

350 WATT HYBRID INVERTER (SOLAR / INVERTER / AC MAINS)



Users' Manual

1. Introduction

Thank you for purchasing the 350 Watt Hybrid Inverter. Connected to the 12 volt battery, the 350W Hybrid Inverter turns out to be AC pure sine wave power through isolation. This advanced product uses the MCU chip control technique, applying the most secure and stable control algorithm design, to improve the output parameters of the inverter to a new level. Also, this product and electrical appliances are well protected by the multiple protection features. The applicability of this inverter can be broadly used at households, schools, camping, flood preventions, communications, first aids, islands and other places without power supply. Please read the instructions carefully to ensure proper operation and save it for future reference.

2. Safety Precautions

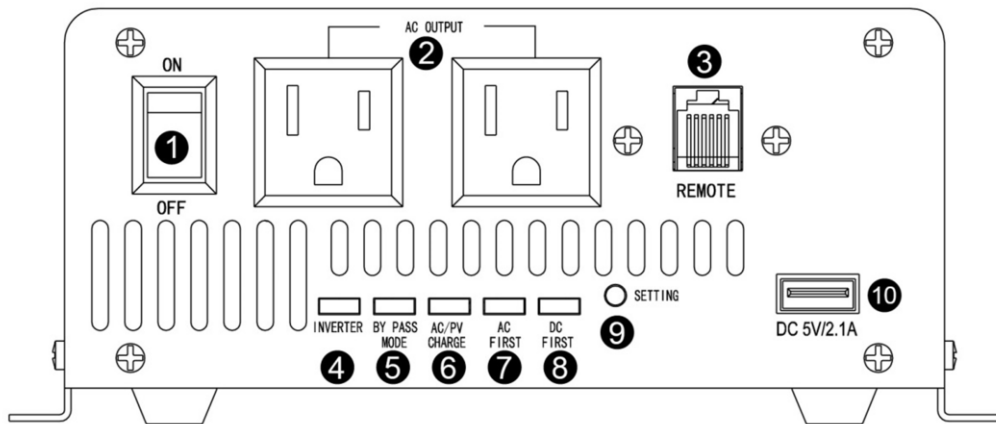
- The inverter can connect only to 12 volt battery and 12 volt DC power supply. Otherwise, it may cause product damage with inappropriate power supply.
- The inverter can convert 12 volt DC into 110 volt AC; 110 volt AC can NOT be converted to 12 volt DC.
- Do NOT place the inverter near flammable materials or any location which accumulate flammable fumes or gases. It has excellent thermal tolerance but might overheat after working for a long time. Please keep the inverter 15 cm (6 inch) away from other objects and place it in a clean and well-ventilated location.
- Do NOT operate the inverter with wet hands and do NOT expose it to rain or moisture.
- To prevent the risk of electric shock or sparkle, the plug must be securely connected to the outlet.
- Any unauthorized repair or disassembly may result in electric shock and void of warranty.

3. Product Features

- ☆ The power supply is controlled by the intelligent chip (MCU).
- ☆ 12 volt DC being converted to high-voltage DC power ends up as AC power.
- ☆ It can charge from either solar power or AC mains. The solar power is given priority by the MCU, considering energy saving.
- ☆ The cooling fan in the inverter is thermally activated and turns on when the inverter becomes warm.
- ☆ Includes a USB port (5VDC/2.1A) used to charge cell phones, digital camera and other appliances.
- ☆ Press the AC / DC priority switch to input either AC or DC power.
- ☆ The AC mains have priority over the inverter and solar mode. (Factory default setting)

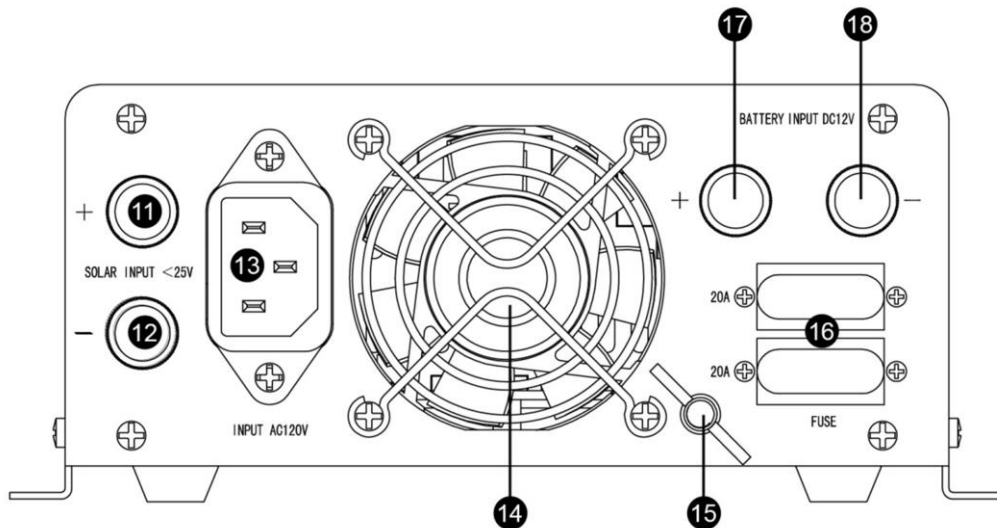
4. Names and Functions

◎Front Panel (Power Output)



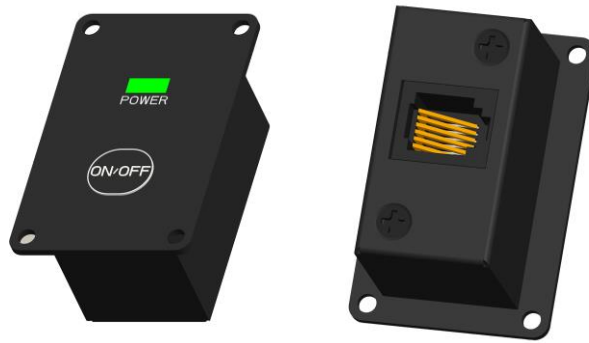
- | | |
|---------------------------|-----------------------------|
| (1) Power switch | (6) AC/PV charge (RED) |
| (2) AC outlet | (7) AC mains first (RED) |
| (3) Remote control socket | (8) DC power first (RED) |
| (4) Inverter mode (RED) | (9) AC / DC priority switch |
| (5) Bypass mode (RED) | (10) USB port |

◎Back Panel (Power Input)



- | | |
|-------------------------------------|-------------------------------|
| (11) Pos. terminal of solar charger | (15) Ground terminal |
| (12) Neg. terminal of solar charger | (16) Inverter input fuse |
| (13) AC input socket | (17) Pos. terminal of battery |
| (14) Fan | (18) Neg. terminal of battery |

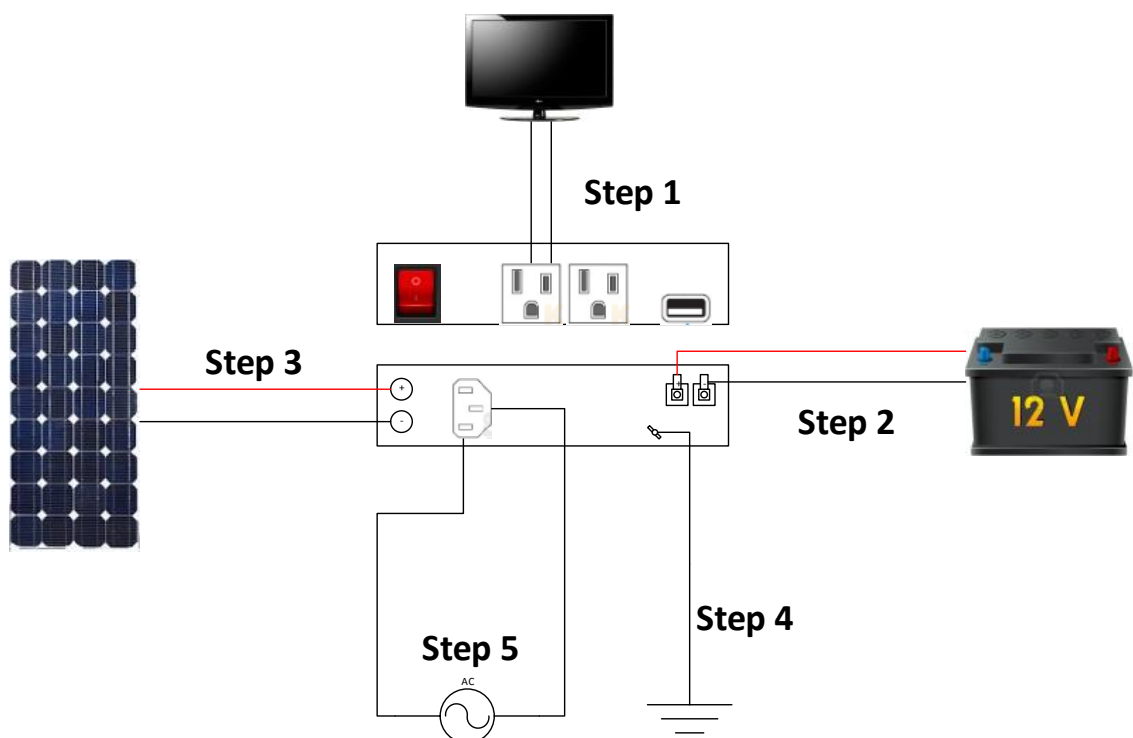
© Remote Control



The remote control is attached to a 2 meter long wire that connects the remote control socket to switch the 350 Watt Hybrid Inverter on or off.

5. How to Connect the Hybrid Inverter with Your Facilities

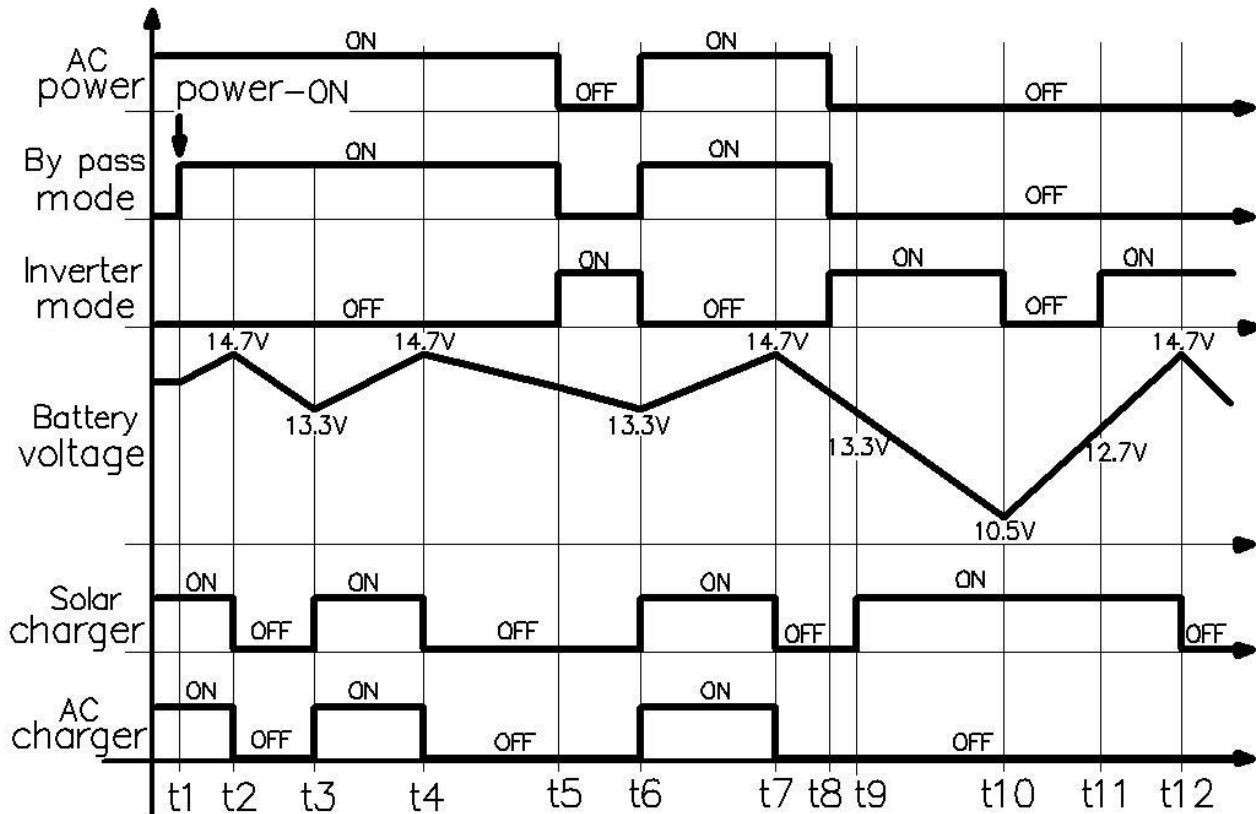
1. Connect the AC outlet (part 2) with appliances as shown in Step 1.
2. Connect the battery terminals (part 17 & 18) with the battery as shown in Step 2. Please ensure the polarity is correct.
3. Connect the solar charge terminals (part 11 & 12) with the solar panel as shown in Step 3. Please ensure the polarity is correct.
4. Connect the ground terminal (part 15) with the ground wire as shown in Step 4.
5. Connect the AC input socket (part 13) with the AC mains as shown in Step 5.
6. After switching the inverter on, the power indicator light (red) constantly lit shows that power is operating normally. If the power indicator light (red) is blinking, please turn it off and check the wiring.



6. FAQ and Troubleshooting Guide

| Problem | Possible Cause | Suggested Action |
|-------------------------------------|--|---|
| Hybrid inverter is not working | The battery is not being charged properly. | Have a qualified technician check the battery. Recharge or replace the battery. |
| | Incorrect connections between the inverter and the power source | Check the connections with exposed conductive parts. |
| | Blown fuse in the inverter | Replace the fuse. |
| No AC output voltage | Over temperature protection | Check for adequate ventilation. Reduce the load on the inverter to rated power. |
| | The load is rated at more than 350 watts; an overload protection has occurred. | Ensure the load with a power rating less than 350 watts. Once the load exceeds the surge capability, please use a load with a starting surge power within its capability. |
| | Short circuit protection | Check if the load exceeds the rating or short circuit occurs. |
| TV or radio interference | The electronic equipment is not shielded to minimize its interference with TV signals. | Put the inverter far away from the equipment and adjust the orientation of the inverter. |
| Battery discharge time is too short | The battery is old or defective. | Replace the battery. |
| | The battery capacity is too small. | Use a higher capacity battery. |
| | Charger failure (no charge voltage) | The battery voltage is too low to be charged. Change the battery. |

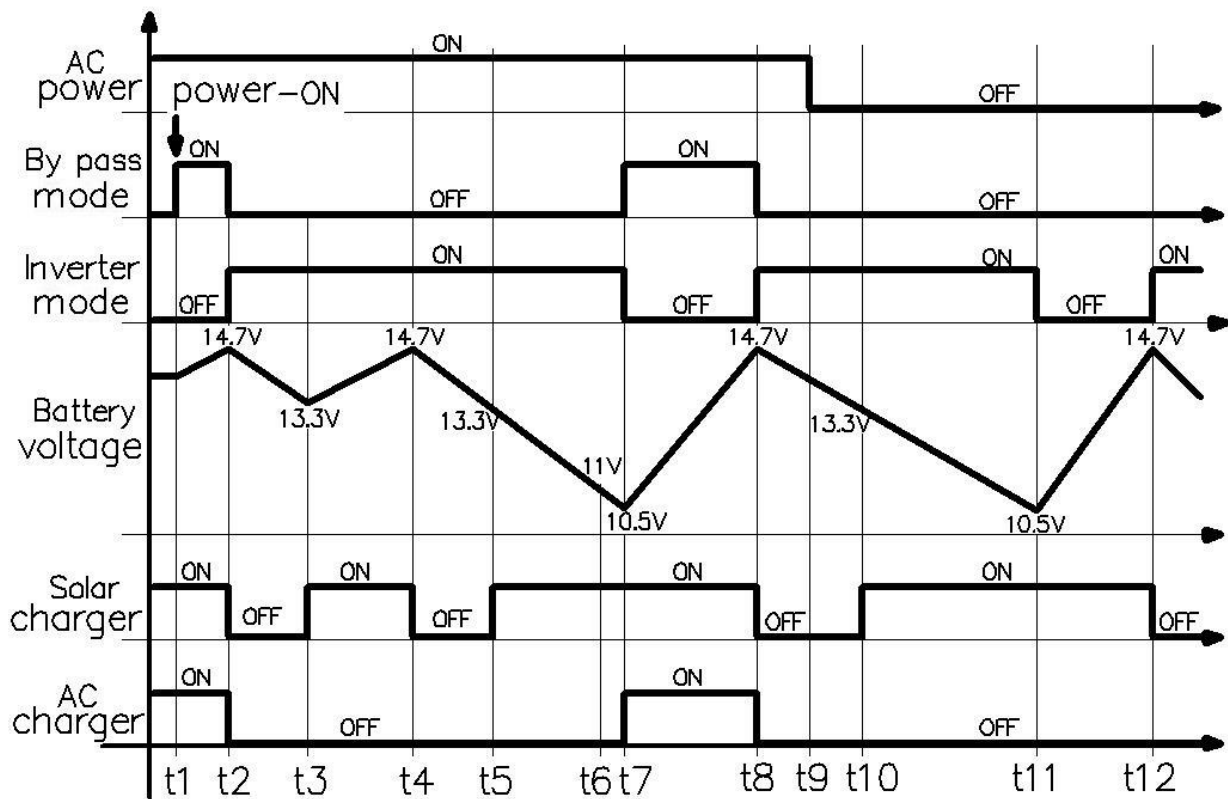
7. AC Mains First



- t1: When you turn on the 350 Watt Hybrid Inverter, in order to ensure full battery capacity, the MCU will automatically enter the bypass mode, supplying electricity to the load. In the meantime the AC charger and solar charger will continue to charge the battery.
- t2: When the battery is fully charged to 14.7 volt, the MCU will turn OFF both the AC and solar charger. Otherwise the battery life span will be shortened by overcharging. Meanwhile, it is still in the bypass mode supplying electricity to the load.
- t3: Even if it is in the bypass mode, the battery voltage will gradually drop due to the standby loss from the 350 Watt Hybrid Inverter. Once the battery drops below 13.3 volt, it will be charged by the AC charger upon the charger current below 2A (e.g. night time or cloudy days). Likewise, it will be charged by the solar charger above 2A.
- t4: When the load requirement is less than the energy provided by the chargers, the battery voltage will climb slowly. Once it reaches 14.7 volt, the MCU will shut off the chargers and supply the electricity to the load.
- t5: As the charger is OFF, the battery voltage will slowly fall between 13.3 volt and 14.7 volt (float charging). Once a power cut occurs, the MCU will automatically turn ON the inverter mode (<15ms) to keep loads running.
- t6: When the power returns, the MCU will switch to the bypass mode supply electricity to the load. If the battery voltage drops to 13.3 volt, the MCU will once again start charging.
- t7: When the load requirement is less than the energy provided by the chargers, the battery voltage will climb slowly. Once it reaches 14.7 volt, the MCU will shut off the chargers and supply electricity to the load.
- t8: When a power cut occurs, the MCU will automatically turn on the inverter mode (<15ms) to keep loads running.

- t9: Since the inverter mode is ON, the battery will be discharging rather quickly. As the battery drops below 13.3 volt, the solar charger will be turned on again.
- t10: As the battery voltage falls as low as 10.5 volt and the utility remains unavailable, the battery will be charged by only the solar charger. Then the battery will discharge very fast since the inverter continues supplying power through it. The inverter mode eventually shut down to prevent over discharging.
- t11: When the battery voltage rises to 12.7 volt, the MCU will restart the inverter supplying power to the load.
- t12: If the solar charger current is more than 2A and the utility is not available at the same time, the power to the battery is provided by the solar charger. As soon as the battery reaches 14.7 volt again, the solar charger will be turned OFF simultaneously.

8. DC Power First



- t1: When you turn on the 350 Watt Hybrid Inverter, in order to ensure full battery capacity, the MCU will automatically enter the bypass mode supplying, electricity to the load. In the meantime the AC charger and solar charger will continue to charge the battery.
- t2: When the battery is fully charged to 14.7 volt, the MCU will turn OFF both the AC and solar charger. Otherwise the battery life span will be shortened by overcharging. The MCU will also switch to the inverter mode supply electricity to the load through the battery. (Users can also press the AC/DC priority switch to set the DC first mode as the battery discharges below 14.7 volt)
- t3: When the battery drops below 13.3 volt, the MCU will once again start up the solar charger instead of the AC charger in order to save energy.

- t4: When the load requirement is less than the energy provided by solar panels, the battery voltage will climb slowly. When it reaches 14.7 volt, the solar charger will turn OFF to avoid overcharging.
- t5: When the battery drops below 13.3 volt, the solar charger will start charging again.
- t6: If the load requirement is greater than the energy provided by the solar panels, the battery voltage will gradually decline. As soon as it is down to 11 volt, the built-in alarm will go off to inform users of the low voltage.
- t7: As the battery voltage falls as low as 10.5 volt and the utility works normally, the MCU will detect this and enter the bypass mode supplying electricity to the load. In the meantime the AC charger and solar charger keep charging the battery to prevent the unit from switching off. Also, the solar charger will be turned ON if the solar current is higher than 2A to achieve the goal of energy saving.
- t8: When the battery is fully charged by the AC charger and solar charger (battery voltage around 14.7 volt), both chargers will be turned OFF to prevent overcharging.
- t9: Once a power cut occurs, the MCU will switch to the inverter mode (<15ms) to keep loads running.
- t10: When the battery drops below 13.3 volt, the MCU will once again start up the solar charger instead of the AC charger in order to save energy.
- t11: As the battery voltage falls as low as 10.5 volt and the utility remains unavailable, the battery will be charged by only the solar charger. Then the battery will discharge very fast since the inverter continues supplying power through it. The inverter mode eventually shut down to prevent over discharging.
- t12: If the solar charger current is more than 2A and the utility is not available at the same time, the power to the battery is provided by the solar charger. As soon as the battery reaches 14.7 volt again, the solar charger will be turned OFF simultaneously.

9. Product Specifications

| Inverter | | | |
|-------------------|---------------------------|------------------|---|
| 1 | Rated Voltage | 13.0VDC | |
| 2 | Rated Voltage Range | 11-16VDC | |
| 3 | Low Voltage Alarm | 10.5±0.5VDC | |
| 4 | Low Voltage Protection | 10.0±0.5VDC | Auto Restart |
| 5 | Low Voltage Recovery | 11.7V±0.5VDC | |
| 6 | High Voltage Protection | 16.5±0.5VDC | Auto Restart |
| 7 | High Voltage Recovery | 15.0V±0.5VDC | |
| 8 | Static | ≤0.7A | DC input 13.0VDC |
| 9 | No Load Output Voltage | 120VAC±5V | |
| 10 | Full Load Output Voltage | 120VAC±5V | |
| 11 | Rated Power | 350W | Ambient Temp.: 25°C/1hr |
| 12 | Overload Output | 360-420W | |
| 13 | Peak Power | 700W | |
| 14 | Output Frequency | 60±0.5Hz | |
| 15 | Output Waveform | Pure Sine Wave | |
| 16 | Short Circuit Test | OK | |
| 17 | Distortion | ≤5% | |
| 18 | Efficiency | ≥80% | |
| 19 | Over Temp. Protection | ≤65°C | |
| 20 | Input Fuses | 20A×2 | |
| 21 | Input Polarity Protection | Blowing the fuse | |
| AC Charger | | | |
| 1 | AC Input Range | 98VAC~132VAC | |
| 2 | Rated Voltage | AC120V | |
| 3 | Frequency Range | 60±5Hz | |
| 4 | Static | ≤0.08A | No DC output without connecting to batteries |
| 5 | Rated Power | 350W | Ambient Temp.: 25°C/1hr |
| 6 | Overload Output | 350-700W | 100%~130% 20 minutes; 130%~150% 2 minutes; 150%~200% 10 seconds |
| 7 | Peak Power | 700W | 10 cycles |
| 8 | Charger Input Current | 1.5A@120VAC | Max. (RMS) |
| 9 | Charger Input Power | 97W | |
| 10 | Output Voltage Range | 10~15VDC | |
| 11 | Output Current | 5A@12VDC | ±10% |
| 12 | Max. Charge Voltage | 14.7VDC±0.3V | |
| 13 | Float Charge Voltage | 13.65VDC±0.2V | |
| 14 | Float Charge Current | 1.0A±0.5A | |
| 15 | Efficiency | ≥80% | |

| | | | |
|----------------------|----------------------------|---|----------------------------------|
| 16 | Short Circuit Protection | OK | |
| 17 | Reverse Battery Protection | OK | |
| 18 | High Voltage Protection | 16VDC±1V | |
| 19 | AC Outlet | 2 | |
| 20 | Length of Cables | 1.5 M (black) | |
| Solar Charger | | | |
| 1 | Max. Charge Current | 7A±1A | |
| 2 | Max. Input Voltage | ≤25VDC | |
| 3 | Max. Charge Voltage | 16VDC±1V | |
| 4 | Recovery Voltage | 13.3VDC±1V | |
| 5 | Efficiency | ≥80% | |
| Others | | | |
| 1 | USB Output Voltage | PIN1: 5±0.5VDC | |
| | | PIN2: 2.6V-2.9V | |
| | | PIN3: 1.8V-2.3V | |
| | | PIN4: GND | |
| | USB Output Current | 2.1A | |
| 2 | Light ④: Inverter Mode | Normal Operation | Inverter LED glows solidly |
| 3 | | Abnormal Warning | Inverter LED pulses |
| 4 | | Low Input Voltage Protection | Inverter LED flashes twice |
| 5 | | High Input Voltage Protection | Inverter LED flashes three times |
| 6 | | Output Overload Protection | Inverter LED flashes once |
| 7 | | Max. Output & Short Circuit Protection | Inverter LED flashes once |
| 8 | | Temperature Protection | Inverter LED flashes four times |
| 9 | Light ⑤: Bypass Mode | Normal Operation | Bypass LED glows solidly |
| 10 | | Abnormal Warning (overload, over temperature, high/low battery voltage) | Bypass LED pulses |
| 11 | Light ⑥: AC/PV Charge | Normal Charging | AC/PV charge LED pulses |
| 12 | | Charge Completed | AC/PV charge LED glows solidly |
| 13 | AC/DC Switching Time | AC to DC | 15ms |
| 14 | | DC to AC | 15ms |
| 15 | Operating Temperature | -20℃ ~40℃ | |
| 16 | Storage Humidity | 5%--95% | |
| 17 | Size (L/ W/ H) | 245 x 180 x 75 MM | |
| 18 | Weight | 2.42 KG | |