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UT381PV Solar Irradiance Meter User Manual

PREFACE

Thank you for purchasing the new Solar Irradiance Meter. In order to use this product safely and correctly, please read this User Manual thoroughly, especially the Safety part. After reading this guideline, it is recommended to keep the manual and product at an easily accessible place, preferably close to the device, for future reference.

LIMITED WARRANTY AND LIABILITY

Uni-Trend guarantees that the product is free from any defect in material and workmanship within one year since the purchase date. This warranty does not apply to damages caused by accident, negligence, misuse, modification, contamination and improper handling. The dealer shall not be entitled to give any other warranty on behalf of Uni-Trend. If you need warranty service within the warranty period, please contact your seller directly.

This warranty is the only compensation you can obtain. Besides, Uni-Trend does not provide any express or implied warranty, e.g. an implied warranty for some particular purpose. Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by any reason or speculation. As some areas or countries do not allow limitations on implied warranties and incidental or subsequent damage, the above limitation of liability and stipulation may not apply to you.

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1.Product Overview

The UT381PV Solar Irradiance Meter measures irradiance from natural or simulated sunlight, features two measurement channels for ambient and solar panel temperatures, and its built-in inclination and azimuth sensor is used to measure installation direction and angle of inclination. It supports connections with a mobile app "IENV" and a UT541 15KW Photovoltaic I-V Curve Analyzer. It is commonly used for solar panel installation and maintenance in PV power station and product test in PV product laboratories.

2.Product Features

- 1) High-precision measurement equipped with professional sensors; accurately capture the solar radiation spectrum energy to ensure data reliability;
- 2) Fast dynamic response; real-time tracking of solar radiation intensity; meet high-frequency monitoring requirements;
- 3) High environmental adaptability; IP65 rating design; suitable for long-term stable outdoor operations;
- 4) Convenient operation and data management; support Bluetooth connection, seamless integration with APP;
- 5) Functions inclination and compass; provide precise base angles of inclination and azimuth in PV panel installation.
- 6) Specialized Anti-UV Housing (F1) protects against UV-induced aging.

3.Configurations

UT381PV Solar Irradiance Meter	1
Cloth Bag	1
User Manual	1
Safety Guide	1
AA Alkaline Battery	2
Suction-Cup Temperature Probe	1
Solar Panel Mounting Bracket	1
General Download Operation Guide	1

If any components are missing or damaged, please contact your dealer.

4.Safety

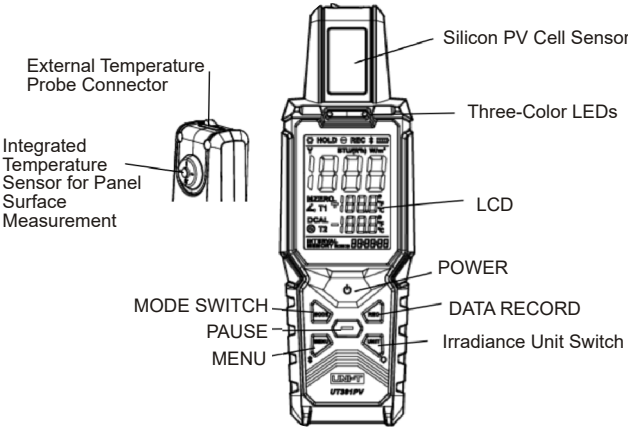
Read the Safety carefully and follow the instructions before using the device.

⚠ "Warning" identifies the dangerous situations and operations may cause to users. "Caution" identifies the potential damages may cause to product or test equipment.

- Check the device and accessories before you use the device. Do not use it when the housing of device is damaged or it fails to work normally.
- Do not disassemble the device or alter the internal wires randomly to avoid device damage.
- Do not store or use the device in high temperature, high humidity, flammable, combustible and strong electromagnetic environments.
- Use soft cloth and neutral detergent to clean the housing of device. Do not use abrasives and solvents to avoid housing corrosion and device damage.
- Store the device in a dry and clean place.

5.Product Structures

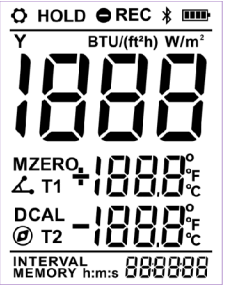
5.1 Components



5.2 Buttons

Buttons	Short Press	Long Press
POWER	/	Power on/off
MODE	Temperature/Inclination/Compass mode	/
Data Hold	Start/stop data hold	/
Data Record	Start/stop data record	/
MENU	Enter/Exit Menu	Bluetooth on/off
UNIT	Irradiance unit switch	Switch the temperature unit in temperature mode and set the inclination to zero in inclination mode.

5.3 Screen Icons



Icons	Descriptions	Icons	Descriptions
	Setting	T1	Built-in sensor temperature
HOLD	Data hold	DCAL	Date
	Offline record		Compass direction
REC	Data record	T2	External probe sensor temperature
	Bluetooth	+	Positive inclination
	Battery state	-	Negative inclination/temperature
Y	Year	1888	Temperature value
BTU/(ft²h) W/m²	Irradiance units	INTERVAL	Record interval
1888	Irradiance value	MEMORY	Memory capacity
M	Month	h:m:s	Hour: minute: second
ZERO	Inclination zeroing	88:88:88	Data record interval
	Inclination		

6. Operations

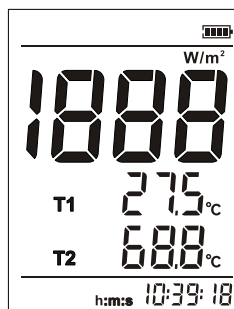
6.1 Basic Operations

1. Power On: Long press POWER button for 2 seconds to power on.
2. Mode Switch: Short press MODE button to switch the mode.
3. Record ON: Short press RECORD button to start to record, 'REC' icon shows on the screen, and press RECORD button again to stop recording.
4. Unit Switch: Short press UNIT button to switch the irradiance unit, long press UNIT button to switch the temperature unit in temperature mode; long press UNIT button to set the inclination to zero in inclination mode.
5. Interface Lock: Short press PAUSE button to lock the interface and 'HOLD' icon will be showed on the screen.
6. Bluetooth ON: Long press MENU button to make Bluetooth on and the Bluetooth icon will be showed on the screen.
7. Enter the Menu for Settings: Short press MENU button to enter the 'Settings' interface, press RECORD button and UNIT button to scroll up and down the menu, and press PAUSE button to enter the secondary menu for settings.

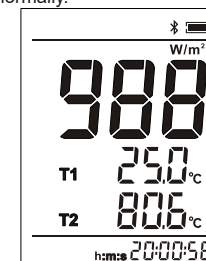
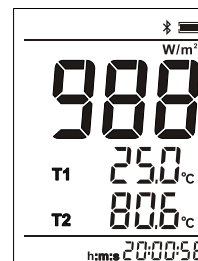
6.2 Connect with UT541 15KW Photovoltaic I-V Curve Analyzer

Set the record settings, memory and clock synchronization functions using the UT541 15KW Photovoltaic I-V Curve Analyzer. For more information, please refer to UT541's User Manual.

1. After power-on, irradiance/temperature mode will be showed on the screen of meter:

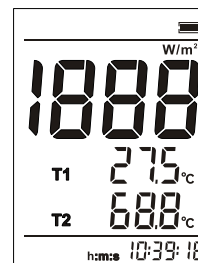


2. Move the Solar Irradiance Meter into the wireless connection range of the UT541 15KW Photovoltaic I-V Curve Analyzer. Ensure a clear sight and no obstructions within the connection range, and keep it within 100 meters. Long press MENU button to open the Bluetooth of Solar Irradiance Meter, and when it stops flashing, it is connected.
3. Once connected, UT541 will acquire meter's data via Bluetooth. When the meter is not synchronized, the Bluetooth icon will flash on the screen and 'REC' will be off. For more information about wireless connection, please refer to UT541's User Manual.
4. When the meter's memory is full, 'REC' will be auto off, FULL shows on the screen, and the measurement data can be imported into UT541 normally.

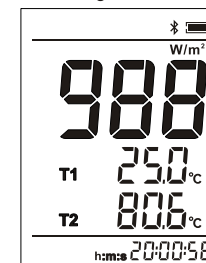


6.3 Connect with Mobile App

1. After power-on, irradiance/temperature mode will be showed on the screen of meter:

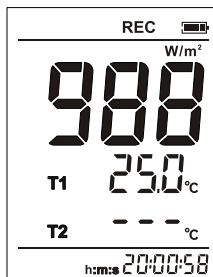


2. Move the meter to the connection range of the mobile phone, long press MENU button to make Bluetooth on, and it is not connected yet when the Bluetooth icon flashes; while Bluetooth icon in solid light means it's connected.



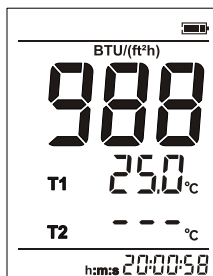
6.4 Record Function

1. Short press  button to enable the record function, and the 'REC' icon shows on the screen.

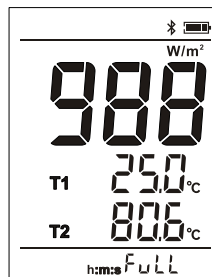


6.5 Unit Switch

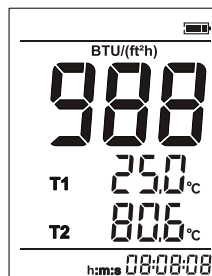
1. Short press  button to switch the irradiance unit.



2. When the meter's memory is full, *FULL* will be showed, and you can set the loop record in the settings.



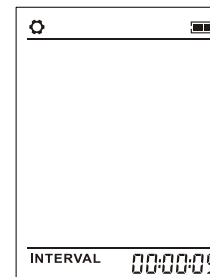
2. Long press  button to switch the temperature unit in the temperature interface.



6.6 Menu Settings

6.6.1 Set Data Record Interval

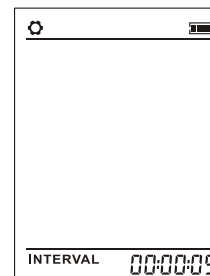
1. Short press  button to enter the menu settings, INTERVAL displays on the screen.



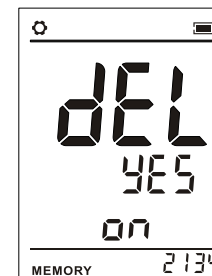
2. Short press  button, the digit starts to flash, short press  button to plus one; short press  button to minus one. Short press  button again to switch to the minute/hour digit set, and short press  and  button in sequence to plus or minus one.

6.6.2 View/Delete Data Records

1. Short press  button to enter the Settings main page.



2. Short press  button to switch to the record count interface, and MEMORY will be showed on the screen.

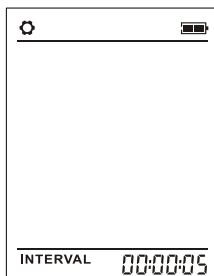


- Short press  button to enter the interface, and **ON** flashes; short press  button again, and **YES** flashes; short press  button again to clear data record count.



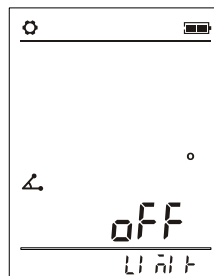
6.6.3 Inclination Limit

- Short press  button to enter the Settings main page.

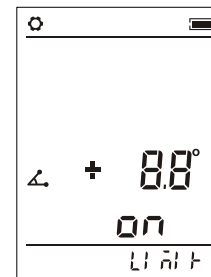


- Short press  button twice to switch to the inclination interface.

- ON** Indicates that the inclination limit is on.
- OFF** Indicates that the inclination limit is off.



- Short press  button and **ON/OFF** flashes, you can short press  button to switch.
- In **ON** flashing, short press  button and digit flashes; short press  button to plus one; short press  button to minus one; short press  button again to complete the inclination limit setting.

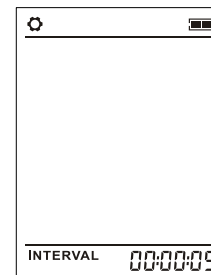


Notes:

To enter other settings' interface, press  (UP) button or  (DOWN) button; To return the main interface, press  button.

6.6.4 LED Light/Buzzer/Loop Record Switch/Auto Power Off Settings

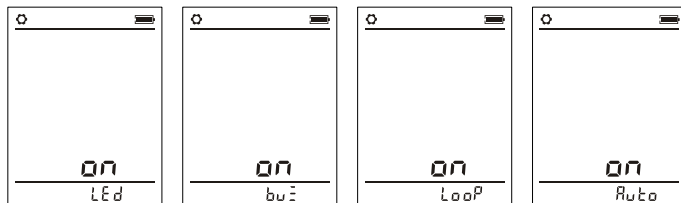
- Short press  button to enter the Settings main page.



- Short press  button multiple times to switch to the LED Light/Buzzer/Loop Record Switch/Auto Power Off Settings respectively.

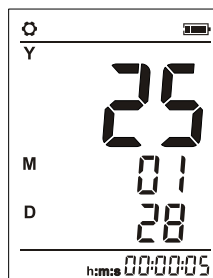
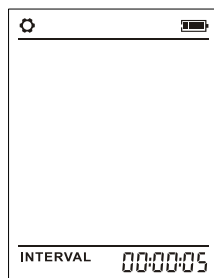
Notes: **ON** and **OFF** each correspond to ON or OFF, and have the following meanings when in a loop record:

- ON** indicates that the meter starts to be in loop record when it is full;
- OFF** indicates that the meter stops recording when it is full;
- Short press  button multiple times to enter the corresponding interface and **ON** flashes. Short press  or  button to switch **ON** / **OFF**, and short press  button again to complete the setting.



6.6.5 Local Clock Settings

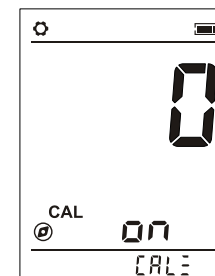
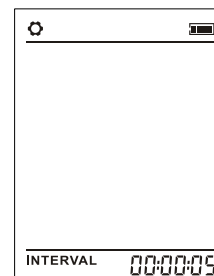
- Short press  button to enter the Settings main page.
- Short press  button five times to switch to the clock interface.



- Short press  button, the seconds digit is flashing; short press  or  button to plus or minus one; short press  again to switch to the next setting of time.

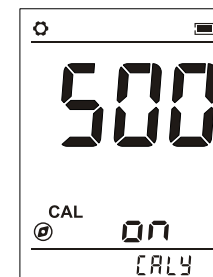
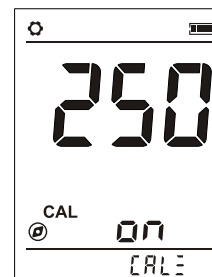
6.6.6 Compass Calibration

- Short press  button to enter the Settings main page.
- Short press  button 8 times to switch to the compass calibration interface.

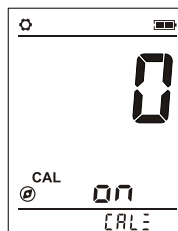


- Short press  button, and **ON** flashes, indicating that calibration is in progress. When the value on the screen is below 250, place the device in a horizontal position and rotate it 360° at a constant speed, centering at the top. When the value is greater than 250, flip it 360° at a constant speed, centering at the meter itself.

Note: Please calibrate in an environment away from magnetic field interference.

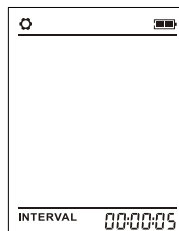


4. After the calibration, **OFF** starts to flash; short press **UNIT** or **REC** button and **YES** flashes; short press **ENTER** button and the calibration is completed.



6.6.7 Factory Reset

1. Short press **MENU** button to enter the Settings main page.



2. Short press **REC** button to switch to the Factory Reset interface. The digital value is the firmware version No..



3. Short press **ENTER** button, **OFF** starts to flash, short press **REC** or **UNIT** button to switch to **YES** flashing; short press **ENTER** button again to confirm, and the recorded data will be cleared. LED Light/Buzzer/Auto Power Off/Inclination Limit/Record Interval/Loop Record settings, etc, will be restored to the factory mode.

7. Typical Usage Scenarios

7.1 Irradiance and Internal Sensor Temperature Measurement

To measure irradiance and temperature, place the meter directly on the PV panel or secure it to the panel using the solar panel mounting bracket.

Notes:

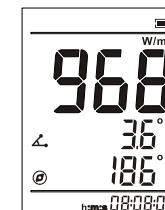
In random sampling measurement, place the meter directly on the PV panel and the embedded conductivity sensor on the rear of meter will automatically read the temperature.

7.2 Measure Temperature via an External Probe

Connect a temperature probe to the meter and place it on or next to the PV panel. Connect the suction-cup temperature probe to the back of the PV panel, and the temperature probe should be in contact with the PV panel. The T2 temperature displayed on the meter is the temperature measured by the external probe.

7.3 Inclination and Cardinal Direction Measurements

Place the meter directly on the PV panel to obtain an accurate inclination. For roof surfaces with an inclination angle other than 0°, press and hold **UNIT** button for 2 seconds to reset the angle and measure the actual inclination of the solar panel. Assuming the set inclination limit is 45.0°, when the meter is placed on the PV panel, the meter will auto alarm if the actual inclination angle is not within the range of 45.0° to 45.9°.



7.4 Compass Measurement

Compass measurement requires three steps to obtain accurate cardinal directions.
Step 1: Make sure the device is in inclination mode.
Step 2: When the meter is inclined above 20 degrees, the compass reading will display "----". If the inclination angle is less than 20 degrees, any compass reading displayed will be inaccurate due to the influence of surrounding metal objects.
Step 3: Take a compass measurement, and keep it away from the PV panel by holding the meter or placing it horizontally (0 to 20 degrees), with its tip pointing at the direction the PV panel is facing. Keep away from any metal objects.

Notes:

The compass will indicate magnetic North. Compass readings are unreliable when the meter is placed on or near objects containing metals (including solar panels, metals, roofs, concrete surfaces with steel reinforcement, etc).

8. Technical Specification

Functions	Range	Resolution	Accuracy ±(a% of reading + b word count)	Descriptions
Solar irradiance measurement	0~1400W/m²	1	± (5.0%rdg+5dgt)	1Btu/(ft²·h) ≈ 3.15459W/m²
	0~500 Btu/(ft²·h)			
Temperature measurement	-40~120°C	0.1	±1°C (-10 75°C) ±2°C (others)	Temperature measurement: Includes meter's sensor temperature and external sensor temperature.
	-40~248°F	0.2/1 (>100°F)	±2°F (14 167°F) ±4°F (others)	
	Response time	/	About 30 seconds	
Inclination measurement (∠)	-90.0~+90.0°	0.1	±1.5° (-50 +50°) ±2.5° (-85 50°, +50 +85°) ±3.5° (others)	
Azimuth measurement	0~360°	1	±7°	Measurement premise (the inclination is within range of -20°~+20°)
Wireless transmission	Bluetooth wireless transmission distance		100m	Open and obstacle-free environments
Data storage	Storage capacity		12800 sets	
	Storage interval		1s ~ 60min	
Sound prompts	When irradiance measurement or inclination angle is out of range.		≥60dB	Test in an open area with no reflective objects, at a distance of 10CM.
Auto power off	30 minutes (no operations)		±1 minute	Can be set.
Battery life	Battery usage life		95h	Bluetooth and LED light OFF
Working height	Altitude of the working environment		≤2000 meters	
Working environment	Temperature		-20°C 60°C	Working environment requirements
	Humidity		≤90%RH	
Storage environment	Temperature		-30°C 70°C	Storage environment requirements
	Humidity		≤80%RH	
Drop test	Drop height		2 meters	Drop test without accessories

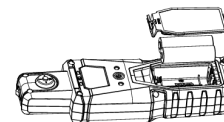
9. Maintenance

1) General Maintenance

- ①.If the product is not used for a long time or is stored in an environment with a temperature above 50°C, please take out the battery to avoid battery leakage.
- ②.Please ensure the battery polarity is correct when you install the battery.
- ③.Use a clean cloth and mild detergent to wipe the housing regularly. Do not use abrasives or solvents to clean the product.
- ④.Do not open the casing randomly to avoid product damage.
- ⑤.The maintenance and service must be done by the professional personnel or qualified departments.

2) Battery Installation and Replacement

- a.The standard battery is 2*1.5V AA battery, please refer to the following figure for installing or replacing the battery.
- b.Place the panel of device facing down, open the battery cover and take the battery out; install the new battery as per the polarity of battery.
- c.Tighten the battery cover after installing the new battery.
- d.Install batteries in same and standard types.



10. Mobile App Download

You can download the mobile App in the following ways:

1. For iOS devices, search and download iENV in the App Store.
2. For Android devices, search and download iENV in Google Play

The User Manual is subject to change without prior notice!

Due to different batches, the materials and details of actual products may be slightly different from the graphic information, please refer to the actual product received. Experimental data provided in the page is from internal laboratory of UNI-T, but it should not be a reference for customer to place orders. Any questions, please contact the customer service, thanks!