Autonics

DIGITAL PRESSURE SENSOR (Pneumatic type)
PSQ 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.
※⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ 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.

⚠ Warning

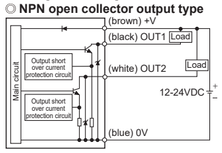
1. **Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.g. nuclear power control, medical equipment, ships, vehicles, railways, aircraft, combustion apparatus, safety equipment, crime/disaster prevention devices, etc.)**
   Failure to follow this instruction may result in fire, personal injury, or economic loss.
2. **Install on a device panel or to a pressure port directly to use.**
   Failure to follow this instruction may result in fire.
3. **Do not connect, repair, or inspect the unit while connected to a power source.**
   Failure to follow this instruction may result in fire.
4. **Check 'Connections' before wiring.**
   Failure to follow this instruction may result in fire.
5. **Do not disassemble or modify the unit.**
   Failure to follow this instruction may result in fire.

⚠ Caution

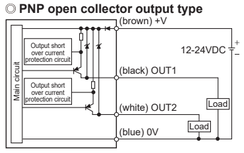
1. **Use the unit within the rated specifications.**
   Failure to follow this instruction may result in fire or product damage.
2. **Use dry cloth to clean the unit, and do not use water or organic solvent.**
   Failure to follow this instruction may result in fire.
3. **This product is designed to detect the pressure of noncorrosive gas. Do not use for corrosive gas.**
   Failure to follow this instruction may result in product damage.
4. **Do not use the unit in the place where flammable/explosive/corrosive gas, humidity, direct sunlight, radiant heat, vibration, impact, or salinity may be present.**
   Failure to follow this instruction may result in fire or explosion.
5. **Keep metal chip, dust, and wire residue from flowing into the unit.**
   Failure to follow this instruction may result in fire or product damage.

■ Input/Output Circuit and Connections

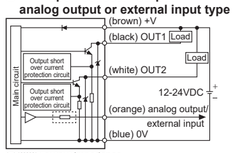
◎ **NPN open collector output type**



◎ **PNP open collector output type**

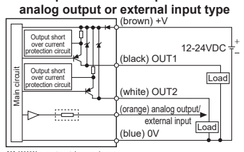


◎ **NPN open collector output+ analog output or external input type**



※ : output impedance
※If short-circuit the control output terminal or supply current over the rated specification, normal control signal is not output due to the output short over current protection circuit

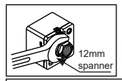
◎ **PNP open collector output+ analog output or external input type**



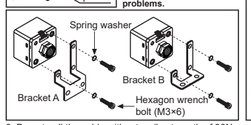
※ : output impedance

■ Installation

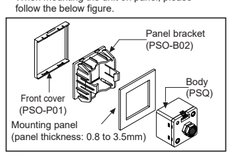
1. Since pressure port is divided to standard and optional specification, be cautious when using commercial one touch fitting. (Standard: Rc1/8, Option: R1/8, NPT1/8)
2. Use a spanner (12mm) at the metal part of the unit in order not to overload on the body when connecting one touch fitting.
3. Two different fixing brackets are provided for PSQ Series. Select proper one according to your application environments.
4. At first, please unscrew hexagon wrench bolt and assemble the bracket on this unit by fixing hexagon the wrench bolt. **In this case, tightening torque of hexagon wrench should be max. 3N·m. It may cause mechanical problems.**



⚠ Caution
The tightening torque of one touch fitting should be max. 10N·m. It may cause mechanical problems.



5. PSQ Series has panel bracket (PSO-B02) and front cover (PSO-P01) (sold separately). When mounting the unit on panel, please follow the below figure.



6. Do not pull the cable with a tensile strength of 30N or over.

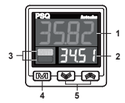
■ Error and Troubleshooting

When occurring error, follow the below troubleshooting.

Display	Cause	Troubleshooting
ERR1	When adjusting zero point while external pressure is input.	Try again after removing external pressure.
ERR2	When over-current is applied on control output	Remove the over current conditions by adjusting load resistance.
ERR3	When the range of Auto sensitivity setting mode [St1, St2] is set incorrectly.	Check the setting range and set St1, St2.
ERR4	When connection between master and slave is wrong during copying parameters.	Check the cables between sensors and the connection of the same models.
ERR5	When entering invalid password.	Enter valid password.
HHHH	When applied pressure exceeds the high-limit of display pressure range.	Apply pressure within the display pressure range.
LLLL	When applied pressure exceeds the low-limit of display pressure range.	
-HH-	When the correction value of auto shift, remote zero exceeds the high-limit of the setting range.	Set the correction value of auto shift, remove zero within the setting range.
-LL-	When the correction value of auto shift, remote zero exceeds the low-limit of the setting range.	
-HL-	When [HH], [LL] occur both.	

※The above specifications are subject to change and some models may be discontinued without notice.
※Be sure to follow cautions written in the instruction manual and the technical descriptions (catalog, homepage).

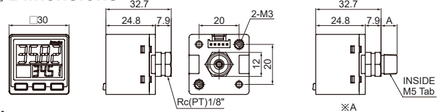
■ Unit Descriptions



1. **Present value (PV) display part (green, red, orange by setting/status)**
   RUN mode: Displays PV.
   Setting mode: Displays parameter.
2. **Setting value (SV) display part (green)**
   RUN mode: Displays setting value, unit, etc.
   Setting mode: Displays SV.
3. **Output indicator (OUT1, OUT2) (orange)**
   : Turn ON while the control output turns ON.
4. **M key**
   RUN mode: Press the M key for over 2 sec to enter parameter 1 group.
   Press the M key for over 4 sec to enter parameter 2 group.
   Parameter setting mode: Press the M key to select the setting items.
   Press the M key for over 2 sec to return RUN mode.
5. **key**
   RUN mode: Press the key to set preset value of output operation mode.
   Press the M+ keys to set key lock/unlock.
   Press the + keys to adjust zero point.
   Press the M+ keys to set peak hold.
   Preset value setting mode: Press the key to increase/decrease setting value.
   Setting mode: Changes the parameter.

■ Dimensions

(unit: mm)



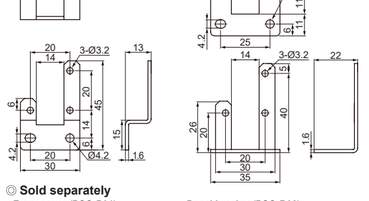
※A

R1/8 model	8mm
NPT1/8 model	

◎ **Accessory**

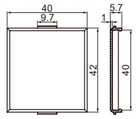
• **Bracket A**

• **Bracket B**

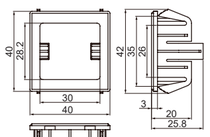


◎ **Sold separately**

• **Front cover (PSO-P01)**



• **Panel bracket (PSO-B02)**

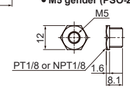


• **Connector cable (PSO-C01)**

※Ø4mm, 5-wire, 2m (AWG24, core diameter: 0.08mm, number of cores: 40, insulator diameter: Ø1mm)

◎ **Panel cut-out**

• **M5 gender (PSO-Z01)**



■ Specifications

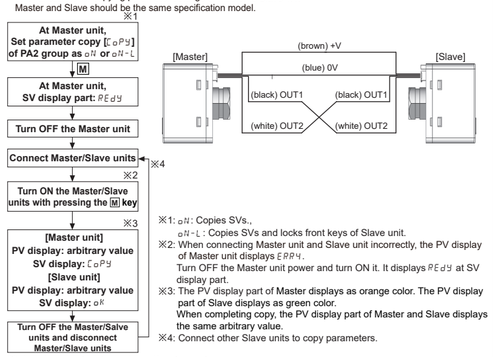
Pressure type		Gauge pressure (compound pressure)		
Type		NPN or PNP open collector output type	NPN or PNP open collector output +analog output or external input type	
Model※1		PSQ-C01C-□	PSQ-C1C-□	PSQ-C01CU-□	PSQ-C1CU-□
Rated pressure range		-100.0 to 100.0kPa	-100 to 1,000kPa	-100.0 to 100.0kPa	-100 to 1,000kPa
Display & Setting pressure range		-101.3 to 110.0kPa	-101 to 1,100kPa	-101.3 to 110.0kPa	-101 to 1,100kPa
Min. display unit		0.1kPa	1kPa	0.1kPa	1kPa
Max. pressure range		2 times of rated pressure	1.5 times of rated pressure	2 times of rated pressure	1.5 times of rated pressure
Applied fluid		Air, non-corrosive gas			
Power supply		12-24VDC⎓ (ripple P-P: max. 10%)			
Allowable voltage range		90 to 110% of rated voltage			
Current consumption		Max. 50mA		Max. 50mA (current output: max. 70mA)	
Control output		NPN or PNP open collector output • Load voltage: max. 30VDC⎓ • Load current: max. 100mA • Residual voltage: max. 2VDC⎓			
	Hysteresis※2	Min. display interval			
	Repeat error	±0.2% F.S. ± min. display interval			
	Response time	Select one; 2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1,000ms, 5,000ms			
	Protection circuit	Output short over current protection circuit			
Analog output※3	Voltage output	—		• Output voltage: 1-5VDC⎓ ±2.5% F.S. • Linear: max. ±1% F.S. • Resolution: 1/2,000 • Output impedance: approx. 240Ω • Response time: 50ms	
	Current output	—		• Output current: DC4-20mA ±2.5% F.S. • Linear: max. ±1% F.S. • Resolution: 1/2,000 • Output impedance: approx. 100kΩ • Response time: 50ms	
External input※3 (Auto shift/ Remote zero/ Hold)		—		• ON voltage: Max. 0.4VDC⎓ • OFF voltage: 5-Vin or open • Resolution: 1/2,000 • Output impedance: approx. 100kΩ	
Display digits		Present value (PV) indicator, setting value (SV) indicator: 4-digit			
Display method		12 segment LCD method			
Min. display interval	MPa	0.001	0.001	0.001	0.001
	kPa	0.1	1	0.1	1
	kgf/cm²	0.001	0.01	0.001	0.01
	bar	0.001	0.01	0.001	0.01
	psi	0.02	0.2	0.02	0.2
	mmHg	1	—	1	—
	inHg	0.1	—	0.1	—
	mmH₂O	0.1	—	0.1	—
Display accuracy		0 to 50°C: max. ±0.5% F.S., -10 to 0°C: max. ±1% F.S.			
Insulation resistance		Over 50MΩ (at 500VDC megger)			
Dielectric strength		1,000VAC 50/60Hz for 1 min			
Vibration		1.5mm amplitude at frequency of 10 to 55Hz (for 1 min) in each of X, Y, Z direction for 2 hours			
Environment	Ambient temp.	-10 to 50°C, storage: -20 to 60°C			
	Ambient humi.	30 to 80%RH, storage: 30 to 80%RH			
Protection structure		IP40 (IEC standard)			
Material		Front case: polycarbonate, rear case: polybutylene terephthalate + glass 15%, pressure port: stainless steel 303			
Approval		CE, cULus			
Weight※4		Approx. 165g (approx. 80g)			

※1: □ in model represents the type of pressure port. Standard: Rc1/8, option: R1/8, NPT1/8.
※2: In hysteresis output mode, it is variable.
※3: Select one between analog output (voltage or current) and external input.
※4: The weight includes packaging. The weight in parenthesis is for unit only.
※For using mmH₂O unit, multiply display value by 100.
※Environment resistance is rated at no freezing or condensation.

■ Functions

◎ **Parameter copy**

This function is for copying parameter settings of Master to Slave 1:1.
Master and Slave should be the same specification model.

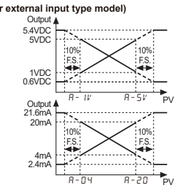


※1: oN: Copies SVs.,
oN-L : Copies SVs and locks front keys of Slave unit.
※2: When connecting Master unit and Slave unit incorrectly, the PV display of Master unit displays ERR4.
Turn OFF the Master unit power and turn ON it. It displays REdY at SV display part.
※3: The PV display part of Master displays as orange color. The PV display part of Slave displays as green color.
When completing copy, the PV display part of Master and Slave displays the same arbitrary value.
※4: Connect other Slave units to copy parameters.

◎ **Analog output scale adjustment**
(only for NPN or PNP open collector output+analog output or external input type model)

Set output voltage, output current to the current display value at 1-5VDC voltage output [A-V], DC4-20mA [A-C] current output.

• Set pressure value for 1VDC output [A-1V] and pressure value for 5VDC output [A-5V].
[A-1V] setting range: 0% F.S.≤ [A-1V] ≤100% F.S.
[A-5V] setting range: 0% F.S.≤ [A-5V] ≤ [A-1V]-10% F.S. or [A-1V]+10% F.S.≤ [A-5V] ≤100% F.S.



• Set pressure value for 4mA output [A-04] and pressure value for 20mA output [A-20].
[A-04] setting range: 0% F.S.≤ [A-04] ≤100% F.S.
[A-20] setting range: 0% F.S.≤ [A-20] ≤ [A-04]-10% F.S. or [A-04]+10% F.S.≤ [A-20] ≤100% F.S.

◎ **Auto Shift/Remote Zero/Hold input**
(only for NPN or PNP open collector output+analog output or external input type)

• Auto Shift [SHFt], Remote Zero [ZERo]
: When reference pressure of the pressure sensor changes, apply auto shift or remote zero digital input. It corrects present pressure to reference pressure and by moving detection level as much as fluctuation level. In case of remote zero, it is the same function as auto shift but remote zero makes the measured pressure as 0 forcibly.
When changing analog output and external input setting, auto shift correction value [SHiN], remote zero correction value [ZEiN] are also reset as 0.
-Setting correction value
: Press the key to set SV manually or apply 0VDC to orange cable over 1ms.
When selecting analog output/external input [io] of PA1 group as [SHFt] or [ZERo], press the M key to select control output at [SHot], [ZEot] to be with correction value.
-Deleting correction value: Press the + keys for over 1 sec to delete set auto shift correction.
• Hold [HoLd]: The function to hold PV and control output while signal is input.

◎ **Response time (chattering prevention)**

It can prevent control output from chattering by changing response time.
There are 10 types of response time; 2.5ms, 5ms, 10ms, 25ms, 50ms, 100ms, 250ms, 500ms, 1000ms, 5000ms. if the response time is getting longer, the detection will be more stable by increasing the number of digital filter.

◎ **PV display color and color linked output**

You can select PV display color to the linked output status.
There are 4 types as below. Select color linked output among [oUt1], [oUt2], or [RLL].

SV	PV display color
R-oN	Green in normal status. When the set color linked output turns ON, it displays red.
G-oN	Red in normal status. When the set color linked output turns ON, it displays green.
REd	Red is fixed.
GREN	Green is fixed.

◎ **SV display part**

Select the display type at the SV display part in RUN mode.
There are 3 types; displaying SV [Std], displaying unit [UNIt], none [oFF]

◎ **High/Low Peak Hold**

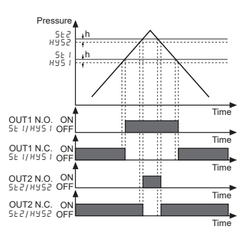
This function is to diagnose malfunction of the system caused by parasitic pressure through memorizing input the max./min. pressure occurred from the system. Press the M+ key more than 1 sec in RUN mode and set the peak hold.

■ Output Operation Mode

※PSQ Series has 4 output operation mode. Use the proper operation mode in accordance with the desired application of detection.

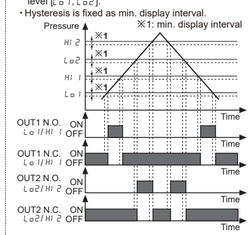
◎ **Hysteresis mode [HYSM]**

• Set the hysteresis of pressure detection.
• Set the pressure detection level [St1, St2] and hysteresis [HYS1, HYS2].



◎ **Window comparison output mode [WIN]**

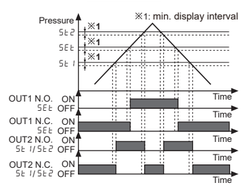
• It detects pressure at the desired range.
• Set high-limit value of pressure detection level [HI1, HI2], and low-limit value of pressure detection level [Lo1, Lo2].
• Hysteresis is fixed as min. display interval.



◎ **Auto sensitivity setting mode [AUto]**

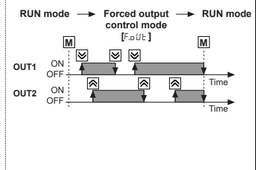
• It sets the proper detection sensitivity automatically.
• It sets by the two pressure points [St1, St2].
• Hysteresis is fixed as min. display interval.
• The pressure detection level [SEt] is shown in the below formula.

$$SEt = \frac{(St1+St2)}{2}$$

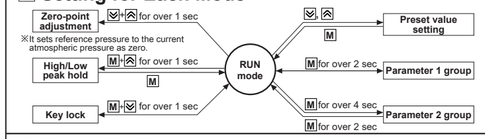


◎ **Forced output control mode [FoUt]**

• Regardless of setting value, it maintains comparison output OFF and displays present pressure.
• Set OUT1 operation mode [oUt1] of parameter 1 group as FoUt and return to RUN mode. The PV display part displays the measured pressure and the SV display part displays [FoUt].
• During forced output control mode, press the or key to turn ON/OFF OUT1, 2 manually.



■ Setting for Each Mode



■ Preset Setting

<Factory default of preset>

Output mode		Pressure range	100.0 to 100.0kPa	-100 to 1,000kPa	Output mode		Pressure range	100.0 to 100.0kPa	-100 to 1,000kPa
HYSM	oUt1	St1	0500	0500	AUto		St1	-500	0000
		HYS1	-500	0000			St2	0500	0500
	oUt2	St2	0500	0500			StE	0000	0250
		HYS2	-500	0000	A-V		A-1V	1000	0000
WIN	oUt1	Lo1	-500	0000			A-5V	1000	1000
		HI1	0500	0500	A-C		A-04	4000	0000
	oUt2	Lo2	-500	0000			A-20	1000	1000
		HI2	0500	0500					

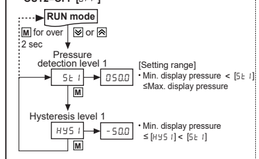
Set preset value of output operation mode.
When changing display unit [UNIt], or external input, preset value is reset.
(when changing the display unit, preset value will be automatically switched to changed pressure unit.)

※Setting items and setting value are displayed at the setting value (SV) display part alternatively.
※If there is no additional key input for over 2 sec during setting, the setting value is automatically set and it returns to RUN mode. (except forced output control mode)
※When changing output operation mode, the preset value is reset for the changed output operation mode. However, if the changed output operation mode has the previous preset value, the previous value is set.

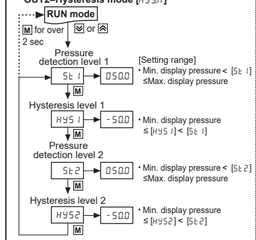
◎ **NPN or PNP open collector output type**

※Press the key to set the setting value.

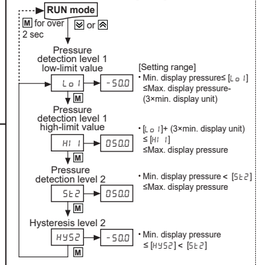
•OUT1=Hysteresis mode [HYSM], OUT2=OFF [oFF]



•OUT1=Hysteresis mode [HYSM], OUT2=Hysteresis mode [HYSM]

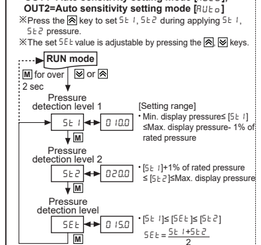


•OUT1=Window comparison output mode [WIN], OUT2=Hysteresis mode [HYSM]

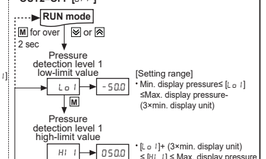


•Auto sensitivity setting mode [AUto], OUT2=Auto sensitivity setting mode [AUto]

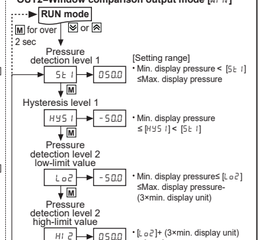
※Press the key to set St1, St2 during applying St1, St2 pressure.
※The set StE value is adjustable by pressing the keys.



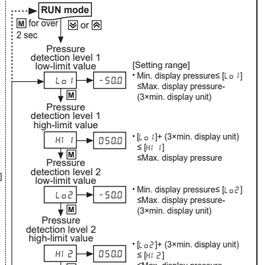
•OUT1=Window comparison output mode [WIN], OUT2=OFF [oFF]



•OUT1=Hysteresis mode [HYSM], OUT2=Window comparison output mode [WIN]



•OUT1=Window comparison output mode [WIN], OUT2=Window comparison output mode [WIN]

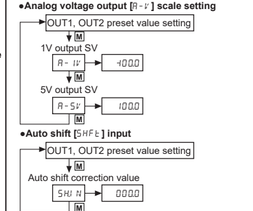


•OUT1=Forced output control mode [FoUt], OUT2=Forced output control mode [FoUt]

When using forced output control mode, auto shift/remote zero/hold input functions are not available.

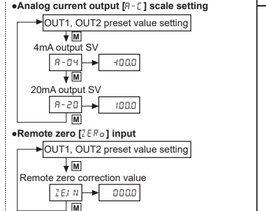
◎ **NPN or PNP open collector output+analog output or external input type**

•Analog voltage output [A-V] scale setting



•Auto shift [SHFt] input

•Analog current output [A-C] scale setting



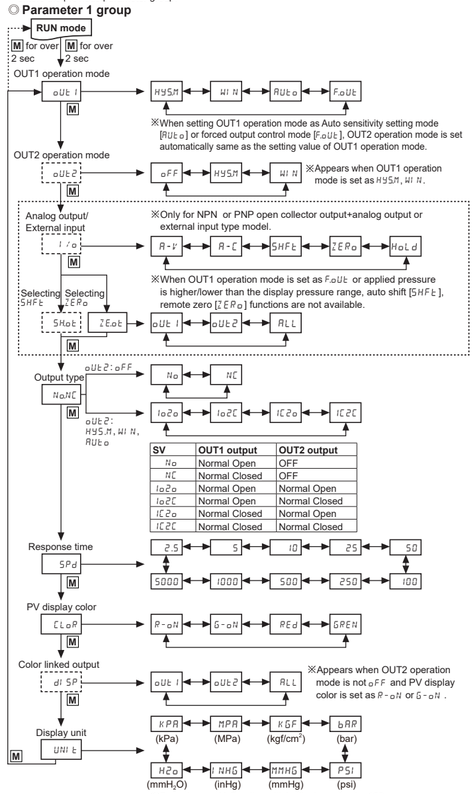
•Remote zero [ZERo] input

※Analog output (voltage or current) and external input (auto shift/remote zero/hold) are not available at the same time.

■ Parameter Setting

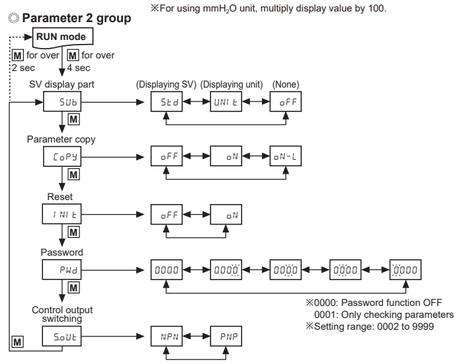
※After entering parameter 1/2 group, if there is no additional key input for 60 sec, it maintains previous setting value and it returns to RUN mode.
※Press the key to set the setting value.
※After entering parameter 1/2 group, press the M key for over 2 sec to return to RUN mode.
※When pressing the M key once returning RUN mode from parameter 1 group, 2 group within 2 sec, it enters the previous parameter group.

◎ **Parameter 1 group**



SV	OUT1 output	OUT2 output
No	Normal Open	OFF
NC	Normal Closed	OFF
Io2o	Normal Open	Normal Open
Io2C	Normal Closed	Normal Open
IC2o	Normal Closed	Normal Open
IC2C	Normal Closed	Normal Closed

◎ **Parameter 2 group**



■ 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 3
   ④Installation category II

■ Major Products

■ Photoelectric Sensors
■ Fiber Optic Sensors
■ Door Sensors
■ Door Side Sensors
■ Area Sensors
■ Proximity Sensors
■ Pressure Sensors
■ Rotary Encoders
■ Connectors/Sockets
■ Switching Mode Power Supplies
■ Control Switches/Lamps/Buzzers
■ I/O Terminal Blocks & Cables
■ Stepper Motors/Drivers/Motion Controllers
■ Graphic/Logic Panels
■ Field Network Devices
■ Laser Marking System (Fiber, CO₂, Nd: YAG)
■ Laser Welding/Cutting System
■ Temperature Controllers
■ Temperature/Humidity Transducers
■ SSRs/Power Controllers
■ Counters
■ Timers
■ Panel Meters
■ Tachometer/Pulse (Rate) Meters
■ Display Units
■ Sensor Controllers

Autonics Corporation
http://www.autonics.com
■ HEADQUARTERS:
18, Bansong-ro 513 beon-gil, Haeundae-gu, Busan, South Korea, 48002
■ E-mail: sales@autonics.com