2-Color Display High-Precision Digital Pressure Switch

Series 10-ZSE30A(F)/10-ISE30A

How to Order

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
C*	NPN open collector 1 output + Analog voltage output
D*	NPN open collector 1 output + Analog current output
E*	PNP open collector 1 output + Analog voltage output
F*	PNP open collector 1 output + Analog current output

∗ Made to Order

Clean Series

Rated pressure range

ISE30A	–0.1 to 1 MPa

For positive pressure

10 – ISE30A – 01 – N – M □ □ □

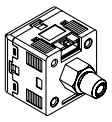
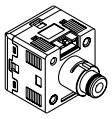
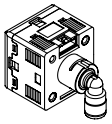
For vacuum/ compound pressure

10 – ZSE30A – 01 – N – M □ □ □

Rated pressure range

ZSE30A	0 to –101 kPa
ZSE30AF	–100 to 100 kPa

Piping

01	R1/8 (M5 female threaded)	
N01*	NPT1/8 (M5 female threaded)	
C4H	One-touch fitting ø4 mm, ø5/32 inch	Straight type 
C6H	One-touch fitting ø6 mm	
N7H	One-touch fitting ø1/4 inch	
C4L	One-touch fitting ø4 mm, ø5/32 inch	Elbow type 
C6L	One-touch fitting ø6 mm	
N7L	One-touch fitting ø1/4 inch	

∗ Made to Order

Display unit

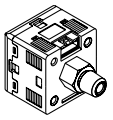
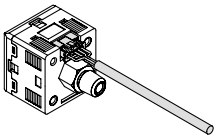
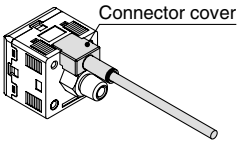
Nil	With unit display Note 1) switching function
M	Fixed SI unit Note 2)
P*	With unit display Note 1) switching function (Initial value psi)

∗ Made to Order

Note 1) Under the New Measurement Law, sales of switches with the unit switching function have not been allowed for use in Japan.

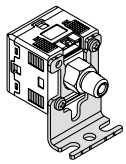
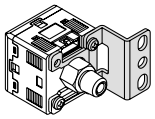
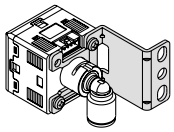
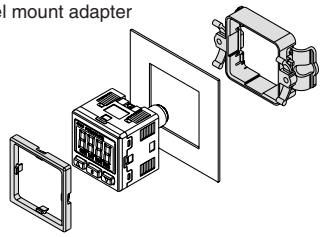
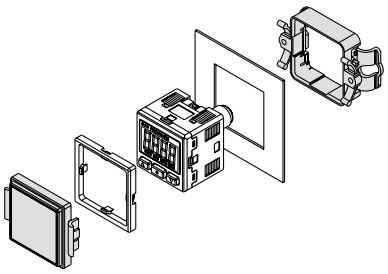
Note 2) Fixed unit kPa, MPa

Option 1

Nil	Without lead wire	
L	Lead wire with connector (Lead wire length 2 m) Note)	
G	Lead wire with connector (Lead wire length 2 m) Note) With connector cover	Connector cover 

Note) For output types N and P, the number of core of lead wires will be 3, and for other types, it will be 4.

Option 2

Nil	None
A1	Bracket A 
A2	Bracket B 
A3	Bracket C 
B	Panel mount adapter 
D	Panel mount adapter + Front protection cover 

Option 3

Symbol	Operating manual Booklet	Calibration certificate
Nil	○	—
Y	—	—
K	○	○
T	—	○

⚠Caution

This product is 10-ZSE30A(F)/ISE30A series blown with air and double packed in a Class M3.5 (ISO Class 5) clean room.

Specifications

Model			10-ZSE30A (Vacuum pressure)	10-ZSE30AF (Compound pressure)	10-ISE30A (Positive pressure)
Rated pressure range			0.0 to –101.0 kPa	–100.0 to 100.0 kPa	–0.100 to 1.000 MPa
Indication/Set pressure range			10.0 to –105.0 kPa	–105.0 to 105.0 kPa	–0.105 to 1.050 MPa
Withstand pressure			500 kPa	500 kPa	1.5 MPa
Indication/Minimum unit setting			0.1 kPa	0.1 kPa	0.001 MPa
Applicable fluid			Air, Non-corrosive gas, Non-flammable gas		
Power supply voltage			12 to 24 VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection)		
Current consumption			40 mA or less		
Switch output			NPN or PNP open collector 1 output, NPN or PNP open collector 2 outputs (selectable)		
	Maximum load current		80 mA		
	Maximum applied voltage		28 V (at NPN output)		
	Residual voltage		1 V or less (with load current of 80 mA)		
	Response time		2.5 ms or less (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) Note 1)		
	Window comparator mode				
Analog output	Note 2) Voltage output	Output voltage (Rated pressure range)	1 to 5V ±2.5% F.S.		0.6 to 5 V ±2.5% F.S.
		Linearity	±1% F.S.		
		Output impedance	Approx. 1 kΩ		
	Note 3) Current output	Output current (Rated pressure range)	4 to 20 mA ±2.5% F.S.		2.4 to 20 mA ±2.5% F.S.
		Linearity	±1% F.S.		
		Load impedance	Maximum load impedance: Power supply voltage 12 V: 300 Ω, Power supply voltage 24 V: 600 Ω Minimum load impedance: 50 Ω		
Display			4-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 switch output is turned ON. OUT1: Green, OUT2: Red		
Environment resistance	Enclosure		IP40		
	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		1000 VAC for 1 minute between live parts and case		
	Insulation resistance		50 MΩ or more between live parts and case (at 500 VDC Mega)		
Temperature characteristics			±2% F.S. (Based on 25°C)		
Lead wire			Oilproof heavy-duty vinyl cable, 3 cores ø3.5, 2 m 4 cores Conductor area: 0.15 mm^2 (AWG26), Insulator O.D.: 1.0 mm		
Standards			CE Marking, UL/CSA, RoHS compliance		

Note 1) If applied pressure fluctuates near the set value, set the hysteresis above the fluctuation range to prevent chattering.
Note 2) When analog voltage output is selected, analog current output cannot be used together.
Note 3) When analog current output is selected, analog voltage output cannot be used together.

Piping Specifications

Model		01	N01	C4H	C6H	N7H	C4L	C6L	N7L
Port size		R1/8 M5 x 0.8	NPT1/8 M5 x 0.8	—	—	—	—	—	—
	One-touch fitting, Straight type	—	—	ø4 mm ø5/32 inch	ø6 mm	ø1/4 inch	—	—	—
	One-touch fitting, Elbow type	—	—	—	—	—	ø4 mm ø5/32 inch	ø6 mm	ø1/4 inch
Wetted parts material	Sensor pressure receiving area	Sensor pressure receiving area: Silicon							
	Piping port	C3602 (electroless nickel plated) O-ring: HNBR		PBT, POM, Stainless steel 304, C3604 (electroless nickel plated) O-ring: HNBR					
Weight	Including lead wire with connector (3 cores, 2 m)	81 g		70 g	71 g	73 g	75 g	73 g	75 g
	Including lead wire with connector (4 cores, 2 m)	85 g		74 g	75 g	77 g	79 g	77 g	79 g
	Excluding lead wire with connector	43 g		32 g	33 g	35 g	37 g	35 g	37 g

Optional Part No.

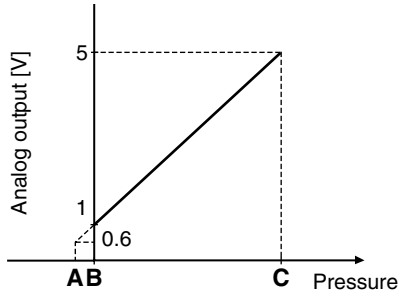
When optional parts are required separately, use the following part numbers to place an order.

Part no.	Option	Note
10-ZS-38-A1	Bracket A	Mounting screw (with 2 pcs. of M3 x 5L)
10-ZS-38-A2	Bracket B	Mounting screw (with 2 pcs. of M3 x 5L)
10-ZS-38-A3	Bracket C	Mounting screw (with 2 pcs. of M3 x 5L)
10-ZS-27-C	Panel mount adapter	Mounting screw (with 2 pcs. of M3 x 8L)
10-ZS-27-D	Panel mount adapter + Front protection cover	Mounting screw (with 2 pcs. of M3 x 8L)
10-ZS-27-01	Front protection cover	
10-ZS-38-3L	Lead wire with connector	3 cores, for 1 output, 2 m
10-ZS-38-4L	Lead wire with connector	4 cores, for 2 outputs, 2 m
10-ZS-38-3G	Lead wire with connector (with connector cover)	3 cores, for 1 output, 2 m

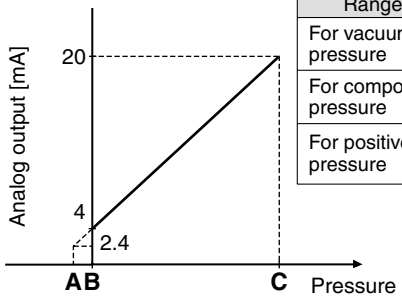
Part no.	Option	Note
10-ZS-38-4G	Lead wire with connector (with connector cover)	4 cores, for 2 outputs, 2 m
10-ZS-38-5L	Lead wire with a connector for copying	3 cores, copy function, 1 m
10-ZS-38-U	Lead wire unit with a connector for copying	Copy function (up to 10 slaves)
10-ZS-38-C4H	One-touch fittings ø4 mm straight	O-ring, one-touch clip included
10-ZS-38-C6H	One-touch fittings ø6 mm straight	O-ring, one-touch clip included
10-ZS-38-N7H	One-touch fittings ø1/4 inch straight	O-ring, one-touch clip included
10-ZS-38-C4L	One-touch fittings ø4 mm elbow	O-ring, one-touch clip included
10-ZS-38-C6L	One-touch fittings ø6 mm elbow	O-ring, one-touch clip included
10-ZS-38-N7L	One-touch fittings ø1/4 inch elbow	O-ring, one-touch clip included

Analog Output

Voltage output



Current output



Range	Rated pressure range	A	B	C
For vacuum pressure	0.0 to –101.0 kPa	—	0	–101 kPa
For compound pressure	–100.0 to 100.0 kPa	—	–100 kPa	100 kPa
For positive pressure	–0.100 to 1.000 MPa	–0.1 MPa	0	1 MPa

Descriptions

Unit display

Displays present unit (only for units of kPa and MPa).

Output (OUT1) display (Green)

Lights up when switch output (OUT1) is turned ON.

△ button (UP)

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.

S button (SET)

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

LCD

Displays the current pressure, set mode, 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.

Output (OUT2) display (Red)

Lights up when switch output (OUT2) is turned ON.

▽ button (DOWN)

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.

Functions (Refer to pages 10 and 11 for details.)

Copy function	Copies the settings of the master sensor to the slave sensors.
Auto-preset function	Calculates and enters rough set values automatically from the actual operating conditions.
Precision indicator setting function	Evens out deviations in the displayed value.
Peak display function	Can retain the maximum pressure value displayed during measurement.
Bottom display function	Can retain the minimum pressure value displayed during measurement.
Key lock function (Security code input can be selected.)	The key board can be locked to prevent any incorrect function of the operation switch.
Zero-out function	The pressure display can be set at zero when the pressure is open to the atmosphere.
Anti-chattering function	Prevents possible malfunction due to sudden fluctuations in the primary pressure by adjusting the response time.
Unit display switching function	Can convert the display value.
Power-saving mode	Reduces power consumption.
Display resolution-switch function	Converts display resolution from the normal value of 1/1000 to 1/100. It reduces the monitor to flicker.
kPa⇔MPa switch function	Converts the unit between kPa and MPa.

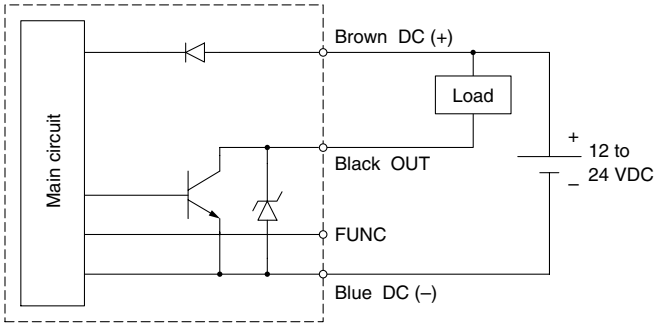
Internal Circuits and Wiring Examples

10-Z/ISE30A(F) – □ – ■ – □□□□

Output

N

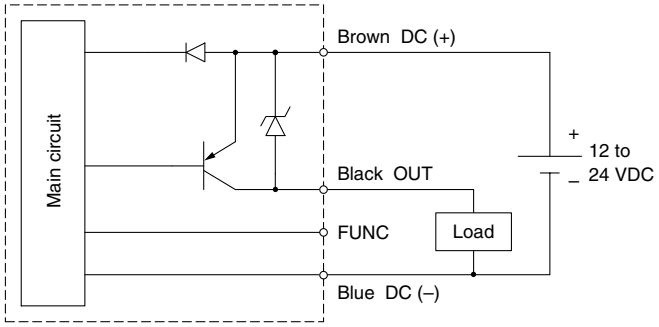
NPN (1 output)



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

P

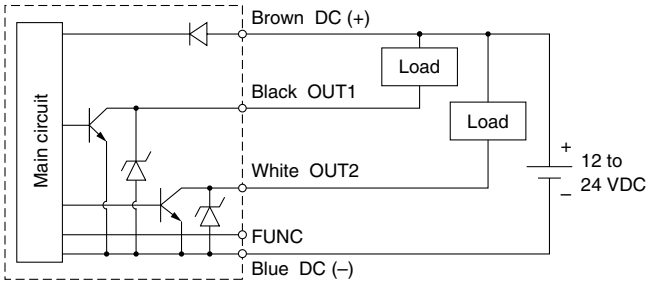
PNP (1 output)



Max. 80 mA
Residual voltage 1 V or less

A

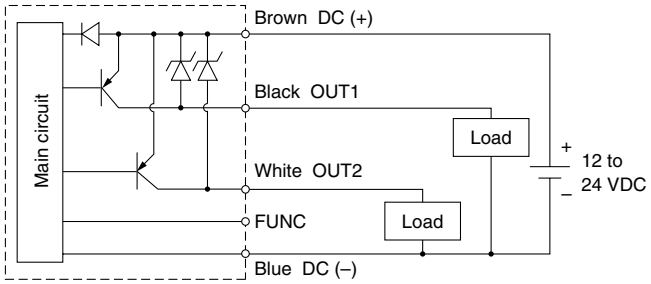
NPN (2 outputs)



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

B

PNP (2 outputs)

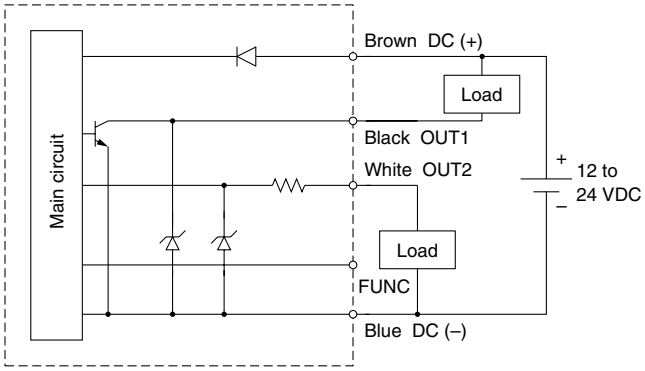


Max. 80 mA
Residual voltage 1 V or less

∗ The FUNC terminal is connected using a dedicated lead wire (10-ZS-38-5L or 10-ZS-38-U) when the copy function is used. (Refer to “Copy function” on page 10.)

C

NPN (1 output) + Analog voltage output

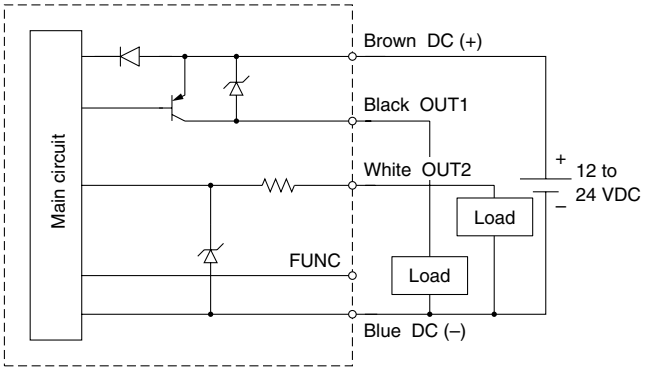


Max. 28 V, 80 mA
Residual voltage 1 V or less

Analog voltage output
Output impedance: Approx. 1 kΩ

E

PNP (1 output) + Analog voltage output

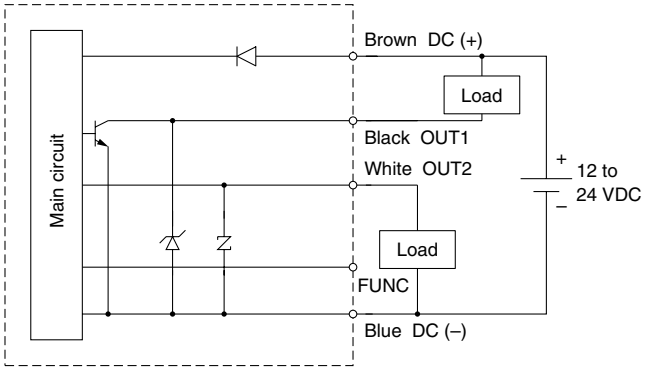


Max. 80 mA
Residual voltage 1 V or less

Analog voltage output
Output impedance: Approx. 1 kΩ

D

NPN (1 output) + Analog current output

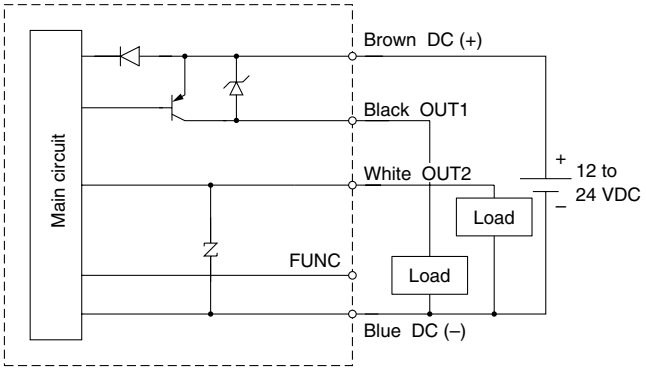


Max. 28 V, 80 mA
Residual voltage 1 V or less

Analog current output
Max. load impedance:
Power supply voltage 12 V: 300 Ω
Power supply voltage 24 V: 600 Ω
Min. load impedance: 50 Ω

F

PNP (1 output) + Analog current output



Max. 80 mA
Residual voltage 1 V or less

Analog current output
Max. load impedance:
Power supply voltage 12 V: 300 Ω
Power supply voltage 24 V: 600 Ω
Min. load impedance: 50 Ω

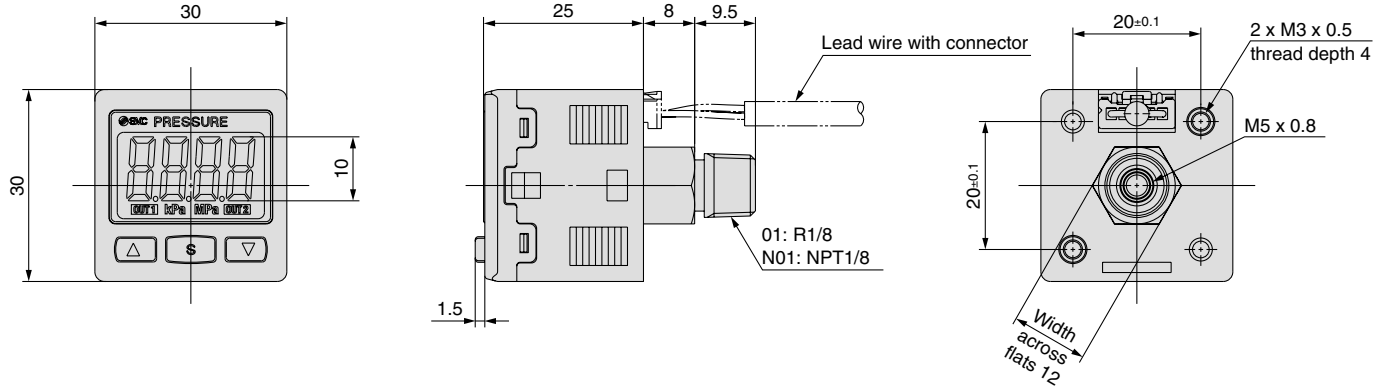
∗ The FUNC terminal is connected using a dedicated lead wire (10-ZS-38-5L or 10-ZS-38-U) when the copy function is used. (Refer to “Copy function” on page 10.)

Dimensions (For details about lead wires, refer to the product specifications.)

10-Z/ISE30A(F)–□–□–□□□□

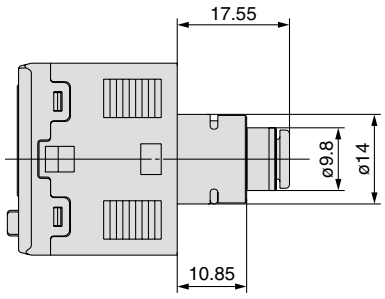
Piping

01 / N01



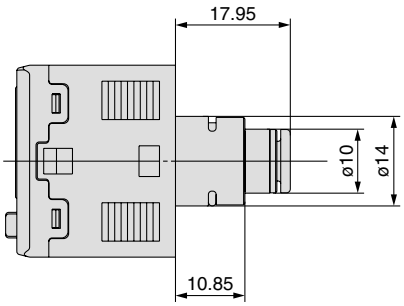
C4H

One-touch fitting ø4 mm ø5/32 inch straight



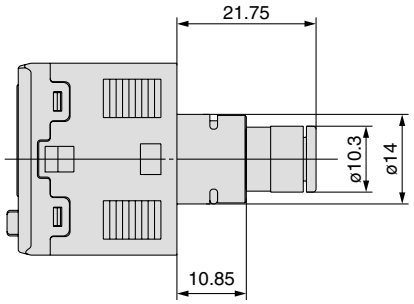
C6H

One-touch fitting ø6 mm straight



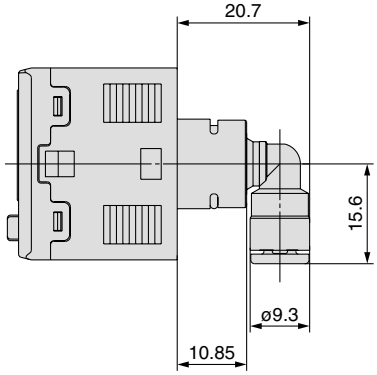
N7H

One-touch fitting ø1/4 inch straight



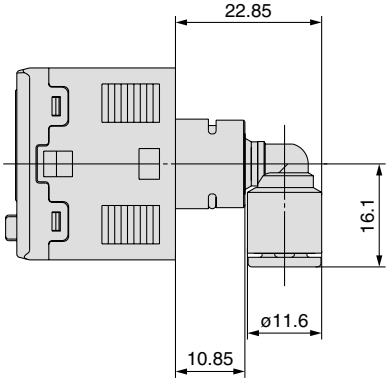
C4L

One-touch fitting ø4 mm ø5/32 inch elbow



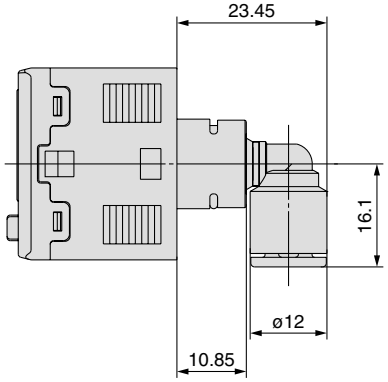
C6L

One-touch fitting ø6 mm elbow



N7L

One-touch fitting ø1/4 inch elbow



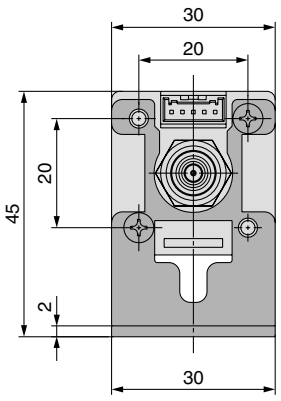
With bracket

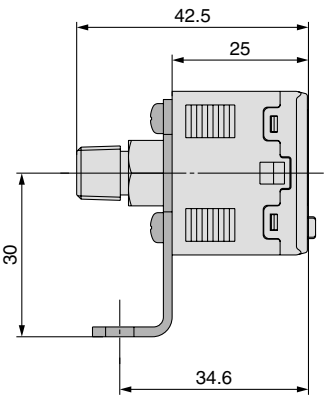
10-Z/ISE30A(F) – □ – □ – □□ ■ □

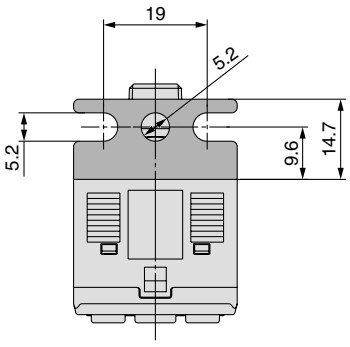
Option 2

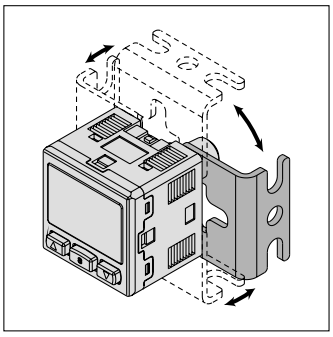
A1

Bracket A
(Option unit part no.: 10-ZS-38-A1)





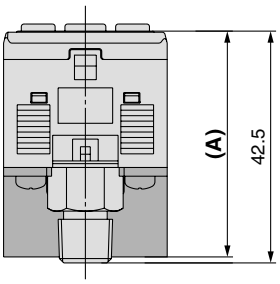




* Bracket configuration allows mounting in four orientations.

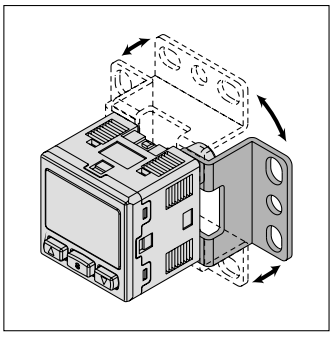
A2

Bracket B
(Option unit part no.: 10-ZS-38-A2)

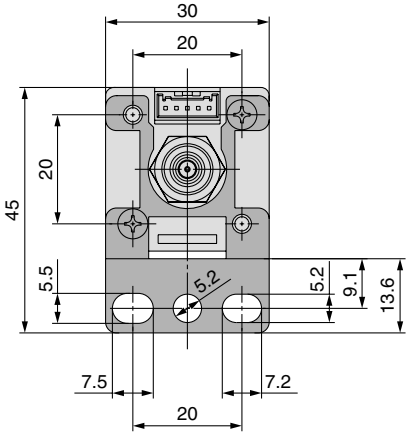


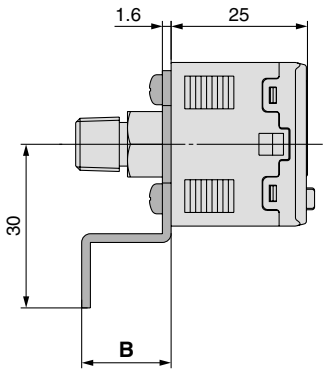
A3

Bracket C
(Option unit part no.: 10-ZS-38-A3)



* Bracket configuration allows mounting in four orientations.





	A	B
Bracket B	41.4	16.4
Bracket C	53	28

Dimensions

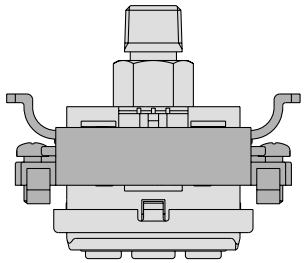
Panel mount

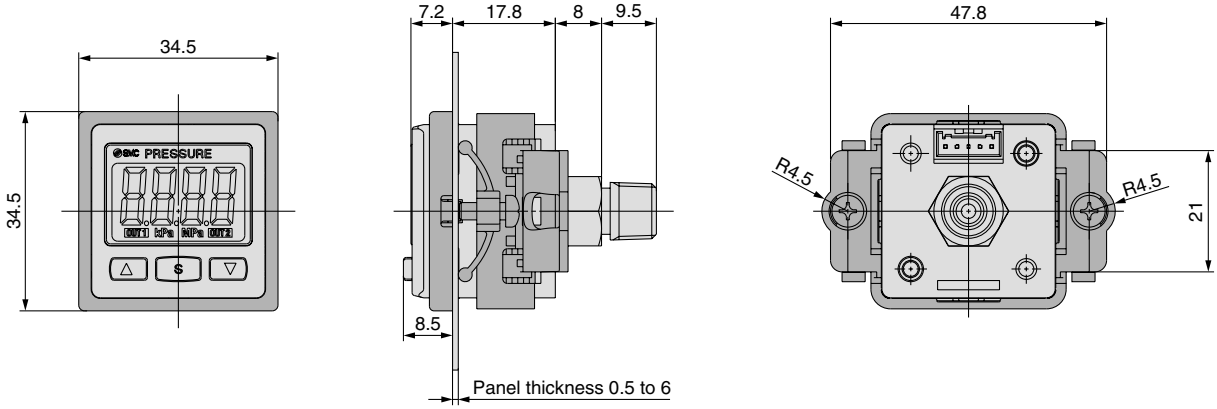
10-Z/ISE30A(F)−□−□−□□■□

Option 2

B

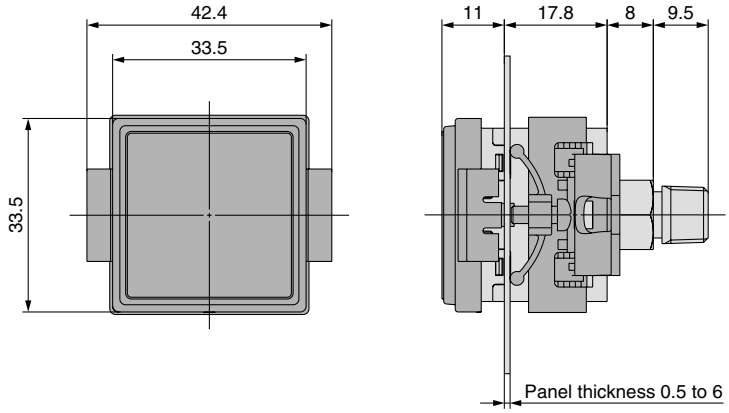
Panel mount adapter
(Option unit part no.: 10-ZS-27-C)





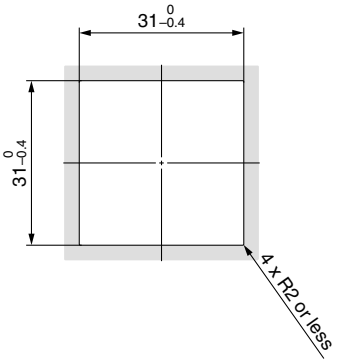
D

Panel mount adapter + Front protection cover
(Option unit part no.: 10-ZS-27-D)

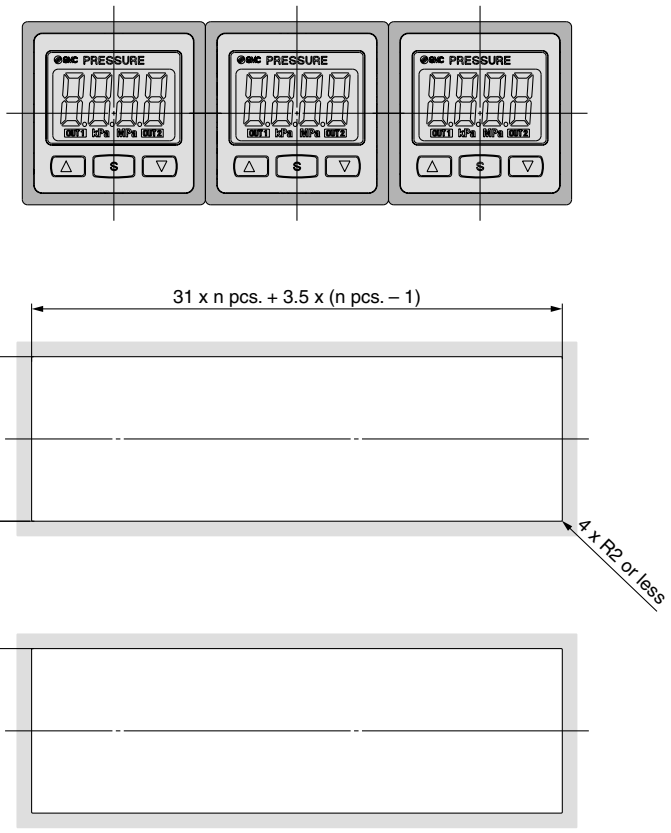


Panel-cut dimensions

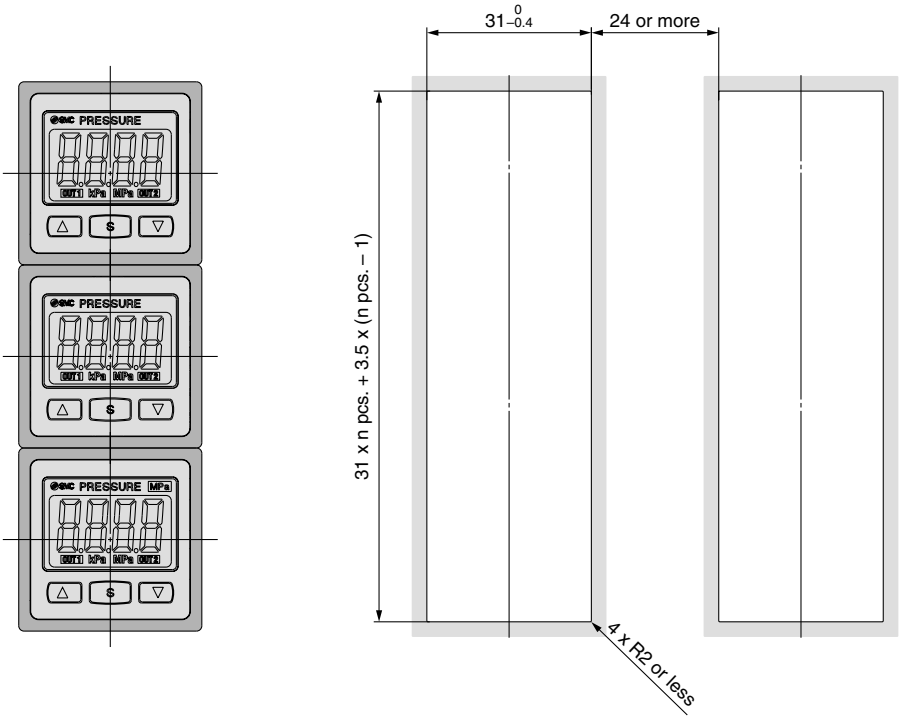
1 pc. mounting



Multiple (2 pcs. or more) horizontal mounting



Multiple (2 pcs. or more) vertical mounting

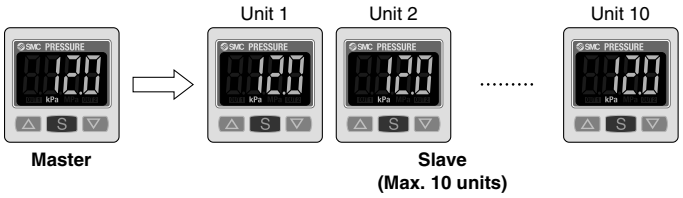


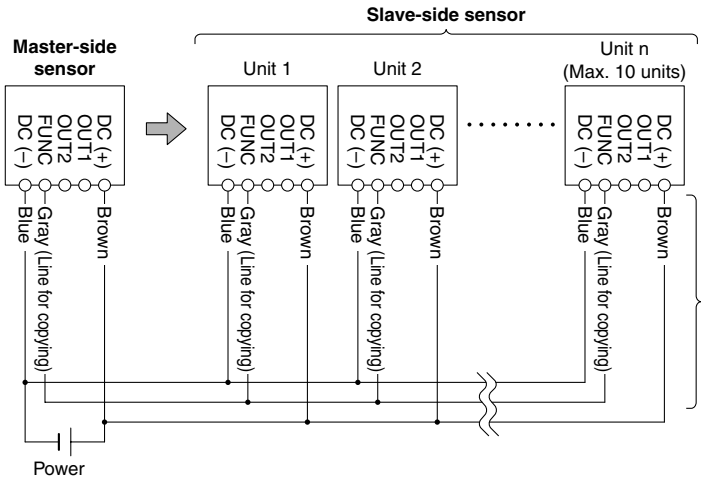
Function Details

A Copy function (F97)

The settings of the master sensor can be copied to the slave sensors.
It is to reduce the time taken for setting and prevent the input of wrong values.

Settings can be copied to up to 10 slave sensors at once.
(Max. transmission distance: 4 m)



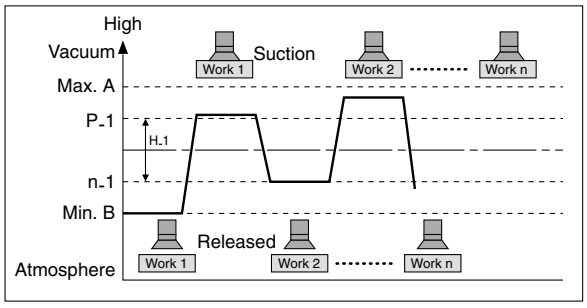


1) The sensors are connected by a dedicated lead wire (10-ZS-38-5L (for master and one slave) or 10-ZS-38-U (for master and up to 10 slaves)). Copying is performed through a dedicated communication line.
2) Make the slave sensor which needs to be the master into the master by button operation. (Initially all sensors are set as slaves.)
3) Press the S button on the master sensor to start copying.

B Auto-preset function (F5)

Auto-preset function, when selected in the 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

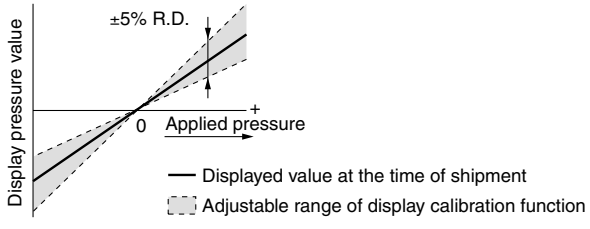


Formula for Obtaining the Set-Value

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 (F6)

Fine adjustment of the indicated value of the pressure sensor 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 held 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 ±7% F.S. of the pressure when ex-factory. (±3.5% F.S. for 10-ZSE30AF (compound pressure))

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

G Error indication function

Error name	Error code	Description	Solution
Overcurrent error	Er 1	Load current of switch output (OUT1) exceeds 80 mA.	Shut off the power supply. After eliminating the output factor that caused the excess current, turn the power supply back on.
	Er2	Load current of switch output (OUT2) exceeds 80 mA.	
Residual pressure error	Er3	A pressure of ±7% F.S. of atmospheric pressure is applied in the zero-out function. (±3.5% F.S. or more for 10-ZSE30AF (compound pressure)) The switch will automatically return to measuring mode in 1 second, however. Due to individual product differences, the setting range of the zero-out function varies within ±1% F.S.	Bring the pressure back to atmospheric pressure and try using the zero-out function.
Applied pressure error	HHH	Supply pressure exceeds the maximum set pressure.	Bring the pressure back to within the set pressure range.
	LLL	Supply pressure is below the minimum set pressure.	
System error	Er0	Internal data error	Shut off the power supply. Turn the power supply back on. If the switch will not recover to normal, consult SMC for investigation.
	Er4		
	Er6		
	Er7		
	Er8		
	Er9		

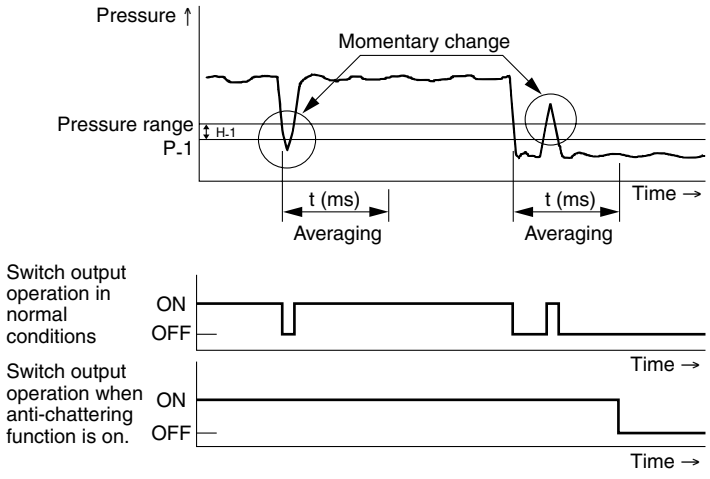
If the switch will not recover to normal even after all of the above-mentioned solutions have been applied, consult SMC for investigation.

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.

Display unit / Min. unit setting	PA		GF	bAr	PSi	inH	mmH
	kPa	MPa*	kgf/cm²	bar	psi	inHg	mmHg
10-ZSE30A (Vacuum pressure)	0.1	0.001	0.001	0.001	0.01	0.1	1
10-ZSE30AF (Compound pressure)	0.1	0.001	0.001	0.001	0.01	0.1	1
10-ISE30A (Positive pressure)	1	0.001	0.01	0.01	0.1		

* For the 10-ZSE30A (vacuum pressure) and 10-ZSE30AF (compound pressure), when the display unit is MPa, setting and display resolutions are changed.

J Power-saving mode (F7)

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 (F8)

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.

Series 10-ZSE30A(F)/10-ISE30A
Specific Product Precautions 1

Be sure to read this before handling.
Refer to "Handling Precautions for SMC Products" (M-E03-3) for Safety Instructions and Pressure Switches Precautions.

Handling

⚠ Warning

1. **Do not drop, bump, or apply excessive impacts (100 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 35 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 7 to 9 N·m when connecting the pipe to the switch. Exceeding these values may cause the switch to malfunction.**
4. **Do not use pressure sensors with corrosive and/or flammable gases or liquids.**
5. **Allow a sufficient margin of tube length in piping in order to prevent application of torsional, tensile or moment load to the tubes and fittings.**
6. **When a brand of tubing other than SMC is used, make sure that the tolerance of the tube's O.D. satisfies the following specifications.**
   1) Nylon tubing: ±0.1 mm or less
   2) Soft nylon tubing: ±0.1 mm or less
   3) Polyurethane tubing: +0.15 mm or less, –0.2 mm or less
7. **The applicable fluid is air. Consult SMC if the switch is to be used with other types of fluids.**

Connection

⚠ Warning

1. **Incorrect wiring can damage the switch and cause a malfunction or erroneous switch output. Connections should be done while the power is turned off.**
2. **Do not attempt to insert or pull the pressure sensor or its connector when the power is on. A switch output malfunction may occur.**

⚠ Caution

1. **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 other lines.**
2. **If a commercial switching regulator is used, make sure that the F.G. terminal is grounded.**

Operating Environment

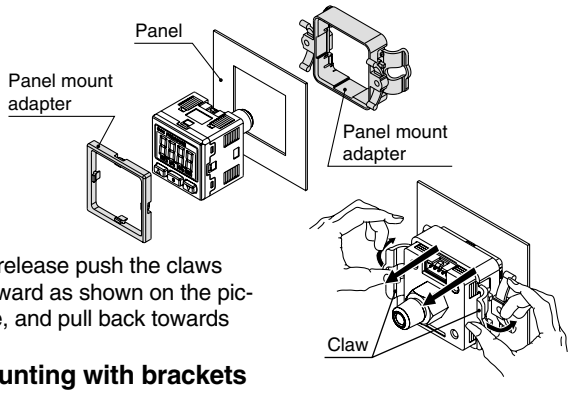
⚠ Warning

1. **This pressure switch is CE marked; however, it is not equipped with surge protection against lightning. Lightning surge countermeasures should be applied directly to system components as necessary.**
2. **This pressure switch does not have an explosion proof rating. Never use in the presence of an explosive gas as this may cause a serious explosion.**
3. **Do not use in an environment where static electricity can cause problems, otherwise system failure or malfunction may result.**

Mounting

⚠ Caution

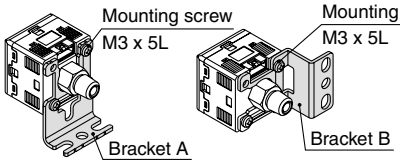
1. **Mounting and removing with panel mount adapter**



To release push the claws outward as shown on the picture, and pull back towards

2. **Mounting with brackets**

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

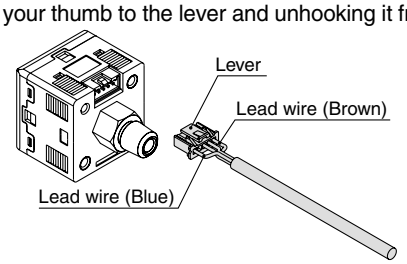


The tightening torque for bracket mounting screw should be 0.5 to 0.7 N·m.

- When using bracket B, take piping dimensions into consideration for installation.

Connection/Removal of Connector

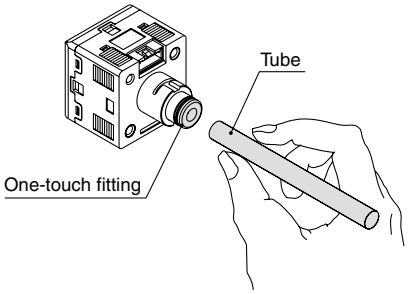
- To connect the connector, insert it straight while pinching the lever, and then push the lever into the jack of the housing and lock it.
- To remove the connector, pull it straight out while applying pressure with your thumb to the lever and unhooking it from the jack.



- Do not attempt to insert or pull the pressure sensor or its connector when the power is on. A switch output malfunction may occur.

Piping

- Cut the tube perpendicularly.
- Hold the tube and insert it into the one-touch fitting carefully and securely all the way to the bottom.



Series 10-ZSE30A(F)/10-ISE30A
Specific Product Precautions 2

Be sure to read this before handling.
Refer to "Handling Precautions for SMC Products" (M-E03-3) for Safety Instructions and Pressure Switches Precautions.

Set Pressure Range and Rated Pressure Range

⚠ Caution

Set the pressure within the rated pressure range.
The set 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 switch.
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 set pressure range.

Switch		Pressure range
For vacuum pressure	**10-ZSE30A**	–101 kPa to 0; –105 kPa to 10 kPa
For com-pound pressure	**10-ZSE30AF**	–100 kPa to 100 kPa; –105 kPa to 105 kPa
For positive pressure	**10-ISE30A**	–100 kPa to 1 MPa; –105 kPa (–0.105 MPa) to 1.05 MPa