OHTS1092 Aluminum Housing UV Transmitter

1 Product Overview

The OHTS1092 is a UV radiation measurement transmitter based on the photoelectric effect principle, featuring an aluminum enclosure design suitable for industrial-grade environmental monitoring applications. The device integrates a high-sensitivity UV photoelectric sensor, capable of detecting ultraviolet radiation in the wavelength range of 290nm to 390nm. It supports dual-parameter output of UV intensity (unit: mW/cm^2) and UV Index. The device employs an RS-485 bus interface and supports the ModBus-RTU communication protocol, making it suitable for distributed data acquisition systems. With a protection rating of IP67, it can operate stably in harsh outdoor environments over long periods.

2 Applications

- UV radiation monitoring at atmospheric environmental monitoring stations
- Solar UV index acquisition for meteorological observation networks
- UV sterilization dose monitoring in agricultural facilities
- UV radiation measurement at forestry ecological monitoring stations
- Calibration of UV radiation intensity from artificial light sources
- Environmental UV monitoring for outdoor photovoltaic installations
- UV source intensity detection in laboratories
- Industrial UV curing process monitoring
- Auxiliary UV transmittance testing for building curtain walls
- UV disinfection dose monitoring in water treatment systems

3 Features

- Utilizes photoelectric sensing technology with high-sensitivity response for the $290-390\text{nm}$ spectral band
- Supports dual-parameter measurement of UV intensity and UV Index
- Standard ModBus-RTU protocol interface, compatible with PLC and SCADA systems
- Wide voltage supply range of $10-30\text{VDC}$, adapting to industrial field power conditions
- Aluminum enclosure structure with IP67 protection rating, providing dust and water resistance
- Built-in spirit level for installation horizontal calibration
- Integrated deviation calibration register, supporting on-site measurement offset compensation

4 Technical Specifications

Parameter	Specification	Remarks
Supply Voltage	$10\text{VDC} \sim 30\text{VDC}$	DC Power Supply
Maximum Power Consumption	0.06W	-
Operating Temperature Range	$-25^\circ\text{C} \sim +60^\circ\text{C}$	-
Storage Temperature Range	$-40^\circ\text{C} \sim +85^\circ\text{C}$	Estimated value, based on industrial-grade component standards
Typical Accuracy	$\pm 10\%\text{FS}$	$@\ 365\text{nm}, 60\%\text{RH}, 25^\circ\text{C}$
UV Intensity Range	$0 \sim 15\ \text{mW/cm}^2$	-
Resolution	$0.01\ \text{mW/cm}^2$	-
UV Index Range	$0 \sim 15$	Dimensionless
Spectral Response Range	$290\text{nm} \sim 390\text{nm}$	-
Linearity	$\leq \pm 1\%$	Full Scale
Annual Stability	$\leq \pm 3\%$	Long-term drift
Response Time	0.2s	t_{90}
Output Interface	RS-485	ModBus-RTU Protocol
Communication Distance	$\leq 2000\text{m}$	Depends on bus load and baud rate
Protection Rating	IP67	Aluminum Enclosure
Default Device Address	0×01	Configurable range $1 \sim 254$
Default Baud Rate	$4800\ \text{bit/s}$	Configurable: $2400/4800/9600\ \text{bit/s}$

5 Physical Specifications

Parameter	Specification
Housing Material	Aluminum Alloy
Mounting Method	Wall-mounted/Bracket mounting, $\phi 4\text{mm}$ mounting holes
Cable Specification	Waterproof mating cable, 70cm length
Weight	TBD (To be determined based on actual measurement)

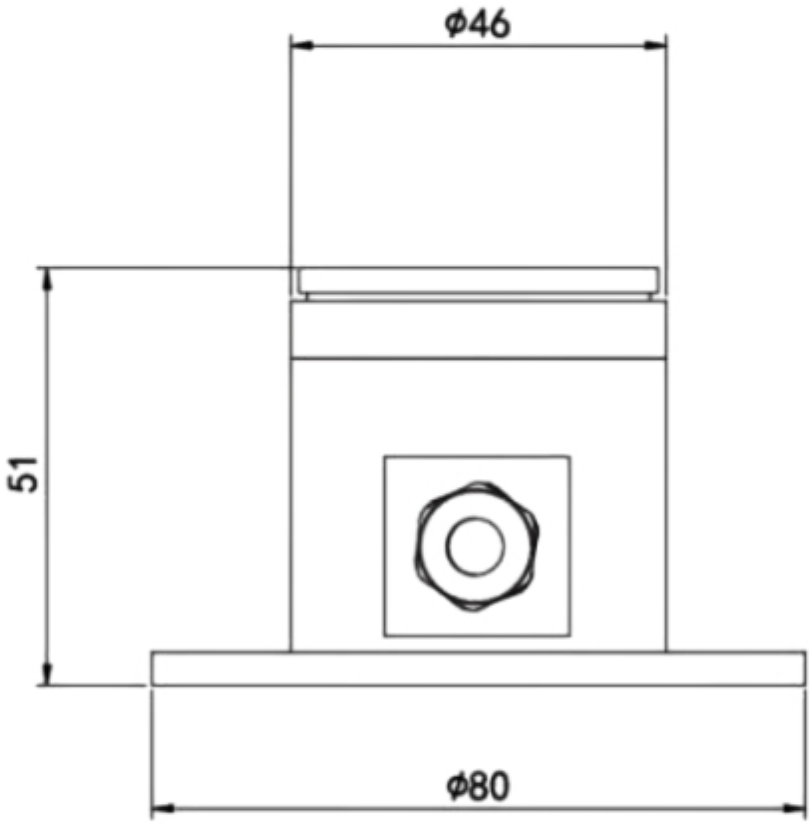

Figure 1: Front and side view dimensions (Unit: mm*)*

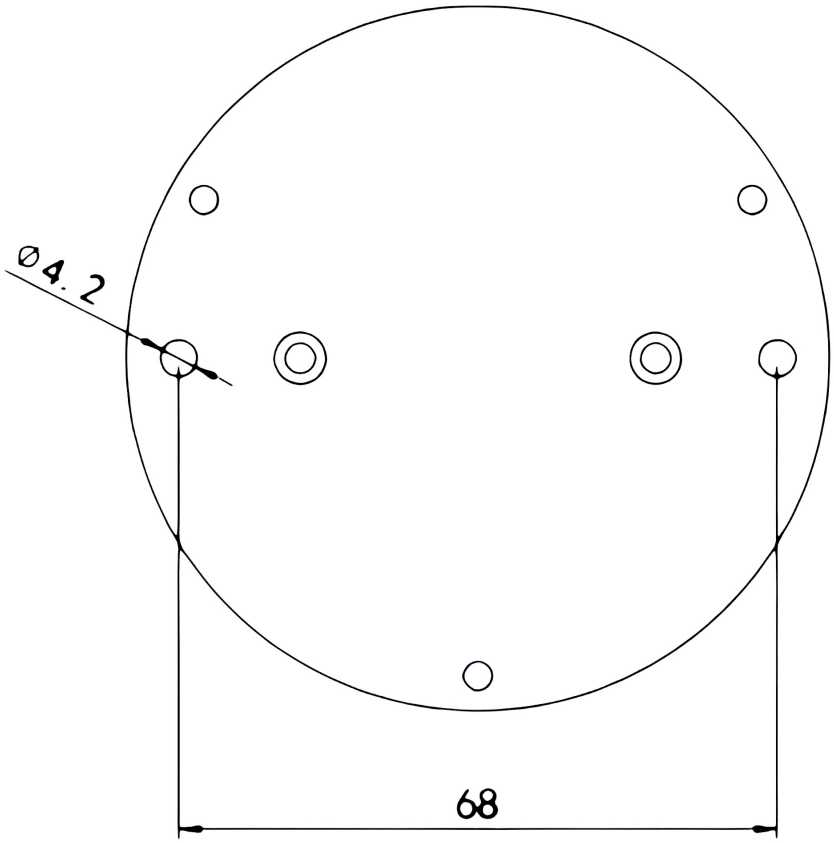

Figure 2: Top and bottom view dimensions (Unit: mm*)*

6 Installation

6.1 Pre-installation Inspection

- Main device unit
- Black waterproof mating cable connector (70cm)
- Warranty card, Certificate of conformity
- Mounting screw kit

6.2 Installation Procedure

1. **Fixed Mounting**: Secure the device to the mounting bracket or wall plate using screws through the sensor mounting holes
2. **Leveling Calibration**: Adjust the thumb screws and observe the spirit level status to ensure the sensor sensing surface remains parallel to the ground
3. **Remove Protective Cover**: After installation, remove the protective cover from the sensor window to ensure an unobstructed optical path

6.3 Installation Environment Requirements

- Avoid installation near vibration sources
- Ensure the sensor window faces the light source to be measured without obstructions
- Avoid strong electromagnetic interference sources (such as frequency converters, high-power motors) at distances less than 1m

7 Wiring Definition

Wire Color	Function Definition	Electrical Characteristics
Brown	Power Positive (V+)	10VDC ~ 30VDC
Black	Power Negative (GND)	System Ground
Yellow(Green)	RS-485 Signal A (D+)	Differential Positive
Blue	RS-485 Signal B (D−)	Differential Negative

Wiring Topology Requirements:

- Use daisy-chain bus topology; avoid star topology
- A 120Ω termination resistor is recommended at both ends of the bus
- Twisted pair shielded cable is recommended for signal lines, with the shield single-point grounded

8 Communication Protocol & Data Conversion

8.1 Communication Parameters

Parameter	Setting
Encoding Format	8-bit Binary
Data Bits	8 Bits
Parity	None
Stop Bits	1 Bit
Error Check	CRC-16 (Cyclic Redundancy Check)
Baud Rate	2400/4800/9600 bit/s, default 4800 bit/s

8.2 ModBus-RTU Frame Format

Master Query Frame Structure:

Address Code	Function Code	Register Starting Address	Register Quantity	CRC Low	CRC High
1 Byte	1 Byte	2 Bytes	2 Bytes	1 Byte	1 Byte

Slave Response Frame Structure:

Address Code	Function Code	Byte Count	Data Field 1	Data Field 2	...	Data Field N	CRC
1 Byte	1 Byte	1 Byte	2 Bytes	2 Bytes	...	2 Bytes	2 Bytes

Note: 16-bit data uses big-endian format (high byte first).

8.3 Register Address Map

Register Address	PLC/Configuration Address	Content	Access Permission	Data Definition
0000H	40001	UV Intensity	Read-only	Actual value $\times 100$
0001H	40002	UV Index	Read-only	Actual value (no scaling)
0052H	40083	UV Intensity Offset Value	Read/Write	Actual value $\times 100$
07D0H	42001	Device Address	Read/Write	Range $1 \sim 254$, default 1
07D1H	42002	Device Baud Rate	Read/Write	$00 = 2400$, $01 = 4800$, $02 = 9600$ bit/s

8.4 Data Conversion Formulas

UV Intensity Conversion:

$$UV_{intensity} = \frac{Register_{value}}{100}\ \mathrm{mW/cm^2}$$

Where $Register_{value}$ is the decimal conversion of the raw hexadecimal value read from register 0000H.

UV Index Conversion:

$$UV_{index} = Register_{value}$$

Where $Register_{value}$ is the raw value read from register $0001\mathrm{H}$, dimensionless.

Offset Compensation Calculation:

To perform measurement offset compensation, write the compensation value $Offset$ to register 0052H:

$$Offset_{register} = Offset_{actual} \times 100$$

Actual output value calculation:

$$UV_{corrected} = UV_{raw} + Offset_{actual}$$

8.5 Communication Examples

Example 1: Read UV Intensity (Device Address 0×01)

Query Frame:

Address Code	Function Code	Starting Address	Data Length	CRC Low	CRC High
0×01	0×03	0×00 0×00	0×00 0×01	0×84	$0 \times 0\mathrm{A}$

Response Frame (Example data 0×01 0×43):

Address Code	Function Code	Byte Count	Data Field	CRC Low	CRC High
0×01	0×03	0×02	0×01 0×43	$0 \times \mathrm{F8}$	0×25

Data Parsing:

$$0 \times 0143 = 323 \Rightarrow UV_{intensity} = \frac{323}{100} = 3.23\ \mathrm{mW/cm^2}$$

Example 2: Read UV Index (Device Address 0×01)

Query Frame:

Address Code	Function Code	Starting Address	Data Length	CRC Low	CRC High
0×01	0×03	$0 \times 00\ 0 \times 01$	$0 \times 00\ 0 \times 01$	$0 \times \mathrm{D5}$	$0 \times \mathrm{AA}$

Response Frame (Example data $0 \times 00\ 0 \times 03$):

Address Code	Function Code	Byte Count	Data Field	CRC Low	CRC High
0×01	0×03	0×02	$0 \times 00\ 0 \times 03$	$0 \times \mathrm{F8}$	0×45

Data Parsing:

$$0 \times 0003 = 3 \Rightarrow UV_{index} = 3$$

Example 3: Modify Device Address to 0×02

Query Frame:

Address Code	Function Code	Starting Address	New Value	CRC Low	CRC High
0×01	0×06	$0 \times 07\ 0 \times \mathrm{D0}$	$0 \times 00\ 0 \times 02$	0×08	0×86

Example 4: Modify Baud Rate to $9600\ \mathrm{bit/s}$ **(Code** 0×02**)**

Query Frame:

Address Code	Function Code	Starting Address	New Value	CRC Low	CRC High
0×01	0×06	$0 \times 07\ 0 \times \mathrm{D1}$	$0 \times 00\ 0 \times 02$	0×59	0×46

Example 5: Broadcast Query Address and Baud Rate (Address $0 \times \mathrm{FF}$**)**

Query Frame:

Address Code	Function Code	Starting Address	Data Length	CRC Low	CRC High
$0 \times \mathrm{FF}$	0×03	$0 \times 07\ 0 \times \mathrm{D0}$	$0 \times 00\ 0 \times 02$	$0 \times \mathrm{D1}$	0×58

Response Frame:

Address Code	Function Code	Byte Count	Address Data	Baud Rate Data	CRC Low	CRC High
0×01	0×03	0×04	$0 \times 00\ 0 \times 01$	$0 \times 00\ 0 \times 01$	$0 \times 6\mathrm{A}$	0×33

Parsing: Device address is 0×01, baud rate code 0×01 corresponds to $4800\ \mathrm{bit/s}$.

9 Precautions

1. **Safety Limitations**: This device is strictly prohibited from use as a safety interlock device or emergency shutdown system component, and must not be used in safety-critical applications where equipment failure could result in personal injury.
2. **Optical Window Protection**: Keep the protective cover in place before installation; remove immediately after installation is complete to avoid fingerprints or contaminants affecting optical measurement accuracy.
3. **Electrical Safety**:
   - Confirm that the supply voltage is within the range of $10\mathrm{VDC} \sim 30\mathrm{VDC}$ before powering on
   - Prohibit plugging or unplugging connectors while the device is energized
   - Route signal lines separately from power lines to avoid interference
4. **Environmental Limitations**:
   - Operating temperature must not exceed the range of $-25^{\circ}\mathrm{C} \sim +60^{\circ}\mathrm{C}$

- Avoid long-term exposure to highly corrosive gas or salt spray environments
- Install horizontally to ensure measurement accuracy

5. **Bus Configuration**:
   - Ensure unique device addresses on the bus to avoid address conflicts
   - For long-distance communication ($>$ 500m), provide local power supply or add repeaters
   - Configure 120Ω termination resistors at both ends of the bus for impedance matching
6. **Maintenance Requirements**: It is recommended to perform calibration verification annually using a standard UV source to check measurement accuracy.

10 After-Sales Warranty & Support

Warranty Period: 12 months from the date of purchase (subject to valid proof of purchase).

Warranty Coverage: Free repair and replacement of parts for failures caused by defects in materials or workmanship under normal use and maintenance conditions.

Exclusions from Warranty:

- Damage caused by improper installation, use, or operation
- Damage caused by unauthorized personnel disassembling, modifying, or repairing the device
- Damage caused by water ingress, foreign object intrusion, or negligent use
- Damage caused by natural disasters or accidents
- Damage caused by operation outside specified working parameters

Lifetime Repair: Paid repair services are provided for the lifetime of the product after the warranty period expires.

Technical Support:

- Technical Support Email: support@orangehorsetech.com
- Technical Support Phone: +86-13918734576

11 Manufacturer Information

Company Name: Shanghai OrangeHorse Electronic Technology Co., Ltd.

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12 Revision History

Version	Revision Date	Revision Content	Revised By
V1.0	-	Initial version created	-