Optical Rain Sensor

（485 Type）

ATO-SN-3001-GYL-N01

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Product Introduction

1.1 Product Overview

This instrument is an optical rain gauge designed to measure precipitation levels. It employs optical sensing principles internally, incorporating multiple optical probes for reliable rainfall detection. Unlike traditional mechanical rain gauges, optical rain gauges feature compact size, high sensitivity, dependability, and intelligent, low-maintenance operation. It finds extensive applications in smart irrigation, marine navigation, mobile weather stations, automated doors/windows, geological hazard monitoring, and other industries and fields.

Equipped with high-precision photo sensors, it delivers accurate illuminance measurements with output values in Lux.

It finds extensive applications in smart irrigation, marine navigation, mobile weather stations, automated doors/windows, geological hazard monitoring, and other industries and fields.

1.2 Features

■ Compact size, lightweight, and easy installation.

■ Low-power design for energy efficiency.

■ High reliability, operates reliably in high-temperature and high-humidity environments.

■ Maintenance-friendly design, resistant to leaf obstruction

■ Optical measurement ensures accurate readings.

■ RS485 signal output enables long-distance communication and convenient data collection.

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1.3 Main Technical Specifications

Rainfall Diameter	6 cm	
Supply Voltage	9–30 V DC	
Power Consumption	Less than 0.24 W	
Resolution	Rainfall	Standard 0.1mm
	Sunlight	1Lux
Typical Accuracy	Rainfall	±5%
	Sunlight	±7% (at 25°C)
Max Instantaneous Rainfall	24 mm/min	
Light Intensity Range	0–200,000 lux	
Output Method	RS485 output	
Operating Temperature	–40 to 60°C	
Operating Humidity	0–99% RH (non-condensing)	
Operating Pressure Range	Standard atmospheric pressure ±10%	
Long-Term Stability	Sunlight	≤5% per year

The performance data stated above was obtained under testing conditions using our company's test systems and software. To continuously improve our products, we reserve the right to modify design features and specifications without prior notice. Although this product offers high reliability, we recommend verifying that the equipment functions properly and meets all parameters before use to ensure it does not affect field operations.

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1.4 Product Appearance

Hardware Connection

2.1 Dimension
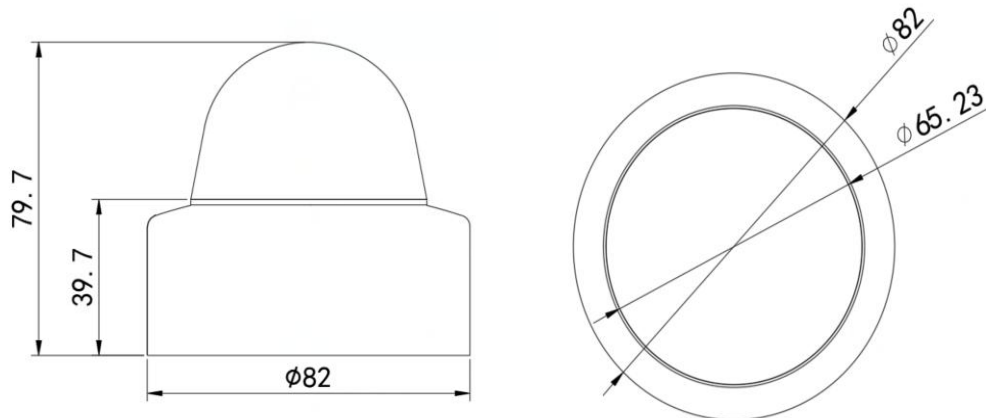
2.2   Pre-Installation Inspection

Ensure the rain gauge sensor housing surface is completely dry before installation. Any moisture or water droplets will cause measurement errors.

Optionally, place desiccant inside the housing.

Verify the housing is securely fastened, the PG7 connector below is locked tight, and there is no looseness.

2.3 Outdoor Installation and Commissioning

Install the rain gauge sensor in an open area free from obstructions above and around it.

First, mount the device onto the included mounting plate using four M4*35 304 stainless steel screws and nuts.

Then install the mounting plate at the designated location (which requires a φ5 circular hole). Ensure the plate is level before securing it with three M4*10 304 stainless steel screws and nuts to anchor both the plate and the device.
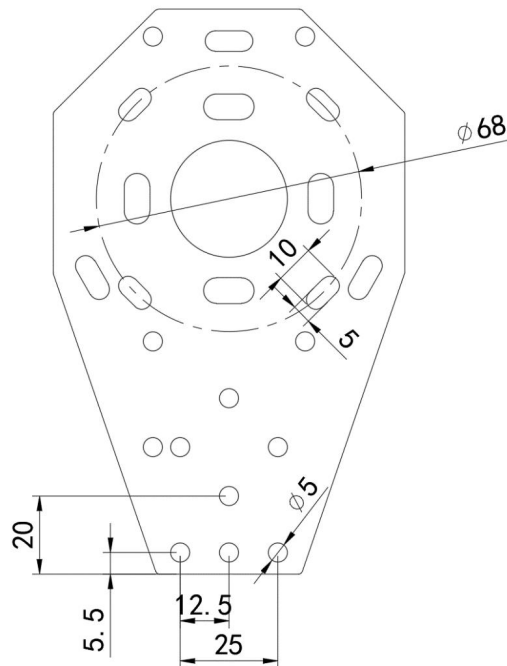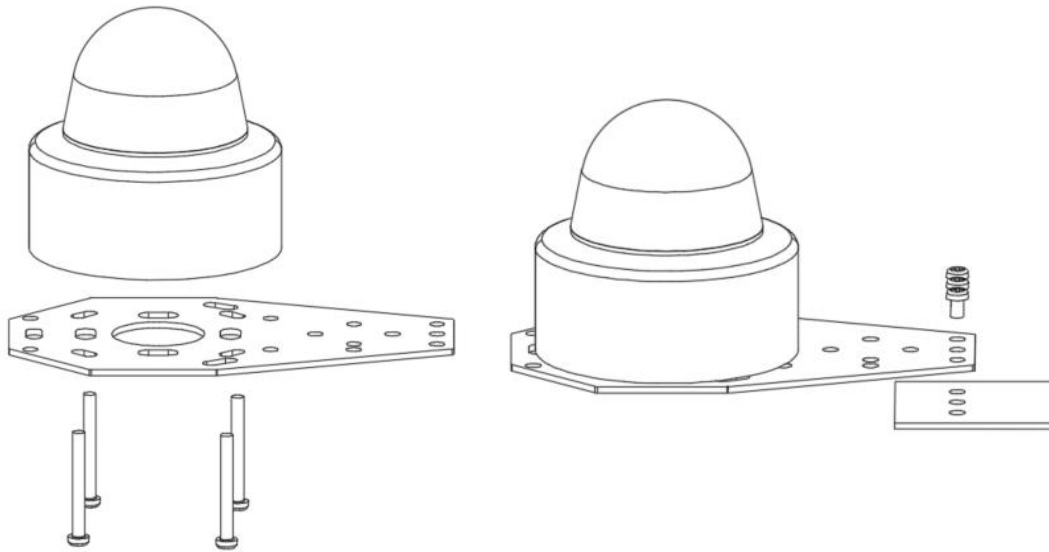
2.4 Wiring Instructions

Wire Color	Description	Line Color	Description
Brown Wire	Power Positive	Yellow Line	485A
Black Wire	Power Negative	Blue Line	485B

ATO   **Communication Protocol**

3.1 Basic Communication Parameters

Code	8-bit binary
Data Bits	8 bits
Parity Bit	None
Stop Bits	1 bit
Error Checking	CRC (Cyclic Redundancy Check)
Baud Rate	Configurable at 2400 bit/s, 4800 bit/s, 9600 bit/s; factory default is 4800 bit/s

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 check = 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 sent by the host. This transmitter only uses function code 0x03 (read register data).

Data Area: Contains the specific communication data. Note: For 16-bit data, the high byte comes first!

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CRC Code: A two-byte check code.

Host Inquiry Frame Structure:

Address Code	Function Code	Register Start Address	Register Length	Checksum Low Byte	Checksum High Bits
1 byte	1 byte	2 bytes	2 bytes	1 byte	1 byte

From-machine Response Frame Structure:

Address Code	Function Code	Number of Effective Bytes	Data Zone 1	Second Data Area	Data Area N	Checksum
1 byte	1 byte	1 byte	2 bytes	2 bytes	2 bytes	2 bytes

3.3 Register Address

Register Address	Content	Operation (Hexadecimal)	Scope, Content, and Definitions
0000H	Rainfall Value	03/06	Rainfall Value: Actual value multiplied by 10
0002H	High Byte of Irradiance	03	Illuminance: Actual value, 32-bit unsigned
0003H	Low Byte of Irradiance		
0050H	Irradiance Deviation Value	03/06	Illuminance Deviation Value: Default 0
0052H	Rainfall Sensitivity	03/06	Rainfall Sensitivity: Default 60
07D0H	Device Address	03/06	1~254 (Factory default 1)
07D1H	Device Baud Rate	03/06	0 represents 2400, 1 represents 4800, 2 represents 9600

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3.4 Communication Protocol Examples & Explanations

3.4.1 Query the Current Total Rainfall Value

Query Frame:

Address Code	Function Code	Start Register	Data Length	Checksum Low Bit	Check Digit High Bit
0x01	0x03	0x00 0x00	0x00 0x01	0x84	0x0A

Response Frame:

Address Code	Function Code	Number of Effective Bytes Returned	Rainfall Value	Checksum Low Bit	Check Digit High Bit
0x01	0x03	0x02	0x00 0x0A	0x38	0x43

Current total rainfall value: (Uploaded value multiplied by 10)

000A (hexadecimal) = 10 (decimal) → Rainfall value: 1.0mm

Note: Rainfall data is automatically reset and recalculated after each power-up,

or can be cleared manually via the following operation.

3.4.2 Clear Rainfall Data

Query Frame:

Address Code	Function Code	Start Register	Clear Command	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x00 0x00	0x00 0x5A	0X09	0XF1

Response Frame:

Address Code	Function Code	Start Register	Clear Command	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x00 0x00	0x00 0x5A	0X09	0XF1

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3.4.3 Query Current Illuminance

Query Frame:

Address Code	Function Code	Start Register	Data Length	Checksum Low Bit	Check Digit High Bit
0x01	0x03	0x00 0x02	0x00 0x02	0x65	0xCB

Response Frame:

Address Code	Function Code	Number of Effective Bytes Returned	High Illumination Level	Low Illumination Level	Checksum Low Bit	Check Digit High Bit
0x01	0x03	0x04	0x00 0x03	0x0D 0x40	0x0F	0x53

Illuminance Calculation Notes:

This protocol applies only to transmitters with a 0~200000Lux measurement range, where the unit is 1Lux.

30D40 H (hexadecimal) = 200000 => Illuminance = 200000 Lux

3.4.4 Modify the Current Address

Query Frame: (If the current address is 01, change the address to 02)

Address Code	Function Code	Starting Address	Modify Value	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

Response Frame:

Address Code	Function Code	Starting Address	Modify Value	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x07 0xD0	0x00 0x02	0x08	0x86

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3.4.5 Modify the Current Baud Rate

Query Frame: (If the current baud rate is 4800, change it to 9600)

Address Code	Function Code	Starting Address	Modify Value	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

Response Frame:

Address Code	Function Code	Starting Address	Modify Value	Checksum Low Bit	Check Digit High Bit
0x01	0x06	0x07 0xD1	0x00 0x02	0x59	0x46

3.4.6 Address Lookup

When users forget an address, they can use the following function code to look up the address.

Query Frame:

Address Code	Function Code	Starting Address	Data Length	Checksum Low Bit	Check Digit High Bit
0xFF	0x03	0x07 0xD0	0x00 0x01	0x91	0x59

Response Frame:

Address Code	Function Code	Number of Effective Bytes Returned	Address	Checksum Low Bit	Check Digit High Bit
0xFF	0x03	0x02	0x00 0x01	0x50	0x50

The address code read is the device's actual address: 01

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Maintenance and Care

4.1 Daily Maintenance

As this instrument operates outdoors under harsh conditions, keep its surface clean by regularly wiping with a soft cloth. For continuous operation, clean the instrument monthly and thoroughly every three months.

4.2 Usage Warning

1. Do not use the rain gauge in any location where incorrect sensor readings could lead to serious consequences.
2. System designers or integrators must ensure fault tolerance to prevent catastrophic outcomes resulting from the failure of any single component, including the rain gauge.
3. The company assumes no liability for any consequences arising from incorrect sensor readings.