OHTS1096 Photoelectric Pyranometer

1 Product Overview

The OHTS1096 is a total solar radiation measurement device based on the photoelectric effect principle, designed for precise measurement of global solar irradiance across the solar spectrum. This sensor employs a wide-spectral-response photosensitive element featuring high sensitivity and stability with excellent full-spectrum absorption characteristics. The sensor is equipped with an optical-grade transparent dust shield on top, offering 95% transmittance and featuring a special anti-adhesion surface treatment to effectively suppress dust accumulation and minimize environmental interference with measurement accuracy.

The device utilizes the standard ModBus-RTU communication protocol with RS-485 digital output, directly providing current solar radiation measurements. Its compact structure incorporates a leveling mechanism to facilitate field installation and commissioning. Suitable applications include solar energy resource assessment, meteorological observation, agricultural ecological monitoring, and material aging testing.

2 Applications

- Performance monitoring and evaluation of solar photovoltaic power generation systems
- Solar radiation flux observation at meteorological stations
- Photosynthetically Active Radiation (PAR) measurement in agricultural ecosystems
- Outdoor aging testing and weather resistance evaluation of building materials
- Atmospheric environmental monitoring and climate research
- Greenhouse illumination intensity monitoring
- Renewable energy resource survey

3 Features

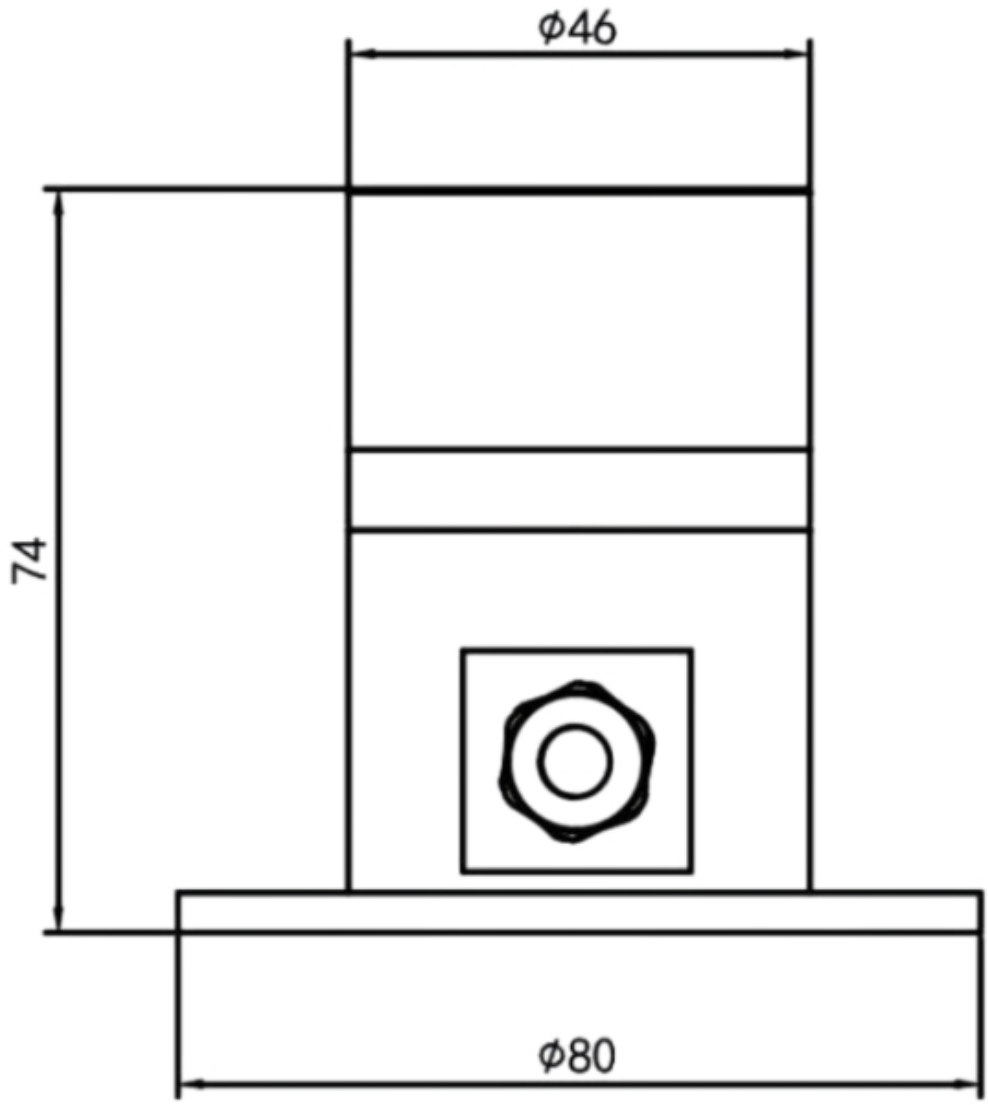
- High-precision photoelectric photosensitive element with high quantum efficiency and flat spectral response across a wide spectral range
- Integrated spirit level and mechanical adjustment mechanism supporting rapid field leveling calibration
- Standard ModBus-RTU communication protocol compatible with industrial automation systems
- High-transmittance dust shield design with special surface treatment to reduce electrostatic dust adsorption
- Wide voltage supply range supporting DC 7V to 30V input
- Aluminum alloy enclosure structure with excellent environmental adaptability and electromagnetic shielding performance

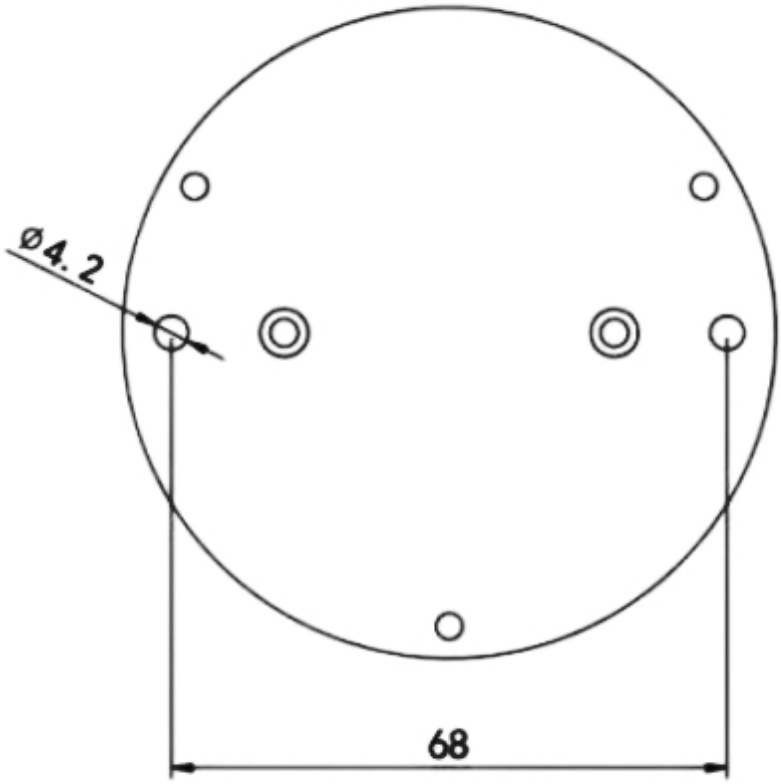
4 Technical Specifications

Parameter	Specification	Remarks
Supply Voltage Range	$7\,\mathrm{V} \sim 30\,\mathrm{V}\,\mathrm{DC}$	DC Input
Power Consumption	$0.06\,\mathrm{W}$	Typical value
Operating Temperature	$-25\,^{\circ}\mathrm{C} \sim 60\,^{\circ}\mathrm{C}$	Ambient temperature
Measurement Target	Sunlight	Global radiation
Measurement Range	$0 \sim 1800\,\mathrm{W/m^2}$	Full scale
Resolution	$1\,\mathrm{W/m^2}$	Minimum resolvable unit
Response Time	$\leq 10\,\mathrm{s}$	90% response
Non-linearity Error	$< \pm 3\%$	Full scale
Annual Stability	$\leq \pm 3\%$	Long-term drift
Output Interface	RS-485	ModBus-RTU protocol
Optional Output	4--20 mA / 0--5 V / 0--10 V	Analog output
Baud Rate	$2400/4800/9600\,\mathrm{bit/s}$	Configurable, default $4800\,\mathrm{bit/s}$
Device Address	$1 \sim 254$	Configurable, default 1
Dust Shield Transmittance	95%	Optical transmittance

5 Physical Specifications

Parameter	Specification
Enclosure Material	Aluminum Alloy
Protection Rating	Suitable for outdoor use
Mounting Method	Screw fixation, ϕ mounting hole
Leveling Adjustment	Built-in spirit level, thumb screw adjustment





6 Installation

1. **Mechanical Fixing**: Use the supplied mounting screws to secure the device to the mounting bracket or plane through the sensor base mounting holes.
2. **Leveling Calibration**: Adjust the base thumb screws while observing the spirit level to ensure the sensor photosensitive surface is in a horizontal position.
3. **Protective Cover Removal**: After confirming correct installation, remove the transparent protective cover to ensure the dust shield is clean and uncontaminated.

7 Wiring Definition

Wire Color	Definition	Description
Brown	Power Positive	7 V ～ 30 V DC input positive
Black	Power Negative	Power ground/negative
Yellow (Green)	485-A	RS-485 differential signal positive (D+)
Blue	485-B	RS-485 differential signal negative (D-)

8 Communication Protocol and Data Conversion

8.1 Communication Parameters

Parameter	Setting
Encoding Format	8-bit binary
Data Bits	8 bits
Parity Check	None
Stop Bits	1 bit
Error Check	CRC-16 (Cyclic Redundancy Check)
Baud Rate	$2400/4800/9600\,\mathrm{bit/s}$ configurable, factory default $4800\,\mathrm{bit/s}$

8.2 Data Frame Structure

Master Query Frame:

Address Code	Function Code	Register Start Address	Register Quantity	CRC Low	CRC High
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

Slave Response Frame:

Address Code	Function Code	Byte Count	Data Field 1	...	Data Field N	CRC Check
1 byte	1 byte	1 byte	2 bytes	...	2 bytes	2 bytes

8.3 Register Address Definition

Register Address	Content	Access Permission	Range and Definition
$0000\,\mathrm{H}$	Solar Radiation Value	Read-only	Actual value, unit $\mathrm{W/m^2}$
$0052\,\mathrm{H}$	Offset Value	Read/Write	Radiation deviation compensation value, range $0 \sim 1800$
$07D0\,\mathrm{H}$	Device Address	Read/Write	Device address, range $1 \sim 254$, factory default 1
$07D1\,\mathrm{H}$	Device Baud Rate	Read/Write	$0 = 2400\,\mathrm{bit/s}$, $1 = 4800\,\mathrm{bit/s}$, $2 = 9600\,\mathrm{bit/s}$

8.4 Data Conversion Rules

Solar Radiation Value Conversion:

The register value is an unsigned 16-bit integer directly corresponding to the irradiance value.

$$Radiation = Reg_{value} \times 1\,\mathrm{W/m^2}$$

Where Reg_{value} is the decimal value read from the register.

Example: If the register value read is $0064\,\mathrm{H}$ (hexadecimal), converted to decimal as 100, then the current solar radiation value is:

$$Radiation = 100\,\mathrm{W/m^2}$$

Offset Value Conversion:

The offset value register data format is identical to the solar radiation value; the written value represents the deviation compensation amount.

$$Offset = Reg_{value} \times 1\,\mathrm{W/m^2}$$

9 Precautions

1. **Safety Limitations**: This device is strictly prohibited from use as safety interlock equipment, emergency stop devices, or any protective equipment that may cause personal injury. Thoroughly read the technical manual before installation and operation.
2. **Model Verification**: Immediately verify the product model and specifications upon receipt to ensure consistency with ordering requirements.
3. **Electrical Safety**: Wiring operations are strictly prohibited in energized states. Verify all connections are correct before applying power.
4. **Optical Maintenance**: The sensor is a precision optical device; do not arbitrarily disassemble the transparent dust shield. The dust shield surface must remain clean and should be regularly wiped with a soft cloth.
5. **Waterproofing Notice**: Water ingress into the dust shield interior is strictly prohibited. During severe weather conditions such as heavy rain, snowstorms, or freezing conditions, it is recommended to install a protective cover or suspend use.
6. **Troubleshooting**:
   - If readings remain at 0, verify the presence of light source and ensure the protective cover has been removed;
   - Check RS-485 bus connection integrity and correct A/B wire sequence;
   - Verify supply voltage is within the $7\,\mathrm{V} \sim 30\,\mathrm{V\,DC}$ range.

10 After-Sales Guarantee & Support

Warranty Policy:
Within 12 months from the date of purchase (based on valid proof of purchase), the company provides free repair and component replacement services for failures caused by material or workmanship defects under normal use and maintenance conditions.

Beyond Warranty Period:
Lifetime paid repair services are provided, charging only for material costs and labor fees.

Exclusions from Warranty:
The following conditions are not covered by the free warranty:

- Damage caused by incorrect installation, use, or operation;
- Disassembly, repair, modification, or component replacement by unauthorized personnel;
- Damage caused by water ingress, foreign object intrusion, or negligent use;
- Failures resulting from force majeure (natural disasters, accidents);
- Damage caused by operation beyond the working parameters specified in the product technical specifications.

11 Manufacturer Information

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12 Revision History

Version	Revision Date	Revision Description
V1.0	-	Initial release