Product introduction

The NBL-W-SRS simple total radiation sensor (transmitter) can be used to measure the total solar radiation in the spectral range of 0.3-3μm. If the sensing face is down, the reflected radiation can be measured, and the shading ring can also measure the scattered radiation. The core device of the radiation sensor is a high-precision photosensitive element, which has good stability and high precision; at the same time, a quartz glass cover made of precision optical cold processing is installed outside the sensing element, which effectively prevents environmental factors from affecting its performance. The product can be widely used in meteorology, energy, agriculture, construction and other fields.

Technical Parameters

Spectral range: 0.3～3μm
Measuring range: 0～1500W/m2
Power supply mode: □ DC 5V
□ DC 12V-24V
□ Other
Output form: □ Current: 4～20mA
□ Voltage: 0～2.5V
□ Voltage: 0～5V
□ RS485
□ Other
Instrument cable length: □ Standard: 2.5 meters
□ Other
Response time: <5s
Temperature related: <±0.08%℃
Cosine response: <±10% (when the sun altitude is 10°)
Nonlinear: <±2%
Annual rate of change: <±2%
Working environment: temperature -20℃～65℃
Humidity≤100%RH
Product weight: sensor 420 g, with transmitter 760 g
Product power consumption: 0.2W

Calculation formula

Voltage type (0～5V output):
E = V / 5 × 1500
(E is the measured radiation value (W/m2), V is the output voltage (V))

Voltage type (0～2.5V output):
(1) V>1578 E=1500

(2) 1578>V>800 E=0.68*V+426

(3) 800>V>300
E=(0.0000010504*V*V*V-0.0008667572*V*V + 1.3964835042 *V - 129.39)

(4) 300>V>20 E has a linear relationship in the interval
{0,0},{30,5},{34,10},{70,40},{148,100},{209,150},{217,200},{309,250},
Where: The numbers in brackets are "voltage value (in millivolts)" and "radiation value (in watts/square meter)"
E = E2-(V2-V)/(V2-V1)*(E2-E1)
E—radiation value
E1—the minimum value in a certain interval
E2—the maximum value in a certain interval
V—radiation channel input voltage value
V1—the minimum voltage in a certain interval
V2—the maximum voltage in a certain interval

(5) 20>V E=0
(E is the measured radiation value (W/m2), V is the output voltage (mV))

Current type (4～20mA output):
E=(I-4)/16 × 1500
(E is the measured radiation value (W/m2), I is the

output current (mA))

Connection method

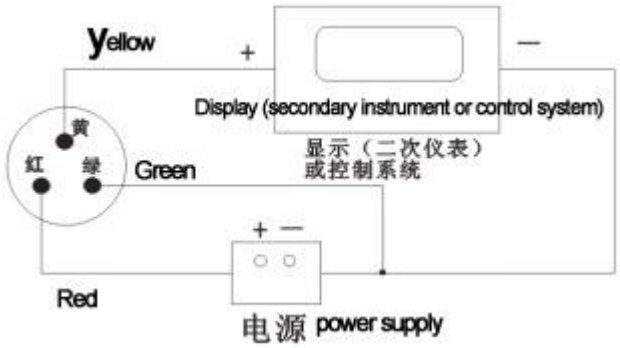
(1) If equipped with the collector produced by our company, directly connect the sensor to the corresponding interface on the collector using the sensor cable.

(2) If the transmitter is purchased separately, the corresponding line sequences are:

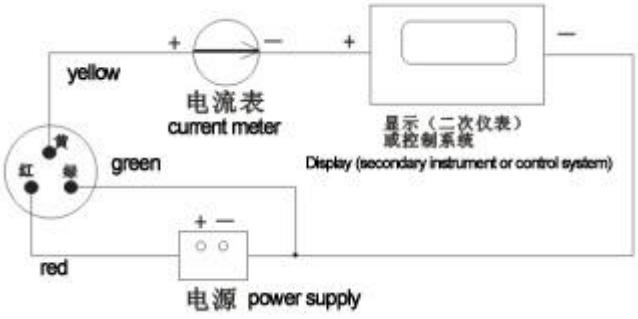
Line color	output signal		
	Voltage	Current	Communications
Red	+	+	+
Black（Green）	-	-	-
Yellow	Voltage signal	Current Signal	A
Blue			B

(3)

There are two output wiring methods for transmitter voltage and Ccurrent:

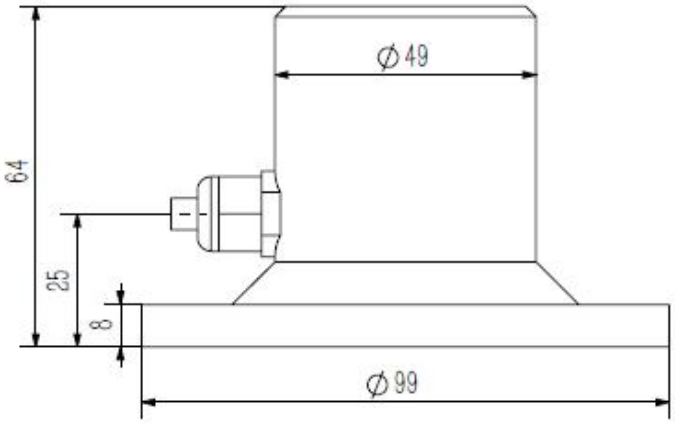


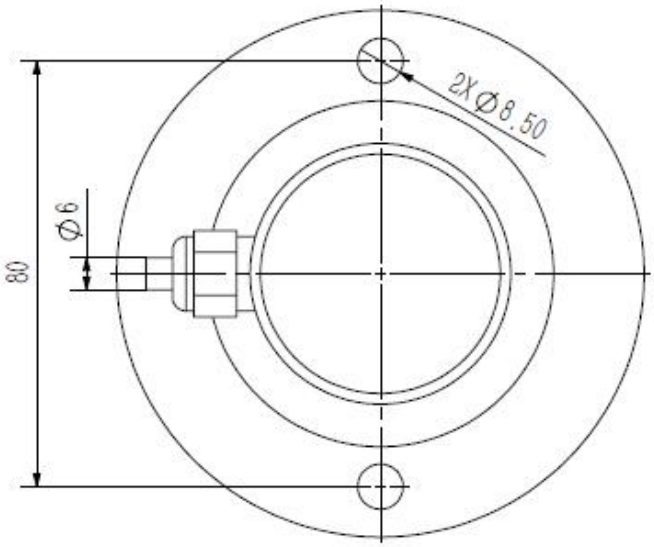
(Wiring diagram of voltage output mode)



(Wiring diagram of current output mode)

Structural Dimensions





MODBUS-RTU Communication protocol

I Serial port format

Data bits 8 bits

Stop bit 1 or 2 bits

Check Digit None

Baud rate 9600 The interval between two communications is at least 1000ms

II Communication format

[1] Write device address

Send: 00 10 Address CRC (5 bytes)
Returns: 00 10 CRC (4 bytes)
Instructions: 1. The address bit of the read/write address command must be 00.
2. Address is 1 byte, the range is 0-255.
For example: send 00 10 01 BD C0
return 00 10 00 7C

[2] Read device address
Send: 00 20 CRC (4 bytes)
Returns: 00 20 Address CRC (5 bytes)
Description: Address is 1 byte, the range is 0-255
For example: send 00 20 00 68
Return 00 20 01 A9 C0

[3] Read real-time data
Send: Address 03 00 00 00 01 XX XX
Description: As shown in the figure below:

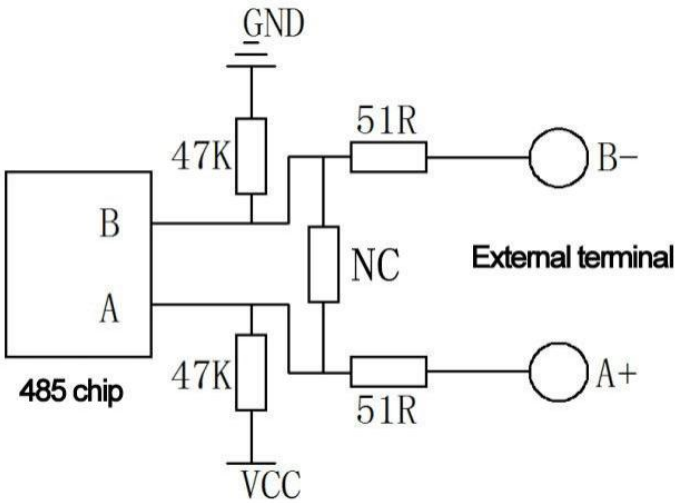
Code	Feature Definition	Remark
Address	Address	
03	Function code	
00 00	Start Address	
00 01	Reading points	
XX XX	CRC Check code, low front and high back	

Return: Address 03 02 XX XX XX XX
Description:

Code	Feature Definition	Remark
Address	Address	
03	Function code	
02	Read unit bytes	
XX XX	Data (front high and back low)	Hex
XX XX	CRC check code	

For example: send 01 03 00 00 00 01 84 0A
Return 01 03 02 00 B4 B8 33
Note: 00 B4 converted to hexadecimal is 180, after data analysis, the actual radiation value is 180W/m2
Steps to calculate CRC code:
1. The preset 16-bit register is hexadecimal FFFF (that is, all 1s). Call this register the CRC register;
2. XOR the first 8-bit data with the lower bits of the 16-bit CRC register, and place the result in the CRC register;
3. Shift the contents of the register one bit to the right (toward the lower bit), fill the highest bit with 0, and check the shifted out bit after the right shift;
4. If the shift out bit is 0: repeat step 3 (shift right one bit again)
If the shift-out bit is 1: XOR the CRC register with the polynomial A001 (1010 0000 0000 0001);
5. Repeat steps 3 and 4 until the right shift is performed 8 times, so that the entire 8-bit data is processed;
6. Repeat steps 2 to 5 to process the next 8-bit data;
7. The final CRC register is the CRC code;
8. When the CRC result is put into the information frame, the high and low bits are exchanged, and the low bits are first.

RS485 circuit

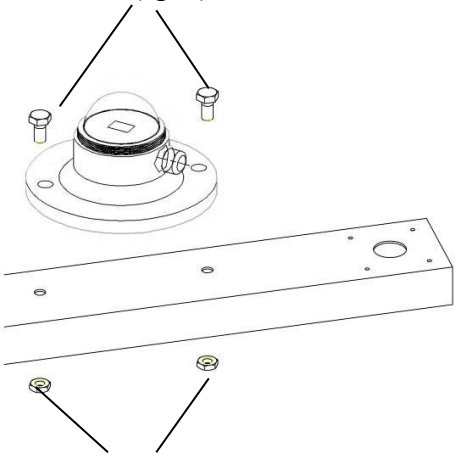


Instruction manual

1. Make sure the mounting bracket is parallel to the ground;
2. As shown in the figure, use M6 screws and nuts to fix the sensor on the mounting bracket through the 2

mounting holes on the sensor;
3. Please avoid disassembling the sensor during installation.

M6*20 Hexagon Screws (2pcs)



M6 nut, ¢6 flat washer, ¢6 spring washer (2 each)

No	Power supply	output signal	explanation
NBL-W-SRS			Simple total radiation sensor (transmitter)
	12-24V		12-24V Power supply
		V	0-5V
		V2	0-2.5V
		A1	4-20mA
		W2	RS485
For example: NBL-W-SRS -12V-24V-A1: Simple total radiation sensor (transmitter) 12V-24V power supply, 4-20mA current signal output			

Contact us

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Selection table