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



ZSE40 ISE40

ZSE10 ISE10

ISE70

ZSE80 ISE80

PS

ISA3

ISA2

ISE35

**PSE** 

IS

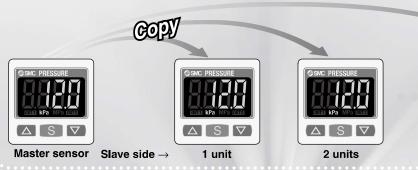
ISG

ZSM1

# Can copy to up to 10 switches simultaneously.

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

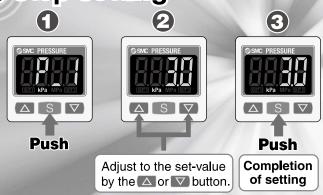
Reducing setting labor
 Minimizing risk of mistakes in setting





10 units

# 3-step setting

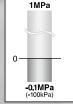






# Added vacuum range.

Rated pressure range: 0.0 to -101.0 kPa



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

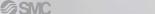
Rated pressure range: -0.100 to 1.000 MPa

# 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)







# Mounting

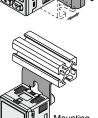
Bracket configuration allows mounting in four orientations.

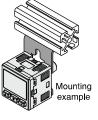
Bracket B Mounting example

Bracket C Mounting example

Bracket B/C

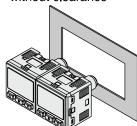
# Bracket A





# Panel mount

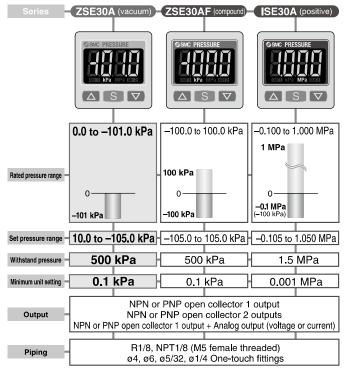
Mountable side by side without clearance



# One opening!

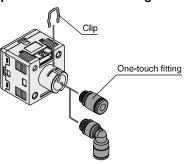
- Reduced panel fitting labor
- Space-saving

# **Series**



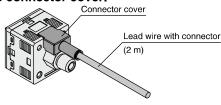
# Replaceable One-touch fittings

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



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.



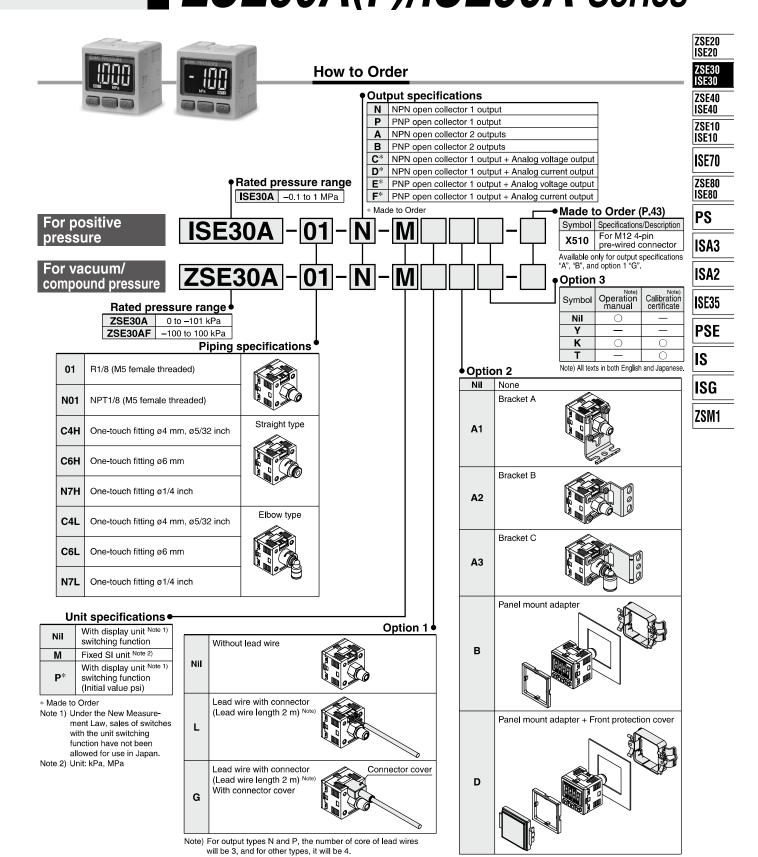
(Accuracy is not changed, only the displayed values.)

### MPa/kPa switch function

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



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



# **Specifications**

Refer to pages 11 and 12 for Pressure Switch Precautions. For details about the Specific Product Precautions, refer to the Operation Manual on the SMC website, http://www.smcworld.com

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				
Display/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				
Display/M	linimum uı	nit setting	0.1 kPa	0.1 kPa	0.001 MPa				
Applicabl	e fluid		Air, Non-corrosive gas, Non-flammable gas						
Power su	pply volta	ge	12 to 24 VDC ±10%, Ripple (p-p) 10% or less (with power supply polarity protection)						
Current c	onsumptic	on	40 mA or less						
Switch ou	tput		NPN or PNP ope	n collector 1 output, NPN or PNP open	collector 2 outputs				
	Maximum	load current		80 mA					
	Maximum	applied voltage		28 V (at NPN output)					
	Residual			1 V or less (with load current of 80 mA	,				
	Response		2.5 ms or less (w	rith anti-chattering function: 20, 100, 50	0, 1000, 2000 ms)				
	Short circ	cuit protection		Yes					
Repeatab				±0.2% F.S. ±1 digit					
Hystere-	Hysteresi			Variable (0 or above) Note 1)					
sis Window comparator mode			valiable (0 of above)						
	Voltage output	Output voltage (Rated pressure range)							
		Linearity	±1% F.S.						
Analog		Output impedance	Approx. 1 kΩ						
output	Note 3) Current	Output current (Rated pressure range)	4 to 20 mA	2.4 to 20 mA ±2.5% F.S.					
		Linearity	±1% F.S.						
	output	Load impedance	Maximum load impedance: Power supply voltage 12 V: 300 $\Omega,$ Power supply voltage 24 V: 600 $\Omega$ Minimum load impedance: 50 $\Omega$						
Display			4-digit, 7-segment, 2-color LCD (Red/Green)						
Display a	ccuracy		±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						
	Enclosu	ıre	IP40						
Environ-	Operati	ng temperature range	Operating: 0 to 50°C, Stored: -10 to 60°C (No freezing or condensation)						
ment	Operati	ng humidity range	Operating/Stored: 35 to 85% RH (No condensation)						
	Withstand voltage		1000 VAC for 1 minute between terminals and housing						
Insulation resistance			50 $\mathrm{M}\Omega$ or more (500 VDC measured via megohmmeter) between terminals and housing						
Temperature characteristics			±2% F.S. (25°C reference)						
Lead wire with connector			Oilproof heavy-duty vinyl cable, 3 cores ø3.5, 2 m 4 cores Conductor area: 0.15 mm² (AWG26), Insulator O.D.: 1.0 mm						
Standard	S		CE, UL/CSA (E216656), RoHS						

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	1	1	_
	One-touch fitting, Elbow type	_	_			_	ø4 mm ø5/32 inch	ø6 mm	ø1/4 inch
Wetted	Wetted Sensor pressure receiving area		Sensor pressure receiving area: Silicon						
parts material			ss nickel plating) HNBR	plating) PBT, POM, Stainless steel 304, C3604 (electroless nickel plating) O-ring: NBR					ng)
	Including lead wire with connector (3 cores, 2 m)	81	g	70 g	71 g	73 g	75 g	73 g	75 g
Weight	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

# Option/Part No.

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

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

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



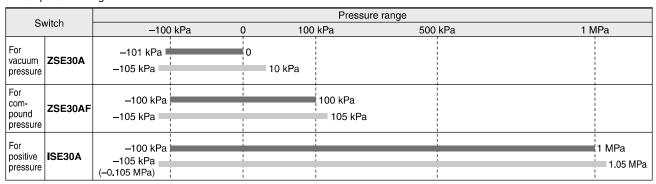
# **Set Pressure Range and Rated Pressure Range**

### Set the pressure within the rated pressure range.

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

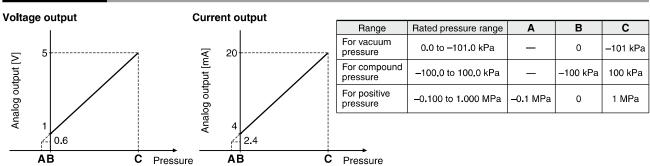
The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) on the switch.

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.



■ Rated pressure range of switch Set pressure range of switch

# **Analog Output**



### Functions (Refer to pages 41 and 42 for details.)

Copy function	Copies the settings of the master sensor to the slave sensors.			
Auto-preset function	This function is to calculate a rough set-value automatically based on the on-going operation.			
Display calibration 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.			
Keylock function (Selectable secret code)	The key board can be locked to prevent any incorrect function of the operation switch.			
Zero-clear 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.			



ZSE20 ISE20

SE30 ZSE40

ISE40 ZSE10 ISE10

ISE70

ZSE80

ISE80 PS

ISA3

ISA2

ISE35

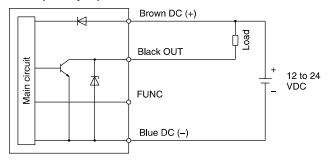
**PSE** 

IS ISG

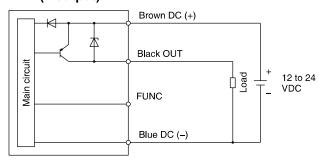
ZSM1

# **Internal Circuits and Wiring Examples**

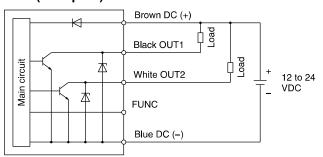
## -N NPN (1 output)



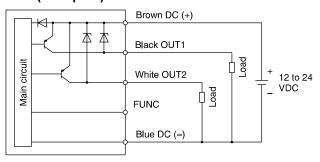
### -P PNP (1 output)



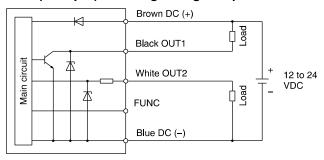
-A NPN (2 outputs)



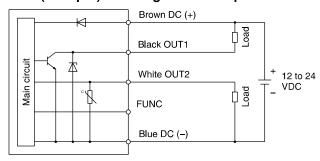
-B PNP (2 outputs)



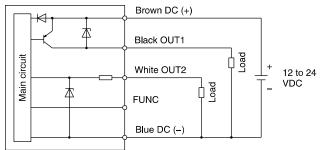
-C NPN (1 output) + Analog voltage output



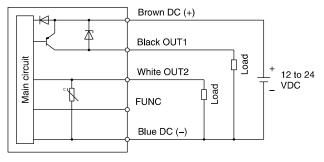
-D NPN (1 output) + Analog current output



-E PNP (1 output) + Analog voltage output



-F PNP (1 output) + Analog current output

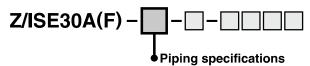


<sup>\*</sup> The FUNC terminal is connected when using the copy function. (Refer to "Copy function" on page 41.)

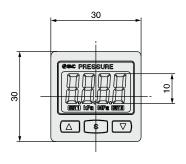


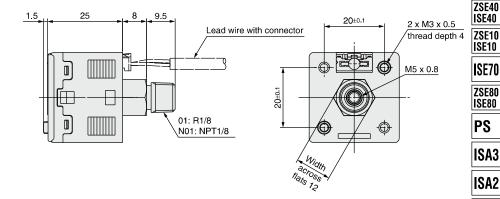
# 2-Color Display High-Precision Digital Pressure Switch **ZSE30A(F)/ISE30A** Series

# **Dimensions**



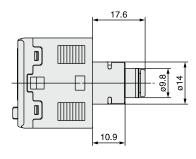
# 01 / N01





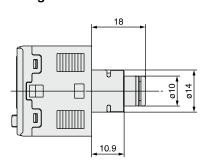
C4H

One-touch fitting Ø4 mm Ø5/32 inch straight



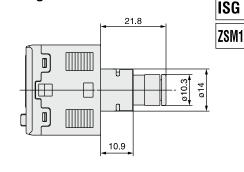
# С6Н

# One-touch fitting Ø6 mm straight



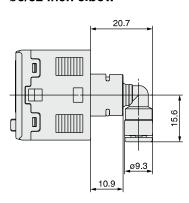
# N7H

# One-touch fitting $\emptyset$ 1/4 inch straight



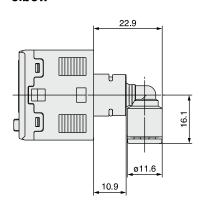
C4L

One-touch fitting Ø4 mm Ø5/32 inch elbow



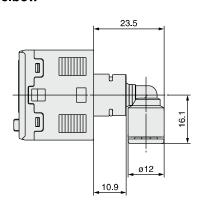
C6L

One-touch fitting Ø6 mm elbow



# N7L

# One-touch fitting $\emptyset$ 1/4 inch elbow





ZSE20 ISE20

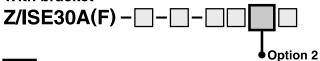
ISE35

**PSE** 

IS

# **Dimensions**

With bracket





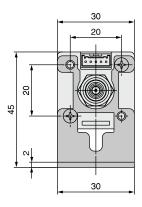
**Bracket A** 

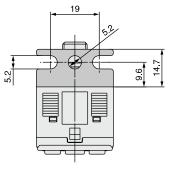
**Bracket B** 

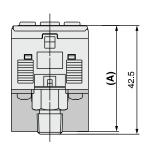
**A3** 

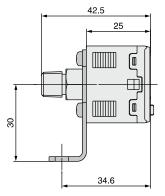
**Bracket C** 

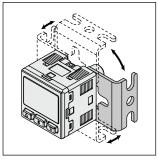
(Option unit part no.: ZS-38-A1)



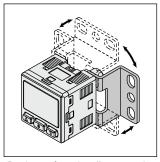




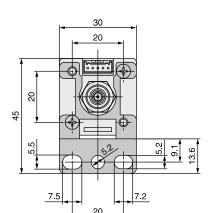


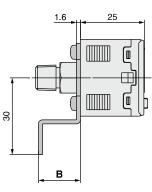


\* Bracket configuration allows mounting in four orientations.



\* Bracket configuration allows mounting in four orientations.





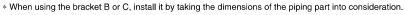
 A
 B

 Bracket B
 41.4
 16.4

 Bracket C
 53
 28

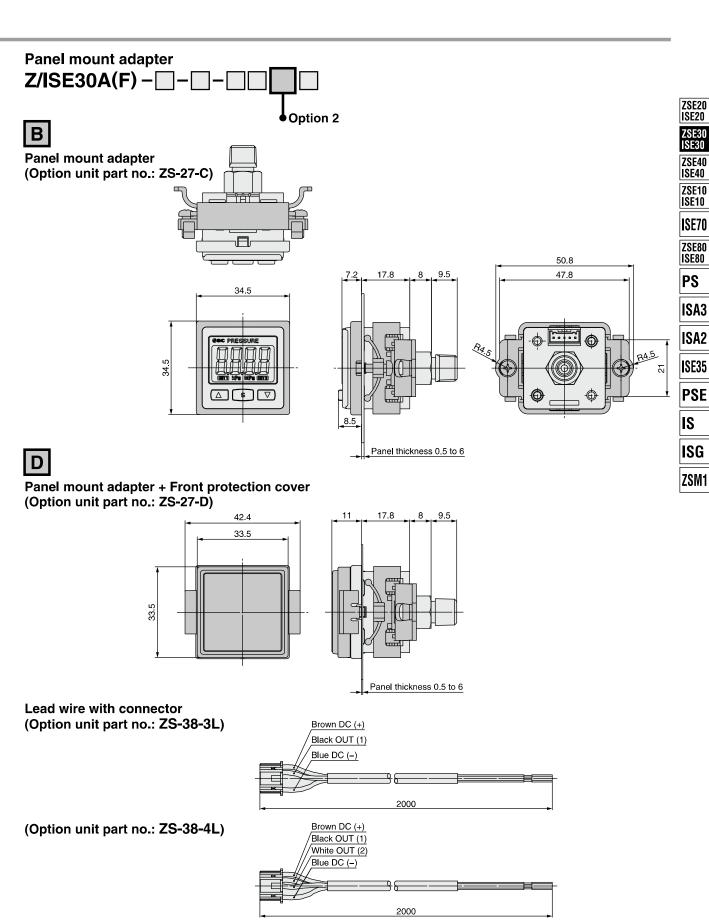
(Option unit part no.: ZS-38-A2)

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





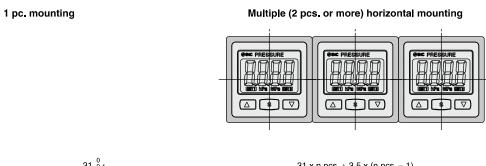
# 2-Color Display High-Precision Digital Pressure Switch **ZSE30A(F)/ISE30A** Series

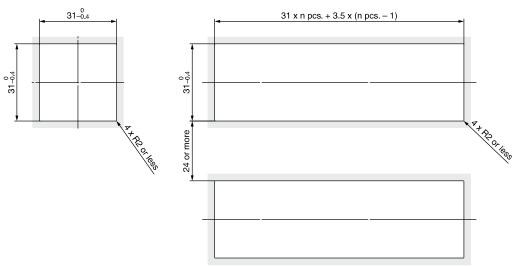


**SMC** 

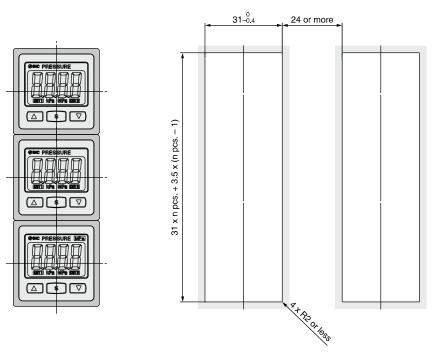
# **Dimensions**

# Panel fitting dimensions





### Multiple (2 pcs. or more) vertical mounting



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

# **Function Details**

Master-side

sensor

(Copy

Power supply

The  $F\square$  in ( ) shows the function code number. Refer to the Operation Manual for the details of operation procedures and function codes.

### A Copy function (F97)

The settings of the master sensor can be copied to the slave sensors, reducing setting labor and minimizing risk of mistakes in setting.

Can copy to up to 10 switches simultaneously. (Maximum transmission distance 4 m)

1 unit

(Copy wire)



(Max. 10 units)

n units

(Up to 10 switches)

(Copy wire)

Brown

ZS-38-5I

(n + 1 pc.)

ZS-38-U

Slave-side sensor

Brown

2 units

Íά

-Gray -Blue

(Copy

wire

1) The sensors are connected by a dedicated lead wire (ZS-38-5L (for master and one slave) or ZS-38-U (for master and up to 10 slaves)). Copying is performed through a dedicated communication line.

2) Select the slave switch which is to be the master, and change it into a master using the buttons. (In the default setting, all switches are set as slaves.)

3) Press the S button of the master switch to start copying.

ZSE20 ISE20

SE30

ZSE40 ISE40

ZSE10 ISE10

ISE70

ZSE80 ISE80

PS

ISA3

ISA2

ISE35

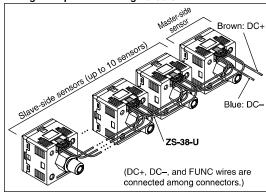
**PSE** 

IS

ISG

ZSM1

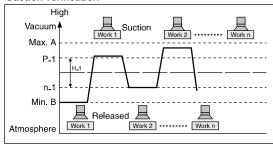
Wiring example when using ZS-38-U



# B Auto-preset function (F5)

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.

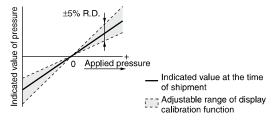
### **Suction Verification**



# C Display calibration 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 display calibration function is used, the set pressure value may change ±1 digit.

### 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) = I (A-B)/2I

## D Peak/Bottom value indication

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** Keylock function

Prevents operation errors such as accidentally changing setting

### Zero-clear 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. The indicated value can be adjusted within ±7% F.S. of the pressure when ex-factory. (ZSE30AF (for compound pressure) ±3.5% F.S.)



# **Function Details**

The  $F\square$  in ( ) shows the function code number. Refer to the Operation Manual for the details of operation procedures and function codes.

### **G** Error indication function

Error name	Error code	Description	Action		
Overcurrent	Er 1	Load current of 80 mA or more is applied to the switch output (OUT1).	Eliminate the cause of the over current by turning		
error	ErZ	Load current of 80 mA or more is applied to the switch output (OUT2).	off the power supply, and then turn on it again.		
Residual pressure error		During zero-clear operation, pressure over $\pm 7\%$ F.S. is applied. (ZSE30AF (compound) $\pm 3.5\%$ F.S.) After 1 second, the mode will reset to measurement mode. $\pm 1\%$ F.S. of the zero-clear range varies between individual products.	Perform zero-clear operation again after restoring the applied pressure to an atmospheric pressure condition.		
Applied	HHH	Supply pressure exceeds the maximum set pressure.	Reset applied pressure to a level within the set		
pressure error	LLL	Supply pressure is below the minimum set pressure.	pressure range.		
	ErO		Turn off the power supply and then turn on it again. If the failure cannot be solved, please contact SMC for investigation.		
	Er4				
Cuatam awar	Er5	Internal data error			
System error	Er7	memai data ener			
	E-8				
	E-9				

If the failure cannot be solved after the above instructions are performed, please contact SMC for investigation.

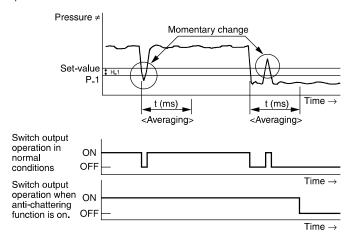
## H Anti-chattering function (F3)

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.



# ■ Display unit 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/cm <sup>2</sup>	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		

<sup>\*</sup> The ZSE30A (vacuum pressure) and ZSE30AF (compound pressure) will have different setting and display resolution when the unit is set to MPa.

### 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 Setting of secret code (F8)

Users can select whether a secret code must be entered to release key lock. At the time of shipment from the factory, it is set such that the secret code is not required.



# ZSE30A(F)/ISE30A Series Made to Order



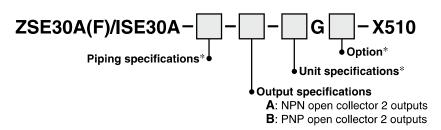
Please contact SMC for detailed dimensions, specifications and lead times.

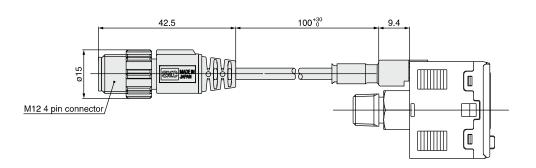
# 1 M12 4-pin Pre-wired Connector (Lead wire length 100 mm)

X510

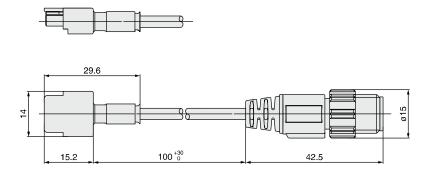
# **How to Order**

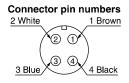
\* Refer to "How to Order" on page 33 for standard specifications.





Option cable ZS-38-4GM12





Pin no.	Pin description
1	DC (+)
2	OUT (2)
3	DC (-)
4	OUT (1)

ZSE20 ISE20

ZSE30 ISE30

ZSE40 ISE40

ZSE10 ISE10

ISE70

ZSE80 ISE80

PS

ISA3

IOAU

ISA2

ISE35

PSE

IS

ISG

ZSM1