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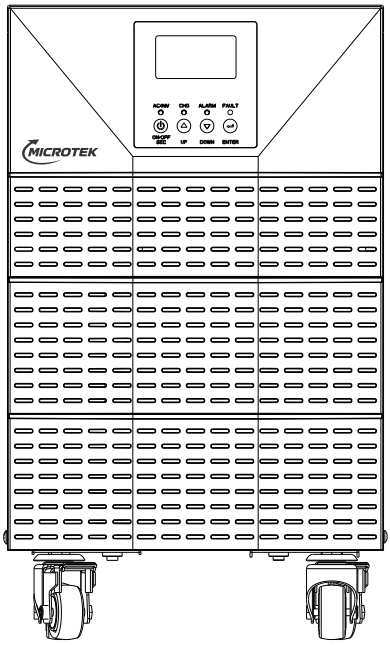

Solar PCU MPPT 5KVA

USER MANUAL

Preface

The manual is intended to provide detailed information of product information, installation, application, trouble shooting, precautions and maintenance of series off-grid solar inverters. The manual does not contain all the information about the photovoltaic system. Please read this manual carefully and follow all safety precautions seriously before any movement, installation, operation and maintenance to ensure correct use and high performance of operation on the inverter.

The use of series off-grid solar inverters must comply with local laws and regulations on off-grid power generation.

The manual needs to be kept well and be available at all times.

There may be data deviation because of product improvement. Detailed information is in accordant with the final product.

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1 Important Safety Warning

Please comply with all warnings and operating instructions in this manual. Save this manual properly and read carefully the following instructions before installing the unit. Do not operate this unit before reading through all safety information and operating instructions carefully.

1.1 Transportation

- Please transport the Inverter system only in the original package to protect against shock and impact.

1.2 Preparation

- Condensation may occur if the Inverter system is moved directly from cold to warm environment. The Inverter system must be absolutely dry before being installed. Please allow at least two hours for the Inverter system to acclimate the environment.
- Do not install the Inverter system near water or in moist environments.

  Do not install the Inverter system where it would be exposed to direct sunlight or near heater.
- Do not block ventilation holes in the Inverter housing.

1.3 Installation

- Do not connect appliances or devices which would overload the Inverter system to the Inverter output terminal block.
- Place cables in such a way that no one can step on or trip over them.
- The Inverter can be operated by any individual with no previous experience.

- Connect the Inverter system only to an earthed shockproof outlet which must be easily accessible and close to the Inverter system.
- Inverter has provided earthed terminal, in the final installed system configuration, equipotential earth bonding to the external Inverter battery cabinets.
- The Inverter can be installed only by qualified maintenance personnel.
- An appropriate disconnect device as short-circuit backup protection should be provided in the building wiring installation.
- An appropriate disconnect device as short-circuit backup protection should be provided between Inverter and solar panel.
- An integral single emergency switching device which prevents further supply to the load by the Inverter in any mode of operation should be provided in the building wiring installation.
- Connect the earth before connecting to the building wiring terminal.
- Installation and wiring must be performed in accordance with the local electrical laws and regulations.

1.4 Operation

- Do not disconnect the Mains cable on the Inverter system or the building wiring outlet (shockproof socket outlet) during operations since this would cancel the protective earthing of the Inverter system and of all connected loads.
- The Inverter system features its own, external current source (batteries). The Inverter output sockets or output terminals block may be electrically live even if the Inverter system is not connected to the building wiring outlet.
- In order to fully disconnect the Inverter system, first press the “ESC/ON/OFF” button for 3 seconds to turn off the Inverter, and then switch off the Input breaker.

- Prevent no fluids or other foreign objects from inside of the Inverter system.

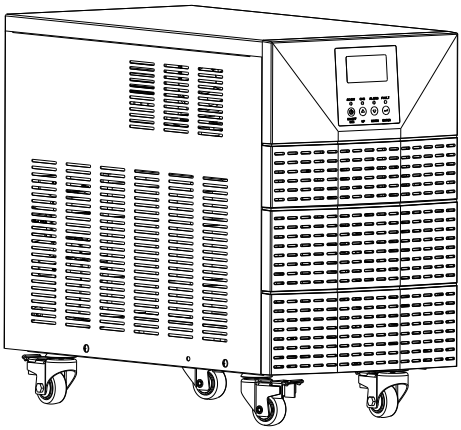
1.5 Maintenance, service and faults

- The Inverter system operates with hazardous voltages. Repairs may be carried out only by qualified maintenance personnel.
- Caution - risk of electric shock. Even after the unit is disconnected from the mains (building wiring outlet), components inside the Inverter system are still electrically live and dangerous.
- Before carrying out any kind of service and/or maintenance, disconnect the batteries and verify that no current is present and no hazardous voltage exists in the terminals of high capability capacitors such as BUS-capacitors.
- Only people who are adequately familiar with batteries and with the required precautionary measures may replace batteries and supervise operations. Unauthorized persons must be kept well away from the batteries.
- Batteries may cause electric shocks and have a high short-circuit current. Please take the precautionary measures specified below and any other measures necessary when working with batteries:
  - Remove wristwatches, rings and other metal objects.
  - Use only tools with insulated grips and handles.
- When changing batteries, install the same number and same type of batteries.
- Please replace the fuse only with the same type and amperage in order to avoid fire hazards.
- Do not dismantle the Inverter system.

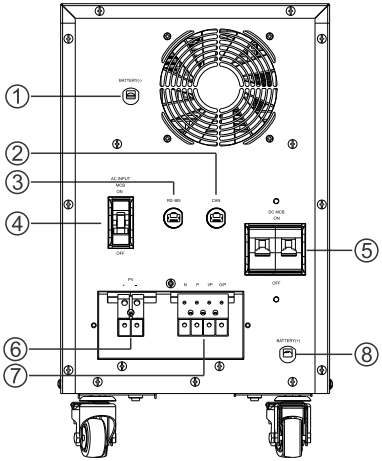
2 Installation and set up

NOTE: Before installation, please inspect the unit. Be sure that nothing inside the package is damaged. Please keep the original package in a safe place for future use.

2.1 Rear panel view



SOLAR PCU MPPT 5KVA 48V



SOLAR PCU MPPT 5KVA 48V

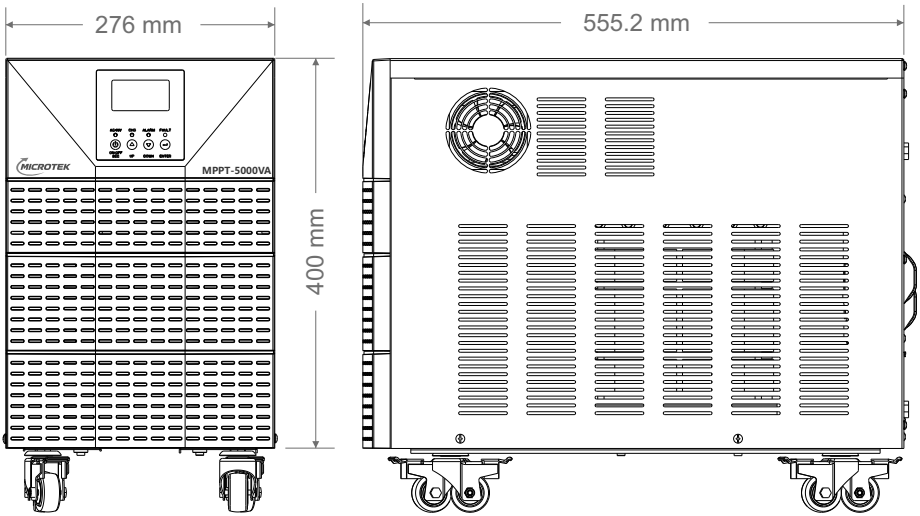
No.	Name
	Solar PCU MPPT 5KVA
1	Battery Input-
2	CAN communication port
3	RS485 communication port
4	Mains input circuit breaker
5	Battery input circuit breaker
6	Solar Input Terminal
7	Input / Output Terminal Block
8	Battery Input+

2.2 Products modules

Product name	Model	Rated output power
Single-phase off-grid solar inverter	Solar PCU MPPT 5KVA 48V	5KVA

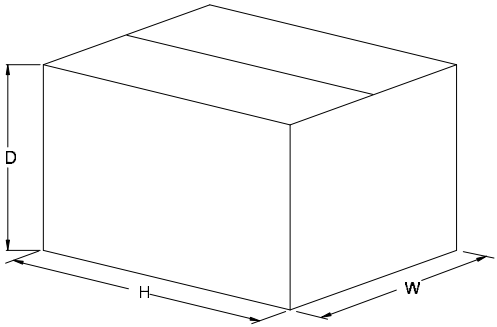
Note: The technical parameters of off-grid solar inverter refer to the appendix.

2.3 Dimensions and weight



Solar PCU MPPT 5KVA

Model	H (mm)	W (mm)	D (mm)	Net weight (kg)
Solar PCU MPPT 5KVA 48V	400	276	555.2	42



Model	H (mm)	W (mm)	D (mm)	Gross weight (kg)	Packaging Material
Solar PCU MPPT 5KVA 48V	667	390	520	54.5	Paper and

Model	H (mm)	W (mm)	D (mm)	Gross weight (kg)	Packaging Material
					wood pallet

2.4 Inverter Installation

Installation and wiring must be performed in accordance with the local electric laws/regulations and execute the following instructions by professional personnel.

Make sure the mains wire and breakers in the building are in compliance with the standard of rated capacity of Inverter to avoid the hazards of electric shock or fire.

NOTE:

1) Do not use the wall receptacle as the input power source for the Inverter, as its rated current is less than the Inverter's maximum input current. Otherwise the receptacle may be burned and destroyed.

2) Switch off the mains switch in the building before installation.

3) Turn off all the connected devices before connecting to the Inverter.

4) Prepare wires based on the following table:

Model	Wiring spec(AWG)				
	Mains Input	Output	Battery	PV Panel	Ground
Solar PCU MPPT 5KVA 48V	10	10	4	8	10

NOTE 1: The Mains input/output cable for Solar PCU MPPT 5KVA should be able to withstand over 22A current. It is recommended to use 10AWG or thicker wire for safety and efficiency.

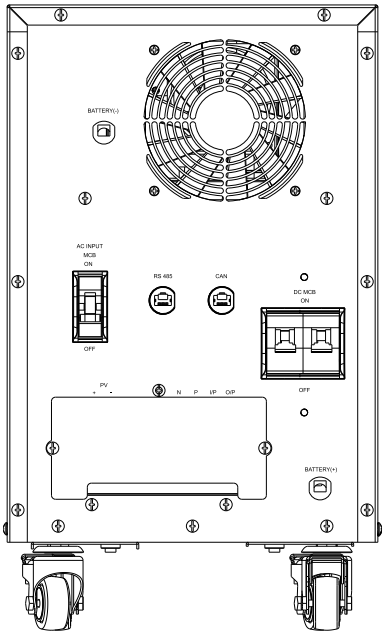
NOTE 2: The battery cable for Solar PCU MPPT 5KVA should be able to withstand

over 98A current. It is recommended to use 4AWG or thicker wire for safety and efficiency.

NOTE 3: The Solar panel cable for Solar PCU MPPT 5KVA should be able to withstand over 45A current. It is recommended to use 8AWG or thicker wire for safety and efficiency.

NOTE 4: The selection of color of wires should be followed by the local electrical laws and regulations.

5) Remove the terminal block cover on the rear panel of Inverter. Then connect the wires according to the following terminal block diagrams: (Connect the earth wire first when making wire connection. Disconnect the earth wire last when making wire disconnection!)



Terminal Block wiring diagram for Solar PCU MPPT 5KVA

NOTE 1: Make sure that the wires are connected tightly with the terminals.

NOTE 2: Please install the output breaker between the output terminal and the load, and the breaker should be qualified with leakage current protective function if necessary.

6) Put the terminal block cover back to the rear panel of the Inverter.

7) Connect the battery cable to the external battery bank, please make sure a DC breaker or other protection device between the Inverter and external battery pack is installed. If not, please install it carefully. Switch off the battery breaker before installation.

8) Connect the Solar panel to the Inverter. Please make sure a DC breaker or other protection device between the Inverter and solar panel is installed. If not, please install it carefully. Switch off the breaker before installation.

 Warning:

Make sure the Inverter is not turned on before installation. The Inverter should not be turned on during a wiring connection.

NOTE: Set the battery pack breaker in "OFF" position and then install the battery pack.

- Pay highly attention to the rated battery voltage marked on the rear panel. The connection with the wrong battery voltage may cause permanent damage to the Inverter.
- Pay highly attention to the rated Solar panel voltage marked on the rear panel. The connection with the wrong solar panel voltage may cause permanent damage to the Inverter.
- Pay high attention to the polarity marking on the external battery connector, and make sure the correct battery polarity is connected. The wrong connection

may cause permanent damage to the Inverter.

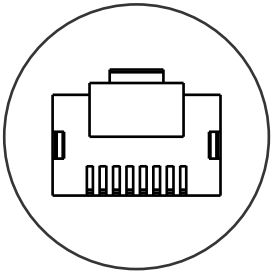
- Pay close attention to the polarity marking on the solar panel connector, and make sure the correct solar panel polarity is connected. The wrong connection may cause permanent damage to the Inverter.
- Make sure the protective earth ground wiring is correct. The current spec, color, position, connection and conductance reliability of the wire should be checked carefully.
- Make sure the utility input & output wiring is correct. The current spec, color, position, connection and conductance reliability of the wire should be checked carefully. Make sure the L/N terminal is correct, not reverse or short-circuited.

2.5 Turn on the Inverter

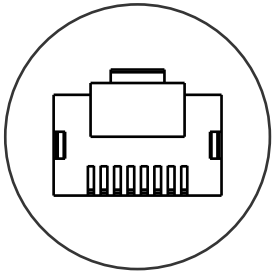
Press the “ON/OFF/ESC” button on the front panel for 3 seconds to turn on the Inverter.

2.6 Communication connection

The inverter supports RS485 and CAN communication. The interfaces are as follows.



RS485



CAN

3. Operations

3.1 Display Panel and Operation

The operation and display panel, shown in below chart, is on the front panel of the inverter. It includes four indicators, four function keys and an LCD display, indicating the operating status and input/output power information.

Solar PCU MPPT 5KVA

3.1.1 LED indicators

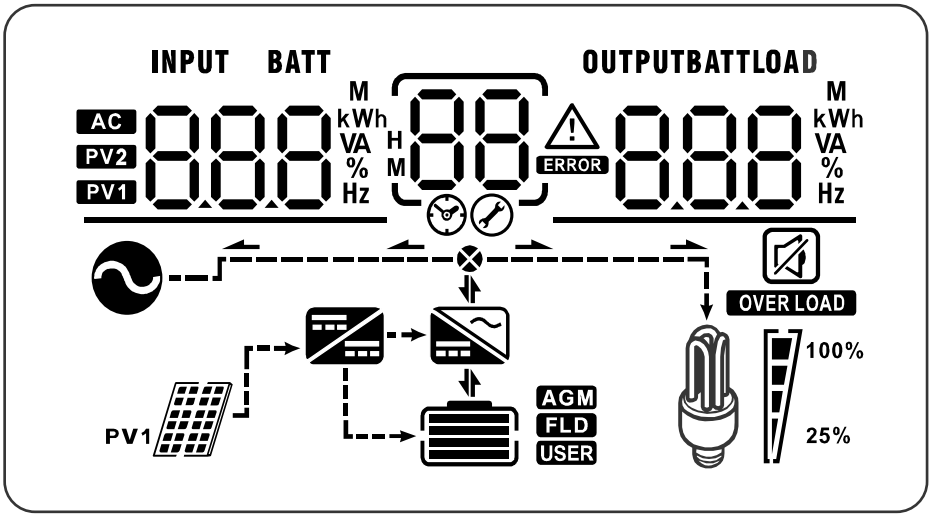
LED indicators		Messages	
AC/INV	Yellow	Solid On	Output is powered by Grid in Mains mode.
		Flashing	Output is powered by a battery in battery mode.
CHG	Green	Solid On	The battery is fully charged.
		Flashing	The battery is charging.

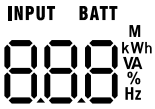
ALARM	Yellow	Solid On	A warning condition occurs in the inverter.
FAULT	RED	Solid On	A FAULT condition occurs in the inverter.

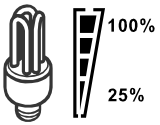
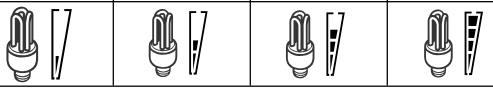
3.1.2 Function Keys

Function Keys	Description
ON/OFF ESC	> Esc key: Press this button to return to the setting item in setting mode. > Turn on the Inverter: Press and hold this button for at least 3 seconds to enable the Inverter output function. > Tum off the Inverter: Press and hold this button for at least 3 seconds to disable the Inverter output function.
UP	To go to next selection
DOWN	To go to previous selection
ENTER	To confirm the selection in setting mode or enter setting mode

3.2 LCD Display Icons



Icon	Function description
Input Source Information	
AC	Indicates the AC input
PV1	Indicates the PV1 input
	Indicate Mains input voltage, mains input frequency, PV voltage, charger current.
Configuration Program and Fault Information	
	Indicates the setting programs.

<table>
<tr><th>Icon</th><th>Function description</th></tr>
<tr><td> 
</td><td>Indicates the warning and fault codes.
Warning: flashing with warning code.
 
Fault: lighting with fault code.
 
</td></tr>
<tr><td colspan="2">Output Information</td></tr>
<tr><td> 
</td><td>Indicate output voltage, output frequency, load percent %, load in VA.</td></tr>
<tr><td colspan="2">Battery Information</td></tr>
<tr><td>  </td><td>Indicates battery level as 0-24%, 25-49%, 50-74% and 75-100% in battery mode and charging status in line mode.</td></tr>
<tr><td colspan="2">Load Information</td></tr>
<tr><td> 
</td><td>Indicates overload</td></tr>
<tr><td rowspan="3"> 
</td><td colspan="4">Indicates the load level by 0-24%, 25-49%, 50-74% and 75-100%</td></tr>
<tr><td>0%~24%</td><td>25%~50%</td><td>51%~74%</td><td>75-100%</td></tr>
<tr><td>  </td></tr>
<tr><td colspan="2">Mode Operation Information</td></tr>
<tr><td>  </td><td>Indicates unit connects to the Mains.</td></tr>
<tr><td> 
</td><td>Indicates unit connects to the PV panel.</td></tr>
<tr><td>  </td><td>Indicates the solar charger is working</td></tr>
</table>

Icon	Function description
	Indicates the DC/AC inverter circuit is working.

3.3 LCD Settings

First pressing and holding the “ENTER” button for 2 seconds, the unit will enter setting mode. And then, Press “UP” or “DOWN” button for 1 second to select setting programs. And then, Press “ENTER” button to for 1 second confirm the selection. Finally, press the “ESC” button for 2 seconds to exit setting mode.

Program	Description	Select-able option	
00	Mains charging current setting	000	Not charging.
		001	25% rated charging current.
		002	50% rated charging current.
		003	75% rated charging current.
		004	100% rated charging current. (Default)
01	Battery Type Setting	000 ~ 009	The value ranges from 000 to 010 See "Battery Type Setting".
		010	Lithium battery
02	Lithium battery protocol Settings	000	Reserve

		006	
03	Lithium battery charging voltage setting	14.0	Reserve
04	Lithium battery charging current setting	45.0	Reserve
05	Lithium battery shutdown voltage setting	13.0	Reserve
06	Output frequency setting	050	Default
		060	Reserve
07	Mode selection	000	Battery priority mode
		001	Main priority mode
08	Mains over voltage point setting	260	Value range: 250 to 300 Default:260
09	Mains under-voltage point setting	180	Value range: 100 to 180 Default:180

10	battery under-voltage point setting		Reserve
11	BOOST charge voltage setting		Value range: 13.9 to 15.0 Default:14.4
12	Floating charge voltage		Value range: 13.3 to 13.8 Default:13.6
13	PV charging current setting		Value range: 00.0 to 104 Default: 104

3.4 Battery Type Setting

Mains priority mode						
Battery Type Setting	Battery Type	Description	BOOST charge voltage		Floating charge voltage	
			12V	48V	12V	48V
	0	/				
	1	FLA	14.0	56.0	13.7	54.8
	2	SMF	14.1	56.4	13.4	53.6
	3	Deep lead-acid battery	14.6	58.4	13.7	54.8
	4	TUB(Default)	14.4	57.6	13.6	54.4
	5	EURO	14.4	57.6	13.8	55.2

	6	Sulfide battery	15.0	60.0	15.0	60.0
	7	NA				
	8	NA				
	9	NA				

NOTE:

1) "0": AC input does not charge the battery, and the "ALARM" yellow light is on. Photovoltaic can charge batteries.

2) If you have any questions about the use of different battery types, please consult the battery supplier to select the appropriate charging voltage range.

If mains priority is selected, select 1 or 2 or 3 or 4 or 5 or 6 as the battery type.

Mains priority mode

Battery Type Setting	Battery Type	Description	BOOST charge voltage		Floating charge voltage	
			12V	48V	12V	48V
	0	/	Not charging			
	1	FLA	14.0	56.0	13.7	54.8
	2	SMF	14.1	56.4	13.4	53.6
	3	Deep lead-acid battery	14.6	58.4	13.7	54.8
	4	TUB	14.4	57.6	13.6	54.4
	5	EURO	14.4	57.6	13.8	55.2
	6	Sulfide battery	15.0	60.0	15.0	60.0
	7	Battery priority	When the discharge is		After charging, the	

		mode	lower than 11V / 44V, it is converted to AC input for load energy	battery is higher than 14V / 56V, it is converted to battery mode for load energy
	8	Battery priority mode	When the discharge is lower than 10.5V /42V, it is converted to AC input for load energy	After charging, the battery is higher than 13.5V / 54V, it is converted to battery mode to load energy
	9	Battery priority mode	When the discharge is lower than 10V / 40V, it is converted to AC input for load energy	After charging, the battery is higher than 13V / 52V, it is converted to battery mode for load energy

NOTE:

1) "0": AC input does not charge, solar energy charges.

2) "1" to "6" gear: AC input priority mode, that is, AC input is preferred to provide load energy when AC input is available. In this case, the AC input will charge the battery in the above three stages according to the charging voltage setting. When the AC input exceeds the AC input range, the battery is converted into an inverter to supply load energy, therefore, the battery is discharged. When the AC input voltage returns to normal, it will switch back to AC input to power the load and re-charge the battery in a three-stage mode.

● **If battery priority is selected, select 7 or 8 or 9 as the battery type.**

3) "7" to "9" gear: battery priority mode, that is, battery discharge priority.

When the battery voltage is lower than the corresponding voltage of each gear, it will be converted to AC input to provide energy for the load. In order to avoid insufficient solar charging, the AC input will charge the battery with 50% of the AC charging current specifications as above. Until the solar energy and AC input charge the battery to a voltage higher than the corresponding voltage of each gear, the inverter discharge of the battery is carried out again to provide energy for the load.

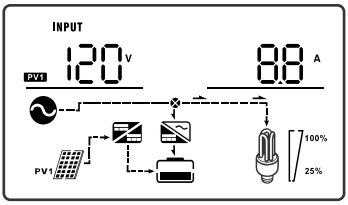
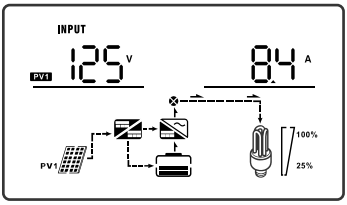
4) Solar charging will be charged according to the voltage corresponding to each gear.

For example: in the "1" gear, when the battery voltage is lower than 56V, the solar panel will be charged with the maximum power; When the battery voltage is close to 56V, it will be converted to 56V constant voltage charging until the charging current is less than 3A and the voltage is greater than 56V. Then it will be transferred to trickle charging mode to ensure the maximum utilization of solar energy.

5) If there is doubt about the range charging setting, you can ask the battery supplier to buy the battery type or the most appropriate charging voltage, and then choose to set to the closest charging voltage range, so that the battery life is longer.

3.5 Operating Mode Description

Operating mode	Description	LCD display

Mains Mode	When the Mains are within acceptable range, the Inverter will supply power to load the Mains directly, while by the Mains are out of range, the Inverter will turn to battery mode. The PV will charge the battery if PV is OK.	
Battery Mode	When Mains voltage is beyond the acceptable range or power failure, Inverter will provide power to load by battery. If PV is OK, when PV energy is greater than the load energy, PV provides energy to the load and also charges the battery; when PV energy is less than the load energy, the PV and the battery together provide the load energy.	

3.6 Warning and Fault Reference Code

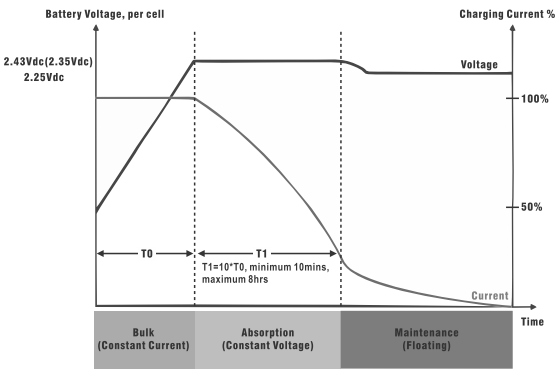
Fault code	Fault event
0	Reserved
1	Fan fault
2	Overload fault
3	Output short circuit
4	Over temperature

Fault code	Fault event
6	Short circuit of relay
8	The inverter is overcharged
9	Battery voltage is too high
11	Communication fault
12	The communication of lithium battery is faulty
17	Reserved
18	The PV voltage is too high
19	PV over current
22	The battery voltage is too low
23	Over-discharge
25	The ambient temperature is too high
26	Reserved
27	PV reversed

4 Specifications

MODEL		Solar PCU MPPT 5KVA 48V
Mains INPUT		
Voltage Range	Low Mains Loss	Default :180Vac;settable Range: 100V~180Vac Tolerance：±10V
	Low Mains Comeback	Low Mains Loss Voltage + 10V Tolerance：±10V
	High Mains Loss	Default :260Vac;settable Range: 250V~300Vac Tolerance:±10V
	High Mains Comeback	High Mains Loss Voltage - 10V Tolerance:±10V
Max AC Input Voltage		300Vac
Frequency Range		45~55Hz±2Hz
Phase		Single phase with ground
OUTPUT		
Output Voltage Waveform		Pure Sine Wave
AC Voltage Regulation (Battery Mode)		230Vac±10%
Frequency Range (Battery Mode)		50Hz±0.5Hz
Maximum Efficiency (Battery		Up to 85%

Mode，R Load)	
Overload Protection	5min@110%~125% load； 1min@125%~150% load； 5s@150%load Tolerance:±5%
	At bulb load and shutdown after 3 retries and no retry >150% load
Transfer Time	< 15ms
BATTERY	
Battery Type &Numbers	FLA/SMF/TUB(Default)/LifePO4 12V*4pcs
Mains charging Current	0A / 5A / 10A / 15A / 20A(Default) ±3A
Max total charging Current	0 ~ 104A, default 104A for Solar PCU MPPT 5KVA. Tolerance： ±5A
Charging Voltage	According to the different battery type, there is a different setting range.
PV	
Maximum PV open circuit voltage range	220V±10V
Maximum PV Array Power	6600W
Maximum PV charging current	104A
Maximum PV charging efficiency	Up to 93%

Charging Curve	
PHYSICAL	
Dimension, H x W x D (mm)	400*276*555.2
Net Weight (kg)	42
ENVIRONMENT	
Humidity	5% to 95% Relative Humidity(Non-condensing)
Storage Temperature	-10°C to 60°C
Operating Temperature	0°C to 50°C
Noise Level	Less than 55dB @ 1 Meter

5 Trouble shooting

If the Inverter system does not operate correctly, please solve the problem by using the table below.

Symptom	Possible cause	What to do
No indication and alarm even though "the mains is normal".	The AC input power is not connected well.	Check if the input power cord is firmly connected to the Mains.
No response after power went on.	1. The battery voltage is far too low. 2. Internal fuse tripped.	1. Contact the repair center to replace the fuse. 2. Re-charge the battery. 3. Replace battery.
The icon  is flashing on the LCD "display and an alarm is sounding every second.	The battery voltage is too low.	1. Re-charge the battery. 2. Replace battery.
The icon  is flashing on the LCD "display and an alarm is sounding every second.	Fan fault	Replace the fan.
The icon  is	Inverter temperature is too high.	Contact your dealer.

flashing on the LCD "display and an alarm is sounding every second.		
The icon  is flashing on the LCD "display and an alarm is sounding every second.	The battery voltage is too high.	Check if the spec and quantity of batteries meet requirements.
The icon  is flashing on the LCD "display and an alarm is sounding every second.	The Inverter shuts down automatically because a short circuit occurs on the output.	Check output wiring and see if connected devices are on short circuit status. If the fault still exists after short cleared, please contact your dealer.
The icon  is flashing on the LCD "display and an alarm is sounding every second.	Inverter is overload.	Remove excess loads from Inverter output. If the fault still exists after the load is reduced, please contact your dealer.
The icon  is flashing on the LCD "display and an alarm is sounding every second.	PV voltage is higher than rating voltage.	Check if the PV voltage is higher than rating voltage.
The icon  is flashing on LCD "display	The PV current exceeds the hardware overcurrent point.	Check if the PV energy is too high.

and alarm is sounding every second.		
The icon  is flashing on the LCD "display and an alarm is sounding every second.	PV wiring reverse.	Check if the PV wiring is reverse.
The icon  is flashing on LCD "display and alarm is sounding every second.	The battery is over-discharge	1. Re-charge the battery. 2. Replace battery.

Quality Assurance

Standard warranty period

Microtek International P. Ltd., warrants each instrument to be free from defects in materials and workmanship for a **period of 2 years** after initial delivery. This obligation is limited to servicing any instrument or part returned to the authorized service center for that purpose and to making good any parts thereof which shall, within the warranty period, be returned to the company or authorized Service center under a written intimation and which to the company's satisfaction be found defective. The company reserves the right to decide as to whether the repair work should be carried out in the company's service center or at site or at any other place.

The freight incurred for to and fro dispatch will have to be borne by the customer and the transit risk for the material will rest with the customer.

The warranty will be invalidated if defects arising in company's opinion are by reasons of accident, abuse, misuse, neglect, Improper Installation (If not undertaken by the company or its representative), fire, flood, any other act of God and any other natural calamities. Further, this warranty does not extend to any instrument which has been repaired / tampered with by any agency/person not authorized by the company. The services given for the same will be paid service.

The warranty will last for a period of 24 months from the date of initial delivery/dispatch of the instrument if used within its specifications. The warranty for the replaced components will lapse along with that of the main instrument.

MICROTEK International P. Ltd., reserves the right to make changes in design and specifications without notice and without any obligation to install such changes on units previously supplied.

In no event will MICROTEK International P. Ltd., its distributors / dealers be liable for any loss or injury or damage caused to life or property or death & disability caused to any form of life for any reasons whatsoever. The company, its distributors / dealers will also not be liable for consequential damages or for any expenses incurred by the buyer or user, due to use or sale of products sold by MICROTEK International P. Ltd., directly or through its authorized Distributors / dealers or any third party.

Invalid warranty clause

Equipment failure caused by the following reasons is not covered by the warranty:

1) The "warranty card" has not been sent to the distributor or our company;
2) Without the consent of our company to change equipment or replace parts;
3) Use unqualified materials to support our company 's products, resulting in product failure;
4) Technicians of non-company modify or attempt to repair and erase the product serial number or silk screen;
5) Incorrect installation, debugging and use methods;
6) Failure to comply with safety regulations (certification standards, etc.);
7) Damage caused by improper storage by dealers or end users;
8) Transportation damage (including scratches caused by internal packaging during transportation). Please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading;
9) Failure to follow the product user manual, installation manual and maintenance guidelines;
10) Improper use or misuse of the device;
11) Poor ventilation of the device;
12) The product maintenance process does not follow relevant standards;
13) Failure or damage caused by natural disasters or other force majeure (such as earthquake, lightning strike, fire, etc.)

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