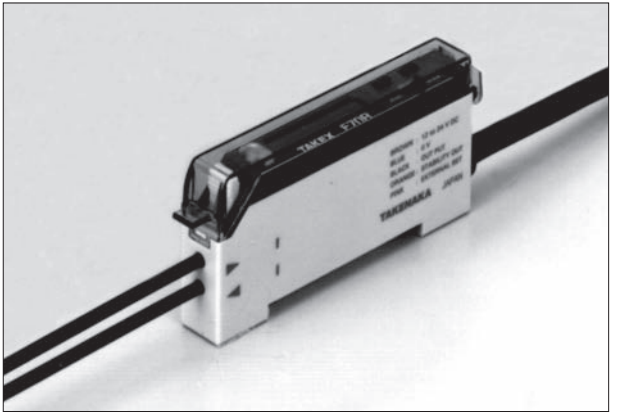
TAKEX

# FIBER SENSOR with degital indication
## F 7 0 series

# INSTRUCTION MANUAL



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 informatons such as operation mode, light level etc.

# Introduction

- Thanks for your purchase of TAKEX products.
- This manual shows you how to treat, how to operate the F70 series fiber sensor and some cautions.
- Beforehand, please read this manual carefully for correct and effective use.
- Please keep to make use of this manual for maintenance whenever required.

## Versatile features

**Auto sensing mode**
Operation level is automatically adjusted depending on light amount variation. Suitable for the installation site where light level is easy to fluctuate, such as where the environments gradually get worse even though better when the work starts.

**Light variation indication**
Incoming light level is shown by plus (+) or minus (-). An actual numerical value represents light variation level or how soiled the end of fiber unit is.
The indications for all sensors can be shown based on ±0 even though two or more sensors are used on different conditions.
——— This enables to manage all sensors at one site.

**Absolute value indication**
Incoming light level is shown in the range of 0 to 9999 even though an amplifier unit is saturated with a large amount of light.

**Hold - to- teach**
Cacthes the instantaneous light variation toward high-speed moving objects or falling objects at full auto teaching mode.
After teaching, Max. value and Min. value are indicated.

**Test teaching**
Sensitivity can be restored to the preset status if a test teaching proves the detection to be unstable.

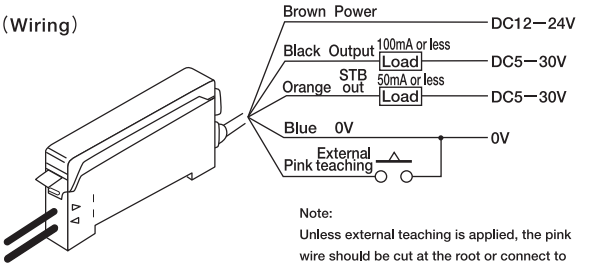
# CONTENTS

# Specifications

| | | | | | |
|---|---|---|---|---|---|
| Model | NPN | F70R | F70G | F70B | F70W |
| | PNP | F70RPN | F70GPN | F70BPN | F70WPN |
| Detection | | Through beam / Reflection (by fiber unit) | | | |
| Range | | Depending on fiber unit and light source | | | |
| Power supply | | 12V to 24VDC ±10% Ripple 10% or less | | | |
| Current consumpion | | NPN type : 39mA or less PNP type : 50mA or less | | | |
| Output mode | Output | Open collector | | | |
| | | NPN: Rated : Sink current 100mA (30VDC) Max. Residual voltage : 1 V or less<br>PNP: Rated : Source current 100mA (30VDC) Max. Residual voltage : 2 V or less | | | |
| | Stability Output | Open collector | | | |
| | | NPN :Rated : Sink current 50mA (30VDC) Max. Residual voltage : 1 V or less<br>PNP :Rated : Source current 50mA (30VDC) Max. Residual voltage : 2 V or less | | | |
| Operation mode | | Light-On / Dark-On selectable | | | |
| Timer | | On delay / Off delay / On-Off delay / non-delay selectable<br>Timer time : 10 / 20 / 40 / 60 / 80 / 100 / 120ms. selectable 40ms. set at factory | | | |
| External teaching input | | Non voltage(contact / non-contact) | | | |
| Response time | | Transmission frequency Channel 1 : 500 μs. or less<br>Channel 2 : 600 μs. 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/SELECT/MODE | | | |
| Teaching system | | Full auto teaching / Auto teaching | | | |
| Teaching input | | Setting button / External input | | | |
| Features | | · Sensor feature : Auto sensing / Teaching / Locking<br>· Accessory feature : S-Manual setting for sensitivity / ON-operation level<br>H-manual setting for hysteresis<br>V-Light variation indication mode / Absolute value indication mode<br>· Interference protection buil-in<br>· Self-diagnostic built-in<br>· Short curcuit protection built-in | | | |
| Material | | Polycarbonate | | | |
| Wiring | | Cable (outer dimension : dia. 4.8) 0.2㎟. 5 core 2m length | | | |
| Weight | | Approx. 80 g (including mounting bracket) | | | |
| Ambient illumination | | Incandescent lamp : 10,000 lx or less Sun light : 20,000 lx or less | | | |
| Ambient temperature | | −25℃ to +55℃ (storage : −40℃ to +70℃)<br>in case of installed some pieces closely, 1-3pcs : −25℃ to +55℃<br>4-10pcs : −25℃ to +50℃ 11-16pcs : −25℃ to +45℃ | | | |

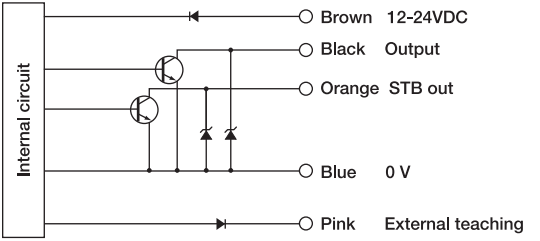
# Output circuit / Wiring

(Wiring)

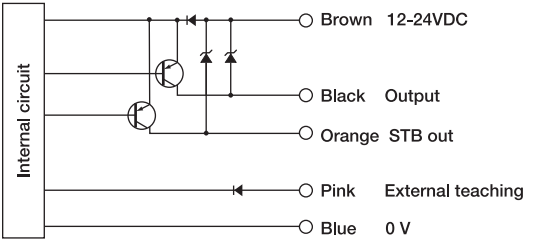



Note:
Unless external teaching is applied, the pink wire should be cut at the root or connect to +side (NPN)/0V(PNP) of the power.

(NPN output)



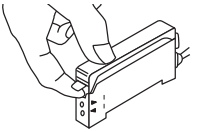

(PNP output)




● The output transistor turns off when load short circuit or overload occurs. Check the load and turn the power back on.

# Amplifier unit

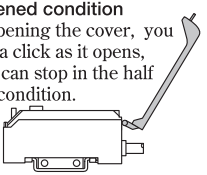
## How to install the case cover



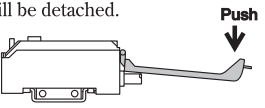
1) **How to open the case cover**
Pull up the tab of the case cover holding the front part of the case cover.

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.

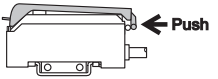
**Half opened condition**
When opening the cover, you will feel a click as it opens, and you can stop in the half opened condition.



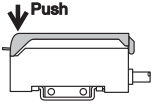
**Full opened condition**
Push the edge of the cover when the cover is fully opened, and the cover will be detached.




2) **How to attach the case cover**
Put the cover on the amplifier unit shown in the figure and push the hinge.

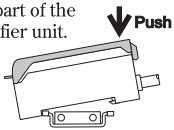



Press the front part of the cover after pushing the hinge. Confirm fixing of the cover with a click.

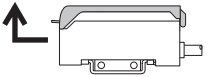



## How to install the amplifier unit onto the DIN rail / the mounting bracket

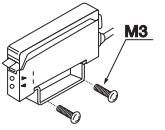
1) **How to attach**
Hook the front hook of the amplifier unit onto the rail (or the mounting bracket) and press the rear part of the amplifier unit.




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.

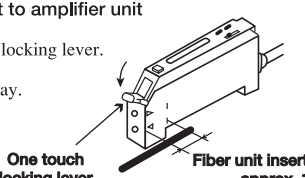


# Fiber unit

## How to insert fiber unit to amplifier unit

1） Push down the one-touch locking lever.

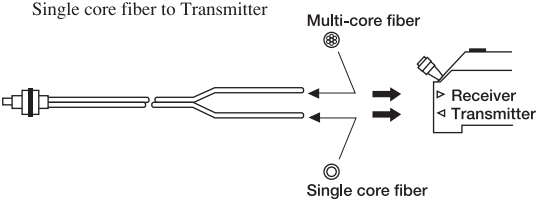
2） Puch in the fiber all the way.




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.

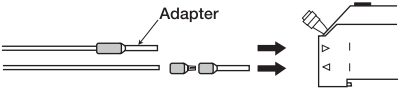
## How to insert coaxial reflection fiber to amplifier unit

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



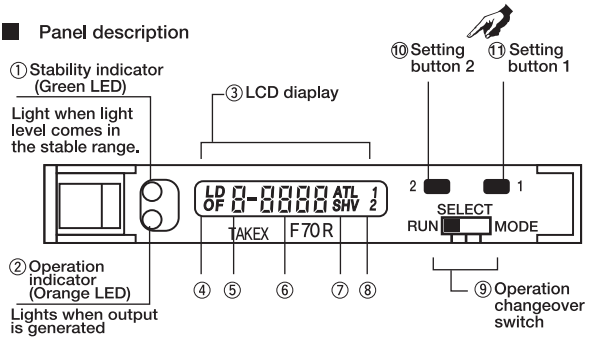

## Installation of the small diameter unit onto the amplifier unit

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



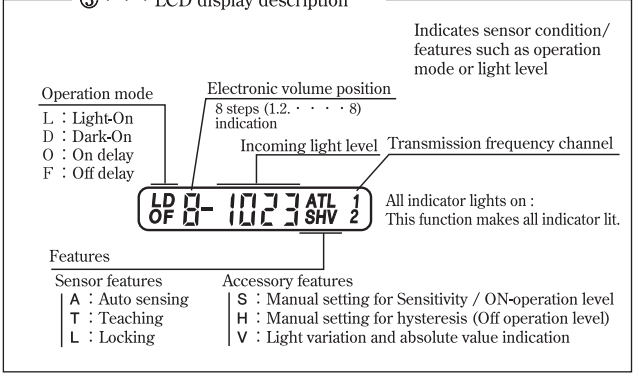
# Basic （Checking in factory set condition）

## ■ Panel description






### ③ ・・・LCD display description



# Basic （Checking in factory set condition）

⑨・・・Operation changeover switch


Sensor function
Functioning as a normal sensor


Selecting function
* Light-On/Dark-On/Timer selectable
* Sensor features selectable
* Accessory features selectable


Mode function
* Sensitivity setting on locking mode (Teaching)
* Operation of accessory features selected at SELECT

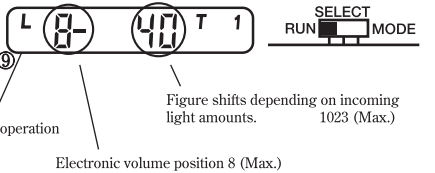
## Basic operation

* Check operation in factory set condition prior to use.

1） Install the fiber unit, correctly make wiring and supply the power.

Factory set condition will show the following indication.

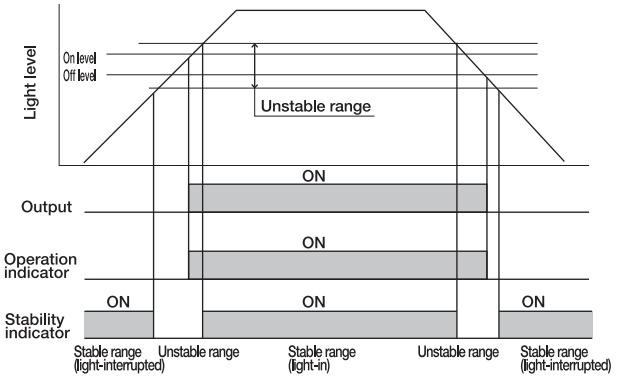
・"L" is shown for ④
・"8" is shown for ⑤
・"T" is shown for ⑦
・"RUN" is positioned for ⑨



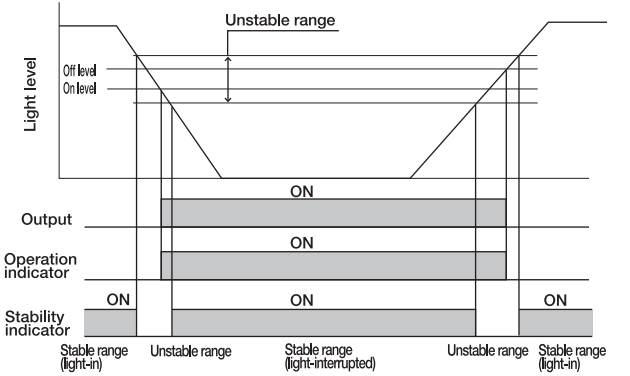

2） Incoming light level indicator ⑥ shows the figure which presents incoming light amount at that moment. The differential (1 to 2) may occur between the indicated value and the actual operating value.

## ■ Operation indicator and Stability indicator

・Light-On operation




・Dark-On operation

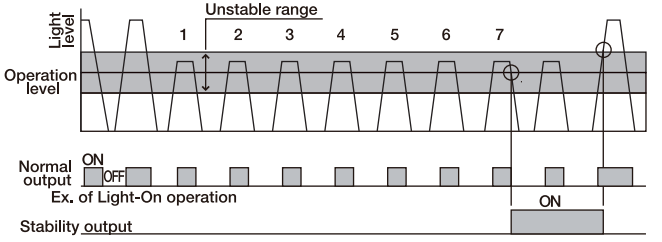


# Basic

## ■ Self-diagnostic feature (Stability output)

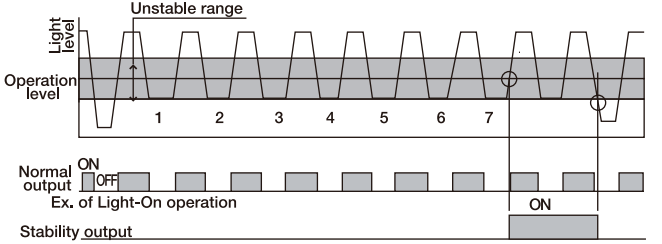
＊This program always monitors incoming light level both when light enters and when light is interrupted. When the light level continues to be the unstable 7 times, the stability output issues to warm that Light-in level or Light-interrupted level is not sufficient for stable operation.

### ・Deficient in Light-in level

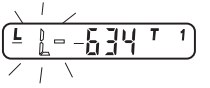



H flashing shows shortage of Light-in level.


### ・Deficient light-interrupted level



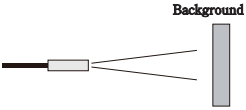

L flashing shows shortage of Light-interrupted level




Addition : Stability output can be canceled once the operation switch is turned to SELECT. Self-diagnostic feature does not function normally when interference protection feature is activated.

# Basic

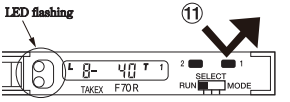
## ■ Try to set sensitivity



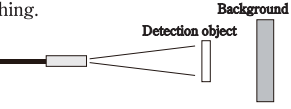

＊ Example : Sensitivity setting by auto teaching with an object still, and using reflection fiber unit.

1 ) Project light to background without a detection object placed.

2 ) Push the button 1 ⑪ once. and the LEDs are flashing.




3 ) Push the button 1 ⑪ once with a detection object placed, and the LEDs stop flashing. Sensitivity setting is completed.




＊ The set operation level keep stored even after power is turned off.

＊ On the above example, light level indication mode — electronic volume position and incoming light level are shown is numerals on the display by each.
— is applied. See page 19 for changeover to light variation indication mode.

Addition : How to set sensitivity differs depending on selected features. (See page 20 for details.)

Sensitivity can be set on

1 ) Teaching mode T, TV
- Auto teaching using a still object
- Full auto teaching using a moving object

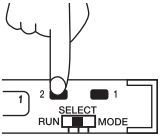
2 ) Auto sensing mode A, AV, Locking mode L, LV

# Practical

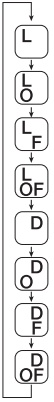
# Operation mode selection

＊ Select Light-On, Dark-On and timer operation.

1 ) Turn the switch RUN to SELECT.

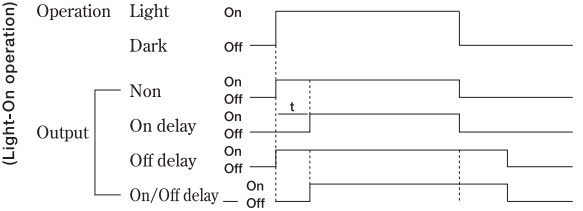




2 ) Push button 2. The operation mode display will change as follows by turns whenever the button is pushed.




| Indication | Output operation | Timer operation |
|---|---|---|
| L | Light-On | Non |
| LO | Light-On | On delay |
| LF | Light-On | Off delay |
| LOF | Light-On | On/Off delay |
| D | Dark-On | Non |
| DO | Dark-On | On delay |
| DF | Dark-On | Off delay |
| DOF | Dark-On | On/Off delay |

3 ) Replace the switch to RUN after selecting the required mode.
The selected operation mode is available.

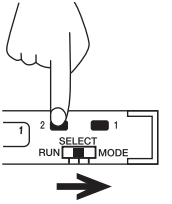



# Timer time changeover

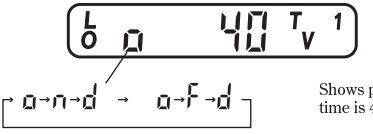
* Timer is factory set at 40ms.
  Any of 10ms, 20ms, 40ms, 60ms, 80ms, 100ms, 120ms. is available.

1 ) Confirm the switch is positioned on RUN.


2 ) Turn the switch to SELECT
while pushing button 2.

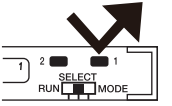



3 ) Release the button 2, and the present timer is shown together with a indication of "ond oFd".




Shows present timer time is 40ms.

4 ) The timer time will change to show whenever button 1 is pushed.
Select the required time.




5 ) After selection is completed, replace the switch to RUN.


* Timer time can be also changed by turning the operation changeover switch to MODE while pushing the set button 2. This is the same procedure for "Transmission frequency channel changeover mode", but "Timer time selection mode" is available by turning the switch to SELECT at this point.

# Features description

■ "Sensor Features" and "Accessory features" are available.

## Sensor features

**A : Auto sensing mode** — The unit always monitors light level. On/Off level is automatically changed as light level fluctuates.

⇨ See page 18.


・ The changed On/Off level is not stored. The sensor will restart to work with the initial data when the power is supplied again.

**T : Teaching mode** — Enables sensitivity setting by auto teaching, full auto teaching or external signal.

⇨ See page 20.


**L : Locking mode** — Inhibits sensitivity setting.
See page 20 for sensitivity setting.


A V
T V
L V — **Light variation Indication mode** — Shows light level increase/decrease rate (light variation) due to detection objects in +/− figure.

⇨ See page 19.


## Assessory Features

S : The preset sensitivity or On operation level can be changed.

⇨ See page 24.


H : Hysteresis (Off-operation level) can be changed. ⇨ See page 25.

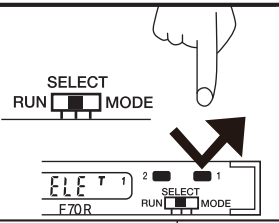

V : Absolute value can be indicated. ⇨ See page 26.

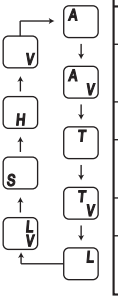
# Sensor feature / accessory feature selection

## How to select sensor features

1 ) Turn the switch to SELECT.

2 ) Push button 1. The display will change as follows by turns to show each sensor / accessory feature whenever the button is pushed.




| Indication | Functioning | Reference page |
|---|---|---|
| A | Auto sensing mode | 18, 21 |
| A ・ V | Auto sensing mode & light variation indication mode | 18, 19, 21 |
| T | Teaching mode | 20 |
| T ・ V | Teaching mode & light variation indication mode | 20, 19 |
| L | Locking mode | 21 |
| L ・ V | Locking mode & light variation indication mode | 19, 21 |

3 ) Replace the switch to RUN after any feature is selected. The selected feature herein keeps stored.

## How to select accessory features

・Turn the switch to MODE after any feature is selected.

・The selected accessory feature functions.

| Indication | Functioning | Reference page |
|---|---|---|
| S | Sensitivity & On-operation level changeover | 24 |
| H | Hysteresis (Off-operation level) selection | 25 |
| V | Absolute value indication | 26 |

Addition : When the operation changeover switch ⑨ is replaced to RUN after an accessory feature is selected or operated, the sensor feature will function as it did without change.

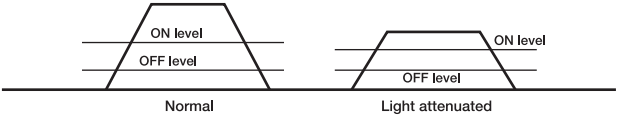
# Sensor features description / application

■ Auto sensing mode ・・・ Useful for the manufacture line where On / Off level fluctuates under working.

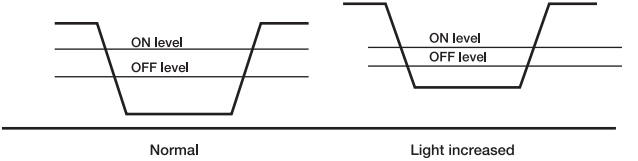

(Application example)

Light level is attenuated and operation gets unstable due to steam on the fiber end in a short time after the power is supplied at commencement of work.

Ex. Light level is attenuated.




Ex. Light level is increased.




＊The sensor works with the teaching data stored just after the power is supplied.
After that the operation level falls down automatically as the light level is attenuated.

＊"A" on the display flashes when the sensor detects light level fluctuation to activate the feature.

＊Turn the switch to SELECT and then replace it to RUN to store the change of On / Off level.

＊Push button 1 to restore the changed On / Off level to the initial level which teaching determined.

(Note) This feature may not display its ability to the full in the following case.
- The incoming light level indicater ⑥ shows 20 or less when light enters.
- Light amount differential between light-in and light-interrupted is 20 or less.
- When the interference protection feature is activated.
- The incoming light level of Light-in always fluctuates.

# Sensor features description / application

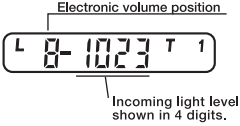
■ Light variation indication mode ・・・ Useful to get light variation information visually or to manage two or more sensors at one site.

(Two indications shown on the incoming light level indicator)

**Indication on light variation indication mode**


Ex. +286 against the standard value

**Indication on light level indication mode**




(Application example)

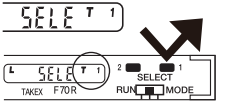
- To obtain incoming light variation details when an object is detected.
- To obtain the detailed light attenuation rate due to soil / damage on the fiber end.
- To manage two or more sensor at one site. All sensor can be managed under the same condition because the indications for all differently conditioned sensor are shown based on one standard (±0).
  Ex. Readjust sensitivity if a sensor is shown as "-10" due to soil of the fiber end.

(Addition)

- In light variation indication, the initial data taken from sensitivity setting is based as a standard (±0).
- In auto teaching, the data when the button was firstly pushed is based as a standard. In full auto teaching, the data when the button started to be pushed is based as a standard.

■ How to change light level indication to light variation indication

1 ) Turn the switch to SELECT to show SELE on LCD display.


2 ) The indication changes whenever button 1 is pushed. Select any of AV, TV, or LV.

3 ) Replace the switch to RUN.

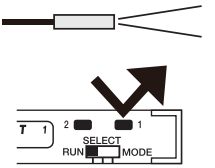
# Sensitivity setting (1) T TV When teaching mode T, TV is selected

* The correct sensitivity setting can not be obtained if the sensors mutually interfere with. Set sensitivity without cross talk of sensors.

* Sensitivity setting in teaching mode — Setting method differs as follows.
  - Auto teaching —— Set with an object still.
  - Full auto teaching —— Set with an object moving

## Auto teaching (with an object still)

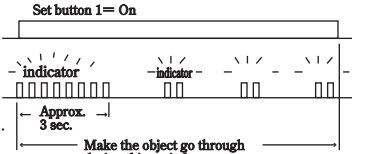
1) Push button 1 and then release it without any objects.
   The indicators flash to show standby status.
2) Push button 1 with a detection object placed on a proper position.
   The flashing indicators stop flashing.
   The setting is completed.




(Addition)
- In light variation indication mode, firstly teach a standard condition (±0) as an initially taking data is set as a standard.
- When teaching starts to be carried out, LCD indication changes to show sensitivity and level. After teaching is completed, the LCD indication will restored to be light variation indication mode (+/-).
- When the switch is turned to SELECT or MODE under teaching, the teaching operation stops with "non" indicated. The teaching resumes when the switch is turned to RUN again.

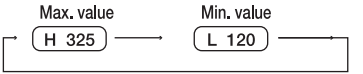
## Full auto teaching (with an object moving)

1) Hold to push button 1 for 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.




## Hold-to-teach (The instantaneous data under full auto teaching are indicated.)

* When button 1 is released, max. value and min. value of the teaching are indicated. (Max. and Min. are alternately shown for 3 sec.)




Max. value H (Light-In) =325
Min. value L (Light-Interrupted) =120

* The hold-to-teach feature is disabled under external teaching.

# Sensitivity setting (2)

When Auto sensing mode A, AV / Locking mode L, LV is selected

＊ Sensitivity can not be set with the switch positioned on RUN.

When auto sensing mode is selected.

1） Turn the switch to MODE.
2） "T" on the display flashes to show teaching is feasible.
3） After teaching, "T" and "S" flash.
4） Replace the switch to RUN.

## ■ Test teaching

＊ The teaching with MODE position enables test detection condition ("Test teaching").

・"T" and "S" flash after teaching is completed (shown on the above 3). This condition ("T" and "S" flashing) is the test teaching conditions. (The switch is remained on MODE)
・Push button 2 if you intend to restore to the condition prior to this sensitivity setting. The flashing "S" vanishes to cancel the latest sensitivity setting.
・Turn the switch to RUN after the cancellation to restore to the preset sensitivity

(addition)
・Response time is 600μs under test teaching. Teaching.speed is 500μs.
・Interference protection feature is disabled under test teaching.

# Sensitivity setting (3)

By external signal

＊ Possible to set when sensor is working under teaching mode only.

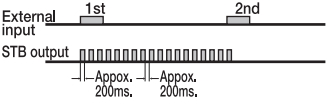
1） Refer to "Wiring" and connect pink wire to switch, PLC, etc.

2） Basic operation and setting procedure is the same as the setting by the set button (teaching mode).
Min. input time = 50ms.

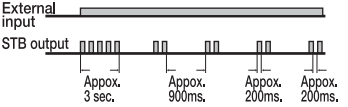
3） STB output flashes with external signal coming in to show "under teaching" to an operator.

The STB output flashing is the same action as the indicator flashing on the display.

(Auto teaching)




(Full auto teaching)

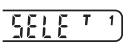


# "S" Manual setting for operation level/sensitivity
(Function)

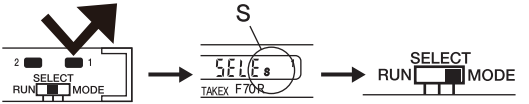
* Check if the light indication is in "+/-" or in numerals "1, 2, .....8".
  The procedure differs depending on which indication appears.

■ In numerals (1, 2, ・・8)
(Light level indication)


1 ) Turn the switch to SELECT to show SELE.


2 ) Push button 1 and select S. Turn the switch to MODE.

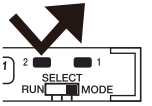



3 ) A figure of electronic volume flashes.

Ex. Electronic volume is positioned on 8 and the incoming light level at that moment is 348.

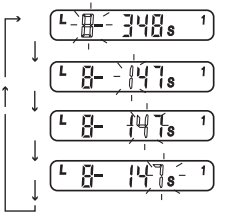

The display shows the incoming light level at that moment.

4 ) Push button 2 to shift flashing digit.




The flashing figure on the light level display shows On-operation level value.

(The illustration shows On-operation level is 147.)

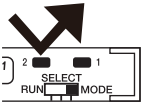


# "S" Manual setting for operation level/sensitivity
**(Function)**

## ■ Operation level changeover

＊On-operation level can be changed both for Light-On and Dark-On operation.

Light-On : On value when light enters.
Dark-On : On value when light is interrupted




1） Push button 2 several times until the digit to be changed flashes.

2） Push button 1 to count up the flashing figure.

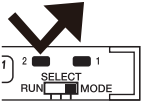

3） After setting is completed, replace the switch to RUN. The changeover is completed.

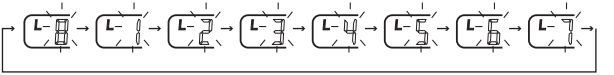

(addition)
- Operation level changeover range ・・・Light-On 9 to 999
  ・・・Dark-On 5 to 995
- OUT is shown for out of changeover range.
  If the switch is replaced to RUN for completion with OUT remained to be shown, the set value is canceled.
- Hysteresis is automatically set at "4".
- When both of operation level and hysteresis level are changed,change hysteresis level (See page 25) after the operation level has been changed according to the above.

## ■ Electronic volume sensitivity changeover

1） Push button 2 several times to flash electronic volume figure.

2） Push button 1 to count up the flashing figure.

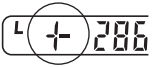


- The display shows incoming light level at the selected volume value.

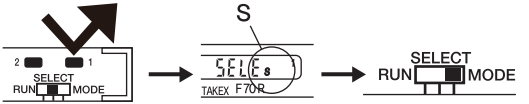
# "S" Manual setting for operation level/sensitivity
(Function)

## In +/- indication (Light variation indication)




1) Turn the switch to SELECT to show SELE.


2) Push button 1 and select "S". Turn the switch to MODE.

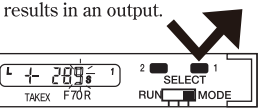



The present operation level is shown.

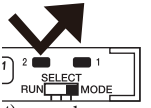

Oparation level is shown as "+288" in the illustration.

Shows that exceeding the value 288 results in an output.

3) Push button 1 to count up the flashing figure.




4) Push button 2 to shift digit.




5) Set proper value by repeating 3) and 4) procedure.

6) After completed, replace the switch to RUN. The changover is completed.

**(Addition)**
- **+/- changeover is impossible.**
- **It is output trigger value (On-operation level) that can be changed.**
  **Light-On : On value when light enters.**
  **Dark-On : On value when light is interrupted.**
- **Hysteresis is automatically set at 4.**
- **Changeover renge……Differs depending on the base value regarded as the standard (±0).**
  **On level changover range is 9 to 999 in light level indication mode.**
  **It is impossible to exceed this range.**
  **(Ex.) Providing incoming light level = 600 as a standard value, changeover range is 999 - 600 = 399.**
- **Out of range …… OUT is shown for out changeover range.**

# "H" Hysteresis selection

**(Function)**

* Off operation level can be changed with On operation level fixed.
  Hysteresis = On operation level - Off operation level

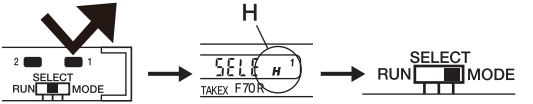
* Hysteresis changeover ranges 1 to 99.

  00 is impossible to be set. This results in "out of range".

* Min. hysteresis value set on teaching mode is "4".

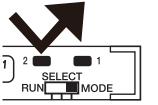
1 ) Turn the switch to SELECT.


2 ) Push button 1 and select "H". Turn the switch to MODE.

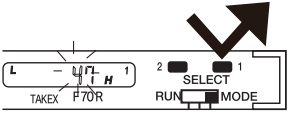



3 ) The flashing digit is possible to be changed.

4 ) Push button 2 to shift digit.




5 ) Push button 1 to count up the flashing figure.




6 ) Replace the switch to RUN after setting is completed.

(Note)
Setting hysteresis value less than required may cause chattering due to external lights, noise etc.

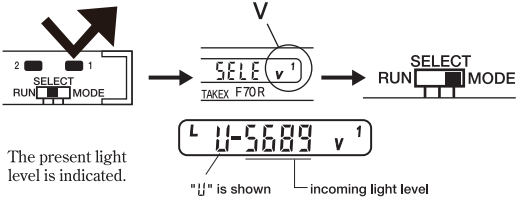
# "V" How to indicate absolute value

**(Function)**

* Useful to compare the incoming light amounts (light-in) with the amounts (light-interrupted) when the light amount differential is undiscriminating on normal mode due to volumes of incoming light.
  (Ex. When the light level indication (light-in) is saturated, etc.)
* Incoming light level is shown in the range of 0 to 9999 regardless of the indication for electronic volume sensitivity. (Incoming light level is shown regardless of output.)

1) Turn the switch to SELECT to show SELE.


2) Push button 1 some times and select "V". Turn the switch to MODE.
Push button 1 some times and select "V".



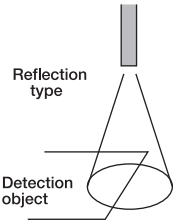

(Addition)
- Push button 1 to change dynamic range width.
- After the indication is saturated up to 999, push button 1 for further indication.
- U shifts to u and light amount can be shown further. In this stage, the Max. indication is also 9999 max.


The indication will shift U→u→U whenever button 1 is pushed.

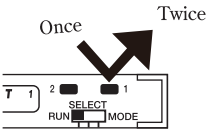
- A number in single figure may flicker. Use it as a reference to compare light amounts.

# Positioning of detection object

1 ) Place an object on the detection point.




2 ) Push button 1 twice. Setting is completed.

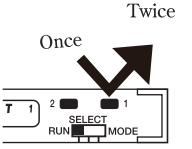



# Maximum sensitivity setting

(Through-beam type)

1 ) Block light by an object,etc. to form light-interrupted condition.

2 ) Push button 1 twice. Setting is completed.

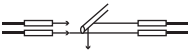



(Note)
If reflection fiber unit is used with max. sensitivity, the unit may be inactivated when light is interrupted.
Do not fail to set sensitivity by auto / full auto teaching with a detection object.

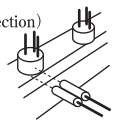
# Interference protection

* Transmission frequency can be changed to avoid interference between 2 sensors.

(Through-beam)

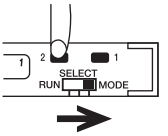


(Reflection)



1 ) Confirm that the switch is positioned on RUN.


2 ) Turn the switch to MODE while pushing button 2.



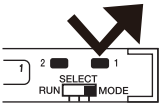

3 ) Relezse the button 2.


Ex. Channel 1 is selected for transmission frequency.

F 1 appears on the display to show the frequency can be changed.

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

5 ) After selected, replace the switch to RUN. Frequency selection is completed.




(Addition 1)

- The frequency channel can be also changed by turning the operation changeover switch to SELECT while pushing the button 2. This is the same procedure for "Timer time changeover mode", but "Frequency channel changeover mode" is available by turning the switch to MODE at this point.
- When frequency channel 2 is selected, response tiome shifts to 600$\mu$s. (500$\mu$s. for channel 1)

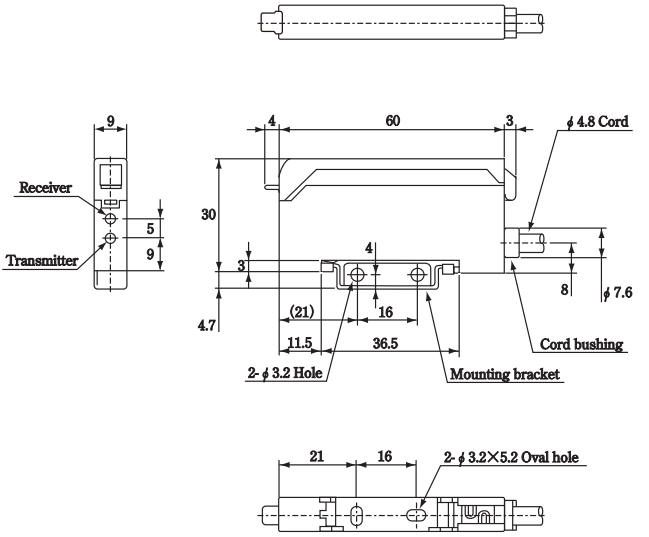
(Addition 2)

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

# Caution

- Be sure to turn off power before wiring.
- Extension cable should be 0.3㎟ 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.
- When a commercial available switching regulator is used, ground the FG (frame ground) terminal.
- Avoid such a usage as continuously switching on and off the power source.
- 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.
- Unless external teaching is applied, the pink wire should be cut at the root or connect to + side (PNP) / 0V(NPN) of the power.
- LCD display for incoming light level shows an average value in a certain time. The differential (±1 to 2) may occur between the indicated value and the actual operationg 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.

# External dimensions (unit : mm)

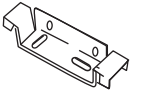


# Note

- The guarantee period of this product is one year after the delivery.
- If any defect is found during the guarantee period, Takenaka will repair or replace the defective product.
- This product is a sensor which issues an output upon detecting a target. It does not have any function to prevent accidents, death or injuries.
- Takenaka 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.

## Accessory

- Mounting bracket 1
- Instruction manual 1




**TAKENAKA ELECTRONIC INDUSTRIAL CO.,LTD.**

Head office, factory : 20-1 Narano-cho, Shinomiya, Yamashina-ku, Kyoto, Japan
Telephone : (075)581-7111
Fax : (075)501-6877

R70
VEGETABLE OIL INK
ABH-HS-0017-1('14—5)-H