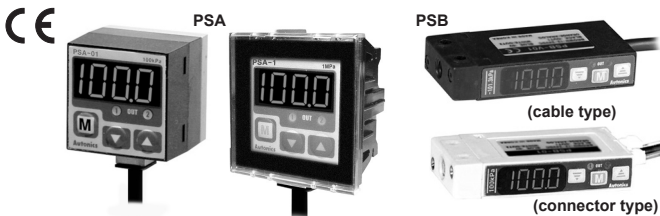


Autonics

DIGITAL PRESSURE SENSOR

PSA/PSB SERIES

INSTRUCTION MANUAL



Thank you for choosing our Autonics product.
Please read the following safety considerations before use.

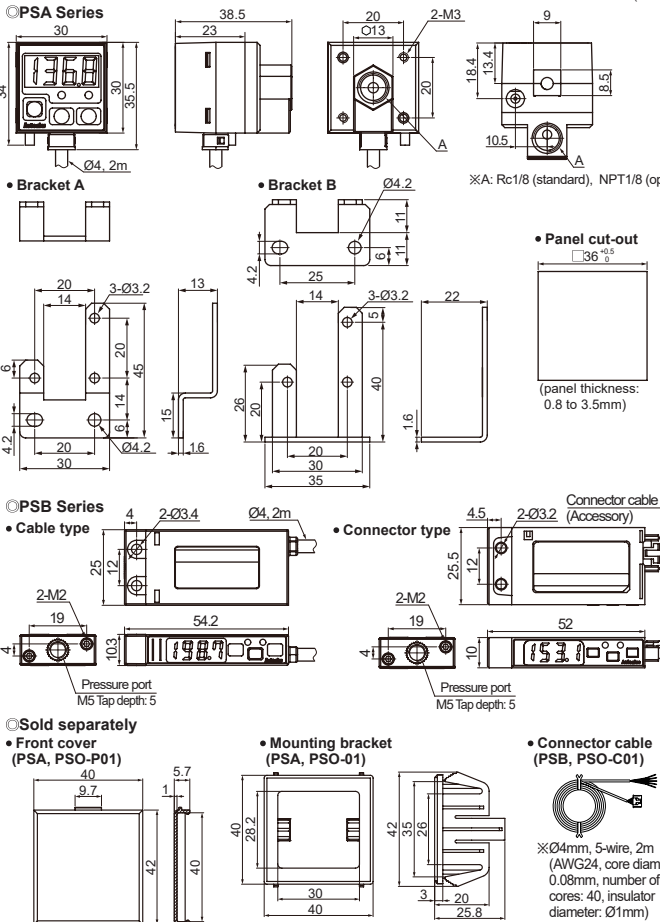
Safety Considerations

- Please observe all safety considerations for safe and proper product operation to avoid hazards.
 - Warning Failure to follow these instructions may result in serious injury or death.
 - Caution Failure to follow these instructions may result in personal injury or product damage.
- Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.) Failure to follow this instruction may result in personal injury, economic loss or fire.
 - Do not use the unit in the place where flammable/explosive/corrosive gas, high humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present. Failure to follow this instruction may result in explosion or fire.
 - Install on a device panel or to a pressure port directly to use. Failure to follow this instruction may result in fire.
 - Do not connect, repair, or inspect the unit while connected to a power source. Failure to follow this instruction may result in fire.
 - Check 'Connections' before wiring. Failure to follow this instruction may result in fire.
 - Do not disassemble or modify the unit. Failure to follow this instruction may result in fire.

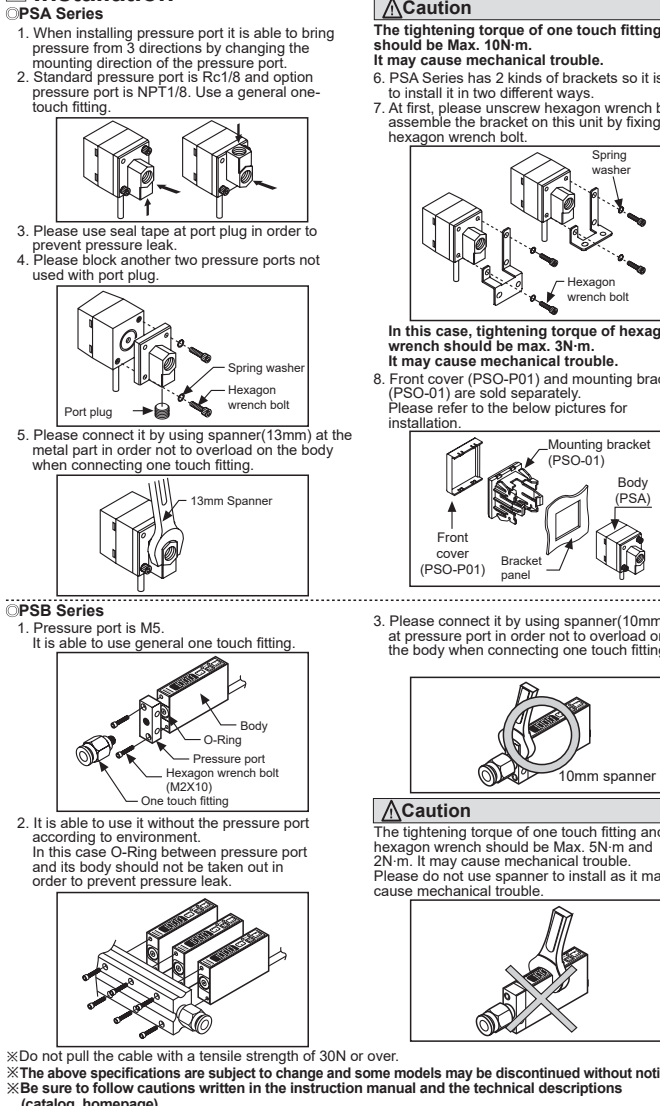
Caution

- Use the unit within the rated specifications. Failure to follow this instruction may result in fire or product damage.
- Use dry cloth to clean the unit, and do not use water or organic solvent. Failure to follow this instruction may result in fire.
- This product is designed to detect the pressure of noncorrosive gas. Do not use for corrosive gas. Failure to follow this instruction may result in product damage.
- Keep metal chip, dust, and wire residue from flowing into the unit. Failure to follow this instruction may result in fire or product damage.

Dimensions



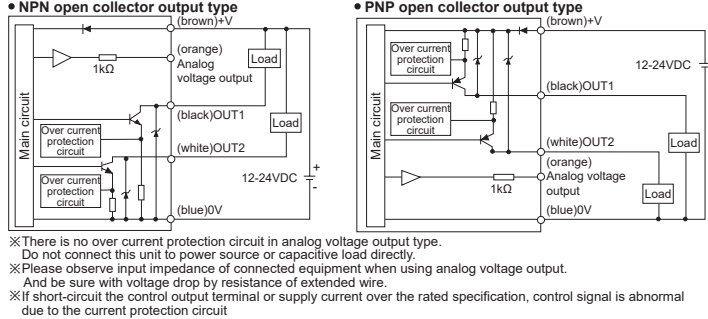
Installation



Specifications

Pressure type	Gauge pressure			
	Negative pressure type	Standard pressure type	PSA-1-□	Compound pressure type
Model ¹⁾	PSA-V01-□ PSB-V01-□ PSB-V01C-□	PSA-01-□ PSB-01-□ PSB-01C-□	PSA-1P-□ PSB-1P-□ PSB-1CP-□	PSA-C01-□ PSB-C01-□ PSB-C01C-□
Rated pressure range	0.0 to -101.3kPa	0.0 to 100.0kPa	0 to 1,000kPa	-100.0 to 100.0kPa
Display pressure range	5.0 to -101.3kPa	-5.0 to 110.0kPa	-50 to 1,100kPa	-101.2 to 110.0kPa
Max. pressure range	2 times of rated pressure		1.5 times of rated pressure	2 times of rated pressure
Applicable fluid	Air, Non-corrosive gas			
Power supply	12-24VDC ±10% (Ripple P-P: max. 10%)			
Current consumption	Max. 50mA			
Control output	NPN or PNP open collector output		Load voltage: Max. 30VDC ±	
	• Load voltage: Max. 30VDC ±		• Residual voltage -NPN: Max. 1VDC ±, PNP: Max. 2VDC	
	• Load current: Max. 100mA			
Hysteresis ²⁾	1digit fixed(2digits for psi unit)		2digits fixed	
Repeat error	±0.2% F.S. ±1digit		±0.2% F.S. ±2digits	
Response time	Selectable 2.5ms, 5ms, 100ms, 500ms			
Short circuit protection	Built-in			
Analog output	• Output voltage: 1-5VDC ±2% F.S.		• Linear: Within ±2% F.S.	
	• Zero point: Within 1VDC ±2% F.S.		• Span: Within 4VDC ±2% F.S.	
	• Resolution: Approx. 1/200		• Output impedance: 1kΩ	
Display digit	3 1/2 digit LED			
Display method	7 Segment LED			
Min. display interval	1digit(psi unit: 2 digits are fixed)		2digits	
Pressure unit	kPa, kgf/cm ² , bar, psi, mmHg, mmH ₂ O, inHg		kPa, kgf/cm ² , bar, psi, mmHg, mmH ₂ O, inHg	
Display accuracy	0 to 50°C: Max. ±1% F.S., -10 to 0°C: Max. ±2% F.S.			
Vibration	1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours			
Environ. Ambient temperature	-10 to 50, Storage: -20 to 60°C			
Environ. Ambient humidity	35 to 85%RH, Storage: 35 to 85%RH			
Material	• PSA - Case: PC, Pressure port: die-cast (Zn)			
	• PSB - Case, Pressure port, Cover: IXEF • PSB-C - Case, Pressure port, Cover: IXEF			
Protection	IP40(IEC standard)			
Cable	Cable type		• 4mm, 5-wire, Length: 2m(AWG 24, core diameter: 0.08mm, number of cores: 40, insulation diameter: 0.1mm)	
	Connector type		• 5-wire, Length: 3m(AWG 24, insulation diameter: 0.14mm)	
Weight ³⁾	PSA: Approx. 200g(approx. 120g), PSB: Approx. 160g(approx. 70g), PSB-C: Approx. 160g(approx. 70g)			

Input/Output Circuit and Connection Diagram

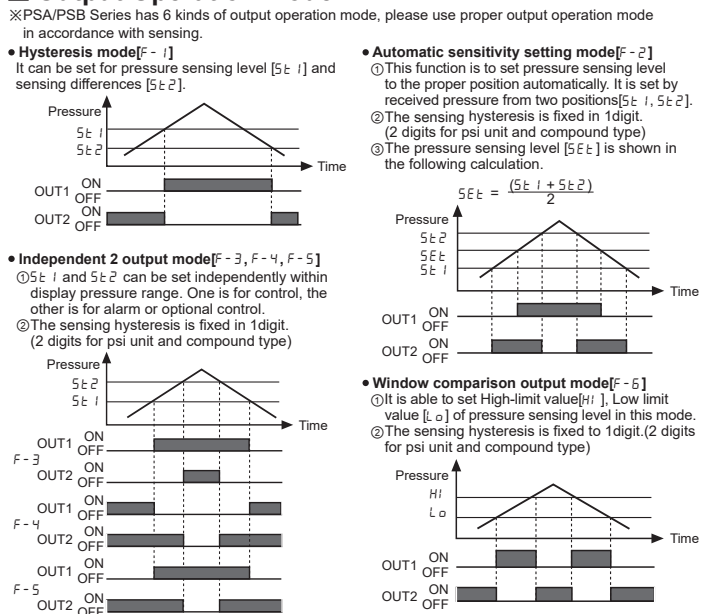


- 3 1/2 digit LED display (red): Displays sensing pressure, every setting value and display error
- 1 output indicator (red): Output 1 is ON, LED will be ON
- 2 output indicator (PSA: red, PSB: green): Output 2 is ON, LED will be ON
- Mode key: Enter to parameter or preset setting mode, and save setting value
- Up key: Sets the setting value to upper step in preset setting or pressure unit, output mode, response time, analog output scale, key lock, peak hold value, bottom hold value display in parameter setting
- Down key: Sets setting value to lower step in preset setting or pressure unit, output mode, response time, analog output scale, key lock, peak hold, bottom hold display in parameter setting
- Range of rating pressure: It is possible to change the pressure unit in pressure sensor. Please use different unit label for your application.

Unit Descriptions

- Pressure unit change**
PS-V01(C)(P) and PS-C01(C)(P) has 7 kinds of pressure unit and PS-□01(C)(P) and PS-□1(C)(P) has 4 kinds of pressure unit. Please select the proper unit for application.
• PS-V01(C)(P), PS-□01(C)(P): kPa, kgf/cm², bar, psi, mmHg, inHg, mmH₂O
• PS-□01(C)(P), PS-□1(C)(P): kPa, kgf/cm², bar, psi
※When using mmH₂O unit, multiply display value by 100.
- Output mode change**
There are 6 kinds of control output mode in order to provide the various detection. Select a mode for your application.
• Hysteresis mode[F-1]: When variable hysteresis is required for pressure detection.
• Automatic sensitivity setting mode[F-2]: When it is required to set detecting sensitivity automatically at proper position.
• Independent 2 output mode[F-3, F-4, F-5]: When it is required to detect pressure from two positions with one product.
• Window comparison output mode[F-5]: When it is required to detect pressure in a certain area.
- Response time change (chattering prevention)**
It can prevent chattering of control output by changing response time. It is able to set 4 kinds of response time (2.5, 5, 100, 500ms) and if the response time is getting longer, the sensing will be more stable by increasing the number of digital filter.
- Analog output scale setting**
It is not fixed the analog output(1-5VDC) scale as the rated pressure range but this is a function to change properly for user's application. When the position [R-1] for 1VDC output and the position [R-5] for 5VDC output are set, the pressure range of R-1 to R-5 is to 1-5VDC analog output.
- Key lock**
This unit has 2 kinds of key lock function in order to prevent wrong operation.
• L o c : All keys are locked, it is impossible to change any parameter setting/preset, zero point adjustment, peak hold and bottom hold. (enables to change P e s t only)
• P R L : It is impossible to change parameter setting/preset, zero point adjustment. (Enables to check peak hold and bottom hold, and to change P e s t mode)
• U n l : All of the setting is available, all keys are unlocked.
- Zero point adjustment**
This function is to set the display value of pressure at zero when port is opened to atmospheric pressure. Zero point adjustment affects analog output voltage.
- Peak hold and bottom hold function**
This function is to display malfunction of the system caused by parasitic pressure or to check through memorizing the max./min. pressure that occurred in the system.

Output Operation Mode



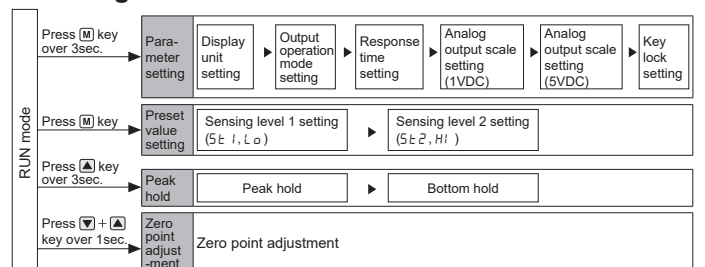
Error

Error display	Description	Countermeasures
Er 1	If external pressure applied, when adjusting Zero point	Please try again after external pressure removing
Er 2	When overloaded on control output	Remove overload
Er 3	When the setting condition is not matched at automatic sensitivity setting mode	Set proper setting value after checking setting condition
HHH	When the applied pressure exceeds the upper display pressure range up	Apply pressure within display pressure range
LLL	When the applied pressure exceeds the lower display pressure range down	

Accessory



Setting



- Zero point adjustment**
1. In state of atmospheric pressure during RUN mode, press [M] key and [A] key at the same time for over 1sec.
2. When the zero point adjustment is completed, it will display 0.0 and return to RUN mode automatically.
※If executing zero point adjustment when external pressure has been applied, Er 1 will be flashing. Please execute zero point again in state of atmospheric pressure.
※Please execute zero point adjustment regularly.
- Parameter setting**
1. Set to pressure display unit, output operation mode, response time (chattering prevention), analog output scales or key lock.
2. Please set parameter after unlocking key lock function when key lock function is set. (please see below key lock setting)
- Display unit [U n t]**
• U n t and previously set unit will flash in turn every 0.5 sec.
• Press [A] or [V] key to select the unit.
• Negative pressure, compound pressure:
kPa (kgf/cm²), bar (psi), mmHg (inHg), mmH₂O (mmH₂O)
• Standard pressure:
kPa (kgf/cm²), bar (psi)
(Press [M] key momentarily, the unit will be saved, then move to the next mode.)
• For using mmH₂O unit, multiply display value by 100.
- Output operation mode [O u t]**
• O u t and previous output operation mode will flash by turning on.(0.5sec.)
• Select the output operation mode with [A] [V] key.
[F-1] [F-2] [F-3] [F-4] [F-5] [F-6]
(Press [M] key momentarily, the response time will be saved, then move to the next mode.)
- Response time [P e s t]**
• P e s t and the previous response time will flash by turning on.(0.5sec.)
• Select the response time with [A] [V] key.
[2.5] [5] [100] [500] (unit: ms)
(Press [M] key momentarily, the response time will be saved, then move to the next mode.)
- Analog output scale [1VDC] [R-1]**
• R-1 and the previous pressure will flash by turning on.(0.5sec.)
• Set the pressure which will output 1VDC with [A] [V] key.
• Set range: Min. value of rated pressure ≤ [R-1] ≤ 90% of rated pressure
(Press [M] key momentarily, the selected pressure is set as 1VDC scales, then move to the next mode.)
- Analog output scale [5VDC] [R-5]**
• R-5 and the previous pressure will flash by turning on.(0.5sec.)
• Set the pressure which will output 5VDC with [A] [V] key.
• Set range: [R-1] + 10% of rated pressure ≤ [R-5] ≤ Max. value of rated pressure
(Press [M] key momentarily, the selected pressure is set as 5VDC scales, then move to the next mode.)
- Key lock [P e s t]**
• P e s t and the previous key lock will flash by turning on.(0.5sec.)
• Select key lock with [A] [V] key.
Key lock functions:
• L o c : Disable to change preset value and parameter value (Enable to change P e s t mode only)
• P R L : Disable to change parameter setting/preset, zero point adjustment. (Enables to check peak hold and bottom hold, and to change P e s t mode)
• U n l : Enable to change preset value and parameter value(Lock off)
Press [M] key over 3 sec.
- Returns to RUN mode**
• When advance to parameter setting mode and preset setting mode, it displays "Setting item" and "Previous setting value" by 0.5 sec. turn. This display will stop by pressing [M] or [A] key(Setting value), if any key is untouched for over 1 sec., it will display old value by 0.5sec. turn again.
• When [M] key is pressed for 3sec. during setting, it will return to RUN mode with memorizing on EEPROM. However, when there is any key is untouched for 60sec., it turns to RUN mode with keeping the previous setting value not current setting value.
• There is memory protection by EEPROM, but life cycle of EEPROM is 100,000 times.
- Peak hold and bottom hold check**
1. Press [M] key for over 3sec. in RUN mode.
2. P e h and memorized max. pressure(Negative pressure type is for max. negative pressure) will flash by turning on.(0.5sec.) then display peak hold value.
3. b a h and memorized min. pressure(Negative pressure type is for min. negative pressure) will flash by turning on.(0.5sec.) then display bottom hold value.
4. If pressing [A] key one time shortly, memorized peak hold and bottom hold value will be removed then return to RUN mode.
• When the peak hold and bottom hold value is over the max. display pressure value, it displays H H H. On the opposite, it displays L L L. Please remove peak hold and bottom hold value by using [A] key.
- Pressure sensing level 1**
1. Set the pressure sensing level.
2. Set preset value after unlocking key lock when key lock function is set. (please refer to the key lock setting)
3. Be sure that the setting method is different by each output operation mode.
• When hysteresis mode [F-1] and independent 2 output mode [F-3, F-4, F-5]
RUN mode
Pressure sensing level 1
• 5 t 1 and previous set sensing level 1 flash in 0.5sec. by turns.
• Set the pressure sensing level 1 by [A] or [V] key.
• Set range: Min. display pressure < 5 t 1 ≤ Max. display pressure
(Press [M] key momentarily, sensing level 1 will be saved, then move to the next mode.)
- Pressure sensing level 2**
• 5 t 2 and previous set sensing level 2 flash in 0.5sec. by turns.
• Set the pressure sensing level 2 by [A] or [V] key.
• Set range: Hysteresis mode →
Min. display pressure ≤ 5 t 2 < 5 t 1
Independent 2 output mode →
Min. display pressure < 5 t 2 ≤ Max. display pressure
(Press [M] key momentarily, sensing level 2 will be saved, then move to the next mode.)
- Returns to RUN mode**
- Automatic sensitivity setting mode [F-2]**
RUN mode
Pressure sensing level 1
• 5 t 1 and previous set sensing level 1 flash in 0.5sec. by turns.
• Apply the required pressure[5 t 1] within the rated pressure.
• Press [A] key shortly one time, current sensing pressure is set as sensing level 1. 5 t 1 and the set sensing level 1 flash by turn (0.5sec.)
• Set range: Min. display pressure < 5 t 1 ≤ Max. display pressure-1% of rated pressure
• If differences of between 5 t 1 and sensing level are not enough, Er 3 flashes 3 times then returns to 5 t 2 setting. Please re-execute the setting for the condition.
• It is possible to set repeatedly by [A] key, the last setting is set as the sensing level 2.
- Pressure sensing level 2**
• 5 t 2 and previous set sensing level 2 flash in 0.5sec. by turns.
• Apply the required pressure[5 t 2] within the rated pressure.
• Press [A] key shortly one time, current sensing pressure is set as sensing level 2. 5 t 2 and the set sensing level 1 flash by turn (0.5sec.)
• Set range: 5 t 1 + 1% of rated pressure ≤ 5 t 2 ≤ Max. display pressure
• Adjust sensing level [5 t 2] by [A] [V] key, when fine adjustment of the sensing level [5 t 2] is required. (adjustment range: between 5 t 1 and 5 t 2)
- Automatic sensitivity and fine adjustment**
• 5 t 2 and sensing level [5 t 2] flash in 0.5sec. by turns.
• Adjust sensing level [5 t 2] by [A] [V] key, when fine adjustment of the sensing level [5 t 2] is required. (adjustment range: between 5 t 1 and 5 t 2)
- Returns to RUN mode**
• When checking the value of sensing level 1, 2 [5 t 1, 5 t 2] and automatic sensitivity setting value [5 t 2], press [M] key shortly and continuously.
• Example of the setting in automatic sensitivity setting mode (to check absorption of component by vacuum pressure): The state of removed target is 5 t 1 and the state of absorbing target is 5 t 2. By [A] key, sensing level [5 t 2] value is set in the between 5 t 1 and 5 t 2 automatically.
- Window comparison output mode [F-5]**
RUN mode
Pressure sensing level 1
• L o and previous set sensing level 1 flash in 0.5sec. by turns.
• Set the pressure sensing level 1 by [A] or [V] key.
• Set range: L o < H i ≤ Max. display pressure
(Press [M] key momentarily, sensing level 1 will be saved, then move to the next mode.)
- Pressure detecting level 2**
• H i and previous set sensing level 1 flash in 0.5sec. by turns.
• Set the pressure sensing level 2 by [A] or [V] key.
• Set range: L o < H i ≤ Max. display pressure
(Press [M] key momentarily, sensing level 1 will be saved, then move to the next mode.)
- Returns to RUN mode**
• If no key is touched for 60sec., it will return to RUN mode. (Automatic sensitivity setting mode [F-2] is exception)
• When changing the display unit, preset value will be calculated according to the display unit.
• Whenever key touched one time, it is increased(decreased) as 1 digit(2 digits for psi unit and compound pressure) but it will be continuously increasing(decreasing) by pressing [A] [V] key constantly.
- Cautions during Use**
1. Follow instructions in 'Cautions during Use'. Otherwise, It may cause unexpected accidents.
2. 12-24VDC power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
3. Use the product, 3 sec after supplying power.
4. When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
5. Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
6. This unit may be used in the following environments.
①Indoors (in the environment condition rated in 'Specifications')
②Altitude max. 2,000m
③Pollution degree 2
④Installation category III
- Main Products**
• Photoelectric Sensors • Temperature Controllers
• Fiber Optic Sensors • Temperature/Humidity Transducers
• Door Sensors • SSR/Power Controllers
• Door Side Sensors • Counters
• Area Sensors • Timers
• Proximity Sensors • Panel Meters
• Pressure Sensors • Tachometer/Pulse(Rate) Meters
• Rotary Encoders • Display Units
• Connector/Sockets • Sensor Controllers
• Graphic/Logic Panels • I/O Terminal Blocks & Cables
• Field Network Devices • Stepper Motors/Drivers/Motion Controllers
• Control Switches/Lamps/Buzzers
• Switching Mode Power Supplies
• Laser Marking System(Fiber, CO₂, Nd:YAG)
• Laser Welding/Cutting System