

Digital Pressure Sensor DPSA SERIES

MANUAL



Thank you for choosing our 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.
- ※ Safety considerations are categorized as follows.

⚠ 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.

- ※ The symbols used on the product and instruction manual represent the following.

⚠ symbol represents caution due to special circumstances in which hazards may occur.

⚠ 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.)
2. Do not use it in flammable gas because it does not have an explosion proof construction.
Failure to follow this instruction may result in explosion.

Small size, High accuracy pressure control digital pressure sensor

Features

- High accuracy digital pressure sensor
- High brightness LCD display.
- High resolution : 1/1000
- Convertible pressure unit
 - Compound pressure : kPa, kgf/cm2, bar, psi, mmHg, mmH2O, inHg
 - Standard pressure : kPa, kgf/cm2, bar, psi, Mpa
- Various output modes : Hysteresis mode, One point selting mode.
Independent 2 output mode, Window comparative output mode
- Chattering prevention for output (Selectable response time : 2.5, 5, 100, 500ms)
- Analog output(1-5VDC) scale function
- Reverse power polarity and overcurrent protection circuit
- Zero-point adjustment function
- Peak and Bottom hold display

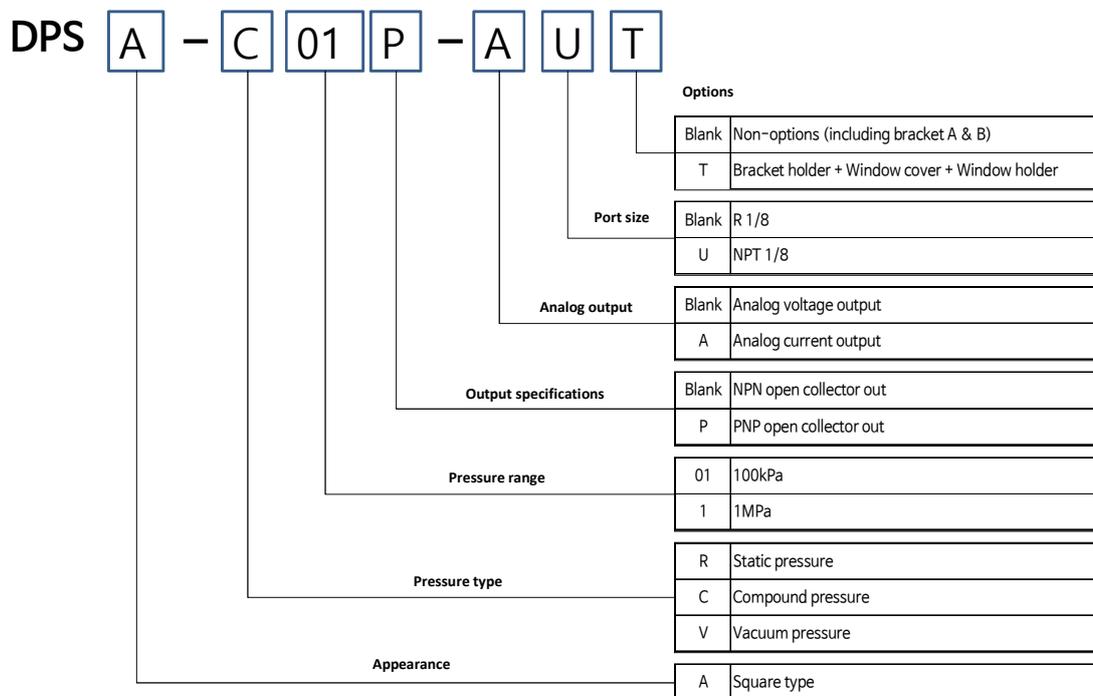


DPSA Series

⚠ Please read "Caution for your safety" in operation manual before using.



Model Configuration



Pressure Conversion chart

from \ to	Pa	kPa	MPa	kgf/cm ²	mmHg	mmH ₂ O	psi	bar	inHg
1Pa	1	0.001	0.000001000	0.000010197	0.007501	0.101972	0.000145038	0.000010000	0.0002953
1kPa	1000.000	1	0.001000	0.010197	7.500616	101.9716	0.145038	0.010000	0.2953
1MPa	1000000	1000	1	10.197162	7500.61683	101971.553	145.038243	10	295.299875
1kgf/cm ²	98066.54	98.066543	0.09806	1	735.5595	10000.20	14.22334	0.980665	28.95878
1mmHg	133.322368	0.133322	0.000133	0.001359	1	13.5954	0.019336	0.001333	0.039370
1mmH ₂ O	9.80665	0.00980	-	0.000099	0.0735578	1	0.00142	0.000098	0.002895
1psi	6894.757	6.89757	0.00689	0.070307	51.71630	703.07	1	0.068947	2.036003
1bar	100000.0	1000000	0.100000	1.019689	750.062	10196.89	14.50339	1	29.52998
1inHg	3386.417	3.388418	0.003386	0.034532	25.40022	345.31849	0.491158	0.033863	1

*To convert 760mmHg in kPa ⇒ 1mmHg is 0.133322kPa, therefore 760mmHg will be 760 × 0.133322kPa=101.32472kPa

Specifications

Pressure type		Gauge pressure			
		Vacuum pressure	Standard pressure		Compound pressure
Model	NPN Open collect output	DPSA-V01	DPSA-R1	DPSA-R01	DPSA-C01
	PNP Open collect output	DPSA-V01P	DPSA-R1P	DPSA-R01P	DPSA-C01P
Rated pressure gauge		-101.3 ~ 0kPa	-100 ~ 1,000kPa	0 ~ 100.0kPa	-100.0 ~ 100.0kPa
Display and set pressure range		-101.3 ~ 5.0kPa	-100 ~ 1,100kPa	-5.0 ~ 110.0kPa	-101.3 ~ 110.0kPa
Max. pressure range		Twice the rated pressure		1.5 times the rated pressure	Twice the rated pressure
Applied fluid		Air, Non-corrosive gas			
Power supply		12~24VDC \pm 10% (Ripple P-P : Max 10%)			
Current consumption		Max 40mA (with no load)			
Control output		NPN or PNP open collector output (Load voltage: Max 30VDC, Load current: Max 100mA, Residual voltage: Max 2V)			
	Hysteresis*	1 digit fixed (2 digits for psi unit)			
	Repeat error	\pm 0.2% F.S. \pm 1digit			\pm 0.2% F.S. \pm 2digit
	Response time	Selectable 2.5ms, 5ms, 100ms, 500ms, 1000ms, 2000ms			
	Short circuit protection	Built-in			
Analog output	Voltage output	Output voltage : 1~5VDC \pm 2% F.S.			
		Zero point : \pm 2% F.S.			
	Curret output	Output impedance: 1K Ω			
		Output current : DC 4~20mA \pm 2.5% F.S.			
		Zero point : \pm 2% F.S.			
		Max impedance: 300 Ω (12V), 600 Ω (24V) Min impedance : 50 Ω			
Display Color		Present value (Red / Green), Preset value (Red / Green)			
Display method		4 digits 7 segment LCD 2-color display (Red / Green)			
Min. display interval		1digit (psi unit : 2 digits)			
Pressure unit		kPa, kgf/cm ² , bar, psi, mmHg, mmH2O, inHg	kPa, MPa, kgf/cm ² , bar, psi	kPa, kgf/cm ² , bar, psi, mmHg, mmH2O, inHg	
Display accuracy		25 $^{\circ}$ C \pm 3 $^{\circ}$ C : Max \pm 2% F.S. \pm 1 digit			
Vibration		1.5mm Amplitude at frequency of 10 to 55HZ (for 1 Min.) in each X, Y, Z direction for 2 hours			
Environment	Ambient temperature	Use : 0~50 $^{\circ}$ C, storage : -10~60 $^{\circ}$ C (Anti-freezing or condensation)			
	Ambient humidity	35~85% RH			
Material		Case : PC , Pressure port : SUS			
Protection		IP40			
Cable		\varnothing 4, 5P, Length : 2m			
APPROVAL		CE			
Weight*		Approx. 180g (Approx. 60g)			

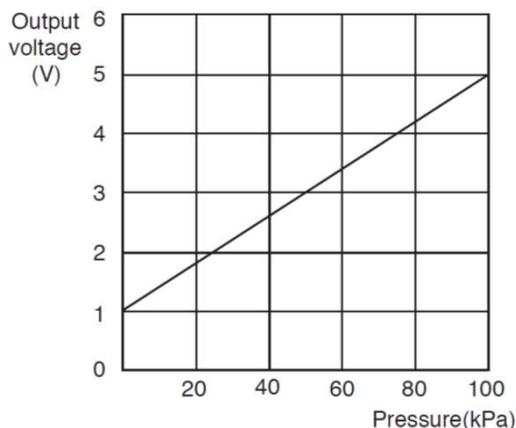
*1. In hysteresis output mode, it is variable.

*2. The weight is in packed condition and parenthesized is body only.

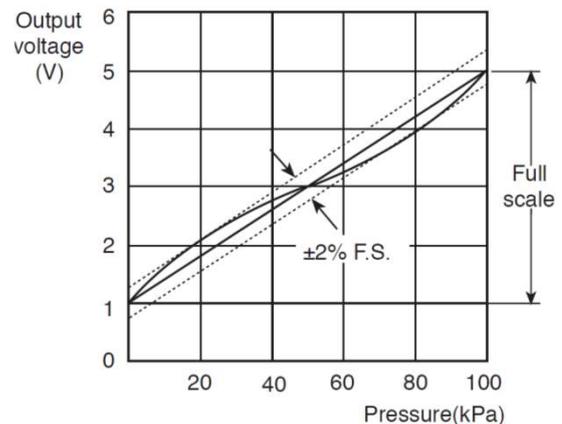
* F.S(Full Scale) : Rated pressure

* The environmental conditions of use are not freezing or condensation.

• Analog output voltage-Pressure characteristic

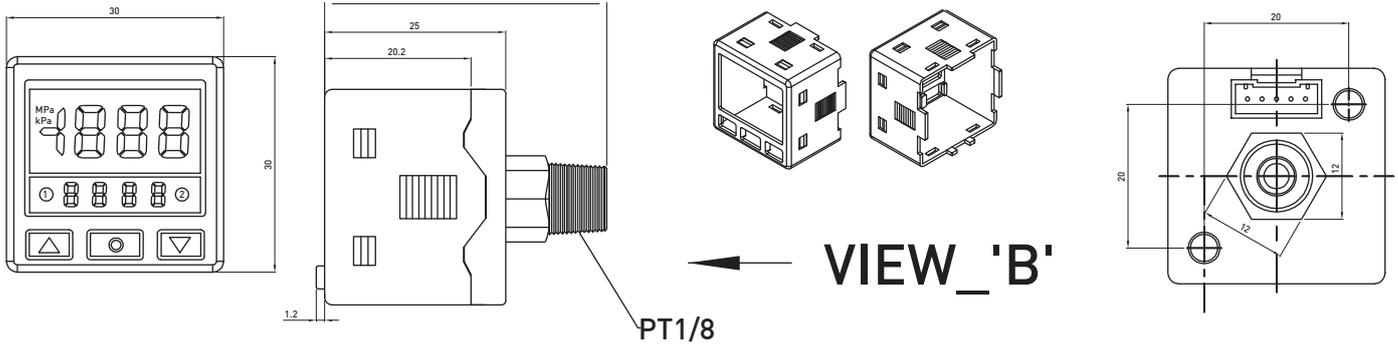


• Analog output voltage-Linear characteristic

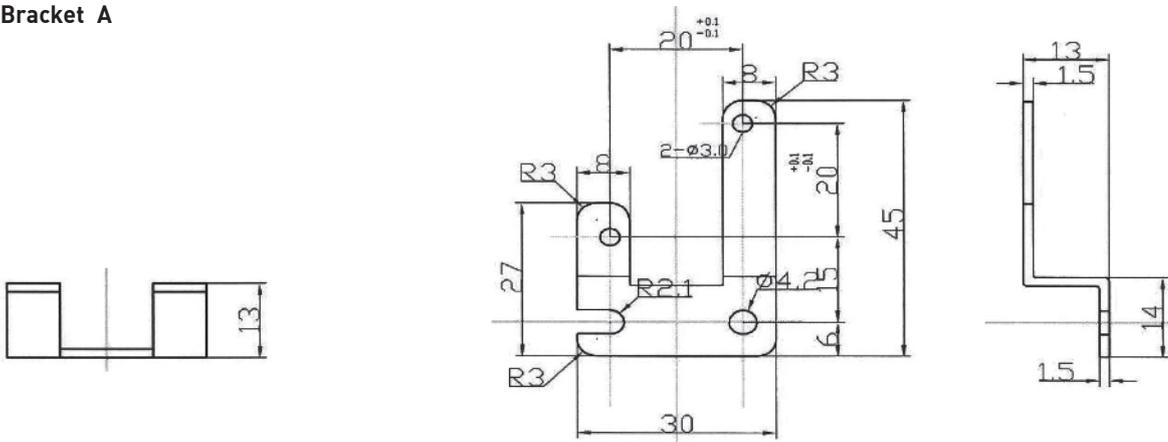


Dimensions

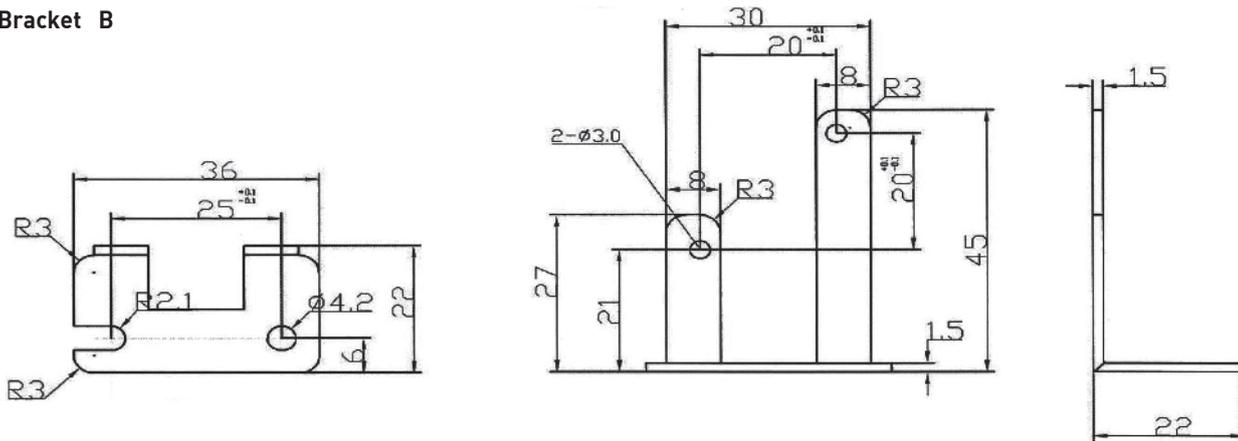
• DPSB Series



• Bracket A

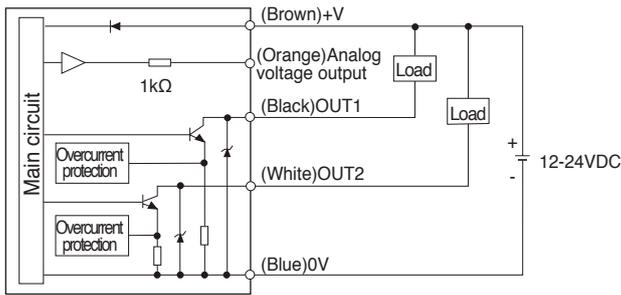


• Bracket B

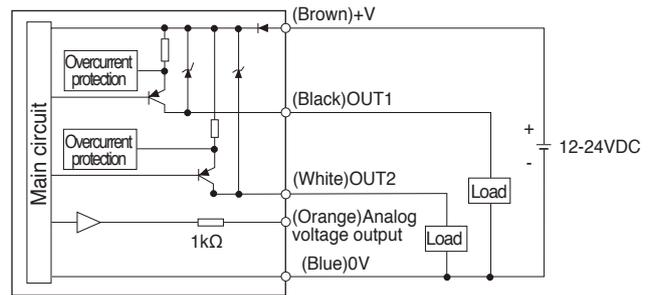


Control output diagram(DPSA)

• NPN open collector output type



• PNP open collector output type



- ※ There is no short-circuit protection in analog voltage output. Do not connect this output to power supply or capacitive load directly.
- ※ Please observe input impedance of connected equipment when use analog voltage output.
And be sure to check voltage drop caused by resistance of extended wire.

Front panel identification

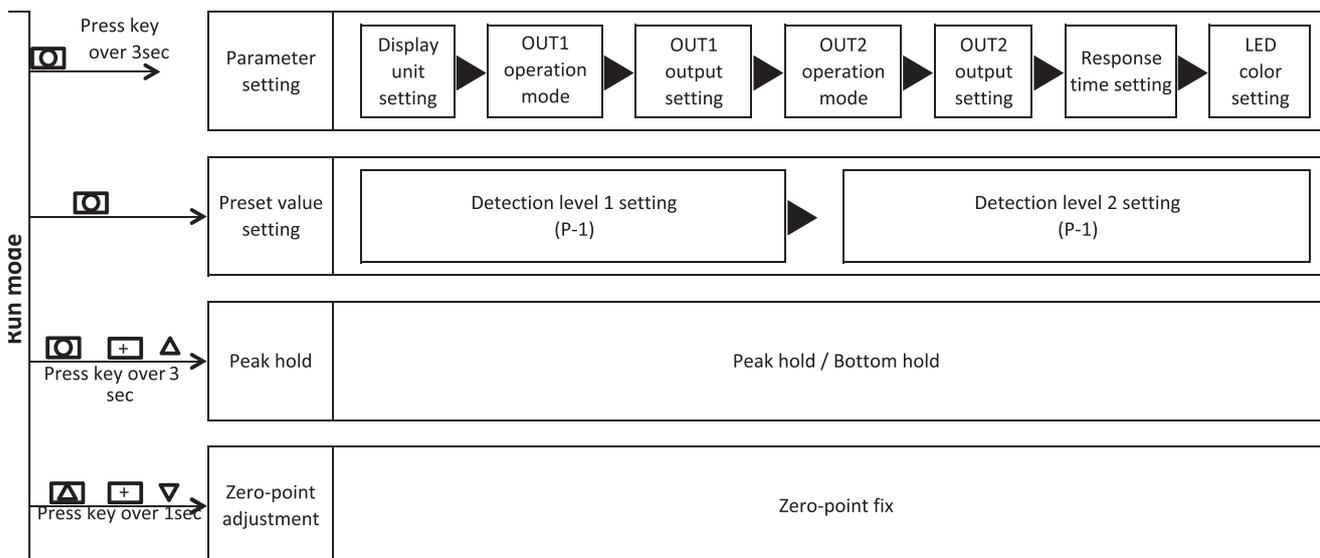
(DPSA Series)



- ① Pressure unit subdisplay : The current set pressure unit is displayed. Settings other than Mpa and Kpa are possible but not displayed.
- ② 2 color main display : Detecting pressure value, Various display setting value and erro contents.
- ③ Setting value indicator : Set pressure value, Various display setting mode.
- ④ Out 1 lamp : Lights during OUT1 operation.
- ⑤ Out 2 lamp : Lights during OUT2 operation.
- ⑥ UP key : Used to change the setting value in the measurement mode to higher lever or to change the pressure unit, output mode, output mode setting, response time, LED color setting etc.
- ⑦ SET key : Enter parameter setting and save setting value.
- ⑧ DOWN key : Used to change the setting value in the measurement mode to lower lever or to change pressure unit, output mode, output mode setting, response time, LED color setting etc.

Setting(DPSA)

Setting(DPSA Series)

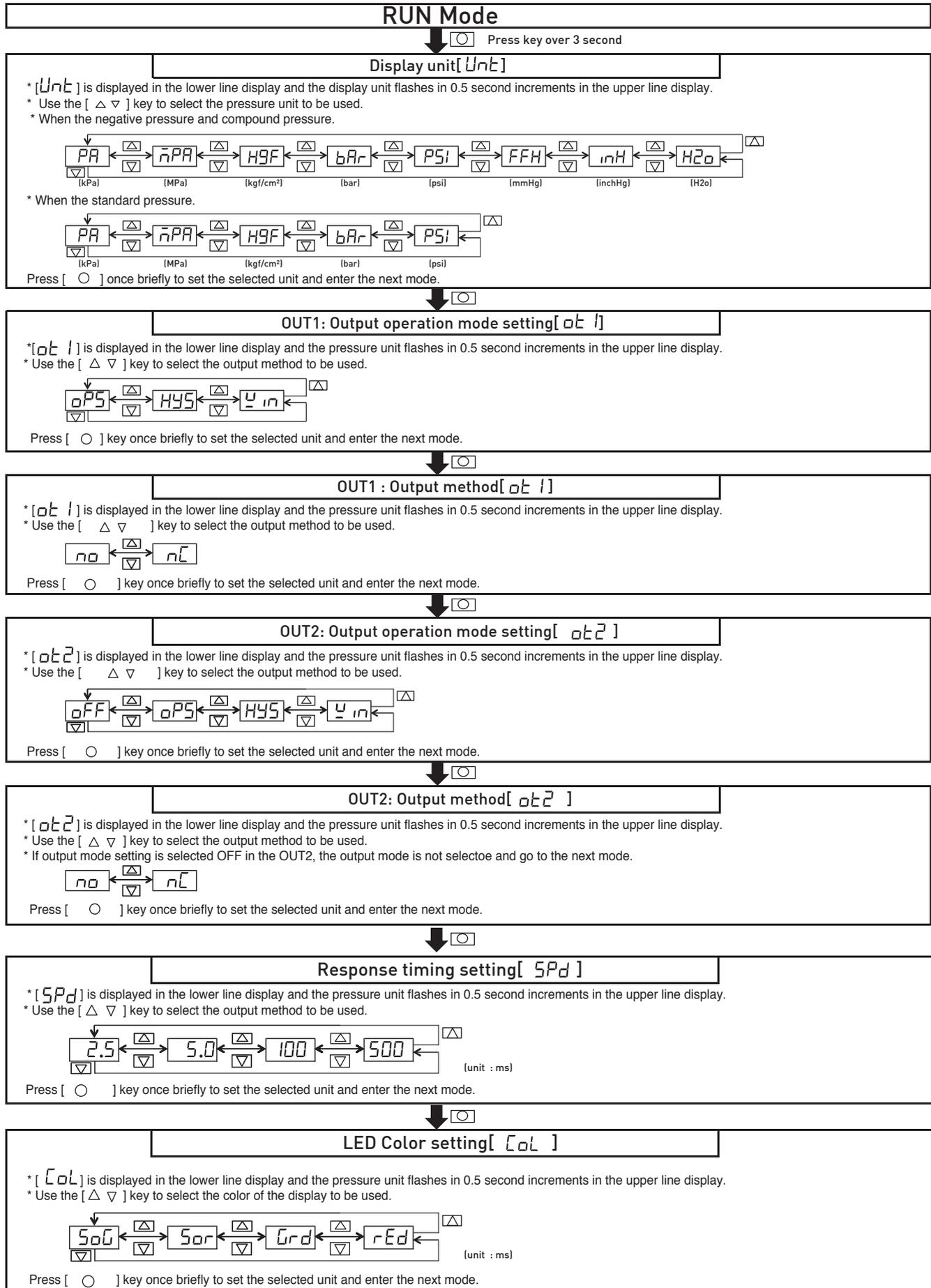


Zero point adjustment(DPSA Series)

1. In operation mode, press the <up>key and <down>key simultaneously for more than 1 second after opening the pressure port.
 2. When zero setting is completed, 0 is displayed.
- * If zero setting is going on while external pressure is applied, Er1 flashes while pressing the key.
* Please perform zero adjustment periodically.

Parameter setting(DPSA)

1. Set the pressure display unit, OUT1 operation mode, OUT1 OUTPUT,OUT2 operation mode, OUT2 output, response time, and the LCD color.
2. When the key lock is set, be sure to release the key lock and set the parameter.



↓  Press key over 3 second

Return to operation mode

- * When entering the parameter setting mode, "Setting item" is displayed on the lower line display and " Previous setting value" is flashing on the upper line display every 1 second.
 - * Use the [ ] key to select the color of the display to be used.
 - * If you press the [] key for more than 3 seconds at any point during parameter setting, the set value is stored in the EEPROM memory and the operation mode is restored.
- Also, if there is no key input for 30 seconds during setting, going on setting is ignored and retains previous settings.
- * The set conditions are stored in the EEPROM memory and are preserved even when the power is turned off. However, please note that the guaranteed life of EEPROM is up to 100,000 times.

* Preset Value setting

1. Sets the input detection level.
2. Keep in mind that the set number differs depending on the type of output operation mode.

←When in hysteresis mode and window comparator mode→

Run mode

Pressure sensing level 1 [L- 1]

- * The lower line display shows the previously set values.
- * If you use the [ ] key to change the pressure detection level 1, L-1 and the set value alternately cycle for 1 second and flashing for 3 seconds.
- * When the flashing stops, the set value is saved.
- * When changing the detection level of OUT2, L-1 changes to L-2.

↓ 

Pressure detecting level 2 [H- 1]

- * The lower line display shows the previously set values.
- * If you use the [] key to change the pressure detection level 1, H-1 and the set value alternately cycle for 1 second and flashing for 3 seconds.
- * When the flashing stops, the set value is saved.
- * When changing the detection level of OUT2, H-1 changes to H-2.

←When One-point setting mode →

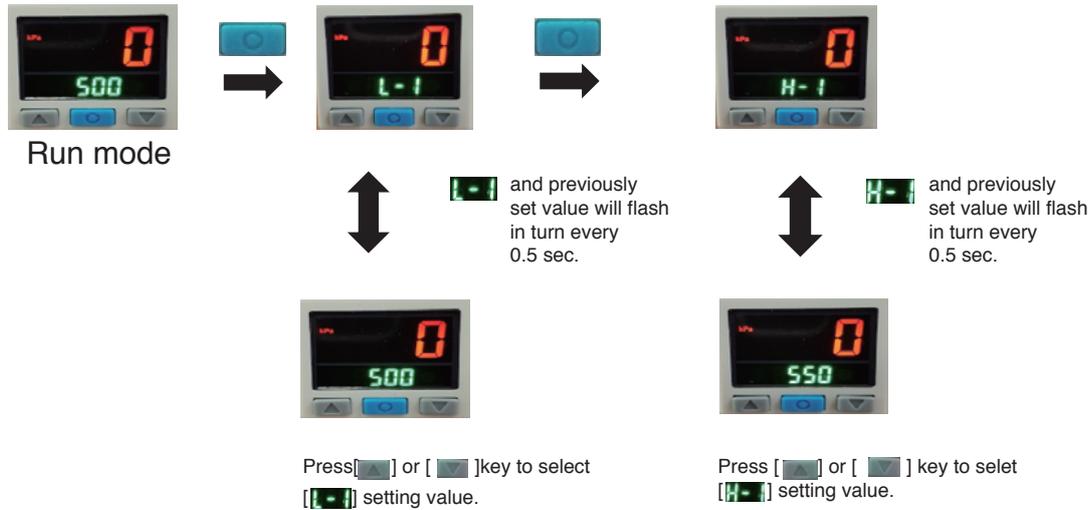
Run mode

Pressure detecting level [P- 1]

- * The lower line display shows the previously set values.
- * If you use the [ ] key to change the pressure detection level 1, L-1 and the set value alternately cycle for 1 second and flashing for 3 seconds.
- * When the flashing stops, the set value is saved.
- * When changing the detection level of OUT2, P-1 changes to P-2.

▮ Preset value setting(DPSA)

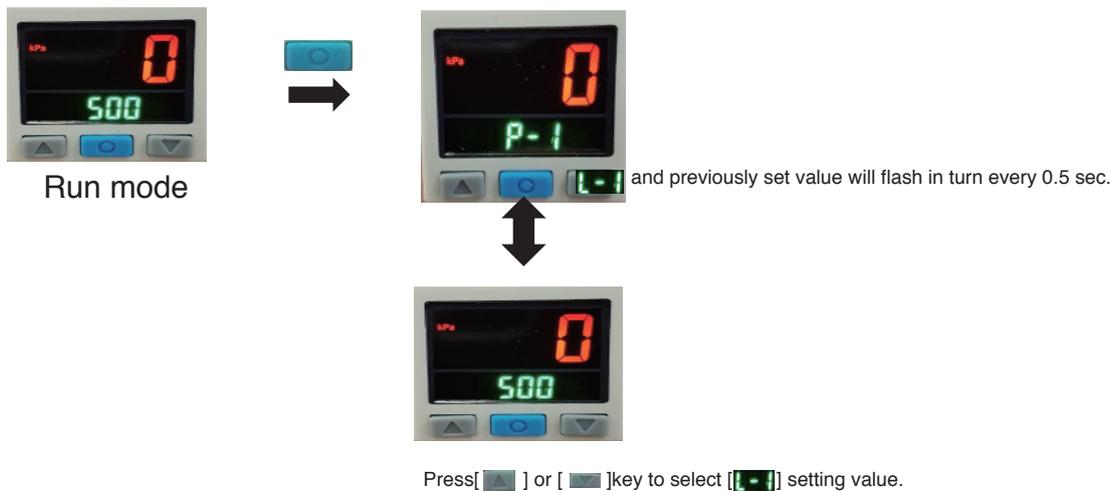
① Hysteresis mode [**HYS**] and Window comparison mode [**WIN**]



L-1 setting range: Min. display pressure < **L-1** <= Max. display pressure

H-1 setting range: Min display pressure < **H-1** <= Max. display pressure

② One point mode [**OPS**]



P-1 setting range: Min display pressure <= **P-1** <= Max. display pressure

■ Peak and Bottom Hold check

1. In the operation mode, press [**Δ + ○**] key for more than 3 seconds.
2. Upper line display shows peak hold value by alternately flashing PE.H and the maximum pressure value after entering mode every 0.5 seconds.
3. Lower line display shows bottom hold value by alternately flashing BO.H and minimum pressure value after entering mode.
4. Press and hold [**○**] for more than 3 seconds to clear the stored peak hold and bottom hold value and return to operation mode.
5. If the peak hold and bottom hold values exceed the maximum display pressure range will be displayed HHH with flashing and exceeds the minimum display pressure range of hold down value will be displayed LLL with flashing.

Output operation mode(DPSA)

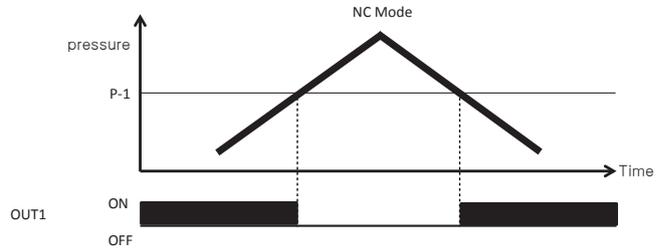
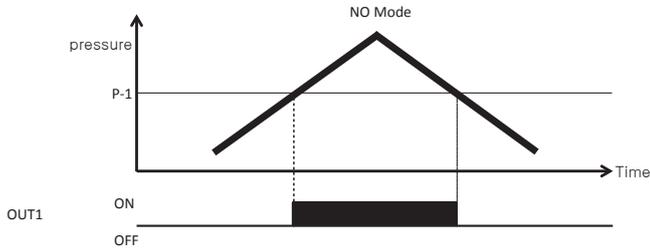
* DPS Series has 3 output operation mode.

Use the proper operation mode in accordance with the desired application of detection.

* The 3 output operation mode have two kinds of OUT mode(NO/NC mode).

* One Point Setting Mode [0 P 5]

The pressure detection level(P-1) can be set to any value.



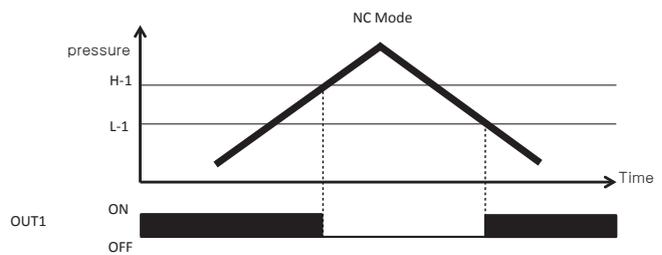
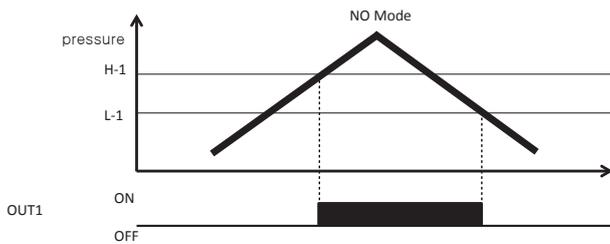
OUT1(NO mode): When applying pressure is large than P-1 value, it will be ON

OUT1(NC mode): When applying pressure is lower than P-1 value, it will be ON

* Hysteresis mode [h 4 5]

① The pressure sensing level [H-1] and sensing difference [L-1] can be set to any value.

② The detection response is fixed to 1 digit.



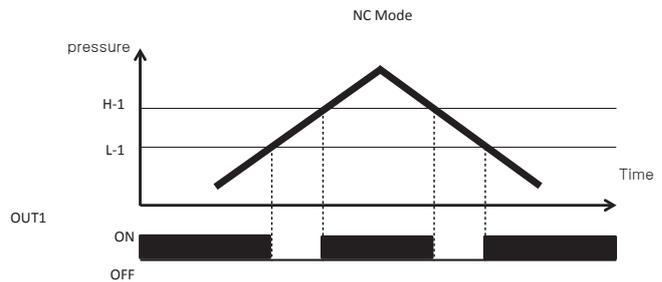
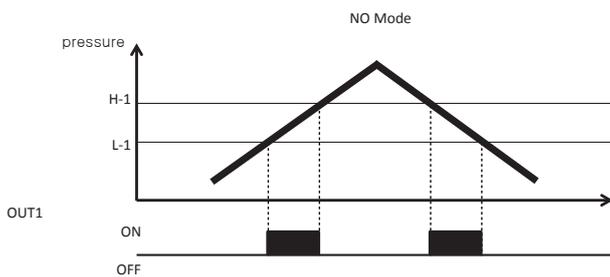
OUT1(NO mode): When applying pressure is larger than [H-1], it will be ON.

OUT1(NC mode): When applying pressure is lower than [L-1], it will be ON.

* Window comparison output mode[H 1 0]

① The upper limit value[H-1] and lower limit value[L-1] of the pressure detection level can be set.

② The detection response is fixed to 1 digit.



OUT1(NO mode): It will be ON between high limit value [H-1] and low limit value [L-1].

OUT1(NC mode): It will be ON when it is over high limit value[H-1] and low limit value [L-1].

► Functions(DPSA)

● Pressure unit change

DPSA - C01 (P) has 7 kinds of pressure unit and DPSA-R1 (P) has 5 kinds of pressure unit. Please select the proper unit for application.

* DPSA - C01 (P) : kPa, kgf/cm², bar, psi, mmHg, inHg, mmH₂O

* DPSA - R1 (P) : kPa, MPa, kgf/cm², bar, psi

● Output mode change

There are 6 kinds of control output modes in order to provide various detection.

Select a mode for your proper application.

1. When the output mode is N.O.

* One-point setting mode [OPS] : When pressure detection is required above a certain pressure.

* Hysteresis mode [HYS] : When it is necessary to vary the hysteresis width for pressure detection.

* Window comparison output mode [WIN] : When pressure detection is required only in a specific section.

2. When output mode is N,C

* One-point setting mode [OPS] : When pressure detection is required below a certain pressure.

* Hysteresis mode [HYS] : When it is necessary to vary the hysteresis width for pressure detection.

* Window comparison output mode [WIN] : When pressure detection is required only outside of a specific section.

● 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 (2.5ms, 5msec, 100ms, 500ms) and if the response is getting longer, the sensing will be more stable by increasing the number of digital filter.

● LED Color change

Change the color of the display to RED or GREEN.

There are four change modes. There are consisting of two line displays with opposite colors.

* SoG : When OUT1 is output, the upper line display changes to RED.

* SoR : When OUT1 is output, the lower line display changes to GREEN.

* GREEN : The upper line display changes to GREEN.

* RED : The upper line display changes to RED.

● Zero-point adjustment

This function is to set the display value of pressure at zero when port is opened to atmospheric pressure.

And the zero-point adjustment also affects the analog output voltage.

● Peak hold and bottom hold

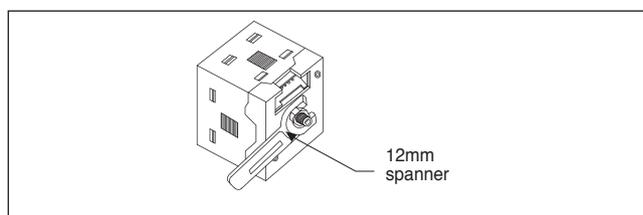
By memorizing the max. and min. values of the pressure input from the system to the pressure sensor, it is possible to determine the abnormal condition of the system which is not easily recognized by the eye or the diagnosis the maximum and minimum pressure function.

● Error display

Error display	Description	Troubleshooting
ER1	When external pressure is input while adjusting zero point	Try again after removing external pressure
ER2	When overload is applied on control output	Remove overload
HHH	When applied pressure exceeds High-limit of display pressure range	Apply pressure within display pressure range
LLL	When applied pressure exceeds Low-limit of display pressure range	

■ Installation (DPSA Series)

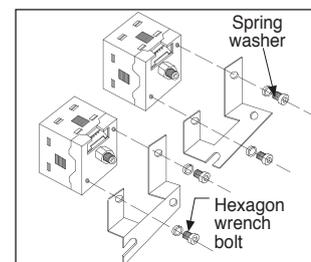
1. Basic spec of pressure port is Rc(PT) 1/8" and option pressure port is NPT1/8". Use general one-touch fitting.
2. Please use seal tape at port plug in order to prevent pressure leak.
3. Please connect it by using spanner(13mm) at the metal part in order not to overload on the body when connecting



⚠ Caution

The tightening torque of one touch fitting should be max.100kgf ·cm. If not, it may cause mechanical problem.

4. PSA Series has 2 kinds of brackets so it is able to install it in two different ways.
5. At first, please unscrew hexagon wrench bolt and assemble the bracket on this unit by fixing the hexagon wrench bolt.

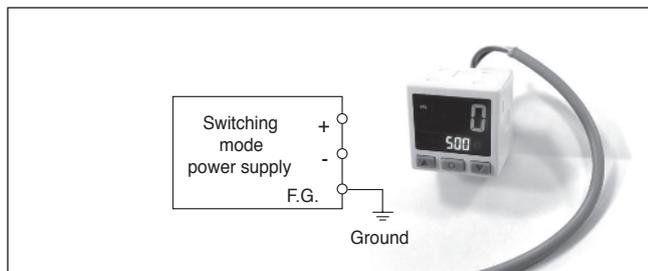


Proper usage

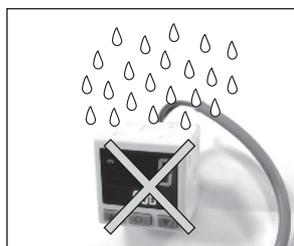
⚠ Caution

DPSA Series is for sensing of non corrosive gas. Do not use this product at corrosive gas or flammable gas, etc.

- Please using this unit within the range of specification, if applying pressure is larger than specification, it may not be working properly due to damage.
- After supplying power, it takes 3 sec. to work.
- When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.



- It may cause malfunction by noise, when wiring with power line or high voltage line.
- Do not insert any sharp or pointed object into pressure port. It may cause mechanical problem due to sensor damage.
- Do not use this unit with flammable gas, because this is not an explosion proof structure.
- Be sure that this unit should not be contacted directly with water, oil, thinner, etc.

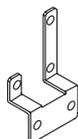


- Wiring must be done with power off.

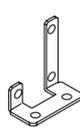
Accessory

• Only for D PSA Series

• Bracket A



• Bracket B



Piping and mounting method

1. Pressure port spec. is PT1/8".
Use commercially available one-touch fittings."
2. To prevent leakage, use seal tape at the screw of plug."
3. When connecting a one-touch fitting, to avoid applying force on the body, use a 12mm spanner at the hex metal part.
4. The DPSA Series comes with two fixing brackets, so you can mount two types depending on the installation.
5. DPSA Series are sold separately with panel mounting bracket and front protective cover.
When mounted on the panel, Please see as shows at the figure.

⚠ Caution

Tightening torque of one-touch fitting should be 10N.m or less. It may cause malfunction.

Caution during use

1. Do not put a point such as a needle into the pressure port. Sensor will be damaged and normal operation will not be done.
2. Please be careful not to let organic solvents such as thinner, water, oil, and come in direct contact.
3. Avoid excessive transient (less than 3 seconds) during power input.
4. When using a switching mode power supply with power line, be sure to ground the frame ground (F.G) terminal of the power line.
5. Please avoid it wiring together with power lines or high-voltage lines may cause malfunctions due to noise.
6. When moving from a cold outdoors to a warm room, please use it the surface moisture is completely dry after.
7. Do not press each setting button with a sharp end of the needle or like.
8. Do not pull the wiring with tensile force of 30N.m or more.
9. This product can be used under the following environmental condition.
 - ① Inside
 - ② Altitude less than 2,000m
 - ③ Pollution Degree 2
 - ④ Category III (Installation Category III)

* The instructions given in the above handling precautions may cause the product to malfunction. Please be sure to observe.