

**Helium Purity Monitor
(HPM-02)**

USER'S MANUAL

3149(rev.1) 2011.05.31



APPLICATION OF ELECTRONIC DEVICES

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Helium Purity Monitor HPM-02

USER'S MANUAL

1. Specifications

1-1. Abstract

This Helium Purity Monitor uses a pirani gauge.

This unit can measure helium gas purity by less than 1% error on the condition of 50 - 100% degree.

HPM-01 type has a screen that shows purity of helium gas (0~100%), and temperature of outer wall sensor (DEG). Analog signal (0~1V) connected with the purity outputs.

HPM-02 type has all function of HPM-01, and LAN communication for reading purity and temperature.

1-2. Mechanism

You set pirani sensor under 1 atmospheric pressure at 100% helium and at mixture of X% helium and air, and pass an electrical current (200mA), then terminal voltage of sensor is calculated this formula. (Over 60% degree, less than 1% error accuracy)

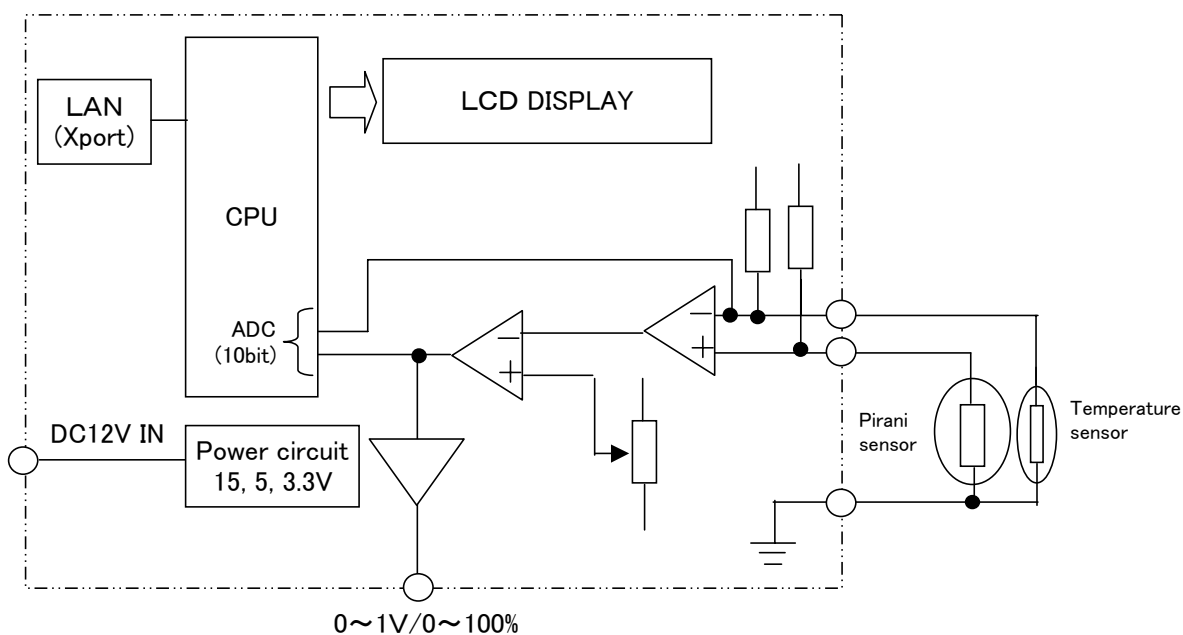
$$V = 3211 + 7.13T + 13.3(100 - X) \quad \text{Units: mV}$$

T: Temperature X: Purity of helium gas (%)

In this way, you can acquire the analog data being in proportion to helium gas purity with using temperature-compensated circuit, amplification, and offset subtraction. This unit converts this analog data into digital, shows it, and enables you to read via LAN.

Outer wall sensor temperature is calculated by converting analog data for temperature-compensated analog to digital.

1-3. Block diagram



1-4. Electrical specification

AC adapter AC100 – 240V/DC12V cable is attached.

Power supply DC12V supplied from AC Adapter.
Generates DC15V for analog calculate circuit, DC5V, and
DC3.3V for digital circuit at converter.

Sensor MAX Voltage : 15V
MAX Current : about 200mA

Monitor 12 character – 2 lines LCD screen

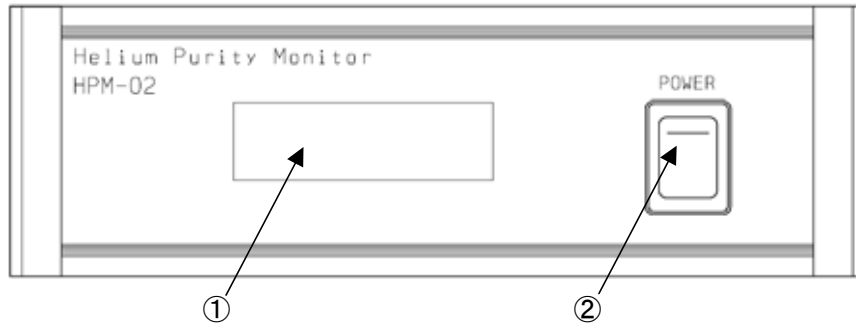
Communication Purity of helium gas, and temperature of outer wall sensor can be read via LAN.

2. How to use

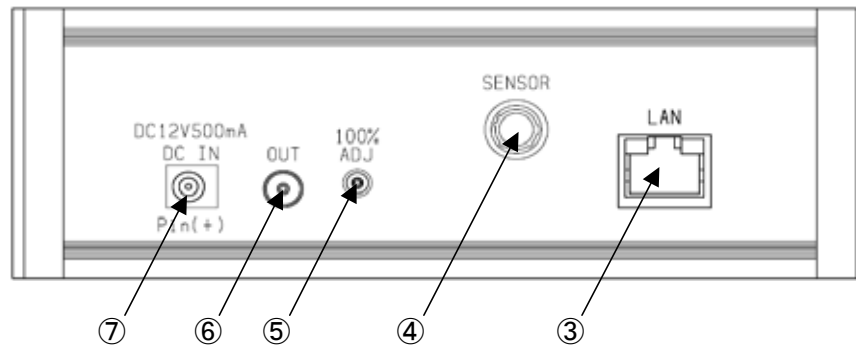
2-1. Body appearance

Size: W150×D125×H50

[FRONT]

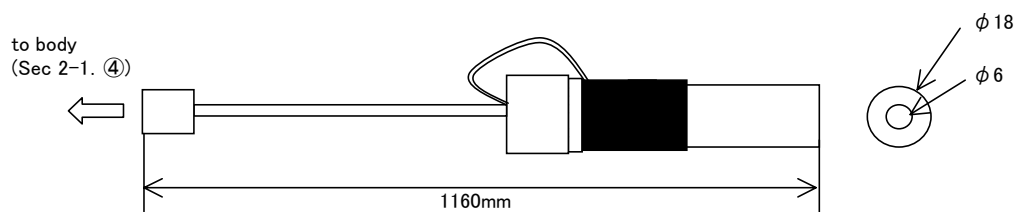


[REAR]



- ① LCD screen: Purity of helium gas and temperature of outer wall sensor are shown here.
- ② Power switch: Upper is power on.
- ③ LAN cable connector
- ④ Sensor cable connector: Connect the sensor cable (See sec.2-2).
- ⑤ 100% adjuster : Adjust purity to 100% with variable resistance (See sec.2-4).
- ⑥ LEMO connector: This connector outputs 0 - 1V analog signal.
- ⑦ DC plug connector: Connect attached AC adapter here.

2-2. Sensor cable



2-3. Preparation for using

1. Connect AC cable
If you have checked that power switch is off, connect attached AC cable.
2. Connect sensor cable
Connect the sensor cable to the sensor connector.
3. Connect LAN cable
If necessary, connect the LAN cable.
Before using LAN communication, it is necessary for LAN setting. (See sec.2-5)
4. Connect analog signal monitor cable
If necessary, connect the cable with a standard.
5. Turn on the power
Turn on the power with connecting AC cable, and HPM-02 works immediately.
6. Show purity of helium gas and Temperature of outer wall sensor
If the power turn on, purity of helium gas and temperature of outer wall sensor is shown at regular intervals.

[LCD SCREEN]

P	U	R	I	T	Y	1	0	0	.	0	%	←Purity of helium gas
		T	E	M	P		2	5	D	E	G	←Temperature of outer wall sensor

2-4. Helium gas purity adjustment

It is necessary for adjustment to 100% for accurate measurement of helium gas purity. First, put the sensor into 1 atmosphere pressure, 100% purity helium gas with the power turned off. If finished, turn on the power, the purity is shown at screen. Adjust the variable resistance "100% ADJ" to 100% with the screwdriver. If you turn clockwise it, purity decreases. If counterclockwise, increases.

2-5. Caution

1. Helium gas purity measurement is premise under the atmospheric pressure because it uses difference of gas thermal conductivity.
Sensor will have BURNED OUT if using under the VACUUM, you must use under the atmospheric pressure.
2. Without purity adjustment, the purity calculation may result in over 100%.
You cannot know correct helium gas purity, you must adjust it before using.

2-6. LAN communication setting

HPM-02 supports external communication via LAN.

2-6-1. Preparation

To control this one by LAN communication, it's need to some setting items by 10Base-T/100Base-T communication cable. Setting protocol is telnet protocol by TCP/IP connection.

To connect network by this one, IP address, subnet mask, and Port NO must be set to this unit.

Factory setting is "IP address : 192.168.1.55", "sub net mask : 255.255.255.0" and "Port No : 7777".

When connecting PC directly, you have to use cross cable.

But using HUB module, you don't have to.

The way of connecting PC directly is as follows.

It's need to set IP address and subnet mask to your PC.

Set IP address to 192.168.1.10, and subnet mask to 255.255.255.0, for example.

about the way of setting address to your PC, see your PC manual.

Select MS-DOS prompt and access command "ping" in MS-DOS prompt.

```
C: ¥Windows>ping 192. 168. 1. 55
```

```
    Pinging 192. 168. 1. 55 with 32 bytes of data:
```

```
    Reply from 192.168.1.55: bytes=32 time=2ms TTL=255
```

```
    Reply from 192.168.1.55: bytes=32 time=1ms TTL=255
```

```
    Reply from 192.168.1.55: bytes=32 time=1ms TTL=255
```

```
    Reply from 192.168.1.55: bytes=32 time=1ms TTL=255
```

```
C: ¥Windows>
```

If replies are listed above, physical connection is correct.

If physical connection is not correct, communication replies are these.

```
C: ¥Windows>ping 192. 168. 1. 55
```

```
    Pinging 192. 168. 1. 55 with 32 bytes of data:
```

```
    Request timed out.
```

```
    Request timed out.
```

```
    Request timed out.
```

```
    Request timed out.
```

```
C: ¥Windows>
```

In this case please retry the connection again after confirming the cable connection.

2-6-2. Change setting condition for network

Once you check connection is correct, enter new IP address and new telnet port No. of HPM-02.
(If default No. is OK, you don't have to do this operation.)

Default IP address is 192.168.1.55, and default port No. is 7777.

IP address must to be changed according to your network system.

If there is no need to change port No. , you may use No. 7777.

If you need to change port No., the recommended port is No. 10000 to 10999.

In Windows screen display

START → Specify the file name and run, file name is

```
telnet 192. 168. 1. 55 9999
```

NO 9999 is port number of HPM-02.

Click OK button and screen changed to telnet mode immediately.

MAC address 00204A80F1B6 ← It depends on each unit.

Software version 01. 5(031003)XPTE ← It depends on each unit.

Press Enter to go into Setup Mode

Push Return button in 3sec.

More than 3 sec, this connection is automatically cut off. Then try again from beginning.

Next,

.....

Change Setup:

0 Server configuration

1 Channel 1 configuration

3 E-mail settings

5 Expert settings

6 Security

7 Factory defaults

8 Exit without save

9 Save and exit Your choice ?

Then select 0

IP Address : (192) 192.(168) 168.(001) 1.(55) 50

Set Gateway IP Address (N) N

Netmask: Number of Bits for Host Part (0=default) (0)

Change telnet config password (N) N

Set IP address as above (Above is the sample for setting 192.168.1.50)

Set Gateway IP address if you need.

Netmask is to be set 24(255.0.0.0), 16(255.255.0.0), 8(255,255.255.0) etc.

In case of displaying command twice, select terminal→settings, and remove the checkbox

at local echo.

Again,

.....

Change Setup:

- 0 Server configuration
- 1 Channel 1 configuration
- 3 E-mail settings
- 5 Expert settings
- 6 Security
- 7 Factory defaults
- 8 Exit without save
- 9 Save and exit Your choice ?

Then select 1

- Baudrate(9600) ? push return.
- I/F Mode(4C) ? push return.
- Flow(00) ? push return.
- Port No(7777) ? enter port address of telnet, then push return
(7777 is default, if you change, recommend to set 10000~10999)
- ConnectMode(C0) ? push return.
- Remote IP Address: (000). (000). (000). (000) push return three times.
- Remote Port (0) ? push return.
- DisConnMode(00) ? push return.
- FlushuMode (80) ? push return.
- Pack Cntrl (10) ? push return.
- DisConnTime(00:00) ? automatically power down set time when in no connection.
(default data 00:00 means 5999s = 99min 59sec)
- SendChar 1 (0D) push return.
- SendChar 2 (0A) push return.

Select 9, then finished setting works

Change Setup:

- 0 Server configuration
- 1 Channel 1 configuration
- 3 E-mail settings
- 5 Expert settings
- 6 Security
- 7 Factory defaults
- 8 Exit without save
- 9 Save and exit Your choice ?

In these setting items, only IP address must be set. Other items may be no change to set.
If you enter wrong number by mistake, you'd better to restore above data.

2-6-3. Turn back PC set data

If you change setting data of PC, turn back PC data to initial condition.

2-6-4. Connection test

Let's try connecting test by optional Windows software such as "telnet".

Example test data is "telnet 192.168.1.55 7777" in MS-DOS prompt screen.

(IP address number must to be set number preliminary.)

When in telnet operation, send data "VER?" which are expected reply data.

If reply data is like "1.00 05-07-07", then communication line is OK.

"Telnet" function contains hardware and software function, when disconnect line,
line must be cut off by "telnet" software operation before hardware disconnection.

2-7. Communication commands

2-7-1. About

Command characters are all ASCII data.

The delimiter of communication command is CR+LF both transmit and receive case.

2-7-2. Commands

COMMAND	ACTION
VER?	Reply the software version of this unit. "1.00 11-04-26 HPM-02"
PURITY?	Reply purity of helium gas. "100.0%"
TEMP?	Reply temperature of outer wall sensor. "25DEG"

※If you send other commands, replies "Illegal Command!!".

Acknowledgements

Hiroshi Hayasaka, Youichi Ootsuka, solid state physics 28 (1993) 230.

The mechanism of helium purity monitor is qwoted from this document.

We express our gratitude to them.

For the further information, feel free to ask us.

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