РусАвтоматизация®

Autonics

TCD210187AD

Display Type Pressure Sensors

PSB Series

PRODUCT MANUAL

For your safety, read and follow the considerations written in the instruction manual, other manuals and Autonics website.
The specifications, dimensions, etc. are subject to change without notice for product improvement. Some models may be discontinued without notice.

Features

- High accuracy digital pressure sensor
- Bright red LED display (character height : 9.5 mm)
- High display resolution
  : negative pressure 0.1 kPa / standard pressure 0.1 kPa, 1 kPa /
  compound pressure 0.2 kPa
- Unit conversion function
  - negative, compound pressure: kPa, kgf/cm^2, bar, psi, mmHg, mmH_2O, inHg
  - standard pressure: kPa, kgf/cm^2, bar, psi
- Various output modes: hysteresis mode, automatic sensitivity adjustment mode, independent 2-point output mode, window comparison output mode
- Chattering prevention function (response time: 2.5 ms, 5 ms, 100 ms, 500 ms)
- Analog output (1 - 5 VDC⎓) scale function
- Zero-point adjustment function
- Peak value and low value hold function
- Built-in reverse polarity protection circuit, overcurrent protection circuit

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.

01. 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.

02. 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.

03. Install on a device panel or to a pressure port directly to use.
Failure to follow this instruction may result in fire.

04. Do not connect, repair, or inspect the unit while connected to a power source.
Failure to follow this instruction may result in fire.

05. Check 'Connections' before wiring.
Failure to follow this instruction may result in fire.

06. 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.

01. Use the unit within the rated specifications.
Failure to follow this instruction may result in fire or product damage.

02. 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.

03. 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.

04. 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.
- 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 2
  - Installation Category III

CE UKCA EAC

Ordering Information

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

P S B - ❶ ❷ ❸ - ❹

❶ 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	-100.0 to 100.0 kPa

❷ Connection
No mark: Cable type
C: Connector type

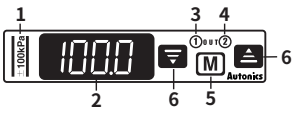
❸ Control output
No mark: NPN open collector output
P: PNP open collector output

❹ Pressure port
M5: M5 standard type

Product Components

- Product
- Unit sticker
- Instruction manual
- Connector type: Connector wiring

Unit Descriptions

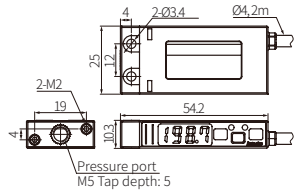


1. Pressure range (sticker)
2. Display part (red)
Run mode: Displays PV (present value), SV (setting value)
Setting mode: Displays parameter and setting value
3. Output 1 indicator (red)
Turns ON when the control output 1 is ON.
4. Output 2 indicator (green)
Turns ON when the control output 2 is ON.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

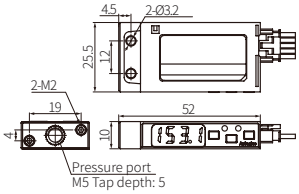
Dimensions

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

■ Cable type



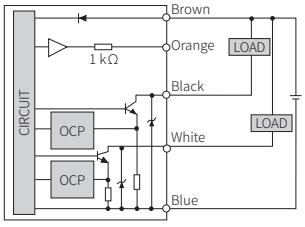
■ Connector type



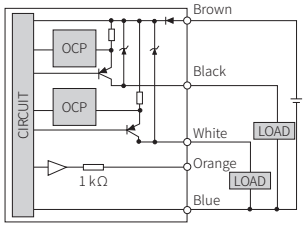
Connections

Color	Function
Brown	+V
Blue	0 V
Black	OUT 1
White	OUT 2
Orange	Analog voltage output

■ NPN open collector output



■ PNP open collector output



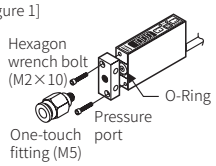
- OCP (over current protection)
- There is no short circuit protection circuit. Do not connect directly to power or capacitive loads.
- The control output is abnormal when the control output circuit is shorted or over current is supplied.
- Pay attention to the input impedance of the connected device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

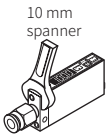
Installation

■ One-touch fitting

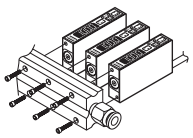
- [Figure 1] Connect the metal part with a spanner so that no large force is applied to the unit body. (one-touch fitting tightening torque: ≤ 5 N m, hexagon wrench tightening torque: ≤ 2 N m, it may cause malfunction.)
  Do not use the spanner at the unit body. It may cause damage.
- [Figure 2] Depending on the usage environment, the pressure port can be removed. At this time, do not remove the O-Ring between the pressure port and the body. Pressure may leak.

[Figure 1]





[Figure 2]



■ Wiring

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

Specifications

Model	PSB-V01□□-□	PSB-01□□-□	PSB-1□□-□	PSB-C01□□-□
Pressure type	Gauge pressure			
Applicable medium	Air, Non-corrosive gas			
Pressure	Negative	Static		Compound
Min display interval	1-digit 01)	1-digit 01)		2-digit
Rated pressure range	0.0 to -101.3 kPa	0.0 to 100.0 kPa	0 to 1,000 kPa	-100.0 to 100.0 kPa
Display & setting pressure range	5.0 to -101.3 kPa	-5.0 to 110.0 kPa	-50 to 1,100 kPa	-101.2 to 110.0 kPa
Display type	7 segment LED, 3 ½ digit			
Display accuracy	-10 to 0 °C: ≤ ±2% F.S., 0 to 50 °C: ≤ ±1% F.S.			
Max. pressure	Rated pressure ×2	Rated pressure ×2	Rated pressure ×1.5	Rated pressure ×2

01) psi unit: 2-digit

Connection type	Cable type / Connector type model
Cable	• Cable type: Ø 4 mm, 5-core, 2 m • Connector type: 5-core, 3 m
Wire spec.	AWG 24 (0.08 mm, 40-core), insulator diameter: Ø 1 mm
Material	Case, Pressure port, Cover: IXEF
Guaranteed parameter write life	100,000 times
Protection structure	IP40 (IEC standard)
Certification 01)	CE UK CA EAC
Unit weight (packaged)	≈ 70 g (≈ 160 g)

01) Certification attainment may vary depending on the model. Check the certification on the Autonics website.

Power supply	12 - 24 VDC⎓ ±10% (ripple P-P: ≤ 10%)
Current consumption	≤ 50 mA
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	Negative / Static: 1-digit (psi unit: 2-digit) Compound: 2-digit 01)
Repeat error	Negative / Static: ±0.2% F.S. ±1digit Compound: ±0.2% F.S.±2digits
Response time	2.5, 5, 100, 500 ms
Protection circuit	Output short over-current protection circuit
Vibration	1.5 mm amplitude at frequency of 10 to 55 Hz in each X, Y, Z direction for 2 hours
Ambient temperature	-10 to 50 °C, storage: -20 to 60 °C (no freezing or condensation)
Ambient humidity	35 to 85%RH, storage: 35 to 85%RH (no freezing or condensation)

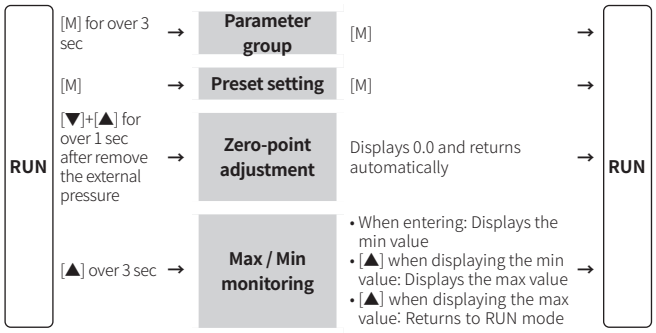
01) Due to the pressure unit operation, ± 1digit errors may occur in the hysteresis.

Analog output	Voltage (1 - 5 VDC⎓ ±2% F.S)
Output impedance	1 kΩ
Linearity	≤ ±2% F.S
Zero-point	≤ 1 VDC⎓ ±2% F.S.
Span	≤ 4 VDC⎓ ±2% F.S.
Resolution	1/200

Error

Display	Cause	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.
Er3	When 'ST1', 'ST2' setting range is not met in auto sensitivity setting mode.	Check setting conditions and set proper setting values.
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.	

Mode Setting



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

Parameter		Display	Default	Setting range
P-1	Display unit	Unt	PA	[Negative / Compound model] Pa: kPa, KGF: kgf/cm^2, bar, psi, mmH: mmHg, inH: inHg, H2O: mmH$_2$O 01)
				[Static pressure model] Pa: kPa, KGF: kgf/cm^2, bar, psi
P-2	OUT operation mode	oUt	F-1	F-1: Hysteresis F-2: Auto sensitivity setting F-3: Independent 2 output F-4: Independent 2 output (reverse) F-5: Independent 2 output (cross) F-6: Window comparison output
P-3	Response time	SPd	2.5	2.5, 5.0, 100, 500 ms
P-4	Voltage low limit Scale	A-1	0.0	Min. rated pressure ≤ Low limit Scale ≤ 90% of rated pressure
P-5	Voltage high limit Scale	A-5	100.0	Low limit scale setting value + 10% of rated pressure ≤ High limit Scale ≤ Max. rated pressure
P-6	Lock	KEY	Loc	LOC: Preset/ Parameter setting lock PA.L: Preset / Parameter / Zero-point adjustment lock UNL: Unlock

01) Multiply displayed value by 100

Preset setting

■ Setting method

- The setting item name and setting value are cross-displayed on the 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 F-2: Auto sensitivity setting mode)

■ Preset setting by operation mode

Operation mode		Preset		Setting range
Hysteresis	F-1	Pressure detection level 1	St1	Min. display pressure < ST1 ≤ Max. display pressure
		Hysteresis level	St2	Min. display pressure < ST2 ≤ ST1
Auto sensitivity setting 01)	F-2	Pressure level 1	St1	Min. display pressure < ST1 ≤ Max. display pressure-1% of rated pressure
		Pressure level 2	St2	ST1+1% of rated pressure ≤ ST2 ≤ Max. display pressure
		Pressure detection level	SEt	Auto setting SET= (ST1+ST2)/2 • Manual setting is possible by [▼] or [▲] key.
Individual 2 output 01)	F-3 F-4 F-5	Pressure detection level 1	St1	Min. display pressure < ST1 ≤ Max. display pressure
		Pressure detection level 2	St2	Min. display pressure < ST2 ≤ Max. display pressure
Window comparison output 01)	F-6	Pressure detection low limit	Lo	Min. display pressure ≤ LO ≤ Max. display pressure
		Pressure detection high limit	HI	LO ≤ HI ≤ Max. display pressure

01) Hysteresis
Negative/Static: 1-digit (fixed) (psi Unit: 2-digit (fixed)), Compound: 2-digit (fixed)

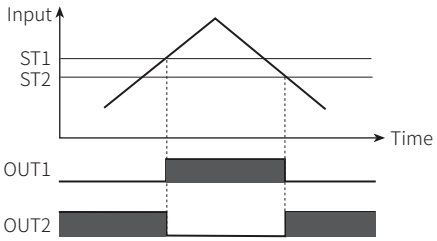
Output Operation Mode

Change the output operation mode to change pressure detection method.

ON: ■■■■ OFF: ____

■ Hysteresis

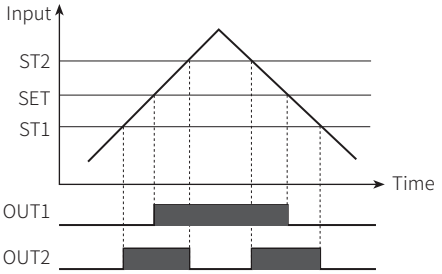
- Set the hysteresis for pressure detection directly.
- Setting: Pressure detection level (ST1), Hysteresis level (ST2)



■ Auto sensitivity setting

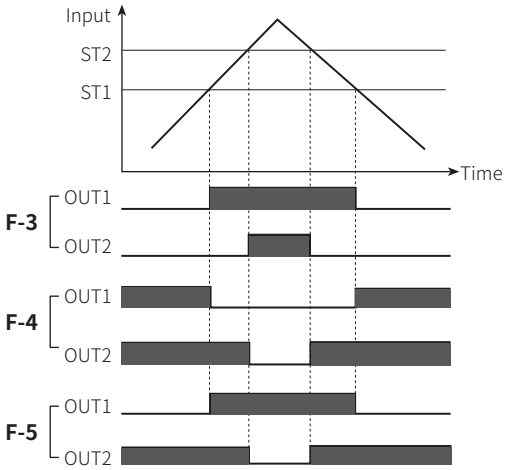
- This function is to set the proper position (SET) automatically by applied pressure from two positions (ST1, ST2).

SET= (ST1+ST2)/2



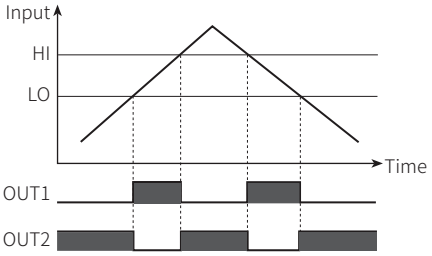
■ Individual 2 output

- ST1 and ST2 can be set independently within display pressure range. One is for control, the other is for alarm or optional control.



■ Window comparison output

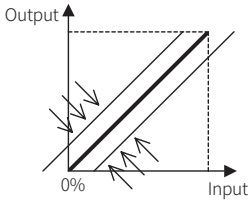
- It detects pressure at the desired range.



Zero-point Adjustment

With the pressure port open, the current pressure value on display is set to zero forcibly by removing deviations from opening the pressure port. Zero-point adjustment affects analog output.

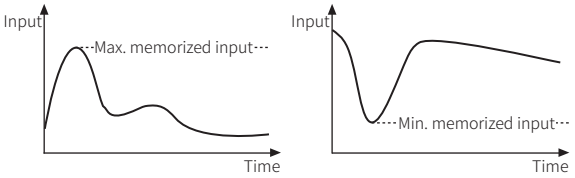
- For precise measurement, execute zero-point adjustment periodically.



Maximum / Minimum Value Monitoring

In order to identify abnormal conditions of the system that are not easily identified or to diagnose the max. / min. input that has occurred, save the value and notify it.

- When the memorized max. / min. pressure is higher / lower than the rated pressure, it displays 'HHHH' / 'LLLL'.



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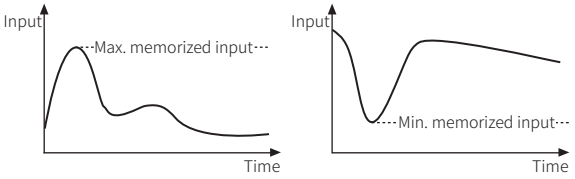
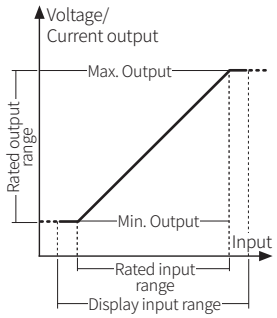


Response Time

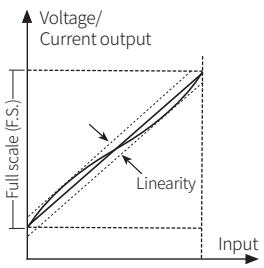
Prevents chattering of the output by changing the response time of the control output and pressure display value.
When the response time is longer, the number of digital filter increase, so stable measurement is possible, but the measured value may differ from the actual input value.

Analog Output Characteristic

■ **Input - Output**



■ **Linearity**



Pressure Conversion Chart

	Pa	kgf/cm²	mmHg	mmH₂O	psi	bar	inHg
Pa	1	0.000010197	0.007501	0.101972	0.00014504	0.00001	0.0002953
kgf/cm²	98066.5	1	735.5592	10000.0005	14.223393	0.980665	28.959025
mmHg	133.3224	0.001359	1	13.595099	0.019337	0.001333	0.039370
mmH₂O	9.80665	0.000099	0.073556	1	0.00142	0.000098	0.002896
psi	6894.733	0.070307	51.71475	703.016716	1	0.068947	2.036014
bar	100000.0	1.019716	750.062	10197.1626	14.503824	1	29.529988
inHg	3386.388	0.034532	25.40022	345.315507	0.491156	0.033864	1

- 1,000,000 Pa = 1,000 kPa = 1 MPa

Segment Table

The segments displayed on the product indicate the following meanings. It may differ depending on the product.

7 Segment				11 Segment				12 Segment				16 Segment			
0	0	I	I	0	0	I	I	0	0	I	I	0	0	I	I
1	1	J	J	1	1	J	J	1	1	J	J	1	1	J	J
2	2	K	K	2	2	K	K	2	2	K	K	2	2	K	K
3	3	L	L	3	3	L	L	3	3	L	L	3	3	L	L
4	4	M	M	4	4	M	M	4	4	M	M	4	4	M	M
5	5	N	N	5	5	N	N	5	5	N	N	5	5	N	N
6	6	O	O	6	6	O	O	6	6	O	O	6	6	O	O
7	7	P	P	7	7	P	P	7	7	P	P	7	7	P	P
8	8	Q	Q	8	8	Q	Q	8	8	Q	Q	8	8	Q	Q
9	9	R	R	9	9	R	R	9	9	R	R	9	9	R	R
A	A	S	S	A	A	S	S	A	A	S	S	A	A	S	S
b	B	T	T	b	B	T	T	b	B	T	T	b	B	T	T
C	C	U	U	C	C	U	U	C	C	U	U	C	C	U	U
d	D	V	V	d	D	V	V	d	D	V	V	d	D	V	V
E	E	W	W	E	E	W	W	E	E	W	W	E	E	W	W
F	F	X	X	F	F	X	X	F	F	X	X	F	F	X	X
G	G	Y	Y	G	G	Y	Y	G	G	Y	Y	G	G	Y	Y
H	H	Z	Z	H	H	Z	Z	H	H	Z	Z	H	H	Z	Z

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