

PC-4  
Environment Monitoring Device  
User Manual



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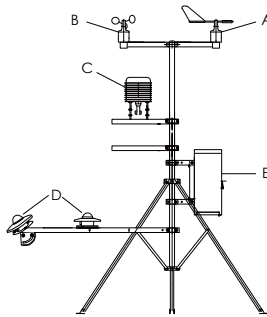
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# 1 System Introduction

The PC-4 environment monitoring device for PV plant is a portable, user-friendly, and highly precise mobile system that can monitor multiple meteorological elements. The device can collect information, such as temperature, humidity, wind direction, wind speed, solar radiation, and air pressure, display the information and perform tendency analysis.

The structure of the PC-4 environment monitoring device for PV plant is shown in the following figure.



Item	Name
A	Digital wind direction sensor
B	Digital wind speed sensor
C*	Radiation shield (temperature & humidity sensors and an air pressure sensor have been installed inside)
D	Solar radiation sensor
E	Main control box

Note 1: If you purchase the temperature & humidity sensors and the air pressure sensor, Sungrow will install the sensors inside the radiation shield before delivery.

Note 2: According to the on-site configuration, the wind speed sensor and the wind direction sensor can be divided into separated one and integrated one. The separated sensors are taken as an example for brief description below.

Note 3: In this document, the description is given by using two solar radiation sensors. However, you may install either one according to on-site requirement.

## 2 Main Technical Parameters

### 2.1 Digital Wind Speed Sensor

Threshold velocity	$\leq 0.5$ m/s
Sensor range	0-70 m/s
Resolution	0.1m/s
Accuracy	$\pm (0.3+0.03V)$ m/s

### 2.2 Digital Wind Direction Sensor

Threshold velocity	$\leq 0.5$ m/s
Sensor range	0-360°
Resolution	3°
Accuracy	$\pm 3^\circ$

### 2.3 Solar Radiation Sensor

Sensitivity	$9.577\text{uv/wm}^{-2}$	Accuracy	$\leq 5\%$
Response time	$\leq 30\text{s}$	Spectral Range	280 ~ 3000nm
Internal resistance	184.5 $\Omega$	Temp. coefficient	$\pm 2\%$ (-20°C ~ +40°C)
Annual stability	$\pm 2\%$	Sensor range	0 ~ 2000 W/m <sup>2</sup>
Resolution	1 W/m <sup>2</sup>	—	—

## 2.4 Module Temperature Sensor (surface mounted)

<b>Sensor range</b>	-40~80℃
<b>Resolution</b>	0.1℃
<b>Accuracy</b>	±0.1℃

## 2.5 Main Control Box

<b>Operation vol.</b>	DC12V/AC220V
<b>Communication manner</b>	RS485

## 2.6 Mechanical Parameters of the Entire Device

Item	Parameter
<b>Width</b>	1-1.2m
<b>Height</b>	1.8-2.5m
<b>Weight</b>	15KG

## 2.7 Ambient Temperature & Humidity Sensors

Temperature sensor

<b>Sensor range</b>	-50~+80℃
<b>Resolution</b>	0.1℃
<b>Accuracy</b>	±0.1℃

Humidity sensor

<b>Sensor range</b>	0~100%RH
<b>Resolution</b>	0.1%RH
<b>Accuracy</b>	±2% RH (≤80%h), ±5% RH (>80%h)

## 2.8 Air Pressure Sensor

<b>Sensor range</b>	550 ~ 1060Hpa
<b>Resolution</b>	0.1Hpa
<b>Accuracy</b>	± 0.3Hpa

## **3 Mechanical Installation**

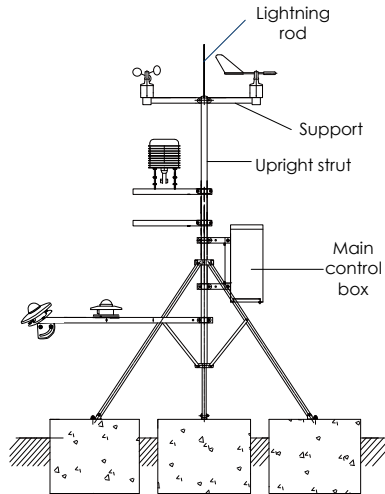
### **3.1 Precautions on Installation**

- Select a proper installation site and construct the foundation before assembling the supports
- The short-strut side should face south during installation
- Only one person is required for assembling the supports. Prepare a wrench, a screwdriver, and other tools in advance
- PV modules should be installed facing south and not obstructed at the front, to ensure better conversion efficiency
- After installation, ensure that all screws are firmly in place
- The wind speed/direction sensor, whether the separated one or the integrated one, should be installed at the top of the upright strut and ensure that the north arrow or north line faces north

### **3.2 Mechanical Installation**

The system structure is shown in the following figure:



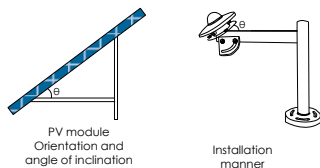


Proceed as follows to install the environment monitoring device:

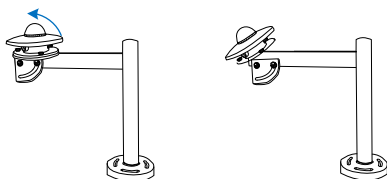
1. Insert the lightning rod (not in the scope of delivery) into the reserved threaded hole on the top of the support, screw the lightning rod, and check whether the wind speed sensor, the wind direction sensor, and the main control box are mounted securely.
2. Install the 2 solar radiation sensors equipped for the monitoring device, where the 2 sensors can be installed horizontally or inclinedly.
  - The inclined-installed solar radiation sensor is the solar radiation sensor 1
  - The horizontally installed solar radiation sensor is the solar radiation sensor 2

### The solar radiation sensor 1

Ensure that the orientation and the angle of inclination of the inclined-mounted solar radiation sensor are the same as those of the PV modules. In the following figure, both angles of inclination are  $\theta$ .



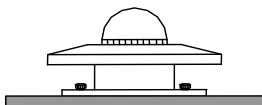
The angle of inclination can be any value between  $0^\circ$  and  $40^\circ$ , and the angle is determined according to that of the on-site PV module. The angle can be adjusted by turning the solar radiation sensor.



## The solar radiation sensor 2

When the solar radiation sensor is installed horizontally, a level instrument can be used to ensure the levelness.

Remove the external protective cover of the sensor after ensuring that it is installed firmly. The solar radiation sensor without the protective cover is shown in the following figure.



It is normal that in the same radiation condition, the difference between the value collected by the purchased standard radiation meter and the value collected by the solar radiation sensor of the environment monitoring device is between 20% to 30%.

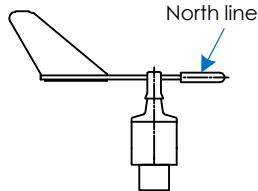


Reason: The spectral range of the purchased standard radiation meter is the solar visible light ranging from 400nm to 1050nm; but the solar radiation sensor of the environment monitoring device is the pyrriometer whose spectral range is 280nm to 3000nm.

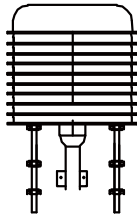
The two devices have different spectral ranges, and therefore the read radiation values are different. The pyrriometer can better reflect the actual radiation value of the PV plant.

3. Install the digital wind speed sensor and the digital wind direction sensor:

connect the two sensors by using screws and a cross arm support and install them onto the top of the upright strut. Notice: the north arrows and the north lines on the sensors should face north.

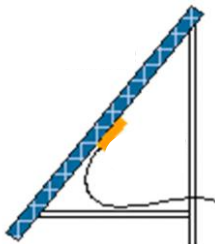


4. Install the radiation shield: remove two nuts at the bottom of the radiation shield and connect the radiation shield to the radiation shield rack which is installed on the upright strut (The installation height is approx. 1.5 m.).



5. Install the module temperature sensor: attach the module temperature sensor to the back surface of the PV module closely, so as to ensure that the measured temperature is consistent with the actual temperature.

During installation, you can directly stick the sensor to the back surface of the PV module. Use hot melt adhesive to seal the gap between the sensor and the module to prevent air penetration, and then use long tape to fasten the sensor onto the module to ensure firm installation. This is shown in the following figure.



6. Fix the bottom of the environment monitoring device onto the foundation made by the user. Notice: the solar radiation device sensor is fixed on the outmost edge of the lower cross arm support.

## NOTICE

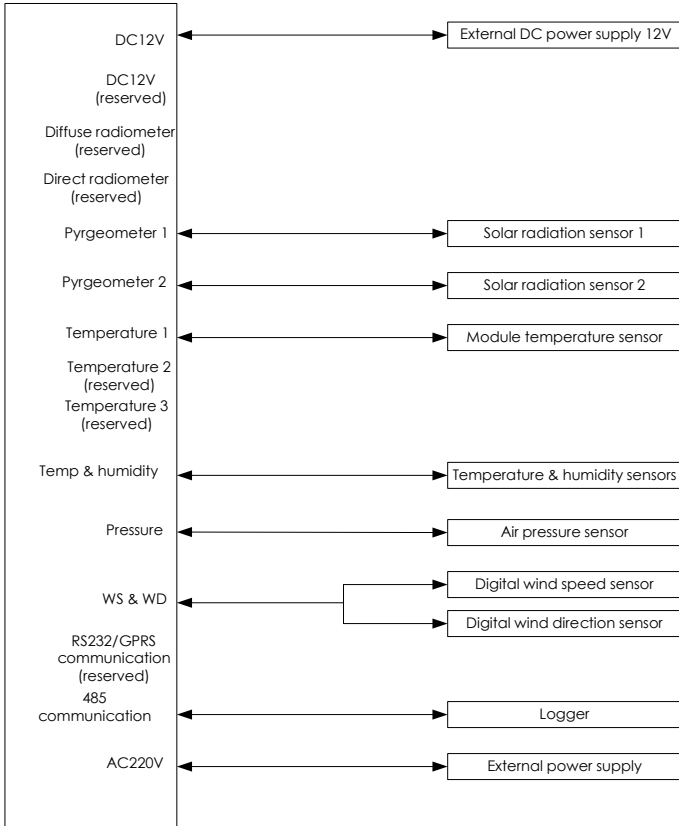
**When the entire device is installed on the roof of the high building, the foundation of the device can be connected to the lightning strip on the roof, so that the device is grounded via the grounding system of the building. When the device is installed in the open field, the device can be fixed on the cement column or metal base of more than 3m.**

If the device is damaged by lightning due to the lack of on-site lightning protection measures, Sungrow holds no liability for corresponding consequence.

7. Lead a downlead from the foundation of the environment monitoring device or the metal base, arrange the earthing network around the foundation by using angle steels, and connect the grounding downlead to the earthing network. For the specific process, refer to the lightning protection standard for local rules and regulations.

## 4 Electrical Connection

All external ports of the environment monitoring device are located at the bottom of the main control box. Port types are shown in the figure below.



Note: Two types of power supply ports are reserved on the main control box, that is, the DC power supply port and the AC power supply port. On site, the user can select either one to supply power.

## 4.1 Power Supply Wiring

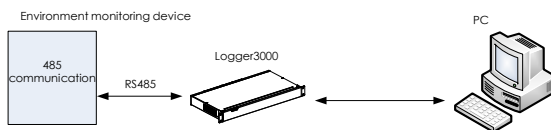
- DC power supply: There are two DC power supply ports DC 12V at the bottom of the main control box. Select either port to connect to external 12V DC power supply.
- AC power supply: Connect the AC power supply port AC 220V to the external AC 220V power supply.

Note: Two types of power supply ports are reserved on the main control box, that is, the DC power supply port and the AC power supply port. On site, the user can select either one to supply power.

## 4.2 Communication Wiring

External port	Connected to	Cable specification
Pyrgometer 1	Inclined-mounted solar radiation sensor	RS485
Pyrgometer 2	Horizontally mounted solar radiation sensor	RS485
Temperature 1	Module temperature sensor	RS485
Temp & humidity	Temperature & humidity sensors	RS485
Pressure	Air pressure sensor	RS485
WS & WD	Digital wind speed sensor Digital wind direction sensor	One RS485 cable is divided into two at the top of the upright strut. One is connected to the digital wind speed sensor while the other is connected to the digital wind direction sensor
485 communication	Logger	RS485

Running information of the environment monitoring device can be viewed on the PC by connecting the device to the PC via the logger. This is shown in the following figure.



## 5 About Us

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