HG808 - A

Dew Point Transmitter

For Ultra-high Temperature Environment

Users Manual

V1.1

HENGKO Technology Co., Ltd.

About Us

HENGKO Technology Co., Ltd. is a specialized and innovative national high-tech enterprise that integrates the research and development, manufacturing, sales, and service of temperature and humidity dew point transmitters.

For over 20 years of deep cultivation in the industry, HENGKO has taken the mission of "solving the filtration, perception, and analysis problems in the gas and liquid world, making life healthier", continuously improving product performance and quality, filling the functional gap in the field of environmental measurement, solving technical problems in temperature, humidity, and dew point measurement, and helping customers continuously improve product competitiveness.

HENGKO has a team of engineers with strong independent innovation capabilities and rich industry customization experience, as well as a systematic, rigorous, and efficient product design and production system. From technical services to product development, from basic measurement to high-end applications, we provide customers with comprehensive temperature and humidity measurement solutions.

HENGKO's products are widely used in industries such as automotive manufacturing, rail transit, aviation, high-speed rail, biopharmaceuticals, gases, compressed air, electronic devices, smart agriculture, warehouses, logistics, and food processing.

Catalogue

1. Product Introduction

1.1. Product Overview

The HG808 A series ultra-high temperature online dew point meter is designed for humidity measurement in high-temperature and dry environments, equipped with a sturdy cast aluminum housing and stainless steel sensor components, suitable for continuous and accurate monitoring of temperature and dew point in extremely harsh high-temperature industrial environments.

The A series ultra-high temperature online dew point meter is equipped with a dew point sensor that can withstand ultra-high temperatures, and also has online real-time monitoring function. This product has a wide range of applications, covering multiple fields such as food, medicine, chemical industry, high-temperature drying, and environmental monitoring.

✧ Food industry: Ultra high temperature drying oven is used to monitor the dryness inside the oven online during the drying and processing of dried vegetables, fruits, and other foods to ensure food quality;

✧ Pharmaceutical industry: During the high-temperature drying and disinfection process of drug raw materials,

monitor dew point data to prevent drug moisture or contamination, and ensure the quality and purity of drugs;

✧ Chemical industry: Some chemical reactions require high-temperature drying conditions. By using the A series to monitor the high-temperature dew point, the influence of moisture on the chemical reaction can be avoided, and the yield and quality of the product can be improved;

✧ High temperature drying: A-series products may accurately monitor the dew point of the source gas in the high-temperature drying system, which helps improve the efficiency of high-temperature drying and optimize energy consumption during the process;

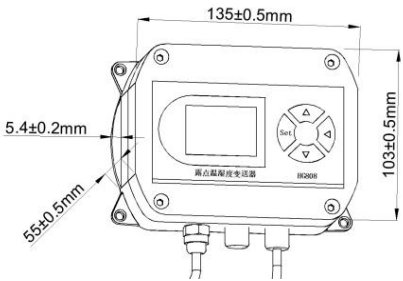
✧ Environmental monitoring: such as combustion flue gas emissions, chimney emissions, etc. Measuring dew point helps to monitor whether emissions meet standards, thereby scientifically addressing environmental pollution issues.

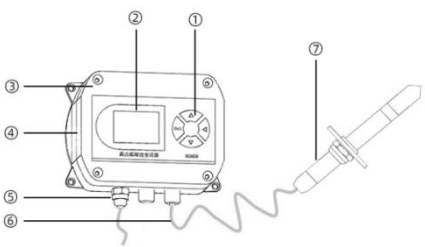
The sensor equipped with the A series ultra-high temperature online dew point meter has extremely strong corrosion resistance and is not affected by most chemical gases such as oil vapor, dust, and micro particles. This series is not only suitable for temperature and humidity monitoring in ultra-high temperature (<190 ℃) conditions, but also for measuring the temperature and humidity of gases that are prone to corrosive damage to equipment, such as exhaust gas emissions from the petrochemical industry and recycled gases from catalytic reaction reforming units in refineries.

The A series ultra-high temperature online dew point meter adopts the standard Modbus RTU protocol, which can easily achieve interconnection with PLC, DCS, and various configuration software. Therefore, in addition to being an online monitoring instrument, it can also be used as an accessory in various ultra-high temperature environmental monitoring and control systems such as high heat process engineering systems, industrial high temperature drying systems, and high temperature constant temperature and humidity experimental chambers to provide dew point and temperature monitoring data.

HG808-A series dew point temperature and humidity transmitter has multiple types of probes to choose from, please refer to Article 4 "Probe " for details.

1.2. Product Overview





1=Keys 2=LCD display screen

3=Aluminum alloy upper cover

4=Aluminum alloy lower cover

5=Sensor power cable

6=Sensor probe input cable

7=Sensor probe (stainless steel)

1.3. Function Features

- Split type probes with strong anti pollution and oil resistance capabilities.
- Simultaneously supporting RS485 output and two analog outputs.
- Analog output with 15 high-resolution bits, digital output with optional resolution of 0.1 or 0.01.
- Supports single register and multi register reading.
- Equipped with anti condensation function, it can keep the sensor synchronized in high humidity environments
- Adopting the standard Modbus RTU protocol, it can easily achieve interconnection with PLC, DCS, and various configuration software.
- 10V~28V ultra wide voltage input, over current protection, power polarity protection, industrial grade ESD safety protection, and power supply anti reverse connection function.

2. Technical Parameter

2.1. Specifications

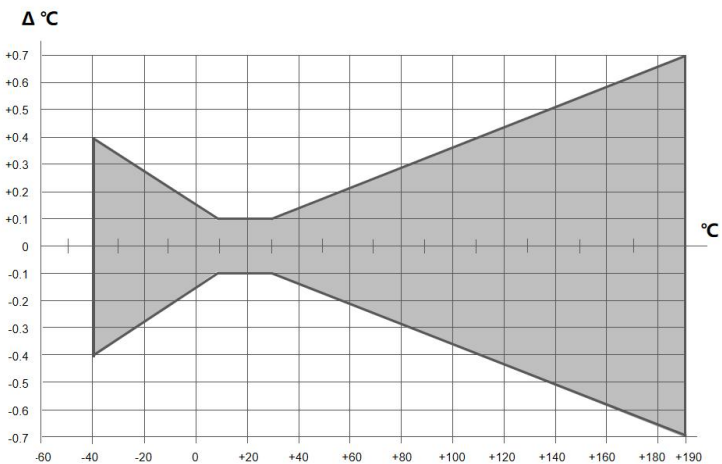
Range and Accuracy	
Dew point range	-50 ~ 90°C （Within the range, it can be set as needed）
Temperature range	-40 ~ 190°C
Dew point accuracy	±3°C (± 5.4 °F) Td
T accuracy	±0.1°C（@20°C）
Input and Output	
Power supply	DC 10V ~ 28V
Power consumption	<0.5W
Analog Outputs	Dew Point+Temperature
	4-20mA/0-5V/0-10V (choose one from three)

RS485 Digital Output	Temperature, humidity, dew point, PPM (read simultaneously)
	resolution ratio： 0.01°C / 0.1°C (optional) 0.01%RH / 0.1%RH (optional)
Baud rate	1200, 2400, 4800, 9600, 19200, 115200 can be set, The default is 9600 PBS
Acquisition frequency	The fastest response is 1 second, other settings can be set according to PLC
Byte format	8 data bits, 1 stop bit, no check
Pressurization	16 bar
Working temperature (Transmitter body)	- 20℃ ~ +60℃, 0%RH ~ 95%RH (Non condensation)

2.2. Measurement values

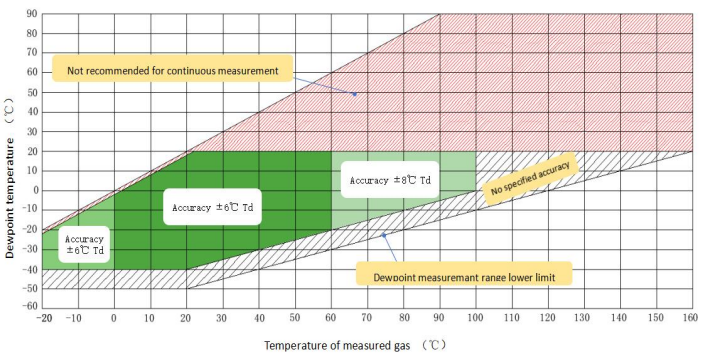
Temperature	
Measurement range	-40 ~ +190°C
Accuracy	±0.1℃（@20℃）

Accuracy of temperature



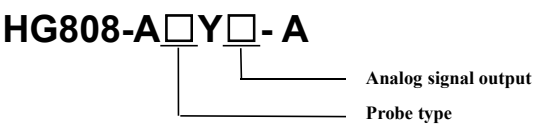
Dew Point	
Measurement range	-50 ~ 90°C
Accuracy	±3°C (± 5.4 °F) Td

Accuracy within the dew point range



3. Product Selection

	HG808-A		
Probe Type	Split 0 (With a protective cover, the total length is 40mm)	Split 8 (With a protective cover, the total length is 103mm)	
	0	8	
Analog signal output type	4~20mA	0-5V	0-10V
	4	5	1

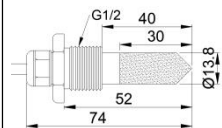
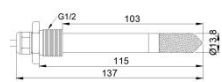


e.g.:

HG808-A8Y4-A stand for Temperature and humidity dew point transmitter with 4-20mA output, and a probe rod length of 103mm.

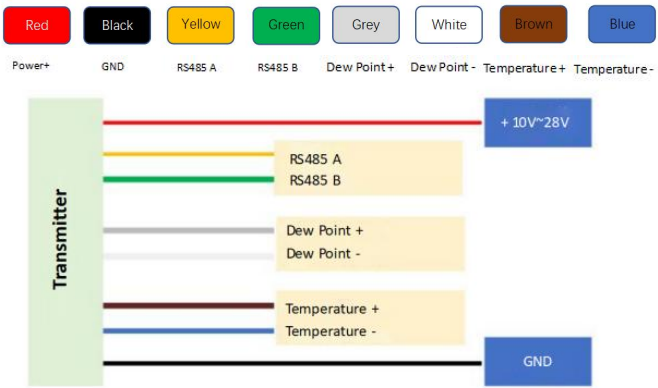
4. Probe Type

The probes of HG808-A transmitter are equipped with Hengko stainless steel sintered filters. The conventional probe structure is as follows (other installation methods can be customized according to customer needs):

Type	Probe Description	Picture	Probe size
Split type probe 0	Compact and compact in structure, with optional hexagonal thread size, suitable for threaded fastening work environments or installation through box walls, easy to install.		
Split type probe 8	Commonly used for measuring temperature and humidity in high-temperature pipeline facilities such as large-sized pipelines and smoke pipes, or in the interior of wider box spaces, under pressurized or non-pressurized conditions.		
Probe installation： The default thread is G1/2, and NPT1/2 or M20 thread is optional.			

5. Wiring

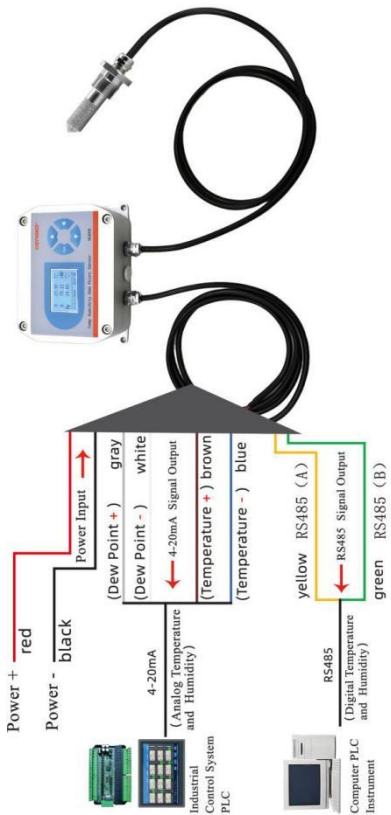
The transmitter output adopts an 8-core cable, and the functions of each color wire core are defined as follows:



Please check the transmitter wiring to prevent damage to the transmitter due to incorrect wiring! Please wire transmitters with different analog output types according to the diagram below.

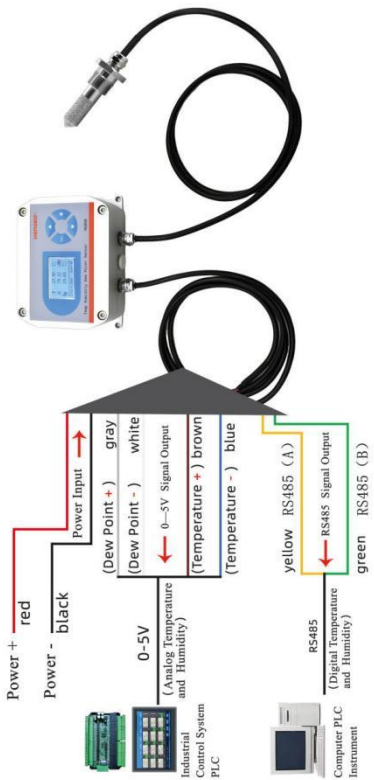
4-20mA Current Type Wiring Diagram :

Please double-check the sensor wiring before powering on to prevent damage to the sensor due to the wrong wire!



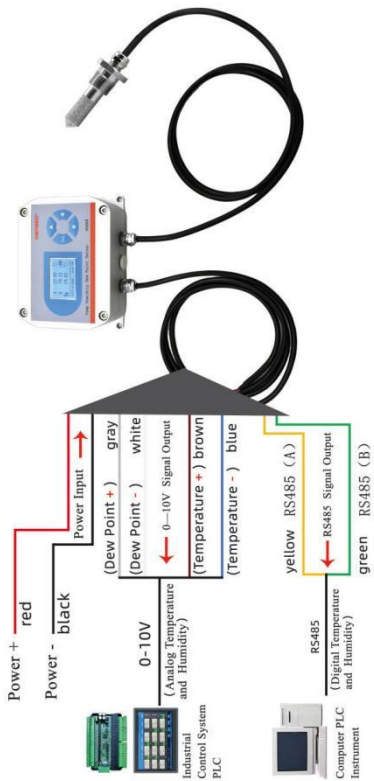
0-5V Voltage Type Wiring Diagram :

Please double-check the sensor wiring before powering on to prevent damage to the sensor due to the wrong wire!



0-10V voltage type wiring diagram :

Please double-check the sensor wiring before powering on to prevent damage to the sensor due to the wrong wire!

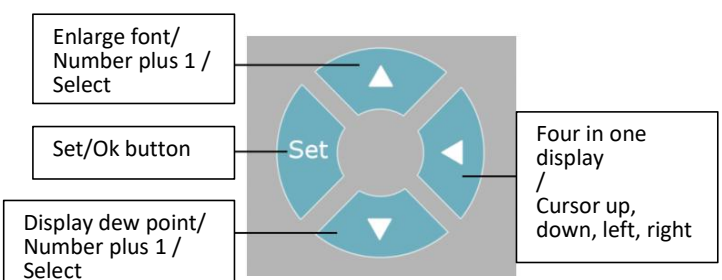


6. Instrument operation

The meter runs automatically after powering on, and when it starts, the model number of the table HG-808 will be displayed, as shown in the following figure:

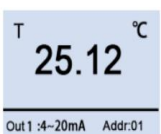
<Button function>

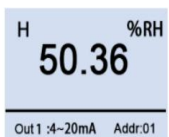
HG-808 has 4 buttons, and the functions of each button are defined as follows:

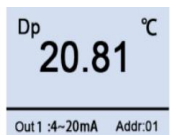


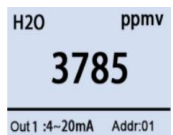
<Real-time monitoring>

Press the button  on the panel to enter the single data display mode. Temperature，humidity and dew point are displayed alternately every second, and the data is automatically refreshed.



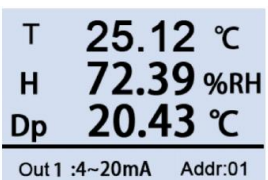






The micro water and dew point display modes are shown in the following figure. In other display modes, press the buttons  on the panel to switch to this display mode at any time.

Press the button  on the panel to switch to the simultaneous display mode of temperature, humidity, and dew point, as shown in the following figure

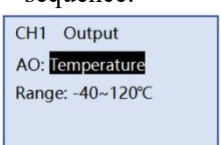


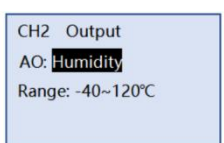
<Parameter settings>

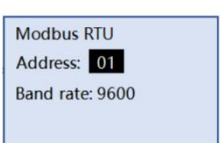
Press the button 

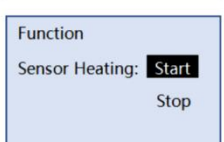
to display the interface that requires entering a password, as shown in the following figure:

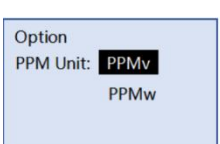
After entering the password of “100”, press the Set button again to enter the following settings interface in sequence:

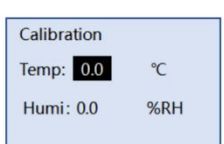


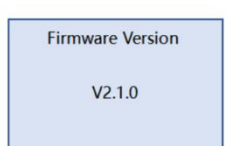












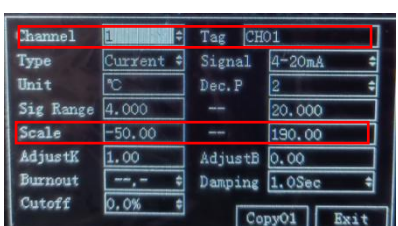
7. User PLC analog range setting

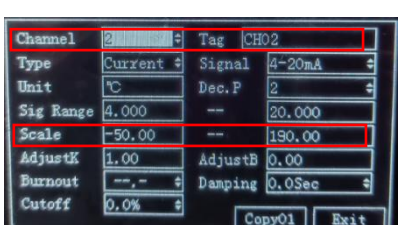
① Test tool interface: The temperature simulation output range (℃) should be -50~190 (as shown in the figure below)

② User PLC analog range setting:

Channel 1: -50~190

Channel 2: -50~190 (as shown in the figure below)





③ After the setting is completed, the measured values of the analog quantity can be read through the PLC. Channel 1 is the temperature value, and channel 2 is the dew point value (as shown in the following figure):

8. Analog output calculation

4-20mA current type output signal conversion calculation:

For example:

The range is -50~+190°C, 4~20mA output, when the output signal is 10mA, the current temperature value is calculated.

The span of this temperature range is 240°C, which is expressed by a 16mA current signal, 240 °C/16mA = 15°C/mA, that is, the current 1mA represents a temperature change of 15°C.

Measured value: 10mA-4mA=6mA,

6mA*15°C/mA=90°C

90 + (-50) = 40°C

The current temperature is 40°C

0-5V voltage type output signal conversion calculation:

For example:

The range is -50~+190°C, 0-5V output, when the output signal is 2V, the current temperature value is calculated.

The span of this temperature range is 240°C, which is expressed by a 5V voltage signal, 240°C/5V=48 °C/V, that is, the voltage 1V represents the temperature change of 48°C.

Measured value: 2V-0V=2V

2V * 48°C/V=96°C

96 + (-50) = 46°C

The current temperature is 46°C

The above calculations are generally used for debugging and analysis, and when the PLC/DCS system is actually connected, the conversion and digital display by the ADC are completed by the PLC or DCS system.

0-10V voltage type output signal conversion calculation:

For example:

Measuring range -50~+190°C, 0-10V output, when the output signal is 4V, calculate the current temperature value.

The span of this temperature range is 240°C, which is expressed by a 10V voltage signal, 240 °C/10V=24 °C/V, i.e. voltage 1V represents a temperature change of 24°C,

Measured value: 4V-0V=4V

4V*24°C/V=96°C

96+(-50)=46°C

The current temperature is 46°C

The above calculations are generally used for debugging and analysis, and when the PLC/DCS system is actually connected, the conversion and digital display by the ADC are completed by the PLC or DCS system.

9. Heat anti-condensation

➢To enable the heating and anti-condensation function, go to the HG602&808 Test Tools program and click the button on the heating function bar<ON>.

➢After 10 minutes of activating the heated anti-condensation function, the heated anti-condensation function will be automatically turned off.

➢If you need to turn off the heating and anti-condensation function immediately, please go to the HG602&808 Test Tools program, click the button in the heating function bar<OFF>, and turn off the heating and anti-condensation function.

10. Communication Protocols

Communication protocol: Modbus-RTU

Default communication mode: 9600pbs,n,8,1,

Address: The default value is 1

Downlink Packet Format (PLC → Instrument):

Address Code	Function	Start Address	Number of Registers	CRC-16
1byte	1byte	2byte (H,L) *	2byte (H,L)	2byte (L,H)

Uplink message format (instrument → PLC):

Address Code	Function	Data length*	Data *	CRC-16
1byte	1byte	1byte	1~N	2byte (L,H)

* "H" is a high byte , "L" is a low byte , used to indicate the byte order

* Data length: the number of bytes of all data,

  data length = number of registers x 2

* Data: A single piece of data is generally composed of 2 bytes, with the high byte first and the low byte last.

The function codes used in this product are as follows：

Function Code (hexadecimal)	Function Description
03	Read input register
06	Write a single hold register

Register address：

Register type	Register Address	Implication	Bytes and data types
Input register	0X0000	Temperature value	2 bytes, signed integer, magnified 100 times
	0X0001	Humidity value	2bytes, unsigned integer, magnified 100 times
	0X0002	Dew point value	2 bytes, signed integer, magnified 100 times
	0X0003	Sensor status	2 bytes, unsigned integer,
	0X0004	Temperature value	2 bytes, signed integer, magnified 10 times
	0X0005	Humidity value	2 bytes, unsigned integer, magnified 10 times
	0X0006	Dew point value	2 bytes, signed integer, magnified 10 times
	0X0007	Sensor status	2 bytes, unsigned integer,

	0X0008	Temperature value	4 bytes, signed integer, magnified 1000 times
	0X0009		
	0X000A	Humidity value	4 bytes, unsigned integer, magnified 1000 times
	0X000B		
	0X000C	Dew point value	4 bytes, signed integer, magnified 1000 times
	0X000D		
	0X000E	Sensor status	4 bytes, unsigned integer,
	0X000F		
	0X0010	H_2O PPMv	4 bytes, unsigned integer, magnified 1000 times
	0X0011		
	0X0012	H_2O PPMw	4 bytes, unsigned integer, magnified 1000 times
	0X0013		
Hold register	0X0100	Device address	Two bytes, unsigned integer,
	0X0101	baud rate	Two bytes, see "Baud Rate Settings"
	0X0109	Sensor heating switch	Two bytes

<03 Function code - Read full data with a resolution of 2 decimal places>

Host query frame format(Hexadecimal):

Add	Function	Start Address (high priority)	Number of registers (H,L)	Check Code CRC-16)
0X01	0X03	0X00，0X00	0X00，0X04	0X44，0X09

Transmitter response frame format（Hexadecimal）

Eg： Tem 26.27°C， Humidity 30.55%RH， Dew point 9.01°C

Add	Function	length	Data				check code (CRC-16)
			Tem	Humidity	Dew point	Status	Low byte(before) High byte(after)
0X01	0X03	0X08	0X0A 0X43	0X0B 0XEF	0X03 0X85	0X00, 0X00	0XD5,0X6A

The temperature and humidity calculation example is as follows:

Convert the hexadecimal into decimal and divide by 100 to get the corresponding temperature and humidity value.

Temperature: 0X0A43=2627/100=26.27°C

Humidity: 0X0BEF=3055/100=30.55%RH

Dew point temperature: 0X0385=901/100=9.01°C

When the temperature value is negative, the data is uploaded as a complement.

For example, if the temperature is =0XFF37, it is converted to decimal: -201, divided by 100, the temperature is -2.01°C

Status values: Analyzed by bit. bit0: indicates that the temperature sensor is faulty, bit1: indicates that the humidity sensor is faulty, and bit2 to bit15: indicates that the temperature sensor is retained.

<03 Function code - Read individual data>

Host query frame format (hexadecimal) :

Add	Function	Start Address (H,L)	Data Lenght (H,L)	Check Code (CRC-16)
0X01	0X03	Specified register address	0X00，0X01	CRC-16

Slave (transmitter/probe) answer frame format (hexadecimal) :

Add	Function	Data Length	Data（H,L）	CRC-16(L, H)
0X01	0X03	0X02	2 bytes	2 bytes

Example : Reading the temperature value (33.21°C)

Down (upper computer /PLC) :

01 03 00 00 00 01 84 0A

Up (Sensor/transmitter) :

01 03 02 0C F9 7D 06

Example 2: Reading the Dew Point Value (15.86°C)

Down (upper computer /PLC) :

01 03 00 02 00 01 25 CA

Up (Sensor/transmitter) :

01 03 02 06 32 3A 31

<03 Function code - Read transmitter address>

Host query frame format:

Function	Register address (High priority)	Date length (High priority)	check code (CRC-16)
0X03	0X01，0X00	0X00，0X01	0X84，0X27

Transmitter response frame format

Add	Function	length	Transmitter address		Check code (CRC-16)
			Address high	Address low	
0X00	0X03	0X02	0X00	0X01	0X44，0X44

<06 Function code - Set address >

Format of the frame sent by the host (for example, 0X08=8) :

Add	Function	Register address (H,L)	Date length (H,L)	CRC-16 (L,H)
0X00	0X06	0X01，0X00	0X00，0X08	0X88，0X21

The transmitter response frame is the same as the host sending frame:

Add	Function	Register address (H,L)	Date length (H,L)	CRC-16 (L,H)
0X00	0X06	0X01，0X00	0X00，0X08	0X88，0X21

Instructions:

* The mailing address ranges from 1 to 247

* When the transmitter address is queried, the address code of the downlink packet is fixed at 0X00. When setting the transmitter address, the address code can be its own real address, or it can be 00 (to prevent forgetting the transmitter address, you can reset through the 00 address)

* When using the 00 address code to reset the device address, ensure that there is only one transmitter on the bus.

<06 Function code - Set baud rate >

Host frame delivery format (for example, set the baud rate to 9600bps) :

Add	Function	Register address (H,L)	Date length (H,L)	CRC-16 (L,H)
0X00	0X06	0X01, 0X01	0X00, 0X04	0XD9, 0XE4

The transmitter response frame is the same as the host sending frame:

Add	Function	Register address (H,L)	Date length (H,L)	CRC-16 (L,H)
0X00	0X06	0X01, 0X01	0X00, 0X04	0XD9, 0XE4

Register value and baud rate comparison table:

Register value	Baud rate
=1	1200bps
=2	2400bps
=3	4800bps
=4	9600bps
=5	19200bps
=6	115200bps

Note: The change of the baud rate generally takes effect immediately. Note that the upper computer software needs to be reconnected with the new baud rate. If the change does not take effect, power it on again.

<06 Function code - Enable/Disable anti-condensation Settings >

Open Settings: 00 06 01 09 00 01 98 25

Off setting: 00 06 01 09 00 00 59 E5

Note:

1) During opening, the temperature of the probe will rise, which will affect the accuracy of the dew point value.

2) In order to protect the sensor, it will automatically turn off 10 minutes after opening (it can be closed by command within 10 minutes).

11. Maintenance and Troubleshooting

<Sensor cleaning>

The main body of the transmitter can be wiped and cleaned with a lint free damp cloth.

Do not immerse the transmitter in liquids, and do not use cleaning agents or solutions.

<Calibration of transmitters>

HG808 has been fully calibrated at the factory. The recommended calibration interval is 1 year. If there is reason to believe that the equipment is not within the accuracy specifications, a high-precision handheld dew point meter with a calibration certificate that can be used for on-site inspection should be used (the calibration certificate is valid). If on-site inspection shows that HG808 is not within its accuracy specifications, contact the supplier or your local agent to calibrate the HG808 transmitter.

<Troubleshooting>

◆ **Fault:**

After RS485 connection, there is no communication message.

✧ **Possible causes and solutions:**

It may be a wiring error or communication parameter error. Please carefully check the wiring and address, baud rate, register address, and other settings. In addition, incorrect power supply can also cause the transmitter to malfunction.

◆ **Fault:**

RS485 communication message has serious frame loss.

✧ **Possible causes and solutions:**

Perhaps the cable is too long or the RS485 converter has very strict requirements for level matching or poor anti-interference ability. Please try adding a 120 ohm balance resistor or replacing it with a reliable RS485 converter.

◆ **Fault:**

There is a communication message, and the upper computer cannot display data.

✧ **Possible causes and solutions:**

Some PLCs or DCS can only parse sensor data with a resolution of 0.1. HG808 provides two types of data with resolutions of 0.01 and 0.1. Please read the corresponding register address

◆ **Fault:**

Analog output error is relatively large.

✧ **Possible causes and solutions:**

The accuracy of analog signals also depends on the sampling error at the receiving end. Please check the working status of the receiving equipment. If it is confirmed that the error is not caused by the cable/receiver, please contact the manufacturer or dealer.

12. Testing Software Download link:

Software download link:

www.hkometer.com/download/

www.hengko.cn/download/

13. Note

1. The product should be fully connected to the receiving end such as PLC or computer before connecting to the power supply; Do not connect the sensor or receiver after power is applied;

2. The transmitter casing should be grounded to eliminate interference (recommended);

3. Do not touch sensor components or blow air;

4. The working power supply voltage should be used within the range;

5. Install the probe facing downwards;

6. The usage environment should not contain polluting gases (acidic);

7. The wind speed and pressure of the environment must be within the range of use;

8. The transmitter and probe should be installed away from sparks, flames, and flammable materials;

9. Other prohibited items for the use of transmitters.

Safety and warnings

- Before using the product, please read the user manual carefully. When operating according to the procedures detailed in this manual, the product is safe. Do not apply this product to measuring situations greater than the maximum value stated in the manual.
- Do not disassemble or replace any cables or electrical components that come with this product, as it may damage the transmitter.
- Before turning on the power, please confirm that all external wiring is correct. Any incorrect wiring or short circuit may cause damage to the transmitter.
- The transmitter must be maintained by the manufacturer or an approved agent.
- Some models of products have anti condensation function, which can improve the performance of sensors in high humidity and frozen environments, as well as perform sensor chemical cleaning. The start stop function is controlled by the user. To protect the sensor, it will automatically shut down after more than 10 minutes of activation.

Please read this user manual carefully before use.

The company reserves the right to interpret this user manual.

The appearance of this product is subject to the actual product.

Product technology or software upgrades are available without prior notice.

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