2-Color Display Digital Pressure Switch For General Fluids

Series ZSE80/ISE80

How to Order

Rated pressure range

80	–0.1 to 1 MPa
80H	–0.1 to 2 MPa

Made to Order
Refer to Table 1 below.

For positive pressure **ISE 80 – 02 – N – M □ □ – □**

For vacuum/ compound pressure **ZSE 80 – 02 – N – M □ □ – □**

Rated pressure range

80	0 to –101 kPa
80F	–100 to 100 kPa

Piping

02	R1/4 (M5 female threaded)	Rear ported
N02	NPT1/4 (M5 female threaded)	
F02	G1/4 (M5 female threaded)	
C01	Rc1/8	
A2	URJ1/4	
B2	TSJ1/4	
02L	R1/4 (M5 female threaded)	Bottom ported
N02L	NPT1/4 (M5 female threaded)	
C01L	Rc1/8	
A2L	URJ1/4	
B2L	TSJ1/4	

Input/Output

N	NPN open collector 1 output
P	PNP open collector 1 output
A	NPN open collector 2 outputs
B	PNP open collector 2 outputs
R	NPN open collector 2 outputs + Analog voltage output/Auto-shift switching
T	PNP open collector 2 outputs + Analog voltage output/Auto-shift switching
S	NPN open collector 2 outputs + Analog current output/Auto-shift switching
V	PNP open collector 2 outputs + Analog current output/Auto-shift switching

Option 1

Nil	With unit display Note 1) switching function
M	Fixed SI unit Note 2)
P	Initial value PSI

Option 3

Symbol	Operating manual Note)	Calibration certificate	Symbol	Operating manual Note)	Calibration certificate
Nil	● (Booklet)	—	**K**	● (Booklet)	●
Y	—	—	**T**	—	●
W	● (CD-ROM)	—	**R**	● (CD-ROM)	●

Note) All texts in both English and Japanese

Note 1) Under the New Measurement Law, sales of switches with the unit switching function have not been allowed for use in Japan.
Note 2) Fixed unit ISE80H: MPa
Others : MPa, kPa

Option 2

Nil	None
A	With bracket **ZS-24-A** (Rear ported) **ZS-35-A** (Bottom ported)
B	With bracket Note) **ZS-24-D**
C	Panel mount **ZS-35-C** (Rear ported) **ZS-35-B** (Bottom ported)
D	Panel mount + Front protection cover **ZS-35-F** (Rear ported) **ZS-35-E** (Bottom ported)

Note) Rear ported only

Made to Order

Table 1 Made to Order

Symbol	Specifications
-X500 Note)	Wetted parts: Stainless steel 316L
-X501	Lead wire length 3 m
-X510	Restrictor installed fitting

Note) Not applicable to the rated pressure range 0 to 2 MPa specification. Refer to page 12 for detail.

Option

Option	Piping direction	Part no.
Bracket	Rear ported	ZS-24-A
	Rear ported	ZS-24-D
	Bottom ported	ZS-35-A
Panel mount	Rear ported	ZS-35-C
	Bottom ported	ZS-35-B
Panel mount + Front protection cover	Rear ported	ZS-35-F
	Bottom ported	ZS-35-E

Specifications

Model			ZSE80 (Vacuum pressure)	ZSE80F (Compound pressure)	ISE80 (Positive pressure)	ISE80H (Positive pressure)
Rated pressure range			0.0 to –101.0 kPa	–100.0 to 100.0 kPa	–0.100 to 1.000 MPa	–0.100 to 2.00 MPa
Set pressure range			10.0 to –111.0 kPa	–110.0 to 110.0 kPa	–0.105 to 1.100 MPa	–0.105 to 2.20 MPa
Withstand pressure			500 kPa		2 MPa	4 MPa
Wetted parts material			Pressure sensor: Stainless steel 630, Fitting: Stainless steel 304			
Applicable fluid			Fluids do not corrode stainless steel 630 and 304			
Port size			R1/4, NPT1/4, G1/4*, URJ1/4, TSJ1/4, Rc1/8 Piping direction: Rear/Bottom			
Power supply voltage			12 to 24 VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection)			
Current consumption			45 mA or less			
Switch output			NPN 1 output, NPN 2 outputs, PNP 1 output, PNP 2 outputs			
	Maximum load current		80 mA			
	Maximum load voltage		28 V (at NPN output)			
	Residual voltage		1 V or less (with load current of 80 mA)			
	Response time		2.5 ms (with anti-chattering function: 20, 100, 500, 1000, 2000 ms)			
	Short circuit protection		Yes			
Repeatability			±0.2% F.S. ±1 digit			
Hysteresis	**Hysteresis mode**		Variable (0 or above)			
	Window comparator mode					
Analog output	**Voltage output**	**Output voltage (Rated pressure range)**	1 to 5 V ±2.5% F.S.		0.6 to 5 V ±2.5% F.S.	0.8 to 5 V ±2.5% F.S.
		Linearity	±1% F.S. or less			
		Output impedance	Approx. 1 kΩ			
	Current output	**Output current (Rated pressure range)**	4 to 20 mA ±2.5% F.S.		2.4 to 20 mA ±2.5% F.S.	3.2 to 20 mA ±2.5% F.S.
		Linearity	±1% F.S. or less			
		Load impedance	Maximum load impedance: 300 Ω (Power supply voltage 12 V) 600 Ω (Power supply voltage 24 V) Minimum load impedance: 50 Ω			
Auto-shift input			Non-voltage input (Reed or Solid state), Low level: 0.4 V or less, 5 ms or longer input			
Display			3 1/2-digit, 7-segment, 2-color LCD (Red/Green)			
Display accuracy			±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)			
Indicator light			Lights up when output is turned ON. OUT1, OUT2: Orange			
Function			Anti-chattering, Zero-out, Key lock function, Auto-preset, Auto-shift, Unit display switching, Power-saving mode			
Environment resistance	**Enclosure**		IP65			
	Operating temperature range		Operating: 0 to 50°C, Stored: –10 to 60°C (No freezing or condensation)			
	Operating humidity range		Operating/Stored: 35 to 85% RH (No condensation)			
	Withstand voltage		250 VAC for 1 minute between live parts and case			
	Insulation resistance		2 MΩ or more between live parts and case (at 50 VDC Mega)			
	Vibration resistance		10 to 150 Hz at whichever is smaller of 1.5 mm amplitude or 20 m/s² acceleration, in X, Y, Z directions, for 2 hours each (De-energized)			
	Impact resistance		100 m/s² in X, Y, Z directions, 3 times each (De-energized)			
Temperature characteristics			±3% F.S. (Based on 25°C, within operating temperature range)			
Lead wire			Oilproof heavy-duty vinyl cable, 3 cores (N.P) ø3.5, 2 m 4 cores (A.B) Conductor area: 0.15 mm² (AWG26) 5 cores (R.T.S.V) Insulator O.D.: 0.95 mm			
Standards			CE marking, UL/CSA, RoHS compliance			

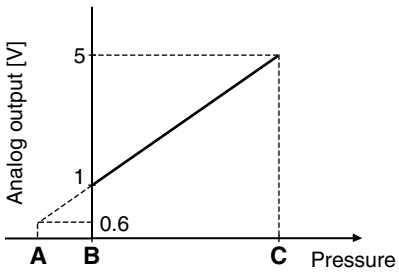
* G1/4 is available for rear ported only.

Piping Specifications

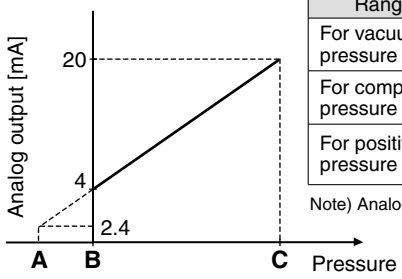
Model	02	N02	F02	C01	A2	B2
Port size	R1/4	NPT1/4	G1/4	Rc1/8	URJ1/4	TSJ1/4
Weight (Bottom ported)	117 g	118 g	—	114 g	120 g	111 g
Weight (Rear ported)	89 g	90 g	86 g	86 g	92 g	83 g
Leakage	1 x 10^{-5} Pa·m³/s				1 x 10^{-10} Pa·m³/s	

Analog Output

Voltage output



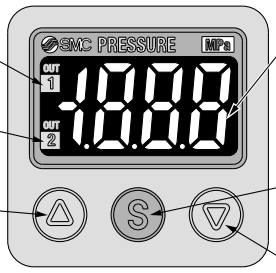
Current output



Range	Rated pressure range	A	B	C
For vacuum pressure	0.0 to –101.0 kPa	10.1 kPa	0	–101.0 kPa
For compound pressure	–100.0 to 100.0 kPa	—	–100.0 kPa	100.0 kPa
For positive pressure	–0.100 to 1.000 MPa	–0.100 MPa	0	1.000 MPa
	–0.100 to 2.00 MPa	–0.100 MPa Note)	0	2.00 MPa

Note) Analog output is 0.8 [V] or 3.2 [mA] at the pressure A.

Descriptions



Output (OUT1) display (Orange)

Lights up when OUT1 is turned ON.

Output (OUT2) display (Orange)

Lights up when OUT2 is turned ON.

△ button

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

LCD

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

SET button

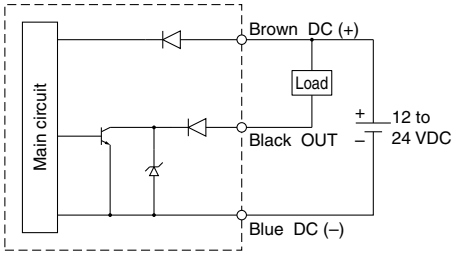
Use this button to change the mode or confirm the set-value.

▽ button

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

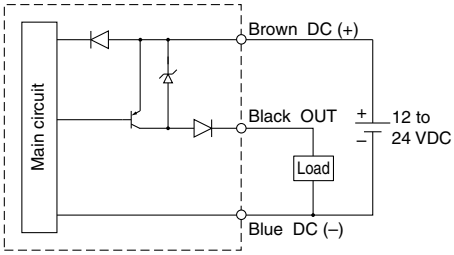
Internal Circuits and Wiring Examples

-N
NPN (1 output)



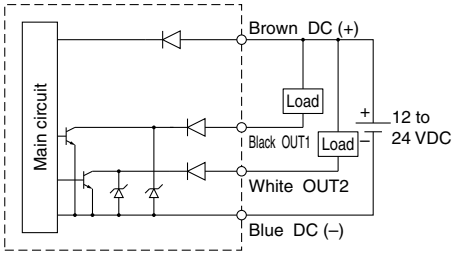
Max. 28V, 80 mA
Residual voltage 1 V or less

-P
PNP (1 output)



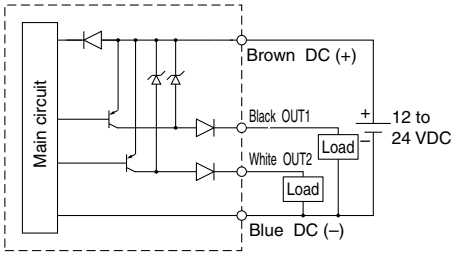
Max. 80 mA
Residual voltage 1 V or less

-A
NPN (2 outputs)



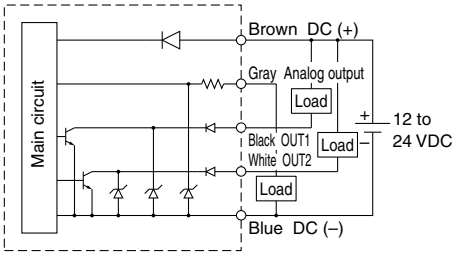
Max. 28V, 80 mA
Residual voltage 1 V or less

-B
PNP (2 outputs)



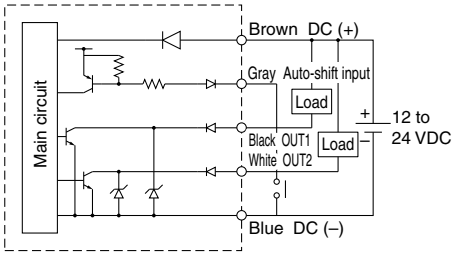
Max. 80 mA
Residual voltage 1 V or less

-R
NPN (2 outputs) + Analog voltage output



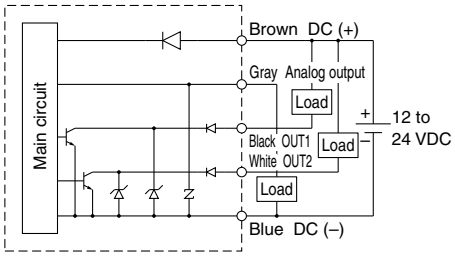
Max. 28V, 80 mA
Residual voltage 1 V or less

-R/-S
NPN (2 outputs) + Auto-shift input



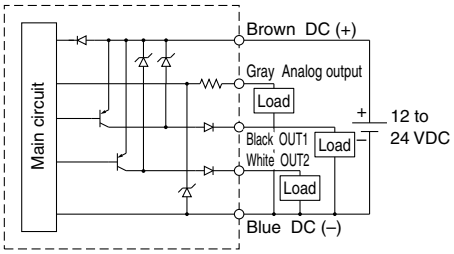
Max. 28V, 80 mA
Residual voltage 1 V or less

-S
NPN (2 outputs) + Analog current output



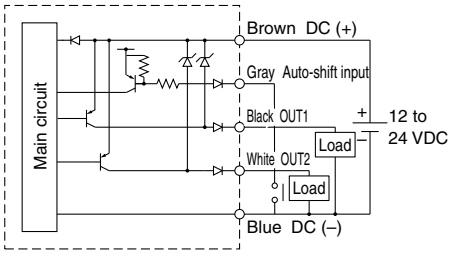
Max. 28V, 80 mA
Residual voltage 1 V or less

-T
PNP (2 outputs) + Analog voltage output



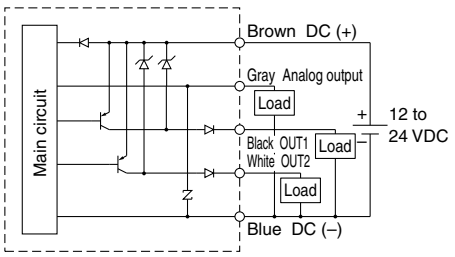
Max. 80 mA
Residual voltage 1 V or less

-T/-V
PNP (2 outputs) + Auto-shift input



Max. 80 mA
Residual voltage 1 V or less

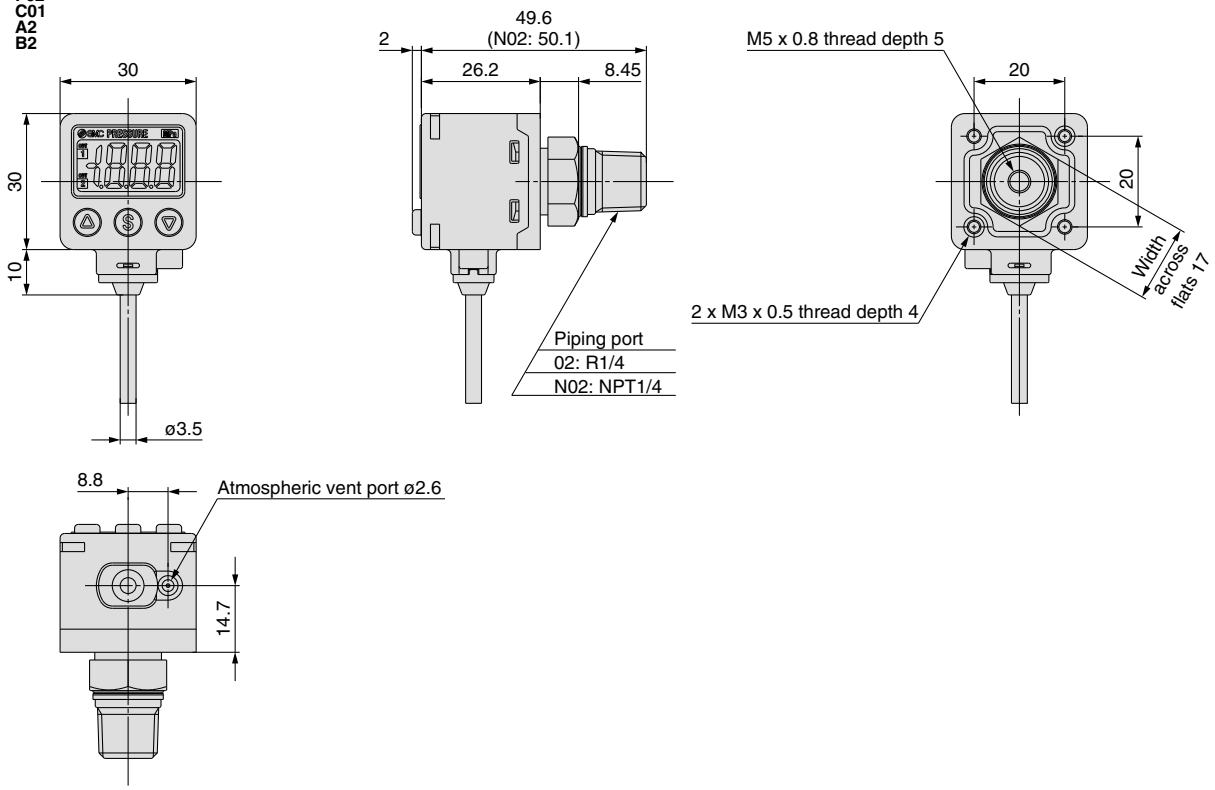
-V
PNP (2 outputs) + Analog current output

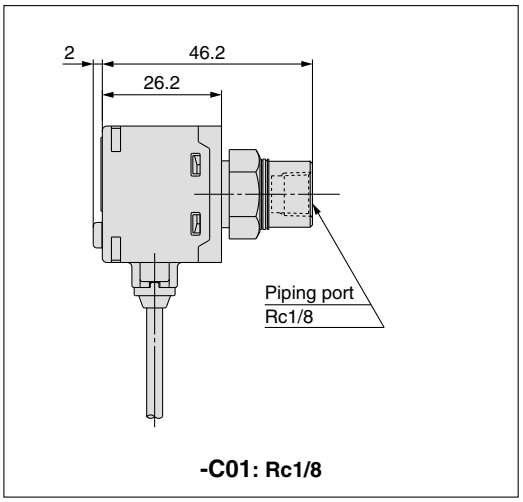


Max. 80 mA
Residual voltage 1 V or less

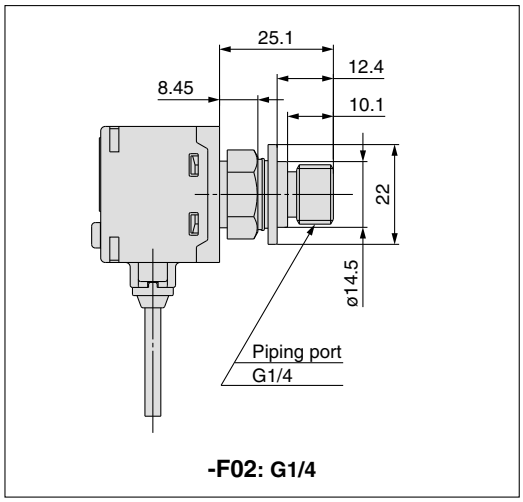
Dimensions

ZSE/ISE8□□- 02 N02 F02 C01 A2 B2

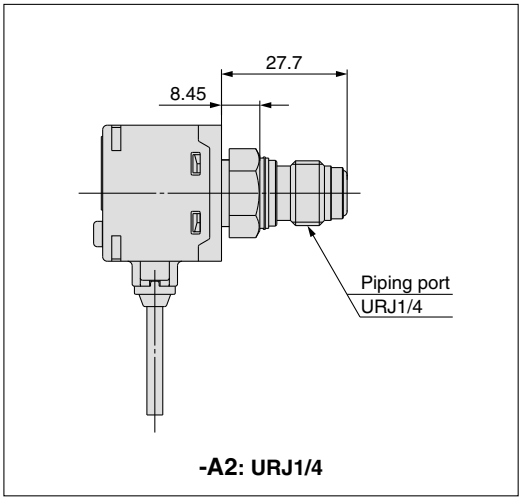




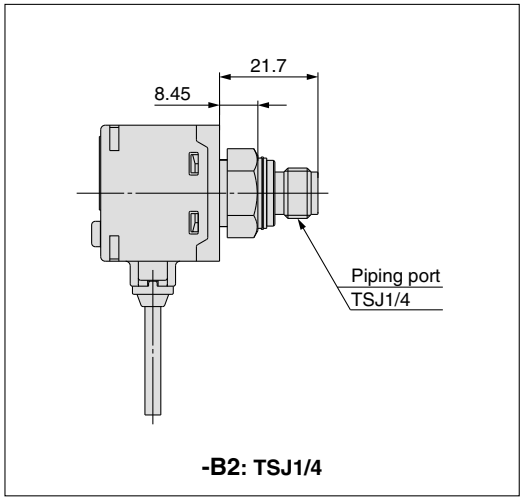
-C01: Rc1/8



-F02: G1/4



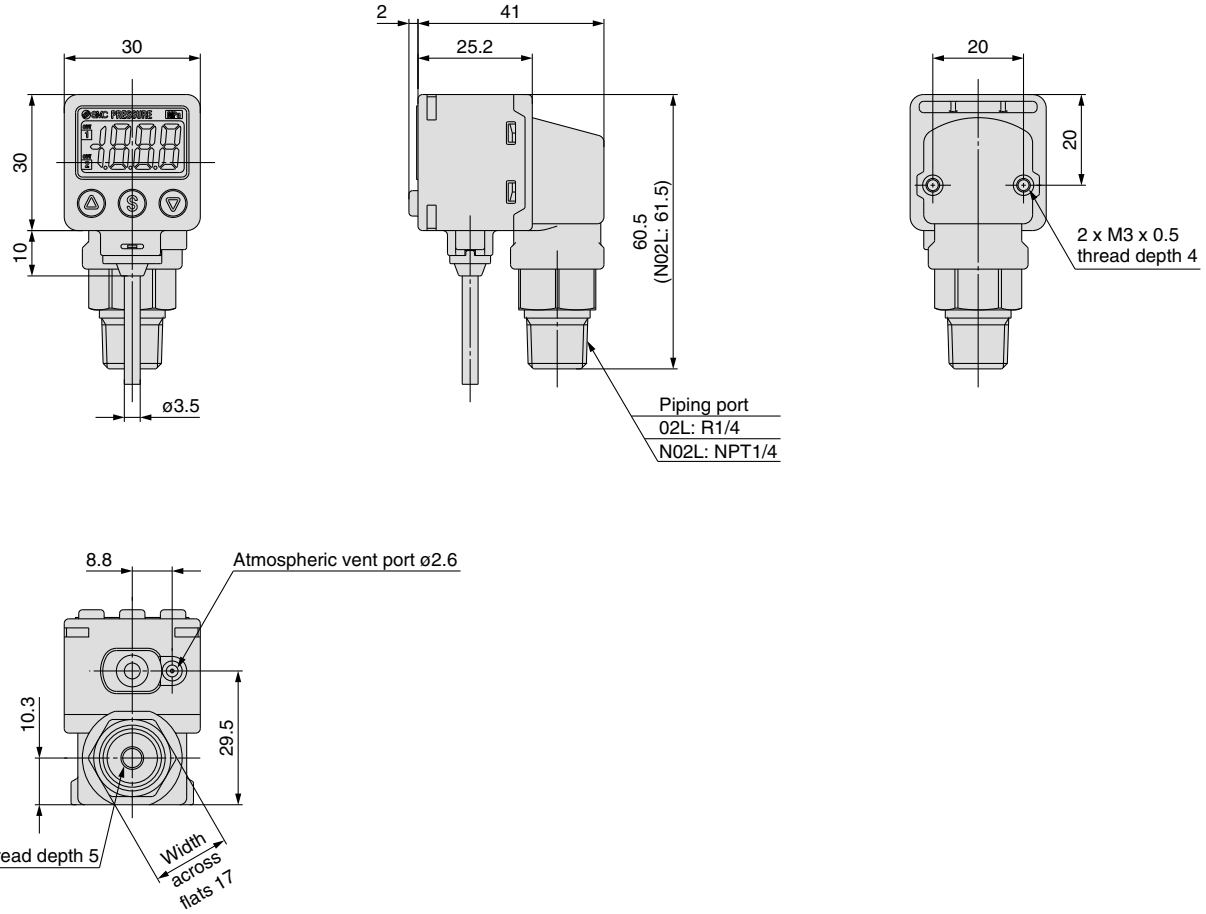
-A2: URJ1/4

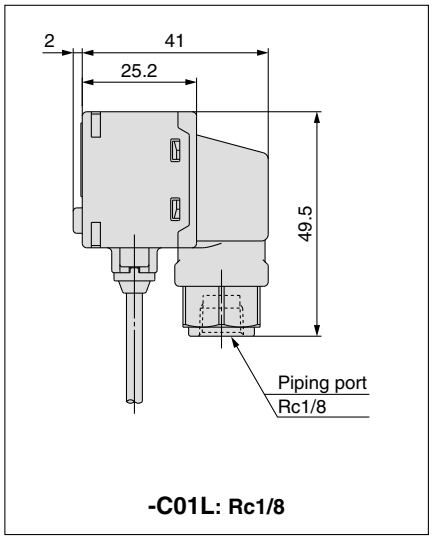


-B2: TSJ1/4

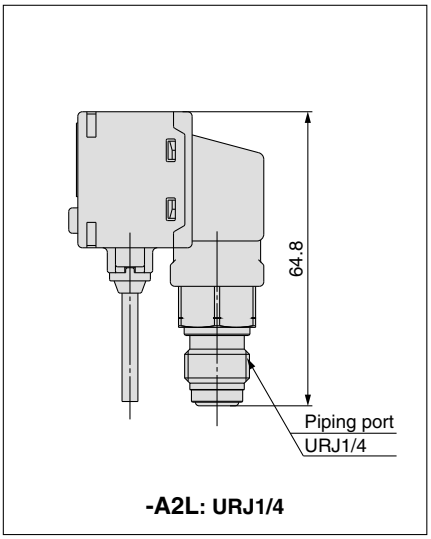
Dimensions

ZSE/ISE8□□- 02L / N02L / C01L / A2L / B2L

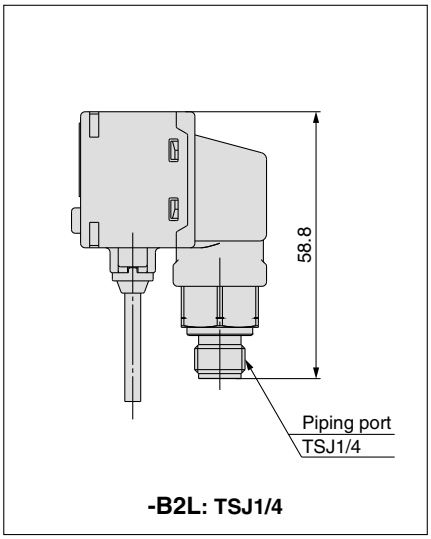




-C01L: Rc1/8



-A2L: URJ1/4

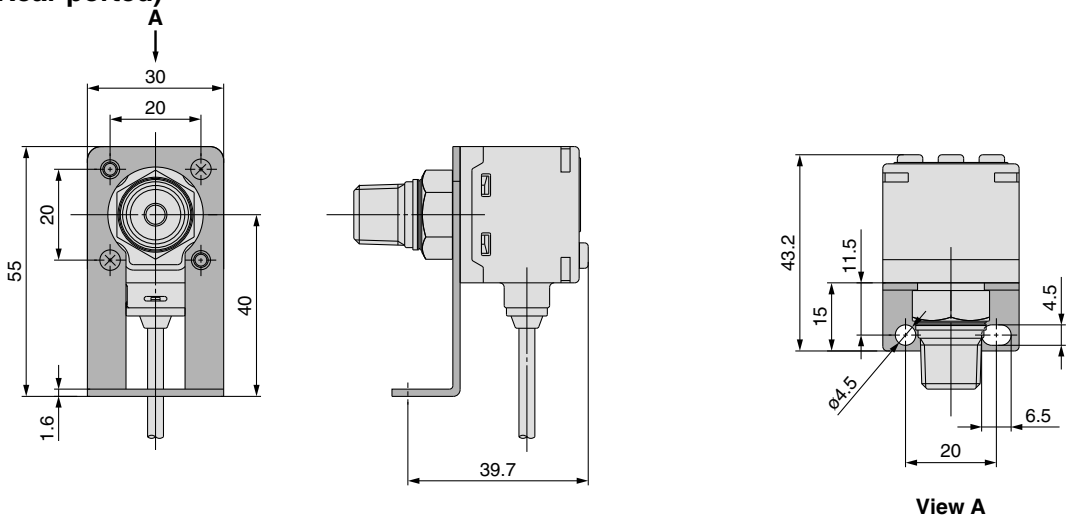


-B2L: TSJ1/4

Dimensions

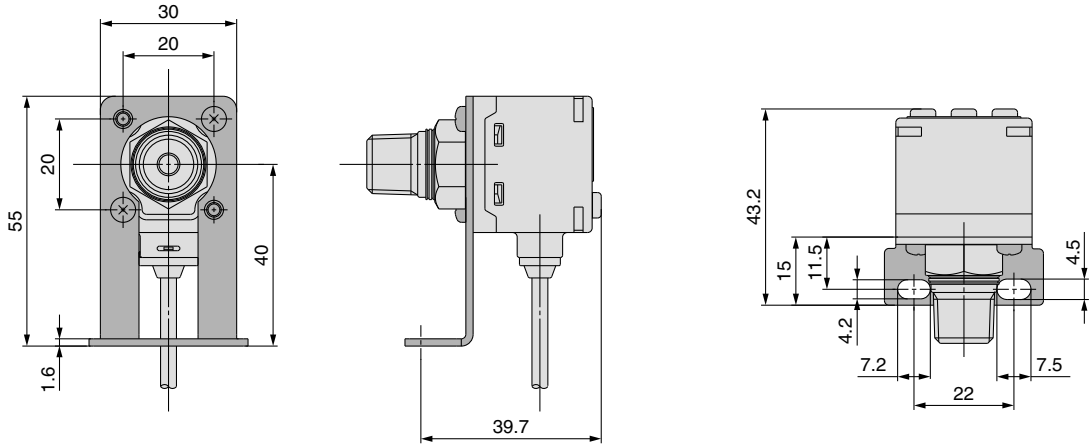
With bracket (Rear ported)

• ZS-24-A

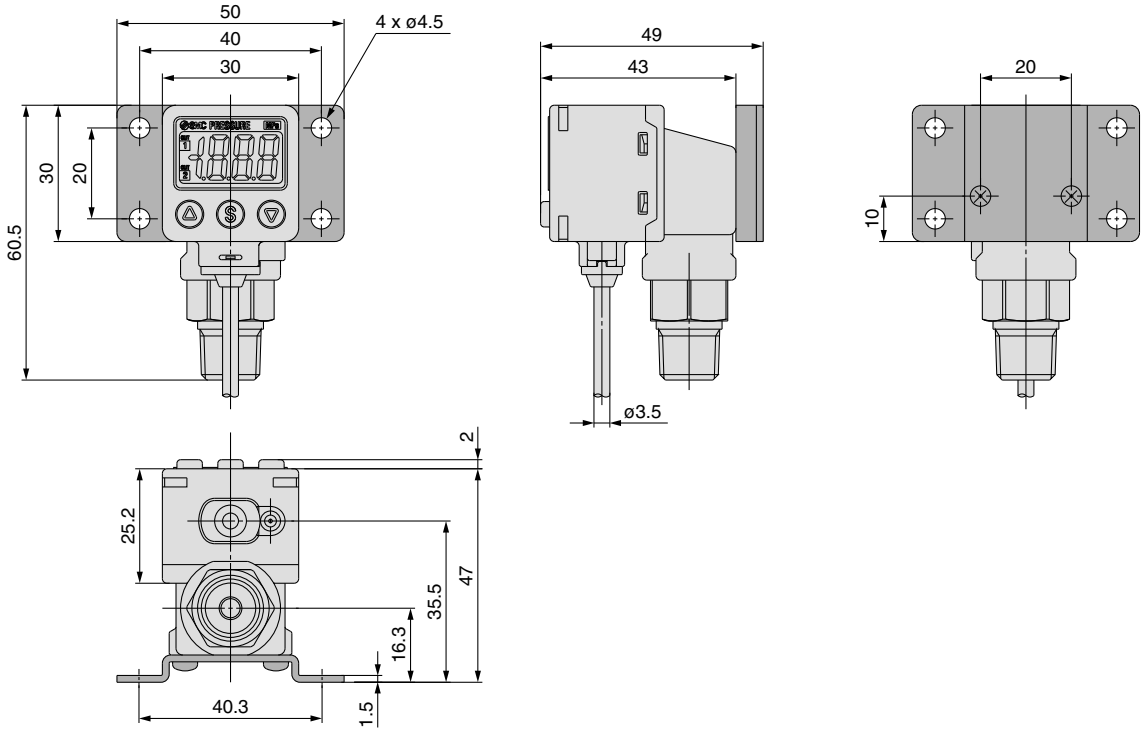


With bracket (Rear ported)

• ZS-24-D

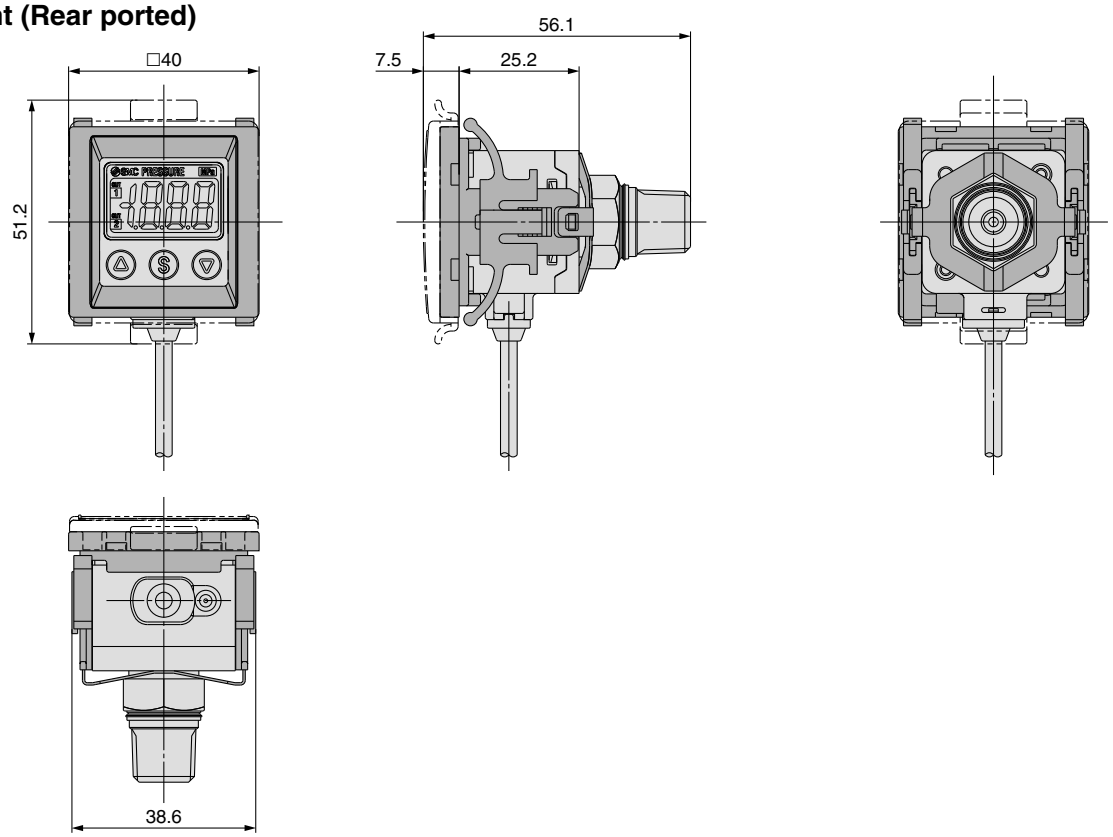


With bracket (Bottom ported)

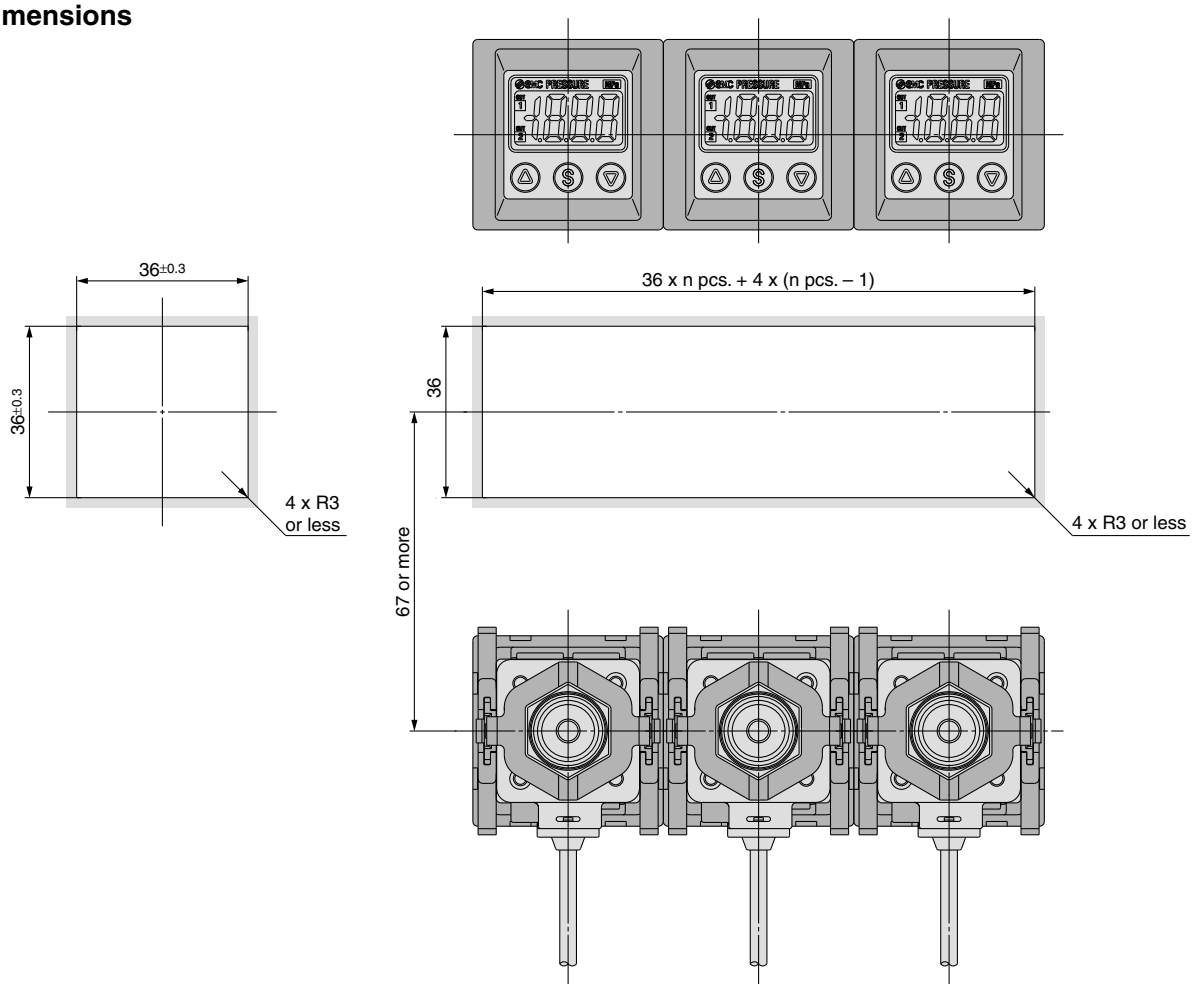


Dimensions

Panel mount (Rear ported)

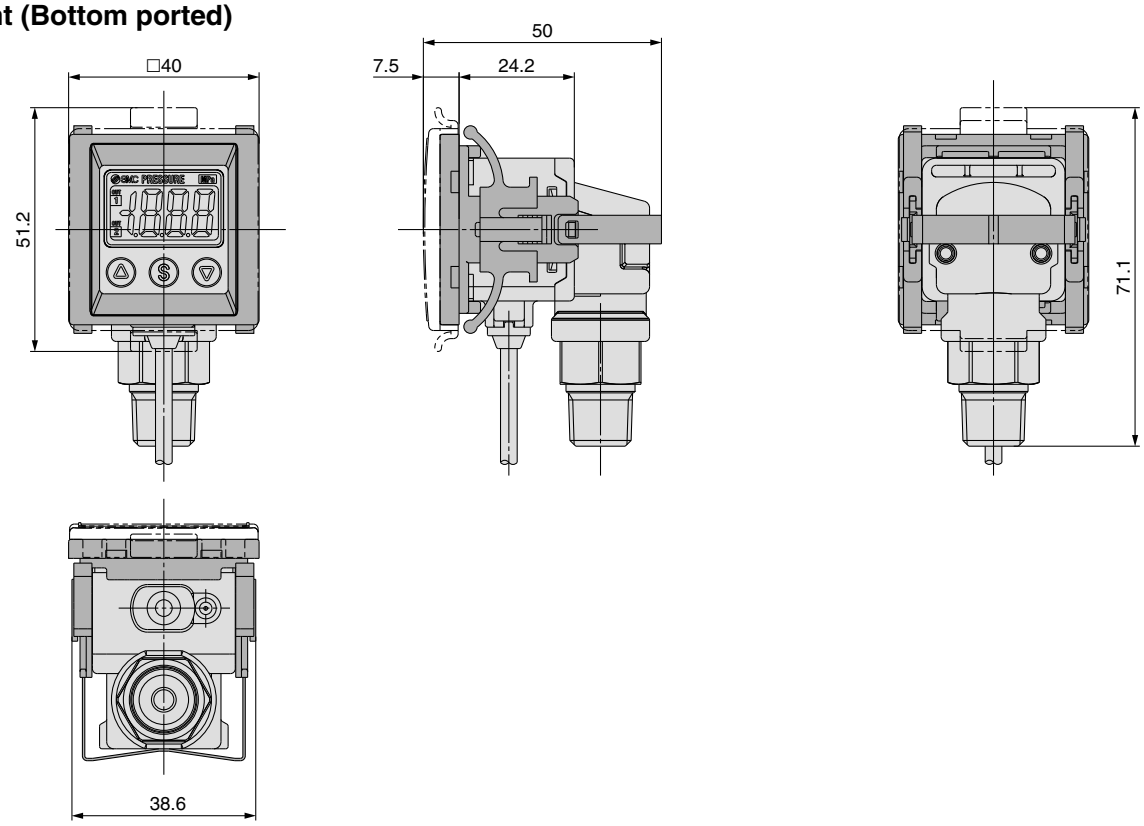


Panel-cut dimensions

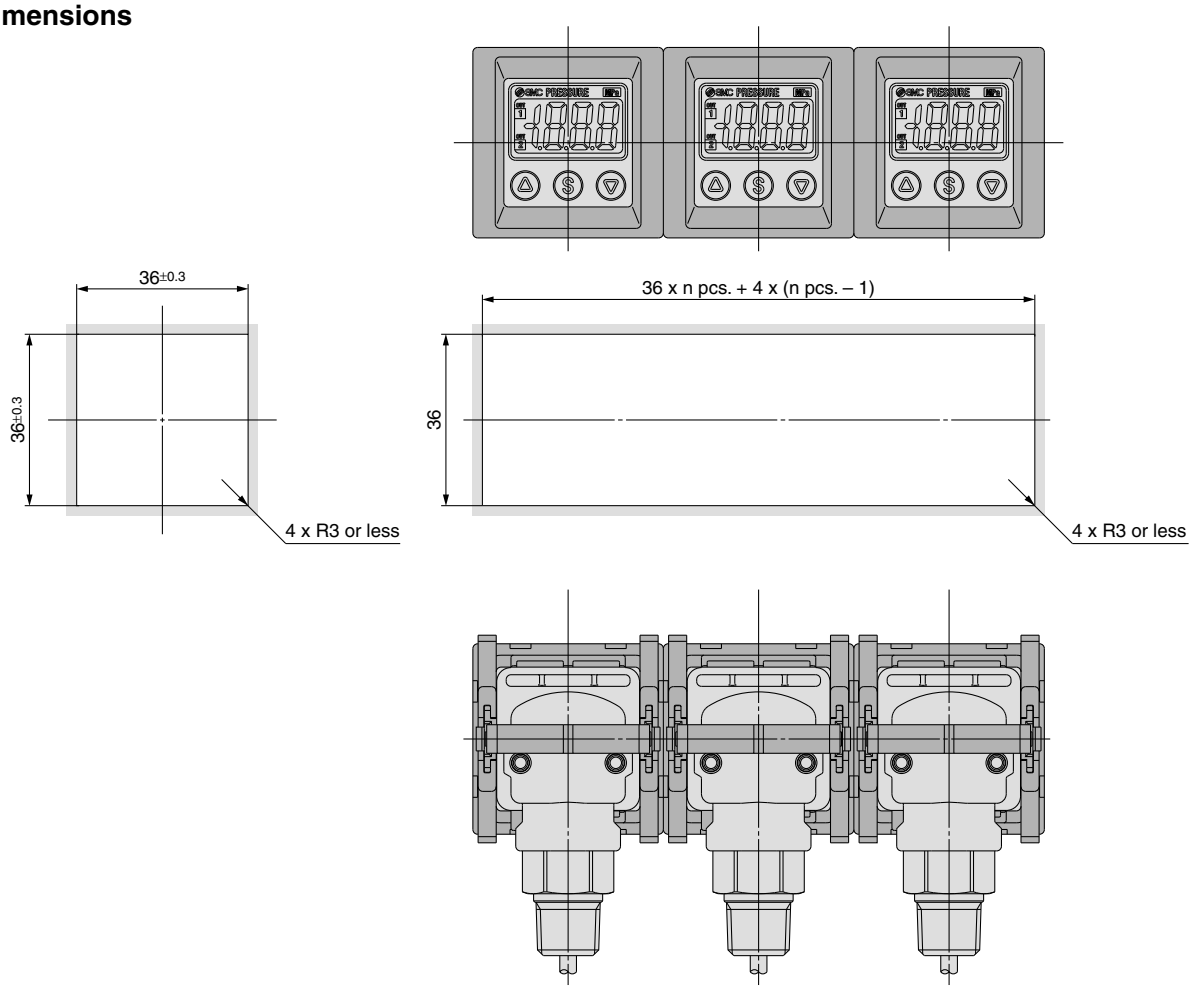


Dimensions

Panel mount (Bottom ported)



Panel-cut dimensions



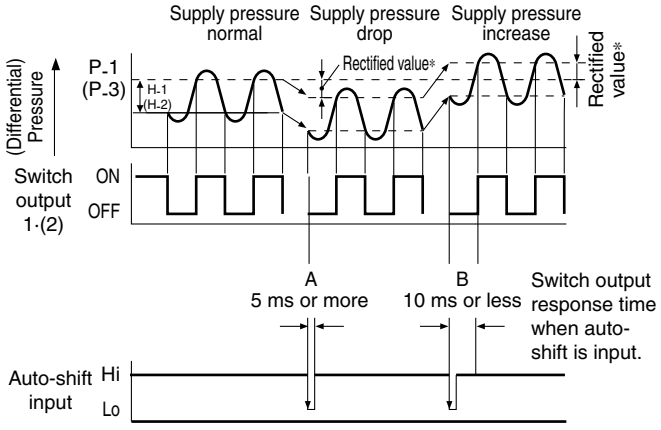
Function Details

F□ in brackets stand for the function codes. Refer to the operating manual for how to operate and function codes in detail.

A Auto-shift function (F4)

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

Set-value correction by auto-shift function



∗ Rectified value
When the auto-shift is selected, “ooo” will be displayed for approximately 1 second, and the pressure value at that point will be saved as a rectified value “C_5”. Based on the saved rectified values, the set-value Note) of “P_1”, “H_1”, “P_2”, and “H_2” will likewise be rectified.

Note) When an output is reversed, “n_1”, “H_1”, “n_2”, “H_2” will be rectified.

Possible Set Range for Auto-Shift Input

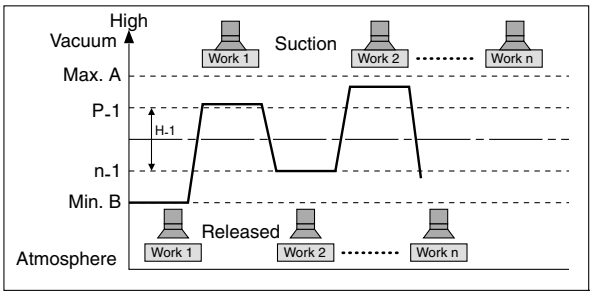
	Regulating pressure range	Possible set range
Compound pressure	–110.0 to 110.0 kPa	–220 to 220 kPa
Vacuum pressure	10.0 to –111.0 kPa	121.0 to –121.0 kPa
Positive pressure	–0.105 to 1.100 MPa	–1.205 to 1.205 MPa
	–0.105 to 2.20 MPa	–2.31 to 2.31 MPa

Auto-shift zero
The basic function of auto-shift zero is the same as the function for auto-shift. Also, it corrects values on the display, based on a pressure value of 0, when the auto-shift is selected.

B Auto-preset function (F8)

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

Suction Verification

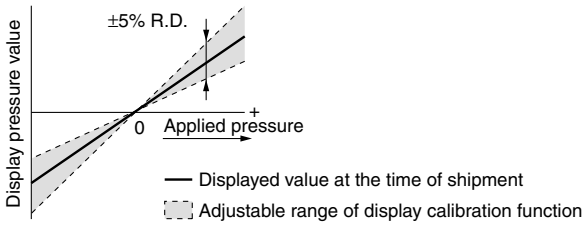


Formula for Obtaining the Set-Value

P_1 or P_2	H_1 or H_2
P_1 (P_2) = A – (A-B)/4 n_1 (n_2) = B + (A-B)/4	H_1 (H_2) = (A-B)/2

C Precision indicator setting function (F7)

Fine adjustment of the indicated value can be made within the range of ±5% of the read value. The scattering of the indicated value can be eliminated.



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

D Peak and bottom display function

This function constantly detects and updates the maximum (minimum) value and allows to hold the maximum (minimum) pressure value.
When the △ ▽ buttons are simultaneously pressed for 1 second or longer, while “holding”, the hold value will be reset.

E Key lock function

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

F Zero-out function

This function clears and resets the zero value on the display of measured pressure.
For the pressure switch with analog output, the analog output shifts according to the indication. A displayed value can be adjusted within ±10% F.S. of the pressure when ex-factory.

Function Details

G Error indication function

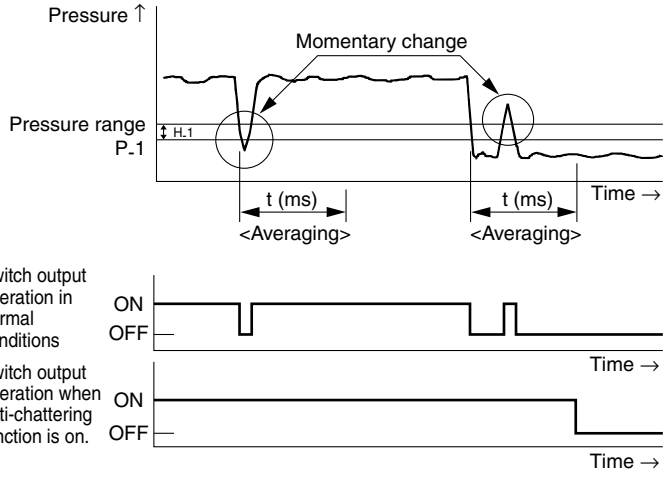
Error name	Error code	Description
Overcurrent error	Er 1	Load current of switch output (OUT1) exceeds 80 mA.
	Er2	Load current of switch output (OUT2) exceeds 80 mA.
Residual pressure error	Er 3	It is still applied with pressure that is ±10% over the atmospheric pressure and the upper limit of the rated pressure range when it is cleared to zero. ∗ After displaying the error code for 1 second, the switch automatically returns to the measuring mode. Due to individual product differences, the setting range varies ±1 digits.
Applied pressure error	HHH	Supply pressure exceeds the maximum set pressure.
	LLL	Supply pressure is below the minimum set pressure.
Auto-shift error	or	The value measured at the time of auto-shift input is outside the set pressure range. ∗ After displaying the error code for one second, the switch returns to the measuring mode.
System error	Er0	Internal data error
	Er4	Internal data error
	Er 7	Internal data error

H Anti-chattering function (F3)

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

Available response time settings
20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms

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



I Unit display switching function (F0)

Display units can be switched with this function.

Pressure range		For compound pressure	For vacuum pressure	For positive pressure	
Applicable pressure sensor		**ZSE80F**	**ZSE80**	**ISE80**	**ISE80H***
Set pressure range		–110 to 110 kPa	10 to –111 kPa	–0.1 to 1.1 MPa	–0.1 to 2.2 MPa
PA	kPa	0.1	0.1	1	1
	MPa	—	—	0.001	0.001
GF	kgf/cm²	0.001	0.001	0.01	0.01
bAr	bar	0.001	0.001	0.01	0.01
PSI	psi	0.02	0.02	0.1	1
inH	inHg	0.1	0.1	—	—
mmH	mmHg	1	1	—	—

∗ ISE80H: Does not indicate the last digit when the pressure is 2.000 MPa or higher.

J Power-saving mode (F9)

The numerical value disappears and the decimal points blink.

Power-saving mode can be selected.
It shifts to the power-saving mode without button operation for 30 seconds. It is set to the normal mode (Power-saving mode is OFF.) when ex-factory. (Decimal points and operation indicator light (only when the switch output is turned ON.) blink in the power-saving mode.)

K Secret code setting (F10)

Input an arbitrary three-digit value.

∗ The set-value can be confirmed when the key is locked.

It can be set whether code number input is required or not when key is locked. It is set to input no code number when ex-factory.

Made to Order

Please contact SMC for detailed dimensions, specifications, and lead times.

1 Wetted parts: Stainless steel 316L

This pressure switch has better corrosion resistance that uses stainless steel 316L for the wetted parts (pressure sensor and fitting).

How to Order

* Refer to How to Order on page 1 for standard specifications.

ZSE80(F)/ISE80–□–□–□–X500

- Piping*
- Output*
- Option*

Note 1) Not applicable to the rated pressure –0.1 to 2 MPa specifications (ISE80H).
Note 2) A restrictor (equivalent to -X510) is installed inside the fitting. (Piping specifications A2(L) and B2(L) are excluded.)

Specifications

Model	ZSE80(F)	ISE80
Withstand pressure	500 kPa	1.5 MPa
Applicable fluid	Fluids do not corrode stainless steel 316L	

Models other than above are the same specifications as standard.

2 Lead wire length 3 m

It has a lead wire extended to 3 meters.

How to Order

* Refer to How to Order on page 1 for standard specifications.

ZSE80(F)/ISE80(H)–□–□–□–X501

- Piping*
- Output*
- Option*

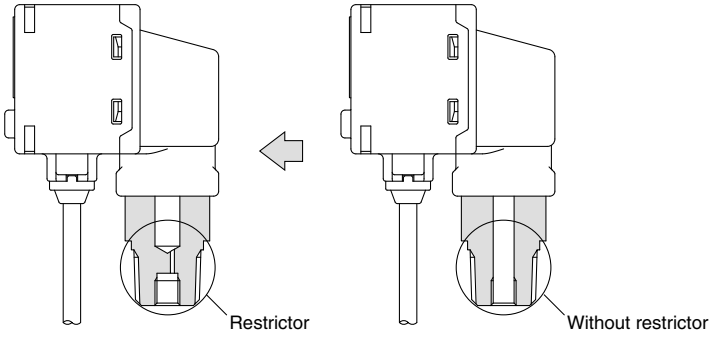
3 Restrictor installed fitting

A restrictor is installed inside the fitting in order to improve endurance of water collision with rush inertia in the piping when adsorption is broken.

How to Order

ZSE80(F)/ISE80(H)–□–□–□–X510

- Piping
- Output
- Option



Made to Order "-X510" **Standard**

Note 1) Not applicable for piping specifications A2(L) and B2(L).
Note 2) Sometimes does not work for suppression of water hammer effect even if this product is used. Take other measures in such a case.