



# GC61 Digital Pressure Gauge Operation Manual

 **NAGANO KEIKI**

2016. 3

Rev.A

## For proper and safe operation

GC61 Digital Pressure Gauge is a compact digital pressure gauge which complies with the EMC Directive.

In order to safely and properly utilize this device, please read this operation manual carefully. Incorrect operation may cause malfunction, damage, or an accident.

 <b>Warning</b>	<p>Indicates that incorrect use may result in severe injury or loss of life.</p>
 <b>Caution</b>	<p>Indicates that incorrect use may result in risk of injury or property damage.</p>
 <b>Warning</b>	<ol style="list-style-type: none"> <li>1. Do not apply pressure greater than the maximum allowable pressure. This may cause damage or burst of the pressure element and also injury or damage to the surroundings.</li> <li>2. Use of a non-designated power source may cause a fire or electrical shock.</li> <li>3. Do not apply excessive weight, vibration or shock. This may cause damage or burst of the unit and release of the measurement fluid. It will result in injury or damage to the surroundings.</li> <li>4. This device is not explosion-proof. Do not use this device in the areas where flammable or explosive gases or liquids are located.</li> <li>5. Perform wiring according to the wiring faceplate or the wiring instructions of this operation manual. Incorrect wiring may cause injury or a fire.</li> <li>6. Use this device within the operating temperature range. Using outside the range of operating temperature may cause malfunction or damage of the unit and also injury or damage to the surroundings.</li> <li>7. Perform installation carefully according to the installation instructions of this operation manual.</li> <li>8. Do not disassemble or alter this device. Also, do not remodel this device by adding new functions. Contact the manufacturer for repairs.</li> <li>9. Perform operation of the switches carefully according to the operation instructions of this operation manual. Incorrect operation may cause malfunction.</li> <li>10. Since this device is a precision electronic instrument, keep this device as far away from noise source as possible. Also, remove noise from power source of this device by using noise filter, etc.</li> </ol> <p>※ Please do not use this device if its breakdown or malfunction may threaten human life directly or it may harm human body.</p>

## Warranty

If the delivered products within the warranty period (within one year from the delivered date) are determined to be non-conforming products according to "Defects due to the design or manufacturing by NAGANO KEIKI", they are repaired or replaced with conforming products free of charge.

However, note that the following cases are excluded:

- (1) Where the delivered products are disassembled, altered or where their parts are replaced or new function is added by the customer or any third party.
- (2) Where directions described in the operation manual or catalog are not observed.
- (3) Where the non-conformance is caused by deterioration due to use, natural disaster, fire or other force majeure events.
- (4) The secondary damage caused by non-conformance of the products including the above.

Whether the customer has recognized a miss handling by the customer himself/herself, where any apparent evidence of deformation, abrasion, burnout, etc. is seen on parts, they shall be excluded from the warranty scope and the cost shall be paid by the customer.

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# 1. Specifications

GC61-□7□

- 4: Standard    Sensor assembly : SUS630(17-4PH)
- G:                Sensor assembly : SUS316L
- 1: Vertical mounting
- 3: Horizontal mounting

Diaphragm material : SUS630(17-4PH)    Joint material : SUS316    in use

Pressure range	Max. pressure display	Resisting pressure
0 to 0.5 MPa	0.500	2 times
0 to 1 MPa	1.000	
0 to 2 MPa	2.000	
0 to 3.5 MPa	3.50	
0 to 5 MPa	5.00	
0 to 10 MPa	10.00	
0 to 20 MPa	20.00	1.5 times
0 to 35 MPa	35.0	
0 to 50 MPa	50.0	2 times*
-0.1 to 0.5 MPa	0.500	
-0.1 to 1 MPa	1.000	
-0.1 to 2 MPa	2.000	

\*:For positive pressure side span (full scale)

Diaphragm material : SUS316L

Joint material : SUS316L    in use

Pressure range	Max. pressure display	Resisting pressure
0 to 0.5 MPa	0.500	2 times
0 to 1 MPa	1.000	
0 to 2 MPa	2.000	
0 to 3.5 MPa	3.50	1.5 times
0 to 5 MPa	5.00	
0 to 10 MPa	10.00	
0 to 20 MPa	20.00	
0 to 35 MPa	35.0	2 times*
-0.1 to 0.5 MPa	0.500	
-0.1 to 1 MPa	1.000	
-0.1 to 2 MPa	2.000	

\*:For positive pressure side span (full scale)

Display range	-10 to 110%F.S. of pressure range or -1999 to 6000 of display value																											
Measurement fluid	Gas, fluid (water or oil) (Non-corrosive gas/liquid) Contact us for other measurement fluids.																											
Operating condition	Free from combustible gas or liquid causing fire/explosion under normal condition																											
Connection screw	R1/4																											
Accuracy	Display accuracy : $\pm(1.0\%F.S. + 1\text{digit})$ Temperature coefficient : $\pm 0.1\%F.S./^{\circ}C$ (Both zero and span)																											
Power supply	12 to 24VDC $\pm 10\%$ Ripple voltage 10% (P-P) or less (4 to 20 mA output: 15 to 24VDC $\pm 10\%$ )																											
Consumption current	NPN specifications : 30mADC or less PNP specifications : 40mADC or less (Not include analog output and comparator output)																											
Display	Pressure representation 4-digit LED(Height of characters 8mm) Operation display lamp Red LED $\times 2$ (Lit with ON)																											
Display period	0.2s																											
Output	Comparator output <table border="0"> <tr> <td>Output form</td> <td>: NPN Open collector 2 Output</td> <td rowspan="2">} Select at factory</td> </tr> <tr> <td></td> <td>: PNP Open collector 2 Output</td> </tr> <tr> <td>Response speed</td> <td>: 5ms or less (Filter off)</td> <td></td> </tr> <tr> <td>Output capacitance</td> <td>: NPN specifications : 30VDC 80mA or less PNP specifications : Supply voltage or less 80mA or less</td> <td></td> </tr> <tr> <td>Dead band</td> <td>: Hysteresis : Variable Window comparator : 1%F.S. Fixed</td> <td></td> </tr> <tr> <td>Delay</td> <td>: 0~2.00 s (Both ON,OFF)</td> <td></td> </tr> </table> Analog output (Option at factory shipment) <table border="0"> <tr> <td>Output</td> <td>: 4 to 20mADC or 1 to 5VDC</td> </tr> <tr> <td>Output accuracy</td> <td>: <math>\pm 1.0\%F.S.</math></td> </tr> <tr> <td>Response speed</td> <td>: 50ms or less (Filter off)</td> </tr> <tr> <td>Resolution</td> <td>: 0.04mADC or less (4 to 20mADC Output ) 12mVDC or less (1 to 5VDC Output )</td> </tr> <tr> <td>Load resistance</td> <td>: 400<math>\Omega</math>以下 (4~20mADC Output) 10k<math>\Omega</math>min. (1 to 5VDC Output )</td> </tr> </table>	Output form	: NPN Open collector 2 Output	} Select at factory		: PNP Open collector 2 Output	Response speed	: 5ms or less (Filter off)		Output capacitance	: NPN specifications : 30VDC 80mA or less PNP specifications : Supply voltage or less 80mA or less		Dead band	: Hysteresis : Variable Window comparator : 1%F.S. Fixed		Delay	: 0~2.00 s (Both ON,OFF)		Output	: 4 to 20mADC or 1 to 5VDC	Output accuracy	: $\pm 1.0\%F.S.$	Response speed	: 50ms or less (Filter off)	Resolution	: 0.04mADC or less (4 to 20mADC Output ) 12mVDC or less (1 to 5VDC Output )	Load resistance	: 400 $\Omega$ 以下 (4~20mADC Output) 10k $\Omega$ min. (1 to 5VDC Output )
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Load resistance	: 400 $\Omega$ 以下 (4~20mADC Output) 10k $\Omega$ min. (1 to 5VDC Output )																											
Heat run time	5 minutes or more																											

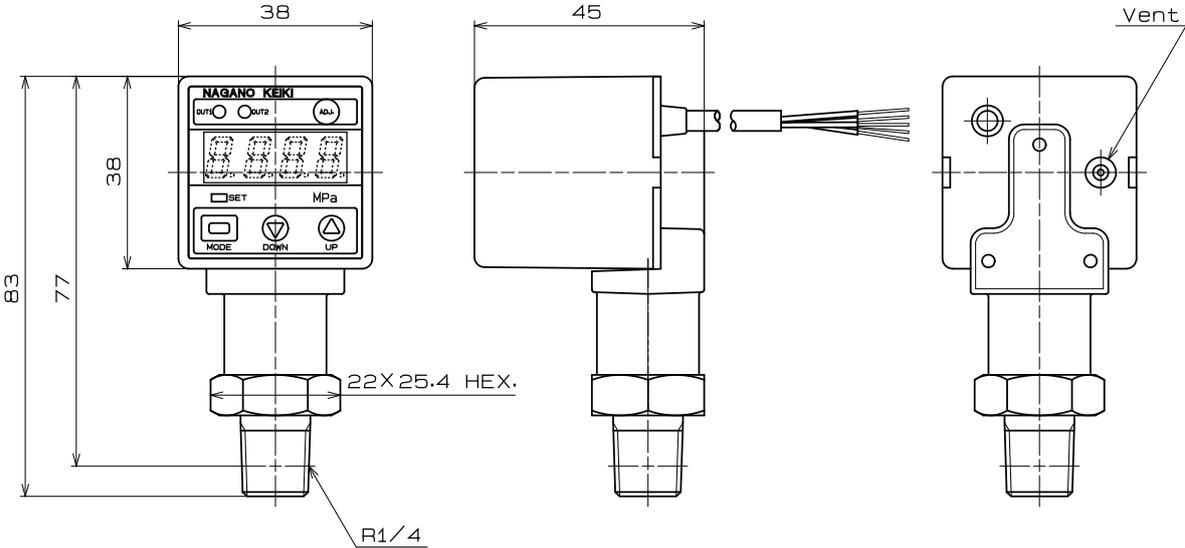
Operating temperature limits	-10 to 50°C (no condensation, no freezing)
Operating humidity limits	35 to 85%RH (no condensation)
Storage temperature range	-20 to 60°C (no condensation, no freezing)
Storage humidity range	35 to 85%RH (no condensation)
Withstand voltage	300VAC 1 minute
Case structure	IP65(with vent hole)
Case material	Front case PC/ABS (UL-94, V-0) Rear case ADC12
Cable length	2m (Standard) Conductor : 0.18sq(7/0.18), Insulation diameter 0.86(mm) Sheath : Outer diameter 4 mm, Material : PVC
Mass	Vertical mounting approx. 175g (incl. cable 2m) Horizontal mounting approx. 170g (incl. cable 2m)
EMC Directive*1	Applicable standards : EN61326-1: 2006, EN61326-2-3: 2006
RoHS Directive	Applicable standards : EU RoHS Directive compliant

\*1 Please connect supply of indoor electric grid that doesn't receive the influence of the excess voltage by the thunder, etc. Application as safe accessories cannot be performed.

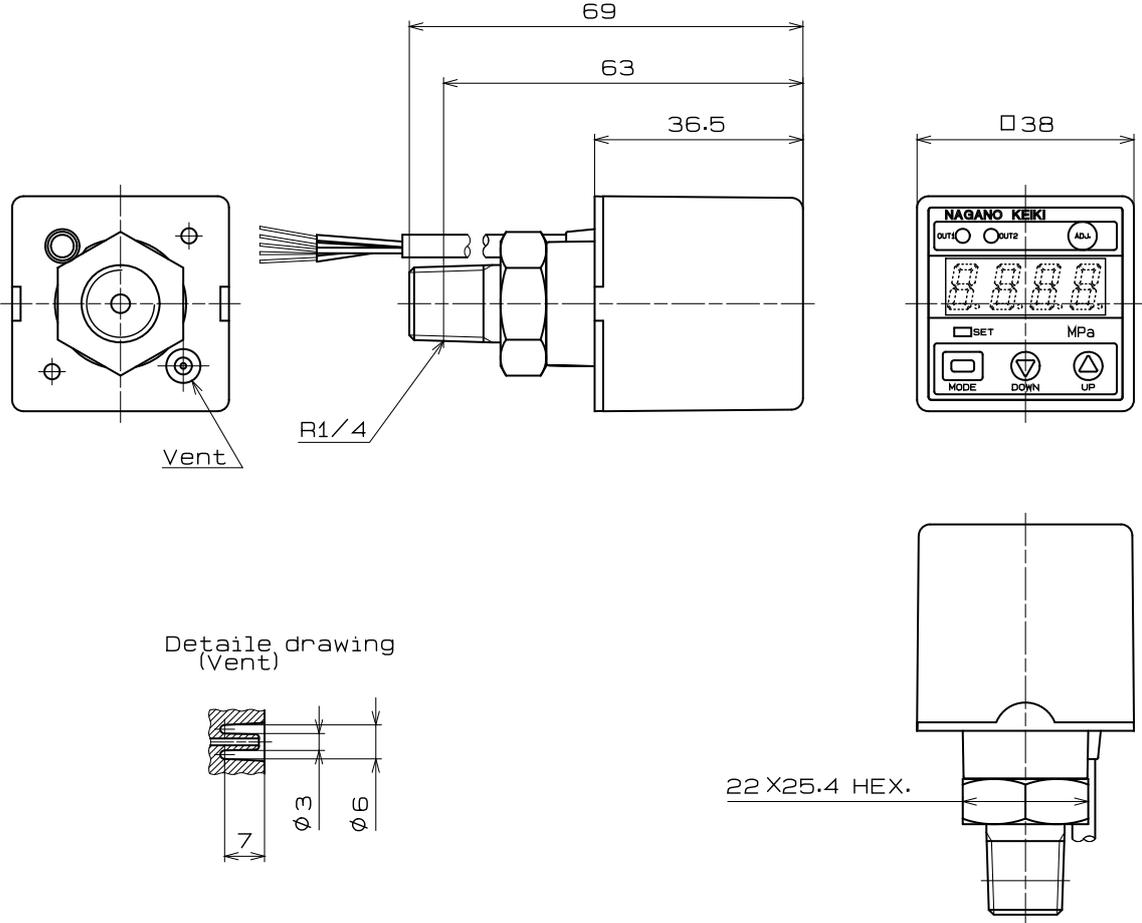
## 2. Outline Drawing

\* Diaphragm : When SUS316L is selected, "LC" is engraved on one side of hexagon part.

### Vertical mounting



### Horizontal mounting



### 3. Mounting

Install in a location where vibration, shock, direct sunlight, humidity and dust can be minimized and free from oil and water.

This device is waterproof equivalent to IP65. However, it should be used outdoors, after measures such as rain-cover are taken and a tube of 4 mm of outer diameter and 2 mm of inside diameter is connected to the vent hole with the tube end letting in no water in case.

During the installation, use wrench (22mm) on the hexagon (metal) while ensuring no excess force is applied to the unit (resin). Installation torque shall be 10 N·m or less. And apply seal tape on the R1/4 screw to prevent leakage of the pressure media.

 <b>Caution</b>	<p>When installing the unit to the pressure line, do not install while the line is filled with a liquid. Because liquid is incompressible, when the connection screw is tightened, a high pressure may be generated thus causing a damage to the unit. When mounting on the existing pressure line or replacing the existing unit, drain the fluid on the pipe connection side to allow 15 to 20 mm of air before tightening.</p>
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 <b>Caution</b>	<p>Do not touch the pressure port with sharp object as it will cause damage to the diaphragm that may result in abnormal operation of the unit.</p>
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### 4. Connection

#### ● Wire connection

The cable wiring colors are indicated as follows. Check the wire connection first and turn on the power supply. Also, wait at least 5 minutes for warming up after power-on. After that confirm the steady state, implement zero point adjustment and measurement.

#### (1) Standard (Without analog output)

- Brown ..... Power supply (+)
- Blue ..... Power supply (-)
- Black ..... Open collector output OUT 1(+)
- White ..... Open collector output OUT 2(+)

#### (2) With 4 to 20 mA DC output or 1 to 5 VDC output

- Brown ..... Power supply (+)
- Blue ..... Power supply (-) , Analog output (-) Common
- Orange ..... Analog output (+) (when option specified)
- Black ..... Open collector output OUT 1(+)
- White ..... Open collector output OUT 2(+)

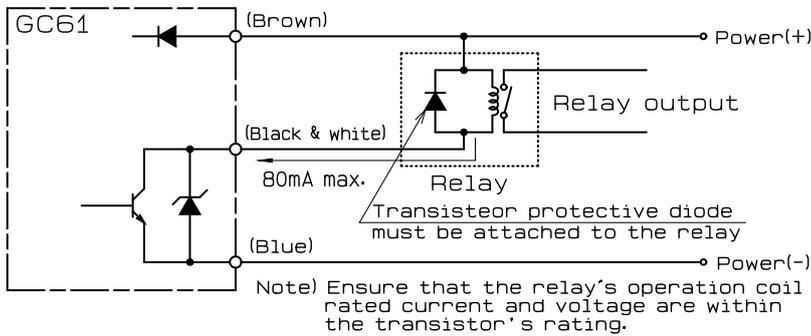
● Internal form

Output forms include open collector output as a comparator output and 4 to 20 mA DC current output or 1 to 5 V DC voltage output as an analog output.

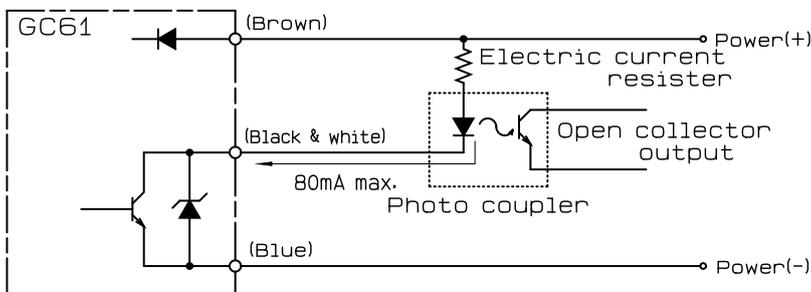
Open collector enables the collector of an output transistor to be opened to the user for various applications. With what connection to use the open collector output can be freely determined by the user but three kinds of usage example are shown below.

 <p><b>Caution</b></p>	<p>Since the rating of output transistor is NPN: 30 V DC, 80 mA and PNP: 24 V DC (supply voltage range), 80 mA, please be careful not to exceed the rating including rush current etc.</p>
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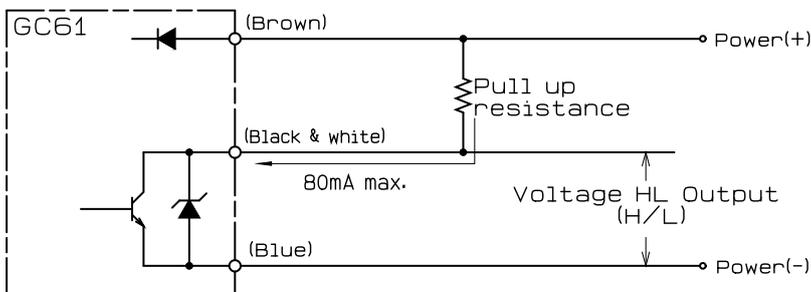
① Usage example of NPN open collector 1(Wiring to relay )



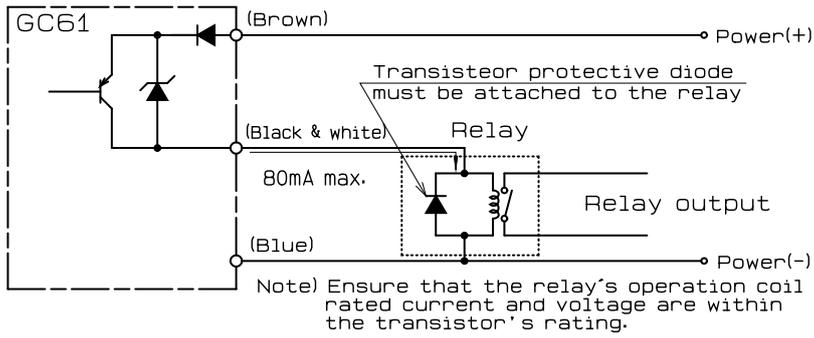
② Usage example of NPN open collector 2(Wiring to photo coupler)



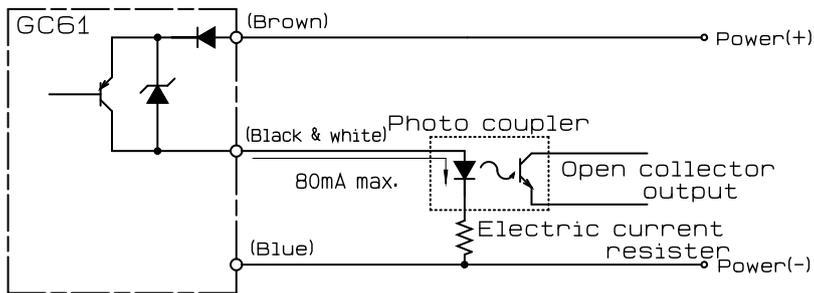
③ Usage example of NPN open collector 3(Voltage output)



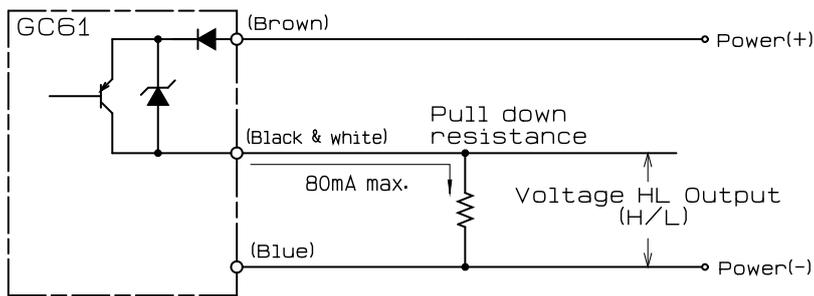
④ Usage example of PNP open collector 1(Wiring to relay )



⑤ Usage example of PNP open collector 2(Wiring to photo coupler)



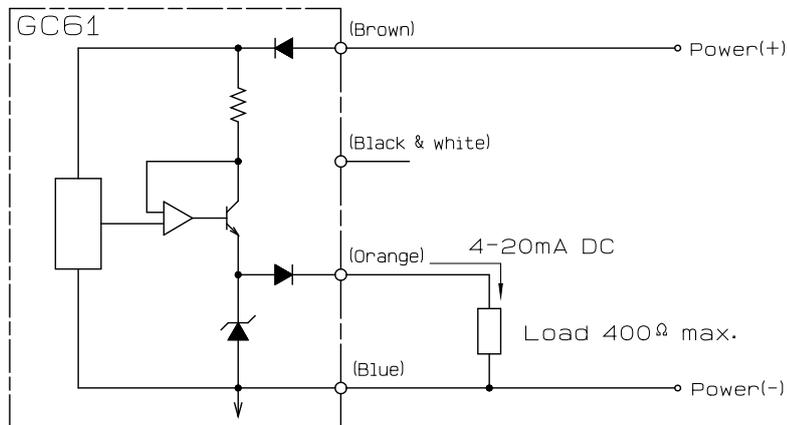
⑥ Usage example of PNP open collector 3(Voltage output)



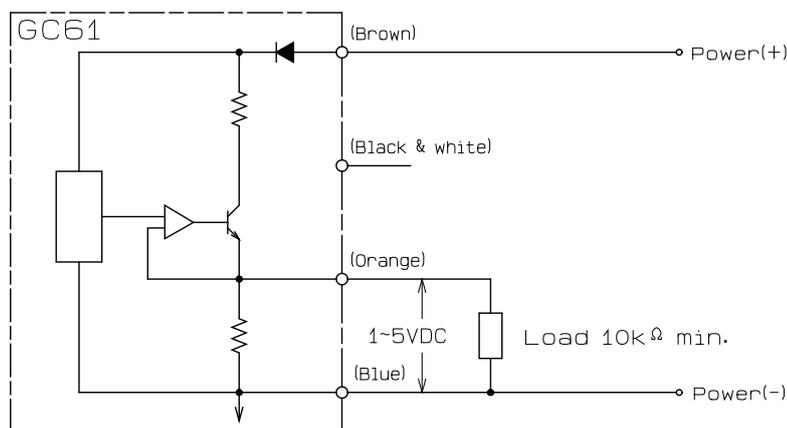
## Example of analog output wiring

(4 to 20mA DC)

Since it is only for source, be careful not to connect or short to power supply (+) .



(1 to 5V DC)



## 5. Noise Prevention

Noise issues are complicated and many of them cannot be solved easily. If measured values often fluctuate or differ, they may be affected by noise. In this case, take noise prevention measures described below.

### ● Power line

If noise remains in the power line, it may cause malfunctions such as fluctuation of pressure display. Take care not to tangle the DC power line. Also use a power supply which is of high noise rejection rate or stable enough for keeping ripple voltage from remaining.

- Output routing

In the open collector output circuit, since output line and internal circuit are connected directly, pay attention not to tangle lines. Also, make connection cables as short as possible.

- Inductive noise

Induction noise from outside sources may cause malfunctions. In this case, separate the device from the noise source, change direction, and use a magnetic shield or an electrostatic shield.

- Lightning surge

Lightning surge may cause malfunctions. Please connect this unit to indoor distribution network which is free from influence of lightning surge.

## 6. Storage Location

 <b>Caution</b>	<p>Do not store this device in the following places as it may cause malfunction and damage.</p> <ul style="list-style-type: none"> <li>• Water splashing places</li> <li>• Any place where there can be negative influence of atmosphere, temperature, humidity, draft, sunlight, dust, salt or sulphuric air.</li> <li>• Any places where there is inclination, vibration or shock (including during transportation).</li> <li>• Any place where chemicals are stored or where there are releases of gas.</li> <li>• In direct sunlight or inside a hot vehicle etc.</li> </ul>
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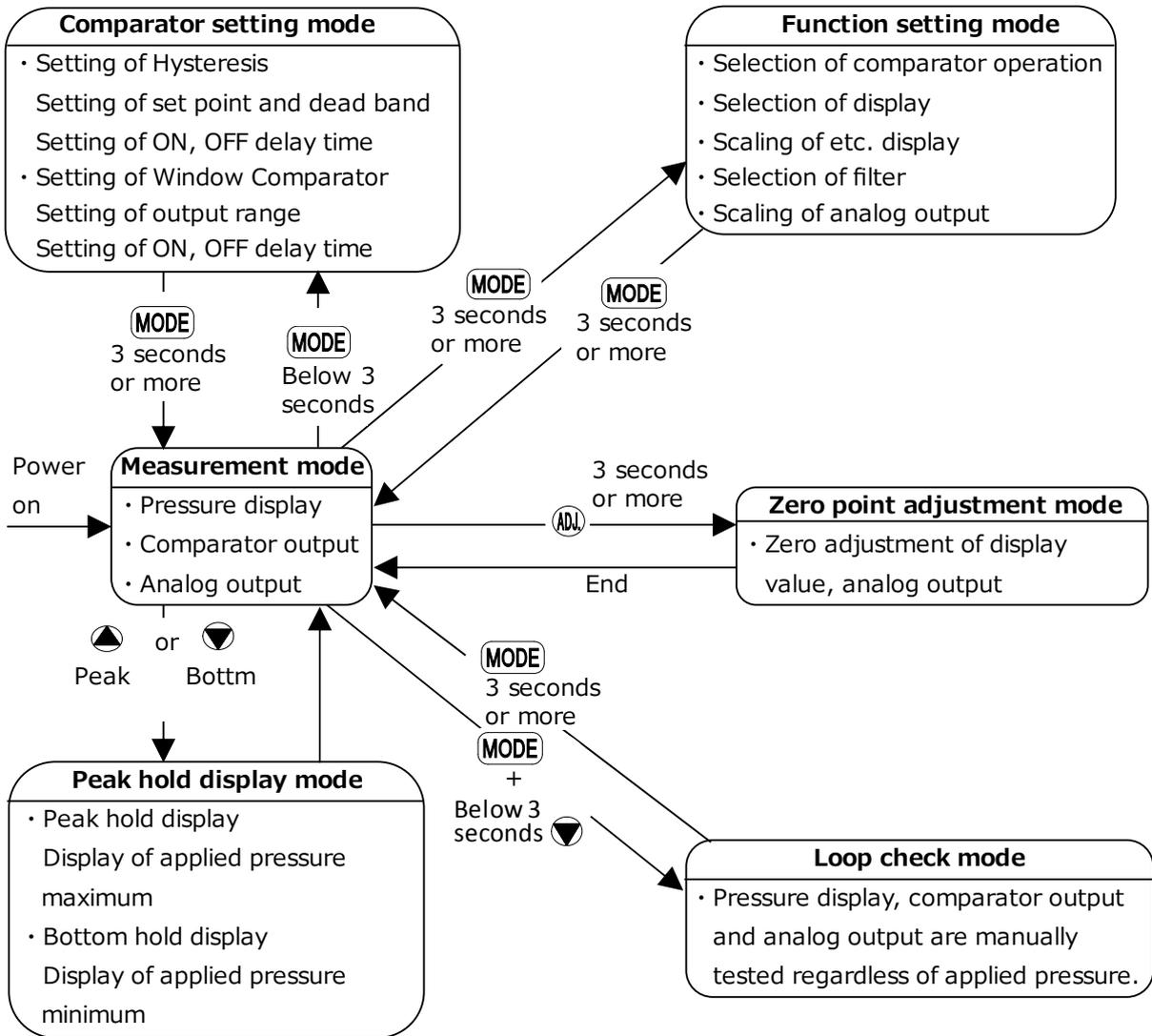
## 7. Maintenance

In this unit, there are no moving parts in the sensing element and circuit components so basically there will be no maladjustment. However, depending on the use condition, aging may occur so biannual regular check is recommended. For the zero point adjustment, please refer to Section of zero point adjustment.

Since plastic molding material is used for the case part of this device, make sure not to touch it with soldering iron, etc. Also, chemicals may have an adverse effect on the case so ensure that none come in contact.

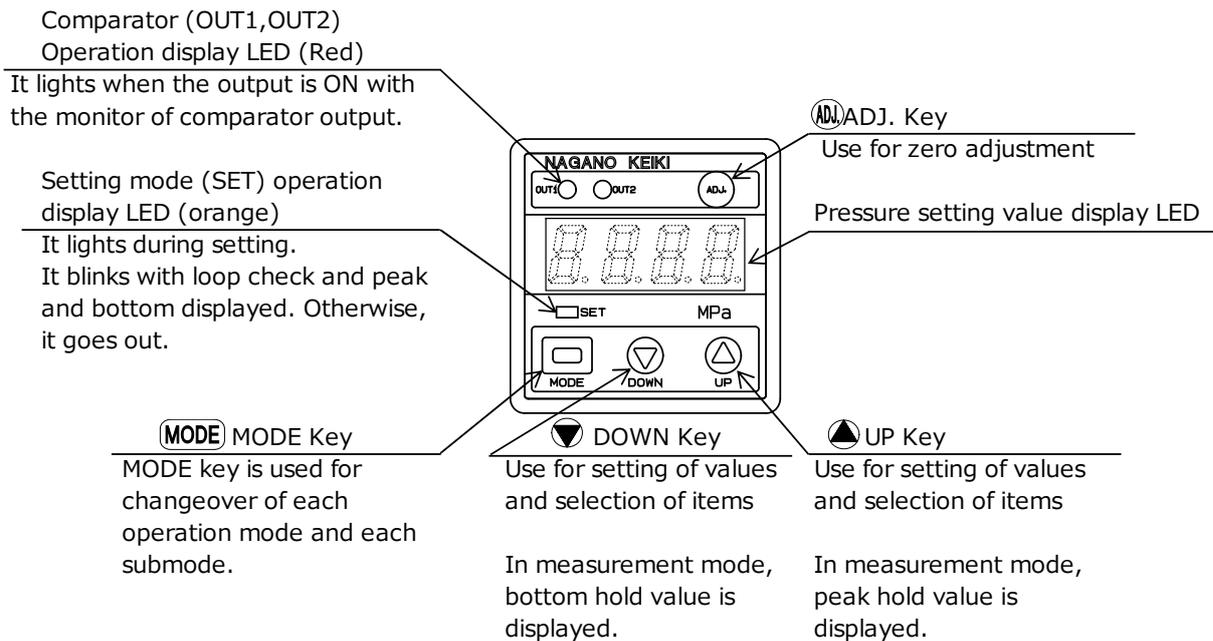
## 8. How to Move to Each Mode

● Each mode and its function



MODE key is pressed, thereby - - - - is displayed. For returning to measurement mode by each setting mode, when pressed for 3 seconds or longer, - - - - display will blink.

## ● Name and functions of panel part



Since a hole opens on the panel, please do not carry out key operation with a sharp object.

## 9. Function Setting Mode

### ● Setup steps

In measurement mode, **MODE** key is pressed, thereby **---** is displayed. When pressed for 3 seconds or longer, "SET LED" will blink.

**MODE** key is released, thereby the function setting mode is active.

It performs selection of comparator operation, selection of display, setting of display scaling, selection of filter time constant, and scaling setting of analog output.

Edit of the setting value in function setting mode recalculates all of the setting values including the comparator. Please note that when the recalculated setting values are out of the display range, they will be the upper or lower limit value that can be processed internally.



● Selection of comparator operation

**MODE** key is used to display "Selection of comparator operation." **Comp** is displayed for 1 second and then the current setting is displayed. **▲▼** key is used to select either hysteresis or window comparator operation mode. As this unit is equipped with two comparator outputs option, both comparators will be in the same operation mode.

● Selection of display

**MODE** key is used to display "Selection of display." **Unit** is displayed for 1 second and then the current setting is displayed. **▲▼** key is used to select either pressure representation under SI unit (kPa or MPa) or representation under display scaling (etc.).

● Scaling of LED display

In "Selection of display," **EEC** is selected, thereby LED indicated value will be arbitrarily scaled based on the applied pressure. This feature can scale LED indicated value based on the minimum and maximum pressures and will not affect the relation between applied pressure and analog output.

**MODE** key is used to set [Decimal point placement] **ds-P** of [Display scaling] [Minimum pressure indicated value] **ds-L** [Maximum pressure indicated value] **ds-H**

1. **ds-P** is displayed for 1 second and then decimal point placement for current display setting is displayed. **▲▼** key is used to select the decimal point placement.
2. **ds-L** is displayed for 1 second and then minimum pressure indicated value for the current setting is displayed. **▲▼** key is used to set the display value.
3. **ds-H** is displayed for 1 second and then maximum pressure indicated value for the current setting is displayed. **▲▼** key is used to set the display value.

The above enables the user to set the scaling of LED display.

Example) Pressure range 0.00 to 5.00 MPa (0 to 100%F.S.) corresponding scaled output 1.0 to 100.0 displayed value.

<b>ds-P</b>	Decimal point placement	:	0.02	→	0.1
	(Least significant digit)				
<b>ds-L</b>	Min. pressure indicated value	:	0.00 (0.0)	→	1.0
<b>ds-H</b>	Max. pressure indicated value	:	5.00 (50.0)	→	100.0
					(Actual display)

● Selection of filter

This device is equipped with 5 internal time constant filters.

**MODE** key is used to display "Selection of filter." **FL** is displayed for 1 second and then the current setting is displayed. **▲▼** key is used to select Filter time constant

<b>FL-0</b>	-----Filter off
<b>FL-1</b>	-----Time constant 25ms
<b>FL-2</b>	-----Time constant 250ms
<b>FL-3</b>	-----Time constant 2.5s
<b>FL-4</b>	-----Time constant 5s
<b>FL-5</b>	-----Time constant 10s

Use of the function is recommended when the pressure fluctuation is so intense that display, comparator output, analog output do not stabilize.

The selected time constant filter is reflected on comparator/analog output as well.

- Analog output scaling (only when output option is selected)

This function sets analog output pressure corresponding to zero point (4 mA DC or 1 V DC) and span point (20 mA DC or 5 V DC) in percentage figure (when pressure range is set to 0.0 to 100.0%F.S.)

**MODE** key is used to set [Analog output pressure at zero point] **AS-L** [Analog output pressure at span point] **AS-H**

1. **AS-L** is displayed for 1 second and then the current analog output under zero point (4 mA DC) value in percentage figure (when pressure range is set to 0.0 to 100.0%F.S.) is displayed. **▲▼** key is used to set pressure value in percentage figure.
2. **AS-H** is displayed for 1 second and then the current analog output under span point (20 mA DC) value in percentage figure (when pressure range is set to 0.0 to 100.0%F.S.) is displayed. **▲▼** key is used to set pressure value in percentage figure.

The above enables the user to set the scaling of analog output.

Example) Pressure range 0.00 to 5.00 MPa (0.0 to 100.0%F.S.) corresponding to analog output of 1 to 5 V DC is scaled to pressure range 0.00 to 4.91 MPa (0.00 to 98.1%F.S.) corresponding to analog output of 1 to 5 V DC.

**AS-L** Pressure value for analog output zero point    0.0 → 0.0    (%F.S.)  
**AS-H** Pressure value for analog output span point    100.0 → 98.1    (%F.S.)

## 10. Comparator Setting Mode

- Setup steps

In measurement mode, **MODE** key is pressed, thereby **----** is displayed. When the key is released within 3 seconds, the comparator setting mode is active.

Comparator setting mode enables the user to change settings on the two comparator outputs provided by the unit. The available settings of this mode varies based on the selected operation common to outputs 1 and 2 in [Selection of comparator operation] of Function setting mode.

For Hysteresis, settings of comparator operation point (A) and dead band (b) can be done independently with outputs 1 and 2. For Window Comparator, settings of comparator operation point (A) and comparator operation point (b) can be also done independently with outputs 1 and 2.

The dead band setting for Window Comparator is fixed at 1 %F.S. in the comparator OFF direction. Also, as common parameters between comparator operations, comparator ON delay time and comparator OFF delay time can be selected in the range of 0.00 to 2.00 seconds independently with outputs 1 and 2.



- Comparator ON delay time (Output 1, output 2)

**MODE** key is used to set [Comparator ON delay time]. **on-1**, **on-2** is displayed for 1 second and then the current setup time appears on the LED display. **▲▼** key is used to set delay time where comparator operation is ON.

- Comparator OFF delay time (Output 1, output 2)

**MODE** key is used to set [Comparator OFF delay time]. **of-1**, **of-2** is displayed for 1 second and then the current setup time appears on the LED display. **▲▼** key is used to set delay time where comparator operation is OFF.

Note) Comparator output setting values are always checked and recalculated when a setting related to comparator operation is changed so that there will be no inconsistency in comparator operation. However, please note that when comparator output setting value is recalculated, if the calculation result is beyond setting range, the comparator output setting value will be changed automatically so that it will be within the setting range. Also, please note that when comparator output setting value is recalculated, calculational error at  $\pm 1$  digit may be observed at comparator output setting value.

## 11. Comparator Operation

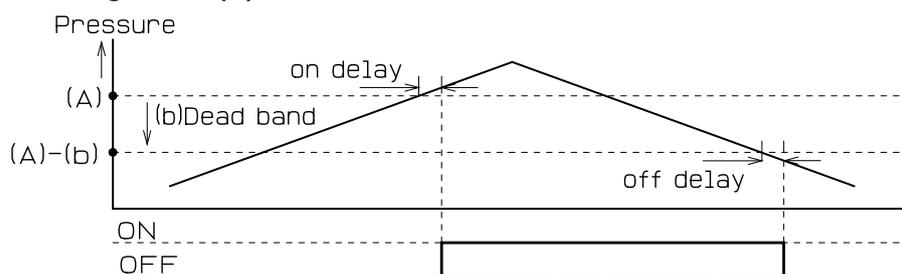
When the comparator output conditions shown below are met, each output becomes ON status and "Comparator display LED (OUT 1, OUT 2)" is lit.

- Operation of Hysteresis

- Setting the upper limit

When the setting value (A) is the upper limit, the comparator operates.

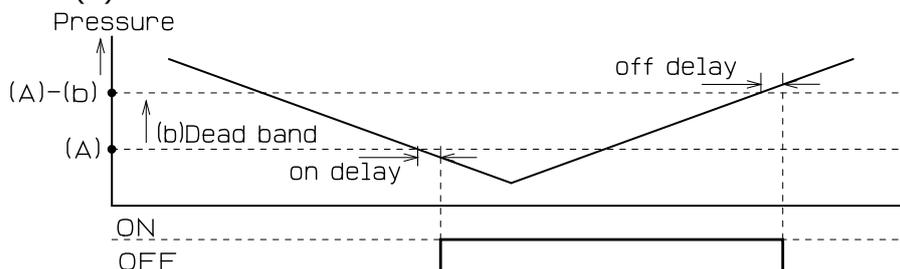
The upper limit setting is determined when you select a positive number (including 0) for setting value (b)



- Setting the lower limit

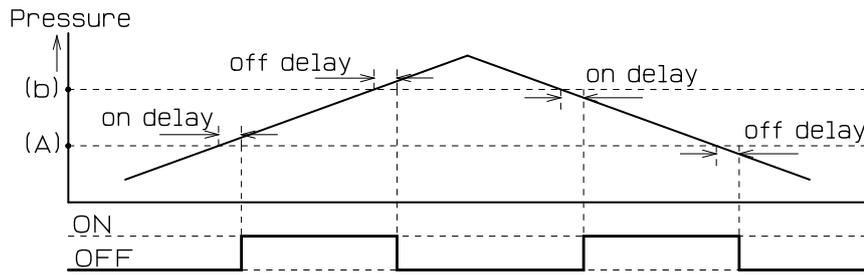
When the setting value (A) is the lower limit, the comparator operates.

The lower limit setting is determined when you select a negative number for setting value (b).

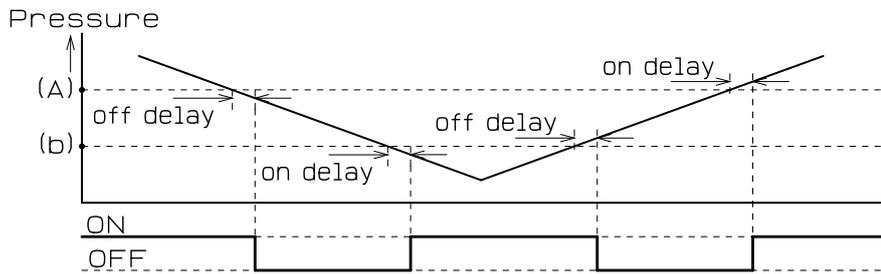


● Operation of Window Comparator

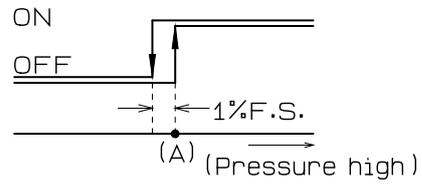
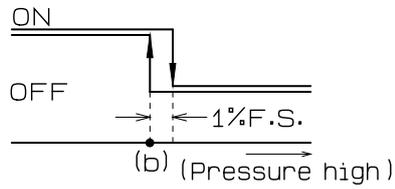
•  $(A) \leq (b)$



•  $(A) > (b)$



Dead band of 1%F.S. is automatically set inside the set points (A) and (b).



## 12. Other Functions

### ● Basic key operations

For setting up in each setting mode, use ▲▼ keys. ▲ key is used to increase value, ▼ key is used to decrease value. A repeat state occurs in three phases of speed when ▲▼ key is pressed for more than 0.5 seconds to increase or decrease value.

For settings of comparator operation mode, unit, and filter in the function setting mode, when each setting is selected, ▲▼ key is used.

### ● Zero adjustment mode

In measurement mode, after releasing pressure from the pressure port, ADJ key is pressed for 3 seconds or longer until `---` blinks. Approximately 1 second later an automatic zero adjustment takes place and the pressure displays as zero.

When the zero adjustment is successful, `0Adj` appears on the LED display.

When applied pressure was outside the range of -10 to 10% F.S, The error `0Err` displays for one second; zero adjustment does not happen.

In order to perform zero point adjustment properly, filter setting for zero point adjustment is temporarily a fixed value.

For user setting of the filter, re-calculation of a setting value needs to reset power or to shift to function setting mode and perform operation to return to measurement mode.

(It is not necessary to set the filter again)

### ● Loop Check mode

In Loop Check mode, without actually applying pressure to the unit, ▲▼ key enables the user to vary pressure display value. As a result, comparator(s) and analog outputs will vary based on the pressure display value chosen. This function allows the user to confirm outputs or output settings manually. This function is also useful in checking proper wiring and other simulations.

In measurement mode, MODE key + ▼ is pressed, thereby `Loop` is displayed for 1 second. Then, the loop check mode is active and "SET LED" is blinking.

The indicated value in the measurement mode just before it changes to the loop check mode is displayed as an initial value. ▲▼ key is used to change the indicated value and thereby check comparator output operation and analog output operation. MODE key is pressed for 3 seconds or longer, enabling to return to measurement mode.

### ● Peak hold display mode

The GC61 unit keeps the maximum and minimum pressure level applied to the pressure port as peak and bottom values respectively, in the internal memory. The peak and bottom values are displayed as long as ▲ key and ▼ key are pressed and held, respectively. When you select this operation, `PEAK` is displayed for one second and selected Peak value is displayed. While the peak value is indicated, "SET LED" blinks.

Peak and bottom values are reset when you reset power to the unit, or by following procedure.

Resetting peak value: ▲ key is held, ▼ key is pressed.

Resetting bottom value: ▼ key is held, ▲ key is pressed.

### ● Key lock

Key operations can be nullified to prevent inadvertent overwriting of setting values.

Once the key lock state is set, the mode cannot be shifted to the one other than the peak hold display mode. The key lock mode cannot be reset by restoring power. It is reset by the following release operation of a key lock.

In measurement mode, **MODE** key + **▲** key is pressed, thereby **LoLk** is displayed for 1 second until key lock state.

Release of key lock : Press **MODE** key + **▲** key. **UnLk** is displayed for one second and key lock is released.

### ● Error display

An error message is alternately displayed when one of the following errors occurs in the measurement mode. Check the content of error message and take the action below immediately.

Error	Contents	Actions
<b>FFF</b>	Out of pressure display range (Upper limit) A pressure above 110% F.S. of pressure range is applied, or when indicated value exceeds 6000.	Adjust the applied pressure within the rated pressure.
<b>-FFF</b>	Out of pressure display range (Lower limit) A pressure less than -10% F.S. of pressure range is applied, or when indicated value	
<b>DErr</b>	During zero point adjustment, applied pressure is outside the range of $\pm 10\%$ F.S.	Open the unit to the atmosphere and perform zero point adjustment again.
<b>EC 1-</b>	Comparator 1 is overloaded.	Use the unit with a load current, set to 80 mA DC or less. Reset power to the unit for error reset.
<b>EC -2</b>	Comparator 2 is overloaded.	
<b>EC 12</b>	Comparators 1 and 2 are overloaded.	

### ● Backup of setting values

The unit has an internal EEPROM and settings and the key lock state are maintained even after the power is turned OFF. However, peak / bottom values are not maintained.

Items which can be backed up	Setting values in function setting mode Setting values of comparator Zero adjustment Key lock & unlock
Items which cannot be backed up	Peak hold Error display

## 13. Trouble Shooting

Error	Probable cause	Actions
No display	Wiring	Please carry out wiring correctly according to the connection procedure.
No output	Supply_voltsage	
After applying pressure, pressure display and output linked to the applied pressure do not change. (It remains zero point)	Pressure leak	Please pipe correctly according to the attachment procedure.
	Too low pressure applied	Please check applied pressure and use the pressure gauge with suitable pressure range.
Pressure display and output linked to the applied pressure conflict with the value of actual applied pressure. (Output does not match)	Zero point shift	Please perform zero point adjustment according to [zero point adjustment mode]
	Pressure indication mode	Please select a pressure indication. [Function setting mode] => [Selection of display]
	Analog scaling mode	Please check an analog output scaling setup. [Function setting mode] => [Analog scaling]
	Setting values of comparator output	Please check setting values of comparator operating point and delay time. [Function setting mode] => [Selection of comparator operation], [Comparator setting mode]
	Foreign material (blockage)	Clean/remove obstruction in piping.

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The contents of this operation manual are subject to change without notice due to revisions or other reasons.

For more information or inquiries, please contact the closest sales office or please access the website shown below.



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