SEM222 LIGHT TEMPERATURE & HUMIDITY

SENSOR (RS485 Type)

Product Manual

OVERVIEW

SEM222 is a high-precision photosensitive transmitter, the output value measurement unit is Lux, the device adopts a wall-mounted waterproof shell, wall-mounted installation, and high protection level. 485 communication, standard ModBus-RTU communication protocol, communication address and baud rate can be set, the longest communication distance is 2000 meters, the product power supply is 10-30V wide voltage power supply, mainly used in agricultural greenhouses, flower cultivation greenhouses, agricultural fields, electronics Equipment production lines and other occasions that require light intensity monitoring.

FEATURES

① The measurement range of high-precision illumination detection is 0-60000 lux and 0-200000 lux.
② 485 communication, standard Modbus RTU communication protocol, communication address and baud rate can be set, the longest communication distance is 2000 meters
③ Wall mounted waterproof shell with high protection level can be used in outdoor or harsh site environment
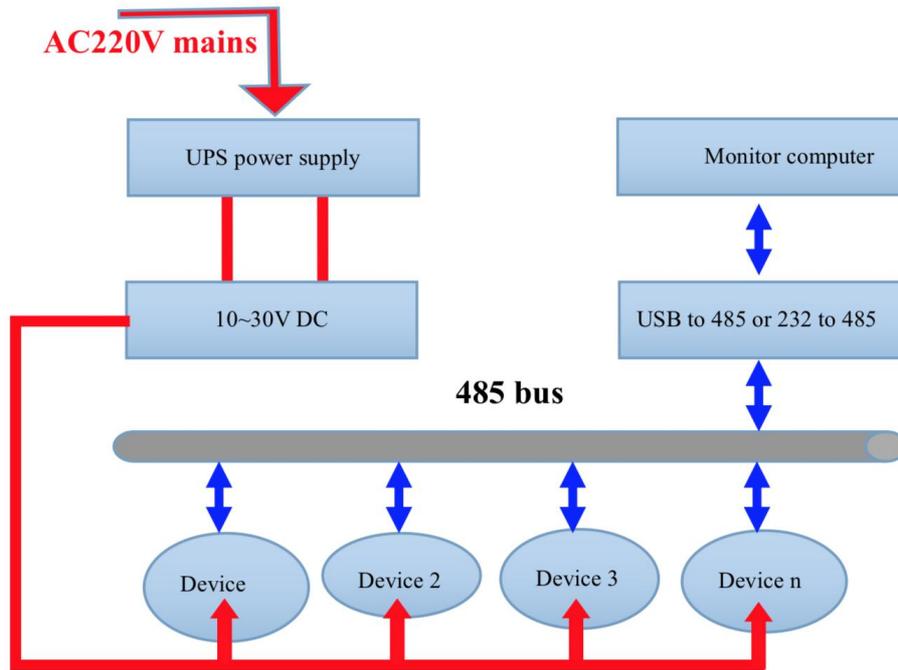④ 10-30V DC wide voltage power supply

SPECIFICATION

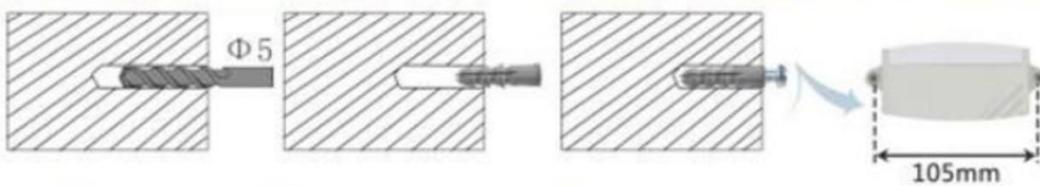| DC power supply (default)	10-30VDC	
Maximum power consumption	0.4W	
Accuracy	humidity	±3%RH(5%RH~95%RH,25°C)
	temperature	±0.5°C(25°C)
	Light intensity	±7%(25°C)
	0-65535Lux;0-200000Lux	
	-40°C~+60°C, 0%RH~80%RH	
Light intensity range Temperature and humidity range Long-term stability	temperature	≤0.1°C/y
	humidity	≤1%/y
	Light intensity	≤5%/y
Response time	temperature	≤18s(1m/s Wind speed)
	humidity	≤6s(1m/s Wind speed)
	Light	0.1s
Signal output	RS485(Modbus protocol)	

Inspection before equipment installation

Equipment list:
■ Transmitter
■ USB to 485 (optional)
■ warranty card, certificate, wiring instructions, etc

SYSTEM FRAMEWORK DIAGRAM

AC220V mains

| UPS power supply | | Monitor computer |

| 10~30V DC | | USB to 485 or 232 to 485 |

485 bus

| Device | Device 2 | Device 3 | Device n |

INSTALLATION

Φ5   105mm

▲ **Punch**   ▲ **Put the expansion plug into the hole**   ▲ **Self-tapping screw into screw plug**

• Interface Description

Wide voltage power input can be 10 ~ 30V. When connecting the 485 signal line, please note that the A / B lines cannot be reversed, and the addresses of multiple devices on the bus must not conflict.

	Thread color	Explanation
power supply	brown	Positive power supply (10 ~ 30V DC)
	black	Negative power supply
Communication	yellow	485-A
	blue	485-B

• 485Field wiring instructions

When multiple 485 model devices are connected to the same bus, there are certain requirements for field wiring. For details, please refer to Examination data package "485 equipment field wiring manual".
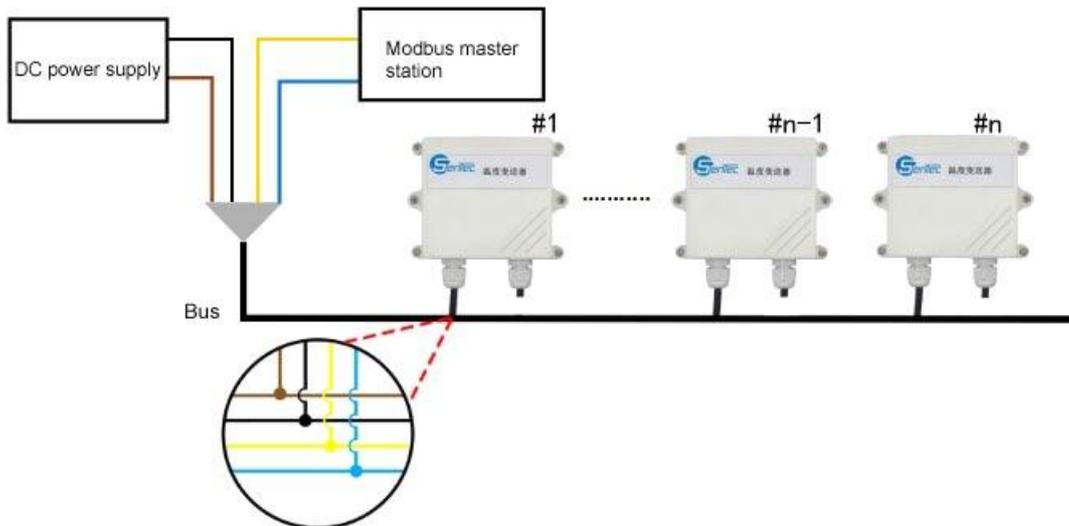

## SOFTWARE CONFIGURATION

• Software selection

Open the data package, select "Debug software" - "485 parameter configuration software", find "485 parameter configuration tool" just open it.

• Parameter settings

1. Select the correct COM port ("COM"-"Properties-Device Manager-Port" to view the COM port), the following figure lists the driver names of several different 485 converters.
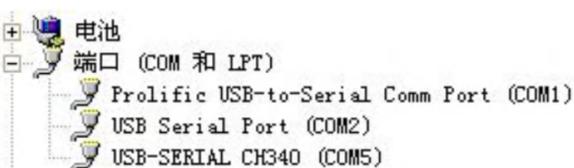
2. Only connect one device and power on, click the test baud rate of the software, the software will test the current device baud rate and address, the default baud rate is 4800bit / s, the default address is 0x01.
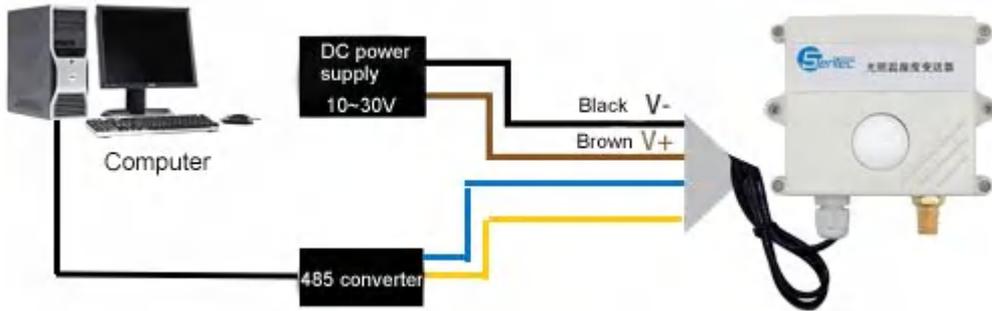
3. Modify the address and baud rate according to the needs of use, and at the same time, you can query the current functional status of the device.

4. If the test is unsuccessful, please recheck the device wiring and 485 driver installation.
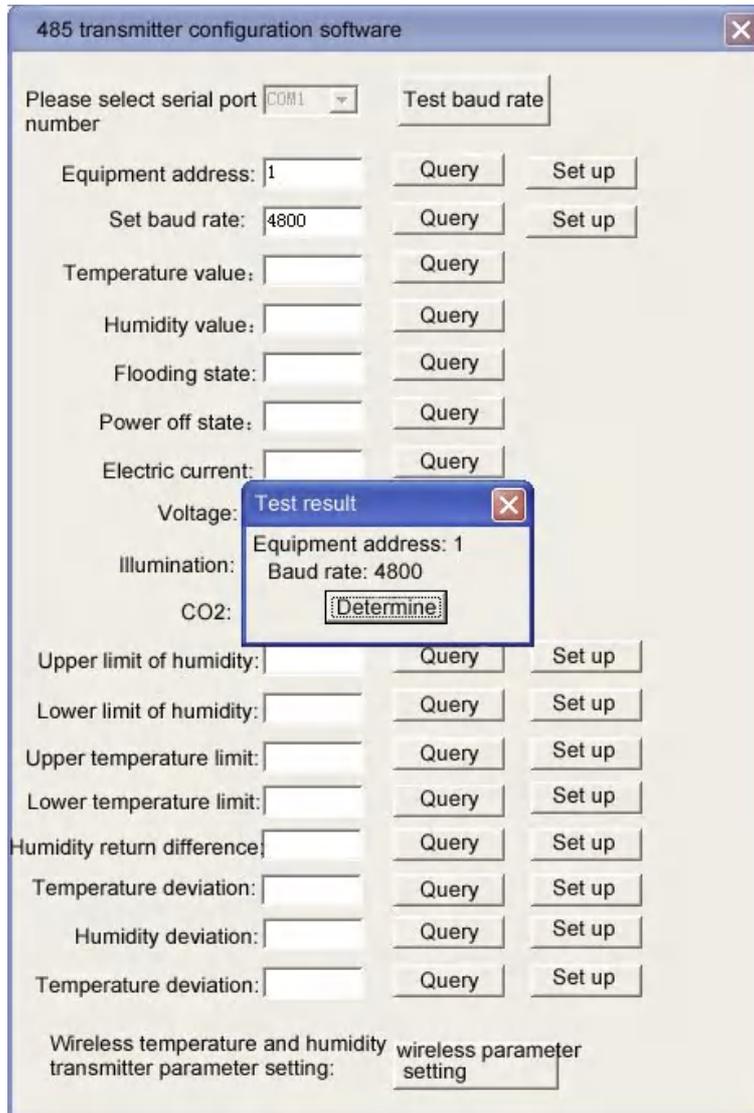
COMMUNICATION PROTOCOL

● Communication basic parameters

Coding	8-bit binary
Data bit	8 bit
Parity bit	no
Stop bit	1 digit
Error checking	CRC (Redundant Cyclic Code)
Baud rate	2400bit / s, 4800bit / s, 9600 bit / s can be set, the factory default is 4800bit / s

● Data frame format definition

Using Modbus-RTU communication protocol, the format is as follows: Time for initial structure ≥ 4 bytes
Address code = 1 byte
Function code = 1 byte
Data area = N bytes
Error check = 16-bit CRC code
End structure ≥ 4 bytes of time
Address code: the address of the transmitter, which is unique in the communication network (factory default 0x01).
Function code: the instruction function instruction issued by the host, this transmitter only uses the function code 0x03 (read register data).
Data area: The data area is specific communication data, pay attention to the high byte of 16bits data first!
CRC code: two-byte check code.

* Host inquiry frame structure:

address code	function code	Register start address	Register length	Check digit low	Check digit high
1byte	1byte	2byte	2byte	1byte	1byte

* Slave response frame structure:

address code	function code	Effective bytes	Data area	Second data area	Nth data area	Check code
1byte	1byte	1byte	2byte	2byte	2byte	2byte

● Register address

Register address	PLC or configuration address	content	operating
0000 H	40001	humidity	Read only
0001 H	40002	temperature	Read only
0002 H	40003	Illumination (Only enabled at 0 ~ 200000Lux, unit 1Lux)	Read only
0006 H	40007	6	Read only

● **Communication protocol example and explanation**

1. Read the temperature and humidity value of device address 0x01

* Inquiry frame

Address code	Function code	Starting address	Data length	Check digit low	Check digit high
0x01	0x03	0x00 0x00	0x00 0x02	0xC4	0x0B

*Response frame (for example, read temperature is -10.1 ° C, humidity is 65.8% RH)

Address code	Function code	Effective bytes	Humidity value	Temperature value	Check digit low	Check digit high
0x01	0x03	0x04	0x02 0x92	0xFF 0x9B	0x5A	0x3D

Temperature: When the temperature is lower than 0 ° C, upload in the form of complement

FF9B H (Hexadecimal) = -101 => Temperature = -10.1 ° C,

Humidity: 292 H (hex) = 658 => humidity = 65.8% RH

2. Read the illuminance value at device address 0x01
(0 ~ 65535 is read in units of 1 Lux or 0 ~ 200000 is read in units of 100 Lux)

* Inquiry frame

Address code	Function code	Starting address	Data length	Check digit low	Check digit high
0x01	0x03	0x00 0x06	0x00 0x01	0x64	0x0B

*Acknowledge frame (for example, read the illuminance of 30000 Lux)

Address code	Function code	Returns the number of valid bytes	Data area	Check digit low	Check digit high
0x01	0x03	0x02	0x05 0x30	0xBB	0x00

1) Illumination calculation instructions:

2) The product is a 0 ~ 65535 range transmitter, the unit is 1Lux

0530 H (Hex) = 1328 => Illumination = 1328 Lux

3) The product is a 0 ~ 200000 range transmitter, the unit is 100 Lux

0530 H (Hexadecimal) = 1328 => Illumination = 132800 Lux

3. Read the illuminance value of the device address 0x01 (0 ~ 200000 is read in units of 1 Lux)

* Inquiry frame

Address code	Function code	Starting address	Data length	Check digit low	Check digit high
0x01	0x03	0x00 0x02	0x00 0x02	0x65	0x0CB

*Acknowledge frame (for example, read the illuminance of 200,000 Lux)

Address code	Function code	Effective bytes	High illumination	Low illumination	Check digit low	Check digit high
0x01	0x03	0x04	0x00 0x03	0x0D 0x40	0x0F	0x53

Illumination calculation instructions:

This protocol is only used under 0 ~ 200000Lux range transmitter, the unit is 1Lux

30D40 H (Hexadecimal) = 200000 => Illumination = 200000 Lux

4.Read the temperature, humidity and illuminance value of device address 0x01
(0 ~ 65535 is read in units of 1 Lux or 0 ~ 200000 is read in units of 100 Lux)

* Inquiry frame

Address code	Function code	Starting address	Data length	Check digit low	Check digit high
0x01	0x03	0x00 0x00	0x00 0x07	0x04	0x08

*Replay fram

Address code	Function code	Number of bytes	Humidity value	Temperature value	**	Illumination	Check code
0x01	0x03	0x0E	0x02 0x92	0x80 0x65	00 fill	0x05 0x30	0xC4 0x33

5. Read the temperature, humidity and illuminance value of device address 0x01(0 ~ 200000 is read in 1 Lux unit)

Address code	Function code	Starting address	Data length	Check digit low	Check digit high
0x01	0x03	0x00 0x00	0x00 0x04	0x44	0x09

*Replay fram

Address code	Function code	Number of bytes	Humidity value	Temperature value	High light level	Low light level	Check code
0x01	0x03	0x08	0x02 0x92	0x80 0x65	0x00 0x03	0x0D 0x40	0x01 0x6F

COMMON PROBLEMS AND SOLUTIONS

• Device cannot be connected to 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) Baud rate, check mode, data bit, stop bit error.
4) The host's polling interval and waiting time for answering are too short, and both need to be set above 200ms.
5) The 485 bus is disconnected, or the A and B lines are reversed.
6) If the number of devices is too large or the wiring is too long, power should be supplied nearby, and a 485 booster should be added, and 120Ω terminal resistance should be added at the same time.
7) The USB to 485 driver is not installed or damaged.
8) The equipment is damaged.