

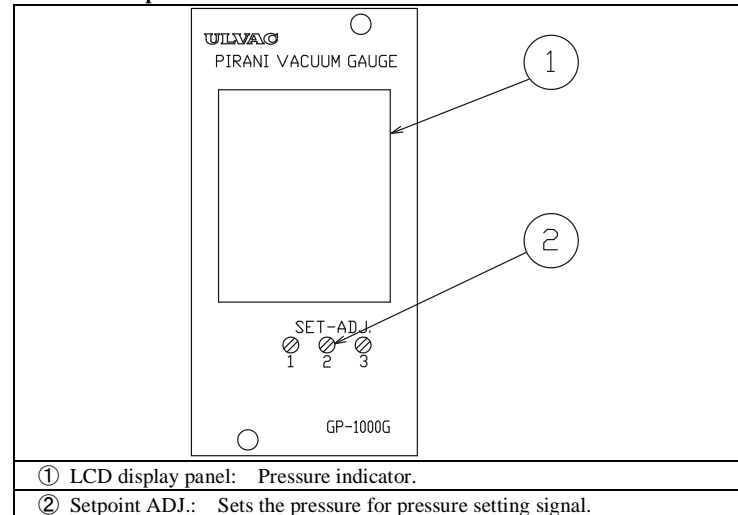
Pirani Vacuum Gauge GP-1000G Quick Manual

Introduction

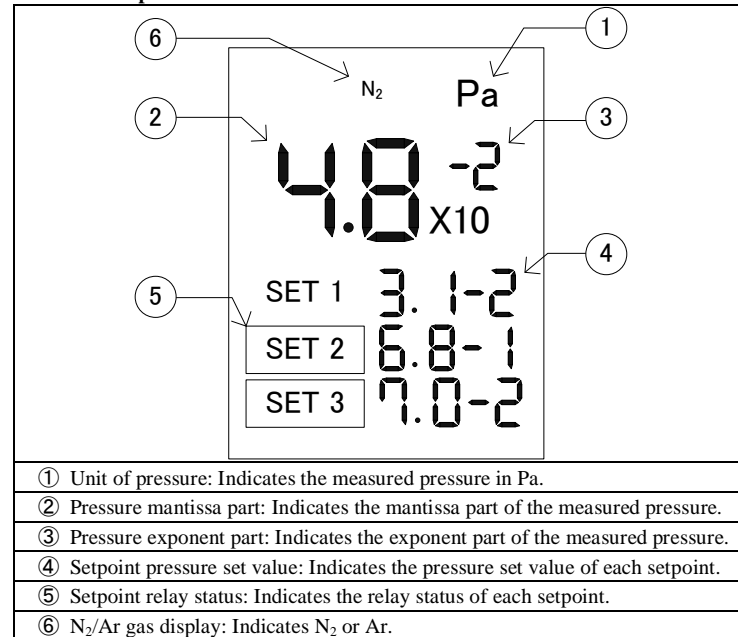
This quick manual is for quick check of operation and display of the product. Please refer to instruction manual in advance for detailed information about operation, precautions and safety for proper use. Available for download from ULVAC website.
<https://showcase.ulvac.co.jp/en>
 This manual is for the following gauges. Serial Nos. 11000G and higher

1. Panel

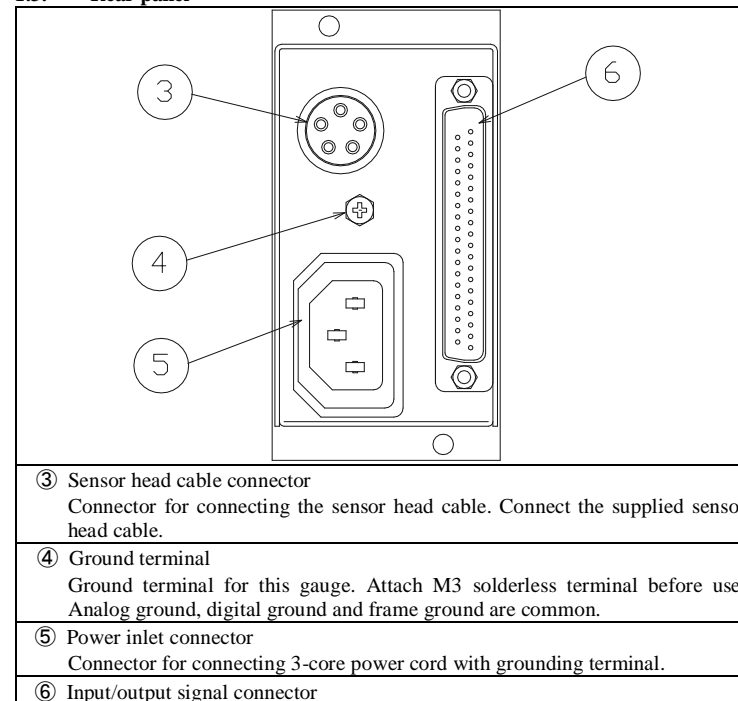
1.1. Front panel



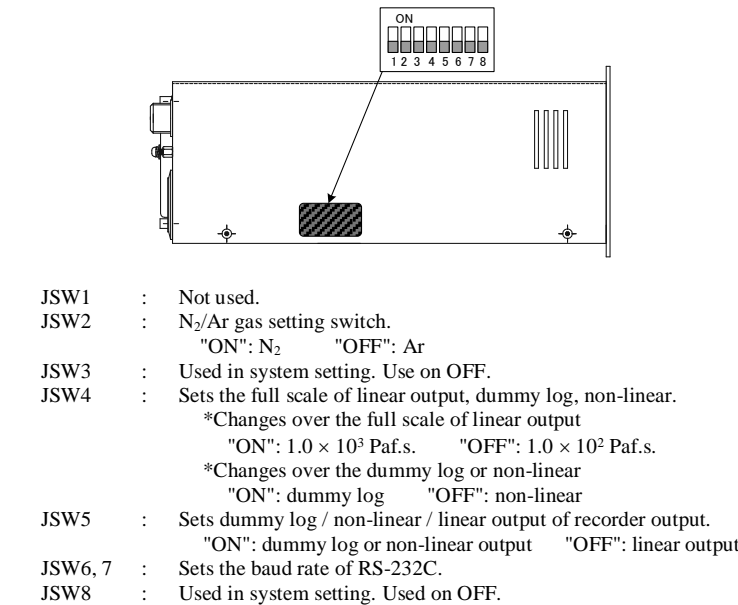
1.2. LCD panel



1.3. Rear panel



2. How to Set the DIP Switch



JSW	ON	OFF
1	-	-
2	N ₂	Ar
3	-	-
4	1.0 × 10 ³ Paf.s. Dummy log	1.0 × 10 ² Paf.s. Non-Linear
5	Dummy log or Non-Linear	Linear
7	See the table below	
8	-	-

JSW	Dummy log	Non-Linear	1.0 × 10 ³ Paf.s.	1.0 × 10 ² Paf.s.
4	ON	OFF	ON	OFF
5	ON	ON	OFF	OFF

JSW	Baud rate			
	9600	4800	2400	1200
6	OFF	OFF	ON	ON
7	OFF	ON	OFF	ON

3. Installing the Pirani Vacuum Gauge

3.1. Installing the sensor head

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

(1) 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).

(2) Installing the sensor head

Install the vacuum 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.

Be careful in selecting the place of installation and in handling.

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.

3.2. A sensor head installation method to GP-H

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



3.3. Electrical connection

Make electrical connection after installing components.

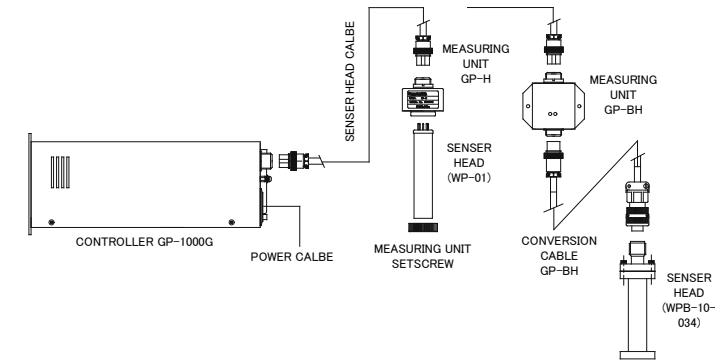
Fix the cable by taking care not to exert undue force to the connection between the sensor head and sensor head cable and the connection between the controller and sensor head cable.

Lay the sensor head cable away from power lines, if possible. Noise may occur. Moving the sensor head cable will generate frictional electricity between conductor and insulator, which can cause an error at a low pressure.

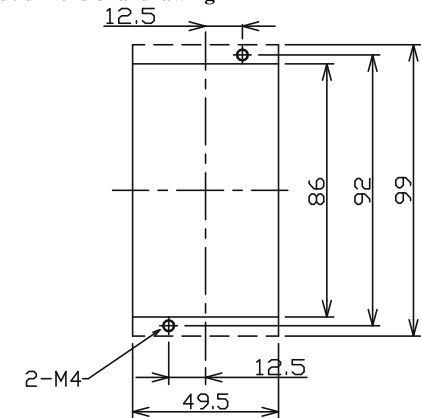
Avoid installation of the vacuum gauge in a high temperature or high humidity place.

Securely fasten the connector fixing screw.

Plug the power cable to a 100 VAC outlet.



3.4. Panel cut dimensional drawing



4. External Inputs/Outputs

4.1. External Input/Output Connector Assignment

Pin No.	Signal	Pin No.	Signal
1	REC OUT (+)	20	REC OUT (-)
* 2	Ar/N ₂ (INPUT)	21	Mantissa part A 1 (OUTPUT)
	• N ₂ Lo/SHORT	22	Mantissa part A 2 (OUTPUT)
	• N ₂ Hi/OPEN	23	Mantissa part A 4 (OUTPUT)
3		24	Mantissa part A 8 (OUTPUT)
4	GND	25	Mantissa part B 1 (OUTPUT)
5	Symbol +/- (OUTPUT)	26	Mantissa part B 2 (OUTPUT)
	• + Lo	27	Mantissa part B 4 (OUTPUT)
	• - Hi	28	Mantissa part B 8 (OUTPUT)
6	Strobe	29	RS-232C SD
7	Exponent part C 1 (OUTPUT)	30	RS-232C RD
8	Exponent part C 2 (OUTPUT)	31	
9	Exponent part C 4 (OUTPUT)	32	SETPOINT-1 NO
10	Exponent part C 8 (OUTPUT)	33	SETPOINT-1 COM
11		34	SETPOINT-1 NC
12		35	ERROR NO
13		36	ERROR COM
14	SETPOINT-2 NO	37	ERROR NC
15	SETPOINT-2 COM		
16	SETPOINT-2 NC		
17	SETPOINT-3 NO		
18	SETPOINT-3 COM		
19	SETPOINT-3 NC		

* Ar/N₂ changeover function is effective only when the DIP switch is OFF.

• The BCD outputs and strobe signals are TTL level open collector outputs. The maximum rating of the output terminal is 80 VDC 50 mA.

• Setpoint outputs are Relay contact output (transfer type, 100 VAC, 0.5 A)

4.2. Relay Setpoint Output

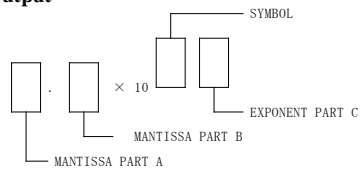
- The relay setpoint is not actuated for about three seconds after power is turned ON even if the measured pressure is lower than the set pressure. But after three seconds, the relay setpoint is actuated in a moment.
- The error relay setpoint output is actuated (reversed) when the sensor head filament has burnt out.

The table below gives the relay action.

Power	Sensor head filament	Relay setpoint output	
		COM-NC	COM-NO
OFF		CLOSE	OPEN
ON	Burnout	OPEN	CLOSE
ON	Normal	CLOSE	OPEN

The relay setpoint is not actuated for about three seconds after power is turned ON even if the sensor head filament has burnt out.

4.3. BCD Output



Digital signals of pressure values are outputted from the I/O connector on the rear panel of the controller.

The following are outputs at other displays.

- (1) When 0.0×10^{-1} Pa is displayed : 0.0×10^{-1}
- (2) When 2.7×10^3 Pa is displayed by blinking : $F.F \times 10^{+F}$
- (3) When $E.E \times 10^E$ is displayed by blinking : $E.E \times 10^{+E}$

4.4. Strobe Signal

- Duration of strobe signal
The duration from the rise to fall of the strobe signal is 1.5 [ms].
- Interval of strobe signal
The interval of strobe signals is 200 [ms].

4.5. Recorder Outputs

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 four outputs are available by setting the DIP switch.

4.5.1. Linear Output 1.0×10^3 Paf.s.

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

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

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

4.5.2. Linear Output 1.0×10^2 Paf.s.

If a linear output in the 102 Pa range is required, use the 1.0×10^3 Pa full scale.

$$P = 1 \times 10^2 \times V / 10 \quad (P \times 10^2) = 10 \times P / V$$

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

4.5.3. Dummy Log Output

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.

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

The dummy log outputs of the recorder can be converted into pressure by using the following equation.

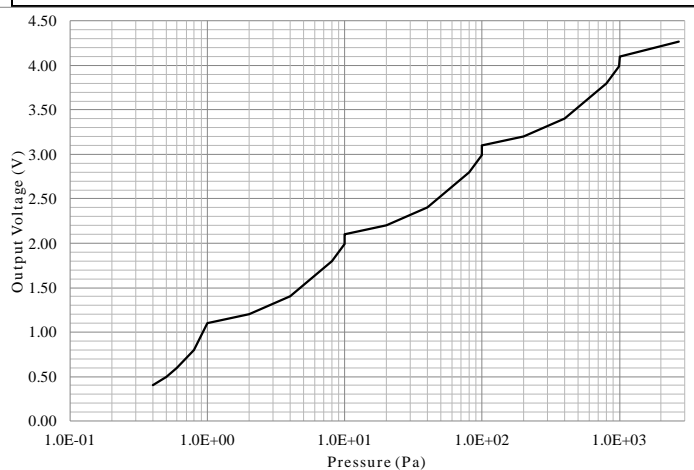
Given that the output voltage value is A and A – (value below decimal point of A) is B, pressure P will be as shown below.

$$P = 10 (A - B) \times 10^{+A-B}$$

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

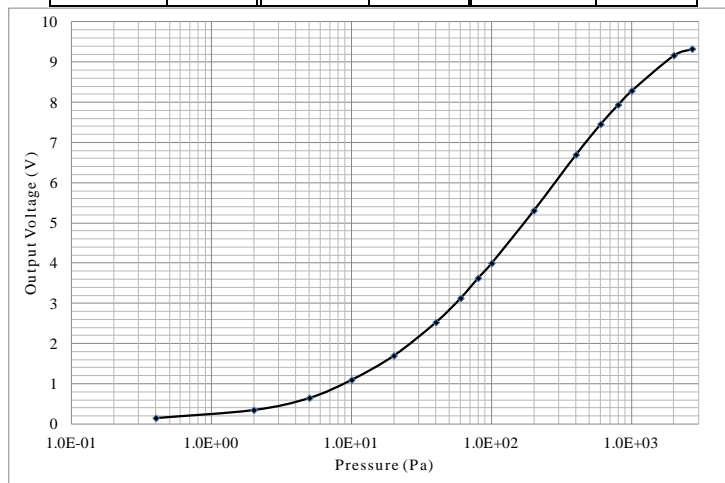
(A-B) value may show as below 0.1 due to fluctuation in output voltage or margin of error. In such case, we would highly recommend rounding up the value to 0.1 for the actual calculation.



4.5.4. Non-linear Output

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

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



5. Communication (RS-232C)

5.1. Specifications

- (1) System : Half duplex
- (2) Data bit length : 8 bits
- (3) Stop bit length : 1 stop bit
- (4) Parity : None
- (5) Code : ASCII
- (6) Baud rate : Selectable from 1200, 2400, 4800 and 9600. Refer to 3.2 "How to Set the DIP Switch" for the setting.
- (7) Command transmitting interval : recommended interval: 0.2seconds or more

5.2. Connecting the Communication Cable

Use the I/O connector (D-sub 37-pin) on the rear panel of the controller. The table below shows the connection.

I/O connector			Signal direction	PC-side standard connector pin No.(Dsub-9P)
Pin No.	Symbol	Meaning		
29	SD	Send data	→	2
30	RD	Receive data	←	3
4	SG	Signal ground		5

5.3. Communication Commands

Command	Answer		Meaning
	OK	NG	
'CO' + CR	'OK' + CR	'?' + CR	Remote command ¹⁾
'CF' + CR	'E' + CR	'?' + CR	Local(communication reset) command
'KN' + CR	'OK' + CR	'?' + CR	N ₂ sensitivity designation
'KA' + CR	'OK' + CR	'?' + CR	Ar sensitivity designation
'P0' + CR	'XXXX' + CR ²⁾	'?' + CR	Loads the pressure value
'P1' + CR	'XXXX' + CR	'?' + CR	Loads the setpoint 1 value
'P2' + CR	'XXXX' + CR	'?' + CR	Loads the setpoint 2 value
'P3' + CR	'XXXX' + CR	'?' + CR	Loads the setpoint 3 value
'RL' + CR	'XXXX' + CR	'?' + CR	Relay, setpoint output status 1: ON, 0: OFF ³⁾
'ER' + CR	'X' + CR	'?' + CR	Error output 1: Error, 0: Normal

- 1) Communication cannot be activated except in the remote status.
- 2) 'ab ± c' when pressure is $a.b \times 10^{+c}$
- 3) 1 (ON) is outputted when pressure is lower than the relay setpoint set value or when in error.

6. Specifications

6.1. Specifications

Name	Pirani vacuum gauge
Model	GP-1000G
Measurable range	4.0×10^{-1} Pa ~ 2.7×10^{-3} Pa
Measurement point	One
Display	2 digits mantissa part, 1 digit exponent part
Display sampling time	200 msec
Measurement accuracy	4.0×10^{-1} Pa ~ 1.0×10^{-1} Pa : ±50% 1.0×10^{-1} Pa ~ 5.1×10^{-1} Pa : ±30% 5.1×10^{-1} Pa ~ 7.6×10^{-2} Pa : ±15% 7.6×10^{-2} Pa ~ 1.0×10^{-3} Pa : ±30% 1.0×10^{-3} Pa ~ 2.7×10^{-3} Pa : ±50%
Recorder output	(1) 0 to 10 V linear output 1.0×10^{-3} Pa f.s. (2) 0 to 10 V linear output 1.0×10^{-2} Pa f.s. (3) Dummy log output Each range 1 V (4) Non-Linear output 0 to 10 V
BCD output	TTL level Open collector
Input signal	Ar/N ₂ changeover input: TTL level
Output signal	Error signal, Setpoint signals(three) Relay contact output (transfer type) Relay load:100VAC/0.5A, 24VDC/1A(resistance load)
Communication	RS-232C
Sensor head interchangeability	Within ± 3% in filament resistance value (sensor head of the same type)
Operating temperature range	10°C to 40°C
Operating humidity range	15% to 80 % (No condensation)
Power requirements	100 to 240 VAC
Power consumption	10 VA
Outside dimensions	50W × 238D × 99H (mm)
Weight	Controller: 1.0 kg Measuring unit: 35g (GP-H) CE standard

6.2. Standard Accessories

Power cable	3m long	1 pc
Input/output connector	D-sub 37 socket (M2.6 screw)	1 pc
Quick Manual	(This manual)	1 copy

6.3. Options

Sensor head	WP-01, WP-02, WP-03, WP-16 (filament material Pt) WPB-10-034, WPB-10(bankable type)
Measuring unit	GP-H (for WP-01, for WP-02, for WP-03, for WP-16) GP-BH(for WPB-10/WPB-10-034, plus connecting cable)
Sensor head cables	2、 5、 10、 15、 20、 30、 50、 100m
Test results certificate	
Calibration certificate	Calibration certificate, JCSS Calibration certificate

7. 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

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 confirm 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 being used (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.

8. 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.

9. 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