

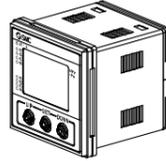


ORIGINAL INSTRUCTIONS



Refer to Declaration of Conformity for relevant Directives

Instruction Manual
Multi Channel Digital Sensor Monitor
PSE200A, PSE201A,
PSE202A, PSE203A



The intended use of the multi channel digital sensor monitor is to monitor and display information from up to four pressure sensors.

1 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.

^{*)} 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.

- Refer to product catalogue, Operation Manual and Handling Precautions for SMC Products for additional information.
- Keep this manual in a safe place for future reference.

	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.

Warning

- **Always ensure compliance with relevant safety laws and standards.**
- All work must be carried out in a safe manner by a qualified person in compliance with applicable national regulations.
- This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted or radiated disturbances.
- **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 specification range.**
Fire, malfunction or damage to the product can result.
- **Do not operate in an atmosphere containing flammable, explosive or corrosive gases.**
Fire or an explosion can result.
- This product is not designed to be explosion proof.
- **If using the product in an interlocking circuit:**
Provide a double interlocking system, for example a mechanical system.
- **Check the product for correct operation.**
Otherwise malfunction can result, causing an accident.
- **Do not drop, bring into contact with other objects or apply excessive force to the unit (980 m/s² or more).**
- **Do not pull the lead wire with excessive force or lift the product by the lead wire. The pulling force is as follows:**
Power and output lead wire: less than 50N
Lead wire for sensor: less than 25N.
- Refer to the operation manual on the SMC website (URL: <http://www.smcworld.com>) for more safety instructions.

2 Specifications

2.1 General specifications

Product No.		PSE20#A series		
Pressure	Rated pressure range	Refer to the table for applicable pressure sensor specifications		
	Set pressure range			
	Minimum setting unit			
Electrical	Power supply voltage	Used as switch output device	12 to 24 VDC (±10%), max. ripple (p-p) 10%	
		Used as IO-Link device *1	18 to 30 VDC, including ripple (p-p) 10%	
Electrical	Current consumption	55 mA or less		
	Protection	Polarity protection		
	Power supply voltage for sensor	Power supply voltage: -1.5 V		
	Power supply current for sensor	Max. 50 mA (Max. 200 mA for total power supply current with 4 sensors)		
	Accuracy	Display accuracy	±0.5% F.S. ±1 digit (at ambient temperature 25±3 °C)	
		Repeatability	±0.1% F.S.±1 digit	
Temperature characteristics		±0.5% F.S. (25 °C standard)		
Switch output	Output type	NPN or PNP open collector output (5 outputs)		
	Output mode	Hysteresis, window comparator, error output, output OFF		
	Switch operation	Normal output, reversed output		
	Max. Load current	80 mA		
	Max. Applied Voltage	30 VDC (NPN output)		
	Internal voltage drop (Residual voltage)	1.5 V or less (Load current 80 mA)		
	Delay time	5 ms or less, variable, 0 to 60 s / 0.01 s increments		
	Hysteresis	Variable from zero		
	Protection	Over current protection		
	Sensor	Input type	Voltage input: 1 to 5 VDC (Input impedance: 1 MΩ)	
Number of inputs		4 input		
Connection method		e-CON connector		
Protection		Over voltage protection (up to 26.4 VDC)		
Auto-shift input *2		Input with no voltage (reed or solid state switch), Input time: 5 ms or more, Channel turns ON/OFF independently		
Display	Units	MPa, kPa, Pa, kgf/cm ² , bar, mbar, psi, inHg, mmHg, mmH ₂ O		
	Display type	LCD		
	Number of displays	3 (1 main display and 2 sub displays)		
	Display colour	Main display: Red/Green, Sub display: Orange		
	Number of display digits	Main display: 4 digits 7 segment Sub display (left): 4 digits (partially 11-segments, 7-segments for other) Sub display (right): 5 digits (partially 11-segments, 7-segments for other)		
Display	Operation light	LED is ON when switch output is ON (OUT1, OUT2: Orange)		
	Digital filter	Variable, 0 to 30 s / 0.01 s increments		
Environment	Enclosure	IP65 (front side only when the panel is mounted), IP40 for others		
	Withstand voltage	1000 VAC for 1 minute between terminals and housing		
	Insulation resistance	50 MΩ or more between terminals and housing (with 500 VDC)		
	Ambient temperature range	Operation: 0 to 50 °C, Storage: -10 to 60 °C (No condensation)		
	Operating humidity range	Operation and storage: 35 to 85%RH (No condensation)		
Standard		CE marked (EMC directive, RoHS directive)		

*1: When PSE202A/PSE203A is selected.

*2: When PSE200A/PSE201A is selected.

2 Specifications (continued)

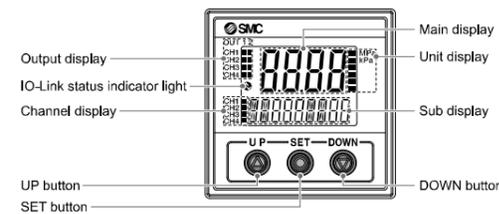
2.2 Applicable Pressure Sensor specifications

Applicable SMC pressure sensor	Rated pressure range	Display / set pressure range	Display / min. setting unit
PSE550	0 to 2 kPa	-0.2 to 2.1 kPa	0.001 kPa
PSE531, PSE541, PSE561	0 to -101 kPa	10 to -105 kPa	0.1 kPa
PSE533, PSE543, PSE563, PSE573	-100 to 100 kPa	-105 to 105 kPa	0.1 kPa
PSE532	0 to 100 kPa	-10 to 105 kPa	0.1 kPa
PSE564, PSE574	0 to 500 kPa	-50 to 525 kPa	1 kPa
PSE530, PSE540, PSE560, PSE570	0 to 1 MPa	-0.105 to 1.05 MPa	0.001 MPa
PSE575	0 to 2 MPa	-0.105 to 2.1 MPa	0.001 MPa
PSE576	0 to 5 MPa	-0.25 to 5.25 MPa	0.01 MPa
PSE577	0 to 10 MPa	-0.5 to 10.5 MPa	0.01 MPa

2.3 IO-Link specifications

IO-Link type	Device
IO-Link version	V1.1
Communication speed	COM2 (38.4 kbps)
Min. cycle time	4.8 ms
Process data length	Input Data: 10 byte, Output Data: 0 byte
On request data communication	Available
Data storage function	Available
Event function	Available
Vendor ID	131 (0x0083)
Device ID	340 (0x00154)

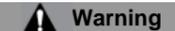
3 Names of individual parts



Part	Description
Output display (Orange)	Lit when OUT is ON.
Main display (Red/Green)	Displays the current status of pressure, setting mode, selected indication units and error code
UP button	Selects the channel and mode, and increases the ON/OFF set value.
DOWN button	Changes the sub display, selects the mode and decreases the ON/OFF set value.
SET button	Changes the mode and sets the set value.
Unit display (Red/Green)	LED is ON the indicator of selected unit. For the Controller without unit selection function, the units are SI units (MPa, kPa or Pa).
Channel display (Orange)	Indicates the CH1 to CH4 currently selected
Sub display left (Orange)	Displays items
Sub display right (Orange)	Displays set values, peak and bottom values
IO-Link status indicator light	Displays OUT1 output communication status (SIO mode, start-up mode, Pre-operation mode, operation mode) and presence of communication data.

4 Installation

4.1 Installation



- Do not install the product unless the safety instructions have been read and understood.

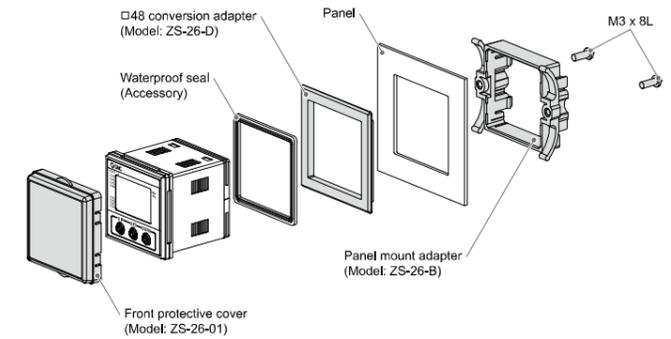
4.2 Environment



- Do not use in an environment where corrosive gases, oil, chemicals, salt water or steam are present.
- Do not use in an explosive atmosphere.
- Do not expose to direct sunlight. Use a suitable protective cover.
- Do not install in a location subject to vibration or impact in excess of the product's specifications.
- Do not mount in a location exposed to radiant heat that would result in temperatures in excess of the product's specifications.

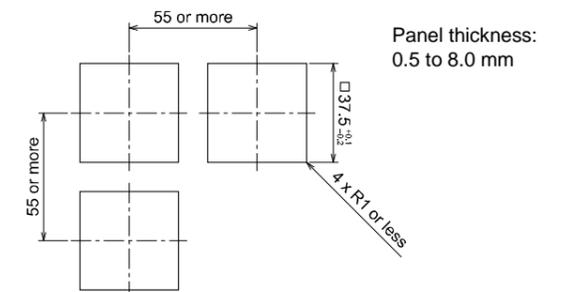
4.3 Mounting with Panel mount adapter

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



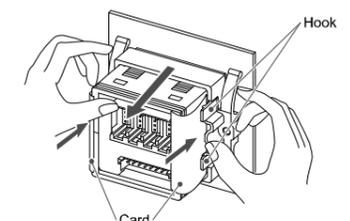
- Panel mounting of the controller conforms to IP65 rating, if the panel mount adapter is installed correctly and the controller is seated correctly (if the □48 conversion adapter is used then IP40). Tighten the screws by 1/4 to 1/2 turn more after the head makes contact with the panel.

4.4 Panel cutout dimensions



Note: When removing the controller

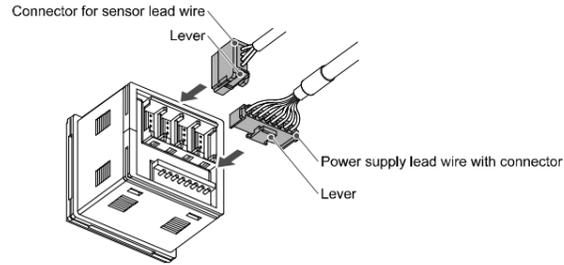
- The controller with panel mount adapter can be removed from the installation after removing two screws, by using a thin card to release the hook on both sides, pull the panel mount adapter forward and remove it. If the panel mount adapter is drawn forward with the hook caught, the adapter and controller may be damaged.



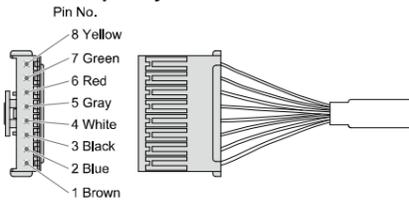
4 Installation (continued)

4.5 Wiring Connection

- Connections should be made with the power supply turned OFF.
- Do not insert or remove the sensor connector with the power ON.
- 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.
- When connecting the connector, insert it straight onto the pins and lock the connector into the groove in the housing until the connector clicks.
- When removing the connector, press down the lever to disengage the lever and pull the connector straight out.



4.6 Power connector pin layout

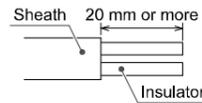


PIN number	Terminal name	
	PSE200A#/PSE201A#	PSE202A#/PSE203A#
1	L+	
2	L-	
3	CH1_OUT1	C/Q (CH1_OUT1)
4	CH1_OUT2	
5	CH2_OUT1	
6	CH3_OUT1	
7	CH4_OUT1	
8	Auto-shift input	N.C.

4 Installation (continued)

4.7 Sensor e-CON connector wiring

- Attach the connector to the lead wire. The sensor wire should be stripped as shown in the figure.
- Refer to the table below for corresponding connector and wire gauge.



AWG No.	Conductor size (mm ²)	Overall diameter (mm)	Colour of cover	SMC product No. (1 pc.)
26-24 (28)	0.14-0.2 (0.08)	φ0.8 to φ1.0	Red	ZS-28-C
		φ1.0 to φ1.2	Yellow	ZS-28-C-1
		φ1.2 to φ1.6	Orange	ZS-28-C-2
22-20	0.3-0.5	φ1.0 to φ1.2	Green	ZS-28-C-3
		φ1.2 to φ1.6	Blue	ZS-28-C-4
		φ1.6 to φ2.0	Grey	ZS-28-C-5

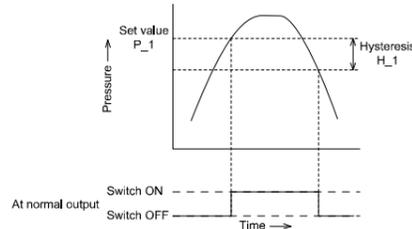


- Check that the above-mentioned wire preparation has been performed correctly, then part A shown in the figure is pushed in by hand to make temporary connection.
- Part A centre should be pressed straight in using a suitable tool, such as pliers. The e-CON connector cannot be re-used once it has been completely crimped.
- In case of connection failure or when a pin is mis-wired, please use a new e-CON connector.
- When the sensor is not connected correctly, [LLL] will be displayed.
- The wire colours are applicable for an SMC sensor lead wire.

5 Settings

5.1 Pressure setting

When the pressure exceeds the set value, the switch will be turned ON. When the pressure falls below the set value by the amount of hysteresis or more, the switch will be turned OFF. The default setting is to turn ON the output at -50.5 kPa when the pressure range of the connected sensor is vacuum. Perform initial setting while referring to the setting outline.



6 Outline of Settings

Power is supplied

The Product code is displayed for 3 seconds. Then Measurement mode is displayed. The switch starts after approximately 0.2 seconds.

[Initial Setting]
Function selection mode [F0]. Set differential pressure check mode, pressure range and units for the connected sensor.

[Measurement mode]
Detects the pressure 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 display

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 mode

Press the SET button once → Press the SET button for 1 to 3 s → Press the SET button for 3 to 5 s → Press the DOWN button once

[3 step setting mode] Set value or hysteresis

[Simple setting mode] Set value, hysteresis and delay

[Function selection mode] Change the function settings

[Sub display setting]

[Other settings]

- The outputs will continue to operate during setting. If a button is not pressed for a certain time during the setting, the display will flash.

7 3-Step Setting mode

7.1 3-Step setting mode (hysteresis mode)

In 3 step setting mode, the set value (P₁ or n₁, P₂ or n₂) and hysteresis (H₁, H₂) can be changed. After selecting the channel, set the items on the sub display (set value or hysteresis) using the 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 shown 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. When the 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 product will turn on within a set pressure range (OUT1: from P1L to P1H, OUT2: from P2L to P2H) during window comparator mode. Set P1L/P2L, the lower limit of the switch operation, and P1H/P2H, the upper limit of the switch operation and WH1/WH2 (hysteresis). When reversed output is selected, the sub display (left) will show [n1L] / [n2L] and [n1H] / [n2H].

- Setting of the normal/reverse output switching and hysteresis/window comparator mode switching are performed with the function selection mode [F 1] Setting of OUT1, [F 2] Setting of OUT2.

8 Simple Setting mode

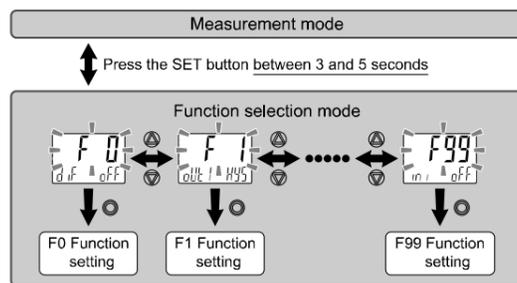
- (1) After selecting the channel, press the SET button for between 1 and 3 seconds in measurement mode. [SEt] is displayed on the main display. When the button is released while in the [SEt] display, the current pressure value is displayed on the main display, [P₁] or [n₁] is displayed on the sub display (left), and the set value is displayed on the sub display (right) (Flashing).
- (2) Change the set value with the UP or DOWN buttons, and press the SET button to set the value. Then, the setting moves to hysteresis setting (The snap shot function can also be used).
- (3) Change the hysteresis value using the UP or DOWN buttons, 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 also be used).
- (4) The delay time of the switch output can be set by pressing the UP or DOWN buttons at the ON and OFF point of the switch output. Delay time setting can prevent the output from chattering. The delay time can be set in the range 0.00 to 60.00 sec. in 0.01 sec. increments.
- (5) Press the SET button for 2 seconds or longer to complete the OUT1 setting. [P₂] or [n₂] is displayed on the sub screen (left). Continue with the setting of OUT2. Press and hold the SET button for 2 seconds or longer to complete the setting. The product will return to measurement mode.

- In window comparator mode, set P1L/P2L, the lower limit of the switch operation, and P1H/P2H, the upper limit of the switch operation, WH1/WH2 (hysteresis) and dt1/dt2 (delay time). (When reversed output is selected, the sub display (left) will show [n1L] / [n2L] and [n1H] / [n2H].)

9 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 to return to measurement mode.



- Some products do not have all the functions. If a function is not available or selected due to configuration of other functions, [- -] is displayed on the sub display (right).
- All channel indicators turn on for the setting, common for all channels.
- Refer to the operation manual on the SMC website (URL: <http://www.smcworld.com>) for more information about the functions available.

9.1 Default function settings

The default settings are shown in the table below.

If there is no problem with this setting, keep these settings.
To change a setting, enter function selection mode.

Item	Description	Default
[F 0]	Differential pressure check mode	OFF
	Connected sensor range	Vacuum
	Display Units	[kPa]
[F 1] OUT1	Output mode	Hysteresis
	Normal / Reversed output	Normal
[F 2] OUT2	Pressure setting	-50.5 kPa
	Hysteresis	5.1 kPa
	Delay Time	0.00 sec.
	Display colour (linked to OUT1)	ON:Green OFF:Red
[F 3]	Digital filter setting	0.00 sec.
[F 4]	Auto-preset function	Not used
[F 5] *	Auto-shift setting	OFF
[F 6]	Fine adjustment of display value	0.0%
[F10]	Sub display setting	Standard
[F11]	Display resolution setting	1000-split
[F14]	Zero cut-off setting	0.0%
[F80]	Power saving mode	OFF
[F81]	Security code	OFF
[F90]	Setting of all functions	OFF
[F95]	Channel to channel copy function	OFF
[F96]	Sensor input / External input signal status *	N/A
[F98]	Output check	N/A
[F99]	Reset to default settings	OFF

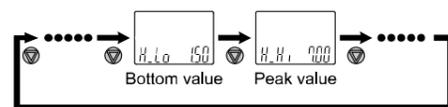
*: When PSE200A/PSE201A is selected.

10 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.

- Snap shot function**
The current pressure value can be stored to the switch output ON/OFF set point.
When the set value and hysteresis are set on the sub display (left), press the UP and DOWN buttons simultaneously for 1 second or longer. The value of the sub display (right) shows [- -], and values corresponding to the current pressure are automatically displayed.
- Peak / bottom value display**
The max. (min.) pressure from when power is supplied is detected and monitored.
In peak/bottom display mode, the current pressure is displayed.
Press the DOWN button in measurement mode to switch the sub-display (left) to the display shown below.
Peak/bottom values are displayed on the sub display (right) at the same time as the current pressure value on the main display.



When the SET and DOWN buttons are pressed for 1 second or longer simultaneously while the peak/bottom values are displayed, the sub display (right) displays [- -] and the maximum (minimum) pressure value are cleared. Peak/ bottom value are not stored to memory.

- Zero-clear function**
The displayed value can be adjusted to zero if the pressure being measured is within $\pm 7\%$ F.S ($\pm 3.5\%$ F.S. for compound pressure) of the zero point set at the time of default setting. The zero clear range varies by $\pm 1\%$ F.S. due to variation between individual products.
In measurement mode, when the UP and DOWN buttons are pressed for 1 second or longer simultaneously, the main display shows [- -], and then will reset to zero. The display returns to measurement mode automatically.
- Key-lock function**
The key lock function is used to prevent errors occurring due to unintentional changes of the set values. If the SET button is pressed while the keys are locked, [LoC] is displayed on the sub display (left) for approximately 1 second.

11 Outline Dimensions (mm)

- Refer to the operation manual on the SMC website (URL: <http://www.smcworld.com>) for the outline dimensions

12 Troubleshooting

12.1 Error indication

Error	Display	Description	Measures
Over current error	Er 1 [H.* oL1] Er 2 [H.* oL2]	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 $\pm 7\%$ F.S. ($\pm 3.5\%$ F.S. for compound pressure) is present. Note that the mode is returned to measurement mode automatically 1 sec. later. The zero clear range varies by $\pm 1\%$ F.S. due to variation between individual products.	Release the applied pressure to atmospheric pressure, and retry the zero clear operation.
Pressure 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	Displayed if an internal data error has occurred.	Turn the power off and on again. If the failure cannot be solved, contact SMC.
	Er 4		
	Er 6		
	Er 7		
	Er 8		
Er 9			

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

13 Maintenance

13.1 General Maintenance

Caution

- Not following proper maintenance procedures could cause the product to malfunction and lead to equipment damage.
- If handled improperly, compressed air can be dangerous.
- Maintenance of pneumatic systems should be performed only by qualified personnel.
- Before performing maintenance, turn off the power supply and be sure to cut off the supply pressure. Confirm that the air is released to atmosphere.
- After installation and maintenance, apply operating pressure and power to the equipment and perform appropriate functional and leakage tests to make sure the equipment is installed correctly.
- If any electrical connections are disturbed during maintenance, ensure they are reconnected correctly and safety checks are carried out as required to ensure continued compliance with applicable national regulations.
- Do not make any modification to the product.
- Do not disassemble the product, unless required by installation or maintenance instructions.

How to reset the product after 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).

14 Limitations of Use

14.1 Limited warranty and Disclaimer/Compliance Requirements

Refer to Handling Precautions for SMC Products.

15 Contacts

Refer to the Declaration of Conformity and (URL: <http://www.smcworld.com>) for contact details.

SMC Corporation

URL: <http://www.smcworld.com> (Global) <http://www.smceu.com> (Europe)
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Specifications are subject to change without prior notice from the manufacturer.
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