

104602-1, 104602-2

104602-3, 104602-4

DIGITAL PRESSURE GAUGE



**READ THIS MANUAL CAREFULLY BEFORE INSTALLING,
OPERATING OR SERVICING THIS EQUIPMENT.**

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.

1. Safety Considerations:

- Please observe all safety considerations for safe and proper product operation to avoid hazards.
- Safety considerations are categorized as follows:

WARNING	Failure to follow these Instructions may result in serious injury or death.
CAUTION	Failure to follow these Instructions may result in personal injury or product damage.

- The symbols used on the product and instruction manual represent the following.
- Symbol represents caution due to special circumstances in which hazards may occur.

WARNING Fail-safe device must be installed when using the unit with machinery that may cause serious injury or substantial economic loss. (e.q. Nuclear power control, Medical equipment, Ships, Vehicles, Railways, Aircraft, Combustion apparatus, Safety equipment, Crime / disaster prevention devices, etc.)

- Do not use it in flammable gas because it does not have an explosion proof construction. Failure to follow this instruction may result in explosion.

CAUTION Do not apply pressure exceeding the rated pressure. This may cause damage to the product.

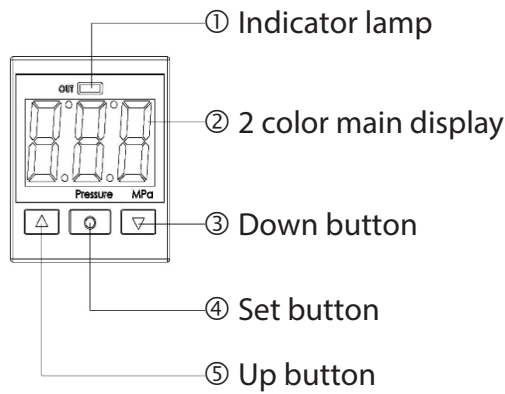
- Do not use beyond the power voltage range. This may cause damage to the product.
- Do not short-circuit the load. This may cause damage to the product.
- Please do not miswire the power supply, including the polarity. This may cause damage to the product.
- This product is for pressure detection of non-corrosive gases. Do not use for corrosive gases and liquids. This may cause damage to the product.
- Do not twist or apply force to the case of this product. This may cause damage to the product.

2. Caution during operation:

1. Do not put a point such as a needle into the pressure port. Sensor will be damaged and normal operation will not be done.
2. Avoid excessive transient (less than 3 seconds) during power input.
3. Please be careful not to let organic solvents such as thinner, water, oil, and come in direct contact.
4. When using a switching mode power supply with power line, be sure to ground the frame ground(F.G) terminal of the power line.
5. Please avoid wiring together with power lines or high-voltage lines may cause malfunctions due to noise.
6. When moving from a cold outdoors to a warm room, do not use until surface is completely dry of moisture.
7. Do not press each setting button with a sharp end of the needle or like.
8. Do not pull the wiring with tensile force of 30 Nm or more.
9. This product can be used under the following environmental condition.
 1. Inside
 2. Altitude less than 2,000 m
 3. Pollution Degree 2
 4. Category III (Installation Category III)

*The instructions given in the above handling precautions may cause the product to malfunction. Please be sure to observe.

3. Panel identification:

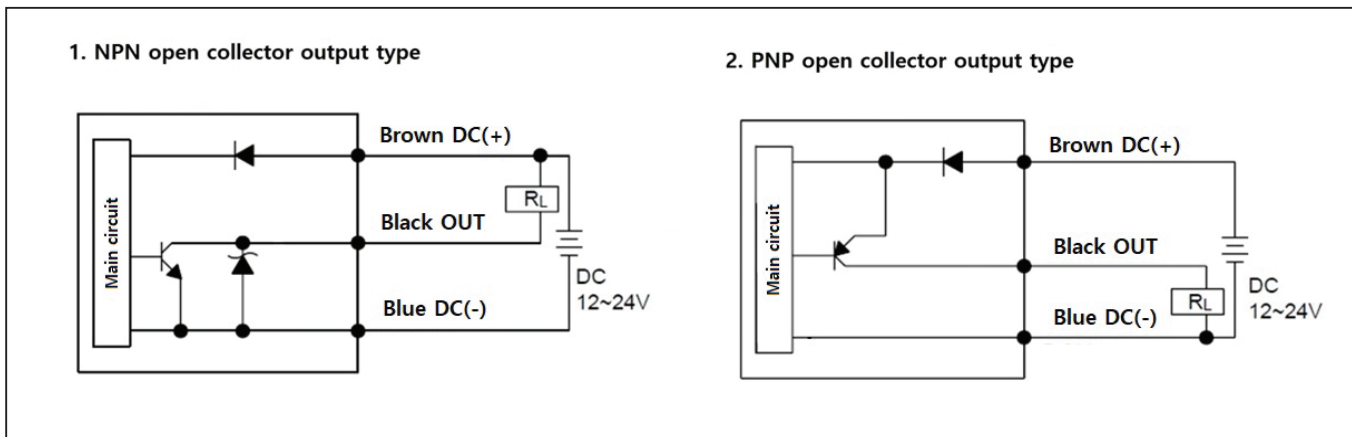


- ① - Indicator lamp : Turns on when digital output is on
- ② - 2 color main display : Detecting pressure value, setting menu & value, and errors, etc.
- ③ - Down button : Used to change the setting value to one lower level.
- ④ - Set button : Enter parameter setting, application mode, and save setting value.
- ⑤ - Up button : Used to change the setting value to one higher level.

4. Products line up:

Pressure gauge	Output	Applicable Models
104602-1	PNP	1000 SERIES R371 / P391
104602-2	PNP	1500 SERIES R372
104602-3	PNP	1500 SERIES P392
104602-4	PNP	2000 SERIES R373 / P393
		2000 SERIES R374 / P394

5. Input / Output circuit and connection diagram:



6. Pressure conversion chart:

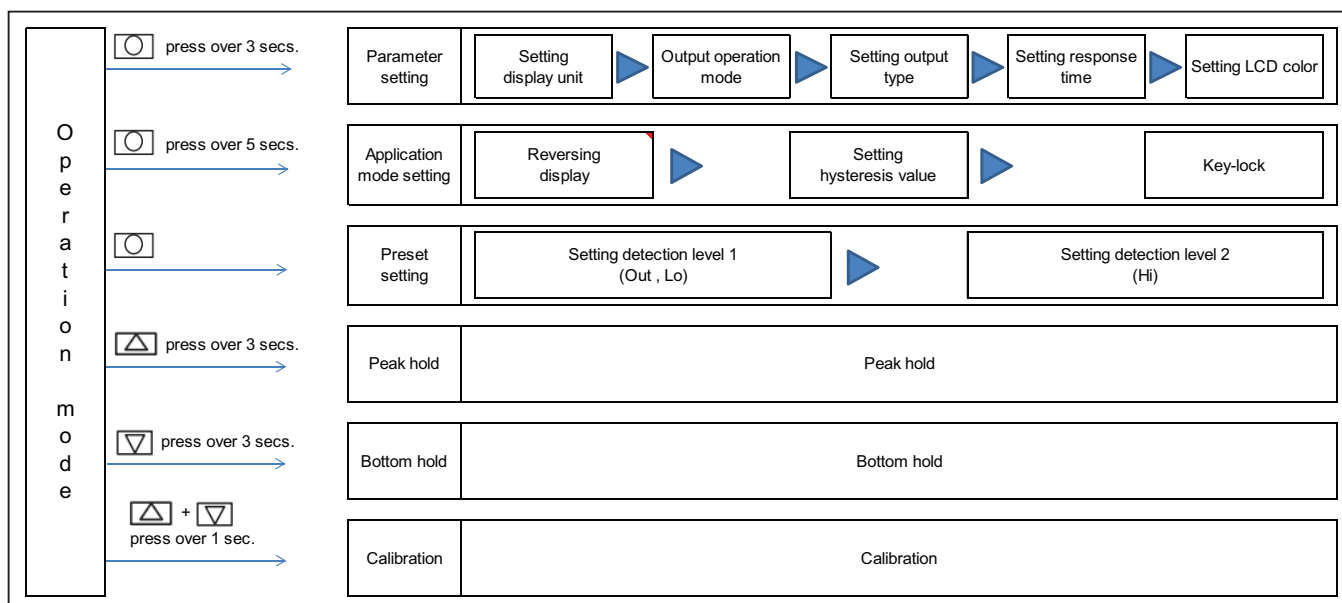
	Pa	kPa	MPa	kgf / cm ²	mm Hg	mm H ₂ O	psi	bar	in Hg
1 Pa	1	0.001	0.0000001	0.0000010197	0.007501	0.101972	0.000145038	0.00001	0.0002953
1 kPa	1000	1	0.001	0.010197	7.500616	101.9716	0.145038	0.01	0.2953
1 MPa	1000000	1000	1	10.197162	7500.61683	101971.553	145.038243	10	295.299875
1kgf / cm ²	98066.54	98.066543	0.09806	1	735.5595	10000.2	14.22334	0.980665	28.95878
1 mm Hg	133.322368	0.133322	0.000133	0.001359	1	13.5954	0.019336	0.001333	0.03937
1 mm H ₂ O	9.80665	0.0098	-	0.000099	0.0735578	1	0.00142	0.000098	0.002895
1 psi	6894.757	6.89757	0.00689	0.070307	51.7163	703.07	1	0.068947	2.036003
1 bar	100000	100	0.1	1.019689	750.062	10196.89	14.50339	1	29.5299800
1 in Hg	3386.417	3.388418	0.003386	0.034532	25.40022	345.31849	0.491158	0.033863	1

Ex) For calculating 760 mm Hg as kPa : According to above chart, 1 mm Hg is 0.133322 kPa, therefore 760 mm Hg will be $760 \times 0.133322 \text{ kPa} = 101.32472 \text{ kPa}$.

7. Specifications

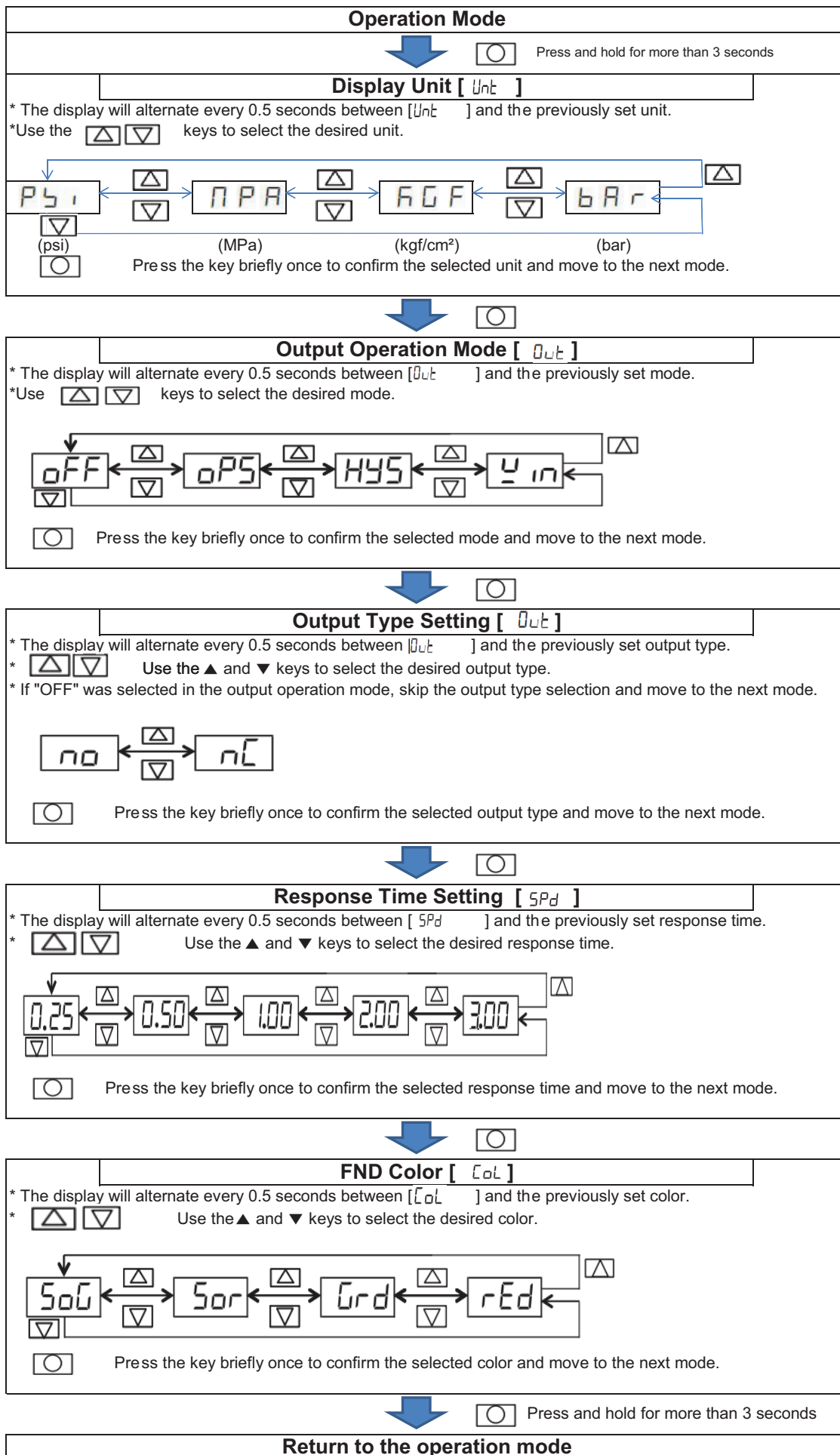
Pressure type		Gauge pressure		
		Standard pressure		
Model	Regulator	1000 SERIES R371 / P391	1500 SERIES R372 / P392	2000 SERIES R373 / P393 2000 SERIES R374 / P394
	PNP	104602-1	104602-2 / 104602-3	104602-4
Rated pressure range		0~145 psi		
Display and set pressure range		0~159 psi		
Max. pressure range		217.5 psi		
Fluid		Air, Non-corrosive gas		
Power supply		12 ~24 V DC (Ripple P-P : Max. 10%)		
Current consumption		40 mA or less (with no load)		
Control output		NPN or PNP open collect output		
		Load current : 100 mA or less		
		Residual voltage: 2 V or less		
		Hysteresis* ¹	1 ~ 8 digit	
		Repeatability	± 0.2% F.S. ±1digit	
Response time		Selectable among 2.5 ms, 5 ms, 100 ms, 500 ms, 1000 ms, and 2000 ms		
Short circuit protection		Integrated		
Display		3 digits / 7 segment LCD 2 color display (red / green)		
Minimum display gap		1 digit (psi 2 digits)		
Pressure unit		Mpa, kgf / cm ² , bar, psi		
Display accuracy		±2% F.S. ±1digit (ambient temperature 25±3°C)		
Environmental resistance	Ambient temperature	Operating : 0 ~ 50°C, Stored : -10 ~ 60°C (no condensation or freezing)		
		Operating / stored : 35 ~ 85% RH (no condensation)		
Material		Case : Nylon		
IP grade		IP40		
Wire		Ø4, 5P, length : 2 m		
Certificate		CE		
Weight* ² (gram)		69 (16)	86 (33)	
<p>* 1 : In hysteresis output mode, it is variable. * 2 : The weight is in packed condition and parenthesized is body only. * F.S (Full Scale) : Rated pressure * The environmental conditions of use are not freezing or condensation.</p>				

8. Setting



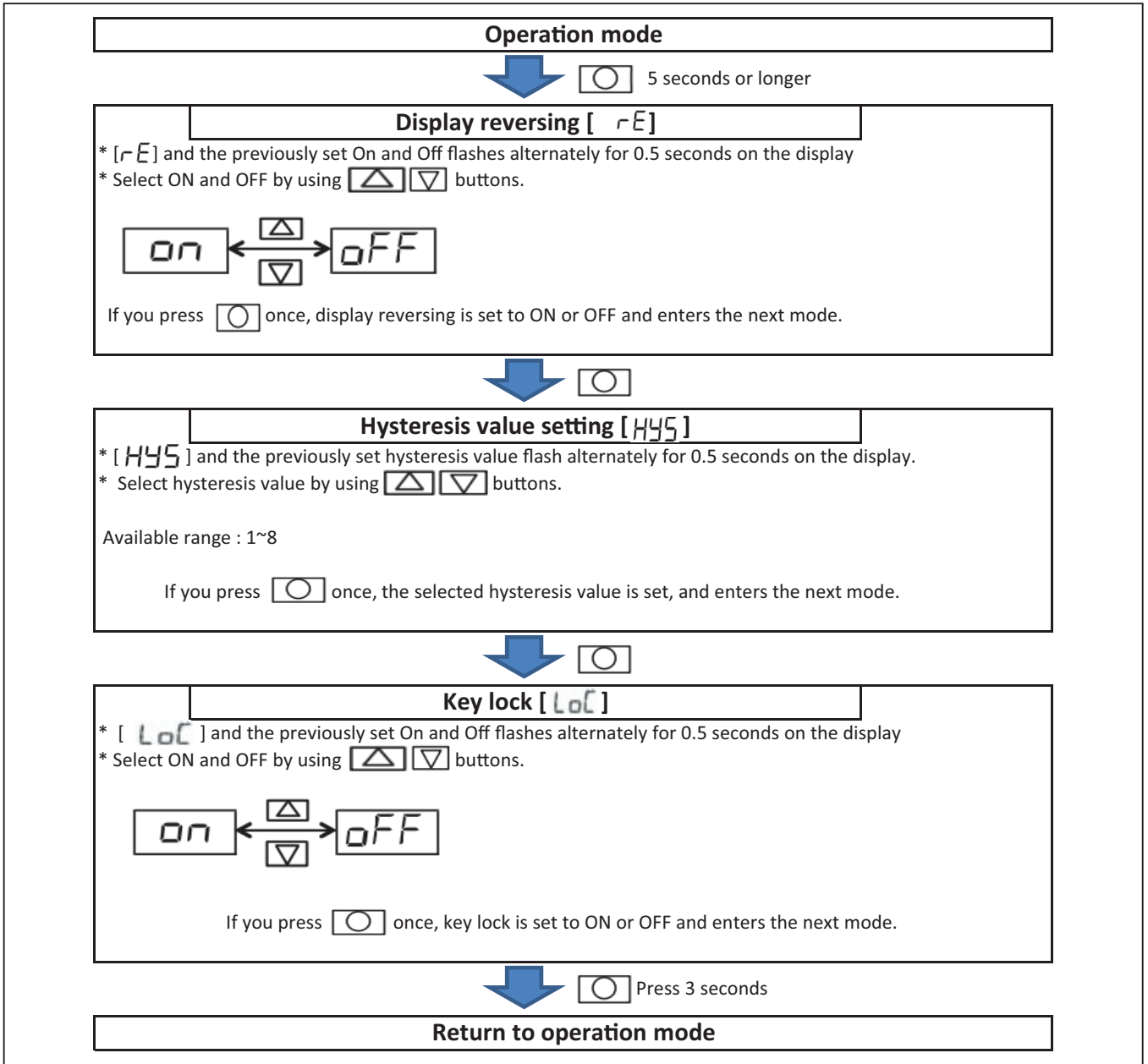
9. Parameter Settings

- Set the pressure display unit, output mode, output type, response time, and FND color.
- If the key lock is enabled, please unlock the keys before configuring the parameters.



10. Application mode setting

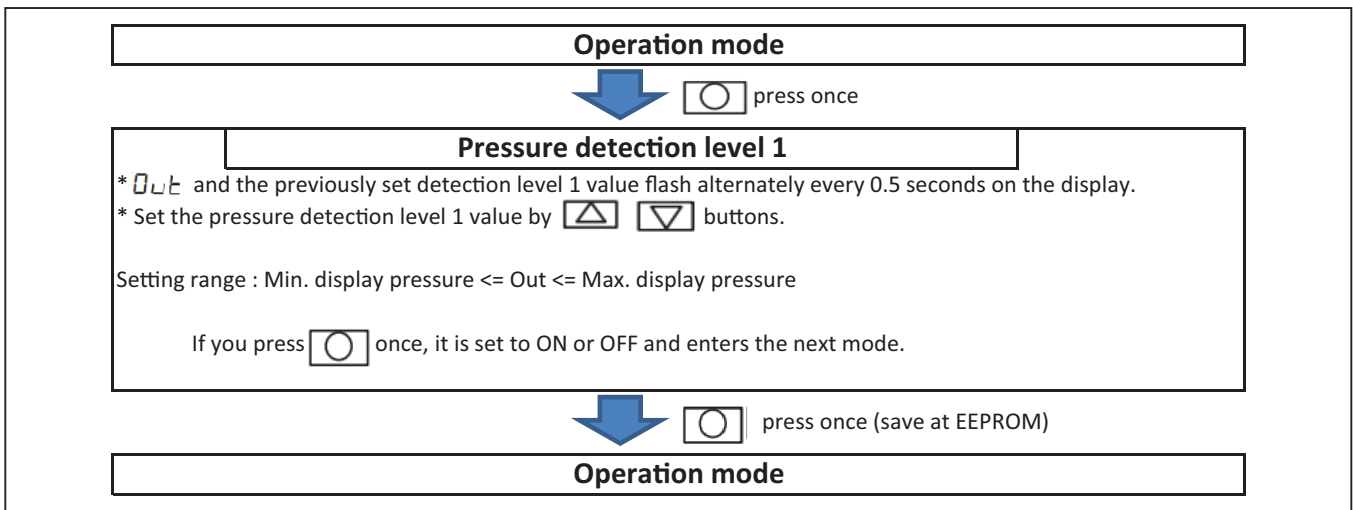
- Set display inversion, hysteresis value, and key lock.
- When the key lock is set, be sure to unlock the key before setting parameters.



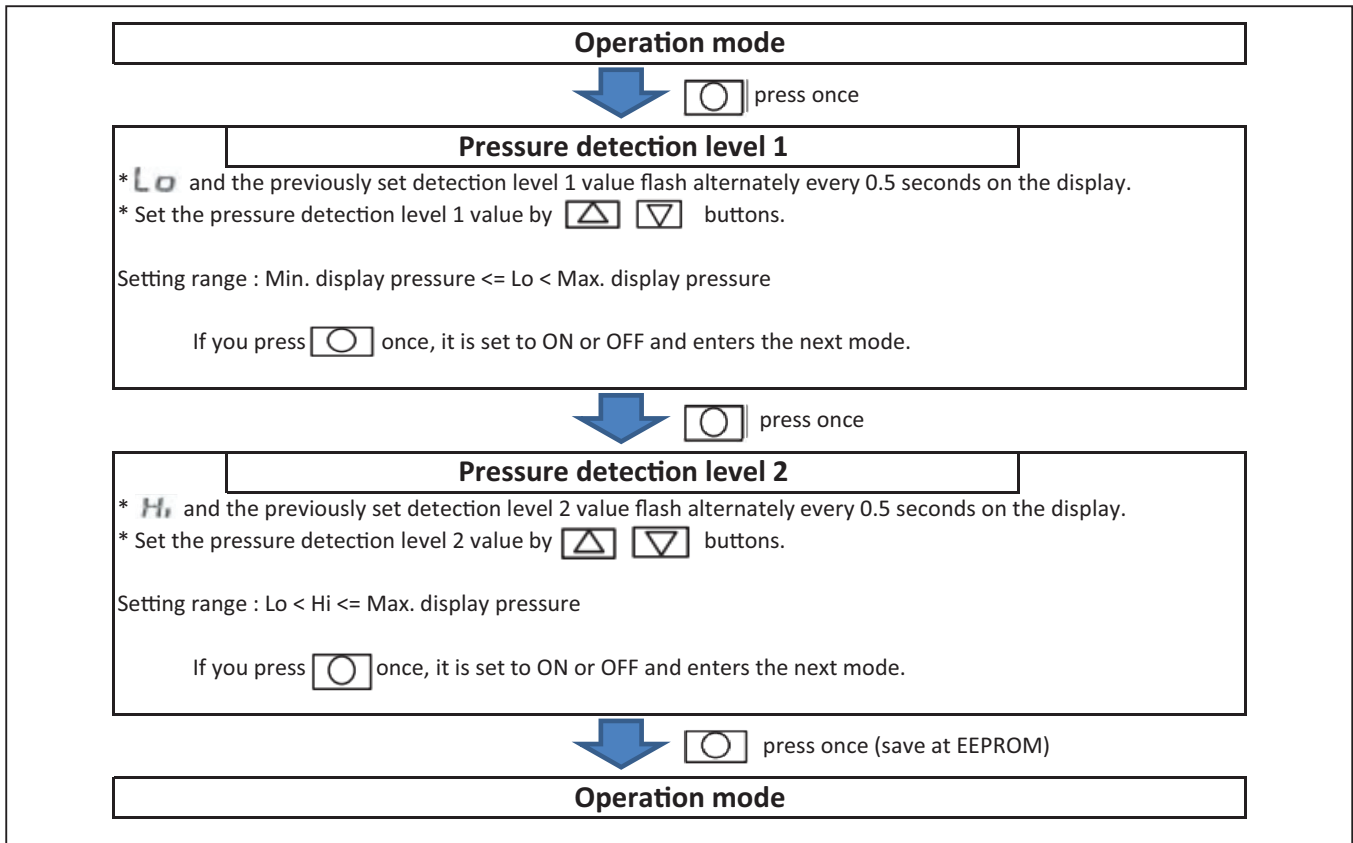
11. Preset value setting

- Set the pressure detection level.
- When the key lock is set, be sure to unlock the key before setting parameters.
- Please note that the setting method varies depending on the type of output operation mode.

12. One point mode (OPS)





13. Hysteresis mode(HYS), window comparator mode(WIN)



14. Peak hold and bottom hold check

14.1 Peak hold

1. In operation mode, press and hold [] for more than 3 seconds.
2. The display will alternate between [PE.H] and the maximum pressure value every 0.5 seconds, indicating the peak hold value.
3. Press [] to clear the stored peak hold value and return to operation mode.

14.2 Bottom hold

1. In operation mode, press and hold [] for more than 3 seconds.
2. The display will alternate between [BO.H] and the minimum pressure value every 0.5 seconds, indicating the bottom hold value.
3. Press [] to clear the stored bottom hold value and return to operation mode.

* If the peak hold or bottom hold value exceeds the upper display pressure limit, [HHH] will flash.
If it exceeds the lower display pressure limit, [LLL] will flash.

15. Pressure unit change

1. The 104602-X Series supports four types of pressure display units.
2. Please select and use the desired unit.

★ Pressure Units: Mpa, Kg/cm², Bar, Psi

16. Response time change



1. Changing the response time prevents control output chattering.
2. There are five types of response times available for setting (0.25 sec, 0.5 sec, 1.0 sec, 2.0 sec, 3.0 sec).
3. The longer the response time, the more digital filters are applied, providing more stable detection.

17. FND color change

1. The display color can be changed to RED or GREEN.
2. There are four modes available for changing:

- ★ SoG: The display changes to GREEN when OUT is active.
- ★ Sor: The display changes to RED when OUT is active.
- ★ Grn: The display changes to GREEN.
- ★ Red: The display changes to RED.

18. Calibration

In operation mode, open the pressure port, then press the  and  keys simultaneously for more than 1 second. Once the calibration is completed, 0 will be displayed.

- ★ If external pressure is applied during calibration, Er1 will flash while the key is pressed.
- ★ Please calibrate regularly.

19. Error Display and Handling

In case of an error, please resolve it using the following methods:

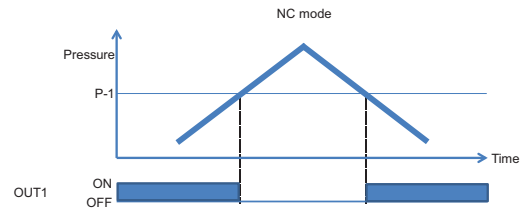
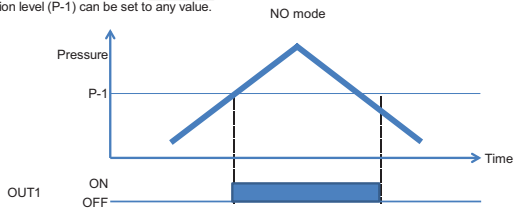
Code	Cause	Resolution
Er1	If external pressure is applied during calibration	Remove external pressure and retry.
Er2	Over current in the OUT output	Remove the overload from the OUT output.
HHH	If applied pressure exceeds the upper range of display	Apply pressure within the range of display
LLL	If applied pressure exceeds the lower range of display	

20. Output operation mode

* 104602-X models have 3 output operation modes. Use the proper operation mode in accordance with the desired application of detection.
 * If the output setting mode is set NC, the output will be reversed.

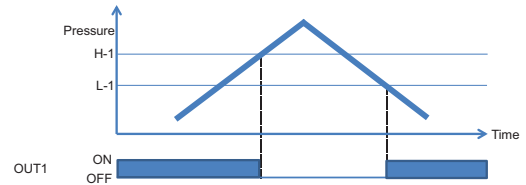
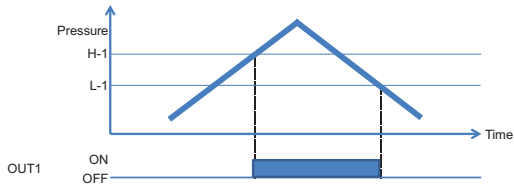
● One point setting mode [**OPS**]

The pressure detection level (P-1) can be set to any value.



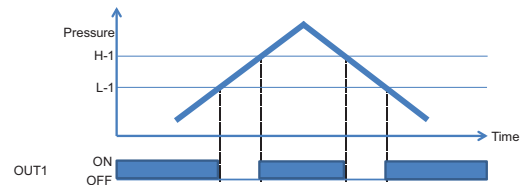
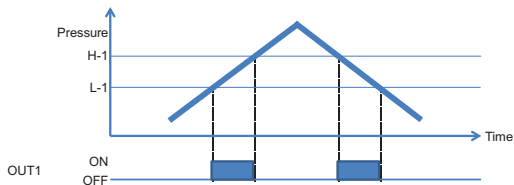
● Hysteresis mode [**HYS**]

① The pressure sensing level [H-1] and sensing difference [L-1] can be set to any value.
 ② The detection hysteresis is fixed to 1 digit.



● Window comparison output mode [**WIN**]

① The upper limit value [H-1] and lower limit value [L-1] of the pressure detection level can be set.
 ② The detection hysteresis is fixed to 1 digit.



21. Regulator Assembly Instructions

- Please turn off the switch's power.
- Cut off the pressure supplied to the regulator and ensure the set pressure is at zero.
- Attach the O-ring to the regulator's O-ring groove.
- Secure the adapter with two screws.
- (Be careful not to apply excessive force to the screws, as it may damage the adapter.)
- Mount the switch body.
- Insert the retaining pin into both the adapter and the switch.
- (Make sure to push it all the way in.)
- Slowly supply pressure to the regulator and confirm there is no air leakage.
- The pressure switch can be assembled in either direction, up to 180°.
- For the pressure display inversion function, refer to the application mode settings.

