Optical fiber sensor FD3 series

Operation manual

LANBAO
FD3-NB11R
Optic Amplifier
NO.V123456
MADE IN CHINA

Precautions

- Please make sure that the power supply voltage is within the rated value before powering on
- The sensor can be detected normally until 100ms after the power is turned on
- When using different power sources for the sensor and load, be sure to turn on the power of the sensor first
- When the sensor is not used, it is recommended to cut off the power of the load first and then turn off the power of the sensor
- Do not subject the sensor to severe external forces (such as hammer hits, etc.) during installation, so as not to damage the sensor performance
- Avoid using thinner, alcohol or other organic solvents when cleaning

Safety Warning

- Do not use in an environment with flammable, explosive or corrosive gases
- Do not use in oil or chemical environments
- Do not use in a high humidity environment
- Do not use in direct sunlight
- Do not use in other environmental conditions that exceed the rated value
- Do not disassemble, repair or modify this product without authorization

Scrap Treatment

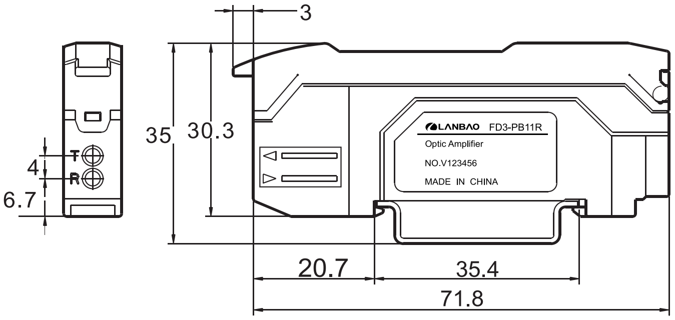
- When the product is scrapped, please dispose of it as industrial waste

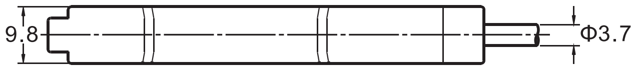
Technical specifications

Model	NPN	FD3-NB11R
	PNP	FD3-PB11R
Light source		Red LED
Response time		50μs(HIGH SPEED)/ 250μs(FINE) / 1ms(SUPER) / 16ms(MEGA)
Output state		NO/NC optional
Delay function		Off-delay timer/on-delay timer/single timer
Control output		NPN: load current:≤100mA; remaining voltage:≤1V PNP : load current:≤100mA; remaining voltage:≤1V
Circuit protection		Short circuit protection, overload protection, reverse polarity protection
Supply voltage		12...24VDC±10%,Ripple(P-P):≤10%
Power consumption *		NPN:normal:≤900mW(for 24V,≤36mA;for 12V:≤48mA) power save mode:≤800mW(for 24V,≤32mA;for 12V:≤39mA)
		PNP:normal:≤950mW(for 24V,≤39mA;for 12V:≤52mA) power save mode:≤850mW(for 24V,≤35mA;for 12V:≤44mA)
Anti ambient light		Incandescent:≤3,000lux;Daylight:≤10,000lux
Ambient temperature		-20...55℃(No freezing)
Environment humidity		35...85%RH(No condensation)
Vibration resistant		10...55Hz,Dual amplitude1.5mm(2h each for X,Y,Z direction)
Impulse withsand		500m/s^2,3 times each for X,Y,Z direction
Housing material		PC
Connection		2m PVC Cable
Weight		About 66g
Accessories		Operation manual 、mounting bracket

*High speed mode makes an increase of 160mW（7mA) power consumption

Dimensions





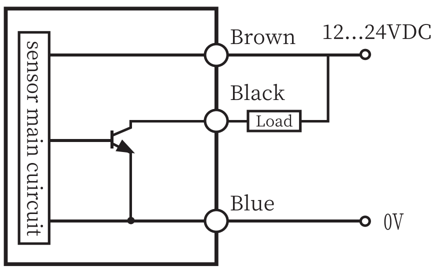
3-pins×Brown/Blue/Black:0.34mm^2 Cable length:2m

unit:mm

■ Wiring diagram

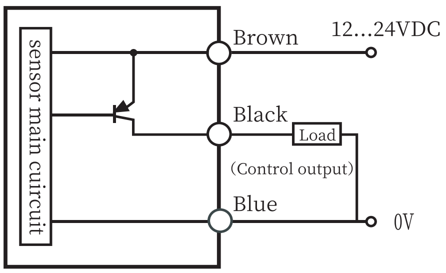
Toggle the power selector switch and then two different channel (NPN/PNP) types will be outputed

FD3-NB11R


sensor main cuircuit
Brown
12...24VDC
Black
Load
Blue
0V

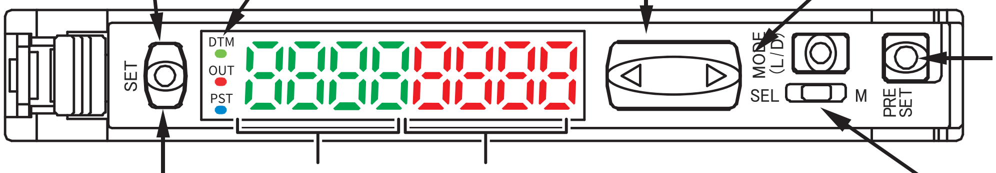
NPN

FD3-PB11R


sensor main cuircuit
Brown
12...24VDC
Black
Load
(Control output)
Blue
0V

PNP

■ Product diagram


SET
DTM
OUT
PST
MODE (L/D)
SEL
M
PRE SET

Set button(SET)

DTM indicator
OUT working status indicator light
PST indicator

Fine adjustment of sensitivity

Minus ◁ ▷ Plus

Mode/Output*
Press the [MODE] button, and then put it to use ◁ ▷ Select L-ON or D-ON

Preset function
When receiving light, it can be easily configured with one click

Set value

Light intensity

Sensitivity setting
Press the button each time when there is/ no workpiece

MEGA Selective switch*
SEL ◫ M
Standard MEGA□ (fixed)

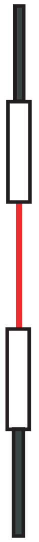
■ Calibration mode

- Detect very subtle differences

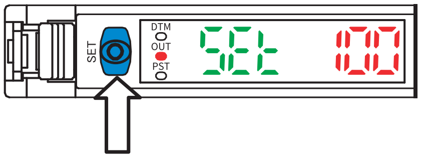
Two-point calibration

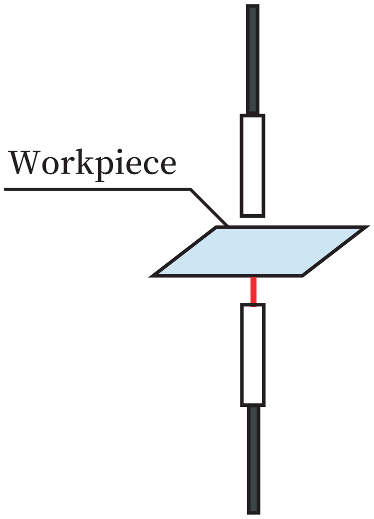
Two-point calibration is the basic method of calibration.
You can set the sensitivity by pressing the [SET] button twice.
Press it once when placed and not placed.

Through beam type setting mode

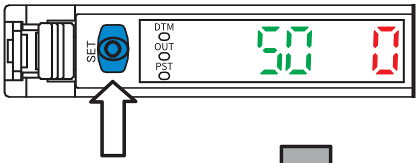


Press the [SET] button when
there are no workpieces



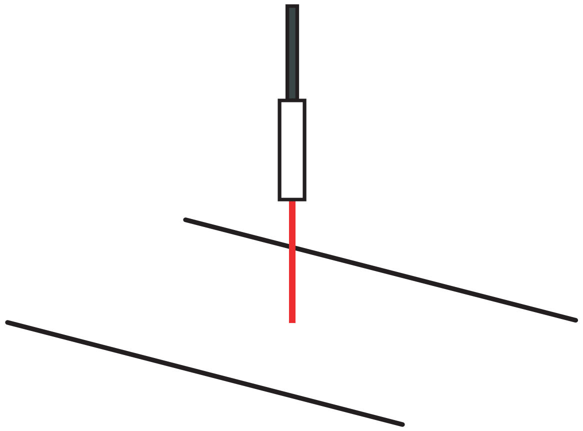


Press the [SET] button when
there are workpieces

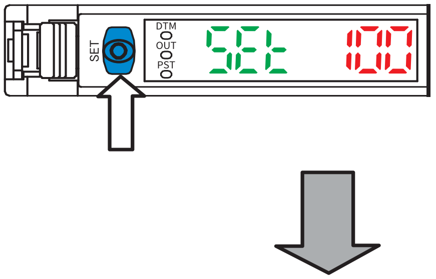


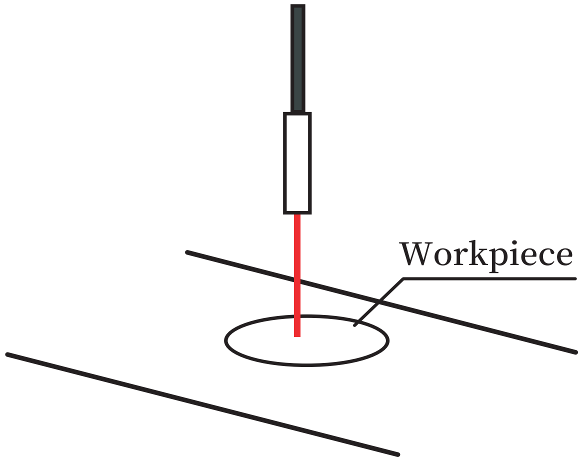
Setting completion

Reflective-type setting mode

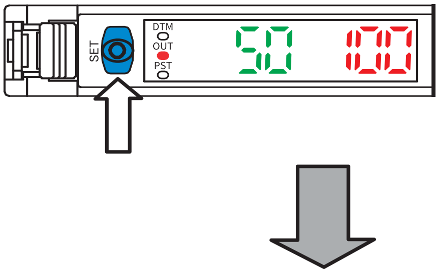


Press the [SET] button when
there are no workpieces


SET
DTM
OUT
PST
SEt
100



Press the [SET] button when
there are workpieces


SET
DTM
OUT
PST
50
100

Setting completion

Two-point calibration works on the basis of whether there are workpieces or not.
The set point is the middle value of the above-mentioned two cases.
If the difference between the two cases is too small, “---” will flash for about two seconds after the calibration is completed.

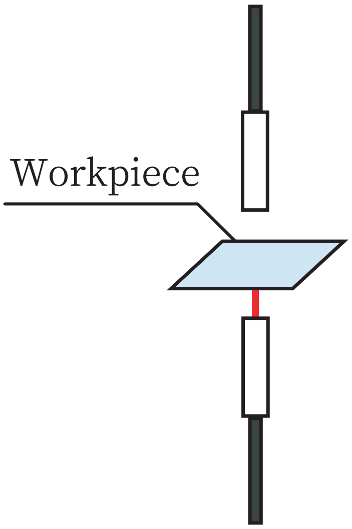
■ Other modes of calibration

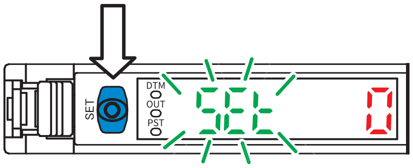
- Enhance the applicability in harsh environments such as dust

Maximum sensitivity setting

In the case shown below, press the [SET] button for more than 3 seconds. When the SEt button flashes, release the button.
The set sensitivity is slightly higher than the received light intensity.

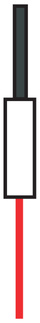
Through beam type : Workpiece

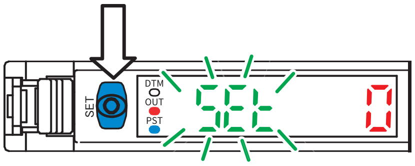




Press and hold for
more than 3 seconds

Reflective-type : No workpiece





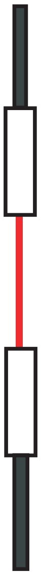
Press and hold for
more than 3 seconds

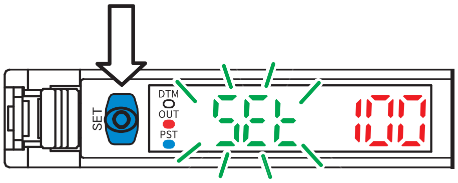
■ Calibrate the moving workpiece

● Automatic calibration

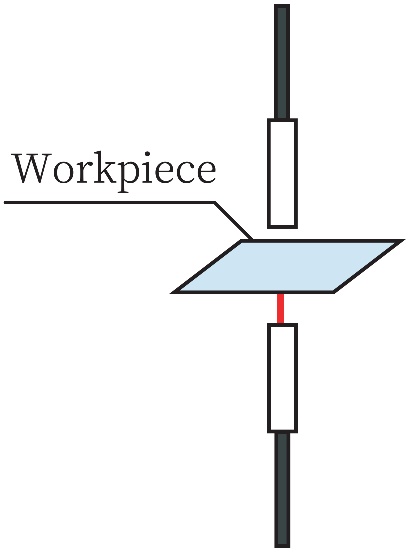
Press and hold the [SET] button without placing workpieces. When “SEt” (Set) flashes, let workpieces through the sensing area. (Pre and hold the [SET] button while the workpieces passing through the sensing area.)

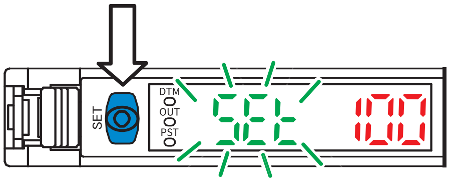
Through beam type and Reflective-type Unanimous





Press the button until “SEt” (SET) flashes





Press the [SET] button when the workpieces pass through the sensing area

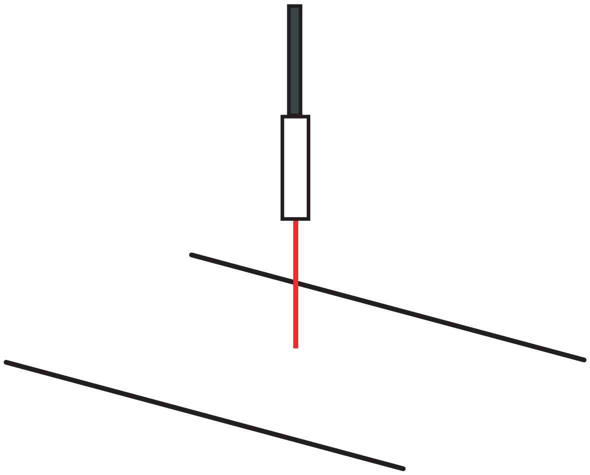
Setting completion

■ Calibrate fixed workpieces.

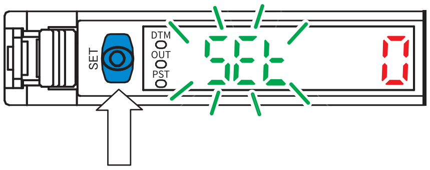
● Location calibration

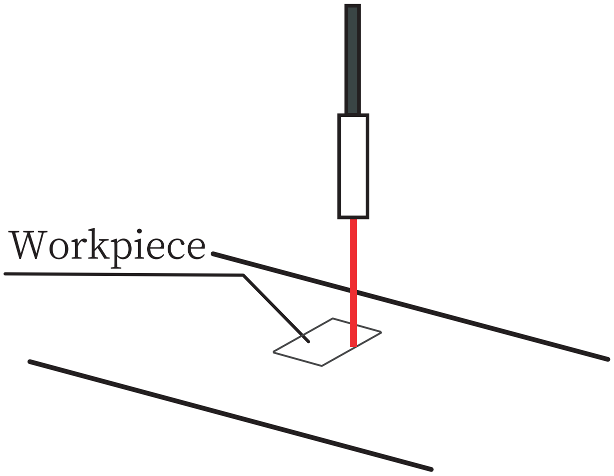
Press and hold the [SET] button without placing workpieces. Placin the workpieces where they are needed. Press the [SET] button for least 3 seconds. When the "SEt" [SET] flashes, release the butto When placing the workpieces, make sure that the edge of the work ieces is aligned with the center of the beam.

Through beam type and **Reflective-type** Unanimous

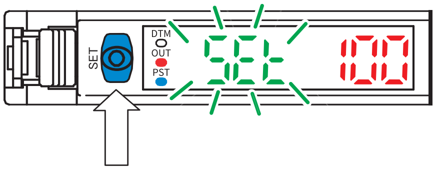


Press the [SET] button when there are no workpieces





Press the [SET] button when there are workpieces



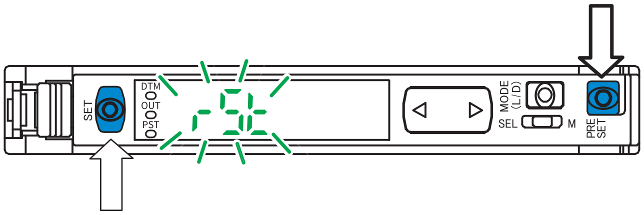
Press the button until "SEt" (SET) flashes

Setting completion

■ Initialization setting

● Initialization mode

1、Press and hold both buttons [SET] and [PRESET] for 3 seconds at the same time.



Press and hold for
more than 3 seconds

2、Use ◁ ▷ to select " rSt" ,and then press the [MODE] button

3、Use ◁ ▷ to select " init" ,and then press the [MODE] button

When the initialization completes, the module redisplays the current value.

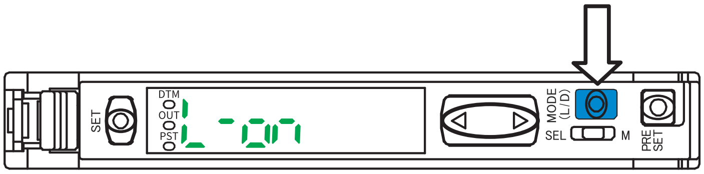
● Initial setting

Set	Initial value
Power mode	FINE
Detection mode	Std(normal)
set value	200
Switch of output	L-on

■ Switch of output

Optional mode is light on (L-on) or dark on (D-on)

1、When the current value is displayed, press the [MODE] button.



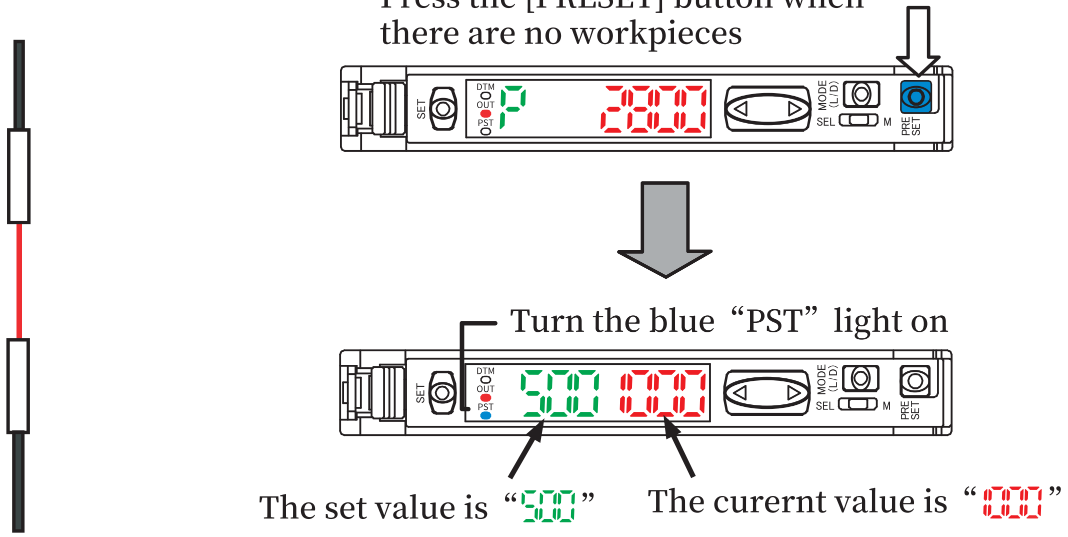
2、Use ◁ ▷ switch to the output(L-on d-on),and then press the [MODE] button again. After the output switch is completed, the module reapprears to display the current value.

■ Error display and corrective measures

Error display	ERC	ERE	END APC	LOC
Cause	Over-current exists in the control output	The internal data writing/ loading fails	Overload on the light source	Activate the key lock function
Solution	Detect the load and restore the current to the rated range	Perform initialization	Replace the sensor if you need high precision detection	Please refer to《FD3-*B11R User Manual》for the disable (setting) methods.

■ Preset function (through beam type)

When the light is received,press the [PRESET] button.Set the current value to “1000”.


Press the [PRESET] button when there are no workpieces

Turn the blue “PST” light on

The set value is “500”

The curernt value is “1000”

Press the [PRESET] button to change the set value and current value.

Apply preset when disable preset.

The set value is “500” . The set value can be changed through normal calibration.

Apply preset when activate preset.

The set value remain unchanged only when the current value is “1000” .

Note

The preset function and the zero shift function cannot be used at the same time. If you want to use the zero shift function, then make sure to turn off the preset function. This mode is not suitable for transparent workpieces or other detection environments with low light intensity difference.

• Disable the preset function

Press the [PRESET] button to disable the preset function.

When the preset function is disabled, the set value and current value remain the same.

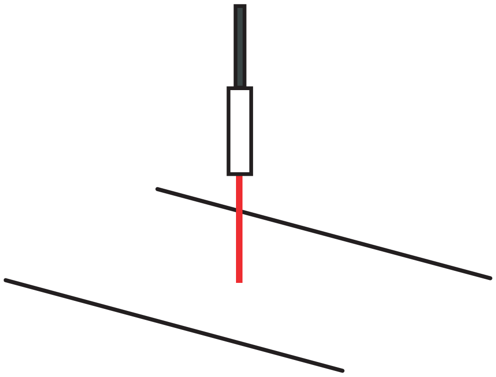
Preset function plays a convenient role

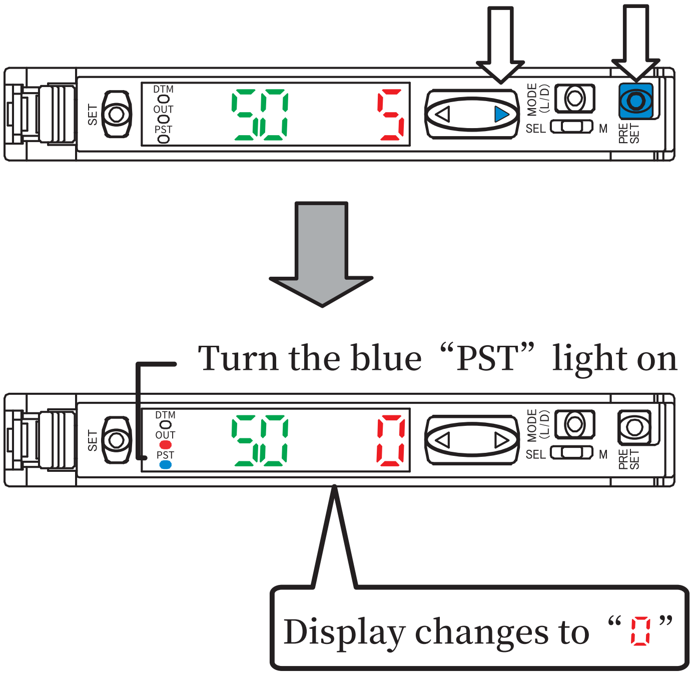
⚠ **Prompt**

This function is most suitable for situations where a simple detection is performed for the use of through beam optical fiber unit.
(For example: completely blocked detection. All optical axes of fiber unit are blocked by non-transparent workpieces)

■ Zero shift function (Reflective)

The function is mainly used for reflective types.
Press the two buttons [PRESET] and [▶] at the same time.
The current value is "0".





Turn the blue "PST" light on

Display changes to "0"

Note

The zero shift function and the preset function cannot be used at the same time
If the use of preset is necessary,please turn off the zero shift function first.

- Disable the zero shift function

Press the [PRESET] button to disable the zero shift function.

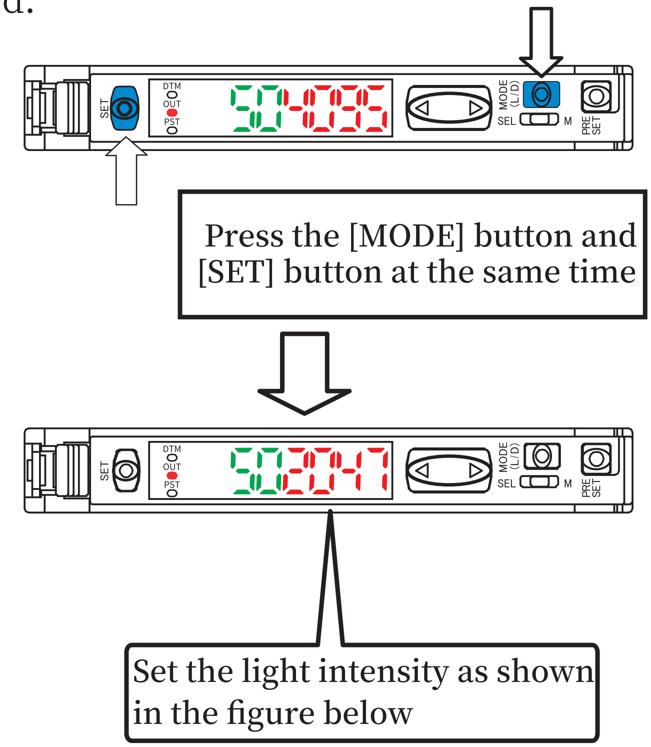
Prompt

The zero shift function plays a convenient role

This function is mainly used to set the current value to "0" for reflective optical fiber unit.
After the reflective fiber unit is installed, the light intensity is sometimes not set to "0".
In this case, use the zero shift function to set the value to "0" when there are no workpieces, so as to make the light intensity difference more noticeable.

■ Saturation recovery function

Press the [MODE] button and the [SET] button simultaneouly to enable the saturation recovery function.
Then the optical transmission level and the light intensity gain will be automatically callibrated.



Press the [MODE] button and [SET] button at the same time

Set the light intensity as shown in the figure below

Power mode	Intensity setting range
HIGH SPEED、FINE	2047±350
SUPER	4095±500
MEGA	5000±600

- Disable the saturation recovery function

After enabling the saturation recovery function, press two buttons [MODE] button and [SET] button at the same time to cancel the enabling of this function.

Saturation recovery function plays a convenient role

Prompt

This function is especially effective in the case where the light intensity value is saturated after installation.
This function automatically calibrates the optical transmission level and the light intensity gain through simple operation, so as to realize the correction saturation.

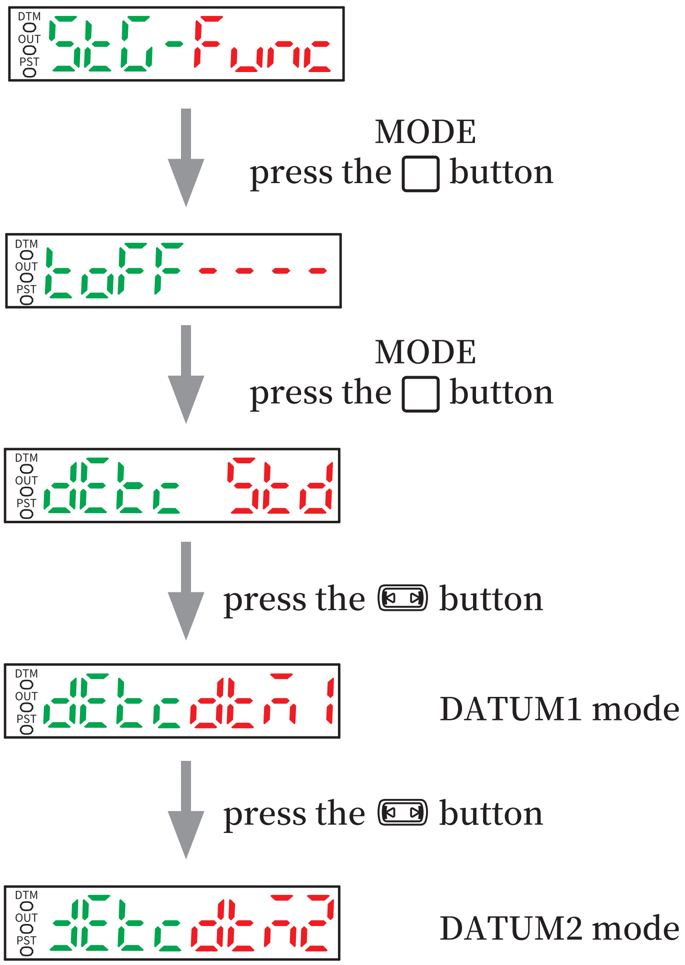
■ DATUM mode

The DATUM mode through beam type is suitable for environments where the intensity of the received light changes gradually.
For example, in the environments where optical fiber modules are vulnerable to be polluted or temperation changes drastically.

The DATUM mode is only suitable for the environments with strong reflective background and weak target reflection, such as black buttons on the white cloth.

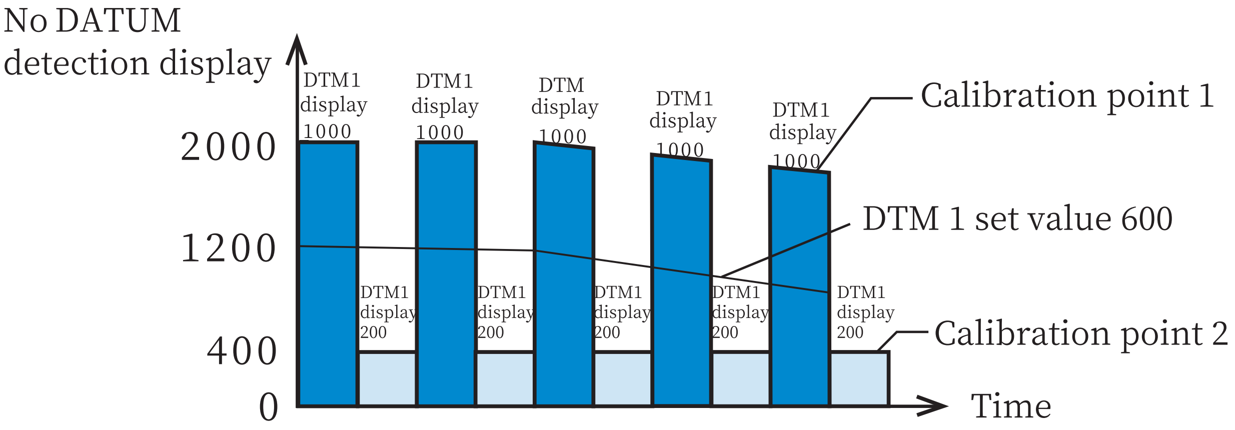
In DATUM mode reflective type, the received light intensity without workpieces is always corrected to “1000” (for DATUM1) or “ 0 ” (for DATUM2). In addition, the set value is also corrected according to the amount of correction, so that the set value and the received light intensity remian the same, in this way, the stability detection will be achieved. The display of the set value won't change.

Enter the DATUM operation mode


DTM
OUT
PST
MODE
press the ☐ button
MODE
press the ☐ button
press the button
DATUM1 mode
press the button
DATUM2 mode

■ Sensitivity setting in DATUM1 mode

The sensitivity setting value is always automatically corrected. Thus when there are no workpieces, the received light intensity is "1000" .

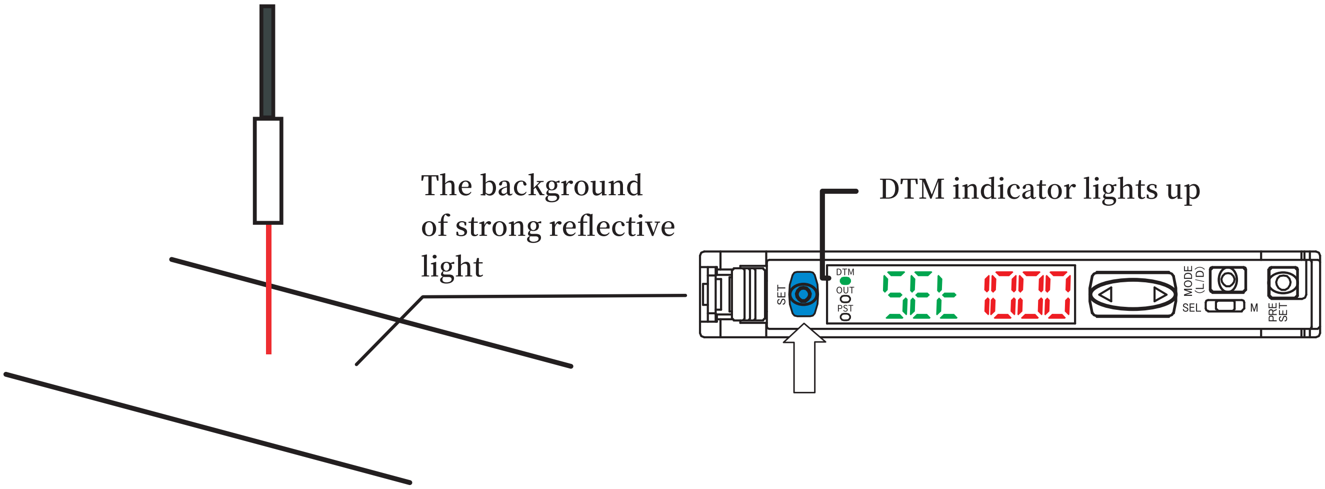


The following sensitivity setting step is an example of two-point calibration. (the received light intensity is "1000" when there are no workpieces; the received light intensity is "200" when there are workpieces.)

Through beam type and **Reflective-type** Unanimous

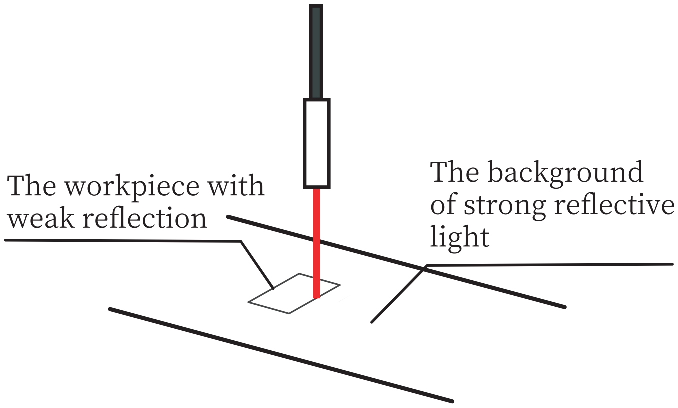
Press the [SET] button when there is no workpiece.

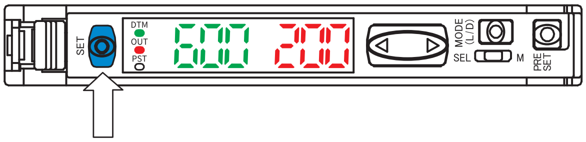
Calibration point 1


The background of strong reflective light
DTM indicator lights up
SET
DTM
OUT
PST
SEt
1000
MODE (L/D)
SEL
M
PRE SET

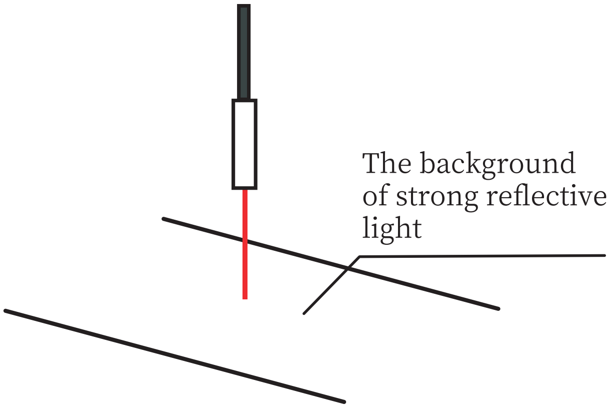
Press the [SET] button when there are workpieces

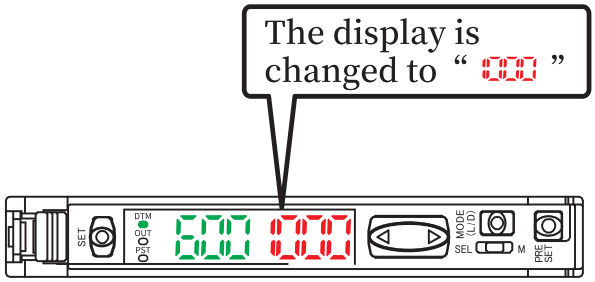
Calibration point 2


The workpiece with weak reflection
The background of strong reflective light


SET
DTM
OUT
PST
600
200
MODE (L/D)
SEL
M
PRE SET

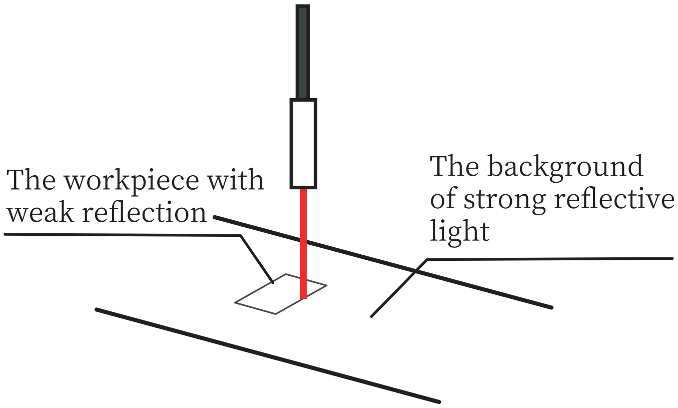
In the full light receiving state, the received light intensity displays “ 1000 ” .

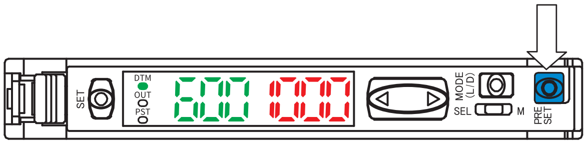

The background of strong reflective light


The display is changed to “ 1000 ”
SET
DTM
OUT
PST
600
1000
MODE (L/D)
SEL
M
PRE SET

Note

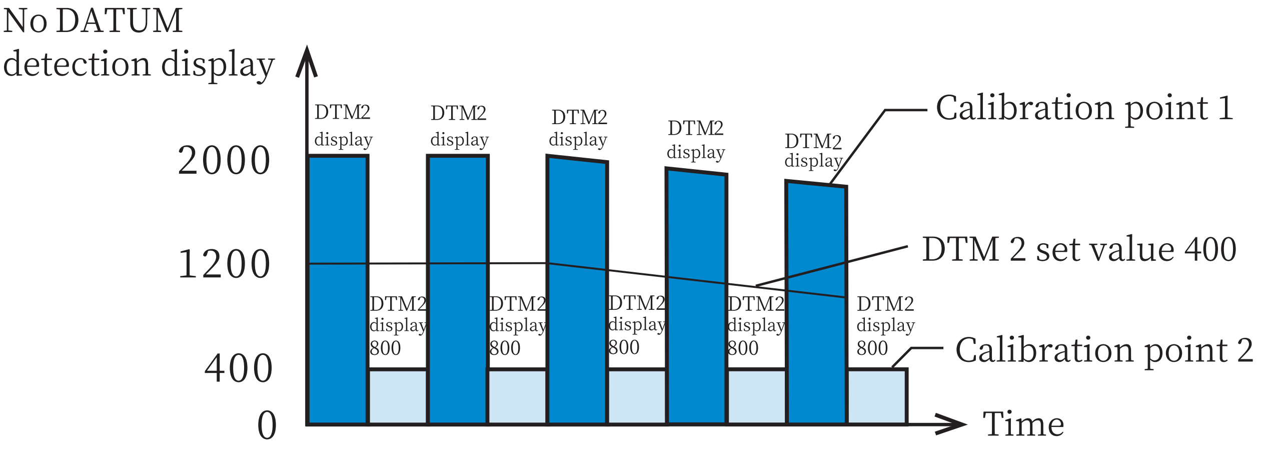
Press the [PRESET] button when the displayed value without workpieces is below “1000” , and does not reach “1000” after 30 seconds. In this way, the received light intensity will be corrected to “1000” . Calibration is complete when the received light intensity stops flashing.


The workpiece with weak reflection
The background of strong reflective light


SET
DTM
OUT
PST
600
1000
MODE (L/D)
SEL
M
PRE SET

Sensitivity setting in DATUM2 mode

The sensitivity setting value is always automatically corrected. Thus when there are no workpieces, the received light intensity is “0”.

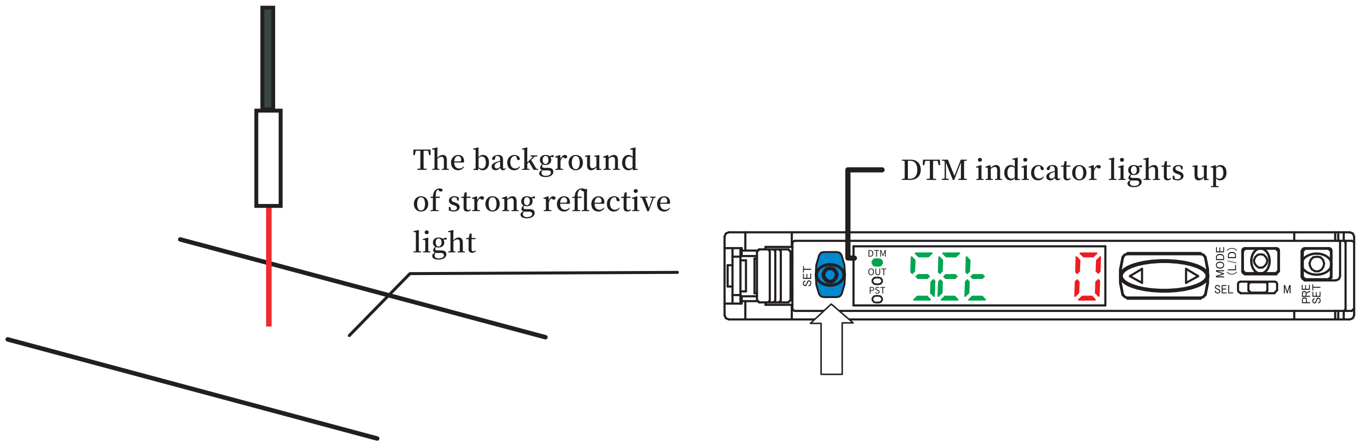


The following sensitivity setting step is an example of two-point calibration. (The received light intensity is “0” when there are no workpieces; the received light intensity is “800” when there are workpieces.)

Through beam type and **Reflective-type** Unanimous

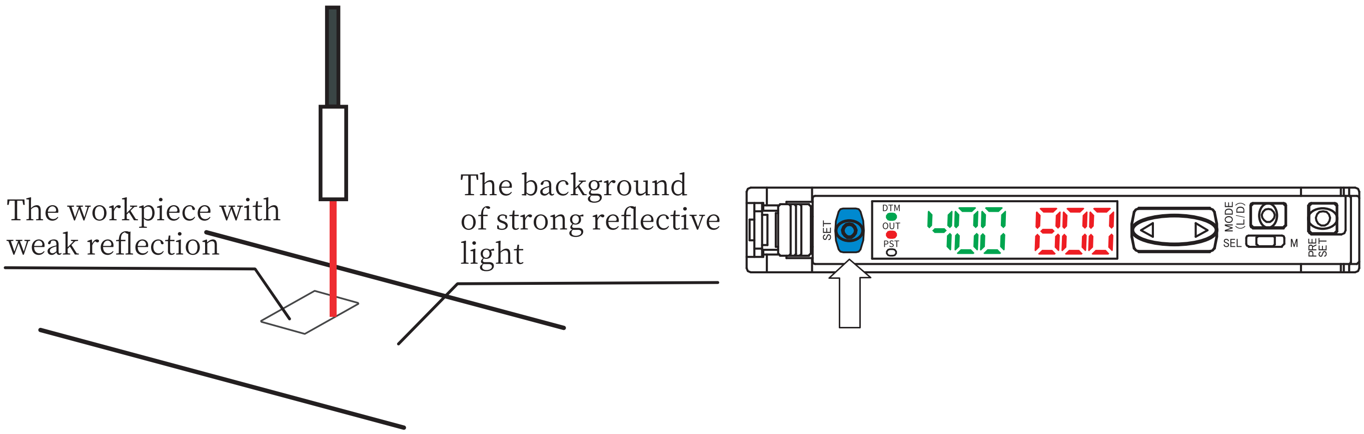
Press the [SET] button when there is no workpiece.

Calibration point 1

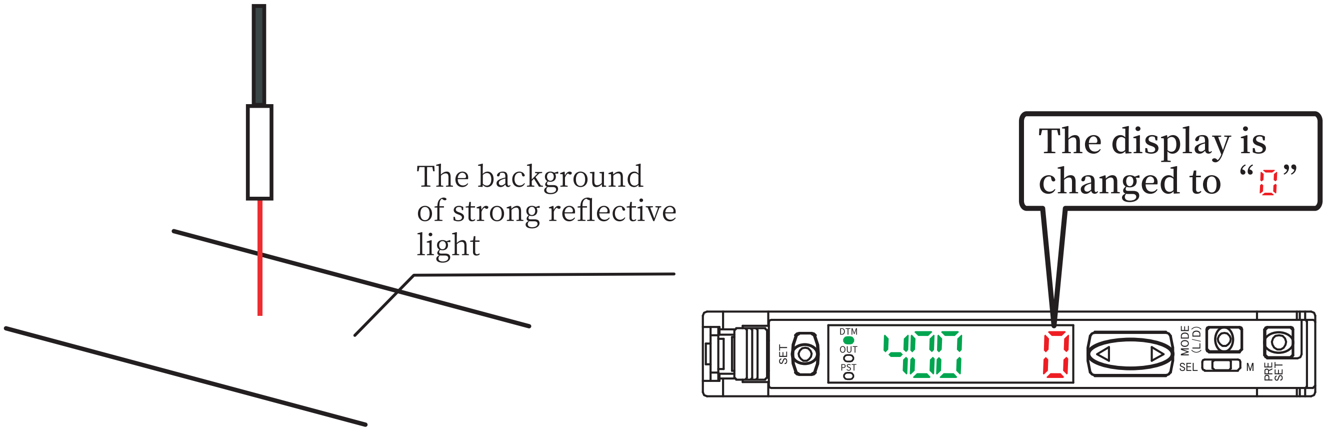

The background of strong reflective light
DTM indicator lights up
SET
DTM
OUT
PST
SEL
0
MODE (L/D)
SEL
M
PRE SET

Press the [SET] button when there are workpieces

Calibration point 2

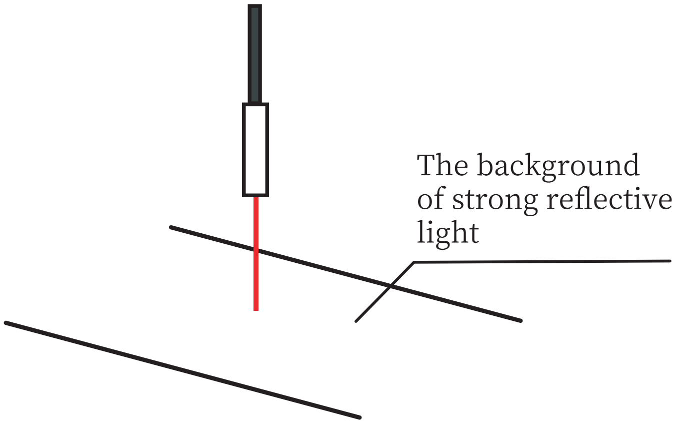

The workpiece with weak reflection
The background of strong reflective light
SET
DTM
OUT
PST
400
800
MODE (L/D)
SEL
M
PRE SET

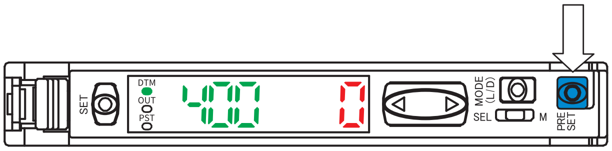
In the full light receiving state, the received light intensity displays “0”.


The background of strong reflective light
The display is changed to “0”
SET
DTM
OUT
PST
400
0
MODE (L/D)
SEL
M
PRE SET

Note

When there are no workpieces, if the value displayed is greater than “0” and does not reach “0” after 30 seconds, presss the [PRESET] button. This operation will correct the received light intensity to “0”. When the received light intensity stops flashing, calibration is complete.

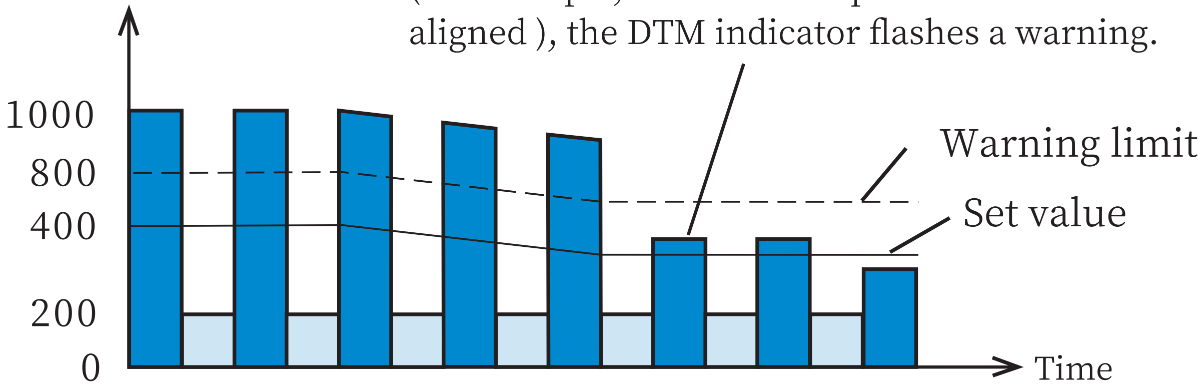

The background
of strong reflective
light

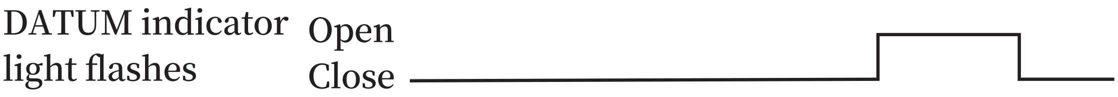

SET
DTM
OUT
PST
400
0
MODE
(L/D)
SEL
M
PRE
SET

- **Change the warning output level**

DATUM warning value refers to the middle value between the light intensity received by no workpieces and the set value. If the received light intensity falls between the warning value and the set value, the received light intensity will stop correcting, and the DTM indicator light flashes as a warning.

If the received light intensity fails to rise to the warning value when there are no workpieces, (for example, because the optical axis is not aligned), the DTM indicator flashes a warning.

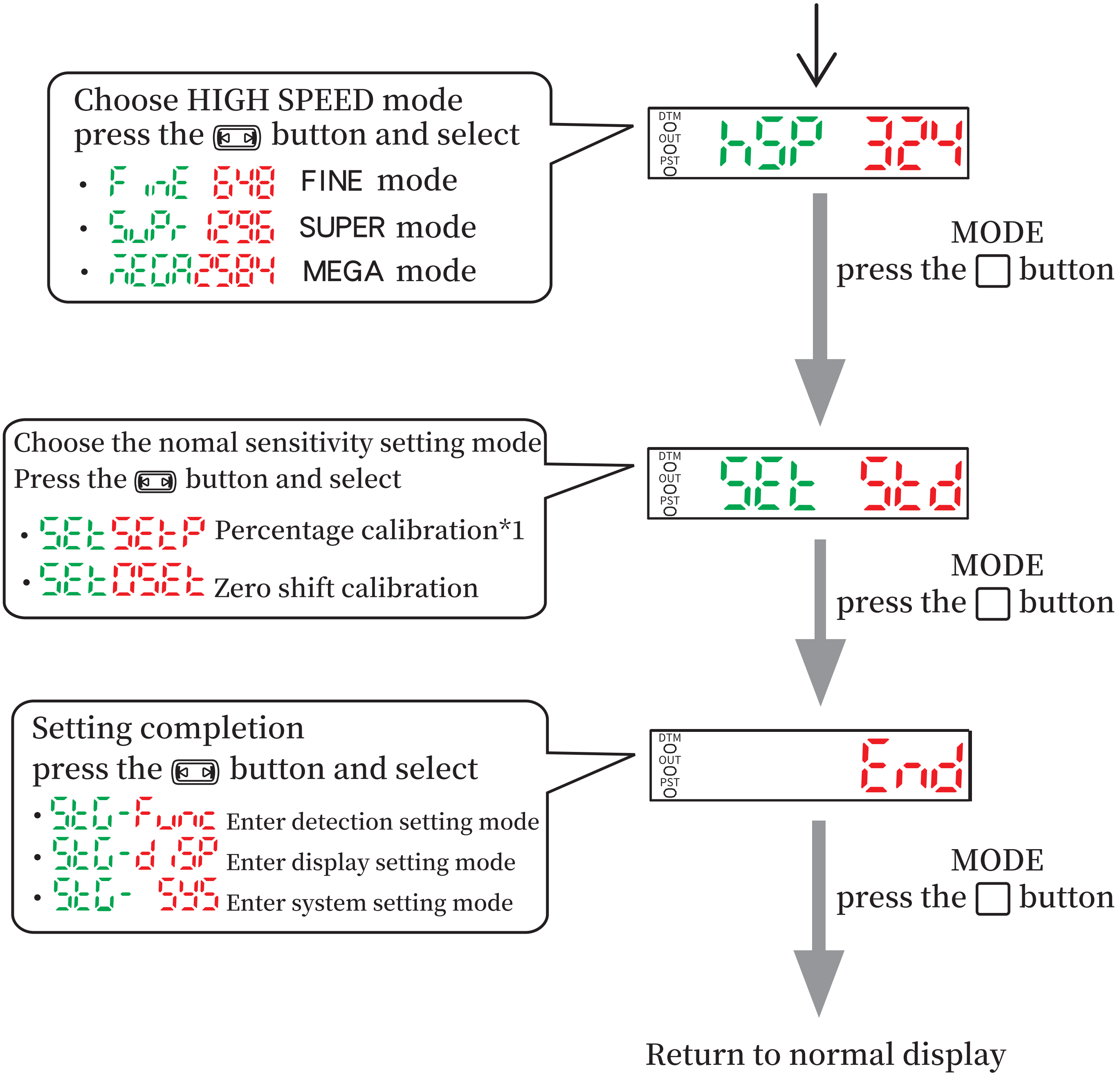



DATUM indicator
light flashes
Open
Close

Functional configuration

Basic setting

Press and hold the button MODE ☐ for more than 3 seconds



Choose HIGH SPEED mode
press the ◁▷ button and select
- FinE 648 FINE mode
- SuPr 1296 SUPER mode
- MEGA2584 MEGA mode

Choose the nomal sensitivity setting mode
Press the ◁▷ button and select
- SEtSEtP Percentage calibration*1
- SEtOSEt Zero shift calibration

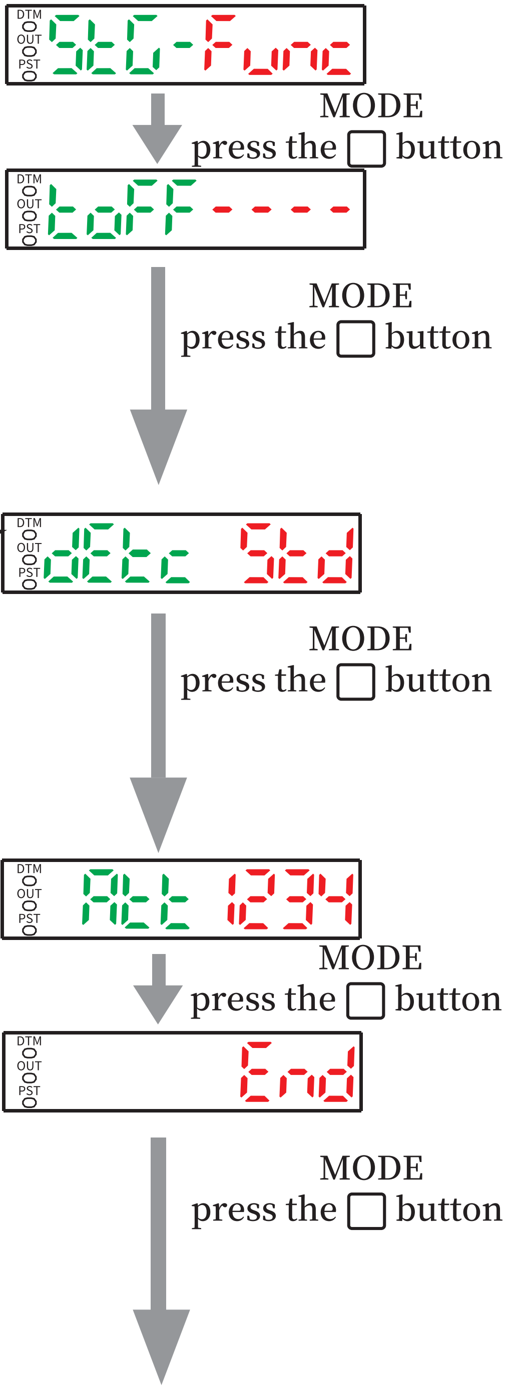
Setting completion
press the ◁▷ button and select
- StG-Func Enter detection setting mode
- StG-dISP Enter display setting mode
- StG- SYS Enter system setting mode

DTM
OUT
PST
hSP 324
MODE
press the ☐ button
SEt Std
MODE
press the ☐ button
End
MODE
press the ☐ button

Return to normal display

*1. You can press the MODE ☐ button to set the value in the range of -99P to 99P

■ Detection setting


DTM OUT PST
SEt-Func
MODE
press the ☐ button
toFF----
MODE
press the ☐ button
dEtc Std
MODE
press the ☐ button
Att 1234
MODE
press the ☐ button
End
MODE
press the ☐ button

Choose timer to turn off
Press the ◁▷ button and select

- oFFd 10 turn off the delay timer*1
- on-d 10 trun on the delay timer*1
- Shot 10 single timer*1

Choose normal (light intensity) detection mode
Press the ◁▷ button and select

- dEtc dtm1 DATUM1 mode
- dEtc dtm2 DATUM2 mode
- dEtc Ar-EA Area detection mode
- dEtc _┌‾d Rising edge detection mode
- dEtc ‾L_d Falling edge detection mode

Luminous power selection*2

Setting completion
press the ◁▷ button and select

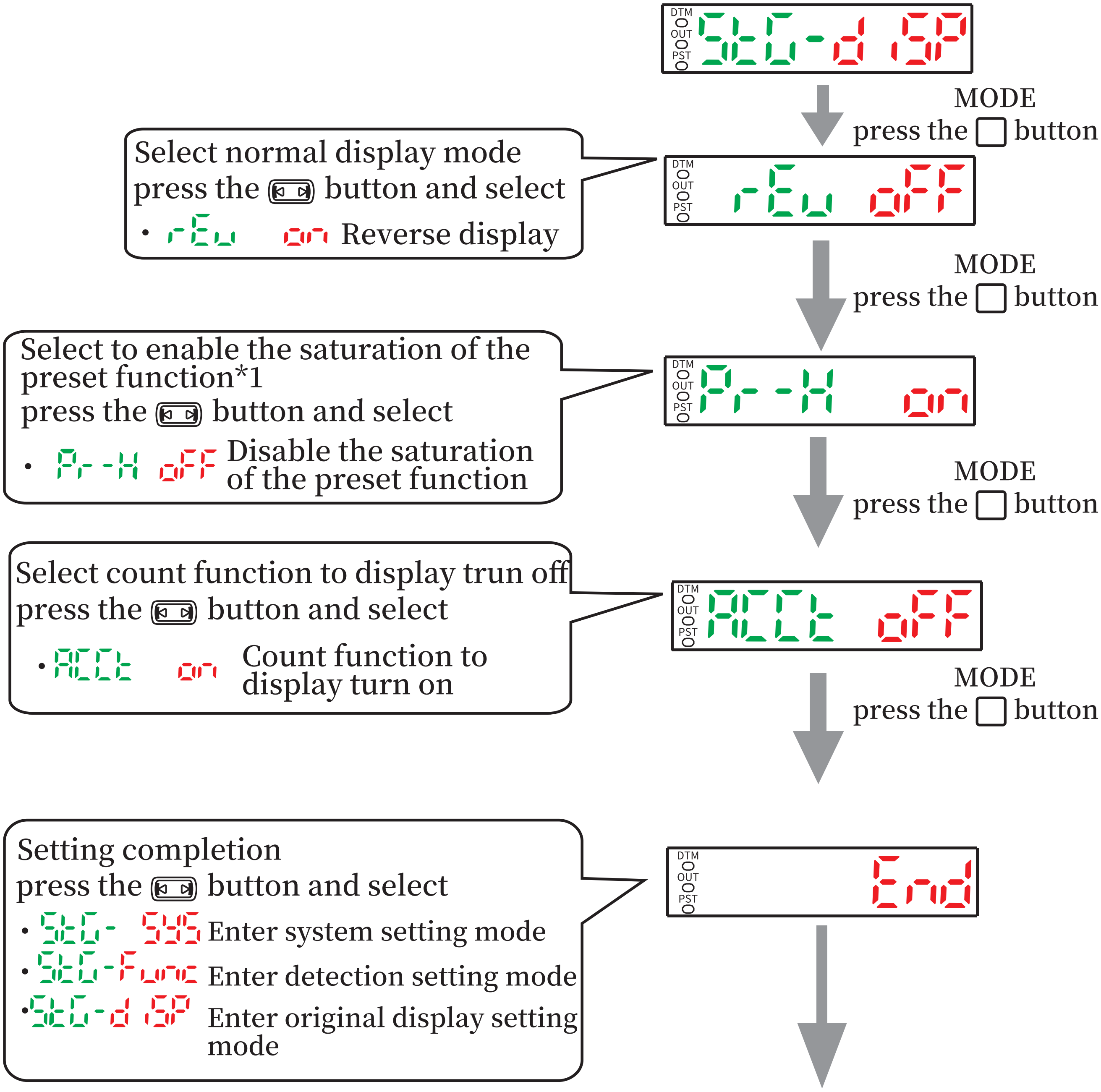
- SEt-d iSP Enter display setting mode
- SEt- SYS Enter system setting mode
- SEt-Func Return to the original detection setting mode

Return to normal display

*1.Press the MODE ☐ button to set the value in the range of 1 to 9999 (ms).

*2.Set in the range of 1 to 100 .

■ Display setting


DTM
OUT
PST
StG-d iSP
MODE
press the ☐ button
rEu oFF
MODE
press the ☐ button
Pr-H on
MODE
press the ☐ button
ACCt oFF
MODE
press the ☐ button
End

Select normal display mode
press the ⧏⧐ button and select
- rEu on Reverse display

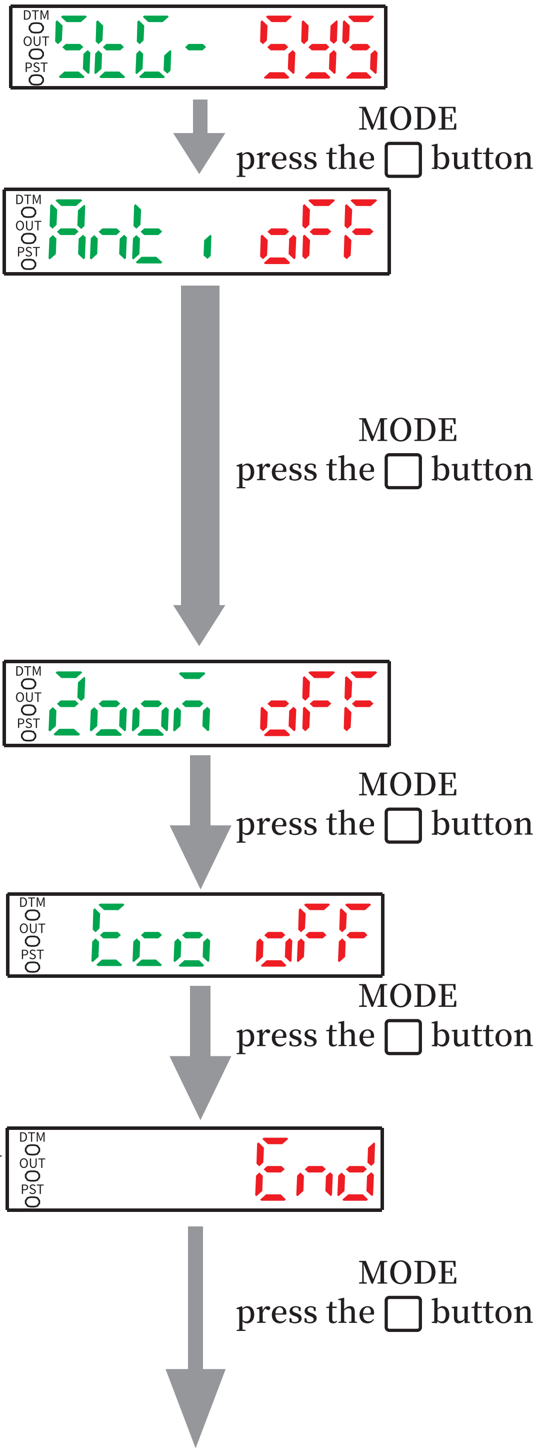
Select to enable the saturation of the preset function*1
press the ⧏⧐ button and select
- Pr-H oFF Disable the saturation of the preset function

Select count function to display trun off
press the ⧏⧐ button and select
- ACCt on Count function to display turn on

Setting completion
press the ⧏⧐ button and select
- StG- SYS Enter system setting mode
- StG-Func Enter detection setting mode
- StG-d iSP Enter original display setting mode

Press the ☐ (MODE) button to set the value in the range of 100P to 200P (ms)

System settings



MODE
press the ☐ button

Select turn off the anti interference function
press the ◁▷ button and select

- Ant i on Turn on the anti interference function
- Ant i StAG Anti-mutual interference function of optical overlap

Select Ant i StAG function,press the MODE ☐ button,press the ◁▷ button again to select

- StAG S-1 Frequency 1
- StAG S-2 Frequency 2
- StAG S-3 Frequency 3
- StAG S-4 Frequency 4

MODE
press the ☐ button

Select to turn off the display magnification function
press the ◁▷ button and select

- Zoom oFF Turn off the display magnification function
- Zoom on Turn on the display magnification function

MODE
press the ☐ button

Select to turn off the power-saving mode
press the ◁▷ button and select

- Eco on Turn on the power-saving function

MODE
press the ☐ button

Setting completion
press the ◁▷ button and select

- StG-Func Enter detection setting mode
- StG-d iSP Enter original display setting mode
- StG- SyS Enter system setting mode

MODE
press the ☐ button

Return to normal display

Installation mode

- DIN guide rail installation

1.As shown in Figure 1, align the card slot at the bottom of the fuselage to the DIN guide rail. While pushing the fuselage in the direction of arrow 1, push down in the direction of arrow.
2.To remove the sensor, while pushing the fuselage forward in the direction of arrow 1, raise it towards the direction of arrow 3.

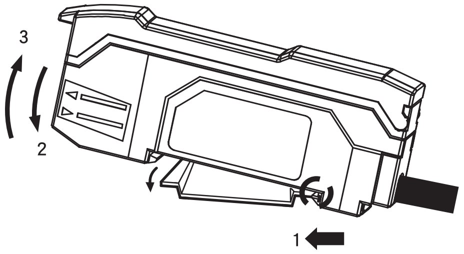


Figure 1

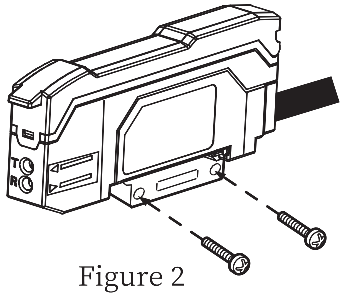
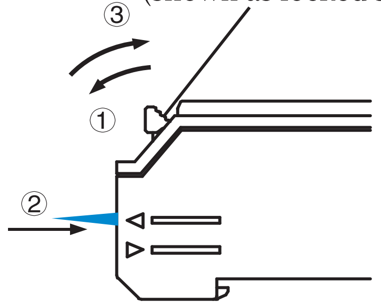


Figure 2

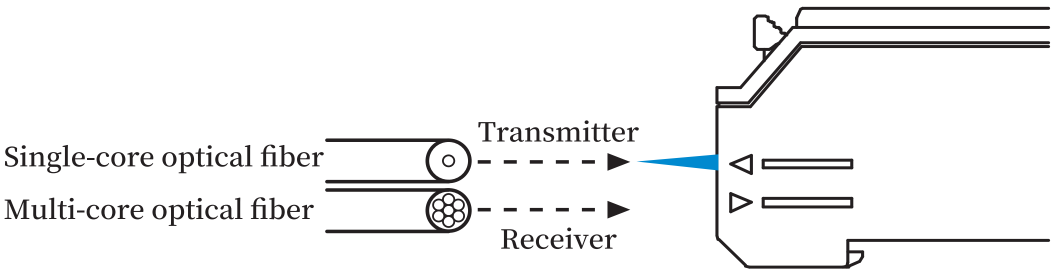
Connect the optical fiber unit



Optical fiber locking rod
(shown as locked state)

①Pull the lever to the level
②Insert the fiber to the bottom
③Set the lever to vertical. At this time, the optical fiber has been installed and clamped. Remove the optical fiber, and set the lever to the horizontal position(Unlock), and take it out.

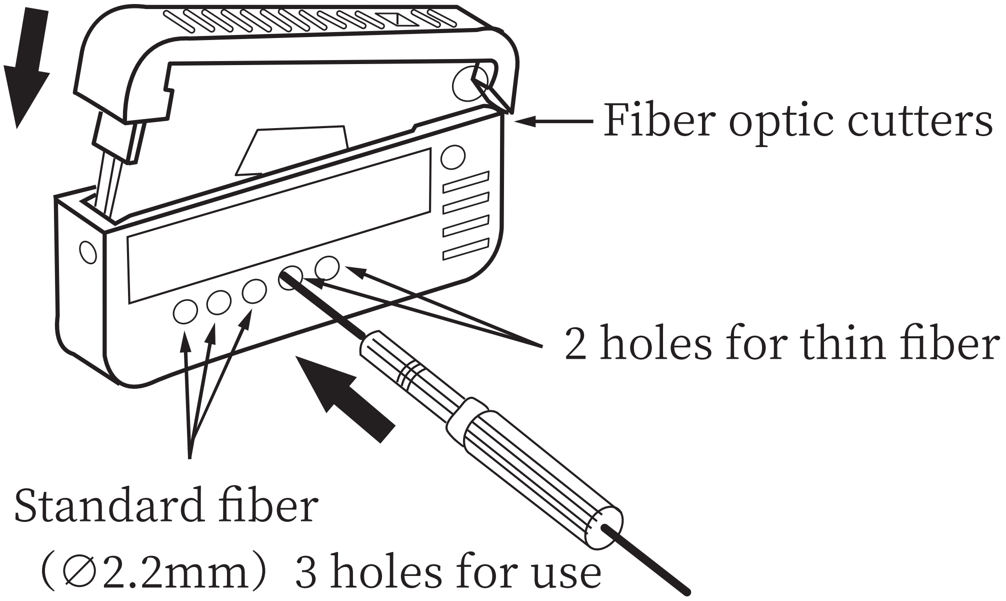
To connect a coaxial reflective-type optical fiber unit to an amplifier, please connect the single-core optical fiber to the transmitter, connect the multi-core optical fiber to the receiver.



■ Usage and precautions of optical fiber cutters

● Use fiber optic cutters

1. Insert the optical fiber into the cutter hole.
2. Quickly press the blade to cut the fiber in one go.
3. Put the fiber into the fiber amplifier to put it to use.


Fiber optic cutters
2 holes for thin fiber
Standard fiber
(∅2.2mm) 3 holes for use

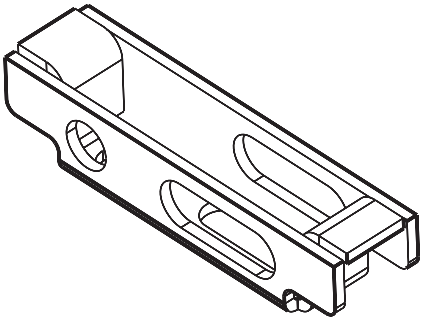
*Fiber Cutter is sold separately

■ Precautions for the use of optical fiber cutter

failure to follow the instructions below may reduce the detection area

Stopping cutting in the middle may result in uneven sections, so as to narrow the detection range. Do not cut twice in the same hole.

■ Attachment list

One mounting bracket