# **Autonics** DIGITAL PRESSURE SENSOR PSA/PSB SERIES



Thank you very much for selecting Autonics products. For your safety, please read the following before using.

## Caution for your safety

※Please keep these instructions and review them before using this unit. XPlease observe the cautions that follow;

**△ Warning** Serious injury may result if instructions are not followed.

△ Caution Product may be damaged, or injury may result if instructions are not followed

※The following is an explanation of the symbols used in the operation manual.

Δcaution:Injury or danger may occur under special conditions.

I. In case of using this unit with machinery (Ex: nuclear power control, medical equipment, ship, vehicle, train, airplane, combustion apparatus, safety device, crime/disaster prevention equipment, etc) which may cause damages to human life or property, it is required to install fail-safe device. It may cause a fire, human injury or damage to property.

 Do not use it in flammable gas because it does not have an explosion proof construction.

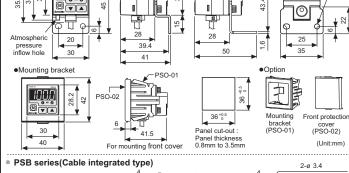
### **⚠** Caution

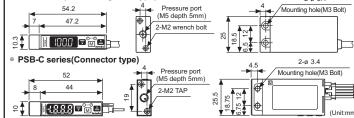
- 1. Do not apply the pressure beyond rated pressure
- 2. Do not use it beyond power supply.
- It may cause damage to this uni 3. Do not make a short circuit for the load.
- It may cause damage to this unit
- 4. Do not wire incorrectly in power polarity etc.
- It may cause damage to this unit.

  5. Do not use corrosive gas or liquid as it is only for non-corrosive gas. It may cause damage to this unit.
- Do not give power to its case or twist its case strongly. It may cause damage to this unit.
- 7. This unit shall not be used outdoors

It may shorten the life cycle of the product or give an electric shock. This unit is produced only for the indoor environment.

### Dimensions PSA series 30 <del>- -</del> 4 20 39.4 pressure inflow hole 30





## Functions

- Pressure display unit change function
  PS□ -V01(C)(P) and PS□ -C01(C)(P) has 7 kinds of pressure unit, PS□ -01(C)(P) and PS□ -1(C)(P) has 4 kinds of pressure unit. Please select the proper unit for application.

  +PS□ -V01(C)(P), PS□ -C01(C)(P): kPa, kgf/cm², bar, psi, mmHg, inHg, mmH2O
  +PS□ -01(C)(P), PS□ -1(C)(P): kPa, kgf/cm², bar, psi

  \*\*When using mmH2O unit, multiply display value by 100.

- Output operation mode change function
  There are 6 kinds of control output mode in order to realize the various pressure sensing.
- Select a mode for your proper application.

   Hysteresis mode(F-1): When needed to change hysteresis for sensing pressure.

   Automatic sensitivity setting mode(F-2): When needed to set sensing sensitivity automatically at
- proper position. Independent two output mode(F-3, F-4, F-5): When needed to detect pressure from two position with
- Window comparison output mode(F 5): When needed to detect pressure in certain area
- Response time change function(Chattering prevention)
  It can prevent chattering of control output by changing response time. It is able to set 4kinds of response time(2.5ms, 5ms, 100ms, 500ms) and if the response time is getting longer, the sensing will be more stable by increasing the number of digital filter.
- Analog output scale setting function
  It is not fixed the analog output(1-5VDC) scale as the rated pressure range but this is a function to
  change properly for user's application. If A1 position for 1VDC output and A5 position for 5VDC output
  are set, the pressure range of A1 to A5 is to 1-5VDC analog output. Key lock function This unit has 2 kinds of key lock function in order to prevent wrong operation.

- Inis unit has 2 kinds of key lock function in order to prevent wrong operation.

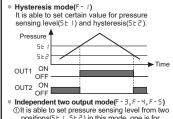
  Loc I All keys are locked therefore it is impossible to change any parameter setting/ preset, zero point adjustment, peak hold and bottom hold check. (It is able to change the status of lock)

  PRAL: This is partial locked status, therefore it is impossible to change parameter setting(It is able to change the status of lock) only, the other functions can be changed.

  \*UnL: All of the setting is available, all keys are unlocked.
- Zero point adjustment function
- This function is to set the display value of pressure as zero point forcibly in case that of port is opened to atmospheric pressure. Zero point adjustment affects analog output voltage.
- This function is to diagnosis malfunction of the system caused by parasitic pressure or to check through memorizing the max./min. pressure occurred from the system

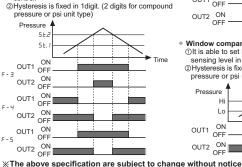
# Output operation mode

\*PSA/PSB series has 6 kinds of output operation mode, please use proper output operation mode in accordance with sensing.



Independent two output mode(F-3,F-4,F-5)
①It is able to set pressure sensing level from two
positions(5£ 1,5£2) in this mode, one is for
control and the other is for alarm or additional

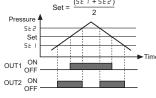
control.
②Hysteresis is fixed in 1digit. (2 digits for compound pressure or psi unit type)



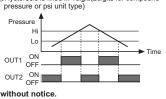
Automatic sensitivity setting mode(F - 2) \*\*Office the control of the control ②Hysteresis is fixed in 1digit.(2 digits for compound

pressure or psi unit type)

③The pressure sensing level is shown in the following calculation. Set = (5£ 1 + 5£2)



 Window comparison output mode(F - 5)
 ①It is able to set Low/High-limit value of pressure sensing level in this mode.
OHysteresis is fixed in 1digit.(2digits for compound



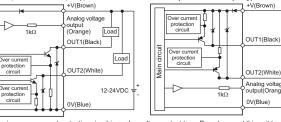
# Specifications

Pressure type			Gauge pressure				
		/ре	Vacuum pressure type Positive pressure type		Compound pressure type		
Mo	dol	NPN output	PSA-V01 PSB-V01 PSB-V01C	PSA-01 PSB-01 PSB-01C	PSA-1 PSB-1 PSB-1C	PSA-C01 PSB-C01 PSB-C01C	
IVIO	uei	PNP output	PSA-V01P PSB-V01P PSB-V01CP	PSA-01P PSB-01P PSB-01CP	PSA-1P PSB-1P PSB-1CP	PSA-C01P PSB-C01P PSB-C01CP	
Rat	ted pres	sure range	0.0 to -101.3kPa	0.0 to 100.0kPa	0 to 1,000kPa	-100.0 to 100.0kPa	
Dis	splay pressure range		5.0 to -101.3kPa	-5.0 to 110.0kPa	-50 to 1,100kPa	-101.2 to 110.0kPa	
Ма	Max. pressure range		2 times of rated pressure 1.5 times of rated pressure		1.5 times of rated pressure	2 times of rated pressure	
Applicable fluid Power supply		fluid	Air, Non-corrosive gas				
		ply	12V-24VDC ± 10%(Ripple P-P:Max. 10%)				
Current consumption			Max. 50mA				
Co	ontrol output		NPN open collector output = Sink current: Max. 100mA, Applied voltage: Max. 30VDC, Residual voltage: Max. 1V PNP open collector output = Source current: Max. 100mA, Residual voltage: Max. 2V				
Hvsteresis*1		esis*1	1 digit fixed(2digits for psi unit)			2digit fixed	
	Repeat error		± 0.2% F.S. ± 1digit ± 0.2% F.S. ± 2d				
	Response time		Selectable 2.5ms, 5ms, 100ms, 500ms				
	Short c	nort circuit protection   Built-in					
Analog output			$ullet$ Output voltage:1V-5VDC $\pm$ 2% F.S. $ullet$ Exposion:Within 1VDC $\pm$ 2% F.S. $ullet$ Span:Within 4VDC $\pm$ 2% F.S. $ullet$ Span:Within 4VDC $\pm$ 2% F.S. $ullet$ Polyput impedance:1KΩ $ullet$ Output impedance:1KΩ				
Display method			3½ digit LED 7segment				
Min. display interval		y interval	1digit(psi unit: 2 digits are fixed)			2digits	
Pressure unit		nit	kPa, kgf/cm²,bar, psi, mmHg, mmH2O, inHg	kPa, kgf/cm², bar, psi		kPa, kgf/cm², bar. psi, mmHg, mmH2O, inHg	
Characteristic of control output and display temp.			Max. ± 1% F.S. **2			Max. ± 2% F.S. <sup>®2</sup>	
Characteristic of analog output			Max. ± 2% F.S. *2				
Vibration			1.5mm amplitude at frequency of 10 to 55Hz in each of X, Y, Z directions for 2 hours				
Environ Ambient temperature							
-me	ent Ami	Ambient humidity 35 to 85%RH, Storage: 35 to 85%RH					
Material			●PSA ☞ Front case:PC, Rear case:PC(Insert glass), Pressure port:die-cast(Zn) ●PSB ☞ Case, Pressure port:PA ●PSB-C ☞ Case, Pressure port, Cover: IXEF				
Protection			IP40(IEC standard)				
	. Cable intergrated type		ø 4, 5P, Length: 2m, AWG 24, Insulation diameter: ø 1.0				
Wir	Conn	nector type	5P, Length: 3m, AWG 24, Insulation diameter: ø 1.4				

PSA: Approx. 120g, PSB: Approx. 70g, PSB-C: Approx. 80g X1: In F I mode, hysteresis is variable.
XF.S. is the rated pressure. ※2: Display pressure at 25°C within 0 to 50°C

### Input/Output circuit and connection diagram NPN open collector output type PNP open collector output type

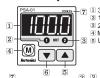
Analog voltage



\*There is no over current protection circuit in analog voltage output type. Do not connect this unit to power source or capacitive load directly. Please observe input impedance of connected equipment when using analog voltage output.

And be sure with voltage drop by resistance of extended wire.

## Front panel identification and function



**⚠** Caution

[7] II 3/2 LED display(Red): Displays sensing pressure, every setting value and display error
 [2] 1 output indicator(Red): Output 1 is ON, LED will be ON
 [3] 2 output indicator(PSA: Red, PSB: Green): Output 2 is ON, LED will be ON
 [4] Mode key: Enter to parameter setting mode or preset setting mode, and save setting valie
 [3] IV key: Sets the setting value to upper step in preset setting or pressure unit, output
 mode, response time, analog output scale, key lock, peak hold value, bottom
 hold value display in parameter setting



- 6 5 2 3 6 Down key: Sets setting value to lower step in preset setting or pressure output mode, response time, analog output scale, key lock, peak hold, bottom hold display in parameter setting.

  7 Range of rating pressure: it is possible to change the pressure unit in pressure sensor. Please use different unit label for your application.

It may cause mechanical trouble.

the hexagon wrench bolt.

It may cause mechanical trouble

The tightening torque of one touch fitting should be Max. 100kgf-cm.

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

In this case, tightening torque of hexagon wrench should be max. 30kgf.cm.

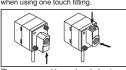
Bracket(PSO-01) and front protection cover (PSO-02) are sold separately.

Please refer to the below pictures for installation

## Installation

- PSA series
- In When installing pressure port it is able to bring pressure from 3 directions by changing the mounting direction of the pressure port.

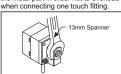
  2. Pressure port has two types, PT1/8 and NPT1/8, therefore be sure to use proper port when using one touch fitting.



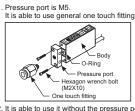
- 3. Please use seal tape at port plug in order to
- prevent pressure leak.
  4. Please block another two pressure ports not used with port plug.

Spring wash Hexagon wrench bolt

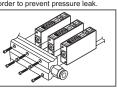
5. Please connect it by using spanner(13mm) at the metal part in order not to overload on the body



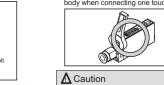
PSB series



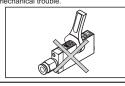
2. It is able to use it without the pressure port according to environment. In this case O-Ring between pressure port and its body should not be taken out in order to prevent pressure leak.



Please connect it by using spanner(10mm) at pressure port in order not to overload on the body when connecting one touch fitting.



The tightening torque of one touch fitting and hexagon wrench should be Max. 50kgf·cm and 20kgf.cm. It may cause mechanical trouble. Please do not use spanner to install as it may cau: mechanical trouble



## Error

	Error display	Description	Countermeasures
	Erl	If external pressure applied, when adjusting Zero point	Please try again after external pressure removing
	Er2	When overloaded on control output	Remove overload
	Er3	When the setting value is not matched with setting condition	Set proper setting value after checking setting condition
	ННН	When the applied pressure exceeds the upper display pressure range up	Apply pressure within display pressure range
	LLL	When the applied pressure exceeds the lower display pressure range down	

## Accessory

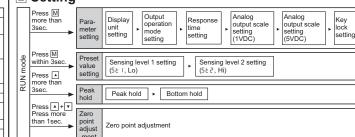


PSA • Port plug





### Setting



- Zero point adjustment

  1. press 

  and 

  keys for over 1sec. at the same time putting an applied pressure in state of the atmospheric pressure.

  2. When the zero point adjustment is completed, it displays 

  and returns to RUN mode automatically.
- | XIf executing zero point adjustment on external | pressure being at pressure port [£2] flashes 3times. Please execute it in the atmospheric pressure after removing external pressure. Please execute zero point adjustment regularly.
- Parameter setting
  1. Set to pressure display unit, output operation mode, response time(Chattering prevention), analog output scales or key lock.
  2. Please set parameter after unlocking key lock function when key lock function is set. (Please see below key lock setting)
  - RUN mode ♣ PressM more than 3sec

Display unit setting 

 Unb
 and previous set unit flash in 0.5sec. by turns

 Select the unit by ♠, ▼ key.

PA PS | bAr PS | nnH H20 Display pressure unit of positive pressure type

Display pressure unit of vacuum pressure type and compound pressure type (Pressing M key shortly, the unit is saved, then move to the next setting mode.)

When using mmH2O unit, multiply display value by

♣ Press Mone time

Output operation mode setting out and previous set output mode flash in 0.5sec

12-24VDC

Load

Load

(Pressing Mkey shortly, the output operation mode is saved, then moves to the next setting mode.)

♣ Press Mone time Response time setting

• **FPd** and previous set response time flashes in 0.5sec. by turns.
• Select the response time by • , • key. 2.5 → 5.0 → 100 → 500 2.5ms 5ms 100ms 500ms (Pressing Mkey shortly, the response time is saved then moves to the next setting mode.)

♣ Press M one time Analog output scale setting(1VDC)

- A 1 and previous set pressure flash in 0.5sec. by
- Set the pressure value which 1VDC is output by ▲, ▼key. Available setting range:
- Min. value of rated pressure ≤ [R 1] ≤ 90% of rated pressure (Pressing M key shortly one time, the selected pressure is set as 1VDC scales then moves to

the next setting mode.) ♣ Press Mone time

Analog output scale setting(5VDC)

[R-5] and previous set pressure will flashes in 0.5sec. by turns.

• Set the pressure value which 5VDC is output by [A]. [7] key.

Available setting range: [R-1]+10% of rated pressure ≤ [R-5] ≤ Max. value of rated pressure

(Pressing M key shortly one time, the selected pressure is set as 5VDC scales then moves to the

♣ Press Mone time

Key lock setting • **FEY** and previous set key lock flashes by turns • Select key lock by ▲, ▼ key.

Loc PA.L UnL

(Pressing  $\boxed{\text{M}}$  key shortly one time, key lock is set then moves to the display unit setting mode.)

Press M more than 3sec. (Saves in EEPROM)

Return to RUN mode

XWhen pressing Mkey for over 3sec. in any setting mode, it returns to RUN mode memorizing set value at EEPROM. Also, if no key touched for 60sec. it displays previous setting value with ignoring current setting.

XSetting data is saved at by EEPROM even though the power off. But, note that the life cycle of EEPROM is 100,000 times.

Peak hold and bottom hold

- 1. Press \_afor more than 3sec. in RUN mode.
  2. PEH and memorized max. pressure(Vacuum type is for max. vacuum pressure) flashes in 0.5sec. by
- 3. Press A key one time shortly, then it displays bottom hold value. **bo H**) and memorized min. pressure (Vacuum type is for max. vacuum pressure) flashes in 0.5sec. by turns.
- 4. If pressing A key one time shortly, memorized peak hold and bottom hold value is removed then returns to RUN mode.

range, it displays LLL.

- Preset value setting
   " procesure sensing level. Set the pressure sensing level.
   Please set preset value after unlocking key lock when key lock function is set.
- (Please see key lock setting) Be sure that the setting method is different by each output operation mode.
- When hysteresis mode(F I) and independent two output mode(F ∃, F Ч, F 5)

### RUN mode ♣ Press Mone time

- Pressure sensing level 1 setting 5£ I and previous set sensing level1 flash in 0.5sec.
- Set the pressure sensing level 1 by ▲, ▼key. Enable setting range: Min. value of setting pressure < 5½ / ≤ Max. value of setting pressure (If pressing M key shortly one time, sensing level 1 is set then move to the next setting mode.)
  - ▶ Press Mone time

### Pressure sensing level 2 setting

- 5£2 and previous set sensing level 2 flash in 0.5sec
- Set the pressure sensing level 2 by A, V key.

  Set the pressure sensing level 2 by A, V key.

  Enable setting range: Hysteresis mode -
  Min. value of setting pressure < 5 t 2 < 5 t 1

  independent two output mode -- Min. value of setting pressure < 5 t 2 4 Max. value of setting pressure (Pressing M key shortly one time, the setting is completed then returns to RUN mode.)
  - ♣ Press Mone time (Saves in EEPROM)

### Return to RUN mode Automatic sensitivity setting mode(F - 2)

RUN mode ♣ Press Mone time

Pressure sensing level 1 setting

pressure. If pressing ▲ key shortly one time, current sensing pressure is set sensing level 1, [5] and the set sensing level 1 flash by turn (0.5sec.).

♣ Press Mone time

### Pressure sensing level 2 setting 5t2 and previous set sensing level 2 flash in 0.5sed

Apply the needed pressure(5 £ 2 ) within the rated pressure

If pressing A key shortly one time, current sensing pressure is set as sensing level 2, then \( \frac{5\cdot 2}{2} \) and the set sensing level 2 flash in 0.5sec. by turns. set sensing level 2 flash in 0.5sec. by turns. Enable setting range; 5£ 1+1% of rated pressure ≤ 5£ 2 ≤ Max. value of setting range ※If differences of between 5£ 1 and sensing level are not enough, [₹-3] flashes 3 times then retruns to 5£ 2 setting. Please re-execute the setting for condition. ※It is possible to set repeatedly by [♣] key, the last setting is set as the sensing level2.

### Automatic sensitivity setting and fine adjustment **SEE** and sensing level(Set) flash in 0.5sec. by turns

Set = (5£ 1 + 5£2) Adjust sensing level(Set) by A, V key, when fine adjustment of the sensing level(Set) is needed. (Enable adjustment range: -Between 5 t 1 and 5 t 2)

## Press Mone time (Saves in EEPROM) Return to RUN mode

When checking the value of sensing level 1, 2(5£ 1, 5£2) and automatic sensitivity setting value, please press [M]key shortly and sequently.

Example of the setting in automatic sensitivity setting mode (To check absorption of component by vacuum pressure). The state of removed target is 5£ 1 and the state of absorbing target is 5£ 2. By ☐key, sensing level (SET) value is set in the middle between 5£ 1 and 5£2 automatically.

■ Window comparison output mode (F - 5)

# RUN mode

Lo and the previous sensing level 1 flashes in Set pressure sensing level 1 by ♠, ▼ key.

Enable setting range: Min. setting pressure ≤ Lo <

♣ Press Mone time Pressure detecting level 2 setting HI and the previous detection level 2 flashes in 0.5sec. by turns.

o.seec. by turns.
• Set pressure sensing level 2 by ▲ , ▼ key.
Enable setting range: Lo < Hi ≤ Max. value of setting Pressing Mkey shortly one time, the setting is completed then returns to RUN mode.)

Press Mone time (Saves in EEPROM)

### Return to RUN mode XPlease check the preset value again when output

operation mode is changed. %When the display unit is changed, preset value is calculated according to the dis XIf no key touched for 60sec., it returns to RUN mode [Except for automatic sensitivity setting

(2digits when using psi unit or compound pressure type) is increased(decreased) and it is continuously increased(decreased) by pressing key constantly.

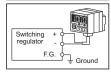
# Caution for using

 Do not insert any sharp or pointed object into pressure port.
It could not operate normally due to mechanical trouble.
 Be sure that this unit must avoid direct touch with water, oil, thinner etc.
 Be sure to avoid transient time(within 3sec.) after initial power on. 4. When a switching moving regulator is used for power supply, frame

ground(E.G.) terminal of its power supply part must be grounded. Avoid wiring with power line or high voltage line.
 It may cause malfunction by noise.
 When moving this unit from cold place to warm place, please remove the humidity on the cover then use it.

7. Do not press the setting button with sharp or pointed object

 Do not apply over 30N tensile strength on connection part or load.
 When using mmH<sub>2</sub>O unit, multiply display value by 100. Installation environment 1) It shall be used indoor ② Altitude Max. 2.000m



# Main products

- Proximity sensors
- Panel meters ■ Graphic/Logic panels Temperature controllers Tachometer/Pulse(Rate) meters
- Temperature/Humidity transducers
- Imperature/Huminity transducers
   Switching power supplies
   Stepping motors/drivers/motion controllers
   Field network devices
   Laser marking system(CO2, Nd:YAG)
   Laser welding/soldering system

Fiber optic sensors
Pressure sensors
Timers

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The proposal of a product improvement and development : product@autonics.co

Autonics Corporation

♣ Press Mone time Pressure sensing level 1 setting

Max. value of setting pressure (Pressing M key shortly one time, sensing level 1 is set then move to next setting mode.)