

3-Screen Display

# High-Precision Digital Pressure Switch

New



IP40



While checking the measured value,

**Main screen** Measured value (Current pressure value)

setting is possible.

**Sub screen** Label (Display item), Set value (Threshold value)

## Visualization of Setting Items

Set value (Threshold value)	P.L	Peak value	H.H
Hysteresis value	H.L	Bottom value	H.Lo
Delay time	dt		



**Delay Time** Fastest **1.5 ms\*** or less

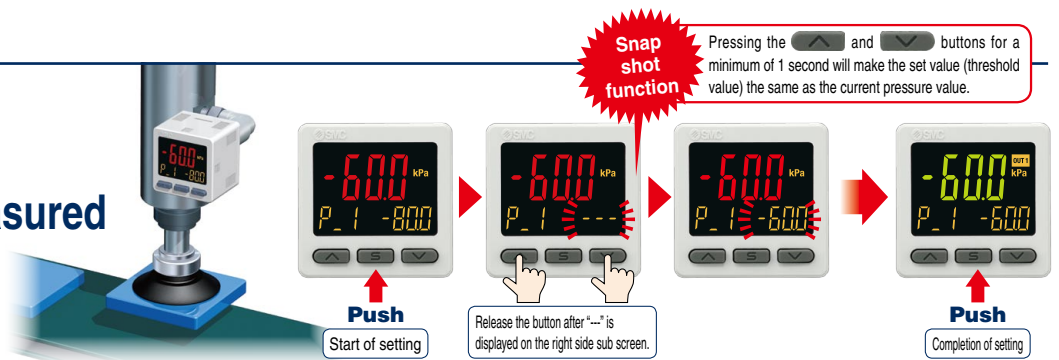
\*Select from 1.5 ms or less, 20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms or 5000 ms.

**Current Consumption** **25 mA\*** or less

\*Reduced by approx. 60% in power saving mode.

## Improved Operability

With a snapshot function for measured value reading



## 3 Setting Modes Page 2

- ① 3 Step Setting Mode
- ② Simple Setting Mode
- ③ Function Selection (detailed setting) Mode

# Series ZSE20(F)/ISE20

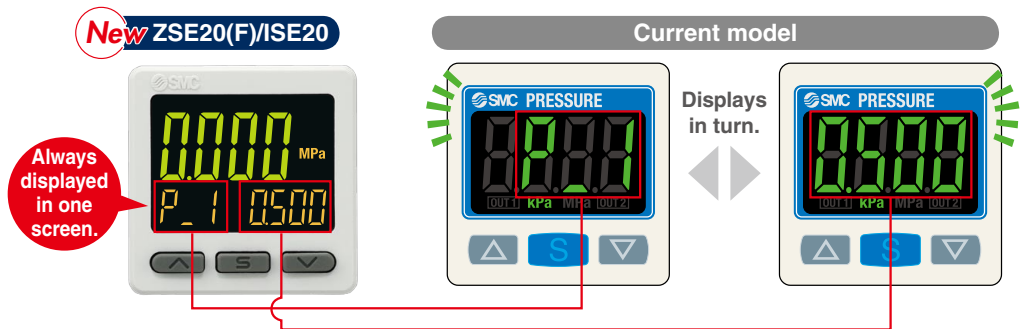


CAT.ES100-114A

## Improved Operability

### Visualization of Setting Items

Sub screen (label) shows the item to be set.



### Mode Examples

#### Hysteresis mode

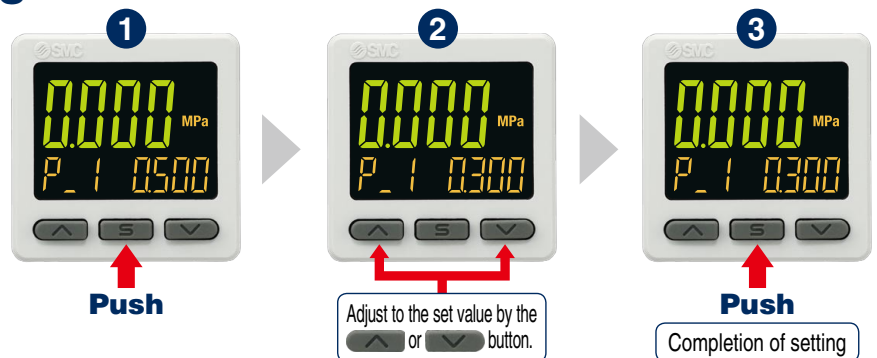


#### Window comparator mode

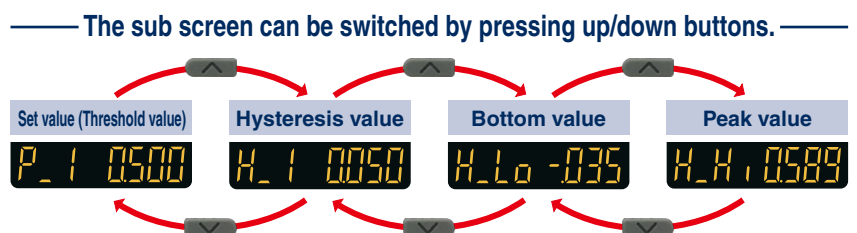
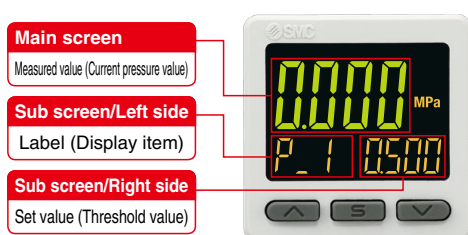


### Simple 3 Step Setting

When S button is pressed, and the set value (P\_1) is being displayed, the set value (Trigger level) can be set. When S button is pressed, and the hysteresis (H\_1) is being displayed, the hysteresis can be set.



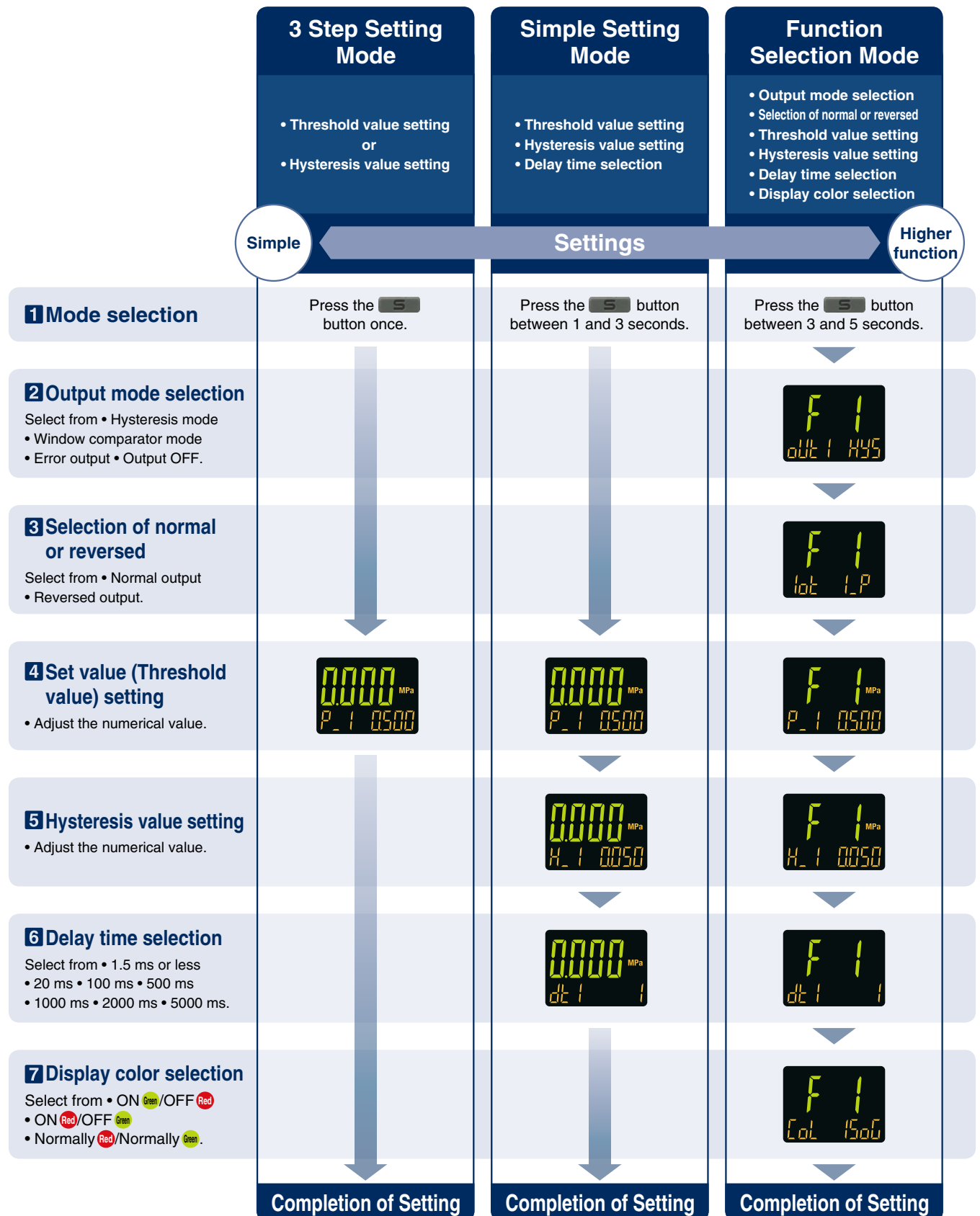
### Easy Screen Switching Setting is possible while checking the measured value.



\*One arbitrary display mode can be added by setting the function. (Refer to page 3.)

### 3 Setting Modes

Setting mode can be selected according to the purpose.



## Other Sub Screen Display

Peak value or bottom value; or both values can be displayed in one screen!

\*Peak and bottom values are maintained even if the power supply is cut.

Peak value		Bottom value		Peak/Bottom value		Output mode/Output type display					
						Hysteresis mode		Window comparator mode			
Label (Peak)		Peak value		Label (Bottom)		Bottom value		Peak value		Bottom value	
Rated range display				Level bar display							
Vacuum pressure range		Compound pressure range		Positive pressure range							
Pressure unit display											
kPa		MPa		psi		bar					

\*Combination of the displays shown above and the set values can be displayed on the sub screens on both sides.

## Convenient 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 approx. 60%.)

- Resolution switch function**

It reduces the monitor to flicker.

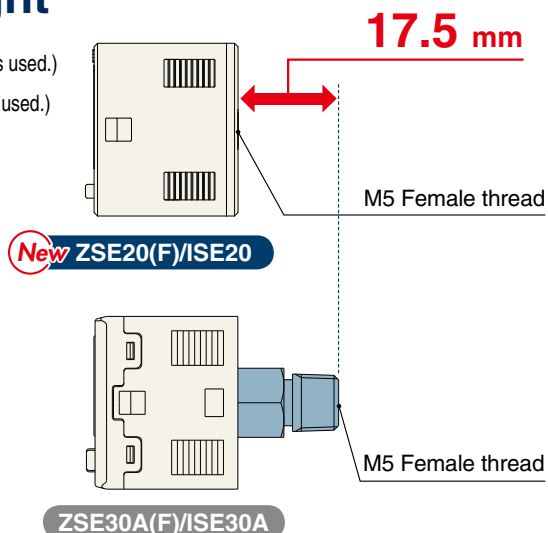
1/1000                      1/100  
(Accuracy is not changed, only the displayed values.)

- MPa/kPa switch function**

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

## Compact & Lightweight

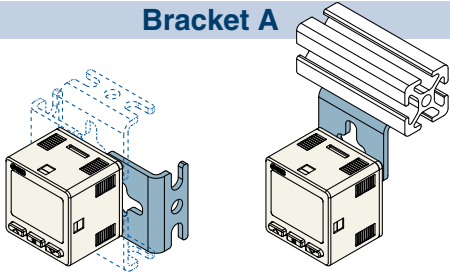
- Compact: 17.5 mm shorter** (When M5 female thread is used.)
- Lightweight: 21 g lighter** (When M5 female thread is used.)  
13 g lighter (When R1/8 is used.)



## Mounting

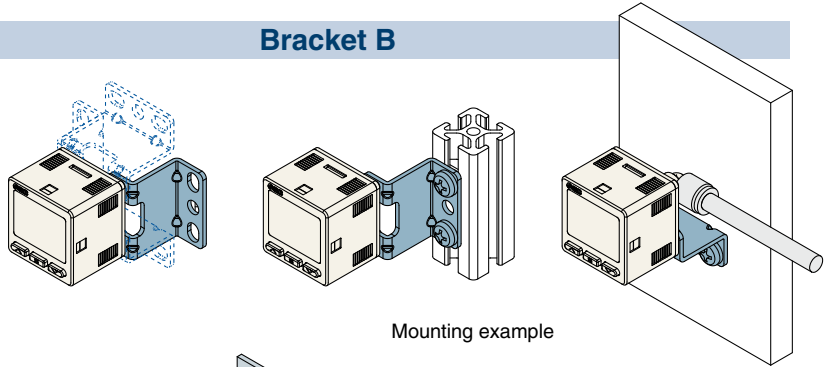
Bracket configuration allows mounting in four orientations.

Bracket A



Mounting example

Bracket B



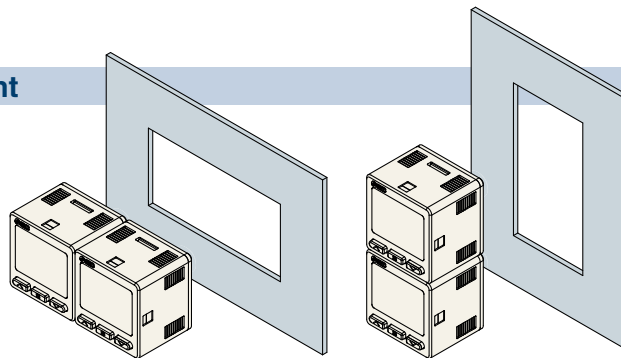
Mounting example

### Panel mount


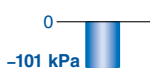

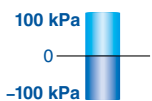

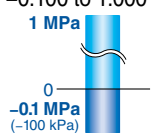
Mountable side by side without clearance

#### One opening!

- Reduced panel fitting labor
- Space saving



## Introduction of Series

Series	Rated pressure range	Set pressure range	Withstand pressure	Smallest settable increment	Output	Piping
<b>ZSE20</b> (Vacuum pressure) 	0.0 to -101.0 kPa 	10.0 to -105.0 kPa	500 kPa	0.1 kPa	NPN or PNP open collector 1 output	M5 Female thread, R1/8, NPT1/8
<b>ZSE20F</b> (Compound pressure) 	-100.0 to 100.0 kPa 	-105.0 to 105.0 kPa	500 kPa	0.1 kPa		
<b>ISE20</b> (Positive pressure) 	-0.100 to 1.000 MPa 	-0.105 to 1.050 MPa	1.5 MPa	0.001 MPa		

# 3-Screen Display

# High-Precision Digital Pressure Switch

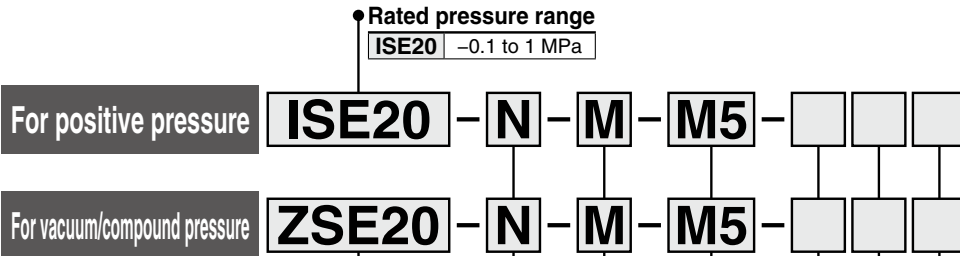


RoHS

# Series ZSE20(F)/ISE20



## How to Order



Rated pressure range

<b>ISE20</b>	-0.1 to 1 MPa
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Rated pressure range

<b>ZSE20</b>	0 to -101 kPa
<b>ZSE20F</b>	-100 to 100 kPa

Output specification


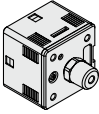
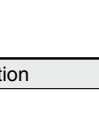
Symbol	Description
<b>N</b>	NPN open collector 1 output
<b>P</b>	PNP open collector 1 output

Unit specification

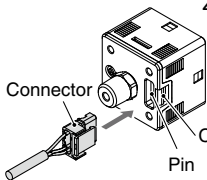
Symbol	Description
<b>Nil</b>	With unit selection function*1
<b>M</b>	SI unit only*2
<b>P</b>	With unit selection function (Initial value psi)*1

\*1. Under the New Measurement Law, sales of switches with the unit selection function have not been allowed for use in Japan.  
\*2. Fixed unit: kPa, MPa

Piping specification

Symbol	Description
<b>M5</b>	M5 Female thread 
<b>01</b>	R1/8 
<b>N01</b>	NPT1/8 

Option 1

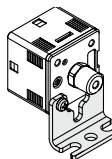
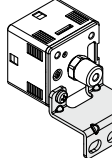
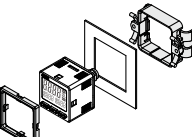
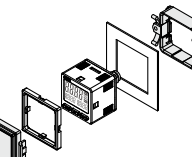
Symbol	Description
<b>Nil</b>	Without lead wire
<b>L</b>	Lead wire with connector (Lead wire length 2 m)  ZS-46-3L Connector, Concave, Pin

### Option 3

Symbol	Operation Manual (Note)	Calibration certificate (Note)
<b>Nil</b>	○	—
<b>Y</b>	—	—
<b>K</b>	○	○
<b>T</b>	—	○

Note) All texts in both English and Japanese

### Option 2

Symbol	Description
<b>Nil</b>	None
<b>A1</b>	Bracket A (Vertical mounting)  ZS-46-A1
<b>A2</b>	Bracket B (Horizontal mounting)  ZS-46-A2
<b>B</b>	Panel mount adapter  ZS-46-B
<b>D</b>	Panel mount adapter + Front protection cover  ZS-46-D

# 3-Screen Display High-Precision Digital Pressure Switch *Series ZSE20(F)/ISE20*

## Specifications

Model		ZSE20 (Vacuum pressure)	ZSE20F (Compound pressure)	ISE20 (Positive pressure)	
<b>Applicable fluid</b>		Air, Non-corrosive gas, Non-flammable gas			
<b>Pressure</b>	<b>Rated pressure range</b>	0.0 to -101.0 kPa	-100.0 to 100.0 kPa	-0.100 to 1.000 MPa	
	<b>Set pressure range</b>	10.0 to -105.0 kPa	-105.0 to 105.0 kPa	-0.105 to 1.050 MPa	
	<b>Smallest settable increment</b>	0.1 kPa		0.001 MPa	
	<b>Withstand pressure</b>	500 kPa		1.5 MPa	
<b>Electrical</b>	<b>Power supply voltage</b>	12 to 24 VDC ±10%, Ripple (p-p) 10% or less			
	<b>Current consumption</b>	25 mA or less			
	<b>Protection</b>	Polarity protection			
<b>Accuracy</b>	<b>Display accuracy</b>	±2% F.S. ±1 digit (Ambient temperature of 25 ±3°C)			
	<b>Repeatability</b>	±0.2% F.S. ±1 digit			
	<b>Temperature characteristics</b>	±2% F.S. (25°C reference)			
<b>Switch output</b>	<b>Output type</b>	NPN or PNP open collector 1 output			
	<b>Output mode</b>	Hysteresis mode, Window comparator mode, Error output, Output OFF			
	<b>Switch operation</b>	Normal output, Reversed output			
	<b>Maximum load current</b>	80 mA			
	<b>Maximum applied voltage (NPN only)</b>	28 V			
	<b>Internal voltage drop (Residual voltage)</b>	1 V or less (with load current of 80 mA)			
	<b>Delay time</b> *1	1.5 ms or less (with anti-chattering function: 20, 100, 500, 1000, 2000, 5000 ms)			
	Hysteresis	<b>Hysteresis mode</b>	Variable from 0*2		
		<b>Window comparator mode</b>			
<b>Short circuit protection</b>	Yes				
<b>Display</b>	<b>Unit</b> *3	MPa, kPa, kgf/cm <sup>2</sup> , bar, psi, InHg, mmHg		MPa, kPa, kgf/cm <sup>2</sup> , bar, psi	
	<b>Display type</b>	LCD			
	<b>Number of screens</b>	3-screen display (Main screen, Sub screen x 2)			
	<b>Display color</b>	1) Main screen: Red/Green 2) Sub screen: Orange			
	<b>Number of display digits</b>	1) Main screen: 4-digit (7-segment) 2) Sub screen: 4-digit (Upper 1-digit 11-segment, 7-segment for other)			
	<b>Indicator light</b>	Lights up when switch output is turned ON. OUT1: Orange			
<b>Digital filter</b> *4	0, 10, 50, 100, 500, 1000, 5000 ms				
<b>Environment</b>	<b>Enclosure</b>	IP40			
	<b>Withstand voltage</b>	1000 VAC for 1 minute between terminals and housing			
	<b>Insulation resistance</b>	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing			
	<b>Operating temperature range</b>	Operating: -5 to 50°C, Stored: -10 to 60°C (No freezing or condensation)			
	<b>Operating humidity range</b>	Operating/Stored: 35 to 85% RH (No condensation)			
<b>Standards</b>	CE, RoHS				
<b>Length of lead wire with connector</b>	2 m				

\*1. Value without digital filter (at 0 ms)

\*2. If the applied pressure fluctuates around the set value, the hysteresis must be set to a value more than the amount of fluctuation or chattering will occur.

\*3. This setting is only available for models with the unit selection function. Only MPa or kPa is available for models without this function.

\*4. The response time indicates when the set value is 90% in relation to the step input.

## Piping Specifications and Weights

Model		M5	01	N01
<b>Port size</b>		M5 x 0.8	R1/8	NPT1/8
<b>Materials of parts in contact with fluid</b>	<b>Sensor pressure receiving area</b>	Silicon		
	<b>Piping port (Common)</b>	PBT, CB156, Heat resistant PPS, O-ring: HNBR		
	<b>Piping port</b>	—	C3604 (Electroless nickel plating), Stainless steel 304, NBR	
<b>Weight</b>	<b>Body</b>	22 g	30 g	
	<b>Lead wire with connector</b>	+35 g		

## Cable Specifications

<b>Conductor area</b>	0.15 mm <sup>2</sup> (AWG26)	
<b>Insulator</b>	<b>Outside diameter</b>	1.0 mm
	<b>Color</b>	Brown, Blue, Black (3 cores)
<b>Sheath</b>	<b>Finished outside diameter</b>	ø3.4

## Options/Part Numbers

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

Description	Part number	Note
Bracket A	<b>ZS-46-A1</b>	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Bracket B	<b>ZS-46-A2</b>	Tapping screw: Nominal size 3 x 8 L (2 pcs.)
Panel mount adapter	<b>ZS-46-B</b>	—
Panel mount adapter + Front protection cover	<b>ZS-46-D</b>	—
Lead wire with connector	<b>ZS-46-3L</b>	3 cores, 2 m
Front protection cover	<b>ZS-27-01</b>	—
R1/8 Piping adapter	<b>ZS-39-N1</b>	—
NPT1/8 Piping adapter	<b>ZS-39-N2</b>	—



# Series ZSE20(F)/ISE20

## 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.

Switch	Pressure range				
	-100 kPa	0	100 kPa	500 kPa	1 MPa
For vacuum pressure <b>ZSE20</b>	-101 kPa	0			
	-105 kPa	10 kPa			
For compound pressure <b>ZSE20F</b>	-100 kPa		100 kPa		
	-105 kPa		105 kPa		
For positive pressure <b>ISE20</b>	-100 kPa				1 MPa
	-105 kPa (-0.105 MPa)				1.05 MPa

Rated pressure range of switch
  Set pressure range of switch

## Functions

<b>Sub screen setting function</b>	The display of the sub screen can be selected.
<b>Auto-preset function</b>	This function is to calculate a rough set value automatically based on the on-going operation.
<b>Display value fine adjustment function</b>	Evens out deviations in the displayed value.
<b>Peak value indication function</b>	Can retain the maximum pressure value displayed during measurement.
<b>Bottom value indication function</b>	Can retain the minimum pressure value displayed during measurement.
<b>Keylock function (Selectable secret code)</b>	The key board can be locked to prevent any incorrect function of the operation switch.
<b>Zero-clear function</b>	The pressure display can be set at zero when the pressure is open to the atmosphere.
<b>Error indication function</b>	This function is to display error location and content when a problem or error has occurred.
<b>Anti-chattering function</b>	Prevents possible malfunction due to sudden fluctuations in the primary pressure by adjusting the delay time.
<b>Unit selection 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.

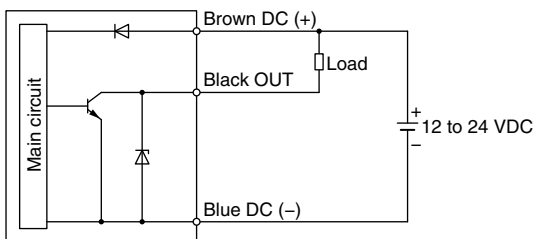
## Internal Circuit and Wiring Examples

Z/ISE20(F) -    -    -    -         

• Output specification

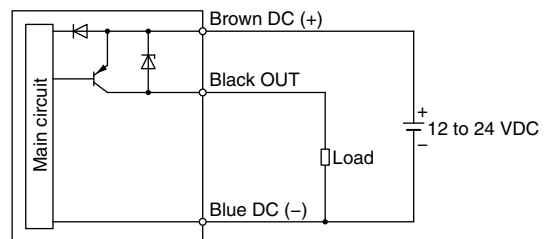
**N**

**NPN (1 Output)**



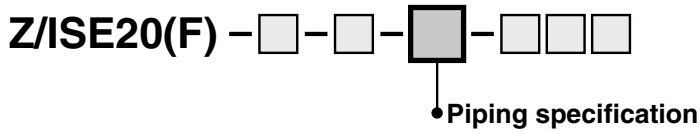
**P**

**PNP (1 Output)**

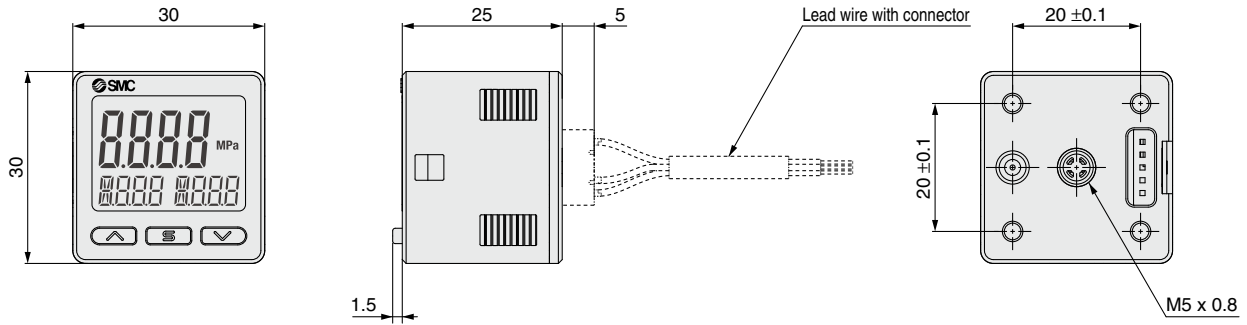




**Dimensions**

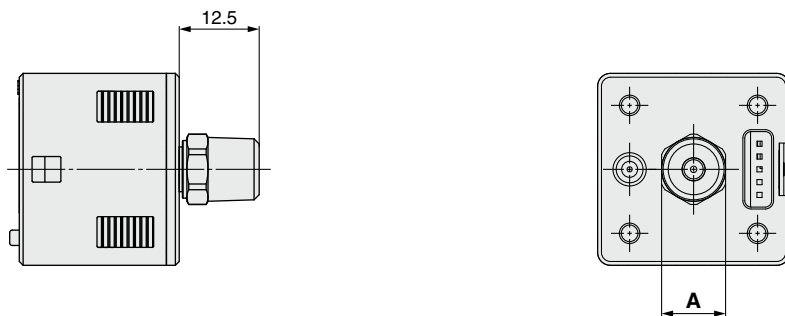


**M5**  
M5 Female thread



**01**  
R1/8

**N01**  
NPT1/8



Piping specification	Port size	A
<b>01</b>	R1/8	Width across flats 10
<b>N01</b>	NPT1/8	Width across flats 12

# Series ZSE20(F)/ISE20

## Dimensions

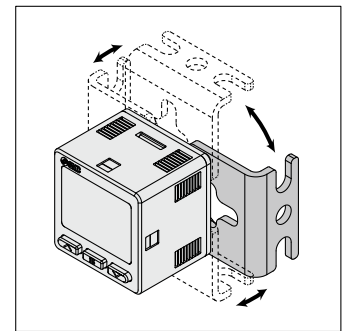
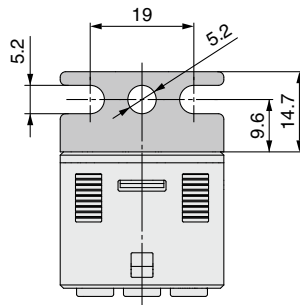
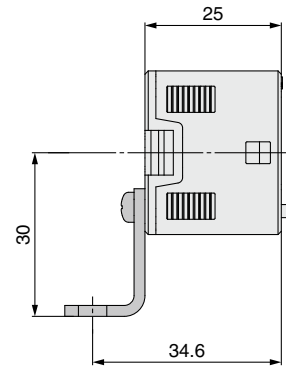
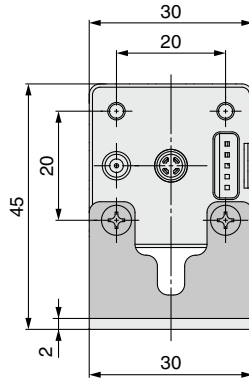
With Bracket

Z/ISE20(F) - □ - □ - □ - □ - □ - □

• Option 2

**A1**

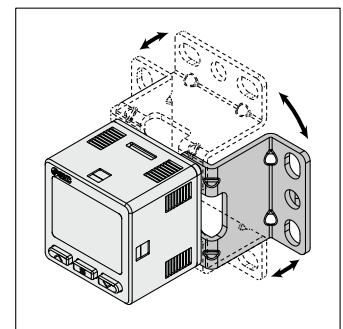
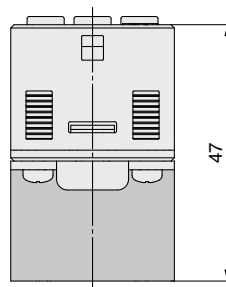
Bracket A  
(Optional part number: ZS-46-A1)



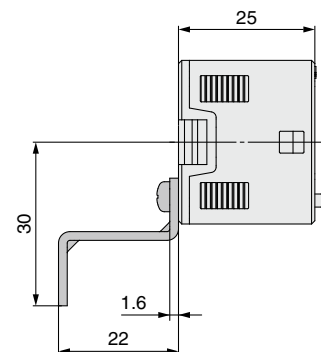
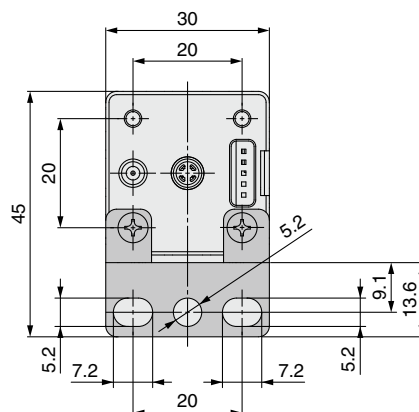
\*Bracket configuration allows mounting in four orientations.

**A2**

Bracket B  
(Optional part number: ZS-46-A2)



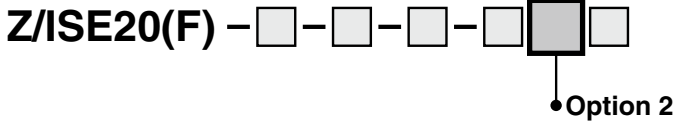
\*Bracket configuration allows mounting in four orientations.



\*When using the bracket B, install it by taking the dimensions of the piping part into consideration.

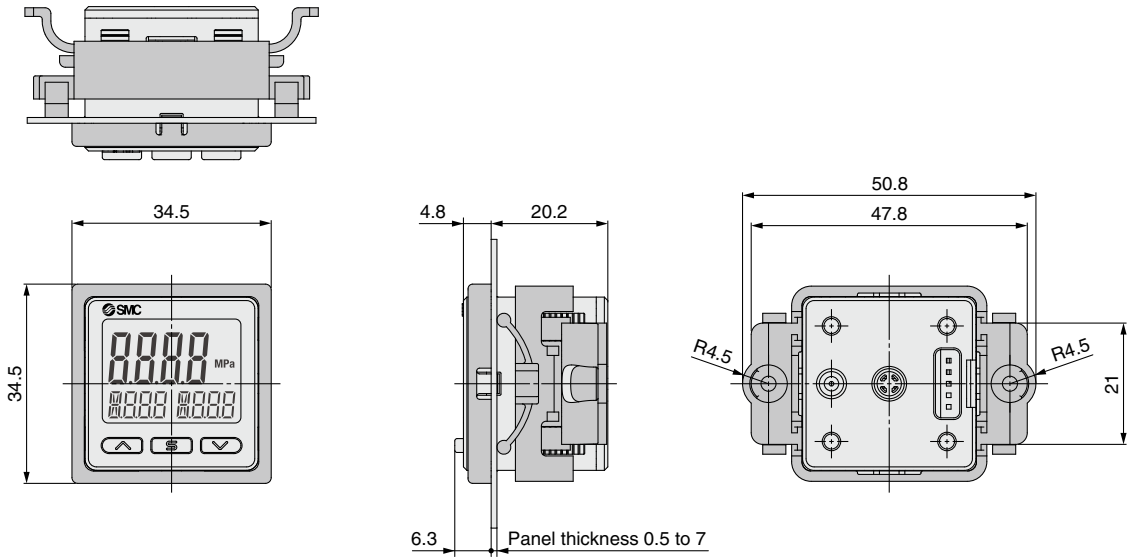
**Dimensions**

**Panel mount adapter**



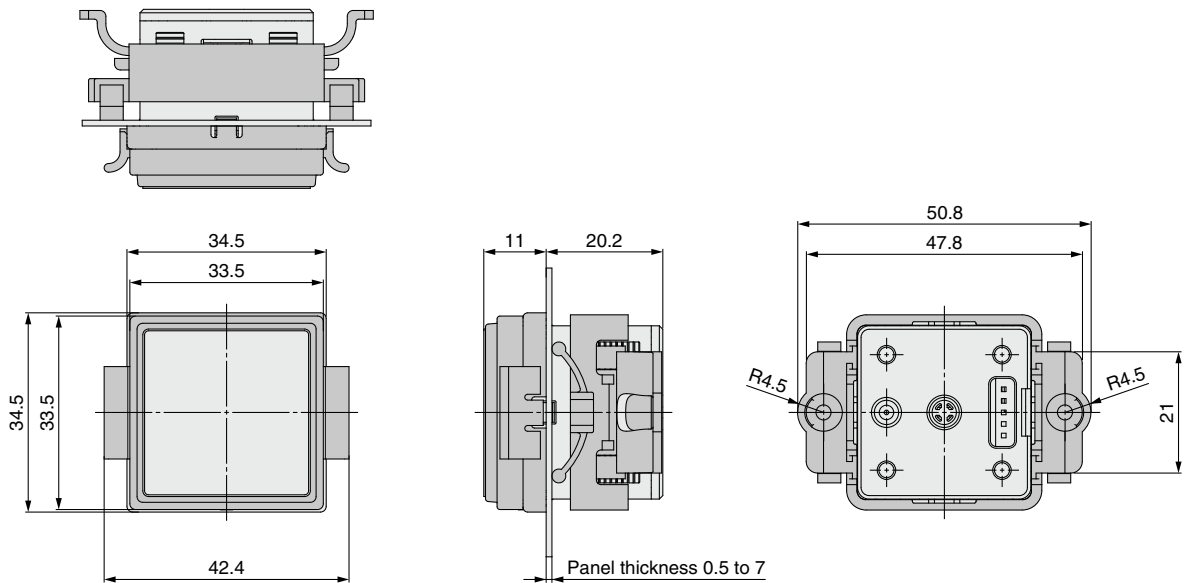
**B**

**Panel mount adapter**  
 (Optional part number: ZS-46-B)



**D**

**Panel mount adapter + Front protection cover**  
 (Optional part number: ZS-46-D)

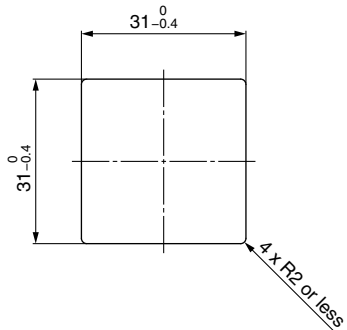


# Series ZSE20(F)/ISE20

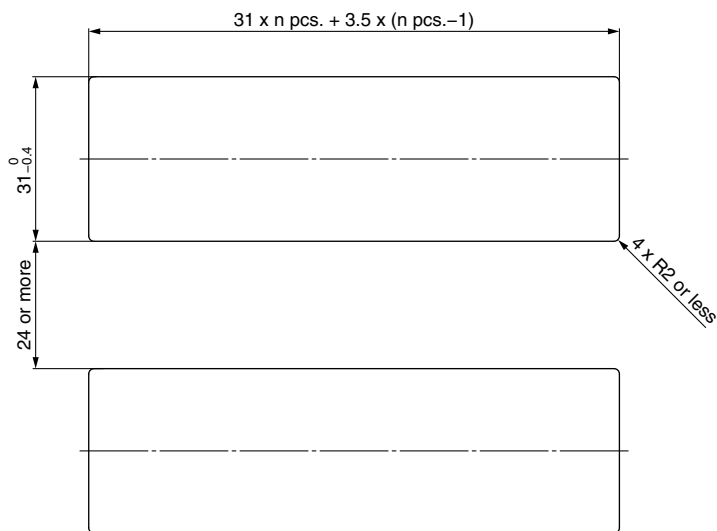
## Dimensions

### Panel fitting dimensions

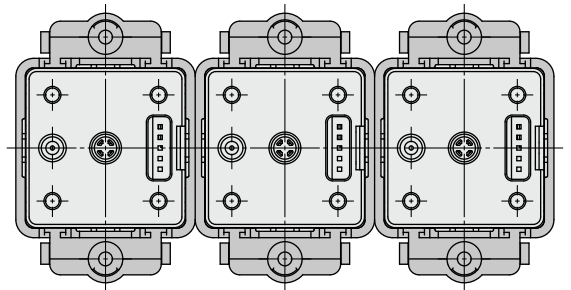
#### Individual mounting



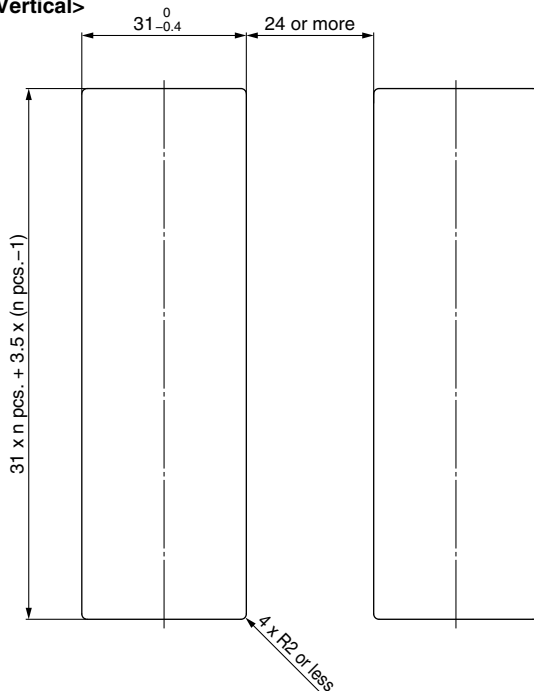
#### Multiple (2 pcs. or more) secure mounting <Horizontal>



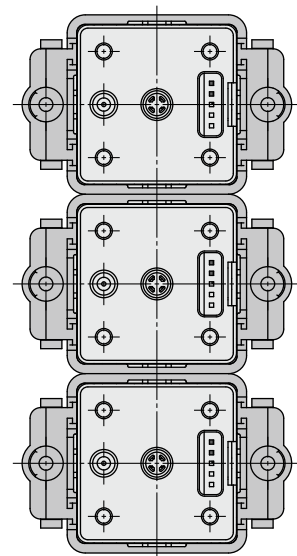
#### Panel mount example <Horizontal>



#### <Vertical>



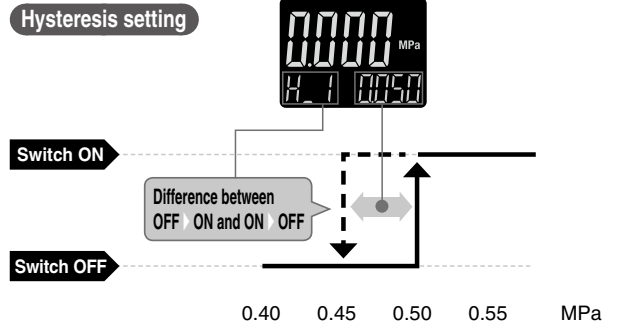
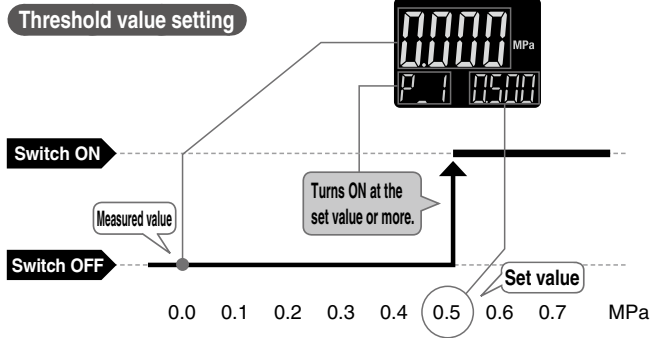
#### Panel mount example <Vertical>



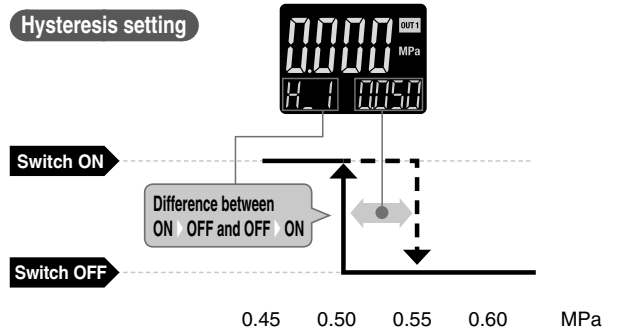
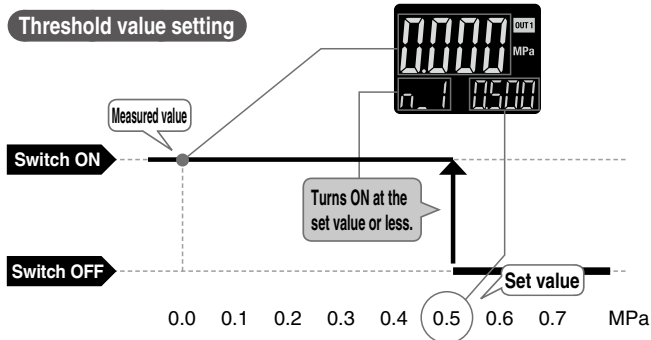
# Series ZSE20(F)/ISE20 Function Details

Display examples of the main and sub (set value) screens of each mode. (For ISE20 (for Positive pressure))

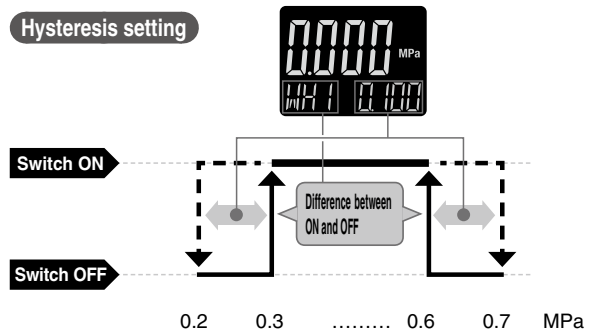
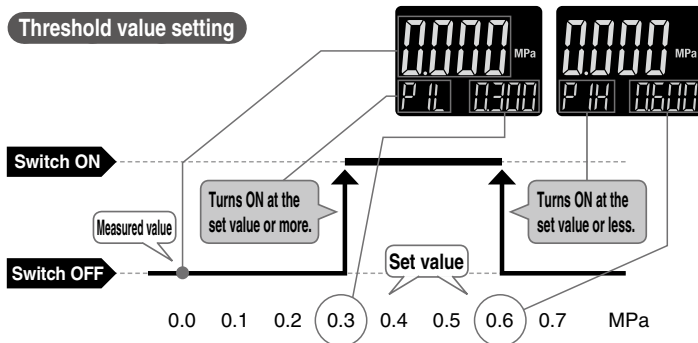
## Hysteresis mode Normal output



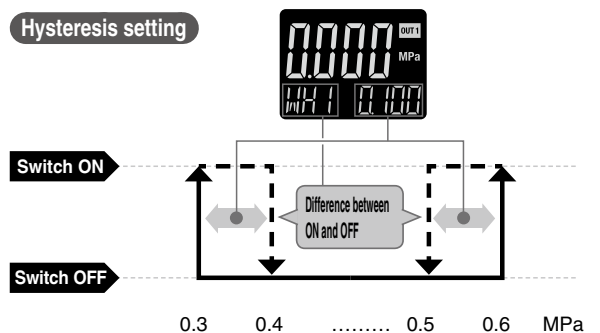
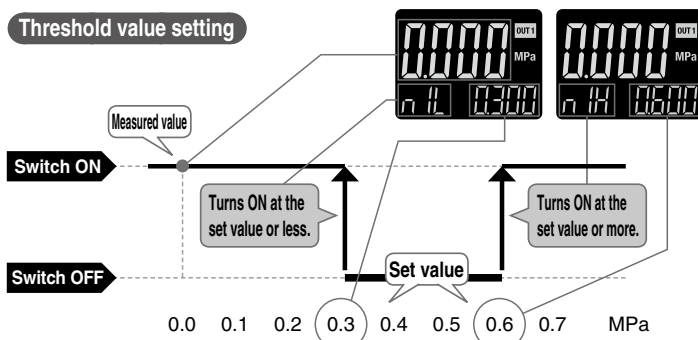
## Hysteresis mode Reversed output



## Window comparator mode Normal output



## Window comparator mode Reversed output



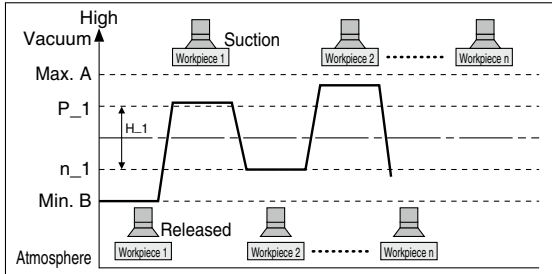
The F□ in ( ) shows the function code number. Refer to the Operation Manual for details about operation procedures and function codes.

## Function Details

### A Auto-preset function (F4)

Auto-preset function, when selected in the initial setting, calculates and stores the set value from the measured pressure. For example, if this function is used for suction verification, the optimum set value is determined automatically by repeating vacuum and break with the target workpiece several times.

#### Suction Verification

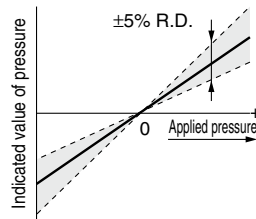


#### Formula for Obtaining the Set Value

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

### B Display value fine adjustment 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.)



— Indicated value at the time of shipment  
 - - - Adjustable range of display value fine adjustment function

Note) When the display value fine adjustment function is used, the set pressure value may change  $\pm 1$  digit.

### C Peak/Bottom value indication function

This function constantly detects and updates the maximum (minimum) pressure when the power is supplied, and allows to hold the maximum (minimum) pressure value.

The held value is maintained even if the power supply is cut. When the buttons are simultaneously pressed for 1 second or longer, while "holding", the held value will be reset.

### D Keylock function

Prevents operation errors such as accidentally changing setting values.

### E Zero-clear function

This function clears and resets the zero value on the display of measured pressure.

The indicated value can be adjusted within  $\pm 7\%$  F.S. of the pressure when ex-factory. (ZSE20F (for compound pressure)  $\pm 3.5\%$  F.S.)

### F Error indication function

This function is to display error location and content when a problem or error has occurred.

Error name	Error code	Description	Action
Over current error		Load current of 80 mA or more is applied to the switch output.	Turn the power off and remove the cause of the over current. Then supply the power again.
Residual pressure error		During zero-clear operation, pressure over $\pm 7\%$ F.S. ( $\pm 3.5\%$ F.S. for compound pressure) is present. Note that the mode is returned to measurement mode automatically 1 second later. The zero clear range varies by $\pm 1\%$ F.S. due to variation between individual products.	Perform zero-clear operation again after restoring the applied pressure to an atmospheric pressure condition.
Applied pressure error		Supply pressure exceeds the maximum set pressure.	Reset applied pressure to a level within the set pressure range.
		Supply pressure is below the minimum set pressure.	
System error		Internal data error	Turn off the power supply and then turn on it again. If the failure cannot be solved, please contact SMC for investigation.

If the error cannot be reset after the above measures are taken, or errors other than above are displayed, please contact SMC.

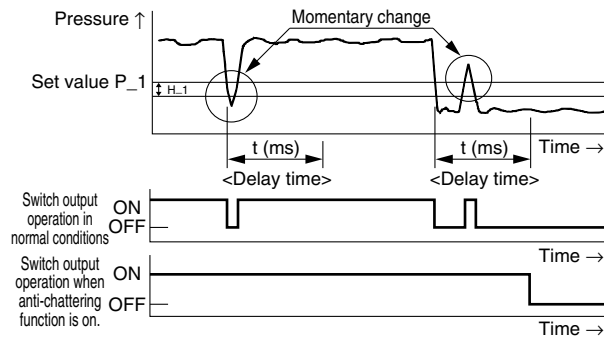
### G Anti-chattering function (Simple setting mode or F1)

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 by changing the delay time setting.

Available delay time settings
1.5 ms or less, 20 ms, 100 ms, 500 ms, 1000 ms, 2000 ms, 5000 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.



### H Unit selection function (F0)

Display units can be switched with this function.

Display unit	MPa	kPa	kGF	bAr	PSi	inCH	mmHG
Smallest settable increment	MPa*	kPa	kgf/cm <sup>2</sup>	bar	psi	inHg	mmHg
ZSE20 (Vacuum pressure)	0.001	0.1	0.001	0.001	0.01	0.1	1
ZSE20F (Compound pressure)	0.001	0.1	0.001	0.001	0.02	0.1	1
ISE20 (Positive pressure)	0.001	1	0.01	0.01	0.1		

\*The ZSE20 (vacuum pressure) and ZSE20F (compound pressure) will have different setting and display resolution when the unit is set to MPa.

### I Power saving mode (F80)

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.

(During power saving mode, [ECo] will flash in the sub screen and the operation light is ON (only when the switch is ON).)

### J Setting of secret code (F81)


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.




## Safety Instructions

These safety instructions are intended to prevent hazardous situations and/or equipment damage. These instructions indicate the level of potential hazard with the labels of “**Caution**,” “**Warning**” or “**Danger**.” They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC)\*1), and other safety regulations.

 **Caution:** **Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

 **Warning:** **Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.

 **Danger:** **Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

\*1) ISO 4414: Pneumatic fluid power – General rules relating to systems.  
ISO 4413: Hydraulic fluid power – General rules relating to systems.  
IEC 60204-1: Safety of machinery – Electrical equipment of machines.  
(Part 1: General requirements)  
ISO 10218-1: Manipulating industrial robots – Safety.  
etc.

### Warning

#### 1. The compatibility of the product is the responsibility of the person who designs the equipment or decides its specifications.

Since the product specified here is used under various operating conditions, its compatibility with specific equipment must be decided by the person who designs the equipment or decides its specifications based on necessary analysis and test results. The expected performance and safety assurance of the equipment will be the responsibility of the person who has determined its compatibility with the product. This person should also continuously review all specifications of the product referring to its latest catalog information, with a view to giving due consideration to any possibility of equipment failure when configuring the equipment.

#### 2. Only personnel with appropriate training should operate machinery and equipment.

The product specified here may become unsafe if handled incorrectly. The assembly, operation and maintenance of machines or equipment including our products must be performed by an operator who is appropriately trained and experienced.

#### 3. Do not service or attempt to remove product and machinery/equipment until safety is confirmed.

1. The inspection and maintenance of machinery/equipment should only be performed after measures to prevent falling or runaway of the driven objects have been confirmed.
2. When the product is to be removed, confirm that the safety measures as mentioned above are implemented and the power from any appropriate source is cut, and read and understand the specific product precautions of all relevant products carefully.
3. Before machinery/equipment is restarted, take measures to prevent unexpected operation and malfunction.

#### 4. Contact SMC beforehand and take special consideration of safety measures if the product is to be used in any of the following conditions.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Installation on equipment in conjunction with atomic energy, railways, air navigation, space, shipping, vehicles, military, medical treatment, combustion and recreation, or equipment in contact with food and beverages, emergency stop circuits, clutch and brake circuits in press applications, safety equipment or other applications unsuitable for the standard specifications described in the product catalog.
3. An application which could have negative effects on people, property, or animals requiring special safety analysis.
4. Use in an interlock circuit, which requires the provision of double interlock for possible failure by using a mechanical protective function, and periodical checks to confirm proper operation.

### Caution

#### 1. The product is provided for use in manufacturing industries.

The product herein described is basically provided for peaceful use in manufacturing industries.  
If considering using the product in other industries, consult SMC beforehand and exchange specifications or a contract if necessary.  
If anything is unclear, contact your nearest sales branch.

### Limited warranty and Disclaimer/ Compliance Requirements

The product used is subject to the following “Limited warranty and Disclaimer” and “Compliance Requirements”.

Read and accept them before using the product.

#### Limited warranty and Disclaimer

1. The warranty period of the product is 1 year in service or 1.5 years after the product is delivered, whichever is first.\*2)  
Also, the product may have specified durability, running distance or replacement parts. Please consult your nearest sales branch.
2. For any failure or damage reported within the warranty period which is clearly our responsibility, a replacement product or necessary parts will be provided.  
This limited warranty applies only to our product independently, and not to any other damage incurred due to the failure of the product.
3. Prior to using SMC products, please read and understand the warranty terms and disclaimers noted in the specified catalog for the particular products.

##### \*2) Vacuum pads are excluded from this 1 year warranty.

A vacuum pad is a consumable part, so it is warranted for a year after it is delivered.  
Also, even within the warranty period, the wear of a product due to the use of the vacuum pad or failure due to the deterioration of rubber material are not covered by the limited warranty.

#### Compliance Requirements

1. The use of SMC products with production equipment for the manufacture of weapons of mass destruction (WMD) or any other weapon is strictly prohibited.
2. The exports of SMC products or technology from one country to another are governed by the relevant security laws and regulations of the countries involved in the transaction. Prior to the shipment of a SMC product to another country, assure that all local rules governing that export are known and followed.

### Caution

#### SMC products are not intended for use as instruments for legal metrology.

Measurement instruments that SMC manufactures or sells have not been qualified by type approval tests relevant to the metrology (measurement) laws of each country. Therefore, SMC products cannot be used for business or certification ordained by the metrology (measurement) laws of each country.

## Safety Instructions

Be sure to read the “Handling Precautions for SMC Products” (M-E03-3) and “Operation Manual” before use.