

3-Screen Display

\* The ISE78G is not in compliance with UL standards.

# High-Precision Digital Pressure Switch: For General Fluids

## ISE70G/75G/76G/77G/78G Series

### How to Order



**ISE70G** - **02**    - **L2** - **M**         

**Pressure range**

Model	Description
<b>ISE70G</b>	0 to 1 MPa
<b>ISE75G</b>	0 to 2 MPa
<b>ISE76G</b>	0 to 5 MPa
<b>ISE77G</b>	0 to 10 MPa
<b>ISE78G</b>	0 to 16 MPa

**Piping specification**

Symbol	Description
<b>02</b>	Rc1/4
<b>N02</b>	NPT1/4
<b>F02</b>	G1/4*1

\*1 ISO 1179-1 compliant

**Orifice**

Symbol	Description
<b>Nil</b>	None
<b>T</b>	Yes*1

\*1 Orifice is shipped together with the product.

**Output specification\*1**

Symbol	Description
<b>L2</b>	IO-Link: Switch output 1 + Switch output 2 (Switch output: NPN or PNP switching type)

\*1 Refer to pages 10 and 13 for details.

**Unit specification**

Symbol	Description
<b>Nil</b>	Units selection function*1
<b>M</b>	SI units only*2

\*1 Under the New Measurement Act, switches with the units selection function are no longer allowed for use in Japan.

\*2 Fixed units: MPa, kPa

**Option 3**

Symbol	Description
<b>Nil</b>	Operation manual
<b>Y</b>	None
<b>K</b>	Operation manual + Calibration certificate
<b>T</b>	Calibration certificate

**Option 2**

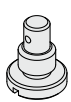
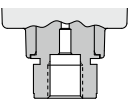
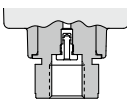
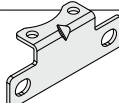
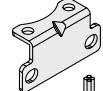

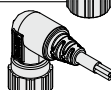
Symbol	Description
<b>Nil</b>	None
<b>A</b>	Bracket A (Interchangeable with ISE75(H))
<b>B</b>	Bracket B

**Option 1**

Symbol	Description
<b>Nil</b>	None
<b>S</b>	Lead wire with M12 connector (Straight, 5 m)
<b>L</b>	Lead wire with M12 connector (Right-angled, 5 m)

### Options/Part Nos.

When only optional parts are required, order with the part numbers listed below.

Description	Part no.	Note
Orifice 	<b>ZS-48-A</b>	  Without orifice      With orifice
Bracket A 	<b>ZS-50-A</b>	Interchangeable with ISE75(H) With 2 mounting screws (M4 x 6 L)
Bracket B 	<b>ZS-50-B</b>	With 2 mounting screws (M4 x 6 L)
Lead wire with M12 connector: Straight 	<b>ZS-31-B</b>	Lead wire length: 5 m
Lead wire with M12 connector: Right-angled 	<b>ZS-31-C</b>	Lead wire length: 5 m



For pressure switch precautions and specific product precautions, refer to the "Operation Manual" on the SMC website.

## Specifications

Model		ISE70G	ISE75G	ISE76G	ISE77G	ISE78G
<b>Applicable fluid</b>		Liquid or gas that will not corrode materials of parts in contact with fluid				
<b>Pressure</b>	<b>Rated pressure range</b>	0 to 1.000 MPa	0 to 2.000 MPa	0 to 5.00 MPa	0 to 10.00 MPa	0 to 16.00 MPa
	<b>Display/Set pressure range</b>	-0.105 to 1.050 MPa	-0.105 to 2.100 MPa	-0.25 to 5.25 MPa	-0.50 to 10.50 MPa	-0.80 to 16.80 MPa
	<b>Display/Smallest settable increment</b>	0.001 MPa	0.001 MPa	0.01 MPa	0.01 MPa	0.01 MPa
	<b>Withstand pressure</b>	3.0 MPa	5.0 MPa	12.5 MPa	30 MPa	48 MPa
<b>Power supply</b>	<b>Power supply voltage</b>	<b>When used as a switch output device</b>	12 to 24 VDC ±10% with 10% voltage ripple or less			
		<b>When used as an IO-Link device</b>	18 to 30 VDC, including ripple (p-p) 10%			
	<b>Current consumption</b>	35 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>	±0.5% F.S.				
	<b>Temperature characteristics (25°C standard)</b>	±3% F.S.				±5% F.S.
<b>Switch output (SIO mode)</b>	<b>Output type</b>	Select from NPN or PNP open collector output.				
	<b>Output mode</b>	Hysteresis, Window comparator, Error output, Output OFF				
	<b>Switch operation</b>	Normal output, Reversed output				
	<b>Max. load current</b>	80 mA				
	<b>Max. applied voltage</b>	30 V (NPN output)				
	<b>Internal voltage drop (Residual voltage)</b>	1.5 V or less (at load current of 80 mA)				
	<b>Delay time*1</b>	2 ms or less, variable from 0 to 60 s/0.01 s increments				
	<b>Hysteresis</b>	<b>Hysteresis mode</b>	Variable from 0*2			
		<b>Window comparator mode</b>				
<b>Short circuit protection</b>	Yes					
<b>Display</b>	<b>Unit*3</b>	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>	Main screen: Red/Green, Sub screen: Orange				
	<b>Number of display digits</b>	Main screen: 4 digits (7 segments), Sub screen: 4 digits (Upper 1 digit 11 segments, 7 segments for other)				
	<b>Indicator light</b>	Lights up when switch output is turned ON (OUT1, OUT2: Orange)				
<b>Digital filter*3,4</b>		Variable from 0 to 30 s/0.01 s increments				
<b>Environmental resistance</b>	<b>Enclosure</b>	IP67				
	<b>Withstand voltage</b>	500 VAC for 1 min between terminals and housing				
	<b>Insulation resistance</b>	50 MΩ or more (500 VDC measured via megohmmeter) between terminals and housing				
	<b>Fluid temperature range</b>	-5 to 70°C (No condensation or freezing)				
	<b>Operating temperature range</b>	Operating: -5 to 50°C, Stored: -10 to 60°C (No condensation or freezing)				
	<b>Operating humidity range</b>	Operating/Stored: 35 to 85% RH (No condensation)				
<b>Standards</b>		UL/CSA (E216656), CE marking (EMC Directive, RoHS Directive)				CE marking (EMC Directive, RoHS Directive)
<b>Piping</b>	<b>Port size</b>	Rc1/4, NPT1/4, G1/4				
	<b>Materials of parts in contact with fluid</b>	Sensor pressure receiving area: Al <sub>2</sub> O <sub>3</sub> (Alumina 96%), Piping port: C3604 (Electroless nickel plating), Sensor seal: FKM + Grease (1 MPa), FKM (2, 5, 10, 16 MPa)				
<b>Weight</b>	<b>Body</b>	<b>Port size Rc1/4</b>	184 g			
		<b>Port size NPT1/4</b>	183 g			
		<b>Port size G1/4</b>	181 g			
	<b>Option</b>	<b>Lead wire with connector</b>	139 g			
		<b>Bracket A</b>	17.7 g			
		<b>Bracket B</b>	14.2 g			
	<b>Orifice</b>	1.2 g				
<b>Communication (IO-Link mode)</b>	<b>IO-Link type</b>	Device				
	<b>IO-Link version</b>	V1.1				
	<b>Communication speed</b>	COM2 (38.4 kbps)				
	<b>Configuration file</b>	IODD file*5				
	<b>Min. cycle time</b>	2.3 ms				
	<b>Process data length</b>	Input data: 2 bytes, Output data: 0 byte				
	<b>On request data communication</b>	Yes				
	<b>Data storage function</b>	Yes				
	<b>Event function</b>	Yes				
<b>Vendor ID</b>	131 (0 x 0083)					

\*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 Setting is only possible for models with the units selection function. For models without this function, only MPa or kPa is available for the ISE70G/ISE75G, and only MPa is available for the ISE76G/ISE77G/ISE78G.

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

\*5 The configuration file can be downloaded from the SMC website, <https://www.smcworld.com>



\* Products with tiny scratches, marks, or display color or brightness variations which do not affect the performance of the product are verified as conforming products.

# ISE7□/7□G/79S Series

## Set Pressure Range and Rated Pressure Range

Set the pressure within the rated pressure range. The set pressure range is the range of pressure within which switch output can be set. The rated pressure range is the range of pressure that satisfies the specifications (accuracy, linearity, etc.) of the product. Although it is possible to set a value outside the rated pressure range, the specifications cannot be guaranteed even if the value stays within the set pressure range.

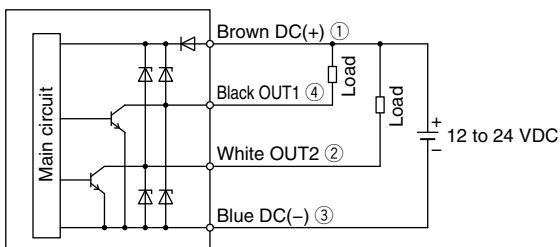
Switch		Pressure range								
		-2 MPa	-0.1 MPa	0	1 MPa	2 MPa	5 MPa	10 MPa	15 MPa	50 MPa
For 1 MPa (For Air and General fluids)	ISE70			0	1 MPa					
	ISE70G	-0.105 MPa			1.05 MPa					
For 1.6 MPa (For Air)	ISE71			0	1.6 MPa					
		-0.105 MPa			1.68 MPa					
For 2 MPa (For General fluids)	ISE75G			0	2 MPa					
		-0.105 MPa			2.1 MPa					
For 5 MPa (For General fluids)	ISE76G			0	5 MPa					
		-0.25 MPa			5.25 MPa					
For 10 MPa (For General fluids)	ISE77G			0	10 MPa					
		-0.50 MPa			10.5 MPa					
For 16 MPa (For General fluids)	ISE78G			0	16 MPa					
		-0.80 MPa			16.8 MPa					
For 50 MPa (For General fluids)	ISE79S			0	50 MPa					
		-2.5 MPa			52.5 MPa					

 Rated pressure range of the switch  
 Set pressure range of the switch

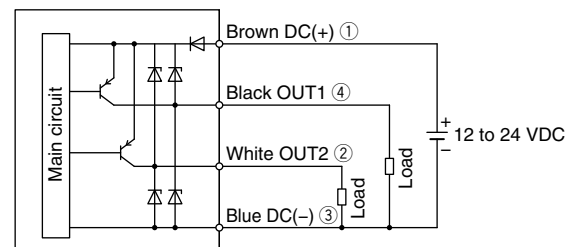
## Internal Circuits and Wiring Examples

### When used as a switch output device Setting of NPN open collector 2 outputs

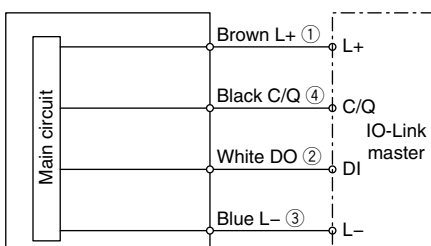
\* The numbers in the circuit diagrams show the connector pin layout.



### Setting of PNP open collector 2 outputs

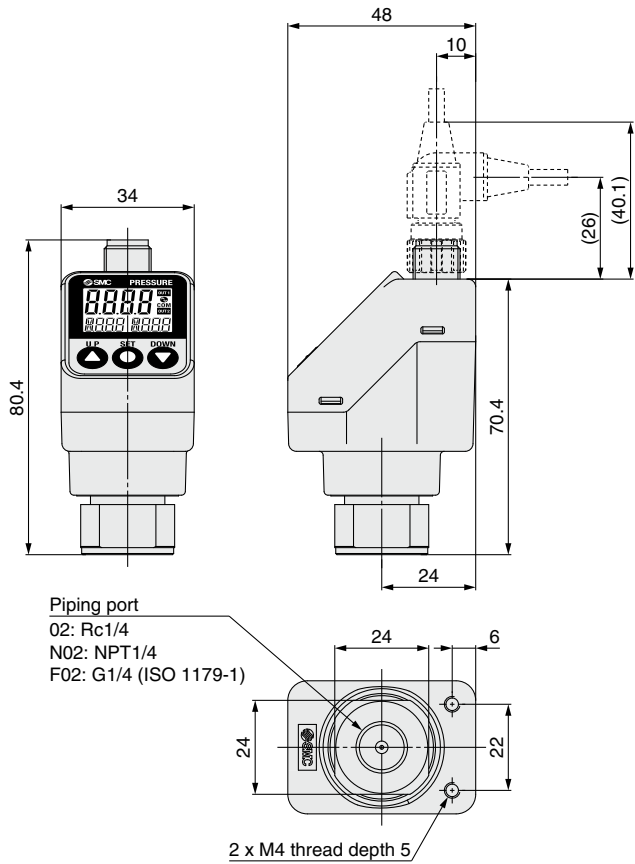


### When used as an IO-Link device

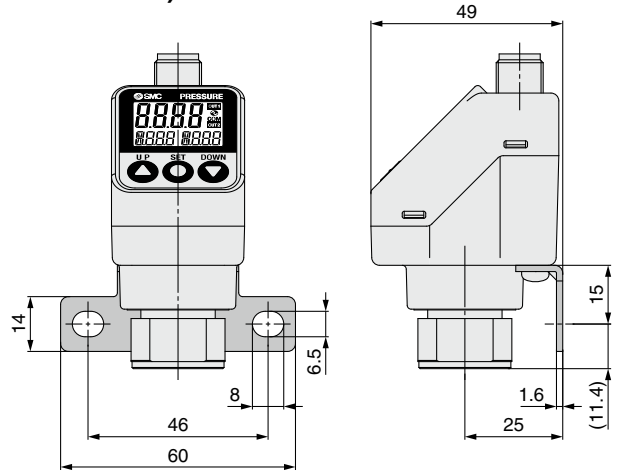


**Dimensions**

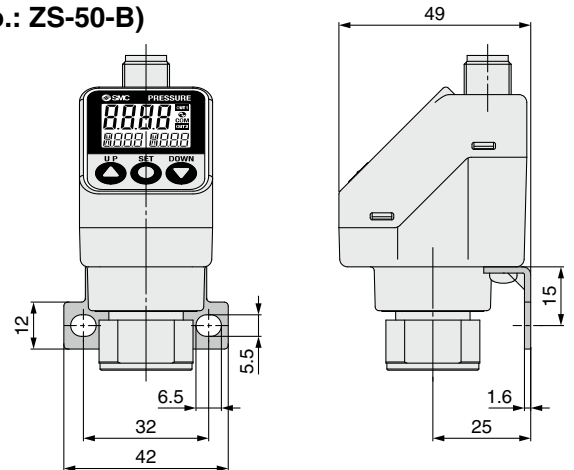
**Without bracket**



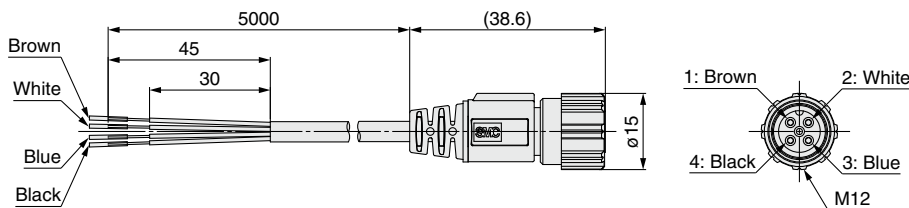
**Bracket A (Interchangeable with ISE70/ISE75(H))  
(Part no.: ZS-50-A)**



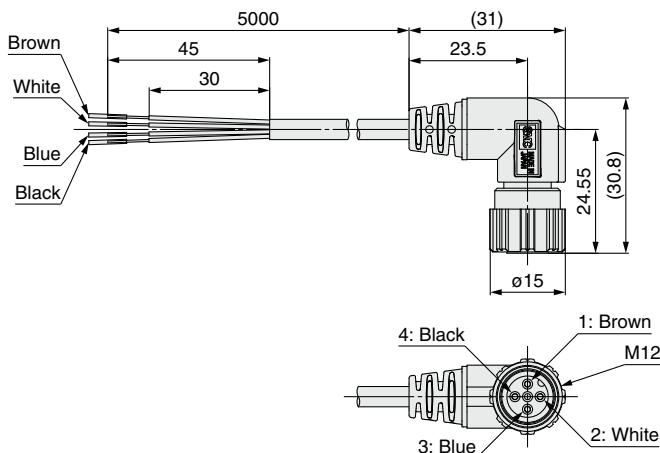
**Bracket B  
(Part no.: ZS-50-B)**



**Lead wire with M12 connector  
(Part no.: ZS-31-B)**



**(Part no.: ZS-31-C)**



**Cable Specifications**

Conductor	Nominal cross section	AWG23
	Outside diameter	0.72 mm
Insulator	Material	Cross-linked vinyl chloride
	Outside diameter	1.14 mm
	Number of cores	4
Sheath	Material	Oil-resistant vinyl chloride
	Finished outside diameter	ø4

**When used as a switch output device**

No.	Description	Lead wire color	Note
1	DC(+)	Brown	12 to 24 VDC
2	OUT2	White	Switch output 2
3	DC(-)	Blue	0 V
4	OUT1	Black	Switch output 1

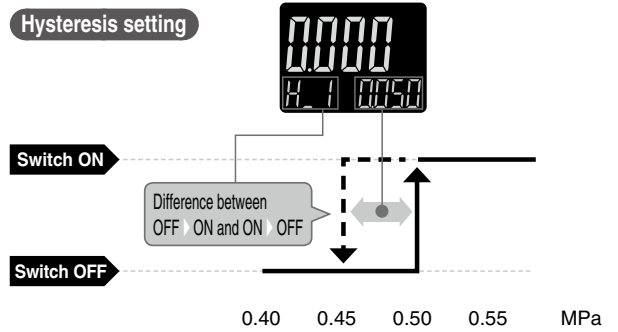
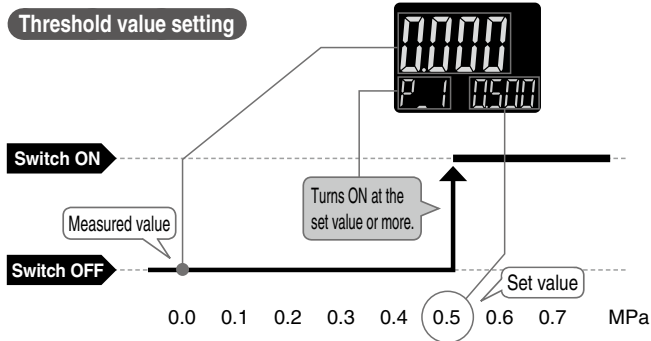
**When used as an IO-Link device**

No.	Description	Lead wire color	Note
1	L+	Brown	18 to 30 VDC
2	DO	White	Switch output 2
3	L-	Blue	0 V
4	C/Q	Black	Communication data (IO-Link)/ Switch output 1 (SIO)

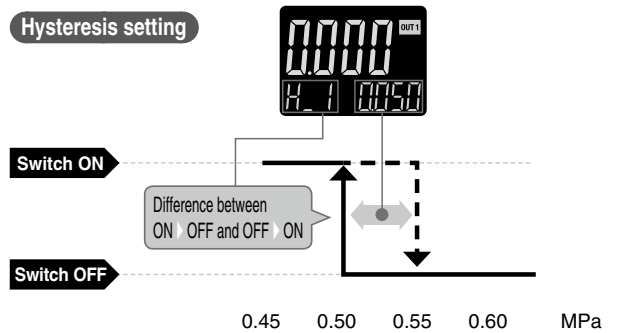
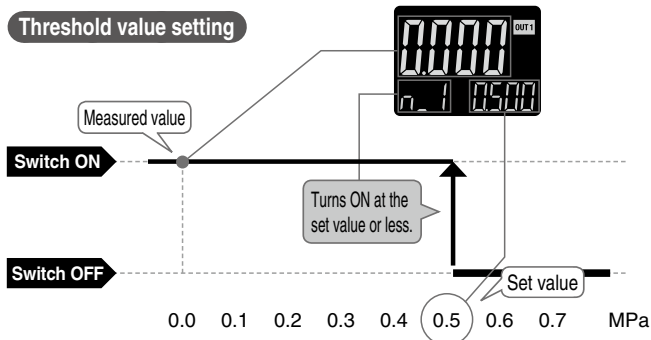
# ISE7□/7□G/79S Series Function Details

Display examples of the main and sub (set value) screens of each mode.

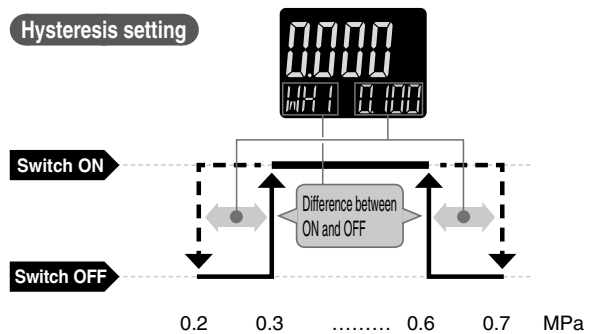
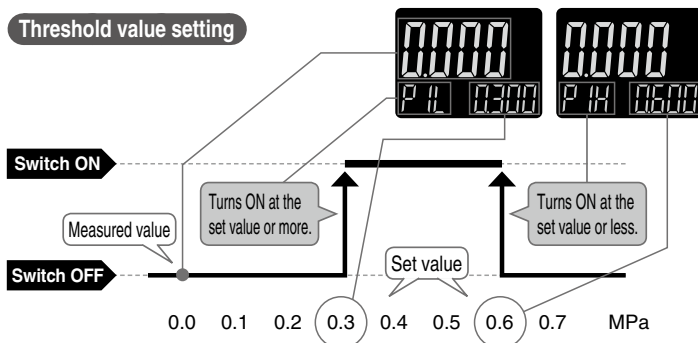
## Hysteresis mode Normal output



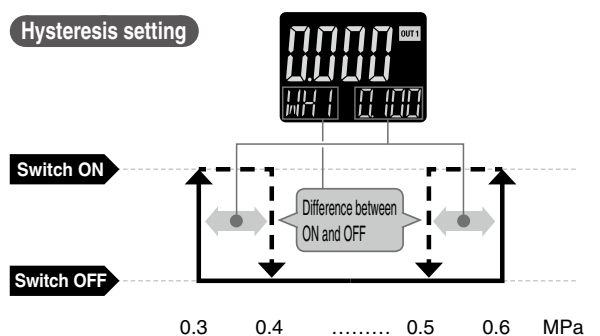
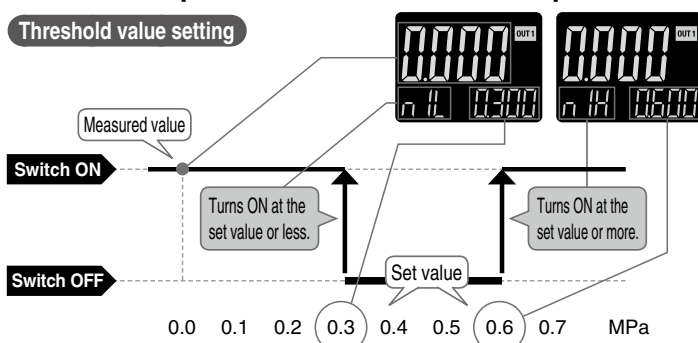
## Hysteresis mode Reversed output



## Window comparator mode Normal output



## Window comparator mode Reversed output



## Function Details

### A Auto-preset function (F4) \* When using with IO-Link, the set values cannot be changed by communication.

This function, when selected in the initial setting, calculates and stores the set value from the measured pressure.

Using this function is possible to automatically determine the optimum set value based on the variation in measured pressure due to the repeated operation of the device.

#### Formula for Obtaining the Set Value

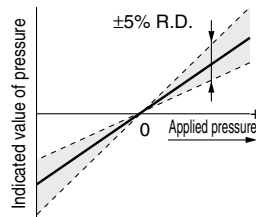
Set value (Threshold value)	Hysteresis value
$P_{-1}(P_{-2}) = A - (A-B)/4$	$H_{-1}(H_{-2}) =  (A-B)/2 $
$n_{-1}(n_{-2}) = B + (A-B)/4$	

A: Max. pressure value in auto-preset mode

B: Min. pressure value in auto-preset mode

### 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. (This eliminates wide variations of the indicated value.)



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

\* 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 max. (min.) pressure when the power is supplied, and allows to hold the max. (min.) pressure value.

The held value is maintained even if the power supply is cut.

When the SET and DOWN buttons are simultaneously pressed for 1 s or longer, while "holding," the held value will be reset.

### D Key-lock function

This 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 the measured pressure.

The indicated value can be adjusted within  $\pm 7\%$  F.S. of the pressure at the time of shipment from the factory.

### F Error display function

When an error or abnormality arises, the location and contents are displayed.

Error name	Display	Description	Action
Over current error		A load current applied to the switch output has exceeded the max. value.	Eliminate the cause of the over current by turning OFF the power supply and then turn it ON again.
Residual pressure error		During zero-clear operation, a pressure over $\pm 7\%$ F.S. has been applied. Note that the mode is returned to measurement mode automatically after 1 s. The zero-clear range varies by $\pm 1\%$ F.S. due to variation between individual products.	Retry the zero-clear operation after restoring the applied pressure to an atmospheric pressure condition.
Applied pressure error		Supply pressure exceeds the max. set pressure.	Reset the applied pressure to a level within the set pressure range.
		Supply pressure is below the min. set pressure.	
System error		An internal data error has occurred.	Turn the power OFF and turn it ON again. If the error cannot be solved, please contact SMC for investigation.
IO-Link master version error		The IO-Link version does not match that of the master. The master uses version 1.0.	Ensure that the master IO-Link version matches the device version.

If the error cannot be solved after the instructions above are performed, or errors other than those above are displayed, please contact SMC for investigation.

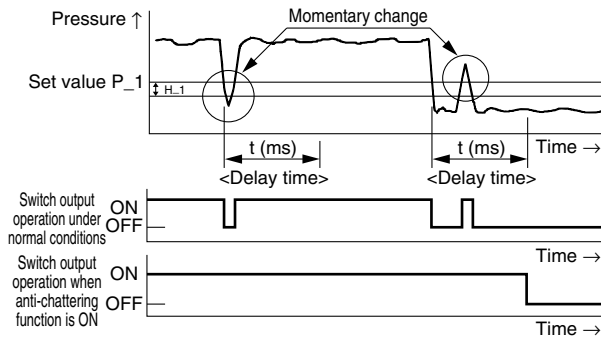
## Function Details

### G Anti-chattering function (Simple setting mode or F1, F2)

A function to delay the switch output response time to prevent chattering or prevent the detection of temporary changes in source pressure. For example, large bore cylinders and ejectors consume a large volume of air during operation and may experience a temporary drop in the supply pressure. The delay time can be set in the range of 0.00 to 60.00 [s] in 0.01 [s] increments.

<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 Units selection function (F0)

Display units can be switched with this function.

Model	Rated pressure range	Smallest settable increment				
		MPa	kPa	kgf/cm <sup>2</sup>	bar	psi
ISE70/70G	0 to 1 MPa	0.001	1	0.01	0.01	0.1
ISE71	0 to 1.6 MPa					0.2
ISE75G	0 to 2 MPa					
ISE76G	0 to 5 MPa	0.01	/	0.1	0.1	1
ISE77G	0 to 10 MPa					
ISE78G	0 to 16 MPa	0.1	/	1	1	10
ISE79S	0 to 50 MPa					

### I Zero cut-off setting (F14)

When the pressure display value is close to zero, this function forces the display to zero.

The range to display zero can be changed within the range of 0.0 to 10.0%.

Example: When the ISE70 (1 MPa range), zero-cut value = 1.0%, 0 is displayed in the range of -9 to 9 kPa.

### J Power saving mode (F80)

The power saving mode can be selected.

With this function, if no buttons are pressed for 30 s, it shifts to power saving mode.

At the time of shipment from the factory, the product is set to the normal mode (the power saving mode is turned OFF).

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

### K Setting of a security code (F81)

The user can select whether a security code must be entered to release the key lock.

At the time of shipment from the factory, it is set such that a security code is not required.