

RK300-10 Visibility Sensor



Revision Time	Reviser	Current Version	Remarks
20250626	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.

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 (Can be extended to 75km), the sensor is constructed from robust aluminum, suitable for use in road and aviation constructed from robust aluminum.

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
- Using aluminum alloy material, 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,10m-75km
Measurement Principle	Forward scatter
Resolution	1m
Accuracy	±10%
Weather phenomena (optional A)	Identify four different types of precipitation: drizzle, light rain, moderate rain, and heavy rain Identify types of states such as rain, snow, thin fog (smoke), thick fog (smoke), etc
Weather phenomena (optional B)	Including the parameters in option A, it can also measure the intensity of precipitation: Measurement range: 0-200mm/h Resolution: 0.1mm (rainfall)
Data update rate	1s(default)
Supply	12-24VDC
Output	RS485,RS232
Power Consumption	Approx.1W, (heating: 6W MAX.)
Dimension	710*250*175mm(Aluminum alloy),646*328*176mm(stainless steel)
Installation	Hoop installation
Lifetime	>10 Years
Operating Temperature	-40°C~+50°C@0-100%RH(No condensation)
Weight	3kg(Aluminum alloy),20kg(stainless steel)
Shell Material	Aluminum alloy or stainless steel ①

① When used in corrosive environments such as the seaside, please choose stainless steel material

4. Electrical Connections

Connector (Cable)	RS485/4-20mA
Red	V+
Black	V-
Yellow	RS485A
Green	RS485B
Brown	4-20mA+
White	4-20mA-

5. Output Types & Formulas

Current Type	Range:10-50000m	$V=(I-4)/(20-4)*(50000-10)+10$
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V: Visibility Data (m);

I: Transmitter output current in mA.

6. Product Dimensions

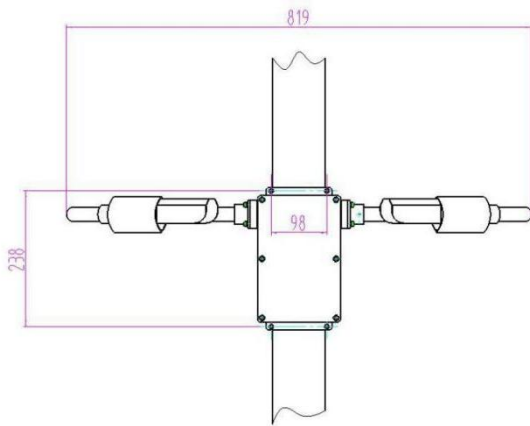


Figure 6.1
Front View with Specific Dimensions

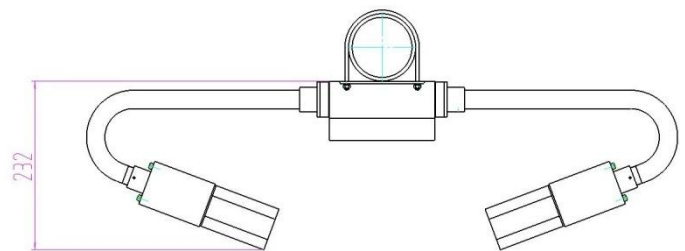


Figure 6.2
Top View with Dimensional Details

7. Communication Protocol (MODBUS-RTU)

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

8.1 Read real-time data (Read Visibility)

Client sends:

01 03 00 00 00 01 840A

Return:

01 03 02 27 10 A278

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	0X02	2bytes
4	Data block	2	Visibility Data	0x2710(10000m)
5	Check block	2		0xA2 0x78

8.2 Read real-time data (Read data with weather phenomenon types)

Client sends:

01 03 00 00 00 16 C404

Return:

01 03 2C 07 D0 00 3D 00 03 07 D0 00 00 08 34 00 00 08 98 00 00 00 03 CC CD 42 F6 00
00 00 00 CC CD 42 62 00 00 00 00 00 00 42 B2 00 7B 00 00 5B C4

8.2.1 Description of return data format

Conception	Byte Number	Description	Remarks	notes
Address block	1	Address(0x01)	0x01	
Function code	1	Only read(0x03)	0x03	
Number of bytes	1	0X2C	2bytes	
Data block	2	Visibility Data	0x07D0(2000m)	
Data block	2	Wx Phenom Type	0x003D(61)	Light Rain (see Attachment 1).
Data block	2	Device status	0x0003	Convert to binary:0011 (see Attachment 2).
Data block	4	10-second visibility	0x07D0 0x0000(2000m)	32-bit Long Integer
Data block	4	1-minute Visibility	0x0834 0x0000(2100m)	32-bit Long Integer
Data block	4	10-minute Visibility	0x0898 0x0000(2200m)	32-bit Long Integer
Data block	2	Number of Rainfall Events	0x0003(3)	Three Rainfall Events
Data block	4	Accumulated Precipitation	0x42F6CCCD $\geq$ 123.4(mm)	32-bit Floating Point Number
Data block	4	Reserve	/	/
Data block	4	Rainfall Intensity	0x4262CCCD $\geq$ 56.7(mm/h)	32-bit Floating Point Number
Data block	4	Reserve	/	/
Data block	4	Last Event Acc.Precip	0x42B20000 $\geq$ 89(mm)	32-bit Floating Point Number
Data block	4	Last Event Rain Dur	0x007B 0x0000(123min)	32-bit Long Integer
Check block	2		0x5B 0xC4	

8.3 Clear Rainfall Acc.

Client sends:

01 10 00 0A 00 02 04 00 00 00 00 73 D0

Return:

01 10 00 0A 00 02 61 CA

8.4 Clear Rainfall Event Count

Client sends:

01 10 00 09 00 01 02 00 00 A6C9

Return:

01 10 00 09 00 01 D1 CB

8.5 Appendix 1. Weather Phenomenon Status Table

Decimal Value	Type (English)
00	None / Instrument Starting Up
04	Thin Smoke or Mist
20	Smoke or Fog
30	Thick Smoke or Fog
40	Falling Objects / ID in Progress
50	Light Drizzle
51	Light Drizzle (Minor)
52	Moderate Drizzle
53	Heavy Drizzle
60	Rain
61	Light Rain
62	Moderate Rain
63	Heavy Rain
70	Snow
71	Light Snow
72	Moderate Snow
73	Heavy Snow
89	Hail / Solid Precipitation
90	Rain and Snow Mixed

8.6 Appendix 2. Device Status Table

Bit	BIT15	BIT14	BIT13	BIT12	BIT11	BIT10	BIT9	BIT8
Value	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0
Desc								
Bit	BIT7	BIT6	BIT5	BIT4	BIT3	BIT2	BIT1	BIT0
Value	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0
Desc							Weather Phenomenon Type	Real-time Visibility
							Accumulated Rainfall	10-second Visibility
							Rainfall Intensity	1-minute Visibility
							Last Event Rainfall Accumulation	10-minute Visibility
							Last Event Rainfall Duration	
							Number of Rainfall Events Since Startup	

8.7 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

8.7.1 Steps:

Set the address:

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

Set the serial port configuration:

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

Notes:

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

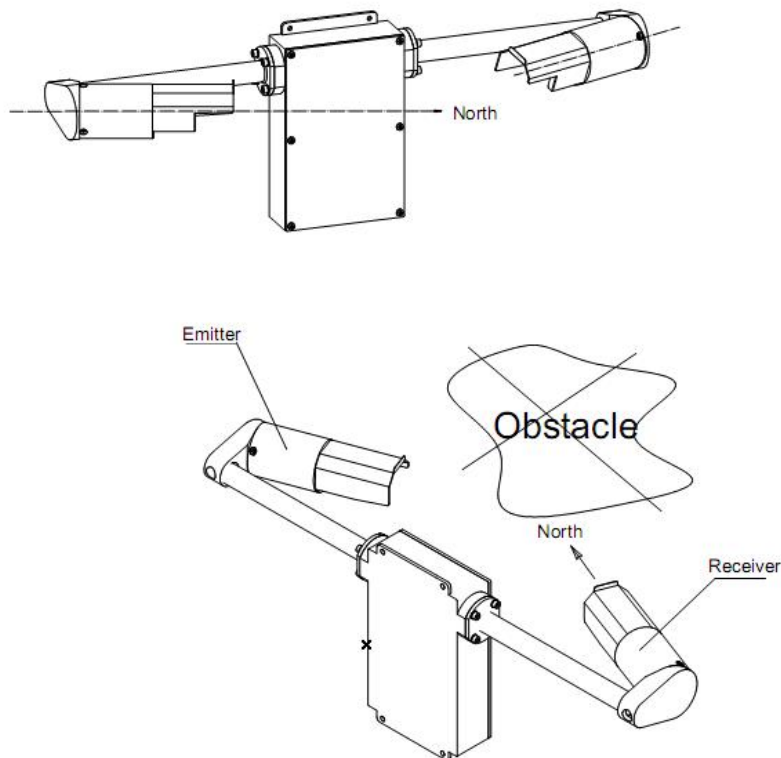
Baud rate	Data Bits	Parity	Stop Bits
2400-115200	8	N:NONE, E:EVEN, O:ODD	1 2

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 Precautions



Please note that receiver hood should be oriented to NORTH, forbid to orient it to EAST or WEST to avoid interference from sun light

10. Precautions

Package and Model Verification

- Ensure the packaging is intact and verify the sensor model and specifications match your purchased product.

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

Environmental Protection

- Prevent sticky particles from entering the sensor.
- Avoid moisture exposure to maintain measurement performance.

Note: Unauthorized modifications void the warranty.

11.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.

Persistent Issues:

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

12.Product Maintenance

Maintenance and Safety

- Regularly clean and inspect the sensor to maintain performance.
- Do not expose the sensor to extreme temperatures, moisture, or corrosive substances unless explicitly specified.
- 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.

13.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.

 Complies with applicable CE directives.

Manual subject to change without notice.

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