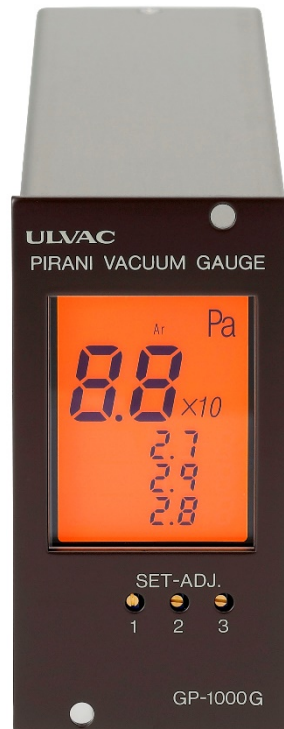


**MODEL GP-1000G
PIRANI VACUUM GAUGE
SPECIFICATION MANUAL**



This manual is for the following vacuum gauges.
S/N: 11000G and higher

Components Division,

ULVAC , Inc.

2500 Hagisono, Chigasaki City, Kanagawa Prefecture, Japan 253-8543

<http://www.ulvac.co.jp/>

1. OVERVIEW

The Model GP-1000G is a constant temperature type Pirani vacuum gauge utilizing heat conduction of gas. The measurable pressure range is 0.4 to 2700 Pa.

Pressure can be set at two points and its comparator output can be taken out as setpoint (transfer type).

Also functional check of the sensor head can be made (the sensor head is not burnt out).

Digital output (BCD output) and RS232C are provided as standard.

The controller and measuring unit being separated from each other, it is not necessary to make re-adjustment when the sensor head cable length is changed.

Changes in pressure indications due to change of the sensor head ambient temperature have been reduced by incorporating a 2-point temperature compensation circuit.

1.1. Specifications

Name	Pirani vacuum gauge	
Model	GP-1000G	
Measurable range	0.4 ~ 2700 Pa	
Measurement range	One	
Display	2 digits mantissa part, 1 digit exponent part	
Display sampling time	200 ms	
Measurement accuracy	$4.0 \times 10^{-1} \text{ Pa} \sim 1.0 \times 10^{+1} \text{ Pa} : \pm 50\%$ $1.0 \times 10^{+1} \text{ Pa} \sim 5.1 \times 10^{+1} \text{ Pa} : \pm 30\%$ $5.1 \times 10^{+1} \text{ Pa} \sim 7.6 \times 10^{+2} \text{ Pa} : \pm 15\%$ $7.6 \times 10^{+2} \text{ Pa} \sim 1.0 \times 10^{+3} \text{ Pa} : \pm 30\%$ $1.0 \times 10^{+3} \text{ Pa} \sim 2.7 \times 10^{+3} \text{ Pa} : \pm 50\%$	
Analog output ^{※1}	① 0~10V linear output 1.0×10 ³ Pa f.s. ② 0~10V Linear output 1.0×10 ² Pa f.s. ③ Dummy log output Each range 1V ④ Non-Linear output 0~10V	
Pressure setting signal	Three: Relay contact output (transfer type) 100 VAC, 0.5 A	
BCD output	TTL level Open collector	
Input signal	Ar/N ₂ changeover input: TTL level	
Communication	RS-232C	
Operating temperature range	10 ~ 40 °C	
Operating humidity range	15% ~ 80 % (No condensation)	
Power supply	AC 100 ~ 240 V	
Power consumption	10 VA	
Outside dimensions ^{※2}	50W × 238D × 99H (mm)	
Weight	Controller : 1.0 kg Measuring unit(GP-H) : 35 g	
Accessories	① Power cable 3m (triplex cable AC125V/7A) 1 pc ② Input/output connector (D-sub 37 socket M2.6 screw) 1 pc ③ Quick Manual 1 copy Subject to change according to order.	
Test results certificate		
Calibration certificate	Calibration certificate, JCSS Calibration certificate	

※1 The analog output specifications are compatible with an older model (GP -1000). (except non-Linear)

※2 Panel cut dimension is compatible with an older model.

1.2. Option

Sensor head	WP-01~03, 16 (Filament material Pt) WPB-10-034 (Bakable type)
Measuring unit	GP-H (GP-BH plus connecting cable when WPB-10 is used)
Sensor head cable	2, 5, 10, 15, 20, 30, 50, 100m

A sensor head cable does not have compatibility with older model "GP -1000".Please prepare the main control and in total another sensor head cable.

Measuring unit "GP - H" becomes compatible with older model measuring unit "GP - 1000H".

Because of its circuitry, the indication of this vacuum gauge varies with the type of sensor head. Theafore, if the type of sensor head is chaged after delivery , re-adjustment will be required.
Because operation, check the conditons at the time of shipment from the factory (type of sensor head)that are indicated on the measuring unit.

2. External Input / Output

N₂/Ar can be changed over by external inputs.

For changeover, input TTL level Lo/Hi or relay setpoint SHORT/OPEN.

For external changeover of Ar/N₂, turn OFF JSW2 of the DIP switch.

Older model "GP -1000" and Assignment of connector pin and the input / output specifications of the signal are common.

Table. 2-1 I/O Connector

Pin No	Signal	Pin No	Signal
1	REC OUT (+)	20	REC OUT (-)
2	Ar/N ₂ (INPUT) <ul style="list-style-type: none"> • N₂ Lo/SHORT • Ar Hi/OPEN 	21	Mantissa par A 1 (OUTPUT)
3		22	Mantissa par A 2 (OUTPUT)
4	GND	23	Mantissa par A 4 (OUTPUT)
5	Symbol + / - (OUTPUT) -: Lo +: Hi	24	Mantissa par A 8 (OUTPUT)
6	Strobe	25	Mantissa par B 1 (OUTPUT)
7	Exponent part C 1 (OUTPUT)	26	Mantissa par B 2 (OUTPUT)
8	Exponent part C 2 (OUTPUT)	27	Mantissa par B 4 (OUTPUT)
9	Exponent part C 4 (OUTPUT)	28	Mantissa par B 8 (OUTPUT)
10	Exponent part C 8 (OUTPUT)	29	RS-232C SD
11		30	RS-232C RD
12		31	
13		32	SETPOINT-1 NO
14	SETPOINT-2 NO	33	SETPOINT-1 COM
15	SETPOINT-2 COM	34	SETPOINT-1 NC
16	SETPOINT-2 NC	35	ERROR NO
17	SETPOINT-3 NO	36	ERROR COM
18	SETPOINT-3 COM	37	ERROR NC
19	SETPOINT-3 NC		

3. Analog output

Recorder outputs DC [V] can be taken out from the recorder output terminal (pin 1, pin 20) of the I/O connector on the rear panel of the controller.

The following three outputs are available by setting the DIP switch.

- (1) 10 V.f.s. for linear output 1.0×10^3 Pa [No. 4: ON, No. 5: OFF]
- (2) 10 V.f.s. for linear output 1.0×10^2 Pa [No. 4: OFF, No. 5: OFF]
- (3) Dummy log output Each range 1 V [No. 4: ON, No. 5: ON]
- (4) Non-Linear output 0~10V [No. 4: OFF, No. 5: ON]

3.1. 10 V.f.s. against LIN Output 1.0×10^3 Pa

The output is 0 to 10 V and is delivered linearly to the pressure indication.

The relationship between the pressure indication and recorder output voltage is as shown below.

Table. 3-1 Pressure-Recorder Output Voltage (Linear 1.0×10^3 Pa f.s.) (with Pa display)

Pressure [Pa]	Voltage [V]	Pressure [Pa]	Voltage [V]
1.0×10^0	0.01	1.0×10^2	1.0
2.0×10^0	0.02	2.0×10^2	2.0
4.0×10^0	0.04	4.0×10^2	4.0
8.0×10^0	0.08	8.0×10^2	8.0
1.0×10^1	0.10	9.9×10^2	9.9
2.0×10^1	0.20	1.0×10^3	10.0
4.0×10^1	0.40		
8.0×10^1	0.80		
9.9×10^1	0.99		

Convert pressure using the following equation.

$$P = 1 \times 10^3 \times V / 10 \quad \Leftrightarrow \quad V = 10 \times P / 1 \times 10^3$$

P: Pressure (Pa) V: Output voltage (V)

Voltage values on order of several mV are low in accuracy because the recorder output is 12-bit DAC.

If a linear output of 10^{-1} to 10^0 Pa range is required, use the 1.0×10^2 Pa full scale.

Linear signals of pressure of 1.0×10^3 or higher Pa cannot be outputted.

The following voltages are outputted in other statuses.

- When 0.0×10^{-1} Pa is displayed : 0.0 V
- When 2.7×10^3 Pa is displayed by blinking : 10.0 V
- When E.E $\times 10^E$ is displayed by blinking : 10.0 V

3.2. 10 V.f.s. against LIN Output 1.0×10^2 Pa

The output is 0 to 10 V and is delivered linearly to the pressure indication.

The relationship between the pressure indication and recorder output voltage is as shown below. (with Pa display)

Table. 3-2 Pressure-Recorder Output Voltage (Linear 1.0×10^2 Pa f.s.) (with Pa display)

Pressure [Pa]	Voltage [V]	Pressure [Pa]	Voltage [V]
4.0×10^{-1}	0.04	1.0×10^1	1.0
5.0×10^{-1}	0.05	2.0×10^1	2.0
8.0×10^{-1}	0.08	4.0×10^1	4.0
1.0×10^0	0.10	8.0×10^1	8.0
2.0×10^0	0.20	9.9×10^1	9.9
4.0×10^0	0.40	1.0×10^2	10.0
8.0×10^0	0.80		
9.9×10^0	0.99		

Convert pressure using the following equation.

$$P = 1 \times 10^{+2} \times V / 10 \quad \Leftrightarrow \quad V = 10 \times P / 1 \times 10^{+2}$$

P: Pressure (Pa) V: Output voltage (V)

Voltage values on order of several mV are low in accuracy because the recorder output is 12-bit DAC.

If a linear output in the 10^2 Pa range is required, use the 1.0×10^3 Pa full scale.

The following voltages are outputted in other statuses.

- When 0.0×10^{-1} Pa is displayed : 0.0 V
- When 2.7×10^3 Pa is displayed by blinking : 10.0 V
- When E.E $\times 10^E$ is displayed by blinking : 10.0 V

3.3. 10 Vfs. against LIN Output 1.0×10^2 Pa

The recorder output is 1 V per pressure range within the output range of 0 to 4.27 V and the scale range is linear. The relationship between the output indication and the recorder output voltage is as shown in the table below.

Table. 3-3 Pressure-Recorder Output Voltage (Dummy Log Each Range 1V) (with Pa display)

Pressure [Pa]	Voltage [V]	Pressure [Pa]	Voltage [V]
0.0×10^{-1}	0.00	1.0×10^1	2.10
4.0×10^{-1}	0.40	2.0×10^1	2.20
5.0×10^{-1}	0.50	4.0×10^1	2.40
6.0×10^{-1}	0.60	8.0×10^1	2.80
8.0×10^{-1}	0.80	9.9×10^1	2.99
1.0×10^0	1.10	1.0×10^2	3.10
2.0×10^0	1.20	2.0×10^2	3.20
4.0×10^0	1.40	4.0×10^2	3.40
8.0×10^0	1.80	8.0×10^2	3.80
9.9×10^0	1.99	9.9×10^2	3.99
		1.0×10^3	4.10
		2.7×10^3	4.27

The dummy log outputs of the recorder can be converted into pressure by using the following equation. Given that the output voltage value is A and A – (value below decimal point of A) is B, pressure P will be as shown below.

With Pa display
$P = 10 (A - B) \times 10^{-1+B}$

If the output voltage is 2.58 V, for example, A = 2.58 and B = 2.

Hence, P (Pa) = $10 (2.58 - 2) \times 10^{-1+2} = 5.8 \times 10^1$ Pa.

Other states are displayed as follows.

- When 2.7×10^3 Pa is displayed by blinking : 9.4 V
- When E.E $\times 10^E$ is displayed by blinking : 10.0 V

(V-E) value may show as below 0.1 due to fluctuation in output voltage or margin of error. In such case, we would highly recommend rounding up the value to 0.1 for the actual calculation.

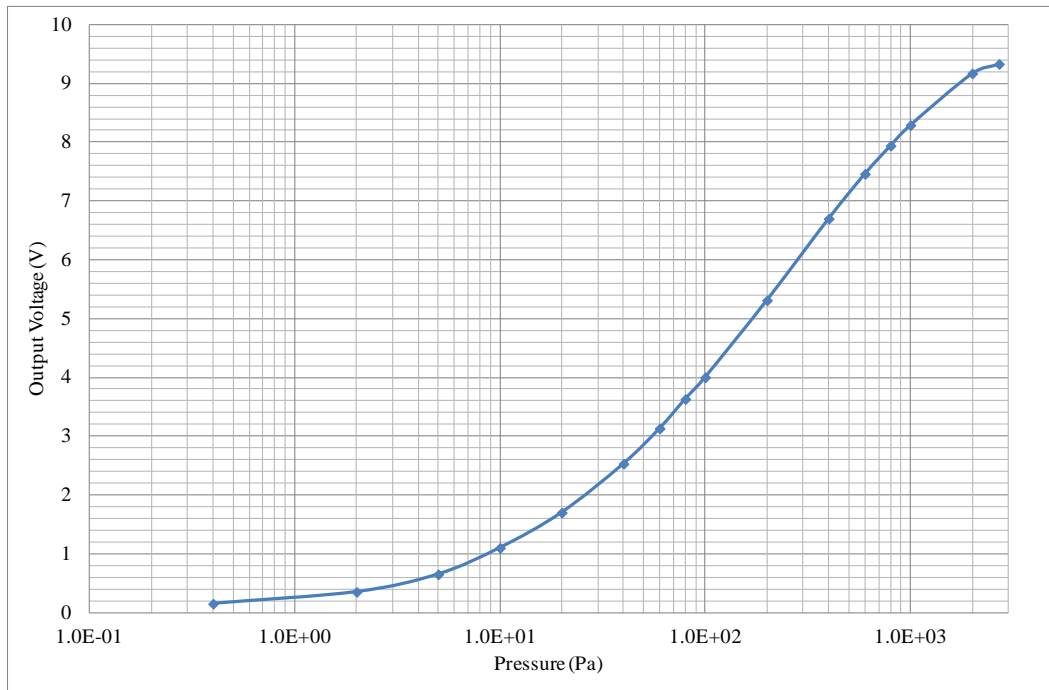
3.4. Non-Linear output 0~10V

Non-Linear output is compatible with S-range output of GP-2G/2GRY and GP-2A/2ARY.

The relationship between the output indication and the recorder output voltage is as shown in the table below.

Table. 3-4 Pressure-Recorder Output Voltage (Non-Linear) (with Pa display)

Pressure [Pa]	Voltage [V]	Pressure [Pa]	Voltage [V]
4.0×10^{-1}	0.15	$1.0 \times 10^{+2}$	4.00
$2.0 \times 10^{+0}$	0.35	$2.0 \times 10^{+2}$	5.31
$5.0 \times 10^{+0}$	0.65	$4.0 \times 10^{+2}$	6.70
$1.0 \times 10^{+1}$	1.10	$6.0 \times 10^{+2}$	7.46
$2.0 \times 10^{+1}$	1.70	$8.0 \times 10^{+2}$	7.94
$4.0 \times 10^{+1}$	2.53	$1.0 \times 10^{+3}$	8.29
$6.0 \times 10^{+1}$	3.13	$2.0 \times 10^{+3}$	9.17
$8.0 \times 10^{+1}$	3.63	$2.7 \times 10^{+3}$	9.49



4. Composition device

Composition device is main gauge (GP-1000G)+ Sensor head cable + measuring unit (GP-H/GP-BH)+ Sensor head

The sensor head cable is GP-H/BH (For GP-1G/1GRY、GP-2G/2GRY、GP-1000G、200□G).
Cannot use the sensor head cable of the older model.

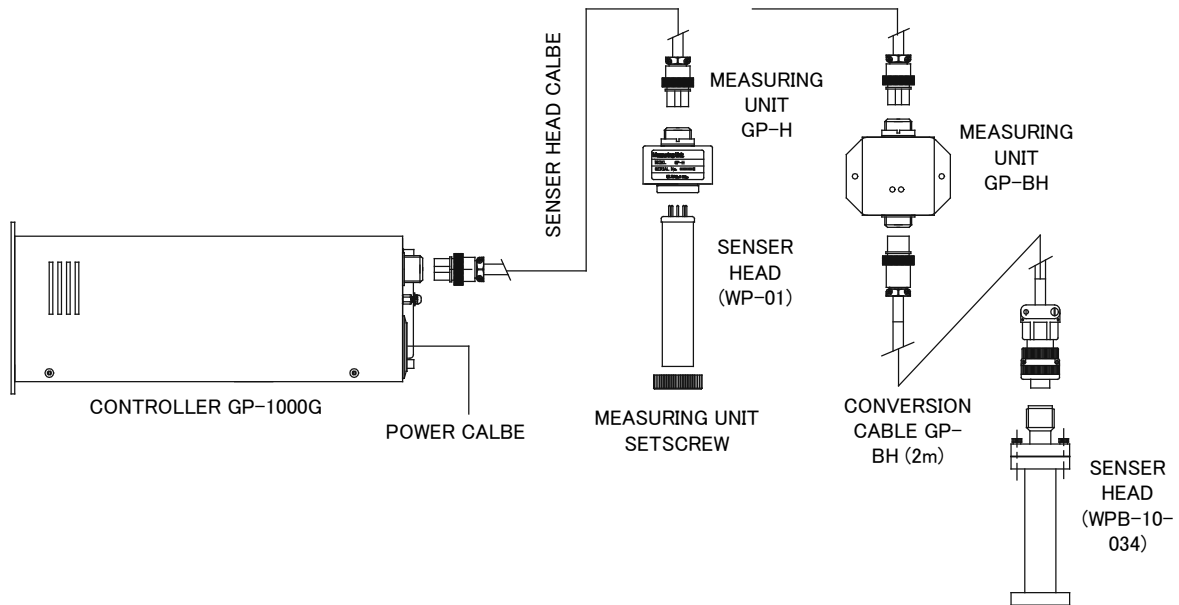


Fig. 4-1 GP-1000G overall connection diagram

5. 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

- 1) This unit

Duration of guarantee

One (1) year after shipping date from ULVAC

Warranty scope

- 1) Domestic business in Japan: Product, which has damage, caused by a failure on delivery.
- 2) Direct export transaction: Product, which has damage, caused by a failure on delivery. The warranty scope shall conform to the new INCOTERMS.
- 3) 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

- 1) 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.
- 2) 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

- 1) Failure occurred after expiration of warranty period
- 2) Failure caused by force majeure, such as fire, storm and flood damage, earthquake, lightning strike, war etc
- 3) Failure occurred due to carelessness handling or faulty usage
- 4) Products remodeled, disassembled or repaired without ULVAC's acceptance
- 5) Failure occurred under abnormal environment, such as intense electromagnetic field, radiation, high-temperature, high-humidity, flammable gases, corrosive gases, dust etc.
- 6) Failure occurred by noise
- 7) Product deficiency or secondary damage occurred to Buyer, from law suit to ULVAC by third party for patent infringement.
- 8) Sensor head being used (expiration of life, measurement error, etc.)
- 9) Sensor head cable in use (cable burnout due to improper installation, poor contact, etc.)

Others

- 1) In case, special agreement or memorandum for specifications is made individually, the descriptions are prior to this article "13 Product Warranty".
- 2) 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.
- 3) As for the question and consultation, Buyer shall check the model and serial number and ask the local representative or ULVAC, Inc.
- 4) The content of this document is subject to change without notice in future.

6. RELATED DRAWINGS

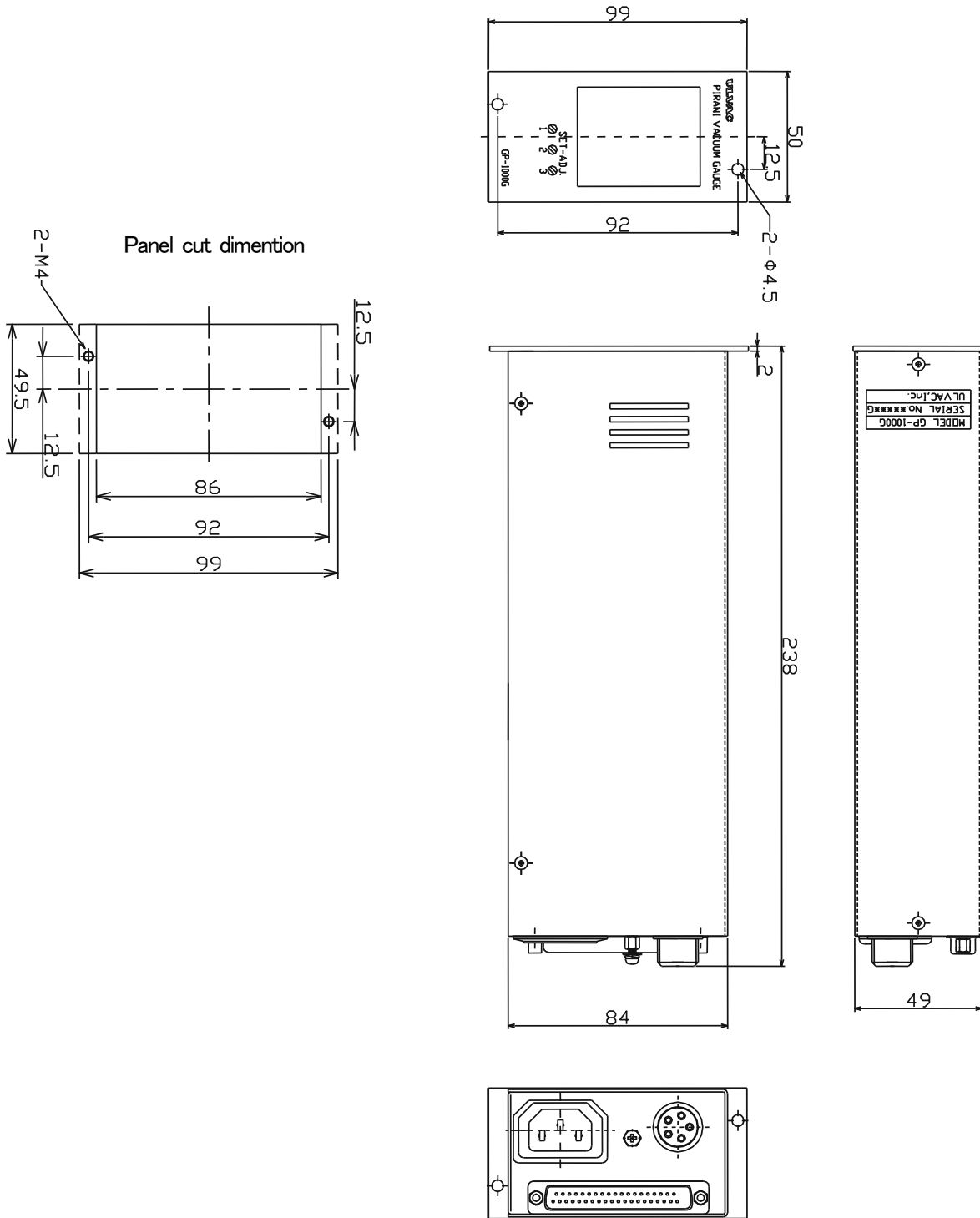


Fig. 6-1 Dimensional drawing for GP-1000G

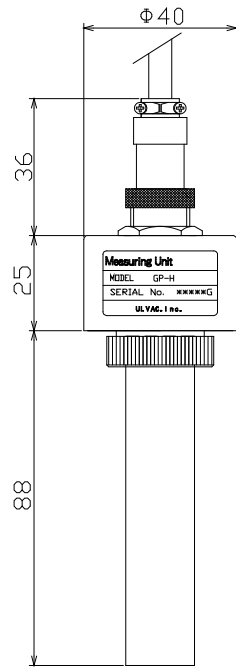


Fig. 6-2 Dimensional drawing for measuring unit GP-H

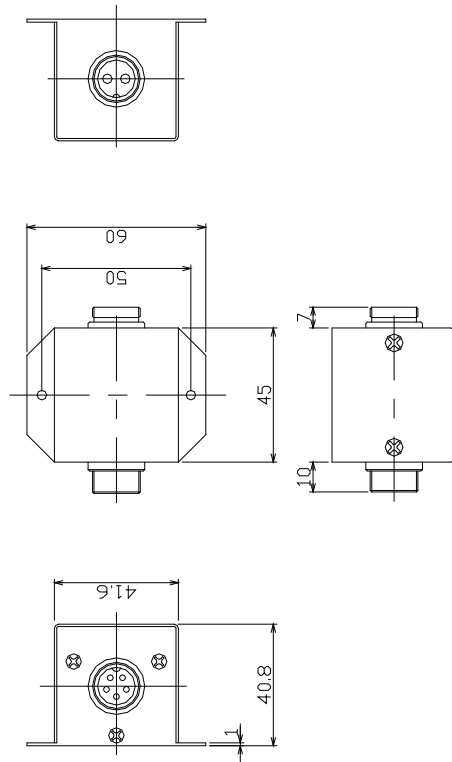
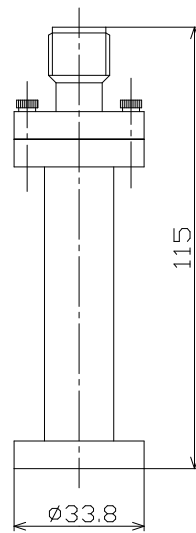
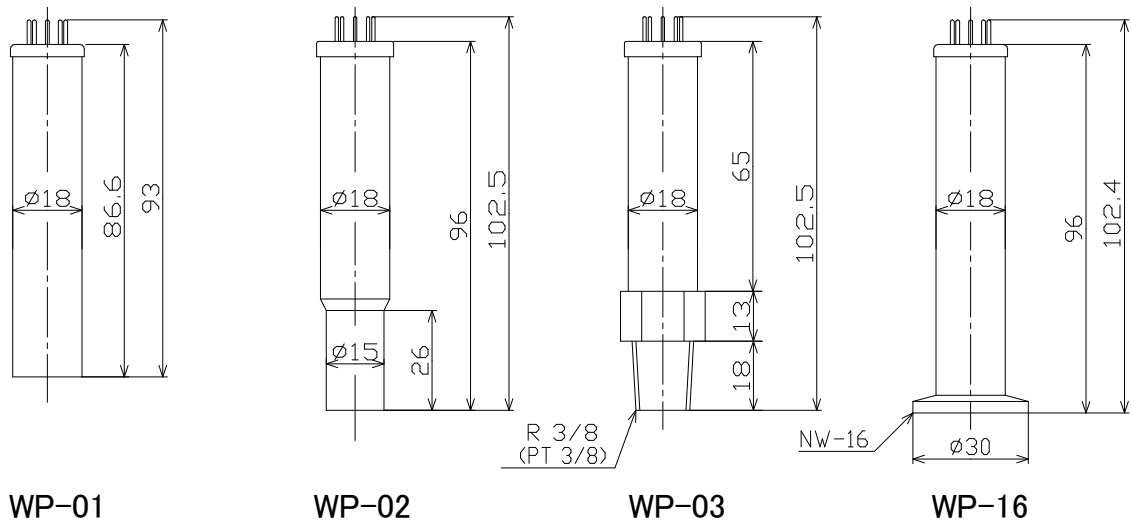


Fig. 6-3 Dimensional drawing for measuring unit GP-BH



Sensor head model	Mounting port size	Filament material	Measuring unit
WP-01	φ18	BS(Ni plating)	GP-H
WP-02	φ15 (18)	BS(Ni plating)	
WP-03	R 3/8 (PT 3/8)	BS(Ni plating)	
WP-16	NW-16 (φ30)	BS(Ni plating)	
WPB-10-034	UFC034	SUS304	Conversion cable for GP-BH、WPB

Fig. 6-4 Sensor head compatible with GP-1000G