Autonics PSAN Series Display Type Pressure Sensors Instruction Manual

Autonics

Display Type Pressure Sensors
PSAN Series
INSTRUCTION MANUAL
TCD210185AB

Contents

PSAN Series Display Type Pressure Sensors

Thank you for choosing our Autonics product.
Read and understand the instruction manual and manual thoroughly before using the product.
For your safety, read and follow the below safety considerations before using.
For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
Keep this instruction manual in a place where you can find easily.
The specifications, dimensions, etc are subject to change without notice for product improvement Some models may be discontinued without notice.
Follow Autonics website for the latest information.

Safety Considerations

- Observe all 'Safety Considerations' for safe and proper operation to avoid hazards.
- ⚠ symbol indicates caution due to special circumstances in which hazards may occur.

  ⚠Warning Failure to follow instructions may result in serious injury or death

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 personal injury, economic loss or fire.
2. 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 explosion or fire.
3. Install on a device panel or to a pressure port directly to use.
   Failure to follow this instruction may result in fire.
4. Do not connect, repair, or inspect the unit while connected to a power source.
   Failure to follow this instruction may result in fire.
5. Check 'Connections' before wiring.
   Failure to follow this instruction may result in fire.
6. Do not disassemble or modify the unit.
   Failure to follow this instruction may result in fire or electric shock.

⚠ **Caution** Failure to follow instructions may result in injury or product damage

1. Use the unit within the rated specifications.
   Failure to follow this instruction may result in fire or product damage.
2. Use a 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 medium. Do not use for corrosive medium.
   Failure to follow this instruction may result in product damage.
4. Keep the product away from metal chip, dust, and wire residue which flow into the unit.
   Failure to follow this instruction may result in fire or product damage.

Cautions during Use

- Follow instructions in ‘Cautions during Use’. Otherwise, it may cause unexpected accidents.
- 12 – 24 VDC ⎓ power supply should be insulated and limited voltage/current or Class 2, SELV power supply device.
- Use the product, 3 sec after supplying power.
- When using switching mode power supply, frame ground (F.G.) terminal of power supply should be grounded.
- Wire as short as possible and keep away from high voltage lines or power lines, to prevent inductive noise.
- This unit may be used in the following environments.
  – Indoors (in the environment condition rated in ‘Specifications’)
  – Altitude max 2,000 m
  – Pollution degree 3
  – Installation category II

Ordering Information

This is only for reference, the actual product does not support all combinations. For selecting the specified model, follow the Autonics website.

1. Medium / Port fitting position
   No mark: Pneumatic type (gas) / Back
   D: Pneumatic type (gas) / Bottom
   B: Fluid type (liquid, gas) / Back
   L: Fluid type (liquid, gas) / Bottom
2. Pressure type and Range

	Pressure	**Rated range**
01	Static	0.0 to 100.0 kPa
1		0 to 1,000 kPa
V01	Negative	0.0 to -101.3 kPa
C01	Compound	-101.3 to 100.0 kPa

3. Wiring
   No mark: Cable type (fluid type)
   C: Connector type

4. Control output
   No mark: NPN open collector output
   P: PNP open collector output
5. Option input / output
   V: Voltage output
   A: Current output
   H: External input
6. Pressure port

Medium Port	**Pneumatic**	**Fluid**
R1/8	○	○
Rc1/8	○	–
NPT1/8	○	○
7/16-20UNF	–	○
9/16-18UNF	–	○

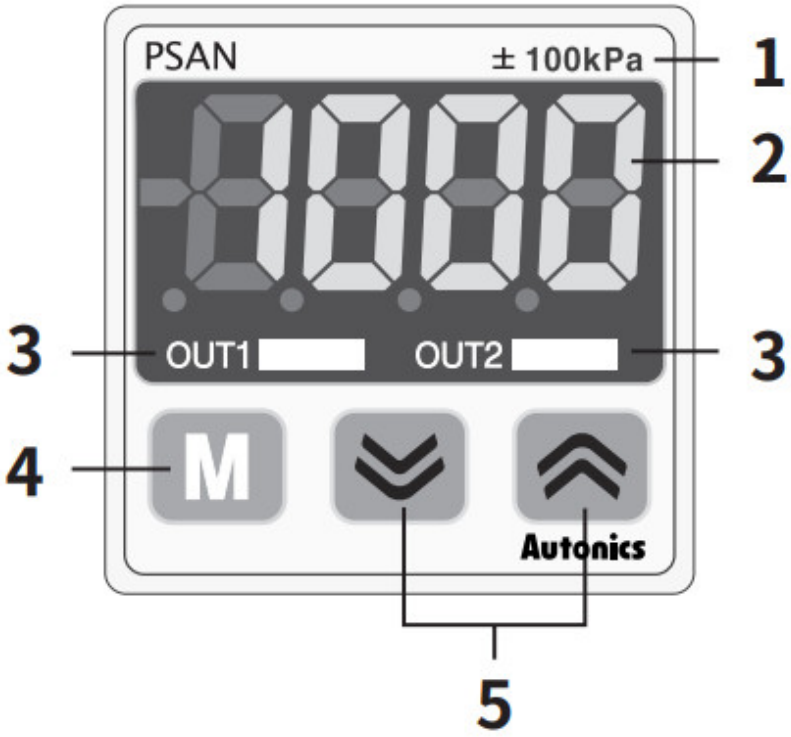
Product Components

- Product
- Instruction manual
- Unit sticker
- Connector type: Bracket A / B, Connector wiring (PSO-C01)
- Cable type: Bracket C

Sold Separately

- Front cover (PSO-P01), Panel bracket (PSO-B02/B03)
- Pneumatic type: M5 gender (PSO-Z01)

Unit Descriptions

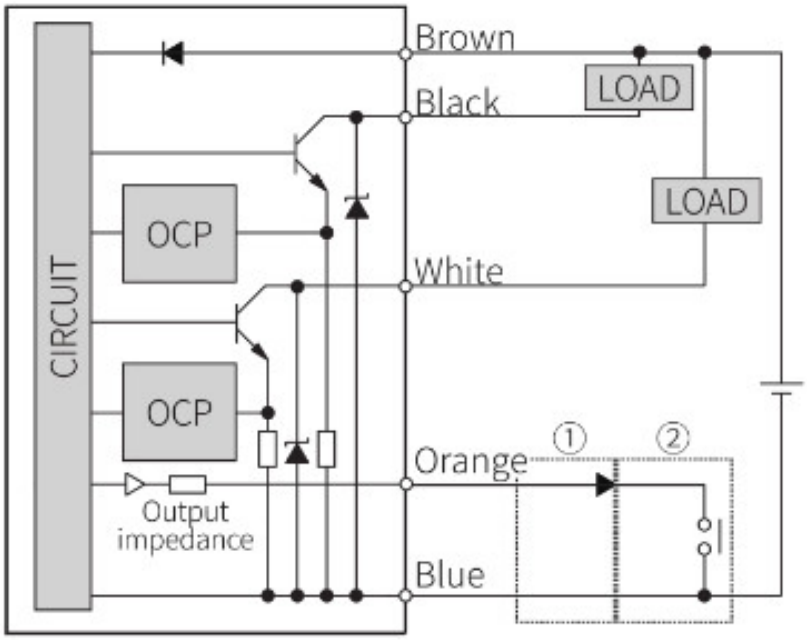


1. Pressure range (sticker)
2. Display part (red)
   Run mode: Displays PV (present value), SV (setting value)
   Setting mode: Displays parameter and setting value
3. Output indicator (OUT1: red , OUT2: green)
   Turns ON when the corresponding control output is ON.
4. [M] key
   Enters parameter group, selects item and returns run mode.
5. [▼] , [▲] key
   Sets preset of output operation mode, runs the mode or changes parameter.

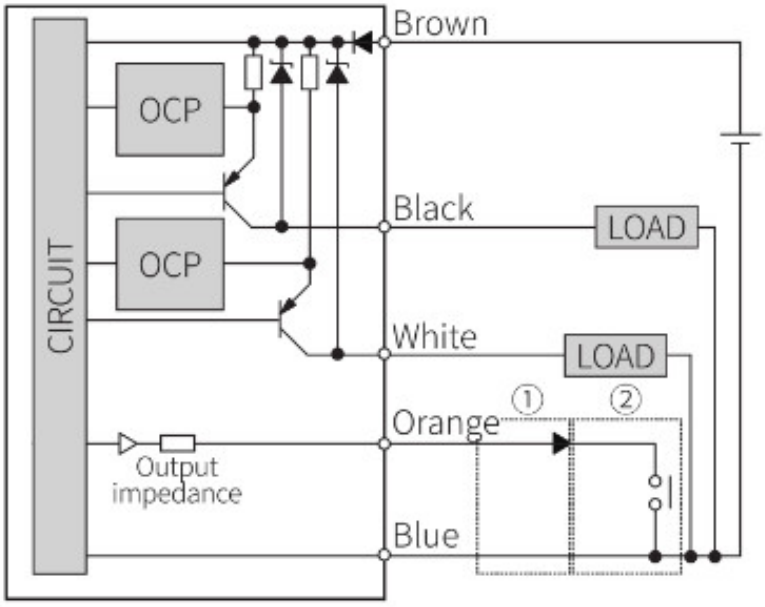
Connections

Color	Function
Brown	+V
Blue	0 V
Black	OUT 1
White	OUT 2
Orange	Option input / output

NPN open collector output



PNP open collector output

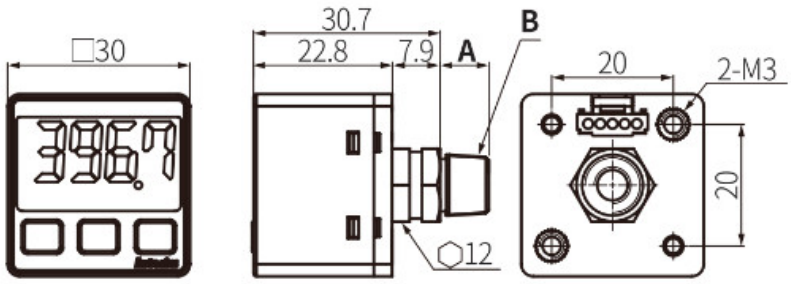


- ①: Option voltage / current output model, ②: Option external input model
- OCP (over current protection circuit)
- There is no short circuit protection circuit. Do not connect directly to power or capacitive loads.
- The control output is abnormal when the control output circuit is shorted or over current is supplied.
- Pay attention to the input impedance of the connected device when using analog voltage output. Be sure to the voltage drop due to the resistance of the wiring when extending the wiring.

Dimensions

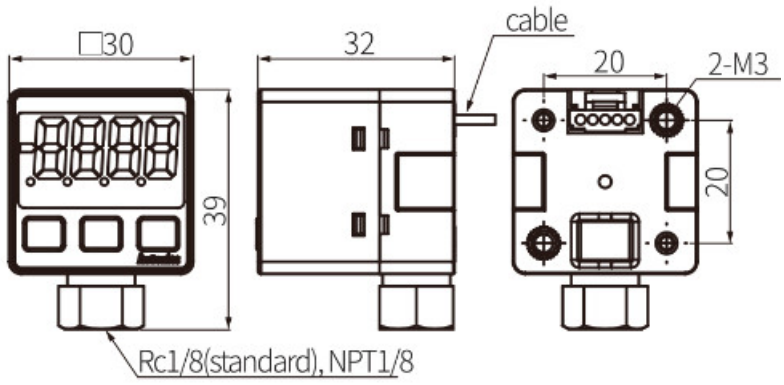
- Unit: mm, For the detailed drawings, follow the Autonics website.

Pneumatic type, back port, connector type

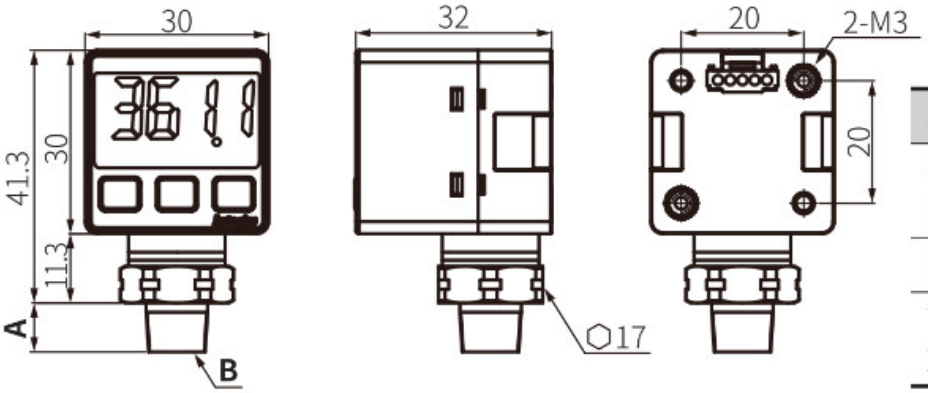


Port	A	B
Rc1/8 (standard)	0	-
NPT1/8	0	Inner M5 tap
R1/8	8	

Pneumatic type, bottom port, connector type

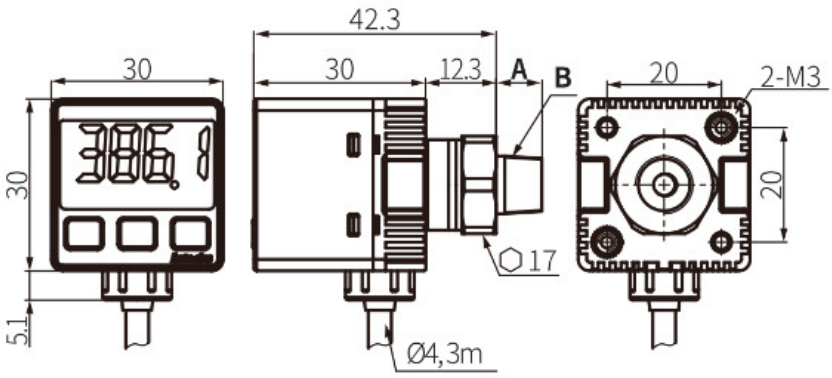


Fluid type, bottom port, connector type



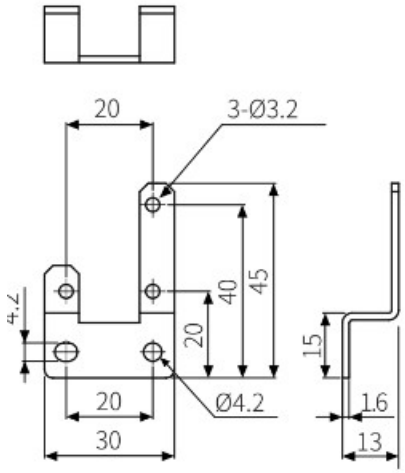
Port	A	B
R1/8 (standard)	8	Inner M5 tap
NPT1/8		
7/16-20UNF	11	-

Fluid type, back port, cable type

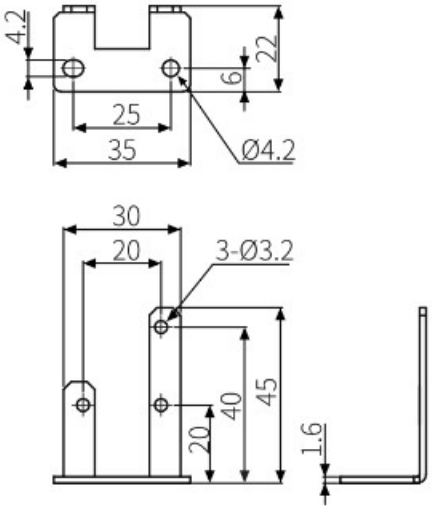


Port	A	B
R1/8 (standard)	8	Inner M5 tap
9/16-18UNF	15.4	-

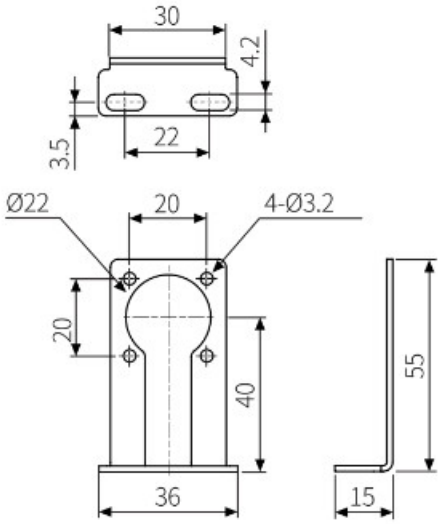
■ Bracket A



■ Bracket B

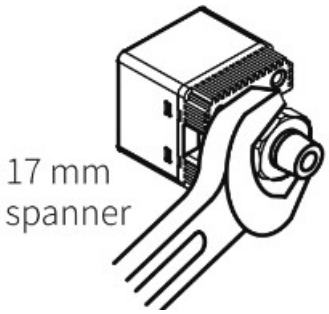


■ Bracket C



Installation

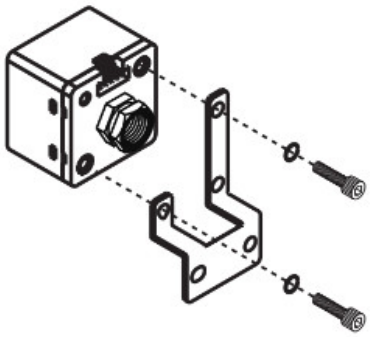
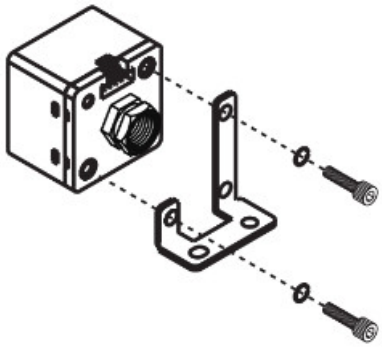
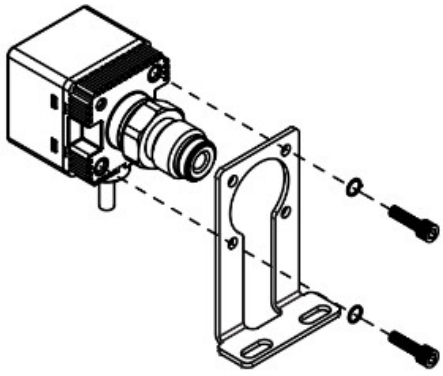
One-touch fitting

Pneumatic type	Fluid type
	

Connect the metal part with a spanner so that no large force is applied to the unit body. (tightening torque: ≤ 10 N m, it may cause malfunction.)

Bracket

Use spring washers and hexagon wrench bolts (tightening torque: ≤ 3 N m) to select and install a bracket suitable for your environment.

Connector type		Cable type
• Bracket A 	• Bracket B 	• Bracket C 

Wiring

- Do not pull the wiring with a force of more than 30 N.

Specifications

Model	**PSAN- □V01C□□-□**	**PSAN- □01C□□-□**	**PSAN-□1□□□-□**	**PSAN- □C01□□□-□**
Pressure Type	Pneumatic type model: Gauge pressure Fluid type model: Gauge pressure [01] or sealed gauge pressure [02]			
Pressure	Negative	Static		Compound
Min display unit	0.1 kPa	0.1 kPa	1 kPa	0.1 kPa
Rated pressure range	0.0 to -101.3 kPa	0.0 to 100.0 kPa	0 to 1,000 kPa	-101.3 to 100.0 kPa
Display & setting pressure range	5.0 to -101.3 kPa	-5.0 to 110.0 kPa	-101.3 to 1,100 kPa	-101.3 to 110.0 kPa
Display type	7 Segment LED, 4 ½ digit			
Display accuracy	-10 to 0 ℃: ≤ ±1% F.S., 0 to 50 ℃: ≤ ±0.5% F.S.			
Max. pressure	Rated pressure × 2	Rated pressure ×2	• Pneumatic type: Rated pressure ×1.5 • Fluid type: Rated pressure ×2	Rated pressure ×2

1. Only for static pressure, rated pressure range 100.0 kPa model
2. The unit is sealed structure. It is based on atmospheric pressure 101.3 kPa.

Applicable medium	**Pneumatic type (air, non-corrosive gas)**	**Fluid type (non-corrosive gas and fluid that do not corrode stainless steel 316L)**
Connection type	Connector type	Cable type / connector type
Cable	Ø 4 mm, 5-core, 2 m	Connector type: Ø 4 mm, 5-core, 2 m Cable type: Ø 4 mm, 5-core, 3 m
Wire spec.	AWG24 (0.08 mm, 40-core), insulator diameter: Ø 1 mm	
Material	Front case: PC Back case: (back port) PC / (bottom port) PBT+GF15% Pressure port: Brass-nickel plated	Front case: PC Back case: PA6 Pressure port: SUS304/SUS316L
Protection structure	Connector type: IP40 (IEC standard)	Connector type: IP40 (IEC standard) Cable type: IP65 (IEC standard)
Approval	CE EAC	
Unit weight (packaged)	Back port: ≈ 80 g (≈ 165 g) Bottom port: ≈ 85 g (≈ 170 g)	Connector type: ≈ 88 g (≈ 173 g) Cable type: ≈ 90 g (≈ 167 g)

Power supply	12 – 24 VDC ⎓ (ripple P-P: ≤ 10%)
Allowable voltage range	90 to 110% of rated voltage
Current consumption	≤ 50 mA 01)
Control output	NPN open collector output / PNP open collector output model
Load voltage	≤ 30 VDC ⎓
Load current	≤ 100 mA
Residual voltage	NPN: ≤ 1 VDC ⎓ , PNP: ≤ 2 VDC ⎓

Hysteresis	According to output operation mode [02)]
Repeat error	±0.2% F.S. ±min display interval
Response time	2.5, 5, 100, 500, 1000 ms
Protection circuit	Output short over-current protection circuit
Insulation resistance	≥ 50 MΩ (500 VDC ⎓ megger)
Dielectric strength	1,000 VAC ⎓ 50 / 60 Hz for 1 min
Vibration	1.5 mm amplitude at frequency of 10 to 55Hz (for 1 min) in each X, Y, Z direction for 2 hours
Ambient temperature	-10 to 50 ℃, Storage: -20 to 60 ℃ (no freezing or condensation)
Ambient humidity	30 to 80%RH, Storage: 30 to 80%RH (no freezing or condensation)

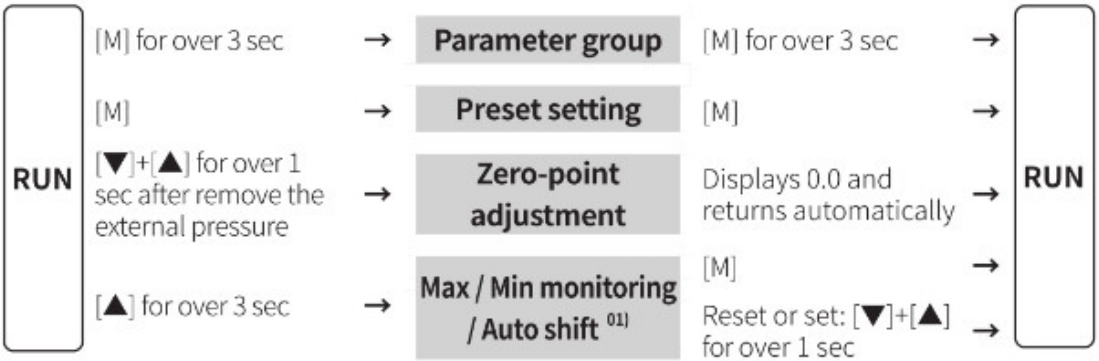
1. Current output: ≤ 75 mA
2. Refer to ‘Output operation mode’. ±1digit error may occur due to pressure unit operation.

Analog output	**Voltage (1 – 5 VDC ±2% F.S)**	**Current (DC 4 – 20mA ±2% F.S)**
Output impedance	1 kΩ	–
Linearity	≤ ±1% F.S	≤ ±1% F.S
Zero-point	≤ 1 VDC ⎓ ±2% F.S.	≤ DC 4 mA ±2% F.S.
Span	≤ 4 VDC ⎓ ±2% F.S.	≤ DC 16 mA ±2% F.S.
Resolution	1/1000 or 1/2000 (different by pressure type and display unit)	
Response time	50 ms	70 ms

Minimum Display Interval

Pressure	Negative		Static				Compound	
Min display interval	0.1 kPa		0.1 kPa		1 kPa		0.1 kPa	
Resolution Display unit	1/1000	1/2000	1/1000	1/2000	1/1000	1/2000	1/1000	1/2000
MPa	–	–	0.001	–	0.001	–	–	–
kPa	0.1	–	0.1	–	1	–	–	0.1
kgf/cm^2	0.001	–	0.001	–	0.01	–	–	0.001
bar	0.001	–	0.001	–	0.01	–	–	0.001
psi	–	0.01	–	0.01	–	0.1	–	0.02
mmHg	–	0.4					–	0.8
inHg	–	0.02					–	0.03
01) mmH_2O	0.1	–					–	0.1

Mode Setting



1. Max. / Min. pressure value is available to check by monitoring.

[Option external input model] Auto shift judgment level checking / setting is available when P-9 External input terminal is set as SHFT. (no input displays 0)

Parameter Setting

- Some parameter are activated / deactivated depending on other parameters. Refer to the description.
- The setting item name and setting value are cross-displayed on the display part.
- It returns to RUN mode when there is no additional key input for 60 sec in each parameter group.
- Guaranteed write life: 100,000 times
- [M] key: Saves setting value and moves to next parameter [▼], [▲] key: Selects setting value

<table>
<tr><th colspan="2">Parameter</th><th>Display</th><th>Default</th><th colspan="4">Setting range</th></tr>
<tr><td rowspan="2">P-1</td><td rowspan="2">Display unit</td><td rowspan="2">Unit</td><td>kPA</td><td colspan="4">[Negative / Compound pressure model]
kPa, KGC: kgf/cm^2, bar, psi, mmHg, inHg, H2O: mmH O2</td></tr>
<tr><td>nPA</td><td colspan="4">[Static pressure model]
MPa, kPa, KGC: kgf/cm^2, bar, psi</td></tr>
<tr><td>P-2</td><td>OUT operation mode</td><td>out.n</td><td>oFF</td><td colspan="4">HYS.M: Hysteresis
WIN: Window comparison output
HY-W: Hysteresis-Window comparison output AUTO: Aut o sensitivity setting
F.OUT: Forced output control</td></tr>
<tr><td rowspan="5">P-3</td><td rowspan="5">Output type</td><td rowspan="5">no.nC</td><td rowspan="5">1o2o</td><td></td><td>OUT1</td><td>OUT2</td><td rowspan="4"></td></tr>
<tr><td>1O2O</td><td>Normally open</td><td>Normally open</td></tr>
<tr><td>1O2C</td><td>Normally close d</td><td>Normally open</td></tr>
<tr><td>1C2O</td><td>Normally close d</td><td>Normally open</td></tr>
<tr><td>1C2C</td><td>Normally close d</td><td colspan="2">Normally closed</td></tr>
</table>

P-4	Response time	SPd	2.5	2.5, 5.0, 100, 500, 1,000 ms
P-5	Voltage low limit scale	A-1u	0.0	[Option voltage output model] Min. rated pressure ≤ Low limit scale ≤ 90% of rated pressure
P-6	Voltage high limit scale	A-Su	100.0	[Option voltage output model] Low limit scale setting value + 10% of rated pressure ≤ High limit scale ≤ Max. rated pressure
P-7	Current low limit scale	A-04	0.0	[Option current output model] Min. rated pressure ≤ Low limit scale ≤ 90% of rated pressure
P-8	Current high limit scale	A-20	100.0	[Option current output model] Low limit scale setting value +10% of rated pressure ≤ High limit scale ≤ Max. rated pressure
P-9	External input terminal	d-In	HoLd	[Option external input model] HOLD: Hold SHFT: Auto shift
P-10	Auto shift output [01)]	SH.ot	oUt1	[Option external input model] OUT1, OUT2, ALL
P-11	Lock	LoCK	LoC1	LOC1: Parameter, preset, zero-point adjustment setting lock / Monitoring value reset lock LOC2: Parameter lock (available to check setting value) OFF

1. Condition: P-9. External input terminal SHFT setting

Preset Setting

Setting method

- Setting name and value are cross-displayed in SV display part.
  1. Set the operation mode in P-2 OUT operation mode.
  2. Enter the preset setting mode by pressing [M] key from RUN mode.
  3. Select the setting item by [M] key and change the preset by [▼] or [▲] key.
  4. Press [M] key to save setting or no key input over 60 sec not to save setting and return to RUN mode.

(except forced output control mode)

Preset setting by operation mode

Operation mode		**Preset**		**Setting range**
Hysteresis	HYS.n	Pressure detection level 1	St 1	Min. display pressure ST1 ≤ Max. display pressure
		Hysteresis level 1	HYS 1	Min. display pressure ≤ HYS1 ST1
		Pressure detection level 2	St2	Min. display pressure ST2 ≤ Max. display pressure
		Hysteresis level 2	HYS2	Min. display pressure ≤ HYS2 ST2
Window comparison output [01)]	out n	Pressure detection low limit 1	Lo-1	Min. display pressure ≤ LO-1 ≤ Max. display pressure -(3 × Min display interval)
		Pressure detection high limit 1	HI-1	LO-1 + (3 × Min display interval) ≤ HI-1 ≤ Max. display pressure
		Pressure detection low limit 2	Lo-2	Min. display pressure ≤ LO-2 ≤ Max. display pressure – (3 × Min display interval)
		Pressure detection high limit 2	HI-2	LO-2 + (3 × Min display interval) ≤ HI-2 ≤ Max. display pressure

Hysteresis- Window comparison output [02]	HY-Y	Pressure detection level 1	St 1	Min. display pressure ST1 ≤ Max. display pressure
		Hysteresis level 1	HYS 1	Min. display pressure ≤ HYS1 ST1
		Pressure detection low limit	LoY	Min. display pressure ≤ LOW ≤ Max. display pressure – (3 × Min display interval)
		Pressure detection high limit	HIGH	Low + (3 × Min display interval) ≤ HIGH ≤ Max. display pressure
Auto sensitivity setting	AUto	Pressure level 1	St 1	Min. display pressure ≤ ST1 ≤ Max. display pressure – 1% of rated pressure
		Pressure level 2 [03]	St2	ST1 + 1% of rated pressure ≤ ST2 ≤ Max. display pressure
		Pressure detection level	SEt	Auto setting SET= $\frac{(ST1+ST2)}{2}$ • Manual setting is possible by [▼] or [▲] key.
Forced output control [04]	F.oUt	–	–	• Manual ON/OFF for OUT1/2 is possible by [▼] or [▲] key.

1. Hysteresis: 1 (min display interval, fixed)
2. ST1 = HYS1, actual hysteresis is 1 (min. display interval)
3. When error appears, check setting conditions and set proper setting values.
4. [Option external input model] Forced output does not support external input terminal.

■ Precaution

- The preset value (default) of the changed operation mode is set when changing P-2 OUT operation mode setting.
- Preset value is converted as the changed unit automatically when changing P-1 Display unit setting.
- Preset is reset when changing P-9 External input terminal setting.

■ Default setting value

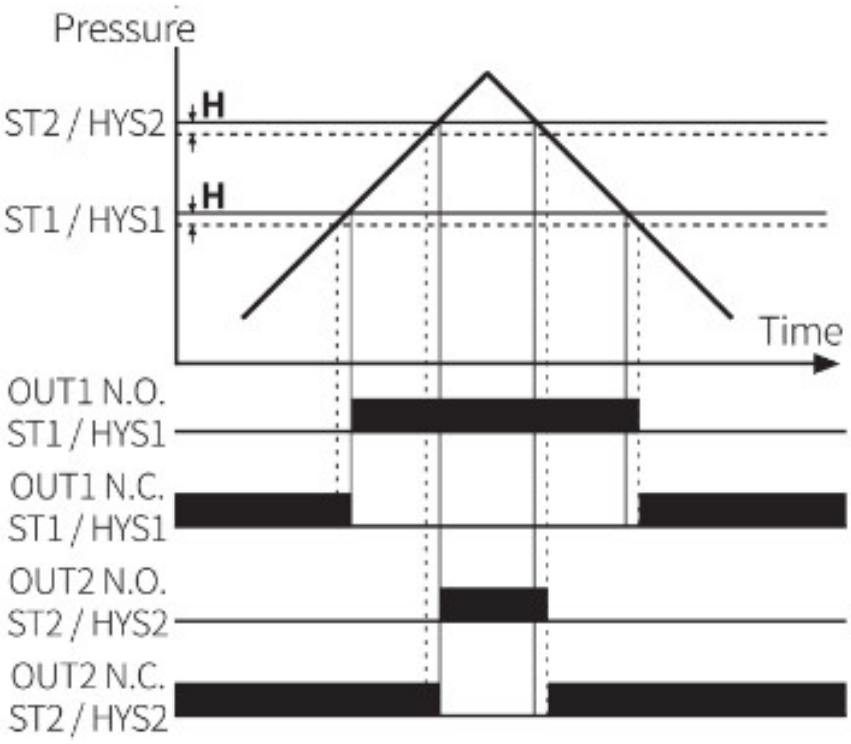
Operation mode		Preset	Negative	Static		Compound
			0.1 kPa	0.1 kPa	1 kPa	0.1 kPa
Hysteresis	HYS.n	St 1	-50.0	50.0	500	50.0
		HYS 1	0.0	0.0	0	-50.0
		St2	-50.0	50.0	500	50.0
		HYS2	0.0	0.0	0	-50.0
Window comparison output	oUt n	Lo- 1	0.0	0.0	0	-50.0
		HI - 1	-50.0	50.0	500	50.0
		Lo-2	0.0	0.0	0	-50.0
		HI -2	-50.0	50.0	500	50.0
Hysteresis- Window comparison output	HY-o	St 1	-50.0	50.0	500	50.0
		HYS 1	0.0	0.0	0	-50.0
		Lo_	0.0	0.0	500	-50.0
		HIGH	-50.0	50.0	0	50.0
Auto sensitivity setting	AUto	St 1	0.0	0.0	0	-50.0
		St2	-50.0	50.0	500	50.0
		SEt	-25.0	25.0	250	0.0
Forced output control	F.oUt	–				

Output Operation Mode

Change the output operation mode to change pressure detection method.

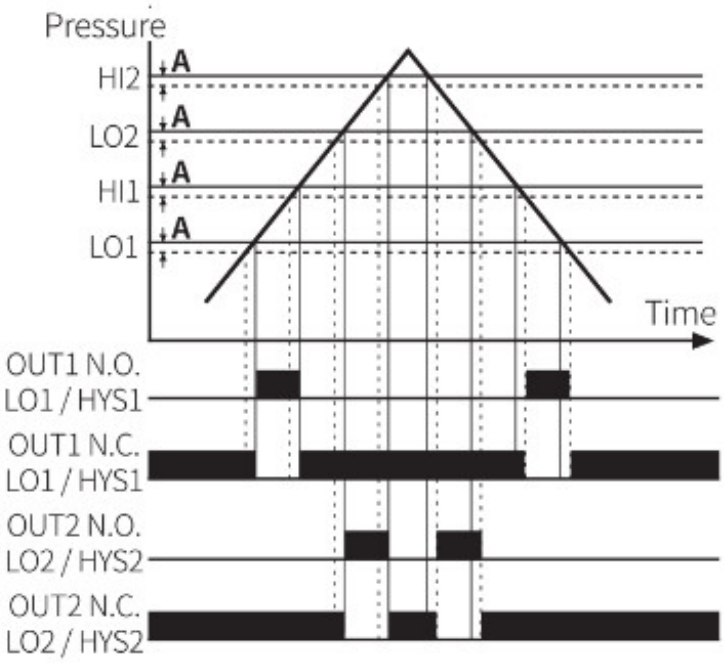
■ Hysteresis

- Set the hysteresis for pressure detection directly.
- Setting: Pressure detection level (ST1, ST2), Hysteresis (HYS1, HYS2)



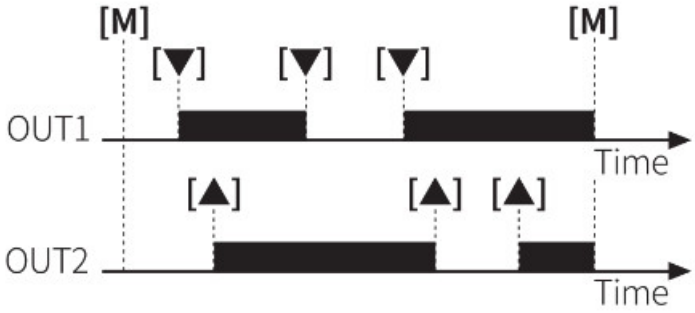
Hysteresis – Window comparison output

- It is available both hysteresis mode and window comparison output mode operations.
- Setting: Pressure detection level (ST1), Hysteresis (HYS1), High limit (HIGH), Low limit (LOW)



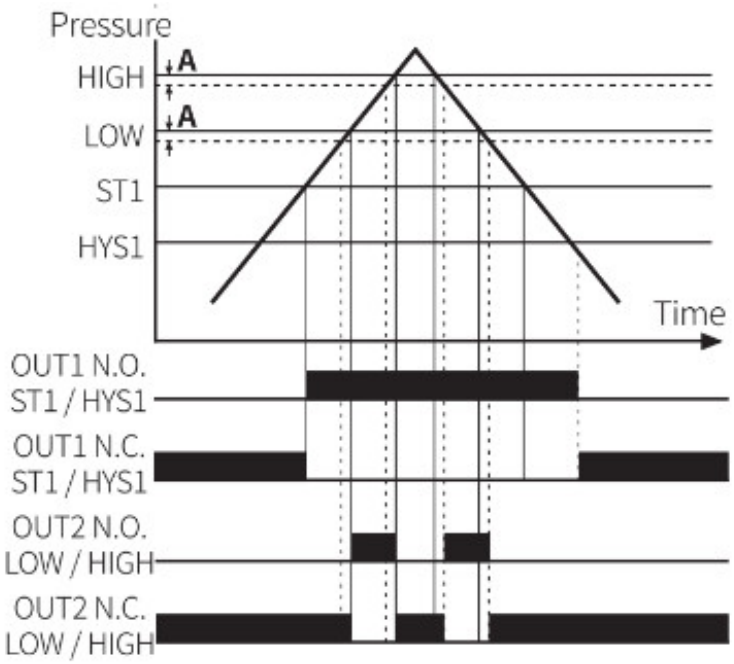
Forced output control

- It displays the present pressure with forcibly holding comparing output OFF regardless of setting value.
- Manual ON/OFF for OUT1/2 is possible by [M], [▼] or [▲] key during forced output control operation.



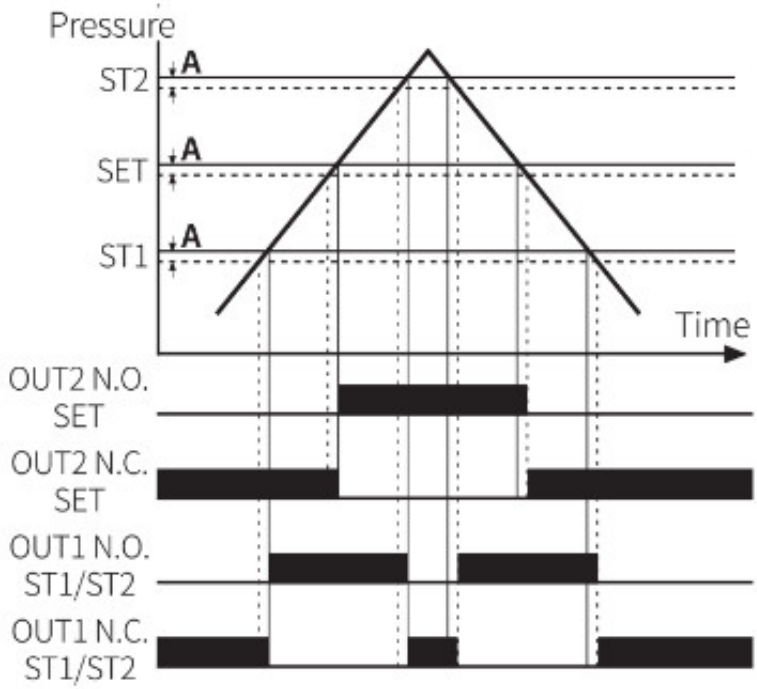
Window comparison output

- It detects pressure at the desired range.
- Hysteresis is fixed as min. display interval.
- Setting: High limit (HI1, HI2), Low limit (LO1, LO2)



Auto sensitivity setting

- This function is to set the proper position (SET) automatically by applied pressure from two positions (ST1, ST2). SET= $\frac{(ST1+ST2)}{2}$
- Hysteresis is fixed as min. display interval.



Auto shift Preset Setting

Setting method [Parameter setting]

1. Select P-9 External input terminal: SHFT.
2. Press the [▲] key for over 3 sec. in RUN mode to enter Max / Min monitoring / Auto shift menu.

3. Press the [M] key to entering Auto shift setting and press the [▼] or [▲] key to change preset.
4. When reset the set correction value, press the [▼] + [▲] keys for over 1 sec .

[External input setting]

1. At the desired preset value pressure, maintain low level for over 1 ms of Auto shift input (orange).
2. The pressure at this time is measured and applied after 7.5 ms and is stored in the auto shift correction value.

Operation mode		**Preset**		**Default**	**Selling range**		
Auto- shift	SHFt	Auto-shift correction	SHJ N	0	Min. preset	setting< SH.IN <	Max. preset setting
					Pressure	Setting range (after correction)	Setting range (preset range)
					Negavive	-101.3 to 5.0 kPa	-101.3 to 101.3 kPa
					Static	-5.0 to 110.0 kPa	-110.0 to 110.0 kPa
						-50.0 to 1100 kPa	-1100 to 1100 kPa
					Compound	-101.3 to 110.0 kPa	-101.3 to 110.0 kPa

Precaution

- Auto shift correction is reset as 0 when changing P-2 OUT operation mode and preset value.
- Preset setting range is wider than the rated pressure with the source pressure fluctuations.
- In case of forced output control mode or PV HHHH/LLLL, Auto shift function does not operate.

Error

Display	Cause	Troubleshooting
Err 1	When external pressure is input while adjusting zero point.	Try again after removing external pressure.
Err2	When overload is applied on control output	Remove overload.
Err3	When ‘ST1’, ‘ST2’ setting range is not met in auto s ensitivity setting mode.	Check setting conditions and set proper settin g values.
HHHH	When applied pressure exceeds high-limit of display pressure range.	Apply pressure within display pressure range.
LLLL	When applied pressure exceeds low-limit of display pressure range.	
-HH-	Auto shift correction error.	Set the corrected setting value within setting pressure range.
-LL-		
-HL-		

18, Bansong-ro 513Beon-gil, Haeundae-gu, Busan, Republic of Korea, 48002
www.autonics.com
+82-2-2048-1577
sales@autonics.com

Documents / Resources

	Autonics PSAN Series Display Type Pressure Sensors [pdf] Instruction Manual PSAN Series Display Type Pressure Sensors, PSAN Series, Display Type Pressure Sensors, P ressure Sensors, Sensors

References

- autonics.com