

## Product Description:

TWS ultrasonic is a specialized small instrument applied to monitor dust at construction sites. It can monitor two meteorological elements, Wind speed and Wind direction, and can also monitor two environmental factors, PM2.5 and PM10. The system is modularized and can be configured flexibly. Small volume, low cost, and it's suitable for industrialized intensive stationing monitoring.

- Maintenance free design
- Standard output protocol RS485
- Small volume, light weight
- Installation height is unrestricted
- Low power consumption, high precision
- China's first production company



## Technical specification:

Factor	Measuring range	Resolution	Accuracy	Measuring principle
Wind speed	0~75m/s	0.1m/s	0.3m/s or 3%	Ultrasonic
Wind direction	0~360°	1°	3°	Ultrasonic
PM2.5	0~1000ug/m <sup>3</sup>	0.3ug/m <sup>3</sup>	±15% or ±10ug/m <sup>3</sup>	Laser scattering
PM10	0~1000ug/m <sup>3</sup>	0.3ug/m <sup>3</sup>	±15% or ±10ug/m <sup>3</sup>	Laser scattering
Optional configuration function (Built-in sensor): GPS-a01, WiFi-a02, Ethernet-a03, Electronic compass-b01, GPS-b02, Heating(48W)-c01, Heating(100W)-c02, Battery-d01.				

## Packing list

- a set sensor
- a line 3.5m cable
- a copy instruction
- a copy certificate/warranty
- a copy packing list

## Safety Instructions



Installation and commissioning must be carried out by suitably qualified specialist personnel only.  
Never take measurements on or touch live electrical parts.  
Pay attention to the technical data and storage and operating conditions.

## Designated Use



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## Incorrect Use



If the equipment is installed incorrectly,

- It may not function.
- It may be permanently damaged.
- Danger of injury may exist if the equipment is allowed to fall.

## Guarantee

The guarantee period is 12 months from the date of delivery. The guarantee is forfeited if the designated use is violated

## Brand Names

All brand names referred to are subject without limitation to the valid trademark and ownership rights of the respective owner.

## Wind:

Wind speed and wind direction measurement, using 4 ultrasonic sensors, can be measured cyclically in all directions. High frequency and high sensitivity ultrasonic transmission can avoid electromagnetic interference in various industrial places and has high reliability.

## PM2.5 and PM10:

Importance of particulate monitoring: ultrafine particulate matter (PM1), suspended particulate matter (which can be incorporated into lung particulate matter), particulate matter (PM10), particulate matter (PM) is a tiny solid or liquid substance suspended in the Earth's atmosphere, which may include dust, Biological pollutants, such as bacteria, mold, pollen; particulate pollutants such as soot, fly ash, cement dust, etc., the size of particulate matter (PM) varies from 0.1 microns to 100 microns.

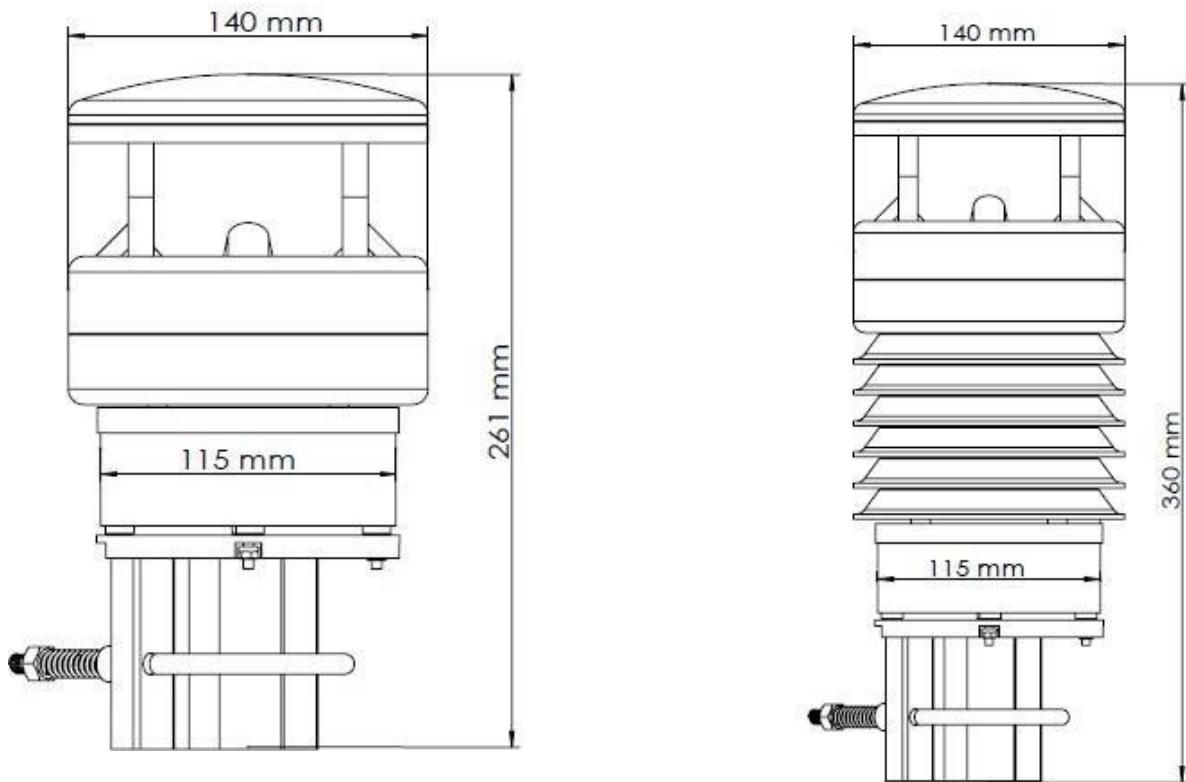
Sources of particulate matter: thermal power plants, automotive fuel emissions, open flames, atmospheric dust, smog, cement industry, natural resources, etc.

Particles that are more harmful to health are generally filtered in the cilia and mucus of the nose and throat, but the particles are less than 10 microns and can deposit in the bronchi and lungs causing health problems. The effects of inhaled particulate matter on humans and animals include asthma, lung cancer, cardiovascular disease, respiratory diseases, premature birth, birth defects and premature death.

This product uses laser scattering to collect the content of particles in the environment.

## Installation:

- Loosen the nut
- Push the sensor from top to bottom to the top of the mast
- Apply even force and tighten the nut until it hits the spring. The sensor should still be free to move.
- Align the sensor to the north (for the wind meter)
- Align the sensor to the North (for wind meters)
- Rotate the two nuts 3 turns and fix

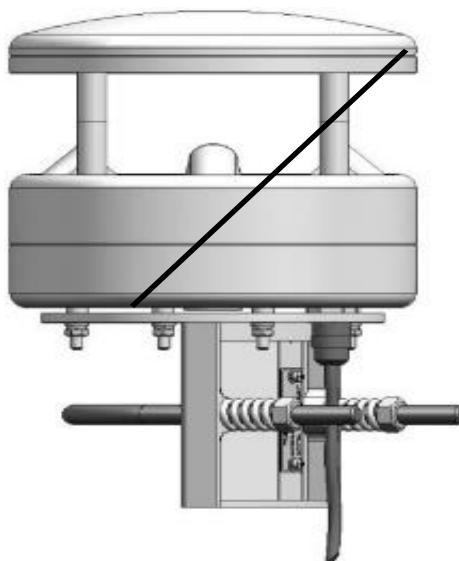
**TWS300 Ultrasonic sensor**

**System parameters:**

Specification	178 mm in diameter and 403 mm in height, Weighs about 1.5 kg
<b>Wind Speed</b>	Measurement methods: ultrasonic Measurement range: 0 – 60m/s Resolution: 0.1m/s Accuracy: $\pm 0.3$ m/s or 3% Response threshold: 0.3 m/s
<b>Wind Direction</b>	Measurement methods: ultrasonic wave Measurement range: 0 – 360° Resolution: 0.1° Accuracy: < 3°, RMSE from 1.0 m / s  Response threshold: 0.3 m/s
<b>PM2.5</b>	Accuracy: $\pm 15\%$ or $\pm 10\mu\text{g}/\text{m}^3$  Monitoring range: 0~1000ug/m <sup>3</sup> Resolution: 0.3ug/m <sup>3</sup>

<b>PM 10</b>	Accuracy: ±15% or ±10µg/m <sup>3</sup> Interface RS485, baud rate (2400, 4800, 9600, 19200 38400, etc.)
<b>Basic Information</b>	Power supply voltage: 9 ~ 30VDC Operating humidity range: 0~100%RH Operating temperature range: -40 to 60 ° C (standard), extended to: -50 to 80 ° C Protection: IP66

## North Alignment

When there is a wind sensor configuration, N is the correct display of the wind direction, and the sensor must be arranged north. There are multiple arrows on the sensor to indicate the direction.



Note: The magnetic north pole and the geographic north pole indicated by the compass are not exactly the same, so the deviation (error) of the position must be considered when arranging the sensors. The error is related to the location and the maximum error may exceed 15° (eg North America). In Central Europe, the error is

**Working conditions:**

Allowable operating temperature: -40 ° C ... +60 ° C Allowable relative humidity: 0 ... 100% RH  
Allow altitude: not available.

**wire half-duplex RS485 interface:**

Data bits: 8  
Stop position: 1 Parity: None  
The third state: 2 after the stop bit  
Adjustable baud rate: 1200, 2400, 4800, 9600, 14400, 19200, etc. Housing: Plastic (PC)

## Appendix1: TWS Protocol

### Simple instruction:

Through the command format: aR0<cr><lf>

### Terminal response:

0R0,Dn=000D,Dm=000D,Dx=000D,Sn=000.0M,Sm=000.0M,Sx=000.0M,Ta=022.1C,Ua=0  
11.8P,Pa=001025.0H,Rc=0000.0M,Sr=0000.0W,Uv=00I,NX=053.8B,NI=051.9B,NS=052.8  
B,PM2.5=023U,PM10=026U

#### Response message parameter description:

A	=	device address;
R0	=	wind element data acquisition command;
Dn	=	minimum wind direction value;
Dm	=	average wind direction value;
Dx	=	maximum wind direction value;
Sn	=	minimum wind speed value;
Ta	=	atmospheric temperature (C = °C );
Ua	=	atmospheric relative humidity (P = %RH);

PM2.5 = PM2.5 particle concentration

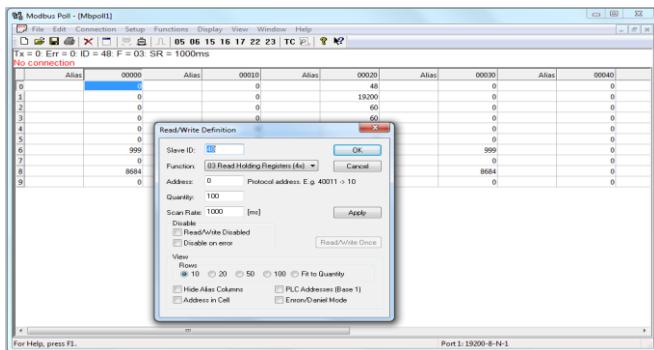
(ug/m3) PM10 = PM10 particle concentration

(ug/m3)

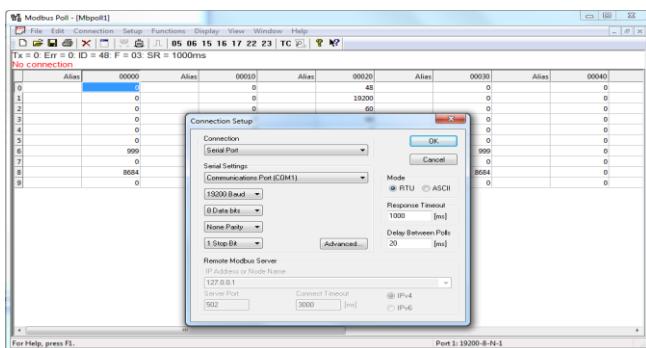
<cr><lf> = command terminator;

## Appendix 2: Modbus Protocol

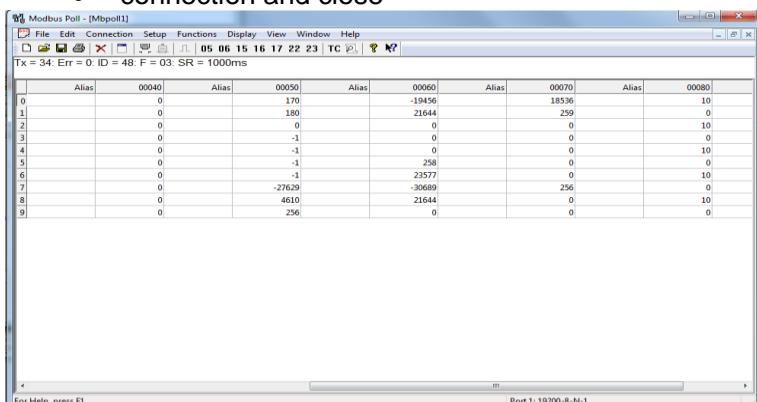
- Query the device ID number, open the serial port assistant to send the \$id query, such as: send \$id reply \$id=1, close the serial port after querying
- Open mod bus poll, select the top Setup-Read\Write Definition, as shown in the figure, click OK after setting.



- select the top Connection-Connect, as shown in the figure, set the completion and click OK



- connection and close



<b>Address</b>	<b>Name</b>	<b>Data length</b>	<b>Description</b>
0	Minimum wind direction	2 Bytes	Read-only; unsigned integer,
1	Average wind direction	2 Bytes	Read only; Unsigned integer;
2	Maximum wind direction	2 Bytes	Read only; Unsigned integer;
3	Minimum wind speed	2 Bytes	Read only; Unsigned integer; Expand ten times
4	Average wind speed	2 Bytes	Read only; Unsigned integer; Expand ten times
5	Maximum wind speed	2 Bytes	Read only; Unsigned integer; Expand ten times
6	Air temperature	2 Bytes	Read only; Unsigned integer; Expand ten times
7	Air humidity	2 Bytes	Read only; Unsigned integer; Expand ten times
8	Rain accumulation	2 Bytes	Read only; Unsigned integer; Expand ten times
9	Total radiation		