3-Screen Display

New

Condensation Checker

(Digital Temperature & Humidity Switch)

RoHS

IP65

IO-Link

Visualization of relative humidity

Real-time digital display

Digital display

Main display
Relative humidity (Atmospheric pressure)

Sub display
Temperature (Atmospheric pressure)

* When the main display is set to humidity. It is also possible to set the main display to temperature.

Visualization of Settings

Set value	hP_1
Humidity peak/ bottom value	HH,
Temperature peak/ bottom value	tH,
IO-Link communication status*1	nodE

*1 For product with IO-Link

Relative humidity [% R.H.]

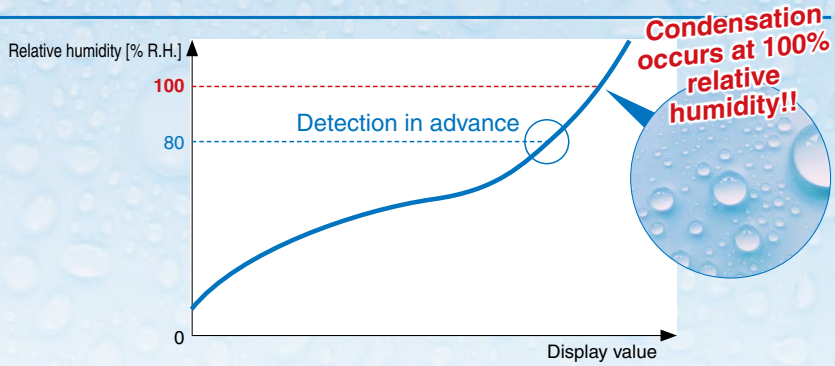
Display/Setting range	0 to 100
Display accuracy	±5% R.H. ±1 digit

Temperature [°C]

Display/Setting range	–5 to 55
Display accuracy	±3°C ±1 digit

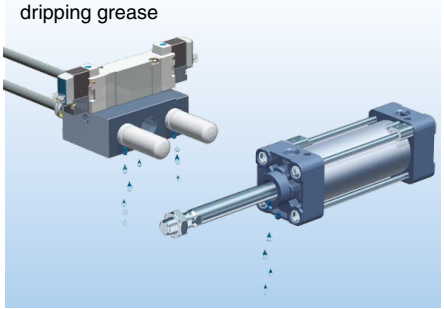
Remote/Condition monitoring

Remote confirmation via switch output preventing condensation problems!



Protect important equipment from moisture.

Malfunction of air blowers/air drivers	Component failure and frequent replacement	Humidity control using a dryer
Generation of water droplets	Malfunction of valves and actuators due to dripping grease	High load on the dryer in summer



PSH Series

SMC

CAT.ES100-161A

3-Screen Display

IO-Link

Condensation Checker (Digital Temperature & Humidity Switch)

PSH Series

How to Order

PSH – L2 – M – 01 – ❑ ❑ ❑

❶ ❷ ❸ ❹ ❺ ❻

❶ Output specification

Symbol	Description
L2	IO-Link/Switch output 1 + Switch output 2 (Switch output: NPN or PNP switching type)
RT	Switch output 1 + Switch output 2 + Analog voltage output (Switch output: NPN or PNP switching type)

∗ Switch output 1/2, analog voltage output can be set to humidity or temperature.

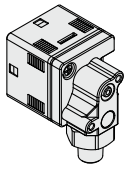
❷ Units specification

Symbol	Description
Nil	Units selection function∗1
M	SI units only∗2

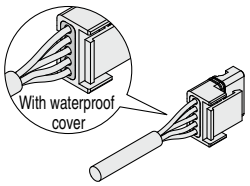
∗1 Under the New Measurement Act, switches with the units selection function are no longer allowed for use in Japan. A unit label is supplied.

∗2 Fixed units: % R.H., °C

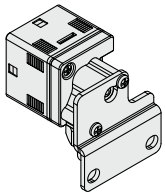
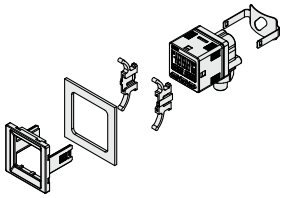
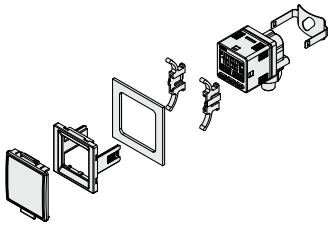
❸ Piping specification

Symbol	Description	
01	Rc1/8	

❹ Option 1

Symbol	Description	
Nil	None	
W	Lead wire with connector (2 m, Waterproof)	ZS-46-5F 

❺ Option 2

Symbol	Description	
Nil	None	
A	Bracket	ZS-55-A 
B	Panel mount adapter	ZS-55-B 
D	Panel mount adapter + Front protection cover	ZS-55-D 

❻ Option 3

Symbol	Description
Nil	Operation manual
Y	None

Accessories Part Number

When an accessory is required separately, order using the part number listed below.

Description	Part no.	Note
Bracket	**ZS-55-A**	—
Panel mount adapter	**ZS-55-B**	—
Panel mount adapter + Front protection cover	**ZS-55-E**	—
Lead wire with connector	**ZS-46-5F**	5-core, 2 m, Waterproof
Front protection cover	**ZS-35-01**	—
Sintered metal filter element	**EBD-3.8-3-2**	Min. purchase quantity: 10 pcs.

Specifications

Model				PSH
Applicable fluid				Air, Non-corrosive gas JIS B 8392-1 1.1.2 to 1.6.2, ISO 8573-1 1.1.2 to 1.6.2
Temperature	Rated temperature range			0 to 50°C
	Display and Set temperature range			–5 to 55°C
	Display and minimum settable increment			0.1 °C
Relative humidity	Display and Set relative humidity range			0 to 100% R.H. (No condensation)
	Display and minimum settable increment			0.1% R.H.
Pressure	Rated pressure range			0.3 to 1 MPa
	Operating pressure range			0.1 to 1 MPa
Flow rate consumption				5 L/min (Pressure: 1 MPa) (Reference: Approx. 3 L/min or less at 0.3 MPa)
Power supply	Power supply voltage			18 to 30 VDC (Including ripple)
	Current consumption			35 mA or less
	Protection			Polarity protection
Accuracy*1, *2	Temperature	Display accuracy		±3°C ±1 digit
		Analog output accuracy*3		±3.5 °C
	Relative humidity	Display accuracy		±5% R.H. ±1 digit*4
		Analog output accuracy*3		±5.5% R.H.
Switch output	Output type			Select from NPN or PNP open collector output.
	Output mode			Hysteresis mode, Window comparator mode, Error output
				Output OFF
	Switch operation			Normal output, Reversed output
	Max. load current			10 mA
	Max. applied voltage (NPN only)			30 V
	Internal voltage drop (Residual voltage)			1.5 V or less (at load current of 10 mA)
	Hysteresis	Hysteresis mode		Variable from 0
		Window comparator mode		
	Short circuit protection			Yes
Analog output	Output type			1 to 5 V*5
	Output impedance			Approx. 1 kΩ
Digital filter				0.0 to 60.00 s (0.01 increments)*6
Display	Units			°C, °F, % R.H.
	Display type			LCD
	Number of screens			3-screen display (Main screen, Sub screen x 2)
	Display color			1) Main screen: White/Red
				2) Sub screen: Orange
	Number of display digits			1) Main screen: 3 1/2 digits, 7 segments
				2) Sub screen: 4 digits, 7 segments
	Indicator light			Light is ON when switch output is ON. OUT1, OUT2: Orange
Environmental resistance	Enclosure rating			IP65
	Withstand voltage			1000 VAC for 1 min between terminals and housing
	Insulation resistance			50 MΩ or more (using 500 VDC Mega) between terminals and housing
	Ambient temperature range			Operating: 0 to 50°C, Storage: –10 to 60°C (No condensation or freezing)
	Ambient humidity range			Operating: 35 to 85% R.H., Storage: 35 to 70% R.H. (No condensation)*7
Standards				CE/UKCA (EMC and RoHS directive)
Length of lead wire with connector				2 m

*1 This is the overall accuracy, including the effects of factors such as temperature and repetition.
*2 Applicable only when using within the rated pressure range.
*3 When using a product with an analog output function. Select temperature or relative humidity using the settings.
*4 When using within the operating pressure range. The range in which relative humidity can change under atmospheric pressure changes depending on the operating pressure.
For details, refer to page 6. If the product is used outside the operating pressure range, the accuracy is not guaranteed.
*5 Relative humidity: 1 to 5 V output for 0 to 100% R.H. Temperature: 1 to 5 V output for 0 to 50°C.
*6 This is the 90% response time to a step input in the internal sensor signal.
*7 Do not store in airtight conditions without air exchange.
* If the piping contains gases such as oil mist or organic solvents, it may not be possible to meet the specified accuracy or it may cause a malfunction.
* Although SMC strive to improve quality, products are considered to be of good quality if there are slight scratches, dirt, display color, uneven brightness, etc. on the exterior that do not affect the performance.

Specifications

Piping Specifications and Weights

Model		PSH
Port size		R1/8
Materials in contact with fluid	Sensor pressure receiving area	Silicon, etc.
	Piping port	SUS303, CAC403, C3604 (Electroless nickel plating), ZDC2 (Nickel plating)
		Glass-fibre epoxy resin
		O-ring: EPDM, FKM
Weight	Body	103 g
	Lead wire with connector	+39 g

Cable Specifications

Conductor cross section		0.15 mm^2 (AWG26)
Insulator	Outside diameter	1.0 mm
	Color	Brown, Blue, Black, White, Grey (5-core)
Sheath	Outside diameter	ø3.5

Communication Specifications (For IO-Link)

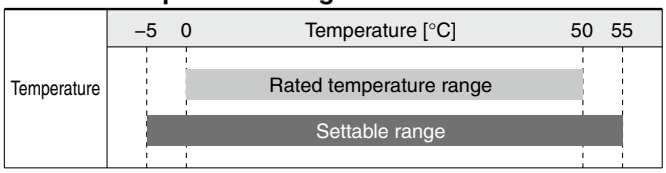
IO-Link type	Device														
IO-Link version	V1.1														
Communication speed	COM2 (38.4 kbps)														
Configuration file	IODD file*1														
Minimum cycle time	3.8 ms														
Process data length	Input data: 6 bytes, Output data: 0 bytes														
On request data communication	Supported														
Data storage function	Supported														
Event function	Supported														
Vendor ID	131 (0 x 0083)														
Device ID	PSH-L2(-M)-*: 650 (0 x 00028A)														
Process data	Bit	47…32													
	Item	Relative humidity measurement value (16-bit signed integer)													
	Bit	31…16													
	Item	Temperature measurement value (16-bit signed integer)													
	Bit	15	14	13	10 to 12	9	8	7	6	5	4	3	2	1	0
	Item	System error diagnostic	Error diagnostic	Fixed output	0	Temperature diagnostic	0					Temperature SW2	Temperature SW1	Relative humidity SW2	Relative humidity SW1

*1 The configuration file can be downloaded from the SMC website, https://www.smcworld.com

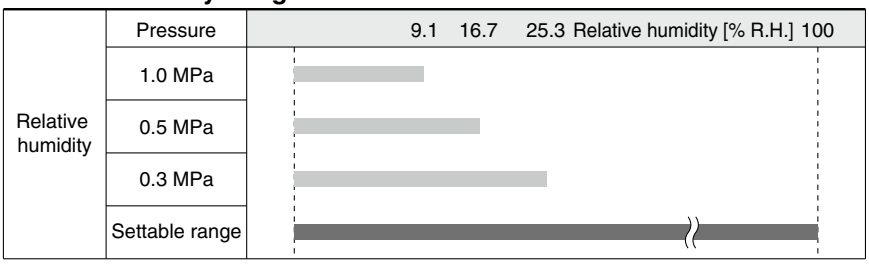
Settable Range

The settable range is the range within which the switch output can be set.

Settable Temperature Range



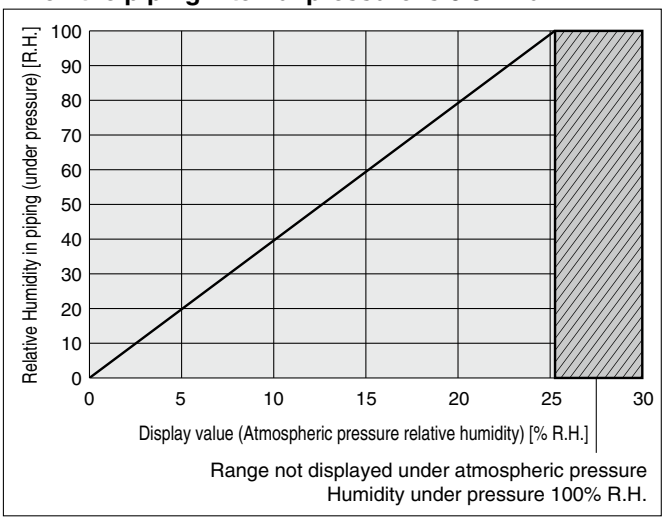
Settable Humidity Range



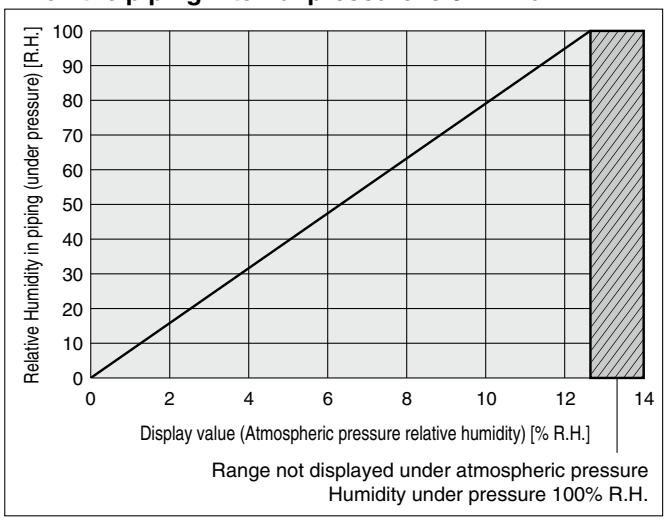
The range of atmospheric pressure and relative humidity that the switch can measure changes depending on the pressure inside the piping (under pressure). For example, if the pressure inside the pipe (under pressure) is 1.0 MPa and the relative humidity is 100% (maximum value), the atmospheric pressure relative humidity when released into the atmosphere will be 25.3%.
If the pressure inside the pipe (under pressure) is 1.0 MPa, the measurable range of the switch is 25.3%.
Atmospheric pressure relative humidity ±5% is guaranteed only when used within the rated pressure range (0.3 to 1.0 MPa).

Relationship between displayed value (atmospheric pressure relative humidity) and relative humidity inside piping (under pressure)

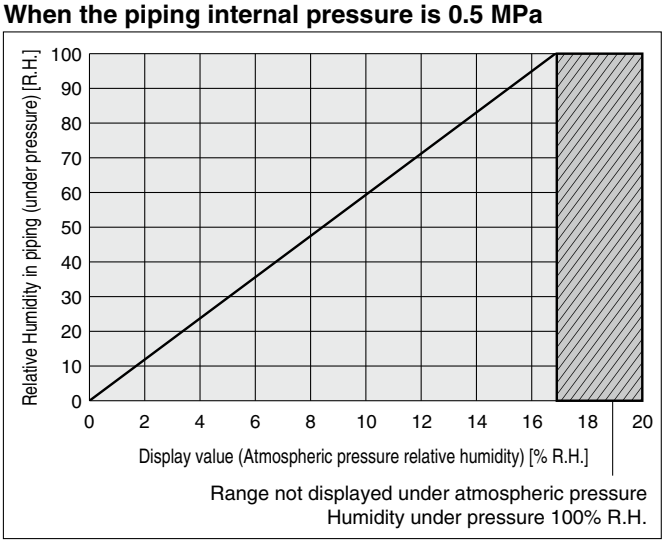
When the piping internal pressure is 0.3 MPa



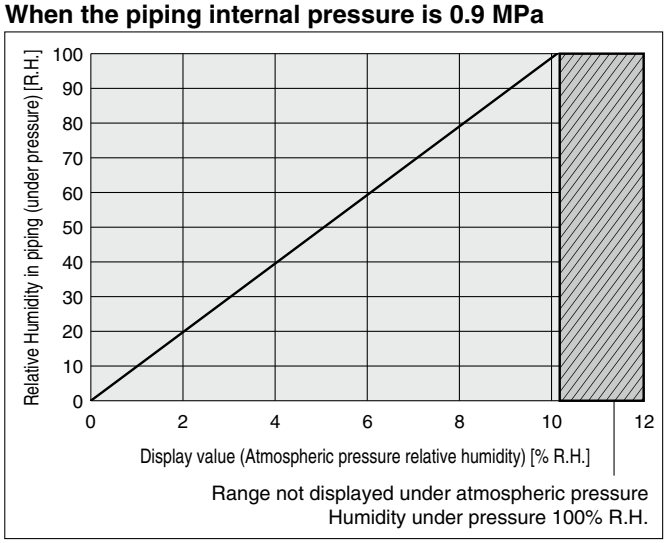
When the piping internal pressure is 0.7 MPa



When the piping internal pressure is 0.5 MPa



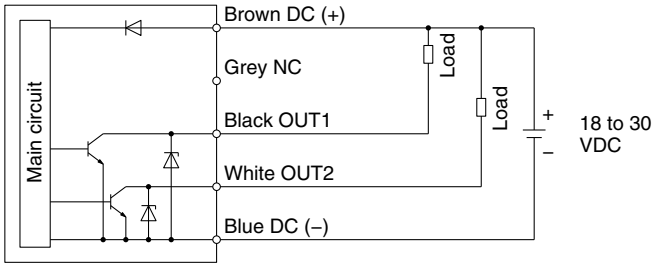
When the piping internal pressure is 0.9 MPa



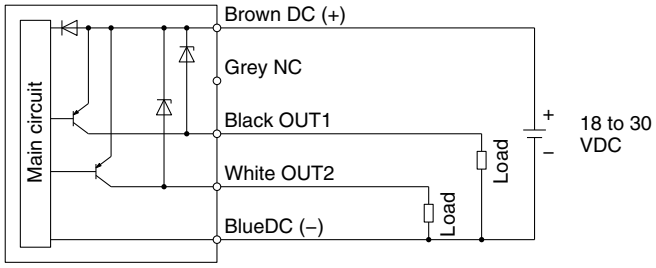
Internal Circuits and Wiring Examples

-L2: IO-Link/Switch output 1 + Switch output 2
When used as a switch output device

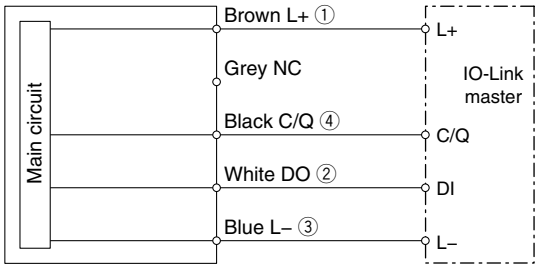
Setting of NPN open collector 2 outputs



Setting of PNP open collector 2 outputs

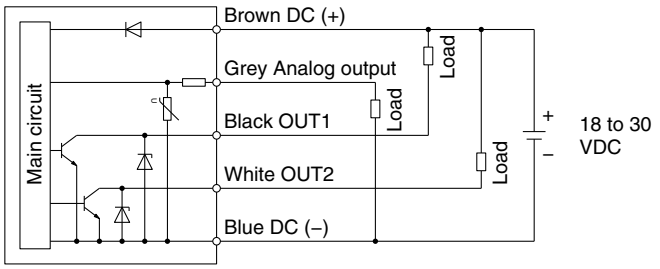


When used as an IO-Link device

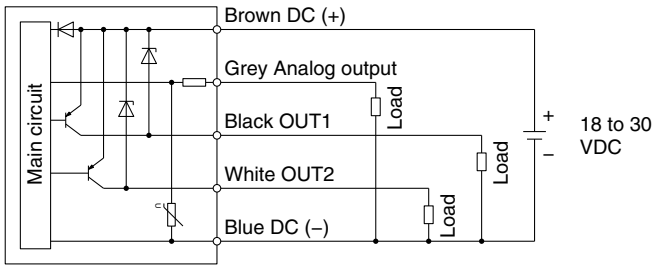


Switch output 1 & 2 + Analog voltage output

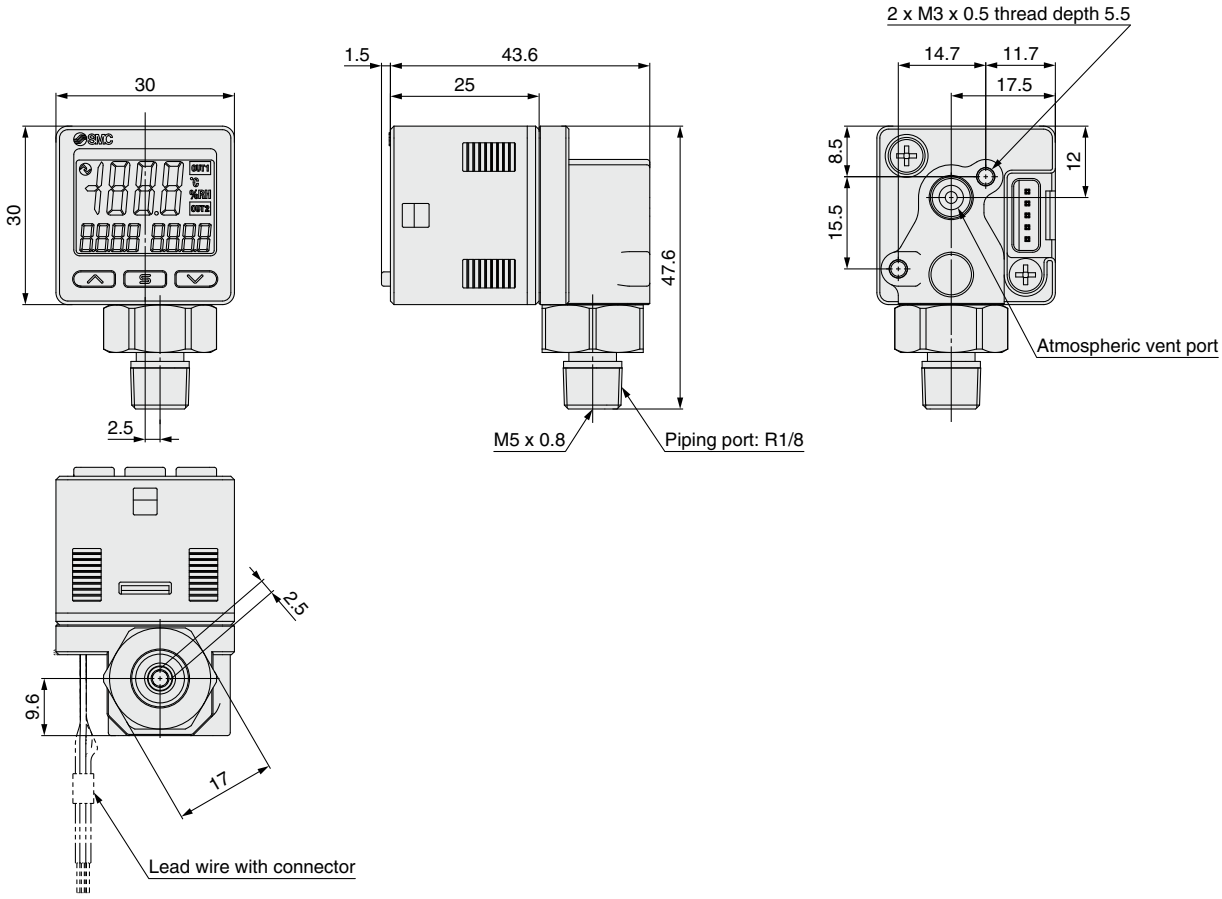
NPN setting



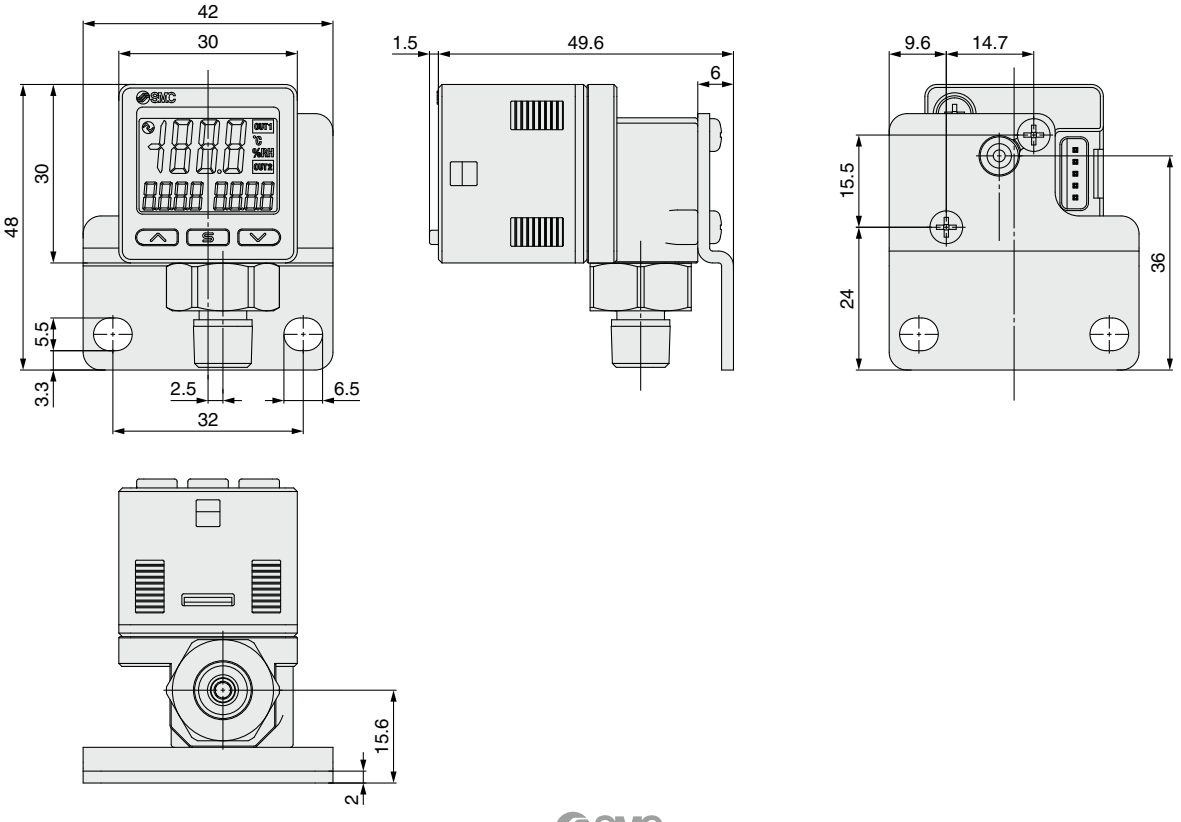
PNP setting



Dimensions

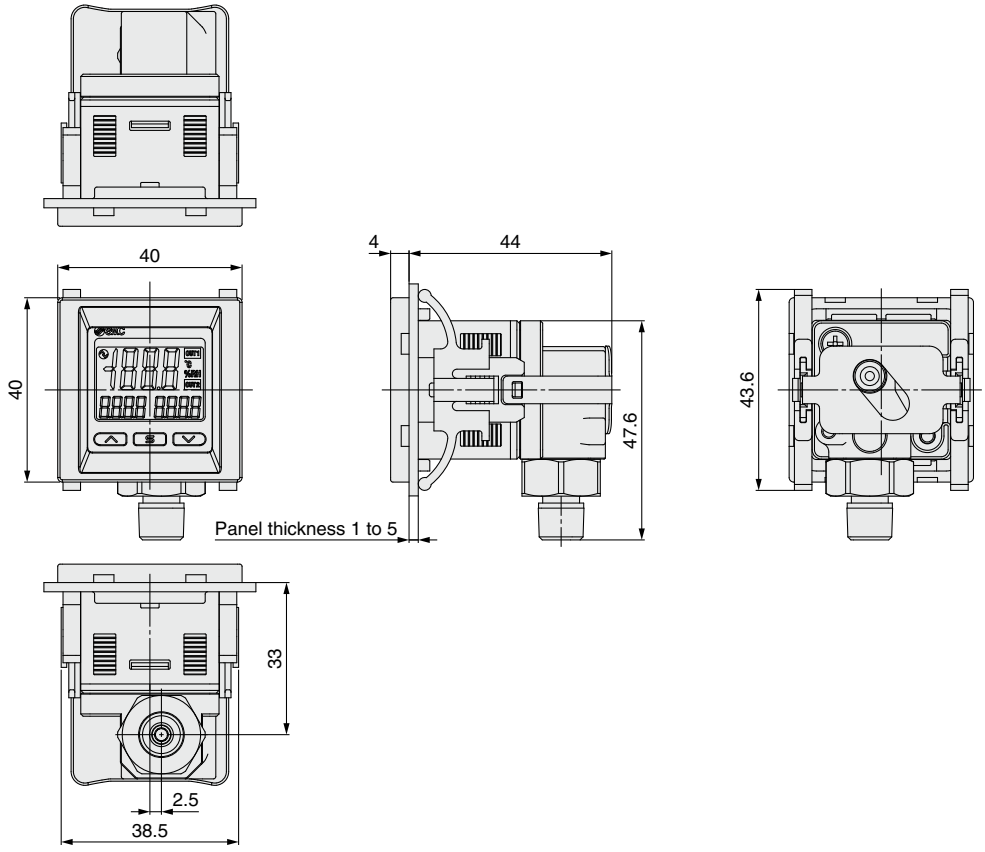


Bracket mounting dimensions

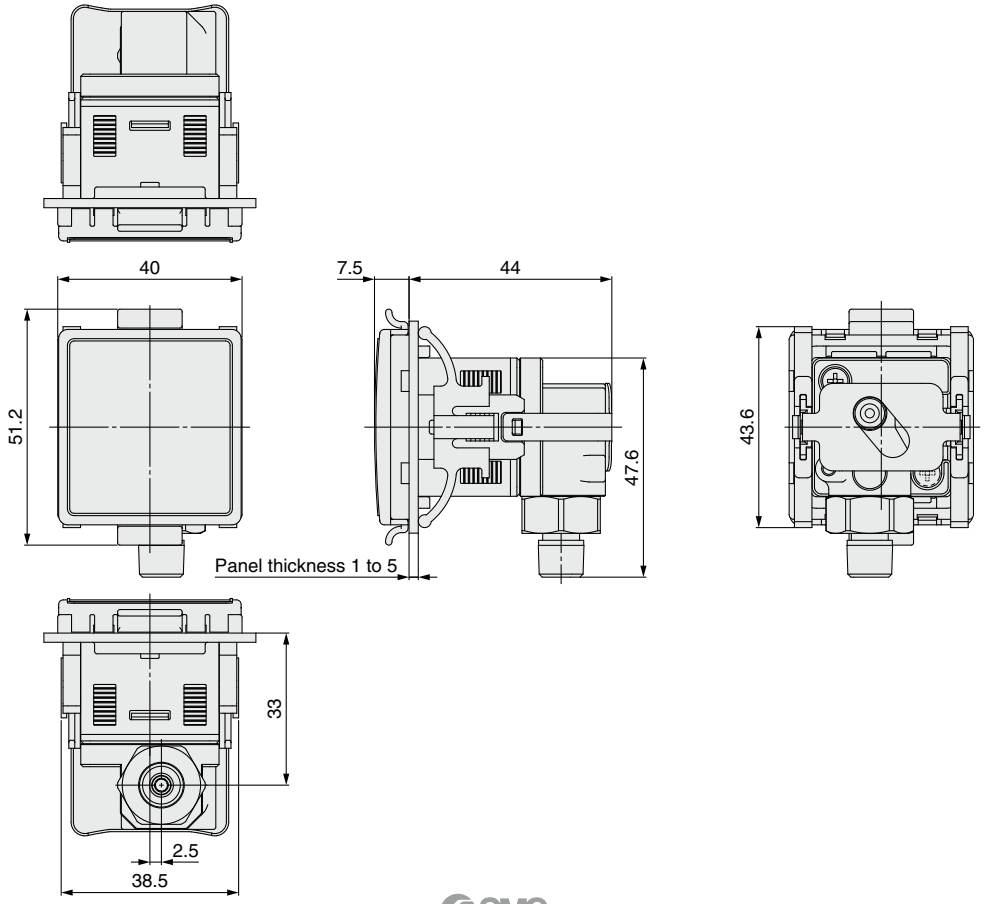


Dimensions

Panel mount adapter mounting dimensions



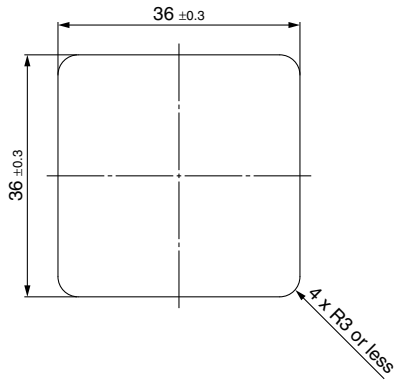
Panel mount adapter + front protection cover mounting dimensions



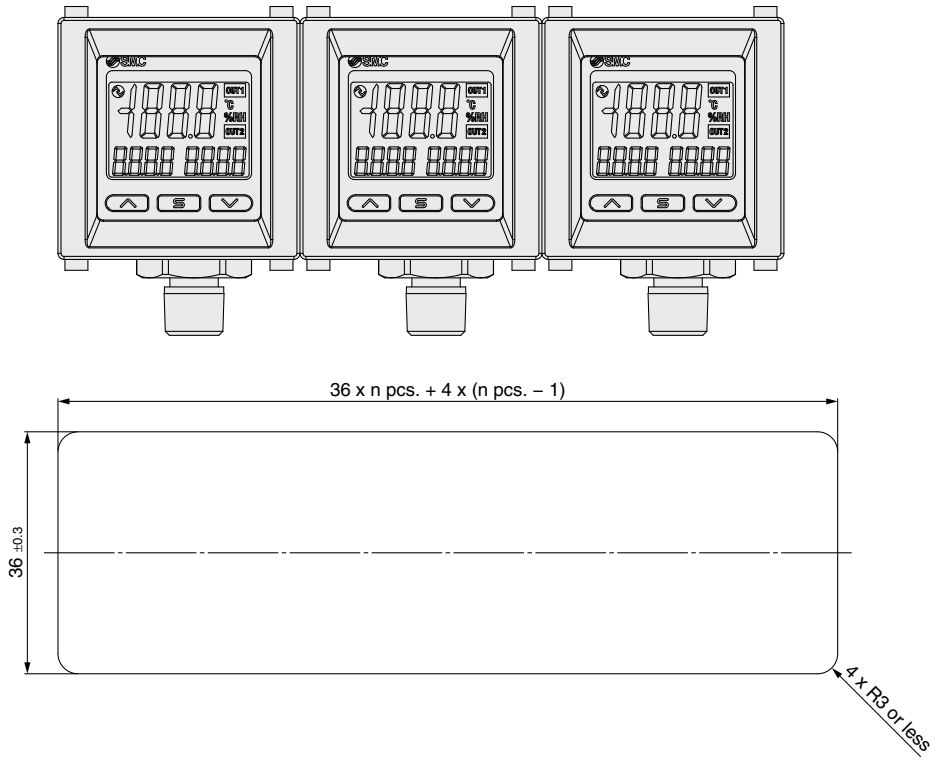
Dimensions

Panel cutout dimensions

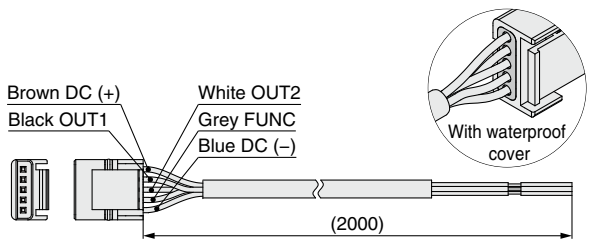
Individual mounting



Multiple (2 pcs. or more) closely mounted
<Horizontal>



Lead wire with connector
(Part no.: ZS-46-5F)



Technical Data

Relative Humidity in Piping (under pressure) ⇔ Atmospheric Pressure Relative Humidity (switch display) Simple Conversion Formula

Relative Humidity is proportional to operating pressure at constant temperature.
Relative Humidity conversion guideline for inside piping (under pressure): It is possible to calculate from the switch display value using the following multiplier.
For 0.3 MPa ⇒ approx. 4 times, For 0.5 MPa ⇒ approx. 6 times, For 0.7 MPa ⇒ approx. 8 times, For 0.9 MPa ⇒ approx. 10 times.

Example) When the operating pressure is 0.3 MPa

$$\text{Relative Humidity in piping (under pressure)} = \overbrace{\frac{300\ [\text{kPa}] + 101.3\ [\text{kPa}]}{101.3\ [\text{kPa}]}}^{\text{Approx. 4 times}} \times \text{Atmospheric pressure relative humidity (Switch display value)}$$

$$\text{Atmospheric pressure relative humidity (Switch display value)} = \overbrace{\frac{101.3\ [\text{kPa}]}{300\ [\text{kPa}] + 101.3\ [\text{kPa}]}}^{\text{Approx. 1/4 times}} \times \text{In piping (below pressure) relative humidity}$$

Setting example

When determining condensation under operating pressure from the temperature/humidity switch display value (atmospheric pressure relative humidity)

Operating conditions	Setting to output when the relative humidity inside the piping reaches 90% or more

Step 1) From the graph of "Relationship between display value (atmospheric pressure relative humidity) and relative humidity in piping (under pressure)", determine that the atmospheric pressure humidity is "18% R.H." when the relative humidity under pressure is "90% R.H.".

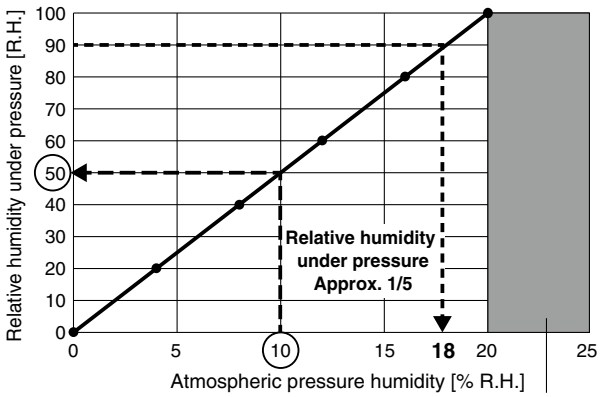
Step 2) Set the humidity to "18.0% R.H." on the setting screen.

∗ The humidity can be converted using the QR code on the right. When setting, enter the relative humidity inside the piping for pressure (P1), the temperature inside the piping for temperature (T1), 0 MPa for pressure (P2), and the temperature inside the piping (T1 = T2) for temperature (T2).

QR

Relationship between display value (atmospheric pressure relative humidity) and relative humidity in piping (under pressure)

When the piping internal pressure is 0.4 MPa



Range not displayed under atmospheric pressure
Humidity under pressure 100% R.H.

PSH Series
Specific Product Precautions

Be sure to read this before handling the products.
Refer to the back cover for safety instructions.

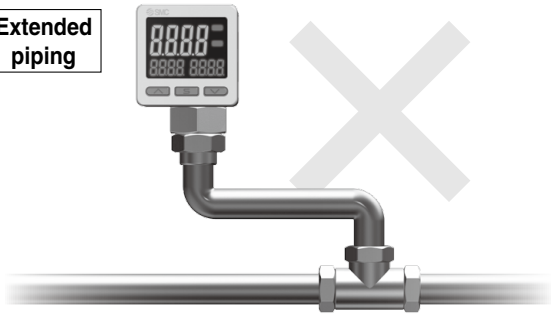
⚠Caution

Temperature & Relative Humidity switch precautions

Do not separate the Digital Temperature/Relative Humidity switch from the fluid to be measured.

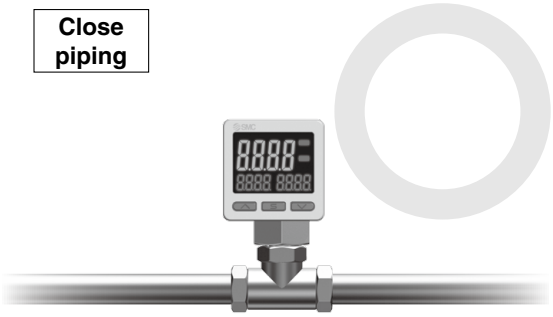
* Measurement accuracy and responsiveness performance will be reduced.

Extended piping



If the product is separated from the original piping, accurate measurements will no longer be possible due to external disturbances such as temperature variation in the extended piping. In addition, increasing the distance from the original piping slows down the temperature transmission and the response.

Close piping



Direct mounting to the piping is recommended.