TAKEX PS300

Sensor Controller

Instruction Manual

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OVERVIEW

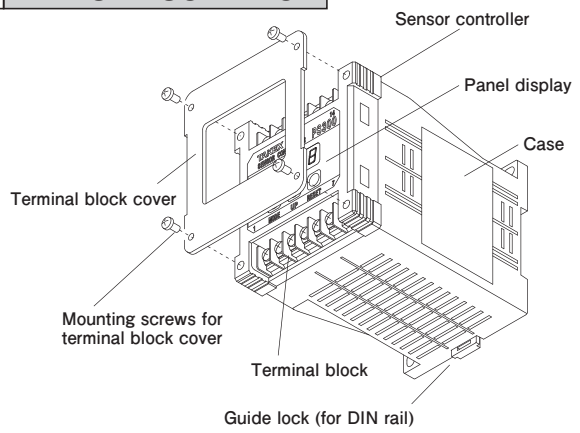
This product is a sensor controller, equipped with two-line sensor inputs and control outputs.

1 WARNINGS AND CAUTIONS

⚠ WARNING Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

2 PARTS DESCRIPTION



3 SAFETY PRECAUTIONS ⚠WARNING

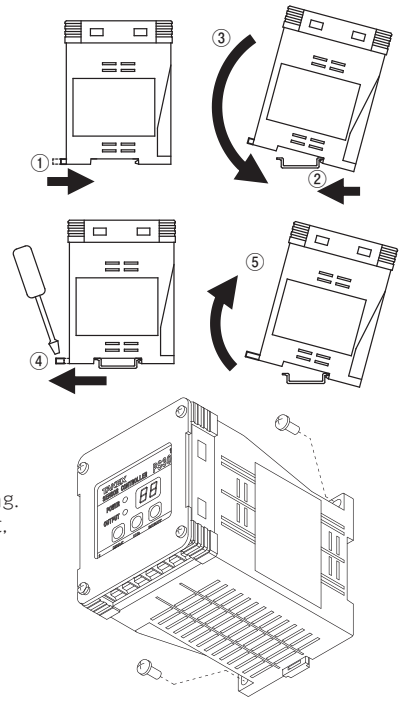
To ensure safety, be sure to follow the precautions below.

1. Any use of the product in a method not specified in this manual could deactivate the protection provided with the product.
2. Do not use this product for life preserving or safety critical applications.
3. Do not use this product when its housing or cable is damaged.
4. Do not attempt to disassemble, repair, or modify this product.
5. Do not use this product in an environment containing flammable, explosive, or corrosive gas.
6. Do not use this product in an environment exposed to chemicals or oil.
7. Do not install this product in a dusty environment.
8. Do not use this product in an environment exposed to water including outdoors or underwater.
9. Use this product within its rated specification.
10. Do not expose this product to direct sunlight.
11. Do not use this product in a place exposed to vibration or shock.
12. For cleaning, wipe the product using a dry cloth. Do not use organic solvents such as alcohol or thinner to clean the product.
13. Perform a daily operation check, weekly periodical check, and maintenance to ensure correct operation.
14. This product should be disposed of as industrial waste.

4 PRECAUTIONS FOR OPERATION ⚠CAUTION

1. During the wiring work, prevent accidents from electric shock.
2. Be sure to route the sensor cables and/or output wiring separate from any power transmission or high voltage line.
3. Using the same conduit or duct as high voltage or power lines will cause malfunctions or damage because of electromagnetic induction.
4. For connecting terminals, be sure to confirm the procedure in 6 CONNECTION. Incorrect wiring could result in a malfunction.
5. Use the electrical wire of 70℃ or more in the temperature rating, in accordance with the power rating and power consumption of the product.
6. When wiring to each terminal, avoid putting undue mechanical stress on the terminal block.
7. To avoid electric shock, be sure to attach the terminal block cover after wiring. Do not touch the terminals when the power is ON. The terminal board should be installed so that the access of the operator can be properly blocked.
8. Isolate exposed cables and round terminals connected to the terminal block using wire markers etc..
9. Be sure to ground the FG (frame ground) terminal.
10. Note that this product has no power switch. After powered, it is always operable. Be sure to provide a switch or a circuit breaker which is compliant with IEC/EN60947-2 or IEC/EN60947-3 outside the product housing, so that it can be properly operated at emergency, with a clear indication that it is a shutdown switch of the product.
11. The product takes several seconds to start operation after power ON, which is a normal operation.
12. Turn off the power of the load first as this product may generate an output pulse when the power of the intrinsically-safe related equipment is turned off.
13. Avoid turning the power on and off consecutively.

5 INSTALLATION



DIN rail mounting

1. With the DIN rail guide lock pressed in ①, insert the DIN rail hook into the DIN rail ②.
2. Insert the guide lock side into the DIN rail ③.

DIN rail removal

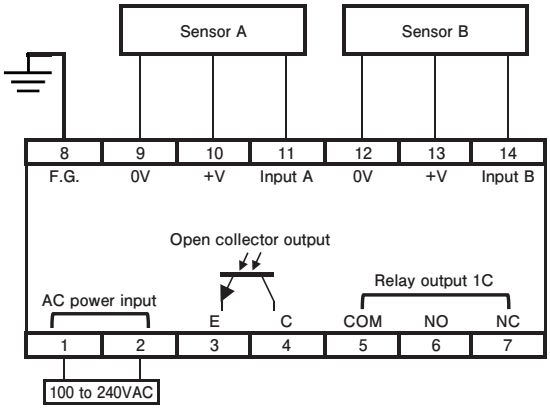
1. Pull out the DIN rail guide lock using a flat-blade screwdriver ④.
2. Lift the guide lock side, and remove the module from the DIN rail ⑤.

Screw mounting

Use M4 screws for mounting. To determine how to mount, see 10 DIMENSIONS.

6 CONNECTION

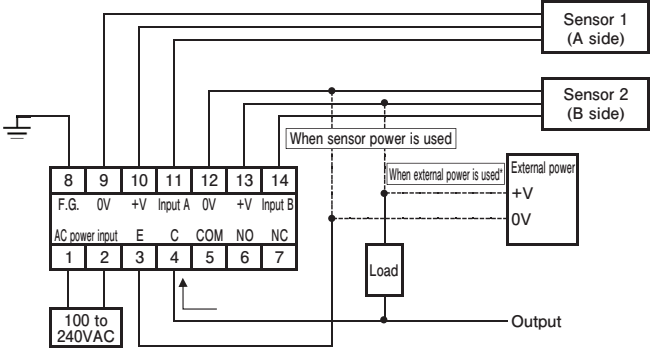
6−1. Terminal positions



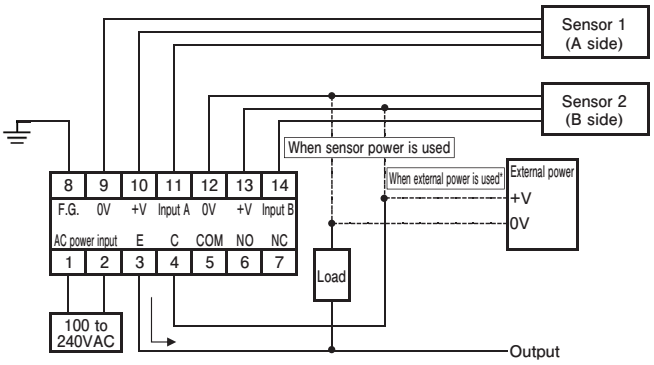
- The sensor power supply voltage is set to 24VDC as the default. When using a dedicated 12VDC sensor, be sure to change the power mode.
- Tighten the terminal screws with a tightening torque of 0.6 N·m.
- Be sure to attach the terminal block cover after wiring the terminal block. Tightening torque 0.6 N·m
- Terminals No. 9 and 12 are internally connected.
- Terminals No. 10 and 13 are internally connected.
- When connecting and using only one sensor, use the "Sensor A" side.

6−2. Connection example

To use open collector output as sync output (Sync output from terminal No.4, terminal C)



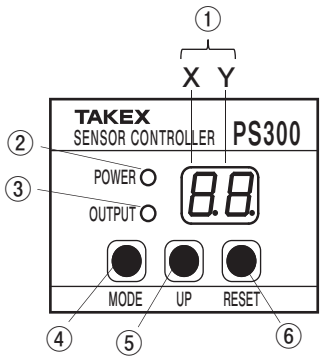
To use open collector output as source output
(Source output from terminal No.3, terminal E)



*Since the open collector output is isolated with a photocoupler, if desired an independent external power supply can be used.

7 INDICATION/OPERATION PANEL

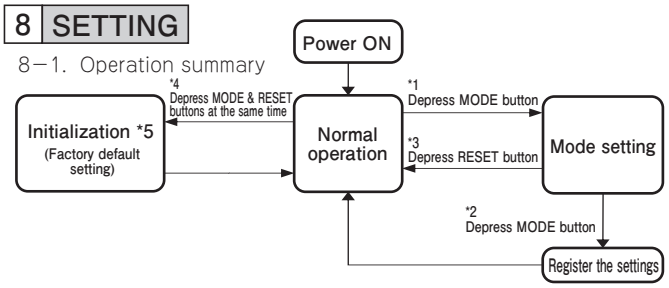
7−1. Panel display



①	Indicator (X, Y)	7-segment indicator Indicates mode setting /sensor input status.
②	Power LED (green)	ON: green lamp lit
③	Operation LED (orange)	Indicates output status. Open collector output and relay ON: orange lamp lit
④	MODE button	・Mode setting ・Initialization
⑤	UP button	・Changes setting value for mode setting
⑥	RESET button	・For initialization ・Cancels mode setting

8 SETTING

8−1. Operation summary



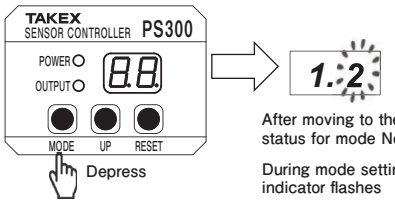
*1: Depressing the MODE button for 3s or more during normal operation moves to the mode setting.
*2: Depressing the MODE button for 3s or more during mode setting registers the setting and returns to normal operation.
*3: Pressing the RESET button during mode setting cancels the mode setting and returns to normal operation.
*4: Depressing the MODE and RESET buttons at the same time for 10s or more during normal operation makes the indicator flash "- - " for 0.5s, initializing the system (to the factory default settings), before returning to normal operation.
*5: The system can be initialized (to the factory default settings) also with the following power ON process.
1. Power ON with the RESET button pressed
2. (X, Y) indicator flashes "- -"
3. While flashing "- -" is displayed, pressing the UP button for 3s or longer causes initialization followed by normal operation. Pressing the RESET button cancels initialization and normal operation returns.

8−2. Modes and initial values (factory default settings)

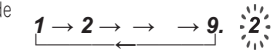
Mode No.	Function	Indicator X	Indicator Y	Description	Initial value Indicator (Y)
1	Sensor power setting	1	1	12VDC	2
			2	24VDC	
2	Sensor input NPN, PNP setting	2	1	NPN input	1
			2	PNP input	
3	Sensor input Active level setting A side	3	1	Active at HI side (Active H)	0
			0	Active at LO side (Active L)	
4	Sensor input Active level setting B side	4	1	Active at HI side (Active H)	1
			0	Active at LO side (Active L)	
5	Logical operation setting	5	1	AND operation	1
			2	CLOCK-AND operation	
6	Timer operation setting	6	1	None	1
			2	ON-delay timer	
			3	OFF-delay timer	
			4	One-shot timer	
7	Timer setting, upper level	7	0 to 9	Timer setting: 0 to 9s	0
8	Timer setting, lower level	8	0 to 9	Timer setting: 0.0 to 0.9s	0
9	Display setting (Indicator A, B)	9	0	Indicator X, Y OFF	2
			1	Recursive display of setting status	
			2	Status display of Input A, Input B	

8−3. Initialization
Changes the mode setting value to the initial value (factory default setting).
・Initialization at power ON: power ON with the RESET button pressed *6
・Initialization during power ON: depress the MODE and RESET buttons at the same time during normal operation *6
The above operations will set the mode setting to the factory default settings.
*6: For the details of initialization, see also *4 and *5 of "8-1. Operation summary".

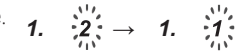
8−4. Operation procedure
8−4−1. Moving to mode setting
Depressing the MODE button for 3s or more moves to the mode setting.
In the mode setting, the mode No. is displayed on the X side of the indicator, and the flashing setting value is displayed on the Y side. Soon after moving to the mode setting, the status for mode No.1 is displayed.



8−4−2. Selecting mode No.
Select mode No. for changing the setting value
Each press of the MODE button increments the mode No. (X side of the indicator)
The flashing setting value of the selected mode is displayed on the Y side of the indicator.



8−4−3. Changing mode setting value
Press the UP button to select the setting value.

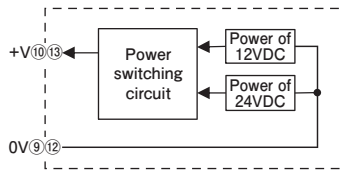


8−4−4. Ending mode setting
Depressing the MODE button ends the mode setting.
Registers the setting and returns to the normal operation mode.
*Pressing the RESET button in the mode setting status aborts the setting and returns to the normal operation mode.
*The output operation in the mode setting status is performed with the setting value before moving to the mode setting.
*The setting values are registered and validated when the mode setting is ended. Do not turn off the power before the mode setting is ended and the normal operation is returned.

8−5. Each mode description and setting

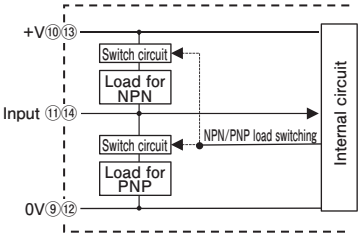
Mode No.	Switching of sensor supply power
1	X Y 1. 2 Setting of sensor supply power 1: 12VDC 2: 24VDC The power for both sensors A and B switches in common. Power of 12V and that of 24VDC cannot be used at the same time.

Circuit of power switching part

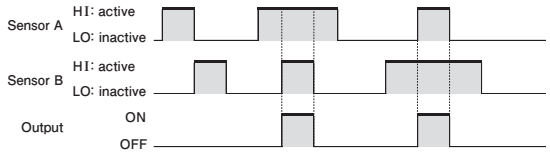
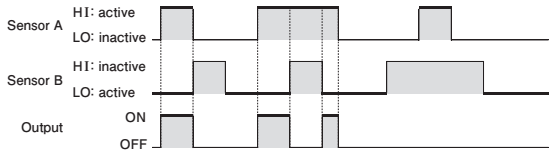
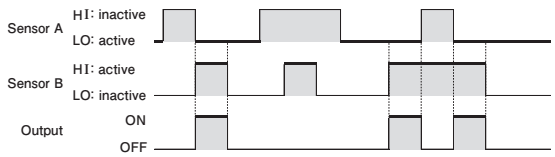
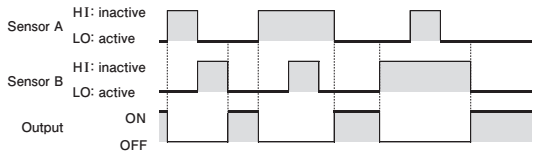


Mode No.	Selection of sensor input
2	X Y 2. 1 Sensor type 1: NPN open collector input 2: PNP open collector input Sensor input AB is switched in common. The sensors with different output types (NPN open collector input and PNP open collector input) cannot be used at the same time.

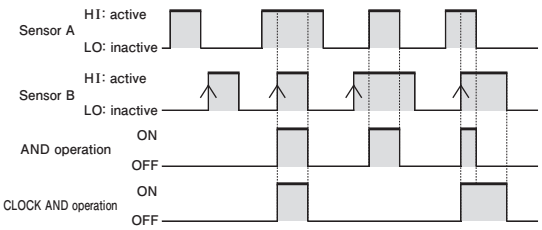
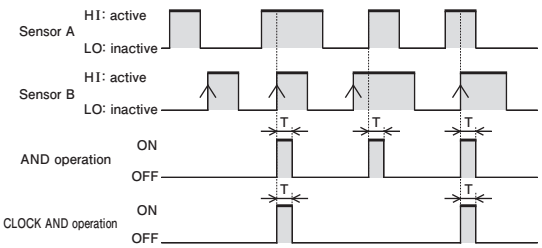
Circuit of sensor input part

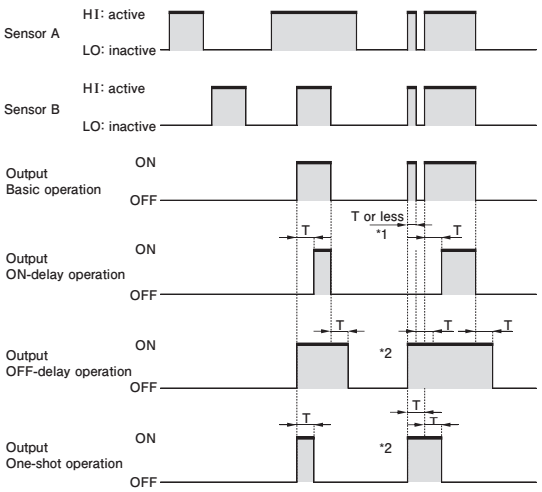


Mode No.	Operation of sensor input A
3	X Y 3. 1 Operation selection of sensor input A 1: HI (the voltage level of the input terminal part is active at HI) 0: LO (the voltage level of the input terminal part is active at LO)

Mode No.	Operation of sensor input A
3	——Input: active side (active: output is ON) Output: ON ——Input: inactive side (inactive: output is OFF) Output: OFF **Example) Logical operation is set to AND, and Timer operation is set to basic operation (None: without timer operation):** **① Sensor Input A: HI is active, Sensor Input B: HI is active**  **② Sensor Input A: HI is active, Sensor Input B: LO is active**  **③ Sensor Input A: LO is active, Sensor Input B: HI is active**  **④ Sensor Input A: LO is active, Sensor Input B: LO is active** 

Mode No.	Operation of sensor input B
4	The operation is the same with the mode No.3. Replace Sensor Input A with Sensor Input B. *When connecting and using only one sensor First connect the sensor input in the unconnected side to the 0V terminal, and set the sensor in the unconnected side to [2:LO active].

Mode No.	Selection of logical operation of two sensors
5	X Y 5. 2 Selection of logical operation of two sensors 1: AND operation 2: CLOCK AND operation AND operation: Output is made when two sensors are in AND operation CLOCK AND operation: Identifies and outputs the input status of sensor A as soon as sensor B is input. Normally used at one-shot operation. **Example 1) For both sensors A and B, HI is set to active, and timer operation is set to basic operation (None: without timer operation):**  **Example 2) For both sensors A and B, HI is set to active, and timer operation is set to one-shot operation:** **T: Timer time set in modes No.7 and No.8** 

Mode No.	Selection of timer operation mode
6	X Y 6. 2 Selection of timer operation 1: Basic operation 2: ON-delay operation 3: OFF-delay operation 4: One-shot operation Basic operation: None (without timer operation) ON-delay operation: disables short-time detection. OFF-delay operation: extends the output signal for a specific time. One-shot operation: outputs signals with a specific time range from the time of detection. **Example) For both sensors A and B, HI is set to active and logical operation is set to AND:**  **T: timer time set in modes No.7 and No.8** *1: Under ON-delay operation, a timer duration that is set greater than the time corresponding to the input logical time, will not activate the output. *2: Under the OFF-delay or One-shot operation, if the output changes to ON again when the timer is active, the output is combined into a single pulse. *3: Under One-shot operation, if timer duration is set to "0.0s", no output is triggered.

Mode No.	Timer duration setting (0 to 9s)
7	X Y 7. 2 Timer duration setting 0: 0s 1: 1s ↓ ↓ 8: 8s 9: 9s The timer duration setting is determined by the combination of mode No.7 and mode No.8. Ex) When mode No.7 is set to 5.0s, and mode No.8 is set to 0.2s: Timer duration is 5.2s. *When both modes No.7 and No.8 are set to "0", the timer time is set to "None". Under this condition, no output is triggered during One-shot operation even when the conditions are satisfied.

Mode No.	Timer time setting (0.0 to 0.9s)
8	X Y 8. 2 Timer time setting 0: 0.0s 1: 0.1s ↓ ↓ 8: 0.8s 9: 0.9s

Mode No.	Display setting at operation
9	X Y 9. 2 Display setting at operation 0: OFF 1: Recursive display of the mode setting status 1–□ ↓ After 2s 2–□ ⋮ 2: Display sensor signal input status Display sensor input A status on indicator X Display sensor input B status on indicator Y When sensor input is HI: "‾‾" (upper line of 7-segment display) When sensor input is LO: "__" (lower line of 7-segment display)

9 RATING/PERFORMANCE/SPECIFICATION

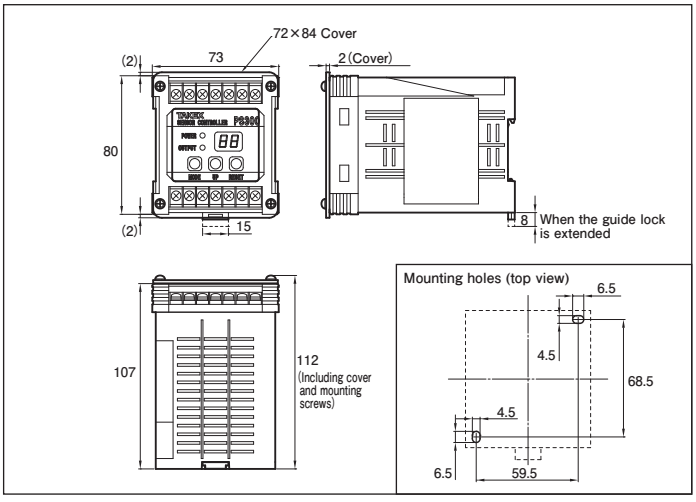
Model	PS300
Operation power	100 to 240VAC, ±10% 50/60Hz
Power consumption	16W 38VA
Input	· Sensor input: 2 systems NPN open collector input or PNP open collector input (selectable) (Note 1) Active input level: LO side/HI side selectable (Note 2) · Conditions for the sensor to connect: Residual voltage at ON: 4V or less, Leakage current OFF: 1mA or less Load current of 15mA or more · Minimum input time: 0.5ms (Note 3)
Operation modes	AND operation, CLOCK AND operation
Timer operations	ON-delay, OFF-delay, One-shot, None
Timer time	0.0 to 9.9s
Output	· NPN open collector output (photocoupler isolated) Rating: 30VDC 100mA or less. Residual ON voltage: 1.5V or less. Response time: 1ms or less · Relay output Contact: 1C, Rating: 250VAC 2A or less, Response time: 10ms or less
Power supply for sensor	24VDC / 12VDC selectable (Note 4) · 24VDC ±10% (400mA or less), 12VDC ±10% (150mA or less)
Indicator	7-segment LED, 2-digit indicator, red
Indicator	POWER: Power indicator (green LED), OUTPUT: Operation indicator (orange LED)
Connection method	Terminal block (screw: M3, terminal width: 6.4mm)
Mounting method	DIN rail (35mm) or M4 screws (mounting with 2 holes)
Weight	Approx. 260 g
Material	Case: PC, Terminal block cover: PC
Accessory	Instruction manual

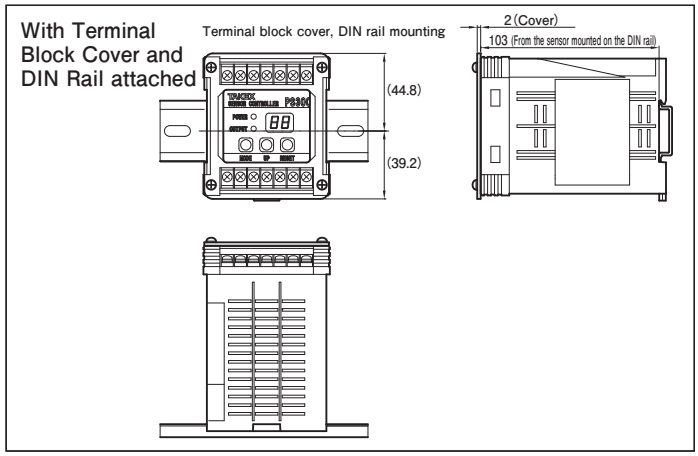
Environmental specifications

Ambient temperature	−10 to +55℃ (non-freezing)
Ambient humidity	35 to 85%RH (non-condensing)
Protection	IP20
Operating environment	Indoor use, Overvoltage category: Ⅱ, Pollution level: 2, Maximum altitude: 2000m
Vibration	Compliant with IEC61131-2 5-8.4Hz (double-amplitude 3.5mm) 8.4-150Hz (1G) X, Y, Z directions, each 2 hours
Impact resistance	Compliant with IEC61131-2 147m/s^2 (15G) X, Y, Z directions, 3 times each
Dielectric withstand voltage	2kVAC, 1 minute (Note 5)
Insulation resistance	500VDC, 20MΩ or more (Note 5)

Note 1: Selection of NPN/PNP type for sensor input is common to the two systems.
Note 2: Active input level can be individually set for the two systems.
Note 3: Minimum time necessary for acquiring input signals.
Note 4: Voltage selection is common to the two systems. The indicated current values are the sum of two electric systems.
Note 5: Between the primary power and the case, between the primary power and the sensor power, between the primary power and F.G., between the primary power and the relay output, between the primary power and NPN open collector output.

10 DIMENSIONS (in mm)





11 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.

12 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.