

3 Convenient Setting Features

3-1 Various Smart Tuning Methods

When Received Light Intensity Decreases due to Dust or Dirt

Maximum Sensitivity Tuning

Long-press the 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 [IPnt] → [FULL].

Incident light level setting: The incident level when the button pressed is adjusted to "0".
Threshold setting: The value is set to approx. 7% of the incident light level when the button pressed.
If the incident light level when the 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

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

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

Determine Workpiece Position

Position Tuning

- Press the button without a workpiece in the area.
The green digital display changes [IPnt].
- Place the workpiece at the desired position and hold the button for 3 seconds or longer.
The green digital display changes [ZPnt] → [Pa5].

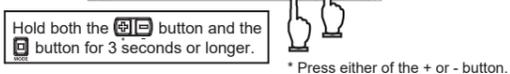
Incident light level setting: The Step 2 incident level is adjusted to half the power tuning level.
Threshold setting: Set to the same value as the Step 2 incident level.

3-2 Convenient Settings

Preventing Malfunction

Key Lock Function

Disables all button operations.
Enable / Cancel (Same procedure)



* Press either of the + or - button.

Returning Received Light Intensity Display to "0"

Zero Reset Function

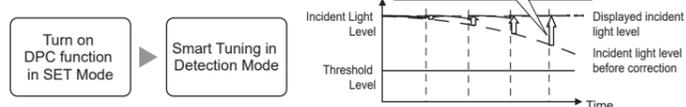
Enable: Hold both the button and the button for 3 seconds or longer.
Cancel: Hold both the button and the button for 3 seconds or longer.

The zero reset function is canceled when either of the DPC function / differential function / Smart Tuning is performed. When DPC (ATC) function or the differential output modes are performed, 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)

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. *2
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. *2 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. *2
Incident light level displayed in a negative value	The zero reset function is enabled.	Cancel the zero reset function. *3
Lost tracking of the settings made	-	Reset the settings. *4
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. *3
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. *5 Alternatively, reset the settings and then perform Smart Tuning again. *4
The incident light level at which the output turns ON and turns OFF is different.	To prevent output chattering, hysteresis is set automatically.	If this difference in detection is large, the margin of detection may be low. Review the installation and response time of the Fiber Head, and perform Smart Tuning again. *5

*1. Refer to "1-2 Input / Output Circuit Diagram" *2. Refer to "3 Detailed Settings"
*3. Refer to "3-2 Convenient Settings" *4. Refer to "3-3 Initialization"
*5 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 button for 3 seconds or longer → Push the button twice → Push the 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) · Use a thin-diameter Fiber.
Percentage Tuning Error [PEr Err]	Incident light level is too high or low.	· 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 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.

1. Output Switching

Switching between Light ON (L-ON) and Dark ON (D-ON)

Light ON: [L-on] | Dark ON: [d-on]

11. Output Mode

Changing Output Mode

Normal detection mode: [OUT Std]

Differential output mode 1: [OUT d.F1] (Response time: 250 μs)
Differential output mode 2: [OUT d.F2] (Response time: 500 μs)
Differential output mode 3: [OUT d.F3] (Response time: 1 ms)
Differential output mode 4: [OUT d.F4] (Response time: 10 ms)
Differential output mode 5: [OUT d.F5] (Response time: 100 ms)

2. Detection Function

Changing Light Level and Response Time (Incident Light Level Example)

Detection function	HS	STND	GIGA	SHS
Response time	250 μs	1 ms	16 ms	50 μs
Light quantity	1 (reference)	x1	x8	x0.24

HS High-speed Mode | STND Standard Mode | GIGA Giga Mode | SHS Super High-speed Mode

The response time differs when the mutual interference prevention function is enabled. Please check 10. Mutual Interference Prevention Function.

12. Emission Level Adjustment Function

Increasing / decreasing emission power

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. 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 button and the button for 3 seconds or longer in the Detection Mode.

3. Setting Initialization

Initializing all settings to factory-set defaults

Setting initialization: [rSt no] → [rSt YES]

Long-press the button for 7 seconds or longer in the Detection Mode to set this function.

Setting initialization completed and then switch to the detection mode

13. Digital Display

Changing Digital Display in RUN Mode for Specific Purpose (Display Example)

Threshold / Receiving light amount: [di SP Std]

(a) To see the reserve of the light intensity level for the threshold: [di SP PEr] (Threshold: 2000, Receiving light amount: 1500)
(b) To set the threshold with a microscopic object or fast-moving object: [di SP P-b] (Threshold: 8000, Receiving light amount: 2000)
(c) To see the intuitive and easy to follow display: [di SP bAr] (Threshold: 3500, Receiving light amount: 3000)
(d) To adjust the beam: [di SP F-rEQ] (Emission cycle setting: 3500, 3000)
(e) To know the setting state of the mutual interference prevention function: [di SP PErL] (Emission cycle setting: F-F 19999)

When 11. Output Mode is Differential output modes, (a), (b), (c) and (d) cannot be used.

4. Selection of EASY / PRO Mode

Changing settings of 5 to 16

EASY Mode: [EASy] | PRO Mode: [Pro]

Function Selection: [EASy] | Function Selection: [Pro]

5. Delay Timer Function

Setting Output Timer

After pressing the 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)
For ZV6M / ZV8M: (0.1 to 0.5 ms in 0.1 ms steps; 0.5 to 5 ms in 0.5 ms steps; 5 to 9999 ms in 1 ms steps; the initial value: 10 ms Error range: 0.1 ms)

Time Off: [dELy toFF] | Off-delay Timer: [dELy oFFd] | On-delay Timer: [dELy on-d] | One shot: [dELy SHot] | On/Off-delay Timer: [dELy onOff]

Only ZV6M/ZV8M can be selected.

6. Power Tuning ON / OFF Setting

To Turn ON / OFF the Light Amount Adjustment at Smart Tuning

Power tuning adjustment ON: [PtUn on] | Power tuning setting on power-up ON: [PtUn Pan] | Power tuning adjustment OFF: [PtUn off]

7. Power Tuning Level

Changing the Target Incident Light Level (Power Tuning Level)

Use the button to set the power tuning level. [100 to 9999 in 1 steps; the initial value: 9999]

Power tuning level: [P-Lu 9999]

8. Percentage Tuning

Detecting Transparent or Microscopic object

Percentage tuning OFF: [PEr off] | Percentage tuning ON: [PEr on]

Press the 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%)

9. DPC Function

Stable Detection Regardless of Incident Light Level Change

DPC OFF: [dPC off] | DPC ON: [dPC on] | ATC (Function) ON: [dPC ATC]

10. Mutual Interference Prevention Function

Installing multiple Fiber Heads next to each other

Mutual interference prevention function OFF: [FrEQ off] | Mutual interference prevention function ON: [FrEQ on]

Unit Number Priority Mode: [FrEQo-F1] to [FrEQo-F4] (Emission cycle settings 1 to 4)
Response time is as follows:
Emission Cycle Setting | Detection Function HS | Detection Function STND
[o-F 1 to o-F 4 (4 Units)] | 700 μs | 1.6 ms

Response Time Priority Mode: [FrEQF-F1] to [FrEQF-F3] (Emission cycle settings 1 to 3)
Response time is as follows:
Emission Cycle Setting | Detection Function HS | Detection Function STND
[F-F 1 to F-F 2 (2 Units)] | 350 μs |
[F-F 1 to F-F 3 (3 Units)] | 400 μs |

Variation in received light intensity when multiple Fiber Heads are installed next to each other is reduced by setting emission cycles for each amplifier. It is not necessary to install fiber amplifiers in close contact with each other. The Unit Number Priority Mode and the Response Time Priority Mode cannot be mixed.
In the Unit Number Priority Mode, set the detection function to HS (STND, and, in the Response Time Priority Mode, to HS. Furthermore, set the output mode to other than the differential output mode.

14. Inverted Display

Mounting Amplifier in Inverted Direction

The display reverses. Normal: [rEv off] | Reverse: [rEv on]

Threshold and light intensity are displayed on green digital and red digital respectively.

15. Eco Function

Saving Power Consumption

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.

16. User Save / Reset Functions

Saving / Reading Settings

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.

User Save (Saving of settings): [USER SAuE] | User Reset (Reading of settings): [USER rSt]

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