

3 Convenient Setting Features

3-1 Various Smart Tuning Methods

When Received Light Intensity Decreases due to Dust or Dirt

Maximum Sensitivity Tuning (CH1/2 individual setting)

Long-press the **[SET]** button for 3 seconds or longer in the presence of a workpiece in the case of through-beam type or without the presence of a workpiece in the case of reflective type, and then take your finger off the button when **[FULL]** is displayed on the green digital display part.

The green digital display changes **[IPnk] → [FULL]**.

Incident light level setting: The incident level when the **[SET]** button pressed is adjusted to "0".
Threshold setting: The value is set to approx. 7% of the incident light level when the **[SET]** button pressed.
If the incident light level when the **[SET]** button pressed is smaller during long distance detection, the minimum value by which an output is correctly turned ON will be set.

Making Adjustment with Passing Workpiece

Full Auto Tuning (CH1/2 individual setting)

Hold the **[SET]** button without the presence of a workpiece, and pass the workpiece through while **[IPnk] → [FULL] → [Auto]** is displayed in green digital. (Keep holding the **[SET]** button while the workpiece passes through, and hold 7 seconds or longer until **[Auto]** is displayed in green digital. After the workpiece passes through, release your finger from the **[SET]** button.)

Incident light level setting: Adjust the max. incident light level while pressing the **[SET]** button as the power tuning level.
Threshold setting: Set to the middle between max. and min. incident light levels while pressing the **[SET]** button.

Determine Workpiece Position

Position Tuning (CH1/2 individual setting)

- Press the **[SET]** button without a workpiece in the area.
The green digital display changes **[IPnk]**.
- Place the workpiece at the desired position and hold the **[SET]** button for 3 seconds or longer.
The green digital display changes **[ZPnk] → [Po5]**.

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.

3-2 Convenient Settings

Preventing Malfunction

Key Lock Function (CH common setting) Disables all button operations.

Enable / Cancel (Same procedure)
Hold both the **[+]** button and the **[SET]** button for 3 seconds or longer.
* Press either of the + or - button.

Returning Received Light Intensity Display to "0"

Zero Reset Function (CH1/2 individual setting)

Enable
Hold both the **[+]** button and the **[SET]** button for 3 seconds or longer.

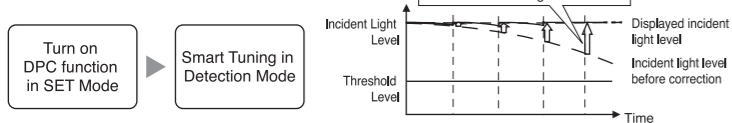
Cancel
Hold both the **[+]** button and the **[SET]** button for 3 seconds or longer.

The zero reset function is canceled when either of the DPC (ATC) function / differential function / Smart Tuning is performed. When DPC (ATC) function is performed and in the differential setting, the zero reset cannot be performed.

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

DPC Function (Dynamic Power Control) (CH1/2 individual setting)

Use this function with through-beam type or regressive reflection type.



Turn on DPC function in SET Mode → Smart Tuning in Detection Mode

Set output switching to D-ON (Dark ON). When power tuning ON / OFF setting is OFF, Smart Tuning is in error or maximum sensitivity tuning is executed, the DPC function is disabled. DPC function does not work depending on the setting. When the Smart Tuning indicator is lit up and the DPC function is set to ON, the DPC function works.

If the threshold level must be changed according to the change in the received light intensity, the ATC Function (Active Threshold Control) can be used instead. (Make the ratio of the received light intensity to the threshold level constant.) The ATC function is enabled when the DPC function is set to ATC in the SET Mode and the Smart Tuning is executed in the Detection Mode. Other restrictions conform to those for the DPC function.

4 Maintenance

4-1 Troubleshooting

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. *1
Nothing is shown on the digital indication.	Eco mode is ON.	Turn OFF Eco mode. *2
Sensing / Detection not possible despite the minimum threshold level	Detection distance for Fiber Head is insufficient, Fiber Head is not deeply inserted, or dust, dirt or Emission Level Adjustment Function has caused this trouble.	Install a Fiber Head, or check the insertion into the fiber amplifier again. Furthermore, try to set to GIGA Mode or Emission Level Adjustment Function. *3
The OUT indicator blinking	Affected by mutual interference or size or passing speed of workpiece.	When multiple Fiber Heads are installed, check the setting for mutual interference prevention. *3 Furthermore, try setting of GIGA Power Mode when the received light intensity is insufficient, or try settings such as OFF-delay Timer for prevention of output chattering. *3
Incident light level displayed in a negative value	The zero reset function is enabled.	Cancel the zero reset function. *4
Lost tracking of the settings made	-	Reset the settings. *5
The light intensity level display changes.	Affected by dust or dirt, temperature change, vibration, etc.	The receiving light intensity display is stabilized using the DPC function. *4
The Smart Tuning indicator does not light up	A tuning error has occur or a cause of the error has not been resolved. Alternatively, Power tuning ON / OFF setting is OFF.	Check the description of tuning error, take corrective action, and then perform Smart Tuning again. *6 Alternatively, reset the settings and then perform Smart Tuning again. *5

*1. Refer to "1-2 Input / Output Circuit Diagram" *2. Refer to "5 Detailed Settings"
*3. Refer to "5 Detailed Settings" *4. Refer to "3-2 Convenient Settings"
*5. Refer to "2-3 Initialization" *6 Refer to "2-4 Basic Tuning Method", "3-1 Various Tuning Methods"

Error Display

Error Name / Display	Cause	Remedy
Load Short Circuit Detection Error E-St	Over current flowing to the control output.	Check wiring and connector connection again. *1
Lock ON LoC on	The key lock function enabled	Cancel the key lock function. *2
DPC Error dPC Err	The incident light level has deteriorated due to dust or dirt. Or DPC/ATC does not work.	Wipe the dust off the Fiber Unit detection surface or other relevant areas and recover the original incident light level. Then, perform Smart Tuning. *3 Or check the settings again. *2
ATC Error AtC Err	-	-
EEPROM Error E-nE *	Failed internal data read / out	Turn ON the power again. If the error is not corrected, Hold the [SET] button for 3 seconds or longer → Push the [+] button once → Push the [SET] button once → Push the [+] button once, and reset settings. If the error remains, the error is caused by memory failure such as rewrite count exceeded. Please replace the amplifier unit.

*1. Refer to "1-2 Input / Output Circuit Diagram", 1-5 Ratings and Specifications" *2. Refer to "3-2 Convenient Settings"
*3. Refer to "2-4 Basic Tuning Method, 3-1 Various Tuning Methods"

Tuning Error

Error Name / Display	Cause	Remedy
Near Error nEAR Err	The light level difference between Points 1 and 2 is extremely small.	· 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)
Low Error Lo Err	Incident light level is too low.	-
Over Error ouEr Err	Incident light level is too high.	· Widen the distance between emitter and receiver. (Through-beam model) · Move the Fiber Head away from the sensing object. (Reflection model)
Percentage Tuning Error PEr Err	Incident light level is too high or low.	· Use a thin-diameter Fiber. · Make the distance between emitter and receiver closer. (Through-beam model) · Check the Light ON (L-ON) or Dark ON (D-ON) and the percentage tuning level of the output settings again.

5 Detailed Settings

Hold **[MODE]** button for 3 seconds or longer to enter SET mode. SET mode provides the following function settings. Contents on the leftmost side of each item (thick-frame parts) are factory defaults.

Press **[MODE]** button for shorter than 1 second to select CH1/CH2.
Press and hold the **[MODE]** button for 3 seconds or longer in the setting mode to switch to the detection mode.

- Output Switching** Switching between Light ON (L-ON) and Dark ON (D-ON) (CH1/2 individual setting)
Light ON (L-on) / Dark ON (d-on)
- Detection Function** Changing Light Level and Response Time (CH common setting)
HS High-speed Mode (HS 100) / STND Standard Mode (STND 100) / GIGA Giga Mode (GIGA 800) / SHS Super High-speed Mode (SHS 24)
Response time: 250µs (HS), 1ms (STND), 16ms (GIGA), 100µs (SHS)
Light quantity: 1 (reference), x1, x8, x0.24
The response time differs when the mutual interference prevention function is enabled. Please check 10. Mutual Interference Prevention Function.
- Setting Initialization** Initializing all settings to factory-set defaults (CH common setting)
Setting initialization (rSt no) / Setting initialization selected (rSt YES) / Setting initialization completed and then switch to the detection mode (inIt oK)
Long-press the **[MODE]** button for 7 seconds or longer in the Detection Mode to set this function.
- Selection of EASY / PRO Mode** Changing settings of 5 to 16 (CH common setting)
EASY Mode (EASy) / PRO Mode (Pro)
- Delay Timer Function** Setting Output Timer (CH1/2 individual setting)
Time Off (dELy toFF) / Off-delay Timer (dELy offd) / On-delay Timer (dELy on-d) / One shot (dELy SHot)
After pressing the **[MODE]** button, use the **[+]** button to set the time. (1 to 9999 ms in 1 ms steps; the initial value: 10 ms Error range: 0.2 ms)
- Power Tuning ON / OFF Setting** To Turn ON / OFF the Light Amount Adjustment at Smart Tuning (CH1/2 individual setting)
Power tuning adjustment ON (PtUn on) / Power tuning setting on power-up ON (PtUn Pon) / Power tuning adjustment OFF (PtUn off)
- Power Tuning Level** Changing the Target Incident Light Level (Power Tuning Level) (CH1/2 individual setting)
Use the **[+]** button to set the power tuning level. [100 to 9999 in 1 steps; the initial value: 9999]
- Percentage Tuning** Detecting Transparent or Microscopic object (CH1/2 individual setting)
Percentage tuning OFF (PEr off) / Percentage tuning ON (PEr on)
Press the **[MODE]** button in [PEr on] menu, then use the **[+]** button to set the percentage tuning level. (-99% to 99% in 1% steps; the initial value: -6%)
- DPC Function** Stable Detection Regardless of Incident Light Level Change (CH1/2 individual setting)
DPC OFF (dPC off) / DPC ON (dPC on) / ATC (Function) ON (dPC AtC)
- Mutual Interference Prevention Function** Installing multiple Fiber Heads next to each other (CH common setting)
Mutual interference prevention function OFF (FrE9 off) / Mutual interference prevention function ON (FrE9 on)
Emission cycle settings 1 to 3: FrE9 o-F1 - FrE9 o-F3
Response time is as follows:
Emission Cycle Setting: (3 Units) 700 µs
Detection Function HS: 1.6 ms
Detection Function STND: 1.6 ms
In the case of two E3X-MZVs: Set the first unit to [o-F1] and the second unit to [o-F2].
In the case of one E3X-MZV and one E3X-ZV: Set E3X-MZV to [o-F2] and E3X-ZV to [o-F1].
In the case of one E3X-MZV and two E3X-ZV: Set E3X-MZV to [o-F3], E3X-ZV to [o-F1] [o-F2].
- Output Mode** Changing Output Mode (CH1/2 individual setting)
Normal detection mode (oUt Std) / AND output mode (oUt And) / OR output mode (oUt or) / XOR output mode (oUt xor) / Rising synchronization mode (oUt S.1) / Falling synchronization mode (oUt S.L) / Differential output mode 1 (oUt d.FS) / Differential output mode 2 (oUt d.F4) / Differential output mode 3 (oUt d.F3) / Differential output mode 4 (oUt d.F2) / Differential output mode 5 (oUt d.F1)
Response time: 100 ms (oUt d.FS), 10 ms (oUt d.F4), 1 ms (oUt d.F3), 500 µs (oUt d.F2), 250 µs (oUt d.F1)
The differential output modes 1 to 5 is turned on if the difference when compared with the received light intensity before the response time exceeds the threshold level. The differential output modes can be set by setting the detection function to HS. Also set DPC (ATC) function setting to OFF.

- Emission Level Adjustment Function** Increasing / decreasing emission power (CH1/2 individual setting)
Emission Level (L 100 9999)
The red digital display shows the incident light level.
The emission level can be increased / decreased with the **[+]** button. (L100 to 1. Initial value: L100)
The emission level is updated when Smart Tuning is executed. The emission level can also be adjusted by increasing / decreasing it after Smart Tuning using the emission level adjustment function. However, since the light receiving sensitivity cannot be changed, the results of Smart Tuning cannot be reproduced. Depending on your environment, it may not work properly when the emission level is set low.
The emission level alone can be set by long-pressing both the **[MODE]** button and the **[+]** button for 3 seconds or longer in the Detection Mode.
- Digital Display** Changing Digital Display in RUN Mode for Specific Purpose (CH common setting)
Threshold / Receiving light amount (di SP Std) / Threshold (di SP PEr) / Receiving light amount (di SP P-b) / Threshold (di SP bAR) / Receiving light amount (di SP dGdG) / Receiving light amount (di SP FrE9) / Receiving light amount (di SP PEARL)
When 11. Output Mode is Differential output modes, (a), (b), (c), (d) and (g) cannot be used.
(a) To see the reserve of the light intensity level for the threshold
(b) To set the threshold with a microscopic object or fast-moving object
(c) To see the intuitive and easy to follow display
(d) To adjust the beam mutual interference prevention function
(e) To know the setting state of the mutual interference prevention function
(g) To see the received light intensity of CH1/CH2 simultaneously
- Inverted Display** Mounting Amplifier in Inverted Direction The display reverses. (CH common setting)
Normal (rEv off) / Reverse (rEv on)
- Eco Function** Saving Power Consumption (CH common setting)
Eco function OFF (ECo off) / Eco function ON (ECo on)
The indicators (green digital and red digital) turn OFF. They turn ON for approx. 10 seconds and then turn OFF by button operation.
- User Save / Reset Functions** Saving / Reading Settings (CH common setting)
User Save (USER SAVE) / User Reset (Reading of settings) (USER rSt)
All the settings including Smart Tuning results are saved with the user save function. Contents saved by the user save function are not cleared by the setting initialization.
In CH1/2 individual setting, lights up when CH1 is selected, and lights up when CH2 is selected.
In CH common setting, both CH indicator lights will light up.

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