TAKEX

FIBER SENSOR with digital indication
F70A※K series

INSTRUCTION MANUAL

· Outline

This product is a Connective Type Fiber Optic Sensor that is designed for the purpose of saving wiring labor when sensors are extended.Max.16 units can be connected on the same power line. Power supply is required for one unit of sensors only and not required for the other sensor units.

Individual output can be obtained from each sensor unit irrespective of master / slave unit.

When two or more units are installed, this series enables drastical saving of wiring labor, wiring line and wiring space as well as ease of maintenance. This product can be used intermingled with –F70K/71K series.

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 informations such as operation mode, light leveletc.

Full auto teaching and auto teaching are available as sensitivity adjustment.

Also manual sensitivity adjustment is built-in.

· Introduction

Thanks for your purchase of TAKEX products.

This manual shows you how to treat, how to operate the F70A※K 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.

CONTENTS

Notes

- Warranty period is limited in duration to 12 months from original date of shipment.
- If the unfitness should be caused on our own responsibility during warranty period, we warrant only to repair the unfitted parts or to replace the unfitted products.
- This sensor is designed to detect an object; it is not a safety device. TAKENAKA is not responsible for damage or losses caused by accident, calamity, acts of God, abuse, misuse abnormal usage, faulty installation or improper maintenance.
- The values described on the feature items represent the sampling value from a certain manufacturing allotment, not warrants the rating or the performance. Make use them for reference.

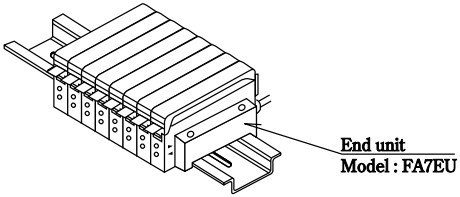
Notes for correct use

- Do not fail to use DIN rail for installation when two or more amplifier unit are used. Fix both edges of amplifier units by sandwiching with end units (optional).

- Note that effective ambient temperature specification changes when two or more amplifier units are used. Max.16 units can be used.

Effective ambient temperature range when two or more units are used ;

1 to 3 units extended	−25 to +55℃
4 to 10 units extended	−25 to +50℃
11 to 16 units extended	−25 to +45℃



- Do not fail to turn the power Off before making wiring, connecting amplifier units and removing connector cord, etc.

- Cord extension should be 100m Max. in length with using 0.3mm^2 or more cord.

- Be sure to wire amplifier unit line separately from high-voltage line/power line as the wiring in the same conduit may cause damage of malfunction due to noise.

- Check power source fluctuation so that the power input meets the rated voltage.

- Do not fail ground Frame ground(F.G) terminal when an ordinary switching regulator is used.

- 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.

Specifications

- Do not start using unit under the transient state (during 0.5sec.) just after the power is supplied.
- Output pulse may be occurred when the power unit turns off. Be sure to turn Off the power. After load or load line turns off.
- Avoid using unit where it is subject to steam, dust, water or oil directly.
- Do not use unit outdoors or in a place which external light can shine on receiver face directly.
- 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 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.

■ Accessory

- End unit : 1 set
- Instruction manual : 1

Specifications

Model	NPN type	F70ARK	F70AGK	F70ABK	F70AWK
	PNP type	F70ARKPN	F70AGKPN	F70ABKPN	F70AWKPN
Detection system		Through beam / Reflective (by fiber unit)			
Range		It depends on emitter LED or the optic fiber cables			
Power supply		12V to 24VDC ±10% Ripple 10% or less			
Current consumption		NPN type : 39mA or less PNP type : 50mA or less			
Output mode		Open collector			
Control output ※1		NPN type : Rated : Sink current 100mA (30VDC) Max. Remain voltage : 1V or less PNP type : Rated : Source current 100mA (30VDC) Max. Remain voltage : 2V or less			
Operation mode		Light-On / Dark-On selectable			
Timer		Off delay / non-delay selectable delay time : 40 ms. fixed			
Response time		Transmission frequency Channel 1 : 600 μs or less Channel 2 : 700 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/SET			
Teaching system		Full auto teaching / Auto teaching			
Teaching input		Setting button			
Sensitivity adjustment		By manual adjustment			
Features		・Interference protection ・Short circuit protection			
Material		Polycarbonate			
Wiring	Between amplifier unit	2P connector (For power supply)			
	Input/Output connection	4P connector ※2			
Frequency of Connector insertion/removal		50 times or less			
Weight		Approx. 20g			

■ Environment

Ambient illumination	Incandescent lamp : 10,000 lx or less Sun light : 20,000 lx or less
Ambient temperature	−25℃ to +55℃ (−40℃ to +70℃ in storage) 1 to 3 units extended : −25℃ to +55℃ 4 to 10 units extended : −25℃ to +50℃ 11 to 16 units extended : −25℃ to +45℃
Ambient humidity	35 to 85%RH (without condensation)
Case protection	I P40
Vibration protection	10 to 55Hz Double amplitude : 1.5mm 2 hours for each direction (X.Y.Z)
Shock protection	500m/s² 3 times for each direction (X.Y.Z)

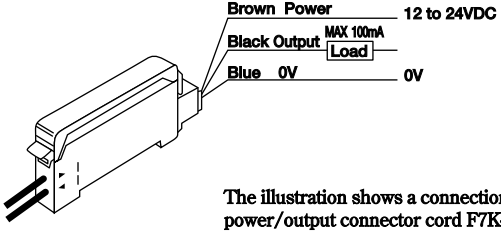
※1 Output current differs depending on power supply position when units are extended.
When power is supplied on the center, Control output : 70mA or less
When power is supplied at the end, Control output : 40mA or less

※2 Compatible connector cord for Input/Output (Optional)
Connector cord for Power/Output Model F7K-3 3 cores Brown, Blue, Black
Connector cord for Output only Model F7K-1 1 cores Black

Output circuit / Wiring

(Wiring)

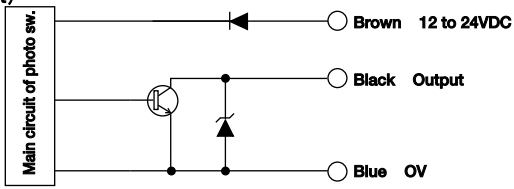
Use a connector cord for input/output connector (optional) for wiring.



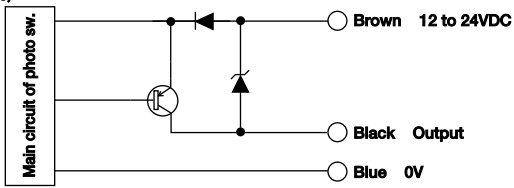
The illustration shows a connection using power/output connector cord F7K-3.

Input/output circuit

(NPN output)



(PNP output)

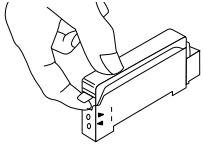


Note1) Input/output circuit is for output only when output connector cord is used. Power is supplied from a fiber amplifier unit using power/output connector cord.

Note2) Refer to "Rating/Features/Specifications" when units are extended as the specification of ambient temperature range and output current differs from no extension.

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.

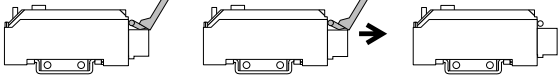
Pulling up only the tab of the case cover forcefully may damage the case cover. Do not fail to hold the front part of the cover when pulling up the tab.

Half-opened condition

When the cover is opened, it will open to the rear connector position and can stop at half-opened condition.

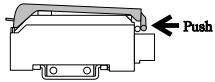
Pull a hinge in half-opened condition to detach cover.

Full-opened condition

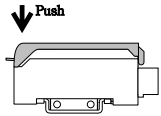


2） How to attach the case cover

Put the cover on the amplifier unit shown as figure and press the hinge.



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

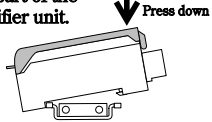


■ How to install the amplifier unit onto the DIN rail / the mounting bracket

Note : Mounting bracket is optional. Side mounting is infeasible with using the mounting bracket.

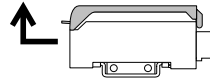
1） How to attach

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.

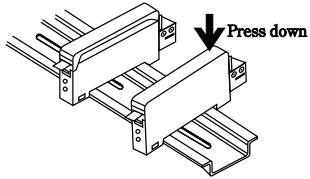


How to use amplifier unit

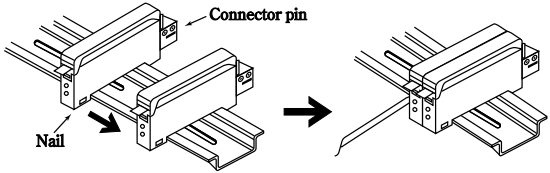
■ Amplifier unit (Connective installation)

Note : Do not fail to use DIN rail for installation when two or more units are extended to be installed. The units can be connectively installed up to 16 units. Do not fail to turn the power off when the units are connected or detached.

① Install amplifier units on the DIN rail one by one leaving some space.

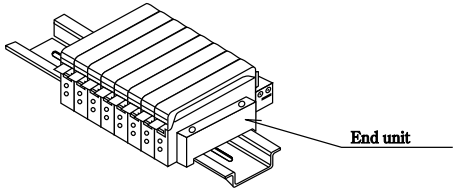


② Slide an amplifier unit and stick the units together with matching up front nails and rear connector pins by each.



How to use amplifier unit

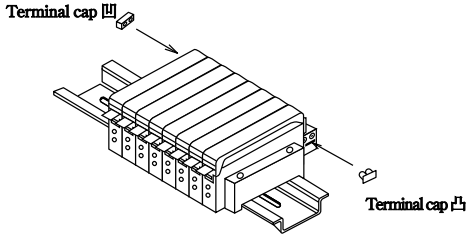
③ Put both of end amplifier units between End units (Optional) to prevent the connector parts separating due to vibration, etc.



④ Detach units one by one on the reverse procedure.
Amplifier unit may be damaged if it is detached under connective condition and without sliding.

Short protection on rear connector pin

As for both of end sensor units, do not fail to put the attached terminal caps on the power supply terminals which are placed at the rear of sensor unit to prevent an electric shock or short when amplifier unit is used itself or connectively. Two types of terminal caps (凹/凸) are available.



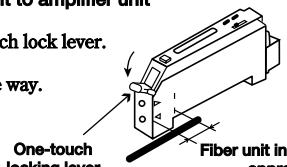
How to use fiber unit

■ How to insert fiber unit to amplifier unit

1) Push down the one-touch lock lever.

2) Push in the fiber all the way.

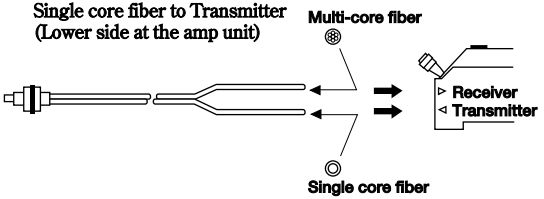
3) Raise the one-touch lock lever.



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.

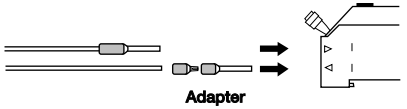
■ How to insert coaxial reflection fiber to the amplifier unit

Fix as ;
Multi-core fiber to Receiver
Single core fiber to Transmitter
(Lower side at the amp unit)



■ 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.

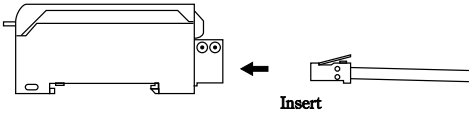


Connector

◆ Connector cord can be attached/detached under connective condition of amplifier units and without sliding.

■ How to attach connector cord

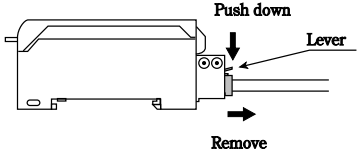
① Connect fiber-amplifier units.
② Insert connector cord to amplifier unit itself until it clicks.



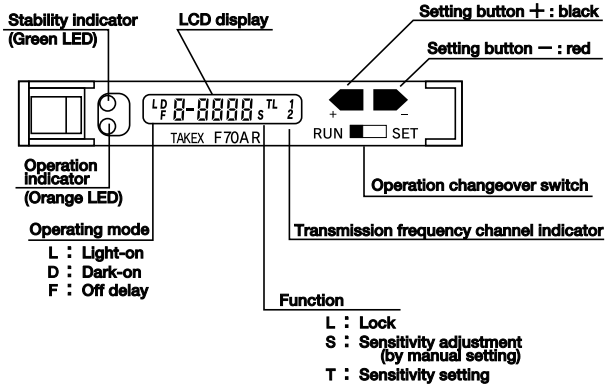
③ Put the terminal caps on the power supply terminals at the end amplifier units.

■ How to detach connector cord

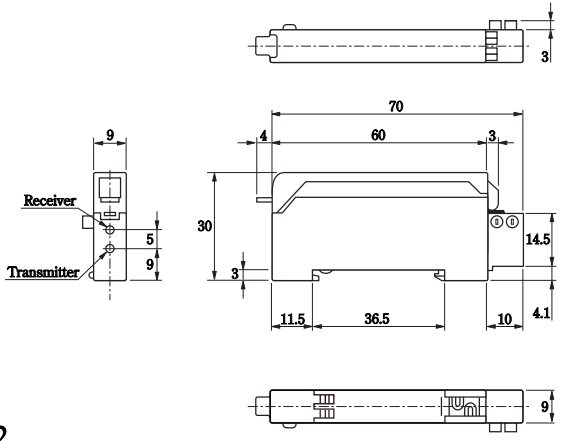
① Turn Off the power of fiber-amplifier units.
② Remove the cord pushing down a lever of connector cord.



Panel description



Dimensions

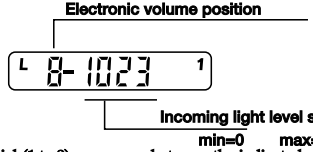


Display mode

(Two indications shown on the incoming light level indicator)

■ **Light variation indication mode**

・・・The display shows the incoming light level at that moment.

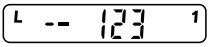


＊The differential (1 to 2) may occur between the indicated value and the actual operating value.

■ **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)

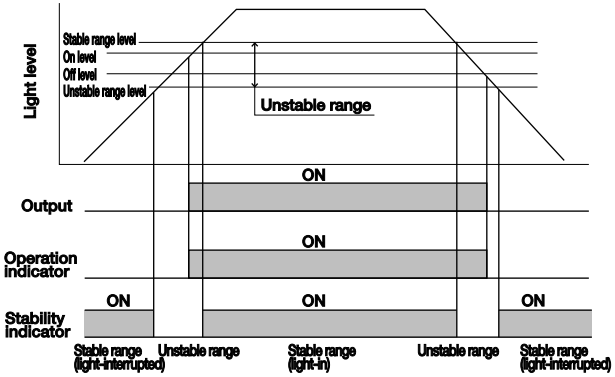
・To obtain incoming light variation details when an object is detected.
・To obtain the detailed light attenuation rate due to soil/damage on the fiber end.

＊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.

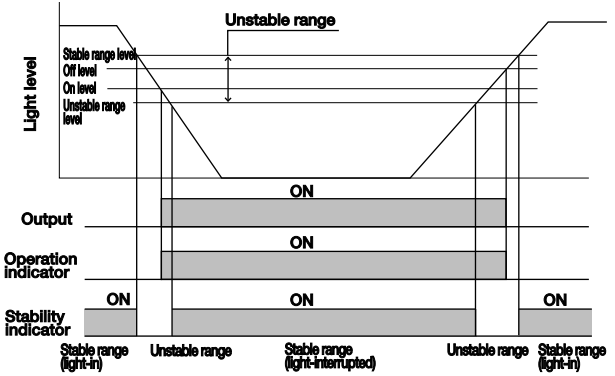
Basic operation

■ Operation indicator and Stability indicator

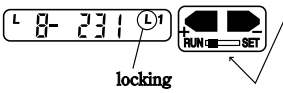
• Light-On operation



• Dark-On operation

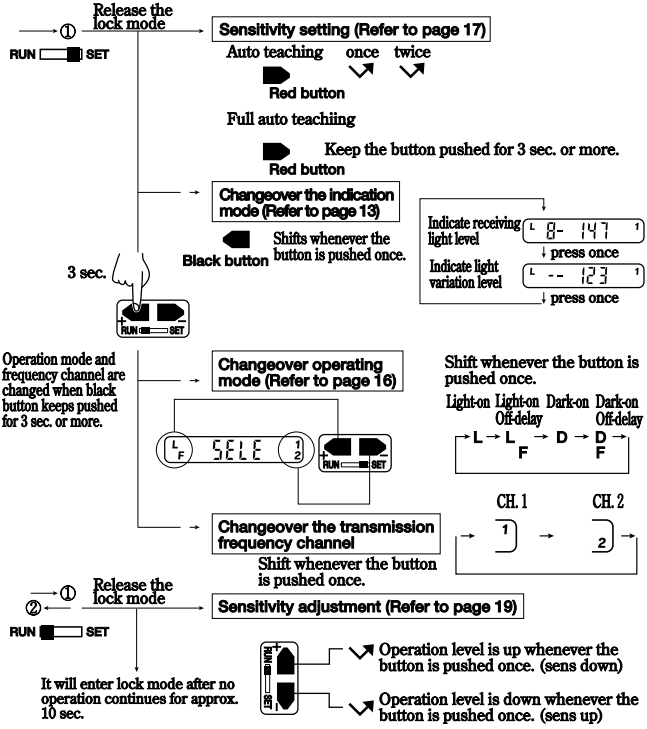


How to operate



Operation changeover switch
Turn the switch to RUN to detect objects.
At this time, all operations are inhibeted under locking mode. Turn the switch to SET, and the locking mode will be released to allow operations

Operation changeover switch | Operation button and explanation | Operation | Action

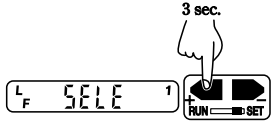


Operating mode and Interference protection

1) Confirm that the switch is positioned on [RUN]. RUN SET

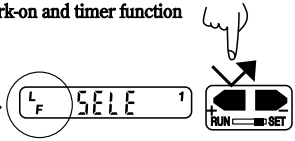
2) Press the "black button" 3 sec. or more.

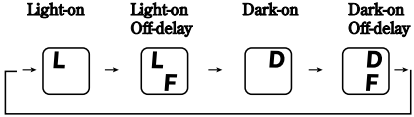
3) The display shows "SELE" and then select the operating mode and Interference protection function.



■ **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.



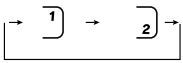


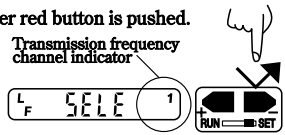
2) After select the operation mode, turn the switch to [RUN]. RUN SET

■ **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.



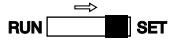


2) After selected, replace the switch to [RUN]. Frequency selection is completed for 2 sensors. RUN SET

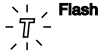
Sensitivity setting

* 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].

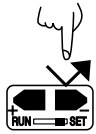


2) The locking mode is released to wait for sensitivity setting. "T" flashes.



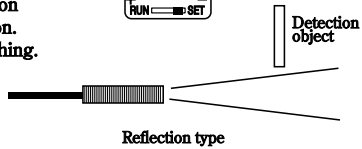
■ Setting with an object stile (Auto teaching)

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.

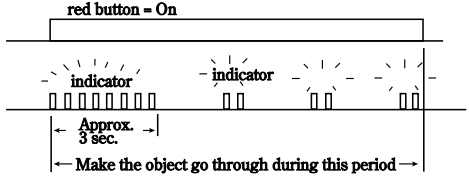


■ Setting with an object moving (Full auto teaching)

1) Push "red button" 3 sec. or more. Orange LED and gerrn LED flash alternately and change to be slow flashing.

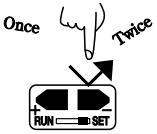
2) Make the object go through while the button continues to be pushed.

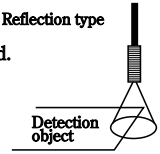
3) Release button 1 after the object finished to go through and the LEDs changed to be slow flashing.



Positioning of detection object

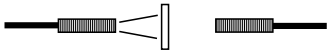
1) Place an object on the detection point.
2) Push "red button" twice. Setting is completed.

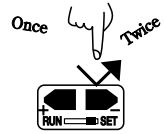




Maximum sensitivity setting

(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]).

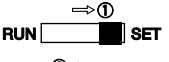
The condition prior to turning the switch to [SET] is restored.

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

Sensitivity adjustment

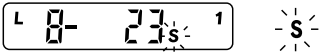
* The optimal operation level can be set as operation status can be checked with ON-operation level shifted.

1) Replace the switch to [RUN] after turning it [RUN] to[SET].

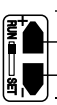


2) Locking mode is released to change to sensitivity mode.

3) "S" flashes to show sensitivity adjustment is standby.



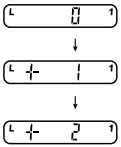
Shows ON-operation level is "23". *1)



Operation level is up whenever the button is pushed once = SENS DOWN

Operation level is down whenever the button is pushed once = SENS UP

On light-variation-indication mode ;



ON-operation level "0" is shown before adjustment. *1)

Numerals will increase (reduce) whenever black (red) set button is pushed.

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.
*2) Hysteresis (HIS) slides depending on sensitivity setting value.
*3) The numerals do not change with the +/- switch pushed when ON-operation level value is out of range.
*4) 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.
*5) 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.
*6) Response speed, detection operation, etc. are the identical with the locking mode operation evern when "S" flashes.

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