Photoelectric Total Solar Radiation Sensor

Product Manual

(V1.1)

● Important statement

Operation errors will shorten the life of the product, reduce its performance, and may cause accidents in severe cases. Please read this manual carefully before use. Give this manual to the end user. Please keep the manual in a safe place for reference when needed. The manual is for reference only, and the actual design and appearance shall prevail.

● Product overview

The photoelectric total solar radiation sensor adopts the photoelectric principle to measure the total solar radiation. The radiation sensor adopts a high-precision photosensitive element with wide-spectrum absorption, high absorption in the full spectrum range, and good stability; at the same time, a dust cover with a light transmittance as high as 95% is installed outside the sensing element, and the dust cover adopts special treatment to reduce dust Adsorption can effectively prevent environmental factors from interfering with internal components, and can measure solar radiation more accurately. The product supports analog output and RS485 digital output to convert the current solar radiation value. The product has simple wiring, small and beautiful appearance, and takes up little installation space. It is widely used in solar energy utilization, meteorology, agriculture, building material aging, and air pollution to measure solar radiation energy.

● Technical indicators

Power supply range	10V~30V DC	
Output method	Digital output	RS485 (standard Modbus-RTU protocol)
	Current output	4-20mA
	Voltage output	0-5V、0-10V
Power consumption	0.06W	
Operating temperature	-25℃~60℃	
Response spectrum	300nm~1100nm	
Measuring range	0~1800W/㎡	
Precision	≤3%FS	
Resolution	1W/㎡	
Response time	≤5s	
Linearity	≤±3%	

Annual stability	≤±3%

● Installation method

1. Use screws to pass through the mounting holes on the sensor, and fix the sensor on the mounting bracket;

2. Make sure that the equipment is parallel to the ground (you can adjust the thumb screw and check the level bubble status to determine whether it is parallel);

3. After the installation is complete, remove the protective cover.

● Equipment size (unit: mm)

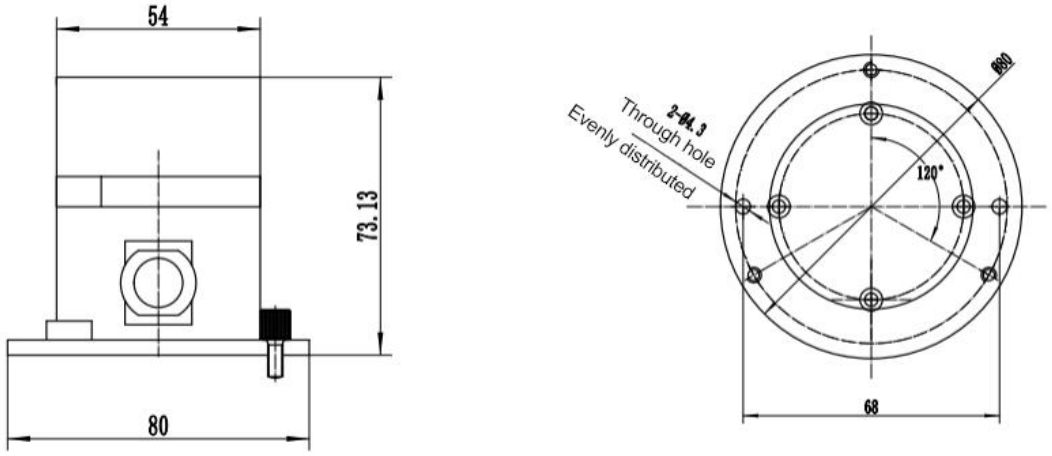

Figure 1: Device dimensions

● Wiring

RS485 type

Wiring	Thread color	Illustrate
LED to direct outlet	Red	Positive power supply (10~30V DC)
	Black	Power negative
	White	RS485-A
	Yellow	RS485-B
Aviation plug to direct outlet	Red	Positive power supply (10~30V DC)
	Black	Power negative
	Green	RS485-A

	White	RS485-B

Analog type

Wiring	Thread color	Illustrate
Power supply	Red	Positive power supply (10~30V DC)
	Black	Power negative
Communication	White	Signal line (4-20mA, 0-5V, 0-10V)

Modbus RTU communication protocol

● Communication basic parameters

Data bit	8 bits
Parity bit	None
Stop bit	1 person
Error checking	CRC (Redundant cyclic code)
Baud rate	2400bit/s, 4800bit/s, 9600bit/s can be set, the factory default is 9600bit/s

Host inquiry frame structure:

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

Slave response frame structure:

Address code	Function code	Effective bytes	Data area	Data area 2	Data N area	Check code low	check code high
1 byte	1 byte	1 byte	2 byte	2 byte	2 byte	1 byte	1 byte

● Register address

Register address	Content	Operate	Scope and definitions
0x00	Radiation value (integer)	Read only	Real value (16-bit unsigned)

0x02	Radiance value (float)	Read only	Real value (32-bit unsigned)
0x03	Address register	Read and write	1~255 (default 1, universal address 200)
0x04	Baud rate register	Read and write	24 is 2400; 48 is 4800; 96 is 9600 (default)

● Communication protocol example

Read the current solar radiation value

Inquiry frame

Address code	Function code	Register start address	Register length	Check code low	Check code high
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0A

Response frame:

Address code	Function code	Effective bytes	Solar radiation value	Check code low	Check code high
0x01	0x03	0x02	0x00 0x64	0x9B	0xAF

Total solar radiation value: 0064 (hexadecimal) = 100, total solar radiation value = 100W/㎡

Modify the current baud rate to 115200

Inquiry frame：

Address code	Function code	Register start address	Change the data	Check code low	Check code high
0x01	0x06	0x00 0x0A	0x04 0x80	0xAA	0xA8

Response frame:

Address code	Function code	Effective bytes	Solar radiation value	Check code low	Check code high
0x01	0x06	0x00 0x0A	0x04 0x80	0xAA	0xA8

● Calculation method

1. Current output signal conversion calculation

For example, the range is 0-1800W/㎡, 4~20mA output, when the output signal is 10mA, calculate the current radiation value. The span of this radiation value range is 1800W/㎡, which is expressed by a 16mA current signal, 1800W/㎡/16mA=112.5W/㎡, that is, the current 1mA represents a temperature change of 112.5W/㎡, and the measured value is 12mA-4mA=8mA, 8mA* 112.5=900W/㎡.

2. Voltage output signal conversion calculation

For example, the range is 0-1800W/㎡, 0-10V output, when the output signal is 4V, calculate the current radiation value. The span of this radiation value range is 1800W/㎡, expressed by a 10V signal, 1800W/㎡/10V=180W/㎡, that is, a voltage of 1V represents a temperature change of 180W/㎡, and the measured value is 4V*180 W/㎡=720W/㎡.

● Precautions

1. After opening the product package, please check whether the appearance of the product is intact, check whether the relevant content of the product instruction manual is consistent with the product, and keep the product instruction manual for more than one year;
2. Wiring strictly according to the wiring diagram of the product, and work under the permissible excitation voltage of the product, and do not use it with overvoltage;
3. Do not knock the product, so as not to damage the appearance and internal structure of the ring;
4. The photosensitive surface of the product should be kept clean, and the surface dust and stains should be removed regularly if necessary;
5. The product has no customer-repairable parts, please contact our company in case of failure;
6. If the company's products fail under normal conditions, the warranty period is one year (13 months from the date of delivery by our company to the date of return). as the basis. For maintenance beyond the time limit, the company will charge a cost fee, and all products of the company will be maintained for life;
7. For the unfinished parts, please refer to our company's website or call us for inquiries.