

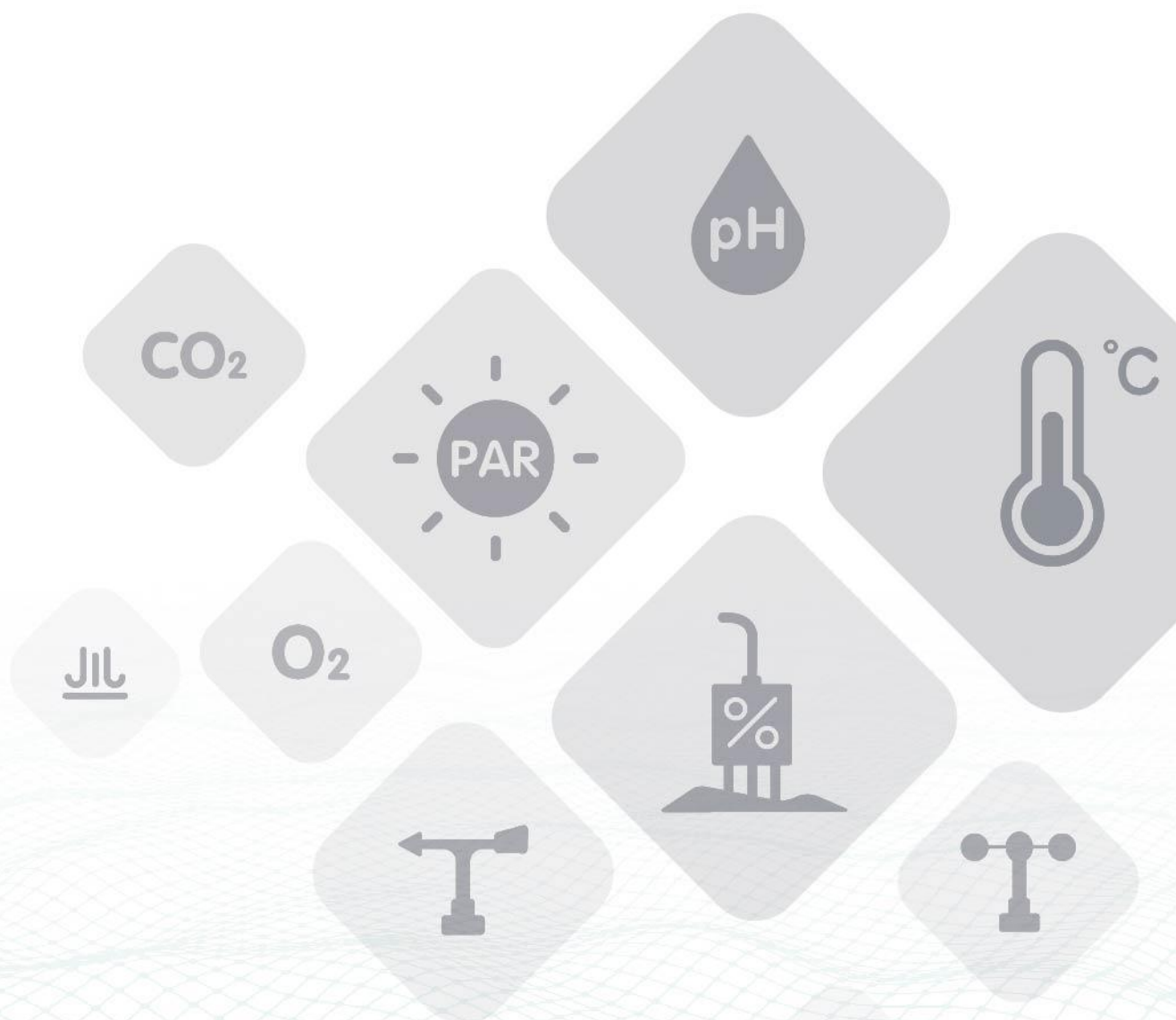


SENSECAP

Total Solar Radiation Sensor Datasheet

Module: S-ZFS-02

Version: V1.0



Directory

1. Introduction	3
2. Sensor wiring	5
3. External Dimensions	6
4. RS485 Communication and Protocols	7
4.1. Modbus communication protocol	7
4.2. Address Modification	8
4.3. Address Modification via Broadcast Command	9
4.4. Data Inquiry	10
4.5. Communication Using Serial Debugging Software	11
5. Precautions for use	12

1. Introduction

The total solar radiation meter is mainly used to measure the total solar radiation value, using silicon photodetector, through the optical filter, when there is light radiation, produce a current signal proportional to the intensity of the incident radiation, and its sensitivity is proportional to the cosine of the angle of direct incidence of the incident light. Each total solar radiation meter gives its own sensitivity and can be read directly from the measured value in units of W/m^2 . It is simple to use, can be directly connected to a digital voltmeter or data collector, and can be used under all-weather conditions. It is widely used in agrometeorology, crop growth and ecology research.

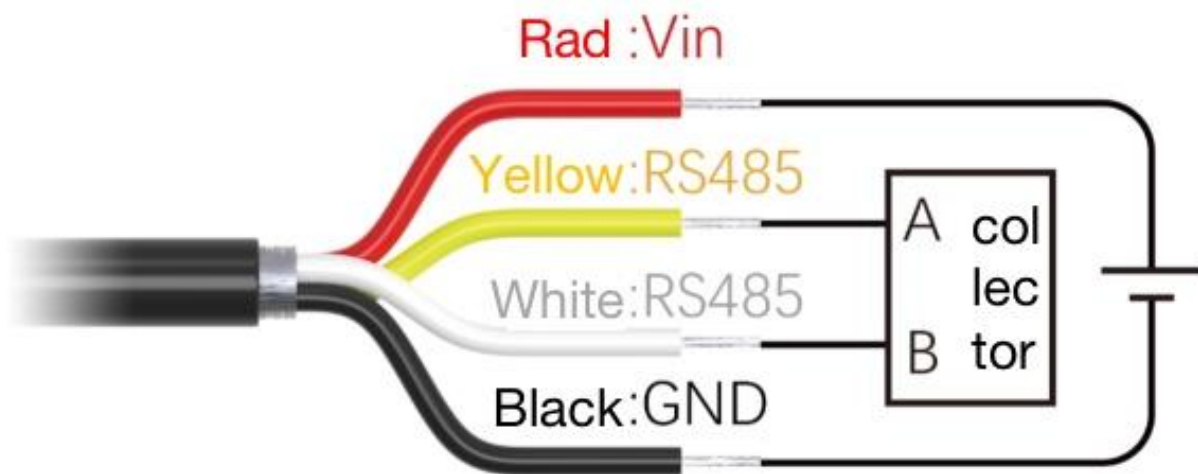
Technical Parameters	
Measurement Parameters	Total solar radiation
Measuring unit	W/m^2
Measuring range	0 ~ 2000 W/m^2
Accuracy	$\pm 3\%$
Resolution	$1W/m^2$
Response spectrum	300~1100nm
Linearity	Maximum offset 1%
Operating Temperature	-30°C ~ 75°C
Response Time	10ms
Stability	Change < 2% within one year
Other Parameters	

Output Signal	Digital Signal Modbus RS485
Supply voltage	5 to 24V DC (12VDC typical)

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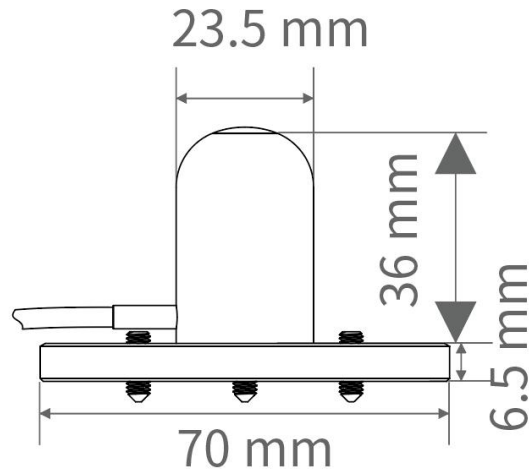
2. Sensor wiring

The total solar radiation sensor can be connected to a variety of devices containing differential input data collectors, data acquisition cards, remote data acquisition modules and other equipment. The specific wiring is shown in the figure to the right:



Wiring diagram of RS485 signal

3. External Dimensions



4.RS485 Communication and Protocols

4.1. Modbus communication protocol

Modbus is a serial communication protocol that is the standard for a wide range of instrumentation as well as smart sensors in terms of communication interfaces, and has a wide range of applications in smart sensors. The Modbus protocol is a master-slave architecture protocol. There is a master node and other nodes that participate in communication using the Modbus protocol are slave nodes. Each slave device has a unique device address.

The sensor has an RS485 interface and supports the Modbus protocol. The factory default values for the communication parameters are: baud rate 9600 bps, one start bit, 8 data bits, no parity, and one stop bit. The communication protocol is Modbus RTU. The communication parameters can be changed by the setup program or Modbus commands, and the sensor needs to be re-powered to take effect after the communication parameters are changed.

4.2. Address Modification

For example: Changing the address of Sensor 01 to 02.

Default Total Solar Radiation Sensor Address (Decimal): 48

Original Address	Function Code	Data address High	Data address Low	Data High	Data Low	CRC16 low	CRC16 high
01	06	01	00	00	02	08	0B

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4.3. Address Modification via Broadcast Command

If you forget the address of the sensor, you can use the broadcast command FE to change it to the new address, for example, the new address is 03.

Broadcast Command	Function Code	Data address High	Data address Low	Data High	Data Low	CRC16 Low	CRC16 High
FE	06	01	00	00	03	DD	C4

If the sensor receives the command correctly, it will return it as-is.

Note: When using the broadcast address FE, the master can communicate with only one slave at a time.

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4.4. Data Inquiry

Inquire data from sensor (address 01) for ultraviolet radiation. Master → Slave:

Address	Function Code	Start register address high	Start register address low	Register length high	Register Length Low	CRC16 low	CRC16 high
01	03	00	00	00	01	84	0A

If the sensor receives correctly, it returns the following data. Slave → Master:

Address	Function Code	Data length	Register 0 Data high	Register 0 Data Low	CRC16 low	CRC16 high
01	03	02	04	B3	04	B3
			Total solar radiation Unit: W/m ²			

The above data indicates that the total solar radiation: 1203 W/m²

4.5. Communication Using Serial Debugging Software

Users can use any one of the serial debugging software to communicate with the sensor, the communication should pay attention to, select the correct serial port, baud rate, and other serial communication parameters, the need to send and receive data should be transmitted in hexadecimal as well as display.



5. Precautions for use

1. When you receive the product, please check whether the package is intact, and check whether the sensor model and specifications are consistent with the product you purchased;
2. The installation place should be far away from chemical corrosion environment;
3. Sensors and wires should be kept away from high-voltage electricity and heat sources;
4. The sensor is a precision device, please do not disassemble when using, so as not to cause damage to the product
5. Do not carry electricity wiring, wiring is completed, check for errors before powering up.