High Precision, Digital Pressure Switch for General Fluids

Series ZSE60F/ISE60

How to Order

For positive pressure	ISE60	A2	22	L	M	
For compound pressure	ZSE60 F	A2	22	L	M	

Piping specifications

A2	URJ 1/4*, Piping in the backward direction
B2	TSJ 1/4*, Piping in the backward direction

* URJ 1/4 and TSJ 1/4 are special fittings for semiconductor manufacturing equipment.

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

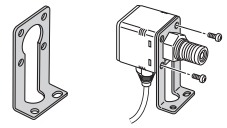
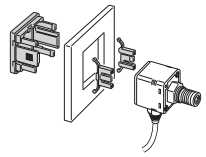
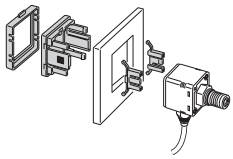
* Option

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 specifications

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

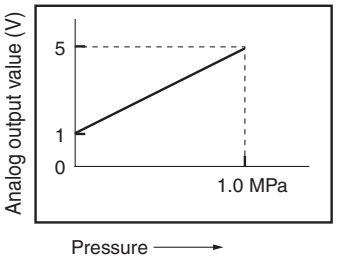
Note 1) Under the New Measurement Law, which has been in effect since October, 1999, sales of switches with the unit conversion function have not been allowed for use in Japan.

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

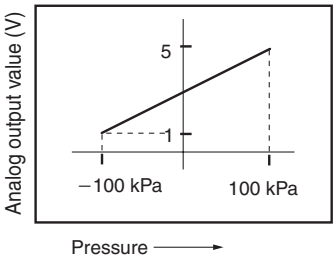
Analog Output

Suitable mode: **ZSE60F/ISE60-□-22/62(L)-(M)**

Series ISE60



Series ZSE60F



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	

Specifications

			ZSE60F (Compound pressure)	**ISE60** (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 Note 1)		kPa	0.1	s
		MPa	—	0.001
		kgf/cm²	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) Note 4)	
Response time			2.5 ms or less (With chattering prevention 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 (Ambient temperature of 25 ±3°C)	
Indicator light			Green LED (OUT1: Light up when ON), Red LED (OUT2: Light up when ON)	
Analog output Note 2)			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 Note 3)			No-voltage input (Solid state switch or reed switch), 5 ms or longer input	
Environment 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)	
	With stand voltage		250 VAC for 1 min, between all lead wires and enclosure	
	Insulation resistance		2 MΩ or more (at 50VDC) between all lead wires and enclosure	
	Vibration resistance		10 to 500 Hz with 1.5 mm amplitude or 98 m/s², whichever is smaller	
	Shock resistance		980 m/s² 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			A2: URJ 1/4 B2: TSJ 1/4	
Lead wire			5-wire oil proof heavy-duty cord (0.15 mm²)	
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

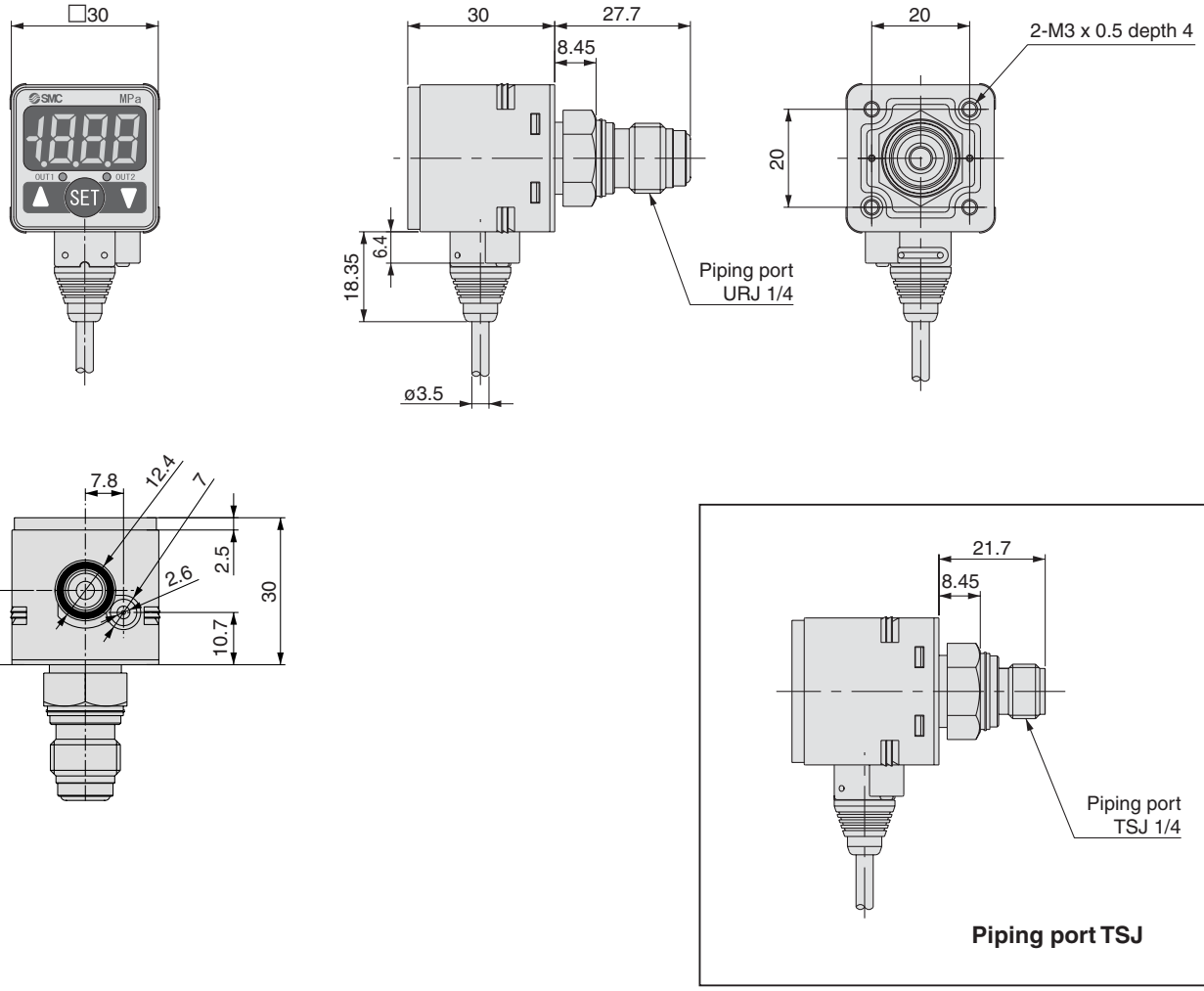
Various additional functions are available for easy measurement, switch operation and check of measured values suitable for the conditions of the measured fluid.

Auto shift function Note 1)	Can correct the pressure set point value of switch output according to fluctuation 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 function (For overseas use) Note 1)	Can convert the display value (For overseas use only).	

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

Dimensions

ZSE60F/ISE60-$^{A2}_{B2}$

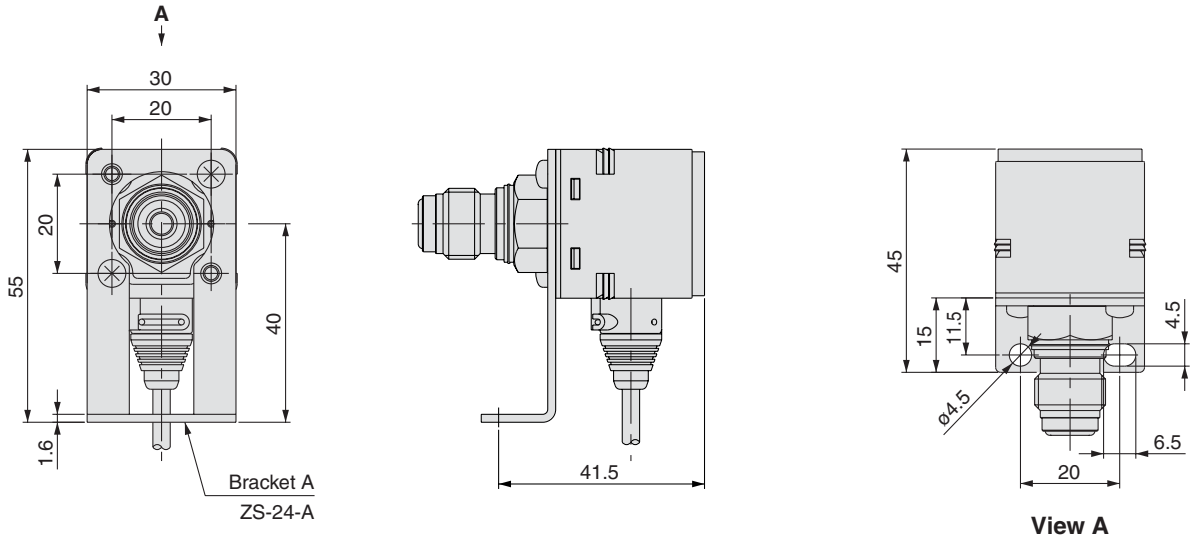


The following items are identical with those of Series ZSE50F/ISE50.

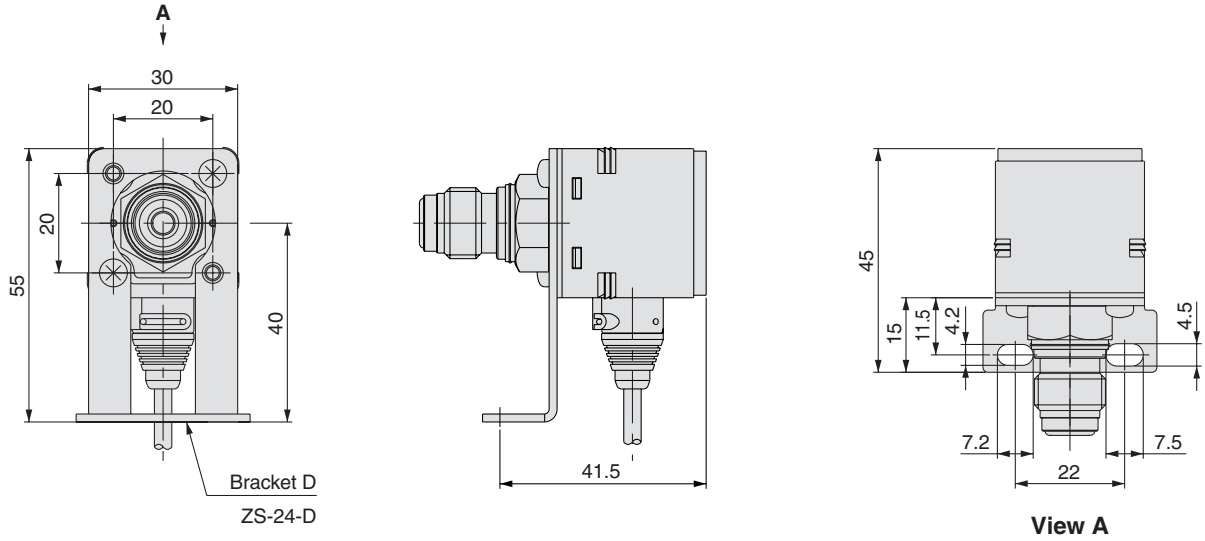
Item	Reference page
Output type	16-2-30
Example of internal circuit and wiring	16-2-31
Auto shift function, Anti-chattering function	16-2-32
Measures to be taken when error occurs	16-2-33

Dimensions

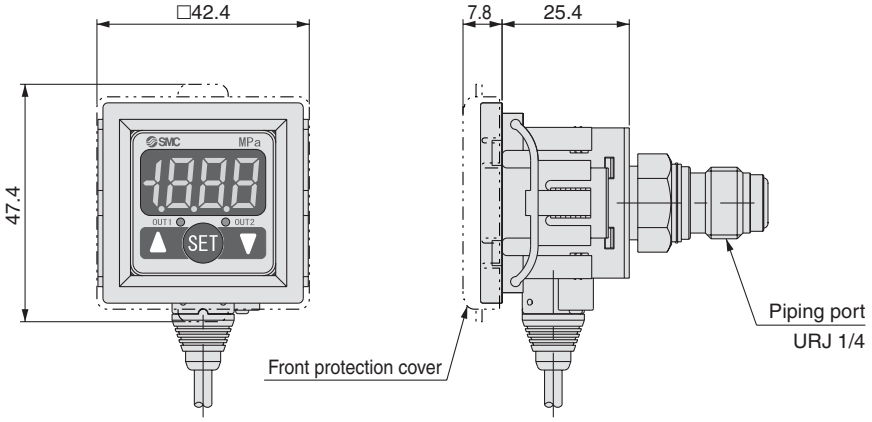
Bracket A



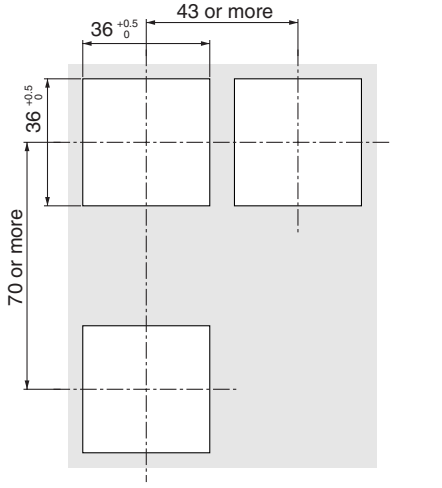
Bracket D



Panel mount

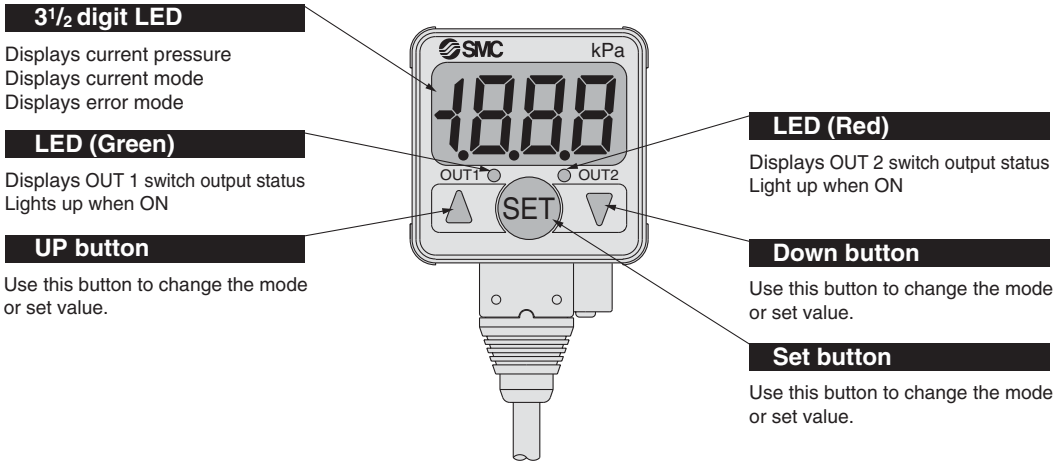


Cutting dimensions for panel mounting



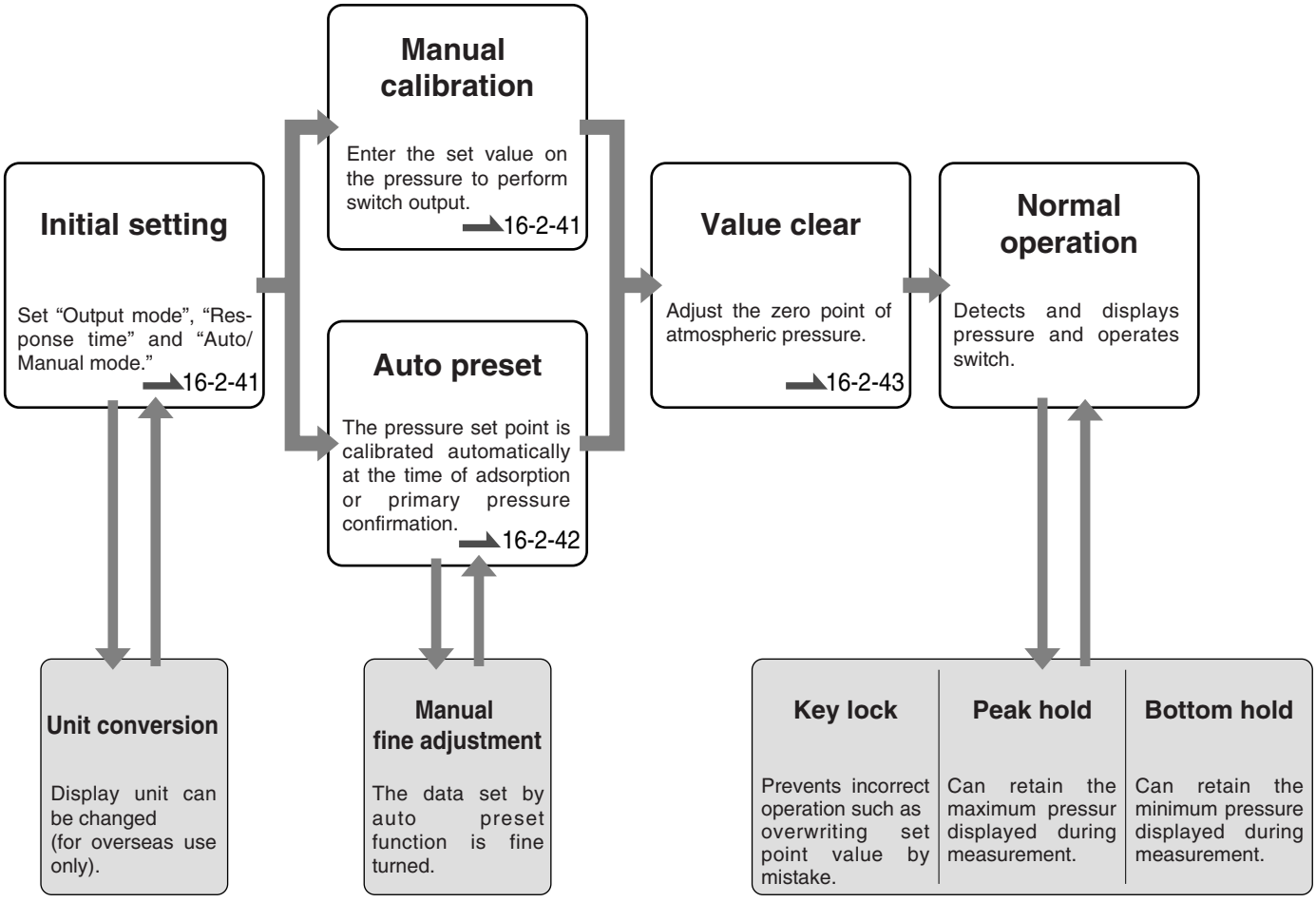
The thickness of the panel is to 3.2 mm.

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)

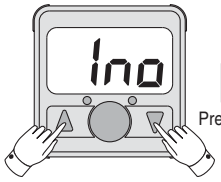
Initial setting

1. Initial setting mode

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

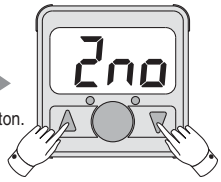
Unit specifications:	In case of types with unit conversion function, refer to "Unit setting (for overseas use)" on page 16-2-43.

2. OUT1 output mode selection



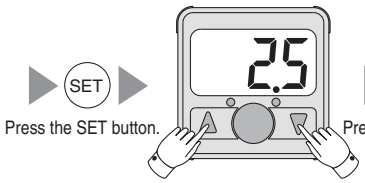
Select the "output mode" of OUT1 with ▲ or ▼ button.
"1no": Normally open mode,
"1nC": Normally closed mode

3. OUT2 output mode selection



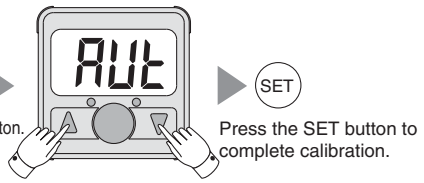
Select the "output mode" of OUT2 with ▲ or ▼ button.
"2no": Normally open mode,
"2nC": Normally closed mode

4. Response time selection



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



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

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

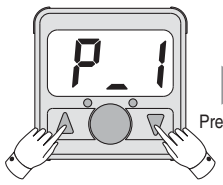
Manual pressure setting

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

1. Manual setting mode

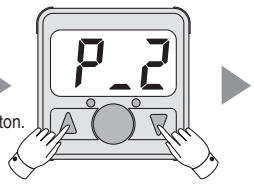
Select the manual setting mode as the initial setting mode. Press the SET button and hold it unit "P_1" or "n_1" appears on the display.

2. OUT1 (1) output set point value input



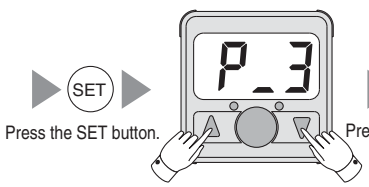
▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_1" or "n_1" and the set point value light up alternately.

3. OUT1 (2) output set point value input



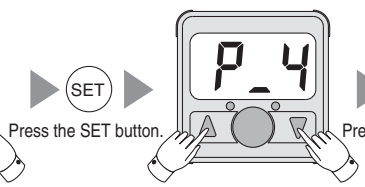
▲ button: Increases the set point value.
▼ button: Decrease the set point value.
"P_2" or "n_2" and the set point value light up alternately.

4. OUT2 (1) output set point value input



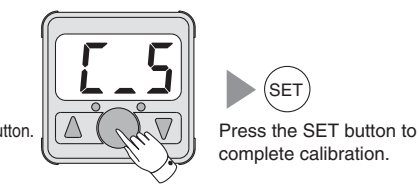
▲button: Increases the set point value.
▼button: Decrease the set point value.
"P_3" or "n_3" and the set point value light up alternately.

5. OUT2 (2) output set point value input



▲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



"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).

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

SET

Press the SET button.

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

3. OUT1 auto preset

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

4. Preparation of auto preset

SET

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

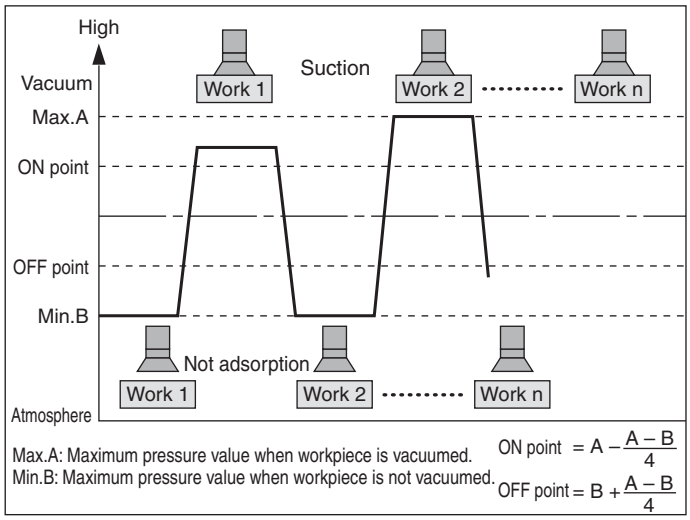
SET

Press the SET button.

SET

Press the SET button to complete calibration.

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



Max.A: Maximum pressure value when workpiece is vacuumed.
Min.B: Maximum pressure value when workpiece is not vacuumed.

$$\text{ON point} = A - \frac{A - B}{4}$$

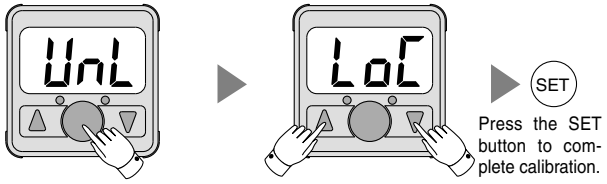
$$\text{OFF point} = B + \frac{A - B}{4}$$

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

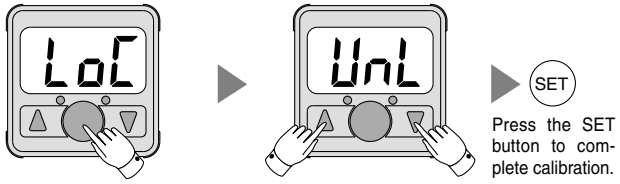


Press the SET button at least 2 seconds. Release it when the display turns to "UnL".

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".

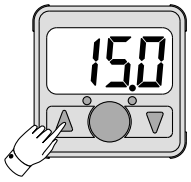
Change the display to "UnL" with the ▲ or ▼ button.

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.

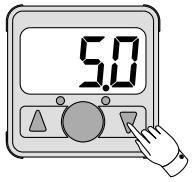
Peak hold



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

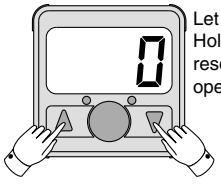


Press the ▲ button at least for 1 second during pressure display to enter the bottom display mode. The displayed value will blink. To return, press the ▼ button again at least for 1 second.

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 ZSE $\frac{50}{60}$ F/ISE $\frac{50}{60}$ -□-□(L)

Unit selection

OUT1 output mode selection

Press the SET button.

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

Set the unit with the ▲or ▼button.

- PF : kPa or MPa
- CF : kgf/cm²
- bAr : bar
- PSI : psi
- inH : inHg Note 1)
- mmH : mmHg Note 1)

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

Series ZSE50/60F/ISE50/60
Pressure Switch Precautions
Be sure to read before handling.

Handling

⚠ Warning
1. Do not drop, or apply excessive impact (980 m/s^2) while handing. 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.

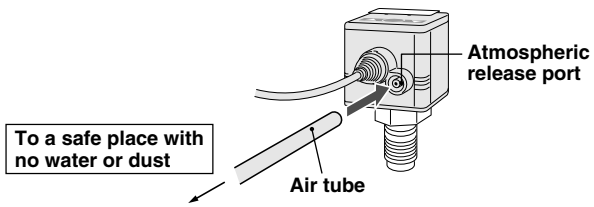
Connection

⚠ 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 ø4 tube (with inside diameter of ø2.5) 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.: ø4, I.D: ø2.5) 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.)

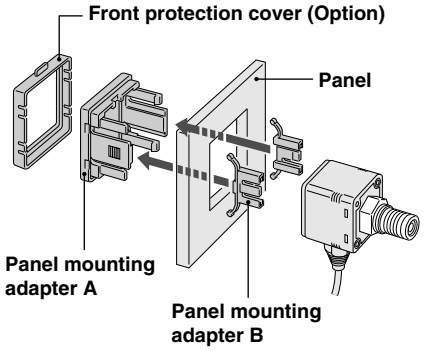
<ZSE60F/ISE60>

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.

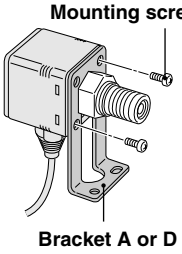
Mounting Method

⚠ 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.