

LANBAO

Optical fiber sensor

FD3 series

Operation manual



www.lanbaosensor.com

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

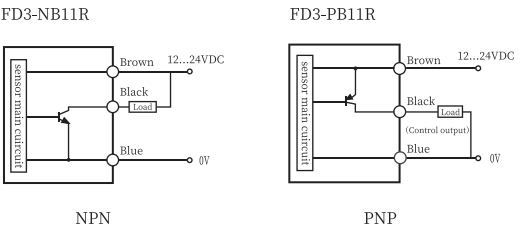
- Do not use in an environment with flammable, explosive or corrosive gases
- Do not use in oil or chemical environments
- Do not use in a high humidity environment
- Do not use in direct sunlight
- Do not use in other environmental conditions that exceed the rated value
- Do not disassemble, repair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

Scrap Treatment

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

Wiring diagram

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

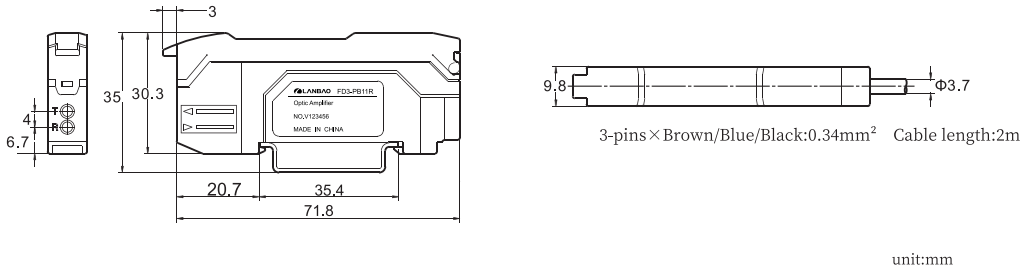


Technical specifications

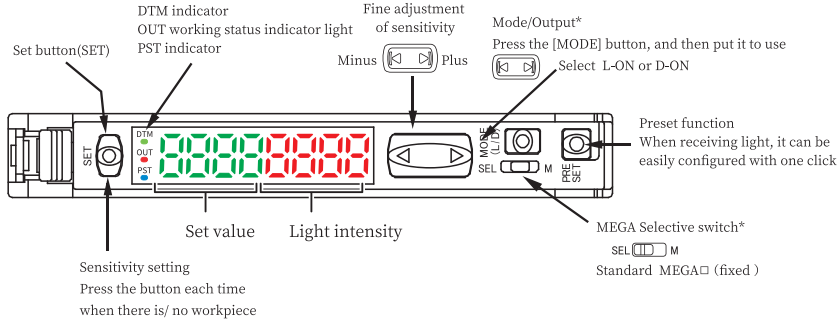
|                      |   |           |
|----------------------|---|-----------|
| Model                | NPN   | FD3-NB11R |
|                      | PNP   | FD3-PB11R |
| Light source         | Red LED   |           |
| Response time        | 50μs(HIGH SPEED)/ 250μs(FINE) / 1ms(SUPER) / 16ms(MEGA)   |           |
| 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)<br>power save mode:≤800mW(for 24V, ≤32mA;for 12V:≤39mA) |           |
|                      | PNP:normal:≤950mW(for 24V, ≤39mA;for 12V:≤52mA)<br>power save mode:≤850mW(for 24V, ≤35mA;for 12V:≤44mA) |           |
| Anti ambient light   | Incandescent:≤3,000lux;Daylight:≤10,000lux  |           |
| Ambient temperature  | -20...55°C(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 <sup>2</sup> ,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



Product diagram

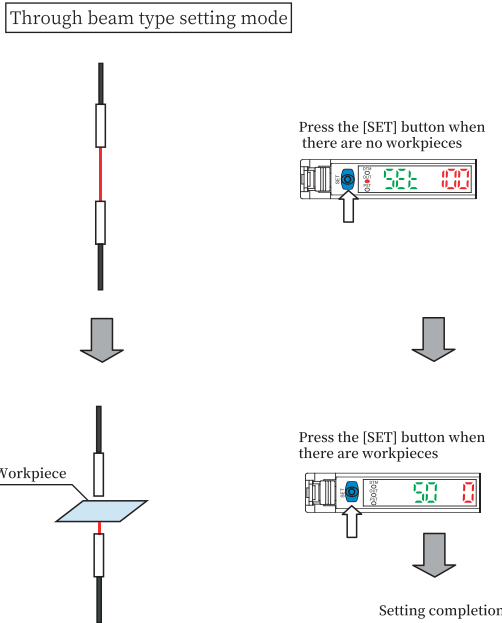


Calibration mode

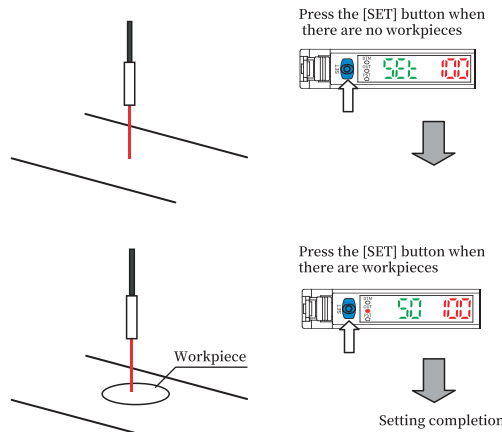
- Detect very subtle differences

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.



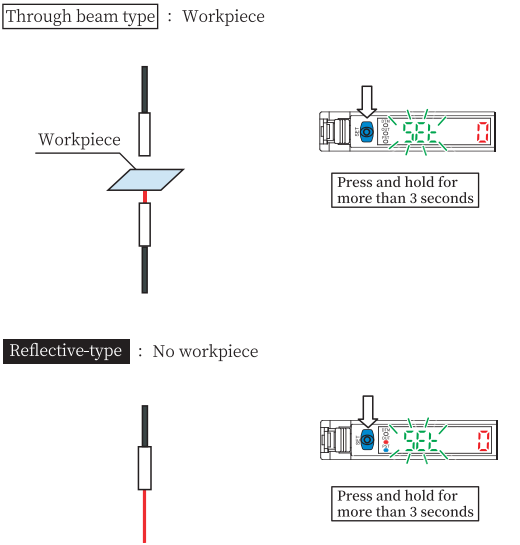
Reflective-type setting mode



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.

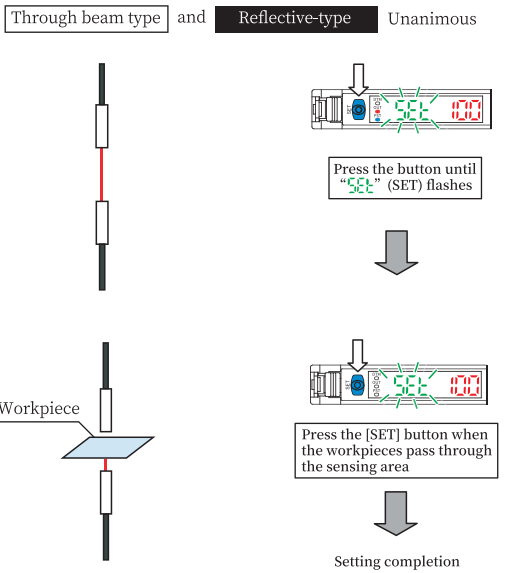
Other modes of calibration

- 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 5Et button flashes, release the button. The set sensitivity is slightly higher than the received light intensity.



Calibrate the moving workpiece

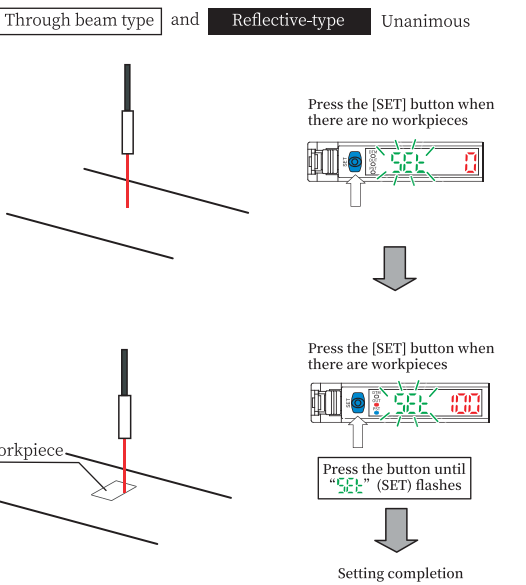
- Automatic calibration
- Press and hold the [SET] button without placing workpieces. When “5Et” (Set) flashes, let workpieces through the sensing area. (Press and hold the [SET] button while the workpieces passing through the sensing area.)



Calibrate fixed workpieces.

- Location calibration

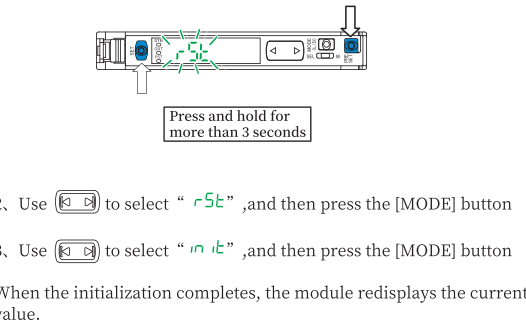
Press and hold the [SET] button without placing workpieces. Placing the workpieces where they are needed. Press the [SET] button for at least 3 seconds. When the “5Et” [SET] flashes, release the button. When placing the workpieces, make sure that the edge of the workpieces is aligned with the center of the beam.



Initialization setting

- Initialization mode

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



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

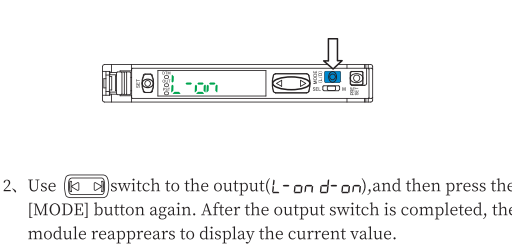
- Initial setting

| 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.

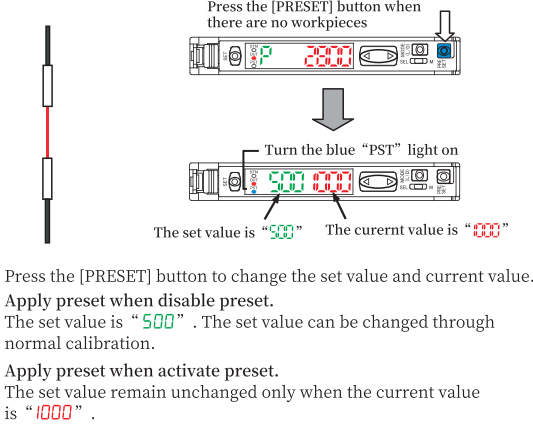


Error display and corrective measures

| 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 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.

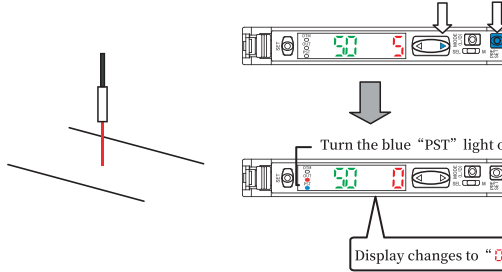
Prompt

**Preset function plays a convenient role**

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” .



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.

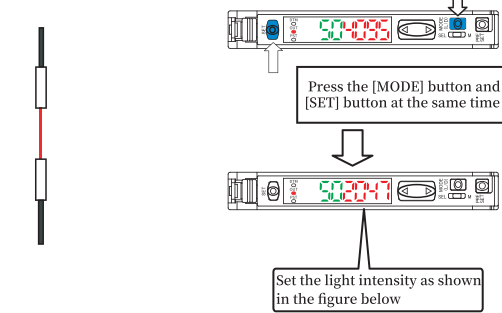
Prompt

**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 calibrated.



| 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.

Prompt

**Saturation recovery function plays a convenient role**

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.



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 temperature changes drastically.

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 remain the same, in this way, the stability detection will be achieved. The display of the set value won't change.

Diagram illustrating the sequence of LED display messages for setting the mode:

- Initial display: **Set Func**
- Action: MODE press the ☐ button
- Display: **toFF** (with a dashed line)
- Action: MODE press the ☐ button
- Display: **Set Set**
- Action: press the **ESC** button
- Display: **Set dat1** (DATUM1 mode)
- Action: press the **ESC** button
- Display: **Set dat2** (DATUM2 mode)

No DATUM  
detection display

DTM1 display 1000

DTM1 display 1000

DTM1 display 1000

DTM1 display 1000

DTM1 display 1000

DTM1 display 1000

DTM1 display 1000

Calibration point 1

DTM1 set value 600

Calibration point 2

Time

Through beam type and Reflective-type Unanimous

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

Calibration point 1


Calibration point 2

The workpiece with weak reflection

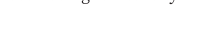
The background of strong reflective light

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

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



The background of strong reflective light



The display is changed to “000”

**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.

Through beam type and Reflective-type Unanimous


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

Calibration point 1

Calibration point 2

The diagram illustrates the setup for Calibration point 2. A probe is positioned to measure a workpiece with weak reflection. The background is a strong reflective light. The probe's display shows a reading of 100.00.

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

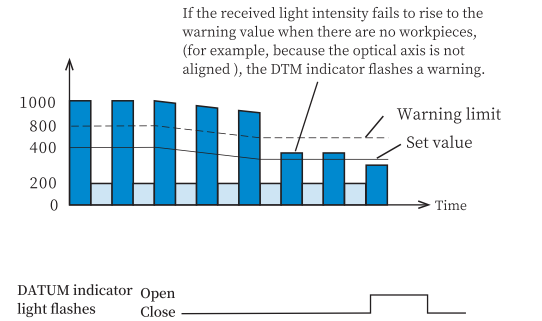


The diagram shows a vertical sensor assembly with a black top section and a white middle section. A red line indicates the light path from the sensor to a horizontal surface below. A speech bubble points to the sensor with the text "The background of strong reflective light". Another speech bubble points to the display on the device with the text "The display is changed to '0'". The device's display shows "0.000" in green, and a red square icon is visible on the screen.

**Note**

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

- 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.



● Basic setting

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

Choose HIGH SPEED mode  
press the **MODE** button and select

- F** **NE** **648** FINE mode
- S** **UP** **1296** SUPER mode
- MEGA** **2594** MEGA mode

**MODE**  
press the **MODE** button

Choose the normal sensitivity setting mode  
Press the **MODE** button and select

- Set** **564P** Percentage calibration\*1
- Set** **056t** Zero shift calibration

**MODE**  
press the **MODE** button

Setting completion  
press the **MODE** button and select

- Set** **F** **func** Enter detection setting mode
- Set** **d** **SP** Enter display setting mode
- Set** **S** **sys** Enter system setting mode

**MODE**  
press the **MODE** button

Return to normal display

- ### ■ Detection setting

```

graph TD
    A[Set Func] -- "MODE  
press the [ ] button" --> B[Set Off]
    B -- "MODE  
press the [ ] button" --> C[Setc Sd]
    C -- "MODE  
press the [ ] button" --> D[Setc 1234]
    D -- "MODE  
press the [ ] button" --> E[Setc End]
    E --> F[Return to normal display]
  
```

Choose timer to turn off  
Press the button and select

- turn off the delay timer\*1
- turn on the delay timer\*1
- single timer\*1

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


- DATUM1 mode
- DATUM2 mode
- Area detection mode
- Rising edge detection mode
- Falling edge detection mode

Luminous power selection\*2

Setting completion  
press the button and select

- Enter display setting mode
- Enter system setting mode
- Return to the original detection setting mode

Return to normal display

- \*1. Press the  button to set the value in the range of 1 to 9999 (ms).
- \*2. Set in the range of 1 to 100.

**MODE**

press the  button

Select normal display mode  
press the  button and select

- **rEL** **ON** Reverse display

**MODE**

press the  button

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

**MODE**

press the  button

Select count function to display turn off  
press the  button and select

- **ACtE** **ON** Count function to display turn on

**MODE**

press the  button

Setting completion  
press the  button and select

- **SEL-Sys** Enter system setting mode
- **SEL-Func** Enter detection setting mode
- **SEL-d SP** Enter original display setting mode

**End**

Press the <sup>MODE</sup>  button to set the value in the range of 100P to 200P (ms)

Select turn off the anti interference function  
press the **Ant** button and select

- **Ant** **on** Turn on the anti interference function of optical overlap

Select **Ant** **off** function, press the **MODE** button, press the **Ant** button again to select

- **S-FRG** **S-1** Frequency 1
- **S-FRG** **S-2** Frequency 2
- **S-FRG** **S-3** Frequency 3
- **S-FRG** **S-4** Frequency 4

Select to turn off the display magnification function  
press the **Zoom** button and select

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

Select to turn off the power-saving mode  
press the **Eco** button and select

- **Eco** **on** Turn on the power-saving function

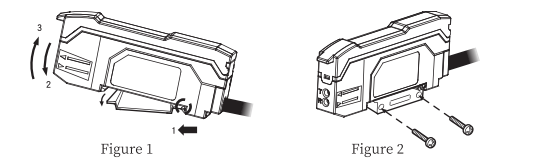
Setting completion  
press the **End** button and select

- **S-FRG** **Func** Enter detection setting mode
- **S-FRG** **d SP** Enter original display setting mode
- **S-FRG** **SYS** Enter system setting mode

Return to normal display

- **DIN guide rail installation**

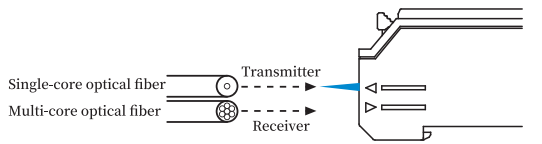
1. As shown in Figure 1, align the card slot at the bottom of the fuselage to the DIN guide rail. While pushing the fuselage in the direction of arrow 1, push down in the direction of arrow.
2. To remove the sensor, while pushing the fuselage forward in the direction of arrow 1, raise it towards the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



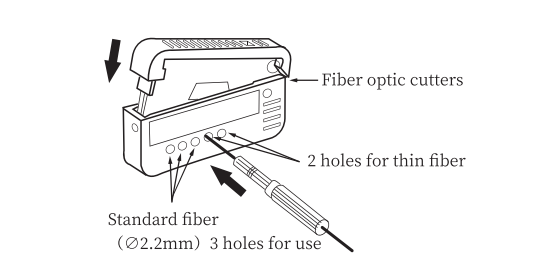
Optical fiber locking rod (shown as locked state)

- ① Pull the lever to the level
- ② Insert the fiber to the bottom
- ③ Set 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.



- 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.

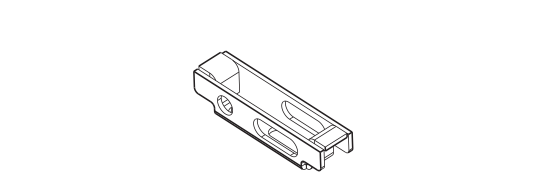


\*Fiber Cutter is sold separately

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.

One mounting bracket



This specification doesn't relate to patent responsibility. Moreover, our company is always devoting to improving product quality, and reserves the right to improve products by changing pattern or size without prior notice. We have considered all the notes when compiling this specification, but for the wrong or clipped parts, and any loss caused by using this manual information, we bear no responsibility.

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