HIGHJOIN

HP3000 Multifunctional Differential Pressure Gauge/Switch

Instruction manual

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Preface

Thank you for using the HP3000 Multifunctional Differential Pressure Gauge. Please read this manual in detail to understand the operation and precautions of the differential pressure gauge before use.

If you have any concerns about the use of the gauge, please contact us freely.

The following matters need special attention:

1. Be sure to turn off the power before implementing the wiring.

2. Never modify the internal wiring and lines of the product by yourself.

3. Read the label on each terminal before wiring, the wrong terminal will cause irreversible damage to the product.

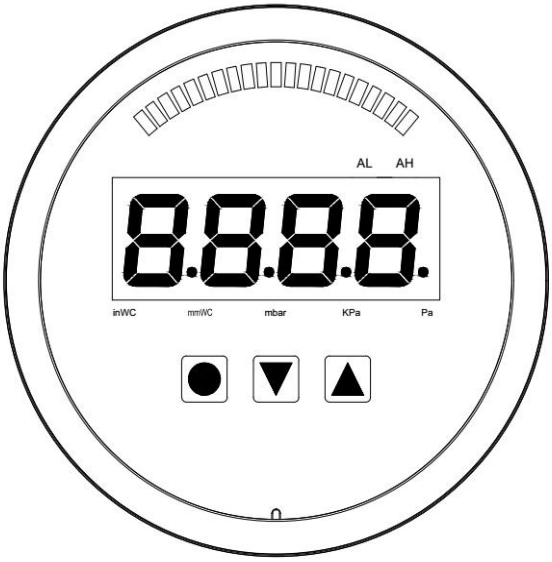
4. Please choose a safe area to install the product to prevent high temperature, moisture and water droplets from splashing.

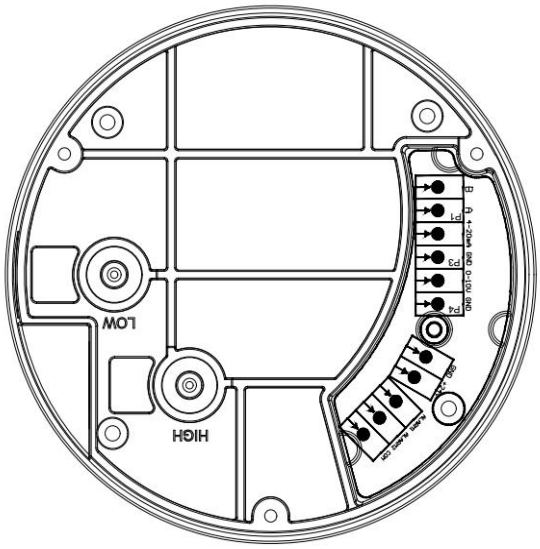
I. Related matters before use

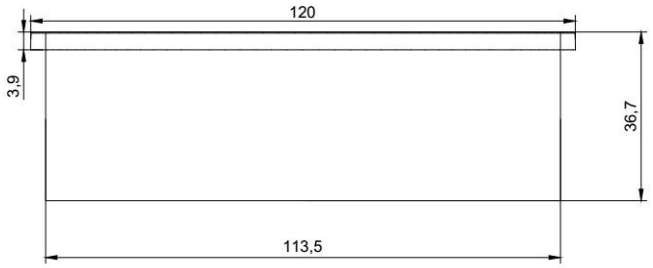
1.1 Delivery Inspection

Each product is strictly quality-controlled before leaving the factory, and is packaged in reinforced anti-collision packaging. After unpacking, customers should check whether the product has been damaged during transportation.

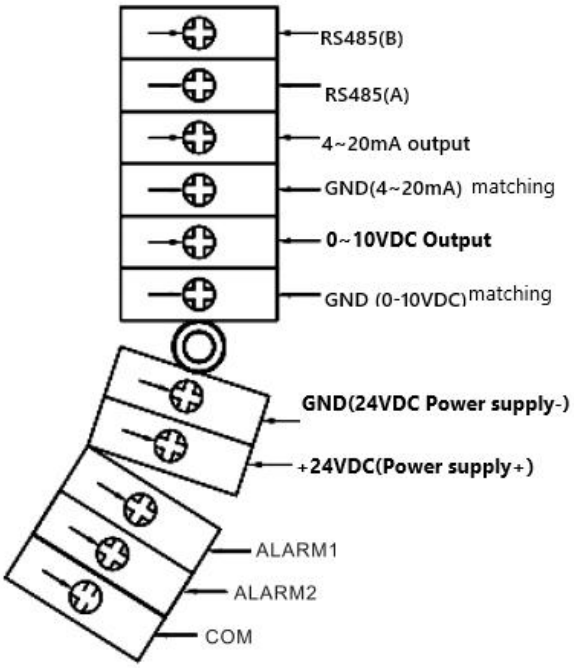
1.2 Product appearance







Electrical Connection:



Main functions:

Range: minimum 30Pa, maximum 10kPa, support compound pressure measurement maximum -5 ~ 5kPa

Example

a.-500Pa ~ 500Pa;

b.-250Pa ~ 250Pa;

c.-125Pa ~ 125Pa;

d.-60Pa ~ 60Pa;

e..... (add according to actual situation)

Output signal options:

Voltage output: 0-10V;

Current output: 4-20mA;

Switching alarm output: 2 normally open + 2 normally closed;

RS485 (modbus).

1.3 storage

- Must be placed in a dust-free and dry place.
- Storage temperature: -10℃~+40℃.
- Storage humidity: 0%~90%.
- Vibration: <20Hz：9.8m/s²(1G)max；20Hz ~50Hz：5.88m/s²(0.6G)max
- Even if the humidity meets the specification, if the temperature changes rapidly, dew and ice may occur, so avoid storing in such places.
- Avoid storing in an environment with corrosive gases and liquids.
- It is best to store in proper packaging on a shelf or a table.

If the capacitors are opened and used for more than 3 months, the temperature around the storage environment should not be higher than 30℃. This is because the characteristics of electrolytic capacitors are susceptible to deterioration when stored at high ambient temperatures without being energized. Do not leave the capacitors unenergized for more than one year.

II. Installation and Wiring

2.1 Installation environmental conditions

1. Ambient temperature: -10 ~ +50°C (14 ~ 104°F).

2. Relative humidity: <90%, no frost.

3. Installation height: <1000m.

4. Pressure: 86 ~ 106 kPa.

5. Vibration: <20Hz: 9.8m/s²(1G)max; 20Hz ~50Hz: 5.88m/s²(0.6G)max.

2.2 Wiring instructions

1. The power supply must be connected to the L and N terminals of the POWER of the product. If the power supply is mistakenly connected to other terminals, the product will be damaged.

2. The control layer 485 bus is divided into A and B. The A line is connected to A and the B line is connected to B. It is best to use a two-color 1mm2 twisted pair cable.

3. This product is used RS485 communication method, in order to improve

stability, it is recommended that the communication line with hand-held connection.

4. Terminal blocks and wires to ensure high reliability of the connection.

5. Please select the wire diameter specification of the wiring in accordance with the electrical regulations to implement the wiring. Please lock the screws of each terminal tightly to prevent sparks from vibrating loose.

6. Please check the following points after completing the circuit wiring:

a) Are all connections correct?

b) Are there any missing wires?

c) Is there a short circuit between the connection lines of each terminal or a short circuit to ground?

III. Product Parameters

1. medium: air and non-flammable, non-corrosive gases.

2. Medium temperature: 0-60°C

3. Housing: ABS engineering plastic

4. Operating environment: -20°C ~ +85°C

5. Differential pressure range: a variety of ranges, overload 3xFS, damage pressure 10xFS

6. communication output: RS485.

7. Accuracy: ±0.5%FS

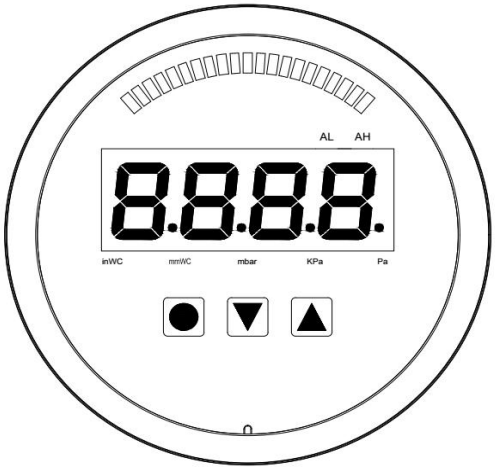
8. Long-term stability: ±0.1%FS / year

9. Temperature drift coefficient: <0.03%FS/°C

10. power supply: 24VDC±3VDC;

IV. Operating Instructions

4.1 interface description



○ key is the setting key, ▵ is used to set the unit (Pa->KPa->mbar->mmWC->inWC->Pa) in the reality interface, ▿ key is used to clear the zero. See item 4.3 for specific use.

4.2 Function introduction

1. Differential pressure alarm

If the current monitored differential pressure value is greater than the set differential pressure upper limit or lower than the differential pressure lower limit is alarmed; if it is higher than the differential pressure upper limit, the analog pointer light tube flashes and the relay output contact alarm signal. When the differential pressure returns to within the alarm value, all alarm signals disappear.

The lower limit is the same as the upper limit.

2. 4-20mA output

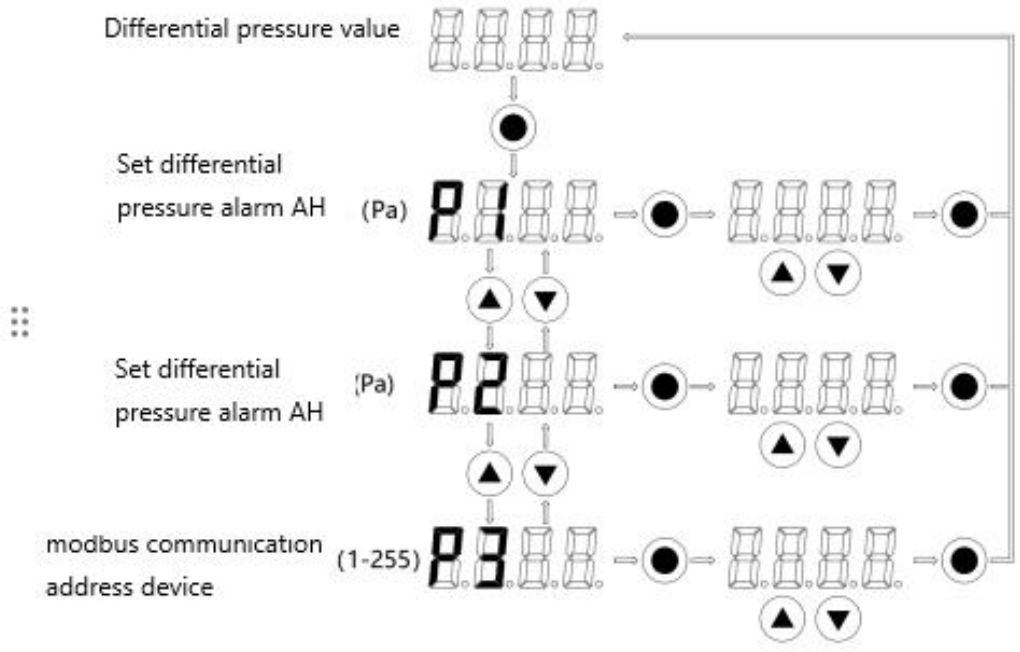
Depending on the range selected, the output corresponding current value varies. If the range is from -500Pa to 500Pa, the output current is 4mA when the differential pressure is -500Pa, 20mA when the differential pressure is 500Pa, and 12mA when the differential pressure is 0Pa. The maximum current sampling resistance should not exceed 1.2KΩ.

2. 0-10V output

According to the selected range, the output voltage value varies. If the range is -500Pa ~ 500Pa, the output voltage is 0V when the differential pressure is -500Pa; 10V when the differential pressure is 500Pa; 5V when the differential pressure is 0Pa.

4.3 Parameter setting

1. Basic parameter setting



Press ○ setting key to enter the setting interface, use △ and ▽ keys to adjust the setting items, every time you press △ plus 1, every time you press ▽ minus 1, press and hold for fast plus or minus.

P1 is the setting of lower limit of differential pressure, △ and ▽ keys to set the actual value, every time you press △ plus 1, every time you press ▽ minus 1, press and hold for rapid addition and subtraction. The setting range cannot exceed the total range, and the setting value is in Pa.

P2 is the upper limit of differential pressure setting, △ and ▽ keys set the actual value, each time you press △ plus 1, each time you press ▽ minus 1,press and hold for fast addition and subtraction. The setting range cannot exceed the total range, and the setting value unit is Pa.

P3 is the communication address setting, △ and ▽ keys set the actual value, every time you press △ add 1, every time you press ▽ subtract 1, press and hold for fast addition and subtraction. The setting range is 1-255.

4.4 Communication Introduction

The protocol is all MODBUS RTU protocol. (Communication protocol is 9600 baud rate, 8-bit data, no parity bit)

1. Introduction of ModbusRTU protocol

A. Read register

Send: ADD+0x03+start register address+number of registers+CRC;

Return: ADD+0x03+data length+register value+.....+register value+CRC.

B. Write register

Send: ADD+0x06+register address+data+CRC;

Return: ADD+0x06+register address+data+CRC

2. CRC Introduction

The host or sensor can use the check code to discern whether the received information is correct or not. Due to electronic noise or some other disturbances, information may sometimes be incorrect during transmission. The error check code (CRC) can check whether the host or sensor has incorrect information during communication data transmission, and incorrect data can be discarded (either sent or received), which increases the safety and efficiency of the system.

The CRC (Redundant Cyclic Code) of the Modbus communication protocol contains 2 bytes, i.e. 16 binary digits. The CRC code is calculated by the sending device (host) and placed at the end of the sent message frame.The CRC is sent in the format of low byte first and high byte second, whether sent or received. The receiving device (sensor) then recalculates the CRC of the received message and compares whether the calculated CRC matches the received one.

○ Calculation method of CRC code

A. Preset one 16-bit register as hexadecimal FFFF (i.e., all 1s) and call this

register the CRC register;

B. Iso-or the first 8-bit binary data (both the first byte of the communication information frame) with the lower 8 bits of the 16-bit CRC register and place the result in the CRC register;

C. Shift the contents of the CRC register one bit to the right (toward the lower bit) to fill the highest bit with a 0 and check the shifted-out bit after the right shift;

D. If the shifted-out bit is 0: repeat step 3 (shift right one bit again); if the shifted-out bit is 1: the CRC register is iso-ored to the polynomial A001 (1010 0000 0000 0001);

E. Repeat steps C and D until the right shift is 8 times, so that the entire 8-bit data is processed in its entirety;

F. repeating steps B through E for the next byte of the communication information frame;

G. Exchange the high and low bytes of the 16-bit CRC register obtained after all bytes of this communication information frame have been calculated according to the above steps;

H. The final obtained CRC register content is the CRC code.

Description: This program calculates the CRC code of the first len length bytes in *ptr.

unsigned short crc16(unsigned char *ptr, unsigned char len)

```
{
    unsigned short crc=0xFFFF;
unsigned character i;
while(len--)
{
crc ^=*ptr++;
for(i=0;i<8;i++)
{
if(crc & 0x01)
{
crc>>=1;
crc^=0xA001;
}
else
{
crc>>=1;
}
}
}
Returns crc;
}
```

3. Example of communication

○ Read the current differential pressure value

Suppose you want to check the differential pressure value of differential pressure gauge No. 1:

Send value	0x01	0x03	0x00	0x01	0x00	0x01	0xD5	0xCA
	Address Location	Read command	Start Address		Number of registers		CRC	
Return Value	0x01	0x03	0x02	0xFF	0xF6	0xB8	0x44	
	Address	Read command	Start Address	Differential pressure value:-10		CRC		

○ Setting the upper limit of differential pressure

Suppose you want to set the upper limit of differential pressure for differential pressure gauge No. 1 to 100

Send value	0x01	0x06	0x00	0x05	0x00	0x64	0x98	0x20
	Address Location	Read command	Start Address		Number of registers:100		CRC	
Return Value	0x01	0x06	0x00	0x05	0x00	0x64	0x98	0x20
	Address	Read command	Register Address		Upper limit of differential pressure		CRC	

Register number	Function	Read/Write Status	Description
1	Differential pressure value	R	Actual measured value (in Pa))
2	Alarm Status	R	0：No alarm 1：Above the upper limit 2：Below the lower limit
3	Differential pressure limit	W/R	
4	Lower limit of differential pressure	W/R	
5	Address	W/R	1-255

All the above data are signed 16-bit integers; for example, the differential pressure value read in the communication example is 0xFF and 0xF6, which is -10;