For General Pneumatics

Remote Controlled
High Accuracy Pressure Sensor
Digital Pressure Switch
Series PSE

Control pressure from a remote location

Controller with easy to read large 4 digits LED display

Series PSE100

Display resolution of controller: 1/1000

Switch output responds to small pressure changes.

2CH X 2 outputs

One controller can process the information from two separate pressure sensors.

Various output modes

Applicable to hysteresis mode, reversed output hysteresis mode, window comparator mode and reversed window comparator mode.

Display units

Display unit can be easily selected and changed.

Vacuum / Positive pressure (Low pressure)	kPa ⇔ mmHg ⇔ kgf/cm^2 ⇔ bar ⇔ InHg
Positive pressure (High pressure)	kPa ⇔ MPa ⇔ kgf/cm^2 ⇔ bar

Self diagnosis

Detects broken connection between sensor and controller, excessive current and excessive pressure.

Panel and DIN rail mount

User interface front plate is rated IP66.

Auto preset function

The controller reads the adsorption/no adsorption points and adjusts the setpoints for optimum performance.

Auto shift function

External reset input allows to reset the zero point and shift the setpoints accordingly.

Compact and lightweight pressure sensor for pneumatic applications

Series PSE510

General purpose pressure sensor applicable for a variety of fluids

Series PSE520

Extremely compact: 13W X 10H X 30Lmm (Excluding process connection)

Lightweight: 12g

Compact and lightweight allows the sensor to be mounted where needed, e.g. as an adsorption confirmation sensor close to a vacuum pad.

Quick response

Due to its miniature size and weight the sensor can be located close to the detection area. Response delays due to piping volume are therefore avoided.

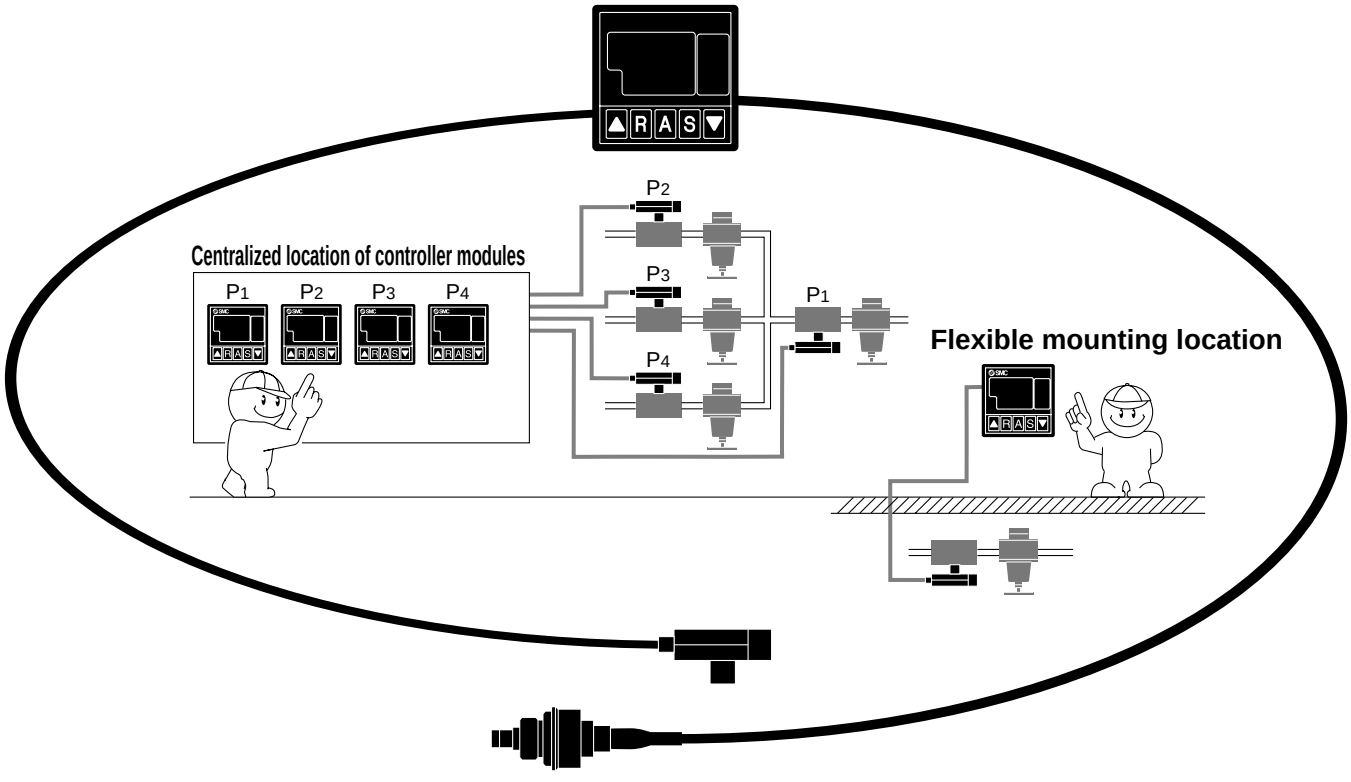
4 different process connections

Process connection is available to easily mount reducer or thread styles, M5, R(PT)$^{1}/_{8}$, NPTF$^{1}/_{8}$.

Stainless steel diaphragm

The use of stainless steel for all wetted parts (SUS630 for diaphragm, SUS304 for fitting) allows this sensor to be used in a wide variety of gas and fluid applications.

IP65 rating for enclosures



Pressure Sensor
For General Pneumatic Applications
Series PSE 510

How to Order

PSE51 □ — □ — Q

Operating pressure

0	High pressure (0 to 1 MPa)
1	Vacuum (–101 to 0 kPa)
2	Low pressure (0 to 100 kPa)

Porting

R06	ø6 reducer
M5	M5 X 0.8
01	R(PT) 1/8, M5
T01	NPTF 1/8, M5

Sensor Specifications/General Pneumatic Applications

Model		**PSE510-□**	**PSE511-□**	**PSE512-□**
Operating pressure range		0 to 1 MPa	–101 to 0kPa	0 to 100kPa
Max. pressure		1MPa	200kPa	
Fluid		Air, Non corrosive gases		
Output specification		Analog (1 to 5V, Load impedance: 10kΩ or more)		
Supply voltage		12 to 24V DC (Ripple ± 10% or less)		
Current consumption		10mA or less		
Operating temperature range		0 to 50°C (No condensation)		
Temperature characteristics (25°C standard)	**25 ± 10°C**	± 1%F.S. or less		
	0 to 50°C	± 1.5% F.S. or less		
Repeatability		± 0.3% F.S. or less		
Voltage resistance		Between external terminal and housing 1000V AC, 50/60Hz for 1 min.		
Insulation resistance		Between external terminal and housing 2MΩ (500V DC by megameter)		
Vibration resistance		10 to 500Hz Pulse width: 1.5mm or acceleration 98 m/s^2 (at the smaller vibration) to X, Y, Z direction (2 hours)		
Shock resistance		980 m/s^2 to X, Y, Z direction (3 times for each direction)		
Protective construction		IP40		

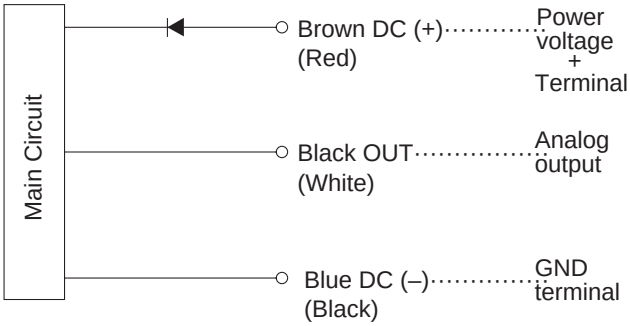
Note) When pressure sensor PSE510 series is connected to controller PSE100 series, display range is as series PSE100.

Process Connection

Model		**R06**	**M5**	**01**	**T01**
Material	**Housing**	Resin housing: PBT	Resin housing: PBT Fitting: Stainless steel (SUS303)	Resin housing: PBT Fitting: C3604BD (Electroless nickel plated)	Resin housing: PBT Fitting: C3604BD (Electroless nickel plated)
	Pressure sensor area	Pressure sensor: Silicon, O ring: NBR			
Lead wire		Oil proof vinyl insulation ø2.55, 0.15mm^2 X 3 wire (Brown, Blue, Black) 3000mm			
Port size		ø6 reducer	M5	R(PT) 1/8, M5	NPTF1/8, M5
Weight (Excluding lead wire)		Approx. 7g	Approx. 10g	Approx. 12g	

Internal Circuit

Lead wire colours inside ( ) are those prior to conformity with IEC standards.

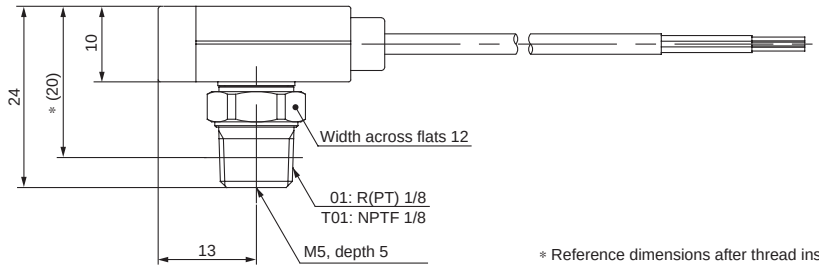


⚠Caution

Be sure to read before handling. Refer to p.0-26 and 0-27 for Safety Instructions and common precautions on the products mentioned in this catalogue, and refer to p.3.0-7 to 3.0-9 for precautions on every series.

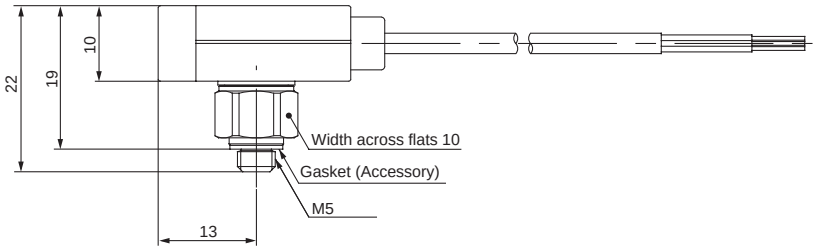
Dimensions

01, T01

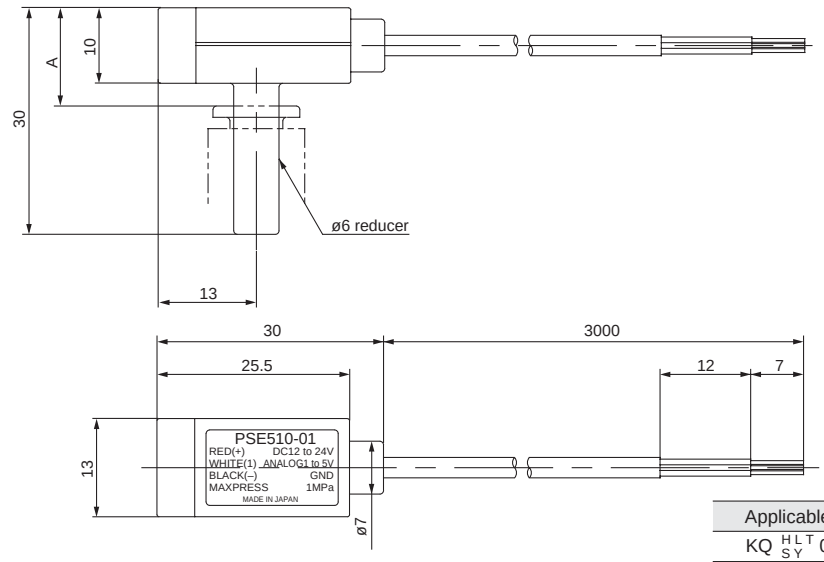


∗ Reference dimensions after thread installation

M5



R06



Applicable fitting	A
KQ $^{H\,L\,T}_{S\,Y}$ 06-M5	16
Other series KQ, KS	13
KJ Series	14.5
KJ (-X20) Series	16

Pressure Sensor

For General Purpose Fluid Applications

Series PSE520

How to Order

PSE52 0 — □ — Q

Operating pressure

0	High pressure (0 to 1 MPa)

Porting

01	R(PT) 1/8, M5 X 0.8
02	R(PT) 1/4, M5 X 0.8
T01	NPTF 1/8, M5 X 0.8
T02	NPTF 1/4, M5 X 0.8

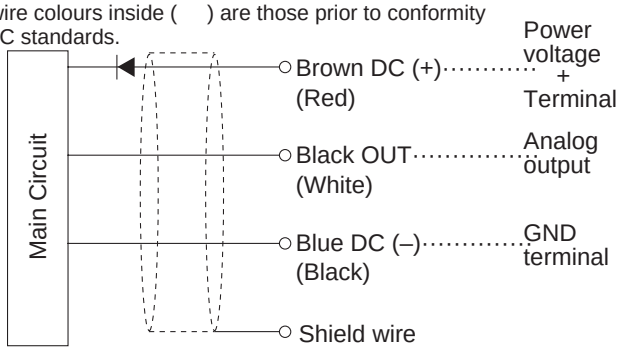
Sensor Specifications/General Purpose Fluid Applications

Model		PSE520-01	PSE520-02	PSE520-T01	PSE520-T02
Operating pressure range		0 to 1 MPa			
Max. pressure		2MPa			
Fluid		Fluid non corrosive to SUS304, SUS630			
Output specification		Analog (1 to 5V, Load impedance: 10kΩ or more)			
Supply voltage		12 to 24 V DC (Ripple ± 10% or less)			
Current consumption		15mA or less			
Operating temperature range		–10 to 70°C (No condensation or frost formation)			
Temperature characteristics (25°C standard)	25 ± 10°C	± 1% F.S. or less			
	–10 to 70°C	± 3% F.S. or less			
Repeatability		± 0.3% F.S. or less			
Voltage resistance		Between GND terminal and housing 250V AC for 1 min.			
Insulation resistance		Between external terminal and housing 100MΩ (50V DC by megameter)			
Vibration resistance		10 to 55Hz Pulse width: 1.5mm to X, Y, Z direction (2 hours)			
Shock resistance		294 m/s^2 (11ms or less) to X, Y, Z direction (3 times for each direction)			
Protective construction		IP65			
Material	Housing	Housing: Stainless steel (SUS304), Fitting: Stainless steel (SUS304)			
	Pressure sensor area	Diaphragm: Stainless steel (SUS630)			
Lead wire		Special elastic polyvinyl chloride ø6, 0.34mm^2, 3 wire, 3000mm			
Port size		R(PT)1/8, M5	R(PT)1/4, M5	NPTF1/8, M5	NPTF1/4, M5
Weight		Approx. 220g			

Note) When pressure sensor PSE 520 series is connected to controller PSE100 series, display range is as PSE100 series.

Internal Circuit

Lead wire colours inside ( ) are those prior to conformity with IEC standards.

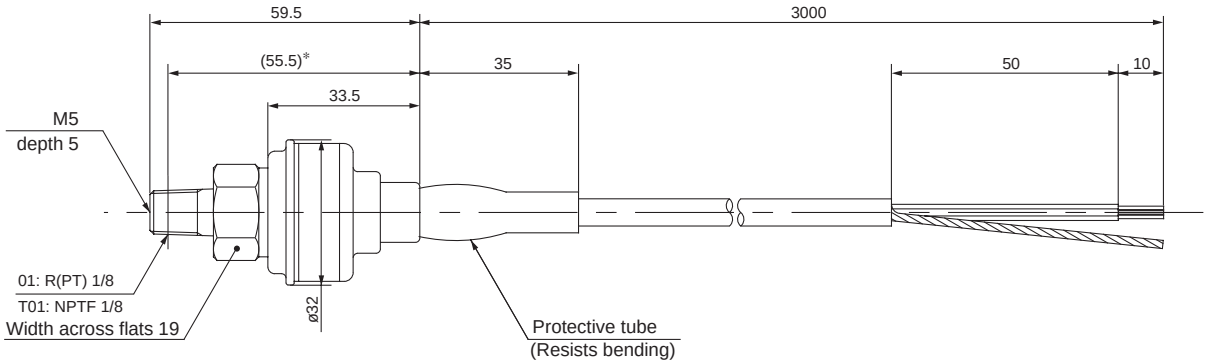


⚠ Caution

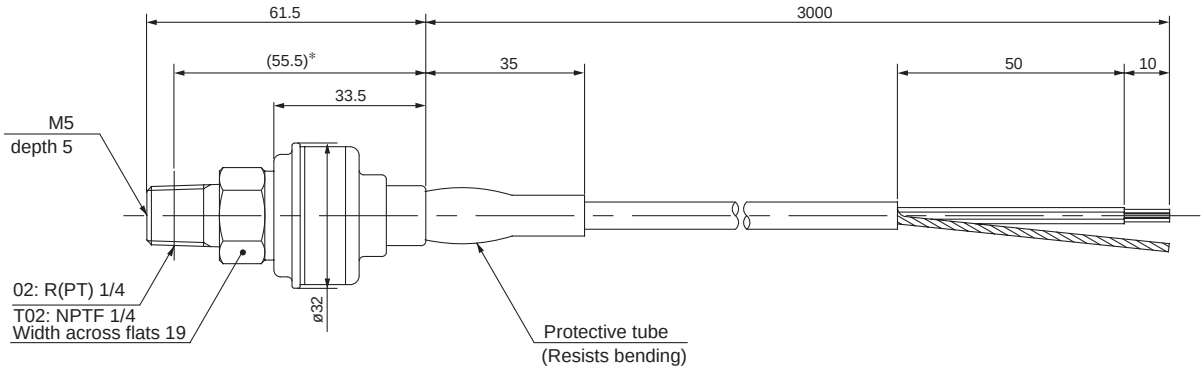
Be sure to read before handling. Refer to p.0-26 and 0-27 for Safety Instructions and common precautions on the products mentioned in this catalogue, and refer to p.3.0-7 to 3.0-9 for precautions on every series.

Dimensions

PSE520-01, T01



PSE520-02, T02



∗ Reference dimensions after thread installation

Controller
Series PSE100

How to Order

PSE10 □ — □ □ – Q

Output specifications

0	NPN output
1	PNP output

Option

—	Without cover
C	With cover

Mounting

A	Panel mounting
B	Wall mounting, DIN rail*

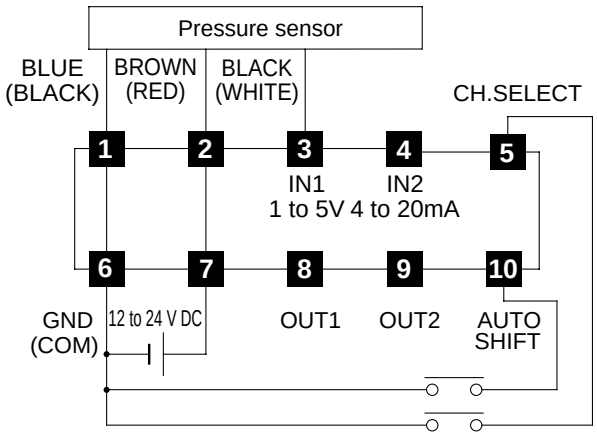
*Refer to p.3.1-14 for DIN rail part number.

Controller Specifications

Model		PSE100-□	PSE101-□
Output specifications		NPN Open Collector 30V 80mA max.	PNP Open Collector 80mA max.
Number of outputs		2CH X 2 outputs	
Pressure display range		–101 to 10kPa (For vacuum), –10 to 100kPa (For low press.), –0.1 to 1MPa (For high press.)	
Display resolution		0.1kPa (For vacuum, low pressure), 1kPa (For high pressure)	
Display unit	For vacuum pressure and low pressure	kPa, mmHg, kgf/cm^2, bar, InHg	
	For high pressure	kPa, MPa, kgf/cm^2, bar	
Operating display		Light at ON. (Switch output 1: Green, Switch output 2: Red)	
Frequency response		100Hz (10ms)	
Hysteresis		Hysteresis mode: Variable, Window comparator mode: Fixed (2% F.S.)	
Temp characteristics (25°C standard)	25 ± 10°C	±0.3% F.S. or less	
	0 to 50°C	±0.5% F.S. or less	
Repeatability		±0.2% F.S. or less	
Supply voltage		12 to 24V DC (Ripple ±10% or less)	
Current consumption		250mA or less	
Error display		Error display at 7 segment LED	
Display specifications		4 figures X 2, 7 segment LED dispay, Sampling cycle 4 times/sec.	
Self diagnostic function		Excess pressure, Excess current, NO sensor connection, Data error (Pressure presence at zero clear)	
Additional function		Auto preset: Possible to set adsorption confirmation by pressing button only.	
		Auto shift: Possible to zero clear by input terminal	
Operating temperature range		0 to 50°C (No condensation)	
Noise resistance		500Vp-p, Pulse width 1μs, Standing 1ns	
Voltage resistance		Between external terminal and case 1000V AC, 50/60Hz for 1 min.	
Insulation resistance		Between external terminal and case 2MΩ (500V DC by megameter)	
Vibration resistance		10 to 500Hz Width: 1.5mm or acceleration 98m/s^2 (at the smaller vibration) to X, Y, Z direction (2 hours)	
Shock resistance		980m/s^2 to X, Y, Z direction (3 times for each direction)	
Protective construction		Panel mounting type: IP66 (Used gasket at panel mount part only), Wall mounting, DIN rail type: IP40	
Mounting		A: Panel mounting, B: Wall mounting, DIN rail	
Weight		A: Approx. 90g B: Approx. 110 g	
Sensor connection	Supply voltage	Same as power supply	
	Voltage input	1 to 5V (Input impedance 100KΩ)	
	Current input	4 to 20mA (Input impedance 250Ω)	

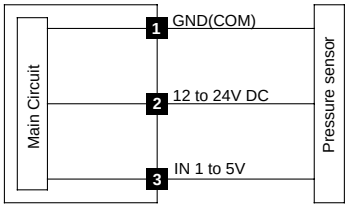
Input/Output Circuit and Connection

Connection diagram

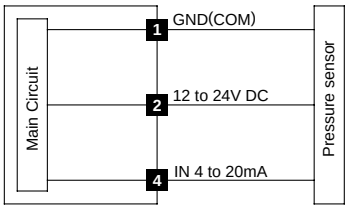


Sensor connection

Voltage input type

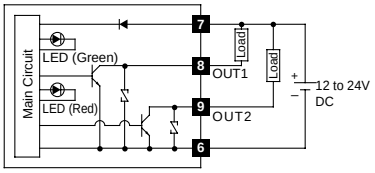


Current input type

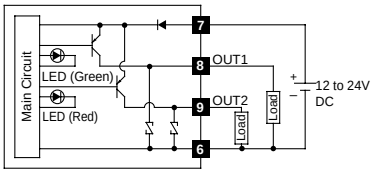


Input/Output circuit diagram

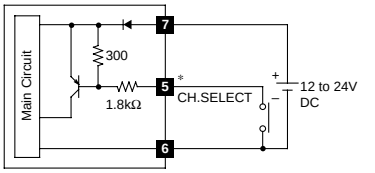
NPN output circuit diagram



PNP output circuit diagram



Input circuit diagram (Autoshift, channel selection)



*Same as **10** AUTO SHIFT.

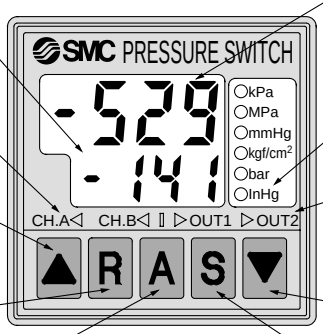
How to use the auto shift function

Connect the autoshift terminal **10** to GND **6**. This forces the unit to accept a new zero point, the display will indicate "0". After disconnecting the autoshift terminal from GND, the display will indicate relative pressure based on the new zero point.
Note) To invoke the autoshift function the autoshift terminal has to be connected to GND for at least 10 msec. LED1 will display "0" during connection to GND.

How to select channel

When CH.SELECT terminal **5** is open, channel A is selected. When it is connected to GND **6**, channel B is selected.
Note) There is a 10 msec. time delay from making contact and the actual selection of the channel.

Description



Display of peak, bottom and absolute pressure
(LED2)

Display of present pressure
(LED1)

Display of channels

Display of units

UP button (▲)
Increases calibration value.

Display of outputs
Light turns on when output is ON.

Reset button (R)
Clears abnormality. Displays "0".

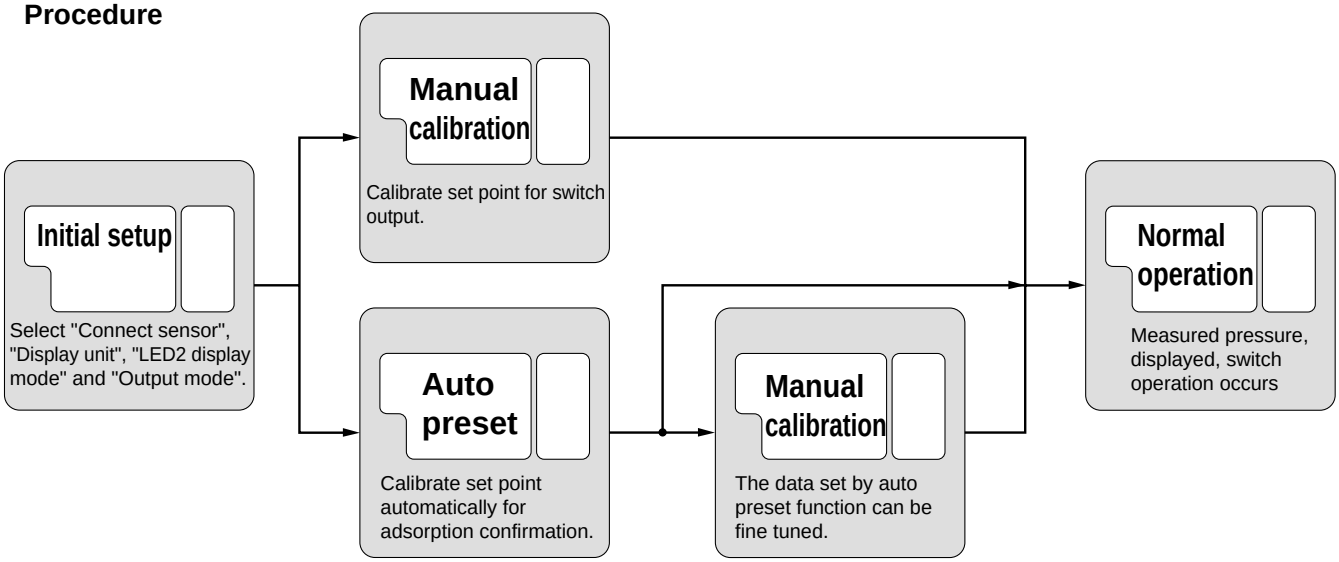
DOWN button (▼)
Decreases calibration values.

Auto preset button (A)
Reads present pressure directly.

Set button (S)
Changes calibration value and modes.

Calibration Procedure

Procedure



Method of calibration/1, 2, 3

Table 1 Sensor types and min. display unit

Sensor type \ Display unit	kPa	MPa	mmHg	kgf/cm²	bar	InHg
PSE511(–100kPa)	–0.1	–	–1	–0.001	–0.001	–0.1
PSE512(100kPa)	0.1	–	1	0.001	0.001	0.1
PSE510, 520(1MPa)	1	0.001	–	0.01	0.01	–

Table 2 LED2 display

LED2 (green) display indicates the following 3 mode options.

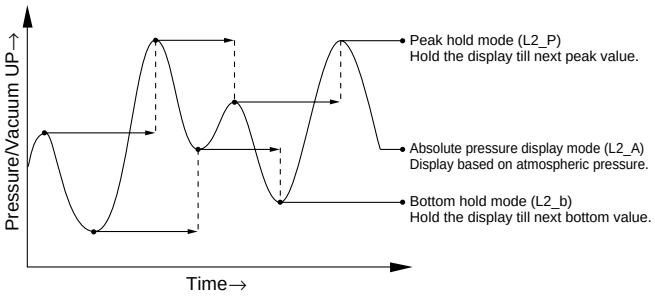
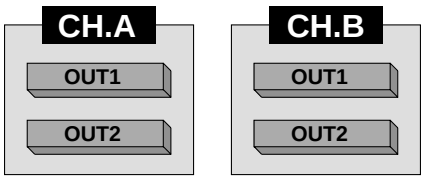


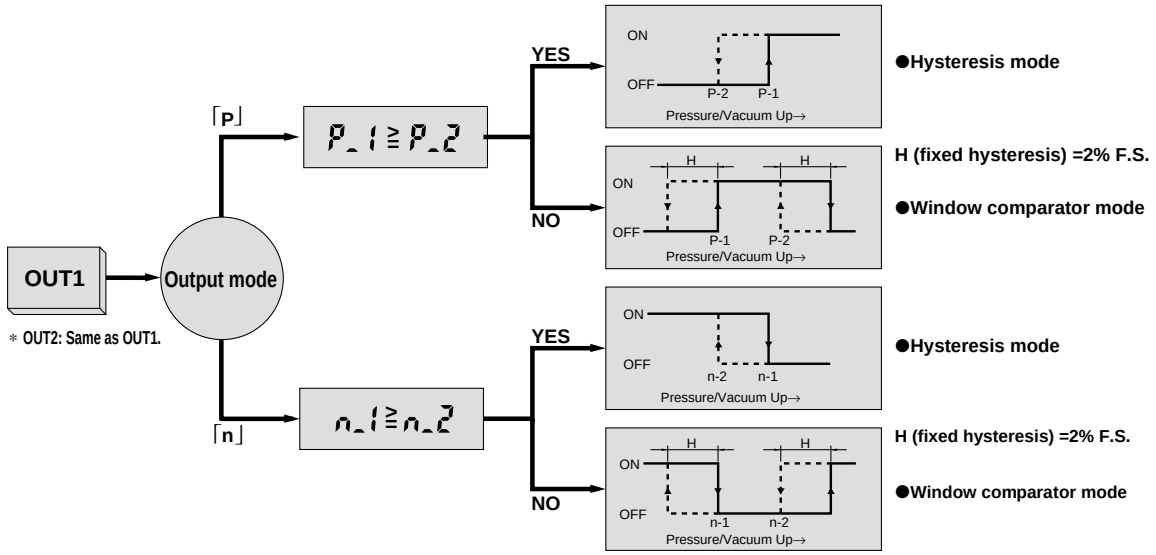
Table 3 Output type

One output type can be selected from 4 types according to output modes and relation of each calibration values.
Two separate outputs, OUT1 and OUT2, can be set per channel and two channels, A and B can be selected from outside.



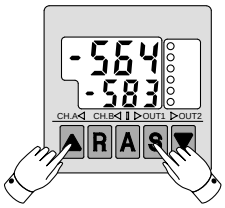
CH.A and **CH.B** can be selected by external signal.

Refer to p.3.1-8 "Channel selection" for further information.



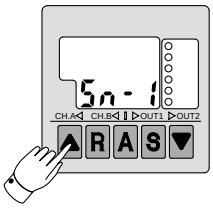
Initial setup

1. Initial setup mode



Press the button "S" at least 3 seconds while holding down the ▲ button.

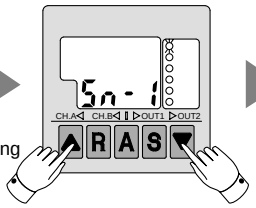
2. Selection of "Connect sensor"



Select "Connect sensor" by pressing the ▲ button.
LED2 display
- Sn -1: PSE511 (For –100kPa)
- Sn 1: PSE512 (For 100kPa)
- Sn 10: PSE510/520 (For 1MPa)

"Display unit" is entered by pressing the button "S".

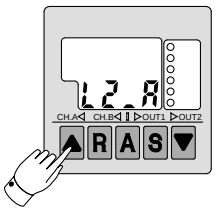
3. Selection of "Display unit"



Select "Display unit" by pressing the ▲ or ▼ button. (Refer to p.3.1-9 **Table1**.)

"LED Display mode" is entered by pressing the button "S".

4. Selection of "LED2 display mode"

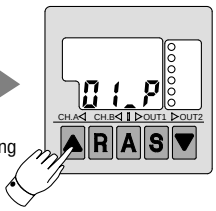


Select "LED2 display mode" by pressing the ▲ button.
LED2 display
- L2_A: Absolute pressure
- L2_P: Peak hold
- L2_b: Bottom hold

(Refer to p.3.1-9 **Table 2**.)

"Output mode" is entered by pressing the button "S".

5. Selection of "OUT1 output mode"

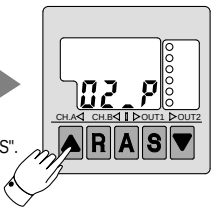


Select "OUT1 output mode" by pressing the ▲ button.
LED2 display
- O1_P: Normal mode
- O1_n: Reversed output mode

(Refer to p.3.1-9 **Table 3**.)

Press the button "S".

6. Selection of "OUT2 output mode"

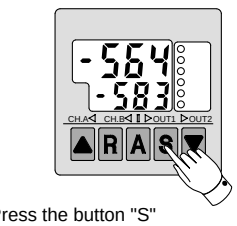


Select "OUT2 output mode" by pressing the ▲ button.
LED2 display
- O2_P: Normal mode
- O2_n: Reversed output mode

By pressing the button "S", the calibration is completed.

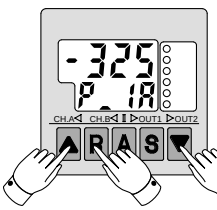
Manual calibration

1. Calibration value input mode (manual)



Press the button "S"
3 seconds or less: Selected channel
3 seconds or more: Not selected channel

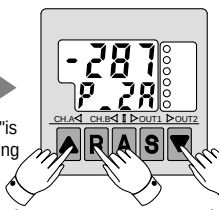
2. Input set point value for OUT1 (1)



▲button: Increase set point value
▼button: Decrease set point value
R button: Reads the pressure value at that moment
(Refer to p.3.1-9 **Table 3**.)

"OUT1(2) mode"is enterd by pressing the button "S"

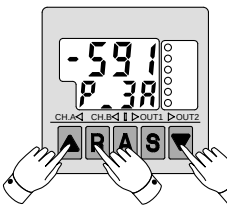
3. Input set point value for OUT1 (2)



▲button: Increase set point value
▼button: Decrease set point value
R button: Reads the pressure value at that moment

"Out2(3) mode" is enterd by pressing the button "S"

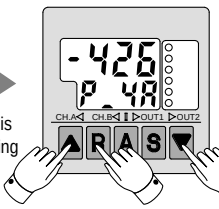
4. Input set point value for OUT2 (3)



▲button: Increase set point value
▼button: Decrease set point value
R button: Reads the pressure value at that moment

"OUT2(4) mode" is entered by pressing the button "S".

5. Input set point value for OUT2 (4)



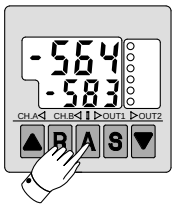
▲button: Increase set point value
▼button: Decrease set point value
R button: Reads the pressure value at that moment

By pressing the button "S" the calibration is completed.

Calibration Procedure

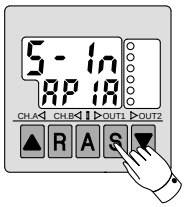
Auto preset

1. Auto preset mode



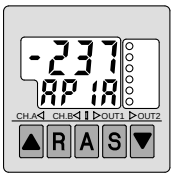
Press the button "A" for 3 to 6 seconds for selected channel, and for more than 6 seconds for not selected channel.

2. Preparation for auto preset



When the initial conditions for adsorption confirmation are met, press the button "S". Press the ▼ button when it is not required to calibrate OUT1.

3. OUT1 auto preset



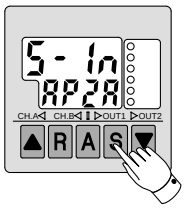
Repeat the steps adsorption and no adsorption several times. This will set the best values automatically.

After pressing button "S", OUT1 auto preset is completed.

(When the button "A" is pressed, calibration is not completed.)

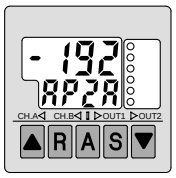
∗ Initial condition for adsorption confirmation means that conditions are met for operation to begin.

4. Preparation for auto preset



When the initial condition for adsorption confirmation are met, press the button "S". Press the ▼ button when it is not required to calibrate OUT2.

5. OUT2 auto preset



Repeat the steps adsorption and no adsorption several times. This will set the best values automatically.

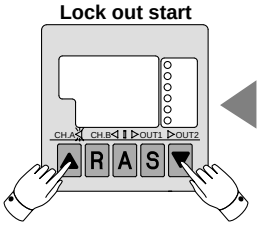
After pressing button "S", OUT2 auto preset is completed.

(When the button "A" is pressed, calibration is not completed.)

Other function

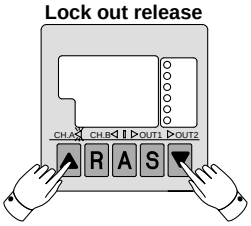
Lock out

Lock out start



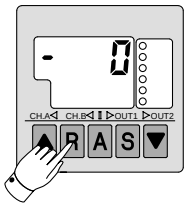
Press the ▼and ▲buttons simultaneously for at least 3 seconds. Display starts to blink.

Lock out release



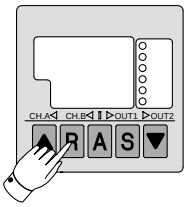
Press the ▲ and ▼buttons simultaneously for at least 3 seconds. Lock out is released. During malfunction lockout is released automatically.

Reset display to "0"



Press the button "R" for at least 3 seconds to reset the display to zero. If pressure is higher than ±2% of rated pressure, reset of the display is not possible.

Clear auto shift



Press the button "R" for at least 2 seconds but no longer than 3 seconds. This clears the auto shift function.

Error Codes

Error codes

Display	Cause	Solution
-FFF	Sensor is not connected.	Connect sensor.
FFFF	Operating pressure over max. limit.	Lower operating pressure.
Err 1	Calibration data lost.	Contact SMC.
Err 2 OU-1	Current draw on Output 1 too high (>120mA).	Check load and/or wiring for Output 1.
Err 2 OU-2	Current draw on Output 2 too high (>120mA).	Check load and/or wiring for Output 2.
Err 2 OU-A	Current draw on Output 1 and 2 too high (>120mA).	Check load and/or wiring for Output 1 and 2.
- - - -	Pressure is 2% above rated pressure during 0 clear.	Apply atmospheric pressure then do 0 clear.

⚠ Precautions

Be sure to read before handling. Refer to p.0-26 and 0-27 for Safety Instructions and common precautions on the products mentioned in this catalogue, and refer to p.3.0-7 to 3.0-9 for precautions on every series.

Wiring

⚠Warning

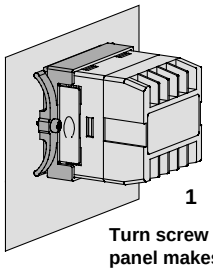
①Connect FG to ground when using switching power supply as a power source.
②Every input signal needs to be longer than 10ms to be recognized by the PSE.

Installation

⚠Caution

①Front plate of the PSE100 meets IP66 rating. However if the panel mount adaptor is used and the instrument is not seated correctly, water might enter.
②As illustrated below, hook the nail located on the bottom of the body on the DIN rail and press down in the direction of the arrow. To remove from the DIN rail lift the switch up with a bladed screw driver, etc. in the direction of the arrow.
③Be careful not to apply excessive force to the wiring during mounting on panel or DIN rail.

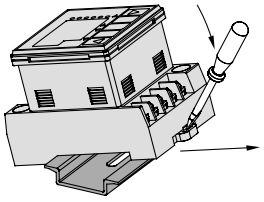
Panel mount



1

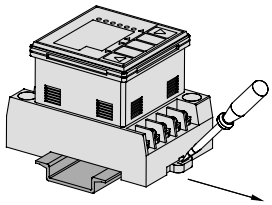
Turn screw 1/4 to 1/2 turn after panel makes contact with the sealing surface of the PSE.

Mounting on DIN rail



2a

Removal from DIN rail



2b

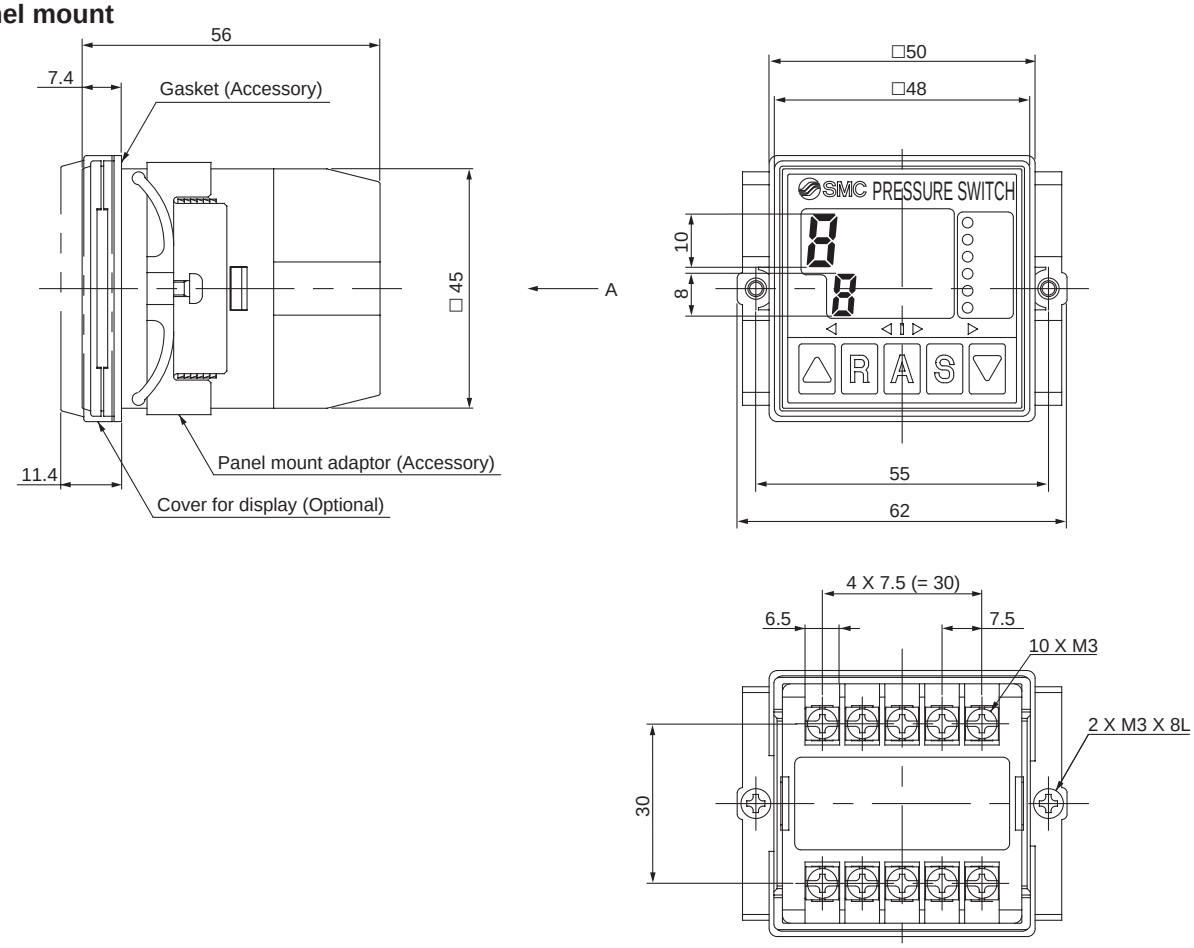
Others

⚠Caution

1. Time delay for power on reset of controller is 0.5 seconds. Be aware that the output circuit is not active immediately after the power is connected.

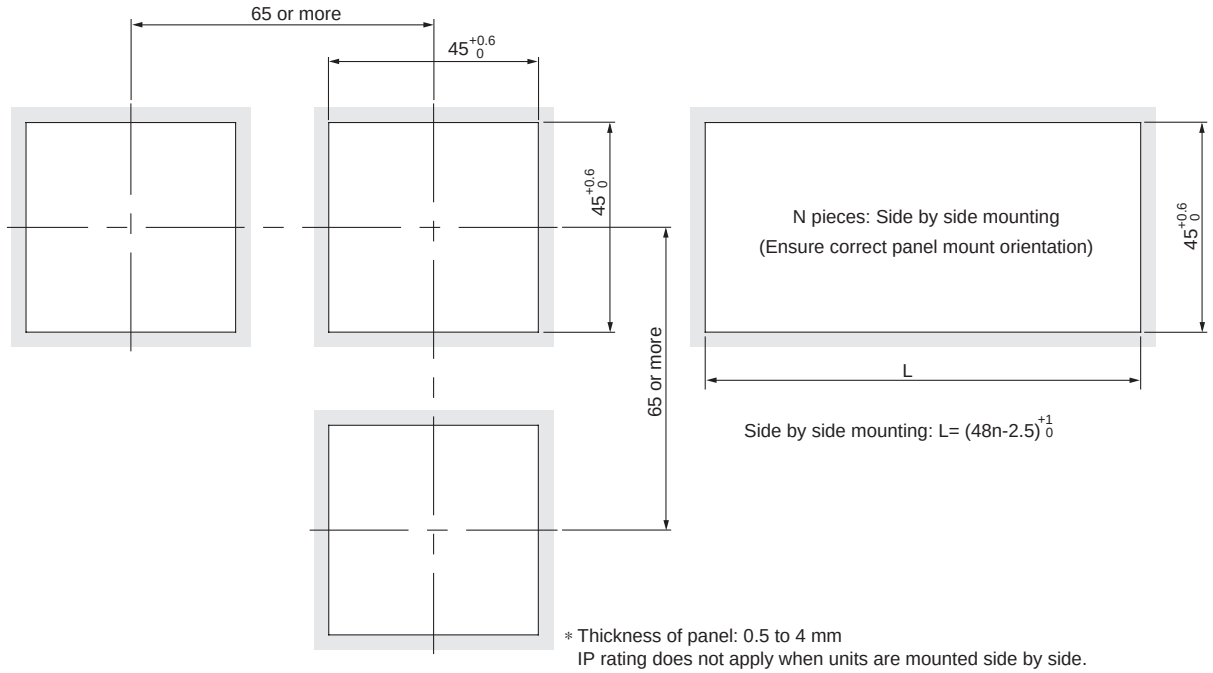
Dimensions

A: Panel mount



View A

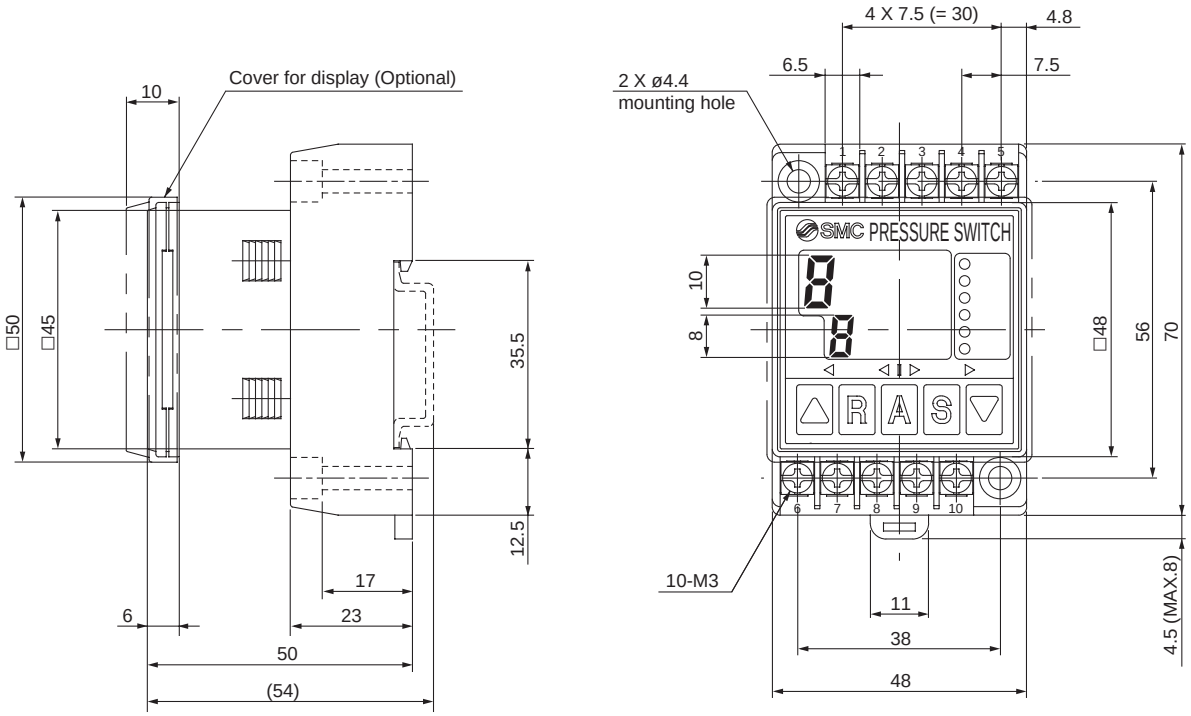
Cutout dimensions for panel mount



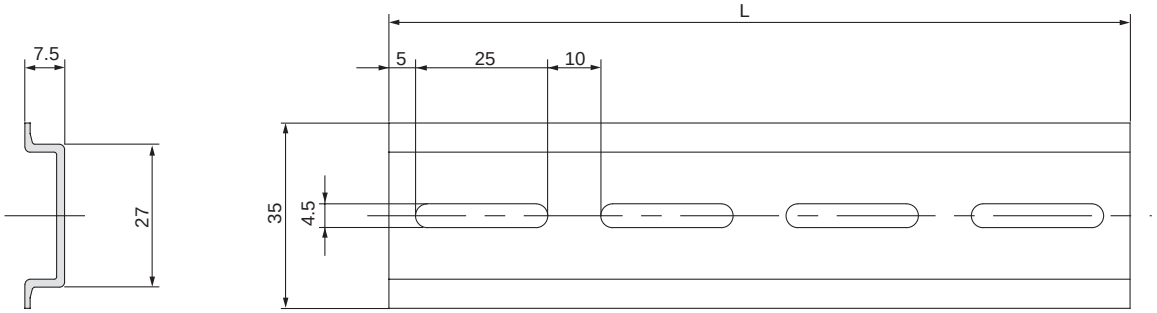
Side by side mounting: L= (48n-2.5) $^{+1}_{0}$

∗ Thickness of panel: 0.5 to 4 mm
IP rating does not apply when units are mounted side by side.

B: Wall mount, DIN rail



DIN rail



Material: Aluminum

Part number of DIN rail

Part number	L
ISA-2-1	105
ISA-2-2	140
ISA-2-3	175
ISA-2-4	210
ISA-2-5	245
ISA-2-6	280
ISA-2-7	315