ 执行



■ 解除



 执行 DPC 功能 / 微分功能 / 智能调整后，归零重置即被解除。

4 维修保养

4-1 故障排除

● 故障排除

故障	原因	对策
画面上显示空白	未接通电源、或断线状态。	请确认通信单元与放大器之间的连接器连接状况。
数字显示上不会显示任何内容	节电功能为 ON 状态。	请关闭环保功能。  “⑤ 详细设定”
即使阈值最小也无法检查・检测	检测功能已被设定为微小光量模式。 受到灰尘或污垢影响。	设定为 GIGA 模式后，光量增大，受光量显示增大。  “⑥ 详细设定”
受光量显示变动	受到灰尘或污垢・温度变化・振动等影响。	若使用 DPC 功能，受光量显示即可稳定。  “③ 便利的设定”
动作指示灯闪烁	受到相互干扰等影响。	请确认放大器的连接状态并重新接通电源。  “1-2 放大器单元的安装”
受光量显示为 -（负）	零重置功能为开启状态。 微分功能为开启状态。	请解除归零重置。  “③ 便利的设定” 请关闭微分功能。  “⑤ 详细设定”
设定不明	-	请执行设定初始化操作。  “③ 便利的设定”

 和通信单元之间的故障问题请查看通信单元附带的用户操作手册。

● 错误显示

错误名称 / 显示	原因	对策
DPC Error*	受光量因受灰尘或污垢影响而下降。	请擦拭光纤单元的检测面等，恢复受光量后重新执行智能调整。  “2-3 智能调整”
EEPROM Error	读取 / 写入内部数据失败。	请重新接通电源。若未恢复，请执行初始化操作。  “③ 便利的设定”
Lock ON	按键锁定为开启状态。	请解除按键锁定。  “③ 便利的设定”
Current Over	控制输出的电流过载。	请确认通信单元与放大器之间的连接器连接状况。  “4-2 额定值 / 规格”

*DPC指示灯闪烁。

4-2 额定值/规格

型号	E3X-HD0
控制输出数	1（省配线连接器内）
连接方式	支持通信单元的省配线连接器
对应通信单元	EtherCAT 支持型号 E3X-ECT，CompoNet 支持型号 E3X-CRT
光源（发光波长）	红色 4 元素 LED（625nm）
电源电压	DC12V～24V±10% 波动（p-p） 10% 以下 （通过通信单元供给电源）
消耗电力	通常：720mW 以下 （电源电压 24V 时 30mA 以下、12V 时 60mA 以下） 省电模式 ECO：530mW （电源电压 24V 时 22mA 以下、12V 时 44mA 以下）
最多连接台数	型号 E3X-ECT 30 台 型号 E3X-CRT 16 台
控制输出	请查看通信单元的规格。
保护电路	电源逆接保护、输出短路保护、输出误接保护
APC（自动光量控制）	持续 ON
防止相互干扰	最多 10 台 *1
使用环境照度	受光面照度 白炽灯：20,000lx、太阳光：30,000lx
周围温度范围	动作时：1～2 台连接时： -25～+55℃ 3～10 台连接时： -25～+50℃ 11～16 台连接时： -25～+45℃ 17～30 台连接时： -25～+40℃ 保存时：-30～+70℃（无结冰凝露）
周围湿度范围	动作・保存时：35～85%RH（无结冰凝露）
绝缘电阻	20MΩ 以上（用 DC500V 兆欧表）
耐电压	AC1000V 50/60Hz 1min.
振动（耐久）	10～55Hz 上下振幅 1.5mm X,Y,Z 各方向 2h
冲击（耐久）	500m/s ² X,Y,Z 各方向 3 次
重量（仅主机）	约 65g
材质	外壳 耐热 ABS（ABS） 外罩 聚碳酸酯（PC） 连接器 聚对苯二甲酸丁二醇酯（PBT）

*1 与执行了光量调整的传感器 E3X-DA-S/MDA 连接时，防止相互干扰台数最多为 6 台。

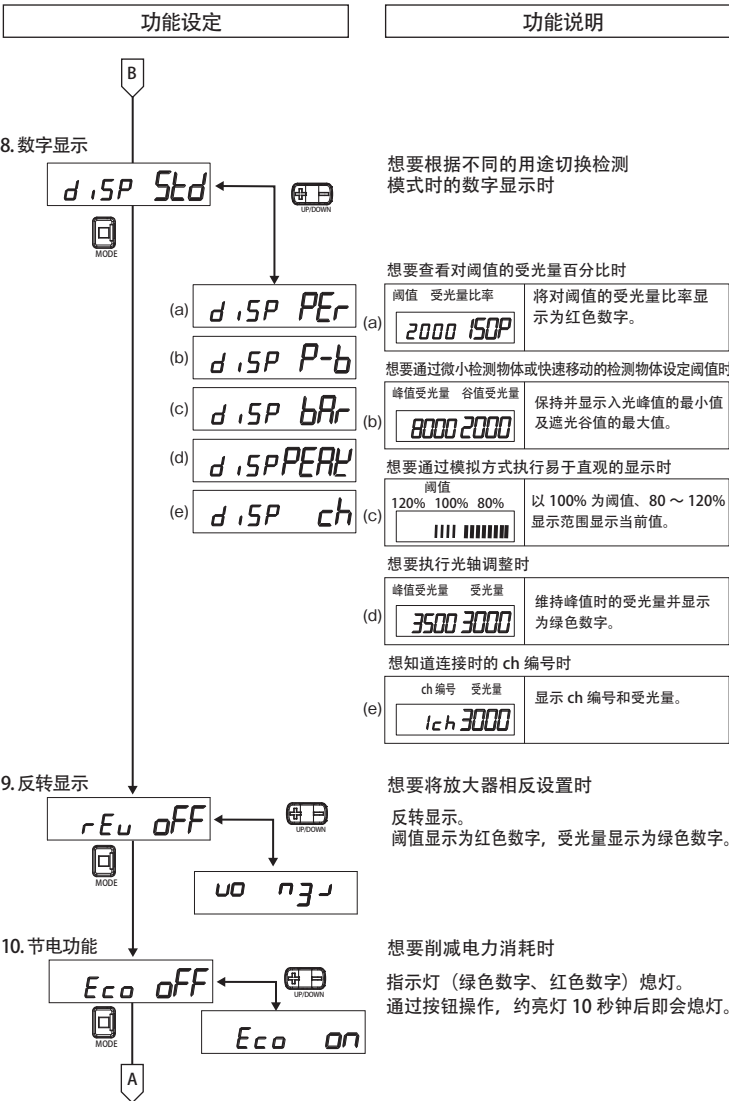
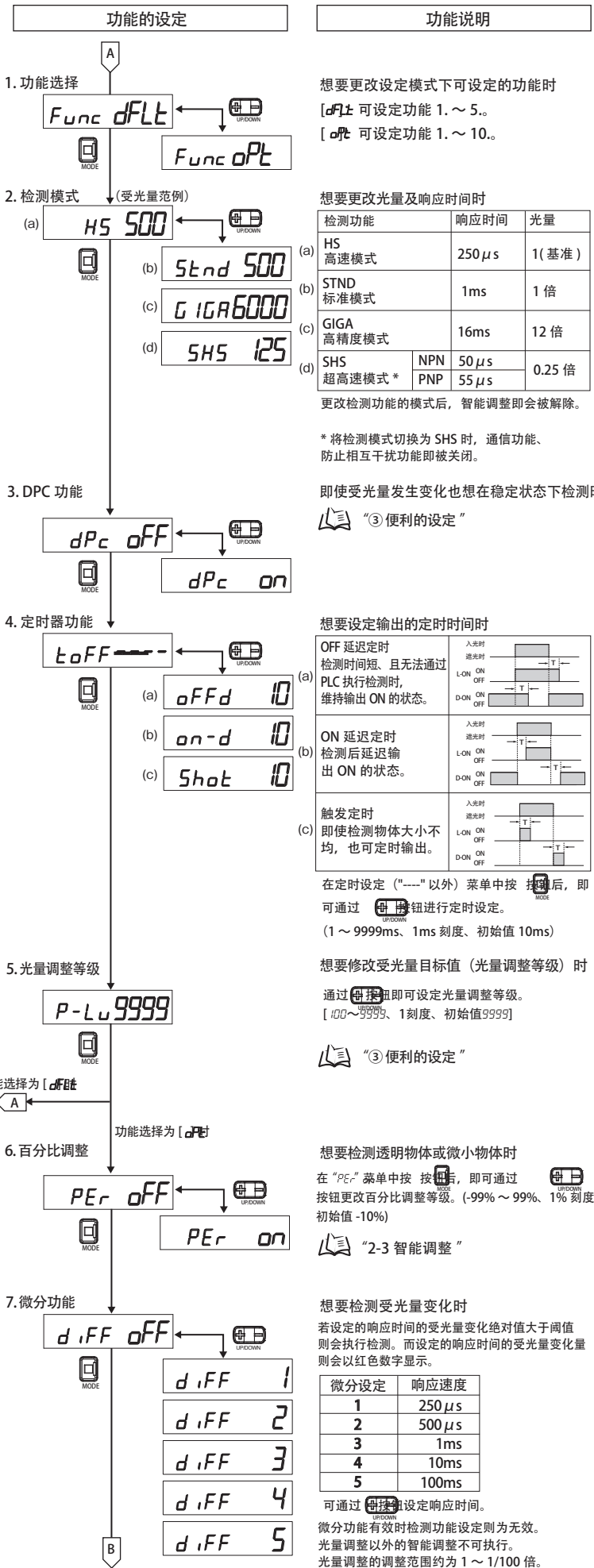
*2 将检测功能选择为超高速模式时，通信功能、防止相互干扰功能即会关闭。

5 详细设定

持续按  按钮 3 秒以上即可切换为设定模式。

设定模式下可执行以下功能的设定。

功能迁移上显示的内容为出厂时的设定内容。



承诺事项

本公司产品是作为工业通用品而设计制造的。因此，不适用于以下用途，当本公司产品被使用于以下用途时，本公司不做任何保证。但若是本公司特意以下为用途而设计、或有过特别协商的情况下，可以用于以下用途。

- a) 需要高度安全性的用途(例：用于原子能控制设备、焚烧设备、航空・宇宙设备、铁道设备、升降设备、娱乐设备、医用器、安全装置、或其他可能危及到生命・人身安全的用途)
- b) 需要高可靠性的用途(例：煤气・水力・电力等的供给系统、24小时连续运转系统、裁决系统、或其他牵涉到权利・财产的用途)
- c) 苛刻条件或环境下的用途(例：室外设备、易受化学污染的设备、易受电磁干扰的设备、易受震动・冲击的设备等)
- d) 产品手册里未记载的条件或环境下的用途

*除上述a)～d)的记载事项，本产品手册等记载的商品不适用于机动车(包括两轮车，以下相同)。请勿搭载于机动车上使用。机动车搭载用商品请咨询本公司销售人员。

*以上是适用条件的一部分。详情请参阅记载于本公司最新版的综合产品目录、使用手册上的保证・免责事项后再使用。

■ 技术咨询

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