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UV Light Sensor

User Manual

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Chapter 1 Product Introduction

1.1 Product Overview

The SN-300AL-UV-N01 is an ultraviolet transmitter developed by our company. This product enables online UV monitoring by converting ultraviolet light into measurable electrical signals using photosensitive components. The circuit incorporates an industrial-grade microprocessor chip imported from the USA and a high-precision UV sensor, ensuring outstanding reliability and accuracy. The product integrates multiple sensors into a single unit, providing comprehensive measurement data. It outputs a 485 signal (standard ModBus-RTU protocol) with a maximum communication range of 2000 meters and supports secondary development. The housing features a high protection rating of IP67.
This product is widely applicable in environmental monitoring, meteorological monitoring, agriculture, forestry, and other environments. It measures ultraviolet radiation in atmospheric conditions and artificial light sources.

1.2 Features

■ Utilizes ultraviolet measurement components with high sensitivity to 290-390nm for precise UV intensity measurement
■ Adopts standard ModBus-RTU communication protocol
■ High protection rating enables long-term outdoor use in rain and snow environments
■ Wide DC voltage supply range: 10-30V

1.3 Key Parameters

Parameter	Specification
Power Supply (DC, Default)	10–30 VDC
Maximum Power Consumption	0.06 W
Typical Accuracy	±10% FS (@365 nm, 60% RH, 25 °C)
UV Intensity Measurement Range	0–15 mW/cm²
Resolution	0.01 mW/cm²
UV Index Measurement Range	0–15
Measurement Wavelength Range	290–390 nm
Response Time (UV Intensity)	0.2 s
Response Time (UV Index)	0.2 s
Output Signal	RS485 (Modbus-RTU protocol)

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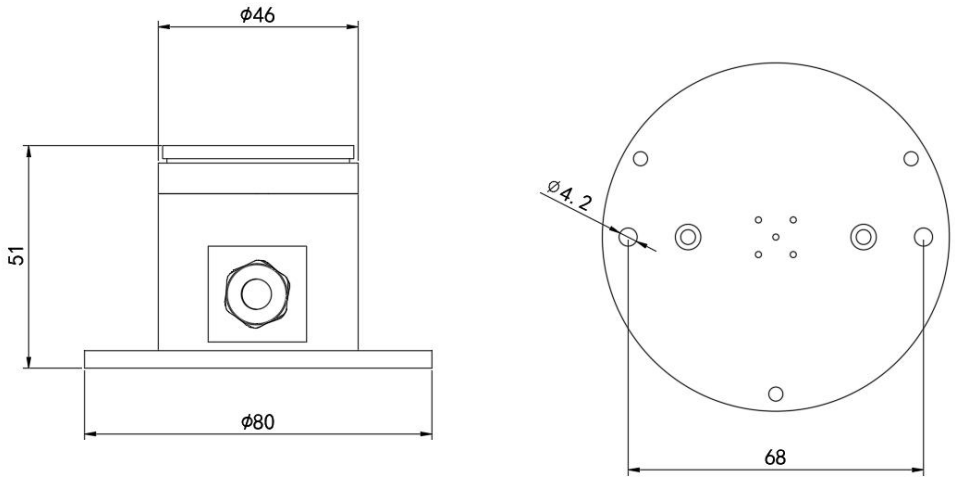
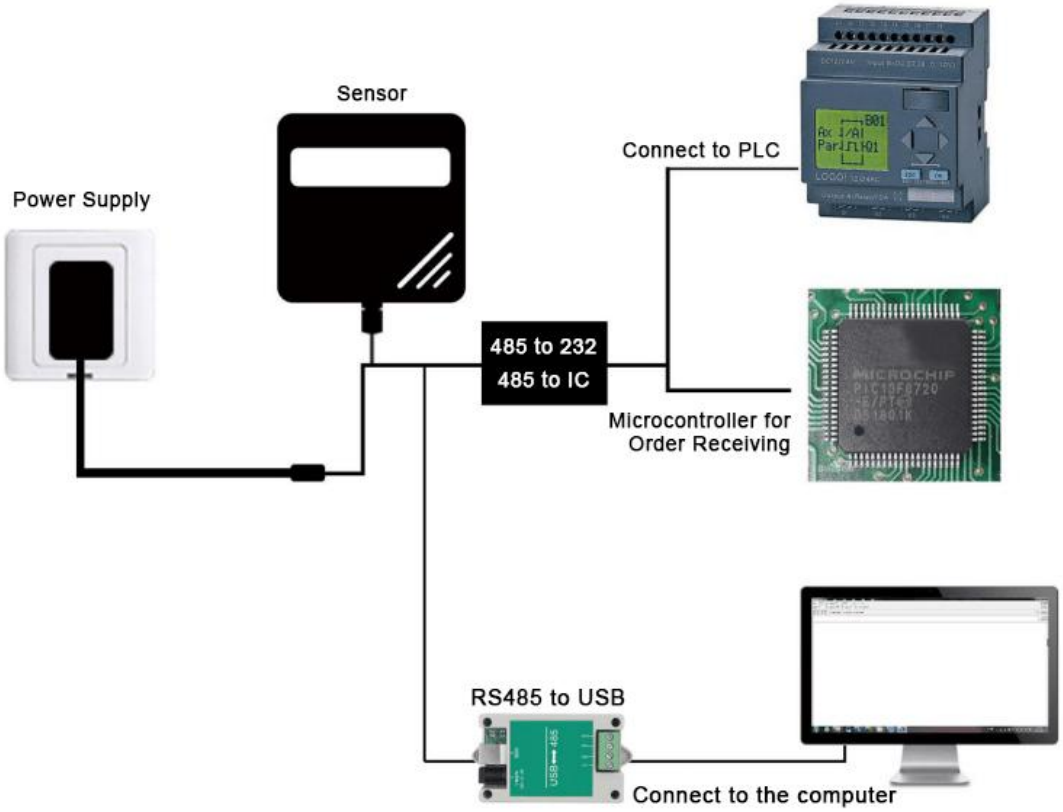
Housing Dimensions



1.4 System Architecture Diagram

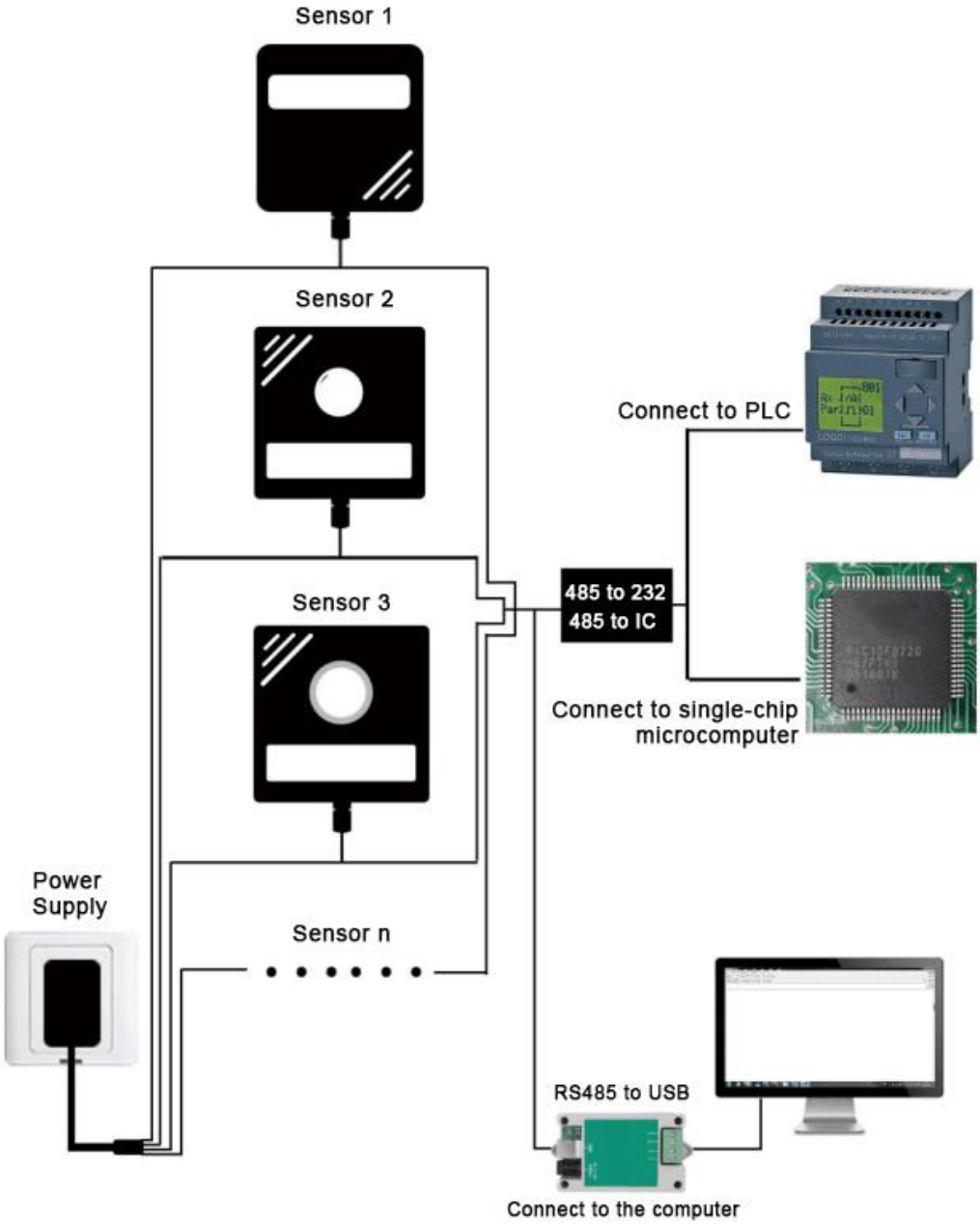
Single Connection



This product can also be used with multiple sensors connected to a single 485 bus. Theoretically, one bus can support up to 254 485 sensors. The other end can be connected to a PLC with a 485 interface, linked to a microcontroller via a 485 interface chip, or connected to a computer using a USB-to-485 adapter. Configuration and testing are performed using the sensor configuration tool provided by our

company (only one device can be connected at a time when using this configuration software).

Multiple Connections



Chapter 2 Hardware Connection

2.1 Pre-Installation Equipment Inspection

Equipment List:

- Main Unit
- Black Waterproof Plug-in Cable (70cm)
- Certificate of Conformity
- Installation Screw Kit

2.2 Interface Specifications

The power interface supports wide-range voltage input from 10-30V. When connecting the 485 signal lines, ensure the A and B wires are not reversed. Avoid address conflicts between multiple devices on the bus.

2.2.1 Sensor Wiring

Function	Wire Color	Description
Power Supply	Brown	Power Positive (10–30 VDC)
	Black	Power Negative (GND)
Communication	Yellow / Green	RS485-A
	Blue	RS485-B

2.3 Installation Method

1. Secure the sensor to the mounting plate by inserting screws through the mounting holes on the sensor.
2. Ensure the device is parallel to the ground. (Adjust the hand-tightening screws and check the level bubble to confirm parallel alignment.)
3. Remove the protective cover after installation is complete.

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Chapter 3: Communication Protocol

3.1 Basic Communication Parameters

Address Encoding	8-bit binary
Data Bits	8 bits
Parity	None
Stop Bits	1 bit
Error Check	CRC (Cyclic Redundancy Check)
Baud Rate	2400 bps / 4800 bps / 9600 bps (configurable, factory default: 4800 bps)

3.2 Data Frame Format Definition

Using the ModBus-RTU communication protocol, the format is as follows:
Initial Structure ≥4 bytes of time
Address Code = 1 byte
Function Code = 1 byte
Data Area = N bytes
Error Checking = 16-bit CRC code
End structure ≥4 bytes of time

Address code: Represents the transmitter's address, which is unique within the communication network (factory default 0x01).
Function code: Indicates the command function issued by the host. This transmitter supports function codes 0x03 (read register data), 0x06 (write register data), and 0x10 (write multiple register data).
Data Field: Contains the specific communication data. Note: For 16-bit data, the high byte precedes the low byte!
CRC Code: A two-byte checksum.

Host Inquiry Frame Structure:

Field	Length
Device Address	1 byte
Function Code	1 byte
Register Start Address	2 bytes
Register Length	2 bytes
CRC Low Byte	1 byte
CRC High Byte	1 byte

From-machine response frame structure:

Field	Length
Device Address	1 byte
Function Code	1 byte
Byte Count	1 byte
Data Field	2 bytes
First Data Field	2 bytes
Nth Data Field	2 bytes
CRC Check	2 byte

3.3 Register Address

Function codes can be read using 03/04 and written using 06/10.

Register Address (Hex)	PLC / Holding Register	Description	Access	Definition
0000H	40001	UV Intensity	Read Only	Actual value × 100
0001H	40002	UV Index	Read Only	Uploaded data equals the actual value
0052H	40083	UV Intensity Offset	Read / Write	Actual value × 100
07D0H	42001	Device Address	Read / Write	Range: 1–254, factory default: 1
07D1H	42002	Device Baud Rate	Read / Write	00 = 2400 bps
				01 = 4800 bps
				02 = 9600 bps

3.4 Communication Protocol Examples and Explanations

3.4.1 Reading the Ultraviolet Intensity Value from Device Address 0x01

Interrogation Frame: Read Value Function Code 03/04

Field	Value
Device Address	0x01
Function Code	0x03
Start Address	0x00 0x00
Data Length	0x00 0x01
CRC Low Byte	0x84
CRC High Byte	0x0A

Ultraviolet intensity:

Field	Value
Device Address	0x01
Function Code	0x03
Byte Count	0x02
Data Field	0x01 0x43
CRC Low Byte	0xF8
CRC High Byte	0x25

Ultraviolet Intensity:

0x143 (hexadecimal) = 323 => Ultraviolet Intensity = 3.23 mW/cm²

3.4.2 Reading Ultraviolet Index Value from Device Address 0x01

Interrogation Frame (Single Ultraviolet Device Reading Register 01)

Field	Value
Device Address	0x01
Function Code	0x03
Start Address	0x00 0x01
Data Length	0x00 0x01
CRC Low Byte	0x74
CRC High Byte	0x0A

Response frame (e.g., reading an ultraviolet index of 3)

Field	Value
Device Address	0x01
Function Code	0x03
Byte Count	0x02
Data Field	0x00 0x03
CRC Low Byte	0xF8
CRC High Byte	0x45

UV Index:

0003 (hexadecimal) = 3 => UV Index = 3

3.4.3 Modify Current Address

Interrogation Frame (Modify current address to 0x02)

Field	Value
Device Address	0x01
Function Code	0x06
Byte Count	0x07 0xD0
Data Field	0x00 0x02
CRC Low Byte	0x08
CRC High Byte	0x86

Response Frame

Field	Value
Device Address	0x02
Function Code	0x06
Byte Count	0x07 0xD0
Data Field	0x00 0x02
CRC Low Byte	0x08
CRC High Byte	0xB5

3.4.4 Modifying the Current Baud Rate

Interrogation Frame (Assuming the baud rate is modified to 9600)

Field	Value
Device Address	0x01
Function Code	0x06
Byte Count	0x07 0xD1
Data Field	0x00 0x02
CRC Low Byte	0x59
CRC High Byte	0x46

Response Frame

Field	Value
Device Address	0x01
Function Code	0x06
Byte Count	0x07 0xD1
Data Field	0x00 0x02
CRC Low Byte	0x59
CRC High Byte	0x46

3.4.5 Querying the Current Address Baud Rate

Interrogation Frame

Field	Value
Device Address	0xFF
Function Code	0x03
Start Address	0x07 0xD0
Data Length	0x00 0x02
CRC Low Byte	0xD1
CRC High Byte	0x58

Response Frame

Field	Value
Device Address	0x01
Function Code	0x03
Byte Count	0x04
Address Data	0x00 0x01
Baud Rate Data	0x00 0x01
CRC Low Byte	0x6A
CRC High Byte	0x33

The actual address of the device read is 01, with a baud rate of 0x01, which is 4800.

Chapter 4: Frequently Asked Questions and Solutions

Important Notes:

1. Upon receiving the product, verify the model number and other specifications.
2. Never connect wires while the power is on. Only apply power after confirming all wiring is correct.
3. Sensors are precision components. Do not disassemble them during use to avoid damage.

Troubleshooting:

1. If the reading displays as 0, check for light source availability and ensure the protective cover is not removed.
2. Verify correct 485 wiring and check for reversed connections.
3. Incorrect device address or duplicate addresses (factory default is 1).
4. Confirm power supply meets specified requirements.
5. Device malfunction.