Before Use

Multi-channel Digital Sensor Monitor

PSE20#A Series

Thank you for purchasing an SMC PSE20#A Series Multi-channel Digital Sensor Monitor.
Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.

To obtain the operation manual about this product, please refer to the SMC website (URL http://www.smcworld.com) or contact SMC directly.

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) 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.

Operator

- The operation manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation and maintenance of such equipment. Only those persons are allowed to perform assembly, operation and maintenance.
- Read and understand the operation manual carefully before assembling, operating or providing maintenance to the product.

■Safety Instructions

⚠ Warning

■ **Do not disassemble, modify (including changing the printed circuit board) or repair.**
An injury or failure can result.

■ **Do not operate the product outside of the specifications.**
Do not use for flammable or harmful fluids.
Fire, malfunction, or damage to the product can result.
Verify the specifications before use.

■ **Do not operate in an atmosphere containing flammable or explosive gases.**
Fire or an explosion can result.
This product is not designed to be explosion proof.

■ **Do not use the product in a place where static electricity is a problem.**
Otherwise it can cause failure or malfunction of the system.

■ **If using the product in an interlocking circuit:**
•Provide a double interlocking system, for example a mechanical system
•Check the product regularly for proper operation
Otherwise malfunction can result, causing an accident.

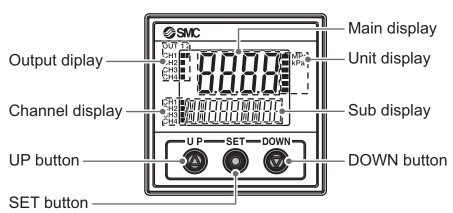
■ **The following instructions must be followed during maintenance:**
•Turn off the power supply
•Stop the air supply, exhaust the residual pressure and verify that the air is released before performing maintenance work
Otherwise an injury can result.

⚠ Caution

■ **Do not touch the terminals and connectors while the power is on.**
Otherwise electric shock, malfunction or damage to the product can result.

■ **After maintenance is complete, perform appropriate functional inspections and leak tests.**
Stop operation if the equipment does not function properly or there is a leakage of fluid.
When leakage occurs from parts other than the piping, the product might be faulty.
Disconnect the power supply and stop the fluid supply.
Do not apply fluid under leaking conditions.
Safety cannot be assured in the case of unexpected malfunction.

Summary of Product parts

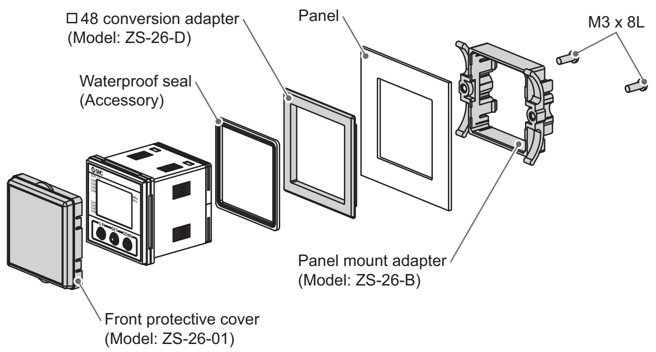


Mounting and Installation

■Installation

○Mounting by panel mount adapter

- Fix the panel mount adapter to the Controller with the set screws M3 x 8L (2 pcs.) as attached.
- •Panel mount adapter (Model: ZS-26-B)
  Panel mount adapter + Front protective cover (Model: ZS-26-01)
  □48 conversion adapter (Model: ZS-26-D)



∗: The panel mount adapter can be rotated by 90 degrees for mounting.
∗: Front panel of this Controller meets IP65 (if □48 conversion adapter is used, it meets IP40). However, if the panel mount adapter is hold enough with screw and the instrument is not seated correctly, water might enter. Screw shall be tightened 1/4 to 1/2 turns more after touched correctly.

Refer to the product catalogue or SMC website (URL http://www.smcworld.com) for more information about panel cut-out and mounting hole dimensions.

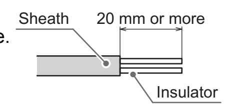
■Wiring

○Wiring connections

- Connections should be made with the power supply turned off.
- Use a separate route for the product wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- If a commercially available switching power supply is used, be sure to ground the frame ground (FG) terminal. If the switching power supply is connected for use, switching noise will be superimposed and it will not be able to meet the product specifications. In that case, insert a noise filter such as a line noise filter/ferrite between the switching power supplies or change the switching power supply to the series power supply.

○Attaching the connector to the lead wire

- Sensor wire is stripped as shown in the right figure. (Refer to the table below for correspondence between connectorand electrical wire gauge.)

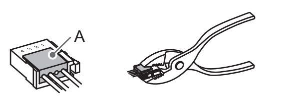


Lead wire table

AWG No.	Conductor size (mm²)	Overall diameter (mm)	Colour of cover	SMC product No. (1 pc.)
26-24 (28)	0.14-0.2 (0.08)	ø0.8 to ø1.0	Red	ZS-28-C
		ø1.0 to ø1.2	Yellow	ZS-28-C-1
		ø1.2 to ø1.6	Orange	ZS-28-C-2
22-20	0.3-0.5	ø1.0 to ø1.2	Green	ZS-28-C-3
		ø1.2 to ø1.6	Blue	ZS-28-C-4
		ø1.6 to ø2.0	Grey	ZS-28-C-5

- Do not cut the insulator.
- The core of the corresponding colour shown in the following table is put into the pin of the number stamped on the connector for sensor connection to the back.

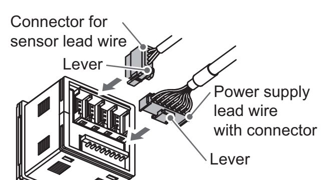
Pin No.	Wire colour
1	Brown (DC+)
2	NC
3	Blue (DC-)
4	Black (IN: 1 to 5 V)



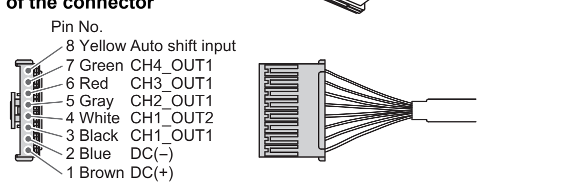
- Check that the above-mentioned preparation work has been performed correctly, and part A shown in the figure is pushed by hand and makes temporary connection.
- Part A centre is pushed straight in using a suitable tool, such as pliers.
- Re-use cannot be performed once it connects the connector for sensor connection completely. When the connection fails or a pin is miswired, please use a new connector for sensor connection.
- When the sensor is not connected correctly, [LLL] will be displayed.
- Cable wire colour is applicable when an SMC sensor with lead wire is used.

○Connector Connecting/Disconnecting

- When connecting the connector, insert it straight onto the pin and lock the connector into the square groove in the housing until connector clicks.
- When removing the connector, press down the lever with your thumb and pull the connector straight out.



Pin No. of the connector



Outline of Settings

Power is supplied

↓

The product code is displayed for approximately 3 sec. after supplying power. After that, measurement mode is displayed.
∗: Within approximately 0.2 second after power-on, the switch starts.

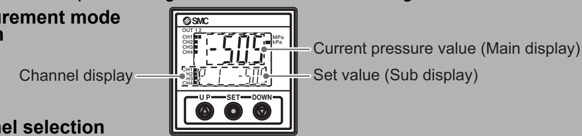
↓

[Initial Setting] (Function selection mode [F 0])
Set the differential pressure check mode, pressure range, and display unit of the connected sensor.

↓

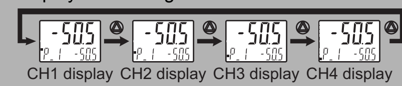
[Measurement mode]
Detects the pressure after power is supplied, and indicates the display and switch operating status. This is the basic mode; other modes should be selected for set-point changes and other function settings.

Measurement mode screen

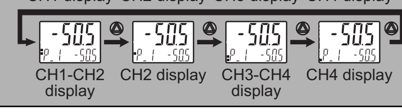


Channel selection
In measurement mode, the channel can be changed by pressing the UP button. Measurement mode display and setting are set for each channel.

Normal operation mode



Differential pressure check mode



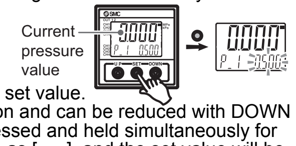
- Press the SET button once. → **[3 step setting mode]** Set either of set value or hysteresis.
- Press the SET button between 1 and 3 sec. → **[Simple setting mode]** Select the set value, hysteresis and delay time.
- Press the SET button between 3 and 5 sec. → **[Function selection mode]** Change the function settings.
- Press the DOWN button once. → **[Sub display setting]**
- **[Other Settings]** •Channel scan function •Zero-clear function •Key-lock function

∗: The outputs will continue to operate during setting.
∗: If a button operation is not performed for 3 seconds during the setting, the display will flash.
(This is to prevent the setting from remaining incomplete if, for instance, an operator were to leave during setting.)
∗: 3 step setting mode, simple setting mode and function selection mode settings are reflected each other.

3 Step Setting Mode

[3 step setting mode (hysteresis mode)]
In the 3 step setting mode, the set value (P_1 or n_1) and hysteresis (H_1) can be changed. After selecting the channel, set the items on the sub display (set value or hysteresis) with the UP or DOWN button. When changing the set value, follow the operation below. The hysteresis setting can be changed in the same way.

(1) Press the SET button once when the item to be changed is displayed on the sub display. The set value on the sub display (right) will start flashing.

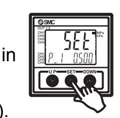


(2) Press the UP or DOWN button to change the set value.
The set value can be increased with UP button and can be reduced with DOWN button. When UP and DOWN buttons are pressed and held simultaneously for 1 second or longer, the set value is displayed as [- - -], and the set value will be the same as the current pressure value automatically (snap shot function). Afterwards, it is possible to adjust the value by pressing the UP or DOWN button.
(3) Press the SET button to complete the setting.

The pressure switch turns on within a set pressure range (from P1L to P1H) during window comparator mode.
Set P1L, the lower limit of the switch operation, and P1H, the upper limit of the switch operation and WH1 (hysteresis) following the instructions given above.
(When reversed output is selected, the sub display (left) shows [n1L] and [n1H].)
∗: Set OUT2 in the same way. (ex. P_2, H_2)
∗: Setting of the normal/reverse output switching and hysteresis/window comparator mode switching are performed with the function selection mode [F 1] OUT1 setting and [F 2] OUT2 setting.

Simple Setting Mode

(1) After selecting the channel, press the SET button for 1 second or longer, but less than 3 seconds, in measurement mode. [SEt] is displayed on the main display. When the button is released while in the [SEt] display, the current pressure value is displayed on the main display, [P_1] or [n_1] is displayed on the sub display (left), and the set value is displayed on the sub display (right) (Flashing).



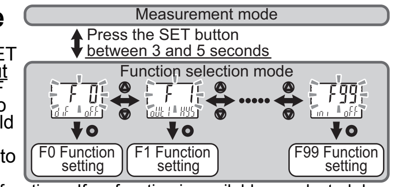
(2) Change the set value with UP or DOWN button, and press the SET button to set the value. Then, the setting moves to hysteresis setting.
(The snap shot function can be used.)
(3) Change the set value with UP or DOWN button, and press the SET button to set the value. Then, the setting moves to the delay time of the switch output.
(The snap shot function can be used.)
(4) Press the UP or DOWN button, the delay time of the switch output can be selected. Delay time setting can prevent the output from chattering.
(5) Press the SET button for 2 seconds or longer to complete the setting.
∗: If the button is pressed for less than 2 seconds, the setting will moves to the OUT2 setting.

In the window comparator mode, set P1L, the lower limit of the switch operation, and P1H, the upper limit of the switch operation, WH1 (hysteresis) and dt1 (delay time) following the instructions given above.
(When reversed output is selected, the sub display (left) shows [n1L] and [n1H].)
∗: Set OUT2 in the same way.

Function Selection Mode

■Function selection mode

After selecting the channel, in measurement mode, press the SET button for 3 seconds or longer (but less than 5 seconds), to display [F 0]. Select to display the function to be changed [F□□]. Press and hold the SET button for 2 seconds or longer in function selection mode to return to measurement mode.



∗: Some products do not have all the functions. If no function is available or selected due to configuration of other functions, [- - -] is displayed on the sub display (right).
∗: All channel indicators turn on for the setting which is common for all channels.

■Default setting

The default setting is as follows.
If no problem is caused by this setting, keep these settings.

●[F 0] Differential pressure check mode, pressure range and display unit

Item	Default setting
Differential pressure check mode	OFF
Connected sensor range	Vacuum pressure
Display units	Units specification ["Nil" or M]: [kPa]

●[F 1] Setting of OUT1

Item	Default setting
Output mode	Hysteresis mode
Reversed output	Normal output
Pressure setting	-50.5 kPa
Hysteresis	5.1 kPa
Delay time	0.00 sec.
Display colour	Output ON :Green/ Output OFF: Red (Linked to OUT1)

●[F 2] Setting of OUT2
Same setting as [F 1] OUT1.

●Other parameter settings

Item	Default setting	Item	Default setting
[F 3] Digital filter setting	0.00 sec.	[F80] Power saving mode	OFF
[F 4] Auto-preset function	Not used	[F81] Security code	OFF
[F 5] Auto shift setting	OFF	[F90] Setting of all functions	OFF
[F 6] Fine adjustment of display value	0.0%	[F95] Channel to channel copy function setting	OFF
[F10] Sub display setting	std (Standard)	[F96] Sensor input/External input signal status display	No configurable items
[F11] Display resolution setting	1000-split	[F98] Output check	N/A (normal output)
[F14] Zero cut-off setting	0.0%	[F99] Reset to default settings	OFF

If you use the product by changing the setting, refer to the SMC website (URL http://www.smcworld.com) for more detailed information, or contact SMC.

Other Settings

○Channel scan function
•Press the UP button for 2 seconds or longer. Channels and the measured pressures will be displayed in order approximately every 2 seconds.
•The function can be released by pressing the UP button again for 2 seconds or longer.
∗: Channel scan function will remain even when the power supply is turned off.
∗: During channel scan, setting is disabled other than channel scan mode release and key lock function setting.
Release the channel scan mode when changing settings.

○Snap shot function
The current pressure value can be stored to the switch output ON/OFF set point.

○Peak/bottom value indication
The max. (min.) pressure when the power is supplied is detected and updated. The value can be displayed on the sub display by pressing DOWN button in measurement mode.

○Zero-clear function
In measurement mode, when the UP and DOWN buttons are pressed for 1 second or longer simultaneously, the main display shows [- - -], and the reset to zero. The display returns to measurement mode automatically.

○Key-lock function

To set each of these functions, refer to the SMC website (URL http://www.smcworld.com) for more detailed information, or contact SMC.

Maintenance

How to reset the product after a power cut or forcible de-energizing
The setting of the product will be retained as it was before a power cut or de-energizing. The output condition is also basically recovered to that before a power cut or de-energizing, but may change depending on the operating environment. Therefore, check the safety of the whole installation before operating the product. If the installation is using accurate control, wait until the product has warmed up (approximately 10 to 15 minutes).

Troubleshooting

■Error indication function

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

Error	Error displayed	Description	Measures
Over current error	Er 1 (CH_※ oC1), Er 2 (CH_※ oC2)	The switch output load current is 80 mA or more. ※ indicates channel with error.	Turn the power off and remove the cause of the over current. Then supply the power again.
Residual pressure error	Er 3 (ZEro)	During zero clear operation, pressure greater than ±7%F.S. (±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 ±1%F.S. due to variation between individual products.	Release the applied pressure to atmospheric pressure, and retry the zero clear operation.
Pressurizing error	HHH	Pressure exceeding the upper limit of the set pressure range is applied.	Reset applied pressure to a level within the set pressure range. Check the sensor connection and wiring.
	LLL	Pressure exceeding the lower limit of the set pressure range is applied. Sensor is not connected or wired incorrectly.	
System error	Er 0, Er 4, Er 6 to Er 9	Displayed if an internal data error has occurred.	Turn the power off and on again. If the failure cannot be solved, contact SMC.

If the error cannot be reset after the above measures are taken, or errors other than above are displayed, please contact SMC.
Refer to the SMC website (URL http://www.smcworld.com) for more information about troubleshooting.

Specifications/Outline with Dimensions (in mm)

Refer to the product catalogue or SMC website (URL http://www.smcworld.com) for more information about the product specifications and outline dimensions.

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