COPAL ELECTRONICS

PRESSURE TRANSDUCER

PA-960/968

INSTRUCTION MANUAL Ver.1.2

Thank you for purchasing a
NIDEC COPAL ELECTRONICS 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 inquiries regarding the product, please contact:

COPAL ELECTRONICS

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Important Information and Warnings

CAUTION

This caution mark indicates a chance of physical damages to the user and/or the product if it is used improperly and/or incorrectly. The damage can be substantial.

- The product is not explosion-proof. Do not use the product in designated areas where explosion-proof specification is required.
- The product is designed for measurement of intended articles and does not feature control functions that ensure security, such as prevention of accidents.

Operating Precautions

①The applicable media are gases/liquids compatible with 17-4PH(Equivalent to SUS630). So please be careful about compatibility with applicable media. Use of corrosive fluid may cause injury and/or malfunction of products. In addition, the product is not explosive-proof. Never use flammable fluid as media.

②Maintain the measuring pressure within the pressure range as stated in specifications. Pressures exceeding the maximum pressure rating may cause product failure.

③Do not press the diaphragm with a hard object. It may cause abnormal output or malfunction.

④Use a stable DC power supply. When using a switching power supply, please do so with the frame ground terminal installed. For inductive loads such as relays and solenoids, put voltage surge protectors (diodes, varisters, etc.) in the circuit.

⑤Cable wiring should be conducted in the state of power OFF. Shorting the output terminal and power terminal will damage the internal circuit. Please be careful not to wire incorrectly.

⑥When using the supplied M12 connector cable, tighten fitting by hand (Tightening torque:0.6[N·m]) after fully inserting the connector. If the tightening and inserting is inadequate, the product may fail to meet the specified IP. In addition, the use of pliers may cause damage to the fitting.

⑦In the insertion and removal of the connector, please check the direction of key slot and do so with the product and connector grabbed tightly. Inadequate insertion and/or removal of the connector may cause product failure.

⑧Do not rotate the connector portion of the cable. It may cause the sensor and connector damage.

⑨Be careful not to let water contact the periphery of the connector. It may cause damage and leakage and entering the interior.

⑩Please note that bending the connector cable at the near end part may lower the waterproof function and cause damage to the product.

⑪In piping, please do so with the hexagonal portion of the fitting grabbed tightly. Tightening by grabbing only case or connector may cause damage.

⑫Be careful about the possibility that the medium may become frozen. The freezing of the medium in the pressure port can cause damage.

Maintenance Precautions

①Make sure the product operates normally before using. Unexpected event may cause product failure and affect its basic function.

②Do not disassemble or modify the product. Unauthorized disassembly or modification may result in a malfunction. The product warranty does not cover failures caused by disassembly and/or modification of the product.

③Stains on the product should be wiped off with a cloth immersed in a neutral detergent diluted water. Dry it with a soft cloth after they are wiped off. At this time, be careful not to allow the neutral detergent solution to enter the inside of the product.
Infiltration of the neutral detergent solution may cause product failure.

④M12 connector is compliant to IEC61076-2-101.
If you would like to use cable other than the supplied cable, please make sure the cable is indeed in compliance with the proper standard. Some cables don't meet IP standard, so please check it before using.

Bundled Items

・Instruction manual (this manual)
・Protective cap
・M12 connector cable (Only included if specified)
Model end "-1" : Straight 1m (4 way connector／3-core cable with shield)
Model end "-2" : Angle 1m (4 way connector／3-core cable with shield)

Model Number Designation

PA−960−104P−R2−1
(1) (2) (3) (4)

(1)Model numbe : ＰＡ−９６０ (Voltage output)
ＰＡ−９６８ (Current output)
(2)Pressure range : ５０３Ｐ、１０４Ｐ、２０４Ｐ、３５４Ｐ、５０４Ｐ
(3)Fitting : Ｒ２ (Ｒ１/４)
Ｇ３ (Ｇ３/８Ａ、included P14 O-ring)
(4)Cable : Blank (Nothing)
−１ (Ｍ１２ connector cable：Straight 1m)
−２ (Ｍ１２ connector cable：Angle 1m)

Specifications

Specification

Item	Specification				
Pressure range	503P	104P	204P	354P	504P
Type	Gauge				
Rated pressure	5MPa	10MPa	20MPa	35MPa	50MPa
Max. pressure	10MPa	20MPa	40MPa	50MPa	65MPa
Operating temp.	PA−960：−20～85℃ PA−968：−20～70℃				
Compensated temp.	−20～70℃				
Operating humidity	20～85%RH (No condensing)				
Storage temp.	−20～70℃ (At atmospheric pressure, humidity below 65%RH)				
Available media	Gases/Liquids compatible with 17−4PH (Equivalent to SUS630)				
IP protection	IP67 ＊				
Weight	Applox.60g/Applox.130g ＊				

＊Including the attached cable

Power supply

Item	Specification
Power supply	10.8～30VDC, Class2 (include ripple)
Consumption current	10mA Max. (No load) /PA-960

Analog output(PA-960)

Item		Specification
Output Voltage		1～5V
Zero Voltage		1±0.05V
Span Voltage		4±0.05V
Linearity		±0.5%FS
Hysteresis		±0.1%FS
Thermal Error	Zero	±0.05%FS/℃
(−20～70℃)	Span	±0.05%FS/℃

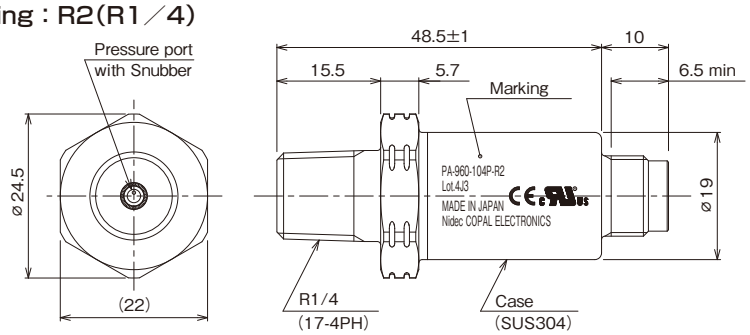
Analog output(PA-968)

Item		Specification
Output Current		4～20mA
Zero Current		4±0.2mA
Span Current		16±0.2mA
Linearity		±0.5%FS
Hysteresis		±0.2%FS
Thermal Error	Zero	±0.05%FS/℃
(−20～70℃)	Span	±0.05%FS/℃
Load resistance		500Ω max. (power supply：24V) ＊＊

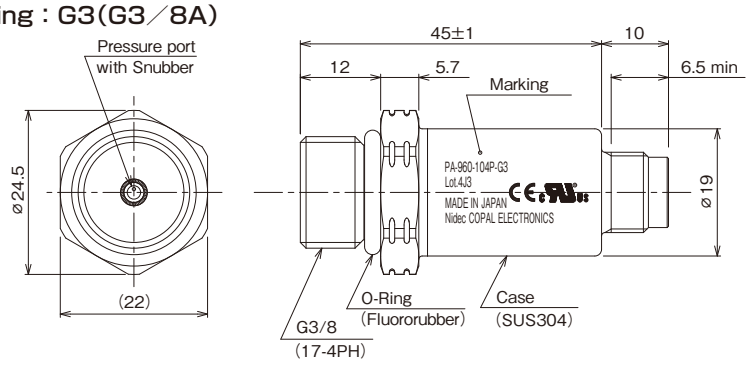
＊＊Please refer to the following table or expression to choose load resistance.

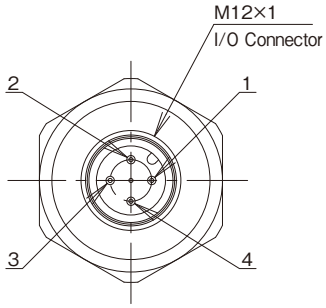
Name / External dimensions (mm) / Wiring

Fitting : R2(R1／4)



Fitting : G3(G3／8A)





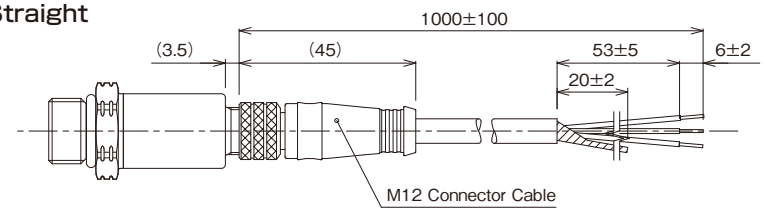
Wire	Connection	
	PA-960	PA-968
1	Power(+)	Power(+)
2	Analog Output	Analog Output
3	Common	CAL
4	F.G.	CAL

※Do not wire the CAL connection.
It may cause malfunction when voltage is applied.

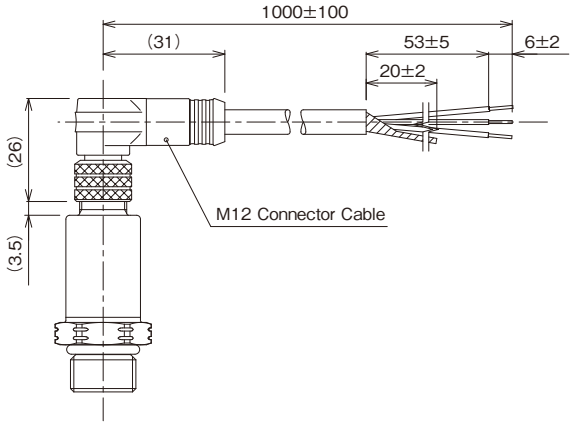
F.G. : Frame Ground , CAL : Calibration

Assembled Cable

◇Straight



◇Angle



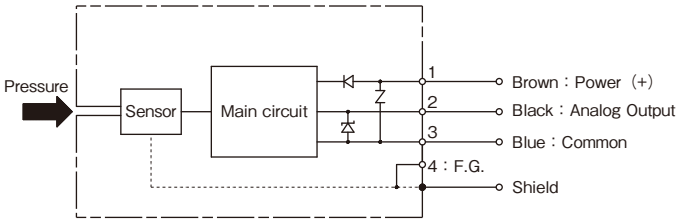
Wire Color	Connection	
	PA-960	PA-968
Brown	Power(+)	Power(+)
Black	Analog Output	Analog Output
Blue	Common	CAL
Shield	–––	–––

※Do not wire the CAL connection.
※Shield wire is connected to the product housing through the connector mating part.

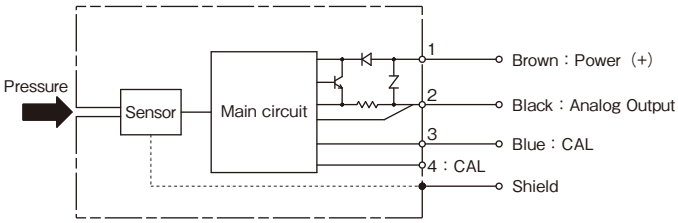
CAL : Calibration

Internal Circuit

PA-960

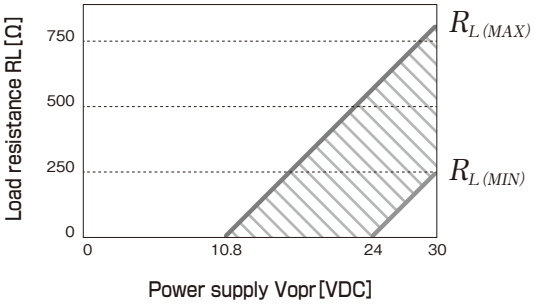


PA-968



Load Resistance

Please refer to the following table or expression to choose load resistance.



Expression of the load resistance

$$R_{L\,(MAX)} = \frac{Vopr - 10.8}{0.026}$$

$$R_{L\,(MIN)} = \frac{Vopr - 10.8}{0.026} - 507.7$$

Warranty

The warranty period for the product shall be one year. A failure due to causes attributed to design or manufacturing defects during the period one year from the date of delivery shall be repaired or replaced free of charge. However, the term “warranty” herein referred to shall imply the warranty for the product unit only, and damages from failure of the product shall be excluded. The following shall be excluded from the warranty:

(1)Failure or damage caused by improper use and careless operation in violation of the Operating Instructions.
(2)Failure or damage caused by inappropriate modification, adjustment, or repair.
(3)Failure or damage caused by acts of God, fire, or other unavoidable accidents.
(4)Replacement of accessories (cables, etc.) and supplies that come with the product.

[Note]
Copying or reprinting the entire or part of the Operating Instructions shall be prohibited except where exceptions to copyright laws apply. Furthermore, descriptions stated in the Operating Instructions are subject to change without prior notice.