



- Compact Design, KF16 Flange and RJ45 Connection
- Support RS485 Modbus-RTU Communication
- Supply Analog Voltage Output
- One Tactile Key for ATM / Zero Calibration

PONI100 /PONI20 Pirani Vacuum Transmitter Operation Manual

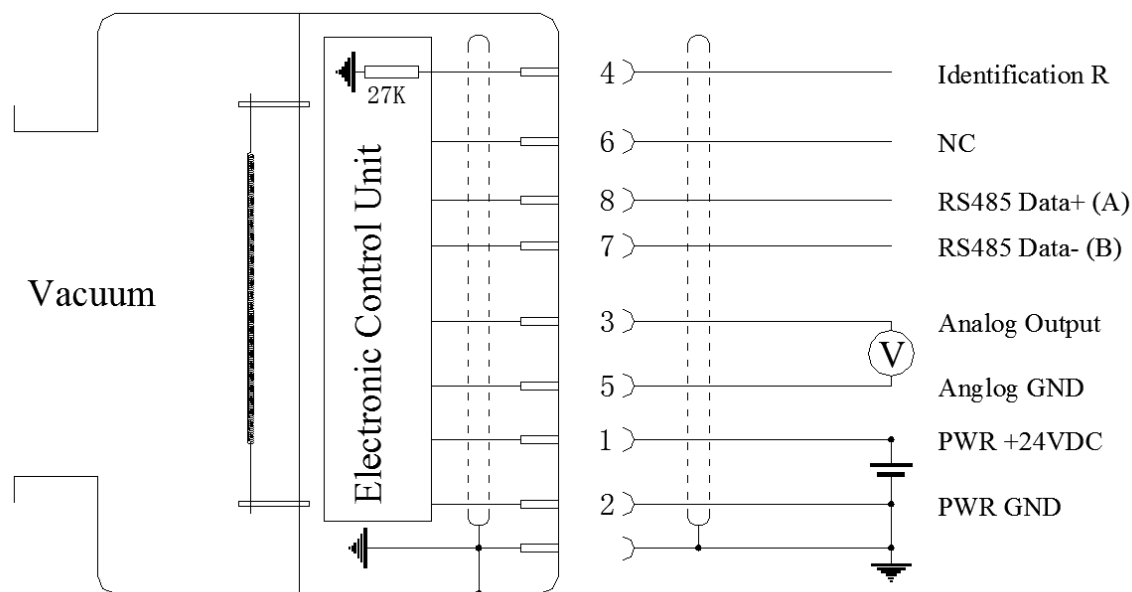
INSTRUE, Makes Vacuum Measurement *Easier*.

1. Specifications

Parameters	Technical Data	
	PON100	PON120
Measuring Range (Air,N2)	$1.0 \times 10^{-2} \sim 1.0 \times 10^{+5}$ Pa	$1.0 \times 10^{-1} \sim 1.0 \times 10^{+5}$ Pa
Accuracy	$1.0 \times 10^{-2} \sim 1.0 \times 10^{+0}$ Pa : $\pm 30\%$ $1.0 \times 10^{+0} \sim 1.0 \times 10^{+4}$ Pa : $\pm 20\%$ $1.0 \times 10^{+4} \sim 1.0 \times 10^{+5}$ Pa : $\pm 50\%$	
Repeatability	$1.0 \times 10^{-2} \sim 1.0 \times 10^{-1}$ Pa : $\pm 5\%$ $1.0 \times 10^{-1} \sim 1.0 \times 10^{+4}$ Pa : $\pm 2\%$ $1.0 \times 10^{+4} \sim 1.0 \times 10^{+5}$ Pa : $\pm 5\%$	
Max. Withstand Pressure	$1.5 \times 10^{+5}$ Pa	
Response Time	80 ms	50 ms
Bake Temp. for Probe	Max.150 °C	
Working Temperature	0 °C ~ +45 °C	
Storage Temperature	-40 °C ~ +75 °C	
Environment Humidity	5 ... 85 %, No condensation	
Output Signal	RS485, Baud Rate 9600 bps	Analog Voltage +2.286V~+10.0V, Min. Impedance 10KΩ
	Analog Voltage +1.0V~ +10V, Min. Impedance 10KΩ	
Power Supply	+16 ~ +32VDC/100mA	
Power Consumption	Max. 1.0W	Max. 0.5W
Protection Degree	IP40, IEC529	
Vacuum Connection	Standard: DN 16 ISO-KF, Others optional	
Electric Connection	FCC68/RJ45 Connector, Length < 100m(8*0.14mm ²)	
Weight	150g (KF16 Flange)	80g (KF16 Flange)
Dimensions	120mmH X 30mmD (with	71mmH X 30mmD (with KF16)
Materials on Vacuum	SS304, SS316L, Kovar, W, Glass	

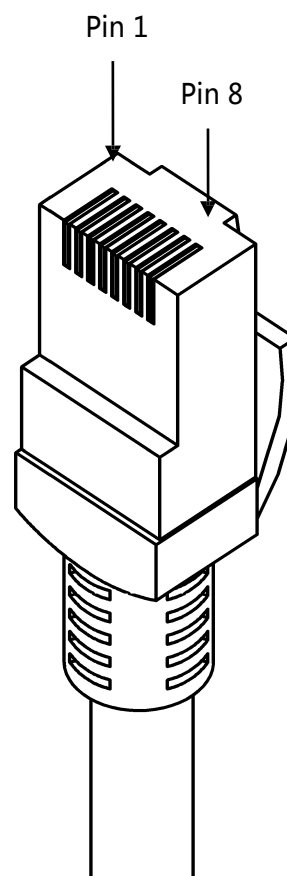
Note : Due to R & D and new product launch, INSTRUE reserves the right to modify this document. Please keep in touch with the original factory!

2. FCC-68 Pin Assignment



FCC-68 Connector

- Pin1: Power +24VDC
- Pin2: Power GND
- Pin3: Measurement Signal
- Pin4: Identification 27K
- Pin5: Signal Common
- Pin6: NC
- Pin7: RS485, Data-
- Pin8: RS485, Data+



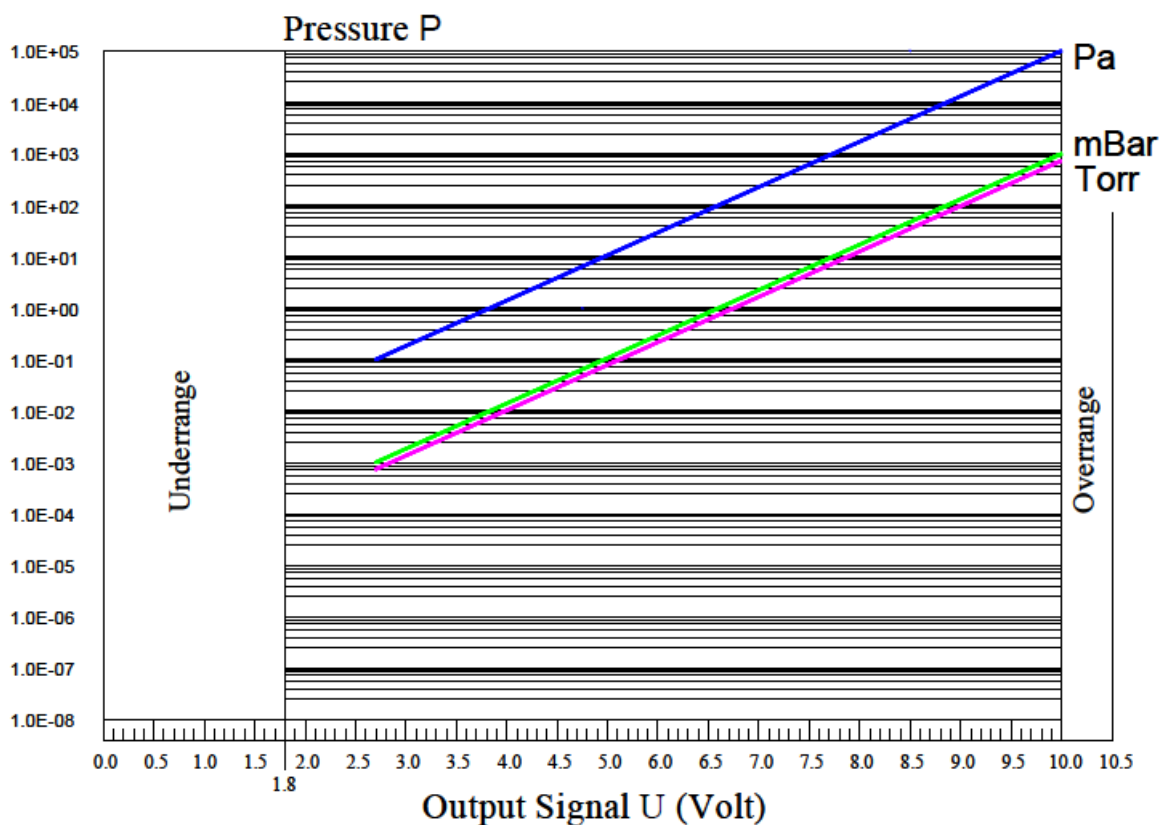
3. Analog Output Signal

The voltage at pin 3 / pin 5 of fcc-68 connector corresponds to real-time vacuum measurement.

Output Range

PON100: +1.0VDC ~ +10.0VDC

PON120: +2.286VDC ~ +10.0VDC



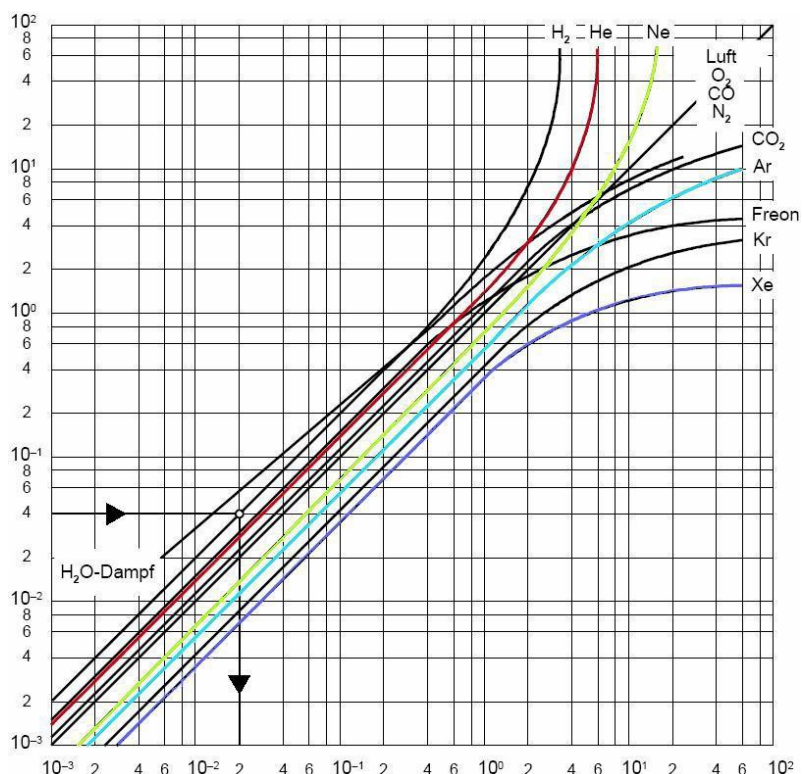
$$P=10^{((U-c)/1.286)} \longleftrightarrow U=c+1.286 \times \lg P$$

P: Vacuum Pressure
 U: Analog Voltage (V)
 C: Constant

U	P	C
(V)	Pa	3.572
(V)	mBar	6.143
(V)	Torr	6.304

4. Gas Type Dependence

For Pirani vacuum gauge, the measurement is sensitive to the type of gas in the system. The different gases have different masses and hence will take different amounts of heat out of the wire. However, this does mean that if the gauge is calibrated using air or N₂ and is then used to measure a process gas such as Argon, there will be an error in the pressure measurement. The error is reproducible and so in most cases the pressure is accepted as being a relative, but reproducible, measure of pressure.

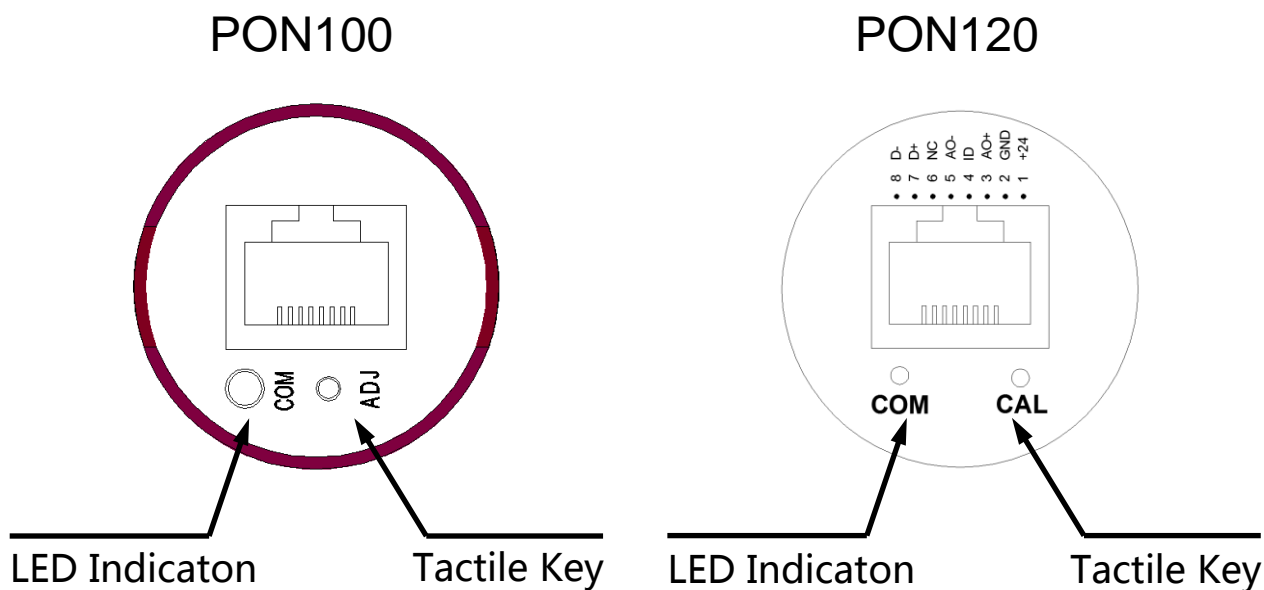


Therefore, when the measured gas is other gases than air/N₂ and the pressure is below 100Pa, a calibration factor is need to calculate the effective pressure:

$$P_{\text{effective}} = C * \text{PressureReading}$$

Gases	C	Gases	系数 C
Air, O ₂ , CO, N ₂	1.0	CO ₂	0.9
H ₂	0.5	Kr	2.4
He	0.8	Xe	3.0
Ne	1.4	H ₂ O Vapor	0.5
Ar	1.7	Freon	0.7

5. Tactile Calibration Key (Top Diagram)



Calibration Method

- The LED indicator is on after power on and flashes once when RS485 communication transmission one time.
- Before calibration, ensure that the vacuum gauge has warmed up for more than 30 minutes.
- **Atmospheric calibration:**

Ensure that the vacuum measuring port is under atmospheric pressure, insert a round rod with a diameter less than 1.5mm into the adj (CAL) round hole, press it down and keep it for 3 seconds after feeling the action of the tactile switch touching, and observe that the COM LED flashes continuously for three times, indicating that the vacuum gauge saves the current measured pressure as the atmospheric pressure as 1.0E+5Pa, and completes the atmospheric calibration process.

- **Zero calibration:**

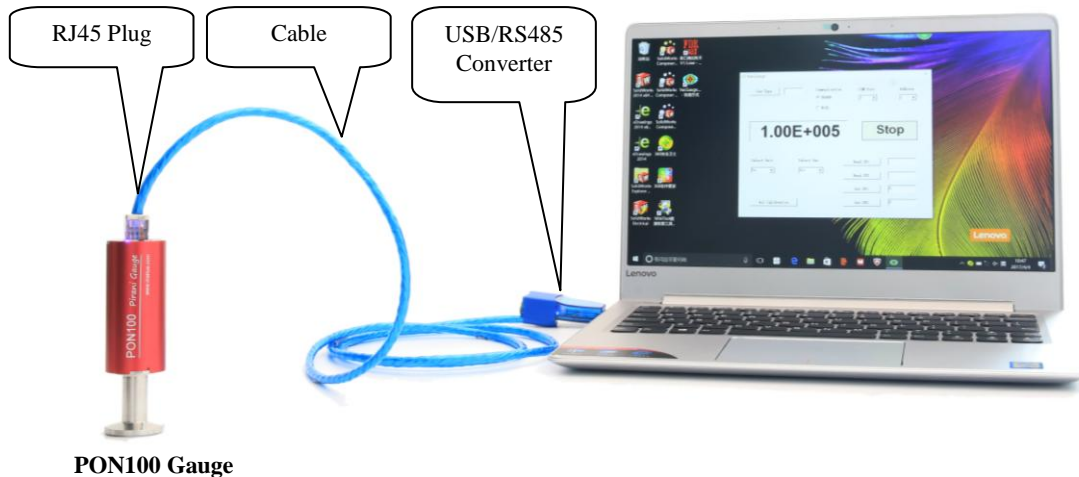
Ensure that the pressure at the vacuum measuring port is less than 5.0E-3Pa, insert a round rod with a diameter of less than 1.5mm into the adj (CAL) round hole, press it down and keep it for 3 seconds after feeling the action of the tactile switch touching, and observe that the COM LED flashes continuously for three times, indicating that the vacuum gauge takes the current measured pressure as the zero pressure of the vacuum gauge, and saves it as 1.0E-1Pa to complete the zero calibration process.

Note: after pressing the calibration button, the vacuum gauge will automatically determine the atmospheric calibration or zero calibration according to the measured pressure range.

6. INSTRUE reading software Gauge Reader 3.0

This Section 6 and 7 are only applicable to PON100 model with RS485 function.

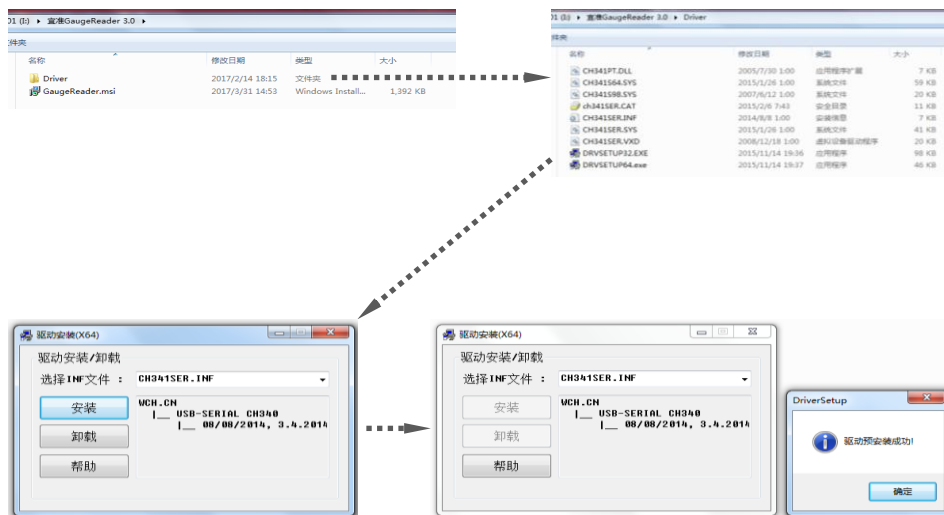
Install Gauge Reader 3.0 application software on ordinary Win XP, Win7, Win8 or Win10, and the computer can communicate with pon100 in real time through a USB/RS485 converter. (the vacuum gauge needs to be powered by separate + 24VDC)



PON100 Gauge

6.1 USB / RS485 Converter Driver Installation

Open the folder supplied by INSTRUE, find the software packages that should be installed on the computer and click the appropriate driver file to install.

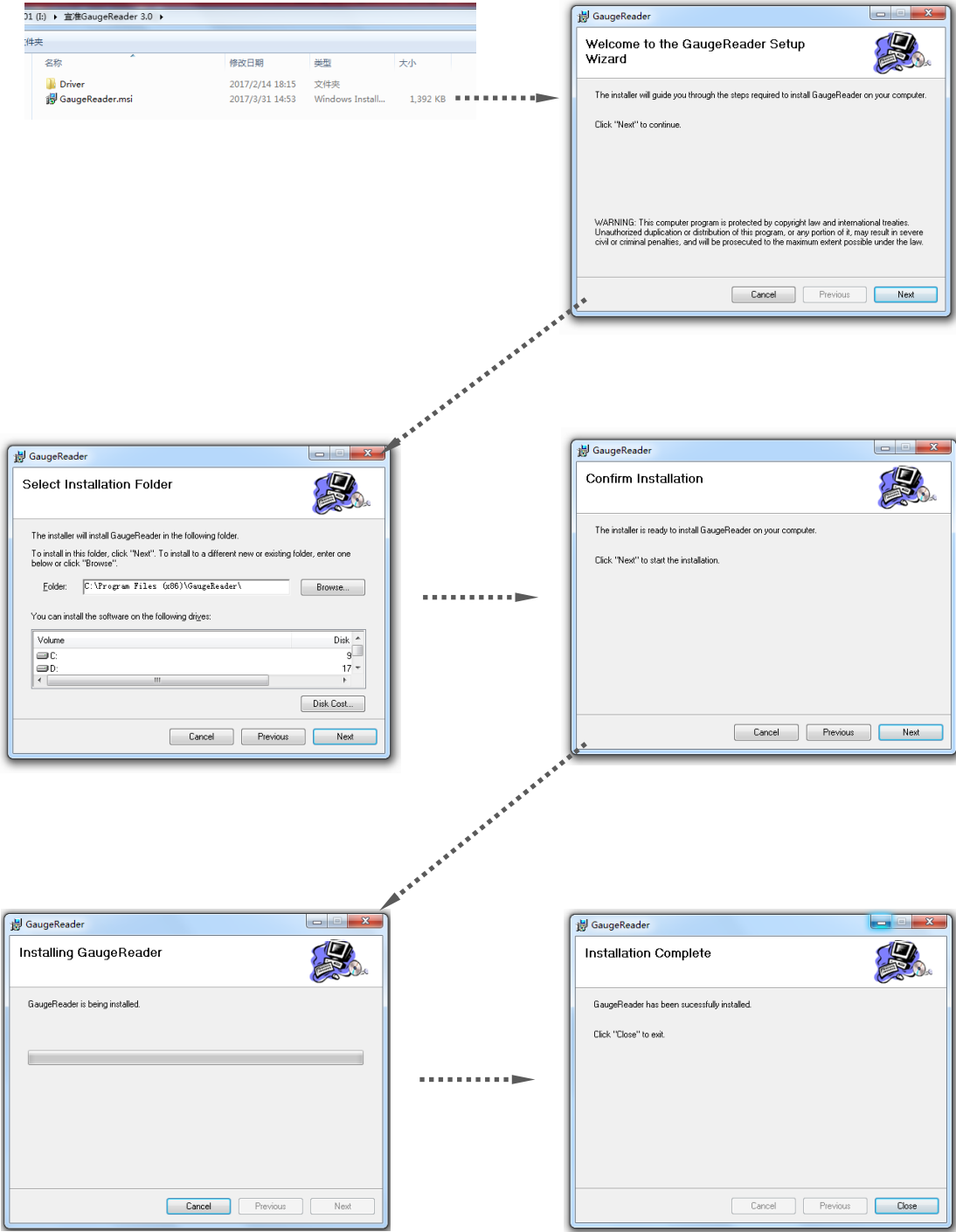


After installation, click OK.

Set the serial port in the computer device manager:

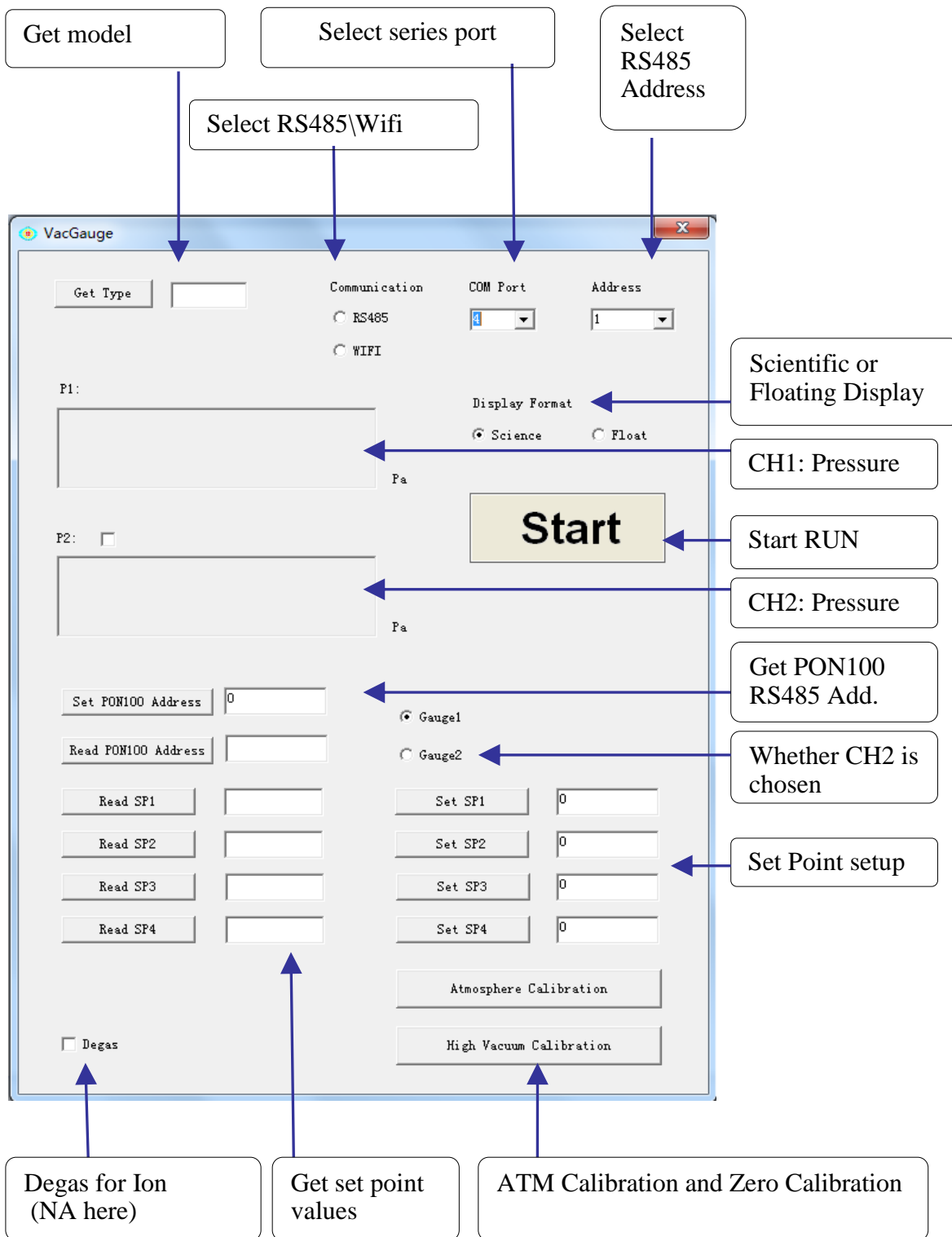
Baud rate: 9600; Start bit: 1; Data bit: 8; Stop bit: 1; Check bit: None

6.2 Application software GaugeReader3 0 installation



After installation, an executable file is generated in the selected folder:
VacGauge.exe

6.3 Use application software GaugeReader3 0



7. RS485 MODBUS RTU Communication Protocol

1) Communication Setup:

Baud rate: 9600 Start Bit: 1 Data Bit: 8 Stop Bit: 1

Checkout bit: No

2) Instruction format:

a. Read instruction:

- Upper computer sends instructions to vacuum gauge:

Add	Com mand	Register Hi	Register Low	Data Word (Hi 8bit)	Data Word (Low 8bit)	CRC Check (Low8bit)	CRC Check (Hi 8bit)
1-99	03	00	XX	00	XX	XX	XX

- Return Instruction:

Add	Comm and	Data Byte	Data	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
1-99	03	XX	XX Byte	XX	XX

b. Write Instruction:

- Upper computer sends instructions to vacuum gauge:

Add	Com mand	Register Hi	Register Low	Data Length (Hi 8bit)	Data Length (Low 8bit)	Data Byte	Highest Data Byte
1-99	16	00	XX	00	02	4	Bit31-24

Data Mid Byte	Data Mid Byte	Data Mid Byte	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
Bit23-16	Bit15-8	Bit7-0	XX	XX

- Return Instruction:

Add	Com mand	Register Hi	Register Low	Data Length (Hi 8bit)	Data Length (Low 8bit)	CRC Check (Low 8bit)	CRC Check (Hi 8bit)
1-99	16	00	XX	00	02	XX	XX

3) Register address table:

Register address (16hexadecimal)	Data byte length	Storage content
01	2	Gauge Ch1: Vacuum data of scientific counting format
03	2	Gauge CH2: Vacuum data of scientific counting format
11	2	Gauge Ch1: Vacuum data of floating point format
13	2	Gauge CH2: Vacuum data of floating point format
21	2	Set Point 01: Floating Format
23	2	Set Point 02: Floating Format
25	2	Set Point 03: Floating Format
27	2	Set Point 04: Floating Format
29	2	Set Point 05: Floating Format
2B	2	Set Point 06: Floating Format
31	1	Set Point 01 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
32	1	Set Point 02 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
33	1	Set Point 03 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
34	1	Set Point 04 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
35	1	Set Point 05 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
36	1	Set Point 06 correspond Gauge 1: Gauge Ch1; 2: Gauge Ch2
40	1	Implement Calibration: 1: Gauge Ch1 atmosphere 2: Gauge Ch1 Zero 4: Gauge Ch2 atmosphere 8: Gauge Ch2 Zero

7.1 Data display format:

7.1.1 Scientific count format:

For example, the vacuum gauge display data is 1.2E+3, and the ASCII code stored in the register is the corresponding data, that is, 0x31, 0x32, 0x2b, 0x33.

For example, the vacuum gauge displays the data 1.0E-1, and the data stored in the register are 0x31, 0x30, 0x2d and 0x31.

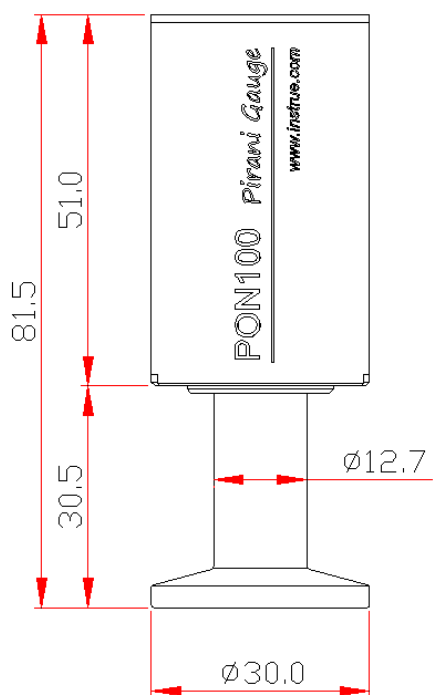
7.1.2 Floating format:

The 32 bit floating number is stored in the register.

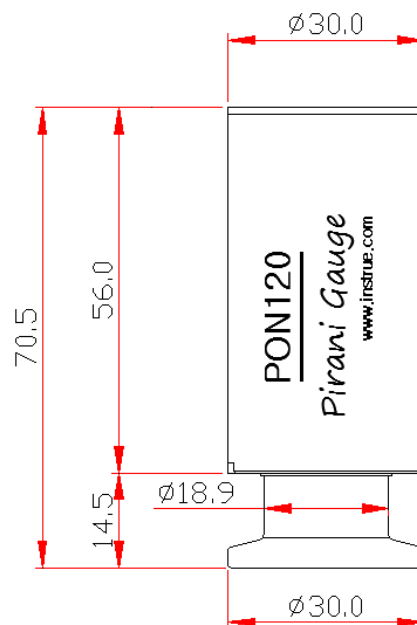
7.1.3 Vacuum gauge address setting:

Through Gauge Reader 3.0 application software interface, you can set the vacuum meter local address, factory address set to 01.

8. Dimensions (mm)



PON100



PON120