

GP-1GRY PIRANI VACUUM GAUGE Quick Manual

Introduction

This quick manual is for quick check of operation and display of the product. Please refer to instruction manual in advance for detailed information about operation, precautions and safety for proper use. Available for download from ULVAC website.
https://showcase.ulvac.co.jp/en
This manual is for the following gauges. Serial Nos. 00001G and higher

Prior to Use

Thank you for purchasing this ULVAC product. Upon receipt of the product, verify that is the correct model ordered and that it has not been damaged during transport.

WARNING	Read this instruction manual before installing, operating, inspecting, or maintaining the product and fully understand the safety precautions, specifications and operating procedures regarding the product.
WARNING	The copyright of this instruction manual is held by ULVAC, Inc. You are prohibited from copying any portion of this instruction manual without the consent of ULVAC Inc. You are also prohibited from disclosing or transferring this instruction manual to third parties without the express written consent of ULVAC Inc.
CAUTION	The contents described in this instruction manual are subject to change without prior notice because of changes in specifications or because of product improvements.

Safety Symbols

WARNING	Safety symbols are used throughout this instruction manual to call the operator's attention to safety. The terminology used in safety symbols is classified below.
DANGER	Indicate status of urgency of danger when failure to comply with DANGER results in serious personal injury or death The work ignoring this warning will lead to serious damage to human life or factory facility (including this equipment) at a high probability.
WARNING	Indicate status of danger when failure to comply with WARNING results in serious worker's injury or death. The work ignoring this warning will cause possibility leading to serious damage to human life or factory facility (including this equipment)
CAUTION	Indicate status of danger when failure to comply with WARNING results in minor injury or moderate damage. The work ignoring this warning will cause possibility leading to minor damage to worker or breakage to equipment or necessary to adjust.
Note	Direct hazard is not existed, describe the necessity to know from the viewpoint of worker's safety or correct and safe operation of equipment

Safety Cautions

For safe use of this vacuum gauge, carefully read this manual and comply with the warnings and cautions given in the manual.

WARNING
Turn OFF power. Before touching any terminal on the rear of the meter or if there is a possibility of touching it, turn OFF the vacuum gauge power and the power applied to the setpoint output terminal. Contact with the terminal, to which the voltage (24 VDC) is applied, will cause electric shock if power is turned ON.
Turn OFF power. Before touching the power terminal on the rear of the controller or if there is a possibility of touching it, turn OFF the power to the vacuum gauge. Contact with the terminal, to which the voltage (24 VDC) is applied, will cause electric shock if power is turned ON.

Turn OFF power. If the vacuum gauge fails, immediately turn OFF the power. Use of a failed gauge may cause fire or electric shock. For repair, contact your local ULVAC representative or ULVAC JAPAN.
Turn OFF power. Turn OFF the power before replacing a fuse. Replacing a fuse with the power turned ON can cause electric shock.
Turn OFF power. Whenever mounting the gauge, unplug the power cable.
Use rated fuse. Use a fuse of the prescribed rating. Do not use a fuse other than the prescribed one or do not short the fuse holder. Damage or fire may result.
Check line voltage. Prior to turning ON the power, make sure that the vacuum gauge operating voltage and the supply voltage are in agreement. Connection of incorrect power can cause damage to the vacuum gauge and fire.
Check connection. The contact output capacity is 125 VAC 1 A (resistance load). If power higher than this is opened/closed, do not use the contact of the vacuum gauge, but use a large capacity switch in conjunction.
Check recorder connection. The recorder output is afloat from ground potential. Always connect the recorder input to the recorder terminal by insulating it from ground. If it is connected to GND potential by mistake, the meter will not indicate the correct value. Also the vacuum gauge may be damaged.

CAUTION

Don't disassemble. Do not try to disassemble the vacuum gauge (controller, sensor head cable and sensor head).
Don't modify. Do not modify the vacuum gauge (controller, sensor head cable and sensor head). If it is modified, its functions are not warranted. Also fire or electric shock may result.
Operating environment Do not connect the sensor head to a test object of which pressure is in excess of atmospheric pressure. If the pressure in the sensor head exceeds atmospheric pressure, the sensor head will be damaged or it will pop out from the connector, causing injury to the surrounding, including human body. If the pressure exceeds atmospheric pressure, provide an isolation valve so that the pressure in the sensor head does not exceed atmospheric pressure.
Operating environment Do not use the gauge in a place where it may be splashed with water. If it is splashed with water, failure, earth leakage or fire can result.
Ventilation Do not plug the air vents of the vacuum gauge. If the air vents are plugged, heat will be contained inside and the gauge may be damaged. The gauge will not indicate a normal value either.
Beware of impact Do not give an impact to the sensor head.
Keep out foreign matter. If foreign matter like metal fragments or combustibles are admitted into the vacuum gauge through the air vents or other openings, remove them. Otherwise, the vacuum gauge may be damaged.
Operating conditions Operate the vacuum gauge under the environment set forth in the specifications.
Repacking for transfer If the vacuum gauge is to be shipped to other site, repack it in the same way as on delivery. If the gauge is shipped bare, it may be damaged.
Disposal When discarding the vacuum gauge, comply with your local regulations. If the gauge was used in an environment that can cause hazards to human body, have it disposed of by an authorized specialist in disposal. Customer shall be responsible for the cost relating to disinstallation.
Maintenance Aluminum electrolytic capacitor is used for the electric circuit in the sensor unit. Generally, the life expectancy of the aluminum electrolytic capacitor is limited and the higher the surrounding temperature, the shorter the life. It is recommended to replace the aluminum electrolytic capacitor once every five years or at the time or repair or overhaul to prevent components from being damaged.
Check line voltage The operating voltage of this gauge is 100 to 240 VAC. Check the line voltage before connection. If incorrect power is applied, damage or fire can result.

1. OVERVIEW

The Model GP-1GRY is a constant temperature type Pirani vacuum gauge utilizing heat conduction of gas. If the sensor head burns out, the meter indication will deflect off-scale to the higher pressure side (atmospheric pressure side). Pressure can be set at two points by meter relay and the comparator output can be taken out as setpoint (transfer type).

1.1. Specifications

Name	Pirani vacuum gauge
Model	GP-1GRY
Measurable range	0.4 to 2700 Pa

Measurement error	Within ± 3% of 100% full-scale as converted to linear scale.
Power requirements	100 to 240VAC, 10VA (Rated power cable: AC125V/10A)
Operating temperature range	10 to 40°C
Operating humidity range	15 to 80% (No condensation)
Recorder output	0 to 10 mVDC
Fuse rating	250 V, 0.5 A
Relay contact capacity	Max.AC125V/1A, AC250V/0.5A, DC30V/2A Min. DC10mV/10µA
Outside dimensions (mm)	Controller: 90W × 140D × 100H A-type meter: 100W × 111D × 100H
Weight	Controller: 1000g A-type meter: 440g Measuring unit: 35g(GP-H)

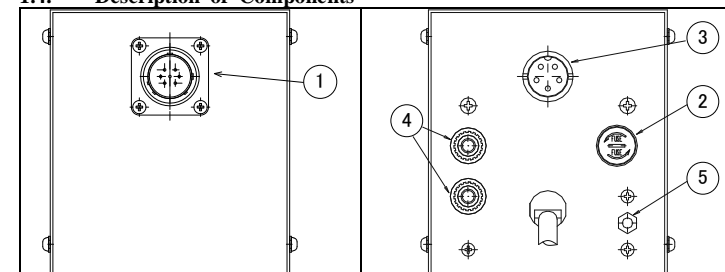
1.2. Standard Accessories

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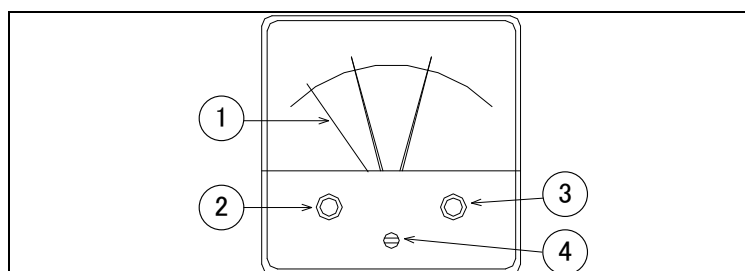
1.3. Options

Sensor head	WP-01~03,16(filament material Pt) WP-04,05(glass pipe type, Productions termination: Aug.2012) WPB-10-034, WPB-10(bankable type)
Measuring unit:	GP-H or GP-BH(Only WPB-10-034)
Sensor head cables	2.5,10, 15, 20, 30, 50, 100 m long

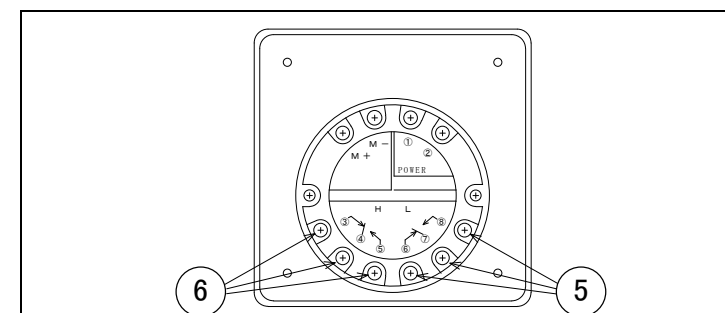
1.4. Description of Components



- 1) Meter connector
- 2) Fuse holder: The fuse ampacity is 0.5A.
- 3) Sensor head connector
- 4) Recorder output terminal: Red terminal (+) Black terminal (-)
- 5) GND terminal



- 1) Meter (Pressure indicator)
- 2) Relay potentiometer: Sets the meter relay L.
- 3) Relay potentiometer: Sets the meter relay H.
- 4) Zero adjustment: Adjust the meter needle to the zero position (extreme left of scale) when power is OFF.



- 5) Setpoint output terminal: Outputs setpoint L.
- 6) Setpoint output terminal: Outputs setpoint H.

2. INSTALLING THE PIRANI GAUGE

2.1. Preliminary Operation

- (1) Unpack the gauge and check quantities.
- (2) Check components for possible damage.

2.2. Installation

2.2.1. A sensor head installation method to GP-H

Caution: The installation methods of a screw for fixation are different by a sensor head.



Gauge WP-01/02
It is inserted a screw for fixation by the port side of the sensor head.

Tighten a screw for fixation in the main body of GP-H, and please fix it.

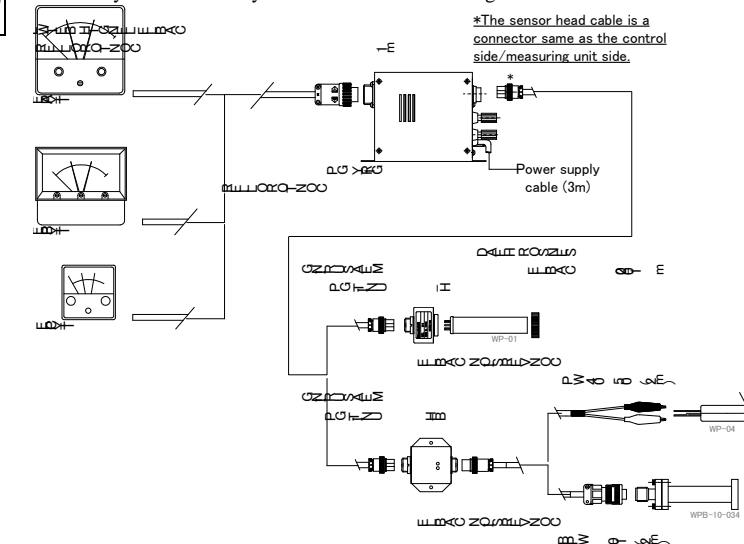
Gauge WP-03/16
Insert a screw for fixation from the connector side of the sensor head. (Please insert it diagonally like a figure.)

2.2.2. Electrical connection

Secure a space for installing the cable on the back of the meter. Install the meter in a position where the meter terminals do not come into contact with other components and parts when the gauge is in operation.

2.2.3. Electrical connection

Make electrical connection after installing components. Fix the cable by taking care not to exert undue force to the connection between the sensor head and sensor head cable and the connection between the controller and sensor head cable. Lay the sensor head cable away from power lines, if possible. Noise may occur. Securely fasten the connector fixing screw.



2.2.4. Installing the sensor head

Install the sensor head to the gauge port of a vacuum system.

- Measuring position
 - This gauge measures the static pressure in the position where the sensor head is connected. If there is gas flow or an outgas source or an intense electron or ion generating source, the measurement value will be affected. So select the measuring position carefully.
 - Note that if the sensor head is subjected to vibration, heat radiation, high intensity magnetic field or intense radiation, correct pressure measurement may not be made.
 - Because of its principles of operation, the Pirani vacuum gauge indication is affected by the ambient temperature of the sensor head. Be careful that the ambient temperature deviates considerably from the calibrating temperature (about 25°C).

- Installing the sensor head
 - Install the gauge in such a manner that the sensor head mounting opening plane is parallel with gas flow. See to it that gas does not enter the sensor head in the form of beam.
 - The vacuum gauge filament is as thin as 25 microns in diameter. Avoid use in a place where vibration is at a high level, if possible. Be careful in selecting the installation place and handling the sensor because major cause of filament burnout is mechanical impact.
 - To install the sensor head, use an O-ring that releases little outgas. Use of a material that releases much outgas like rubber pipe or grease can be a cause of error.

3. OPERATING PROCEDURE

3.1. Handling

- Start measurement more than one minute after power is turned ON and the indication is stabilized.
- For precision measurement, wait for at least 10 minutes until temperature equilibrium of the sensor head is established after power is turned ON. Do not turn OFF the power when a sequence of measurements is being made.
- If the sensor head is exposed to a chemically active gas or highly adsorptive gas, its characteristics may change. In such a case, fill the chamber with nitrogen, inert gas or dry air with the sensor head energized with power, and then evacuate it. Repeat this purging operation. The sensor head may be restored to the condition before the characteristics changed. At this time, do not blow gas toward the opening plane of the sensor head even if the gas is inert or dry air. If there is no prospect of the characteristics being restored by purging operation, replace the sensor head.
- The Pirani vacuum gauge is sensitive to all types of gas, but its sensitivity varies with the type of gas. This gauge indicates pressure by assuming that the gas is nitrogen (N₂).

3.2. Meter Relay Action

When the pressure has lowered to below a set level (pressure indicator from relay potentiometer the left side), NC closed (ON) and NO opened (OFF).

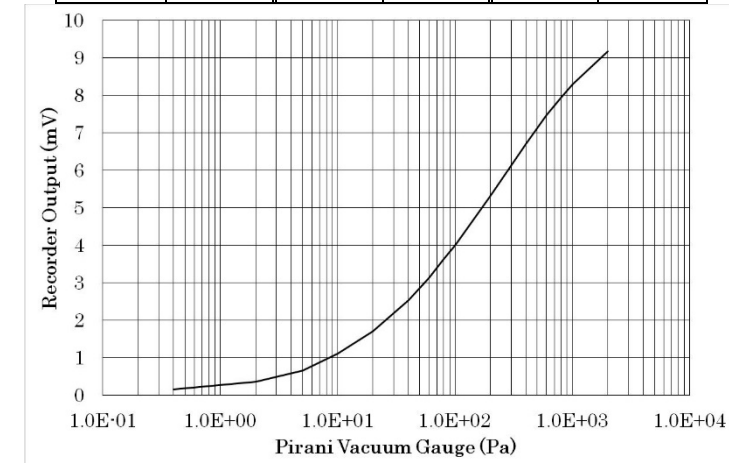
Range in which meter relay setting is effective

- Between 5% and 100% of the full scale with the higher limit setting (H: red needle)
- Between 0% and 95% of the full scale with the lower limit setting (L: green needle)

3.3. Recorder Output

CAUTION Check recorder connection. The recorder output is afloat from ground potential. Always connect the recorder input to the recorder terminal by insulating it from ground. If it is connected to GND potential by mistake, the meter will not indicate the correct value. Also the vacuum gauge may be damaged.

Pa	mV	Pa	mV	Pa	mV
0.4	0.15	40	2.53	400	6.70
2	0.35	60	3.13	600	7.46
5	0.65	80	3.63	800	7.94
10	1.10	100	4.00	1000	8.29
20	1.70	200	5.31	2000	9.17



4. TROUBLESHOOTING

Symptom: The meter needle does not deflect when power is turned ON.	
Possible cause	Corrective action
• Fuse has burnt out.	(1) Replace the fuse (250 VAC, 0.5 A). Turn OFF the power to the controller before replacing a fuse. (2) If the fuse blows out immediately after replacement, repair is necessary.
• Mater cable (between the controller and mater) is not connected and disconnected.	(1) Reconnect the connector after turning OFF the power to the controller. (2) Check the the controller and meter cable by a circuit tester. (3) If the connector is broken, replace it.

Symptom: The meter needle remains deflected off-scale to the right (atmospheric pressure side).	
Possible cause	Corrective action
• Pressure is beyond the measurable range.	(1) The measurable range of the GP-1G is 0.4 to 2700 Pa.
• Sensor head cable is not connected.	(1) Reconnect the sensor head cable after turning OFF the power to the controller.
• Sensor head cable is disconnected.	(1) Check the sensor head cable for continuity by a circuit tester. (2) If the cable is disconnected, replace it.
• Filament has burnt out.	(1) Check the filament for continuity by a circuit tester. At this time, do not energize the filament with a current more than 10 mA. Its life will be shortened. The filament resistance is about 13 Ω at atmospheric pressure. (See Fig. 1.) (2) If the filament has burnt out, replace it.

Symptom: The pressure indication does not exceed 2000Pa when atmospheric pressure is measured.	
Possible cause	Corrective action
• The type of the sensor head differs from the specified one.	(1) Change it with a specified one. (2) Adjust or recalibrate with the one currently in use.
• Gas under measurement is not nitrogen.	(1) The type of gas used for calibration of this gas is nitrogen.
• The sensor head is contaminated or its filament has worn out.	(1) Replace the sensor head.
• The sensor head or controller is installed in a place where temperature is high. (This gauge was calibrated at about 25°C.)	(1) Move the gauge to a clean, well ventilated place not blown with draft.

Symptom: The needle vibrates and does not indicate a fixed value.	
Possible cause	Corrective action
• The type of the sensor head differs from the specified one.	(1) Change it with a specified one. (2) Adjust or recalibrate with the one currently in use.
• The sensor head is contaminated or its filament has worn out.	(1) Replace the sensor head.
• Leak in the sensor head or a leak in the area where the sensor head is installed.	(1) If there is a leak in the sensor head, replace it. (2) If the leak is elsewhere, stop it.
• Increased wire resistance due to poor contact of the sensor head cable or corrosion of the wire rod.	(1) Check the sensor head cable. (2) Replace the sensor head cable.
• The line voltage is not within 100 to 240 VAC.	(1) Hold the line voltage within 100 to 240 VAC.

Symptom: Pointer does not move from the right (Atm pressure) but it start moving suddenly after the pressure decreases.	
Possible cause	Corrective action
• The gauge has been exposed to high temperature and high humidity above the specification for long time.	(1) Use the gauge at condition as listed on the specification. (2) If the same problem occurs in the regular environment, the gauge needs repair.

Symptom: The pressure indication not accurate.	
Possible cause	Corrective action
• Ambient temperature of the sensor head is high or is low	(1) The Pirani vacuum gauge indication is affected by the ambient temperature of the sensor head. Use the gauge at condition as listed on the specification.
• Gas under measurement is not nitrogen.	(1) The type of gas used for calibration of this gas is nitrogen.
• The sensor head is	(1) Replace the sensor head.

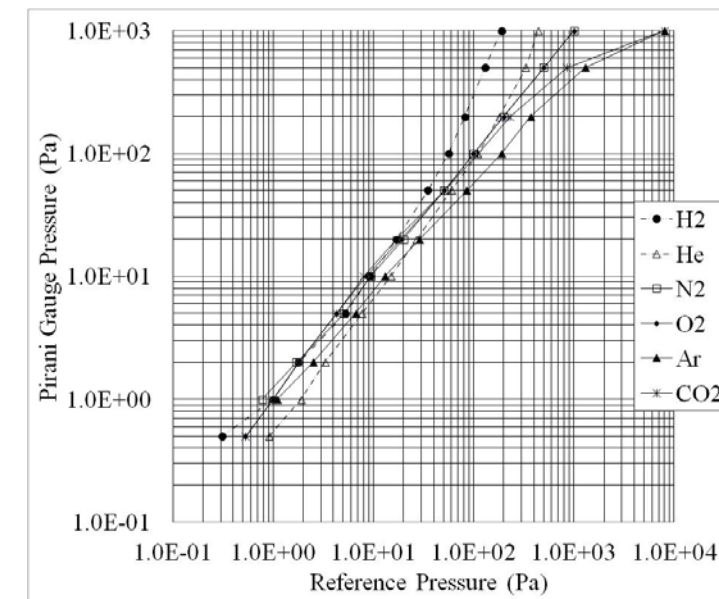
contaminated or its filament has worn out.	
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Symptom: Meter relay contact output is not actuated.	
Possible cause	Corrective action
• The needle is not yet lower than the pressure of the relay setting needle.	(1) The relay contact output is not actuated until the pressure lowers below the relay setting needle.
• The relay circuit power is not supplied.	(1) Check the rear of the meter.

5. APPENDIX

5.1. Types of Gas Measured and Indication

For your reference, Fig. 2 (Indication of various types of gas) shows the relationship between the indication and pressure when representative gases are measured.



5.2. Accuracy of Pirani Vacuum Gauge

Indicated Values (Pa)	Working Standard (Pa)	Indicated Values (Pa)	Working Standard (Pa)
0.4	0 - 3	100	83 - 120
2	0 - 5	200	170 - 230
5	2 - 8	400	345 - 465
10	7 - 14	600	510 - 715
20	14 - 26	1000	825 - 1250
40	32 - 49	2000	1650 - 2900
60	49 - 71	2700	1920 - 3750

6. WARRANTY

This product was shipped after rigid company inspection. However, in case any failure occurs under ULVAC's responsibility, such as defect in manufacturing and damage during transportation, Buyer shall inform ULVAC, Inc. or the local ULVAC representatives. ULVAC will repair or exchange it at free of charge.

Warrantable Items: Vacuum gauge (controller)

Duration of guarantee
One (1) year after shipping date from ULVAC

- Warrantee scope
- Domestic business in Japan: Product, which has damage, caused by a failure on delivery.
 - Direct export transaction: Product, which has damage, caused by a failure on delivery. The warrantee scope shall confirm to the new INCOTERMS.
 - Products not satisfying meet the standard specifications although the product is used under the normal service conditions such as temperature range and power etc.

- Response procedure
- Domestic business in Japan: ULVAC send a replacement or Buyer return the defective items to ULVAC, Inc. or to the local ULVAC representatives for repair. If field service is required, Buyer shall ask ULVAC, Inc. or the local ULVAC representatives.
 - Direct export transaction: ULVAC send a replacement or Buyer return the defective items to ULVAC, Inc. or to the local ULVAC representatives for repair. Return charge shall be paid by Buyer.

- Disclaimer
- Failure occurred after expiration of warranty period
 - Failure caused by force majeure, such as fire, storm and flood damage,

- earthquake, lightning strike, war etc
- Failure occurred due to carelessness handling or faulty usage
- Products remodeled, disassembled or repaired without ULVAC's acceptance
- Failure occurred under abnormal environment, such as intense electromagnetic field, radiation, high-temperature, high-humidity, flammable gases, corrosive gases, dust etc.
- Failure occurred by noise
- Product deficiency or secondary damnification occurred to Buyer, from law suit to ULVAC by third party for patent infringement.
- Sensor head being used (expiration of life, measurement error, etc.)
- Sensor head cable being used (cable burnout due to improper installation, poor contact, etc.)

Others

- In case, special agreement or memorandum for specifications is made individually, the descriptions are prior to this article "13 Product Warranty".
- Buyer shall inform ULVAC when this product is exported out of Japan. In the meantime, Buyer shall take necessary procedures according to Foreign Exchange and Foreign Trade Law.
- As for the question and consultation, Buyer shall check the model and serial number and ask the local representative or ULVAC, Inc.
- The content of this document is subject to change without notice in future.


7. Certificate of Contamination

Please enter the operating condition/trouble symptom of your vacuum gauge in this form and submit it to your local ULVAC service station or sales office after signing it. The form is available for download from ULVAC website.

8. Networks

ULVAC, Inc. <http://www.ulvac.co.jp/eng/>
 Service Centers <http://www.ulvac.co.jp/eng/support/service/index.html>
 Sales Office http://www.ulvac.co.jp/eng/support/sales_office/index.html

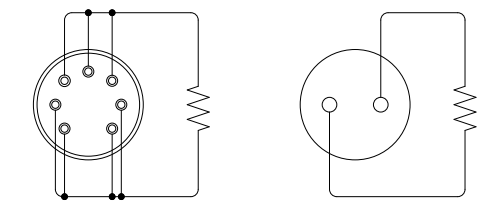
9. China RoHS Declaration



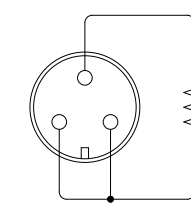
This mark is applied to the electronic information product sold in the People's Republic of China. The figure at the center of the mark is the validity date of environmental protection. This product does not influence the environment, the human body and the property during the period reckoning the manufacturing date as long as the caution for safe use regarding the products are observed.
 *The environmental protection validity date is not the product warranty period.

Name of parts	Making format for names and contents of hazardous substances or elements					
	Hazardous substances or elements					
	Pb	Hg	Cd	Cr ⁶⁺	PBB	PBDE
Printed Circuit Board	X	O	O	O	O	O
Chassis	O	O	O	O	O	O
Connector	O	O	O	O	O	O
DC Converter	O	O	O	O	O	O
Label	O	O	O	O	O	O
Detection Unit	O	O	O	O	O	O
Gauge Head	X	O	X	O	O	O
Cable	O	O	O	O	O	O

10. RELATED DRAWINGS



WP-01, 02, 03, 16 WP-04, 05



WPB-10-***

Fig. 1 Dimensional drawing for GP-1G