

Low Differential Pressure Sensor Series *PSE550/300*

Rated differential pressure range:
0 to 2 kPa

Accuracy:
±1% F.S.

LED display to confirm energization

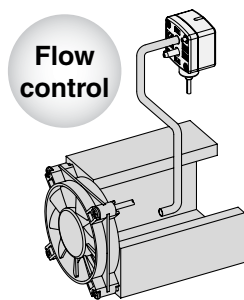
Proof pressure: 65 kPa

Output: 1 to 5 VDC/
(Analog output) 4 to 20 mADC

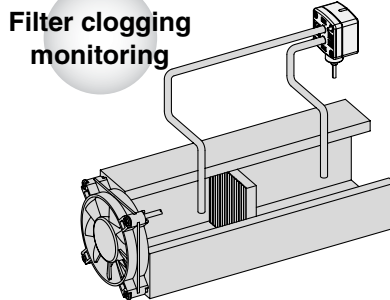
Specifications:
PSE550
PRESS: 0 - 2kPa | BROWN
SUP: 12 - 24VDC | BLACK
15mA MAX | BLUE
SMC MADE IN JAPAN

- ZSE
- ISE
- PSE**
- ZSE3
- PS
- ZSE1
- ZSE2
- ZSP
- ISA2
- IS
- ZSM
- PF2
- IF
- Data

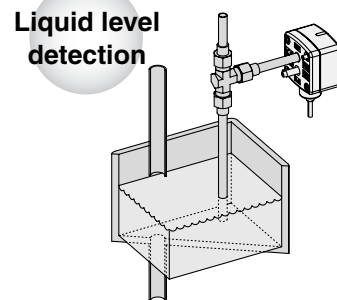
Applications



Can control air flow by monitoring the flow rate inside the duct.

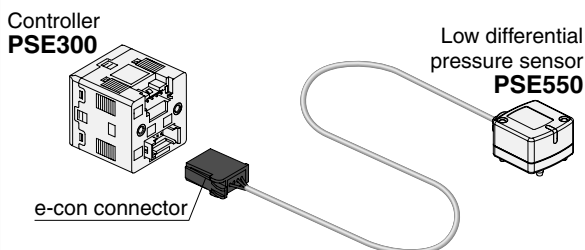


Can control filtration and replacement periods by monitoring the clogging of the filter.

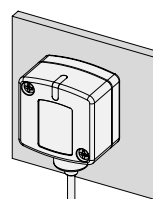


Can detect the liquid level through changes in the purge pressure.

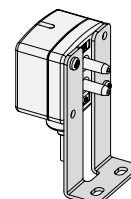
Plug connection



Two mounting methods



Direct mounting



Bracket mounting



Controller

Series PSE300

How to Order



Input/Output specifications

0	NPN2 output + 1-5 V output
1	NPN2 output + 4-20 mA output
2	NPN2 output + Auto shift input
3	PNP2 output + 1-5 V output
4	PNP2 output + 4-20 mA output
5	PNP2 output + Auto shift input

Unit specifications

Nil	With unit display switching function
M	Fixed SI unit <small>Note 1)</small>

Note 1) Fixed unit
 For vacuum & low pressure & low differential pressure & compound pressure: kPa
 Positive pressure: MPa (For 1 MPa)
 kPa (For 500 kPa)

PSE30 0 M [] [] []

Option 1

Nil	Without cable
L	Power supply/Output connection cable

Power supply/Output connection cable ZS-28-A

Note) The cable is unassembled in the factory, but is included with the shipment.

Option 3

Nil	Without connector
C	Sensor connector

Sensor connector (e-con connector) ZS-28-C

Note) The connector is unassembled in the factory, but is included with the shipment.

Option 2

Nil	Without bracket/panel mount adapter/front protective cover
A	Bracket
B	Panel mount adapter
D	Panel mount adapter + Front protective cover

M3 x 5L
Bracket

Panel
Panel mount adapter
Mounting screw (M3 x 8L) (Accessory)

Panel
Front protective cover
Panel mount adapter
Mounting screw (M3 x 8L) (Accessory)

Note) These options are unassembled in the factory, but are included with the shipment.

Option/Part No.

Description	Part no.	Note
Power supply/Output connection cable	ZS-28-A	
Bracket	ZS-28-B	With M3 x 5L (2 pcs.)
Sensor connector	ZS-28-C	1 pc.
Panel mount adapter	ZS-27-C	With M3 x 8L (2 pcs.)
Panel mount adapter + Front protective cover	ZS-27-D	With M3 x 8L (2 pcs.)

Specifications

Conforms to CE marking and UL (CSA) standards.

Model		PSE30□					
Set (differential) pressure range		-101 to 101 kPa	10 to -101 kPa	-10 to 100 kPa	-0.1 to 1 MPa	-50 to 500 kPa	-0.2 to 2 kPa
Pressure range ^{Note 1)}		For compound pressure	For vacuum	For low pressure	For positive pressure		For low difference pressure
Rated (differential) pressure range		-100 to 100 kPa	0 to -101 kPa	0 to 100 kPa	0 to 1 MPa	0 to 500 kPa	0 to 2 kPa
Power supply voltage		12 to 24 VDC, Ripple (p-p) 10% or less (With power supply polarity protection)					
Current consumption		50 mA or less (Current consumption for sensor is not included.)					
Sensor input		1 to 5 VDC (Input impedance: 1 MΩ)					
No. of inputs		1 input					
Input protection		With excess voltage protection (Up to 26.4 V)					
Hysteresis		Hysteresis mode: Variable, Window comparator mode: Variable					
Switch output		NPN or PNP open collector output: 2 outputs					
Maximum load current		80 mA					
Maximum load voltage		30 VDC (at NPN output)					
Residual voltage		1 V or less (With load current of 80 mA)					
Output protection		With short circuit protection					
Response time		1 ms or less					
Anti-chattering function		Response time settings for anti-chattering function: 20 ms, 160 ms, 640 ms, 1280 ms					
Repeatability		±0.1% F.S. or less					
Analog output	Voltage output ^{Note 2)}	Output voltage: 1 to 5 V (Within rated pressure range (Differential pressure)), Output impedance: Approx. 1 kΩ Linearity: ±0.2% F.S. (Not including sensor accuracy), Response speed: 150 ms or less					
	Accuracy (To display value) (25°C)	±0.6% F.S. or less		±1.0% F.S. or less		±1.5% F.S. or less	
	Current output ^{Note 2)}	Output current: 4 to 20 mA (Within rated pressure range) Maximum load impedance: 300 Ω (at 12 VDC), 600 Ω (at 24 VDC), Minimum load impedance: 50 Ω Linearity: ±0.2% F.S. (Not including sensor accuracy), Response time: 150 ms or less					
	Accuracy (To display value) (25°C)	±1.0% F.S. or less		±1.5% F.S. or less		±2.0% F.S. or less	
Display accuracy (Ambient temperature of 25°C)		±0.5% F.S. ±2 digits or less	±0.5% F.S. ±1 digit or less				
Display		3 + 1/2 digit, 7 segment indicator, 2-color display (Red/Green), Sampling frequency: 5 times/sec					
Indicator light		OUT1: Lights up when ON (Green), OUT2: Lights up when ON (Red)					
Auto shift input ^{Note 2)}		Non-voltage input (Reed or Solid state), Low level input: 5 ms or more, Low level: 0.4 V or less					
Resistance	Enclosure	IP40					
	Operating temperature range	Operating: 0 to 50°C, Stored: -10 to 60°C (No freezing or condensation)					
	Operating humidity range	Operating/Stored: 35 to 85% RH (No condensation)					
	Withstand voltage	1000 VAC for 1 minute between live parts and case					
	Insulation resistance	50 MΩ or more between live parts and case (at 500 VDC Mega)					
	Vibration resistance	10 to 150 Hz at whichever is smaller of 1.5 mm amplitude or 98 m/s ² acceleration, in X, Y, Z directions, for 2 hours each (De-energized)					
	Impact resistance	100 m/s ² in X, Y, Z directions, 3 times each (De-energized)					
Temperature characteristics		±0.5% F.S. or less (Based on 25°C)					
Connection		Power supply/Output connection: 5P connector, Sensor connection: 4P connector					
Material		Front case: PBT, Rear case: PBT					
Weight	With power supply/output connection cable	85 g					
	Without power supply/output connection cable	30 g					

Note 1) Pressure range can be selected during initial setting.

Note 2) Auto shift function is not available when analog output option is selected.

Also, analog output option is not available when auto shift function is selected.

Note 3) The following units can be selected with unit conversion function:

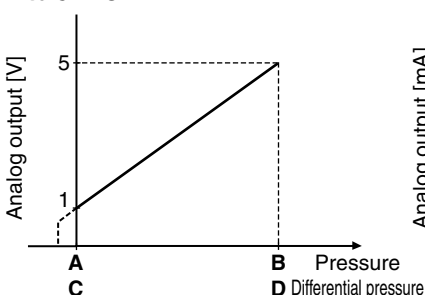
For vacuum & compound pressure: kPa-kgf/cm²-bar-psi-mmHg-inHg

For positive pressure & low pressure: MPa-kPa-kgf/cm²-bar-psi

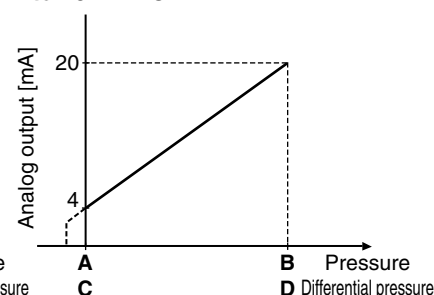
For low differential pressure: kPa-mmH₂O

Analog Output

1 to 5VDC



4 to 20 mADC



Range	Rated pressure range	A	B
For vacuum	0 to -101 kPa	0	-101 kPa
For compound pressure	-100kPa to 100 kPa	-100 kPa	100 kPa
For positive pressure	0 to 1 MPa	0	1 MPa
	0 to 500 kPa	0	500 kPa

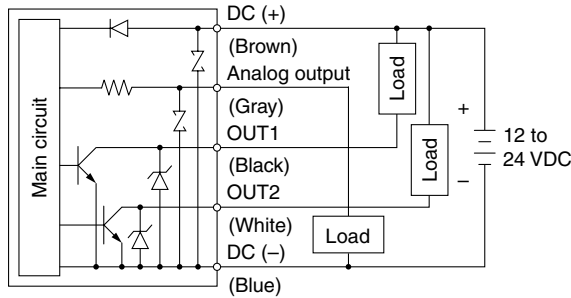
Range	Rated differential pressure range	C	D
For low differential pressure	0 to 2 kPa	0	2 kPa

Series PSE300

Internal Circuit

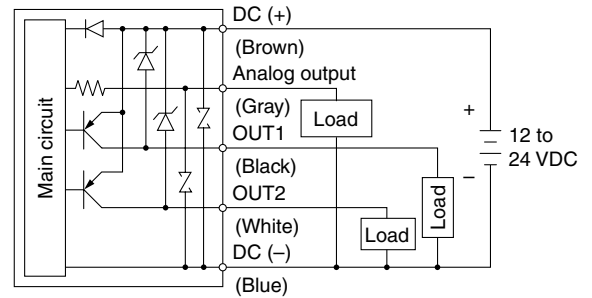
PSE300

NPN open collector output (2 outputs), Max. 30 V or 80 mA, residual voltage 1 V or less
 Analog output: 1 to 5 V
 Output impedance: Approx. 1 k Ω



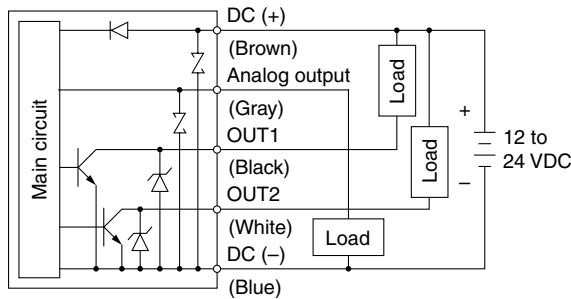
PSE303

PNP open collector output (2 outputs), Max. 80 mA, residual voltage 1 V or less
 Analog output: 1 to 5 V
 Output impedance: Approx. 1 k Ω



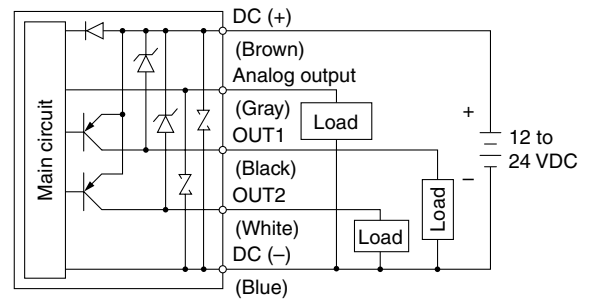
PSE301

NPN open collector output (2 outputs), Max. 30 V or 80 mA, residual voltage 1 V or less
 Analog output: 4 to 20 mA
 Maximum load impedance: 300 Ω (12 VDC), 600 Ω (24 VDC)
 Minimum load impedance: 50 Ω



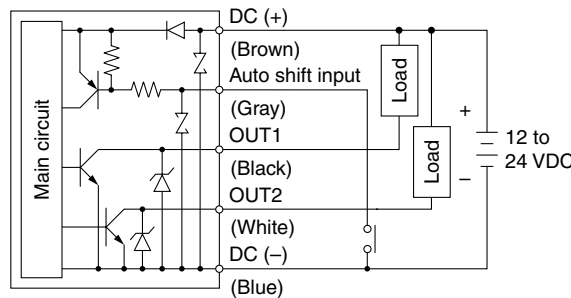
PSE304

PNP open collector output (2 outputs), Max. 80 mA, residual voltage 1 V or less
 Analog output: 4 to 20 mA
 Maximum load impedance: 300 Ω (12 VDC), 600 Ω (24 VDC)
 Minimum load impedance: 50 Ω



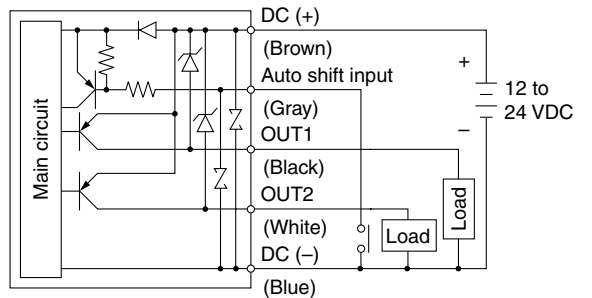
PSE302

NPN open collector output with auto shift input (2 outputs), Max. 30 V, 80 mA, residual voltage 1 V or less



PSE305

PNP open collector output with auto shift input (2 outputs), Max. 80 mA, residual voltage 1 V or less



Descriptions

LCD

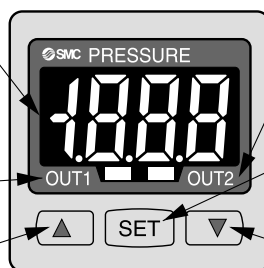
Displays the current pressure, set mode, selected display unit, and error code. Four different display settings are available. Always use red or green display; or switch between green and red according to the output.

Output (OUT1) display (Green)

Lights up when OUT1 is ON.

Up button

Use this button to select the mode or increase the ON/OFF set value. It is also used for switching to the peak display mode.



Output (OUT2) display (Red)

Lights up when OUT2 is ON.

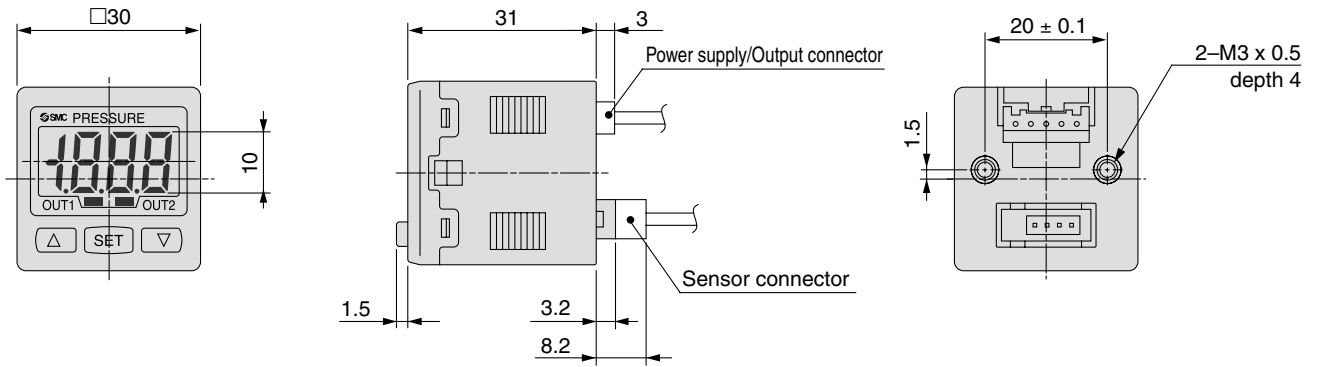
SET button

Use this button to change the mode or confirm the set value.

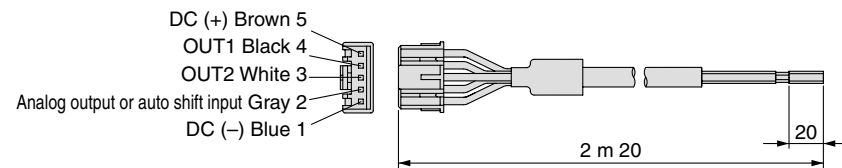
Down button

Use this button to select the mode or decrease the ON/OFF set value. It is also used for switching to the bottom display mode.

Dimensions

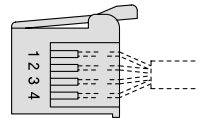


Power supply/Output connection cable (ZS-28-A)

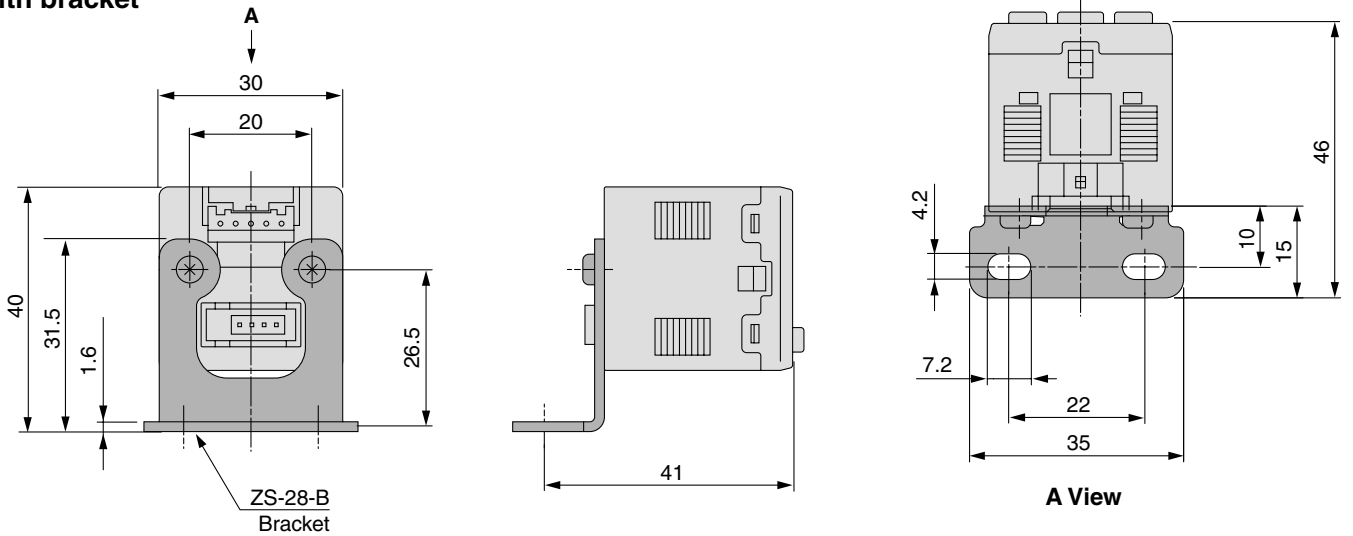


Sensor connector

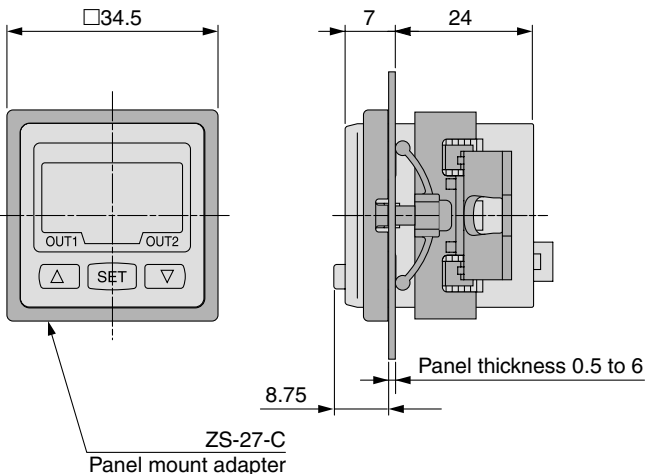
PIN no.	Terminal
1	DC (+)
2	N.C.
3	DC (-)
4	IN (1 to 5 V)



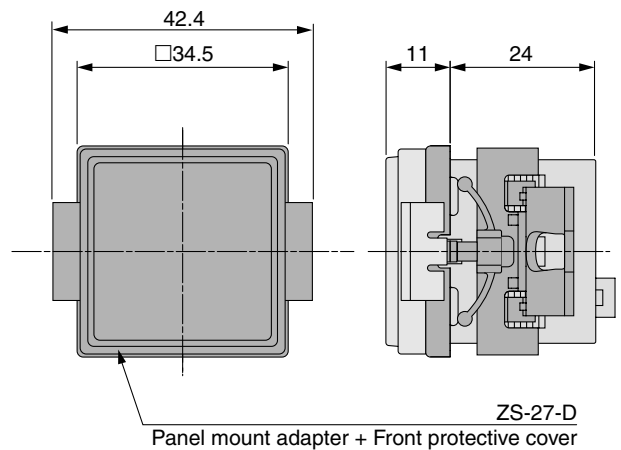
With bracket



With panel mount adapter



With panel mount adapter + Front protective cover



ZSE
ISE

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS

ZSM

PF2

IF

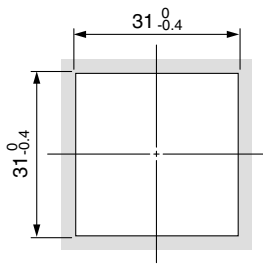
Data

Series PSE300

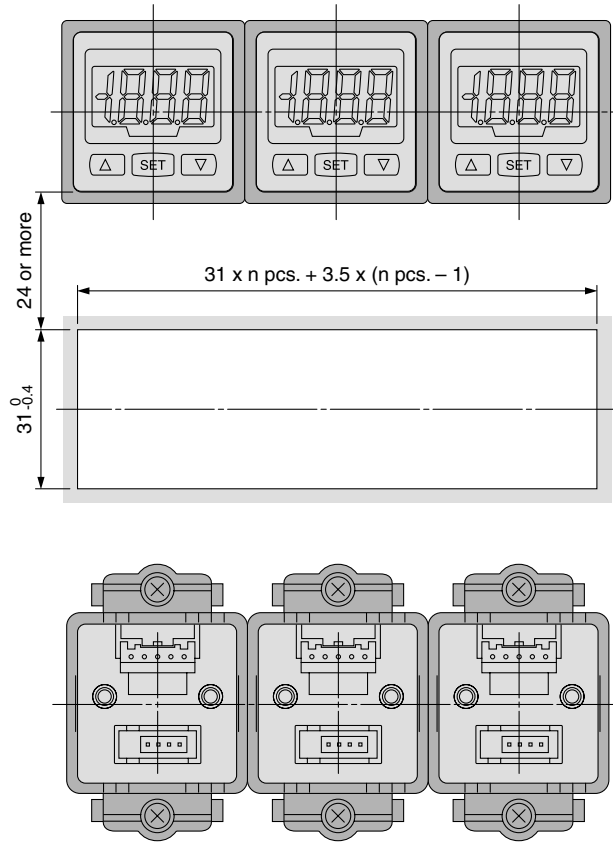
Dimensions

Panel cutout dimensions

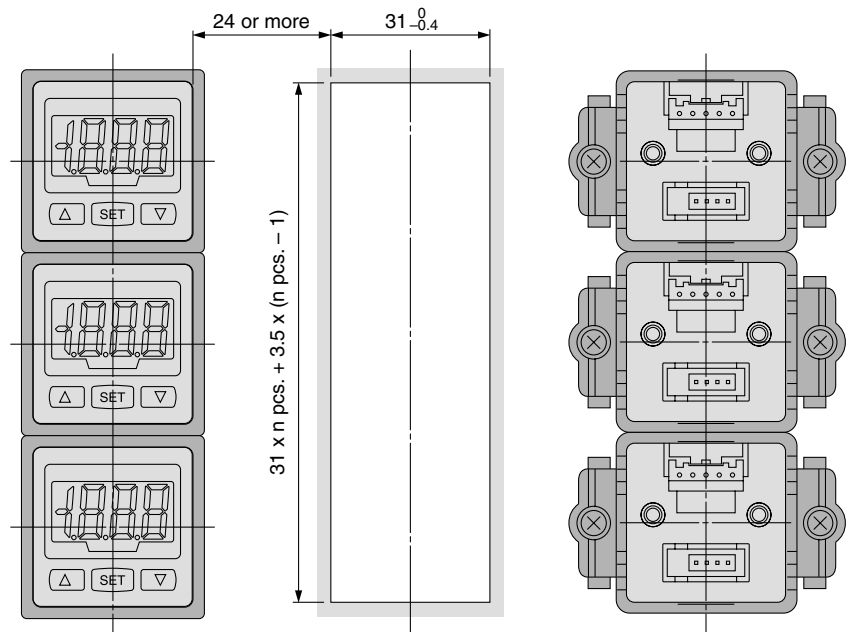
Mount of single unit



Horizontal stacking mount of multiple units (n pcs.)



Vertical stacking mount of multiple units (n pcs.)

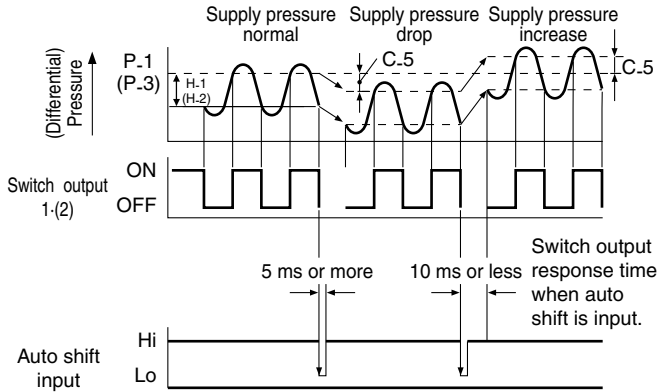


Functions

A Auto shift function

When there are large fluctuations in the supply pressure, the switch may fail to operate correctly. The auto shift function compensates such supply pressure fluctuations. It measures the (differential) pressure at the time of auto shift signal input and uses it as the reference (differential) pressure to correct the set value on the switch.

Set value correction by auto shift function



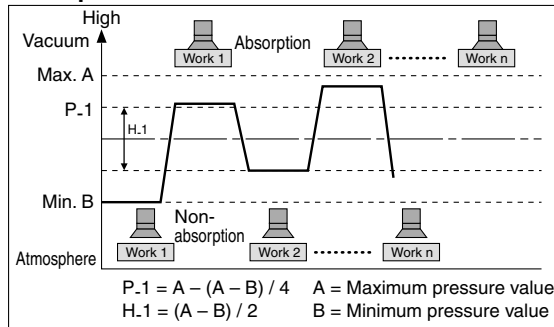
Possible Set Range For Auto Shift Input

	Set (differential) pressure range	Possible set range
Compound pressure	-101.0 to 101.0 kPa	-101.0 to 101.0 kPa
Vacuum	10.0 to -101.0 kPa	-101.0 to 101.0 kPa
Low pressure	-10 to 100.0 kPa	-100.0 to 100.0 kPa
Positive pressure	-0.1 to 1.000 MPa	-1.000 to 1.000 MPa
	-50 to 500 kPa	-500 to 500 kPa
Low differential pressure	-0.2 to 2.00 kPa	-2.00 to 2.00 kPa

B Auto preset function

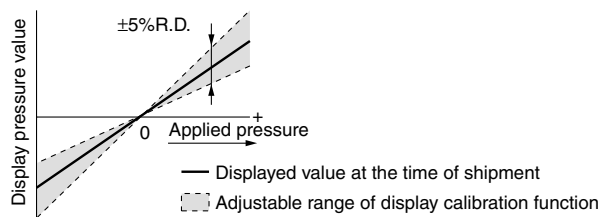
Auto preset function, when selected in the initial setting, calculates and stores the set value from the measured (differential) pressure. The optimum set value is determined automatically by repeating vacuum and break with the target workpiece several times.

Adsorption Verification



C Display calibration function

This function eliminates slight differences in the output values and allows uniformity in the numbers displayed. Displayed values of the pressure sensors can be adjusted to within $\pm 5\%$.



Note) When the precision indicator setting function is used, the set (differential) pressure value may change ± 1 digit.

D Peak and bottom display function

This function constantly detects and updates the maximum and minimum values and allows to hold the display value.

E Key lock function

This function prevents incorrect operations such as accidentally changing the set value.

F Reset function

This function clears and resets the zero value on the display of measured (differential) pressure within $\pm 7\%$ F.S. of the factory adjusted value.

G Error indication function

Error name	Error code	Description
Overcurrent error	OUT1	Er1
	OUT2	Er2
Residual pressure error	Er3	Pressure applied during the zero reset operation exceeds $\pm 7\%$ F.S. * After displaying the error code for 3 seconds, the switch automatically returns to the measuring mode. Due to individual product differences, the setting range varies ± 4 digits.
Applied pressure error	HHH	Supply pressure exceeds the maximum set (differential) pressure or upper limit of the display pressure.
	LLL	A sensor may be unconnected or miswired. Or, supply pressure is below the minimum set (differential) pressure or lower limit of the display pressure.
Auto shift error	or	The value measured at the time of auto shift input is outside the set (differential) pressure range. * After displaying the error code for one second, the switch returns to the measuring mode.
System error	Er4	Internal data error
	Er6	Internal data error
	Er7	Internal data error
	Er8	Internal data error

H Unit display switching function

Display units can be switched with this function. Units that can be displayed vary depending on the range of the pressure sensors connected to the controller.

Pressure range	For compound pressure	For vacuum	For low pressure	For positive pressure		For low differential pressure
Applicable pressure sensor	PSE533* PSE543 PSE563	PSE531* PSE541 PSE561	PSE532*	PSE530* PSE560	PSE564	PSE550
Set (differential) pressure range	-101 to 101 kPa	10 to -101 kPa	-10 to 100 kPa	-0.1 to 1 MPa	-50 to 500 kPa	-0.2 to 2.00 kPa
PA	kPa	0.2	0.1	0.1	—	1
	MPa	—	—	0.001	—	—
CF	kgf/cm ²	0.002	0.001	0.001	0.01	0.01
bar	bar	0.002	0.001	0.001	0.01	0.01
PSI	psi	0.05	0.02	0.02	0.2	0.1
inHg	inHg	0.1	0.1	—	—	—
mmHg	mmHg	2	1	—	—	1 mmH ₂ O

* Series PSE530 pressure sensors are also applicable. Please contact SMC for more information.

Series PSE300

Functions

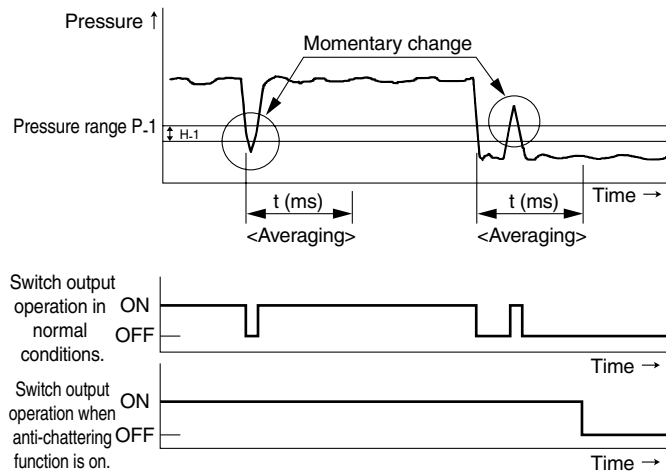
1 Anti-chattering function

A large bore cylinder or ejector consumes a large volume of air in operation and may experience a temporary drop in the supply pressure. This function prevents detection of such temporary drops in the supply pressure as an error.

Response time settings: 20 ms, 160 ms, 640 ms, 1280 ms

<Principle>

This function averages pressure values measured during the response time set by the user and then compares the average pressure value with the pressure set point value to output the result on the switch.





Series PSE

Specific Product Precautions 1

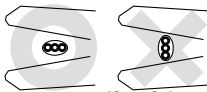
Be sure to read before handling.

Pressure Sensor

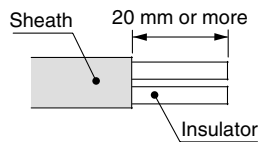
Handling

Warning

1. Do not drop, bump, or apply excessive impact while handling. Although the body of the sensor may not be damaged, the inside of the sensor could be damaged and lead to malfunction.
2. The tensile strength of the cord is 50 N or less. Applying a greater pulling force to it can cause malfunction. When handling, hold the body of the sensor—do not dangle it from the cord.
3. Care should be taken when stripping the outer cable covering as the insulator may be accidentally torn or damaged if incorrectly stripped, as shown on the right.
4. Do not use pressure sensors with corrosive and/or flammable gases or liquids.
5. Connection of sensor connector

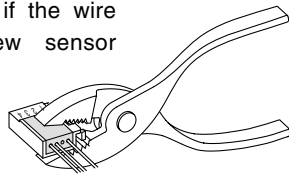
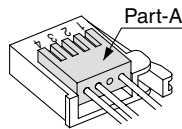


- Cut the sensor cable as illustrated to the right.
- Referring to the table below, insert each lead wire of the cable at the position marked with a number corresponding to the color of the lead wire.



Connector no.	Wire core color For PSE300 (ZS-28-C)
1	Brown (DC (+))
2	Not connected
3	Blue (DC (-))
4	Black (OUT: 1 to 5 V)

- Confirm that the numbers on the connector match the colors of the wires and that the wires are inserted to the bottom. Press Part A by hand for temporary fixing.
- Press in the central part of Part A vertically with a tool such as pliers.
- A sensor connector cannot be taken apart for reuse once it is crimped. If the wire arrangement is incorrect or if the wire insertion fails, use a new sensor connector.



- For connection to SMC Series PSE300 pressure switches, use sensor connectors (ZS-28-C) or e-con connectors listed below.

Manufacturer	Part no.
Sumitomo 3M	37104-3101-000FL
Tyco Electronics AMP	1-1473562-4
OMRON Corporation	XN2A-1430

- For detailed information about e-con connectors, please consult the manufacturers of the respective connectors.
- When piping, increase the length of the air tubing to allow for any possible warping, increased tension or moment load or increased tension, etc.
- In cases where SMC air tubing is not used, make sure the product has similar I.D. accuracy within $\varnothing 4 \pm 0.3$ mm.

Handling

- Make sure that the air tubing is firmly inserted to avoid possible disconnection. (Tensile strength is approx. 25 N when being inserted 8 mm.)
- Please consult with SMC if you intend to use with fluids other than air, non-corrosive gas and non-inflammable gas.

Operating Environment

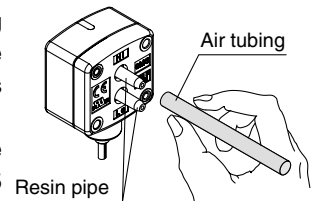
Warning

1. The pressure sensors are CE marked; however, they are not equipped with surge protection against lightning. Lightning surge countermeasures should be applied directly to system components as necessary.
2. The pressure sensors do not have an explosion proof rating. Never use pressure sensors in the presence of flammable or explosive gases.

Piping Connection

Caution

- Cut the air tubing vertically.
- Carefully hold the air tubing and slowly push it into the resin pipe, ensuring that it is inserted by more than 8 mm. For your information, the tensile strength is approx. 25 N when inserted by more than 8 mm.
- Insert the low pressure tubing into "Lo" pipe, and the high-pressure tubing into "Hi" pipe.



Controller

Handling

Warning

1. Do not drop, bump, or apply excessive impact (100 m/s²) while handling. Although the body of the controller case may not be damaged, the inside of the controller could be damaged and cause malfunction.
2. The tensile strength of the power supply/output connection cable is 50 N; that of the pressure sensor lead wire with connector is 25 N. Applying a greater pulling force than the applicable specified tensile strength to either of these components can lead to malfunction. When handling, hold the body of the controller.

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1
ISE2

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Be sure to read before handling.

Controller

Connection

Warning

1. Incorrect wiring can damage the switch and cause malfunction or erroneous switch output. Connections should be done while the power is turned off.
2. Do not attempt to insert or pull out the pressure sensor or its connector when the power is on. Switch output may malfunction.
3. Wire separately from power lines and high voltage lines, avoiding wiring in the same conduit with these lines. Malfunctions may occur due to noise from these other lines.
4. If a commercial switching regulator is used, make sure that the F.G. terminal is grounded.

Operating Environment

Warning

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2. Our pressure sensor controllers do not have an explosion proof rating. Never use pressure sensors in the presence of flammable or explosive gases.

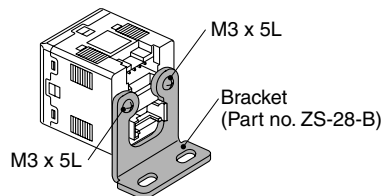
Mounting

Caution

1. Mounting with bracket

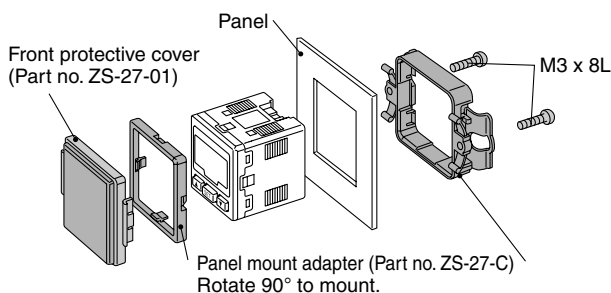
Mount the bracket on the body with two M3 x 5L mounting screws.

Tighten the bracket mounting screws at a tightening torque of 0.5 to 0.7 N·m.



2. Mounting with panel mount adapter

Secure the panel mount adapter with two M3 x 8L mounting screws.

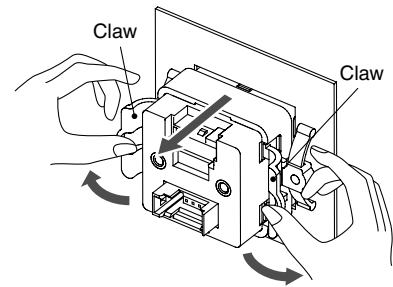


Mounting

3. Panel mount adapter removal

To remove the controller with panel mount adapter from the equipment, remove the two mounting screws, and pull out the controller while pushing the claws outward.

Failure to follow this procedure can cause damage to the controller and panel mount adapter.

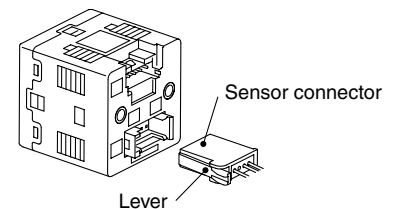


Wiring

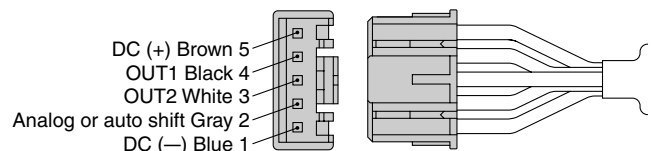
Caution

1. Connection and removal of sensor connector

- Hold the lever and connector body with two fingers and insert the connector straight into the pin until it is locked with a click sound.
- To remove the connector, pull it out straight while pressing the lever with one finger.



2. Connector pin numbers for power supply/output





Series *PSE*

Specific Product Precautions 3

Be sure to read before handling.

Set Differential Pressure Range & Rated Differential Pressure Range

Caution

Set the pressure within the rated differential pressure range.

The set differential pressure range is the range of differential pressure that can be set on the controller. The rated differential pressure range is the range of differential pressure that satisfies the specifications (accuracy, linearity, etc.) of the sensor.

Although it is possible to set a value outside the rated differential pressure range, the specifications will not be guaranteed even if the valve stays within the set differential pressure range.

Sensor		Pressure range				
		-2 kPa	0	2 kPa	5 kPa	10 kPa
For low differential pressure	PSE550		0	2 kPa		
			-0.2 kPa	2 kPa		

Rated differential pressure range of sensor
 Set differential pressure range of controller

ZSE
ISE

PSE

ZSE3

PS

ZSE1
ZSE2

ZSP

ISA2

IS

ZSM

PF2

IF

Data