TAKEX

Photoelectric sensor with built-in amplifier

GNA SERIES Instruction Manual

TAKENAKA ELECTRONIC INDUSTRIAL CO.,LTD.

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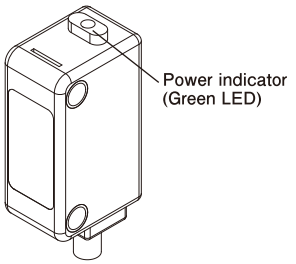
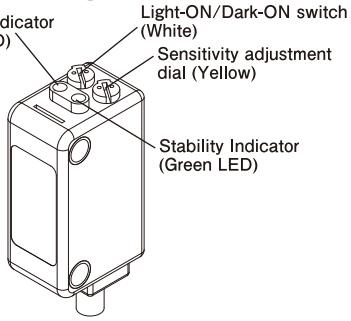
1 PARTS DESCRIPTION

① Through-beam type (Transmitter)



② Through-beam type (Receiver), Polarized reflector type, Reflector type, Diffusion-reflective type, Limited reflective type



2 SAFETY PRECAUTIONS

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

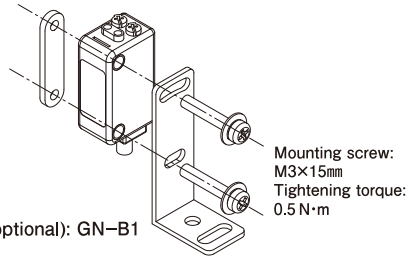
1. Do not use this product for safety critical applications.
2. Do not use this product when its housing or cable is damaged.
3. Do not attempt to disassemble, repair, or modify this product.
4. Do not use this product in an environment containing flammable, explosive, or corrosive gas.
5. Do not use this product in an environment exposed to chemicals or oil.
6. Do not use this product in an environment exposed to water including outdoors or underwater.
7. Do not exceed the rated specifications.
8. Do not expose this product to direct sunlight.
9. Do not use this product in a place where it may be exposed to vibration or shock.
10. Use a soft cloth to clean the lens. Do not use organic solvents such as alcohol or thinner for cleaning.
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 lines, or else use shielded cables. Using the same conduit or ducting as high voltage or power lines may cause malfunctions or damage because of electromagnetic induction.
2. Do not apply excessive force to the cables.
3. When using a switching regulator, be sure to ground the frame ground (FG) terminal.
4. The sensor is enabled approx. 100ms after power is applied. Always power on the sensor prior to the load.
5. Turn off the power of the load first as this product may generate an output pulse when the power is turned off.
6. Avoid turning the power on and off in rapid succession.
7. When extending the cables, use conductors of at least 0.3 ㎟ cross-sectional area.
8. Limit the current from the power supply to 2A, in accordance with a wire gauge that matches the sensor.

4 MOUNTING

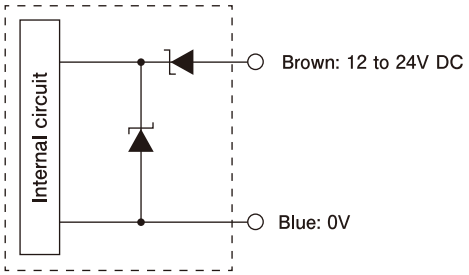
Mounting brackets are optionally available.



Mounting bracket (optional): GN-B1

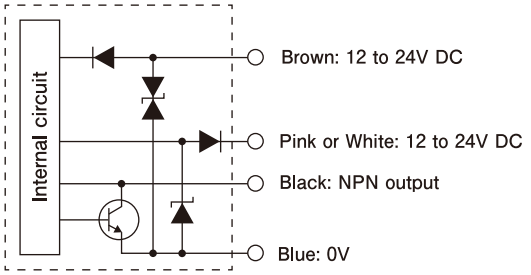
5 CONNECTION (Including I/O circuits)

1. Through-beam type (Transmitter)

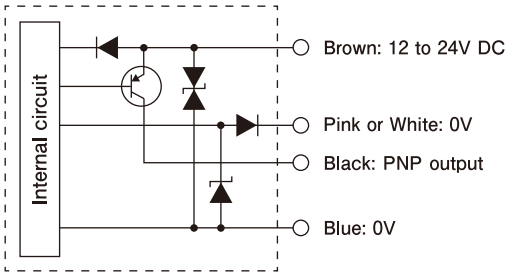


2. Through-beam type (Receiver), Polarized reflector type, Reflector type, Diffusion-reflective type, Limited reflective type

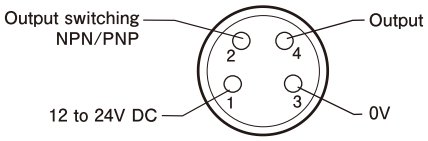
① When using with NPN output (Connect Pink or White to 12 to 24V DC)



② When using PNP output (Connect Pink or White to 0V)

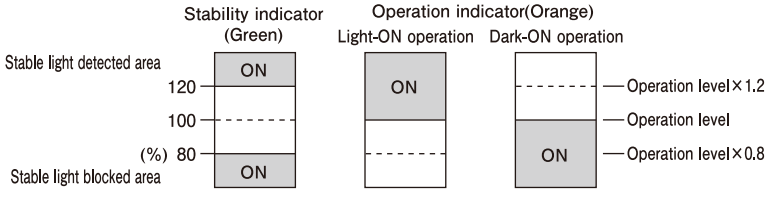


Connector pin No. (Sensor side)



6 INDICATOR

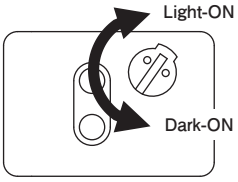
① Operation indicator (Orange LED) and stability indicator (Green LED) indicate the operation level status shown in the figure below.
② After adjusting the detection distance, repeat light entry/blocking processes with the object to be detected, to ensure that stable operation is achieved.
③ By setting the light level for stable light entry/blocking range, more reliable detection is ensured allowing for possible environmental variations after setting.
④ The orange LED is an operation indicator.
When used in Light-ON mode, the indicator is ON when the light source is detected.
When used at Dark-ON mode, the indicator is ON when the light source is blocked.



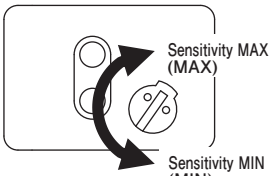
7 SETTING

*Use the supplied screwdriver.
Use with care as turning with excessive force may cause damage.

① Light-ON/Dark-ON switching



② Sensitivity adjustment

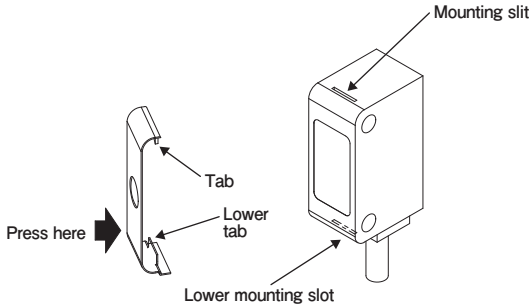


〈Through-beam type〉

Install the transmitter and the receiver aligned along the same straight line. Adjust the orientation of the transmitter in its four available directions to find the extent of the area in which the operation indicator (Orange LED) and the stability indicator (Green LED) are ON, and set the transmitter so that it faces toward the center of this detected area. Adjust the receiver orientation in the same manner. Set the sensitivity adjustment dial (SENS.) to MAX.
If there is influence from unwanted reflected light from floor surfaces or side walls, adjust the dial to minimize such effects.

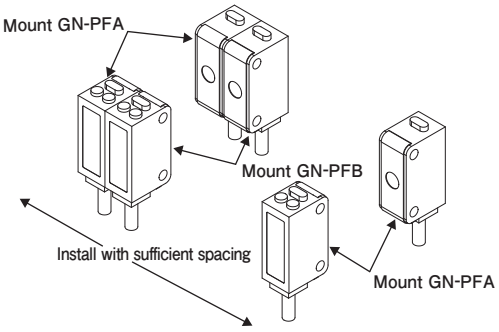
How to use a pinhole plate (optional)

Use of the optional pinhole plate enables detection of an object of a smaller diameter and/or detection in a reduced area of sensitivity. Additional use of the sensitivity adjustment dial can detect even smaller objects or objects that are almost transparent.



How to use interference-prevention filter (optional)

Use of the optional interference-prevention filter enables installation of up to two sensors in close proximity to each other.
The interference-prevention filter is available only for red LED (GNA-T10RS and GNA-T10RSJ) used as a light source. It is not available for infrared LED types.
There are two types of filter. As shown in the figure below, mount the same type of filter to the transmitter and receiver facing each other. Up to two sensors can be installed in close proximity to each other. A third sensor would require separate installation with sufficient spacing so as to be free from interference. After checking the directionality characteristics, use a filter different to that being used on the neighboring transmitter/receiver.



How to mount pinhole plate and interference prevention filter

Hook the tabs of the pinhole plate or interference prevention filter to the upper/lower mounting slot on the lens surface of the transmitter/receiver, and push the pinhole plate so that the tabs engage the slot.

Detection distance when pinhole plate or interference prevention filter are mounted on the transmitter/receiver

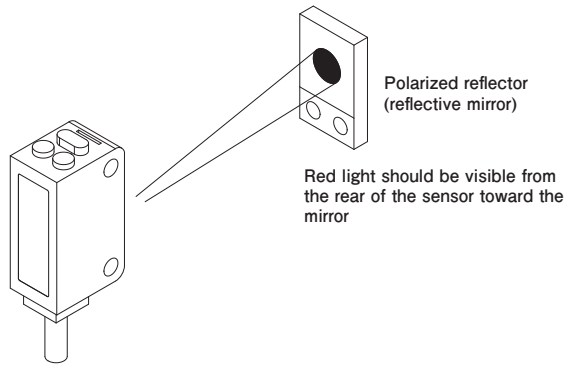
Model	Pinhole plate				Interference prevention filter	
	GNP1	GNP2	GNP3	GNP5-1	GN-PFA (Vertical polarization)	GN-PFB (Horizontal polarization)
GNA-T1S(J)	100㎜	300㎜	400㎜	300㎜	——	
GNA-T10S(J)	400㎜	1m	3m	2m	——	
GNA-T10RS(J)	400㎜	1m	3m	2m	5m	

Precautions during use of pinhole plate/interference prevention filter

When dust or water droplets are adhering to the pinhole or filter, a malfunction may result.
The pinhole plate and interference prevention filter cannot be used at the same time.
Check the detection distance, and use a pinhole plate with a suitable pinhole diameter.

〈Polarized reflector type, Reflector type〉

Install the sensor and the reflector aligned along the same straight line. Adjust the orientation of the sensor to the reflector in its four available directions to find the extent of the area in which the operation indicator (Orange LED) is OFF and the stability indicator (Green LED) is ON, and set the sensor it faces toward the center of this detected area.
Set so that you can see the red light spot on the reflector from the rear of the sensor.
Set the sensitivity adjustment dial (SENS.) to MAX.
If the light is not obscured even when the light axis is blocked by the detection object, decrease the sensitivity adjustment dial (SENS.).



Polarized reflector type sensor

Detection distance according to reflector type
Detection distance depends on the reflector being used.

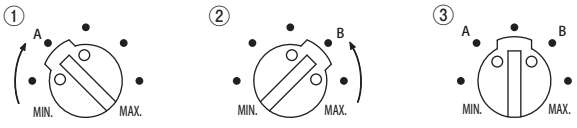
Model name	Reflector			
	K-71(Accesorry)	K-7	S25	S-510G
GNA-M2RS(J)	0.01 to 2m	0.01 to 3m	70 to 400㎜	0.01 to 1m
GNA-M2RPS(J)	0.07 to 1.3m	0.04 to 2m	120 to 450㎜	140 to 800㎜

〈Diffusion-reflective type, Limited reflective type〉

Install the sensor facing toward the detection object, and perform adjustment as described below.

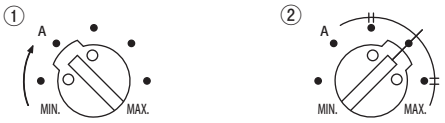
・When reflective objects are present behind the detection object

① Install the detection object in the specified position. Gradually increase the sensitivity adjustment dial (SENS.) from the minimum level (MIN.), and note the position at which the operation indicator (Orange LED) turns ON as in A.
② With no detection object present, gradually decrease the sensitivity adjustment dial (SENS.) from the maximum level (MAX.), and note the position in which the operation indicator (Orange LED) turns OFF as in B. (If the operation indicator does not turn ON at the maximum sensitivity level, then take the MAX. as B.
③ Set the dial at the mid-point between A and B.



・When no reflective objects are present behind the detection object

① Install the detection object at the specified position. Gradually increase the sensitivity adjustment dial (SENS.) from its minimum level (MIN.), and note the position in which the operation indicator (Orange LED) turns ON as in A.
② Set the dial at the mid-point and the MAX. position. As a final check, place a detection object at the specified position and confirm that the operation indicator (Orange LED) and the stability indicator (Green LED) are ON.



8 RATING/PERORMANCE/SPECIFICATIONS

Model											
Cord drawing type	GNA-T1S	GNA-T10S	GNA-T10RS	GNA-M2RPS	GNA-M2RS	GNA-R7S	GNA-R40S	GNA-R40RS	GNA-Z4S	GNA-Z4RS
Connector type	GNA-T1SJ	GNA-T10SJ	GNA-T10RSJ	GNA-M2RPSJ	GNA-M2RSJ	GNA-R7SJ	GNA-R40SJ	GNA-R40RSJ	GNA-Z4SJ	GNA-Z4RSJ
Detection method	Through-beam type			Polarized reflector type	Reflector type	Diffusion reflective type			Limited reflective type	
Detection distance	1m	10m		0.07 to 1.3m	0.01 to 2m	70㎜	400㎜		1 to 40㎜	
Detection objects	Opaque objects with φ8㎜ or more	Opaque objects with φ6㎜ or more		Specular objects Opaque objects	Opaque objects with φ40㎜ or more	Standard detection object White drawing paper of 50×50㎜	Standard detection object White drawing paper of 100×100㎜		Standard detection object White drawing paper of 50×50㎜	
Operation power supply	12 to 24V DC ±10%, Ripple: 10% or less									
Current consumption	Transmitter: 14mA or less, Receiver: 10mA or less			No more than 20mA						
Output mode	NPN/PNP Open collector output (cable switch), Load current: 100mA, Residual voltage: 2V or less									
Operation mode	Light-ON/Dark-ON switch operation (Selectable by the switch)									
Mutual interference prevention function	———			Automatic mutual interference prevention function *						
Response time	Up to 0.5ms									
Light source for transmitter	Infrared LED		Red LED	Red LED		Infrared LED		Red LED	Infrared LED	Red LED
Indicators	Transmitter: Power indicator (Green LED) Receiver: Power indicator (Green LED), Stability indicator (Green LED)			Operation indicator (Orange LED), Stability indicator (Green LED)						
Dial	Sensitivity adjustment dial equipped (Receiver side for through-beam type)									
Switch	Light-ON/Dark-ON switch (Equipped on the receiver side for through-beam type)									
Protective circuits	Power reverse connection prevention, output reverse connection prevention, output short-circuit protection									
Materials: Case	Polybutylene terephthalate (PBT)									
Materials: Lens	Acryl (PMMA)			Cyclo Olefin Polymer (COP)		Acryl (PMMA)				Cycloolefin Polymer (COP)
Connection method: Cord drawing type	Cord drawing type (φ3.5㎜ o.d.) Transmitter 0.2㎟×2 cores, 2m (gray), .Receiver 0.2㎟×4 cores, 2m (black)			Cord drawing type (φ3.5㎜ o.d.), Receiver 0.2㎟×4 cores, 2m (black)						
Connection method: Connector type	M8 connector type (Cord with M8 connector, separately sold)									
Weight: Cord drawing type	Transmitter/receiver Approx. 60g			Approx. 60g						
Weight: Connector type	Transmitter/receiver Approx. 10g			Approx. 10g						
Accessories	———			Reflector K-71		———				
	Screwdriver for adjustment, Instruction manual (mounting brackets separately available)									

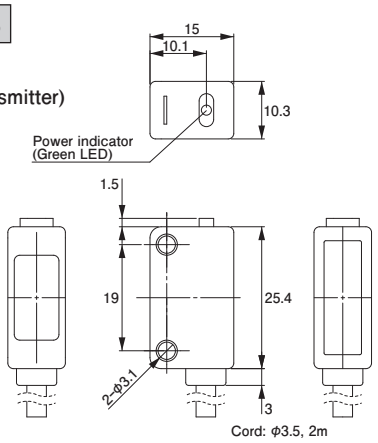
*Detection can fluctuate depending on the settings and/or detection targets. Be sure to perform an operation check.

ENVIRONMENTAL SPECIFICATIONS

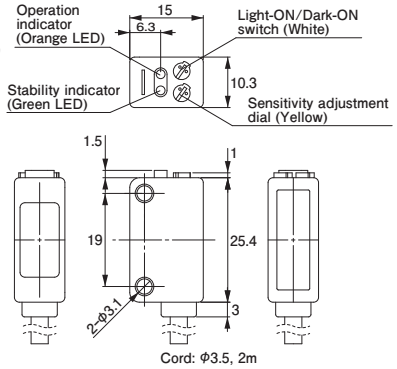
Ambient light	5,000 lx or less
Ambient temperature	−25 to +55℃ (at storage: −40 to+70℃) (no freezing)
Ambient humidity	35 to 85%RH (no dew condensation)
Protection	IP67
Anti-vibration	10 to 55Hz, double amplitude 1.5㎜, X,Y,Z directions, 2 hours each
Shock	500m/s², 3 times each in X, Y and Z directions
Dielectric withstand voltage	1,000V AC for 1 min
Insulation resistance	At least 20MΩ with 500V DC Megger

9 DIMENSIONS

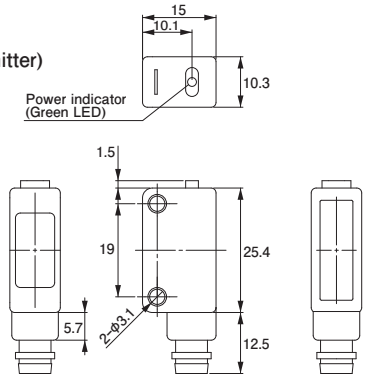
① Cord drawing type
Through-beam (transmitter)



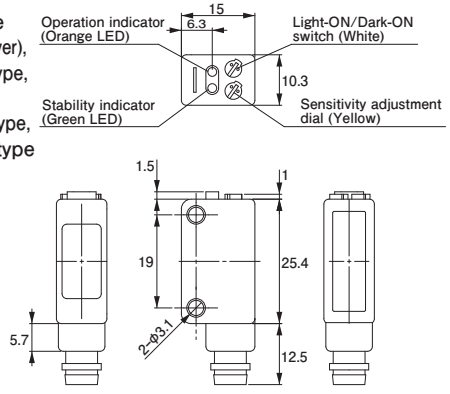
② Cord drawing type
Through-beam (receiver),
Polarized reflector type,
Reflector type,
Diffusion-reflective type,
Limited reflective type



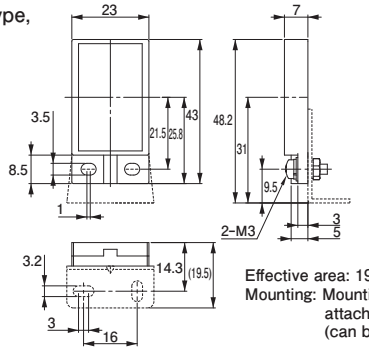
③ M8 connector type
Through-beam (transmitter)



④ M8 connector-type
Through-beam (receiver),
Polarized reflector type,
Reflector type,
Diffusion-reflective type,
Limited reflective type

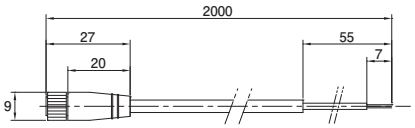


⑤ Polarized reflector type,
Reflector type
Accessory
Reflector K-71

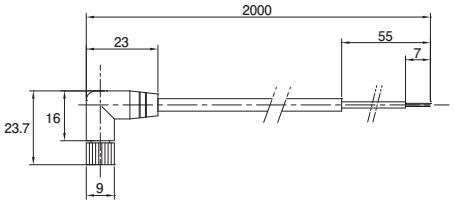


Effective area: 19×32 ㎜
Mounting: Mounting brackets attached, M3 screws (can be used)

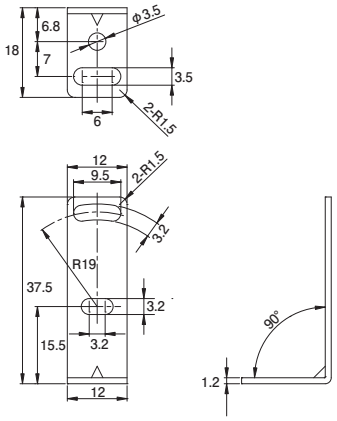
Cord with M8 connector
FBC-4R2S



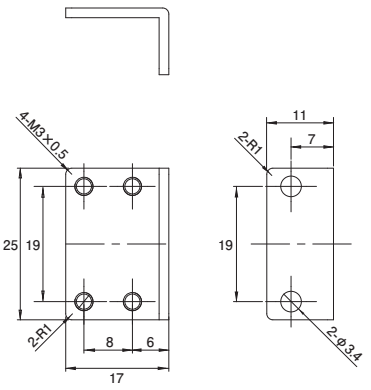
Cord with M8 connector
FBC-4R2L



Mounting bracket
GN-B1



Mounting bracket
GN-B2



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 warrantied 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 enviroment.
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.