No.DOC1142436

Operation Manual

PRODUCT NAME

Digital Pressure Switch
(IO-Link compatible)

MODEL / Series / Product Number

ISE35-#-26/28/L

SMC Corporation

Table of Contents

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.

*1) ISO 4414: Pneumatic fluid power - General rules and safety requirements for systems and their components
ISO 4413: Hydraulic fluid power - General rules and safety requirements for systems and their components
IEC 60204-1: Safety of machinery - Electrical equipment of machines - Part 1: General requirements
ISO 10218-1: Robots and robotic devices - Safety requirements for industrial robots - Part 1:Robots
etc.

Danger	**Danger** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.
Warning	**Warning** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
Caution	**Caution** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

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. Our products cannot be used beyond their specifications. Our products are not developed, designed, and manufactured to be used under the following conditions or environments. Use under such conditions or environments is not covered.

1. Conditions and environments outside of the given specifications, or use outdoors or in a place exposed to direct sunlight.
2. Use for nuclear power, railways, aviation, space equipment, ships, vehicles, military application, equipment affecting human life, body, and property, fuel equipment, entertainment equipment, emergency shut-off circuits, press clutches, brake circuits, safety equipment, etc., and use for applications that do not conform to standard specifications such as catalogs and operation manuals.
3. Use for interlock circuits, except for use with double interlock such as installing a mechanical protection function in case of failure. Please periodically inspect the product to confirm that the product is operating properly.

Safety Instructions

⚠ Caution
We develop, design, and manufacture our products to be used for automatic control equipment, and provide them for peaceful use in manufacturing industries. **Use in non-manufacturing industries is not covered.** Products we manufacture and sell cannot be used for the purpose of transactions or certification specified in the Measurement Act. The new Measurement Act prohibits use of any unit other than SI units in Japan.

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.

Operator

- ♦This 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 this 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 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.

■NOTE

○Follow the instructions given below when designing, selecting and handling the product.

●The instructions on design and selection (installation, wiring, environment, adjustment, operation, maintenance, etc.) described below must also be followed.

∗Product specifications

- The direct current power supply to be used should be UL approved as follows:
  Circuit (of Class 2) which is of maximum 30 Vrms (42.4 V peak), with UL1310 Class 2 power supply unit or UL1585 Class 2 transformer.
- The product is a UL approved product only if it has a c UL us mark on the body.
- Use the specified voltage.
  Otherwise failure or malfunction can result.
- Do not exceed the specified maximum allowable load.
  Otherwise it can cause damage or shorten the lifetime of the pressure switch.
- Design the product to prevent reverse current when the circuit is opened or the product is forced to operate for operational check.
  Reverse current can cause malfunction or damage to the product.
- Input data to the pressure switch is not deleted, even if the power supply is cut off.
  (Writing time: 10,000 times, Data duration: 20 years after power off)
- Use the clean air.
  This can cause operating failure.
  If compressed air containing condensate is used, install an air dryer or drain catch before the filter and perform drainage regularly.
  If drainage is not performed regularly and condensate enters the secondary side, it can cause operating failure of pneumatic equipment.
  If regular drainage is difficult, the use of a filter with an auto drain is recommended.
- Applicable fluid is air, inert gases and incombustible gases.
  Do not use a fluid containing chemicals, synthetic oils including organic solvent, salt and corrosive gases.
  Otherwise, damage to the product and malfunction can result.
  Check the details of the specifications before using.
- Use the specified operating pressure.
  Otherwise it can cause damage to the pressure switch or inability to measure correctly.
- Reserve a space for maintenance.
  Allow sufficient space for maintenance when designing the system.

●Product handling

∗Installation

- •Tighten to the specified tightening torque.
  If the tightening torque is exceeded the mounting screws and brackets may be broken.
  If the tightening torque is insufficient, the product can be displaced and loosen the mounting screws.
- •Do not apply excessive stress to the product when it is mounted with a panel mount.
  Otherwise damage to the product and disconnection from the panel mount can result.
- •Be sure to ground terminal FG when using a commercially available switch-mode power supply.
- •Do not drop, hit or apply shock to the pressure switch.
  Otherwise damage to the internal parts can result, causing malfunction.
- •Do not pull the lead wire forcefully, not lift the product by pulling the lead wire. (Tensile force 35 N or less)
  Hold the body when handling to avoid the damage of the pressure switch which lead to cause the failure and malfunction.
- •For piping of the pressure switch, hold the piping with a spanner on the metal part of the piping (Piping attachment).
  Holding other part with spanner leads to damage the pressure switch.
- •Eliminate any dust left in the piping by air blow before connecting the piping to the product.
  Otherwise it can cause damage or malfunction.
- •Do not insert metal wires or other foreign matter into the pressure measurement port.
  It can damage the pressure sensor causing failure or malfunction.
- •Never mount a pressure switch in a location that will be used as a foothold.
  The product may be damaged if excessive force is applied by stepping or climbing onto it.
- •If the entering of foreign material to the fluid is possible, install and pipe the filter or the mist separator to the inlet to avoid failure and malfunction.

∗Wiring

- •Do not pull the lead wires.
  In particular, never lift a pressure switch equipped with fitting and piping by holding the lead wires.
  Otherwise damage to the internal parts can result, causing malfunction or to be off the connector.
- •Avoid repeatedly bending or stretching the lead wire, or placing heavy load on them.
  Repetitive bending stress or tensile stress can cause the sheath of the wire to peel off, or breakage of the wire.
  If the lead wire can move, fix it near the body of the product.
  The recommended bend radius of the lead wire is 6 times the outside diameter of the sheath, or 33 times the outside diameter of the insulation material, whichever is larger.
  Replace the damaged lead wire with a new one.
- •Wire correctly.
  Incorrect wiring can break the pressure switch.
- •Do not perform wiring while the power is on.
  Otherwise damage to the internal parts can result, causing malfunction.
- •Do not route wires and cables together with power or high voltage cables.
  Otherwise the product can malfunction due to interference of noise and surge voltage from power and high voltage cables to the signal line. Route the wires (piping) of the product separately from power or high voltage cables.
- •Confirm proper insulation of wiring.
  Poor insulation (interference from another circuit, poor insulation between terminals, etc.) can lead to excess voltage or current being applied to the product, causing damage.
- •Design the system to prevent reverse current when the product is forced to operate for operational check.
  Depending on the circuit used, insulation may not be maintained when operation is forced, allowing reverse current to flow, which can cause malfunction and damage the product.
- •Keep wiring as short as possible to prevent interference from electromagnetic noise and surge voltage.
  Do not use a cable longer than 30 m.
  Wire the DC(-) line(blue) as close as possible to the power supply.
- •When analog output is used, install a noise filter (line noise filter, ferrite element, etc.) between the switch-mode power supply and this product.

∗Environment

- •Do not use the product in area that is exposed to corrosive gases, chemicals, sea water, water or steam.
  Otherwise failure or malfunction can result.

•Do not use in a place where the product could be splashed by oil or chemicals.
If the product is to be used in an environment containing oils or chemicals such as coolant or cleaning solvent, even for a short time, it may be adversely affected (damage, malfunction, or hardening of the lead wires).
•Do not use in an area where surges are generated.
If there is equipment which generates a large amount of surge (solenoid type lifter, high frequency induction furnace, motor, etc.) close to the pressure switch, this may cause deterioration or breakage of the internal circuit of the pressure switch. Avoid sources of surge generation and crossed lines.
•Do not use a load which generates surge voltage.
When a surge-generating load such as a relay or solenoid is driven directly, use a load with a built-in surge suppressor.
•The product is CE/UKCA marked, but not immune to lightning strikes. Take measures against lightning strikes in the system.
•Mount the product in a place that is not exposed to vibration or impact.
Otherwise failure or malfunction can result.
•Prevent foreign matter such as remnant of wires from entering the pressure switch.
Take proper measures for the remnant not to enter the pressure switch in order to prevent failure or malfunction.
•Do not use the product in an environment that is exposed to temperature cycle.
Heat cycles other than ordinary changes in temperature can adversely affect the inside of the product.
•Do not expose the product to direct sunlight.
If using in a location directly exposed to sunlight, shade the product from the sunlight.
Otherwise failure or malfunction can result.
•Keep within the specified fluid and ambient temperatures range.
The fluid and ambient temperatures should be -5 to 50 °C. Operation under low temperature (5 °C or less) leads to cause damage or operation failure due to frozen moist in the fluid or air.
Protection against freezing is necessary. Air dryer is recommended for elimination of drain and water.
Avoid sudden temperature change even within specified temperature.
Do not install the product in an enclosed space at high temperature. Otherwise malfunction can result.
•Do not operate close to a heat source, or in a location exposed to radiant heat.
Otherwise malfunction can result.

∗Adjustment and Operation
•Turn the power on after connecting a load.
Otherwise it can cause excess current causing instantaneous breakage of the pressure switch.
•Do not short-circuit the load.
Although error is displayed when the pressure switch load is short circuit, generated excess current lead to cause the damage of the pressure switch.
•Do not press the setting buttons with a sharp pointed object.
It may damage the setting buttons.
•If using the product to detect very small pressure rates, warm up the product for 10 to 15 minutes first.
There will be a drift on the display of approximate ±1% immediately after the power supply is turned on, within 10 minutes.
•Perform settings suitable for the operating conditions.
Incorrect setting can cause operation failure.
For details of each setting, refer to page 19 to 53 of this manual.
•Do not touch the LCD during operation.
The display can vary due to static electricity.

∗Maintenance
•Turn off the power supply, stop the supplied air, exhaust the residual pressure and verify the release of air before performing maintenance.
There is a risk of unexpected malfunction.
•Perform regular maintenance and inspections.
There is a risk of unexpected malfunction.
•Perform drainage regularly.
If condensate enters the secondary side, it can cause operating failure of pneumatic equipment.
•Do not use solvents such as benzene, thinner etc. to clean the pressure switch.
They could damage the surface of the body and erase the markings on the body.
Use a soft cloth to remove stains. For heavy stains, use a cloth soaked with diluted neutral detergent and fully squeezed, then wipe up the stains again with a dry cloth.

Model Indication and How to Order

ISE35 - N - 26 - M □ □ - □

Electrical entry

Symbol	N	R
Content	Electrical entry (Bottom)	Electrical entry (Top)
		

Output specification

Symbol	Content
26	Analog voltage output: -5 V/0-10 V switching type
28	Analog current output: 4-20 mA
L	IO-Link/Switch: 1 output (NPN or PNP switching type for switch output)

Unit specification

Symbol	Content
Nil	With unit conversion function *1
M	Fixed SI unit
P	Pressure unit: psi (Initial value) With unit conversion function *1

*1: The new Measurement Law prohibits the use of pressure switch with the unit conversion function in Japan.
A unit label is attached.

Option 1

Symbol	Content
Nil	No option
L	Lead wire with connector (2 m)

Option 2

Symbol	Content
Nil	No option
A	With kit for mounting of modular AR/AW series *2
B	With kit for mounting of ARM10/11 series *2

*2: An adapter, O-ring, lock pin and two mounting screws are attached.

Made to Order

Symbol	Content
X523	AR/AW-D series mounting kit is included

*: Option 2 "A" only.

○Option/Part No.

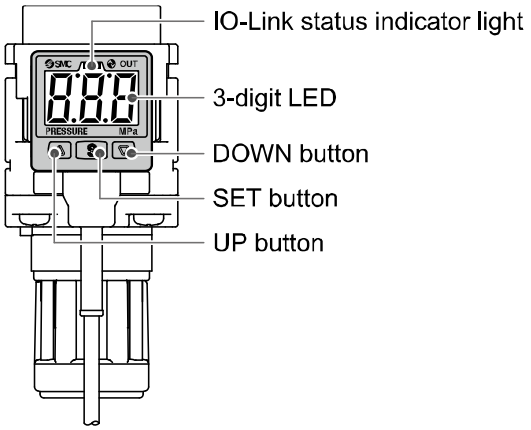
When optional parts are required separately, use the following part numbers to place an order.

Name	Part No.	Note
Lead wire with connector	ZS-32-A	Length: 2 m (With rubber cover)
	ZS-32-A-X344	Length: 0.3 m (With M12 connector)
Mounting kit	ZS-32-D	For ISE35-#-B (ARM10/11 series) Mounting thread (M3 x 13, 2 pcs.), adapter, lock pin, O-ring are attached
	ZS-32-C-X473	For ISE35-#-A-X523 (AR/AW-D series) Mounting thread (3 x 8L, 2 pcs.), adapter, lock pin, O-ring are attached
Assembly type connector	PCA-1557730	M8/3-pins/plug
	PCA-1557743	M12/4-pins/plug

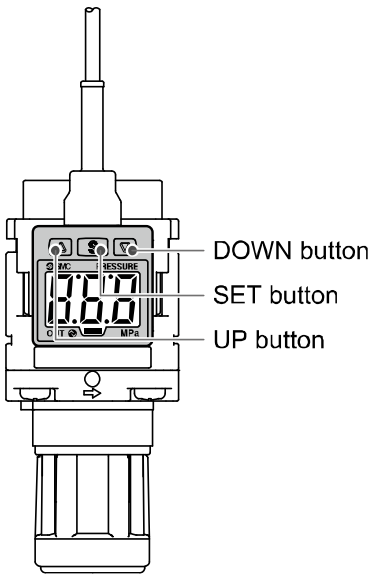
*: Please refer to SMC website catalog for details.

Summary of Product parts

○Names of individual parts



ISE35-N-#



ISE35-R-#

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.

3-digit LED: Displays the current status of pressure, setting mode and error code.
Four display modes can be selected display always in red or green only, or switch from green to red, or red to green linking to output.

UP button: Increases the mode and ON/OFF set value.
Press this button to change to the peak display mode.

DOWN button: Decreases the mode or ON/OFF set value.
Press this button to change to the bottom display mode.

SET button: Press this button to change to another mode and to set a set value.

●IO-Link indicator light operation and display

Communication with master	IO-Link indicator light	Status			Content
Yes		IO-Link mode	Correct	Operate	Normal communication status (Reading of measurement value)
				Start up	When communication starts up
				Preoperate	
			Abnormal	Version does not match	"E15" displayed Version of master and IO-Link does not match *
				Lock	Back-up and re-store required due to data storage lock
No				Communication shut-off	Correct communication was not received for 1 second or more
	○	SIO mode			General switch output

LCD display: "○" OFF, "  " Flashing, "  " ON

*: When the product is connected to the master with version "V1.0", error Er15 is generated.

■Definition and terminology

	Term	Definition
A	Analog output	Function to output the voltage or current in proportion to the pressure.
B	Bottom value display (mode)	Shows the minimum pressure from when the power was supplied to the current time.
C	Chattering	The problem of the switch output turning ON and OFF repeatedly around the set value at high frequency due to the effect of pulsation.
	Chattering prevention function	A function to delay the response time of switch output in order to prevent chattering.
D	Delay time	The setting time from when the pressure applied to the pressure switch reaches the set value, to when the ON-OFF output actually begins working. Delay time setting can prevent the output from chattering.
	digit (Min. setting unit)	Shows how precisely the pressure can be displayed or set by the digital pressure switch. When 1 digit = 1 kPa, the pressure is displayed in increments of 1 kPa, e.g., 1, 2, 3, …, 99, 100.
	Digital filter	Function to add digital filtering to the fluctuation of pressure value. Smooth the fluctuation of displayed value for sharp start up or fall of the pressure. When the function is valid, digital filtering is reflected to the ON/OFF of the switch output. Output chattering or flicker in the measurement mode display can be reduced by setting the digital filter. The response time indicates when the set value is 90% in relation to the step input.
	Display accuracy	Shows The maximum deviation between the displayed pressure value and the true pressure.
	Display color	Indicates the color of the number of digital display. Always green, always red, green (switch OFF) → red (switch ON), red (switch OFF) → green (switch ON) are available.
	Display mode	The display can be inverted vertically.
	Display resolving power	Indicate in how many the rated pressure range can be divided to display. (Example: When the value can be displayed down to 0.001 MPa for the product for 0 to 1 MPa, the resolution is 1/1000)
	Display value fine adjustment (function)	Displayed pressure value can be adjusted within the range of ±5%R.D. (±5% of displayed value). It is used if the true pressure value is known, or to eliminate differences between the displayed values of different instruments that are measuring the same pressure.
E	Error displayed	The code number displayed, identifying the error detected by the self-diagnostic function of the pressure switch. Refer to "Error indication function" on page 76 for details of the errors.
	Error output	Switches the switch output to ON/OFF when an error is displayed. Refer to "List of output modes" on page 29 for operating conditions. Refer to "Error indication function" on page 76 for details of the errors.

	Term	Definition
F	F.S. (full span/full scale)	Abbreviation of full span and full scale; difference between the minimum and maximum rated pressure values. means the maximum fluctuation range of the pressure switch rated value. For example, when the rated pressure range is 0.000 to 1.000 [MPa]: F.S. = 1.000 - (0.000) = 1.000 [MPa] (Reference: 1%F.S. = 1.000 x 0.01 = 0.010 [MPa])
	Fine adjustment mode	Refer to "Display value fine adjustment (function)".
	Fluid contact part (or wetted part)	Part of the pressure switch which contacts detected fluid. Pressure sensor, seal and fitting are included.
	Function selection mode	A mode in which setting of functions is performed. It is a separate menu from the pressure setting. If any function settings need to be changed from the factory default, each setting can be selected with "F∗". The setting items are: operation mode, output type, display color, digital filter, display value fine adjustment, reversed display, analog output range, display resolution, use of power saving mode and use of security code.
H	Hysteresis	Difference between the points at which the pressure switch is turned ON and OFF.
	Hysteresis mode	Refer to the "List of output modes" on page 29.
I	Insulation resistance	Insulation resistance of the product. The resistance between the electrical circuit and the case.
K	Key-lock function	Function that prevents changes to the settings of the Pressure switch (disables button operation).
M	Manual setting	Manual pressure setup without using auto preset. This term is used to distinguish between manual and auto preset pressure setup.
	Maximum applied voltage	The maximum voltage that can be connected to the output of an NPN device.
	Maximum load current	The maximum current that can flow to the output (output line) of the switch output.
	Measurement mode	Operating condition in which pressure is being detected and displayed, and the switch function is working.
	Min. setting unit	Refer to "digit".
N	Normal output	One of the switch output types. In hysteresis mode the switch output is turned ON when pressure equal to or greater than the switch output set value is detected. In window comparator mode, the switch output is turned ON when pressure between the switch output set values (P1L to P1H) is detected. (Refer to the "List of output modes" on page 29.)

	Term	Definition
O	Operation light	A light that turns on when the switch output is ON.
	Operation mode	Hysteresis mode, window comparator mode, Error output or Output off can be selected.
	Output style	The operation principle of the switch output. Normal output and reversed output can be selected. Please refer to the" List of output modes" on page 29 operating conditions.
P	Peak value display (mode)	Shows the maximum pressure from when the power was supplied to the current time.
	Power saving mode	Operating mode in which the digital display turns off and power consumption is reduced.
	Pressure setting	The set pressure value that determines the point at which the pressure switch turns ON and OFF.
	Proof pressure	Pressure limit that if exceeded will result in mechanical and/or electrical damage to the product.
R	R.D.	Current read value For example, when the display value is 1.000[MPa], ±5%R.D. is ±5% of 1.000[MPa], which becomes ±0.05[MPa]. When the display value is 0.800[MPa], ±5%R.D. is ±5% of 0.800[MPa], which becomes ±0.04[MPa].
	Rated pressure range	The pressure range within which the product will meet all published specifications. Values outside of this range can be set as long as they are within the set pressure range, but the specifications cannot be guaranteed.
	Repeatability	Variation in repeated measurement of pressure display or ON-OFF output point when the pressure changes at 25 centigrade.
	Residual voltage	The difference between the ideal ON voltage and the actual voltage when the switch output is on. Varies with load current. Ideally should be 0 V.
	Resolution	Refer to "Display resolution".
	Reversed output	One of the switch output types. In hysteresis mode the switch output is turned ON when pressure less than or equal to the switch output set value is detected. In window comparator mode, the switch output is turned ON when pressure is outside the switch output set values (n1L to n1H) is detected. (Refer to the "List of output modes" on page 29.)
	Ripple	A type of chattering.
S	Set pressure range	The pressure range that can be set for switch output.
	Switch output	Sometimes referred to as "ON-OFF output".
U	Units selection function	A function to change the units in which the measured pressure value is displayed. The display units can only be changed if the product is equipped this function. It is not possible to purchase the product with this function if the product is used in Japan. The product for Japan is displayed in SI only.

	Term	Definition
W	Window comparator mode	An operating mode in which the switch output is turned on and off depending on whether the flow is inside or outside the range of two set values. (Refer to the "List of output modes" on page 29.)
	Withstand voltage	A measure of the product's resistance to a voltage applied between the electrical circuit and case. Durability in withstanding voltage. The product may be damaged if a voltage over this value is applied. (The withstand voltage is not the supply voltage used to power the product.)
Z	Zero-clear function	This function to adjust the displayed pressure to zero.

Mounting and Installation

■Wiring

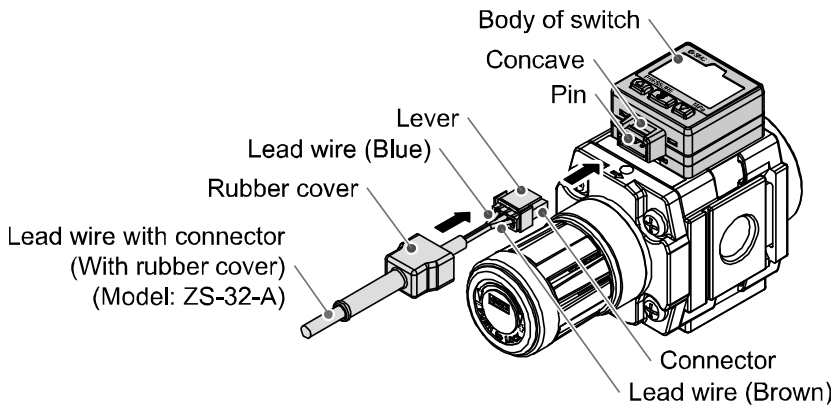
○Connection

- Connections should only be made with the power supply turned off.
- Use separate routes for the Pressure switch wiring and any power or high voltage wiring. Otherwise, malfunction may result due to noise.
- Ensure that the FG terminal is connected to ground when using a commercially available switch-mode power supply. When a switch-mode power supply is connected to the product, switching noise will be superimposed and the product specification can no longer be met. This can be prevented by inserting a noise filter, such as a line noise filter and ferrite core, between the switch-mode power supply and the product, or by using a series power supply instead of a switch-mode power supply.

○Connector

Connecting/Disconnecting

- When connecting the connector, insert it straight onto the pin holding the lever and connector body between fingers and lock the connector by pushing the lever claw into the concave in the body of switch.
- When disconnecting the connector, push down the lever by thumb to disengage the lever claw from the concave. Then pull the connector straight out.

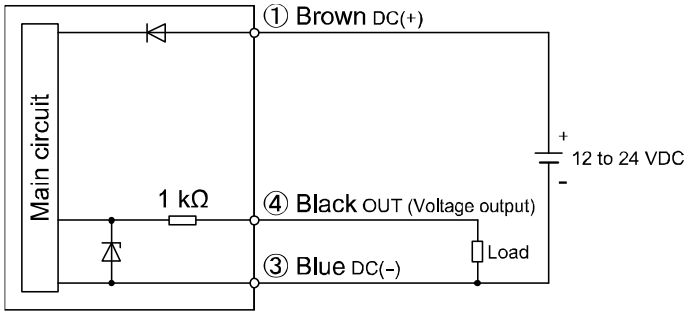


○Internal circuit and wiring examples

•Output specification

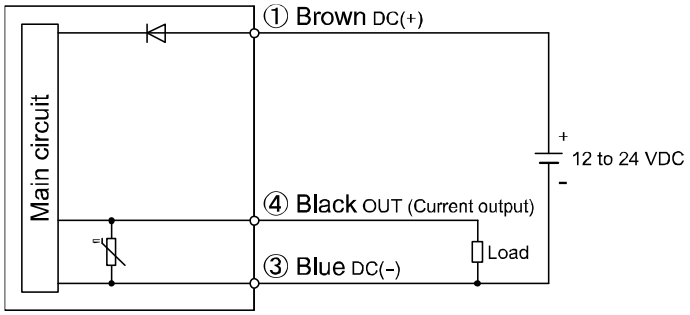
-26

Voltage output: 1 to 5 V, 0 to 10 V
Output impedance: Approx. 1 kΩ



-28

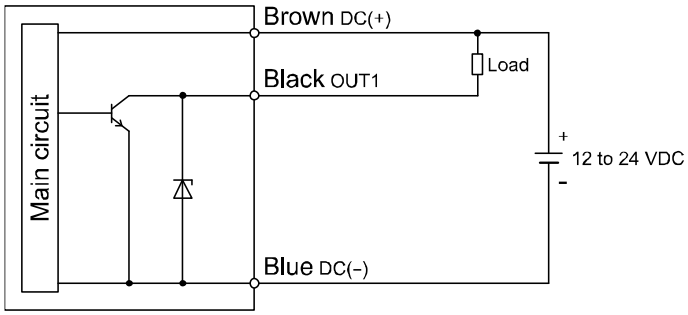
Current output: 4 to 20 mA
Allowable load impedance:
600 Ω or less (at 24 VDC)
300 Ω or less (at 12 VDC)



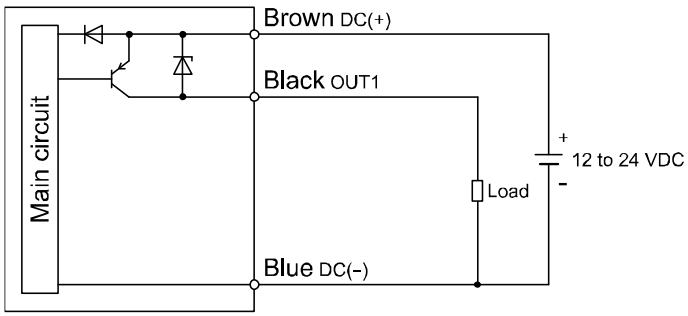
-L

Used as switch output device

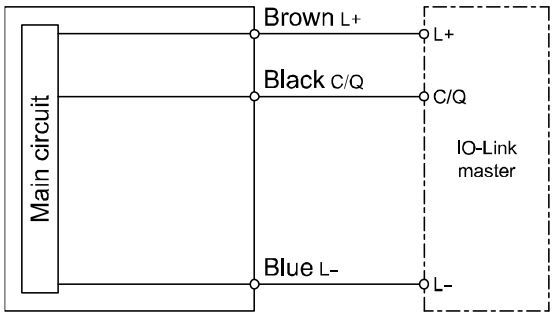
NPN open collector 1 output
Max. 30 V, 80 mA
Residual voltage: 1.5 V or less



PNP open collector 1 output
Max. 80 mA
Residual voltage:1.5 V or less



Used as IO-Link device



Outline of Settings [Measurement mode]

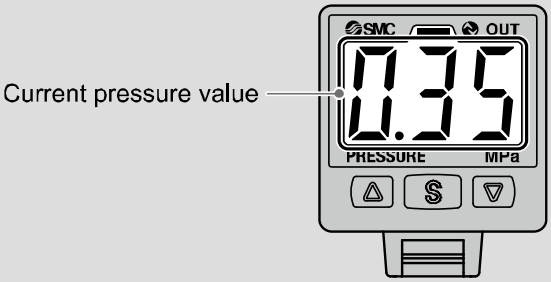
Power is supplied.

The product code is displayed for approximately 3 seconds after supplying power.
∗: Within approximately 0.2 second after power-on, the switch starts.

[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



Press the SET button once.

Select the set value, hysteresis and delay time.
(Simple setting mode)
(Refer to page 21.)

Press the SET button between 2 and 5 seconds.

Change the function settings.
(Function selection mode)
(Refer to page 22.)

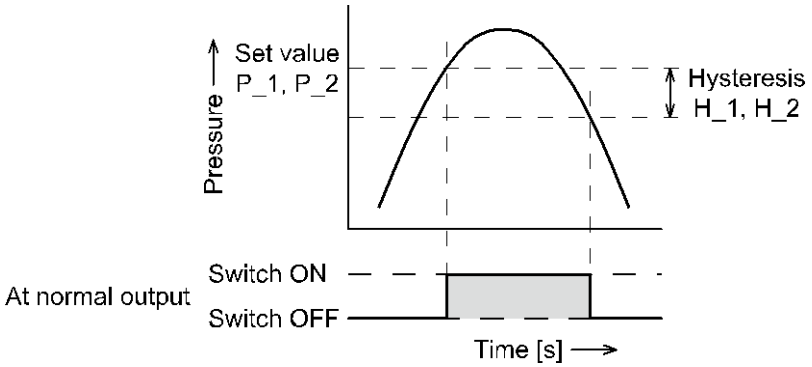
Other Settings
•Zero-clear function
•Key-lock function
(Refer to page 50.)

∗: 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.)
∗: Simple setting mode and function selection mode settings are reflected each other.

Pressure Setting

Default settings

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.
If this condition, shown to the below, is acceptable, then keep these settings.



Item	Default setting
[P_1] Set value of OUT1 (SW1)	0.35 MPa
[P_2] Set value of SW2	
[H_1] Hysteresis of OUT1 (SW1)	0.01 MPa
[H_2] Hysteresis of SW2	

Zero-clear of display

The display is reset to zero when the UP and DOWN buttons are pressed simultaneously for 1 second.
For the first operation, perform a zero-clear without pressure at measurement mode.

Simple Setting Mode

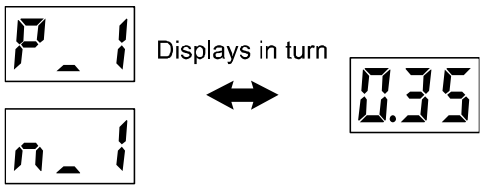
Simple setting mode is available when using an IO-Link product.

<Operation>

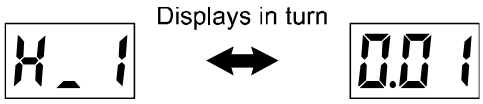
[Simple setting mode (hysteresis mode)]

In the simple setting mode, the set value, hysteresis and delay time can be changed.

(1) In measurement mode, pressing the SET button once will alternately display [P_1] or [n_1] and the set value.
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. (Refer to page 50.))



(2) 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. (Refer to page 50.))



(3) The delay time of the switch output can be selected by pressing the UP or DOWN button 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 10.00 sec. (display only 10.00 as 10.0 by digit shift) in 0.01 sec. increments.

(4) 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 SW2 setting.)

∗1: Selected items (1) to (3) become valid after pressing the SET button.

∗2: After enabling the setting by pressing the SET button, it is possible to return to measurement mode by pressing the SET button for 2 seconds or longer.

∗3: When the output mode (refer to page 26) is set to error output or output OFF, the simple setting mode cannot be used.
(The setting changes to measurement mode by releasing the button when [SEt] is displayed.)

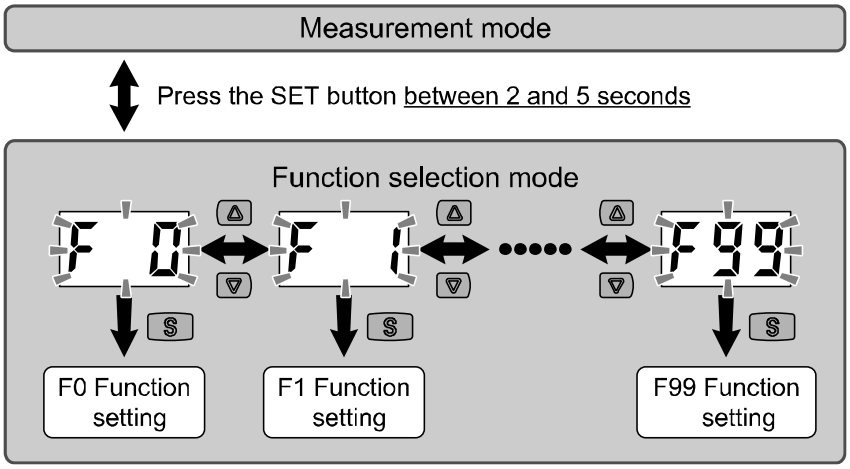
In the window comparator mode, set P1L, the lower limit of the switch operation, and P1H, the upper limit of the switch operation, H1 (hysteresis) and dt1 (delay time) following the instructions given above.
(When reversed output is selected, the display shows [n1L] and [n1H].)
Please refer to the "List of output modes" on page 29 for the relationship between the set values and operation.

∗: Set SW2 in the same way.

Function Selection Mode

■Function selection mode

In measurement mode, press the SET button between 2 and 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.

■Default setting

The default setting is as follows.
If no problem is caused by this setting, keep these settings.
To change a setting, enter function selection mode.

●[F 0] Display unit selection, switch output specifications and IO-Link communication switching ➡ Page 24

Units specification	Default setting
"Nil" or M	MPa
P	psi

Output specification	Default setting
26 or 28	-
L	PNP

Item	Default setting
IO-Link setting	ON: Enabled

●[F 1] Setting of OUT1 ➡ Page 26

Item	Explanation	Default setting
Output mode	Either comparator output, error output or output off can be selected.	Comparator output
Comparator output mode	Either hysteresis mode or window comparator mode can be selected.	Hysteresis
Reversed output	Selects which type of switch output is used, normal or reversed.	Normal output
Pressure setting	Sets the ON and OFF point of the switch output.	0.35 MPa
Hysteresis	Appropriate setting of the hysteresis will prevent the switch output from chattering.	0.01 MPa
Delay time	Delay time of the switch output can be selected.	0.00 sec
Display color	Selects the output according to the display color.	ON: Green

●Other parameter settings

Item	Page	Default setting
[F 3] Digital filter setting	Page 30	0.00 s
[F 6] Fine adjustment of display value	Page 31	0%
[F13] Display mode setting	Page 32	N/A (normal output)
[F22] Analog output range setting	Page 33	1-5 V
[F50] SW1 comparator output setting *1	Page 34	*2
[F51] SW2 comparator output setting *1	Page 36	*2
[F80] Power saving mode	Page 37	OFF
[F81] Security code	Page 38	OFF
[F90] Setting of all functions	Page 40	OFF
[F98] Output check	Page 44	N/A (normal output)
[F99] Reset to default settings	Page 49	OFF

∗1: SW1 and SW2 are outputs in the process data.

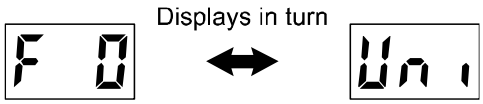
∗2: Available only when IO-Link is enabled.

■[F 0] Display unit selection, switch output specifications and IO-Link communication switching

This setting is only available for models with the units selection function.

<Operation>

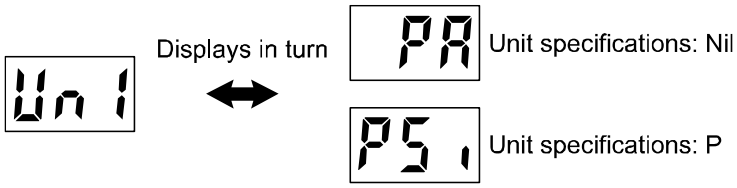
Press the UP or DOWN button in function selection mode to display [F 0].

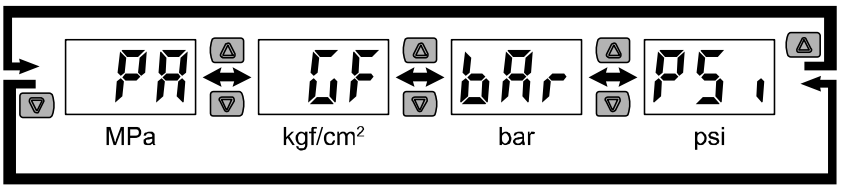


Press the SET button. Move on to display unit selection.

Display unit selection

Press the UP or DOWN button to select the display unit.





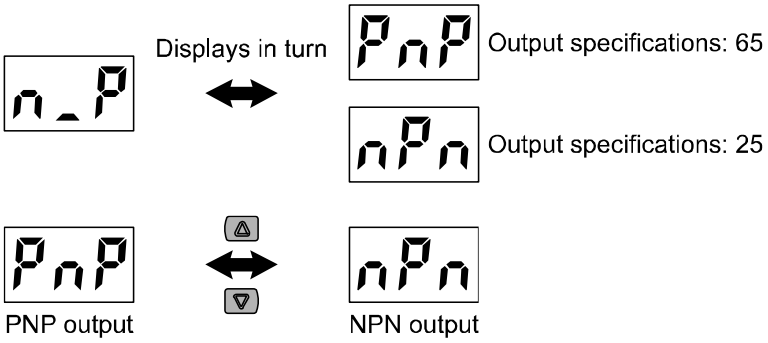
IO-Link specification
Press the SET button to set.

Move on to switching setting of switch output NPN/PNP specifications.

Switching setting of switch output NPN/PNP specifications

The switch output of this product can be switched to NPN or PNP output in accordance with the user device construction.

Press the UP or DOWN button to select the switch output specification.



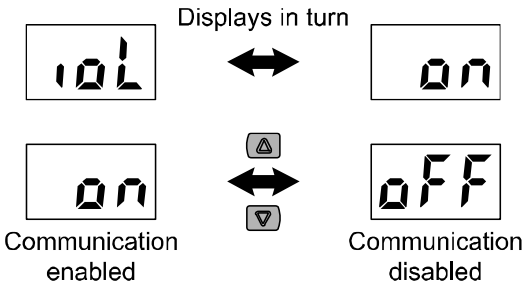
Analog output specification
Press the SET button to set.

Return to function selection mode.

Press the SET button to set. Move on to IO-Link enabled/disabled setting.

IO-Link enabled/disabled setting

IO-Link communication mask enabled/disabled can be set.



∗: This function is available in SIO mode.

Press the SET button to set. Return to function selection mode.

[F 0] Display unit selection, switch output specifications and IO-Link communication switching

●Available display unit and minimum set value

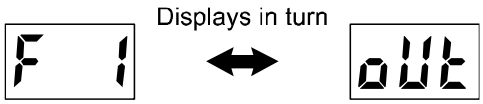
	Setting/display resolution
MPa	0.01
Kgf/cm^2	0.1
bar	0.1
psi	1

■[F 1] Setting of OUT1

Set the output mode of OUT1.
Output turns on when the pressure is greater than the set value.
The display color changes according to the OUT1 output status. It will turn Green when the output is ON and it will be Red when the output is OFF.
Please refer to the "List of output modes" on page 29 for the relationship between the set items and operation.

<Operation>

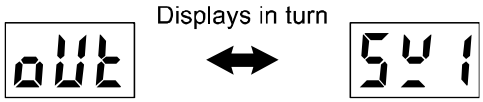
Press the UP or DOWN button in function selection mode to display [F 1].

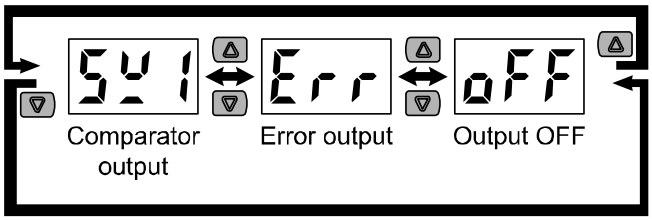


Press the SET button. ↓ Move on to output mode setting.

Output mode setting

Press the UP or DOWN button to select the required output mode.



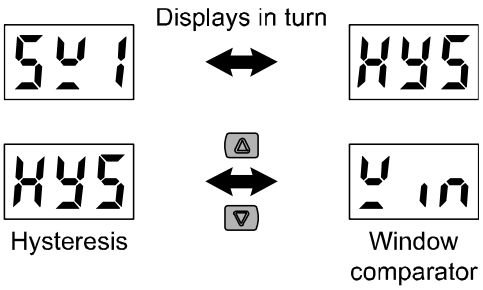


∗: Analog output specification is fixed to "OFF".

Press the SET button to set. ↓ Move on to comparator output mode setting.

Comparator output mode setting

Press the UP or DOWN button to select the comparator output mode.



Press the SET button to set. ↓ Move on to reversed output setting.

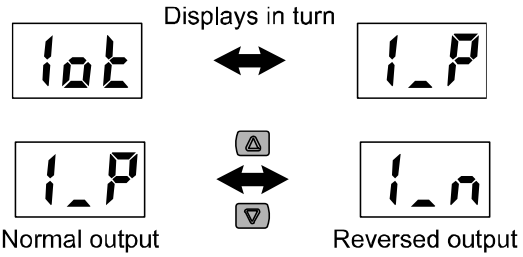
[Err] Error output is selected
Press the SET button to move on to reversed output setting.

[oFF] Output OFF is selected
Press the SET button to move on to display color setting.

Reversed output setting

Press the UP or DOWN button to select the reversed output.

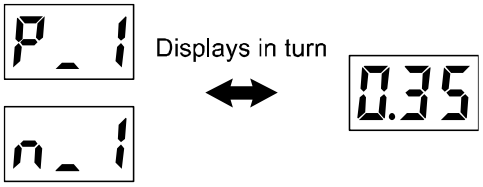
∗: Changes from [1ot] to [Eot] when error output.



Press the SET button to set. → Move on to pressure setting.

Pressure setting

Press the UP or DOWN button to set the pressure value.

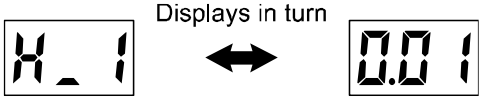


Hysteresis mode: [P_1]
Window comparator mode: [P1L] [P1H]
"P" is changed to "n" as [P_1] → [n_1] when reversed output is selected.
The snap shot function can be used.
(Refer to page 50.)

Press the SET button to set. → Move on to hysteresis setting.

Hysteresis setting

Press the UP or DOWN button to set the hysteresis.



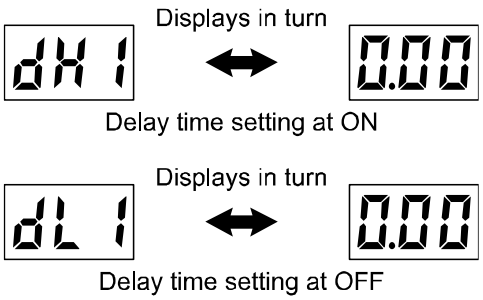
Hysteresis mode: [H_1]
Window comparator mode: [WH1]
The snap shot function can be used.
(Refer to page 50.)

Press the SET button to set. → Move on to delay time setting.

[Err] Error output is selected
Press the SET button to move on to display color setting.

Delay time setting

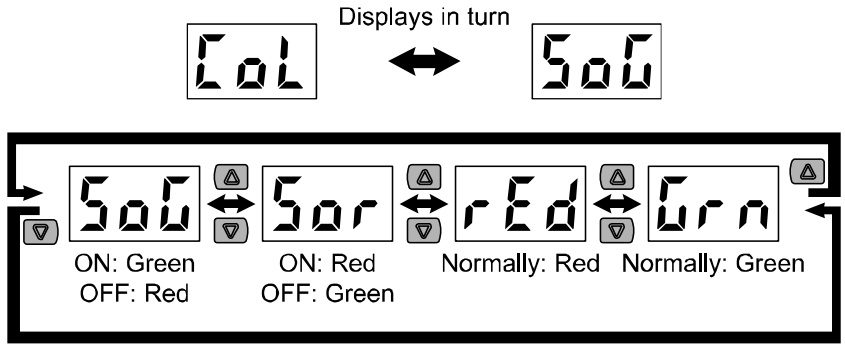
Set the delay time referring to the setting method on page 21.



Press the SET button to set. Move on to display color setting.

Display color setting

Press the UP or DOWN button to select the display color.



Press the SET button to set. Return to function selection mode.

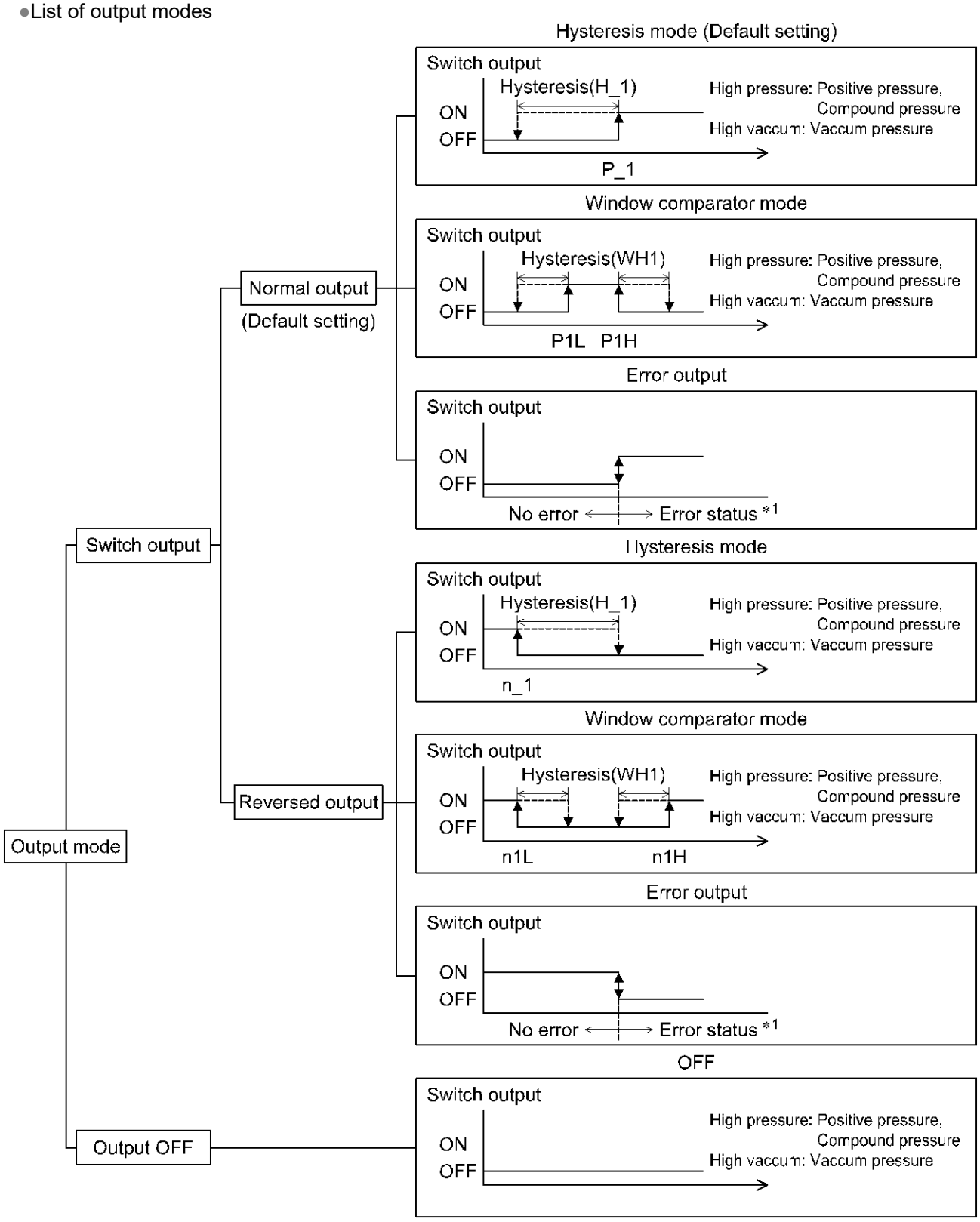
[F 1] Setting of OUT1 completed

∗1: Selected item becomes valid after pressing the SET button.

∗2: After enabling the setting by pressing the SET button, it is possible to return to the measurement mode by keeping pressing the SET button for 2 seconds or longer.

∗3: When comparator output is selected in the output mode setting, it synchronizes with the settings of [F50] for comparator output mode, reversed output, pressure, hysteresis, and delay time.

●List of output modes



∗1: The applicable errors are Er6, 8, 9, 15 as well as Er1 (excluding the error output).

∗: The chart above shows the OUT1 operation. For SW2, all "1" in the chart will be changed to "2". (example P_1→P_2)

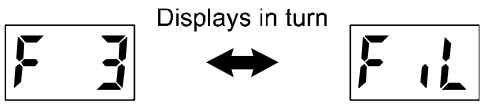
If the point at which the switch output changes is outside of the set pressure range due to the selection of normal or reversed output, the hysteresis value is automatically adjusted.

■[F 3] Digital filter setting

The Digital filter can be selected to filter the pressure measurement.
Output chattering or flicker in the measurement mode display can be reduced by setting the digital filter.
Digital filter can be set in 0.01[sec.] increment in the range of 0.00 to 10.00 sec.

<Operation>

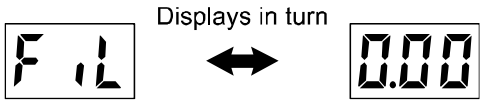
Press the UP or DOWN button in function selection mode to display [F 3].



Press the SET button. ↓ Move on to digital filter setting.

Digital filter setting

Press the UP or DOWN button to select the digital filter.



∗: Display only 10.00 as 10.0 by digit shift

Press the SET button to set. ↓ Return to function selection mode.

[F 3] Digital filter setting completed

∗1: Each set value is a guideline for 90% response time.

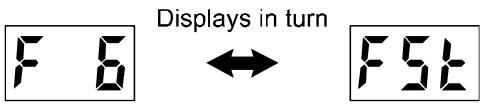
∗2: Both the switch output and pressure display are affected. When only switch output needs to be affected, select the delay time setting (page 21 and 28).

■[F 6] Fine adjustment of display value

This function is to manually perform a fine adjustment of the displayed pressure value.
Pressure can be adjusted in the following range of ±5%R.D.

<Operation>

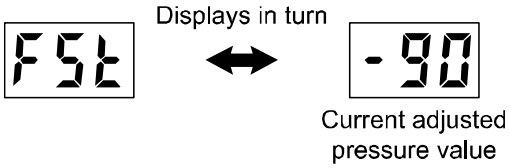
Press the UP or DOWN button in function selection mode to display [F 6].



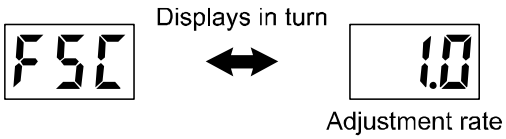
Press the SET button. ↓ Move on to fine adjustment of display value.

Fine adjustment of display value

Display the currently adjusted pressure value, then press the SET button to move on to fine adjustment of the display value.



Press the UP or DOWN button to change adjustment rate.



Press the SET button to set. ↓ Return to function selection mode.

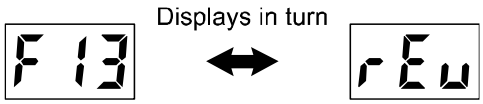
[F 6] Fine adjustment of display value completed

■[F13] Display mode setting

This function is for reversing the display.

<Operation>

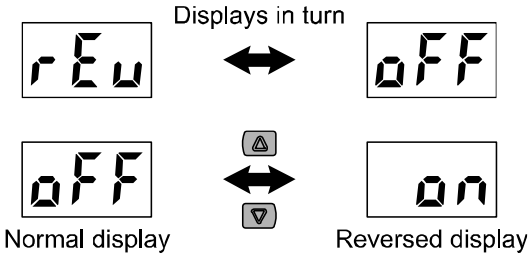
Press the UP or DOWN button in function selection mode to display [F13].



Press the SET button. ⇩ Move on to display mode setting.

Display mode setting

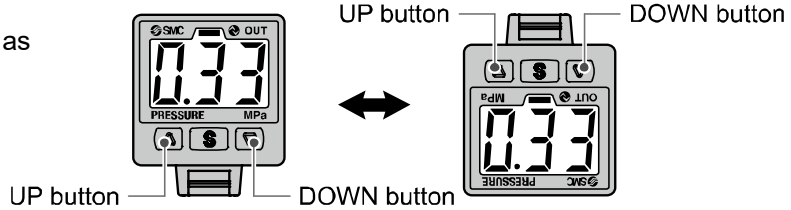
Press the UP or DOWN button to select the display mode to be used.



Press the SET button to set. ⇩ Return to function selection mode.

[F13] Display mode setting completed

If reverse indication is selected, the button operation is changed as shown on right figure.

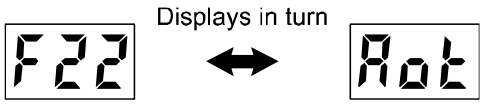


■[F22] Analog output range setting (analog output specifications only)

Set the analog voltage output range.

<Operation>

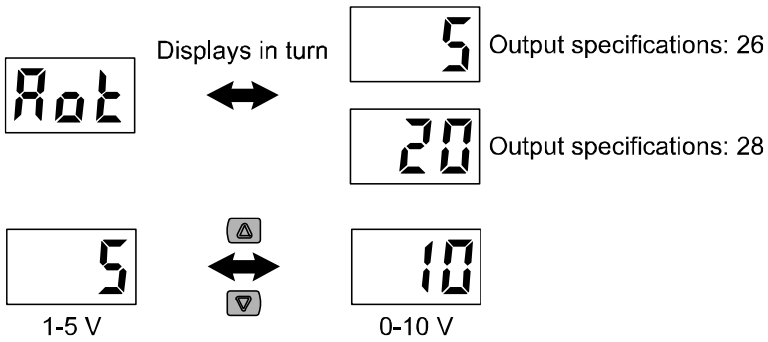
Press the UP or DOWN button in function selection mode to display [F22].



Press the SET button. ⬇ Move on to analog output range setting.

Analog output range setting

Press the UP or DOWN button to select the analog output range to be used.



∗: Analog output range cannot be selected for output specification "28".

Press the SET button to set. ⬇ Return to function selection mode.

[F22] Analog output range setting completed

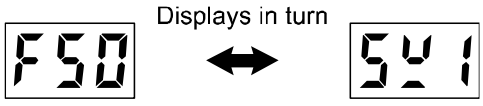
■[F50] SW1 comparator output setting (IO-Link specifications only)

(When analog output is selected, [F50] is not displayed.)
(Setting of the SW1 output available in the IO-Link communication process data)

Set the output mode of SW1.
Output turns on when the pressure is greater than the set value.
When comparator output is selected in the output mode setting of [F1], it synchronizes with the settings of [F1] for comparator output mode, reversed output, pressure, hysteresis, and delay time.
Please refer to the "List of output modes" on page 29 for the relationship between the set items and operation.

<Operation>

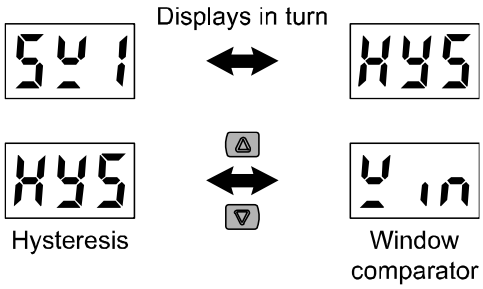
Press the UP or DOWN button in function selection mode to display [F50].



Press the SET button. Move on to comparator output mode setting.

Comparator output mode setting

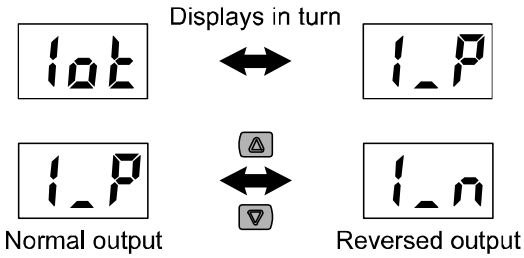
Press the UP or DOWN button to select the comparator output mode.



Press the SET button to set. Move on to reversed output setting.

Reversed output setting

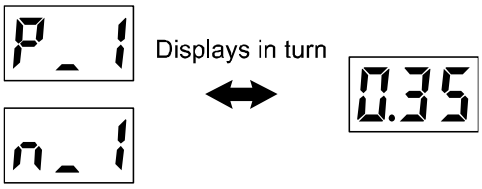
Press the UP or DOWN button to select the reversed output.



Press the SET button to set. Move on to pressure setting.

Pressure setting

Press the UP or DOWN button to set the pressure value.

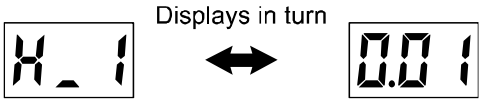


Hysteresis mode: [P_1]
Window comparator mode: [P1L] [P1H]
"P" is changed to "n" as [P_1] → [n_1] when reversed output is selected.
The snap shot function can be used. (Refer to page 50.)

Press the SET button to set. Move on to hysteresis setting.

Hysteresis setting

Press the UP or DOWN button to set the hysteresis.

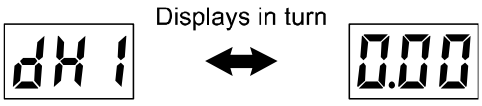


Hysteresis mode: [H_1]
Window comparator mode: [WH1]
The snap shot function can be used. (Refer to page 50.)

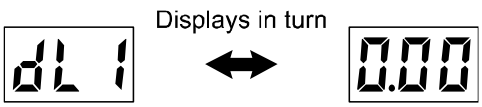
Press the SET button to set. Move on to delay time setting.

Delay time setting

Set the delay time referring to the setting method on page 21.



Delay time setting at ON



Delay time setting at OFF

Press the SET button to set. Return to function selection mode.

[F50] SW1 comparator output setting completed

∗1: Selected item becomes valid after pressing the SET button.
∗2: After enabling the setting by pressing the SET button, it is possible to return to the measurement mode by keeping pressing the SET button for 2 seconds or longer.

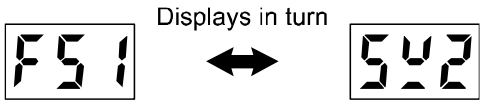
■[F51] SW2 comparator output setting (IO-Link specifications only)

(When analog output is selected, [F51] is not displayed.)
(Setting of the SW2 output available in the IO-Link communication process data)

Set the output mode of SW2.
Output turns on when the pressure is greater than the set value.
Please refer to the "List of output modes" on page 29 for the relationship between the set items and operation.

<Operation>

Press the UP or DOWN button in function selection mode to display [F51].



Press the SET button. ↓ Move on to comparator output mode setting.

The following settings are the same as SW1 comparator output setting.
All the "1" on the display will be changed to "2".

Press the SET button to set. ↓ Return to function selection mode.

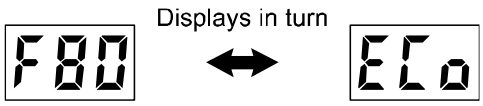
[F51] SW2 comparator output setting completed

■[F80] Power saving mode

Power saving mode can be selected.
When selected and no buttons are pressed for 30 seconds, the pressure switch will shift to power saving mode.

<Operation>

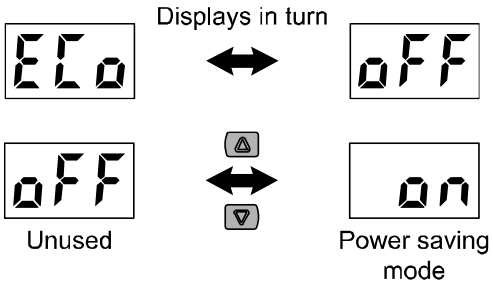
Press the UP or DOWN button in function selection mode to display [F80].



Press the SET button. ⬇ Move on to power saving mode.

Power saving mode

Press the UP or DOWN button to select the power saving mode.

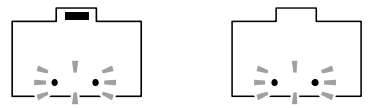


Press the SET button to set. ⬇ Return to function selection mode.

[F80] Power saving mode completed

In power saving mode, when buttons are pressed the display is normal, but if no buttons are pressed for 30 seconds, it will revert to power saving mode. (Power saving is only enabled in measurement mode)

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

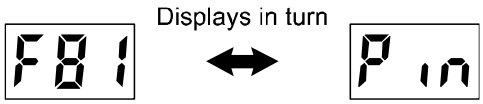


■[F81] Security code

The security code can be turned on or off and the security code can be changed when unlocked.

<Operation>

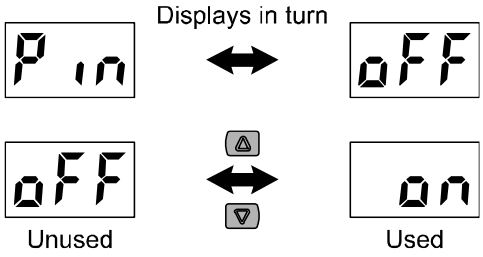
Press the UP or DOWN button in function selection mode to display [F81].



Press the SET button. ↓ Move on to security code.

Security code

Press the UP or DOWN button to select the setting of security code.



[oFF] (not use) is selected
Press the SET button to return to function selection mode.

[on] (use) is selected
Press the SET button to set. ↓ Move on to security code checking.

Security code checking

Press the UP or DOWN button to input the security code.
(The default setting is [000].)*

For instructions on how to enter the security code, refer to "How to input and change the security code" on page 53.

If the security code entered is incorrect, [FAL] will be displayed, and the security code must be entered again.
If the wrong security code is entered 3 times, [nG] is displayed and the device returns to function selection mode.

Press the SET button for 1 second to set. ↓ Move on to security code changing.

Security code changing

Press the UP or DOWN button to input the changed security code. *
For instructions on how to enter the security code, refer to "How to input and change the security code" on page 53.

After entry, the changed security code will flash by pressing the SET button for 1 second.
(At this point, the changing of the security code is not completed)
Return to the change of setting again by pressing the UP or DOWN button.

Press the SET button to set. → Return to function selection mode.

[F81] Security code completed

If the security code function is enabled, it is will be necessary to input a security code to release the key-lock.

*: If a key is not pressed for 30 seconds while entering the security code, function selection mode will return.

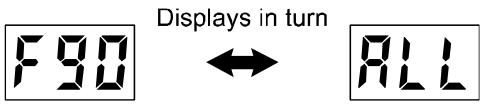
●Special function setting

■[F90] Setting of all functions

All functions can be set in turn.

<Operation>

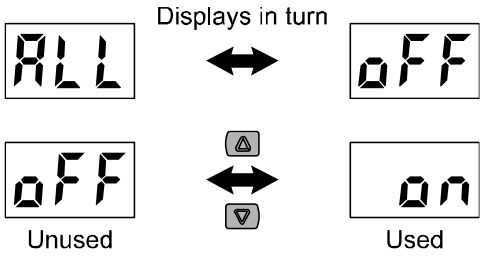
Press the UP or DOWN button in function selection mode to display [F90].



Press the SET button. Move on to setting of all functions.

Setting of all functions

Press the UP or DOWN button to select all functions.



[oFF] (not use) is selected
Press the SET button to set.

Return to function selection mode.

[on](use) is selected

Setting of functions *

Return to [oFF] (not used), then press the SET button to set.

Return to function selection mode.

Press the SET button for 2 second or longer.

[F90] Setting of all functions completed

Measurement mode

*: Setting of each function

Every time the SET button is pressed, the display moves to the next function in order of "Setting of each function" on page 41.

Set by using the UP and DOWN buttons.

For details of how to set each function, refer to the relevant setting of function section in this manual.

●Setting of each function

Order	Function
1	Display unit selection
2	Switching setting of switch output NPN/PNP specifications
3	Setting of OUT1
4	Digital filter setting
5	Fine adjustment of display value
6	Display mode setting
7	Analog output range setting
8	SW1 comparator output setting (IO-Link specifications only)
9	SW2 comparator output setting (IO-Link specifications only)
10	Power saving mode
11	Security code

∗: Measurement mode can return from any setting item by pressing the SET button for 2 seconds or longer.

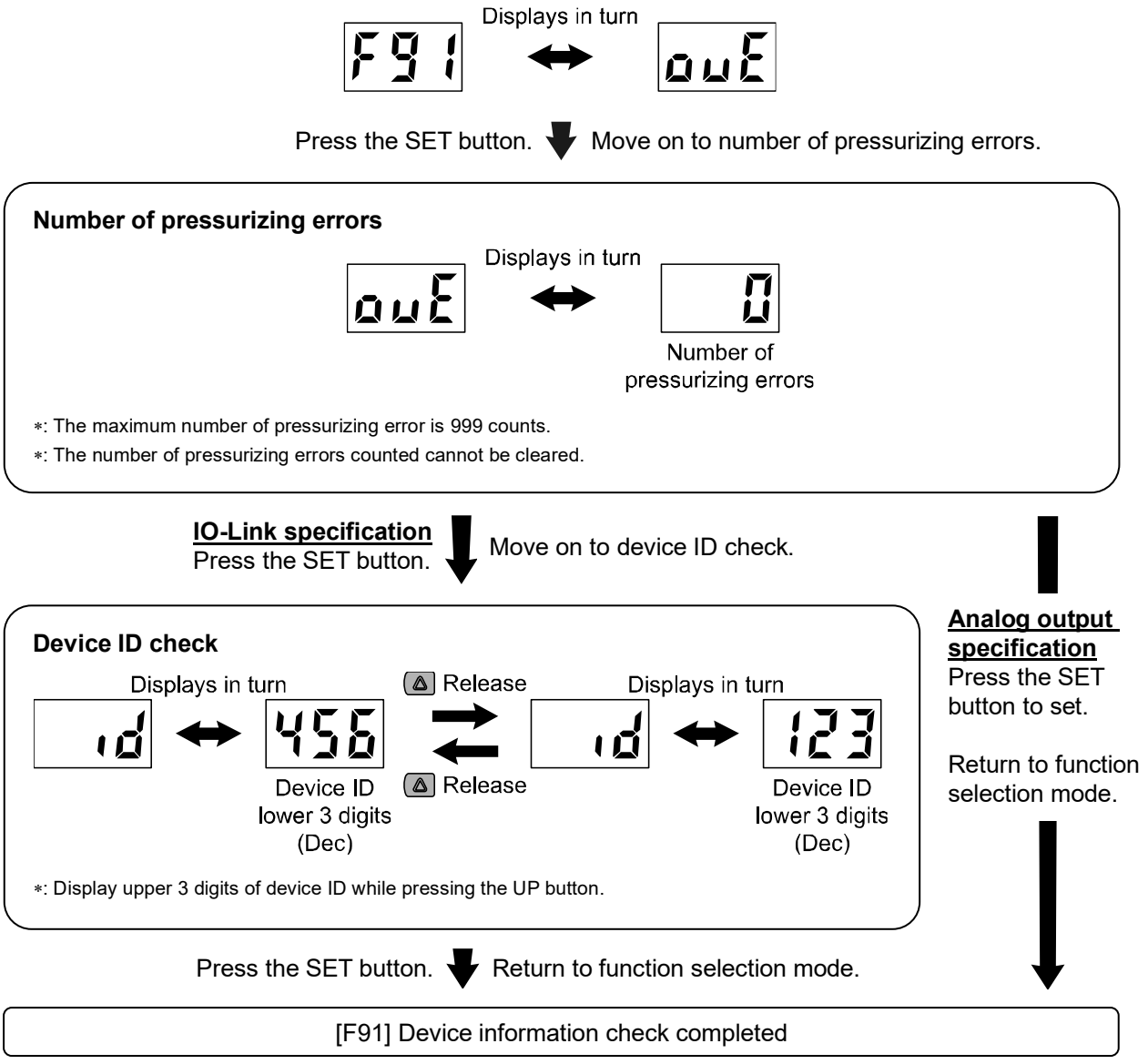
∗: Function set before returning to the measurement mode is maintained.

■[F91] Device information check

When the pressure has exceeded 115% of the rated pressure, this is counted as a pressurizing error.
The Device ID can be checked.

<Operation>

Press the UP or DOWN button in function selection mode to display [F91].

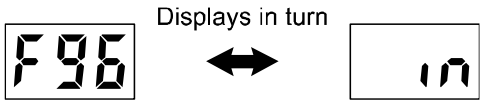


■[F96] Cycle time check (IO-Link specifications only)

The true cycle time can be checked.

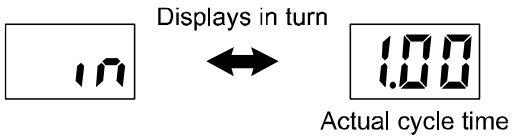
<Operation>

Press the UP or DOWN button in function selection mode to display [F96].



Press the SET button. ⬇ Move on to cycle time check.

Cycle time check



∗: Display the average of 10 true cycle times.

Press the SET button to set. ⬇ Return to function selection mode.

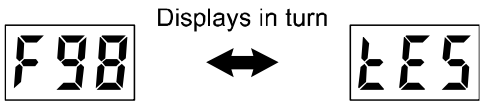
[F96] Cycle time check completed

■[F98] Output check

Correct operation of the switch output or analog output can be confirmed.
The output can be turned ON/OFF manually.

<Operation>

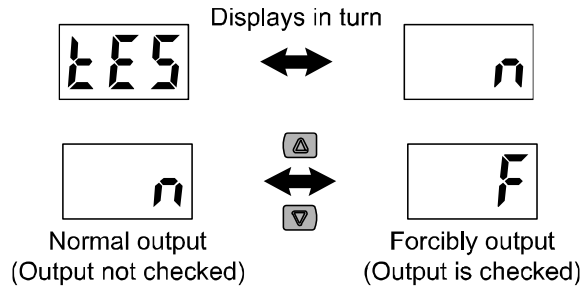
Press the UP or DOWN button in function selection mode to display [F98].



Press the SET button. Move on to output check.

Output check

Press the UP or DOWN button to select the output check.



[n] (Normal output) is selected
Press the SET button to set.

Return to function selection mode.

IO-Link specification

[F] (Forced output) is selected
Press the SET button to set.

Move on to OUT1 output check.

Analog specification

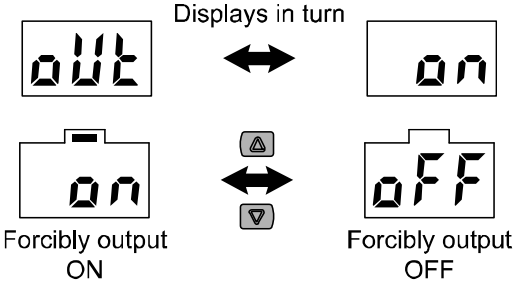
[F] (Forced output) is selected
Press the SET button to set.

Move on to analog output check.

Refer to page 48

OUT1 output check

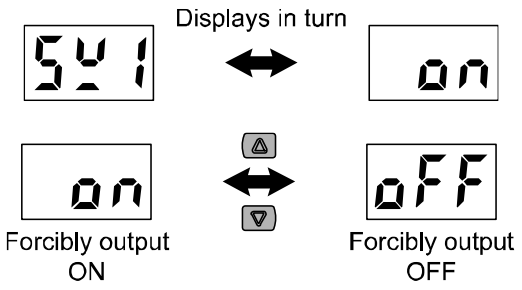
Press the UP or DOWN button to select OUT1 output check.



Press the SET button. Move on to SW1 output check.

SW1 output check (using the IO-Link communication only)

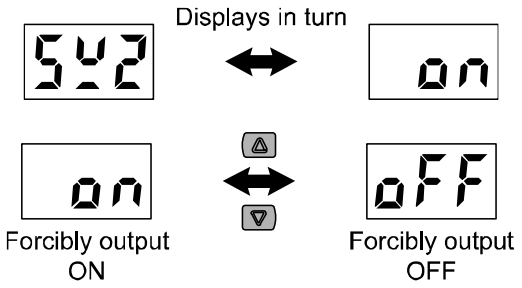
Press the UP or DOWN button to select SW1 output check.



Press the SET button to set. Move on to SW2 output check.

SW2 output check (using the IO-Link communication only)

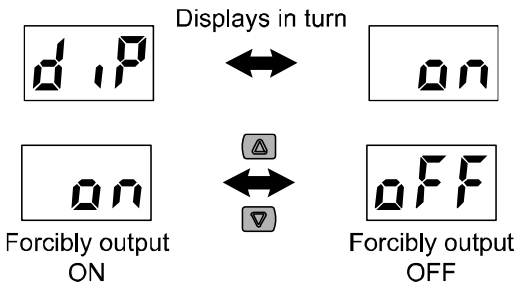
Press the UP or DOWN button to select SW2 output check.



Press the SET button to set. Move on to diagnostic output check.

Diagnostic output check (using the IO-Link communication only)

Press the UP or DOWN button to select the diagnostic output check.



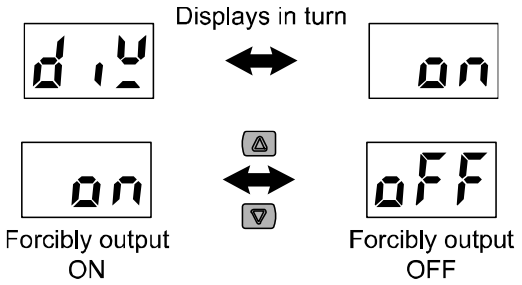
∗: IO-Link mode can provide the communication function.

∗: Refer to page 55 for details of the diagnostic information.

Press the SET button to set. Move on to error (other than system error) output check.

Error (other than system error) output check (using the IO-Link communication only)

Press the UP or DOWN button to select the error output check.



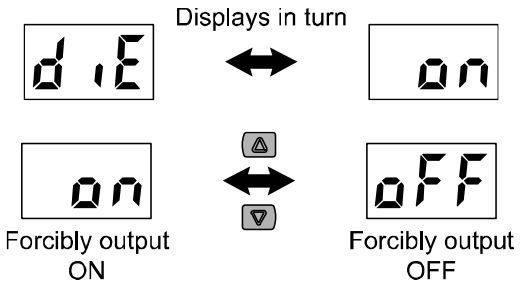
∗: IO-Link mode can provide the communication function.

∗: Refer to page 55 for details of the error information.

Press the SET button to set. Move on to error output check.

Error output check (using the IO-Link communication only)

Press the UP or DOWN button to select the error output check.



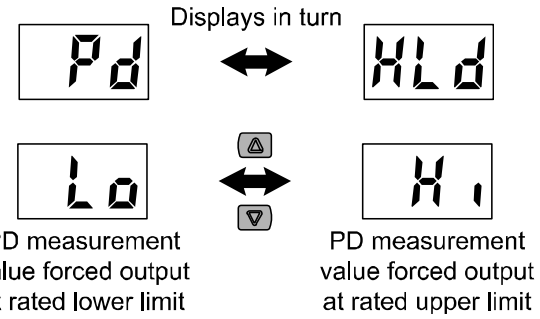
∗: IO-Link mode can provide the communication function.

∗: Refer to page 55 for details of the error information.

Press the SET button to set. Move on to PD measurement value.

PD measurement value (using the IO-Link communication only)

The upper and lower limit values of the rated pressure value can be output compulsively as PD measurement value (process data).
Press the UP or DOWN button to select the lower or upper limit value.



PD measurement value forced output at rated lower limit

PD measurement value forced output at rated upper limit

∗: IO-Link mode can provide the communication function.

∗: Refer to page 55 for details of the diagnostic information.

Press the SET button to return to [n] (Normal output), then press the SET button to set.

Return to function selection mode.

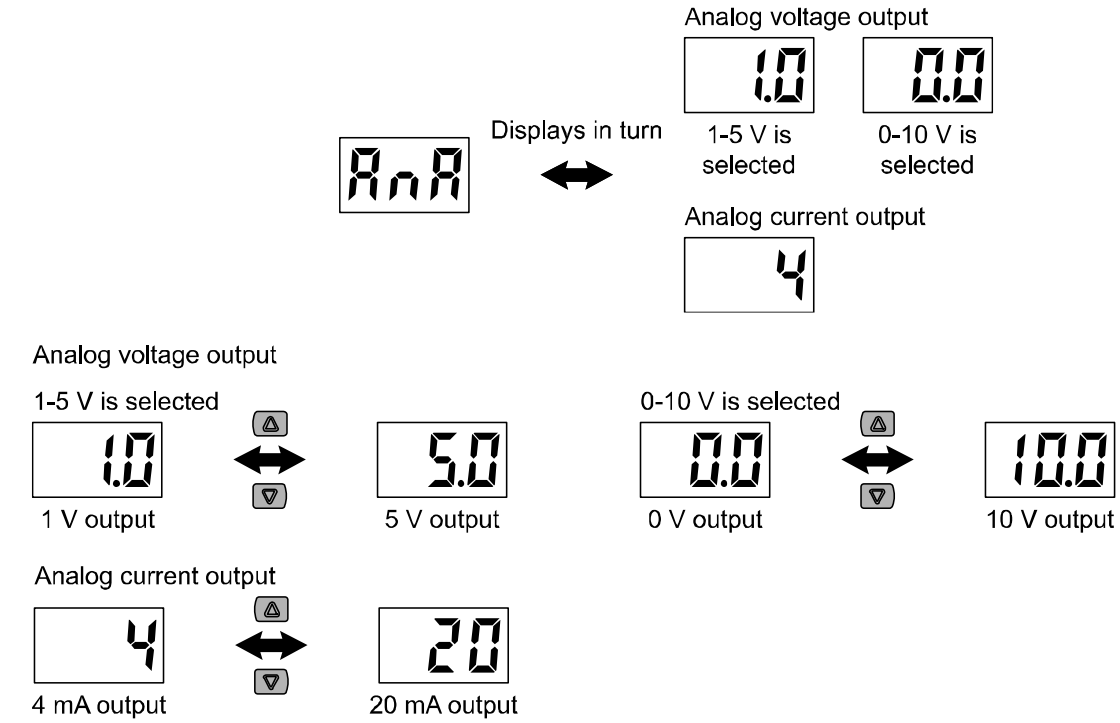
[F98] Output check completed

∗: Measurement mode can return from any setting item by pressing the SET button for 2 seconds or longer.

Analog output specification

Analog output check

Press the UP or DOWN button to select the analog output check.



Press the SET button to return to [n] (Normal output), then press the SET button to set.

Return to function selection mode.

[F98] Output check completed

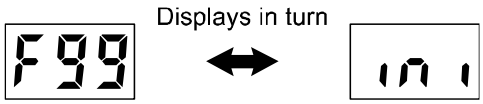
∗: Measurement mode can return from any setting item by pressing the SET button for 2 seconds or longer.

■[F99] Reset to default settings

If the product settings are uncertain, the default values can be restored.

<Operation>

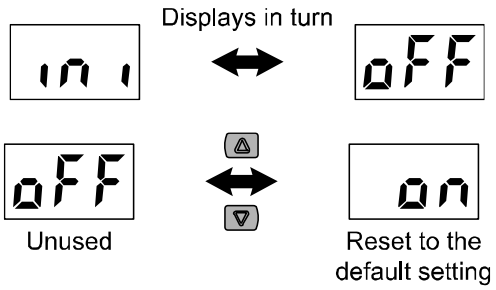
Press the UP or DOWN button in function selection mode to display [F99].



Press the SET button. Move on to reset to default settings.

Reset to default settings

Press the UP or DOWN button to select reset to default settings.



[oFF] (not use) is selected
Press the SET button to set.

Return to function selection mode.

[on] (reset to default settings) is selected
Press the SET and DOWN buttons simultaneously for 5 second or longer.
All settings are returned to the default values. Return to function selection mode

[F99] Reset to default settings completed

Other Settings

○Snap shot function (IO-Link specifications only)

The current pressure value can be stored to the switch output ON/OFF set point.
When the items below are selected in simple setting mode or function selection mode ([F 1] Setting of OUT1 ([F50] Setting of SW1), [F51] Setting of SW2), by pressing the UP and DOWN buttons simultaneously for 1 second or longer, the display shows [- - -], and the values corresponding to the current pressure values are automatically displayed.

Output mode	Configurable items	Snap shot function
Hysteresis mode	OUT1 (SW1), SW2 set value: P_1(n_1), P_2(n_2)	○
	Hysteresis: H_1, H_2	○
Window comparator mode	OUT1 (SW1), SW2 set value: P1L(n1L), P1H(n1H), P2L(n2L), P2H(n2H)	○
	Hysteresis: H1, H2	x

•OUT1 (SW1) set value and SW2 set value
The value is set to the same value as the display value (current pressure value).
(There is a range which cannot be set to the current pressure depending on the hysteresis. In that case, the value is set to the closest value.)

•Hysteresis
The hysteresis is calculated from the equation below and set.

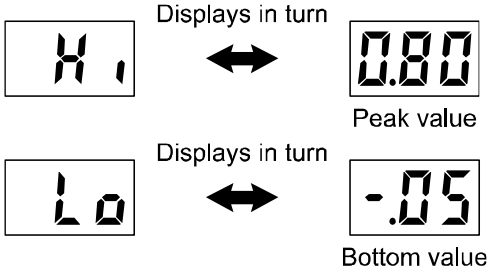
Normal output: (OUT1 (SW1, SW2) set value) - (current pressure value)
Reversed output: (current pressure value) - (OUT1 (SW1, SW2) set value)

If the calculation result becomes 0 or less, [Err] is displayed and the set value is not changed.

Afterwards, it is possible to adjust the value by pressing the UP or DOWN button.

○Peak/bottom value indication

The maximum (minimum) pressure from when the power is supplied to this moment is detected and updated.
In the peak/bottom indication mode, the pressure is indicated.
As the peak indication, when the UP button is pressed for 1 second or longer, the maximum pressure starts flashing and is held.
To release holding the indication of the maximum pressure, press the UP button for 1 second or longer again.
The measurement mode returns.
As the bottom indication, when the DOWN button is pressed for 1 second or longer, the minimum pressure starts flashing and is held.
To release holding the indication of the minimum pressure, press the DOWN button for 1 second or longer again.
The measurement mode returns.



Peak/bottom values are maintained even if the power supply is cut.
When the SET and DOWN buttons are pressed for 1 second or longer simultaneously while the peak/bottom values are displayed, [rPb] is displayed and the maximum (minimum) pressure value are cleared.

○Zero-clear function

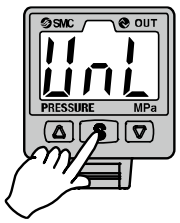
The displayed value can be adjusted to zero if the pressure being measured is within ±7%F.S of the zero point set at the time of default settings.
(The zero clear range varies by ±1%F.S. due to variation between individual products.)
In measurement mode, when the UP and DOWN buttons are pressed for 1 second or longer simultaneously, the display shows [- - -], and the reset to zero. The display returns to measurement mode automatically.

○Key-lock function

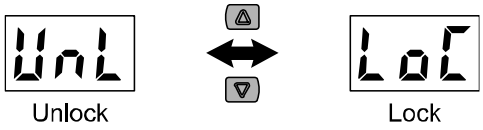
A wrong operation performed unintentionally such as change of set value can be prevented.
If the button operation is performed while key lock setting is being performed, [LoC] is indicated for approx. 1 second.

<Operation - Without security code input ->

(1) Keep pressing the SET button for 5 seconds or longer in the measurement mode.
The current setting [LoC] or [UnL] is indicated.
(Releasing key lock can be done in the same way.)



(2) Press the UP or DOWN button to select locking or unlocking of the key.



Unlock　　Lock

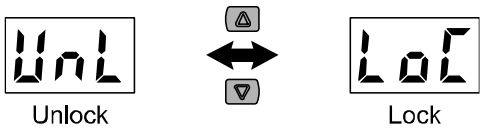
(3) Press the SET button to enter the setting.

<Operation – With security code input ->

•Locking

(1) Keep pressing the SET button for 5 seconds or longer in the measurement mode.
[UnL] is indicated.

(2) Press the UP or DOWN button to select locking of the key [LoC].

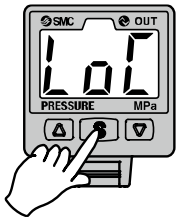


Unlock Lock

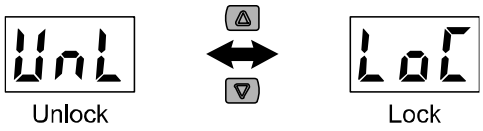
(3) Press the SET button to enter the setting.

•Unlocking

(1) Keep pressing the SET button for 5 seconds or longer in the measurement mode.
[LoC] is indicated.



(2) Press the UP or DOWN button to select unlocking of the key [UnL].



Unlock Lock

(3) When the SET button is pressed, the input of security code is asked.
For how to input the security code, refer to "How to input and change the security code " on page 53.

(4) If inputted security code is correct, the indication changes to [UnL], and pressing one of UP, SET and DOWN buttons releases key lock, and the measurement mode returns.
If inputted security code is wrong, [FAL] is indicated and the security input mode returns.
If the wrong security code is inputted three times, [LoC] is indicated and the measurement mode returns.

If the security code is forgotten, contact SMC.

•How to change the security code
At the time of shipment, the security code is set to [000], but can be changed to optional one.

<Operation>

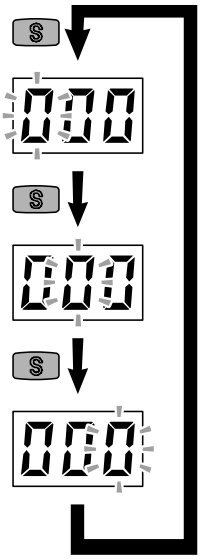
(1) After the lock setting is finished (page 52), perform all three steps in the unlock setting procedure. (page 52, (3))

(2) After the security code is inputted and the indication changes to [UnL], keep pressing the SET and DOWN buttons simultaneously for 5 seconds or longer. [000] is indicated and the change of security code is asked.
For how to input the security code, refer to "How to input and change the security code".
Changed security code is indicated.

(3) After check it is as desired, press the SET button.
The measurement mode returns. At this time, if the UP or DOWN button is pressed, changed security code is not entered and the change of security code is asked.

●**How to input and change the security code**
The first digit starts flashing.
Press the UP or DOWN button to set the value.
Pressing the SET button starts flashing the second digit.
(If the SET button is pressed at the uppermost digit, the first digit starts flashing again.)

After the setting is finished, keep pressing the SET button for 1 second or longer.
If the operation is not performed for 30 seconds during input and change of the security code, the measurement mode returns.



IO-Link Specifications

■Outline of IO-Link functions

○Communication function

This product can check the pressure measurement value, diagnostic information and switch output status using cyclic data communication via the IO-Link system.

○Product status monitoring function

This function monitors the product status via the IO-Link communication.
•Detects the error status (internal hardware error).
•Detects the warning conditions (measurement pressure error).

○Data storage function

The Data storage function stores the IO-Link device parameter settings to the IO-Link master.
With the IO-Link data storage function, the IO-Link device can be replaced easily without re-setting the equipment construction or setting parameters
When the device parameters are set and downloaded to the device using the IO-Link setting tool, the parameters in the downloaded device will be activated.
After that, these parameters are uploaded to the data storage in the master by stem command (back-up communication command).
When the device is replaced with the same type of IO-Link device due to failure, the parameter settings stored in the master are downloaded automatically, device can be operated with the parameter settings of the previous device.
Device parameter setting is applicable to 3 types of back-up levels of the master setting ("Inactive", "back-up/Restore", "Restore").
"Back-up" implies the activation of upload and "restore" implies download.

■Communication specifications

IO-Link type	Device
IO-Link version	V1.1
Communication speed	COM2 (38.4 kbps)
Min. cycle time	3.4 ms
Process data length	4 byte
On request data communication	Available
Data storage function	Available
Event function	Available

■Process data

Process data is the data which is exchanged periodically between the master and device.
This product process data consists of switch output status, error diagnostics and pressure gauge measurement value.
(Refer to the table below.)

Bit offset	Item	Notes
0	SW1 output	0: OFF 1: ON
1	SW2 output	0: OFF 1: ON
2-7	-	Reserved
8	Measurement diagnosis	0: OFF 1: ON Out of range (HHH/LLL are displayed)
9-12	-	Reserved
13	Fixed output	0: OFF 1: ON
14	Diagnosis (Error)	0: OFF 1: ON When errors are generated (Er□□□ is displayed)
15	Diagnosis (System error)	0: OFF 1: ON When system errors are generated (Er□□□ is displayed)
16-31	Measurement value	With code 16 bit

Bit offset	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Item	Input Measurement value (Integer with 16 bit code)															

Bit offset	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Item	System error	Error (Other than system error)	Fixed output	0				Measurement diagnosis	0						SW2	SW1

•The process data of this product is Big-Endian type.
When the transmission method of the upper communication is Little-Endian, the byte order will be changed.
Refer to the table below for the Endian type of the major upper communication.

Endian type	Upper communication protocol
Big-Endian type	Such as PROFIBUS and PROFINET
Little-Endian type	Such as EtherNET/IP, EtherCAT and CC-Link IE Field.

○Diagnostic information

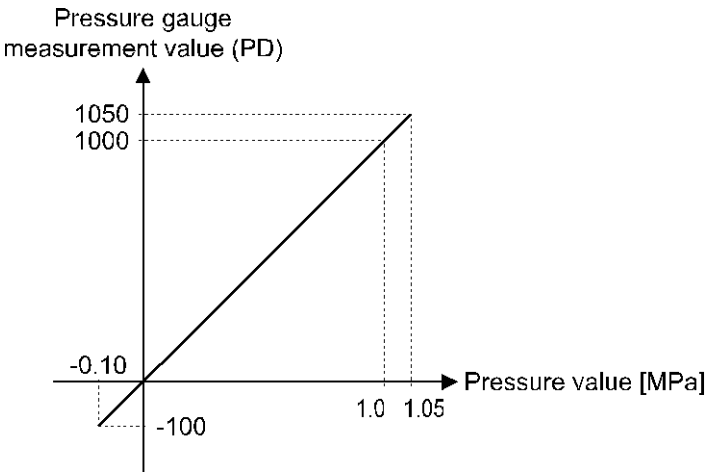
This product can detect the device error by diagnostic bit in the process data.

Set value	Content
PrES Pressurizing error	Diagnostic bit will be "1: ON" when the following error is generated. •Out of the rated pressure (when HHH and LLL are generated.)

○Unit specification and measurement value (PD)

Range	Unit	Rated pressure range			Display/Settable range			
		A	to	B	A	to	B	
Positive pressure 1 MPa	MPa	0.00	to	1.00	-0.10	to	1.05	*
	kgf/cm^2	0.00	to	10.2	-1.02	to	10.7	
	bar	10.0	to	10.0	-1.00	to	10.5	
	psi	0	to	145	-15	to	152	
	Pressure gauge measurement value (PD)	0	to	1000	-100	to	1050	

*: The figure below describes the relationship between the pressure gauge measurement value (PD) and pressure value in the unit specification (MPa).



Relationship between the pressure gauge measurement value (PD) and pressure value (e.g.: Unit MPa)

○Conversion formula of the process data and pressure gauge measurement value

(1) Conversion formula from the process data to the pressure gauge measurement value:
Pr = a × (PD) + b

(2) Conversion formula from the pressure gauge measurement value to the process data:
(PD) = (Pr – b) / a

Pr: Pressure gauge measurement value and set value
PD: Measurement value (process data)
a: Inclination
b: Intercept

[Inclination and intercept to the unit specification]

Range	Unit	Inclination a	Intercept b
Positive pressure 1 MPa	MPa	0.001	0
	kgf/cm^2	0.010197	0
	bar	0.01	0
	psi	0.145038	0

[Calculation example]

(1) Conversion from the process data to the pressure measurement value (For unit specification MPa and PD = 500)

Pr = a × (PD) + b
= 0.001 × 500 + 0
= 0.5 [MPa]

(2) Conversion from the pressure measurement value to the process data (For unit specification MPa and Pr = 0.75 [MPa])

(PD) = (Pr – b) / a
= (0.75 – 0) / 0.001
= 750

■IO-Link parameter setting

○IODD file

IODD (I/O Device Description) is a definition file which provides all properties and parameters required for establishing functions and communication of the device.
IODD includes the main IODD file and a set of image files such as vendor logo, device picture and device icon.
The IODD file is shown below.

	Product No.	IODD file *1
1	ISE35-#-L(-M)	SMC-ISE35-L-yyyymmdd-IODD1.1
2	ISE35-#--L-P	SMC-ISE35-L-P-yyyymmdd-IODD1.1

*1: "yyyymmdd" indicates the file preparation date. yyyy is the year, mm is the month and dd is the date.

IODD files can be downloaded from the SMC website (https://www.smcworld.com).

○Service data

The tables below indicates the parameters which can be read or written by simple access parameter (direct parameters page) and ISDU parameters which are applicable to various parameters and commands.

*: The parameter data of this product is the Big Endian type.
When the transmission method of the upper communication is Little-Endian, the byte order will be changed.

●Direct parameters page 1

DPP1 address	Access	Parameter name	Initial value (dec)	Contents
0x07	R	Vendor ID	0x0083(131)	"SMC Corporation"
0x08				
0x09	R	Device ID	0x0002F6(758) 0x0002F7(759)	"ISE35-*-L(-M)" "ISE35-*-L-P"
0x0A				
0x0B				

●ISDU parameters

Index (dec)	Sub index	Access *1	Parameters	Initial value	Remarks
0x0002 (2)	0	W	System command	-	Refer to "System command" on page 59.
0x000C (12)	0	R/W	Device access lock	0x0000	Refer to "Device access lock parameters" on page 60.
0x0010 (16)	0	R	Vendor name	SMC Corporation	
0x0011 (17)	0	R	Vendor text	www.smcworld.com	
0x0012 (18)	0	R	Product name	Example: PSE540-L	
0x0013 (19)	0	R	Product ID	Example: PSE540-L	
0x0014 (20)	0	R	Product text	Pressure Sensor	
0x0015 (21)	0	R	Serial number	Example: "xxxxxxxx"	•Initial value is indicated as 8-digit. •16 octets fixed character string
0x0016 (22)	0	R	Hardware version	HW-Vx.y	x: Large revision number y: Small revision number
0x0017 (23)	0	R	Software version	FW-Vx.y	x: Large revision number y: Small revision number
0x0024 (36)	0	R	Device status parameter	-	Refer to "Device state parameters" on page 60.
0x0025 (37)	0	R	Device detailed state parameter	-	Refer to "Device detail status parameters" on page 60.
0x0028 (40)	0	R	Process data input	-	The latest value of process data can be read.

*1: R: Read, W: Wright

●System command (index 2)

In the ISDU index 0x002 SystemCommand (system command), the command shown in the table below will be issued.

The button of each system command is displayed on the IO-Link setting tool (excluding "ParamDownloadStore").

Click the button to send the system command to the product.

Writable commands are shown below.

Data type: 8 bit UInteger

Value (dec)	Function definition	Description
0x7E(126)	Locator Start	Flashing operation light used to locate
0x7F(127)	Locator Stop	Operation light stops flashing
0x80(128)	Device Reset	Restarts the device
0x81(129)	Application Reset	Clears peak/bottom value
0x82(130)	Restore Factory Settings	Restores factory default values
0xA0(160)	Zero Clear	Executes zero clear

●Device access lock parameters (index 12)
The contents are as follows.
Data type: 16 bit Record

Value (dec)	Contents
0x0000(0)	DS unlock (Initial value)
0x0002(2)	DS lock
0x0008(8)	DS unlock
0x000A(10)	DS lock

[Lock data storage (DS lock)]
Locking "Data storage" will invalidate the data storage function of the pressure switch.
In this case, access will be denied for backup and restoration of data storage.

●Device state parameters (index 36)
Readable device states are as follows.
Data type: 8 bit UInteger

Value (dec)	State definition	Description
0x00(0)	Normal operation	-
0x01(1)	Maintenance inspection required	Not available
0x02(2)	Outside specification range	Measured pressure range upper limit exceeded Falls below measured pressure range lower limit
0x03(3)	Function check	Not available
0x04(4)	Failure	Internal failure of digital pressure switch

●Device detail status parameters (index 37)
Detailed event contents of readable device status are as follows.

Array	Event content	Event classification		Event code	Error output mode target
		Definition	Value		
1	Internal failure of pressure switch	Error	0xF4	0x8D03	Available
2	Internal failure of pressure switch	Error	0xF4	0x8D04	-
3	Internal failure of pressure switch	Error	0xF4	0x8D05	Available
4	Internal failure of pressure switch	Error	0xF4	0x8D01	Available
5	Internal failure of pressure switch	Error	0xF4	0x8D06	-
6	Internal failure of pressure switch	Error	0xF4	0x8CD0	Available
7	-	-	0x00	0x0000	-
8	Measured pressure range upper limit exceeded	warning	0xE4	0x8C10	-
9	Fell below measured pressure range lower limit	warning	0xE4	0x8C30	-
10	-	-	0x00	0x0000	-
11	-	-	0x00	0x0000	-
12	Data storage upload request	notification	0x54	0xFF91	-

●Product individual parameters

Index (dec)	Sub index	Access *1	Parameter	Data storage *2	Date type *3	Initial value (dec)	Remarks
0x03E8 (1000)	0	R/W	Unit (Selection of display unit)	Y	U8	ISE35-*-L-(M)** : 0x00(0) ISE35-*-L-P** : 0x03(3)	Setting of display unit 0: MPa 1: kgf/cm^2 2: bar 3: psi
0x03F2 (1010)	0	R/W	CoL (Selection of display color)	Y	U8	0x02 (2)	Setting of display color 0: rEd (Constantly red) 1: Grn (Constantly green) 2: SoG (OUT1 turns green at ON) 3: Sor (OUT1 turns red at ON)
0x03FC (1020)	0	R/W	NorP (Selection of NPN/PNP)	Y	U8	0x01 (1)	Setting of switch output specification 0: NPN 1: PNP
0x04B0 (1200)	1	R/W	Output1(HW) (Selection of OUT1 hardware output target)	Y	U8	0x00 (0)	Setting of OUT1 hardware output target 0: HYS or wind 1: Err 2: oFF
	2	R/W	1ot(Error) (Selection of OUT1 normal/reversed output mode)	Y	U8	0x01 (1)	Setting of OUT1 output normal and reserved output at error output 0: 1_P (Normal output) 1: 1_n (Reserved output)
0x04BA (1210)	1	R/W	oUt1 (Selection of OUT1 (SW1) output mode)	Y	U8	0x00 (0)	Setting of OUT1 (SW1) output mode 0: HYS (Hysteresis) 1: Wind (Window comparator)
	2	R/W	1ot (Selection of OUT1 (SW1) normal/reversed output mode)	Y	U8	0x00 (0)	Setting of OUT1 (SW1) output normal and reserved output 0: 1_P (Normal output) 1: 1_n (Reserved output)
0x04C4 (1220)	1	R/W	P_1(n_1) (Setting of OUT1 (SW1) output set value)	Y	U16	0x015E (350)	Setting of OUT1 (SW1) output set value Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)
	2	R/W	H_1 (Setting of OUT1 (SW1) hysteresis)	Y	U16	0x000A (10)	Setting of OUT1 (SW1) hysteresis Setting range 0x0000 ~ 0x047E (0 ~ 1150)

●Product individual parameters (continued)

Index (dec)	Sub index	Access *1	Parameter	Data storage *2	Date type *3	Initial value (dec)	Remarks
0x04C4 (1220)	3	R/W	P1L(n1L) (Setting of OUT1 (SW1) output set value_ Lower limit of window comparator)	Y	U16	0x015E (350)	Setting of OUT1 (SW1) output set value (lower limit of window comparator) Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)
	4	R/W	P1H(n1H) (Setting of OUT1 (SW1) output set value_ Upper limit of window comparator)	Y	U16	0x0294 (660)	Setting of OUT1 (SW1) output set value (upper limit of window comparator) Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)
	5	R/W	WH1 (Setting of OUT1 (SW1) hysteresis_ Window comparator hysteresis)	Y	U16	0x000A (10)	Setting of OUT1 (SW1) hysteresis (window comparator hysteresis) Setting range 0x0000 ~ 0x023F (0 ~ 575)
	6	R/W	dtH1 (OUT1 (SW1) delay time at ON)	Y	U16	0x0000 (0)	Setting of OUT1 (SW1) delay time at ON Setting range 0x0000 ~ 0x03E8 (0 ~ 1000) 0.01 s increment
	7	R/W	dtL1 (OUT1 (SW1) delay time at OFF)	Y	U16	0x0000 (0)	Setting of OUT1 (SW1) delay time at OFF Setting range 0x0000 ~ 0x03E8 (0 ~ 1000) 0.01 s increment

●Product individual parameters (continued)

Index (dec)	Sub index	Access *1	Parameter	Data storage *2	Date type *3	Initial value (dec)	Remarks
0x0582 (1410)	1	R/W	SW2 (Selection of SW2 output mode)	Y	U8	0x00 (0)	Setting of SW2 output mode 0: HYS (Hysteresis) 1: Wind (Window comparator)
	2	R/W	2ot (Selection of SW2 normal/reversed output mode)	Y	U8	0x00 (0)	Setting of SW2 output normal and reversed output 0: 2_P (Normal output) 1: 2_n (Reversed output)
0x058C (1420)	1	R/W	P_2(n_2) (Setting of SW2 output set value)	Y	U16	0x015E (350)	Setting of SW2 output set value Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)
	2	R/W	H_2 (Setting of SW2 hysteresis)	Y	U16	0x000A (10)	Setting of SW2 hysteresis Setting range 0x0000 ~ 0x047E (0 ~ 1150)
	3	R/W	P2L(n2L) (Setting of SW2 output set value_ Lower limit of window comparator)	Y	U16	0x015E (350)	Setting of SW2 output set value (lower limit of window comparator) Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)
	4	R/W	P2H(n2H) (Setting of SW2 output set value_ Upper limit of window comparator)	Y	U16	0x0294 (660)	Setting of SW2 output set value (upper limit of window comparator) Setting range 0xFF9C ~ 0x041A (-100 ~ 1050)

●Product individual parameters (continued)

Index (dec)	Sub index	Access *1	Parameter	Data storage *2	Date type *3	Initial value (dec)	Remarks
0x058C (1420)	5	R/W	WH2 (Setting of SW2 hysteresis_ Window comparator hysteresis)	Y	U16	0x000A (10)	Setting of SW2 hysteresis (window comparator hysteresis) Setting range 0x0000 ~ 0x023F (0 ~ 575)
	6	R/W	dtH2 (SW2 delay time at ON)	Y	U16	0x0000 (0)	Setting of SW2 delay time at ON Setting range 0x0000 ~ 0x03E8 (0 ~ 1000) 0.01 s increment
	7	R/W	dtL2 (SW2 delay time at OFF)	Y	U16	0x0000 (0)	Setting of SW2 delay time at OFF Setting range 0x0000 ~ 0x03E8 (0 ~ 1000) 0.01 s increment
0x0708 (1800)	0	R/W	FiL (Digital filter)	Y	U16	0x0000 (0)	Setting of digital filter 0x0000 ~ 0x03E8 (0 ~ 1000) 0.01 s increment
0x0712 (1810)	0	R/W	FSC (Display value fine adjustment ratio)	N	S16	0x0000 (0)	Displayed pressure value can be adjusted within ±5%R.D. 0xFFCE ~ 0x0032 (-50 ~ 50) 0.1% increments
0x07E4 (2020)	0	R/W	rEv (Selection of display mode)	Y	U8	0x00 (0)	Setting of display mode 0: oFF (Normal display) 1: on (Reversed display)
0x0960 (2400)	0	R/W	ECo (Economy mode)	Y	U8	0x00 (0)	Setting of power saving mode 0: oFF 1: on
0x096A (2410)	1	R/W	Pin (use or unused of the security code)	Y	U8	0x00 (0)	Setting of use or unused of the security code 0: Unused 1: Used
	2	R/W	PinCodE (Security code)	Y	U16	0x0000 (0)	Setting of security code 0 ~ 999
0x1B58 (7000)	0	W	tES (OUT output test)	N	U8	-	0: Normal output 1: Fixed output
0x1B62 (7010)	0	W	tGL (Toggle output directive)	N	U8	-	0x00: Measurement value 0x10: OUT output 0x20: SW1 bit 0x21: SW2 bit 0xE0: Diagnosis bit 0xFE: Error bit (other than system error) 0xFF: Error bit (system error))

●Product individual parameters (continued)

Index (dec)	Sub index	Access *1	Parameter		Data storage *2	Date type *3	Initial value (dec)	Remarks
0x1F40 (8000)	0	R	Measurement related	Process data Conversion formula Inclination a	N	F32		Refer to table "Inclination and intercept to the unit specification". (Page 57)
0x1F4A (8010)	0	R	Measurement related	Process data Conversion formula Intercept b	N	F32		
0x1F54 (8020)	0	R	Measurement related	Peak value	N	U16	0	Refer to process data on page 55 to 57.
0x1F5E (8030)	0	R	Measurement related	Bottom value	N	U16	0	
0x1F72 (8050)	0	R	Diagnostic information	Number of pressurizing errors	N	U16	0	0 ~ 999
0x1F9A (8090)	1	R	oFS (Lower limit of rated pressure range)		N	U16	-	0
	2	R	SPn (Upper limit of rated pressure range)		N	U16	-	1000
	3	R	SrL (Lower limit of setting range)		N	U16	-	-100
	4	R	SrU (Upper limit of setting range)		N	U16	-	1050

*1: "R" means Read and "W" means Write.
*2: "Y" indicates that the parameter setting data is saved to the master, and "N" indicates that the parameter is not saved.
*3: Refer to the table below for the symbol.

Symbol	Data type (IO-Link standard)	Data length Bit [byte]	Description
U8	UIntegerT	8[1]	Unsigned integer
U16		16[2]	
S16	IntegerT	16[2]	Signed integer
F32	Float32T	32[4]	Floating point number

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).

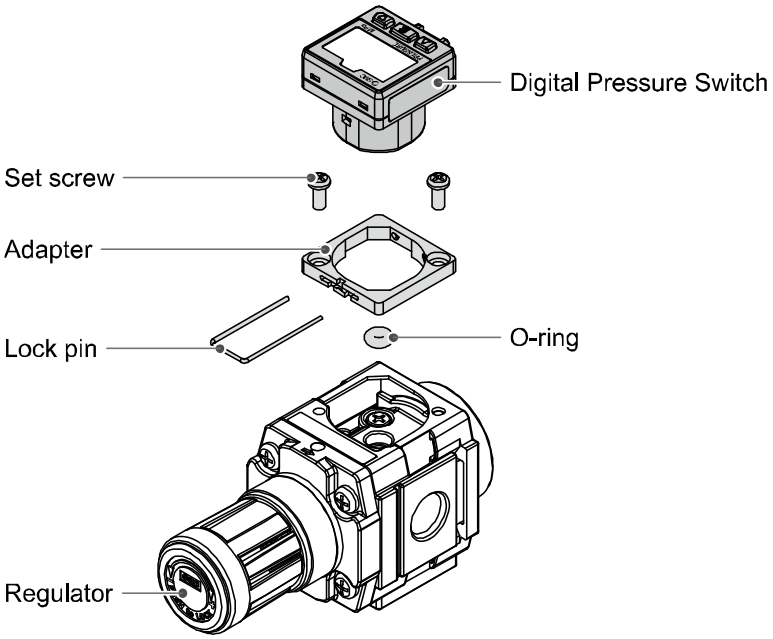
Mounting regulator

- Cut the power supply to the Pressure switch when assembling. Also, turn the set pressure of the regulator to zero.
- Mount O-ring to the O-ring groove of the regulator. Attention should be taken not to damage the O-ring.
- Set the adapter with 2 set screws.

Recommended tightening torque:

Modular AR/AW series	0.6±0.05 N•m
ARM10/11 series	0.32±0.03 N•m

- Mount the main body of the Pressure switch.
- Insert the lock pin to the adapter to the end firmly.
- Supply pressure slowly, and ensure no air leaks.
- The Pressure switch can be assembled with rotated 180 degree.



Forgotten the security code

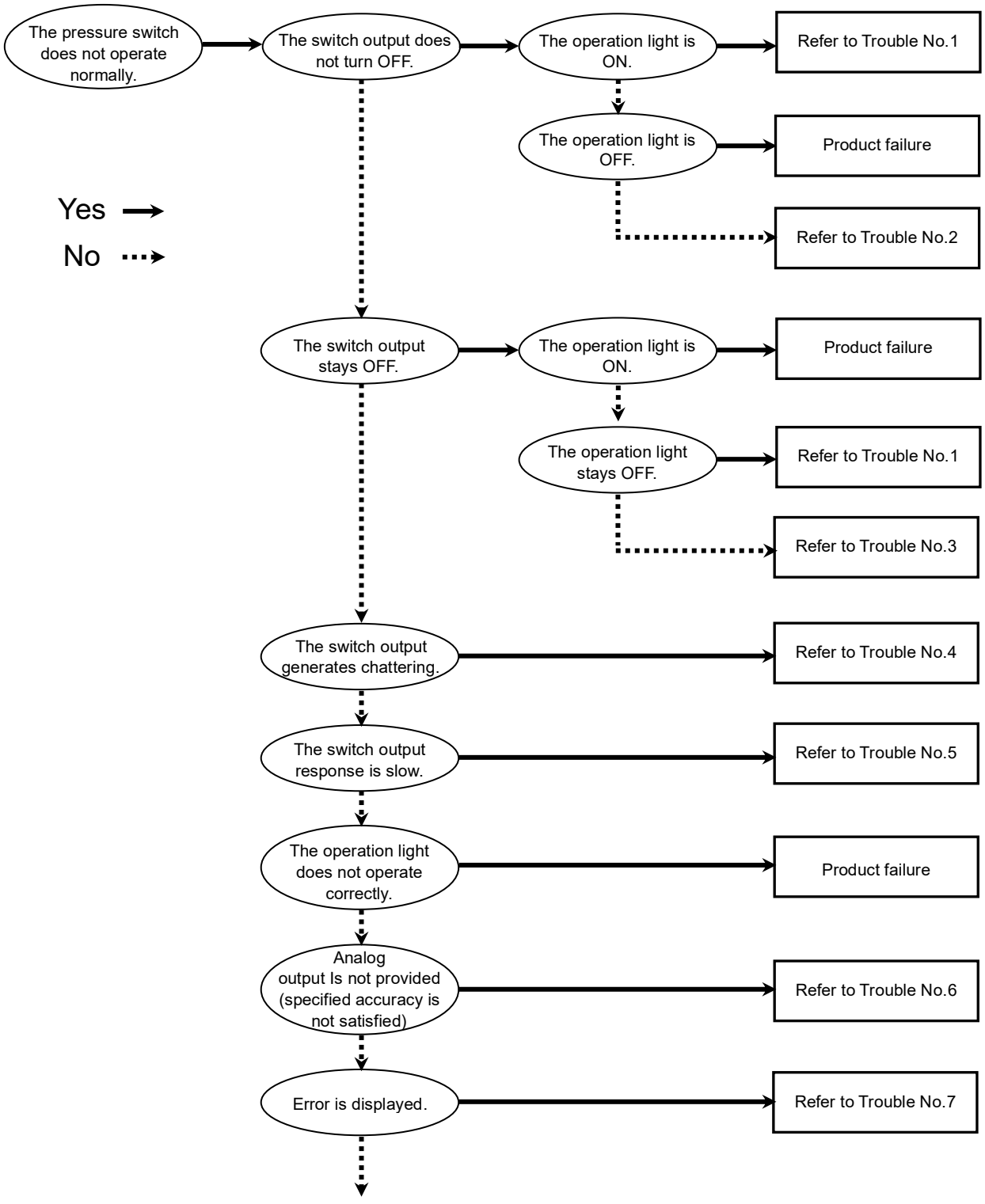
If you have forgotten your security code, please contact SMC directly.

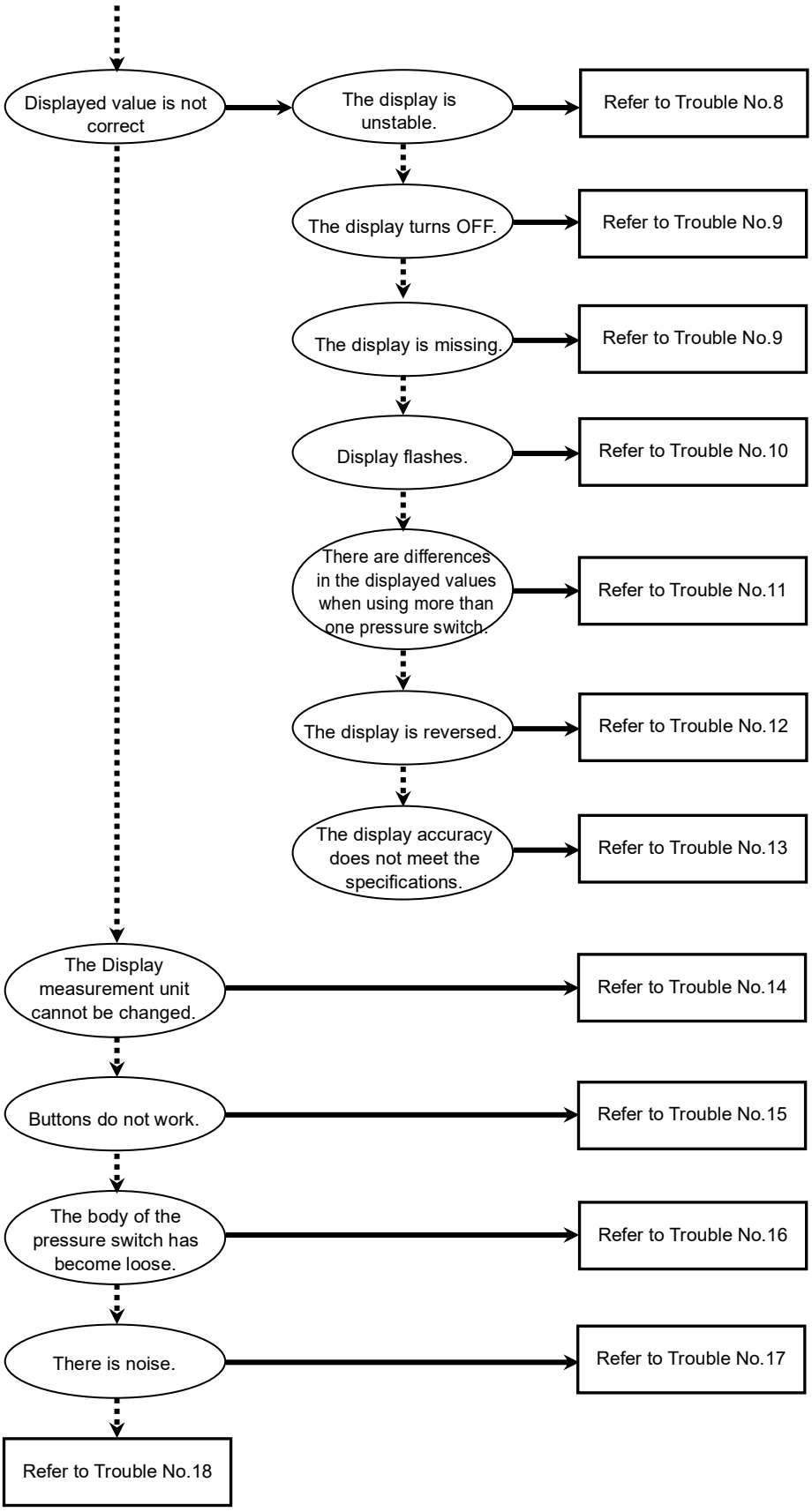
Troubleshooting

○Troubleshooting

Applicable pressure switch: ISE35-#-26/28/L

When any failure occurs with this product, the following chart can be used to identify the cause of the failure. If a cause applicable to the troubles cannot be identified and normal operation is recovered by replacement with a new product, this indicates that the product itself was faulty. Problems with the product may be due to the operating environment (installation etc). Please consult SMC.




Displayed value is not correct
The display is unstable.
Refer to Trouble No.8
The display turns OFF.
Refer to Trouble No.9
The display is missing.
Refer to Trouble No.9
Display flashes.
Refer to Trouble No.10
There are differences in the displayed values when using more than one pressure switch.
Refer to Trouble No.11
The display is reversed.
Refer to Trouble No.12
The display accuracy does not meet the specifications.
Refer to Trouble No.13
The Display measurement unit cannot be changed.
Refer to Trouble No.14
Buttons do not work.
Refer to Trouble No.15
The body of the pressure switch has become loose.
Refer to Trouble No.16
There is noise.
Refer to Trouble No.17
Refer to Trouble No.18

○Troubleshooting list

Problem No.	Problem	Problem possible causes	Investigation method	Countermeasures
1	•Output remains ON. Indicator LED remains ON. •Output remains OFF. Indicator LED remains OFF.	Incorrect pressure setting	(1) Check the set pressure. (2) Check the operation mode, hysteresis and output type. (hysteresis mode/window comparator mode, normal/reversed output)	(1) Reset the pressure setting. (2) Reset the function settings.
		Product failure		Replace the product.
2	Output remains ON. Indicator LED works correctly.	Incorrect wiring	Check the wiring of the output. Check if the load is connected directly to DC(+) or DC(-).	Correct the wiring.
		Product failure		Replace the product.
3	Output remains OFF. Indicator LED works correctly.	Incorrect wiring	Check the wiring of the output. Check if the load is connected directly to DC(+) or DC(-).	Correct the wiring.
		Improper model selection	Check the SW output specification setting. Check if the SW output is PNP while NPN is intended to be set, and vice versa.	Set the SW output specification again.
		Broken lead wire	Check if there is bending stress applied to any parts of the lead wire. (bending radius and tensile force applied)	Correct the wiring conditions. (adjust the tensile force and increase the bending radius.)
		Product failure		Replace the product.
4	Switch output generates chattering.	Incorrect wiring	Check the wiring. Check if the brown and blue wires are connected to DC(+) and DC(-) respectively, and if the output wiring is loose (contact failure).	Correct the wiring.
		Incorrect settings	(1) Check the set pressure. (2) Check that the hysteresis range is not too narrow. (3) Check the delay time setting. Check if the delay time is too short.	(1) Reset the pressure setting. (2) Increase the hysteresis. (3) Reset the function settings.
		Product failure		Replace the product.
5	Slow switch output response	Incorrect pressure setting	Check the pressure setting. Check that the detected pressure and the set pressure value are not the same or not too close.	Reset the pressure setting. Set the pressure setting value so it is not too close to the detected pressure.

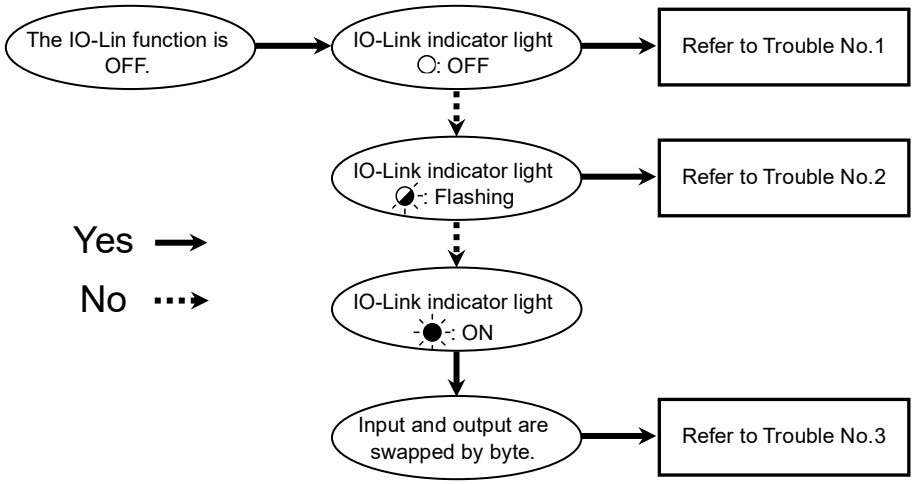
Problem No.	Problem	Problem possible causes	Investigation method	Countermeasures
6	Analog output is not provided. (specified accuracy is not satisfied.)	Incorrect wiring	Check that the analog output is connected to a load.	Correct the wiring.
		Non-compliance with the load spec.	(1) Check that the correct load is connected. (2) Check that the impedance of the input equipment (A/D transformer) is suitable.	Connect a suitable load.
		Insufficient warm-up time	Check if the product satisfies the specified accuracy after 10 minutes warm up time.	After energizing, the display and output can drift. For detecting fine pressures, warm up the product for 10 to 15 minutes.
		Product failure		Replace the product.
7	•An over current error (Er1) is displayed. •System error (Er0, Er4, Er6, Er7, Er8 or Er9) is displayed. •The display shows "HHH". •The display shows "LLL". •Residual pressure error (Er3) is displayed.	Over current to the output (Er1)	(1) Check that the switch output load current is not more than 80 mA. (2) Check that the connected load satisfies the specifications, and check the load for short circuits. (3) Check that any relay is connected with a surge voltage suppressor. (4) Check if the wiring is not in the same route as (or bundled together with) a high voltage cable or power cable.	(1), (2) Connect the load as specified. (3) Use a relay with a surge voltage suppressor or take measures to prevent noise. (4) Separate the wiring route from any high voltage cable or power cable.
		Incorrect operation of the internal data of the Pressure switch (Er0, Er4, Er6, Er7, Er8, Er9)	(1) Check that there is no noise interference such as static electricity, and check for noise sources. (2) Check that the power supply voltage is within the range 12 to 24 VDC ±10%.	(1) Remove the noise and the noise source (or take measures to prevent noise interference), and reset the product or turn off the power supply. Then, supply the power again. (2) Supply a correct voltage of 12 to 24 VDC ±10%.
		Applied pressure is above the upper limit (HHH)	(1) Check that the pressure is not above the upper limit of the set pressure range. (2) Check that foreign matter has not entered the piping.	(1) Adjust the pressure to within the set pressure range. (2) Take measures to prevent foreign matter from entering the piping.
		Applied pressure is below the lower limit (LLL)	(1) Check that the pressure is not below the lower limit of the set pressure range. (2) Check that foreign matter has not entered the piping.	(1) Adjust the pressure to within the set pressure range. (2) Take measures to prevent foreign matter from entering the piping.
		Pressure is not atmospheric pressure at zero-clear operation (Er3)	Check that during the zero clear operation, pressure above ±7% F.S. (±3.5%F.S. for compound pressure) was not applied.	Return the applied pressure to atmospheric pressure, and retry the zero clear operation.
		Product failure		Replace the product.

Problem No.	Problem	Problem possible causes	Investigation method	Countermeasures
8	Displayed value fluctuates.	Incorrect power supply	Check that the power supply voltage is within the range 12 to 24 VDC ±10%.	Supply the correct voltage of 12 to 24 VDC ±10%.
		Incorrect wiring	Check the wiring to the power supply. Check that the brown and blue wires are connected to DC(+) and DC(-) respectively and that the output wiring is not loose (contact failure).	Correct the wiring.
		Factory pressure change	Check if the factory pressure has changed.	If the fluctuation is not acceptable, the product display resolution can be changed. Digital filter setting also needs to be improved.
9	•Display turns OFF. •Part of the display is missing.	Incorrect power supply	Check that the power supply voltage is within the range 12 to 24 VDC ±10%.	Supply the correct voltage of 12 to 24 VDC ±10%.
		Incorrect wiring	Check the power supply wiring. Check that the brown and blue wires are connected to DC(+) and DC(-) respectively and that the output wiring is not loose (contact failure).	Correct the wiring.
		Power saving mode	Check if the power saving mode is selected.	Reset the function settings.
		Product failure		Replace the product.
10	Display is flashing.	Wiring failure	(1) Check the power supply wiring. (2) Check if there is bending stress applied to any parts of the lead wire.	(1) Correct the wiring (2) Correct the wiring conditions (reduce the tensile force and increase the bending radius).
11	Pressure display difference when using 2 or more Pressure switches.	Dispersion within the display accuracy range	Check if the dispersion is within the display accuracy range.	Use the fine adjustment mode to adjust the display if the dispersion is within the display accuracy range.
		Product failure		Replace the product.
12	The display is reversed.	Improper model selection (Selection of wrong electrical entry)	Check the part number for the electrical entry.	Review the selected model.
		Change of display mode	Check the selected display mode.	Change the display mode.

Problem No.	Problem	Problem possible causes	Investigation method	Countermeasures
13	The pressure display accuracy does not satisfy the specifications.	Foreign matter	Check if any foreign matter has entered the piping port.	Install a 5 μm filter to prevent foreign matter from entering the piping port. Also, clean the filter regularly to prevent drainage deposits.
		Air or fluid leakage	Check if air or fluid are leaking from the piping.	Rework the piping. If an excessive tightening torque is applied, the mounting bracket, screws or the product may be damaged.
		Insufficient warm-up time	Check if the product satisfies the specified accuracy after 10 minutes warm up time.	After energizing, the display and output can drift. For detecting fine pressures, warm up the product for 10 to 15 minutes.
		Product failure		Replace the product.
14	The display units cannot be changed.	Improper model selection (selection of model "without units selection function")	Check that the product No. printed on the product is equipped with unit switching function.	Unit selection function is not available for models which are fixed to SI units. (kPa↔MPa can be selected) ∗: The units selection function is not available in Japan due to a new measurement law. ∗: It is fixed to the SI unit "kPa", "MPa".
		Product failure		Replace the product.
15	The buttons cannot be operated.	Key lock mode	Check if the key lock mode is turned on.	Turn off the key lock mode.
		Product failure		Replace the product.
16	The product is loose.	Incorrect installation	Check that the panel mount adapter and the product are correctly assembled.	Mount the product on the panel correctly.
		Product failure		Replace the product.
17	The product is noisy.	Air or fluid leakage	Check if air or fluid are leaking from the piping.	Rework the piping. If an excessive tightening torque is applied, the mounting bracket, screws or the product may be damaged.
		Product failure		Replace the product.

Problem No.	Problem	Problem possible causes	Investigation method	Countermeasures
18	The operation is unstable. (chattering)	Effect of line pressure fluctuation because hysteresis is too narrow or delay time of the switch is too short	(1) Check the set pressure values (hysteresis) (2) Check the delay time.	(1) Check the pressure setting. (2) Reset the function settings.
		Incorrect wiring or broken lead wire	(1) Check the power supply wiring. (2) Check if there is bending stress applied to any parts of the lead wire.	(1) Correct the wiring (2) Correct the wiring conditions (reduce the tensile force and increase the bending radius).
		Product failure		Replace the product.

○Troubleshooting (IO-Link communication function)



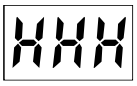
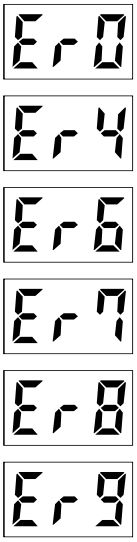
○Troubleshooting list (IO-Link communication)

Problem No.	Problem	Description	Problem possible causes	Investigation method	Countermeasures
1	IO-Link indicator light ○: OFF	—	incorrect wiring	Check the connection of the connector.	Correct the cable wiring.
			Power supply error from the IO-Link master	Check the power supply voltage from the IO-Link master.	Supply 18 to 30 VDC to the IO-Link master.
2	IO-Link indicator light ☼: Flashing	—	Communication is not established. IO-Link wiring failure	Check the connection and cable condition of the IO-Link cable.	Additionally tighten the IO-Link cable. (Replace the cable if it is broken.)
			Communication mode is not transferred to the Operation mode.	Check the setting of the data storage access lock and data storage backup level of the master.	Release the data storage access lock. Or deactivate the setting of the data storage backup level of the master port.
			Backup and restore required during data storage lock	Check the data storage lock.	Release the data storage lock.
		E 15	IO-Link master and product version are not matched.	Check the IO-Link version of the master and device.	Align the master IO-Link version to the device. *1
3	Data is swapped by byte.	—	Program data assignment is incorrect.	Check that the Endian type on the master upper level communication transmission format is Big Endian type or Little Endian type.	Assign the program data based on the Endian type of the transmission format of the master upper level communication. Or set to the master byte swap setting. (Refer to page 55 for the Endian type of the upper level communication.)

*1: When the product is connected to the master with version "V1.0", error Er15 is generated.

○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		The load current applied to the switch output has exceeded the maximum value.	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 greater than ±7% F.S. 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		Pressure exceeding the upper limit of the set pressure range is applied.	Reset applied pressure to a level within the set pressure range.
		Pressure exceeding the lower limit of the set pressure range is applied.	
System error		Displayed if an internal data error has occurred.	Turn the power off and on again. If the failure cannot be solved, contact SMC.
Version does not match		Version of master and IO-Link does not match. Mismatch because master version is 1.0.	Align the master IO-Link version to the device.

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

Specification

○Analog output specifications

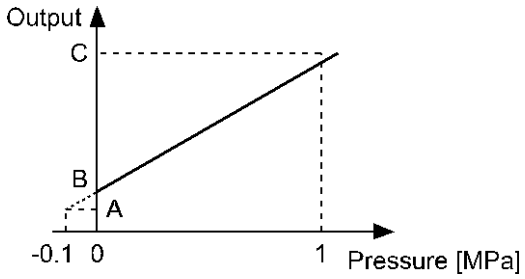
Product No.		ISE35-#-26-#	ISE35-#-28-#
Applicable fluid		Air, non-corrosive gas and non-flammable gas	
Pressure spec.	Rated pressure range	0 to 1 MPa	
	Display pressure range	-0.10 to 1.05 MPa	
	Display Min. unit	0.01 MPa	
	Proof pressure	1.5 MPa	
Power supply spec.	Power supply voltage	12 to 24 VDC±10%, ripple (p-p) 10% or less	
	Current consumption	55 mA or less (No-load)	
	Protection	Polarity protection	
Accuracy	Display accuracy	±2%F.S.±1 digit (at 25 °C±3 °C)	
	Repeatability	±1%F.S.±1 digit	
	Analog output accuracy	±2.5%F.S. (at 25 °C±3 °C)	
	Analog output linearity	±1%F.S.	
Analog output	Output type	Setting from 1 to 5 V or 0 to 10 V	4 to 20 mA
	Output impedance	Approx.1 kΩ	-
	Load impedance	-	Max. lead impedance 300 Ω (at power supply voltage of 12 VDC) 600 Ω (at power supply voltage of 24 VDC) Min. lead impedance: 50 Ω
Display	Unit *1	MPa, kgf/cm^2, bar, PSI	
	Display type	LED	
	Display color	Red/Green	
	Number of display digits	3 digits (7-segments)	
Digital filter *2		Variable at 0 to 10.0 s/0.01 s increments	
Environment	Enclosure	IP40	
	Ambient temperature range	Operating: -5 to 50 °C, Stored: -10 to 60 °C (No condensation or freezing)	
Standard		CE/UKCA marked, UL/CSA(E216656)	
Materials in fluid contact part		Pressure-sensing part: Silicone, Heat resistant PPS, O-ring: NBR	
Weight		Approx.14 g (Body only), Approx.38 g (Including lead wire with connector)	

∗1: This setting is only available for models with the units selection function. Only MPa is available for models without this function.

∗2: The response time indicates when the set value is 90% in relation to the step input.

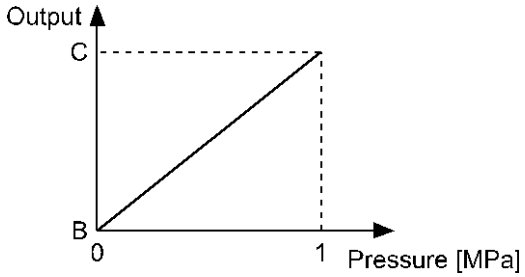
∗3: Any products with tiny scratches, smears, or variations in the display color or brightness, which does not affect the performance of the product, are verified as conforming products.

Voltage output (1 to 5 V)/Current output (DC4 to 20 mA)



Analog output	Rated pressure range	A	B	C
		-0.1 MPa	0 MPa	1 MPa
Voltage output (1 to 5 V)	0 to 1 MPa	0.6 V	1 V	5 V
Current output (4 to 20 mA)		2.4 mA	4 mA	20 mA

Voltage output (0 to 10 V)



Analog output	Rated pressure range	A	B	C
		-0.1 MPa	0 MPa	1 MPa
Voltage output (0 to 10 V)	0 to 1 MPa	-	0 V	10 V

○IO-Link specification

Product No.			ISE35-#-L-#
Applicable fluid			Air, non-corrosive gas and non-flammable gas
Pressure spec.	Rated pressure range		0 to 1 MPa
	Display/Set pressure range		-0.10 to 1.05 MPa
	Display/Min. setting unit		0.01 MPa
	Proof pressure		1.5 MPa
Power supply spec.	Power supply voltage	When used as a switch output device (When not used as an IO-Link device)	12 to 24 VDC±10%, ripple (p-p) 10% or less
		When used as an IO-Link device	18 to 30 VDC, including ripple (p-p) 10%
	Current consumption		55 mA or less (No-load)
	Protection		Polarity protection
Accuracy	Display accuracy		±2%F.S.±1digit (at 25 °C±3 °C)
	Repeatability		±1%F.S.±1 digit
Switch output (During SIO mode)	Output type		Setting from NPN or PNP open collector output 1 output
	Output mode		Hysteresis mode, window comparator mode, error output, output off
	Switch operation		Normal output, reversed output
	Maximum load current		80 mA
	Maximum applied voltage (NPN only)		30 V
	Internal voltage drop (Residual voltage)		1.5 V or less (Load current 80 mA)
	Delay time *1		10 ms or less + 0.00 to 10.0 s (Variable at 0.01 s increments)
	Hysteresis	Hysteresis mode	Variable from 0 *2
		Window comparator mode	
	Short circuit protection		Provided

Product No.		ISE35-#-L
Display	Unit *3	MPa, kgf/cm^2, bar, PSI
	Display type	LED
	Display color	Red/Green
	Number of display digits	3 digits (7-segments)
	Operation light	SIO mode: LED is ON when switch output is ON OUT: Red IO-Link communication: ON/Flashing OUT: Green
Digital filter *4		Variable at 0 to 10.0 s/0.01 s increments *2
Environment	Enclosure	IP40
	Ambient temperature range	Operating: -5 to 50 °C, Stored: -10 to 60 °C (No condensation or freezing)
Standard		CE/UKCA marked, UL/CSA(E216656)
Materials in fluid contact part		Pressure-sensing part: Silicone, Heat resistant PPS, O-ring: NBR
Weight		Approx.14 g (Body only), Approx.38 g (Including lead wire with connector)
IO-Link type		Device
IO-Link version		V1.1
Communication speed		COM2 (38.4 kbps)
Configuration file		IODD file *7
Min. cycle time		3.4 ms
Process data length		Input Data: 4 byte, Output Data: 0 byte
On request data communication		Available
Data storage function		Available
Event function		Available
Vendor ID		131 (0x0083)
Device ID		ISE35-*-L(-M): 0x0002F6 ISE35-*-L-P: 0x0002F7

∗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.

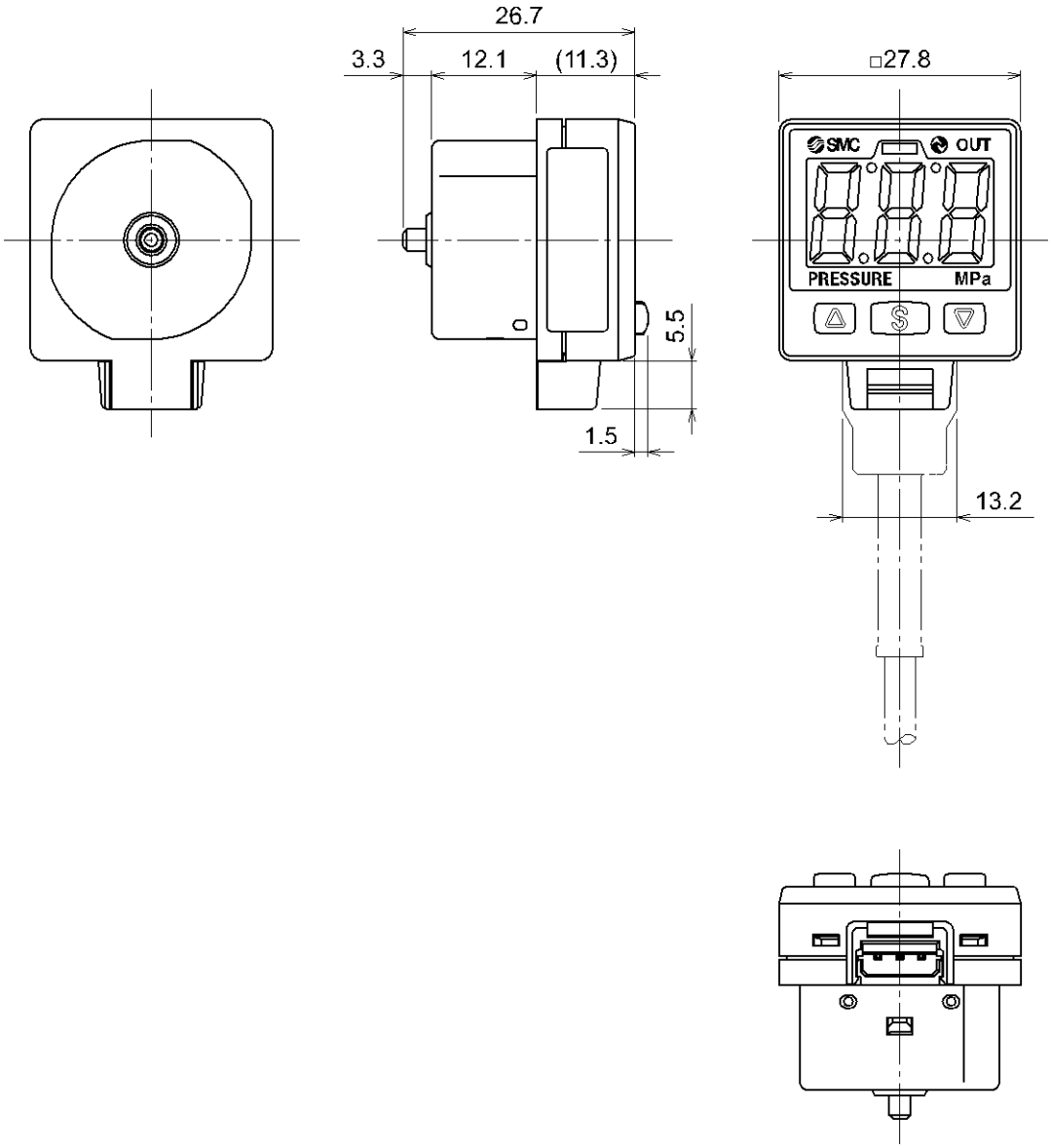
∗3: This setting is only available for models with the units selection function. Only MPa is available for models without this function.

∗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

∗6: Any products with tiny scratches, smears, or variations in the display color or brightness, which does not affect the performance of the product, are verified as conforming products.

■Dimensions



Revision history

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