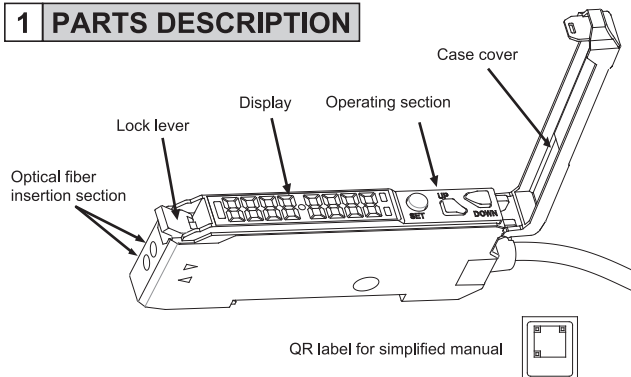


F85R Operation Manual

- Thank you very much for choosing this product.
- Please read this operation manual to learn how to use this product correctly.
- Store this manual in an appropriate location, so it can be referred to when necessary.

1 PARTS DESCRIPTION



2 SAFETY PRECAUTIONS

To ensure safety, be sure to follow the precautions below.

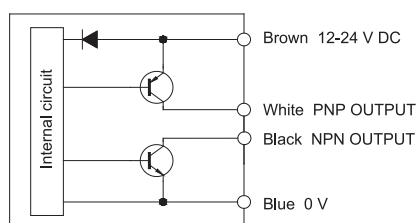
1. Do not use this product for safety critical applications.
2. Do not use this product when its housing or cable is damaged.
3. Do not attempt to disassemble, repair, or modify this product.
4. Do not use this product in an environment containing flammable, explosive or corrosive gas.
5. Do not use this product in environments where it could be exposed to chemicals or oils.
6. Do not use this product in an environment exposed to water including outdoors or under the water.
7. Use this product within the rating specifications.
8. Do not expose this product to direct sunlight.
9. Do not use this product in a place exposed to vibration or shock.
10. Do not use organic solvent such as alcohol and thinner to clean the sensor unit.
11. Perform a daily operation check, weekly periodical check, and maintenance to ensure correct operation.
12. This product should be disposed of as industrial waste.

3 PRECAUTIONS FOR OPERATION

1. 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.
2. Do not apply excessive force to the cable.
3. When using a DC power unit with an insulated transformer or a switching regulator, be sure to ground the frame ground (FG) terminal.
4. The sensor starts operation 100 msec after power is supplied. Always power on the sensor first.
5. This product may generate an output pulse when the power is turned off. Turn off the power of the load first.
6. Avoid turning the power on and off consecutively.
7. Limit the current of the power supply to 2 A.
8. Under teaching for maximum sensitivity the detecting range or the received light level indication may vary with individual products.
9. When extending the cables, use conductors of at least 0.3 mm² cross-sectional area and the length should not exceed 100 m.
10. To activate the mutual interference prevention function, closely install adjacent sensors and supply power simultaneously.
11. The mutual interference prevention function may not work properly when excessive light is input. Reset the threshold to a higher value in such circumstances.

4 CONNECTION

• Input/Output circuit

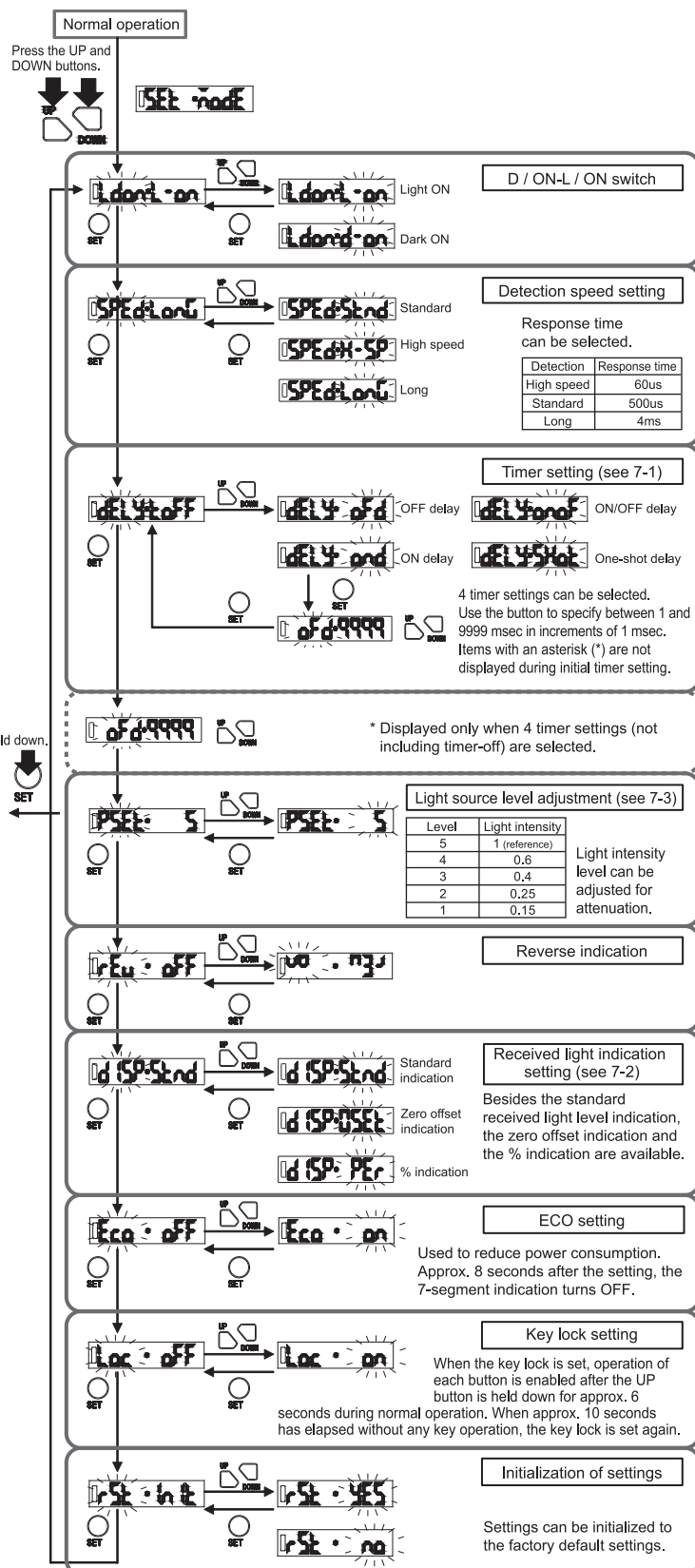


Do not use NPN and PNP output cable simultaneously. Be sure to use either cable.

5 SETTING AND OPERATION

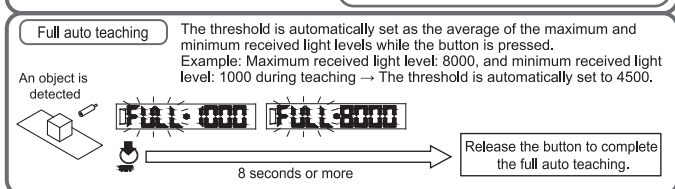
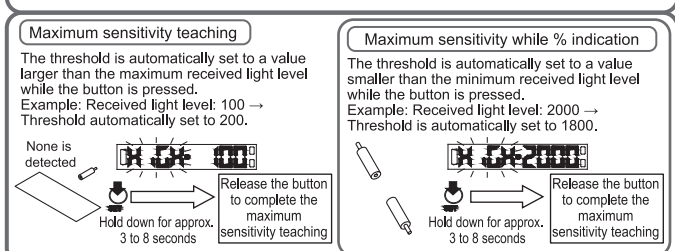
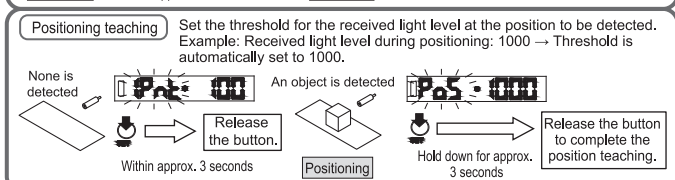
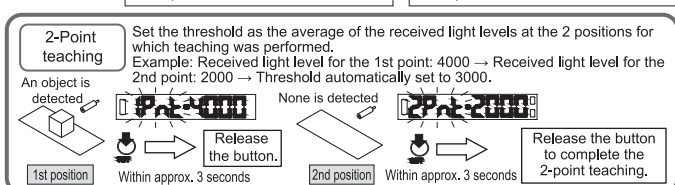
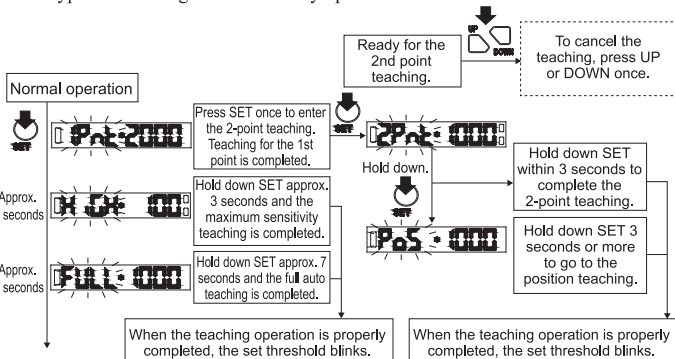
5-1 Basic setting

Pressing both UP and DOWN buttons during normal operation enters the basic setting mode. Holding down the SET button during basic setting mode returns the unit to normal operation.



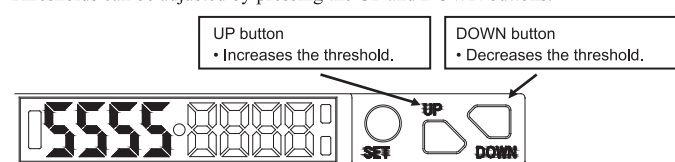
5-2 Teaching

Holding down the SET button during normal operation starts the teaching operation. Four types of teaching are available by operation of the SET button.



5-3 Manual threshold setting

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



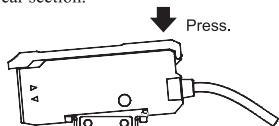
6 INSTALLATION

6-1 Installation of an amplifier unit

• DIN rail and dedicated mounting bracket

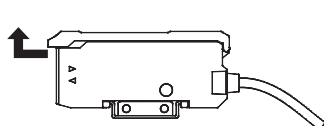
(1) DIN rail mount

Hook the front tab on the rail (or mounting bracket), and then press the rear section.



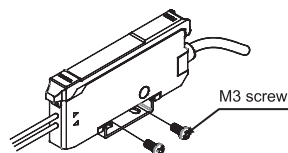
(2) Removal

Press the unit forward and pull up the front section to remove the front tab.



(3) Side face mount

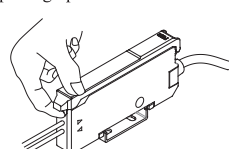
Install the side of the amplifier unit using an optional mounting bracket. Tightening torque should be 0.8 Nm or less.



• Amplifier case cover

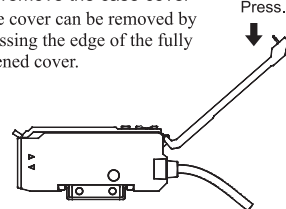
(1) To open the case cover

While pressing down the front part of the case cover, lift the cover by pulling up the tab.



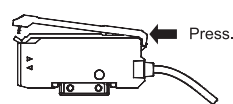
(2) To remove the case cover

The cover can be removed by pressing the edge of the fully opened cover.



(3) To attach the case cover

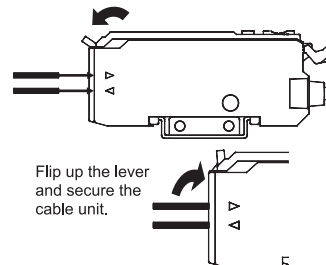
Place the removed cover on the amplifier unit as shown in the figure, and then press the hinge.



6-2 Installation of fiber optic cable unit

• Installation into the amplifier unit

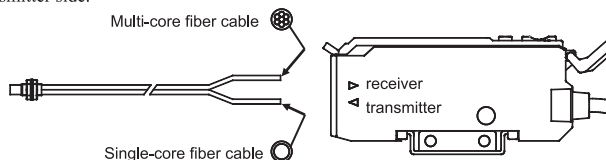
- Flip down the one-touch lock lever.
- Insert the fiber optic cable unit until it stops.



- After inserting the fiber optic cable unit, flip up the securing one-touch lock lever until it clicks. Then secure the fiber optic cable unit.

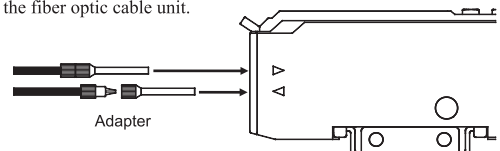
• Coaxial-reflection type fiber optic cable

Attach the multi-core fiber cable to the receiver side, and the single-core fiber cable to the transmitter side.



• Thin fiber optic cable

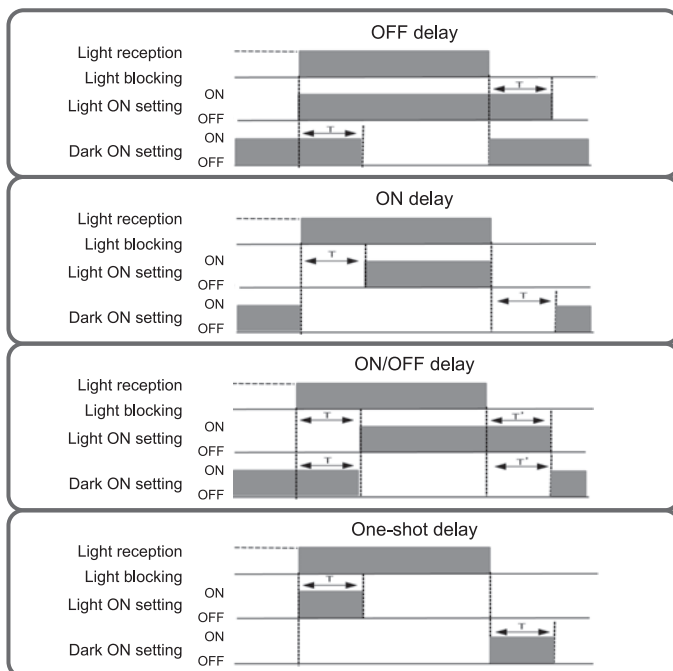
When using a thin fiber optic cable unit, use the adapter provided with the fiber optic cable unit.



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.)



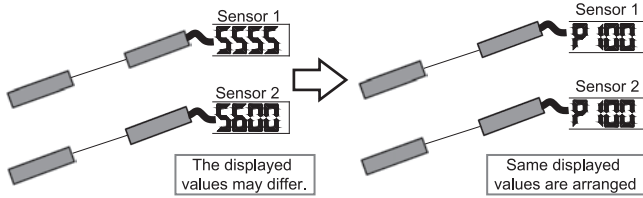
7-2 Received light level indication

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

• Standard indication:

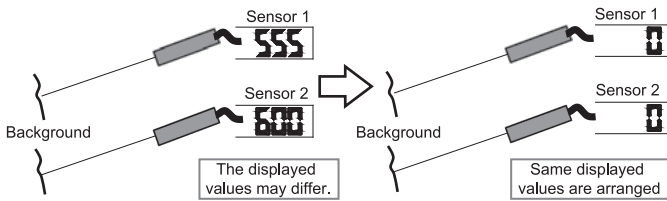
The direct values of received light level and threshold are displayed without correction.

- % 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:

Differential value is displayed in the received light level and threshold as the minimum value of the received light level during teaching is set to zero. Same displayed values can be arranged when multiple reflective-type units are in use.

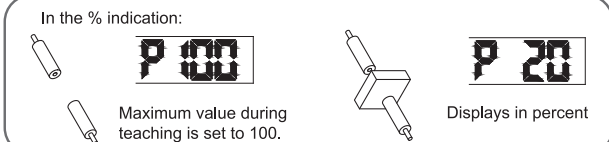
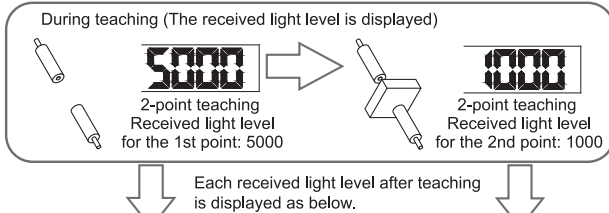


(Example)

% indication setting

PEr

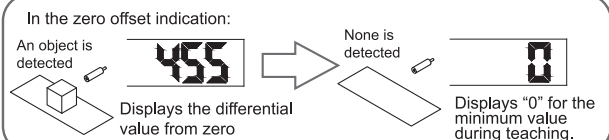
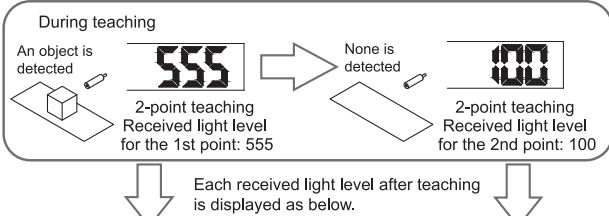
The received light level is displayed in percent as the maximum received light level during teaching is set to 100.



Zero offset indication setting

0SEt

Differential value is displayed as the minimum received light level during teaching is set to zero.



7-3 Light source level adjustment function

The light source intensity can be adjusted as shown below.

The larger the level, the larger the light intensity. Levels 3 to 1 are valid for the high-speed mode, and 5 to 1 for the standard and long modes.

Level	Light intensity
5	1 (reference)
4	0.6
3	0.4
2	0.25
1	0.15

← Maximum and default values for the standard mode / long mode

← Maximum and default values for the high-speed mode

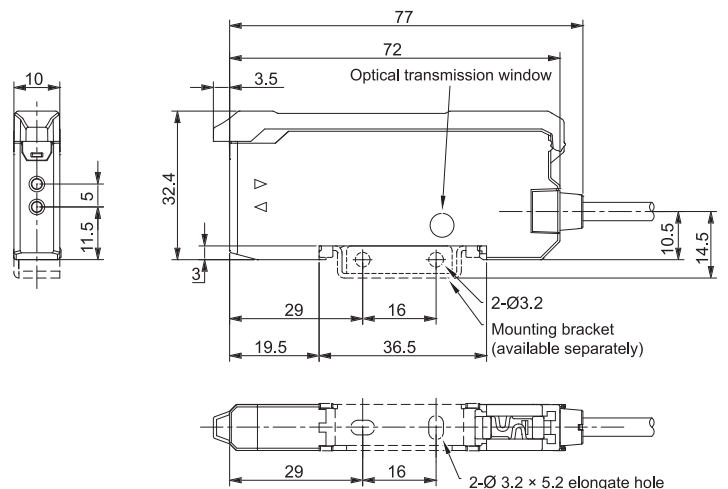
8 RATING/PERFORMANCE/SPECIFICATION

Model	F85R
Power supply	12 – 24 V DC $\pm 10\%$ / Ripple 10% or less
Power consumption	Normal mode : 770 mW or less (32 mA or less at 24 V) ECO mode : 600 mW or less (25 mA or less at 24 V)
Control output	NPN open collector output / Load current 100 mA (30 V DC) or less / Residual voltage: 1 V or less PNP open collector output / Load current 100 mA (30 V DC) or less / Residual voltage: 2 V or less
Operation mode	Light ON/Dark ON
Timer	ON delay/OFF delay/ON/OFF delay/1-shot/no timer Delay timer: 1 ms – 9999 ms (set in millisecond)
Response time	H-SP mode: 65 μ s or less / Std mode: 500 μ s or less / LonG mode: 4 ms or less
Light source (wavelength)	Quaternary red LED (660 nm)
Indicator	Operation indicator, Setting indicator, Light ON/Dark ON indicator: orange LED
Display	Received light level: 4 digits in red LED (high-speed mode (0 -3500), standard/long mode (0 - 9999)) Threshold: 4 digits in green LED (high-speed mode (0 -3300), standard/long mode (0 - 9700))
Switch	Teaching and set switch (SET) Switch for threshold adjustment (UP/DOWN)
Sensitivity setting	2-point teaching / Max. sensitivity teaching / Full auto teaching / Position teaching
Sensitivity adjustment function	Provided (manual adjustment)
Mutual Interference prevention	UP to 8 units (standard/long mode)
Protection circuit	Power supply reverse connection protection / Output short circuit protection
Material	Polycarbonate
Wiring	2 m attached cable (Outer dimension: dia. 4.2 mm) 0.2 mm ² , 4 cores
Weight	Approx. 75 g
Accessory	Operation manual / QR code label for simplified manual

ENVIRONMENTAL SPECIFICATION

Ambient light	Illumination on light receiving surface: 3,500 lx or less (incandescent lamp)
Ambient temperature	1 – 5 adjacent units in operation: -25 – +55°C Over 5 adjacent units in operation: -25 – +50°C Storage: -40 – +70°C (non-freezing, non-condensing)
Ambient humidity	35 – 85% RH (non-condensing)
Protective structure	IP40
Vibration	10 – 55 Hz / 1.5 mm double amplitude / 2 hours each in X, Y, and Z directions
Shock	500 m/s ² / 3 times each in X, Y and Z directions
Dielectric withstanding	1000 V AC for 1 minute
Insulation resistance	500 V DC mega, 20 M Ω or more

9 DIMENSIONS (in mm)



10 WARRANTY

Takenaka Electronic Industrial Co., Ltd. (Takenaka) guarantees the quality of the product described in this manual, based on Takenaka Quality Standard. Please contact the agent or sales office where you bought the product if you find any defects.

1 《Warranty period》

The warranty period of this product is one year after the invoice date. This warranty does not apply to consumable parts such as batteries or relays. Regarding a product of another manufacturer sold by Takenaka, the warranty conforms to the quality standard of the manufacturer.

2 《Scope of warranty》

If any defect is found during the warranty period, Takenaka will repair or replace the product without charge.

The following cases are not covered by the warranty even within the warranty period. Please note that the warranty period is not extended after a repair or replacement.

- 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 product 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) When combining the Takenaka product with a product made by another manufacturer, confirm any related laws, rules, regulations, standards, and so on. It is the customer's responsibility to confirm the suitability of the product for the system or device it is to be combined with.

(2) This product is designed and manufactured for industrial use. This warranty does not cover the application of the product to:

- ① Equipment for nuclear facilities including nuclear power stations or nuclear control facilities, incineration systems, railway vehicles, aircraft or automobiles and their related facilities, medical equipment, entertainment equipment, safety devices, equipment regulated by administrative bodies or specific industries.
- ② Equipment that may create serious danger or adversely affect human life or property.
- ③ Public utilities for electricity, town gas or water supply, or equipment that requires consistent reliability, such as 24-hour continuous operation.
- ④ Usage outdoors or usage in conditions or environments that are not prescribed in the instruction manuals.
- ⑤ Usage or equipment that requires considerable care or attention to safety, similar to the cases in ① to ④.

This warranty may cover these applications if Takenaka is notified about the application of the product before sale and the customer approves the compatibility and the specification of the product by written agreement and/or by providing the required safety measures.

11 DISCLAIMER

- This product is designed for industrial applications to detect the presence, absence, or passage of a variety of objects. It has no functions to prevent disasters, 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, incomplete wiring or installation, or any act that does not follow the instruction manual.

We will assume no responsibility for damages or losses caused by:

- 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.