RK300-10S Visibility sensor

Revision time	Reviser	Current Version	Remarks
20250411	SUN	V5.0	

User Notice

Please read this manual carefully before use to ensure safe and optimal operation. Retain this manual for future reference.

Pre-Use Instructions

- Carefully review this manual and follow all operational and safety guidelines to prevent malfunctions and hazards.

Unpacking Inspection

- Upon receipt, carefully inspect the sensor device and accessories for any shipping damage.
- If damage is detected:
- Immediately notify the manufacturer and distributor.
- Retain all packaging materials for return or replacement processing.

Parts List

Item	Quantity	Remarks
Visibility sensor	1	
Cable	1	Customizable

1. Product Introduction

The forward scatter measurement principle and unique design ensure the output accurate and reliable in all weather conditions and will not be influenced by local lights sources, even the flash. With a measurement range of 10m to 10km, the sensor is made of stainless steel, suitable for harsh environments.

Finished with a high quality powder coat, the sensor will provide years of reliable service. Heating of the optical windows and sensor hoods is provided as standard allowing use in the harshest of conditions. Both optical windows are monitored for contamination and the visibility output is automatically compensated to reduce maintenance requirement.

2. Product Features

- Applicable to highway, port, ship and environmental visibility detection
- Strong and lightweight
- Hood heating for use in extreme environments
- Simple structure, good working stability, high reliability, low energy consumption, easy to use and maintain
- Not affected by local lights
- Low maintenance requirement

3. SPECIFICATIONS

Item	Technical Specification
Measurement Range	10m-10km(Typ.),10m-30km
Measurement Principle	Forward scatter
Resolution	1m
Accuracy	±10%
Data update rate	1s(default)
Supply	12-24VDC
Output	RS485,RS232
Power Consumption	Approx.1W, (heating: 6W MAX.)
Dimension	646*328*176mm
Installation	Hoop installation
Lifetime	>10 Years
Operating Temperature	-40℃-+50℃@0-100%RH(No condensation)
Weight	9.1kg
Shell Material	Stainless steel

4. Electrical Connections

Cable	RS485	RS232
Red	V+	V+
Black/Blue	V-	V-
Yellow	RS485A	TXD
Green/Brown	RS485B	RXD
White		Signal GND

5. Product Dimensions

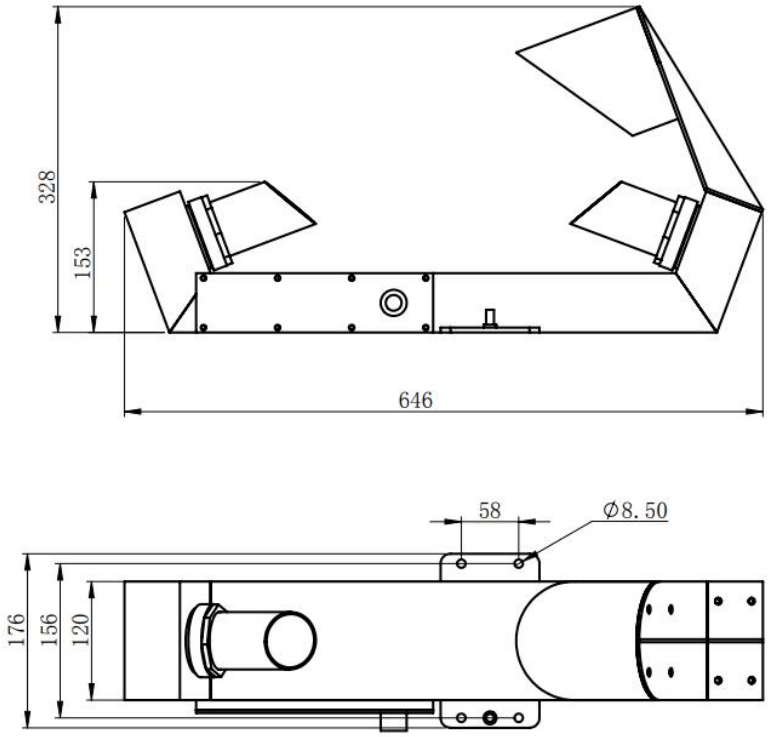

Figure 5.1
Dimensional Specifications Unit：mm

6. Communication Protocol（MODBUS-RTU）

Parameter	Value
Data Bits	8 bits
Check bit	EVEN
Stop Bit	1 bit
Baud Rate	9600 bps
Slave Address	0x01 (Factory Default)

8.1 Read real-time data

Client sends:

01 03 00 03 00 06 35C8

Return:

01 03 0C 07 D0 00 00 08 34 00 00 08 98 00 00 3992

8.1.1 Description of Return data format

No.	Conception	Byte Number	Description	Remarks
1	Address block	1	Address(0x01)	0x01
2	Function code	1	Only read(0x03)	0x03
3	Number of bytes	1	0x0C	12bytes
4	Data block	4	Visibility(10s)	0x000007D0 (2000)
		4	Visibility(1 min)	0x00000834 (2100)
5		4	Visibility(10 min)	0x00000898 (2200)
6	Check block	2	CRC	0x39,0x92

8.2 Instrument configuration(you can choose ASCII or Hex)

Through the connecting with the instrument, some parameters of the instrument can be configured, such as changing the communication address and changing the Baud rate

- **Command one: Enter the Settings mode**

Sent

（ASCII） >*\r\n

（Hex） 3E 2A 0D 0A

Response

（ASCII） \n>CONFIGURE MODE\r\n

（Hex） 0A 3E 43 4F 4E 46 49 47 55 52 45 20 4D 4F 44 45 0D 0A

- **Command two: Set the serial port configuration**

Sent

（ASCII） >CUS 9600 8-N-1\r\n

（Hex） 3E 43 55 53 20 39 36 30 30 20 38 2D 4E 2D 31 0D 0A

Response

（ASCII） >CMD IS SET\r\n

（Hex） 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note: The CUS is required followed by the serial port parameters that will need to be set. If it is not followed by the parameters, the command becomes the current query configuration.(Such as sent: '>CUS\r\n', Response:' \n>COM USART SET : 9600 N-8-1\r\n')

- **Command three: Set the address**

Sent

（ASCII） >ID 2\r\n

（Hex） 3E 49 44 20 32 0D 0A

Response

（ASCII） >CMD IS SET\r\n

（Hex） 3E 43 4D 44 20 49 53 20 53 45 54 0D 0A

Note: This 2 is the address you want to set(set according to the need,1-255)，which must be in decimal format, If 'ID' is not followed by address, the command becomes the current query address(Such as sent: >ID\r\n, Response: ID(HEX) : 02\r\n)

- **Command four: Reset**

Sent:

（ASCII） >RESET\r\n

（Hex） 3E 52 45 53 45 54 0D 0A

After the instrument receives this command successfully，Soft reset is performed.

- **Command five: Manually exit the Settings mode**

Sent:

（ASCII） >!\r\n

（Hex） 3E 21 0D 0A

Response:

（ASCII） \n>NORMAL MODE\r\n

（Hex） 0A 3E 4E 4F 52 4D 41 4C 20 4D 4F 44 45 0D 0A

Steps:

1. Set the address

'Command one' => 'Command three' => 'Command five' => 'Command four'

2. Set the serial port configuration

'Command one' => 'Command two' =>' Command five' =>' Command four'

Note:

1. There are two spaces in the 'CUS 9600 8-N-1'to note,'8-N-1' separated by'-', no spaces.

Baud rate	Data Bits	Parity	Stop Bits
2400-115200	8	N:NONE, E:EVEN, O:ODD	1 2

2. Any setting instruction (2, 3) must first let the instrument enter the setting mode, and the setting mode will be automatically closed if no operates on setting within 15-second. so the setting instruction must be input within 15 seconds. and the 15-second countdown reset restart after successful input.

3. After setting the instrument, "Command four must be sent to make the instrument soft reset before the new setting can take effect.

4. "\r\n" is the carriage return line feed, corresponding to HEX (0x0D,0x0A)

9. Installation Guidelines

- The measured values should represent the meteorological conditions of the surrounding environment. The ideal installation site should be at least 10 meters away from large buildings or other facilities that generate heat and obstruct rainfall. In addition, the influence of shade should also be avoided.
- The site should be free of obstacles, reflective surfaces, and obvious pollution sources that interfere with optical measurements.
- The installation direction of the instrument should prevent direct sunlight from entering the field of view of the receiver. When installing in the Northern Hemisphere, the receiver of the instrument should face north.

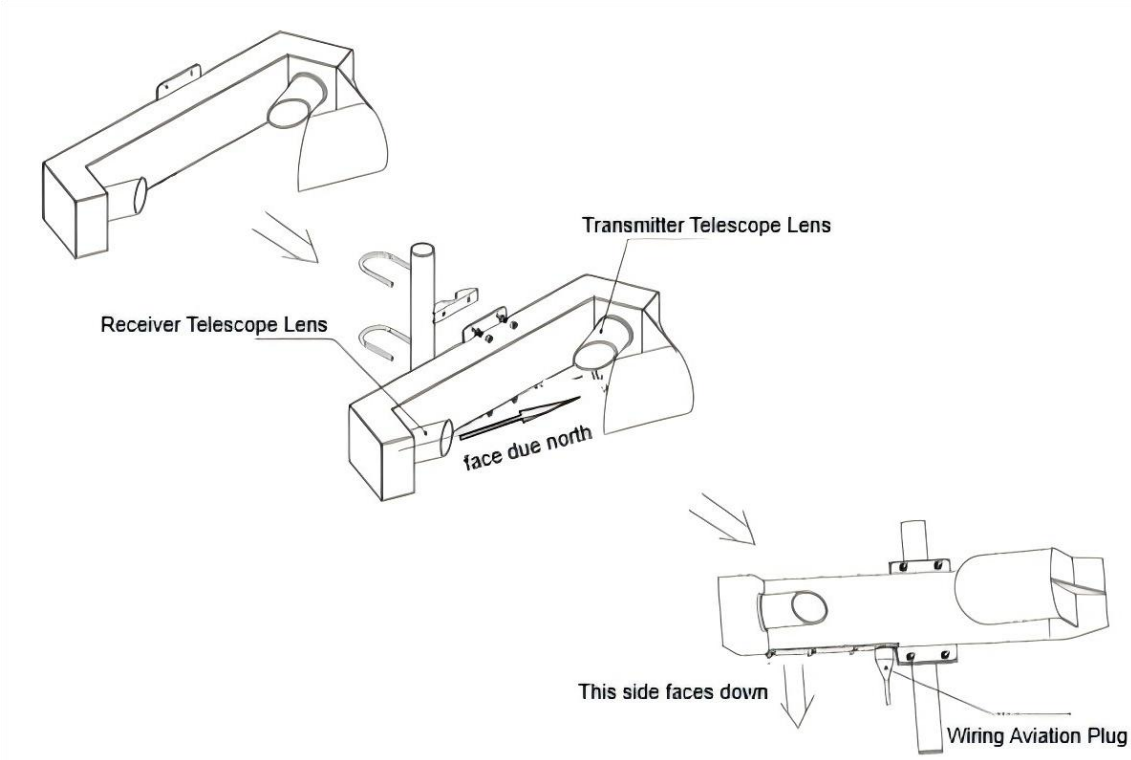

Figure 9.1 Installation Steps

7. Precautions

Powered Wiring Prohibition

- Do not connect wires while powered. Only energize the sensor after confirming correct wiring.

Component Modification Restriction

- Do not alter factory-soldered components or pre-connected wires.

Precision Handling Requirement

The sensor is a precision device. Avoid:

- Unauthorized disassembly
- Do not touch internal components to prevent product damage

Note: Unauthorized modifications void the warranty.

8. Troubleshooting

Incorrect Output Signals (Analog/RS232/RS485):

- Verify wiring correctness and secure connections.
- Check if the serial port is occupied or malfunctioning.
- Confirm serial port settings (baud rate, data/stop bits) match device requirements.

- **The visibility value is significantly too high.**

  （1）This condition can be caused by multiple factors. In most cases, it is due to the light path between the transmitter and receiver being blocked;

  （2）The transmitter or receiver lens tube is clogged;

- **The visibility value is significantly too low.**

  （1）Something is interfering with the sampling. Check for the presence of branches, cobwebs, or other substances within or near the sampling space;

  （2）Verify whether the instrument was installed in strict accordance with the installation precautions;

  （3）Manual testing and verification of the instrument's visibility accuracy and sensitivity by non-professionals are unnecessary and meaningless, as each visibility instrument undergoes strict calibration and verification before leaving the factory;

Persistent Issues:

- Contact the manufacturer if the above steps fail to resolve the problem.

9. Product Maintenance

Maintenance and Safety

- The lens protection window of the visibility meter should be kept clean to ensure accurate measurement results. When the window is dirty, the measured visibility values will be higher than actual. Typically, the window needs to be cleaned every three months, but in areas such as highways, coastal regions, ships, and windy/dusty areas in northern China, cleaning should be more frequent. Check that there is no condensed water, ice, or snow on the protective cover and window glass, and remove dust from both the inner and outer surfaces of the protective cover.
- Use a soft, lint-free cotton cloth or deseeded cotton with ethanol to wipe the window glass, taking care not to scratch the glass surface.
- Unauthorized disassembly, modification, or repairs may void the warranty and lead to malfunctions.

Troubleshooting Protocol

- In case of malfunction, refer to the troubleshooting section of this manual.
- Do not attempt unauthorized disassembly or repairs.
- Contact the manufacturer's after-sales department directly for technical support.

10. Warranty Terms

This product comes with a one-year warranty, starting from the date of delivery. Within twelve months, the Company shall be responsible for free repair or replacement of any failure caused by sensor quality issues (non-human damage). Fees will be charged for repairs or replacements after the warranty period expires.

CE Complies with applicable CE directives.

Manual subject to change without notice.

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