CWT-UWD series RS485 Small Weather Station Manual

Product description

This small integrated weather station can be widely used in environmental detection, integrating ultrasonic wind speed and direction, temperature and humidity, noise collection, PM2.5 and PM10, atmospheric pressure, light, and accumulated rainfall

it adopts standard MODBUS-RTU protocol, RS485 output, and the communication distance can reach up to 2000m. The data can be uploaded to the customer's monitoring software or PLC, HMI by RS485.

It is widely used in wind speed and wind direction measurement in the fields of meteorology, ocean, environment, airport, port, laboratory, industry, agriculture and transportation.

Features

- Adopt multi-collection device integrated design, easy to install.
- Wind speed and direction are measured by ultrasonic, no angle limit, 360° omnidirectional, and data of wind speed and wind direction can be obtained at the same time.
- Noise acquisition, accurate measurement, range up to 30dB~130dB.
- Simultaneous acquisition of PM2.5 and PM10, range: 0-1000ug/m3, resolution 1ug/m3, unique dual-frequency data acquisition and automatic calibration technology, consistency up to ±10%.
- Measure the ambient temperature and humidity, the measuring unit is imported from Switzerland, and the measurement is accurate.
- Wide range of 0-120Kpa pressure range, can be applied to various altitudes.
- Adopt special 485 circuit, stable communication.

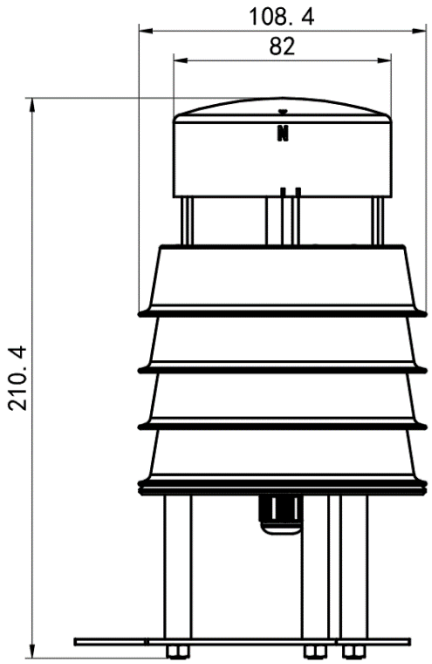
Parameters measuring

Wind speed	• Measuring range: 0~40m/s, start at 0.5m/s • Accuracy: ±0.5+2%FS • Response time: 1s
Wind direction	• Measuring range: 0~359° • Accuracy: ±3° • Response time: 1s
Humidity	• Measuring range: 0~99%RH • Accuracy: ±3%RH (60%RH,25℃) • Long-term stability: ≤1%/year • Response time: ≤1s
Temperature	• Measuring range: -40℃~+80℃ • Accuracy: ±0.5℃（25℃） • Long-term stability: ≤0.1℃/year • Response time: ≤1s
Atmospheric pressure	• Measuring range: 0-130Kpa • Accuracy: ±0.15Kpa@25℃ 101Kpa • Long-term stability: -0.1Kpa/year • Response time: ≤1s
Noise	• Measuring range: 30dB~120dB • Accuracy: ±0.5dB • Long-term stability: ≤3db/year • Response time: ≤1s
PM10/PM2.5	• Measuring range: 0-1000ug/m3 • Accuracy: ±3%FS（@100μg/m3、25℃、50%RH） • Particulate counting efficiency: 50%@0.3μm, 98%@>=0.5μm • Long-term stability: ≤1%/year • Response time: ≤90s
Illumination	• Measuring range: 0~200000 Lux • Accuracy: ±7% (25℃) • Long-term stability: ≤5%/year • Response time: ≤0.1s
Rainfall	• Accuracy: ±5% • Resolution: 0.1mm • Maximum instantaneous rainfall: 24mm/min • Rain sensing diameter: 6cm
Solar irradiance	• Measuring range: 0~1800W/m² • Accuracy: ≤±3%@150W/m² • Long-term stability: ±3% • Response time: ≤10s

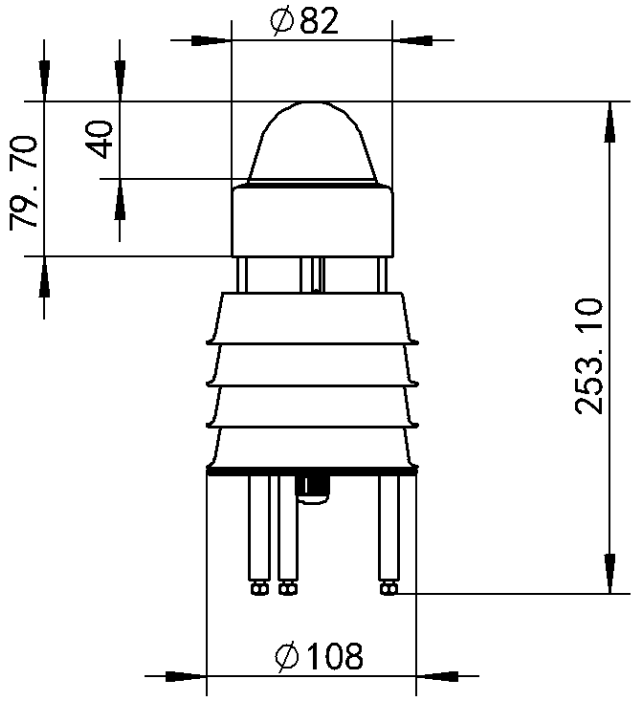
Base parameter

DC power Supply	10-30vdc
Maximum power consumption	0.7W (12V)
Working environment	-40～80℃，0～95%RH
Protection level	IP54
Output	RS485 (Modbus RTU protocol)

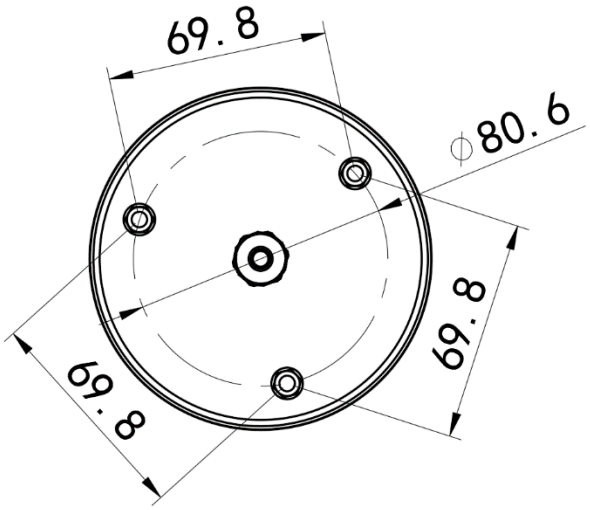
Size and installation

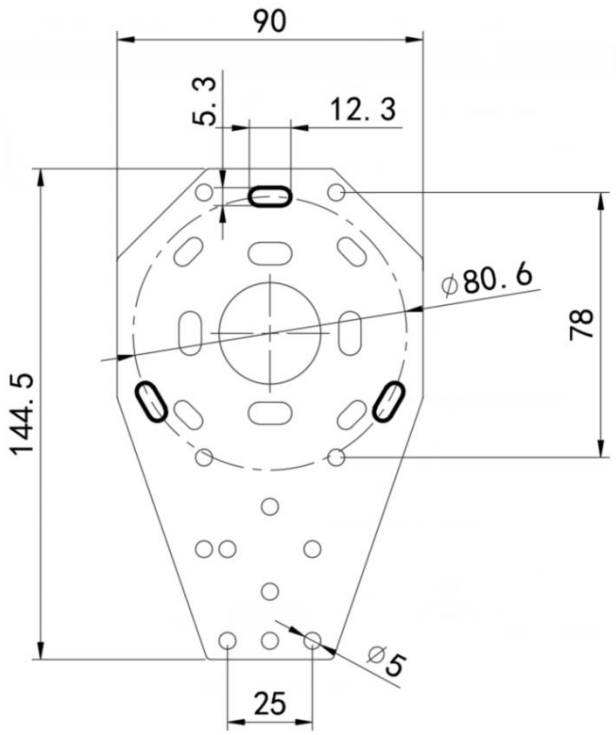


Unit: mm



the size with optical rainfall





Wiring

Cable color	Description
Brown	DC10-30V)
Black	GND
Yellow	RS485 A+
blue	RS485 B-

RS485 communication

Default parameters: 4800,n,8,1

Default device address is 1

Modbus RTU protocol

Read status registers, read function code: 0x30					
Register address (Hex)	PLC Address (decimal)	meaning	Number of bytes	content	remark
1F4	40501	Wind speed	2	0.01m/s	read
1F5	40502	Wind strength	2	1	level value corresponding to the wind speed
1F6	40503	Wind direction (0-7 direction)	2	0-7	0：north 1：northeast 2：east 3：southeast 4：south 5：southwest 6：west 7：northwest
1F7	40504	Wind direction (0-360°)	2	1°	0° corresponds to North, increase degrees clockwise, 90° corresponds to East
1F8	40505	Humidity	2	0.1%RH	read
1F9	40506	Temperature	2	0.1C	read
1FA	40507	Noise	2	0.1dB	read
1FB	40508	PM2.5	2	1ug/m3	read
1FC	40509	PM10	2	1ug/m3	read
1FD	40510	Atmospheric pressure	2	0.1kpa	read
1FE	40511	Illuminance (0-200000 Lux) high 16 byte	2	1Lux	read
1FF	40512	Illuminance (0-200000 Lux) low 16 byte	2	1Lux	read
200	40513	Illuminance (0-200000 Lux)	2	100Lux	read
201	40514	Rainfall	2	0.1mm	read
202	40515	Reserve	2		read
203	40516	Solar irradiance	2	1 W/m²	
Parameters registers, read function code: 0x30 (0x40), write function code: 0x60					
07D0	42001	Slave ID	2		1-254
07D1	42002	Baud rate	2		0：2400 1：4800 (default) 2：9600 3：19200 4：38400 5：57600 6：115200 7：1200

Calibration register:

Register address (Hex)	PLC Address (decimal)	Content	Meaning
6000	424577	Wind Direction Offset Register	0 means normal direction 1 means the direction is offset by 180°
6001	424578	zero wind speed register	Write 0xAA, after waiting for 10s, the speed will be zeroed
6002	424579	zero rainfall register	Write 0x5A, zero the rainfall value
6003	424580	Rainfall sensitivity value	The default is 11H. After reducing it, the rainfall sensitivity can be increased.

How is the rainfall calculated?

The rainfall value is a cumulative value, it will keep accumulating until the power off (automatically reset to zero). Also, rainfall value can be reset by writing 0x5A to register 6002 (see above table)

How does it sense the rain?

Water soaks the two screws, causing a short circuit. Then the rain falls on this transparent cover and the counting begins. the resolution of the rain measurement is 0.1mm. When the sensor detects 0.1mm of rainfall, it sends a pulse signal with a duration of 50ms.

E.g., read wind speed:

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x01	0xF4	0x00	0x01	0x C4	0x04

Sensor responds:

Address	Function Code	Number of byte	Wind speed	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x02	0x00 0x7D	0x78	0x65

Wind speed: 007D H= 125 => Wind speed = 1.25M/S

E.g., read wind direction (0-7):

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x01	0xF6	0x00	0x01	0x65	0xC4

Sensor responds:

Address	Function Code	Number of byte	wind direction (0-7)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x02	0x00 0x02	0x39	0x85

Calculates:

wind direction (0-7): 0002 H= 2 it's east wind

0-7 direction	0-360° degree	direction
0	0°	north
1	45°	northeast
2	90°	east
3	135°	southeast
4	180°	south
5	225°	southwest
6	270°	west
7	315°	northwest

E.g., read humidity and temperature:

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x01	0xF8	0x00	0x02	0x44	0x06

Sensor responds:

Address	Function Code	Number of byte	humidity	temperature	Error Check (Lo)	Error Check (Hi)
0x01	0x03	0x04	0x01 0xFE	0x00 0xE6	0x1B	0xB5

Calculates:

humidity:1FE H= 510=> humidity = 51%RH

temperature: E6 H= 230=> temperature = 23C

Set slave ID

E.g., set slave ID=2, Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	ID	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD0	0x00 0x02	0x08	0x86

Sensor responds:

Address	Function Code	Start Address (Hi)	Start Address (Lo)	ID	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD0	0x00 0x02	0x08	0x86

Set baud rate

E.g., set baud rate to 9600, Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	command	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD1	0x00 0x02	0x59	0x46

Sensor responds:

Address	Function Code	Start Address (Hi)	Start Address (Lo)	command	Error Check (Lo)	Error Check (Hi)
0x01	0x06	0x07	0xD1	0x00 0x02	0x59	0x46

Enquiry slave ID

Master sends

Address	Function Code	Start Address (Hi)	Start Address (Lo)	Number of Points (Hi)	Number of Points (Lo)	Error Check (Lo)	Error Check (Hi)
0xFF	0x03	0x07	0xD0	0x00	0x01	0x91	0x59

Sensor responds:

Address	Function Code	Number of Points	address	Error Check (Lo)	Error Check (Hi)
0xFF	0x03	0x02	0x00 0x01	0x50	0x50