

High-Precision Digital Pressure Switch for General Fluids

Series ZSE50F/60F/ISE50/60



Pressure detection for a wide range of fluids.

Enclosure

IP65



Hydraulic fluid (JIS-K2213)

Silicon oil (JIS-K2213)

Lubricating oil (JIS-K6301)

Fluoro carbon

- To confirm absorption of work piece with water on the surface, e.g. wet LCD glass plate
- To measure hydraulic pressure

Argon

Air containing drain

Ammonia

Carbon dioxide

Nitrogen

Water

- To measure low-quality air, containing drain
- Leakage test with nitrogen

ZSE
ISE

ZSP

PS

ISA

PSE

IS

ISG

ZSM

Using of stainless steel diaphragm

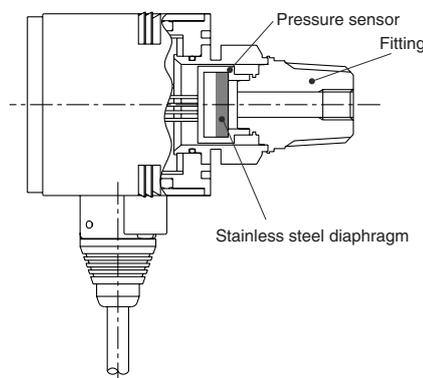
The stainless steel diaphragm prevents direct contact between sensor and measured fluid.

- Pressured areas Stainless steel 630
- Fittings Stainless steel 304

Extremely low leakage

Sensor and fittings are electron-beam welded. Leakage is kept at the lowest level by using VCR® and Swedgelok® fittings.

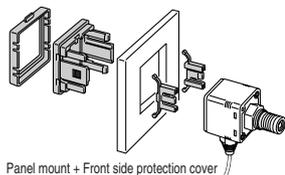
- ZSE50F / ISE50 $1 \times 10^{-5} \text{Pa} \cdot \text{m}^3/\text{s}$
- ZSE60F / ISE60 $1 \times 10^{-10} \text{Pa} \cdot \text{m}^3/\text{s}$



* VCR® and Swagelok® are trademarks of Swagelok Company.

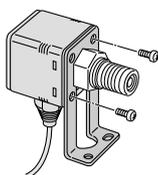
Option

■ Panel mount



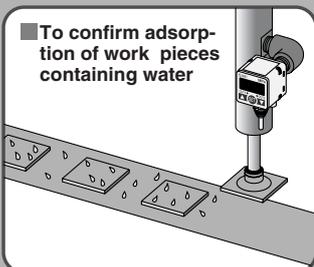
Panel mount + Front side protection cover

■ With bracket

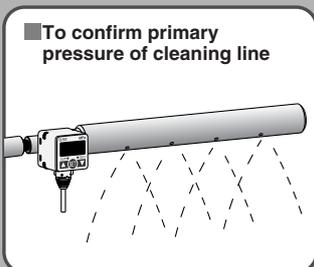


Application examples

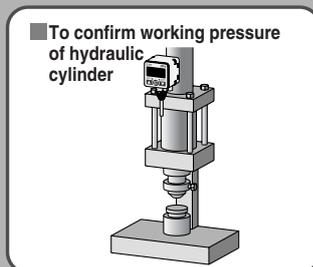
■ To confirm adsorption of work pieces containing water



■ To confirm primary pressure of cleaning line



■ To confirm working pressure of hydraulic cylinder



Note) When vacuum is released, take precautions to avoid water collision with rush inertia.

(An adapter with throttle (ZS-31-X175, X186) is available to prevent water collision with rush inertia.) (Refer to "Infiltration of water and drainage" on page 761 for details.)



High precision and high resolution

Compound pressure 1/2000(0.1 kPa)

Positive pressure 1/1000(0.001 MPa)

Repeatability ±0.2%F.S. ±1digit or less

Variety of functions

Anti-chattering function

Prevents erroneous operation due to sudden fluctuations in primary pressure, by allowing the response time to be changed.

- Selectable response times: 2.5ms, 24ms, 192ms, 768ms or less

Auto shift function

Pressure detection is not affected by fluctuations in primary pressure.

Auto preset function

Automatic pressure setting is possible. Saves time for setting operation.

- Key lock function
- Peak and bottom display function
- Zero out function

Series ZSE60F/ISE60

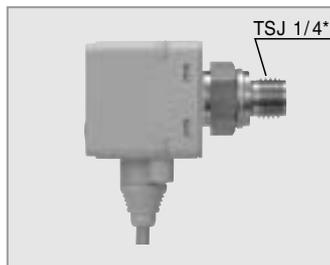
Special fitting types are used in semiconductor production equipment (metal gasket seal fittings)

- Leak rate: $1 \times 10^{-10} \text{Pa} \cdot \text{m}^3/\text{s}$

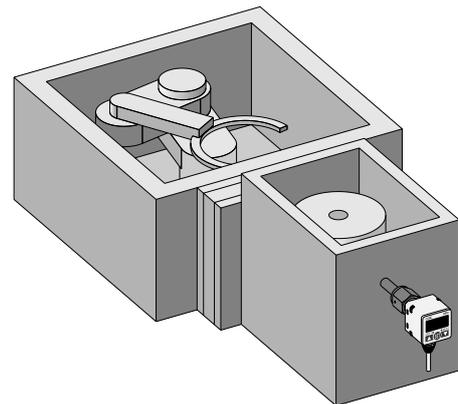
■ ZSE60F/ISE60-A2



■ ZSE60F/ISE60-B2



■ Confirmation of atmospheric pressure of load lock



Variations

Model		ZSE50F	ISE50	ZSE60F	ISE60
		Standard thread type		Special fittings for the semiconductor industry (metal gasket seal fittings)	
Port size		R 1/4 · NPT 1/4 · G 1/4 (with M5 male thread)		URJ 1/4 · TSJ 1/4*	
Leak rate		$1 \times 10^{-5} \text{Pa} \cdot \text{m}^3/\text{s}$		$1 \times 10^{-10} \text{Pa} \cdot \text{m}^3/\text{s}$	
Rated pressure range		100 kPa 0 -100 kPa	1 MPa 0	100 kPa 0 -100 kPa	1 MPa 0
Output	Switch output	2 outputs NPN or PNP			
	Analog output	Output voltage 1 to 5 V			

* Refer to Glossary of Terms/Technical Information on pages 878 and 879 for URJ 1/4 and TSJ 1/4.

High-Precision Digital Pressure Switch for General Fluids



Series ZSE50F/ISE50



How to Order

For positive pressure

ISE50 - 02 - 22 L - M

For compound pressure

ZSE50 F - 02 - 22 L - M

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

* Optional

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

* Optional

Note) Auto shift input is used for the auto shift function.
For more information, please refer to Auto Shift Function on page 752.

Lead wire length

L	3 m
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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

ZSE
ISE

ZSP

PS

ISA

PSE

IS

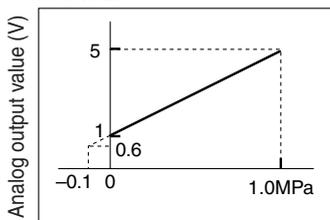
ISG

ZSM

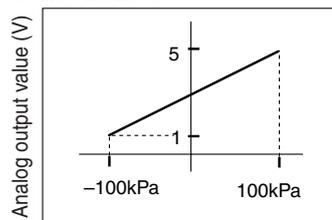
Analog output

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	
Adapter with throttle Rc1/4	ZS-31-X175	1	
Adapter with throttle NPT1/4	ZS-31-X186	1	

Unit specification

Nil	With unit switching function
M	Fixed SI unit ^(Note)

Note) Fixed units:

For compound pressure : KPa
For positive pressure : MPa

Series ZSE50F/ISE50

Specifications

		ZSE50F (Compound pressure)	ISE50 (Positive pressure)
Rated pressure range		-100.0 to 100.0 kPa	0.000 to 1.000 MPa
Regulating pressure range		-100.0 to 100.0 kPa	-0.100 to 1.000 MPa
Extended analog output range		—	-0.100 to 0 MPa
Proof pressure		500 kPa	1.5 MPa
Setting/Display resolution	kPa	0.1	—
	MPa	—	0.001
Fluid		Fluid or air that will not corrode stainless steel 630 and 304	
Power supply voltage		12 to 24 VDC, Ripple (p-p) 10% or less (With power supply polarity protection)	
Current consumption		55 mA or less	
Switch output		NPN or PNP open collector output 2 output	
	Max. load current	80 mA	
	Max. applied voltage	30 V (With NPN output)	
	Residual voltage	1 V or less (With load current 80 mA)	
	Response time	2.5 ms or less (Response time selections with chattering prevention function: 24 ms, 192 ms and 768 ms)	
	Short circuit protection	With short circuit protection	
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)	
Display		3 1/2-digit, 7 segment indicator (Sampling frequency: 5 times/sec.)	
Display accuracy		±2% F.S. ±1 digit or less (With ambient temperature of 25°C)	
Indication light		Green LED (OUT1: Lights when ON), Red LED (OUT2: Lights when ON)	
Analog output ^{Note 1)}		Output voltage: 1 to 5 V ±5% F.S. or less (In rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ	Output voltage: 1 to 5 V ±2.5% F.S. or less (In rated pressure range) 0.6 to 1 V ±5% F.S. or less (in extended analog output range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ
Auto shift input ^{Note 2)}		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 (With no condensation or freezing)	
	Ambient humidity range	Operating and stored: 35 to 85% RH (With no condensation)	
	Withstand voltage	250 VAC for 1 min, between live parts and case	
	Insulation resistance	2 MΩ or more (at 50 VDC) between live parts and case	
	Vibration resistance	10 to 500 Hz at the smaller of amplitude 1.5 mm or acceleration 98 m/s ² 2 hours each in direction of X, Y and Z respectively (De-energized)	
	Shock resistance	980 m/s ² in X, Y, Z directions 3 times each (De-energized)	
Temperature characteristics		±3% F.S. or less (At 25°C in standard)	
Port size		O2: R1/4, M5 x 0.8 T2: NPT1/4, M5 x 0.8 G2: G1/4, M5 x 0.8	
Wetted material		Pressure receiving area: Stainless steel 630, Fittings: Stainless steel 304	
Lead wire		Oil-resistant vinyl cabtire cable 5 cores, ø3.5, Cross section: 0.15 mm ² , Insulator O.D.: 0.97 mm	
Mass		Approx. 120 g (Each including 3 m lead wire)	
Standard		Compliant with CE marking	

Note 1) In case of ZSE50F/ISE50-□-²²/₆₂
 Note 2) In case of ZSE50F/ISE50-□-³⁰/₇₀

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

Model	Regulating pressure range
ZSE50F-□- ³⁰ / ₇₀	-100.0 to 100.0 kPa
ISE50-□- ³⁰ / ₇₀	-1.000 to 1.000 MPa

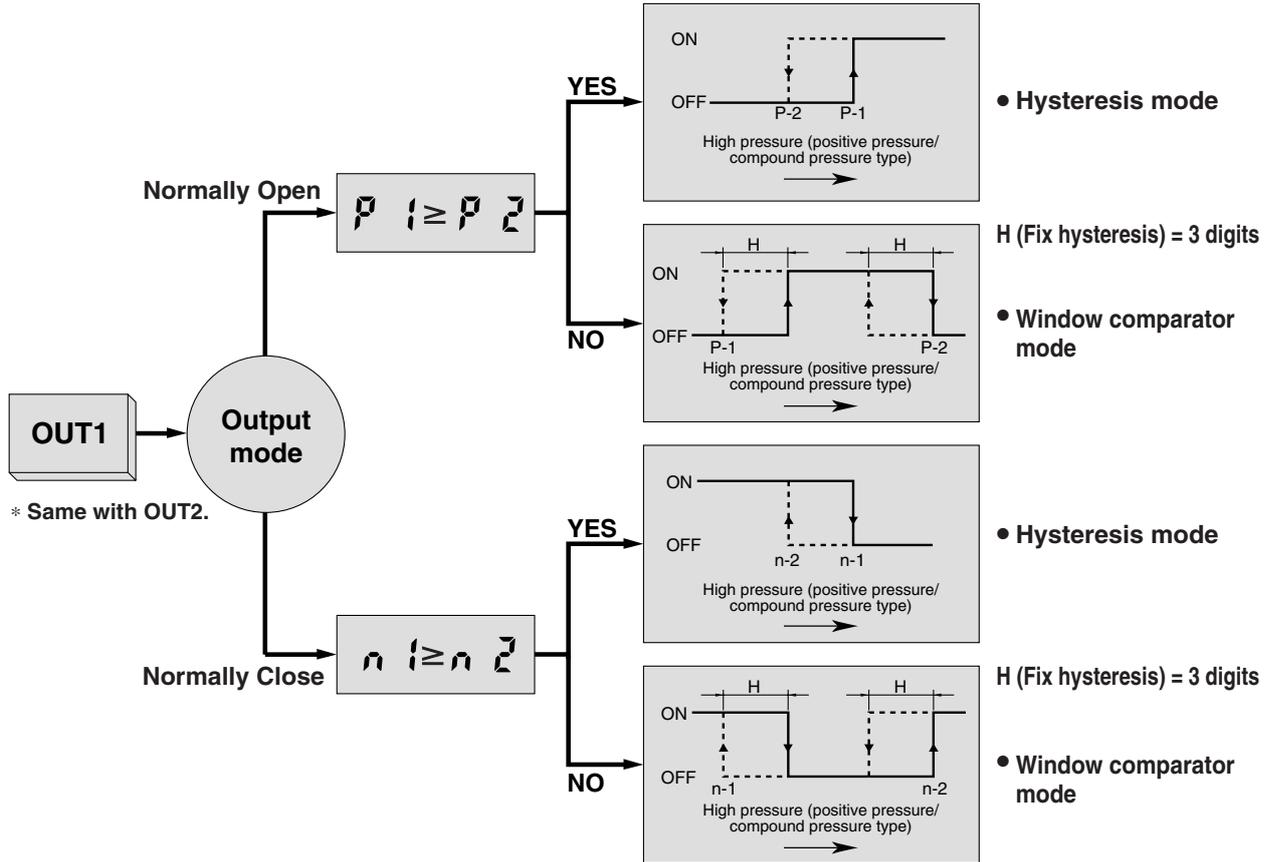
Function

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 fluctuations in the primary pressure.
Anti-chattering function	Prevents malfunction due to sudden fluctuations in the primary pressure by adjusting the response time.
Key lock function	Key operation can be locked to prevent incorrect operation on the operation switch.
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 ^{Note 1)}	Can convert the display value.

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

Output Method

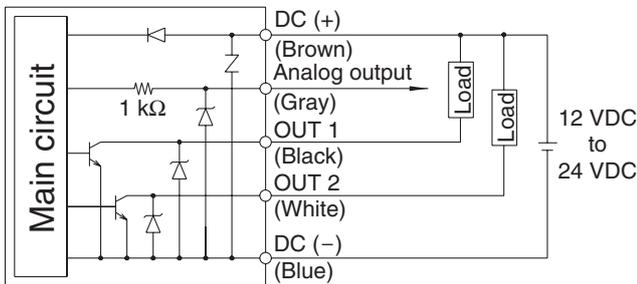


Note) When in hysteresis mode and window comparator mode, setting is determined automatically by comparing the small and large set pressure values P1, P2 (n1, n2).

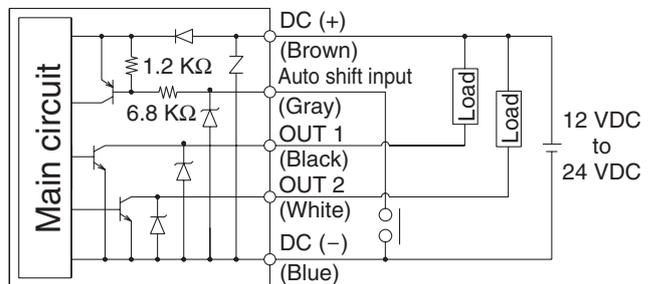
ZSE
ISE
ZSP
PS
ISA
PSE
IS
ISG
ZSM

Example of Internal Circuit and Wiring

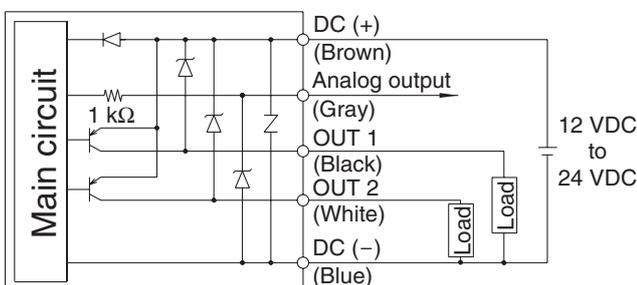
ZSE 50 F/ISE 50 -□-22(L)-(M)
With analog output



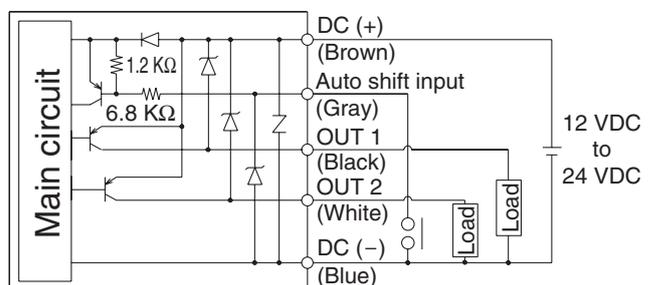
ZSE 50 F/ISE 50 -□-30(L)-(M)
With auto shift input



ZSE 50 F/ISE 50 -□-62(L)-(M)
With analog output



ZSE 50 F/ISE 50 -□-70(L)-(M)
With auto shift input



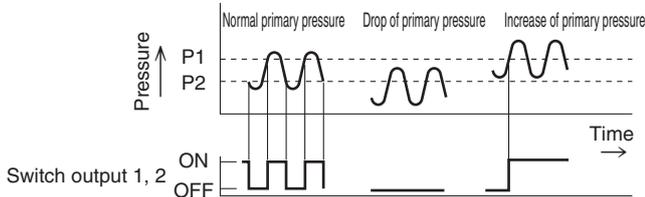
Series ZSE50F/ISE50

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.

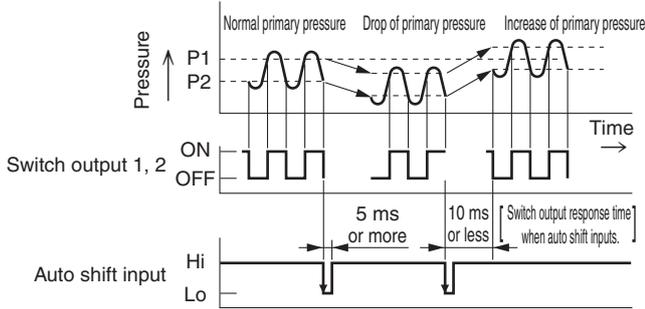
When auto shift is not used:

Fluctuations in the primary pressure interrupt correct judgment.



When auto shift is used:

When the primary pressure changes, set the auto shift function to Lo (No electrical pressure input). 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:

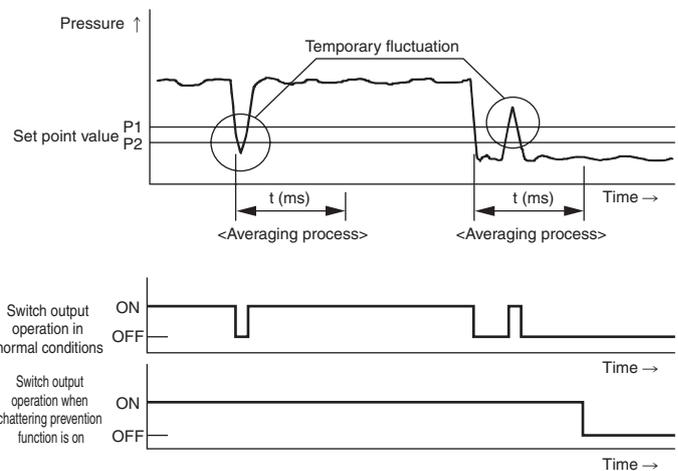
Model	Regulating pressure range
ZSE50F-□ ³⁰ / ₇₀	-100.0 to 100.0 kPa
ZSE60F-□ ³⁰ / ₇₀	
ISE50-□ ³⁰ / ₇₀	-1.000 to 1.000 MPa
ISE60-□ ³⁰ / ₇₀	

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**

Error Function

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 second, 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 second, 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.

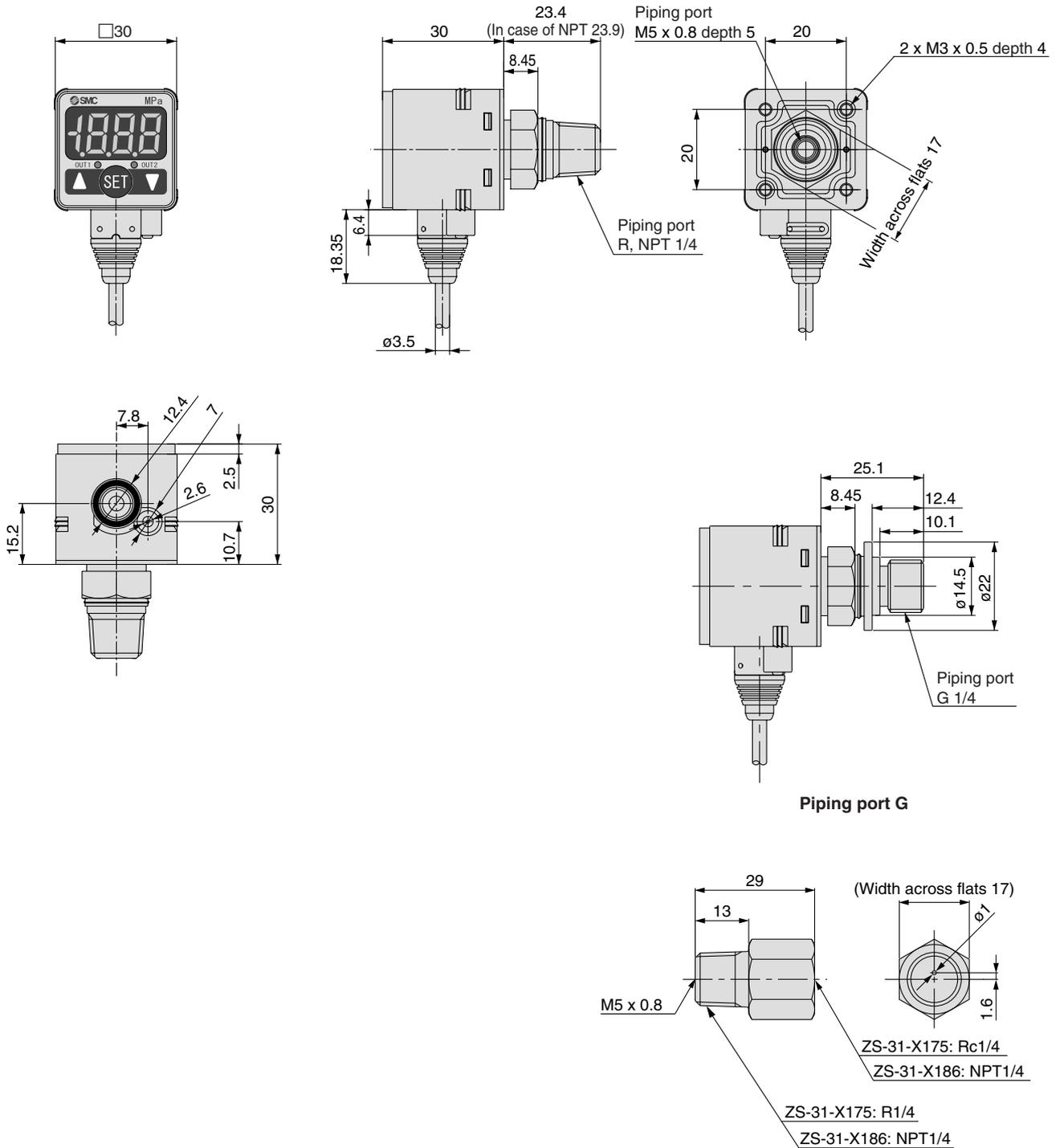
	Regulating pressure range	Lower limit	Upper limit
Compound pressure	-100.0 to 100.0 kPa	-100.0 kPa	100.0 kPa
Positive pressure	-0.100 to 1.000 MPa	-0.100 MPa	1.000 MPa
With auto shift function			
	Regulating pressure range	Lower limit	Upper limit
Compound pressure	-100.0 to 100.0 kPa	-100.0 kPa	100.0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

ZSE
ISE
ZSP
PS
ISA
PSE
IS
ISG
ZSM

Series ZSE50F/ISE50

Dimensions

ZSE50F/ISE50-
02
T2
G2



Piping port G

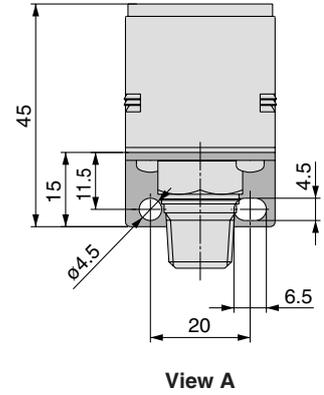
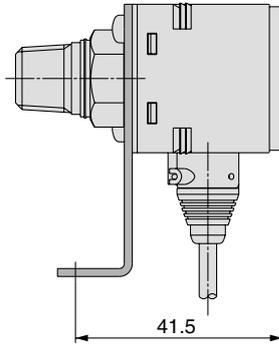
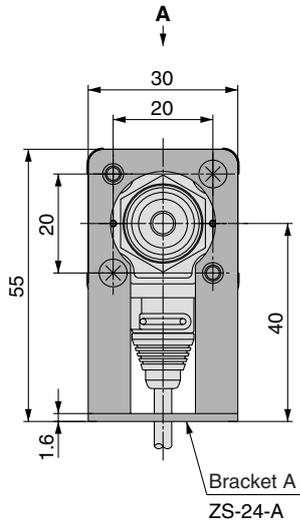
Adapter with throttle

* Refer to "Infiltration of water and drainage" on page 761 for details.

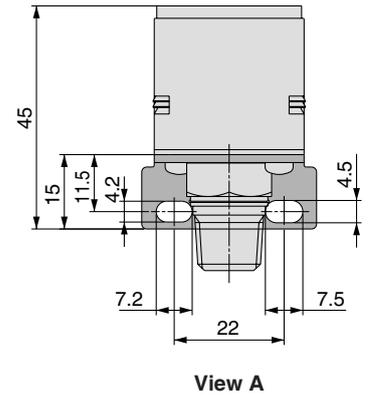
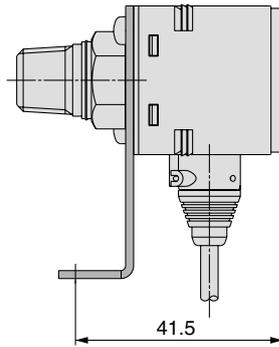
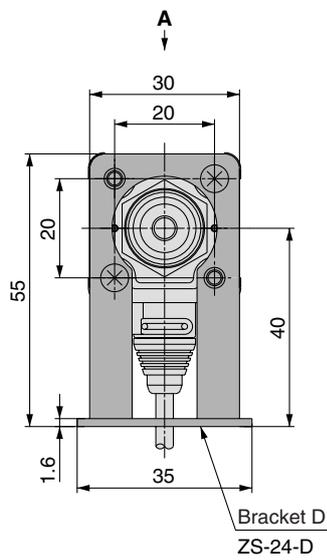
High-Precision Digital Pressure Switch for General Fluids **Series ZSE50F/ISE50**

Dimensions

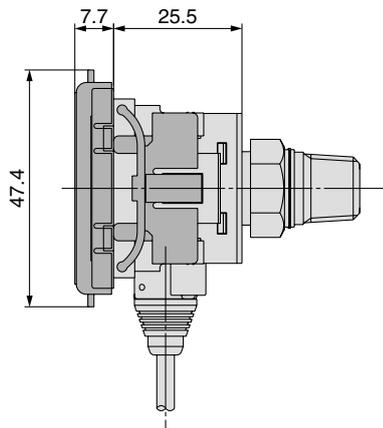
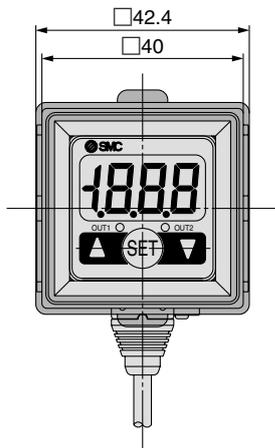
Bracket A



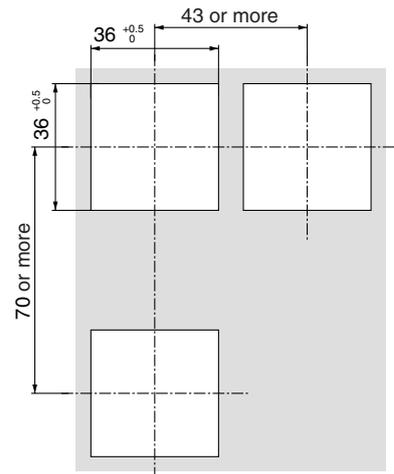
Bracket D



Panel mount + Front protection cover



Cutting dimensions for panel mounting



The thickness of the panel is 1 to 3.2 mm.

- ZSE
- ISE
- ZSP
- PS
- ISA
- PSE
- IS
- ISG
- ZSM

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.
Refer to Glossary of Terms/Technical Information on pages 878 and 879 for details.

Input/output specifications

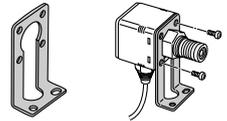
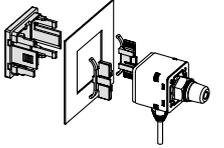
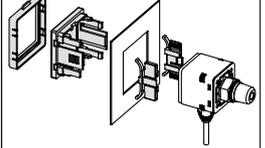
22	NPN open collector 2 output + Analog output
30	NPN open collector 2 output + Auto shift input
* 62	PNP open collector 2 output + Analog output
* 70	PNP open collector 2 output + Auto shift input

* Optional
Note) Auto shift input is used for the auto shift function.
For more information, please refer to Auto Shift Function on page 752.

Lead wire length

L	3 m
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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

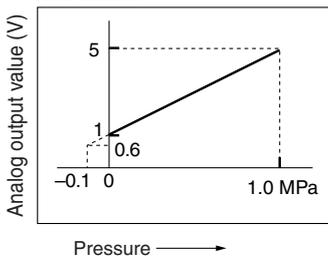
Nil	With unit switching function
M	Fixed SI unit ^(Note)

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

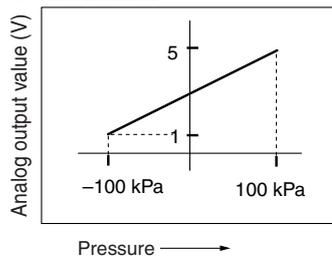
Analog output

Suitable model: 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	

High-Precision Digital Pressure Switch *Series ZSE60F/ISE60*

Specifications

Model		ZSE60F (Compound pressure)	ISE60 (Positive pressure)
Rated pressure range		-100.0 to 100.0 kPa	0.000 to 1.000 MPa
Set pressure range		-100.0 to 100.0 kPa	-0.100 to 1.000 MPa
Extended analog output range		—	-0.100 to 0 MPa
Proof pressure		500 kPa	1.5 MPa
Setting/Display resolution	kPa	0.1	—
	MPa	—	0.001
Fluid		Fluid or air that will not corrode stainless steel 630 and 304	
Power supply voltage		12 to 24 VDC, Ripple (p-p) 10% or less (With power supply polarity protection)	
Current consumption		55 mA or less	
Switch output		NPN or PNP open collector output 2 output	
	Max. load current	80 mA	
	Max. applied voltage	30 V (With NPN output)	
	Residual voltage	1 V or less (With load current 80 mA)	
	Response time	2.5 ms or less (Response time selections with chattering prevention function: 24 ms, 192 ms and 768 ms)	
	Short circuit protection	With short circuit protection	
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)	
Display		3 1/2-digit, 7 segment indicator (Sampling frequency: 5 times/sec.)	
Display accuracy		±2% F.S. ±1 digit or less (With ambient temperature of 25°C)	
Indication light		Green LED (OUT1: Lights when ON), Red LED (OUT2: Lights when ON)	
Analog output ^{Note 1)}		Output voltage: 1 to 5 V ±5% F.S. or less (In rated pressure range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ	Output voltage: 1 to 5 V ±2.5% F.S. or less (In rated pressure range) 0.6 to 1 V ±5% F.S. or less (in extended analog output range) Linearity: ±1% F.S. or less Output impedance: Approx. 1 kΩ
Auto shift input ^{Note 2)}		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 (With no condensation or freezing)	
	Ambient humidity range	Operating and stored: 35 to 85% RH (With no condensation)	
	Withstand voltage	250 VAC for 1 min, between live parts and case	
	Insulation resistance	2 MΩ or more (at 50 VDC) between live parts and case	
	Vibration resistance	10 to 500 Hz at the smaller of amplitude 1.5 mm or acceleration 98 m/s ² 2 hours each in direction of X, Y and Z respectively (De-energized)	
	Shock resistance	980 m/s ² in X, Y, Z directions 3 times each (De-energized)	
Temperature characteristics		±3% F.S. or less (At 25°C in standard)	
Port size		A2: URJ1/4 B2: TSJ1/4	
Wetted material		Pressure receiving area: Stainless steel 630, Fittings: Stainless steel 304	
Lead wire		Oil-resistant cabtire cord 5 cores, ø3.5, Cross section: 0.15 mm ² , Conductor O.D.: 0.97 mm	
Mass		Approx. 120 g (Each including 3 m lead wire)	
Standard		Compliant with CE marking	

Note 1) In case of ZSE60F/ISE60-□-²²/₆₂

Note 2) In case of ZSE60F/ISE60-□-³⁰/₇₀

Note

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

Model	Regulating pressure range
ZSE60F-□- ³⁰ / ₇₀	-100.0 to 100.0 kPa
ISE60-□- ³⁰ / ₇₀	-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 fluctuations in the primary pressure.
Anti-chattering function	Prevents malfunction due to sudden fluctuations in the primary pressure by adjusting the response time.
Key lock function	Key operation can be locked to prevent incorrect operation on the operation switch.
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 ^{Note 1)}	Can convert the display value.

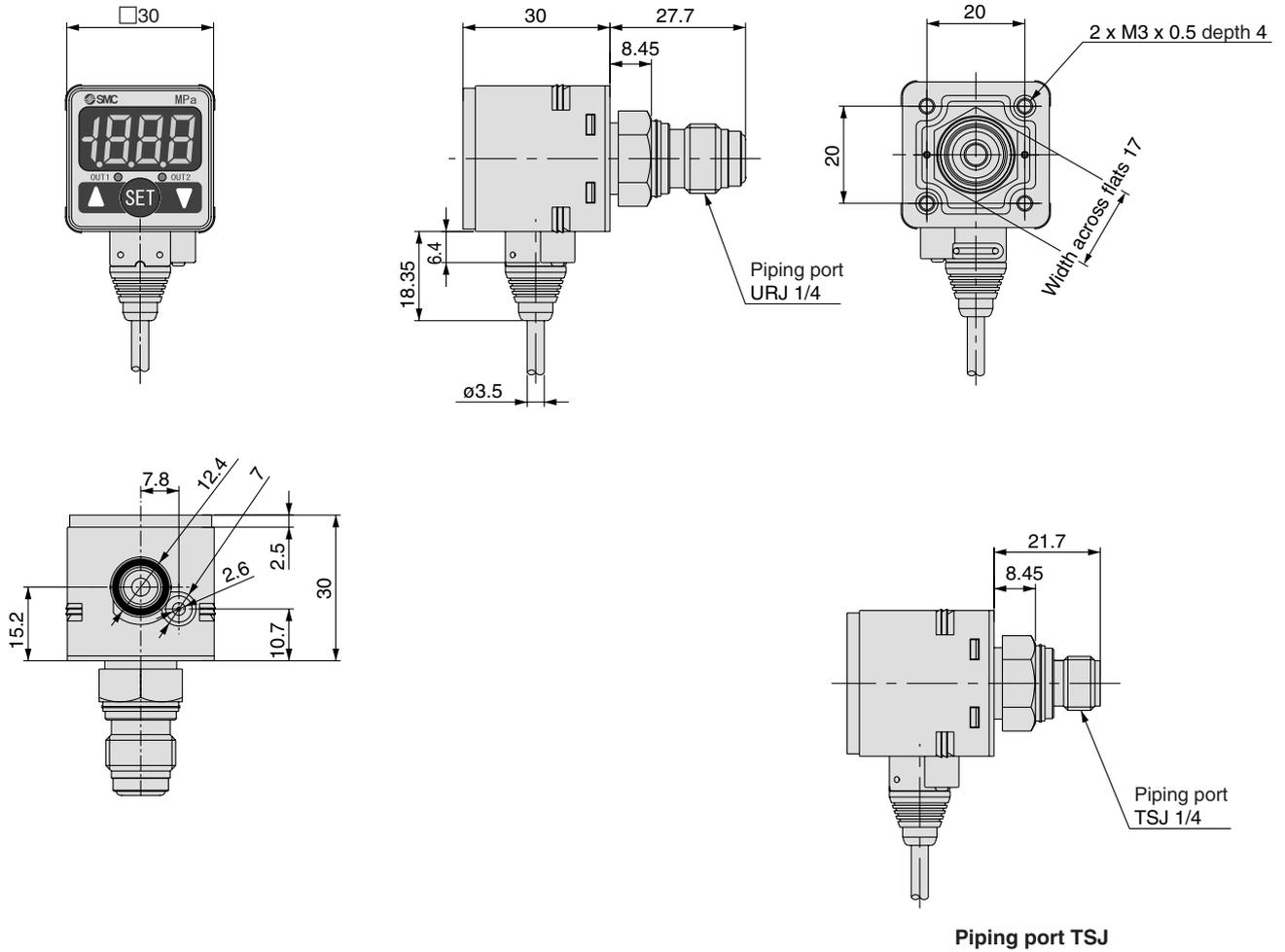
Note 1) Select and order by specifying the types and models.



Series ZSE60F/ISE60

Dimensions

ZSE60F/ISE60-A2
B2



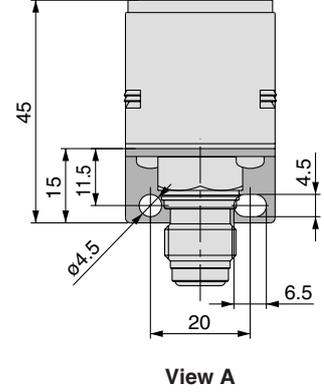
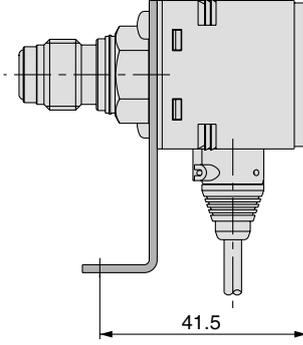
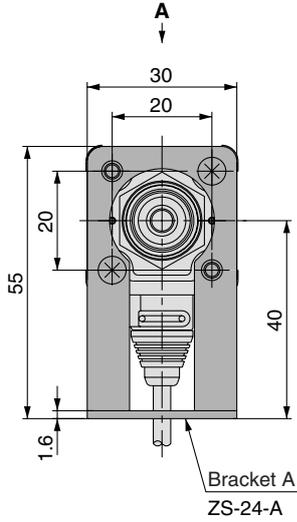
The following items are identical with those of series ZSE50F/ISE50.

Item	Reference page
Output type	751
Example of internal circuit and wiring	751
Auto shift function, Chattering prevention function	752
Measures to be taken when error occurs	753

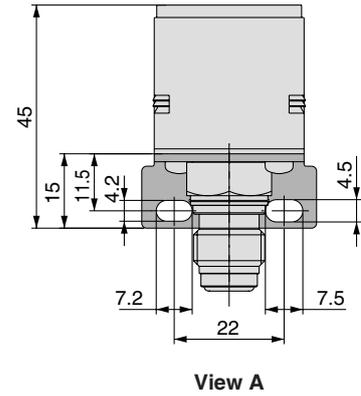
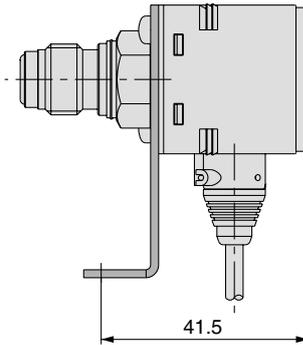
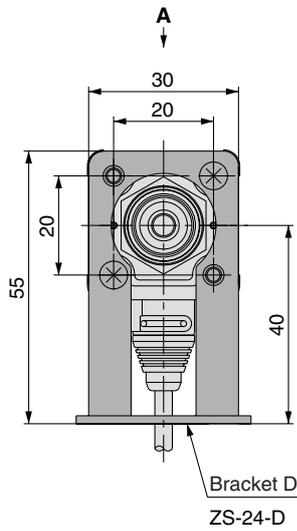
High-Precision Digital Pressure Switch for General Fluids **Series ZSE60F/ISE60**

Dimensions

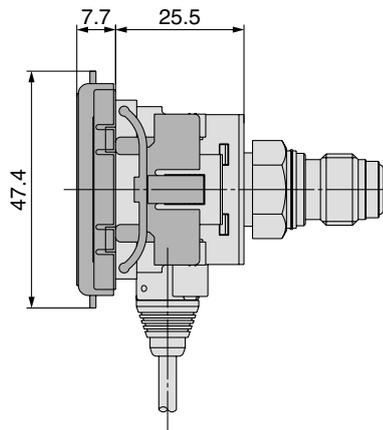
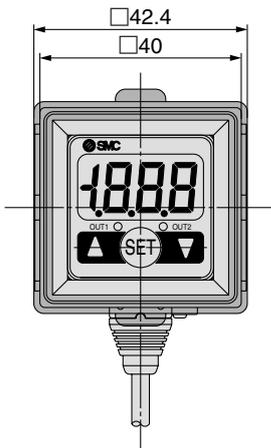
Bracket A



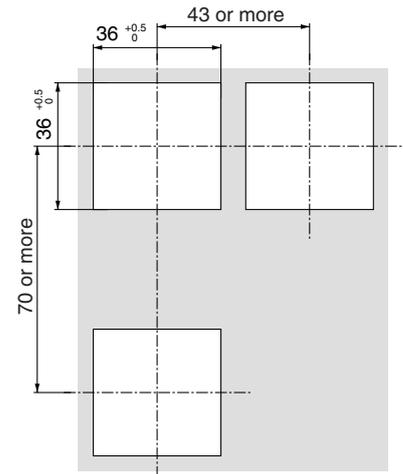
Bracket D



Panel mount + Front protection cover



Cutting dimensions for panel mounting



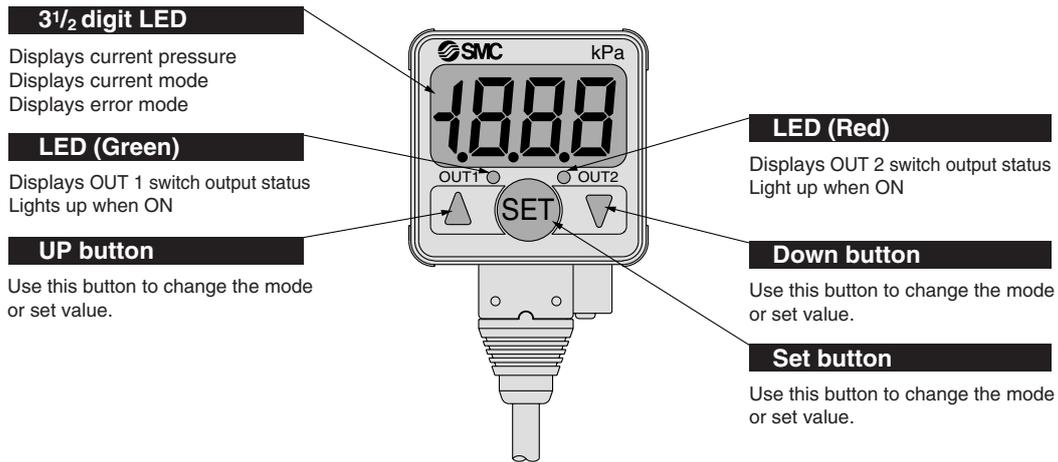
The thickness of the panel is 1 to 3.2 mm.



- ZSE
- ISE
- ZSP
- PS
- ISA
- PSE
- IS
- ISG
- ZSM

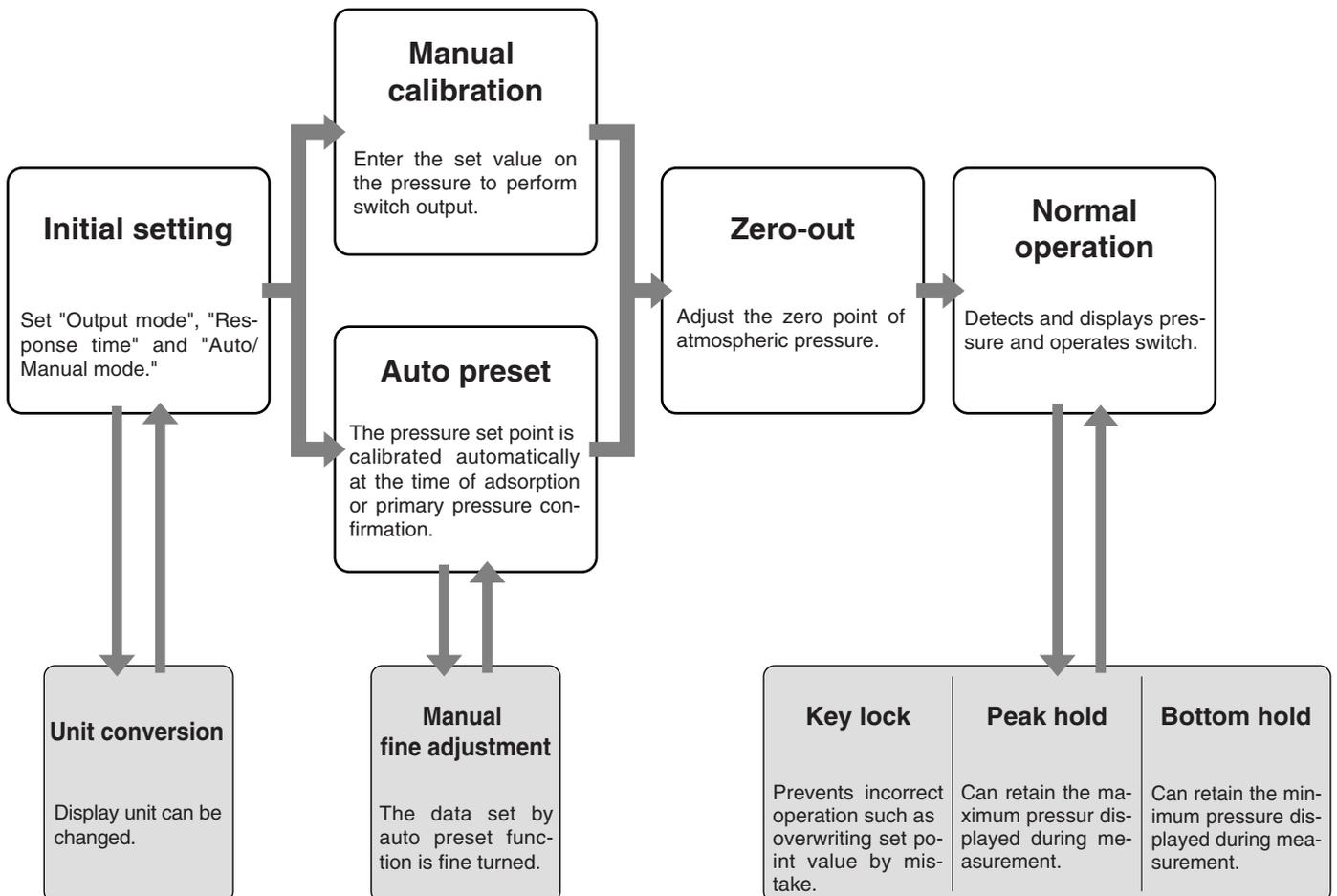
Series ZSE50F/60F, ISE50/60

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



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

Calibration procedure





Series ZSE50F/60F, ISE50/60 Pressure Switch Precautions 1

Be sure to read before handling. Refer to front matters 58 and 59 for Safety Instructions and pages 687 to 691 for Pressure Switch Precautions.

Handling

Warning

1. Do not use pressure sensors with corrosive and/or flammable gases or liquids.

Caution

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

Connection

Caution

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.

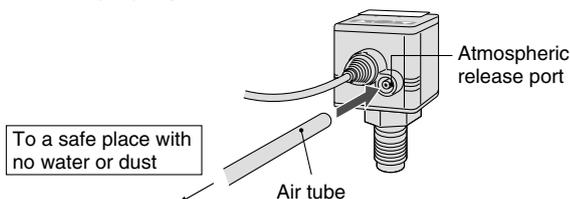
Operating Environment

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 (I.D.: $\phi 2.5$) 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.

Operating Environment

Caution

3. When resin piping is used, depending on the fluid, static electricity may occur. When connecting the switch and sensor, please take adequate anti-static electricity measures on the equipment side, and do not use with a grounding that is shared with equipment that generates strong electromagnetic noise or high-frequency waves. This can result in a switch or sensor being damaged by static electricity.

Pressure Source

Warning

1. Use of toxic, deleterious, corrosive or flammable fluid.

The materials of the pressure sensor and fittings on the switch are stainless steel 630 and stainless steel 304. Do not use **toxic, deleterious or corrosive fluid**.

The switch is not protected against explosion. Do not use it with flammable gas or fluid, either.

2. Compatible fluid

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 the manufacturer of the fluid.)

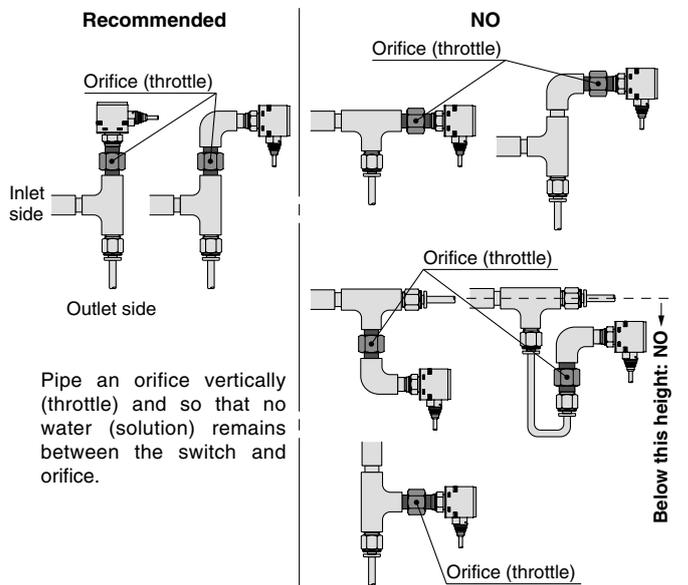
Caution

1. Infiltration of water and drainage

The pressure sensor of this switch adapts stainless diaphragm that would not be damaged by water. However, the pressure sensor might be damaged when condensate included in water and air may collide with the sensor due to its rush inertia, which occurs when vacuum is released after absorption is confirmed.

In the above case, make an orifice in the middle shown in the Fig. below or mount the external adapter with throttle (ZS-31-X175, X186) to the fitting.

The external adapter with throttle might not work for water hammers, please take other countermeasures.



ZSE
ISE
ZSP
PS
ISA
PSE
IS
ISG
ZSM



Series ZSE50F/60F, ISE50/60 Pressure Switch Precautions 2

Be sure to read before handling. Refer to front matters 58 and 59 for Safety Instructions and pages 687 to 691 for Pressure Switch Precautions.

Pressure Source

Caution

2. Withstand pressure

When fluid is liquid, excessive pressure fluctuation such as a water hammer or surge pressure occurs when the valve is ON/OFF.

If needed, install a damper, absorber or accumulator to prevent the pressure fluctuation. When pressure over the withstand pressure is applied even for a short period of time, it may damage the pressure sensor or switch.

<ZSE60F/ISE60>

Helium leakage test

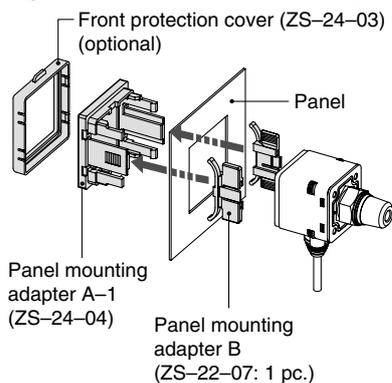
Helium leakage test is conducted on the welding parts. Use a ferrule by Swagelok (Swagelok® fittings) as the TSJ fittings and packing, ground, etc. by Swagelok (VCR® fittings) as the URJ fittings. If a ferrule, packing or ground by other manufacturers are to be used, conduct helium leakage test before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

* Swagelok® and VCR® are trademarks of Swagelok Company.

Mounting Method

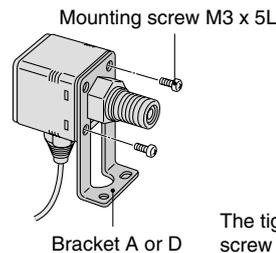
Caution

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.

Regulating pressure range and rated pressure range

Caution

Set the pressure within the rated pressure range.

The regulating pressure range is the range of pressure that is possible in setting.

The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) on the sensor.

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

Switch	Pressure range				
	-100 kPa	0	100 kPa	500 kPa	1 MPa
For compound pressure ZSE50F ZSE60F	-100 kPa	100 kPa			
	-100 kPa	100 kPa			
For positive pressure ISE50 ISE60		0	1 MPa		
	-100 kPa (-0.1 MPa)	1 MPa			

Rated pressure range of switch
 Regulating pressure range of switch