Nidec

SMALL SIZE PRESSURE GAUGE

PG-35H

INSTRUCTION MANUAL   Ver.4.0

Thank you for purchasing a
NIDEC COMPONENTS CORP. product.
In order to use the product correctly and most
appropriately, please completely read this manual before
use and keep it for future reference.

Important Information and Warnings

⚠ CAUTION This caution mark describes when there is a possibility that user may suffer from damage or physical damage may occur if the product is used improperly.

⚠ **CAUTION**

These products (pressure sensors, pressure switches, pressure gauges, pressure indicators, leakage sensors, etc.) are designed and manufactured as general industrial parts. Therefore, a person with sufficient knowledge and experience shall confirm the conditions and environments described in the catalog, specifications, and instruction manual of each product, check the suitability of the product for the machine, device, or system which you use, and ensure safety before use.

These products are not intended to be used for applications particularly requiring high reliability (These include, but are not limited to, nuclear power control, aerospace and military purposes).

The details of warranty shall be as per the descriptions in this document and we shall not be liable for any damage on you resulting from the use of any equipment or device (including control systems) which is not in accordance with this document (hereinafter referred to as "use in violation"). In the case where you resell our products, we shall not be liable for any damage on a third party resulting from use in violation by the third party, and even if we make payment to the third party in connection with such use in violation regardless of the name by which such payment may be called, we may demand the whole amount thereof from you.

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① For stability, use a regulated direct current power supply.
Surge absorbing devices（diodes, varistors, etc.）are necessary if inductive loads such as relays or solenoids are connected to the same circuit as the PG-35H.
If using a DC power supply unit such as a switching power supply, the FG terminal should be earthed. Do not wire in parallel to high tension cables or power lines, or use cable ducts which contain high tension cables or power lines.

② Be careful not to crimp any wires during handling, or put any pressure on the display area of the main body while assembling piping.

③ Use pH neutral detergents to clean the body. Do not use solvents such as thinners.

④ This product is dust proof and drip proof（IP65 of IEC standards）and is not suitable for use in environments requiring higher standards.
Also, do not use this product in an environment with a possibility of product being covered by liquids other then water（Such as oil, solvent, and etc.）and outdoor.

⑤ Do not use pointed objects such as pens to press the setting buttons on the display panel, as this may push holes in the setting buttons and damage them.

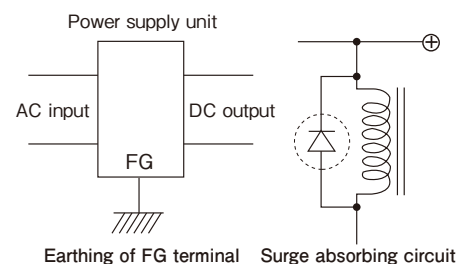⑥ Do not insert wires, etc. in the pressure port, as this may damage the internal diaphragm and cause malfunctioning.

⑦ The PG-35H series do not have an explosion proof structure. Do not use it for the detection of flammable gases.

⑧ When analog output is supplied to a noise-sensitive device,a low-pass filter is requested in a customer's circuit.

⑨ Countermeasures for noise interference:
Please connect either the shield wire or the metal part of the product to frame ground（FG）of the power source.

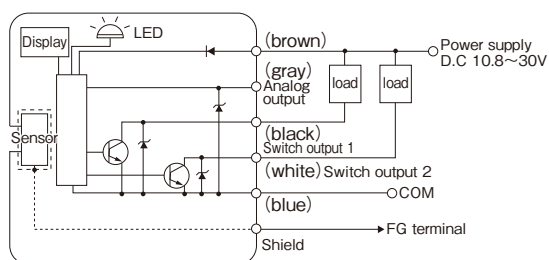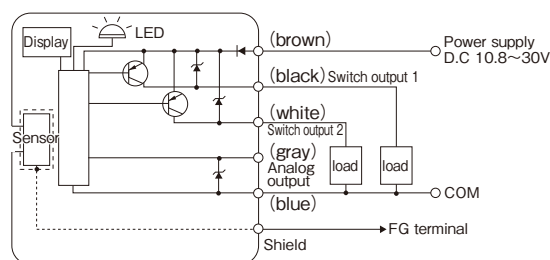⑩ In case a wire extension is needed, please use a shielded wire.

Power supply unit

AC input   DC output

FG

Earthing of FG terminal   Surge absorbing circuit

Specifications

Model		PG-35H	
		104R	**354R**
Type		Gauge pressure	
Rated pressure range		−0.1～10MPa	−0.1～35MPa
Maximum pressure		20MPa	50MPa
Break-down pressure		40MPa	50MPa
Acceptable media	R2	Oil that do not corrode Fe and Ni	
	G3	Liquids or gases that do not corrode SUS316	
Operating voltage		10.8～30VDC（including ripple）	
Current consumption		50mA maximum	
Switch outputs		Two outputs NPN/PNP:Transistor open collector Switch rating: 30VDC100mA maximum Residual voltage: 1.2V maximum（NPN）／2.2V maximum（PNP）at 100mA.	
	Hysteresis	0～300 counts setting（adjustable）	
	Repeatability	±0.2%FS±1digit	
	Response	Approx.5ms（Digital Fillter:"F-0"）	
	Short circuit protection	Exists	
Analog output		Output voltage 1～5V／Pin（L）～Pin（H）, Output impedance:10kΩ , Resolution:1／204 Only R／G mode.	
	Output mode	Pressure range　Pin（L）～Pin（H）	
	R	−0.1～10MPa	−0.1～35MPa
	G	0～10MPa	0～35MPa
	Output mode	Output voltage accuracy　Vzero（upper）／Vspan（Lower） （Vzero:Pin=0、Vspan:Pin=0～Pin（H））	
	R	1.04±0.2V 3.96±0.2V	1.01±0.2V 3.99±0.2V
	G	1±0.2V 4±0.2V	
Display		Full 3 digit LED display（display cycle:4 times per second）	
	Negative pressure display	− LED is lit	
	Display accuracy	±2%FS	
Operation display		SW1 LED（green）and SW2 LED（red）light up when switch outputs are ON	
Operating conditions	IP protection	Meets IP65（pressure gauge main body）of IEC	
	Operating temperature	−10 ～50℃（storage −20～70℃）	
	Operating humidity	35～85% RH	
	Insulation resistance	100MΩ minimum at DC500V between bundled leads and pressure port	
	Dielectric strength	One minute at AC500V between bundled leads and pressure port（1mA maximum leakage）	
	Vibration resistance	10～500HZ　1.5mm　maximum／98.1$^m/_{s^2}$,three directions, two hours each	
	Shock resistance	490m/s^2, three directions, three times each	
Thermal error		±3%FS（0～50℃）	
Fitting part types	R2	Fe,Ni,SUS316L	
	G3	SUS316,SUS316L	
Materials at pressure receiving area		SUS316L	
Net Weight		200±30g（incl. 2m cable）	

Output Electrical Diagram (Wire colors correspond to IEC standards)
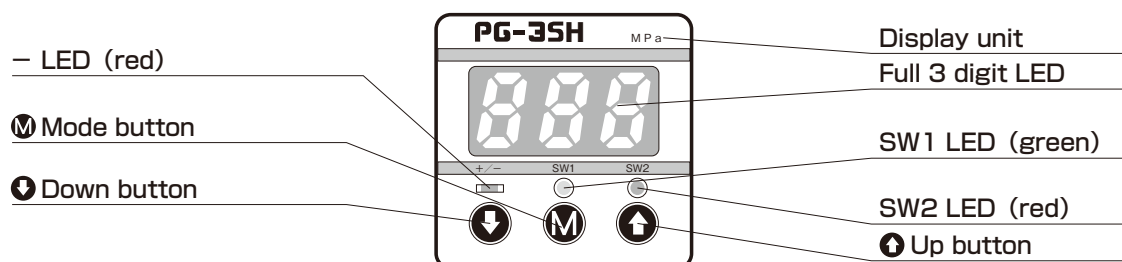
NPN Open Collector Output Model

Display — LED
(brown) — Power supply D.C 10.8~30V
(gray) Analog output
load   load
Sensor
(black) Switch output 1
(white) Switch output 2
COM
(blue)
Shield — FG terminal

PNP Open Collector Output Model

Display — LED
(brown) — Power supply D.C 10.8~30V
(black) Switch output 1
(white) Switch output 2
(gray) Analog output
load   load
Sensor
COM
(blue)
Shield — FG terminal

Wire color	Connection
Brown	Power ⊕
Gray	Analog output
Black	SW output1
White	SW output2
Blue	Common
Shield	FG terminal

Function Names

PG-3SH MPa

— LED (red)

Ⓜ Mode button

⬇ Down button

Display unit
Full 3 digit LED
SW1 LED (green)
SW2 LED (red)
⬆ Up button

Operating Procedures

Set magnification (four selections)
Set analog output (two selections)
Set switch output (eight combinations)

Initial Settings Mode

Press the ⬇ and Ⓜ buttons simultaneously →
← Press the Ⓜ button (more than one second)

Operations Mode

Press the ⬆ and Ⓜ buttons simultaneously →
← Press the Ⓜ button (more than one second)

Pressure Settings Mode

Setting1
Setting2
Hysteresis (0~300 counts)
Digital Filter (F-0~F-3)

Initial Settings Mode

PG-3SH MPa A21
PG-3SH MPa A21
PG-3SH MPa A21
PG-3SH MPa 218

Press the ⬇ and Ⓜ buttons simultaneously to enter the Initial Settings Mode.

Press the Ⓜ button to move to the next digit. The value of the digit may be set when the LED below the digit flashes.

Use the ⬇ and ⬆ button to set the value of each digit.

Press the Ⓜ button for more than one second to return to the Operations Mode.

The LED of an item flashes when selected using the Ⓜ button.

Note: Values A21 are set prior to delivery.

Press the Ⓜ button to move

Third digit	Second digit	First digit

A 2 1

Multiplier factor
2:×0.0102
6:×0.01
9:×145
A:×0.001

Analog output
1:R mode
2:G mode

Switch output
1~4:Separate Mode
5~8:Window Comparator Mode

▌Multiplier factor Setting

The multiplier factor setting is determined by the value of the third digit : the red −LED should be flashing during the setting.

	Muitiplier factor		Pressure range（−Pr～+Pr）	
			104R	354R
Value selected	1			
	2	×0.0102	−1.0～99.9	−1～357
	3			
	4			
	5			
	6	×0.01	−1.0～99.9	−1～350
	7			
	8			
	9	×145	−0.01～1.45	−0.01～5.07
	A	×0.001	−0.10～9.99	−0.1～35.0
	b			

Sections containing an oblique stroke are multiplier factor that cannot be selected because of resolving power or display digits.
（Values will not be displayed automatically.）
Note:"A" is set prior to delivery.

An example of setting "2".

In the operations mode, press the ⊙ and Ⓜ buttons simultaneously to enter the Initial Settings Mode.	▶	Press the Ⓜ button until the − LED under the third digit flashes.	▶	Set the value of the third digit to "2" using ⊙ and ⊙ buttons.	▶	Press the Ⓜ button for more than one second to return to the Operations Mode.

※Change of magnification setting is effective only for pressure reading. Set values for switching are not scaled automatically.

▌Analog Output Setting

The analog output setting is determined by the value of the second digit:the green SW1 LED should be flashing during the setting.

		Mode	−Pr　　　　　　　　0　　　　　　　　+Pr		
Value selected	1	R mode（Compound pressure output）	1V ·······▶ (Vzero) ·······▶ 5V		
	2	G mode（Positive pressure output）	1V ·······▶ 5V		

An example of setting the R mode in the 104R range.

In the Operations Mode, press the ⊙ and Ⓜ buttons simultaneously to enter the Initial Settings Mode.	▶	Press the Ⓜ button until the SW1 LED under the second digit flashes.	▶	Set the value of the second digit to "1" using the ⊙ and ⊙ buttons.	▶	Press the Ⓜ button for more than one second to return to the Operations Mode.

Note:G mode are set prior to shipment.

■ Switch Output Setting

The switch output setting is determined by the value of the first digit : the red SW2 LED should be flashing during the setting.

	Output	SW1 output				SW2 output			
	Mode	Separate		Window comparator		Separate		Window comparator	
	Operation	H	L	A	B	H	L	A	B
Value selected	1	○				○			
	2	○						○	
	3			○		○			
	4			○				○	
	5			○				○	
	6			○					○
	7				○			○	
	8				○				○
		Setting 1		Minimum: Setting 1 Maximum: Setting 2		Setting 2		Minimum: Setting 1 Maximum: Setting 2	
		Note 1		Note 2		Note 1		Note 2	

There are four operation modes. These are shown in the diagrams below.

Separate Mode	Window Comparator Mode
（H operation）	（A operation）
（L operation）	（B operation）
P1≦P2　or　P1≧P2	P1≦P2−2H

Note 1. In the Separate Mode, setting 1 corresponds to SW1, and Setting 2 corresponds to SW2.
Note 2. In the Window Comparator Mode, the minimum value for SW1 and SW2 corresponds to Setting 1 and the maximum value corresponds to Setting 2.
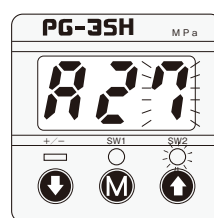
■ Window Comparator Mode
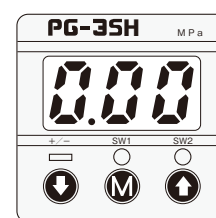（An example of setting the value"7"for the mode shown in the diagram.）
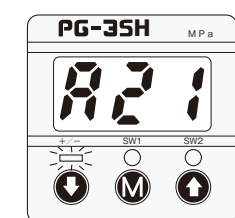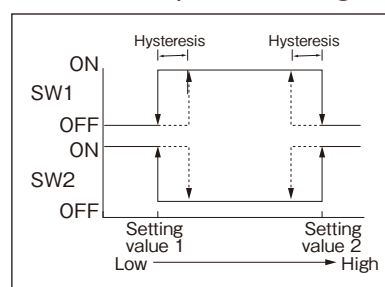
In the operations mode, press the ⬇ and Ⓜ buttons simultaneously to enter the Initial Settings Mode.
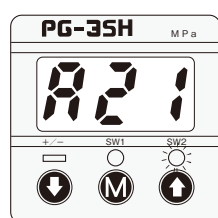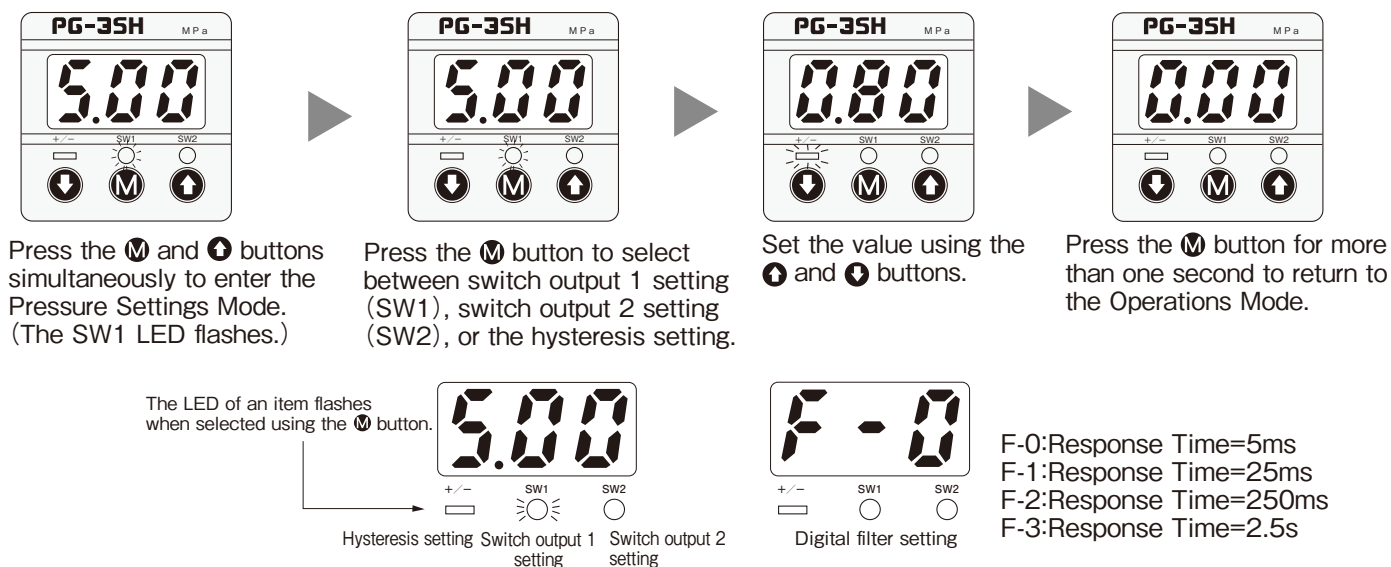
Press the Ⓜ button until the SW2 LED under the first digit flashes.

Set the value of the first digit to"7"using the ⬆ and ⬇ buttons.

Press the Ⓜ button for more than one second to return to the Operations Mode.

Pressure Settings Mode

Press the Ⓜ and ⬆ buttons simultaneously to enter the Pressure Settings Mode. (The SW1 LED flashes.)

Press the Ⓜ button to select between switch output 1 setting (SW1), switch output 2 setting (SW2), or the hysteresis setting.

Set the value using the ⬆ and ⬇ buttons.

Press the Ⓜ button for more than one second to return to the Operations Mode.

The LED of an item flashes when selected using the Ⓜ button.

Hysteresis setting   Switch output 1 setting   Switch output 2 setting

Digital filter setting

F-0:Response Time=5ms
F-1:Response Time=25ms
F-2:Response Time=250ms
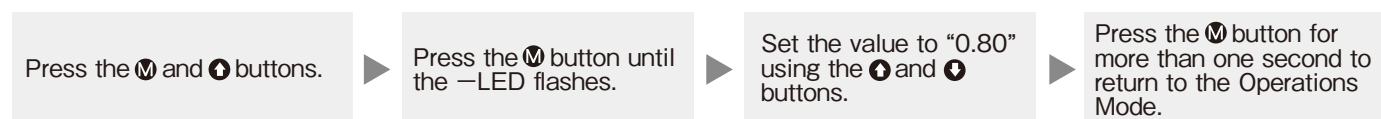F-3:Response Time=2.5s

Switch Output Setting

To set switch output 1 the SW1 LED should be flashing. (To set switch output 2 the SW2 LED should be flashing.)
An example of setting 6MPa for switch output 1 (SW1 LED is flashing) with 104R.

| Press the Ⓜ and ⬆ buttons | Press the Ⓜ button until the SW1 LED flashes. | Set the value to "6.00" using the ⬇ and ⬆ buttons. | Press the Ⓜ button for more than one second to return to the Operations Mode. |

Note:+50%F.S. is set prior to delivery.

Hysteresis setting
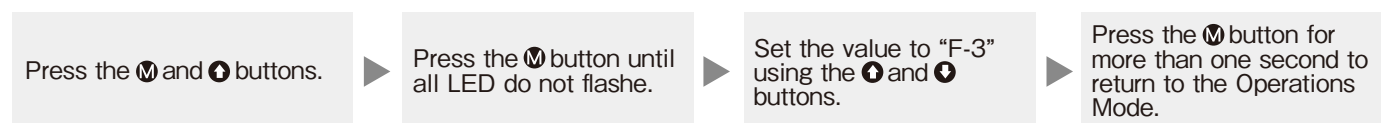
To set hysteresis the "−" LED should be flashing.
An example of setting a hysteresis value of 0.8MPa with the 104R (MPa).

| Press the Ⓜ and ⬆ buttons. | Press the Ⓜ button until the −LED flashes. | Set the value to "0.80" using the ⬆ and ⬇ buttons. | Press the Ⓜ button for more than one second to return to the Operations Mode. |

Note:20counts is set prior to delivery.

Digital Filter setting

To set Digital Filter all LED should be not flashing. An example of setting 2.5s response time by Digital Filter.

| Press the Ⓜ and ⬆ buttons. | Press the Ⓜ button until all LED do not flashe. | Set the value to "F-3" using the ⬆ and ⬇ buttons. | Press the Ⓜ button for more than one second to return to the Operations Mode. |

Note:"F-0" is set prior to delivery.

Troubleshooting

■If the following error messages are displayed, follow the procedures in the table.

Display and problem	Cause	Solution
E–1	Output current is exceeding 100mA.	Turn off the power and verify the load connected switch output 1 and 2.
E–2	Pressure was applied at the zero point adjustment.	Press M button and return the applied pressure to the atmospheric pressure and try zero-point adjustment again.
E–3,E–4	Failure of the internal circuit.	Please contact us. Please use a regulated DC power supply and measures for the power line noise.
999Flashing	Pressure values exceed the display range.	Normal state
Flashing of the pressure valie	Pressure values exceed the rated pressure range.(110%FS)	Normal state
Black out of the display	Non-display mode	Normal state（See Non-display mode.）
Disable the key operation	Key protection mode	Normal state（See Key protection mode.）

Zero point Adjustment
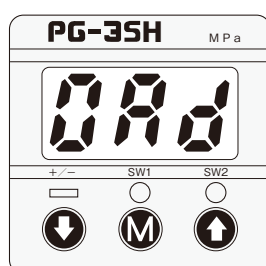
Pressing ⬇ the ⬆ and buttons simultaneously in the Operations Mode displays *0Ad* on the screen. One second later this change to *0* than the ⬇ and ⬆ buttons are released.（If the pressure port is opened to the atmosphere.）

Note: You have to adjust Zero under open air condition.
　　　Otherwise you can be seen E-2 error as you adjusted Zero with residual pressure.

Others

Piping

Use a wrench on the aluminum die-casting. Do not hold the plastic case when tightening.
Apply sealing tape at the male screw area（R2 type）to protect against air leaks.

Non-Display Mode

〈Non-Display［Temporary］Mode〉

・ When the keys are not operated for more than 10 seconds during Operation Mode, the system will automatically select Non-Display［Temporary］Mode and the display will turn off.
・ Decimal point LED shown in the figure below will blink during Non-Display［Temporary］Mode
・ Using the EEPROM, the PG-30/35 series can retain preset valies even if the power is turned off.
・ If an error message is detected, the display will comeback and show the error message.
・ You can change any functions during Non-Display［Temporary］Mode
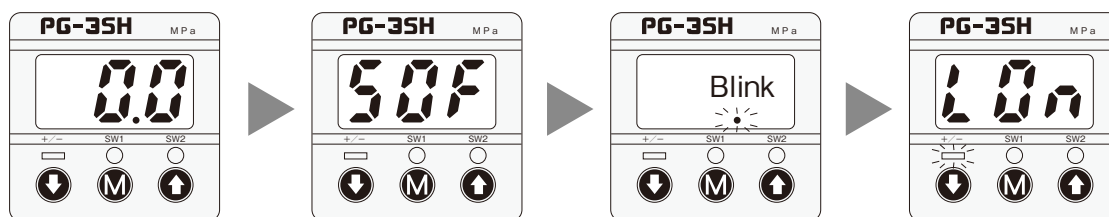
· To enable Non-Display〔Temporary〕Mode, press ⬇ key for more than 4 seconds. `5OF` will be displayed and Non-Display〔Temporary〕Mode will be set After 10 seconds. display will go off.
· To disable Non-Display〔Temporary〕Mode, press ⬇ key for more than 4 seconds. `LOn` will be displayed and Non-Display〔Temporary〕Mode will be canceled.

〈Non-Display〔Full-time〕Mode〉
· In Non-Display〔Full-time〕Mode, the display will be turned off and the keys will be locked.
· Decimal point LED shown in the figure below will light up during Non-Display〔Full-time〕Mode.
· Using the EEPROM, PG-30/35 series can retain the preset values even if the power is turned off.
· You cannot change any functions during Non-Display〔Full-time〕Mode.

〈How to set〉
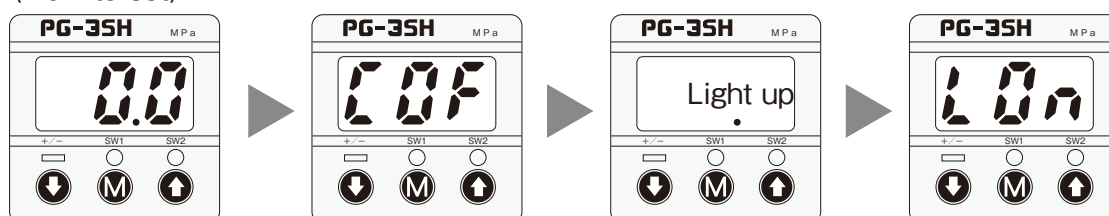
· To enable Non-Display〔Full-time〕Mode, press Ⓜ key for more than 4 seconds. `COF` will be displayed and Non-Display〔Full-time〕Mode will be set. Display will turn off in a secind.
· To disable Non-Display〔Full-time〕Mode, press Ⓜ key for more than 4 seconds. `LOn` will be displayed and Non-Display〔Full-time〕Mode will be canceled.

▌Key Protection Mode

〈Key Protection Mode〉
· key Protection Mode is used to lock the front panel key in order to prevent preset values from being accidentally changed.
· Using EEPROM. the PG-30/35 series can retain the preset values even if the power is turned off.
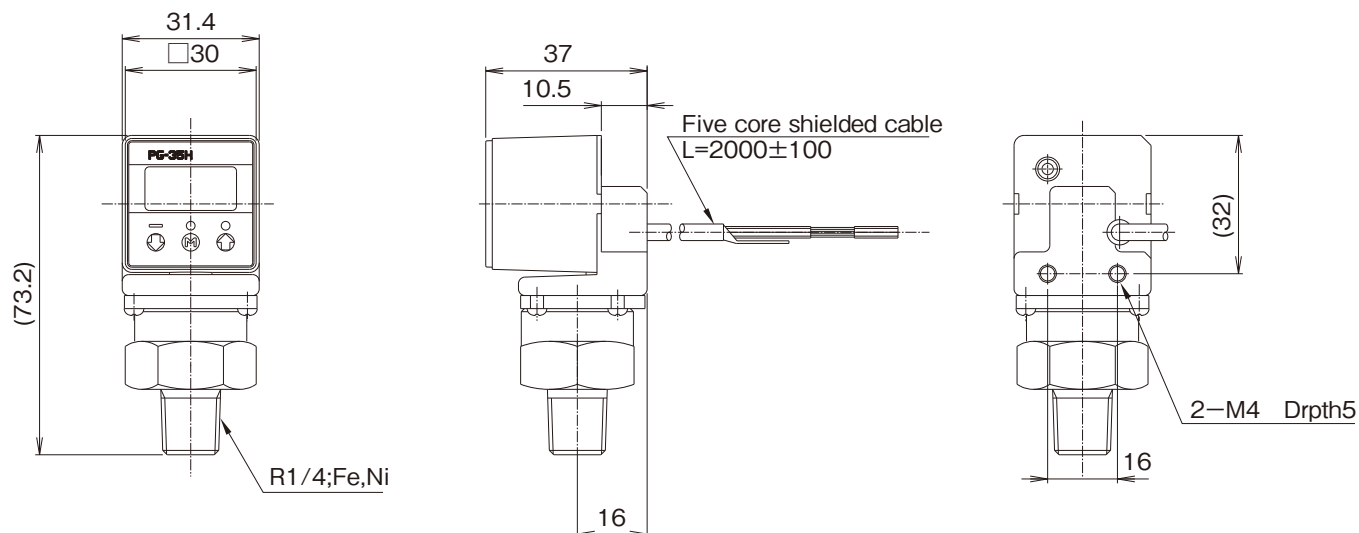
〈How to set〉
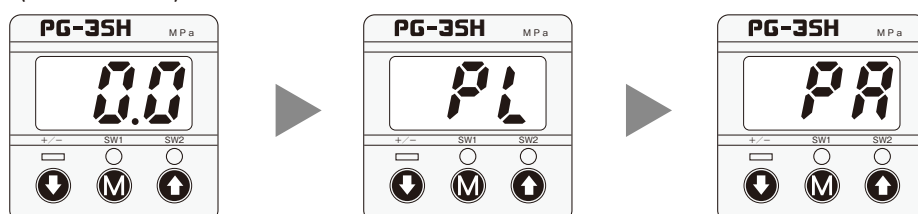
· To enable Key Protection Mode, press ⬆ key for more than 4 seconds. `PL` will be displayed and the keys will be locked.
· To disable Key Protection Mode, press ⬆ key for more than 4 seconds. `PA` will be displayed and the keys will be unlocked.

Outline Dimensions （Unit:mm）

■PG-35H Outline Dimensions

Fitting part:R2 type

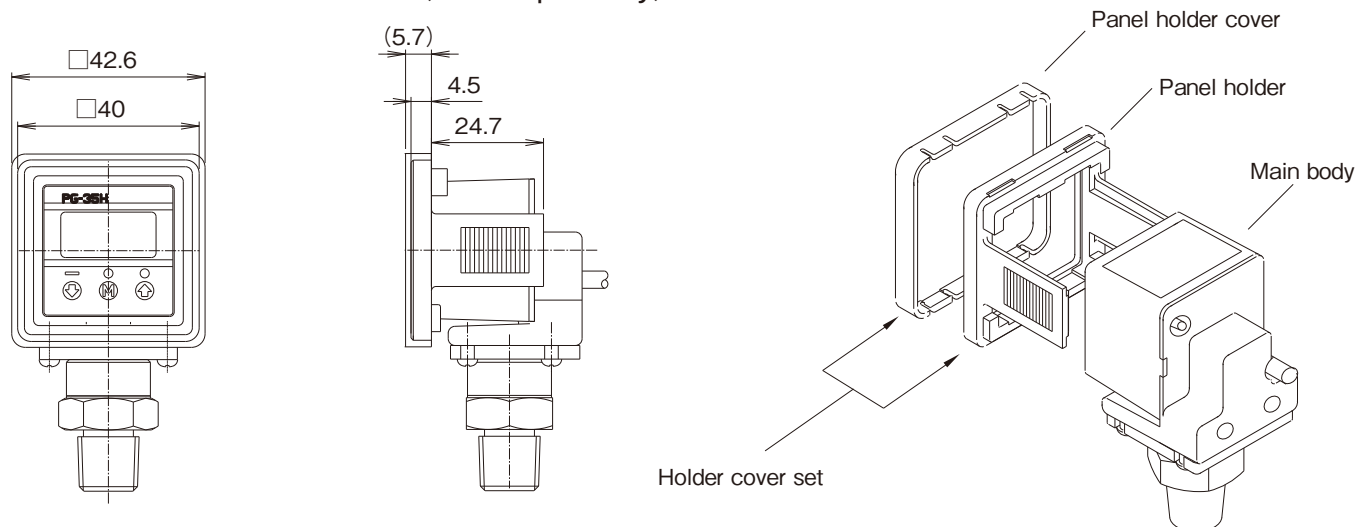31.4
□30

(73.2)

PG-35H

37
10.5

Five core shielded cable
L=2000±100

(32)

16

2－M4　Drpth5

R1/4;Fe,Ni

16

Fitting part: G3 type

31.4
□30

(79.2)

PG-35H

37
10.5

Five core shielded cable
L=2000±100

(32)

16

2－M4　Depth5

G3/8;SUS316L

16
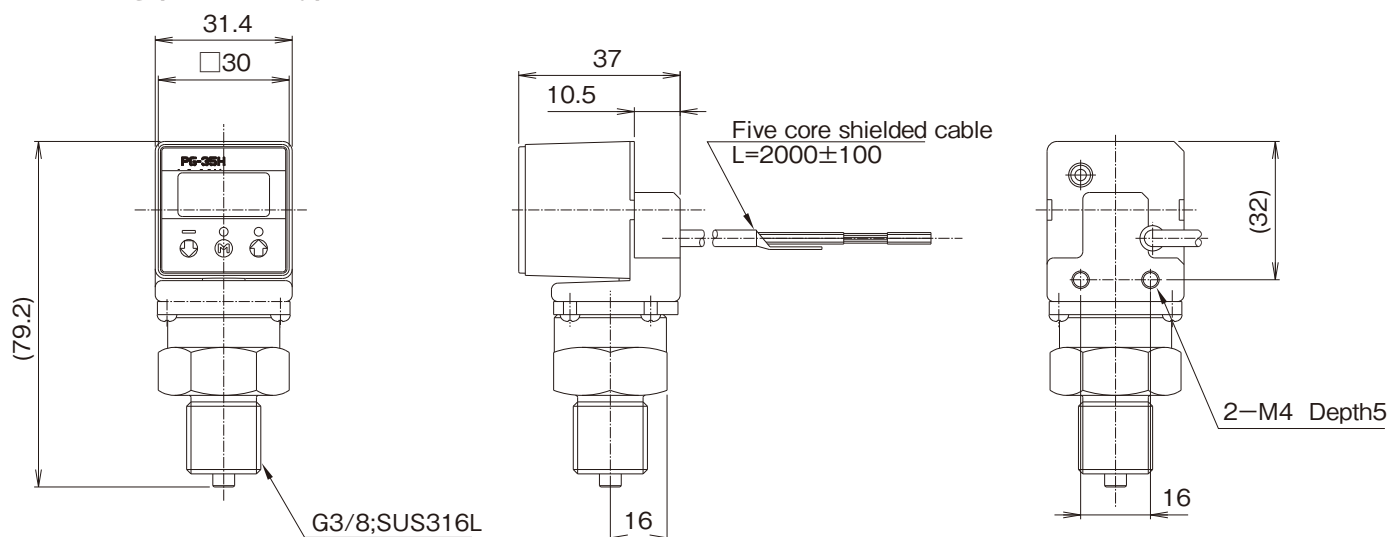
Brackets （Option）

■PG-35H Holder cover set （sold separately）

Panel holder cover

Panel holder

Main body

Holder cover set

■Accessories（Sold separately）

Name	Series name	Contents	Applicable model
Panel holder set	ACPG-003	Panel holder cover Panel holder Panel stopper (2pcs.)	PG-30・PG-35・PG-75 PG-35H・PG-35L・PS30
Holder cover set (For protecting gauge operating panel)	ACPG-004	Panel holder cover Panel holder	PG-30・PG-35・PG-75 PG-35H・PG-35L・PS30
Holder stopper set	ACPG-007	Panel holder Panel stopper (2pcs.)	PG-30・PG-35・PG-75 PG-35H・PG-35L・PS30

（Note）Since this product contains small components, please handle this product carefully.
Product can be damaged if an unwanted force is applied.

Warranty and Disclaimer

1）The warranty period of these products is one year after delivery to a designated place. The warranty mentioned here is limited to the warranty of a delivered product itself, and it does not cover consumables such as batteries. Each product has its own specifications such as durability (pressure cycles). Therefore, check with each service office.

2）If a failure or damage of the product occurs during the warranty period, for which we are responsible, we will promptly replace or repair the product free of charge. The warranty mentioned here means the warranty of the product itself and does not cover any damage induced by a failure of the product.

3）The warranty does not cover when any of the following items is applicable:
・The failure is caused by conditions, environments, or handling not described in the catalogue and agreed specifications and other documents.
・The product has been modified, adjusted, or repaired by a person/company other than our company after delivery.
・The failure cannot be foreseen by the scientific and technological knowledge at the time of delivery.
・The failure is caused by force majeure such as disasters.

Model Numbers

Pressure ranges
104:−0.1〜10MPa
354:−0.1〜35MPa

Fitting part types
R2:R1/4
G3:G3/8

$$PG-35H-104R-NR2$$

Model names
PG-35H

Indicator
R:Compound pressure
（negative pressure〜positive pressure）

Switch output type
N:NPN open collector
P:PNP open collector