

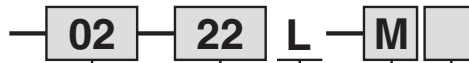
High Precision, Digital Pressure Switch For General Fluids Series ZSE50F/ISE50

How to Order



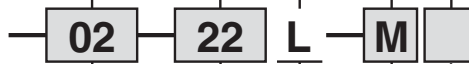
For positive pressure

ISE50



For compound pressure

ZSE50 F



Piping specifications

02	R 1/4 (M5 with female screw), Piping in backward direction
T2	NPT 1/4 (M5 with female screw), Piping in backward direction
G2*	G 1/4 (M5 with female screw), Piping in backward direction

* Option

Input/Output specifications

22	NPN open collector 2 output + Analog output
30	NPN open collector 2 output + Auto shift input
62*	PNP open collector 2 output + Analog output
70*	PNP open collector 2 output + Auto shift input

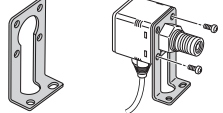
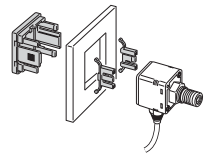
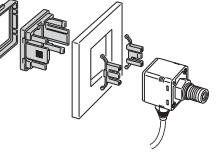
* Option

Note) Auto shift input is used for the auto shift function.
For more information, please refer to "Auto Shift Function" on page 16-2-32.

Lead wire length

L	3 m
----------	-----

Option

Nil	None
A	Bracket A 
D	Bracket D Refer to the dimensions for the difference between brackets A and D.
E	Panel mount 
F	Panel mount + Front protection cover 

Unit specification

Nil	With unit switching function ^{Note 1)}
M	Fixed SI unit ^{Note 2)}

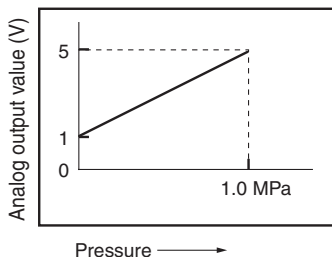
Note 1) Under the New Measurement Law, which has been in effect since October, 1999, sales of switches with the unit conversion function have not been allowed for use in Japan.

Note 2) Fixed units:
For compound pressure : KPa
For positive pressure: MPa

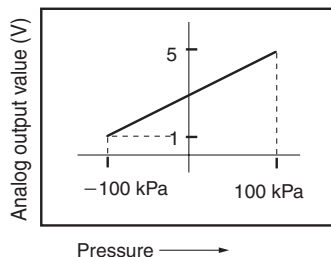
Analog Output

Suitable model: ZSE50F/ISE50-□-22/62(L)-(M)

Series ISE50



Series ZSE50F



Option

When option parts are required separately, use the following part numbers to place an order.

Option	Part no.	Qty.	Note
Bracket A	ZS-24-A	1	With 2 pcs. of mounting screws
Bracket D	ZS-24-D	1	With 2 pcs. of mounting screws
Panel mount	ZS-24-E	1	
Panel mount + Front protection cover	ZS-24-F	1	

High Precision, Digital Pressure Switch for General Fluids Series ZSE50F/ISE50

Specifications

		ZSE50F (Compound pressure)	ISE50 (Positive pressure)
Rated pressure range		-100 to 100 kPa	0.000 to 1.000 MPa
Operating pressure range and regulating pressure range		-100 to 100 kPa	-0.100 to 1.000 MPa
Proof pressure		500 kPa	1.5 MPa
Setting/Display resolution <small>Note 1)</small>	kPa	0.1	—
	MPa	—	0.001
	kg/cm ²	0.001	0.01
	bar	0.001	0.01
	psi	0.02	0.1
	mmHg	1	—
	inHg	0.1	—
Fluid		Fluid that will not corrode stainless steel 630 and 304	
Power supply voltage		12 to 24 VDC, Ripple (p-p) 10% or less	
Current consumption		55 mA or less (With no load)	
Switch output		NPN or PNP 2 output (Max. applied voltage 30 V (NPN), Max. load current 80 mA)	
Repeatability		±0.2% F.S. ±1 digit or less	±0.3% F.S. ±1 digit or less
Hysteresis	Hysteresis mode	Variable (0 or above)	
	Window comparator mode	Fix (3 digits) <small>Note 4)</small>	
Response time		2.5 ms or less (With anti-chattering function: 24 ms, 192 ms, 768 ms or less)	
Output short circuit protection		Yes	
Display		3 1/2 digit LED display (Sampling frequency: 5 times/sec)	
Display accuracy		±2% F.S. ±1 digit or less (With ambient temperature of 25 ±3°C)	
Indicator light		Green LED (OUT1: Light up when ON), Red LED (OUT2: Lights up when ON)	
Analog output <small>Note 2)</small>		Output voltage: 1 to 5 V ±5% F.S. or less	Output voltage: 1 to 5 V ±2.5% F.S. or less
Auto shift input <small>Note 3)</small>		No-voltage input (Solid state switch or reed switch), input 5 ms or more	
Environmental resistance	Enclosure	IP65	
	Ambient temperature range	Operating: 0 to 50°C, Stored: -10 to 60°C (No condensation or freezing)	
	Ambient humidity range	Operating and stored: 35 to 85% RH (No condensation)	
	Withstand voltage	250 VAC for 1 min, between all lead wires and enclosure	
	Insulation resistance	2 MΩ or more (at 50 VDC) between all lead wires and enclosure	
	Vibration resistance	10 to 500 Hz with 1.5 mm amplitude or 98 m/s ² , whichever is smaller	
	Shock resistance	980 m/s ² in X, Y, Z directions 3 times each (Not energized)	
Temperature characteristics		±3% F.S. or less of measured pressure at 25°C in temperature range of 0 to 50°C	
Wetted material		Pressure receiving area: Stainless steel 630, Fittings: Stainless steel 304	
Port size		O2: R 1/4, M5 x 0.8 T2: NPT 1/4, M5 x 0.8	
Lead wire		5-wire oil proof heavy-duty cable (0.15 mm ²)	
Weight		Approx. 120 g (Each including 3 m lead wire)	

Note 1) In case of types with unit conversion function. (Types without unit conversion function are fixed to the SI units (KPa or MPa).)

Note 2) When a type with analog output is selected.

Note 3) When a type with auto shift is selected.

Note 4) 0.03 to 0.04 psi in psi display.

Note 5) Value clear ±0.01 psi in psi display.

Note)

The possible set ranges for types with auto shift function are as follows:

Regulating pressure range	Possible set range
-100.0 to 100.0 kPa	-100.0 to 100.0 kPa
-0.1 to 1.000 MPa	-1.000 to 1.000 MPa

Function

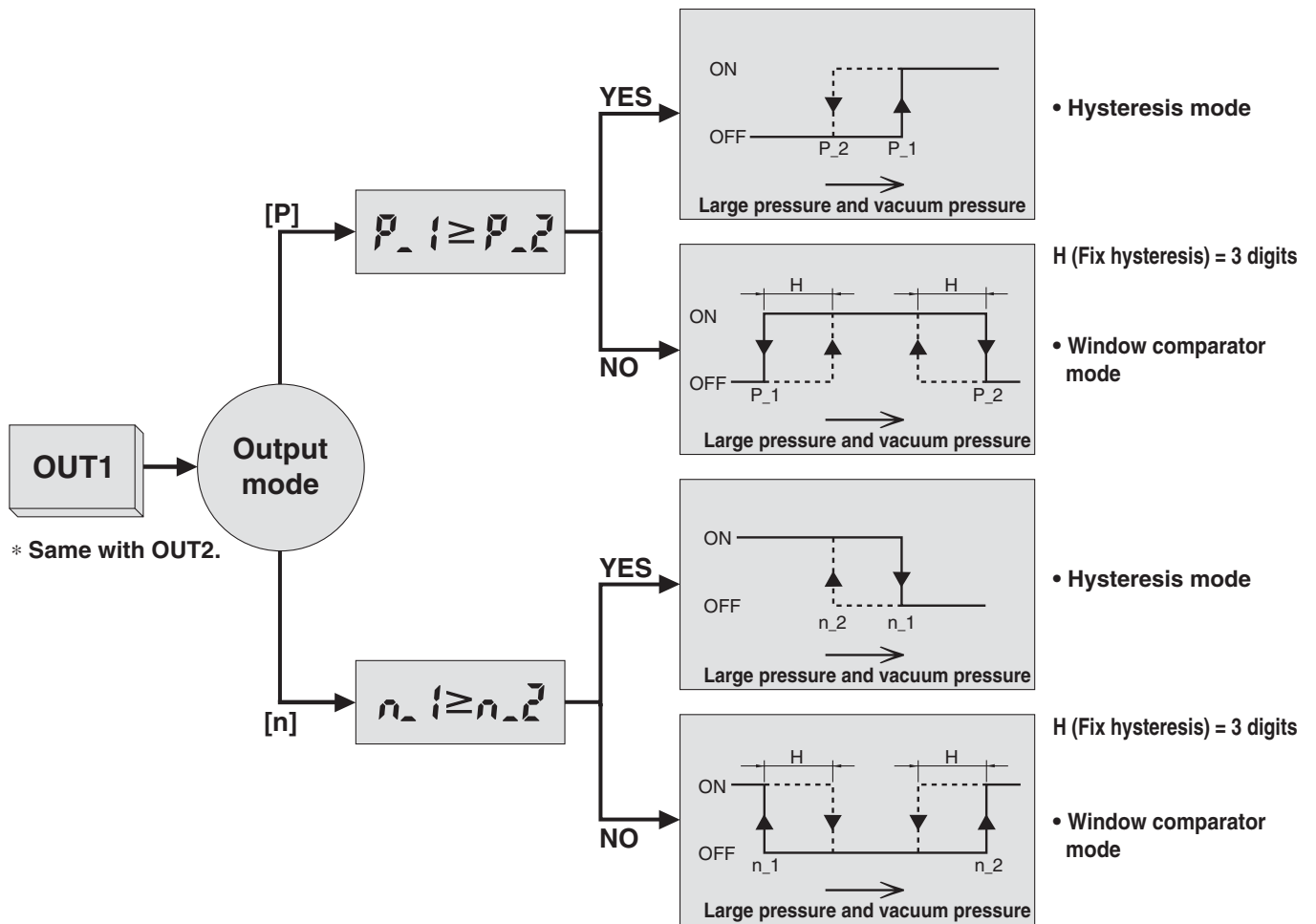
Various additional functions are available for easy measurement, switch operation and check of measured values suitable for the conditions of the measured fluid.

Auto shift function <small>Note 1)</small>	Can correct the pressure set point value of switch output according to fluctuations in the primary pressure.	16-2-32
Anti-chattering function	Prevents malfunction due to sudden fluctuations in the primary pressure by adjusting the response time.	
Key lock function	The key board operation can be locked to prevent incorrect operation on the operation switch.	16-2-43
Peak hold function	Can retain the maximum pressure value displayed during measurement.	
Bottom hold function	Can retain the minimum pressure value displayed during measurement.	
Zero out function	The pressure display can be set at zero when the pressure is open to the atmosphere.	
Unit conversion (for overseas use) <small>Note 1)</small>	Can convert the display value (for overseas use only).	

Note 1) Select and order by specifying the types and models.

Series ZSE50F/ISE50

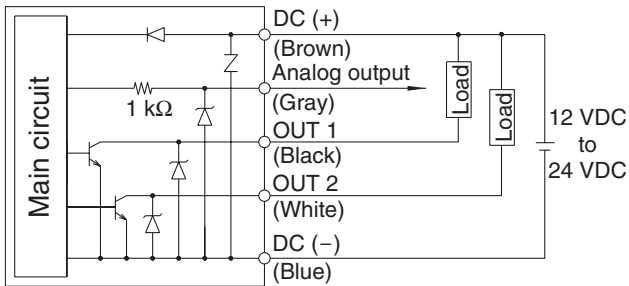
Output Method



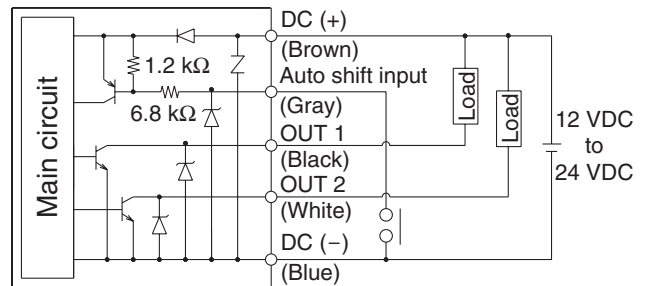
High Precision, Digital Pressure Switch for General Fluids Series ZSE50F/ISE50

Example of Internal Circuit and Wiring

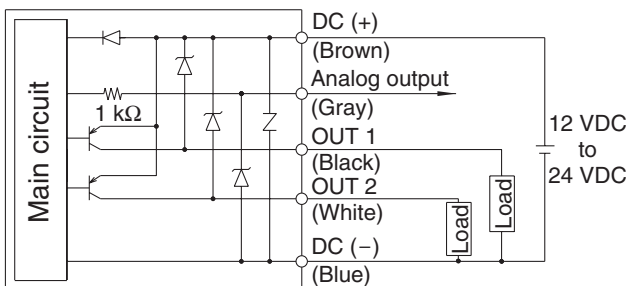
ZSE₆₀⁵⁰ F/ISE₆₀⁵⁰ -□-22(L)-(M)
With analog output



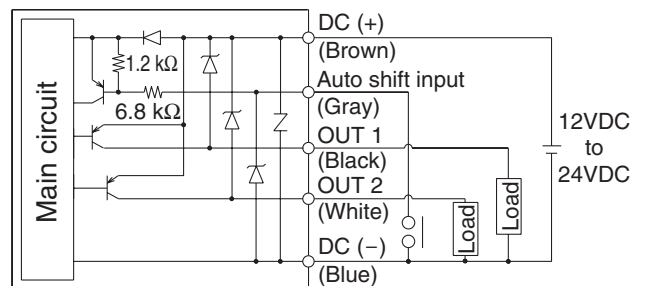
ZSE₆₀⁵⁰ F/ISE₆₀⁵⁰ -□-30(L)-(M)
With auto shift input



ZSE₆₀⁵⁰ F/ISE₆₀⁵⁰ -□-62(L)-(M)
With analog output



ZSE₆₀⁵⁰ F/ISE₆₀⁵⁰ -□-70(L)-(M)
With auto shift input



- ZSE□
- ISE□
- PSE
- ZSE3
- PS
- ZSE₁²
- ZSP
- ISA2
- IS□
- ZSM
- PF2□
- IF□
- Data

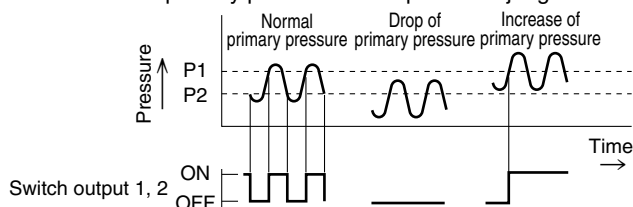
Series ZSE50F/ISE50

Auto Shift Function

This function uses the measured pressure at the time of auto shift input as the reference pressure value and corrects the set point values "P_1" and "P_2" of switch output 1 and "P_3" and "P_4" of switch output 2. "P_1" to "P_4" correspond to "n_1" to "n_4" in case of normally closed circuit.

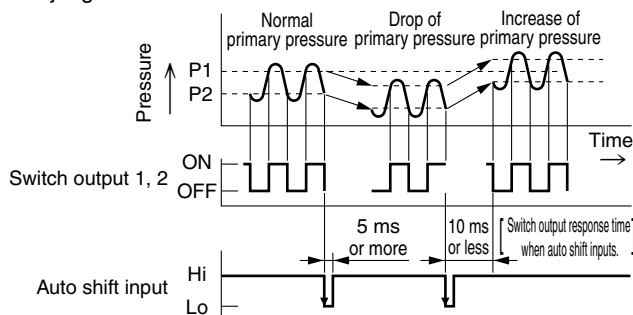
When auto shift is not used:

Fluctuations in the primary pressure interrupt correct judgement.



When auto shift is used:

When the primary pressure changes, set the auto shift function to Lo. The pressure value at this point will be saved as the reference value to correct the pressure set point values in order to make correct judgments.



Auto shift function conditions and explanation

- Keep the pressure constant at least for 5 ms after the last transition signal of auto shift input.
- At the time of auto shift input, the display unit displays "ooo" for about 1 second. The pressure value at this time is saved as the correction value "C_5".
- The set point values "P_1" to "P_4" or "n_1" to "n_4" are corrected based on the saved correction values.
- The time between the auto shift input and start of switch output is 10 ms or less.
- If the set point value corrected by auto shift input falls out of the possible set range, the correction value is not saved. The display will show "UUU" if the set point value is above the upper limit and "LLL" if it is below the lower limit.
- The correction value "C_5" set by auto shift input disappears when the power is turned off.
- The correction value "C_5" for the auto shift function is reset to zero (the initial value) when the power is turned on again.

* The correction value is not stored on the EEPROM.

The possible set range for types with auto shift function is as follows:

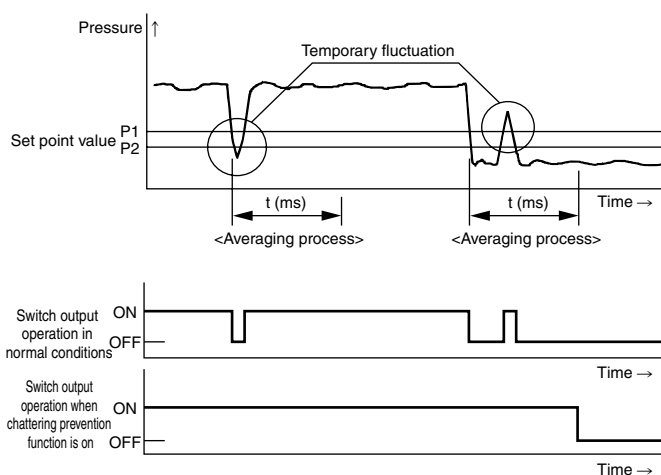
Regulating pressure range	The possible set range for types with auto shift function
-100.0 to 100.0 kPa	-100.0 to 100.0 kPa
-0.1 to 1.000 MPa	-1.000 to 1.000 MPa

Anti-chattering Function

A large bore cylinder or ejector consumes a large amount of air in operation and may experience a temporary drop in the primary pressure. This function prevents detection of such temporary drops in primary pressure as abnormal pressure.

<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.



High Precision, Digital Pressure Switch for General Fluids Series ZSE50F/ISE50

Description

Take the following measures when an error occurs.

Error description		LCD display	Condition	Solution
Over current error	OUT 1	Er1	Load current of switch output is more than 80 mA.	Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on.
	OUT 2	Er2		
Residual pressure error		Er3	Pressure is applied during the zero out operation as follows: $\left[\begin{array}{l} \pm 0.071 \text{ MPa or more with ISE50/60} \\ \pm 7.1 \text{ kPa or more with ZSE50F/60F} \end{array} \right]$ * After displaying for 3 seconds, it will return to the measuring mode.	Bring the pressure back to atmospheric pressure and try using the zero out function.
Applied pressure error		---	Supply pressure exceeds the maximum regulating pressure.	Reduce/increase supply pressure to within the regulating pressure range.
		----	Supply pressure is below the minimum regulating pressure.	
Auto shift error		UUU	The value is above the upper limit of the set pressure * After displaying this message for about 1 seconds, the switch returns to the measurement mode.	Set the pressure again so that the sum of the applied pressure and pressure set point value at the time of auto shift input will not fall out of the set pressure range.
		LLL	The value is below the upper limit of the set pressure * After displaying this message for about 1 seconds, the switch returns to the measurement mode.	
System error		Er4	Internal data error	Shut off the power supply. Turn the power supply back on. If the power should not come back on, please contact SMC for an inspection.
		Er6	Internal data error	
		Er7	Internal data error	
		Er8	Internal data error	

* The upper limits and lower limits are shown in the table below.

	Regulating pressure range	Lower limit	Upper limit
Compound pressure	-100.0 to 100.0 kPa	-100.0 kPa	100.0 kPa
Positive pressure	-0.100 to 1.000 MPa	-0.100 MPa	1.000 MPa
With auto shift function			
	Regulating pressure range	Lower limit	Upper limit
Compound pressure	-100.0 to 100.0 kPa	-100.0 kPa	100.0 kPa
Positive pressure	-1.000 to 1.000 MPa	-1.000 MPa	1.000 MPa

ZSE□
ISE□

PSE

ZSE3
|SE3

PS

ZSE1
|SE2

ZSP

ISA2

IS□

ZSM

PF2□

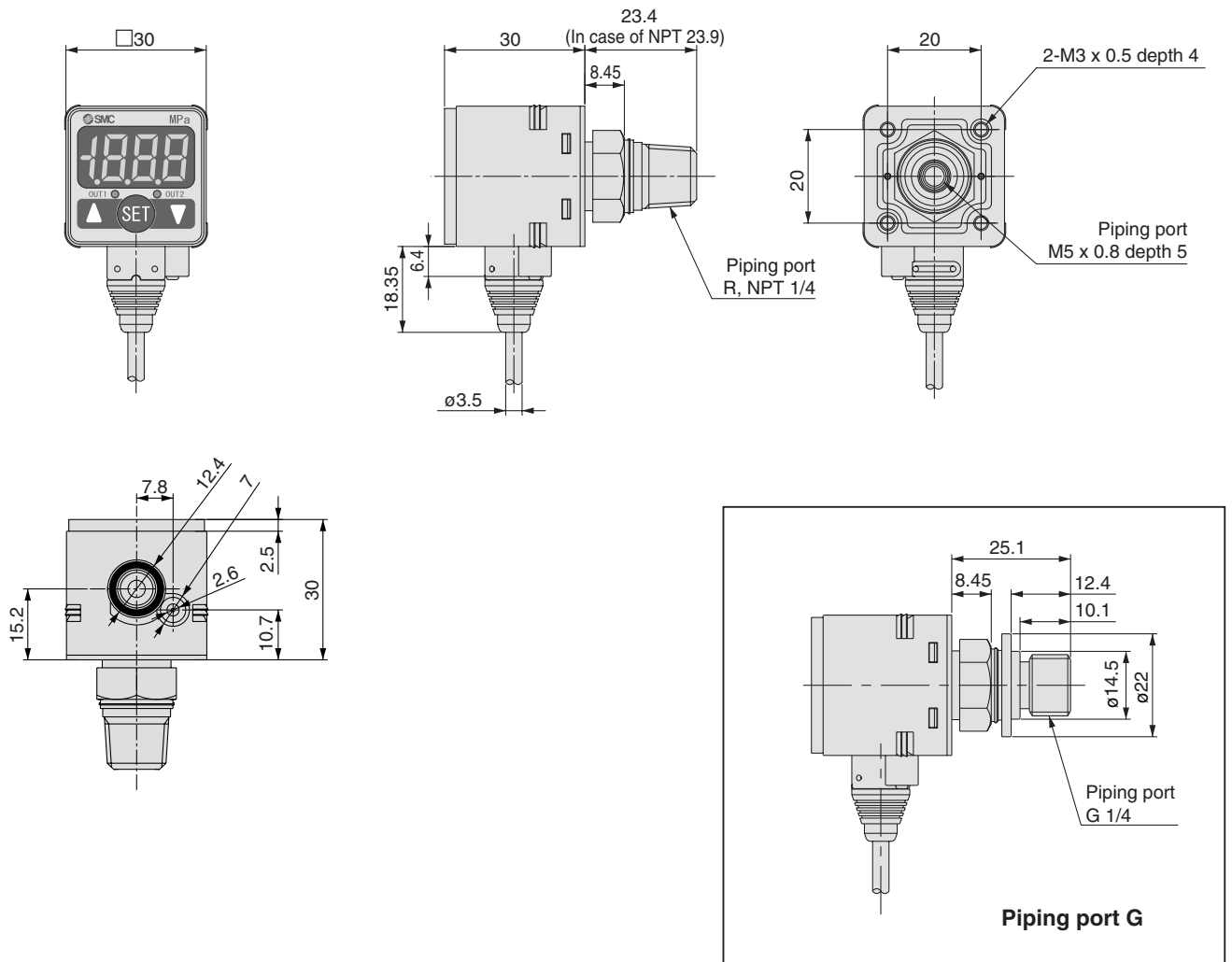
IF□

Data

Series ZSE50F/ISE50

Dimensions

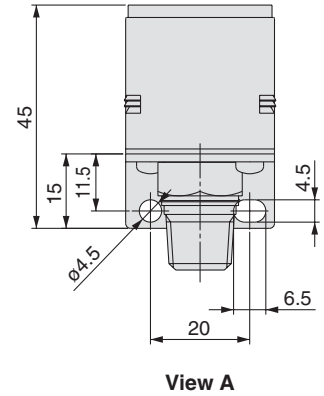
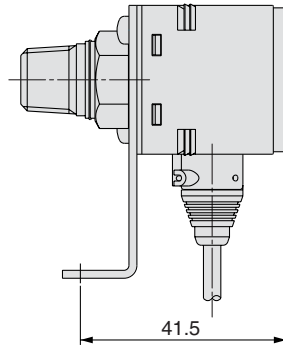
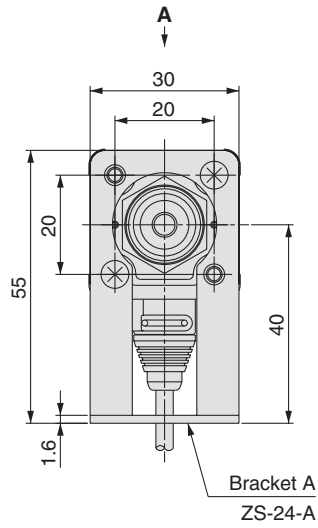
ZSE50F/ISE50-
02
T2
G2



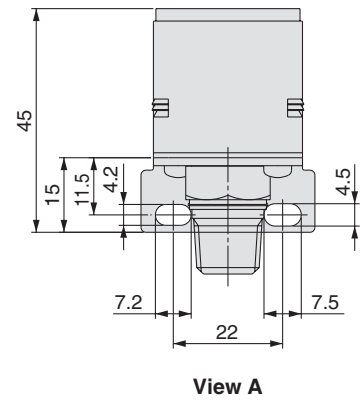
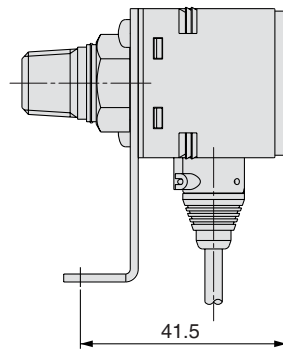
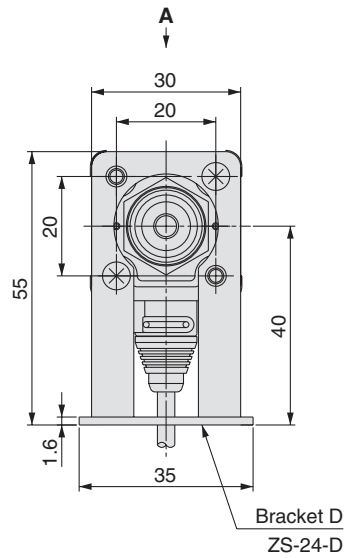
High Precision, Digital Pressure Switch for General Fluids Series ZSE50F/ISE50

Dimensions

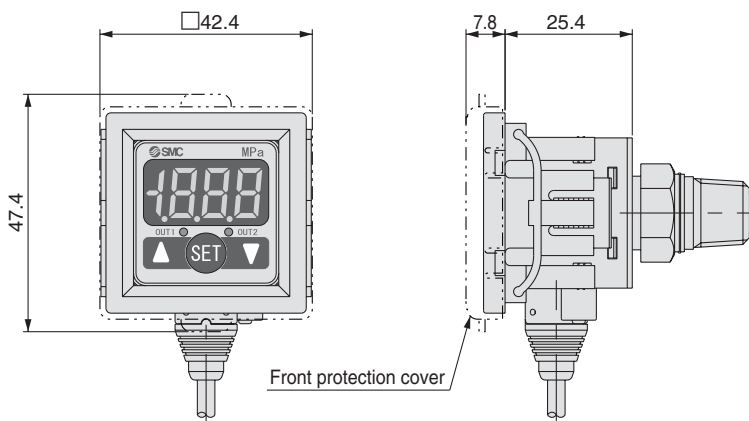
Bracket A



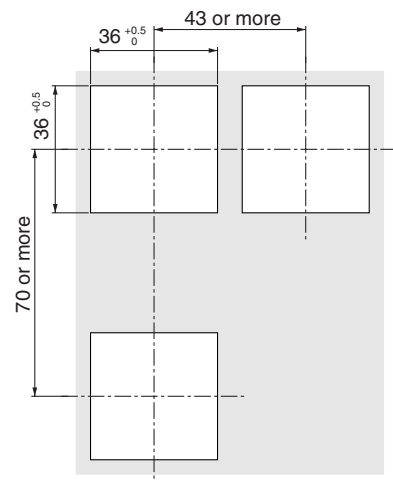
Bracket D



Panel mount



Cutting dimensions for panel mounting

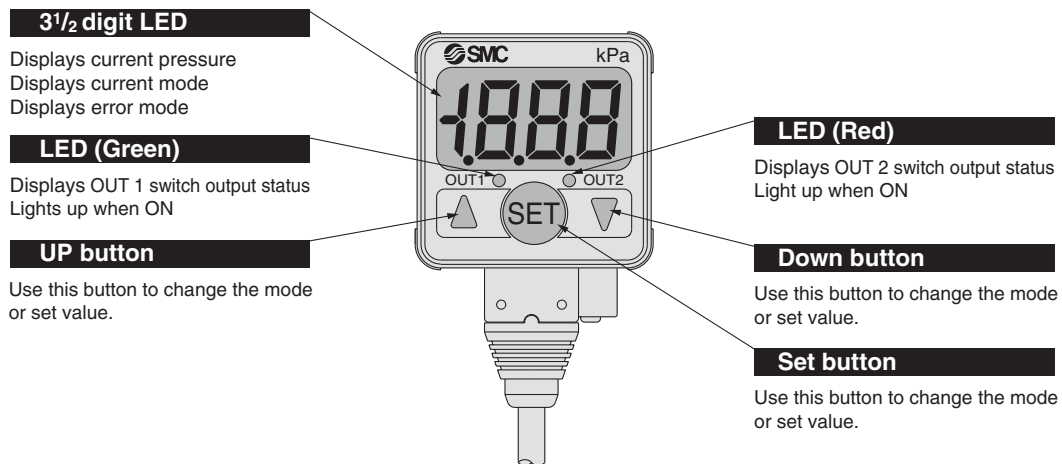


The thickness of the panel is to 3.2 mm.

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

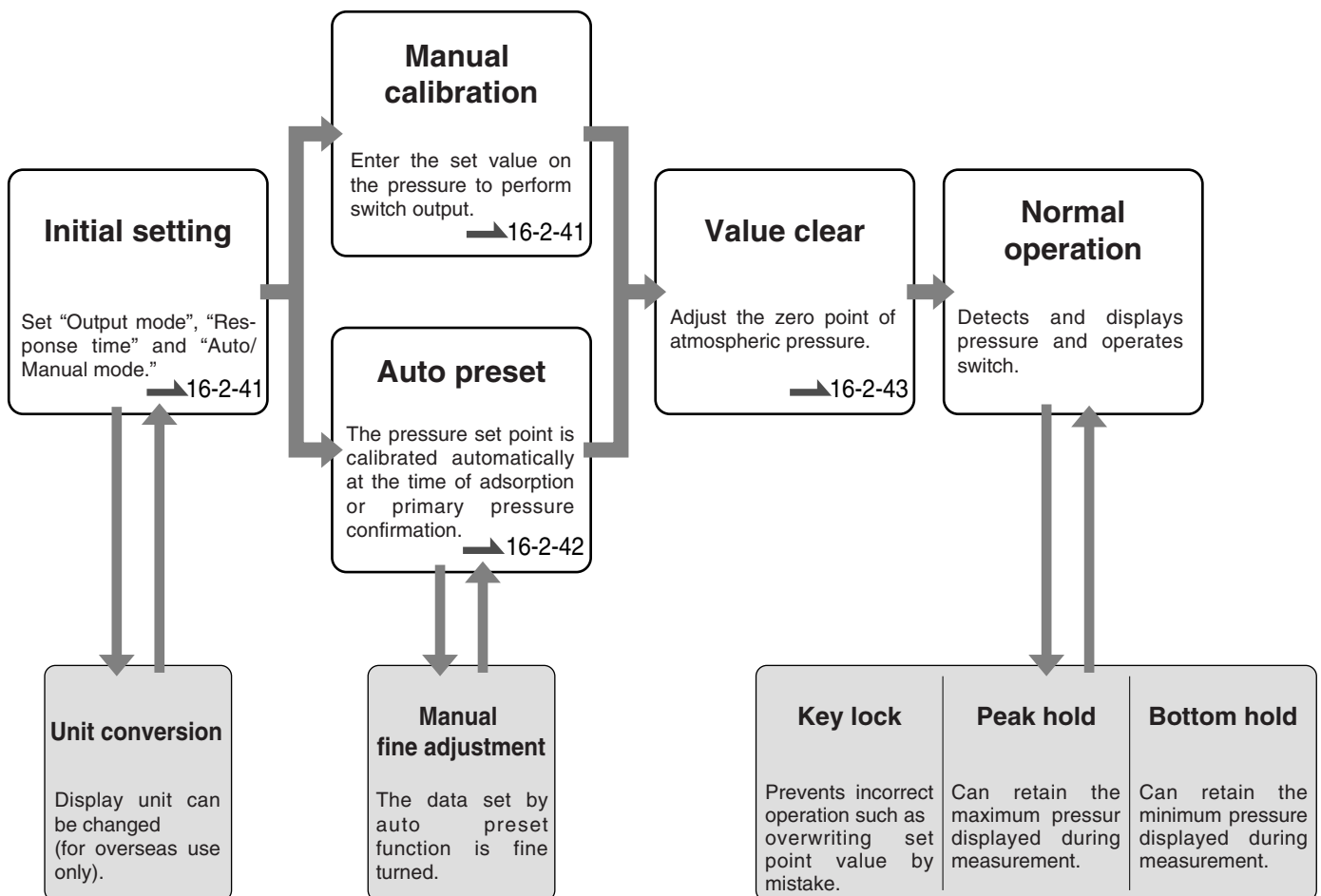
Series ZSE⁵⁰/₆₀F/ISE⁵⁰/₆₀

Description (Common to ZSE50F/ISE50 and ZSE60F/ISE60)



Setting (Common to ZSE50F/ISE50 and ZSE60F/ISE60)

Calibration procedure



Setting (Common to ZSE50F/ISE50 and ZSE60F/ISE60)

Initial setting

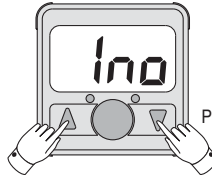
1. Initial setting mode



Press the SET button at least 2 seconds. Release it when the display turns to "1no"

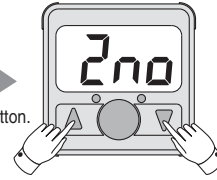
Unit In case of types with specifications: unit conversion function, refer to "Unit setting (for overseas use)" on page 16-2-43.

2. OUT1 output mode selection



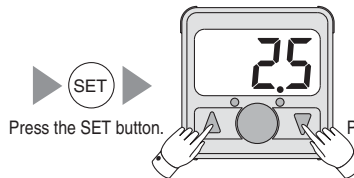
Select the "output mode" of OUT1 with ▲ or ▼ button.
"1no": Normally open mode,
"1nC": Normally closed mode

3. OUT2 output mode selection



Select the "output mode" of OUT2 with ▲ or ▼ button.
"2no": Normally open mode,
"2nC": Normally closed mode

4. Response time selection



Press the SET button.

Set the response time with ▲ or ▼ button.
(Select from "2.5: 2.5 ms," "24: 2.4 ms," "192: 192 ms," and "768: 768 ms.")

5. Auto/Manual setting



Press the SET button.

Press the SET button to complete calibration.

Select the auto preset mode or manual calibration mode with the ▲ or ▼ button.
"AUT": Auto preset mode,
"nRn": Manual calibration mode.

Please refer to "Chattering prevention function" on page 16-2-43.

Manual pressure setting

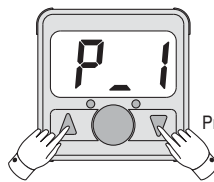
The output method is determined by the pressure set point value.

1. Manual setting mode



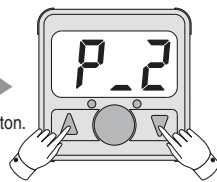
Select the manual setting mode as the initial setting mode. Press the SET button and hold it until "P_1" or "n_1" appears on the display.

2. OUT1 (1) output set point value input



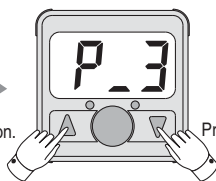
▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_1" or "n_1" and the set point value light up alternately.

3. OUT1 (2) output set point value input



▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_2" or "n_2" and the set point value light up alternately.

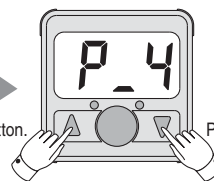
4. OUT2 (1) output set point value input



Press the SET button.

▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_3" or "n_3" and the set point value light up alternately.

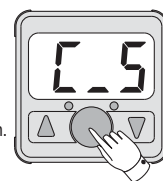
5. OUT2 (2) output set point value input



Press the SET button.

▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_4" or "n_4" and the set point value light up alternately.

6. Auto shift input display



Press the SET button.

Press the SET button to complete calibration.

"C_5" and the correction value light up alternately. In case there has been no auto shift input, zero is displayed.
* Auto shift input is displayed only if auto shift is supported by the I/O specifications (-30/-70). It is not displayed in case of types with analog output (-22/-62).

ZSE□
ISE□

PSE

ZSE3

PS

ZSE1

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data

Setting (Common to ZSE50F/ISE50 and ZSE60F/ISE60)

Auto preset (Example: Adsorption Confirmation)

1. Auto preset mode



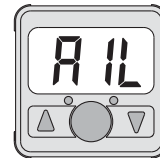
Select auto preset mode as the initial setting mode. Press the SET button and hold it until "RP1" appears on the display.

2. Preparation of auto preset



Prepare the equipment to be set while "RP1" is displayed. If OUT1 setting is not required, press ▲ the ▼ buttons simultaneously to skip to "RP2".

3. OUT1 auto preset



Repeat vacuum and break several times while "A1L" is displayed. The optimum set point value is determined automatically.

4. Preparation of auto preset



Press the SET button.

Change the vacuum nozzle or other conditions of the workpiece and supply vacuum pressure. If OUT2 setting is not required, press the ▲ and ▼ buttons simultaneously to skip to the measurement mode.

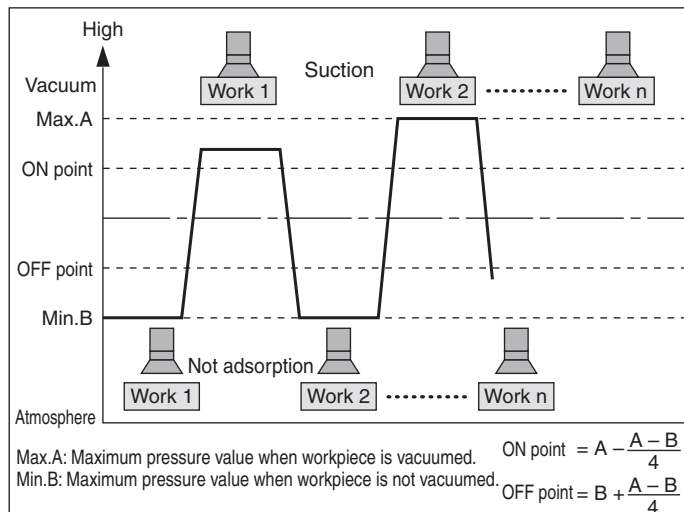
5. OUT2 auto preset



Press the SET button.

Repeat vacuum and break several times while "A2L" is displayed. The optimum set point value is determined automatically.

Press the SET button to complete calibration.



Setting (Common to ZSE50F/ISE50 and ZSE60F/ISE60)

Key lock function

Can prevent incorrect operation of operation buttons on the switch front.

Key lock start



Press the SET button at least 2 seconds. Release it when the display turns to "UnL".



Change the display to "LoC" with the ▲ or ▼ button.

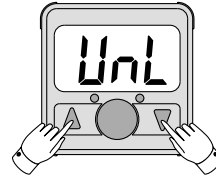


Press the SET button to complete calibration.

Key lock cancel



Press the SET button at least 4 seconds. Release it when the display turns to "LoC".



Change the display to "UnL" with the ▲ or ▼ button.

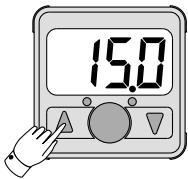


Press the SET button to complete calibration.

Peak/Bottom hold function

Can retain the maximum pressure value displayed (peak value) and minimum pressure value displayed (bottom value) during measurement.

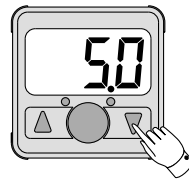
Peak hold



Press the ▲ button at least for 1 second during pressure display to enter the bottom display mode. The displayed value will blink. To return, press the ▼ button again at least for 1 second.

Note) There is no apparent difference between peak display and bottom display.

Bottom hold

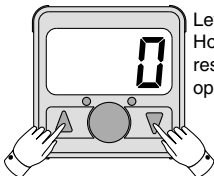


Press the ▲ button at least for 1 second during pressure display to enter the bottom display mode. The displayed value will blink. To return, press the ▼ button again at least for 1 second.

Note) There is no apparent difference between peak display and bottom display.

Zero out

The displayed value can be calibrated at zero if the measured pressure is in the range of ± 70 increments of atmospheric pressure.

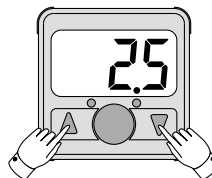


Let the supply pressure open to the atmosphere. Hold both ▲ and ▼ buttons simultaneously to reset the display value to zero. After resetting, the operation returns to the measurement mode.

Unit conversion (for overseas use)

Only for ZSE⁵⁰₆₀F/ISE⁵⁰₆₀-□-□(L)

Unit selection



Press the SET button.

Set the unit with the ▲ or ▼ button.
 FF : kPa or MPa
 CF : kgf/cm²
 bBr : bar
 PS : psi
 iHg : inHg ^{Note 1)}
 mHg : mmHg ^{Note 1)}

Note 1) Calibration is available with series ZSE50 and ZSE60.

OUT1 output mode selection

Goes to 2. OUT1 output mode selection in Initial Setting on page 16-2-41.

ZSE□
ISE□

PSE

ZSE3

PS

ZSE¹₂

ZSP

ISA2

IS□

ZSM

PF2□

IF□

Data



Pressure Switch Precautions

Be sure to read before handling.

Handling

Warning

1. Do not drop, or apply excessive impact (980 m/s²) while handling. Although the body of the sensor may not be damaged, the internal parts of the sensor could be damaged and lead to a malfunction.
2. The tensile strength of the cord is 49 N. Applying a greater pulling force on it can cause a malfunction. When handling, hold the body of the sensor — do not dangle it from the cord.
3. Do not exceed the screw-in torque of 13.6 N·m when installing piping. Exceeding this value may cause malfunctioning of the sensor.
4. Do not use pressure sensors with corrosive and/or flammable gases or liquids.

Connection

Warning

1. Incorrect wiring can damage the switch and cause a malfunction or erroneous switch output.
2. Turn off the power before connecting the wires.
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 lines.
4. If a commercial switching regulator is used, make sure that the F.G. terminal is grounded.

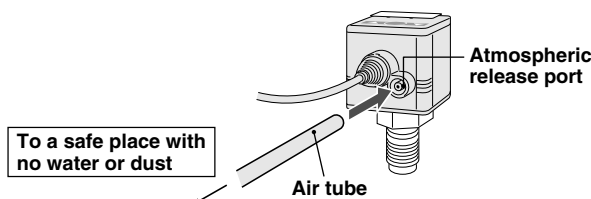
Operating Environment

Warning

1. Our pressure switches 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. Our pressure switches do not have an explosion proof rating. Never use it in the presence of an explosive gas as this may cause a serious explosion.

Caution

1. Do not use in an environment with spattering liquid of oil or solvent.
2. In an environment where the body of the switch is exposed to water or dust, there is possibility of water or dust invasion of the switch through the atmospheric release port. Insert a $\phi 4$ tube (with inside diameter of $\phi 2.5$) into the atmospheric release port and pipe the other end to a place with no spattering water or other liquid. Do not fold or clog the tube or the pressure cannot be measured properly.



- * Confirm that the air tube is inserted to the bottom of the atmospheric release port.
- * Use SMC TU0425 (Material: Polyurethane, O.D.: $\phi 4$, I.D.: $\phi 2.5$) as the air tube.

Pressure Source

Warning

1. **Use of toxic, corrosive or flammable gas.**
The materials of the pressure sensor and fittings on the switch are stainless steel 630 and stainless steel 304. Do not use toxic or corrosive gas.
The switch is not protected against explosion. Do not use it with flammable gas, either.
2. **Fluid compatibility**
The fluid contact areas are stainless steel 630 (pressure sensor) or stainless steel 304 (fittings). Use fluid that will not corrode the materials.
(For corrosiveness of fluid, consult with the manufacturer of the fluid.)

<ZSE60F/ISE60>

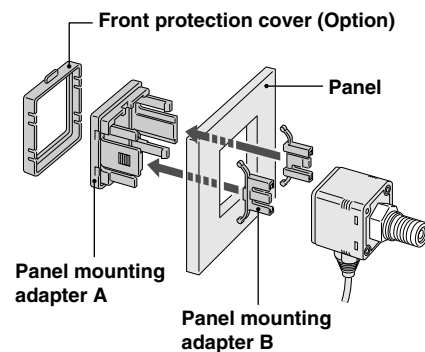
Helium leakage test

Helium leakage test is conducted on the welding parts. Use a ferrule a ferrule by (Swagelok® fittings) as the TSJ fittings and packing, ground, etc. by Cajon (VCR® fittings) as the URJ fittings. If a ferrule, packing or ground by other manufacturers are to be used, conduct helium leakage test before using those products.

Mounting Method

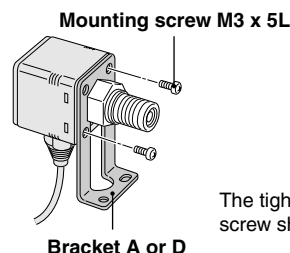
Caution

1. Mounting with panel mount adapter



2. Mounting with brackets

Mount a bracket to the using two M3 x 5L mounting screws and install on piping with a hexagon socket cap screws. The switch can be installed horizontally depending on the installation location.



The tightening torque for bracket mounting screw should be 0.98 N·m or less.