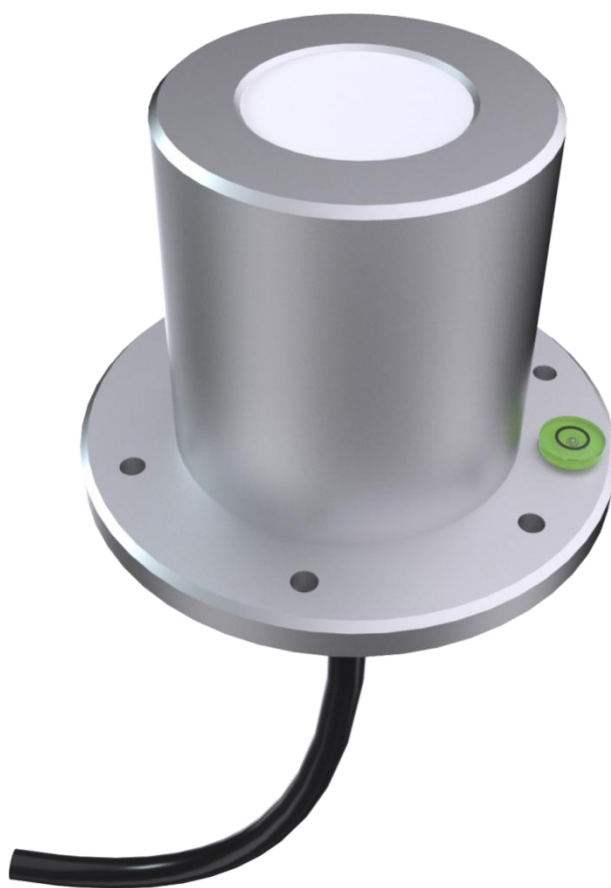


PAR Sensor Product User Manual



1 Overview

The photosynthetically active radiation (PAR) sensor is mainly used to measure photosynthetically active radiation of natural light within the 400-700 nm wavelength range.

Using an imported precision optical detector and a 400-700 nm optical filter, the sensor generates a voltage signal proportional to the intensity of incident radiation under natural light. The measured light flux density is proportional to the cosine of the incident angle of light.

Each photosynthetically active radiation sensor provides its own light flux density measurement and directly displays the measured value in $\mu\text{mol}/\text{m}^2\cdot\text{s}$. It can be directly connected to a digital voltmeter or data logger for simple and convenient operation, high sensitivity, accurate measurement, and all-weather use.

2 Feature

- **Compact Design:** Compact size.
- **High Measurement Accuracy:** High measurement accuracy, fast response time, and good interchangeability.
- **Cost-Effective Design:** Low cost, competitive price, and high performance.
- **Flange Installation:** Simple and convenient installation.
- **High Data Transmission Efficiency:** Efficient data transmission.

3 Application

The product is suitable for research in areas including crop growth, photosynthetic production potential, tourism environmental and ecological studies, greenhouse lighting control, and solar energy.

4 Product Information

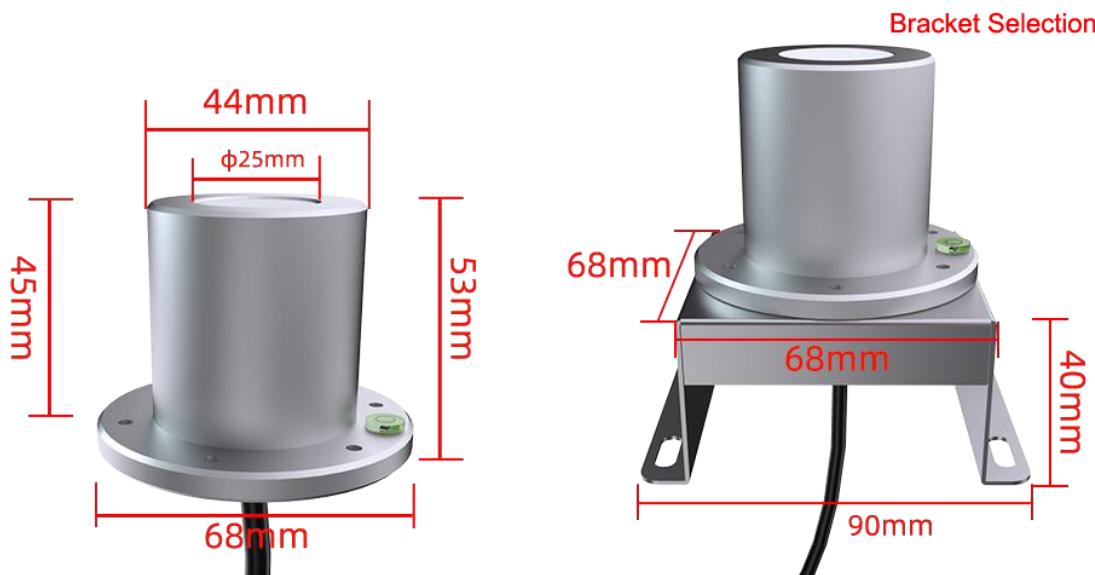
4.1 Specs

Measurement Range	0-2500 $\mu\text{mol}/\text{m}^2\cdot\text{s}$
Response Time	<1 s
Resolution	1 $\mu\text{mol}/\text{m}^2\cdot\text{s}$
Accuracy	$\pm 2\%$
Spectral Range	400-700 nm
Output Signal	A: Voltage output (0-2 V, 0-5 V, or 0-10 V selectable) B: 4-20 mA (current loop) C: RS485 (standard Modbus-RTU protocol, default address: 01) D: SDI-12 (serial data communication interface protocol of the U.S. hydrological organization)
Supply Voltage	5-24 V DC (when output signal is 0-2 V, RS485, or SDI-12) 12-24 V DC (when output signal is 0-5 V, 0-10 V, or 4-20 mA)
Stability	< $\pm 2\%$ change per year
Operating Temperature	-30°C to $+75^{\circ}\text{C}$
Cable Specification	2 m, 3-wire cable (analog signal); 2 m, 4-wire cable (RS485); cable length available

4.2 Current Output Impedance Requirements

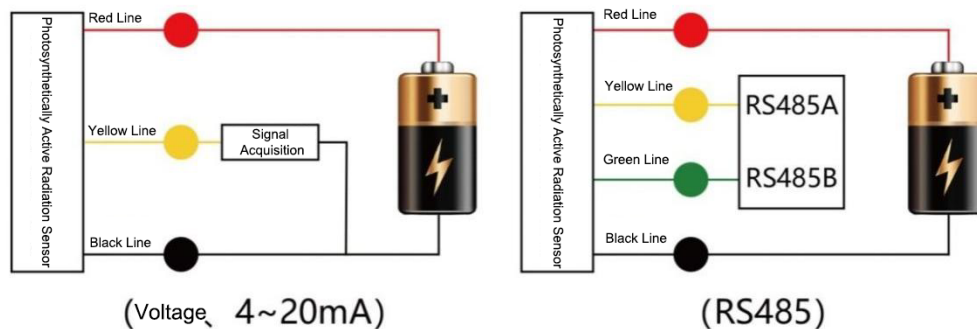
Supply Voltage	9V	12V	20V	24V
Maximum Load Resistance	<250 Ω	<400 Ω	<500 Ω	<900 Ω

5 Dimension (Unit: mm)



6 Installation and Operation

The photosynthetically active radiation (PAR) sensor can be connected to various data acquisition devices equipped with differential inputs, such as data loggers, data acquisition cards, and remote data acquisition modules. The wiring instructions are shown below:



7 Data Conversion Method

- PAR: Photosynthetically active radiation, unit: $\mu\text{mol}/\text{m}^2\cdot\text{s}$;
- V: Voltage value collected by the data logger, unit: V;
- A: Current value collected by the data logger, unit: mA;

Output Signal	Conversion Formula
0~2V DC	$PAR = 1250 \times V$
0~5V DC	$PAR = 500 \times V$
0~10V DC	$PAR = 250 \times V$
4~20mA	$PAR = 156.25 \times A - 625$

RS485 Signal (Default Address: 01):

Standard Modbus-RTU protocol; baud rate: 9600 bps; parity: None; data bits: 8; stop bits: 1.

7.1 Modify Address

Example: Change the sensor address from 01 to 02.

Host → Slave

Original Address	Function Code	Register Address High Byte	Register Address Low Byte	Starting Address High Byte	Starting Address Low Byte	CRC16 Low Byte	CRC16 High Byte
0X01	0X06	0X00	0X30	0X00	0X02	0X08	0X04

If the sensor receives the command correctly, it returns the data through the original route.

Note: If the original sensor address is forgotten, the broadcast address 0xFE can be used instead. When using 0xFE, only one slave device can be connected to the host. The returned address remains the original address, which can be used as a method for address query.

7.2 Data Query

Query the photosynthetically active radiation data of the sensor with address 01.

Host → Slave

Address	Function Code	Starting Register Address High Byte	Starting Register Address Low Byte	Register Quantity High Byte	Register Quantity Low Byte	CRC16 Low Byte	CRC16 High Byte
0X01	0X03	0X00	0X00	0X00	0X01	0X84	0X0A

If the sensor receives the command correctly, it returns the following data.

Slave → Host.

Address	Function Code	Data Length	Register 0 Data High Byte	Register 0 Data Low Byte	CRC16 Low Byte	CRC16 High Byte
0X01	0X03	0X02	0X00	0XC8	0XB9	0XD2
			Photosynthetically active radiation: 200 $\mu\text{mol}/\text{m}^2\cdot\text{s}$			

8 Precautions for Use

1. When receiving the product, please check whether the package is intact and confirm that the sensor model and specifications match the purchased product.
2. The installation location should be kept away from chemically corrosive environments.
3. The sensor and cable should be kept away from high-voltage electricity and heat sources.
4. The sensor is a precision instrument and should be stored in a dry, well-ventilated indoor environment at normal temperature.
5. The sensor is a precision instrument. Users should not disassemble it during use to avoid product damage.