EPION

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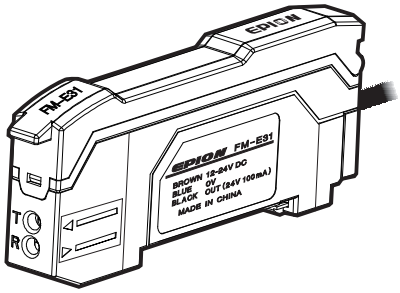
Intelligent digital fiber optical sensor

FM-E31 series manual



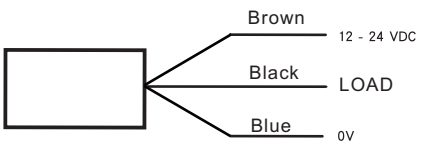
Patent number: ZL201520147441.4

Technical specifications

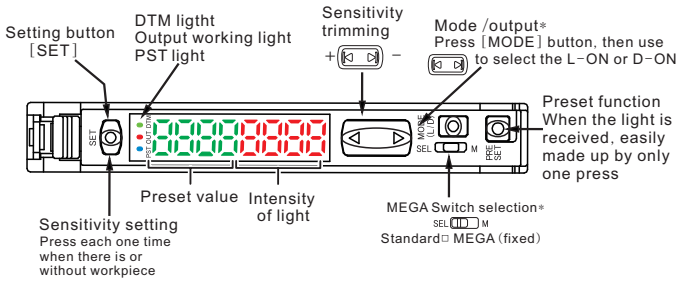
Model	NPN	FM-E31	FM-E31C
	PNP	FM-E31P	FM-E31CP
Cable / connector		Cable	M8
Light source		Infrared emitting diode(LED)	
Response time		40 μs (HIGH SPEED)/250 μs (FINE) 1ms (SUPER) /16ms (MEGA)	
Out select		LIGHT-ON/DARK-ON(Switch selection)	
Time delay function		Delayed-breaking-off timer / Delayed-turn-on timer / One-shot timer	
Output selection	NPN Output	NPN open-collector 24V; Maximum output value: 100mA Residual Voltage 1V or lower	
	PNP Output	PNP open-collector 24V: Maximum output value: 100mA Residual Voltage 1V or lower	
Circuit protection		Reverse electrode protection(power) Overcurrent protection(output) / Overvoltage protection(output)	
Rated value Source voltage		12 - 24 VDC ?10%, ripple voltage(P-P): maximum 10%	
NPN		Normal: maximum 900mW(when 24V, the maximum is 36mA; when 12V, the maximum is 48mA) Energy saving mode: maximum 800mW(when 24V, the maximum is 32mA; when 12V, the maximum is 48mA) Notice: When use the "HIGH SEEP" mode, the power consumption will increase by 160mw (7mA)	
PNP		Normal: maximum 950mW(when 24V, the maximum is 39mA; when 12V, the maximum is 52mA) Energy saving mode: maximum 850mW(when 24V, the maximum is 35mA; when 12V, the maximum is 44mA) Notice: When use the "HIGH SEEP" mode, the power consumption will increase by 160mw (7mA)	
Ambient Tolerance	Luminance	Incandescent lamp :maximum 20,000lux Fluorescent lamp: maximum 30,000lux	
	Temperature	-20 to + 55℃ (No freezing)	
	Humidity	35 to 85% RH(No condensing)	
	Aseismic	10 to 55Hz, complex amplitude 1.5mm, each 2 hours for X/Y/Z axis	
	Anti vibration	500 m/s?, each 3 times for X/Y/Z axis	
Case material		Polycarbonate	
Size		30.3 mm (H) x 9.8 mm (W) x 71.8 mm (D)	
Weight		About 50g	About 50g

FM-E31 series wiring and the name of each parts

Wiring



Name of each part



* Press [MODE] button to for the advanced settings

Module Installation

DIN Track installation

Aligning the slot at the bottom of the device with the DIN track, as shown in Figure 1.
Push the device to the direction of arrow 1 and press down in the direction of arrow 2.

If to remove the sensor, push the device forward to the arrow 1 meanwhile raise the device to the arrow 3 direction.

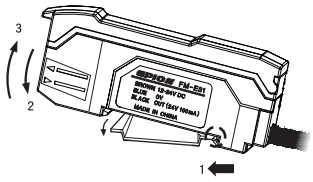


Figure 1

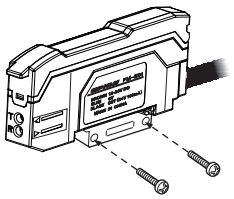
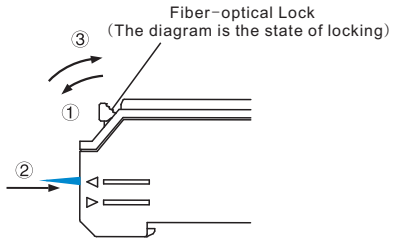


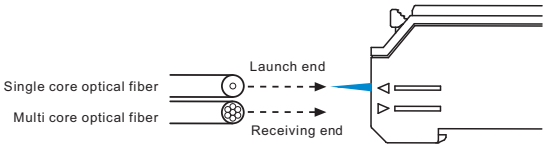
Figure 2

Fiber optical connection



① Lock rod to horizontal position
② Insert the optical fiber until to the most inside
③ Dial the lock lever to the vertical position, at this point the optical fiber has been fastened, remove the optical fiber and dial the lock lever to the horizontal position

To connect coaxial reflector optical fiber unit to amplifier, please connect the single core optical fiber to the launch end, and multi core optical fiber to the receiving end.

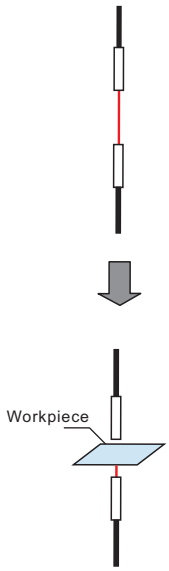


Calibration mode

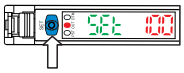
Detct the extremely subtle difference

- Two points calibration
  Two points calibration is the most basic calibration mode.
  Just press two times [SET] button to calibrate the sensitivity.
  Press once when placed and not.

Through Beam type setting mode

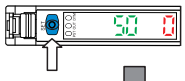


Press [SET] button
when no workpiece



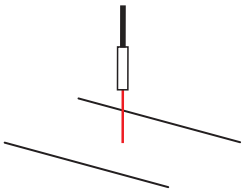
Workpiece

Press [SET] button
when have workpiece

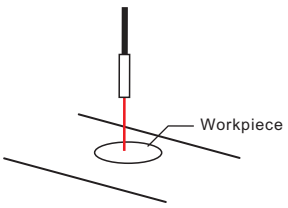


Setting complete

Reflection type



Press [SET] button
when no workpiece



Workpiece

Press [SET] button
when have workpiece

Setting complete

Two point calibration is based on with the workpiece or without the workpiece to calibrate.The preseted point is the intermediate value of the above two cases.

If the difference between the cases that with or without workpiece is too small, then after the calibration will appear "----" blink for about 2 seconds.

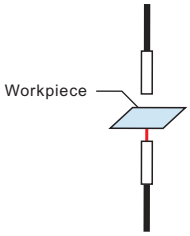
Other calibration mode

Enhance the applicability of the dusty ambient

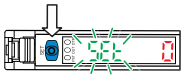
- Maximum sensitivity setting

In the case shown below, hold down the [SET] button for 3 seconds or longer, until "SEt" blinking

Through B type : have workpiece



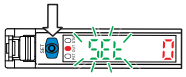
Workpiece



Press on 3 seconds or longer

Reflection-type

No workpiece



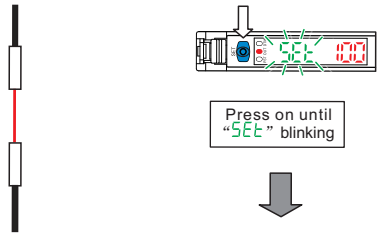
Press on 3 seconds or longer

Calibrating the moving workpiece

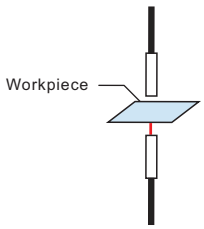
- Automatic calibration

In the case of have workpiece, press [SET] button, when " SEt " is blinking, make the workpiece pass through the sensing area.
(don't release the [SET] button when the workpiece is passing through the sensing area)

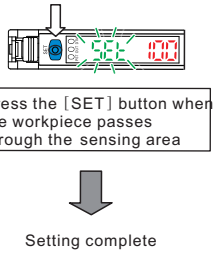
Through B type and Reflection-type are the same



Press on until
"SEt" blinking



Workpiece



Press the [SET] button when the workpiece passes through the sensing area

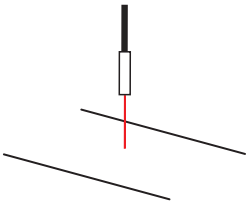
Setting complete

Calibrate the fixed workpiece

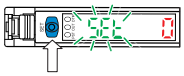
- Positioning calibration

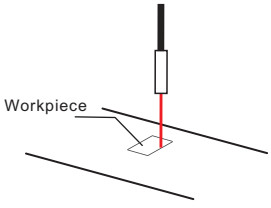
In the case of on workpiece, press [SET] button.
Place the workpiece in the desired position, press the [SET] button for 3 seconds or longer, until "SEt" blinking, press off the button.
When the workpiece is placed, the edge of the workpiece is aligned with the center of the beam.

Through B type and Reflection-type are the same



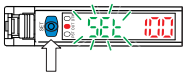
Press [SET] button
when no workpiece





Workpiece

Press [SET] button
when have workpiece



Press on until
"SEt" blinking

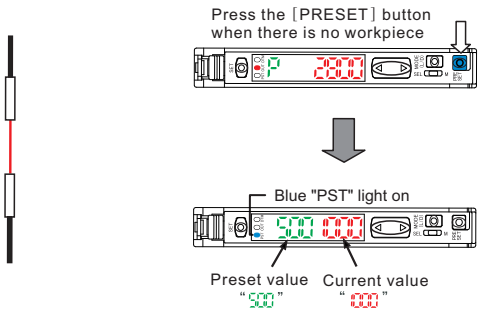
Setting complete

Functions are easy and simple to operate

Easily setting display

- Pre-setting function

When the light is received, press the preset button, and the current value is setted to be"1000"



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

When disable the presetting function
The preset value is set to" 500 ", the preset value can be changed by normal calibration.

When the presetting function is enable, the current value is setting to" 1000 ", the preset value is unchanged.

Notice

The preset function can not be used together with the zero point migration function.
If want to use the zero point migration function, must disable the preset function first.
This mode is not suitable to transparent workpiece and other low light intensity difference detection cases.

- Disable the presetting function

Press the [PRESET] button to disable the presetting function.
When the presetting function is disable, the ratio between the preset value and the current value is unchange.

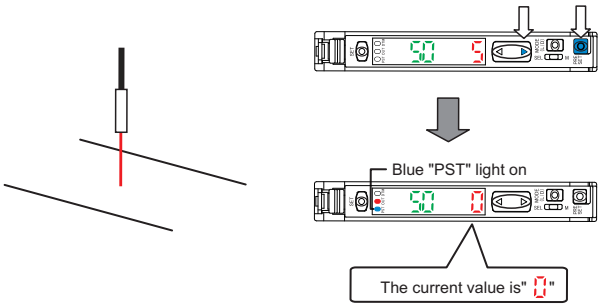
Tips

The convenience of presetting functions.
This function is most suitable for the use of simple detection of opposite-type fiber optical unit.
For example, complete block detection, such as optical axis of optical fiber units are blocked by non transparent parts.

Set the current value to be"0"

- Zero point migration function

This function is mainly used for reflection type.
Press the [PRESET] button and press the [▶] button together.
Set the current value to be"0"



Notice

The preset function can not be used together with the zero point migration function. If want to use the zero point migration function, must disable the preset function first.
This mode is not suitable to transparent workpieces and other low light intensity difference detection cases.

- Disable the zero point migration function
Press [PRESET] button to disable the zero point migration function

Tips

The convenience of zero point migration function

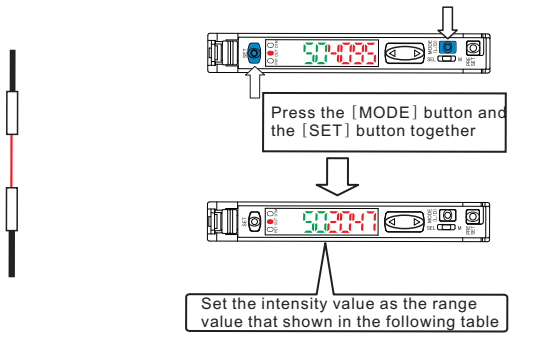
This function is mainly used to set the current value to " 0 " for reflective fiber optical unit.
Sometimes after installing the reflective fiber optical unit, the intensity of light is not be set to" 0 "
If this happens, use zero migration function to set the value to " 0 " when no workpiece.
This makes the light intensity difference more obvious

Adjusting when the light intensity is too large (saturated)

- Enable the saturation recovery function

Press the [MODE] button and the [SET] button together, to enable saturation recovery function.

Optical transmission level and light intensity gain will be automatically calibrated at this time.



Power mode	Light intensity setting range
HSP*、FINE	2047 ± 350
SUPER	4095 ± 500
MEGA	5000 ± 600

*HIGH SPEED

- Disable the saturation recovery function

When the saturation recovery function is ensable, press the [MODE] button and the [SET] button together can disable this function.

Tips

The convenience of the saturation recovery function

After installation, this function is particularly useful when the light value intensity is saturated.
This function can automatically calibrate optical transmission level and optical gain through simple operation

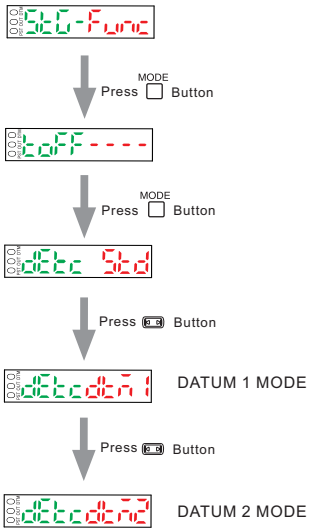
DATUM MODE

The DATUM mode opposite-type is suitable for the light intensity is gradually changing ambient. Such as that large scale temperature changes or easily pollute the optical module ambient.

The DATUM mode's reflection type is only suitable for the environment that with strong reflection background and the target is week reflection. For example, a black button on a white cloth.

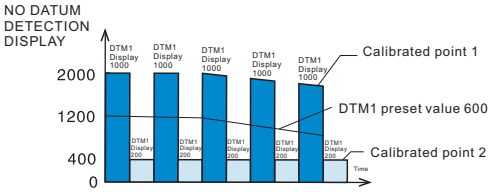
In the DTUM mode, the intensity of the received light is always corrected to " 000 " for DATUM1) , " 0 " (for DATUM2) when without workpiece.
In addition, the preset value will be corrected according to the correction amount, then the ratio between the preset value and the received light intensity remains unchanged.

Start the operation of the DATUM mode.



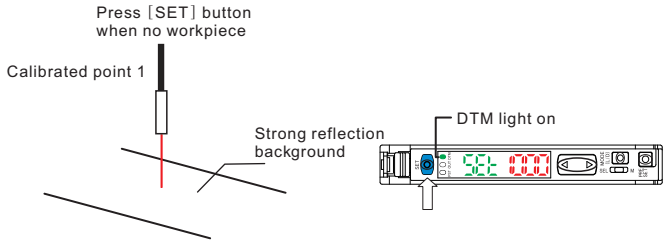
Sensitivity setting in DATUM mode 1

The sensitivity pre set value is always automatically corrected, therefore, in case of no workpiece, the intensity of light received is " 000 "

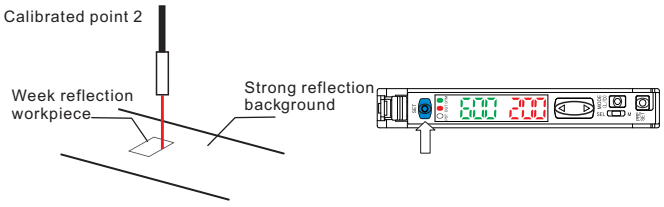


The following sensitivity setting procedure is an example of two point calibration.
When there is no workpiece, the intensity of the received light is " 000 ", when there is workpiece, the intensity of light received is " 200 "

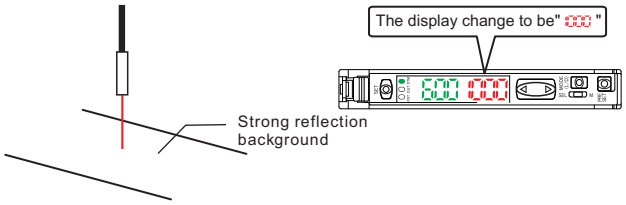
Through B type and Reflection-type are the same



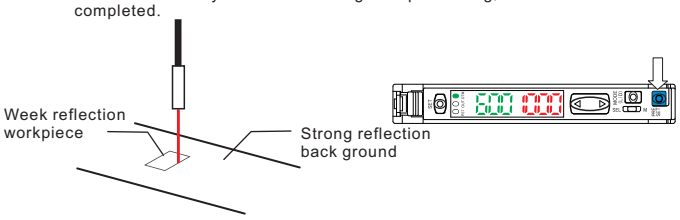
When there is workpiece, pres [SET] button



In the state of receiving all light, the intensity of light show "888"

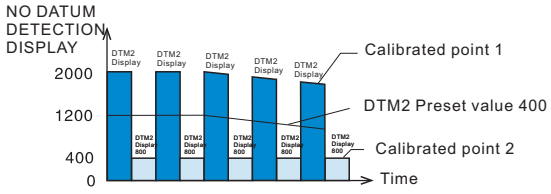


Notice If there is no workpiece, the displayed value is lower than " 888 " and after 30 seconds still does not reach" 888 " , please press the [PRESET] button. This will correct the received light intensity to be " 888 "
When the intensity of the received light stops flashing, the correstion i completed.



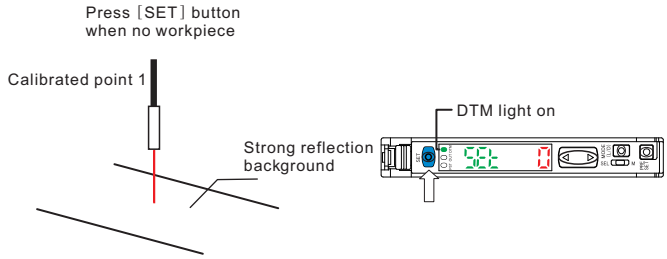
Sensitivity setting in DATUM mode 2

The sensitivity pre set value is always automatically corrected, therefore, in case of no workpiece, the intensity of light received is " 0 "

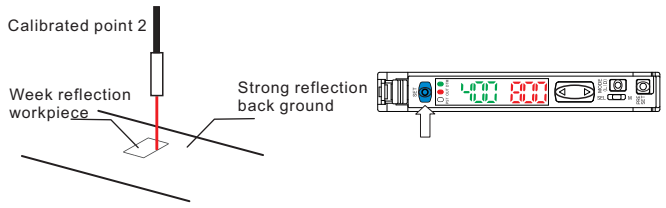


The following sensitivity setting procedure is an example of two point calibration.
When there is no workpiece, the intensity of the received light is " 888 ", when there is workpiece, the intensity of light received is " 0 "

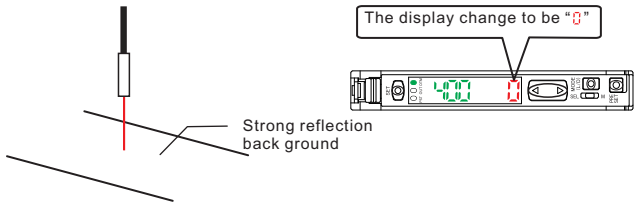
Through B type and Reflection-type are the same



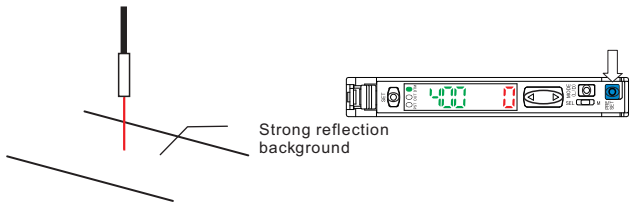
When there is workpiece, pres [SET] button



In the state of receiving all light, the intensity of light show "0"

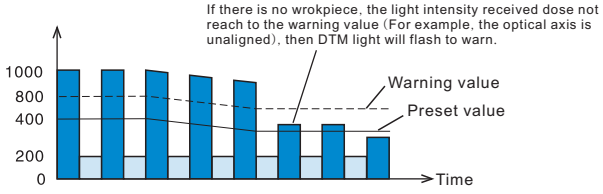


Notice If there is no workpiece, the displayed value is over than " 0 " and after 30 seconds still does not reach " 0 ", please press the [PRESET] button. This will correct the received light intensity to be " 0 "
When the intensity of the received light stops flashing, the correction is completed.



Change the warning output level

DATUM Warning value is the intermediate value of the received light's intensity and the preset value when there is no workpiece, if the intensity of the received light is between the warning value and the preset value, the intensity of the received light will stop correcting, and the DTM light will flash to warn.



Output switching

Optional mode is the action of light entry (L-on) or light shading (D-on)

1. When showing the current value, press the [MODE] button.

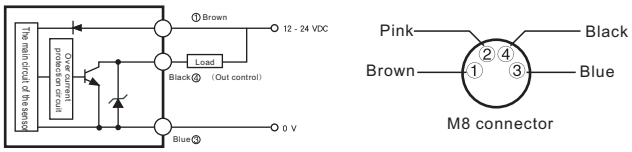
2. Use the button to switch the output mode (L-on D-on), after that, press [mode] button one more time. After the switching of out put, the module show the current value.

Connecting the external device

Switching the power selection switch, two different types of channel (NPN/PNP) switch will be outputted.

NPN

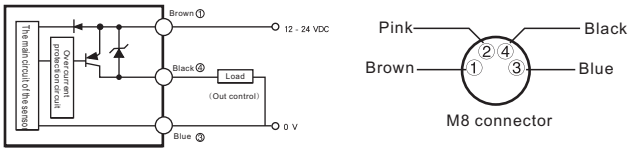
Output circuit diagram of FM-E31/FM-E31C



FM-E31C series, do not connect to cable but M8 connector

PNP

Output circuit diagram of FM-E31P/FM-E31CP



FM-E31P series, do not connect to cable but M8 connector

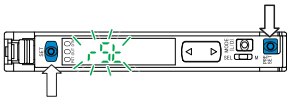
Erro display and correction

Erro display	ERC	ERE	END APC	LOC
Reason	Overcurrent exists in the control output	Internal data write/load failure	Light source overload	Keylock
Solution	Detect the load and return the current to the rated rang	Perform initialization (Page 4)	For high precision detection, please replace the sensor	For disabling (setting) methods please refer to the FM-E31 user manual

Initialization settings

Initialization operation method

1. Press the [SET] button and the [PRESET] button together for 3 seconds



Press on for 3 seconds or longer

2. Use the button to select "rSt" and then press [MODE] button
3. Use the button to select "in it" and then press [MODE] button

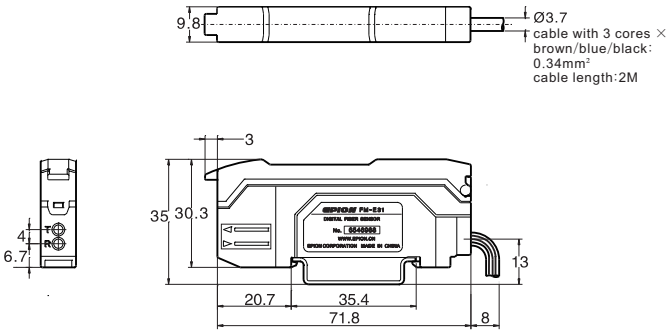
After the initialization is completed, the module redisplays the current value.

Initial setting

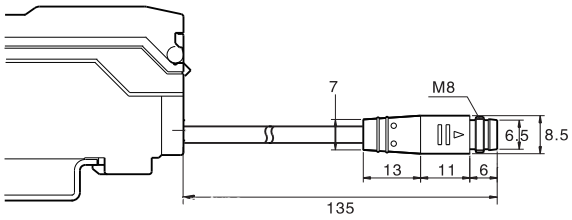
Setting	Initial value
Power mode	FINE
Detection mode	STD (normal)
Preset value	200
Output switching	L-on

Size diagram

FM-E31



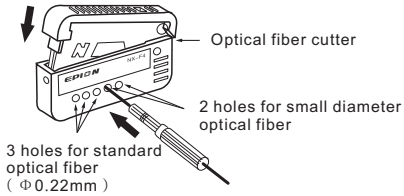
FM-E31C



The using methods and matters need to attention of the fiber optical cutter

Using the optical fiber cutter

1. Inserting the optical fiber into the cut-off hole
2. Fast press the blade to cut off the fiber at one time
3. Put the optical fiber into the NX-F4 to cut



Notice for using the optical fiber cutter

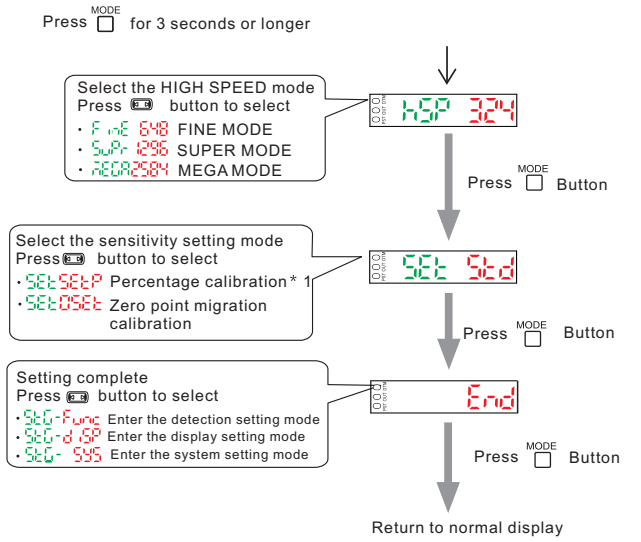
Fiber optic unit attached with the fiber optical cutter

If do not follow the following precautions, maybe narrow the scope of detection

Stopping the cutting of optical fiber halfway may lead to uneven section and narrow the scope of detection.
Please don't cut in the same hole for 2 times.

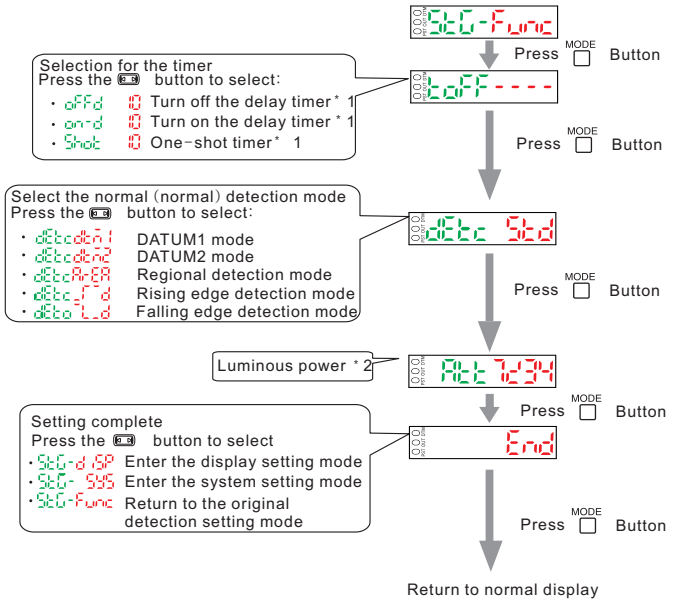
Function setting

Basic setting



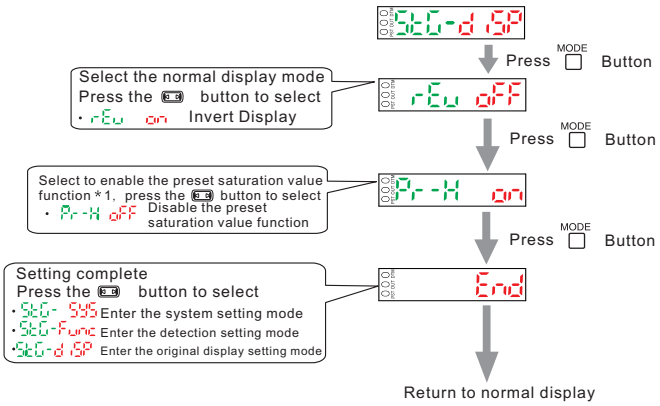
* 1Press the button to set the value range of 99P to -99P

Detection setting



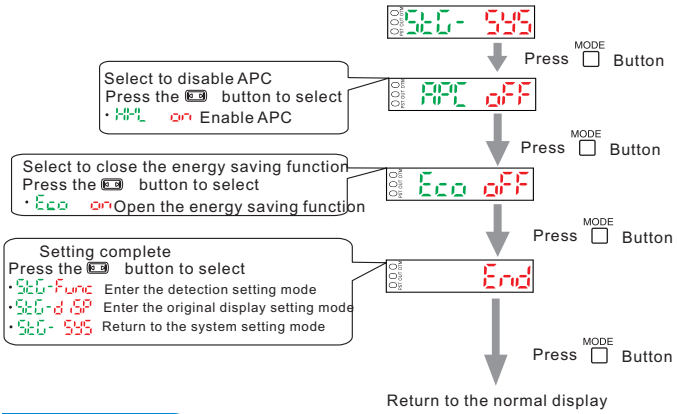
*1 Press button to preset the value rang from 1 to 9999 (ms)
*2 The value rang can be set from 1 to 100

Display setting

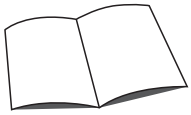


Press the button, set the value in the range from 100P to 200P .

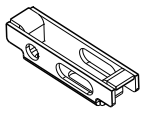
System setting



Accessoriess list



User's guide *1



Mounting bracket *1

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