



**bar** **KPG-PA**  
Ultracompact Pore Pressure Gauge

**Pore water pressure in model testing**

This is a miniature pore pressure gauge for measurement of pore water pressure in soil. It is designed for use in model testing, and is applicable to measurement for about one week under conditions within the specifications.



Protection ratings: IP68 equivalent

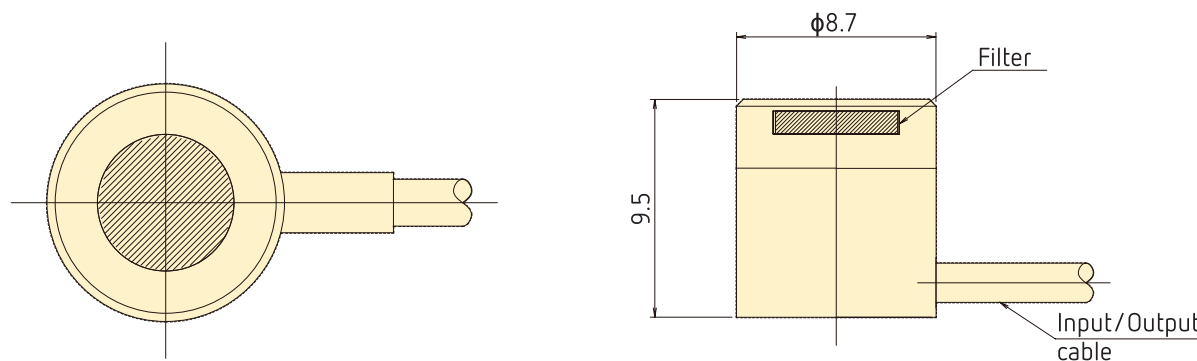
**FEATURES**

- Small, lightweight
- Easy handling
- Dual structure not affected by the outer lateral pressure
- Replaceable filter

**SPECIFICATIONS**

TYPE	KPG-50KPA	KPG-100KPA	KPG-200KPA
Capacity	50kPa	100kPa	200kPa
Rated output	Approx. 0.5mV/V (1000x10 <sup>-6</sup> strain)	Approx. 0.75mV/V (1500x10 <sup>-6</sup> strain)	Approx. 1.6mV/V (3200x10 <sup>-6</sup> strain)
Non-linearity	1%RO		2%RO
Filter mesh	40µm		
Allowable temperature range	0 ~ +60°C (No icing)		
Input/Output resistance	350Ω		
Recommended exciting voltage	2V or less		
Allowable exciting voltage	5V		
Weight	Approx. 2.3 g		

Input/Output cable : Ø 1.7mm 0.035mm<sup>2</sup> 4-core shielded vinyl cable 2m



## Operation Manual of TML Small Pore Pressure Gauge

This operation manual applies to the following products but products with special specifications are partly out of this manual.

All capacities of series KPG-PA/KPH-PA

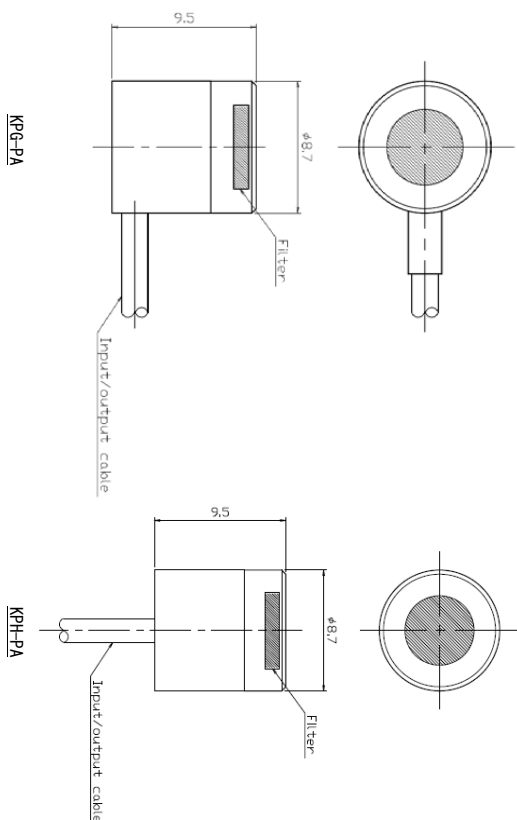
- Please read this operation manual thoroughly to familiarize yourself with the operating procedure of this product.
- General operation procedures and cautions are shown in this manual.
- Incorrect operation and/or installation may lead to incorrect measurement and/or accident.
- Please retain this operation manual together with test data.

### 1. SUMMARY

This is a small sized pore pressure gauge suited to measuring pore water pressure under the ground in model experiment for a short term.

Since the sensing part of this pressure gauge has a hermetically sealed construction, the measured value varies depending on the change of atmospheric pressure. It is recommended to measure the atmospheric pressure separately and to compensate the measured value of this pressure gauge accordingly.

### 2. DIMENSIONS



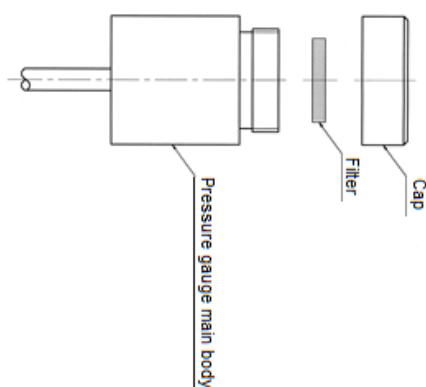
Weight: Approx. 2.3g  
Unit: mm

### 3. HOW TO MOUNT THE FILTER

The pore pressure gauge enables highly accurate measurement on condition that the mesh in the filter and the space between the pressure-sensing surface and the filter are filled with water. The filter must be installed on the main body of the pressure gauge according to the following procedures.

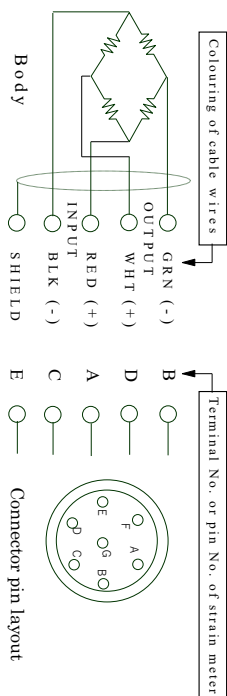
1. Pour water into a vessel and put the pressure gauge and packed filter in the water.  
(Take care not to soak the end of the cable.)
2. Remove the filter cap.
3. Unpack the filter and install it on the gauge. Put the cap on and screw it to fix the filter.

N.B. The attached filter is supplied with its mesh ventilated and impregnated with water.



### 4. MEASUREMENT

1. One end of the supplied cable is usually supplied without connector plug. The cable is connected to a strain meter or its switching box by screwing or soldering. In case of using NDIS 7-pin connector plug, refer to the following connection layout.



N.B. The shield of the cable is not connected to the body of pore pressure gauge.



TCAH-0485A

- The pore pressure gauge is calibrated with a constant voltage excitation type strain meter with its input/output cable connected to the strain meter. The rated output and sensitivity shown on the test data are found with the instrument gauge factor 2.00. (In case of using TML data logger, its coefficient should be set to 1.000.)
- Set necessary measuring parameters to a strain meter, recorder, computer, etc. (For strain meter; for example, initial balancing, sensitivity adjustment, settings of unit, coefficient and measure mode, initial value measurement and so on.)
- Measured values are in + side for increase of pressure. When a reverse polarity is required, change connections between B and D (green and white) on the strain meter terminal.
- In ordinary measurement, it is recommended that the strain meter is previously set to measure directly in physical unit. In case of strain reading, pressure can be found using the following equation.

$$\text{Pressure [kPa, MPa]} = \text{Measured value} \times \text{Calibration Coefficient} \times 10^{-6}$$

The calibration coefficient is a value obtained by dividing the rated capacity (kPa, MPa) by the rated output ( $\times 10^{-6}$ ). It is found in the test data supplied.

- In case that the cable is extended under constant voltage excitation, correct the lowering of sensitivity using the following equation

$$\text{Equation : } \epsilon_0 = \left( 1 + \frac{r}{R} \right) \epsilon$$

where  $\epsilon_0$  = Real value after correction

$\epsilon$  = Measured value

R = Input resistance of pore pressure gauge

r = Resistance value of extended cable (Total resistance at input) [ $\Omega$ ]

Sectional area of wire of extended cable (mm <sup>2</sup> )	0.035	0.05	0.08	0.3	0.35	0.5
Total resistance value per meter ( $\Omega$ )	1.00	0.63	0.44	0.119	0.106	0.071

### 5. CAUTIONS FOR PRECISE MEASUREMENT



- Do not drop or shock the pore pressure gauge. Strong vibration or impact may cause damage.
- Do not apply pressure more than the capacity. If it is applied, a damage of the pressure gauge may be caused.
- This pore pressure gauge is intended for use in a short term. It is not applicable to a long term use. The maximum allowable period is about one week for continuous use in water.
- The measured value of this pressure gauge varies depending on the change of atmospheric pressure. It is recommended to measure the atmospheric pressure separately and to compensate the measured value of this pressure gauge accordingly.
- Do not use the pore pressure gauge in salt water, oil or chemicals.

- Do not use the transducer out of its temperature range.
- In case of using other instruments than strain meter, employ an instrument having well stable excitation voltage to the electrical bridge.
- Do not apply voltage larger than the allowable bridge excitation.
- Continuous operation in excess of the recommended excitation voltage may drive drift, etc. to make the pore pressure gauge out of the specifications.

KPG-PA/KPH-PA all capacities	Recommended bridge excitation	Allowable bridge excitation
	Less than 2 V	5 V

- Do not forcibly bend the cable near its root. Do not place an object on the cable, or pull or hurt the cable.
- Take care of immersion of water or oil from the end of input/output cable.
- If the measured value is not stable, connect the body of the pressure gauge to the earth terminal of the strain meter.
- Never disassemble or alter the pore pressure gauge.

### 6. CHECK and STORING

- Measure an initial unbalance value [ $\times 10^{-6}$ ] in DIRECT mode of the strain meter. The initial unbalance value means strain output [ $\times 10^{-6}$ ] at no load.
- Using an insulation resistance tester with an excitation voltage of 50V DC or less, measure insulation resistance [M $\Omega$ ] between input/output wires of the cable (Red, Green, Black and White) and the pore pressure gauge body.
  - Make sure that the measured values of 1 to 3 above are not largely different from the values shown on the test data.
- With a digital voltmeter or tester, measure resistance values [ $\Omega$ ] between each input/output wire (between red and black, and between green and white).
- For storing, avoid high or low temperature, high humid place, dust, water drop, vibration, shock, etc. Replace the cable cap on the electrical cable.

### 7. STANDARD ACCESSORIES

Test data	1 copy
Operation manual	1 copy
Filter (with 40 $\mu$ m mesh)	1 piece



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