Specification

Seven Elements Sensor

HD-S70

File version：V4.2

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1. Product Description

1.1 Overview

This one-piece shutter can be widely used in environmental detection, integrating noise collection, PM2.5 and PM10, temperature and humidity, atmospheric pressure, and light. It is installed in a louver box, the equipment adopts standard MODBUS-RTU communication protocol, RS485 signal output, and the maximum communication distance can reach 2000 meters (measured). This transmitter is widely used in various occasions that need to measure environmental temperature and humidity, noise, air quality, atmospheric pressure and illumination, etc. It is safe and reliable, beautiful in appearance, easy to install, and durable.

1.2 Features

This product is small in size, light in weight, made of high-quality anti-ultraviolet materials, long service life, high-sensitivity probe, stable signal, high precision. The key components adopt imported components, which are stable and reliable, and have the characteristics of wide measurement range, good linearity, good waterproof performance, convenient use, easy installation, and long transmission distance.

■ Noise collection, accurate measurement, the range is as high as 30dB~120dB.

■ PM2.5 and PM10 are collected at the same time, range: 0-1000ug/m3, resolution 1ug/m3, unique dual-frequency data collection and automatic calibration technology, consistency can reach ±10%.

■ Measure the environmental temperature and humidity, the measuring unit is imported from Switzerland, the measurement is accurate, and the range is -40~120 degrees.

■ Wide range 0-120Kpa air pressure range, applicable to various altitudes.

■ The light collection module adopts a high-sensitivity photosensitive probe, and the light intensity range is 0~200,000 Lux.

■ Use dedicated 485 circuit, stable communication, 10~30V wide

voltage range power supply.

1.3 Main Technical Index

DC power supply（default）		10-30VDC
Maximum power consumption	RS485 output	0.8W
Precision	Temperature	±3%RH(60%RH,25℃)
	Humidity	±0.5℃（25℃）
	Light intensity	±7%（25℃）
	Atmospheric pressure	±0.15Kpa@25℃ 75Kpa
	Noise	±3db
	PM10 PM2.5	±10%（25℃）
Range	Humidity	0%RH~99%RH
	Temperature	-40℃~+120℃
	Light intensity	0~20万Lux
	Atmospheric pressure	0-120Kpa
	Noise	30dB~120dB
	PM10 PM2.5	0-1000ug/m3
Long-term stability	Temperature	≤0.1℃/y
	Humidity	≤1%/y
	Light intensity	≤5%/y
	Atmospheric pressure	-0.1Kpa/y
	Noise	≤3db/y
	PM10 PM2.5	≤1%/y
Response time	Humidity&Temperature	≤1s
	Light intensity	≤0.1s
	Atmospheri	≤1s

	c pressure	
	Noise	≤1s
	PM10 PM2.5	≤90S
Output signal	RS485 output	RS485(Standard Modbus communication protocol)

2. Installation Instructions

2.1 Checklist Before Installation

Equipment List：

■1 transmitter

■USB to 485（Optional）

■Warranty card, certificate of conformity, after-sales service card, etc.

2.2 Interface Description

Wide voltage power input range 10~30V. When wiring the 485 signal line, pay attention to the two lines A and B not to be reversed, and the addresses of multiple devices on the total wire must not conflict.

	Thread color	Illustrate
Power supply	Brown	Power is positive （10~30V DC）
	Black	Power is negative
Communication	Yellow	485-A
	Blue	485-B

2.3 485 Field Wiring Instructions

When multiple 485 devices are connected to the same total wire, there are certain requirements for field wiring. For details, please refer to the "485 Device Field Wiring Manual" in the information package.

2.4 Installation Example

Pallet installation

托片安装
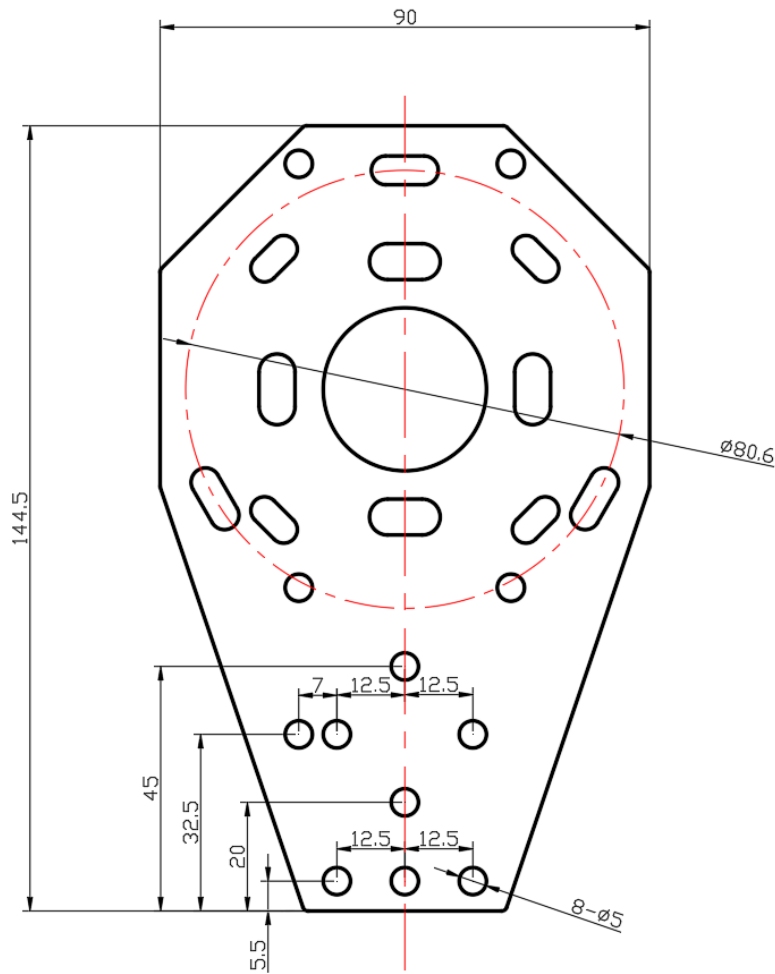
3. Configuration Software Installation and Use

3.1 Software Selection

Open the data package, select "Debugging software" --- "485 parameter configuration software", find "485 parameter configuration tool"

3.2 Parameter Settings

①、Select the correct COM port (check the COM port in "My Computer—Properties—Device Manager—Port"). The following figure lists the driver names of several different 485 converters.
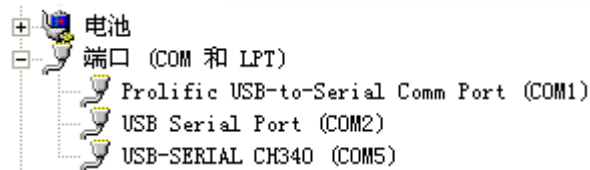

②、Connect only one device separately and power it on, click the test baud rate of the software, the software will test the baud rate and address of the current device, the default baud rate is 4800bit/s, and the default address is 0x01.

③、Modify the address and baud rate according to the needs of use, and at the same time query the current function status of the device.

④、If the test is unsuccessful, please recheck the equipment wiring and 485 driver installation.

485 parameter configuration tool
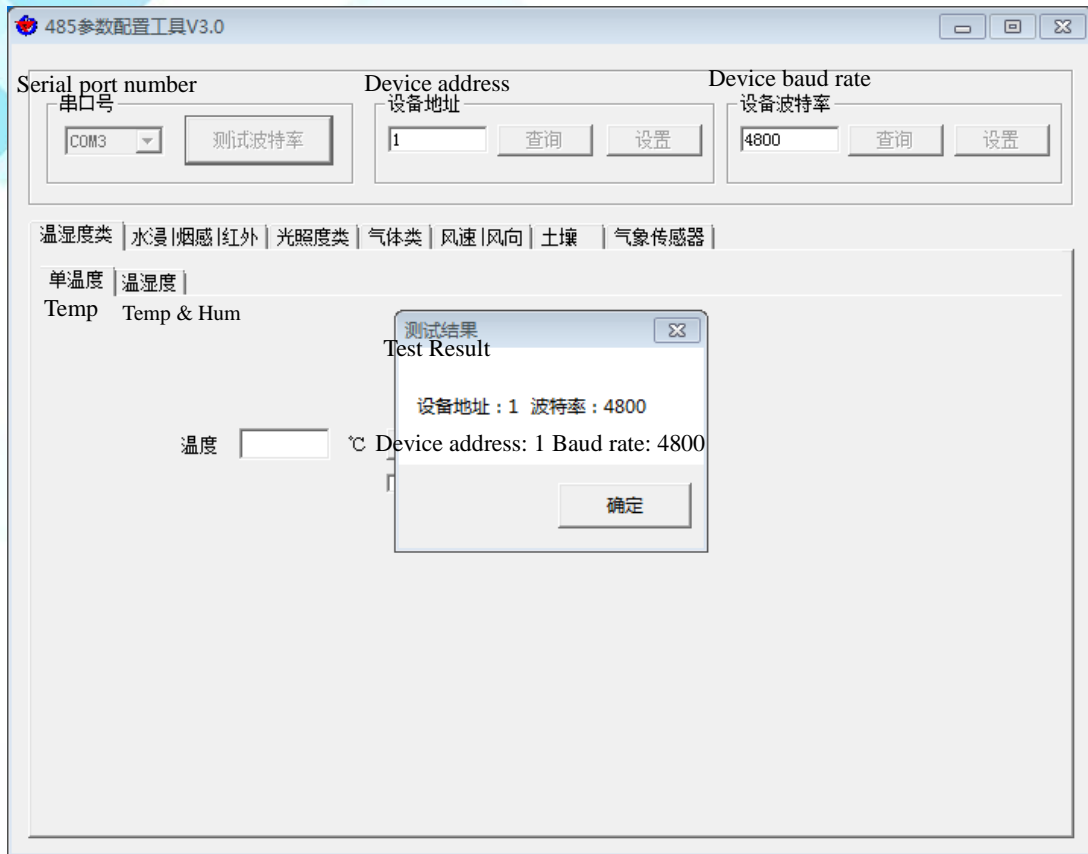
4. Communication Protocol

4.1 Basic Communication Parameters

Code	8-bit binary
Data bit	8-bit
Parity bit	None
Stop bit	1-bit
Error checking	CRC（Redundant cyclic code）
Baud rate	Can be set to 2400bit/s, 4800bit/s, 9600 bit/s, the factory default is 4800bit/s

4.2 Data Frame Format Definition

Adopt Modbus-RTU communication protocol, the format is as follows:

Initial structure ≥4 bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

Time to end structure ≥ 4 bytes

Address code: the starting address of the transmitter, which is unique in the communication network (factory default 0x01).

Function code: the command function instruction issued by the host, this transmitter only uses function code 0x03 (read register data).

Data area: The data area is the specific communication data, pay attention to the high byte of the 16bits data first!

CRC code: two-byte check code.

Host query frame structure:

Address code	Function code	Register start address	Register length	Check code low bit	High bit of check code
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave response frame structure：

Address code	Function code	Number of valid bytes	Data area	Second data area	Nth data area	Check code
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

4.3 Communication Register Address Description

The contents of the register are shown in the following table (support 03/04 function code):

Register address	PLC or configuration address	Content	Operation
500	40501	Humidity value (10 times the actual value)	Read only
501	40502	Temperature value (10	Read only

		times the actual value)	
502	40503	Noise value (10 times the actual value)	Read only
503	40504	PM2.5 (actual value)	Read only
504	40505	PM10（actual value）	Read only
505	40506	Atmospheric pressure value (unit Kpa, actual value 10 times)	Read only
506	40507	The high 16-bit value of the Lux value of 20W (actual value)	Read only
507	40508	The low 16-bit value of the Lux value of 20W (actual value)	Read only

4.4 Communication Protocol Example and Explanation

4.4.1 Inquire About Equipment Temperature and Humidity

For example, inquire about the temperature and humidity value: the device address is 03

Address code	Function code	Initial address	Data length	Check code low bit	High bit of check code
0x03	0x03	0x01 0xF4	0x00 0x02	0x85	0xE7

Response frame (for example, the temperature is -10.1℃ and the humidity is 65.8%RH)

Address code	Function code	Number of valid bytes	Humidity value	Temperature value	Check code low bit	High bit of check code
0x03	0x03	0x04	0x02 0x92	0xFF 0x9B	0x79	0xFD

Temperature: upload in the form of complement code when the temperature is lower than 0℃

0xFF9B (Hexadecimal)= -101 => Temperature = -10.1℃

Humidity：

0x0292(Hexadecimal)=658=> Humidity = 65.8%RH

5. Common Problems and Solutions

The device cannot connect to the PLC or computer

Possible reason:

1) The computer has multiple COM ports and the selected port is incorrect.

2) The device address is wrong, or there are devices with duplicate addresses (the factory default is all 1)

3) The baud rate, check method, data bit, and stop bit are wrong.

4) The host polling interval and waiting response time are too short, and both need to be set above 200ms.

5) The 485 total wire is disconnected, or the A and B wires are connected reversely.

6) If the number of equipment is too large or the wiring is too long, power supply should be nearby, add a 485 booster, and add a 120Ω terminal resistance at the same time.

7) The USB to 485 driver is not installed or damaged.

8) Equipment damage.

Appendix：Shell Size