

# 2-Color Display High-Precision Digital Pressure Switch

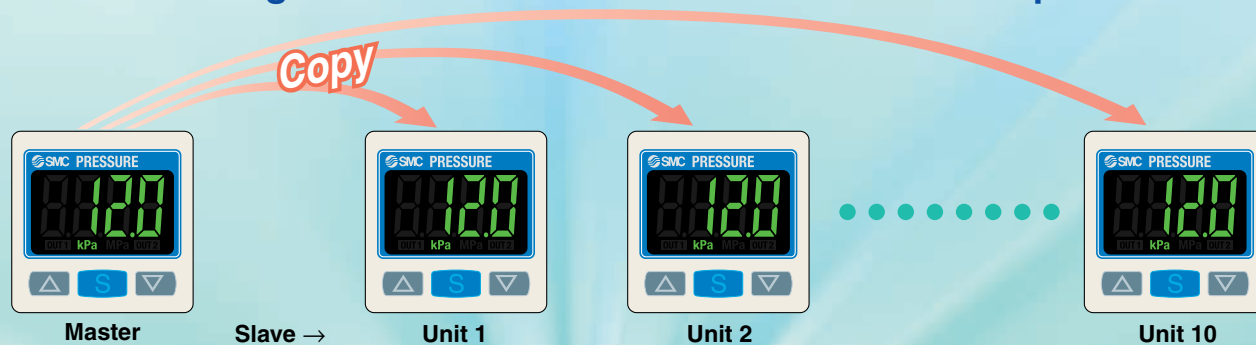


RoHS compliant

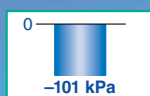
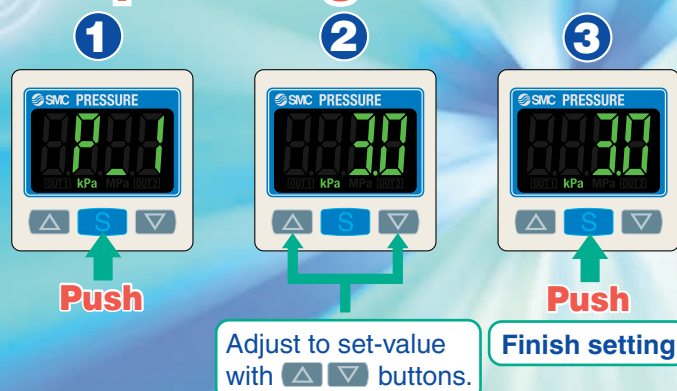
**Settings can be copied to up to 10 slave sensors at once.**

The settings of the master sensor can be copied to the slave sensors.

- Reduced setting efforts
- Reduced chance of set-value input error

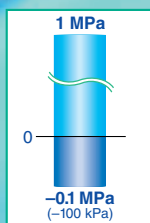


## 3-step setting



### Added vacuum range.

- Rated pressure range: 0.0 to -101.0 kPa



### Expanded pressure range for positive-pressure type to the vacuum range.

- Rated pressure range: -0.100 to 1.000 MPa

## 2 added outputs

- NPN or PNP open collector 2 outputs
- NPN or PNP open collector 1 output + Analog output (1 to 5 V or 4 to 20 mA)



**Series ZSE30A(F)/ISE30A**

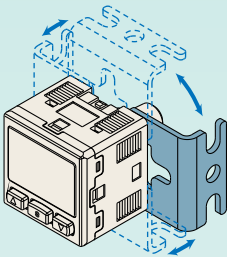


CAT.ES100-70B

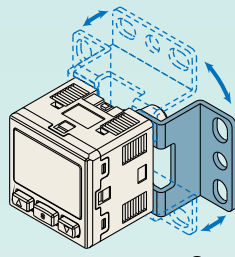
## Mounting

Bracket configuration allows mounting in four orientations.

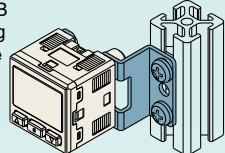
### Bracket A



### Bracket B/C



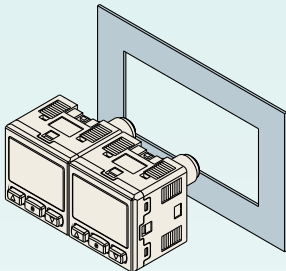
Bracket B  
Mounting  
example



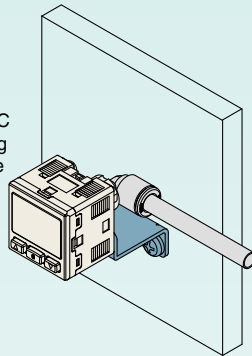
Mounting  
example

### Panel mount

Mountable side by side  
without clearance



Bracket C  
Mounting  
example



**One opening!**

- Reduction of panel-cut job
- Space-saving

## Series

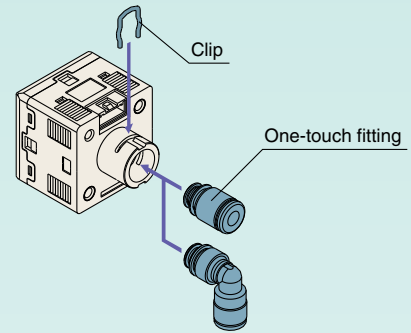
Series **ZSE30A** (vacuum) **ZSE30AF** (compound) **ISE30A** (positive)



	<b>ZSE30A</b> (vacuum)	<b>ZSE30AF</b> (compound)	<b>ISE30A</b> (positive)
Rated pressure range	0.0 to -101.0 kPa -101 kPa	-100.0 to 100.0 kPa 100 kPa -100 kPa	-0.100 to 1.000 MPa 1 MPa -0.1 MPa (-100 kPa)
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
Minimum unit setting	0.1 kPa	0.1 kPa	0.001 MPa
Output	NPN or PNP open collector 1 output NPN or PNP open collector 2 outputs NPN or PNP open collector 1 output + Analog output (voltage or current)		
Piping	R1/8, NPT1/8 (M5 female threaded) ø4, ø6, ø5/32, ø1/4 One-touch fittings		

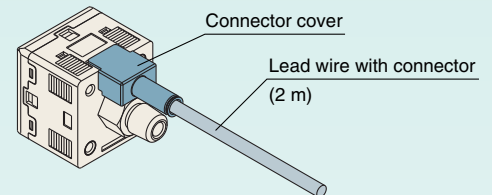
## Replaceable One-touch fittings

The clip type allows easy removal of fittings.  
Fitting's type and size can be changed.



## Lead wire

Added the connector cover.



## 4-digit display

4-digit display allows easy reading of displayed values.

Example: 0.5 MPa



Series 30A  
(New)



Series 30  
(Conventional)

## Possible to check set-value during key locking

## Additional functions

### Secret code setting function

The key locking function keeps unauthorized persons from tampering with buttons.

### Power-saving function

Power consumption is reduced by turning off the monitor. (Reduce power consumption by up to 20%.)

### Resolution-switch function

It reduces the monitor to flicker.



1/1000

(Accuracy is not changed, only the displayed values.)



1/100

### MPa/kPa switch function

Vacuum, compound and/or positive pressure can be displayed in MPa or kPa.



MPa



kPa

# 2-Color Display High-Precision Digital Pressure Switch



RoHS

## Series ZSE30A(F)/ISE30A



### How to Order

For positive pressure

For vacuum/  
compound pressure

Rated pressure range

ISE30A -0.1 to 1 MPa

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	
C6H	One-touch fitting ø6 mm	
N7H	One-touch fitting ø1/4 inch	
C4L	One-touch fitting ø4 mm, ø5/32 inch	
C6L	One-touch fitting ø6 mm	
N7L	One-touch fitting ø1/4 inch	

\* Made to Order

Display unit

Nil	With unit display <sup>Note 1)</sup> switching function
M	Fixed SI unit <sup>Note 2)</sup>
P*	With unit display <sup>Note 1)</sup> 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

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

Made to Order (P.12)

X510 For M12 4-pin pre-wired connector

Available only for output "A" or "B".

Option 3

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

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 1

Nil	Without lead wire 
L	Lead wire with connector (Lead wire length 2 m) <sup>Note)</sup> 
G	Lead wire with connector (Lead wire length 2 m) <sup>Note)</sup> With 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.

# Series ZSE30A(F)/ISE30A

## Specifications

Model		ZSE30A (Vacuum pressure)	ZSE30AF (Compound pressure)	ISE30A (Positive pressure)
Rated pressure range		0.0 to −101.0 kPa	−100.0 to 100.0 kPa	−0.100 to 1.000 MPa
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
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) <sup>Note 1)</sup>		
	Window comparator mode			
Analog output	<sup>Note 2)</sup> 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. or less	
		Output impedance	Approx. 1 kΩ	
	<sup>Note 3)</sup> 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. or less	
		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)		
	Vibration resistance	10 to 150 Hz at whichever is smaller of 1.5 mm amplitude or 20 m/s <sup>2</sup> acceleration, in X, Y, Z directions, for 2 hours each (Non-energized)		
	Impact resistance	100 m/s <sup>2</sup> in X, Y, Z directions, 3 times each (Non-energized)		
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 <sup>2</sup> (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	—	—	$\phi 4$ mm $\phi 5/32$ inch	$\phi 6$ mm	$\phi 1/4$ inch	—	—	—
One-touch fitting, Elbow type	—	—	—	—	—	$\phi 4$ mm $\phi 5/32$ inch	$\phi 6$ mm	$\phi 1/4$ inch
Wetted parts material	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: NBR					
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

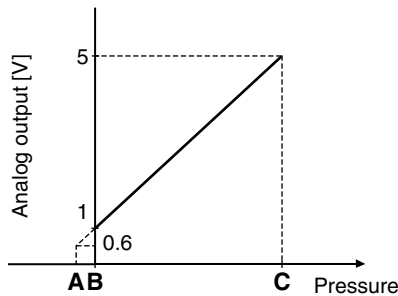
## Optional Part No.

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

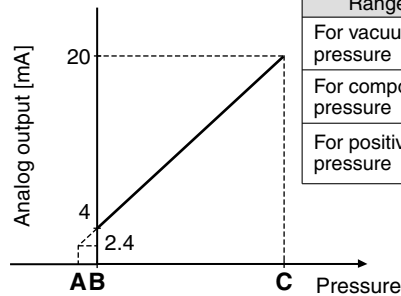
Part no.	Option	Note	Part no.	Option	Note
ZS-38-A1	Bracket A	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-4G	Lead wire with connector (with connector cover)	4 cores, for 2 outputs, 2 m
ZS-38-A2	Bracket B	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-5L	Lead wire with a connector for copying	3 cores, copy function, 1 m
ZS-38-A3	Bracket C	Mounting screw (with 2 pcs. of M3 x 5L)	ZS-38-U	Lead wire unit with a connector for copying	Copy function (up to 10 slaves)
ZS-27-C	Panel mount adapter	Mounting screw (with 2 pcs. of M3 x 8L)	ZS-38-C4H	One-touch fittings $\phi 4$ mm straight	O-ring, one-touch clip included
ZS-27-D	Panel mount adapter + Front protection cover	Mounting screw (with 2 pcs. of M3 x 8L)	ZS-38-C6H	One-touch fittings $\phi 6$ mm straight	O-ring, one-touch clip included
ZS-27-01	Front protection cover		ZS-38-N7H	One-touch fittings $\phi 1/4$ inch straight	O-ring, one-touch clip included
ZS-38-3L	Lead wire with connector	3 cores, for 1 output, 2 m	ZS-38-C4L	One-touch fittings $\phi 4$ mm elbow	O-ring, one-touch clip included
ZS-38-4L	Lead wire with connector	4 cores, for 2 outputs, 2 m	ZS-38-C6L	One-touch fittings $\phi 6$ mm elbow	O-ring, one-touch clip included
ZS-38-3G	Lead wire with connector (with connector cover)	3 cores, for 1 output, 2 m	ZS-38-N7L	One-touch fittings $\phi 1/4$ 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)

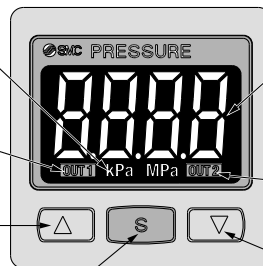
Lights up when switch output (OUT1) is turned ON.

### △ 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)

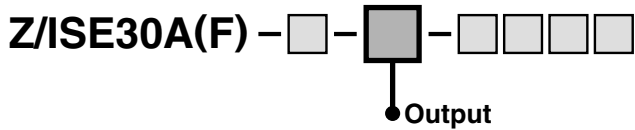
Use this button to select the mode or decrease the ON/OFF set-value.  
It is also used for switching to the bottom display mode.

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

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

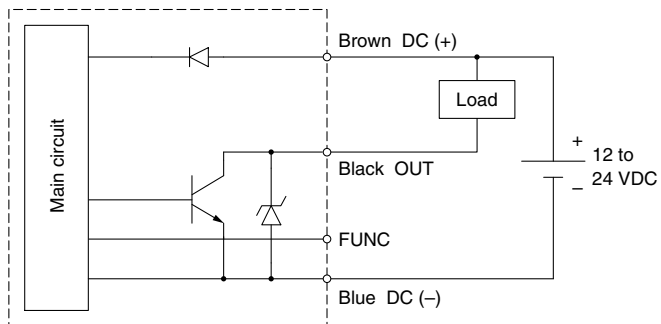
# Series ZSE30A(F)/ISE30A

## Internal Circuits and Wiring Examples



**N**

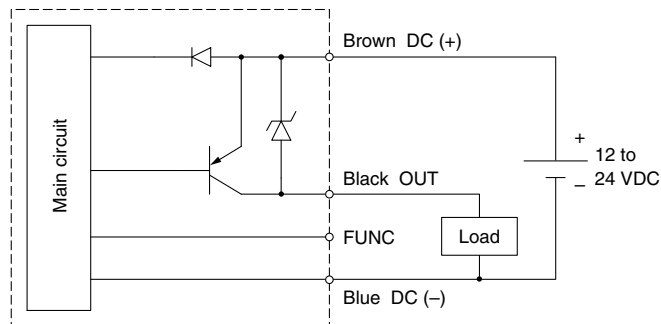
**NPN (1 output)**



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

**P**

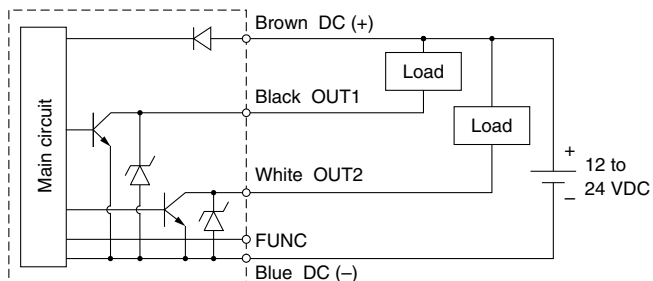
**PNP (1 output)**



Max. 80 mA  
Residual voltage 1 V or less

**A**

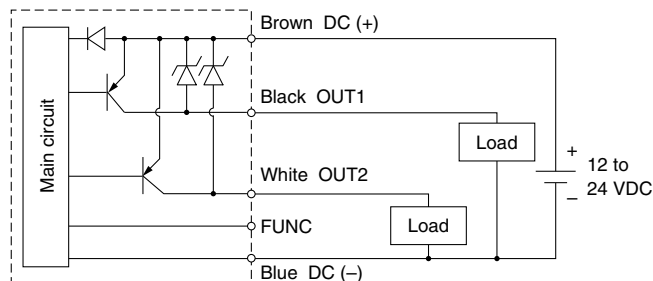
**NPN (2 outputs)**



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

**B**

**PNP (2 outputs)**



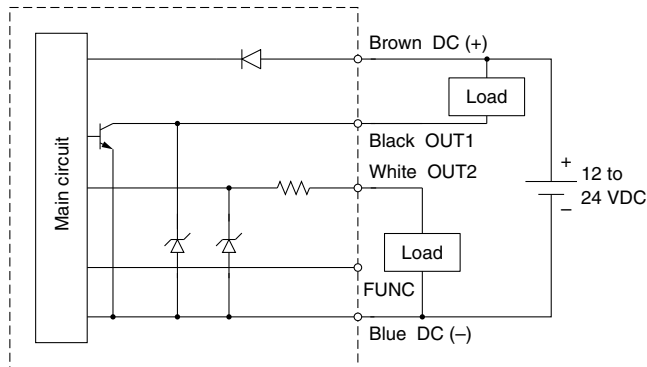
Max. 80 mA  
Residual voltage 1 V or less

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



**C**

**NPN (1 output) + Analog voltage output**

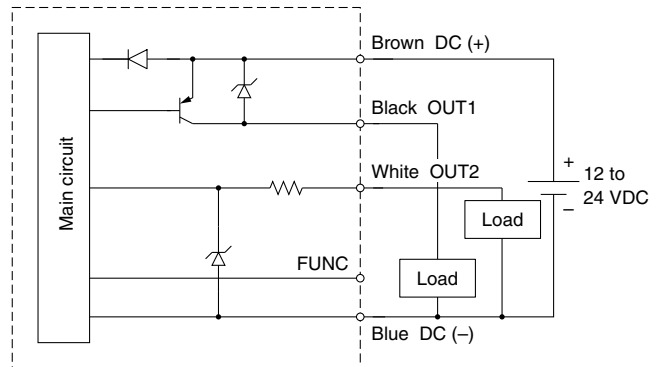


Max. 28 V, 80 mA  
Residual voltage 1 V or less

Analog voltage output  
Output impedance: Approx. 1 k $\Omega$

**E**

**PNP (1 output) + Analog voltage output**

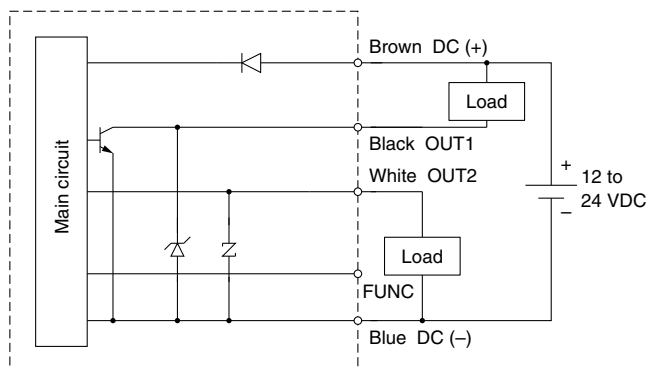


Max. 80 mA  
Residual voltage 1 V or less

Analog voltage output  
Output impedance: Approx. 1 k $\Omega$

**D**

**NPN (1 output) + Analog current output**

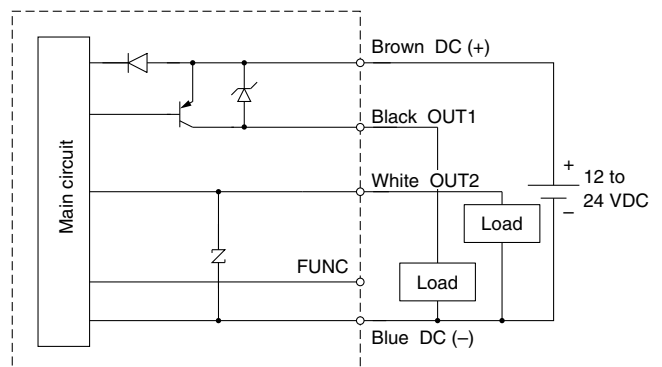


Max. 28 V, 80 mA  
Residual voltage 1 V or less

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

**F**

**PNP (1 output) + Analog current output**



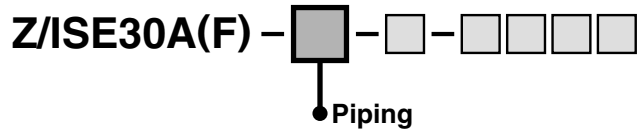
Max. 80 mA  
Residual voltage 1 V or less

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

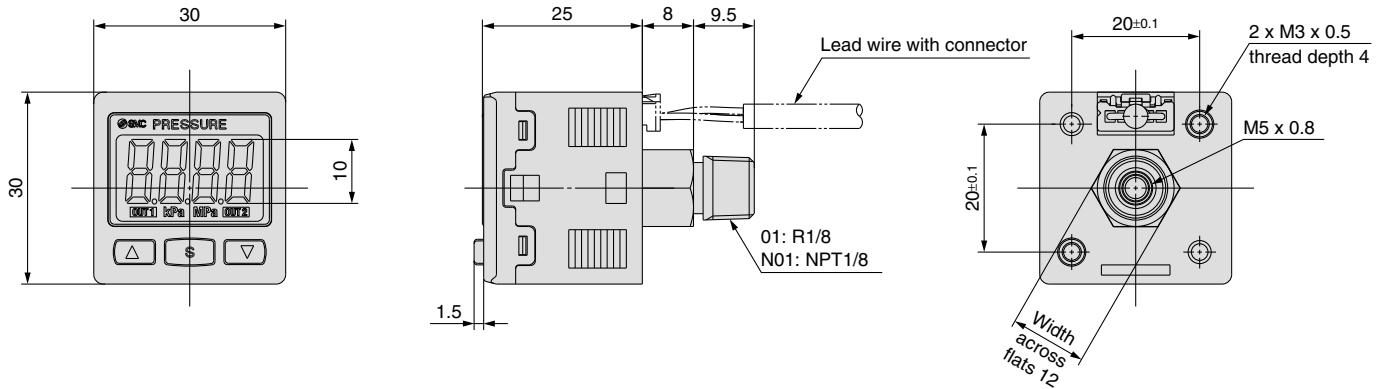
\* The FUNC terminal is connected using a dedicated lead wire (ZS-38-5L or ZS-38-U) when the copy function is used. (Refer to "Copy function" on page 10.)

# Series ZSE30A(F)/ISE30A

## Dimensions

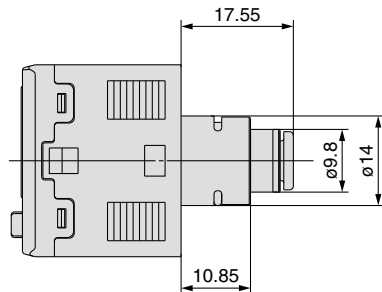


**01 / N01**



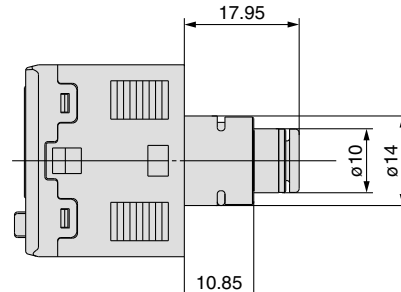
**C4H**

One-touch fitting  $\varnothing 4$  mm  
 $\varnothing 5/32$  inch straight



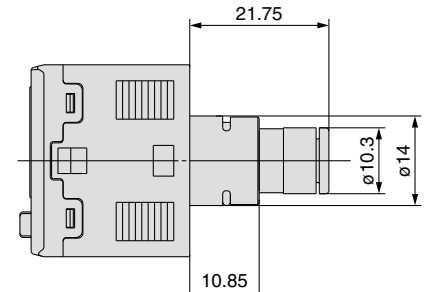
**C6H**

One-touch fitting  $\varnothing 6$  mm  
straight



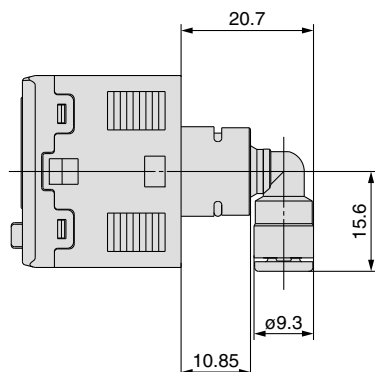
**N7H**

One-touch fitting  $\varnothing 1/4$  inch  
straight



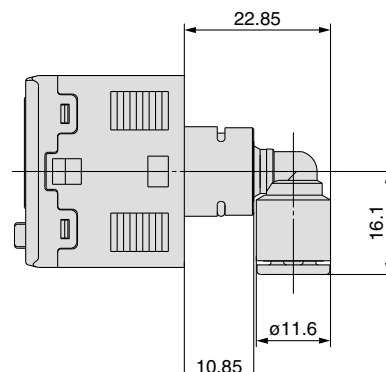
**C4L**

One-touch fitting  $\varnothing 4$  mm  
 $\varnothing 5/32$  inch elbow



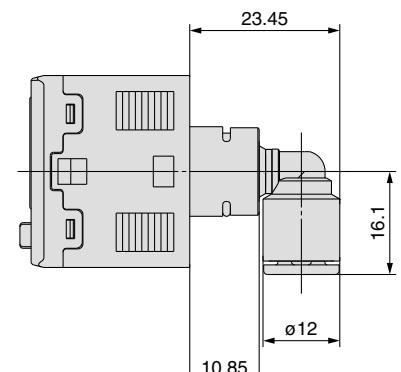
**C6L**

One-touch fitting  $\varnothing 6$  mm  
elbow



**N7L**

One-touch fitting  $\varnothing 1/4$  inch  
elbow





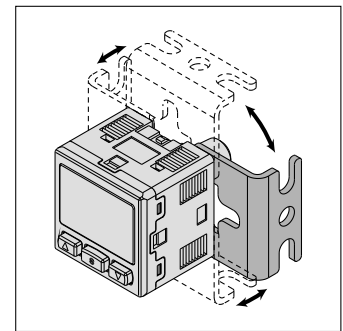
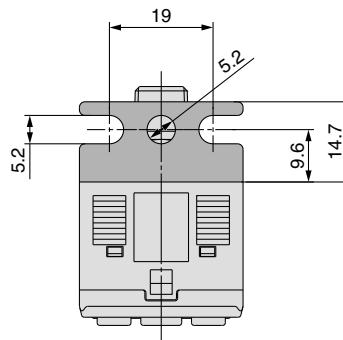
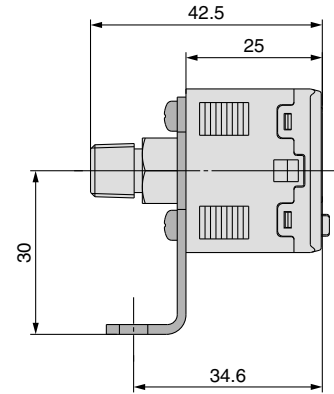
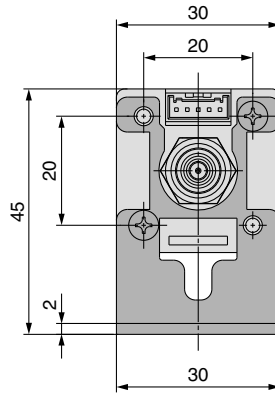
With bracket

**Z/ISE30A(F)** – □ – □ – □ □ □ □

● Option 2

**A1**

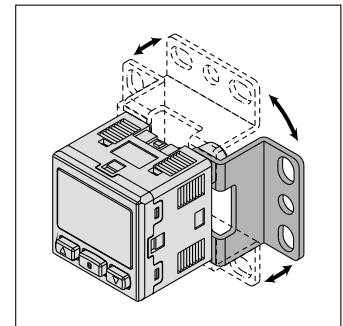
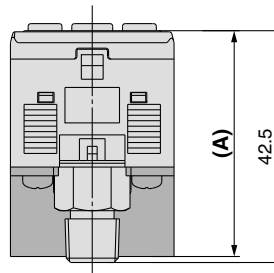
**Bracket A**  
(Option unit part no.: ZS-38-A1)



\* Bracket configuration allows mounting in four orientations.

**A2**

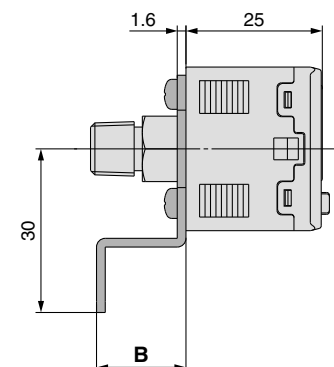
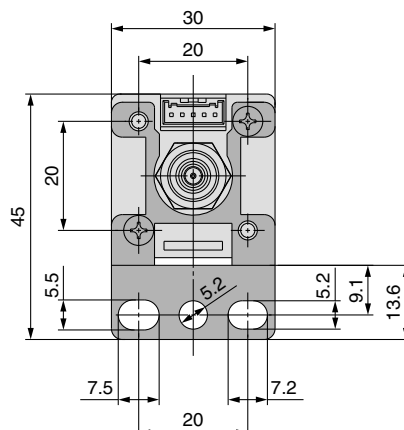
**Bracket B**  
(Option unit part no.: ZS-38-A2)



\* Bracket configuration allows mounting in four orientations.

**A3**

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

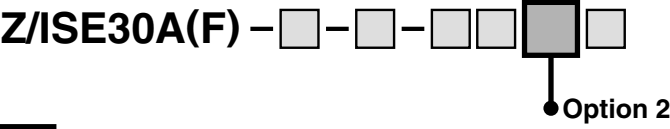


	A	B
Bracket B	41.4	16.4
Bracket C	53	28

# Series ZSE30A(F)/ISE30A

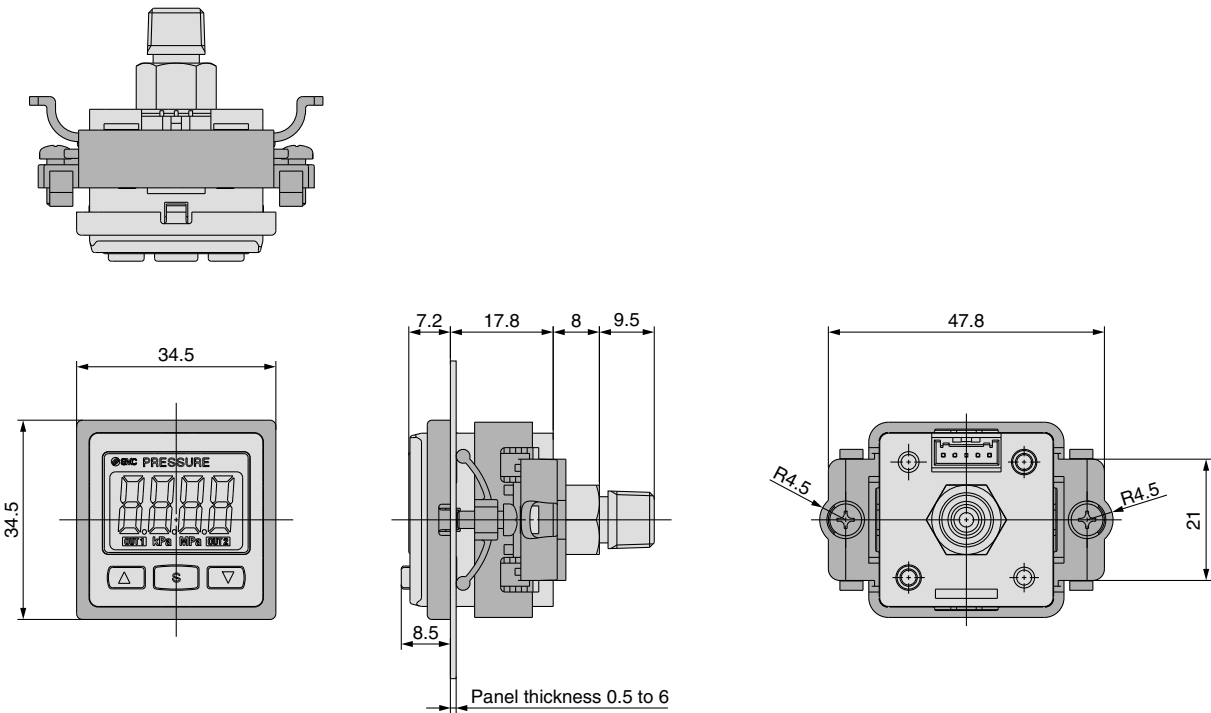
## Dimensions

Panel mount



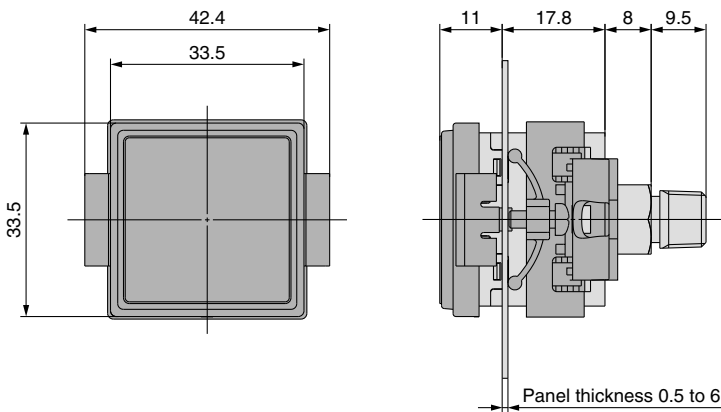
B

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



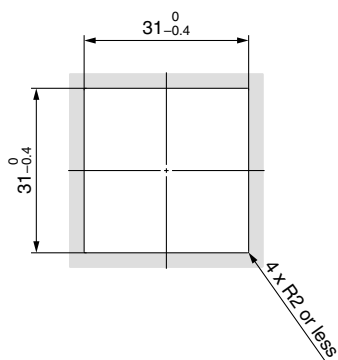
D

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

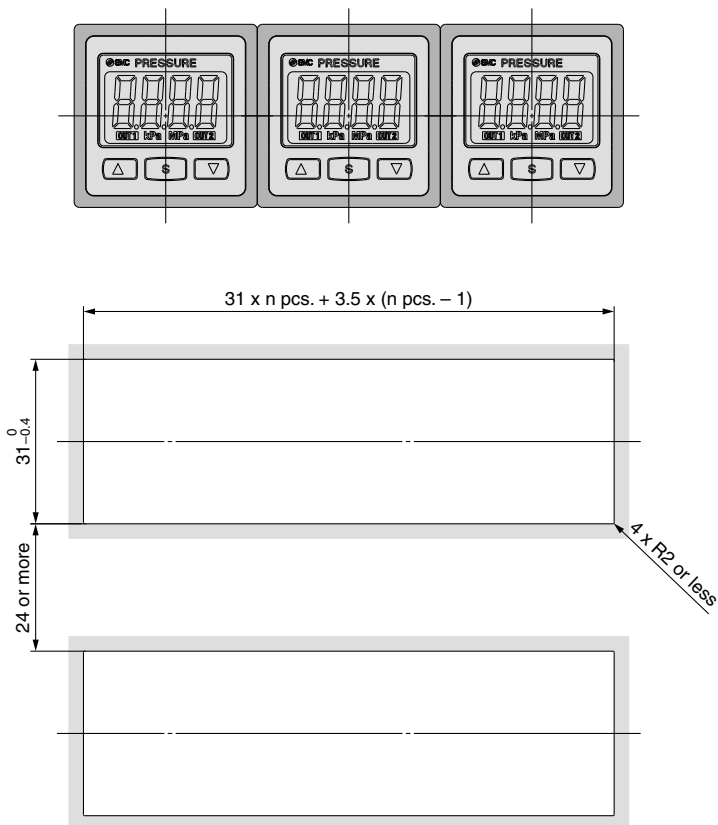


## Panel-cut dimensions

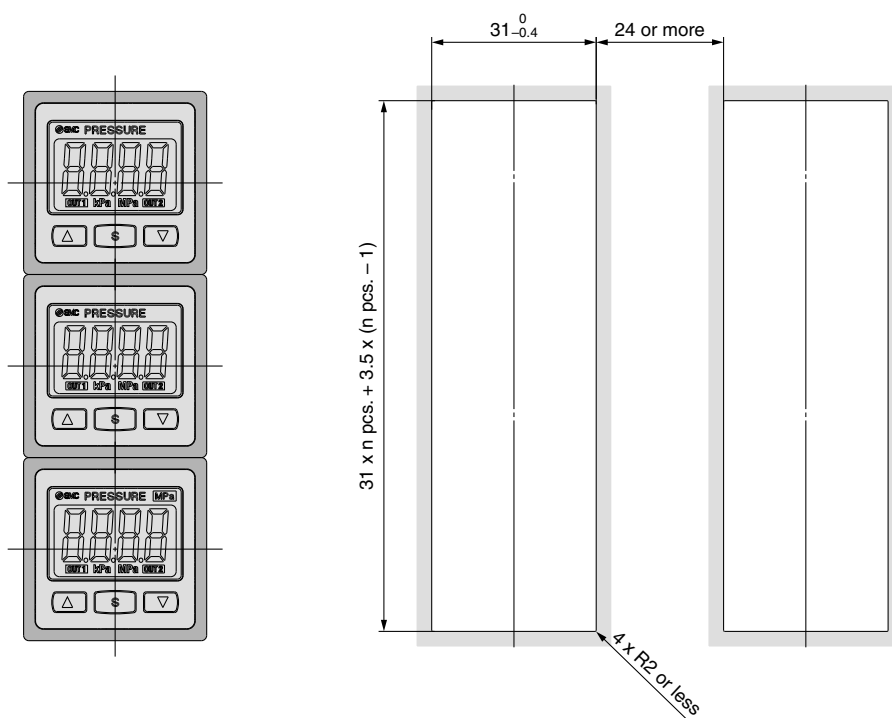
1 pc. mounting



Multiple (2 pcs. or more) horizontal mounting



Multiple (2 pcs. or more) vertical mounting



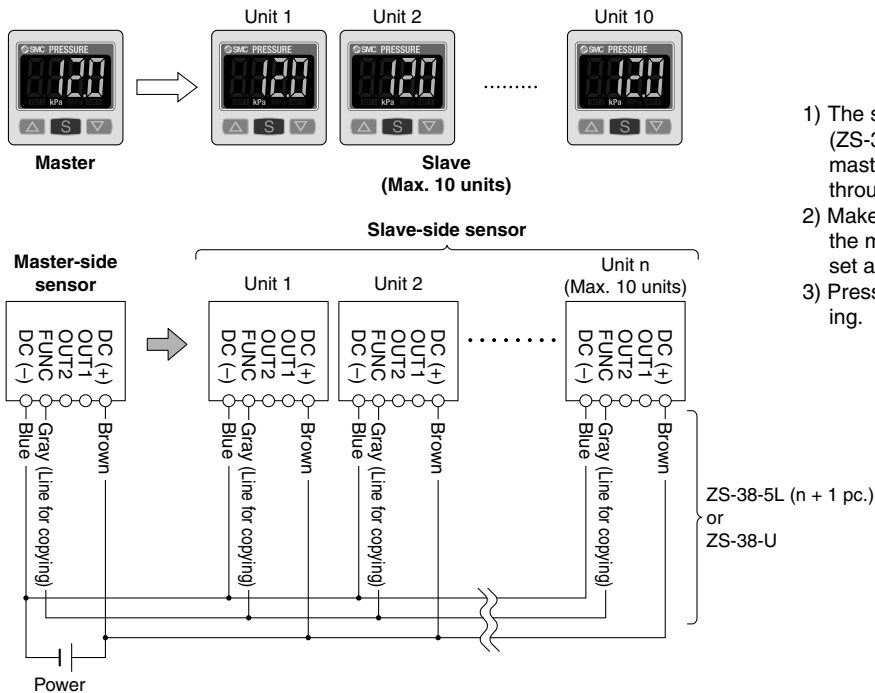
## Function Details

### 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.**

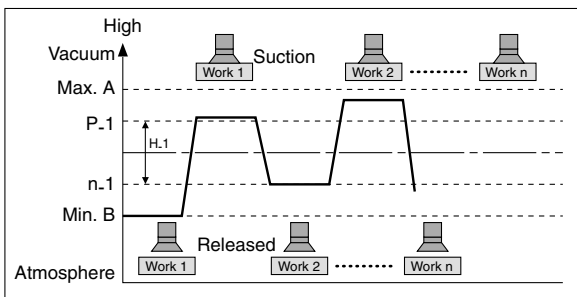
**(Max. transmission distance: 4 m)**



### 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

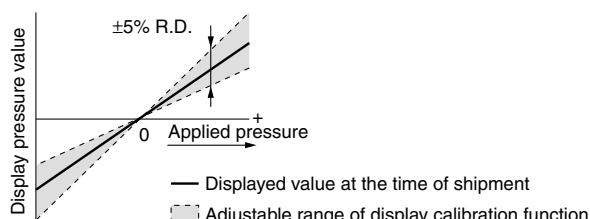


#### Formula for Obtaining the Set-Value

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

### C Precision indicator setting function (F6)

Fine adjustment of the indicated value of the pressure sensor can be made within the range of  $\pm 5\%$  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  $\pm 1$  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 **[Δ]** **[▽]** 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  $\pm 7\%$  F.S. of the pressure when ex-factory. ( $\pm 3.5\%$  F.S. for ZSE30AF (compound pressure))

# 2-Color Display High-Precision Digital Pressure Switch *Series ZSE30A(F)/ISE30A*

**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	Er1	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 $\pm 7\%$ F.S. of atmospheric pressure is applied in the zero-out function. ( $\pm 3.5\%$ F.S. or more for 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 $\pm 1\%$ 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.

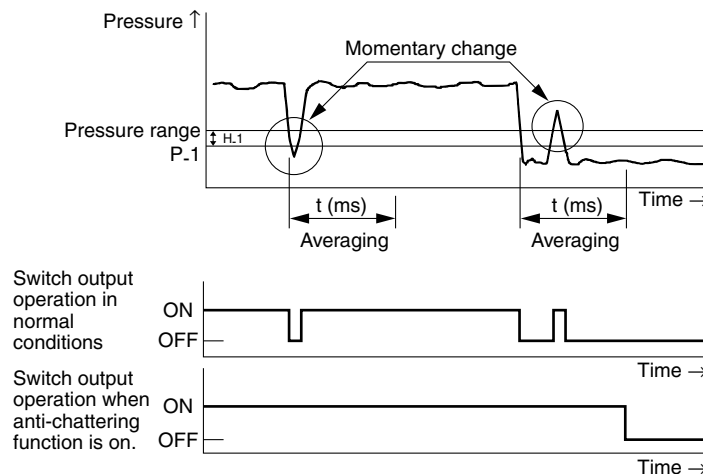
## H Anti-chattering function (F3)

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

\* For the ZSE30A (vacuum pressure) and 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.