

AGP3000(H02) Datasheet

Pirani composite vacuum gauge

- 0.05Pa~120kPa absolute pressure measurement
- Fast, accurate, repeatable, and long-term stable pressure measurement
- TFT-LCD Display
- 0~10V Analog signal linear output
- Standard Modbus RTU
- Easy to install

Product Summary

AGP3000 is a Pirani composite vacuum gauge for wide range pressure measurement that integrates an advanced pressure sensor module and a MEMS Pirani vacuum sensor chip. This vacuum gauge is not only powerful, but also easy to operate, equipped with a color liquid crystal display (TFT-LCD) and intuitive key control, analog voltage output and RS485 communication protocol, easy to connect and data exchange with a variety of devices and systems.

AGP3000 supports the switching of Pa, Torr, and mbar three common units, and is equipped with a standard KF16 pressure interface. Different adapters can be selected according to needs to ensure seamless connection with various equipment and systems.

Before leaving the factory, AGP3000 precision, repeatability, response time and other indicators have been strictly tested and calibrated to ensure that each vacuum gauge can achieve excellent performance.

Application

AGP3000 Pirani composite vacuum gauge is widely used in various precision measurement scenarios with low and medium vacuum requirements, such as vacuum baking, vacuum packaging, vacuum coating, vacuum heat treatment, vacuum brazing, vacuum coating, metal smelting, semiconductor intelligent equipment, photovoltaic equipment, and other industries.



Figure 1. AGP3000 diagram

1. Appearance structure

Figure 2 shows the exterior structure of the AGP3000, including the LCD display and operation keys. The three operation keys from left to right represent the up or left key, down or right button, OK or back key.

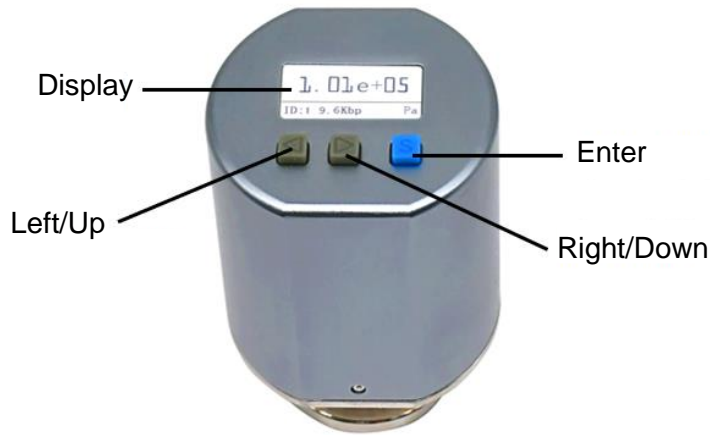


Figure 2. Schematic diagram of AGP3000

2. Size

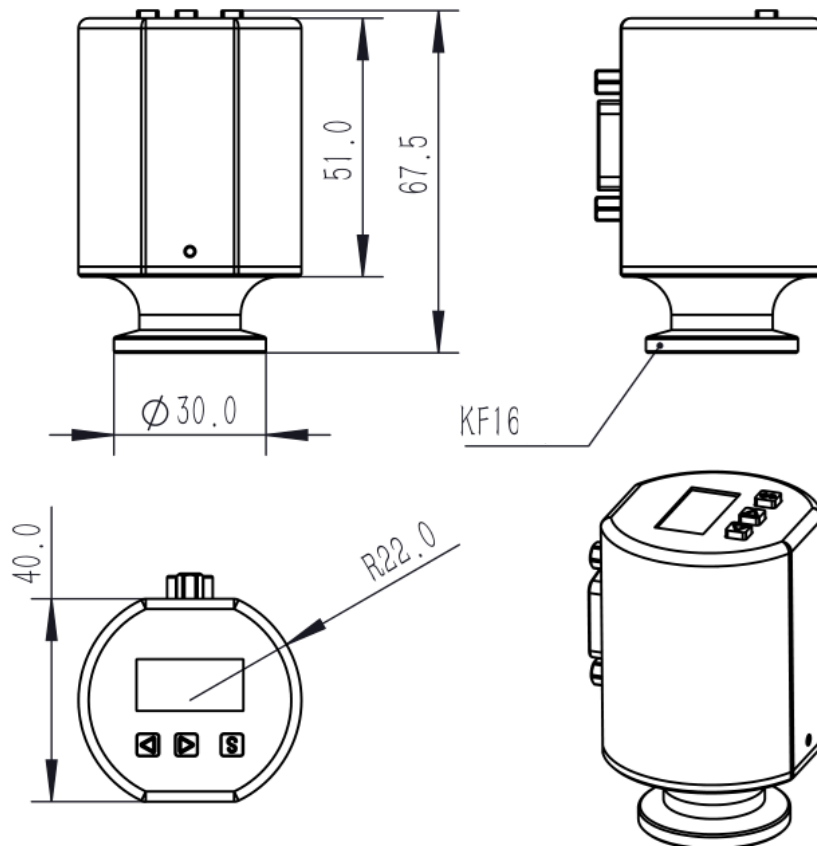


Figure 3. AGP3000 specification size (unit: mm, tolerance: ±0.5mm)

3. Interface

3.1 Product DB9 Male connector definition

The communication interface of AGP3000 is the standard DB9 male head, the pin diagram is shown in Figure 4, and the pin definition is shown in Table 1.

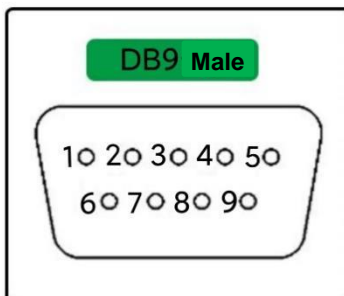


Figure 4. Pin diagram of DB9 male head

Table 1. DB9 pin definition

Pin	Definition
1	Signal +
2	485 A+
3	485 B-
4	9 ~ 24 VDC Power +
5、7、8	GND
6	9 ~ 24 VDC Power -
9	Signal -

3.2 AGP3000 Cable definition

The cable of AGP3000 is the DB9 female lead cable, the material is UL2464, and there are 9 cables, as defined in Table 2, and the actual cable is shown in Figure 5.

Table 2. Definition of Cable side

Cable color	Definition
Black	Signal +
Brown	485 A+
Red	485 B-
Orange	Power +
Yellow, Blue, Grey	GND
Green	Power -
White	Signal -

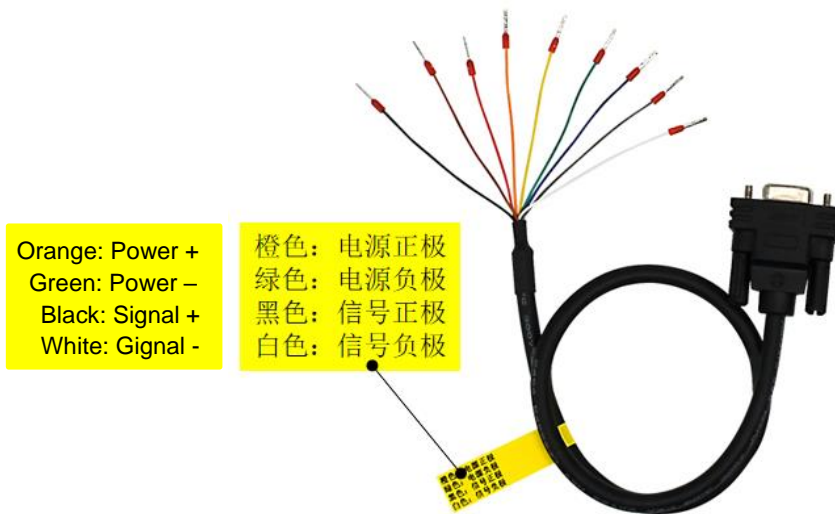


Figure 5. Physical diagram of AGP3000 lead wire

3.3 Flange Interfaces

The pressure interface of AGP3000 is the standard KF16 flange, the material is 304 stainless steel, the surface adopts the electropolishing process, which can realize the requirements of high vacuum sealing, and has the characteristics of convenient installation, convenient disassembly, and easy deformation of the joint. In addition, the adapter with KF16 to other interfaces is optional. Such as KF16-KF25, KF16-KF40, KF16-1/4 VCR, KF16-1/2 VCR, KF16-1/8 NPT, KF16-1/4 NPT, KF16-1/2 NPT, KF16-1/4 VCO, KF16-1/2 VCO, etc., Easy to use different interfaces, please contact us when purchasing specific requirements.

Take KF16-KF25 as an example, the physical adapter is shown in Figure 6.



Figure 6. Physical diagram of KF16-KF25 adapter

4. Technical specification

Table 3. Technical specifications and mechanical parameters of AGP3000

Item	Specification
Range (N ₂ & Air)	5×10 ⁻² ~ 1.2×10 ⁵ Pa
Accuracy (N ₂) ¹	5×10 ⁻² ~ 1×10 ⁻¹ Pa (error: ±50% reading)
	1×10 ⁻¹ ~ 1.5×10 ⁴ Pa (error: ±15% reading)
	1.5×10 ⁴ ~ 1.2×10 ⁵ Pa (error: ±0.5% reading)
Repeatability (N ₂) ¹	1×10 ⁻¹ ~ 1.2×10 ⁵ Pa (error: ±2% reading)
Response time	≤100mS
Communication interface	DB9
Output	RS485、0 ~ 10VDC
Display unit	Pa、Torr、mbar (Ability to switch)
Pressure connection	KF16 (Standard)
Power	9 ~ 28 VDC
Power consumption	<1.2W
Operating temperature	0 ~ 40 °C
Preheating time	60s
Load pressure	130KPa
Shell material	Aluminum

5. Analog voltage output

AGP3000 provides 0~10V analog voltage output (U, unit: VDC), voltage output is a function of pressure (P, unit: Pa), the function relationship is shown in Figure 7.

Transformation formula: $P = 10^{((U-6.143)/1.286+2)}$

$U = \log_{10}(P/100) \times 1.286 + 6.143$

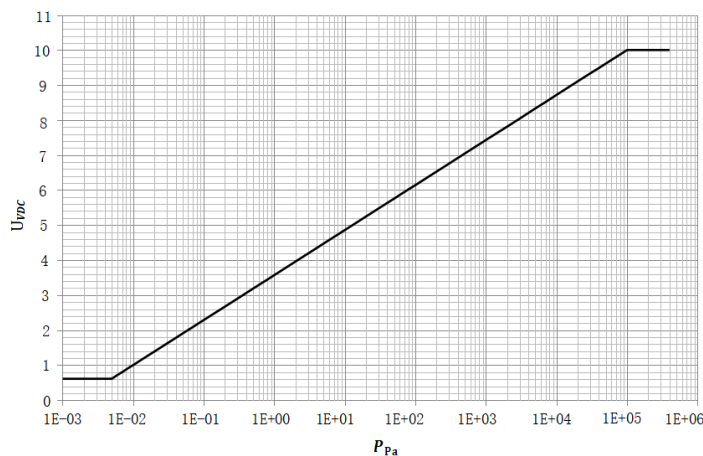


Figure 7. Output voltage and pressure characteristic curves

¹ Accuracy and repeatability values are typical of calibrated measurements at room temperature nitrogen.

6. Digital communication output

6.1 RS485

The digital output communication mode of AGP3000 Pirani composite vacuum gauge is RS485 communication, and the communication parameters are shown in Table 4.

Table 4.RS485 communication parameters

Parameter	Description
Protocol format	Modbus RTU
Communication rate	4800/9600/19200/115200bps

The communication protocol is standard Modbus RTU. The host can be a computer, RS485 receiver, MCU controller, etc. As the slave machine, the default address of AGP3000 is 1, that is, 0x01, and the maximum address is 255, that is, 0xFF. Support address modification can access multiple slave bus.

The definition of Modbus RTU communication register of AGP3000 is shown in Table 5.

Table 5. Definition of Modbus RTU register

Name	Address	Byte length & type	Read/Write attribute	Function code
Pressure value	0x0000	32bits (float)	Read only	03
AD value	0x0002	32bits (float)	Read only	03
Real-time state	0x0004	8bits (byte)	Read only	03
Device address	0x0005	8bits (byte)	Read only	03
Communication rate	0x0006	16bits (short)	Read only	03

The following is an example of AGP3000.

When the host reads the instantaneous pressure value of the AGP3000 (the default slave address of the device is 0x01), the host sends the command to the AGP3000, the data is 01 03 00 00 00 02 C4 0B, and the format is shown in Table 6. .

Table 6. Format table of the register read command sent by the host

Send by Host	Number of bytes	Example of Sending Information (Hex)	Information meaning description
Slave address	1	01	Address of the communication slave
Function code	1	03	Read the multiplex register
Register origin address	2	00 00	Register 0x0000 holds the current pressure value
Read register count	2	00 02	Read 1 register
CRC check code	2	C4 0B	The CRC code is used for verification

When the host receives the data returned by AGP3000, the data is 01 03 04 00 44 C5 47 A9 44 in the format shown in Table 7.

Table 7. Format table of AGP3000H01 register data received by the host

Slave send	Number of bytes	Example of Sending Information (Hex)	Information meaning description
Slave address	1	01	Address of the communication slave
Function code	1	03	Read the multiplex register
Bytes of received data	1	04	Bytes of received data
Register data	4	00 44 C5 47	Read 1 register, the register returned data is single-precision hexadecimal floating point data, the data sequence is the right high byte; The value is atmospheric pressure 101000;
CRC check code	2	A9 44	CRC code for verification

The C language code for computing CRC code is as follows:

```

// * ptr communication sends or receives an array of data bytes,
// len Bytes length of data sent or received (excluding CRC codes)
// Returns the result of the CRC code calculation, with the high byte first
unsigned int CRC16(unsigned char * ptr,unsigned char len)
{
    unsigned int crc= 0xFFFF; //Initial value initialization
    unsigned char i;
    while(len--)
    {
        crc ^=*ptr++;
        for(i=0;i<8;i++){
            if(crc & 0x1){
                crc>>=1;
                crc^=0xA001;
            }
            else crc>>=1;
        }
    }
    return crc;
}

```

6.2 6.2 Common Commands

The host sends Modbus RTU common commands, as shown in Table 8. To read the device address, pressure value, and communication rate of different sensors, change 01 to the address of the corresponding sensor. Example: If the sensor address is 2, the command to read the pressure value of the sensor is changed to 02 03 00 00 00 02 C4 0B.

Table 8. Common Modbus RTU instructions sent by the host

Instruction function	Send instruction
Calibration at 0.1pa	ff 10 00 11 00 03 06 aa f1 00 00 00 00
Calibration under atmospheric pressure	ff 10 00 11 00 03 06 aa f2 00 00 00 00
Write flash	ff 10 00 11 00 03 06 aa fe 00 00 00 00
Read Address 1 Pressure of the sensor	01 03 00 00 00 02 C4 0B
Read the current device address	01 03 00 05 00 01 94 0B
Read the current device communication rate	01 03 00 06 00 01 64 0B

7. Work interface and interface operation

As shown in Figure 8, after the AGP3000 is powered on, the display screen will display the main screen, displaying the current air pressure value, device address, communication rate, and current display unit. Press the left or right button to enter the level-1 menu, which includes Settings, status, and back. Select one of the functions and enter the corresponding second-level menu after confirming it, and so on. There are at most three-level menus. When entering the setting function menu, you can set the product communication address, communication rate, display pressure value unit Settings, press the confirm/return key to return to the previous menu. The specific operation mode and corresponding function description are shown in Table 8, and the summary of interface display is shown in Table 9.

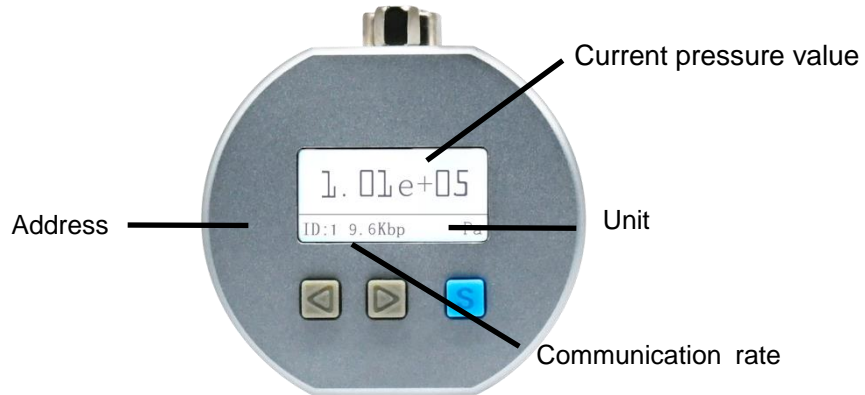


Figure 8. AGP3000 main screen

Table 8. Summary of interface operations

First menu	Secondary menu	Third menu	Function description
Set	Device address	Device address number	The current device address is displayed. Press the left button to increase the device address and press the right button to decrease the device address. The address range is 1 to 255. S keys confirm and automatically return to the upper-level menu
	Communication rate	Device communication rate	The default is 9600bps. You can change it to 4800bps, 115200bps, and 19200bps.
	Unit setting	Display unit setting	Default Pa, Torr, mbar can be changed.
	Back	/	Back to Level 1 menu
Status	To display parameters, press left or right button to pull down the list	/	V1 is the current working voltage of the equipment (1200~3200mV); I is the current working current; R is the resistance of the sensor; V2 indicates the working voltage of the current sensor (600~1600mV). LAD is the lower limit of calibration value. HAD indicates the upper limit of the calibration value.
Back	/	/	Back to main page

Table 9. Summary of the interface display

No.	Interface display definition	Display
1	Vacuum degree display interface	
2	First level menu	
3	Set the secondary menu	
4	Device address adjustment page	
	Communication rate adjustment page	
	Unit Settings adjustment page	
5	Status bar	
6	Status bar content	
7	Back	

8. Precautions for use

- 1) When purchasing products, if there is a need for different adapters, please indicate the type of adapters you need.
- 2) The vacuum gauge can be installed in any direction. Vertical installation is recommended.
- 3) During installation, ensure that the surface of the clamp, seal ring or other connecting devices is clean and undamaged to avoid air leakage.
- 4) Ensure that the power supply voltage is stable and does not exceed the operating voltage range.
- 5) During use, the maximum allowable pressure should not be exceeded.
- 6) When the product has product problems, it is not recommended to disassemble and repair, please communicate with the manufacturer.

Warning and personal injury

Do not use this product in safety devices or scram devices, or in any other application where the failure of this product may result in personal injury, unless there is a specific purpose or authorized use. Refer to the product data sheet and manual before installing, handling, using or maintaining the product. Failure to comply with the recommendations may result in death or serious injury. The Company will not be liable for all compensation for personal injury and death arising therefrom and will waive any claims that may arise from the Company's officers and employees and affiliated agents, distributors, etc., including various costs, claim costs, attorney's fees, etc.

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Guangzhou Osun Electronics Co., Ltd. provides the following table of quality assurance (calculated from the date of delivery) to the direct purchasers of its products, with the technical specifications indicated in the manual of Osun Electronics. If the product is proved to be defective during the warranty period, the company will provide free repair or replacement services.

Warranty period description

Product category	Warranty period
AGP3000	12 months

Aosong is only responsible for the defects in the application of the application in accordance with the technical conditions of the product. The Company does not guarantee that the products will be used in special scenarios other than recommended. The Company does not make any promises about the reliability of the products when applied to other products or circuits that are not part of the Company.

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