

## Ceiling Light Sensor (RS485 Type) User Manual



## 1. Product Description

### 1.1 Product Overview

Ceiling light transmitter is a high-precision light-sensitive transmitter, the output value unit of measurement is Lux, the device adopts ceiling housing, ceiling-mounted, beautiful structure, easy to install.

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### 1.2 Functional Features

- Measurement Range: 0-65535 Lux, 0-20 million Lux.
- 485 communication, standard ModBus-RTU communication protocol, communication address and baud rate can be set, the farthest communication distance 2000 meters.
- High sensitivity light-sensitive probe, signal stability, high precision.
- High reliability, beautiful structure, easy to install and use, strong anti-inductive interference performance.
- 10-30V DC wide voltage supply.

### 1.3 Main technical indicators

DC power supply (default)	10-30VDC
Maximum power consumption	0.4W
Humidity Accuracy	+3%RH(60%RH.25℃)
Temperature Accuracy	±0.7℃(25℃)
Light Intensit Accuracy	±7%(25℃)
Light Intensity Range	0-65535Lux;0-200,000Lux
Temperature and Humidity Range	-40℃~+60℃, 0%RH~80%RH
Long-term Stability	
Temperature	≤0.1℃/y
Humidity	≤1%/y
Light intensity	≤5%/y
Response Time <sup>1</sup>	Temperature <25s (1m/s wind speed <sup>2</sup> )
	Humidity <8s (1m/s wind speed <sup>2</sup> )
Light Level Response Time	≤2s
Output Signals	RS485 (ModBus protocol)

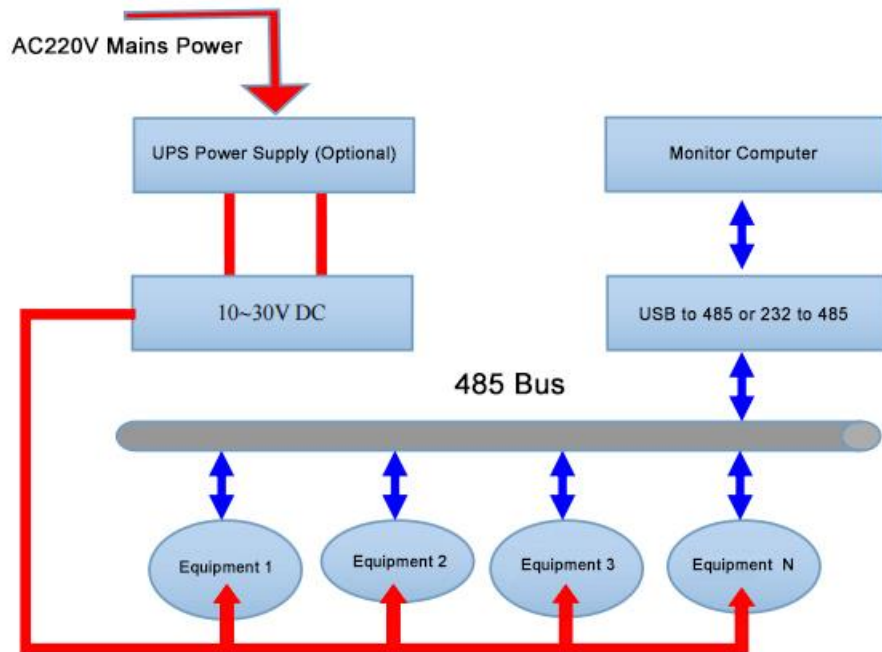
Note: <sup>1</sup> Response time is  $\tau$  63 time.

<sup>2</sup> Wind speed refers to the wind speed at the sensitive material inside the sensor, and the wind speed in the test environment is 10 m/ms.

-2m/ms, the wind direction is perpendicular to the sensor acquisition port, the wind speed at the sensitive material inside the sensor is about 1m/s.

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## 1.4 System Framework Diagram



## 2. Dimension



## 3. Equipment Installation Instructions

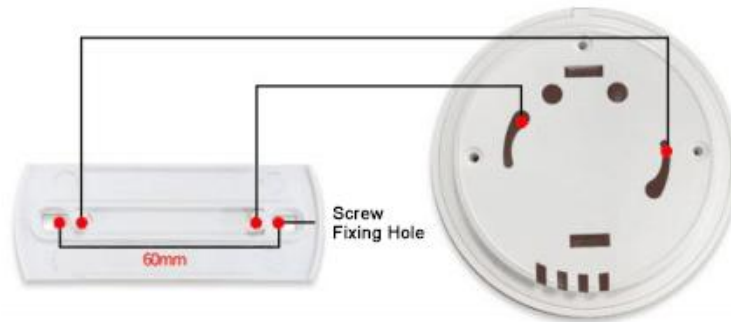
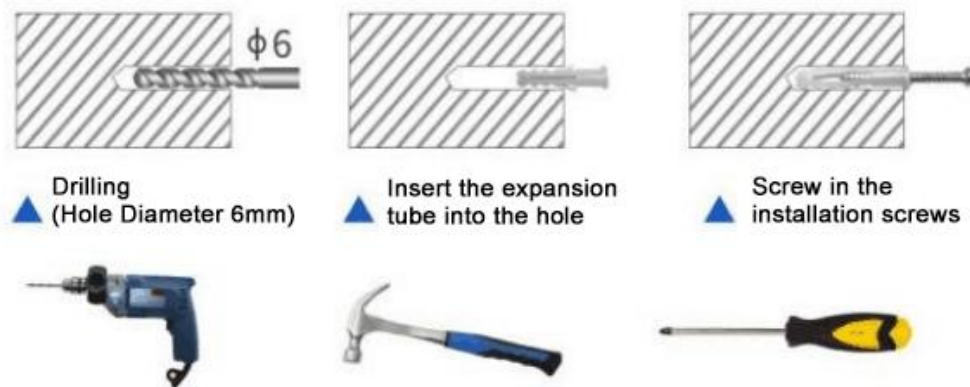
### 3.1 Pre-installation Inspection of Equipment

Equipment list:

- Transmitter device 1 unit
- USB to 485 (optional)
- Warranty card, certificate of conformity, wiring instructions, etc.

## 3.2 Installation Method

Firstly, fix the mounting plate with screws in the place to be installed, and then install the light sensor.



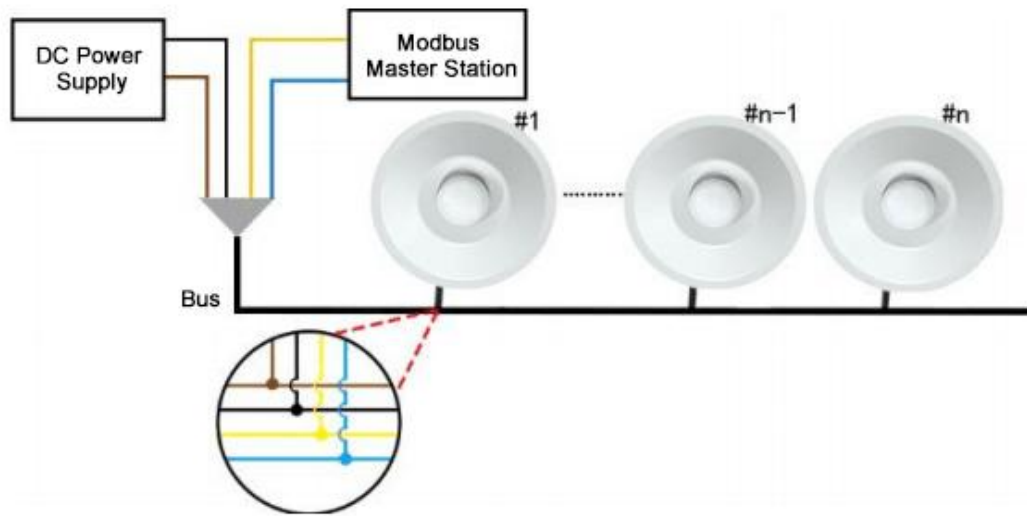
## 3.3 Interfaces

Wide voltage power supply input 10~30V is available. 485 signal line wiring should be careful not to reverse A/B lines, and the addresses of multiple devices on the bus should not conflict with each other.

	Thread Color	Clarification
Power Supply	Brown	Power Positive (10~30VDC)
	Black	Power Negative
Communications	Yellow	485-A
	Blue	485-B

## 3.4. 485 Field Wiring Instructions

When multiple 485 models are connected to the same bus, there are certain requirements for field wiring.



## 4. Communication Protocol

### 4.1 Communication Basic Parameters

Code	8-bit binary
Data bits	8-bit
Parity bit	None
Stop bit	1-bit
Error check	CRC (Redundant Cyclic Code)
Baud rate	2400bit/s, 4800bit/s, 9600 bit/s settable, factory default 4800bit/s

### 4.2 Data Frame Format Definition

The ModBus-RTU communication protocol is used with the following format:

Initial structure  $\geq 4$  bytes of time

Address code = 1 byte

Function code = 1 byte

Data area = N bytes

Error check = 16-bit CRC code

End structure  $\geq 4$  bytes of time

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

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

Data area: Data area is the specific communication data, note that 16bits data high byte in front!

CRC code: two-byte check code.

The host asks for the frame structure:

Address code	Function code	Register start address	Register length	Checksum low	Checksum high
1 byte	1 byte	2 byte	2 byte	1 byte	1 byte

Slave answer frame structure:

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

## 4.3 Register Addresses

Register address	PLC or configuration address	Contents	Operations
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
0003 H	40004		
0006 H	40007	Illumination (0~65535 units of 1LuX 0~200000 units of hundred Lux)	read-only

## 4.4 Communication Protocol Example and Explanation

### 4.4.1 Reading the temperature and humidity value at device address 0x01

Interrogation frame

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

Answer frame (e.g. reads temperature -10.1°C, humidity 65.8% RH)

Address code	Function code	Number of valid bytes	Humidity value	Temperature value	Checksum low	Checksum high
0x01	0x03	0x04	0x02 0x92	0xFF 0x9B	0x5A	0x3D

Temperature: uploaded as complementary code when the temperature is below 0°C

FF9B H(hex) = -101 => temperature = -10.1°C

Humidity:

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

### 4.4.2 Read the illuminance value of device address 0x01

(0~65535 read in 1Lux or 0~200000 read in hundred Lux)

Interrogation frame

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

Answer frame (e.g. reading a light level of 30000 Lux)

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

Illuminance calculation instructions:

- 1) The product is 0~65535 range transmitter, unit is 1Lux  
0530 H(hexadecimal) = 1328=> Illuminance = 1328 Lux
- 2) Products for 0~200000 range transmitter, unit is hundred Lux.  
0530 H(hex) = 1328=> Illuminance = 132800 Lux

#### 4.4.3 Reading illuminance value at device address 0x01 (0~200000 in 1 Lux)

Query frame

Address code	Function code	Starting address	Data length	Checksum low	Checksum high
0x01	0x03	0x00 0x02	0x00 0x02	0x62	0xCB

Answer frame (e.g. reading a light level of 200000 Lux)

Address code	Function code	Number of valid bytes	Illumination high	Illumination low	Checksum low	Checksum high
0x01	0x03	0x04	0x00 0x03	0x0D 0x40	0x0F	0x53

Illuminance Calculation Instructions:

This protocol is only used with 0 to 200000 Lux range transmitters in units of 1 Lux

30D40 H(hex) = 200000=> Illuminance = 200000 Lux

#### 4.4.4 Read the temperature, humidity and illuminance value at address 0x01.

(0~65535 read in 1Lux unit or 0~200000 read in hundred Lux unit)

Interrogation frame

Address code	Function code	Starting address	Data length	Checksum low	Checksum high
0x01	0x03	0x00 0x00	0x00 0x07	0xC4	0x08

Response frame

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

#### 4.4.5 Read the temperature, humidity and illumination value at device address 0x01.

(0~200000 read in 1 Lux unit)

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

Response frame

Address code	Function code	Number of bytes	Humidity value	Temperature value	Illumination high	Illumination low	Checksum
0x01	0x03	0x08	0x02 0x92	0x80 0x65	0x00 0x03	0x0D 0x40	0x01 0x6F

## 5. Frequently Asked Questions and Solutions

### **Device cannot be connected to PLC or computer**

Possible causes:

- 1) The computer has multiple COM ports and the port selected is incorrect.
- 2) The device address is wrong, or there are devices with duplicate addresses (the factory default is 1 for all).
- 3) Incorrect baud rate, parity, data bits, stop bits.
- 4) Host polling interval and wait for answer time are too short, need to be set above 200ms.
- 5) The 485 bus is disconnected, or the A and B lines are reversed.
- 6) The number of devices is too large or the wiring is too long, the power supply should be nearby, add 485 enhancer, and increase the 120Ω termination resistor.
- 7) USB to 485 driver is not installed or damaged.
- 8) The device is damaged.