

# PG-U, PHB-A Pressure Transducers

## Instruction Manual

Thank you for purchasing the KYOWA product. Read this instruction manual carefully before starting to use. Also be sure that the manual is ready for reading at any time.

### 1. Calling the operator's attention

The following cautionary symbols and headlines are used to invite the operator's attention. Be sure to observe the accompanying precautions in order to safeguard the operator and preserve the performance of the instrument.

**Warning!** Improper handling can cause serious injury to the operator. To avoid it, be sure to observe the accompanying instructions.

**Caution!** Improper handling can cause deleterious effects to the operator's body. To avoid it, be sure to observe the accompanying instructions.

### 2. Safety precautions

#### Warning!

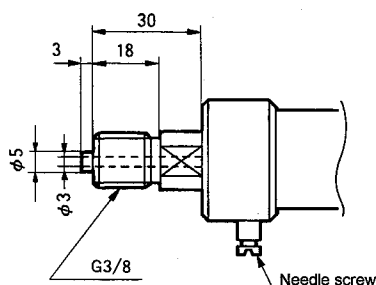
- Avoid pressure in excess of the allowable overload rating, or the instrument can explode.
- Avoid contact of a projection to the sensor, or it can be cracked resulting in the instrument's explosion.
- Use the specified tightening torque. Improper tightening torque applied can lead to the instrument's explosion.
- If an excessive pressure is expected, provide a protection casing surrounding the instrument to secure safety.

#### Caution!

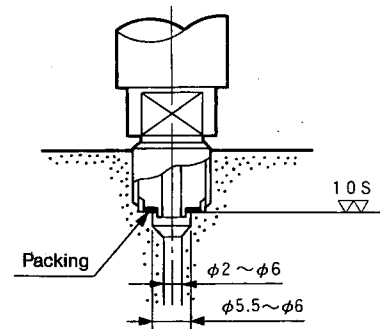
- Dismount the instrument only after the applied pressure has been completely removed.
- SUS 630 (JIS G4303) is used where the instrument contacts a liquid. Avoid application of the instrument to a corrosive liquid or gas.
- Don't use endurance tests.
- Avoid using for long-term measurement of gas pressure if much importance is attached to the stability of output in a minute range.

### 3. Mounting

3.1 The configuration of the mount screw is shown below.



3.2 Mount the transducers as illustrated below. Use a new packing. Teflon seal tape may be tied around the screw for sealing.



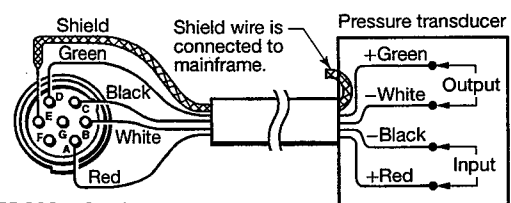
3.3 Apply tightening torque, referring to the table below. To mount or dismount, apply a spanner to the bevelled edge (14mm in width) on the connecting screw section.

Recommended tightening torque	Allowable maximum tightening torque
30N•m	60N•m

3.4 Mount the transducer possibly closest to the pressure source. A cock or valve may be provided at the connection with a conduit to facilitate connection and disconnection.

### 4. Connection and measurement

- 4.1 Connect the transducer to a strain amplifier. (Note) Measuring Method of Data Logger setting CH mode (ex. UCAM-60B and UCAM-500) is "4-gage method (Strain gage transducer)". Select the CH mode from "4-Gage (Constant voltage)".
- 4.2 Connector pin assignment is as follows.



4.3 If the measurement object fluid is a liquid, allow the liquid to enter into the pressure chamber by loosening the needle screw provided on the transducer, thereby letting contained air go out.

In case of cable extension, correct the reading value using the equation below.

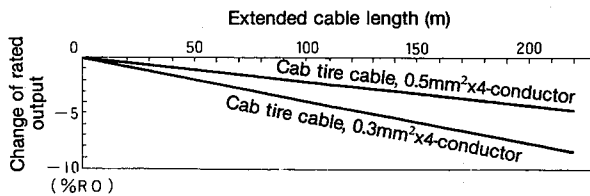
$$e_2 = e_1 / (1 + \alpha L)$$

where  $e_1$ : Rated output with the standard cable length of 3m (described in the inspection sheet)

$e_2$ : Rated output after cable extension

- a: Correction coefficient  
 $a=3.8 \times 10^{-4}/m$  with a 0.3×4-conductor shielded chloroprene cab tire cable  
 $a=2.3 \times 10^{-4}/m$  with a 0.5×4-conductor shielded chloroprene cab tire cable  
L: Extended cable length (m)

#### Rated output vs. cable extension lengths



## 5. Conversion

- 5.1 Use the calibration coefficient described in the inspection sheet for conversion of the reading into pressure.  
5.2 In case a strain amplifier is in use, output reads in  $\epsilon \times 10^{-6}$  equivalent strain. The inspection sheet describes the pressure value which corresponds to  $1510^{-6}$  equivalent strain. Use the equation below for conversion into pressure.

$$\text{Pressure} = (\text{Amplifier's output, } \epsilon \times 10^{-6}) \times (\text{Calibration coefficient, Pa / } 1 \times 10^{-6})$$

## 7. Specifications

### • PG-U

Model	Rated capacity	Natural freq.
PG-2KU	200kPa (2.039kgf/cm <sup>2</sup> )	Approx. 2kHz
PG-5KU	500kPa (5.099kgf/cm <sup>2</sup> )	Approx. 4kHz
PG-10KU	1MPa (10.20kgf/cm <sup>2</sup> )	Approx. 7kHz
PG-20KU	2MPa (20.39kgf/cm <sup>2</sup> )	Approx. 13kHz
PG-50KU	5MPa (50.99kgf/cm <sup>2</sup> )	Approx. 21kHz
PG-100KU	10MPa (102.0kgf/cm <sup>2</sup> )	Approx. 29kHz
PG-200KU	20MPa (203.9kgf/cm <sup>2</sup> )	Approx. 40kHz
PG-300KU	30MPa (305.9kgf/cm <sup>2</sup> )	Approx. 45kHz
PG-500KU	50MPa (509.9kgf/cm <sup>2</sup> )	Approx. 50kHz

Note: The unit and numerical values in brackets in the [CAP.] column on the nameplate as well as in the above rated capacity column depend on the conventional unit expression just for reference.

Rated output:	2mV/V (4000×10 <sup>-6</sup> strain)±0.5% (PG-2, 5, 10KU: ±1%)
Non-linearity:	±0.2%RO (2, 5, 10KU: ±0.3%RO)
Hysteresis:	±0.2%RO (2, 5, 10KU: ±0.3%RO)
Excitation voltage:	1~10V, AC or DC
Safe excitation voltage:	15V, AC or DC
Input & output resistance:	350Ω±1%
Compensated temp. range:	-10~60°C
Safe temperature range:	-20~70°C
Temperature effect on zero balance:	±0.02%/RO/°C
Temperature effect on output:	±0.02%/°C
Safe overload rating:	150%
Mount screw:	G3/8 male screw; material, SUS630;
Weight:	300g, approx. (2, 5KU: 500g, approx.)
Cable:	0.3mm <sup>2</sup> , 4-conductor shielded chloroprene 3m, ø 7.6mm, terminated in connector plug

- 5.3 In case other type of amplifier or recorder is in use, it is necessary to measure the applied bridge voltage accurately. The inspection sheet describes the pressure value which corresponds to 1μV output voltage against 1V voltage applied. Use the equation below for conversion into pressure.

$$\text{Pressure} = \frac{\text{Output bridge voltage, } \mu\text{V}}{\text{Applied bridge voltage, V}} \times (\text{Calibration coefficient, Pa / } 1\mu\text{V/V})$$

## 6. Maintenance and inspection

- 6.1 Avoid water and oil on the transducer.  
6.2 If the initial value or reading is found abnormal, measure input/output resistance and insulation resistance (which should be 100MΩ or higher). If the measured values are different from the descriptions of the inspection sheet, the cause may be a trouble. In this case, contact your nearest Kyowa representative for necessary inspection.

**CAUTION:** For measurement of insulation resistance, apply a voltage lower than 50V to the insulation resistance tester.

- 6.3 Do NOT disassemble the transducer.

### • PHB-A

Model	Rated capacity	Natural freq.
PHB-A-1MP	1MPa(10.20kgf/cm <sup>2</sup> )	Approx. 8kHz
PHB-A-2MP	2MPa(20.39kgf/cm <sup>2</sup> )	Approx. 13kHz
PHB-A-5MP	5MPa(50.99kgf/cm <sup>2</sup> )	Approx. 21kHz
PHB-A-10MP	10MPa(102.0kgf/cm <sup>2</sup> )	Approx. 29kHz
PHB-A-20MP	20MPa(203.9kgf/cm <sup>2</sup> )	Approx. 40kHz
PHB-A-30MP	30MPa(305.9kgf/cm <sup>2</sup> )	Approx. 45kHz
PHB-A-50MP	50MPa(509.9kgf/cm <sup>2</sup> )	Approx. 50kHz

Note: The unit and numerical values in brackets in the [CAP.] column on the nameplate as well as in the above rated capacity column depend on the conventional unit expression just for reference.

Rated output:	2.2mV/V (4400×10 <sup>-6</sup> strain)±15%
Non-linearity:	±0.4%RO
Hysteresis:	±0.4%RO
Excitation voltage:	1~10V, AC or DC
Safe excitation voltage:	15V, AC or DC
Input & output resistance:	350Ω±2%
Compensated temp. range:	-196~200°C
Safe temperature range:	-196~210°C
Temperature effect on zero balance:	±0.03%/RO/°C
Temperature effect on output:	±0.03%/°C (PHB-A-1MP: ±0.035%/°C)
Safe overload rating:	120%
Mount screw:	G3/8 male screw; material, SUS630
Weight:	530g, approx. (incl. cable)
Cable:	0.3mm <sup>2</sup> , 4-conductor shielded Teflon 3m, ø 5mm, terminated in connector plug

■ Accessories (PG-U, PHB-A)	Gasket	3
	Inspection sheet	1
	Warranty	1
	Instruction manual	1
	Cable	1 (PG-U only)