

# Weather Monitor

TZS series

TPJ series

TNHY series

GLZ series

## User Manual

Please read this manual carefully before use

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## 1. Introduction

The Agricultural Environment Monitor consists of hand-held data logger and different sensors. It can be connected to a host through a multi-channel hub, but also access to a plurality of the same or different types of sensors. The product is a device suitable for monitoring the environmental parameters of agrometeorological. It has USB data export function and can choose voice function, GPRS positioning function and GPRS unload function etc. It ultimately based on your needs to configure your desired function.

## 2. Functions and features

- 2.1 It can optionally configure more than a dozen wired sensors, measurement accuracy and convenience
- 2.2 Low-power design, increase system reset protection against short-circuit power supply or external interference and damage, to avoid system crashes
- 2.3 Liquid crystal display screen, can display the current time, sensor measurements, storage capacity, battery life, voice status, GPS status, network status, etc.
- 2.4 Large-capacity lithium battery-powered and battery overcharge and over-discharge protection
- 2.5 External power 5V2A power adapter about 5 hours full, wherein the data lines can be used as a computer USB cable charging about 10 hours (this function is incidental feature and need to charge the device using a specifically configured USB charging adapter)
- 2.6 USB interface for data communication with the computer, you can export data, parameter configuration and other operations
- 2.7 Large-capacity data storage, the device comes with Flash can store 30,000 recent data and can unlimitedly store data by configuring the TF card. The data in the TF card and Flash are stored at the same time.
- 2.8 Agricultural environment monitor has a PC (Instrument cloud), the data in the TF card can be imported to PC Client Software by USB. And it can realize the function of data analysis, data export and cloud synchronization.
- 2.9 Environmental information parameter alarm settings is simple, quick
- 2.10 Wired RS485 communication, sensor communication cable distances up to 100 meters

### **Attention:**

- 1. In order to prolong the life of battery, manually shut down the device if you don't use it.
- 2. General instructions manual for the series, this manual describes the function does not mean that your model has all the features in particular GPS, GPRS

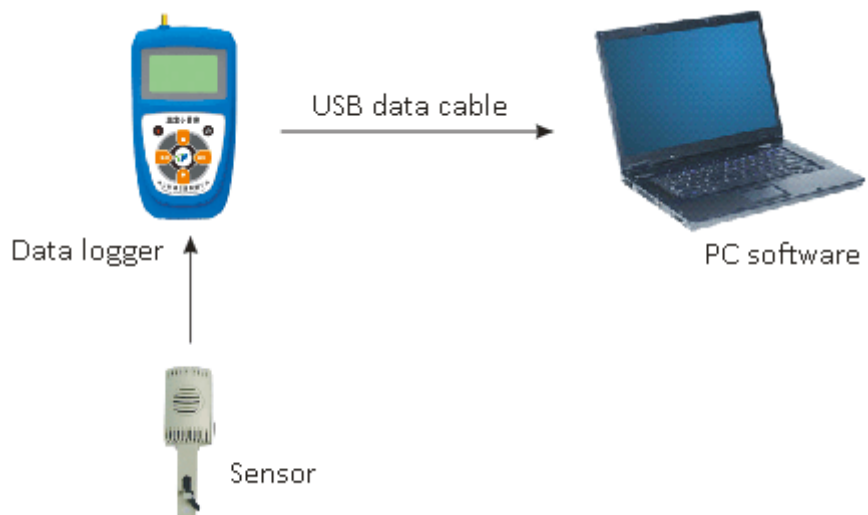
### 3. Instrument structure



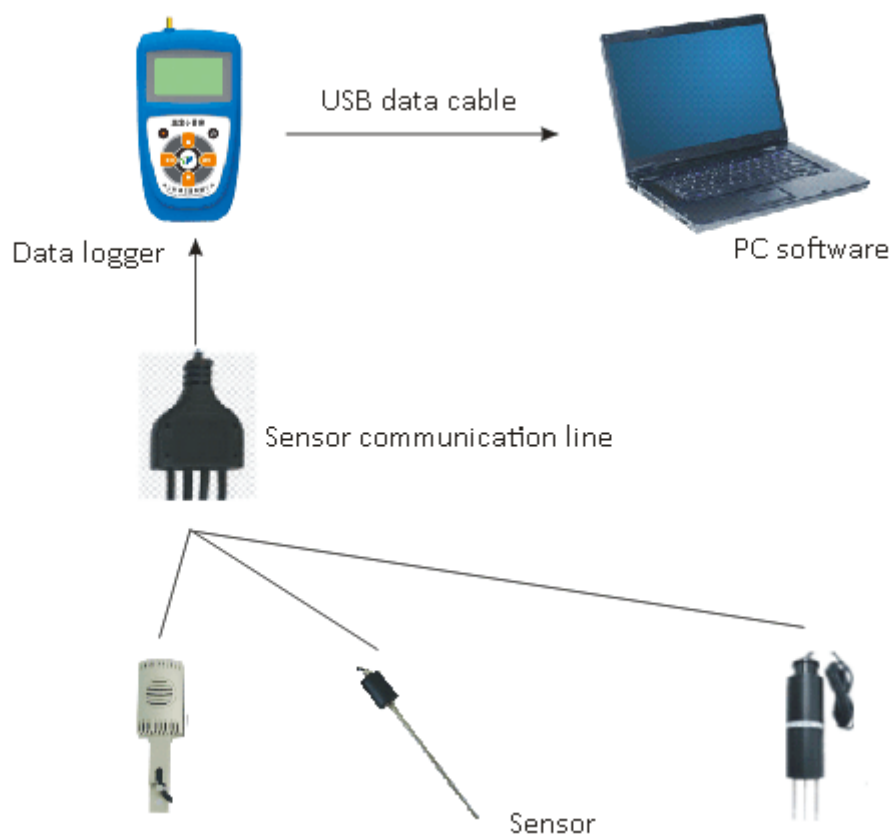
- ① Wireless module antennas
- ② SIM card interface
- ③ TF card interface
- ④ Reserved port
- ⑤ USB connector (charging interface)
- ⑥ Wired Sensor Interface

#### Sensor connection structure:

##### 1. Single-parameter systems (installation only one sensor)



## 2. Multi-parameter system architecture



## 4. Functional description and operation





### 4.1 Technical parameters of data logger

Working power:	3.7V lithium battery
Working current:	Standby power consumption 8mA, other power depending on the model
Weight:	400g
Size (length*width*height):	180mm*100mm*35mm
Ambient temperature:	-40℃~80℃
Relative humidity:	≤95%RH
Data storage:	Maximum 30,000 sets of data
Coordinate precision:	3 decimal places, ±0.05 points (≤50M)
E: 0----180°	N: 0----90°











## 4.2 Standard accessories






Agricultural environment monitor object contains temperature, humidity, dew point, illuminance, PAR, CO<sub>2</sub>, wind speed, wind direction, rain gauge, soil temperature, evaporation, soil salinity, Ultraviolet, PH, leaf moisture, air pressure, total radiation etc. Our company has full set of sensors as following:

### I. Logger and accessories list

	Data logger		Data cable
	Hub		USB charge

### II. Conventional sensors list (customized)

	Temperature, humidity and dew point sensor		Illuminance sensor
	CO <sub>2</sub> sensor		Wind speed and direction sensor
	Ultraviolet sensor		PAR sensor
	Rainfull sensor		Soil temperature sensor
	Soil moisture sensor		Total radiation sensor

	Soil salinity sensor		Evaporation sensor
	Air pressure sensor		Soil PH sensor
	Leaf moisture sensor		

Note: For different types of instruments using the same method, please be sure to read the instructions carefully, other non-standard models, if necessary, can call customer service: 400-672-1817.

### 4.3 Sensor connection

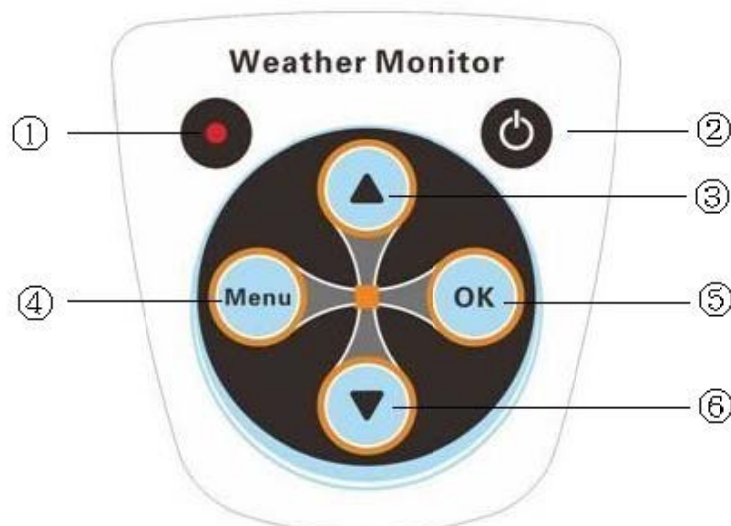
Take out the collection device, connect the sensor and hub and then turn on the device, you can enter the main interface.

**Note:**

1. Standard contains lithium battery, when the battery is low. You need to directly connect the power adapter until full charge and then use.
2. The test chip device with a battery voltage, when the battery voltage is too low, it will prompt customers charging.

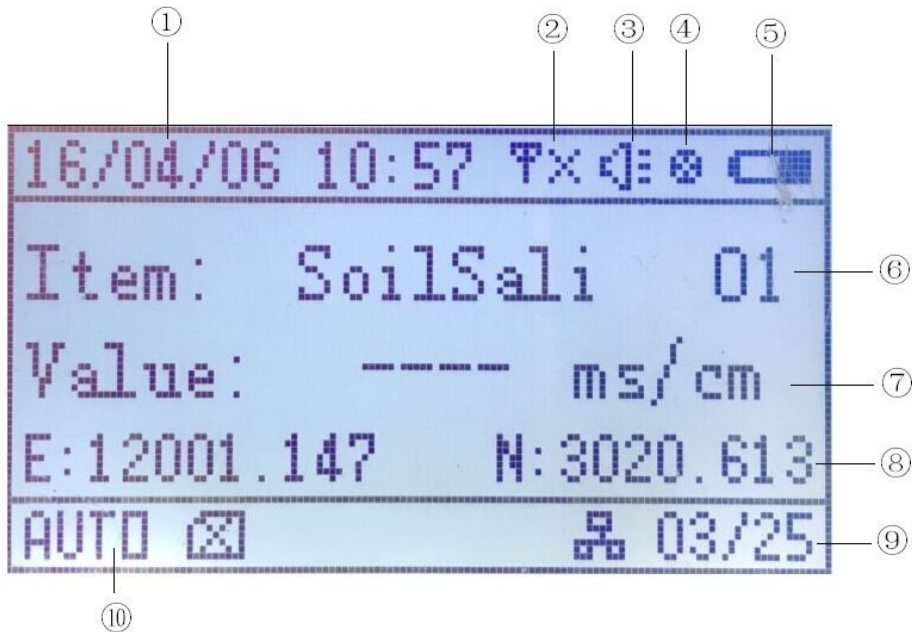
### 4.4 Instrument operation

Panel buttons shown below



- ① Power charge indicator
- ② Switch button
- ③ Up arrow button
- ④ Menu button
- ⑤ OK button
- ⑥ Down arrow button

Long press the power button to turn on your instrument, enter the main interface as follows.



- ① The current date and time
- ② Internet signal
- ③ Voice Switch
- ④ GPS Switch (Optional)
- ⑤ battery power
- ⑥ Sensors and their numbers
- ⑦ Sensor data
- ⑧ GPS coordinates
- ⑨ The total number of sensors
- ⑩ Data storage

**Remark:**

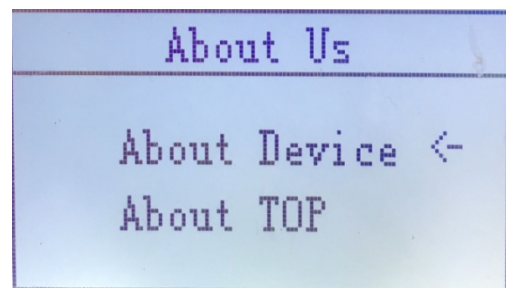
1. E is longitude and the range is between 0 and 180. N is latitude and the range from 0 to 92.
2. GPS module is optional functions depending on customer demand, if there is no module then no GPS icon. Turn on the GPS , the icon is ⊕ solid round, turn off the GPS is O hollow round.
3. The Internet signal is the mobile phone signal of SIM card, Non-hot-plug this card (Plug the card to operate the device after shutdown), otherwise it is easy to cause damage. SIM, TF Card minimize installed after the plug in order to better protect the life of the card slot.



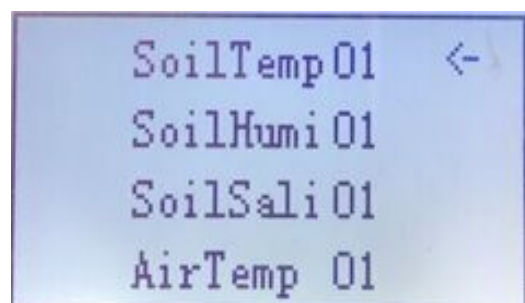
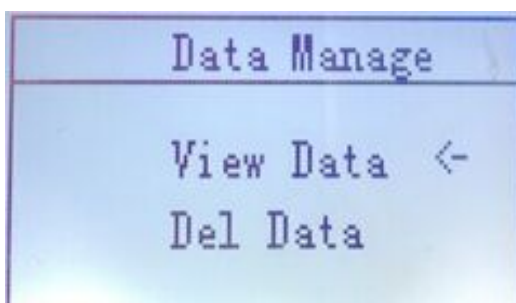
4. GPS signal acquisition must first select the "Open" in the menu, and get a signal on the open outdoor. It's difficult to obtain signals indoor, coordinate signals in the room is not a normal phenomenon, because the surrounded buildings may affect the strength of signal.

5. If you turn on the GPS module in the application, especially in the absence of the signal turned on, the instrument will continue to search for a signal, large power consumption, long working instrument for data collection advised to turn off GPS or GPS signal acquisition and then turn off.

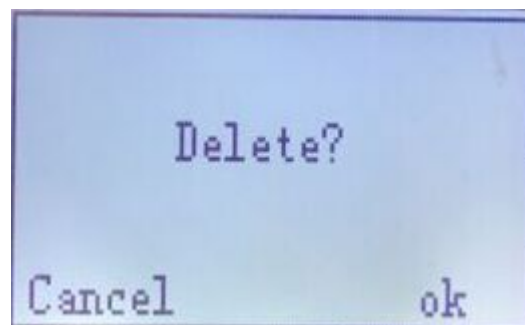
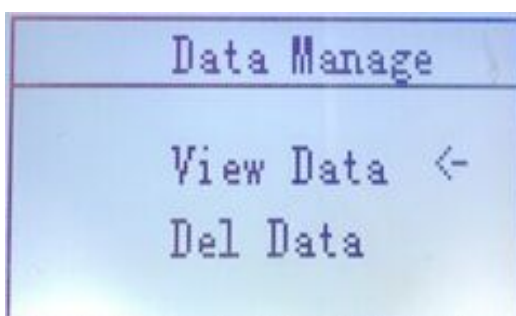
Press **[Menu]** key to enter the function of the system menu, the user can set according to their needs. Such as the following picture:



**[Data Manage]** functions can be viewed directly or delete all sensor data, press the **[OK]** button to realize the function of view the data or delete the data, press the **[Menu]** key to return to previous level. If we choose [View Data], then we can enter the data list of sensor, the user can check the sensor case history data (up to 100 records view):

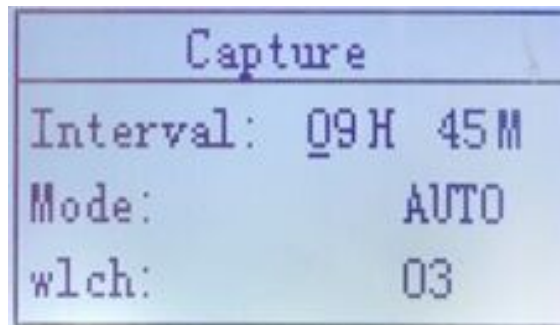


If the user choose [delete data] and press [ok] key, all the data will be deleted. The user can press [Menu] key to cancel.



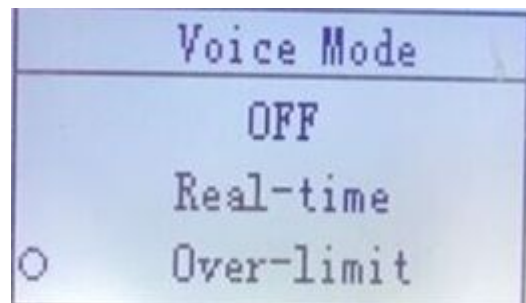
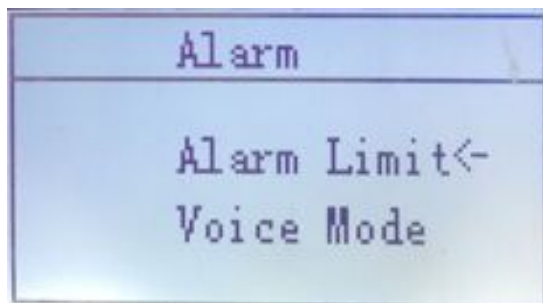
After returning to the main menu, press up and down keys to **[Capture]** function, press **[ok]** key to set the capture interval, the capture mode, power-saving mode

these three parameters:



Note: The factory default setting 1 hour capture interval, the minimum interval is 5 minutes. The device can't be operated during uploading or capturing the data. After waiting for capture or upload is finished, the device can be operated.

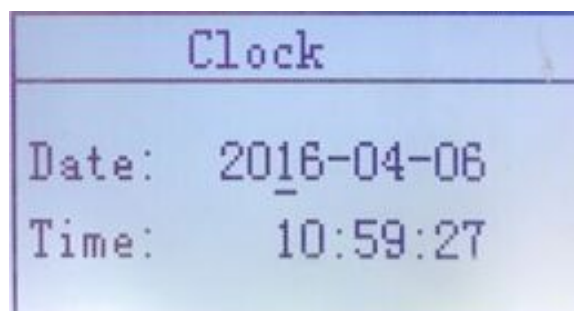
After capture setting is finished, the user can set the sensor alarm. Choose [**Alarm**] and then press [**ok**] key can enter the alarm setting:



Note: This feature needs to be configured with voice broadcast function (only Chinese), and [**Real-time**] is the function of real-time voice broadcast during test. Broadcast the current time interface sensor values and sensor values collected. Broadcast: Real-time +sensor type + sensor value, when exceeding the alarm condition broadcast: Over-limit + sensor type + sensor value. [**Over-limit**] is beyond the upper limit set by the user voice alarm, broadcast limit alarm + sensor type + sensor value.

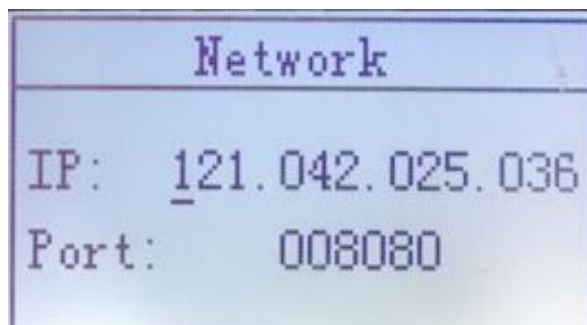
If you choose the [**Clock**] function and press [**ok**] key, you can enter the setting interface.

User can use the [**Menu**] key to shift and the arrow keys to increase or decrease the value. After setting, press the [**ok**] key to save and exit to the main menu interface.

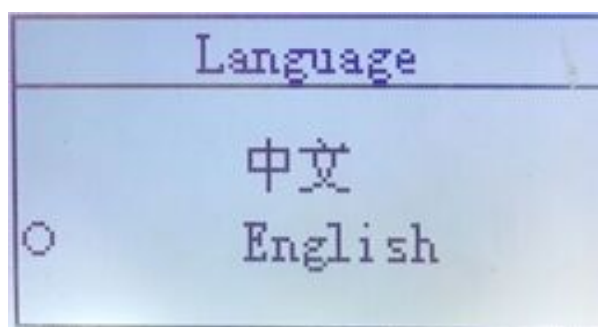


If you choose the [**Network**] function and press [**ok**] key to enter the setting interface, you can use the [**Menu**] key to shift and arrow keys to increase or decrease the value.

After the IP and port number setting is completed, you can press [ok] key to save, and it will prompt you the setting is successful.

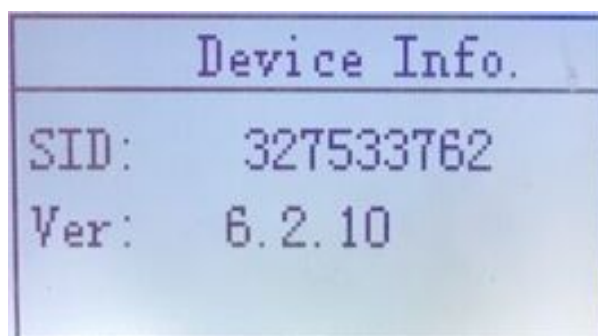


[Language] function is used to switch the language. If you enter the setting interface, you can achieve the English switch by arrow keys. If you can't enter the interface of language selection, it means this function is currently only supports Chinese Version.



[GPS switch] is used to open or close.

[About us] is used to view information about the company, and view the device version number and ID.



## 5. Sensor Specifications

### 5.1 TP-TRHDP-1 Temperature, Humidity and Dew point Sensor

#### I. Technical parameter

Working power:

DC 5V~14V



Working current:	<2mA;
Weight:	50g
Size (length*width*height):	26mm×84mm×16mm
Ambient temperature:	-40℃～80℃
Relative humidity:	≤100%RH
Measurement accuracy:	Temperature ±0.4 ℃, 3% humidity, dew point ±0.4 ℃
Resolution:	Temperature 0.1 ℃, humidity 0.1% RH, dew point 0.1 ℃
Measuring range:	Temperature -40~120℃, humidity 0% to 100%, dew point -40℃~120℃

## II. Installation notes

1. Ventilation, the installed position should be good in air, environment and ventilation.
2. No heat source, such as incandescent lamps, etc. (Except when required to detect the selected object, such as detecting temperature and humidity air conditioning vent etc.)
3. Waterproof, note that this probe can detect the air humidity, when installed we need to prevent water from entering the probe.
4. When the humidity is above 90%, after 48 hours of work, it required to process the sensor to dry before use.

## 5.2 TP-PT-1 Illuminance Sensor

### I. Technical parameter

Working power:	DC 5V～14V
Working current:	<2mA;
Weight:	300g
Size (length*width*height):	50mm×50mm×48mm
Ambient temperature:	-20℃～80℃
Spectral response:	400 ～700nm
Relative humidity:	≤95%RH
Measurement accuracy:	±2% (0-20000lux)
Resolution:	1 lux
Measuring range:	0 ~ 200000lux



### II. Installation notes

1. Through the light detection position is there should be no artificial shading objects.
2. No any waterproof glass cover, the probe has the waterproof function.
3. Place the probe horizontally, since the probe surface portion of the semiconductor device is a core layer of white filter material, the glass with the light reflected on the incident angle of light varies, we need to place the probe horizontally to ensure the accuracy.

4. Under heavy sand or dust environment, we need to clean the glass surface of probe.

### 5.3 TP-CO<sub>2</sub>-1 CO<sub>2</sub> Sensor

#### I. Technical parameter

Working power:	DC 5V~14V
Maximum current:	≤150mA
Weight:	200g
Size (length*width*height):	56mm×78mm×35mm
Ambient temperature:	-40℃~80℃
Relative humidity:	≤95%RH
Measurement accuracy:	± (50ppm + measured value × 3%)
Resolution:	1 ppm
Measuring range:	0~2000ppm or 0~5000ppm

#### II. Installation notes

1. Ventilation, the installed position should be in good air environment, allowing real-time response around probe CO<sub>2</sub> concentration measured environment.
2. Waterproof, prevent large amounts of water immersion probe.
3. Shockproof, use gently, vibrations will cause the sensor drift.

### 5.4 Wind Speed and Direction Sensor

#### I. Technical parameter

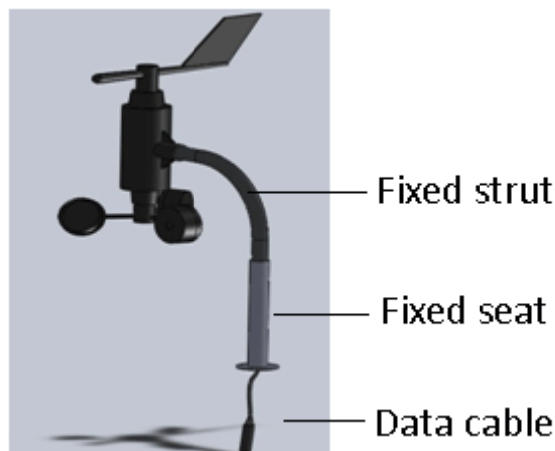
Working power:	DC 5V~14V
Working current:	<10mA;
Weight:	370g
Size (length*width*height):	261mm×261mm×288mm
Ambient temperature:	-15℃~60℃
Relative humidity:	≤95%RH
Wind speed measurement accuracy:	± (0.3 + 0.03 * V) m / s; (Note: V represents the current wind speed)
Wind speed measuring range:	0~45m/s
Wind speed resolution:	0.1m / s
Start wind speed:	≤0.8m / s
Wind direction measurement accuracy:	± 3°
Wind direction measuring range:	0° ~359°
Wind direction resolution:	2°



#### II. Installation notes

1. Horizontally installed, if you have a certain inclination with the horizontal, the wind speed will be broken, affecting the measurement accuracy.
2. When installed, the first sensor 0° direction towards the north direction, then

insert the sensor fixing base by fixing rods. As shown, the holder can't install communication port at the bottom of the cover.



## 5.5 TP-PH-1 PAR Sensor

### I. Technical parameter

Working power:	DC 5V~14V
Working current:	<2mA;
Weight:	300g
Size (length*width*height):	50mm×50mm×48mm
Ambient temperature:	-40℃~80℃
Relative humidity:	≤95%RH
Measurement accuracy:	±1μmolm <sup>-2</sup> s <sup>-1</sup>
Resolution:	1μmolm <sup>-2</sup> s <sup>-1</sup>
Measuring range:	0~2700 μ molm <sup>-2</sup> s <sup>-1</sup>

### II. Installation notes

1. Through the light detection position is there should be no artificial shading objects.
2. Insulation, photosynthetically active radiation detection is a parameter of solar radiant energy, such as infrared radiation, so we can't place heat source or other light sources around the sensor.
3. Waterproof, the basic function of waterproof, to prevent rainwater from entering, but not soaked in water.
4. Horizontally installed, since the filter probe has the effect to light refraction, the probe has a direction angle, when the instrument is installed, try to maintain the level.
5. Under heavy sand or dust environment, we need to clean the glass surface of probe.



## 5.6 TP-R-1 Rain Gauge Sensor

### I. Technical parameter

Working power:	DC 5V~14V
Working current:	<2mA;
Weight:	2000g
Size (length*width*height):	280mm×345mm×345mm
Ambient temperature:	0°C~80°C
Relative humidity:	≤95%RH
Measurement accuracy:	±0.1mm
Resolution:	0.1mm
Measuring range:	0~4mm/min



### II. Installation notes

1. Chassis with three screws on the concrete base or stakes, first adjust the horizontal screw and adjust the instrument to a horizontal position (bubble level sensor inside the bubble in the center of the circle), then gradually tighten the nut on the bolt, and repeatedly adjust the level bubble.
2. Note that the instrument is protected against collision deformation, dredging periodically according to the local condition. Check and dredge waterways, dump component reverse the course of questioning arrest, use clean water to wash and the bearings shouldn't refuel in order to avoid dust.

## 5.7 TP-ST-1 Soil Temperature Sensor

### I. Technical parameter

Working power:	DC 5V~14V
Working current:	<4mA;
Weight:	400g
Size (length*width*height):	300mm×36mm×36mm
Ambient temperature:	-40~80°C
Relative humidity:	≤95%RH
Measurement accuracy:	±0.5°C
Resolution:	0.1°C
Measuring range:	-40°C~100°C



### II. Installation notes

1. Detection, stainless steel probe into the soil about 1/4, if long-term fixed outdoors, all into the soil.
2. If the soil is too hard, we need to drill a hole which is smaller than probe rather than insert the probe forcibly into the soil.
3. When finished using and pull out of the soil, we need to hold the black shell pull, not directly pull the communication cord.
4. The sensor for professional use in soil temperature measurements is not available on other class oven temperature.

## 5.8 TP-SR-1 Soil Moisture Sensor

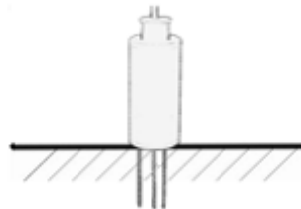
### I. Technical parameter

Working power:	DC 5V~14V
Working current:	<30mA;
Weight:	600g
Size (length*width*height):	185mm×60mm×60mm
Ambient temperature:	0°C~100°C
Relative humidity:	≤100%RH
Measurement accuracy:	±3%
Resolution:	0.1%
Measuring range:	0%~100%

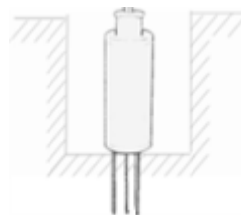


### II. Installation notes

1. When detection, put the stainless steel probe completely buried in the soil.

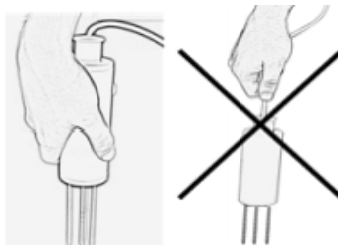


2. When the soil is deep, we need to remove the surface of soil or digging.



3. When the soil is rocky surface soil and the thickness is shorter than the length of probe, then you'd better use other way to measure the moisture of the soil.

4. When plug probe during the measuring, the force point should be black round box as shown, rather than the probe data line.



5. Not bend the probe, otherwise it will affect the measurement accuracy.

## 5.9 TP-HP01 Air Pressure Sensor

### I. Technical parameter

Working power:	DC 5V~14V
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Working current:	<2mA;
Weight:	50g
Size (length*width*height):	26mm×84mm×16mm
Ambient temperature:	-40℃～80℃
Relative humidity:	≤95%RH
Measurement accuracy:	±1hPa
Measuring range:	300.0hPa～1100.0hPa

## II. Installation notes

1. Ventilation, the installed position should be in good air environment.
2. No heat source, such as incandescent (need to detect when an object is selected, except as to detect the air conditioning vent temperature and humidity).
3. Waterproof, the installation should prevent water from entering the probe.

## 5.10 TP-SS-1 Soil Salinity Sensor

### I. Technical parameter

Working power:	DC 5V～14V
Working current:	<10mA;
Weight:	400g
Size (length*width*height):	300mm×36mm×36mm
Ambient temperature:	0～50℃
Relative humidity:	≤95%RH
Measurement accuracy:	±2%
Measuring range:	0-20ms/cm
Resolution:	0.01ms/cm



### II. Installation notes

1. Measuring junction box should be placed in ventilated place, try to keep dry and not be exposed to high acidity, high alkalinity environment.
2. Shockproof, when in the process of transport and removal, gently.
3. The sensor is inserted and covered with flattened after the soil is paste.

## 5.11 TP-WE-1 Evaporation Sensor

### I. Technical parameter

Working power:	DC 5V～14V
Working current:	<15mA;
Weight:	2500g
Size (length*width*height):	235mm×235mm×260mm
Ambient temperature:	-20℃～80℃
Relative humidity:	≤95%RH
Measurement accuracy:	0.1mm
Measuring range:	0～100mm




### II. Installation notes

1. Chassis with three screws on the concrete base or stakes, first adjust the horizontal screw and adjust the instrument to a horizontal position, then gradually tighten the bolts, nuts.
2. After the installation is complete, cover the anti-bird thorn on the device (Mainly used to prevent erroneous detection caused by water birds).
3. Note that the instrument is protected against collision deformation, dredging periodically according to the local condition, check and dredge water holes.

## 5.12 Total Radiation Sensor

### I. Technical parameter

Working power:	DC 6V~14V	
Working current:	<8.5mA;	
Weight:	2.5kg	
Size (length*width*height):	165mm×165mm×120mm	
Ambient temperature:	-40℃~50℃	
Relative humidity:	≤100%RH	
Measurement accuracy:	±5%	
Spectral range:	0.3~3μm	
Measuring range:	0~2000W/m <sup>2</sup>	
Internal resistance:	about 350Ω	
Response time:	≤35 seconds (99%)	
Sensitivity:	7 ~ 14 μV / w • m <sup>-2</sup>	
Degree of stability:	≤ ± 2%	
Cosine response:	≤7% (when the solar elevation angle 10 °)	
Azimuth response error:	≤5% (when the solar elevation angle 10 °)	
Temperature characteristics:	± 2% (- 10 °C ~ 40 °C)	
Nonlinear:	≤2%	

### II. Installation notes

1. Before the test wipe with a soft cloth dipped in alcohol glass (fragile, careful, spent hood cover).
2. The sensor is adjusted to the level, and the radiation is on the table cable plugs north.
3. The total radiation should be placed in the space around the instrument sensor surface throughout the year without any obstacle place and any time the shadow of the obstacle can't vote in instrument sensing surface areas.
4. The best cable is firmly fixed to the mounting plate to reduce the fracture or on a windy day interruption occurred intermittently.

## 5.13 Soil PH Sensor

### I. Technical parameter

Working power:	DC 6V~14V
Working current:	<3mA;
Weight:	180g
Size (length*width*height):	290mm×50mm×50mm
Ambient temperature:	0~50°C
Relative humidity:	≤95%RH
Measurement accuracy:	±5
Measuring range:	1~14
Response time:	1 second



### II. Working principle

1. Soil PH value of the sensor does not support online testing PH value data, duration of use is generally not more than half an hour, otherwise it will damage the metal surfaces. It is suitable for monitoring the soft soil.
2. The product electrode is electrochemical reaction, so the electrode is a consumable item, the product out of warranty range.
3. Situ PH sensor is extensive measurement, if you want to measure more accurate, you can use a glass electrode to test the solution after the soil is filtered.
4. The sensor can't be directly applied in the solution pH measurement and should stay away from the instrument with a magnetic object. Don't store together with other metal objects to avoid damage.
5. Hold the temperature probe stably when removing the instrument from the soil. Don't touch the probe with your fingers. Oils from your fingers can affect the conductivity probe electrodes, resulting in inaccurate measurements.
6. Before and after use, keep the probe clean, put on protective cover during storage to prevent damage to the probe metal film.

### III. Installation notes

1. When testing, insert the metal probe into the soft soil
2. If the soil is too hard, we need to drill a hole which is smaller than probe rather than insert the probe forcibly into the soil. The back of sensor can't be struck with a hard object.
3. When finished using and pull out of the soil, hold the black pull housing needs and not directly pull the communication lines, keep the probe clean and put on protective cover to prevent damage to the metal film.
4. The sensor for professional use in the soil PH value measured in the laboratory is not available strong acid solution was measured.

## 5.14 TP-UV-1 Ultraviolet Radiation Sensor

### I. Technical parameter

Working power:	DC 5V~14V
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Working current:	<5mA;
Weight:	300g
Size (length*width*height):	50mm×50mm×48mm
Ambient temperature:	-20℃～50℃
Spectral response:	260～400nm
Relative humidity:	≤95%RH
Measurement accuracy:	±5% (0～3mW/cm <sup>2</sup> )
Measuring range:	0～6mW/cm <sup>2</sup>

## II. Installation notes

1. Through light, there should be no artificial light shielding object between the light source and this sensor.
2. No any waterproof glass cover, the probe has the waterproof function.
3. Place the probe horizontally. Since different light angles of incidence may produce different radiation intensity, we need to place the probe horizontally to ensure that the light is incident and to ensure the accuracy of detection.
4. Under heavy sand or dust environment, we need to clean the glass surface of probe.
5. Clean the light well dust and debris regularly.

## 5.15 TP-LW-1 Leaf Humidity Sensor

### I. Technical parameter

Working power:	DC 5V～14V
Measuring range:	0～99.9%
Resolution:	0.1
Accuracy:	<10%
Linearity:	full scale ± 1%
Stability:	changes less than ± 2% / years
Response Time:	2S
Working environment:	-10～50℃
Relative humidity:	0～95% (no condensation)
Instrument Dimensions:	235mm × 142mm × 115mm



### II. Installation notes

1. The instrument mounting holes in a holder or on a plane.
2. The plant leaves caught in the sensor.

## 6. Note the use of the instrument

1. The long-term instruments without periodic charging, so can only use the power adapter (D5V/2A) supplied by our company. So does the sensor.
2. The instrument shouldn't have water.
3. Instrument connected to a computer via USB, the PC software can export data, data analysis, data can also be uploaded onto the cloud, as detailed instructions for use PC software to help explain.

## 7. Common troubleshooting

phenomenon	possible reason	solution
No display	Battery is low or system error	Access to power adapter or reset the system
Showing, no response	System crashes	Reset System
Voice-based configuration but no sound	Not open alarm function	Check the alarm system
With sensors but no measurement data	Sensor Close	Check the sensor whether is normal
	Port loose or sensor failure	Check the sensor whether is normal

## 8. Schedule

### Addendum 01: KCL the conductivity of solution (temperature affect)

t/°C	c/mol·L-1			
	1.000**	0.1000	0.0200	0.0100
0	65.41	7.15	1.521	0.776
5	74.14	8.22	1.752	0.896
10	83.19	9.33	1.994	1.020
15	92.52	10.48	2.243	1.147
16	94.41	10.72	2.294	1.173
17	96.31	10.95	2.345	1.199
18	98.22	11.19	2.397	1.225
19	100.14	11.43	2.449	1.251
20	102.07	11.67	2.501	1.278
21	104.00	11.91	2.553	1.305
22	105.94	12.15	2.606	1.332
23	107.89	12.39	2.659	1.359
24	109.84	12.64	2.712	1.386
25	111.85	12.89	2.765	1.412
26	113.77	13.13	2.819	1.441
27	115.74	13.37	2.873	1.468
28		13.62	2.927	1.496
29		13.87	2.981	1.524
30		14.12	3.036	1.552
35		15.39	3.312	
36		15.64	3.368	

Conductivity unit: ms/cm

## Addendum 02: 25°C KCL the conductivity of solution

Concentration <>mol/L)	Conductivity ms/cm
0.0001	0.0149
0.0005	0.0739
0.001	0.1469
0.005	0.7175
0.01	1.412
0.02	2.765
0.05	6.667
0.1	12.89
0.2	24.8
0.5	58.67
1	111.9

### Algorithm:

Test result is A, Soil temperature is B:

1. When 25°C, the conductivity value AC is:  $B > 25$ ,  $AC = A$  divide by  $(B-25)$  1.02times;  $B = 25$ ,  $A = AC$ ;  $B < 25$ ,  $AC = A$ , multiple by  $(25-B)$  1.02times;
2. After getting AC value, check Addendum 2 to see which range it is.

The algorithm formula is:

Actual concentration  $K = \frac{(AC - \text{low concentration conductivity})}{(\text{High concentration conductivity} - \text{low concentration conductivity})} * (\text{High concentration value} - \text{Low concentration value}) + \text{low concentration value}$ .

### Example 01:

When soil temperature  $B > 25^\circ\text{C}$ ;

We assume that the test result A is: 13.62ms/cm, Soil temperature is 29°C, then while 25°C, the conductivity value AC is:  $AC = 13.62 / 1.02 / 1.02 / 1.02 / 1.02 = 12.58$

Note:  $29-25=4$ , 4 times divide by 1.02

According Addendum 2, 12.58ms/cm is between low concentration 0.05mol/L(6.667 ms/cm)and high concentration 0.1mol/L(12.89ms/cm), then:

The actual concentration  $K = (12.58 - 6.667)/(12.89 - 6.667) * (0.1-0.05) + 0.05 = 0.0975$

**Example 02:**

When soil temperature **B=25°C**;

1. We assume that the test result A is: 5.58ms/cm, then the conductivity value AC is  $A=AC=5.58\text{ms/cm}$

2. According Addendum 2, 5.58ms/cm is between low concentration 0.02mol/L (2.76 ms/cm)and high concentration 0.05mol/L(6.667ms/cm), then:

The actual concentration  $K = (5.58 - 2.765)/(6.667 - 2.765)*(0.05-0.02) + 0.02 = 0.0416$

**Example 03:**

When soil temperature **B<25°C**;

1. We assume that the test result A is: 24.63ms/cm, the soil temperature is: 22.6°C (23°C), then the conductivity value AC is:

$AC = 24.63\text{ms/cm} * 1.02 * 1.02 = 25.63\text{ms/cm}$

Note:  $25-23 = 2$  times multiple by 1.02

2. According Addendum 2, 25.63ms/cm is between low concentration 0.2mol/L (24.8 ms/cm) and high concentration 0.5mol/L (58.67ms/cm), then:

The actual concentration  $K = (25.63 - 24.8) / (58.67 - 24.8) * (0.5 - 0.2) + 0.2 = 0.207$

**Note: 1mol/L KCL salinity is equal to 7.45%**



## 9. Packing list

### 9.1 System Model and sensor configuration (optional)

Model		
Name	Choose	Quantity
Air temperature, humidity and dew point	<input type="checkbox"/>	
Wind speed and direction	<input type="checkbox"/>	
Rainfall	<input type="checkbox"/>	
Illuminance	<input type="checkbox"/>	
Evaporation	<input type="checkbox"/>	
CO <sub>2</sub>	<input type="checkbox"/>	
Leaf humidity	<input type="checkbox"/>	
Soil temperature	<input type="checkbox"/>	
Soil moisture	<input type="checkbox"/>	
Soil salinity	<input type="checkbox"/>	
Soil PH	<input type="checkbox"/>	
Ultraviolet radiation	<input type="checkbox"/>	
Air pressure	<input type="checkbox"/>	
PAR	<input type="checkbox"/>	
Total radiation sensor	<input type="checkbox"/>	

### 9.2 Packing list (Different models of different configuration)

NAME	Quantity
Data logger	
Sheath (Optional)	
charger	
User manual	
USB line	
Hub (in-one cable)	
PC CD-ROM (optional)	