

Nidec

Thin film type semiconductor pressure gauge

PG-20

CE marking
(Compliance with EMC Standards)

UK
CA

Instruction Manual Ver.3.0

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.

For more detailed information please ask for the
nearest distributor or the following sales center.

NIDEC COMPONENTS CORPORATION

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Important Information and Warnings



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.

- ① The applicable pressure medium of PG-20 gases and liquids compatible to SUS316L.
- ② For stability, use a regulated direct current power supply.
Please earth the terminal FG when you use the switching power supply.
- ③ Surge absorbing devices (diodes, varistors, etc.) are necessary if inductive loads such as relays or solenoids are connected to the same circuit to PG-20.
- ④ Turn off the power while wiring. Also, please do not mis-wire.
- ⑤ Do not wire parallel to a high tension cables or power lines, or use cable ducts containing high tension or high power.
- ⑥ Cables connectors should be removed from the product while piping. The product can be damaged if the connected cable is pulled at 20N or more. In addition, the display rotation part can be damaged when turning the display at 0.3N · m or more.
- ⑦ Clean the product with the cloth that contains a small amount of pure water or alcohols solvent when the product is dirty. The cleaning solution must never enter into the product. It may cause an internal circuit breakdown.
- ⑧ This product is dust proof and drip proof (to IP40 of IEC standards) and is not suitable for use in environments requiring higher standards.
- ⑨ 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.
- ⑩ Do not insert wires, etc. in the pressure port, as this may damage the internal diaphragm and cause malfunctioning.
- ⑪ Do not touch or scratch the edge of the fitting, as this may damage the sealing and cause leakage.
- ⑫ The PG-20 series is not explosion proof. Do not use it for the detection of flammable gases.
- ⑬ When analog output is supplied to a noise-sensitive device, a low-pass filter is requested in a customer's circuit.
- ⑭ For EMC measures, please earth the power supply. Also, please connect the fitting block to an earthed metallic casing or to the ground. This product can not resist thunder surge, therefore please do not use this product at unprotected outdoors or extend the cable to 30m or more.

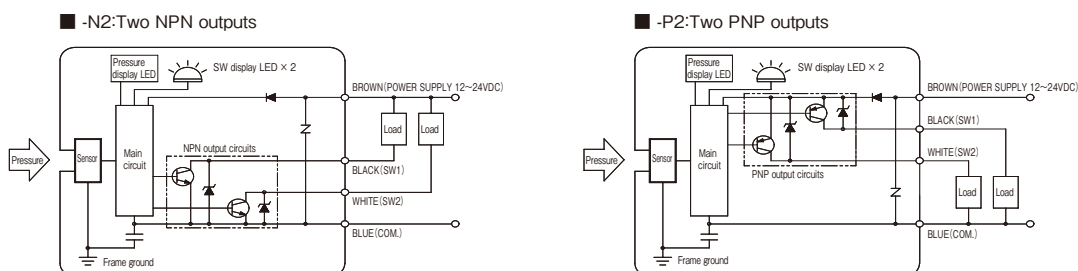
Specifications

Spec item	Mode	PG-20	
	Pressure Range	502G/502R	103G/103R
Pressure	Type	Gauge pressure	
	Rated pressure range	0.5MPa	1.0MPa
	Maximum pressure	0.75MPa	1.5MPa
	Leakage	5×10 ⁻¹² Pa·m ³ / sec maximum (He Leake)	
	Acceptable medium	Gases and Liquids	
Power supply	Operating voltage	24VDC±10% (Current output type) / 12~24VDC±10% (Voltage output type and other)	
	Current consumption	30mA maximum (It doesn't contain switch/analog output.)	
	Insulation resistance	DC125V, 50MΩ minimum / Between bundled electrical wirings and the pressure port.	
	Dielectric strength	DC125V 1minutes (current leakage: 5mA max.) / Between bundled electrical wirings and the pressure port.	
Pressure display	Display method	3·1/2 LED display (Red LED)	
	Rotation angle	270° (90°step)	
	Display accuracy	±1%FS (The repeatability, Linearity, and Hysteresis are contained.)	
	Thermal error	±0.1%FS/°C (0~50°C, reference temperature at 25°C.)	
	Response	4 times/sec	
Switch output	Number of circuits	Select model (N.A./One circuit (SW1) / Two circuits (SW1, SW2))	
	Output method	Select model (NPN/PNP, transistor open collector)	
	SW capacity	30VDC at 100mA minimum	
	Residual voltage	1.2V (NPN) / 2.2V (PNP) maximum at Load current (100mA)	
	Hysteresis	0~300counts (Can be adjusted)	
	Operation display	Green LED lights with switch ON.	
	Protection function	None	
	Repeatability	±0.3%FS maximum	
	Thermal error	±0.1%FS/°C (0~50°C, reference temperature at 25°C.)	
	Response	Can be adjusted to Approx. 2.5ms/25ms/250ms	
	Analog output	Number of circuits	Select model (N.A./One circuit (White lead line:Vo / Ao))
Output method		Select model (Voltage output: 1-5V / Current output: 4-20mA)	
Range of output		Select model (G: Positive pressure range/R: Compound pressure range)	
Output mode: (G/R)		(G) 0.0~0.5MPa, (R) -0.1~0.5MPa	(G) 0.0~1.0MPa, (R) -0.1~1.0MPa
Vzero / Izero		(G) 1.00V / 4.00mA, (R) 1.67V / 6.67mA	(G) 1.00V / 4.00mA, (R) 1.36V / 5.46mA
Vfull / Ifull		(G / R) 5.00V / 20.00mA	(G / R) 5.00V / 20.00mA
Output accuracy		±1%FS by load resistance (Voltage output type: 1MΩ minimum / Current output type: 250Ω)	
Thermal error		±0.1%FS/°C (0~50°C, reference temperature at 25°C.)	
Pressure contact	Response	1ms maximum	
	Fitting	Select model (W1: 1.5"W-Seal/W2: 1.125"W-Seal)	
	Sensor material	SUS316L	
	Fitting material	SUS316L	
	Roughness	Ra:0.15μm (Ave.) / Ry:0.7μm (Max.)	
Use conditions	Particle	Zero count for size 0.1μm or greater (by our inspection standard)	
	Operating temp.	-10~50°C (No condensation)	
	Operation humidity	35~85%RH (No condensation)	
	Storage temp.	-20~60°C (No condensation)	
Environment characteristics	Vibration resistance	10~500Hz 1.5mm max./98.1m/s ² 3 directions, 2 hours each	
	Shock	490m/s ² 3 directions, 3 times each	
	High temp.	70°C 96 hours, No load	
	Low temp.	-20°C 96 hours, No load	
	Humidity	40°C 90~95%RH 240 hours, No load	
	Pressure cycle	0~Rated pressure range 10 ⁶ cycles, No load	
	EMC	EMC directive: 2004/108/EC Applicable standards: EN61326-1: 2006, EN61326-2-3: 2006 (EMI: Class B, EMS: Annex BB)	
Others	IP protection	Close type structure (EC standard: P40)	
	Connected method	Connector type (HG connector from JST)	
	Net Weight	W1: Approx. 200g W2: Approx. 110g (Only the main body)	
	Accessories	Manual, Cable (2m), Cable holder	

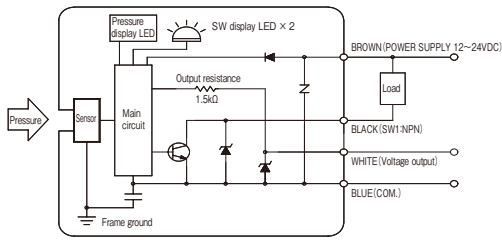
※G (positive pressure) type is special order item.

Output Electrical Diagram (Example: PG-20-103R- * * W2)

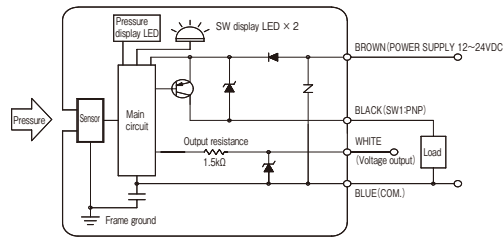
(■-B: Display single function type is omitted)



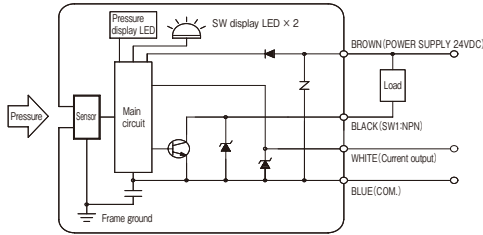
■ -NV:One NPN output and voltage output



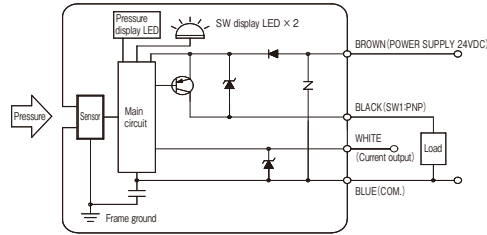
■ -PV:One PNP output and voltage output



■ -NA:One NPN output and current output



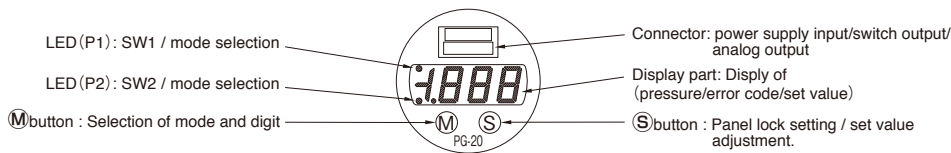
■ -PA:One PNP output and current output



Terminal wiring list

Model	(ex.) PG-20-103R-**-W2			
Lead	-BW2	-(N/P)2W2	-(N/P)VW2	-(N/P)AW2
Brown	Power supply: (12~24VDC±10%)			(24VDC±10%)
Black	N. C.	Switch output:SW1 (NPN / PNP)		
White	N. C.	Switch output SW2 (NPN / PNP)	Voltage output (1-5V)	Current output (4-20mA)
Blue	COMMON			

Panel function explanation



Initial operation

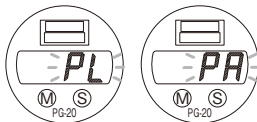
◆Initial Operation



1. All displays will light for one second after initial operation.
2. Pressure display and SW will be in operation.
3. The panel lock will be turned on at the initial operation due to setting protection.

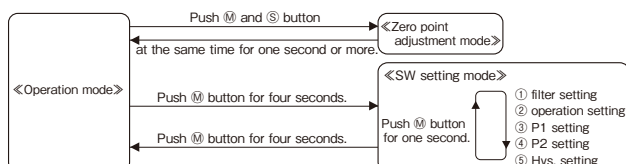
Operating procedure

◆Release panel lock.



1. After the initial operation, you must turn off the panel lock in order to adjust the setting.
2. The panel lock can be released by pushing the S button until the blinking LED turns from "PL" to "PA".

◆Switch of mode



Zero point adjustment

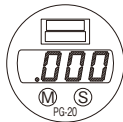
Pressure display can be adjusted to Zero at Open pressure port. However, the analog output can not be zero adjusted.

◆Adjust Zero points



1. Release the pressure port to an atmospheric pressure.
2. Zero point adjustment starts when M and S button are pushed at the same time for one second or more at the operation mode. Display will read "0A" when Zero point adjusting.

◆Finish Zero point adjustment



1. Release the M and S button when "0A" is displayed.
2. Zero points will be adjusted in one second, and will return to operation mode.
3. Zero points will be memorized, and will not be lost even if the power is turned off.



1. "E2" blinks when there is the remaining pressure.
2. Please push either of the button to go back to the operation mode. Please pushing the button of either.
3. Release the pressure port to an atmospheric pressure and adjust the zero point again.

Switch setting mode

Adjustment of filter setting, switch operation, pressure switch (P1/P2), and hysteresis.

◆Filter Setting



1. Push the M button for four seconds or more at operation mode.
2. After entering the switch setting mode, the display will blink once at present set value. Factory default for filter setting is set at "F-0".
3. The setting value can be adjusted from "F-0" to "F-2" by pressing the S button. Filter: ("F-0": 2.5ms, "F-1": 25ms, "F-2": 250ms) After the value is set for filter, the filter will be in effect by displaying the average pressure at given filter setting.

★When M button is pushed for one second or more, it will move the the next setting mode. If the M button is pushed for another one second or more, it will exit for switch setting mode and return to operation mode.

(Omit)

☆If there is no switch mode for your model, the following setting model shall not apply.

◆Switch operation setting



However, it displays it in the product with only SW1 in order of S-1/S-3/C-5/C-7.

1. In the SW operation setting mode, the blinking display ..present set value.. is done once.
2. It displays in order of "S-1" to "S-4" and "C-5" to "C-8" whenever S button is pushed short, and this is repeated.

However, it displays it in the product with only SW1 in order of "S-1/S-3/C-5/C-7".

S:Separate mode, C: Window comparator mode. Factory default is set at "S-1"

★Ditto

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

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

Separate Mode	Window Comparator Mode
(H operation) 	(A operation)
(L operation) 	(B operation)
$P1 \leq P2$ or $P1 \geq P2$	$P1 \leq P2 - 2H$

Note 1. In Separate mode, P1 corresponds to SW1, and P2 corresponds to SW2.

Note 2. In the window comparator mode, common lower bound value corresponds to P1 and upper bound value corresponds to P2.

Note 3. Hysteresis (H) is a common setting to SW1/SW2 and the operation mode.

◆Pressure switch P1 setting.



1. In the Pressure SW setting mode, the display will blink once at present set value. P1 setting starts when the P1 display LED on the top left blinks. (P1: SW1 setting value of separates mode or lower bound value of window comparator)
The factory default is set at "500".

2. The digit that is blinking can be adjusted.

S button is pressed to increment the blinking value.

3. Blinking digit can be adjusted by pressing the M button.

The very top digit can only be adjusted in the following value: +1/-1/-0./+0.

★Ditto

For Separate mode setting with 1 Switch output model, P2 setting is not needed and will jump directly to hysteresis setting mode.

◆Pressure switch P2 setting



1. In the Pressure SW setting mode, the display will blink once at present set value. P2 setting starts when the P2 display LED on the bottom left blinks.
(P1: SW1 setting value of separates mode or lower bound value of window comparator)
The factory default is set at ".500".
2. The digit that is blinking can be adjusted.
S button is pressed to increment the blinking value.
3. Blinking digit can be adjusted by pressing the M button.
The very top digit can only be adjusted in the following value: +1/-1/0./+0.
★Ditto

◆Hysteresis setting



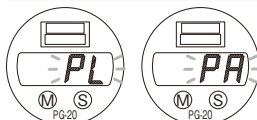
1. In the hysteresis setting mode, the display will blink once at present set value.
Hysteresis setting starts when P1 and P2 display LED of the left side blink.
Hysteresis: Common hysteresis value for switch. The factory default is set at ".000".
2. The digit that is blinking can be adjusted.
S button is pressed to increment the blinking value.
3. Blinking digit can be adjusted by pressing the M button.
Hysteresis can be adjusted from ".000" to ".300".
★By pressing the M button for one or more seconds, it will return to filter setting. Ditto.

Setting protection function (panel lock)

◆About panel lock

- This function limits the panel operation so that each setting condition is not changed by mistake.
- In the state of the panel lock, when a button is operated, "PL" is blinked several times.
And zero point adjustment and the switch setting, etc. can not be adjusted.
- The panel lock can be released by the following operation. However, panel lock will be set at the initial operation. when starting again.

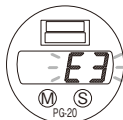
◆Release/set of panel lock



1. When the panel lock is set, push the S button for four seconds or more until the display blinks.
Display will change from "PL" into "PA", when the panel lock is released.
2. When the panel lock is relased, push the S button for four seconds or more until the display blinks. Display will change from "PA" into "PL", when the panel lock is set. After the panel lock is set, the display will return to operation mode.

Troubleshooting

◆Action when following error messages display.

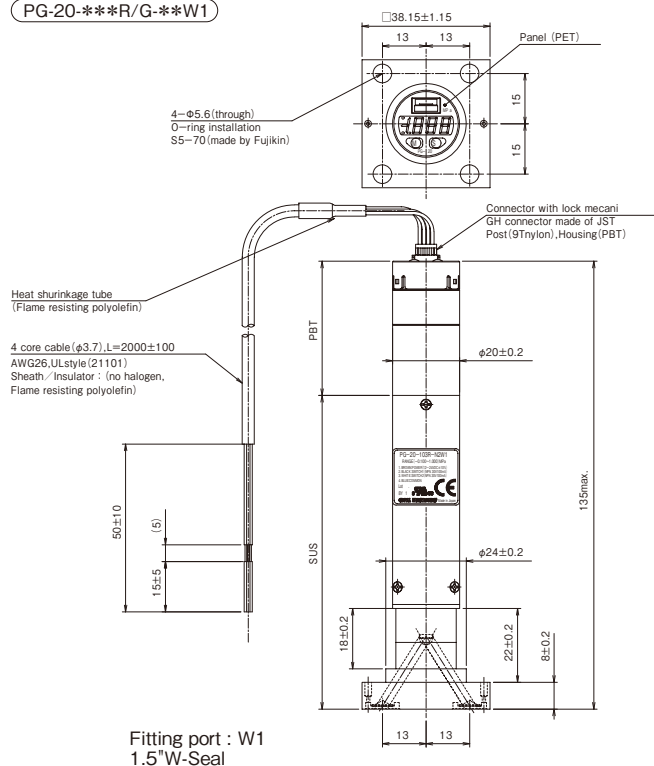


Error message/trouble	Problem	Solution
"E2"	Pressure detected when adjusting the zero point.	Please release the error display pushing either button, and adjust Zero again.
"E3"	It doesn't satisfy the pressure setting of window comparator mode.	Please release the error display. And, try to set pressure SW.
"E4"	The memory data is abnormal.	Please contact the nearest sales office.
"-H."	The range of detection is exceeded.	This is not an error. Product is operating normally.
LED doesn't light all	LED might have broken down.	Please contact the nearest sales office.
Panel not in operation	The panel lock is set.	Please review the instruction for panel lock setting.
P2 cannot be set	P2 of separates mode cannot be set.	The is only one switch for this model.

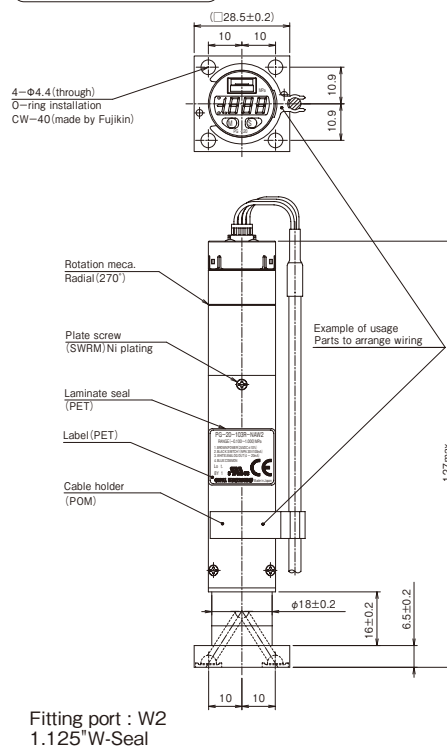
Externals specification (unit : mm)

◆PG-20 externals dimensions / Example of accessory usage

PG-20-***R/G-**W1



PG-20-***R/G-**W2



Warranty and Disclaimer

- 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.
- 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.
- 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

PG-20-103 R-NV W1

① ② ③ ④

- ① Pressure range 502 : Pr (0.500MPa)
103 : Pr (1.000MPa)
- ② Indicating type G : Gage pressure (positive) 0MPa~Pr ※
(Analog output range) R : Gage pressure (compound) 0.1MPa~Pr ※
- ③ Output spec. B : SW (nothing)
* (N: NPN/P: PNP) * 2 : SW (two outputs)
* V : SW (one output) + Voltage output (1~5V)
* A : SW (one output) + Current output (4~20mA)
- ④ Fitting block spec W1 : 1.5"W-Seal
W2 : 1.125"W-Seal
- ※ Please choose (R) in the indicating type when the analog output is unnecessary.