

## F70A SERIES Instruction Manual

### OUTLINE

- This product is a touch-to-teach fiber sensor with micro controller built-in.
- The LCD (with back light) display on the panel provides various sensor information such as operation mode, light level, etc.
- Full auto teaching and auto teaching are available as sensitivity adjustment.
- Also manual sensitivity adjustment is built-in.

### SPECIFICATIONS

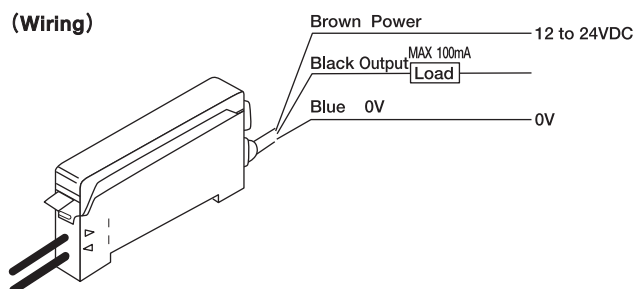
| Model                      | NPN type                                                                                                                                                 | F70AR             | F70AG            | F70AB     | F70AW   |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|------------------|-----------|---------|
|                            | PNP type                                                                                                                                                 | F70ARPN           | F70AGPN          | F70ABPN   | F70AWPN |
| Detection system           | Trough beam / Reflective (by fiber unit)                                                                                                                 |                   |                  |           |         |
| Range                      | Depending on fiber unit                                                                                                                                  |                   |                  |           |         |
| Power supply               | 12V to 24VDC $\pm 10\%$ Ripple 10% or less                                                                                                               |                   |                  |           |         |
| Current consumption        | NPN type : 39mA or less / PNP type : 50mA or less                                                                                                        |                   |                  |           |         |
| Output mode                | Open collector                                                                                                                                           |                   |                  |           |         |
|                            | NPN Rated : Sink current 100mA (30VDC) Max. Residual voltage : 1V or less<br>PNP Rated : Source current 100mA (30VDC) Max. Residual voltage : 2V or less |                   |                  |           |         |
| Operation mode             | Light-On / Dark-On selectable                                                                                                                            |                   |                  |           |         |
| Timer                      | Off delay / non-delay selectable<br>delay time : 40 ms. fixed                                                                                            |                   |                  |           |         |
| Response time              | Transmission frequency Channel 1 : 600 $\mu$ s or less Channel 2 : 700 $\mu$ s or less                                                                   |                   |                  |           |         |
| Light source (wave length) | Red LED (680nm)                                                                                                                                          | Green LED (525nm) | Blue LED (470nm) | White LED |         |
| Indicator                  | Operation indicator : Orange LED, Stability indicator : Green LED                                                                                        |                   |                  |           |         |
| Display                    | LCD with back light                                                                                                                                      |                   |                  |           |         |
| Switch                     | Setting button : 2 Operation changeover switch : RUN/SET                                                                                                 |                   |                  |           |         |
| Teaching system            | Full auto teaching / Auto teaching                                                                                                                       |                   |                  |           |         |
| Teaching input             | Setting button                                                                                                                                           |                   |                  |           |         |
| Sensitivity adjustment     | By manual adjustment                                                                                                                                     |                   |                  |           |         |
| Features                   | Interference protection<br>Short circuit protection                                                                                                      |                   |                  |           |         |
| Material                   | Polycarbonate                                                                                                                                            |                   |                  |           |         |
| Wiring                     | Cable(outer dimension : dia.4.8) 0.2mm <sup>2</sup> 3 core 2m length                                                                                     |                   |                  |           |         |
| Weight                     | Approx. 80g (including mounting bracket)                                                                                                                 |                   |                  |           |         |

### ENVIRONMENT

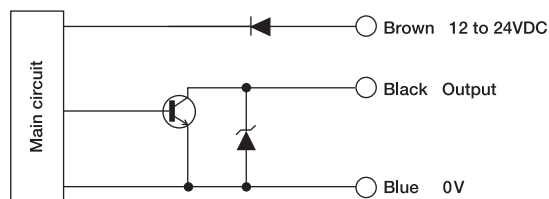
|                         |                                                                                                                                                                           |
|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient illumination    | Incandescent : 10,000lx or less Sun light : 20,000lx or less                                                                                                              |
| Operating temperature   | -25°C to +55°C (-40°C to +70°C in storage)<br>1 to 3 units extended : -25°C to +55°C, 4 to 10 units extended : -25°C to +50°C<br>11 to 16 units extended : -25°C to +45°C |
| Operating humidity      | 35 to 85%RH (without condensation)                                                                                                                                        |
| Case protection         | IP 40                                                                                                                                                                     |
| Vibration protection    | 10 to 55Hz Double amplitude : 1.5mm 2 hours for each direction (X.Y.Z)                                                                                                    |
| Shock protection        | 500m/s <sup>2</sup> 3 times for each direction (X.Y.Z)                                                                                                                    |
| Dielectric withstanding | 1000VAC for 1 minute                                                                                                                                                      |
| Insulation resistance   | 500VDC, 20M $\Omega$ or more                                                                                                                                              |

### OUTPUT CIRCUIT / WIRING

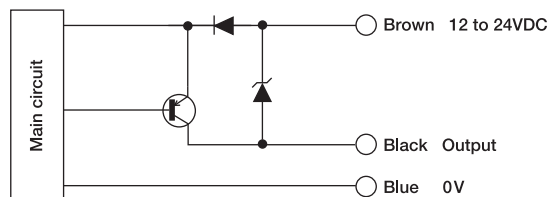
#### (Wiring)



#### (NPN output)



#### (PNP output)

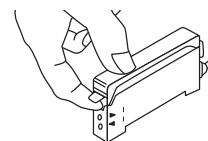


### HOW TO USE AMPLIFIER UNIT

#### How to install the case cover

##### 1) How to open the case cover

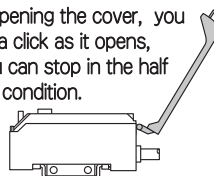
Pull up the tab of the case cover holding the front part of the case cover.



Pulling up only the tab of the case cover forcefully may damage the case cover. Do not fail to hold the front part of the cover when pulling up the tab.

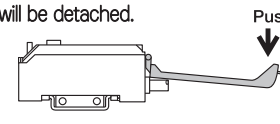
##### Half opened condition

When opening the cover, you will feel a click as it opens, and you can stop in the half opened condition.



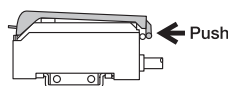
##### Full opened condition

Push the edge of the cover when the cover is fully opened, and the cover will be detached.

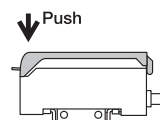


##### 2) How to attach the case cover

Put the cover on the amplifier unit shown in the figure and push the hinge.



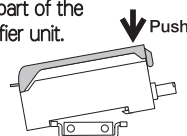
Press the front part of the cover after pushing the hinge. Confirm fixing of the cover with a click.



#### How to install the amplifier unit onto the DIN rail / the mounting bracket

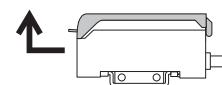
##### 1) How to attach

Hook the front hook of the amplifier unit onto the rail (or the mounting bracket) and press the rear part of the amplifier unit.



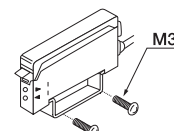
##### 2) How to detach

Pushing the amplifier unit towards the front, pull the front up and the front hook comes off.



##### 3) Side mounting of amplifier unit

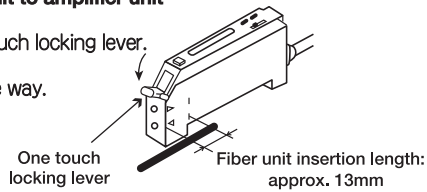
Fasten with screws by using the attached mounting bracket. Tightening torque should be 0.8Nm or less.



## HOW TO USE FIBER UNIT

### How to insert fiber unit to amplifier unit

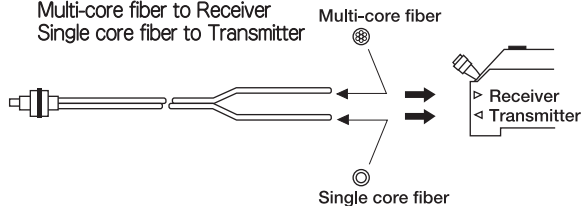
- 1) Push down the one-touch locking lever.
- 2) Push in the fiber all the way.



You can find some marks on the side of the case showing the insertion length to avoid mistakes when the fiber unit is inserted. Use them as a gauge.

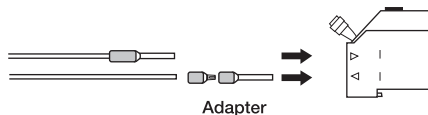
### How to insert coaxial reflection fiber to amplifier unit

Fix as ;  
Multi-core fiber to Receiver  
Single core fiber to Transmitter



### Installation of the small diameter unit onto the amplifier unit

When installing the small diameter fiber unit, use the adapter included in the fiber unit.

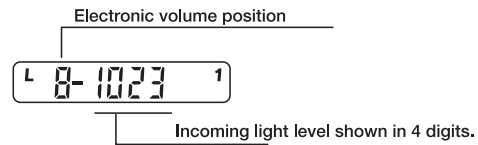


## DISPLAY MODE

(Two indications shown on the incoming light level indicator)

### Light variation indication mode

- • • The display shows the incoming light level at that moment.

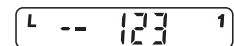


\* The differential (1 to 2) may occur between the indicated value and the actual operating value.

### Indication on light variation indication mode

- • • Indicate light level by plus/minus.

Indicate the receiving light level by plus/minus from the standard value.



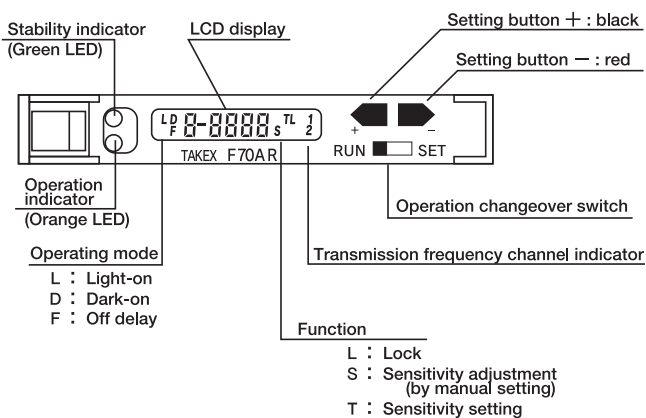
Ex. 123 minus from the standard value.

### (Application example)

- To obtain incoming light variation details when an object is detected.
- To obtain the detailed light attenuation rate due to soil/damage on the fiber end.

\* Incoming light level indication gets unstable when sensors mutually interfere with. Get rid of interference by blocking either of light path, etc, to obtain correct incoming light level.

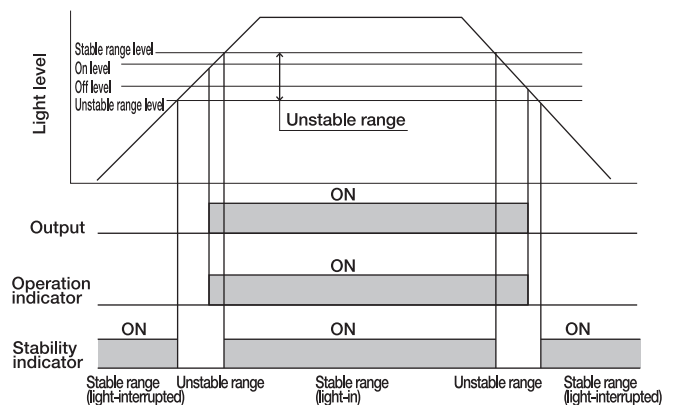
## PANEL DESCRIPTION



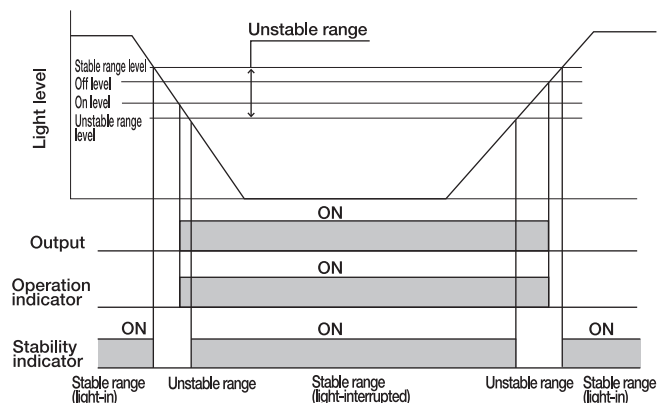
## BASIC OPERATION

### Operation indicator and Stability indicator

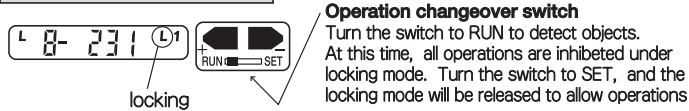
#### Light-On operation



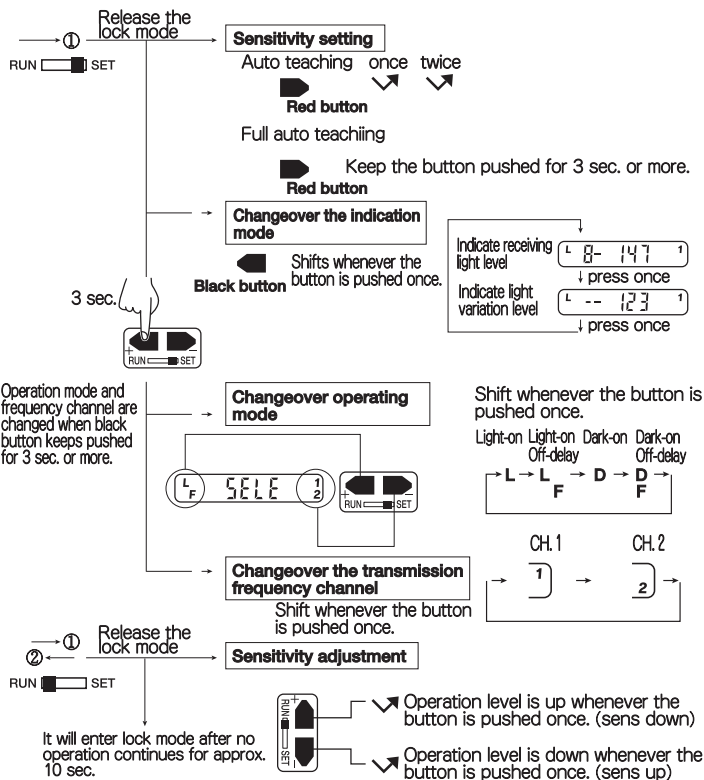
#### Dark-On operation



## HOW TO OPERATE



Operation changeover switch    Operation button and explanation    Operation    Action



## OPERATING MODE AND INTERFERENCE PROTECTION

- 1) Confirm that the switch is positioned on [RUN].
- 2) Press the "black button" 3 sec. or more.
- 3) The display shows "SELE" and then select the operating mode and Interference protection function.

### ■ Operating mode . . . Light-on, Dark-on and timer function

- 1) LCD display changes as follows whenever button is pushed. Select output mode or timer function. 

Light-on    Light-on Off-delay    Dark-on    Dark-on Off-delay

→ → →
- 2) After select the operation mode, turn the switch to [RUN].

### ■ Interference protection . . . Changeover transmission frequency channel

- \* Transmission frequency can be changed to avoid interference between 2 sensors.
- \* Set the channel 1 and channel 2 for two sensors.

- 1) The channel number will shift whenever red button is pushed. Select the proper channel. 

Transmission frequency channel indicator
- 2) After selected, replace the switch to [RUN]. 

Frequency selection is completed for 2 sensors.

## SENSITIVITY SETTING

- \* Incoming light level indication gets unstable when sensors mutually interfere with. Get rid of interference by blocking either of light path, etc, to obtain correct incoming light level.

- 1) Turn the switch [RUN] to [SET].

- 2) The locking mode is released to wait for sensitivity setting. "T" flashes.

### ■ Setting with an object stille (Auto teaching)

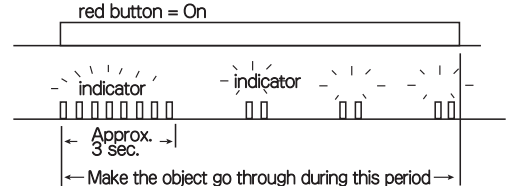
- 1) Push "red button" and then release it without any objects. The indicators flash to show standby status.

- 2) Push "red button" with a detection object placed on a proper position. The flashing indicators stop flashing. The setting is completed.

(Addition) There is no problem even if the object is placed or not in reverse order under the above sensitivity setting process.

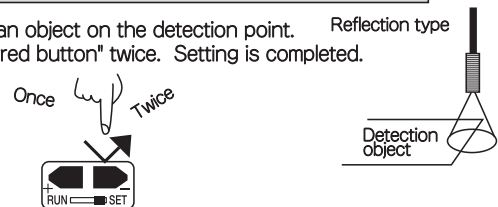
### ■ Setting with an object moving (Full auto teaching)

- 1) Push "red button" 3 sec. or more. Orange LED and green LED flash alternately and change to be slow flashing.
- 2) Make the object go through while the button continues to be pushed.
- 3) Release button 1 after the object finished to go through and the LEDs changed to be slow flashing. red button = On



## POSITIONING OF DETECTION OBJECT

- 1) Place an object on the detection point.
- 2) Push "red button" twice. Setting is completed.



## MAXIMUM SENSITIVITY SETTING

(Through-beam type)

- 1) Block light by an object, etc. to form light-interrupted condition.
- 2) Push "red button" 1 twice. Setting is completed.



Note : If reflection fiber unit is used with max. sensitivity, the unit may be inactivated when light is interrupted. Do not fail to set sensitivity by auto/full auto teaching with a detection object.

### Sensitivity setting

The condition prior to sensitivity setting can be restored.

The operation after sensitivity setting can be checked without replacing the switch to [RUN].

Push the "red button" once again to be in sensitivity setting condition (an orange indicator and a green indicator flash alternately) and turn the switch to [RUN] if you intend to restore to the condition prior to sensitivity setting (the condition prior to turning the switch to [SET]).

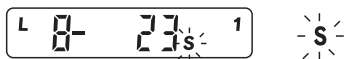
The condition prior to turning the switch to [SET] is restored.

All data are cancelled even through any sensitivity settings are carried out with the switch on [SET] side.

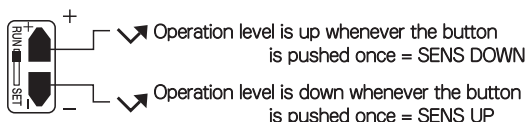
## SENSITIVITY ADJUSTMENT

- \* The optimal operation level can be set as operation status can be checked with ON-operation level shifted.

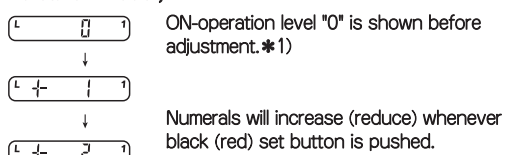
- 1) Replace the switch to [RUN] after turning RUN  SET it [RUN] to [SET].
- 2) Locking mode is released to change to sensitivity mode. RUN  SET
- 3) "S" flashes to show sensitivity adjustment is standby.



Shows ON-operation level is "23". \*1)



### Operation level-indication mode ;



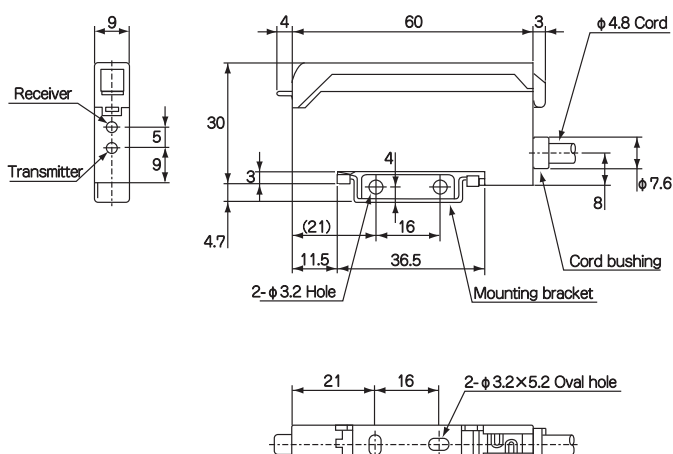
It will automatically enter the locking mode approx. 10 sec. after the sensitivity adjustment is completed.

- \*1) On-operation level value    Ligh-ON : On value when light enters.  
                                               Dark-ON : On value when light is interrupted.
- Hysteresis (HIS) slides depending on sensitivity setting value.
  - The numerals do not change with the +/- switch pushed when ON-operation level value is out of range.
  - On-operation level is indicated under adjusting ON-operation level, however the indication changes to show receiving light level or light variation level when output is turned ON/OFF. After that, push the set button and adjust sensitivity (operation level-UP/DOWN), and ON-operation level will be shown.
  - It will enter locking mode after no operation continues for approx. 10 sec. Once entering locking mode, no reaction is obtained with the set button pushed.
  - Response speed, detection operation, etc. are the identical with the locking mode operation even when "S" flashes.

## NOTES FOR CORRECT USE

- Be sure to turn off power before wiring.
- Extension cable should be 0.3mm<sup>2</sup> or more and up to 100m long.
- Do not run the amplifier unit cable in the same conduit as power line or high voltage line. Use separate conduit to avoid malfunction or damage.
- Check power fluctuation so that the power supply matches rated voltage.
- Connect the frame ground terminal/the ground terminal of the switching regulator to the ground.
- Use the sensor with the operation changeover switch turned on "RUN" just after power is supplied. Wait for warming up time (0.5 sec.) just after power is supplied.
- Do not use the amplifier unit in humid or dusty place, or where the unit may be directly splashed by water or oil.
- Do not use outdoors or in a place where external light can shine directly on the receiver.
- LCD display for incoming light level shows an average value in a certain time. The differential ( $\pm 1$  to 2) may occur between the indicated value and the actual operating value.
- If reflection fiber unit is used with max. sensitivity, the unit may be inactivated when light is interrupted. Do not fail to set sensitivity by using a detection object.
- LCD display for incoming light level gets to show an incorrect figure when interference protection is activated. Read a correct figure after getting rid of interference by blocking the disturbing light or turning Off the power of the disturbing sensor.
- Use power supply which is limited the current (2A) in accordance with the lead wire size of the sensor.
- In case of using this product as UL approved equipment, use UL Class 2 power supply.

## DIMENSIONS (unit : mm)



- This sensor is designed to detect a specific object. It is not provided with control functions for prevention of injuries or accidents in itself.
- Takex will not held responsible for any damage or loss incurred due to accidents, faulty installation, abuse, misuse, improper maintenance or acts of God including lightning surge.
- Specifications and dimensions may be subject to change without notice.