

# TAKEX IO-Link supported Fiber Sensor

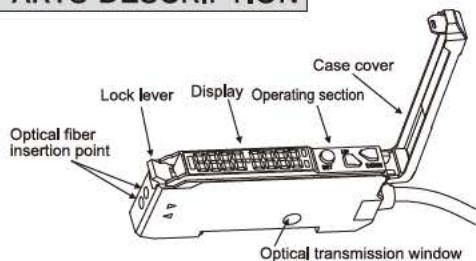
## F85RN-ILP Instruction Manual

(UL File No. E193797)

# TAKENAKA ELECTRONIC INDUSTRIAL CO.,LTD.

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## 1 PARTS DESCRIPTION



## 2 SAFETY PRECAUTIONS

- To ensure safety, be sure to follow the precautions below.
- Do not use this product for life or safety critical applications.
  - Do not use this product when its housing or cable is damaged.
  - Do not attempt to disassemble, repair, or modify this product.
  - Do not use this product in an environment containing flammable, explosive or corrosive gas.
  - Do not use this product in an environment where it could be exposed to chemicals or oils.
  - Do not use this product in an environment exposed to water including outdoors or underwater.
  - Use this product within its rated specification.
  - Do not expose this product to direct sunlight.
  - Do not use this product in a place exposed to vibration or shock.
  - Do not use organic solvent such as alcohol or thinner to clean the sensor unit.
  - Perform a daily operation check, weekly periodical check, and maintenance to ensure correct operation.
  - This product should be disposed of as industrial waste.

## 3 PRECAUTIONS FOR OPERATION

- Be sure to route the sensor cables separate from any power transmission or high voltage line, or else use shielded cables. Using the same conduit or duct as high voltage or power lines will cause malfunctions or damage because of electromagnetic induction.
- Do not apply excessive force to the cable.
- When using a DC power unit with an insulated transformer or a switching regulator, be sure to ground the frame ground (FG) terminal.
- The sensor starts operation 200 msec after power is applied. Always power on the sensor first.
- This product may generate an output pulse when the power is turned off. Turn off the power of the load first.
- Avoid turning the power on and off consecutively.
- When extending the cabling, the total length should not exceed 20m.
- Limit the current of the power supply to 2A.
- When undergoing teaching for maximum sensitivity, the detection range or the received light level indication may vary among individual examples.
- When using the mutual interference prevention function, install the sensors in close contact with each other before turning on the power.
- The mutual interference prevention function may not work properly when the device is exposed to excessive light levels. Reset the threshold to a higher value in such circumstances.
- Strong insertion force may be required depending on type of fiber cable.
- Intense external light including sunlight, inverter or LED light may cause malfunctions.

## 4 CONNECTION

### IO-Link Specification

|                     |                  |
|---------------------|------------------|
| Model               | F85RN-ILP        |
| IO-Link Version     | V.1.1            |
| Communication mode  | COM2 (38.4kbps)  |
| Minimum cycle time  | 3.6 ms           |
| Process Data Length | 4 Byte           |
| Vendor ID           | 929              |
| Device ID           | 0x010001 (65537) |

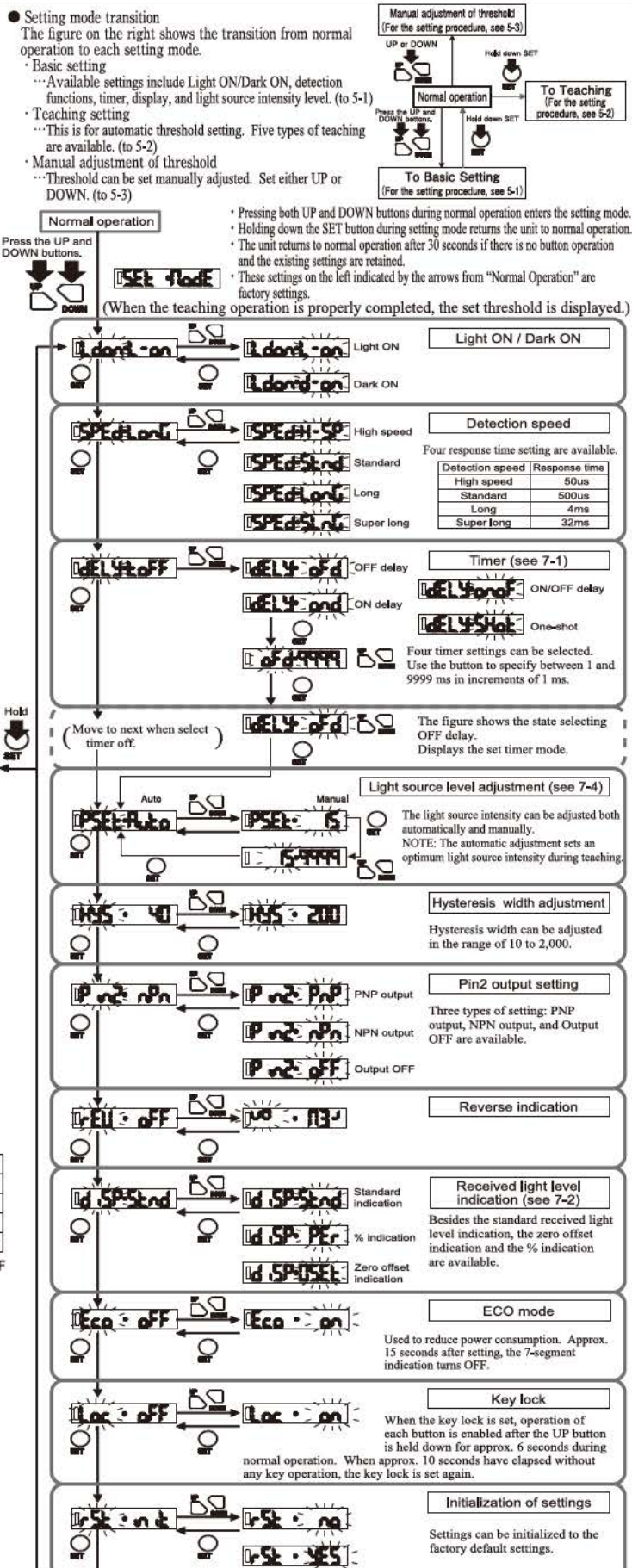
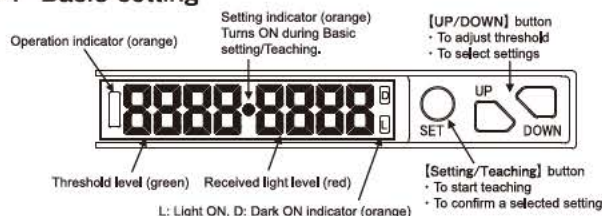
### Wiring

| Pin No. | Symbol | Color | Name                     |
|---------|--------|-------|--------------------------|
| 1       | L+     | Brown | Power source             |
| 2       | OUT    | White | Second output ※1         |
| 3       | L-     | Blue  | GND                      |
| 4       | Q/C    | Black | Main Output(PNP)/IO-Link |

※1 Selectable from NPN output, PNP output, or Output OFF

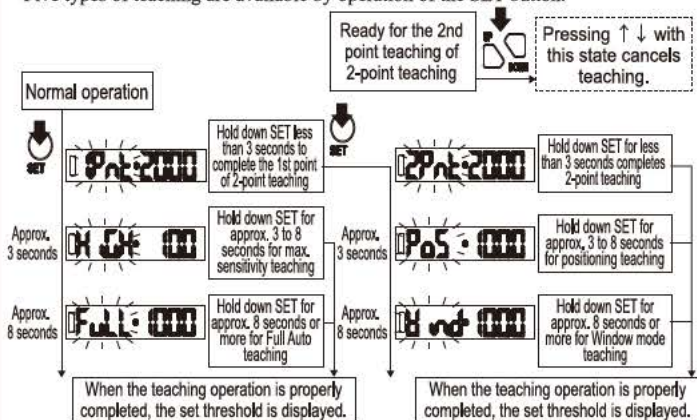
## 5 SETTING AND OPERATION

### 5-1 Basic setting

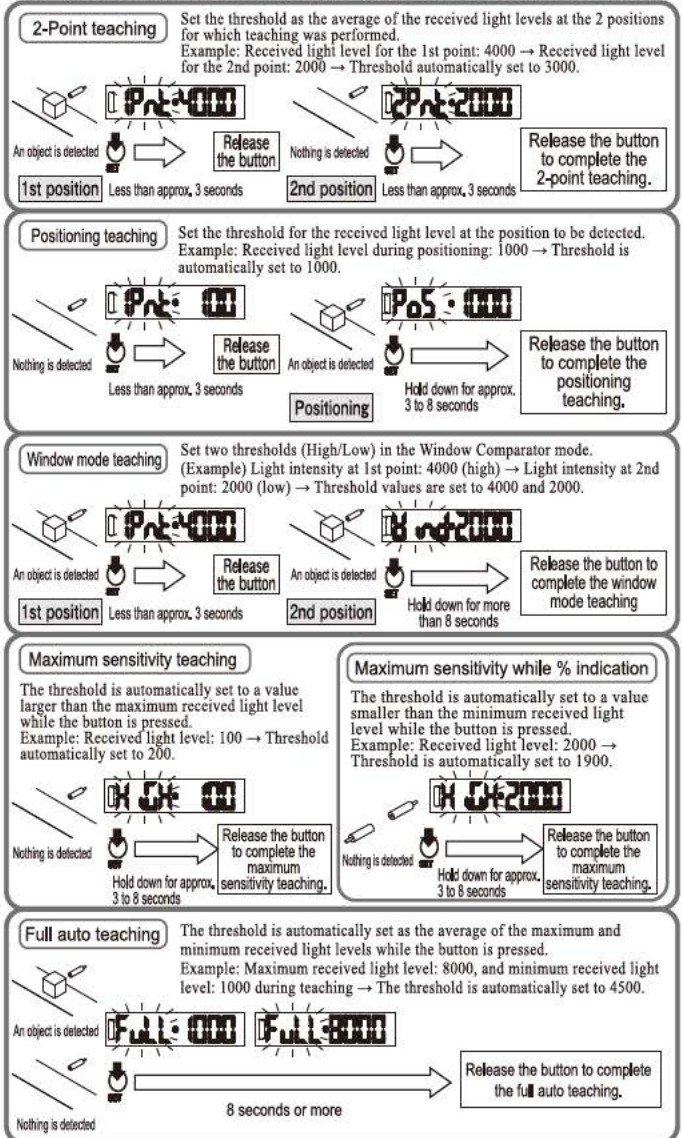


## 5-2 Teaching settings

Holding down the SET button as below during operation starts the teaching operation. Five types of teaching are available by operation of the SET button.



If teaching is not completed within 30 seconds, the teaching is canceled and the unit returns to normal operation.



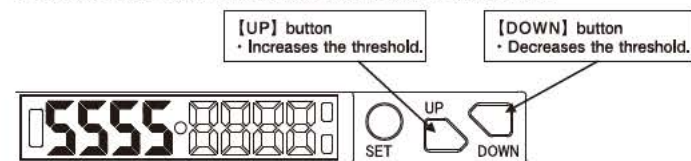
### 【TEACHING ERROR】

Refer to the below table for teaching errors. The sensor holds the threshold before teaching and returns to normal operation when teaching error occurs.

| Display | Description                                                                                                                                                                  | Solution                                                                                                                                                                                                                                                                                                                      |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Err1    | The threshold to be set is too high.<br>• High speed mode: 3,500 or more<br>• Standard mode: 9,700 or more<br>• Long mode: 9,700 or more<br>• Super long mode: 9,700 or more | Reduce the received light intensity.<br>• Reduce the light power manually.<br>• Use fiber cables of smaller diameter.<br>• For through-beam type, set up a larger distance between the transmitter and the receiver.<br>• For reflective type, set up a larger distance between the detection target and the fiber unit.      |
| Err2    | The threshold to be set is too low.<br>• High speed mode: 100 or less<br>• Standard mode: 180 or less<br>• Long mode: 50 or less<br>• Super long mode: 22 or less            | Increase the received light intensity.<br>• Increase the light power manually.<br>• Use fiber cables of larger diameter.<br>• For through-beam type, set up a smaller distance between the transmitter and the receiver.<br>• For reflective type, set up a smaller distance between the detection target and the fiber unit. |

## 5-3 Manual threshold setting

Thresholds can be adjusted by pressing the UP and DOWN buttons.

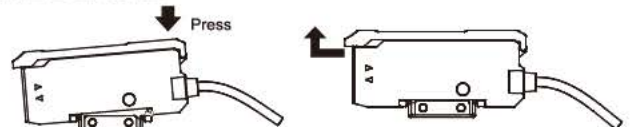


## 6 INSTALLATION

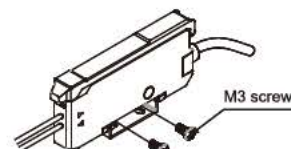
### 6-1 Installation of the amplifier unit

#### • DIN rail and dedicated mounting bracket

- (1) DIN rail mount  
Hook the front tab on the rail (or mounting bracket), and then press down the rear section.
- (2) Removal  
Press the unit forward and pull up the front section to remove the front tab.

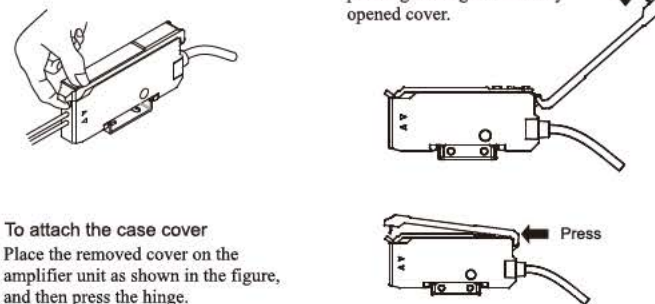


- (3) Side face mount  
Install the side of the amplifier unit using an optional mounting bracket. Tightening torque should be 0.8 N·m or less.



#### • Amplifier case cover

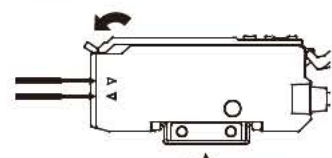
- (1) To open the case cover  
Lift the cover by pulling up the tab.
- (2) To remove the case cover  
The cover can be removed by pressing the edge of the fully opened cover.
- (3) To attach the case cover  
Place the removed cover on the amplifier unit as shown in the figure, and then press the hinge.



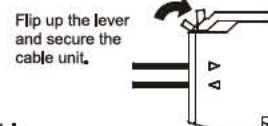
### 6-2 Installation of fiber optic cable unit

#### • Installation into the amplifier unit

- Flip down the lock lever.
- Insert the fiber optic cable end as far as it will go.

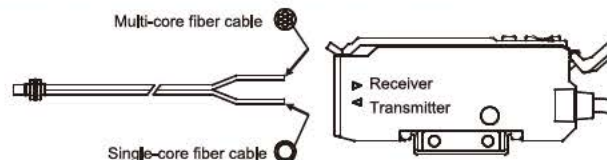


- After inserting the fiber optic cable unit, flip up the lock lever and fix the cable.



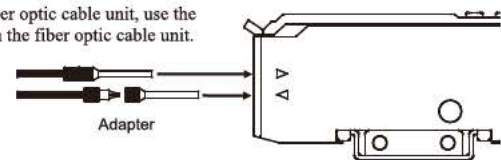
#### • Coaxial-reflection type fiber optic cable

Attach the multi-core fiber cable to the receiver side, and the single-core fiber cable to the transmitter side, and insert the fiber optic cable as far as it will go.



#### • Thin fiber optic cable

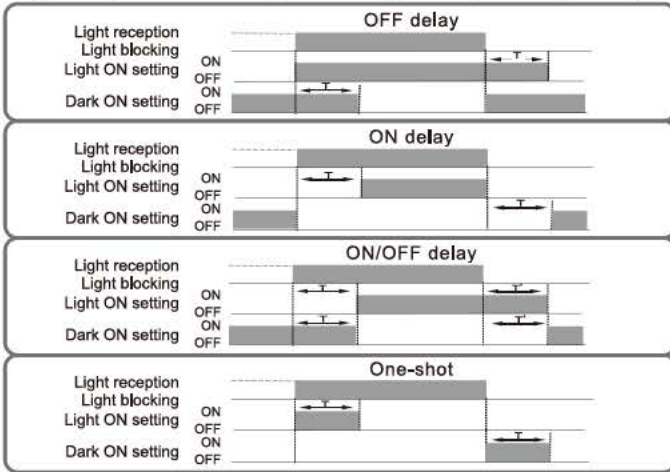
When using a thin fiber optic cable unit, use the adapter provided with the fiber optic cable unit.



## 7 FUNCTIONS

### 7-1 Timer

Four types of delay timer mode are available, as shown in the figure below. (For the setting procedure, see 5-1.)



### 7-2 Received light level indication

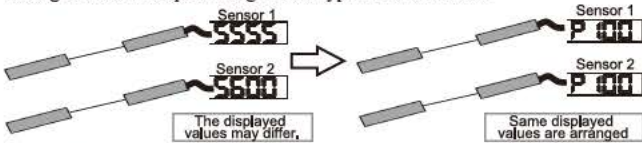
Three types of indication are available for the received light level and threshold. (For the setting procedure, see 5-1.)

#### • Standard indication:

The direct values of received light level and threshold are displayed without correction.

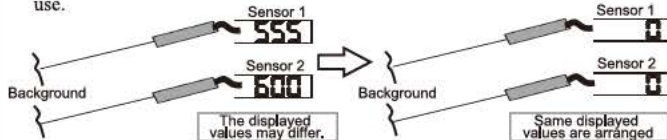
#### • % indication:

The received light level and threshold are displayed in percent as the maximum received light level during teaching is set to 100. Same displayed values can be arranged when multiple through-beam type units are in use.

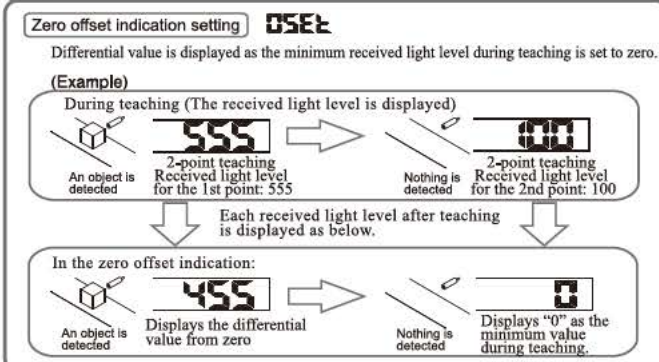
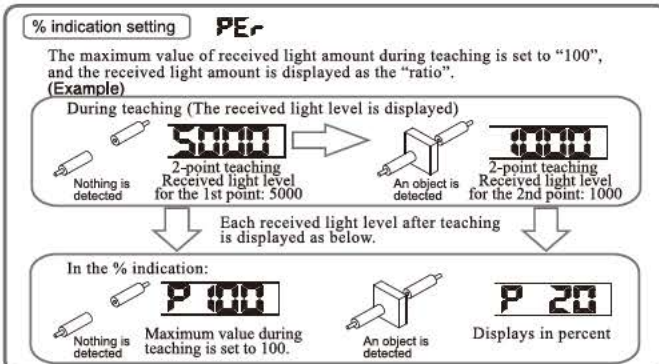


#### • Zero offset indication:

The minimum value of received light amount during teaching is set to "0", and the "difference" from it is displayed in the received light amount and the threshold value. Same displayed values can be arranged when multiple reflective-type units are in use.



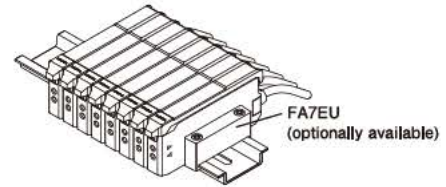
#### (Example)



### 7-3 Mutual interference prevention function

Via the mutual interference prevention function, sensors set to Standard, Long and Super long modes can be coupled (up to eight can be used).

To couple the sensors, be sure to use the End Unit FA7EU (optionally available), and install the sensors so that the optical communication windows of the sensors are in close contact with each other.



### 7-4 Light source intensity adjustment function

The light source intensity can be automatically or manually adjusted.

This is useful when the sensor has reached saturation with large receiving light intensity.

Use this function for detection at close distances (for reflective type) or for semi-transparent workpiece (for through-beam type).

#### • Automatic adjustment

The light source intensity is automatically adjusted when teaching is initiated.

The light source level is settable to 15 steps for the standard/long/super long modes and 12 steps for the high speed mode. Larger number indicates higher light intensity.

Note: Light source intensity can be low depending on the set level, in which the light spot may not be seen.

## 8 SPECIFICATION



| Model                          | F85RN-ILP                                                                                                                                                                                                                                 |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply                   | 12 to 24VDC Ripple 10% or less ※                                                                                                                                                                                                          |
| Power consumption              | 1000mW or less (40mA or less at 24V)                                                                                                                                                                                                      |
| Control output                 | NPN open collector output / Load current 100mA (30VDC, class2) or less / Residual voltage: 2V or less<br>PNP open collector output / Load current 100mA (30VDC, class2) or less / Residual voltage: 2V or less                            |
| Operation mode                 | Light ON / Dark ON                                                                                                                                                                                                                        |
| Timer                          | ON delay, OFF delay, ON/OFF delay, One-shot, Timer off<br>Delay timer : 1ms to 9999ms (set in millisecond)                                                                                                                                |
| Response time                  | H-SP mode : 50 μs or less / Standard mode : 500 μs or less /<br>Long mode : 4ms or less / Super long mode : 32ms or less                                                                                                                  |
| Light source (wavelength)      | Four-element (ALGaInP) LED (660nm)                                                                                                                                                                                                        |
| Indicator                      | Operation indicator, Setting/Teaching indicator, Light ON/Dark ON indicator : orange LED                                                                                                                                                  |
| Display                        | Received light level : 4 digits in red LED<br>(high-speed mode (0 to 3800), standard/long/super long modes (0 to 9999))<br>Threshold : 4 digits in green LED<br>(high-speed mode (0 to 3500), standard/long/super long modes (0 to 9700)) |
| Sensitivity setting            | 2-point teaching / Max sensitivity teaching / Full auto teaching /<br>Positioning teaching / Window mode teaching                                                                                                                         |
| Light source level adjustment  | Provided (auto / manual)                                                                                                                                                                                                                  |
| Mutual Interference prevention | UP to 8 units (standard, long, and super long modes) / 0 unit (high speed)                                                                                                                                                                |
| Protection circuit             | Power reverse connection / Output short-circuit protection                                                                                                                                                                                |
| Material                       | Polycarbonate                                                                                                                                                                                                                             |
| Wiring                         | Retractable cable with M12 connector<br>(cable length: 0.15m) 0.2mm <sup>2</sup> ×4-core, o.d. Ø4.2mm)                                                                                                                                    |
| Weight                         | Approx. 35g                                                                                                                                                                                                                               |
| Accessory                      | Instruction manual                                                                                                                                                                                                                        |

※ UL : Class 2 power source

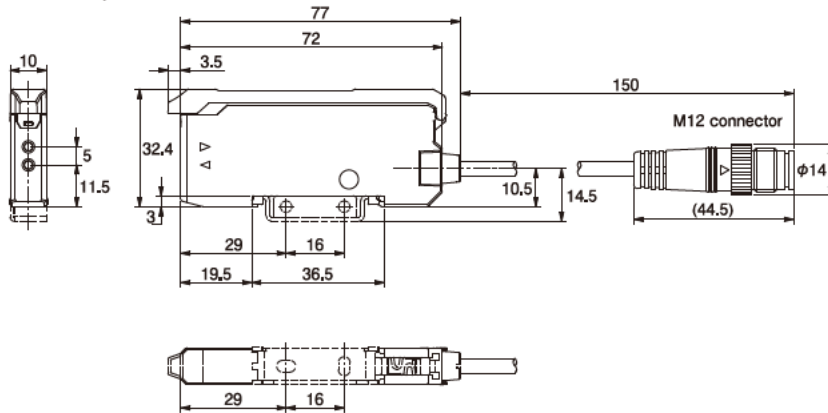
## ENVIRONMENTAL SPECIFICATION

|                         |                                                                                                                                                                      |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ambient light           | Illumination on light receiving surface : 3,500 lx or less (incandescent lamp)                                                                                       |
| Ambient temperature     | 1 to 5 adjacent units in operation : -25 to +55°C<br>6 or more adjacent units in operation : -25 to +50°C ※1<br>Storage : -40 to +70°C (no freezing or condensation) |
| Ambient humidity        | 35 to 85% RH (no condensation)                                                                                                                                       |
| Protective structure    | IP40                                                                                                                                                                 |
| Vibration               | 10 to 55 Hz / 1.5 mm double amplitude / 2 hours each in X, Y, and Z directions                                                                                       |
| Shock                   | 500 m/s <sup>2</sup> / 3 times each in X, Y and Z directions                                                                                                         |
| Dielectric withstanding | 1000 VAC for 1 minute                                                                                                                                                |
| Insulation resistance   | 500 VDC mega, 20 MΩ or more                                                                                                                                          |

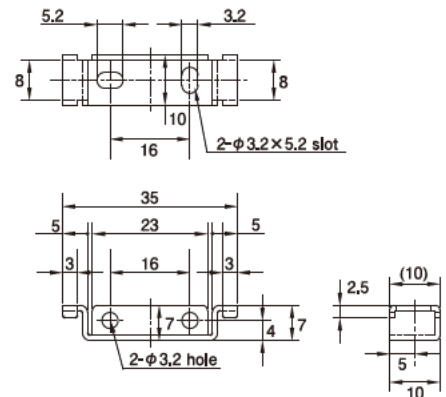
※1 : UL : Maximum ambient temperature : +50°C for single use, +40°C for two or more units connected installation.

## 9 DIMENSIONS (in mm)

### 〈F85RN-ILP〉



### 〈Mounting bracket〉 (available separately) ・ AC-BF3



## 10 WARRANTY

The product is covered by a warranty based on the Quality Regulations of Takenaka Electronic Industrial Co., LTD. (Takenaka). Regarding the warranty, please feel free to ask any questions to Takenaka, Takex sales office or authorized distributors.

### 1 〈Warranty period〉

The warranty period is one (1) year after delivery to a designated location. This warranty does not apply to expendable supplies like batteries or relays, and products of other manufacturers which Takenaka markets.

### 2 〈Scope of warranty〉

If any defect is found during the warranty period. Takenaka will, at its option, repair or replace the defective product at the location of delivery. This warranty is void and of no effect if the product is subject to improper use or handling, improper maintenance, modification, repair made by persons not authorized by Takenaka or a lack of reasonable care. The warranty does not cover defects caused by the other product, reason including fire, flood, earthquake, lighting surge and other natural disasters.

- ① If the product is used inappropriately or used under inappropriate conditions that are not described in the instruction manual or specifications.
- ② If the defect is caused by improper maintenance, including a failure to replace consumable or periodical parts as described in the instruction manual or specifications.
- ③ If the defect is not directly caused by the warranted product.
- ④ If the products is modified or repaired by persons not authorized by Takenaka.
- ⑤ If the defect is caused by rough handling, dropping, or collision after the product is delivered.
- ⑥ If the defect could not be predicted from a technical viewpoint at the time Takenaka made the agreement for, manufactured, or installed the product.
- ⑦ If the defect is caused by a natural disaster such as a fire, flood, earthquake, lightning (including a lightning surge) and so on, or an accident such as an abnormal voltage that Takenaka is not responsible for.

The warranty provided here is only for the Takenaka product and does not cover any secondary damage caused by problems related to the product.

### 3 〈Target of Warranty〉

- (1) In case that the product is used in combination with other products or as a part of a system, Buyer should confirm the compatibility of the product to the application by relevant laws, decrees, standards and regulations.
- (2) This product is designed and manufactured for use in general industries. This warranty does not cover the application of the product to:
  - ① Nuclear power facilities including power station, incineration plant, public utilities including railway, vehicle and airway facilities, medical devices, amusement machines, safety devices and facilities that are governed by regulation of government or industrial organization.
  - ② Facilities that may cause danger or serious effects on human life and assets.
  - ③ Utilities like electricity, gas or water facilities. Facilities that are required 24 hour continuous operation.
  - ④ Outdoor use or use in improper conditions or environment.
  - ⑤ Other facilities which requires broad and detailed consideration concerning safety and reliability equivalent to the above.

This warranty may cover these application in case that Takenaka is notified about the application of the product before sale and Buyer approves the compatibility and the specifications of the product by written agreement and / or by providing required safety measures.

## 11 DISCLAIMER

- This product is designed to detect a presence or passage of an object. This product does not have any function to prevent accidents, death or injuries.  
Takenaka will assume no responsibility for damages or losses resulting from accidents or disasters caused by a failure of the product, complete wiring or installation or any act that does not follow the instruction manual.
- Earthquakes, lightning (including lightning surges), fires that we are not responsible for, acts or incidents caused by third parties, intentional or accidental misuse, or usage under other abnormal conditions.
- Any secondary damage caused by the usage, faulty operation, or malfunction of the product like suspended operation or malfunction of a connected device or system, damage to a device, loss of profit, interruption of business, corruption or loss of memory contents, cost of restoration, etc.
- Misuse, failure related to maintenance, installation or deinstallation, or failure to follow the contents of the instruction manual.
- Any malfunction (including false alarm or lost alarm) caused by the combination with a connected device or software over that we have no control.
- The responsibility of Takenaka is limited to the extent of repair or replacement of the product. The expenses we are liable for will not exceed the original product cost.