



OMNIPOWER
THE POWER OF CHOICE

OHY1P4805

3-WAY HYBRID INVERTER



5kW Hybrid Inverter

USER MANUAL

V3.0

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1. Introduction

This hybrid PV inverter can provide power to connected loads by utilizing PV power, utility power and battery power.

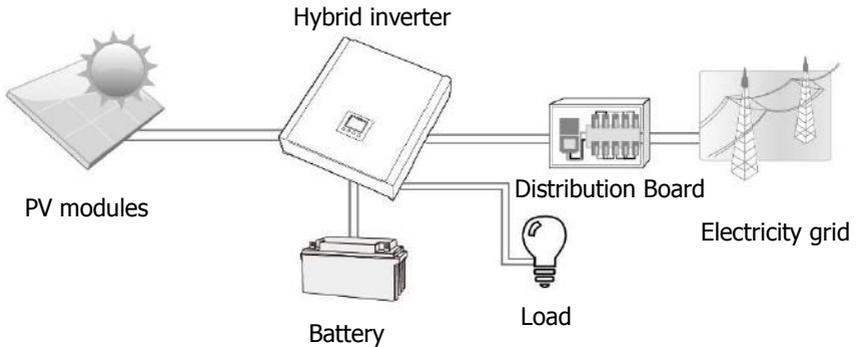


Figure 1 Basic hybrid PV System Overview

Depending on different power situations, this hybrid inverter is designed to generate continuous power from PV solar modules (solar panels), battery, and the utility. When MPP input voltage of PV modules is within acceptable range (see specification for the details), this inverter is able to generate power to feed the grid (utility) and charge battery. Do not connect the positive or negative terminal of the solar panel to the ground. See Figure 1 for a simple diagram of a typical solar system with this hybrid inverter.

Note: As per EEG standard, every inverter sold to a German area is not allowed to charge battery from utility. The relevant function is automatically disabled by the software.

2. Important Safety Warning

Before using the inverter, please read all instructions and cautionary markings on the unit and this manual. Store the manual where it can be accessed easily.

This manual is for qualified personnel. The tasks described in this manual may be performed by qualified personnel only.

General Precaution-

Conventions used:

WARNING! Warnings identify conditions or practices that could result in personal injury.

CAUTION! Caution identifies conditions or practices that could result in damage to the unit and / or other equipment connected.



WARNING! Before installing and using this inverter, read all instructions and cautionary markings on the inverter and all appropriate sections of this guide.



WARNING! Normally grounded conductors may be disconnected and energized when a ground fault is indicated.



WARNING! This inverter is heavy. It should be lifted by at least two persons.



CAUTION! Authorized service personnel should reduce the risk of electrical shock by disconnecting AC, DC and battery power from the inverter before attempting any maintenance or cleaning or working on any circuits connected to the inverter. Turning off controls will not reduce this risk. Internal capacitors can remain charged for 5 minutes after disconnecting all sources of power.



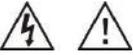
CAUTION! Do not disassemble this inverter yourself. It contains no user-serviceable parts. Attempting to service this inverter yourself may cause a risk of electrical shock or fire and will void the manufacturer's warranty.



CAUTION! To avoid risk of fire and electric shock, make sure that existing wiring is in good condition and that the wire is not undersized. Do not operate the Inverter with damaged or substandard wiring.



CAUTION! Under high temperature environment, the cover of this inverter could be hot enough to cause skin burns if accidentally touched. Ensure that this inverter is away from normal traffic areas.



CAUTION! Use only recommended accessories/instruments from installer. Unsuitable tools may cause a risk of fire, electric shock, or injury to persons.



CAUTION! To reduce risk of fire hazard, do not cover or obstruct the cooling fan.



CAUTION! Do not operate the Inverter if it has, been knocked, dropped, or damaged in any way. If the Inverter is damaged, please contact your distributor.



CAUTION! AC breaker, DC switch and Battery circuit breaker are used as disconnect devices and these disconnect devices shall be easily accessible.

Before working on this circuit

- Isolate inverter/Uninterruptible Power Supply (UPS)
- Then check for Hazardous Voltage between all terminals including the protective earth.

Symbols used in Equipment Markings

	Refer to the operating instructions
	Caution! Risk of danger
	Caution! Risk of electric shock
	Caution! Risk of electric shock. Stored energy. Allow discharge time of 5 minutes.
	Caution! Hot surface

3. Unpacking & Overview

3-1. Packing List

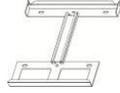
Before installation, please inspect the unit. Ensure that nothing inside the package is damaged. You should have received the following items inside of the package:



Inverter unit



PV connectors



Mounting plate



Fixing screws



EMS port



Software CD



Manual



USB cable

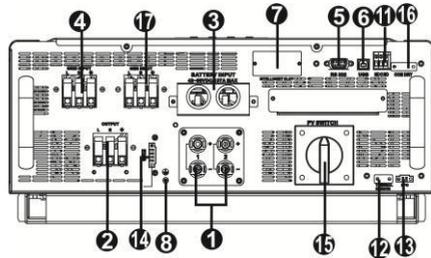
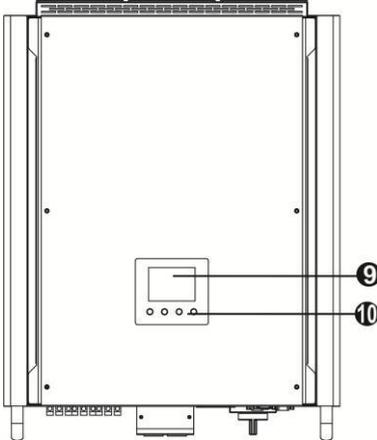


RS-232 cable



Relay control port

3-2. Product Overview



- | | |
|---------------------------------------------------------------------------|--------------------------------|
| 1) PV connectors | 10) Control buttons |
| 2) AC output connection (Load) | 11) Dry contacts |
| 3) Battery connection | 12) Battery temperature sensor |
| 4) AC Grid connection | 13) Emergency Power Off (EPO) |
| 5) RS-232 communication port | 14) EMS (UPS) port |
| 6) USB communication port | 15) PV DC Switch |
| 7) Intelligent slot | 16) Relay control port |
| 8) Grounding | 17) Generator connection |
| 9) LCD display panel (Please check section 10 for detailed LCD operation) | |

4. Installation

4-1. Selecting Mounting Location

Consider the following points before selecting where to install:

- Do not mount the inverter on flammable materials.
- Mount on a solid surface
- This inverter can emit noises during operation which may be perceived as a nuisance in a living area.
- Install this inverter at eye level in order to allow the LCD display to be read at all times.
- For proper air circulation to dissipate heat, allow a clearance of ± 20 cm to the side and ± 50 cm above and below the unit.
- Dusty conditions on the unit may impair the performance of this inverter.
- The ambient temperature should be between 0°C and 40°C and relative humidity should be between 5% and 85% to ensure optimal operation.
- The installation position is to be vertical.
- For proper operation of this inverter, please use appropriate cables for grid connection.
- The pollution degree of the inverter is PD2. Select an appropriate mounting location. Install the solar inverter in a protected area that is dry, free of excessive dust and has adequate air flow. Do **NOT** operate it where the temperature and humidity is beyond the specific limits. (Please check the specs for the limitations.)
- Installation position should not impede access to the connections.
- This inverter is designed with a rating of IP20 for indoor applications only.
- Regularly clean the fan filter.

4-2. Mounting Unit

WARNING!! Remember that this inverter is heavy! Please be careful when lifting.

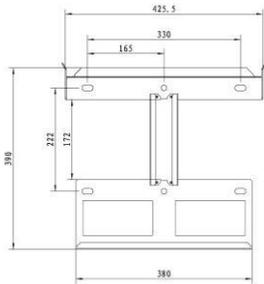
Wall mounting should be implemented with the proper bolts. The device should be bolted on securely.

The inverter can only be used in an ENCLOSED ELECTRICAL OPERATING AREA. Only service personnel should enter this area.

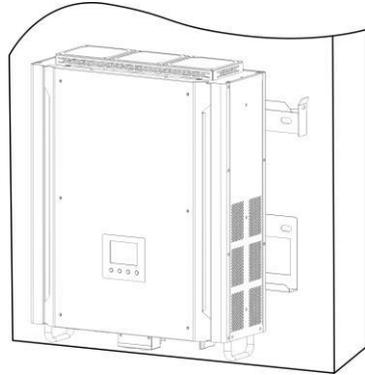
WARNING!! FIRE HAZARD.
MOUNT ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACES ONLY.

4. Installation

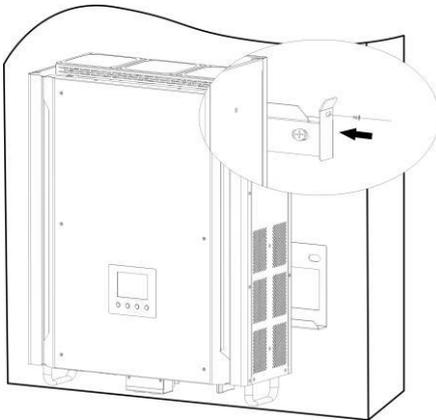
1. Drill six holes at the marked locations for six screws supplied. The tightening torque is 35 N.m.



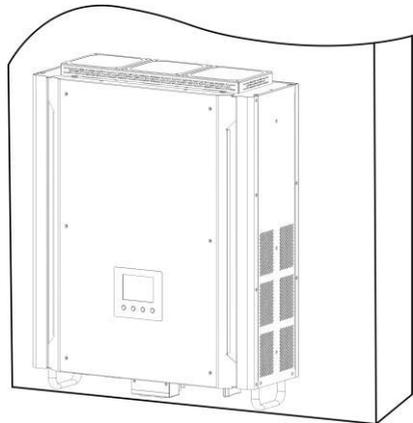
2. Raise the inverter and place it over the mounting plate.



3. Fix the inverter in position with the two screws (M4*12) supplied. Top two sides of the inverter.



4. Check if the inverter is firmly secured.



5. Grid (Utility) Connection

5-1. Preparation

Before connecting to AC utility, please install a **separate** AC circuit breaker between inverter and AC utility. This will ensure the inverter can be safely disconnected during maintenance and is fully isolated from the AC input.

NOTE1: Although this inverter is equipped with a 250VAC/40A fuse, install a separate circuit breaker for safety. Use a 250VAC/40A circuit breaker between inverter and AC utility.

NOTE2: The overvoltage category of the AC input is III. It should be connected to a power distribution board.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for grid (utility) connection. To reduce risk of injury, please use the proper recommended cable size as below. Suggested cable requirement for AC wire:

Model	5KW
Nominal Grid Voltage	230VAC
Conductor cross-section (mm ²)	10 mm ²
AWG no.	7

5-2. Connecting to the AC Utility

Step 1: Check the grid voltage and frequency with a voltmeter. It should be the same as "VAC" value on the product label.

Step 2: Turn off the circuit breaker.

Step 3: **Remove insulation sleeve 10 mm on all three conductors.** Shorten phase and neutral conductors to 3 mm. Refer to chart 1.

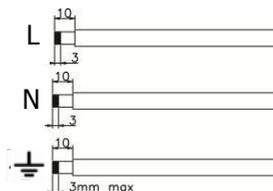


Chart 1

Step 4: Connect wires according to polarities indicated on terminal block. Be sure to connect PE protective conductor (⊕) first.

L → LINE (brown or black)
 **→ Ground (yellow-green)**
N → Neutral (blue)

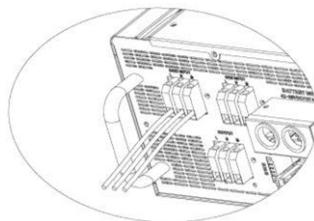


Chart 2

Step 5: Make sure the wires are securely connected. The tightening torque is 0.8 N.m.

5-3. Connecting to the Generator

Step 1: Check the generator voltage and frequency with a voltmeter. It should be the same as "VAC" value on the product label.

Step 2: Turn off the circuit breaker.

Step 3: Remove insulation sleeve 10 mm from all three conductors. Shorten phase and neutral conductors to 3 mm. Refer to chart 1.

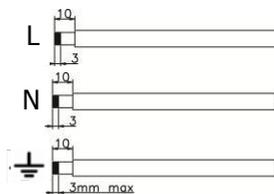
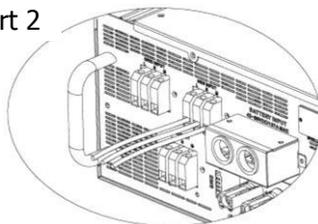


Chart 1

Step 4: Connect wires according to polarities indicated on terminal block. Be sure to connect PE protective conductor (⊕) first.

- L** → LINE (brown or black)
-  → Ground (yellow-green)
- N** → Neutral (blue)

Chart 2



Step 5: Make sure the wires are securely connected. The tightening torque is 0.8 N.m.

Note: For safe operation, use one more wires with ring terminal to connect earth. Refer to Chart 3.

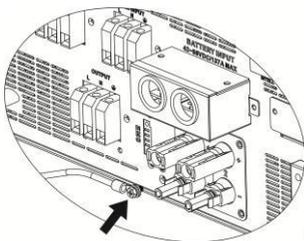
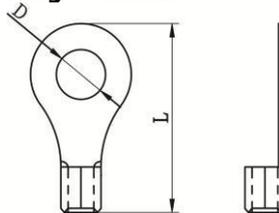


Chart 3

Ring terminal:



Recommended wire and terminal size:

Wire Size	Ring Terminal			Torque value
	Cable mm ²	Dimensions		
		D (mm)	L (mm)	
7 AWG	10	4.3	21.8	1.2 to 2 Nm

CAUTION: To prevent risk of electric shock, ensure the ground wire is properly earthed before operating this hybrid inverter, regardless if grid is connected or not.

6. PV Module (DC) Connection

CAUTION: Before connecting to PV modules, please install a DC circuit breaker/fuse **separately** between inverter and PV modules.

NOTE1: Use a 1000VDC/10A circuit breaker / fuse.

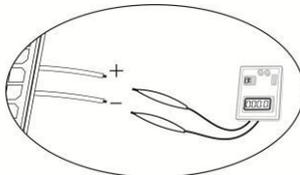
NOTE2: The overvoltage category of the PV input is II.

Please follow below steps to implement PV module connection:

WARNING: Because this inverter is not isolated, only three types of PV modules are acceptable: A-class rated monocrystalline, polycrystalline and CIGS modules. To avoid any malfunction, do not connect any PV modules with possible leakage current to the inverter. For example, grounded PV modules will cause leakage current to the inverter. When using CIGS modules, do **NOT** ground them.

CAUTION: Use a PV junction box with surge protection and fuses. Otherwise, lightning strikes can cause inverter damage. **NOT** covered by warranty!

Step 1: Check the output voltage of the PV array. The acceptable input voltage range of the inverter is 250VDC - 900VDC. This system is designed for two PV array strings. Make sure that the maximum current load of each PV input is below 10A.



CAUTION: Exceeding the maximum input voltage can destroy the unit!!
Check the voltage before connecting.

Step 2: Open the circuit breaker/fuse and switch off the DC switch.

Step 3: Assemble provided PV connectors.

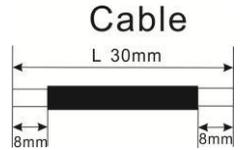
Components and Tools for PV connectors:

Female connector housing	
Female terminal	
Male connector housing	

Male terminal	
Crimping tool and spanner	

Cable preparation and connector assembly process:

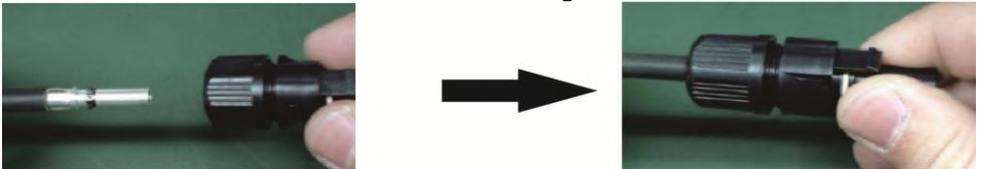
Strip one cable 8 mm on both ends and be careful NOT to nick or bend any of the strands.



Insert stripped cable into female terminal and crimp female terminal as shown below.



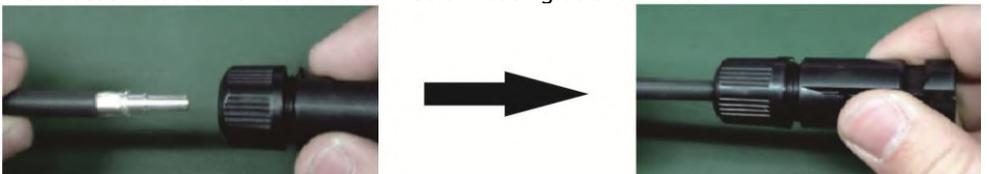
Insert assembled cable into female connector housing as shown below.



Insert stripped cable into male terminal and crimp male terminal as shown below.



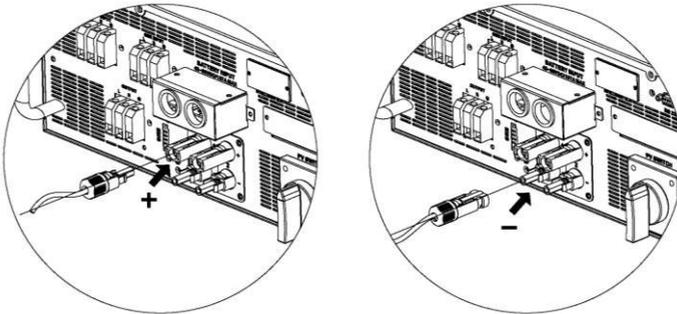
Insert assembled cable into male connector housing as shown below.



Use spanner to screw compression nut tightly to female and male connector as shown below.



Step 4: Check correct polarity of cable from PV modules to PV input connectors. Connect positive pole (+) of cable to positive pole (+) of PV input connector. Connect negative pole (-) of cable to negative pole (-) of PV input connector.



WARNING! It is very important for system safety and efficient operation to use appropriate UV resistant cable for PV module connection. To reduce risk of injury, use the recommended cable size as below:

Conductor cross-section (mm ²)	AWG no.
4	12

CAUTION: Never touch any inverter terminal. It will cause lethal electric shock.

CAUTION: To avoid electric shock, **DO NOT** touch the inverter. PV modules exposed to sunlight will generate high DC voltage which can be lethal

Recommended Panel Configuration

Solar Panel Spec. (reference)	SOLAR INPUT 1	SOLAR INPUT 2	Quantity of panels	Total Input Power
	(Min in serial: 11pcs; Max. in serial: 18pcs)			
- 250Wp - Vmp: 36.7Vdc - Imp: 6.818A - Voc: 44Vdc - Isc: 7.636A - Cells: 72	11pcs in serial	x	11pcs	2750W
	x	11pcs in serial	11pcs	2750W
	11pcs in serial	11pcs in serial	22pcs	5500W
	18pcs in serial	18pcs in serial	36pcs	9000W

7. Battery Connection

CAUTION: Before connecting batteries, please install an **additional** fuse / DC circuit breaker between inverter and batteries.

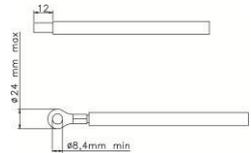
NOTE1: Use only sealed lead acid, vented or Gel battery. Check maximum charging voltage and current before using this inverter. For Lithium iron or NiCad battery, please consult with installer for details.

NOTE2: Please use 60VDC/125 – 250A fuse / circuit breaker.

NOTE3: The overvoltage category of the battery input is II. Please follow below steps to implement battery connection:

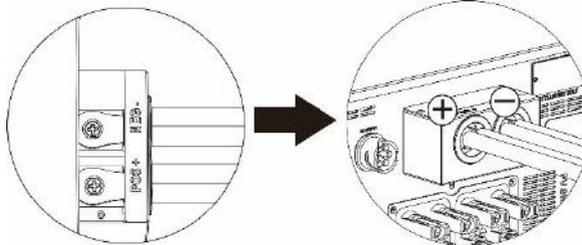
Step 1: Check the nominal voltage of batteries. The nominal inverter input voltage is 48VDC.

Step 2: Use two battery cables. Remove insulation sleeve 12 mm and insert conductor into cable ring terminal. Refer to chart on right.



Step 3: Remove battery cover and follow battery polarity guide printed near the battery terminal! Place the external battery cable ring terminal over the battery terminal.

RED cable to positive terminal (+); BLACK cable to negative terminal (-).



WARNING! Incorrect connections will damage the unit permanently. **NO** warranty.

Step 4: Make sure the wires are securely connected. The tightening torque is 2.04 N.m.

WARNING! For system safety and efficient operation, use appropriate cables.

To reduce risk of injury, use recommended cable size as below.

Nominal Battery Voltage	48V
Conductor cross-section (mm ²)	50
AWG no.	0

8. Load (AC Output) Connection

CAUTION: To prevent continued supply to the load via the inverter during any mode of operation, an additional disconnection device (circuit breaker) must be installed.

WARNING! It's very important for system safety and efficient operation to use appropriate cable for AC connection. To reduce risk of injury, please use the proper recommended cable size as below:

Model	5KW
Nominal Grid Voltage	230VAC
Conductor cross-section (mm ²)	6
AWG no.	10

Step 1: **Remove insulation sleeve 8 mm** for three conductors. Shorten phase and neutral conductors to 3 mm. Refer to chart 4.

Step 2: Connect wires according to polarities indicated on terminal block. Be sure to connect PE protective conductor (⏏) first. Refer to Chart 5.

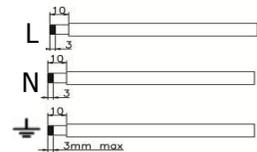


Chart 4

L → **LINE (brown or black)**
 ⏏ → **Ground (yellow-green)**
N → **Neutral (blue)**

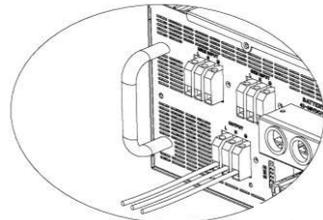


Chart 5

Step 3: Make sure the wires are securely connected. The tightening torque is 0.8 N.m.

CAUTION: Only connect load to "AC Output Connector". **NEVER** connect the utility to "AC Output Connector".

CAUTION: Be sure to connect L terminal of load to L terminal of "AC Output Connector" and N terminal of load to N terminal of "AC Output Connector". The G terminal of "AC Output Connector" is connected to ground of the load. Do **NOT** swap connections.

CAUTION: This inverter is not designed to operate in parallel. Do **NOT** parallel connect multiple inverters as this will damage the inverter. Not covered by warranty!

Software Setting

Please set up mains output in parameter setting of software. When “Emergency power supply control” is enabled and inverter is working in battery mode, it will cut off AC output but maintain limited power to the EMS port until battery voltage drops down to the setting value in “Battery voltage to cut-off AC output in battery mode”. After that, if battery voltage recovers to the setting value in “Battery voltage to turn on AC output in battery mode”, inverter will turn on AC output again.

Parameters setting ✕

Min. grid-connected voltage: <input type="text" value="184"/> V <input type="button" value="Apply"/>	The waiting time before grid-connection: <input type="text" value="60"/> Sec. <input type="button" value="Apply"/>
Max. grid-connected voltage: <input type="text" value="264.5"/> V <input type="button" value="Apply"/>	Max. grid-connected average voltage: <input type="text" value="253"/> V <input type="button" value="Apply"/>
Min. grid-connected frequency: <input type="text" value="47.48"/> Hz <input type="button" value="Apply"/>	Max. feed-in grid power: <input type="text" value="5,000"/> W <input type="button" value="Apply"/>
Max. grid-connected frequency: <input type="text" value="51.5"/> Hz <input type="button" value="Apply"/>	Feed-in power factor: <input type="text" value="1"/> <input type="button" value="Apply"/>

Min. PV input voltage: <input type="text" value="200"/> V <input type="button" value="Apply"/>	Floating charging voltage: <input type="text" value="54"/> V <input type="button" value="Apply"/>
Max. PV input voltage: <input type="text" value="900"/> V <input type="button" value="Apply"/>	Battery cut-off discharging voltage when Grid is available: <input type="text" value="48"/> V <input type="button" value="Apply"/>
Min. MPP voltage: <input type="text" value="250"/> V <input type="button" value="Apply"/>	Battery re-discharging voltage when Grid is available: <input type="text" value="54"/> V <input type="button" value="Apply"/>
Max. MPP voltage: <input type="text" value="850"/> V <input type="button" value="Apply"/>	Battery cut-off discharging voltage when Grid is unavailable: <input type="text" value="42"/> V <input type="button" value="Apply"/>
Max. charging current: <input type="text" value="60"/> A <input type="button" value="Apply"/>	Battery re-discharging voltage when Grid is unavailable: <input type="text" value="48"/> V <input type="button" value="Apply"/>
Max. AC charging current: <input type="text" value="60"/> A <input type="button" value="Apply"/>	Battery temperature compensation: <input type="text" value="0"/> mV <input type="button" value="Apply"/>
Bulk charging voltage(C.V. voltage): <input type="text" value="56"/> V <input type="button" value="Apply"/>	Max. battery discharge current in hybrid mode: <input type="text" value="150"/> A <input type="button" value="Apply"/>
Start LCD screen-saver after: <input type="text" value="60"/> Sec. <input type="button" value="Apply"/>	Feeding grid power calibration: <input type="text" value="0"/> W <input type="button" value="Apply"/>

Mute Buzzer alarm: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Generator as AC source: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Mute the buzzer in the Standby mode: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Wide AC input range: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Mute alarm in battery mode: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Parallel for output: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Activate Li-Fe battery while commissioning: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="button" value="Apply"/>	

Emergency power supply control

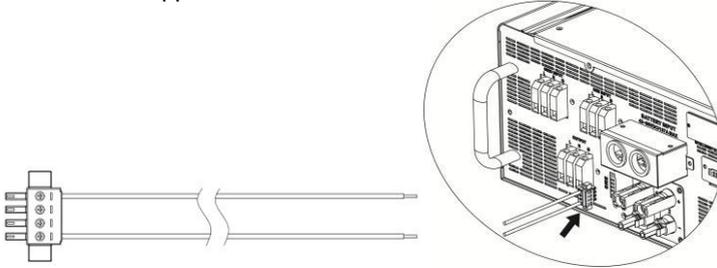
Battery voltage to cut-off mains output in battery mode: <input type="text" value="42"/> V <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	
Battery voltage to turn on mains output in battery mode: <input type="text" value="48"/> V	

9. EMS Connection

This port is available to provide limited power (230V/5A) for emergency lights, etc.

9-1 Interface Configuration

There are four pins on this port. However, only Pin 1 (Line) and Pin 4 (Neutral) are useable. Use supplied cables to connect Pin 1 and Pin 4 shown as below.

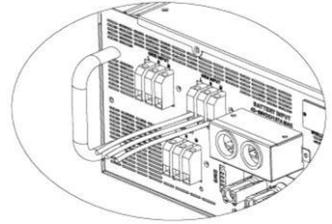


9-2. Function Description

If "Emergency power supply control" is enabled, EMS port will be active. Even though battery voltage drops to cut-off AC output point, EMS port will maintain output power for emergency use.

10. Generator connection

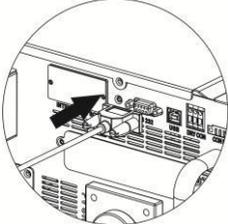
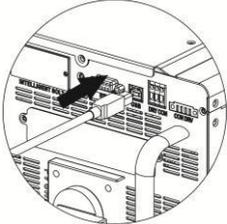
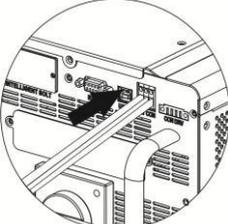
Connect to generator for power backup when utility is not available and battery is connected. Inverter will trigger generator via dry contact during low battery condition. Once generator is active, solar power will only charge battery and overload protection will be enabled automatically.



11. Communication

The inverter is equipped with several communication ports and it is also equipped with a slot for alternative communication interfaces in order to communicate with a PC with corresponding software. This intelligent slot is suitable to install with SNMP card and Modbus card.

Follow below procedure to connect communication wiring and install the software.

<p>For RS232 port, you should use a DB9 cable as follows:</p>	<p>For USB port, you should use a USB cable as follows:</p>
	
<p>For Dry contact port, please remove insulation sleeve 8 mm for three conductors and insert three cables into ports</p>	<p>For SNMP or MODBUS card, you should use RJ45 cables as follows:</p>
	

Please install monitoring software on your computer. Detailed information is listed in the next chapter. After software is installed, you can initialize the monitoring software and extract data via the communication port.

12. Dry Contact Signal

There is one dry contact available. It can be used to remote control an external generator.

12-1. Electric Parameter

Parameter	Symbol	Max.	Unit
Relay DC voltage	Vdc	30	V
Relay DC current	Idc	1	A

Note: The application of the dry contact should not exceed the electric parameters shown above. Otherwise the internal relay will be damaged.

12-2. Function Description

Unit Status	Condition	Dry contact port: 	
		NO&C	NC&C
Power Off	Unit is off and no output is powered.	Open	Close
Power On	Battery voltage is lower than setting battery cut-off discharging voltage when grid is available.	Close	Open
	Battery voltage is lower than setting battery cut-off discharging voltage when grid is unavailable.	Close	Open
	Battery voltage is higher than below 2 setting values: <ol style="list-style-type: none"> Battery re-discharging voltage when grid is available. Battery re-discharging voltage when grid unavailable. 	Open	Close

12. Dry Contact Signal

You can set the related parameters in software. Refer to below chart:

Parameters setting

Min. grid-connected voltage: 184 V <input type="button" value="Apply"/>	The waiting time before grid-connection: 60 Sec. <input type="button" value="Apply"/>
Max. grid-connected voltage: 264.5 V <input type="button" value="Apply"/>	Max. grid-connected average voltage: 253 V <input type="button" value="Apply"/>
Min. grid-connected frequency: 47.48 Hz <input type="button" value="Apply"/>	Max. feed-in grid power: 5,000 W <input type="button" value="Apply"/>
Max. grid-connected frequency: 51.5 Hz <input type="button" value="Apply"/>	Feed-in power factor: 1 <input type="button" value="Apply"/>

Min. PV input voltage: 200 V <input type="button" value="Apply"/>	Floating charging voltage: 54 V <input type="button" value="Apply"/>
Max. PV input voltage: 900 V <input type="button" value="Apply"/>	Battery cut-off discharging voltage when Grid is available: 48 V <input type="button" value="Apply"/>
Min. MPP voltage: 250 V <input type="button" value="Apply"/>	Battery re-discharging voltage when Grid is available: 54 V <input type="button" value="Apply"/>
Max. MPP voltage: 850 V <input type="button" value="Apply"/>	Battery cut-off discharging voltage when Grid is unavailable: 42 V <input type="button" value="Apply"/>
Max. charging current: 60 A <input type="button" value="Apply"/>	Battery re-discharging voltage when Grid is unavailable: 48 V <input type="button" value="Apply"/>
Max. AC charging current: 60 A <input type="button" value="Apply"/>	Battery temperature compensation: 0 mV <input type="button" value="Apply"/>
Bulk charging voltage(C.V. voltage): 56 V <input type="button" value="Apply"/>	Max. battery discharge current in hybrid mode: 150 A <input type="button" value="Apply"/>
Start LCD screen-saver after: 60 Sec. <input type="button" value="Apply"/>	Feeding grid power calibration: 0 W <input type="button" value="Apply"/>

Mute Buzzer alarm: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Generator as AC source: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Mute the buzzer in the Standby mode: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Wide AC input range: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Mute alarm in battery mode: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>	Parallel for output: <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Activate Li-Fe battery while commissioning: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="button" value="Apply"/>	

Emergency power supply control

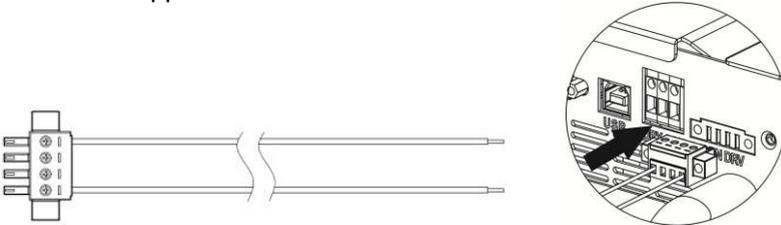
Battery voltage of cut-off Main output in battery mode: 42 V <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>
Battery voltage of re-connecting Main output in battery mode: 48 V <input type="radio"/> Enable <input checked="" type="radio"/> Disable <input type="button" value="Apply"/>

13. Relay Control Port

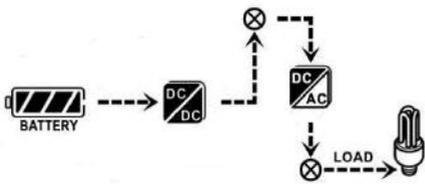
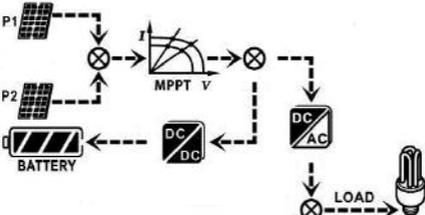
This port is available to provide a power source (230V/8A) to trigger external relay. This function is only valid for **Grid-tie with backup II** mode.

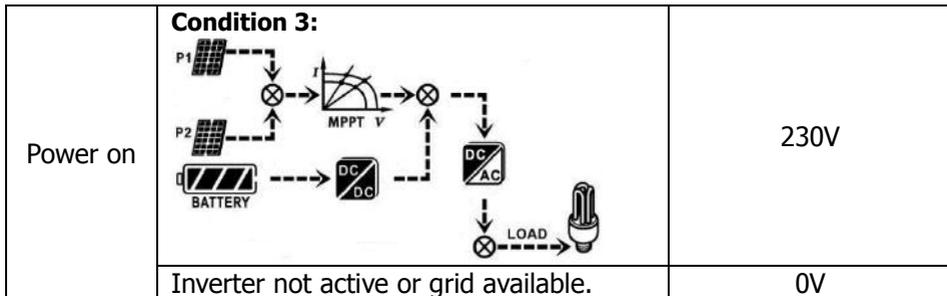
13-1. Interface Configuration

There are four pins on this port. However, only Pin 1 and Pin 4 are useable. Please use supplied cables to connect Pin 1 and Pin 4 shown as below.



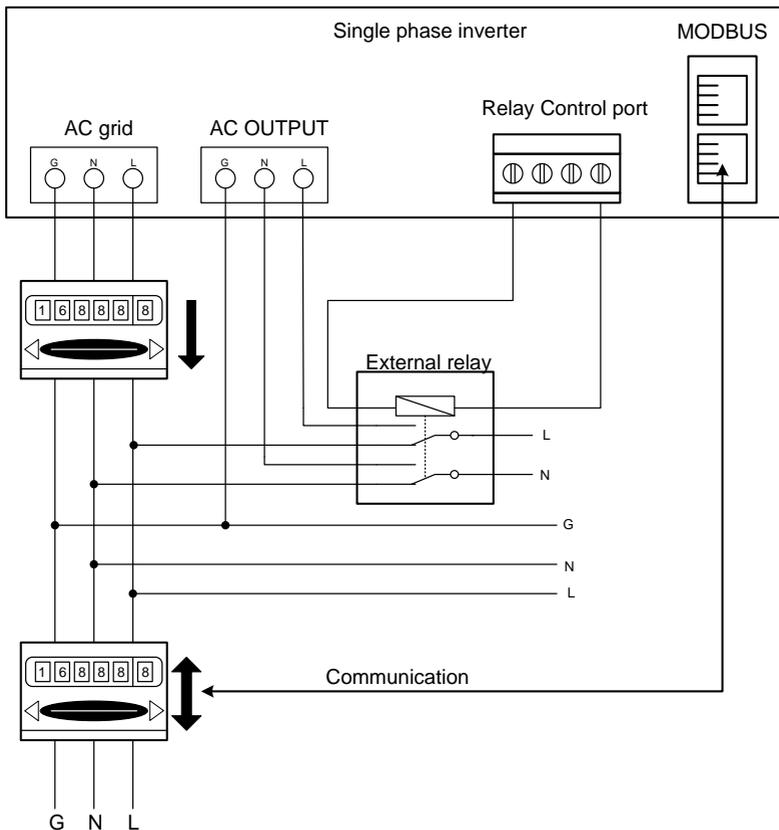
13-2. Function Description

Unit status	Condition	Output voltage from relay control port
Power Off	Unit is off and no output is active.	0V
Power On	<p>Inverter is active, grid is not available.</p> <p>Condition 1:</p>  <p>Condition 2:</p> 	230V



13-3. Application

Below the recommended circuit.

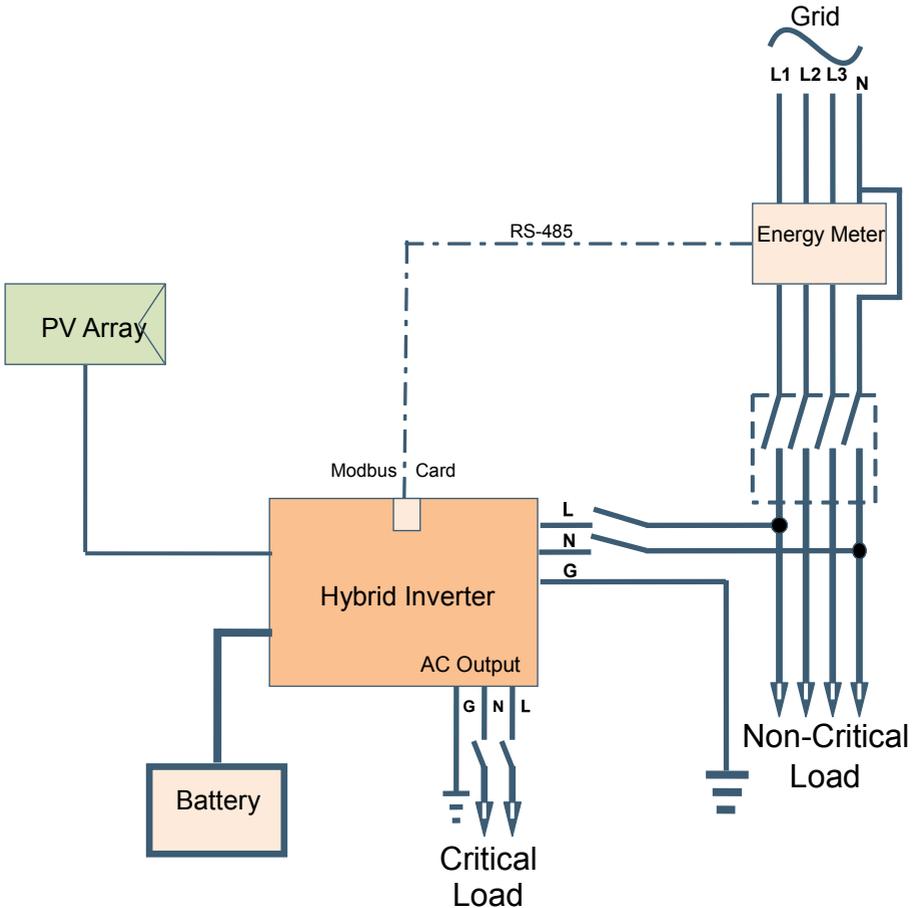


14. Application with Energy Meter

With Modbus card II and energy meter, hybrid inverter can easily be integrated into an existing household. For details please refer to Modbus card II manual.

Note: This application is only valid for **Grid-Tie with Backup II** mode.

Equipped with Modbus card II, hybrid inverter is connected to energy meter with RS485 communication port. This enables control of self-consumption via Modbus card to control power generation and battery charging.



15. Commissioning

Step 1: Check the following requirements before commissioning:

- Ensure the inverter is firmly secured
- Check if the open circuit DC voltage of PV modules meet requirement (Refer to Section 6)
- Check if the utility voltage is approximately in line with the nominal expected value from utility.
- Check if connection of AC cable to grid (utility) is correct, if applicable.
- Complete connection to all PV modules.
- AC input circuit breaker (only applicable if utility is used), battery circuit breaker/fuse, and DC circuit breaker/fuse from array are installed correctly.

Step 2: Switch on the battery circuit breaker/fuse and then switch on PV DC breaker. After that, if there is utility connection, switch on the AC input circuit breaker. At this point, the inverter is active. However, there is no output generation for loads.

Then:

- If LCD lights up to display the current inverter status, commissioning has been carried out successfully. After pressing "ON" button for 1 second when the utility is detected, the inverter will start to supply power to the loads. Without utility, simply press "ON" button for 3 seconds and the inverter will start to supply power to the loads.
- If a warning/fault indicator appears on the LCD screen, an error has occurred. Please inform your installer.

Step 3: Insert CD into your computer and install monitoring software on your PC. Follow below steps to install software.

1. Follow the on-screen instructions to install the software.
2. When your computer restarts, the monitoring software will appear as a shortcut icon located in the system tray, near the clock.

NOTE: If using Modbus card as communication interface, please install bundled software. Contact your distributor for details.

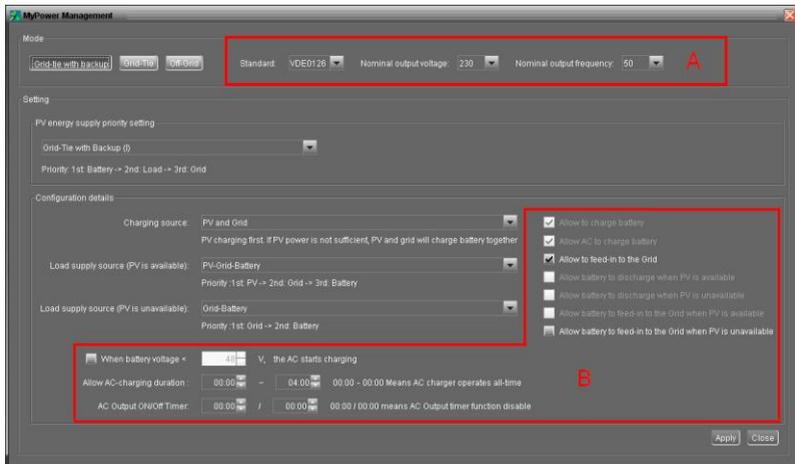
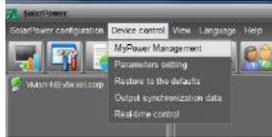
16. Initial Setup

Before inverter operation, set up "Operation Mode" via software. Strictly follow below steps to set up. For more details, please check software manual.

Step 1: After turning on the inverter and installing the software, please click "Open Monitor" to enter main screen of this software.

Step 2: Log in to software first by entering default password "administrator".

Step 3: Select Device Control>>MyPower Management. This is to set up inverter operating mode and personalized interface. Refer to diagram below.



Mode

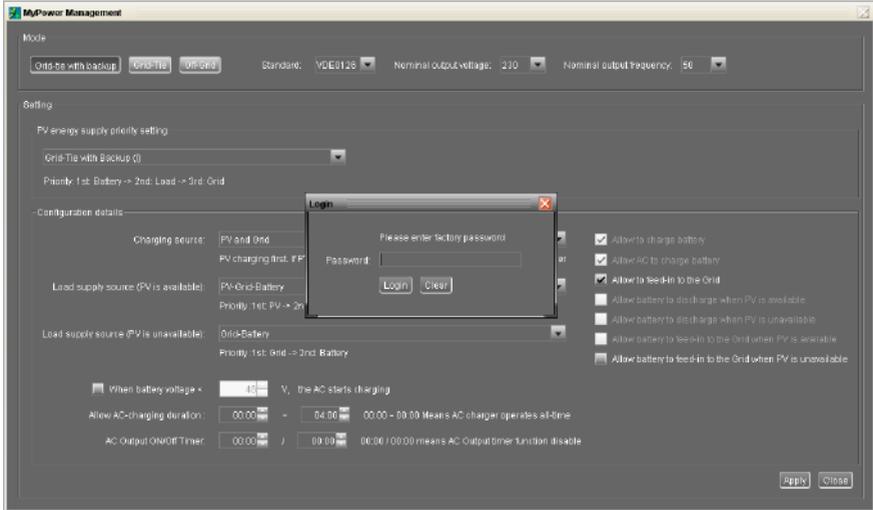
There are three operation modes: Grid-tie with backup, Grid-Tie and Off-Grid.

- **Grid-tie with backup:** PV power can feed back to grid, provide power to the load and charge battery. There are four options available in this mode: Grid-tie with backup I, II, III and IV. In this mode, users can configure *PV power supply priority, charging source priority and load supply source priority*. However, when Grid-tie with backup IV option is selected in PV energy supply priority, the inverter is only operated between two working logics based on defined peak time and off-peak time of electricity. Only peak time and off-peak time of electricity are able to set up for optimized electricity usage.
- **Grid-Tie:** PV power only can feed-in back to grid.
- **Off-Grid:** PV power only provides power to the load and charges battery. No feed-in back to grid is allowed.
-

SECTION A:

Standard: It will list local grid standard. A factory password is required to make any changes. Contact local dealer only when a change to the standard is required.

CAUTION: Incorrect settings can cause damage to the unit or render it inoperable.



Nominal Output Voltage: 230V.

Nominal Output Frequency: 50HZ.

SECTION B:

This section's contents may be different based on operation selected.

Allow AC charging duration: A time period allowing AC (grid) to charge battery. With the set up 00:00-00:00, no time limitation for AC to charging applies.

AC output ON/Off Timer: Enables on/off timer for AC output. If set to 00:00/00:00, this function is disabled.

Allow to charge battery: This option is automatically determined by setting in "Charging source". It cannot be modified here. When "NONE" is selected in charging source section, this option becomes unchecked as grey text.

Allow AC to charge battery: This option is automatically determined by setting in "Charging source". It cannot be modified here. When "Grid and PV" or "Grid or PV" is selected in charging source section, this option is default selected. Under Grid-tie mode, this option is invalid.

Allow feeding into the Grid: This option is only valid under Grid-tie and Grid-tie with backup modes. Users can decide if this inverter can feed into the grid.

Allow battery to discharge when PV is available: This option is automatically determined by setting in "Load supply source (PV is available)". When "Battery" is higher priority than "Grid" in Load supply source (PV is available), this option is default selected. Under Grid-tie, this option is invalid.

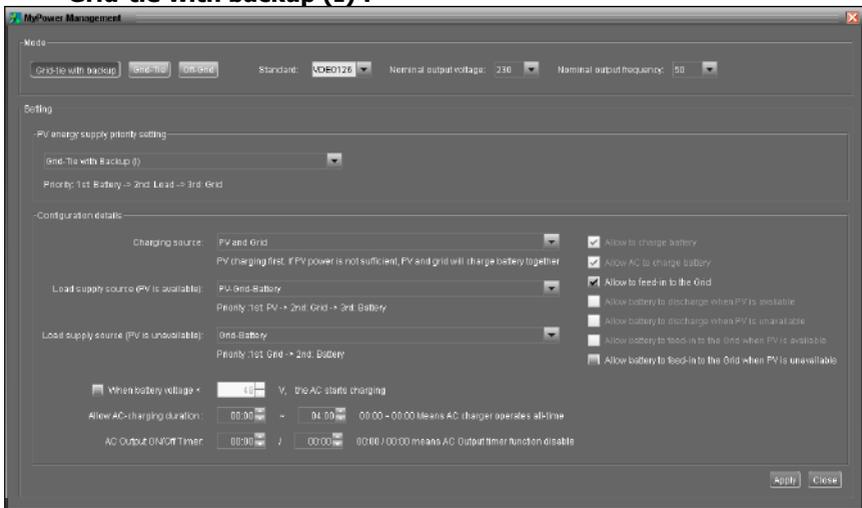
Allow battery to discharge when PV is unavailable: This option is automatically determined by setting in "Load supply source (PV is unavailable)". When "Battery" is higher priority than "Grid" in Load supply source (PV is unavailable), this option is default selected. Under Grid-tie mode, this option is invalid.

Allow battery to feed-in to the Grid when PV is available: This option is only valid in Grid-tie with backup II or Grid-tie with backup III modes.

Allow battery to feed-in to the Grid when PV is unavailable: This option is only valid in all options of Grid-tie with backup mode.

GRID-TIE WITH BACKUP

● Grid-tie with backup (I) :



PV energy supply priority setting: 1st Battery, 2nd Load and 3rd Grid.

PV power will first charge battery, then provide power to the load. Any excess PV power will be fed into the grid.

Battery charging source:

1. PV and Grid (Default)
PV power will first charge battery. If power is insufficient, grid will charge battery.
2. PV only
Only PV power is allowed to charge battery.
3. None
No battery charging permitted.

Load supply source:

When PV power is available: 1st PV, 2nd Grid, 3rd Battery

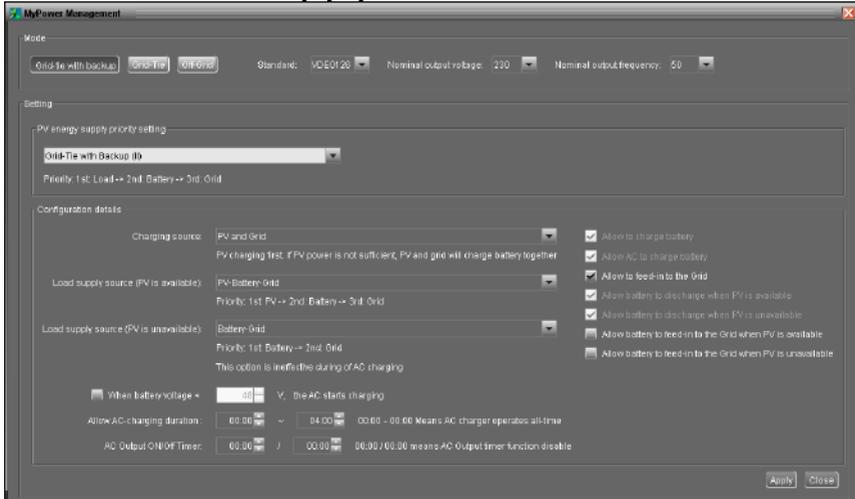
If battery is not fully charged, PV will first charge battery. Remaining PV power will feed the load. If PV power is insufficient, grid will feed the load. If grid is not available, battery will back up.

When PV power is not available:

1. 1st Grid, 2nd Battery (Default)
Grid will first provide power to the load. If grid is not available, battery will backup.
2. 1st Battery, 2nd Grid
Battery will first feed the load. If battery is low, grid will back up the load.

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

● Grid-tie with backup (II) :



PV energy supply priority setting: 1st Load, 2nd Battery and 3rd Grid.

PV will first feed the load. Then it will charge battery.

Any excess power will be fed into the grid.

Battery charging source:

1. PV and Grid:
PV power will first charge battery. If PV power is insufficient, grid will charge battery.
2. PV only
Only PV power will charge battery.
3. None
No battery charging permitted

Load supply source:

When PV power is available:

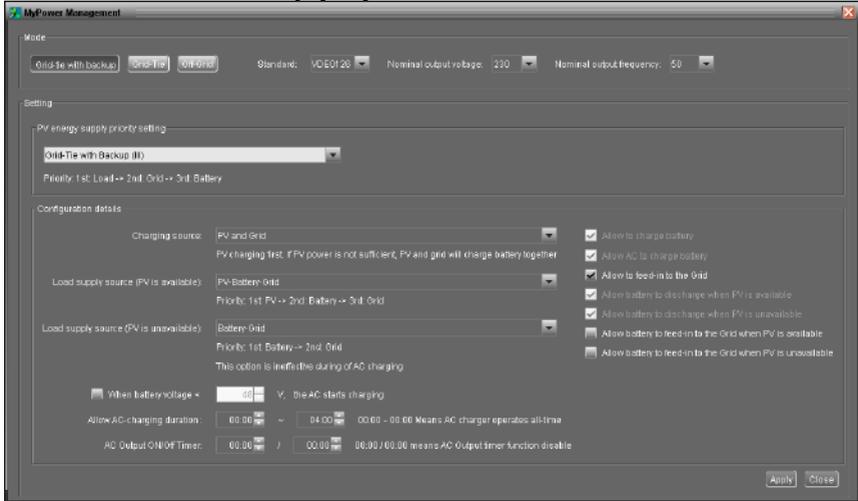
1. 1st PV, 2nd Battery, 3rd Grid
PV power will first feed the load. If PV power is insufficient, battery will feed the load. When battery power is low or not available, grid will back up the load.
2. 1st PV, 2nd Grid, 3rd Battery
PV power will first feed the load. If PV power is insufficient, grid will feed the load. If grid is not available, battery will back up.

When PV power is not available:

1. 1st Grid, 2nd Battery: Grid will first feed the load. If grid is not available, battery will provide backup.
2. 1st Battery, 2nd Grid: Battery will first feed the load. If battery is low, grid will back up the load

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

● Grid-tie with backup (III):



PV energy supply priority setting: 1st Load, 2nd Grid and 3rd Battery

PV power will provide power to the load first. Any excess PV power will be fed into the grid. If feed-in power reaches max setting, the remaining power will charge battery.

NOTE: The max feed-in grid power setting is under parameter setting. Refer to software manual.

Battery charging source:

1. PV and Grid:
PV power to first charge battery. If insufficient, grid will charge battery.
2. PV only:
Only PV is allowed to charge battery.
3. None:
No battery charging permitted.

Load supply source:

When PV power is available:

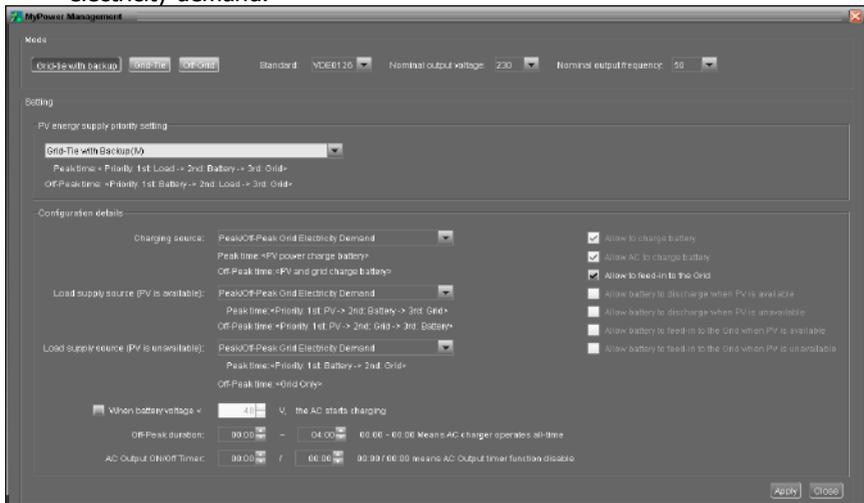
1. 1st PV, 2nd Battery, 3rd Grid
PV power will feed the load first. If insufficient, battery will feed the load. When battery power is running low or not available, grid will back up the load.
2. 1st PV, 2nd Grid, 3rd Battery
PV power will feed the load first. If insufficient, grid will feed the load. If grid is not available, battery power will back up.

When PV power is not available:

1. 1st Grid, 2nd Battery: Grid will feed load first. If grid is not available, battery will provide backup.
2. 1st Battery, 2nd Grid: Battery will feed the load first. If battery is running low, grid will back up the load.

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

- **Grid-tie with backup (IV):** Users can only set up peak time and off-peak electricity demand.



Working logic under peak time:

PV energy supply priority: 1st Load, 2nd Battery and 3rd Grid

PV power will feed the load first. If PV power is sufficient, it will charge battery next. Any excess PV power will be fed into the grid. Grid feeding is disabled by default.

Battery charging source: PV only

Only if PV power can support the load, is the remaining PV power allowed to charge battery during peak time.

Load supply source: 1st PV, 2nd Battery, 3rd Grid

PV power will feed the load first. If PV power is insufficient, battery power will back up the load. If battery power is not available, grid will support the load. When PV power is not available, battery power will supply the load first. If battery power is running low, grid will back up the load.

Working logic under off-peak time:**PV energy supply priority:** 1st Battery, 2nd Load and 3rd Grid

PV power will charge battery first. If PV power is sufficient, it will provide power to the loads. Any excess PV power will be fed into the grid.

NOTE: The max feed-in grid power setting is under in parameter setting. Please refer to software manual.

Battery charging source: PV and grid charge battery

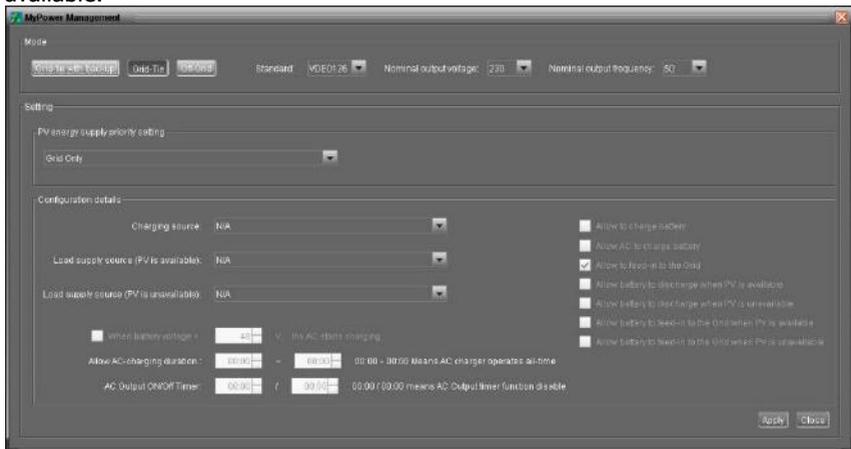
PV power will charge battery first during off-peak time. If insufficient, grid will charge battery.

Load supply source: 1st PV, 2nd Grid, 3rd Battery

After battery is fully charged, excess PV power will feed the load first. If PV power is insufficient, grid will back up the load. If grid is not available, battery will feed the load.

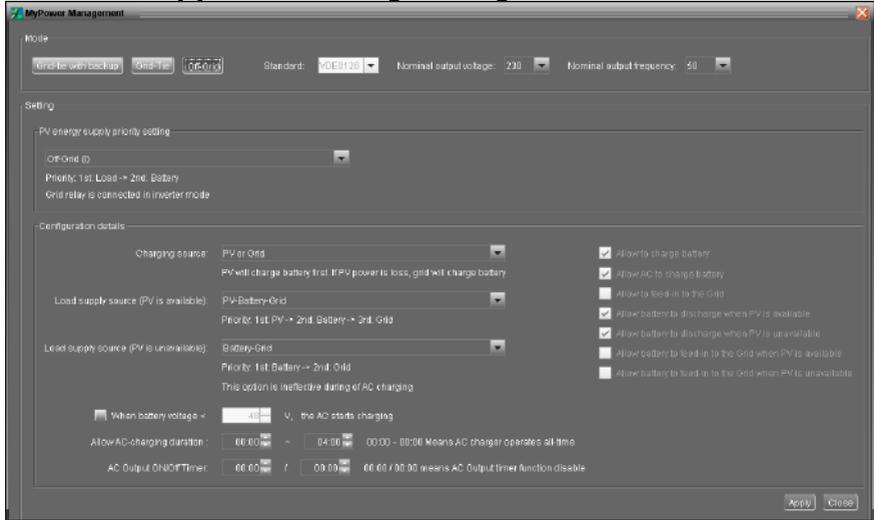
GRID-TIE

Under this operation mode, PV power only feeds into the grid. No priority setting is available.



OFF-GRID

● Off-Grid (I): Default setting for off-grid mode.



PV energy supply priority setting: 1st Load, 2nd Battery

PV power will feed the load first and then charge battery. Feed into the grid is not allowed in this mode. The grid relay is connected in Inverter mode. The transfer time from inverter mode to battery mode will be less than 15ms. In addition, it will avoid overload fault since grid can supply loads above 10kW.

Battery charging source:

1. PV or Grid: After supporting the load, any excess PV power will charge battery. If PV power is not available, grid will charge battery. (Default)
2. PV only: Only PV may charge battery.
3. None: No battery charging permitted.

Load supply source:

When PV power is available:

1. 1st PV, 2nd Battery, 3rd Grid (Default)
PV will feed the load first. If insufficient, battery will feed the load. If battery is running low or not available, grid will back up the load.
2. 1st PV, 2nd Grid, 3rd Battery
PV will feed the load first. If insufficient, grid will feed the load. If grid is not available, battery will back up.

When PV power is not available:

1. 1st Grid, 2nd Battery

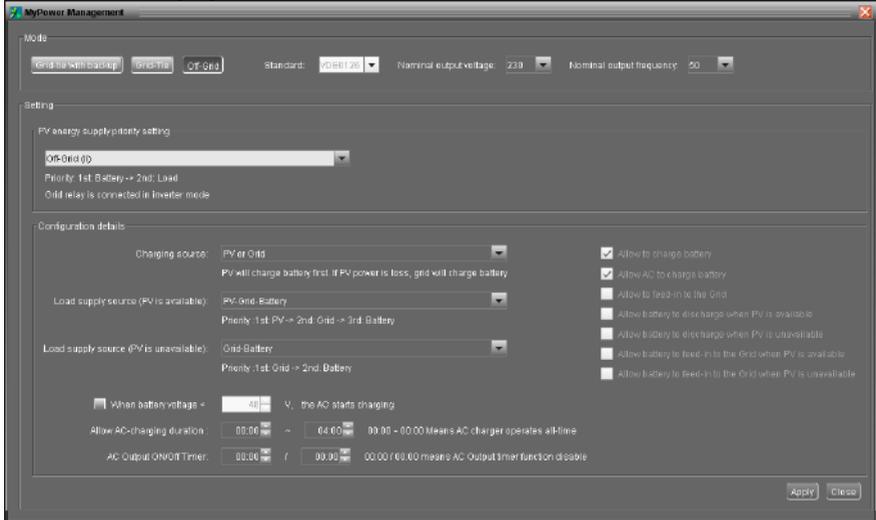
Grid will feed the load first. If grid is not available, battery will provide backup.

2. 1st Battery, 2nd Grid (Default)

Battery will feed the load first. If battery is running low, grid will back up the load.

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

● **Off-Grid (II)**



PV energy supply priority setting: 1st Battery, 2nd Load

PV will charge battery first. Once battery is fully charged, excess PV power will feed the load. Feed into the grid is not allowed in this mode. The grid relay is connected in Inverter mode. Therefore, transfer time from inverter mode to battery mode will be less than 15ms. This avoids overload faults as grid can supply loads over 10kW.

Battery charging source:

1. PV or Grid:

After supporting the loads, any excess PV power will charge battery. Once PV power is no longer available, grid will charge battery.

2. PV only:

Only PV power is allowed to charge battery.

3. None:

No battery charging permitted.

NOTE: AC charging duration can be set.

Load supply source:

When PV power is available: 1st PV, 2nd Grid, 3rd Battery

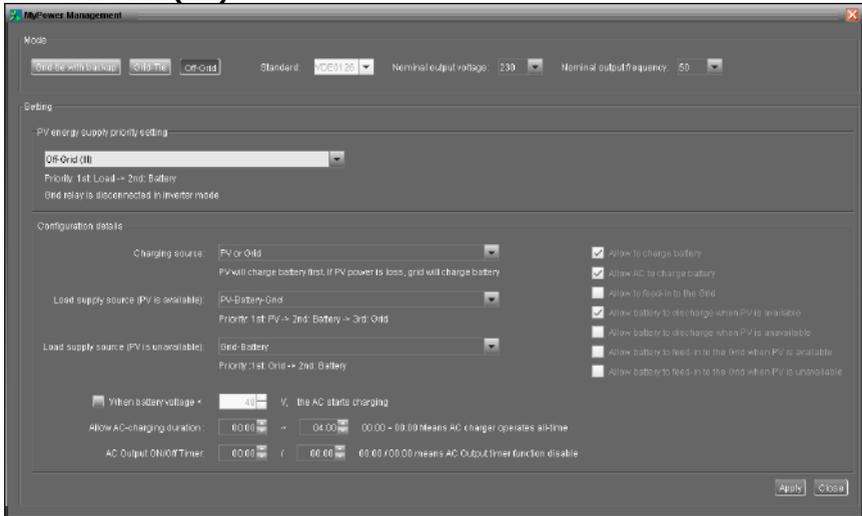
PV will feed the load first. If insufficient, grid will feed the load. If grid is not available, battery will back up.

When PV power is not available:

- 1st Grid, 2nd Battery: Grid will feed the load first. If grid is not available, battery will provide backup.
- 1st Battery, 2nd Grid: Battery will feed the load first. If battery is running low, grid will back up the load.

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

● **Off-Grid (III)**

**PV energy supply priority setting: 1st Load, 2nd Battery**

PV will feed load first and then charge battery. Feed into the grid is not allowed in this mode. The grid relay is NOT connected in Inverter mode. The transfer time from inverter mode to battery mode will be about 15ms. If load is over 10kW and grid is available, the inverter will allow grid to feed the load and PV power to charge battery. Otherwise, the inverter will activate fault protection.

Battery charging source:

1. PV or Grid:
In case of excess PV power after supporting the loads, it will charge battery. In case PV power is not available, grid will charge battery.
2. PV only:
PV only is allowed to charge battery.
3. None:
No battery charging permitted.

NOTE: AC charging duration can be set up.

Load supply source:

When PV power is available: 1st PV, 2nd Battery, 3rd Grid

PV power will feed the load first. If not sufficient, battery power will back up the load. If battery is low, Grid will back up the load.

When PV power is not available:

1. 1st Grid, 2nd Battery: Grid will feed the load first. If grid is not available, battery will backup.
2. 1st Battery, 2nd Grid: Battery power will feed the load at first. If battery power is low, grid will back up the load.

NOTE: This option will become ineffective during AC charging time and the priority will automatically become 1st Grid and 2nd Battery order. Otherwise, it will cause battery damage.

17. Operation

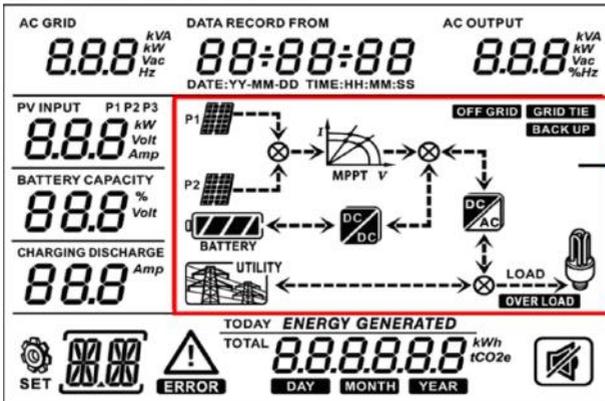
17-1. Interface



The display is controlled by four buttons.

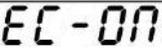
NOTICE: To accurately monitor and calculate the energy generation, calibrate the timer of this unit via software once a month. For the detailed calibration, check the user manual of bundled software.

17-2. LCD Information Define



Real-time operation status
Section 12-5 describes all operation conditions when the inverter is set up at "Grid-tie with backup (I)" mode.

Display	Function
AC GRID 8.8.8 ^{Vvac} Hz	Indicates AC input voltage or frequency. Vac: Voltage, Hz: Frequency
AC OUTPUT 8.8.8 ^{kVA} kW ^{Vvac} %Hz	Indicates AC output power, voltage, frequency, or load percentage. KVA: apparent power, kW: active power, Vac: Voltage, %: Load percentage, Hz: Frequency
PV INPUT P1 P2 8.8.8 ^{kW} Volt	Indicates PV input voltage or power. Volt: Voltage, kW: Power, P1: PV input 1, P2: PV input 2
BATTERY CAPACITY 8.8.8 [%] Volt	Indicates battery voltage or percentage. Volt: Voltage, %: Percentage
CHARGING DISCHARGE 8.8.8 ^{Amp}	Indicates charging current to battery or discharging current from battery.
	Indicates a warning.

	<p>Indicates a fault.</p>
	<p>Indicates fault code or warning code.</p>
<p>DATA RECORD FROM  <small>DATE : YY - MM - DD TIME : HH : MM : SS</small></p>	<p>Indicates date and time, or the date and time users set for querying energy generation.</p>
	<p>Indicates solar panels. Icon flashing indicates PV input voltage or is out of range.</p>
	<p>Indicates utility. Icon flashing indicates utility voltage or frequency is out of range.</p>
	<p>Indicates battery condition. The bars of the icon indicate battery capacity.</p>
	<p>Icon  flashing indicates battery is not allowed to discharge.</p>
	<p>Icon  flashing indicates the battery voltage is too low.</p>
	<p>Indicates AC output for loads is enabled and inverter is providing power to the connected loads.</p>
	<p>Indicates AC output for load is enabled but there is no power provided from inverter. Also, no battery and no utility are available. Only PV power exists but is not able to provide power to the connected loads.</p>
<p>OVER LOAD</p>	<p>Indicates overload.</p>
<p>TODAY ENERGY GENERATED TOTAL  Kw/h <small>rCO_{2e}</small> <small>DAY MONTH YEAR</small></p>	<p>Indicates PV energy generated.</p>
	<p>Indicates inverter is using generator.</p>
	<p>Indicates inverter is connected with Energy meter.</p>

17-3. Button Definition

Button	Operation	Function
ENTER/ON	Short press.	Enter query menu. If you are in query menu, press this button to confirm selection or entry.
	Press and hold the button for approximately 1 second when the utility is detected or 3 seconds without the utility.	This inverter is able to provide power to connected loads via AC output connector.
ESC/OFF	Short press.	Return to previous menu.
	Press and hold the button until the buzzer sounds continuously.	Turn off power to the loads.
Up	Short press.	Select last selection or increase value.
Down	Short press.	If you are in query menu, press this button to jump to next selection or decrease value.
		Mute alarm in standby mode or battery mode.

NOTE: If backlight shuts off, you may activate it by pressing any button. When an error occurs, the buzzer will continuously sound. Press any button to mute.

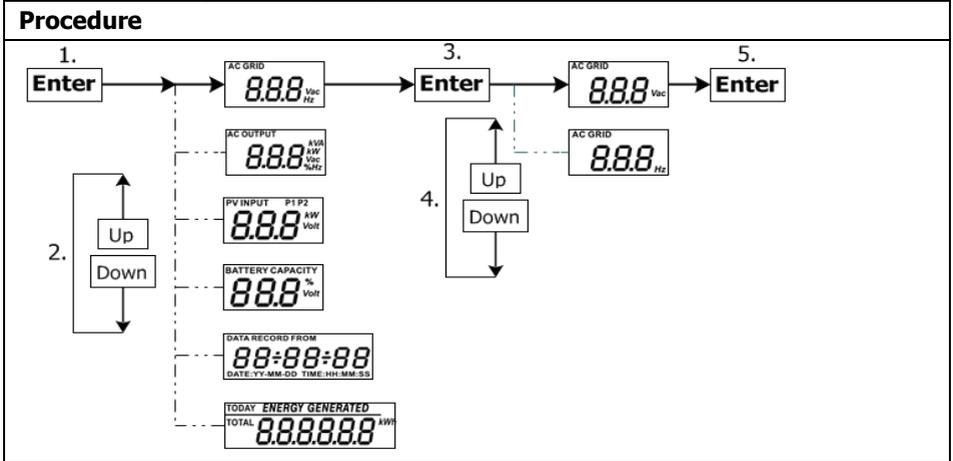
17-4. Query Menu Operation

The display shows current contents that have been set. The displayed contents can be changed in query menu via button operation. Press 'Enter' button to enter query menu. There are seven query selections:

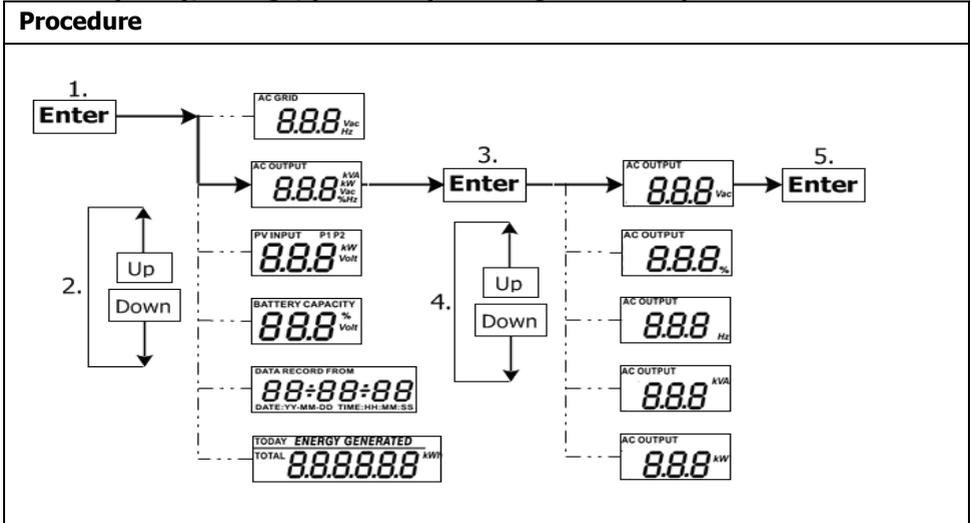
- Input voltage or frequency of AC input.
- Frequency, voltage, power or load percentage of AC output.
- Input voltage or power of PV input.
- Battery voltage or capacity percentage.
- Date and time.
- Today's or total energy generated.
- Mode of query energy generated.

Setting Display Procedure

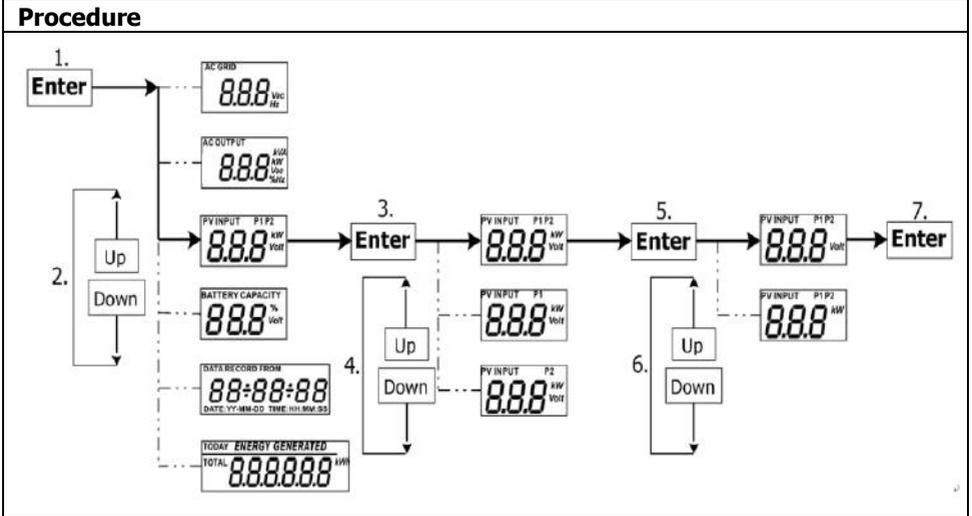
- Input voltage or frequency of AC input



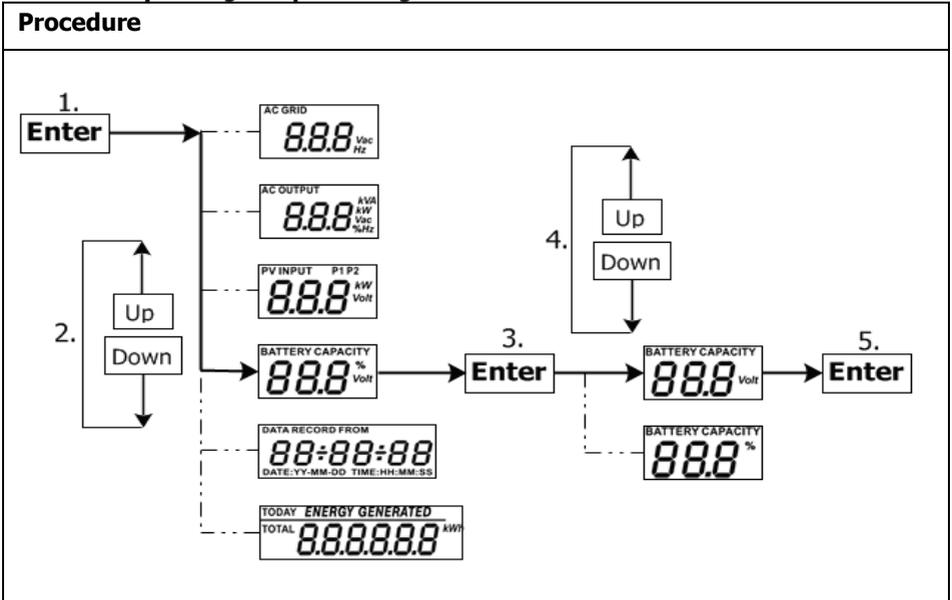
- Frequency, voltage, power or percentage of AC output



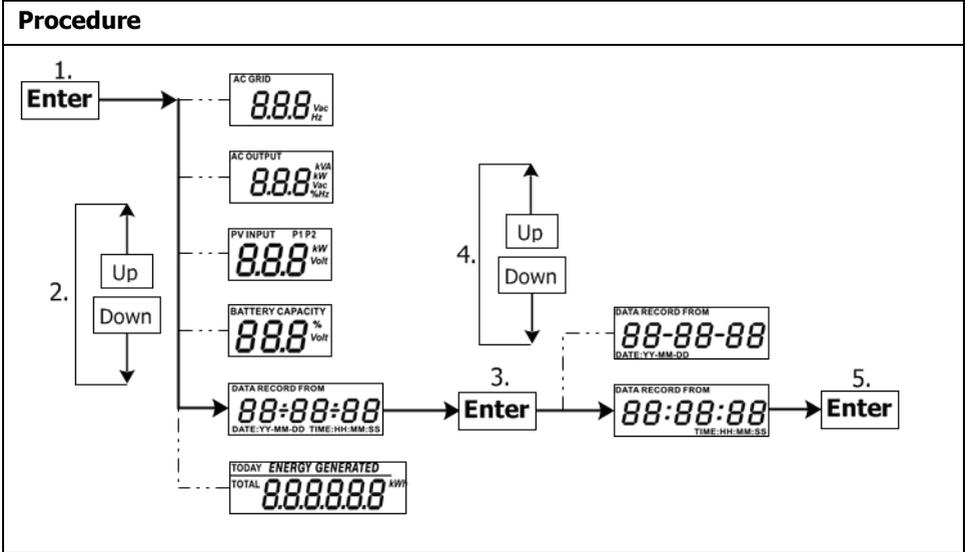
● **Input voltage or power of PV input.**



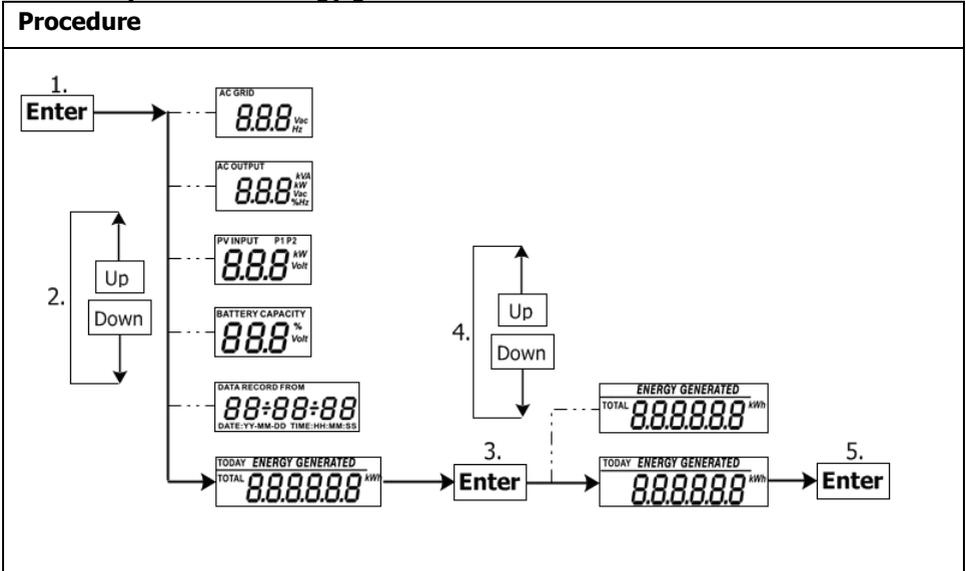
● **Battery voltage or percentage.**



● **Date and time.**



● **Today's or total energy generated.**

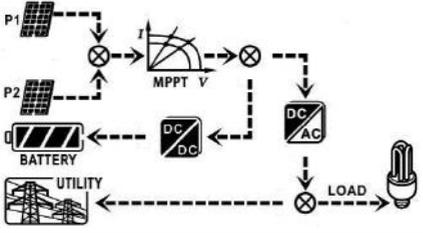
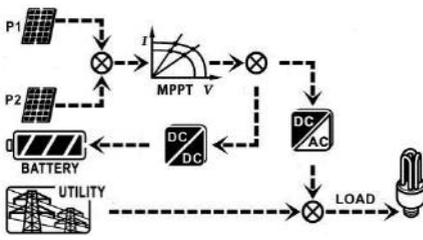
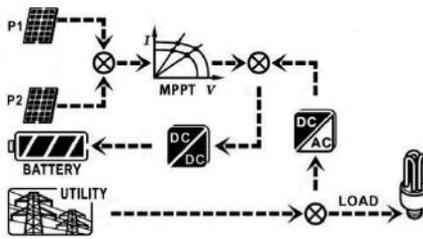
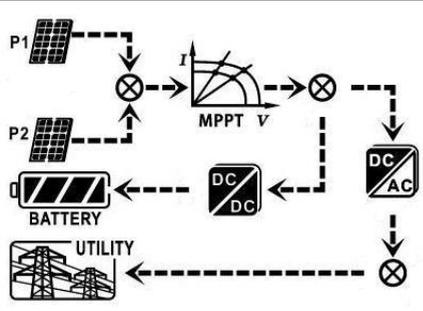


17-5. Operation Mode & Display

LCD display for **grid-tie with backup mode (I)**. If you require details of other operation modes with LCD display, please check with your installer.

Inverter mode with grid connected

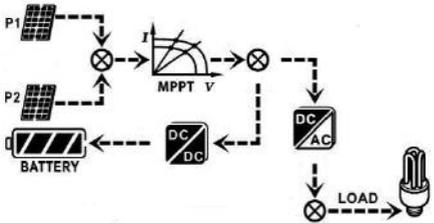
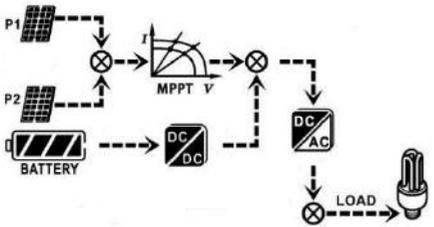
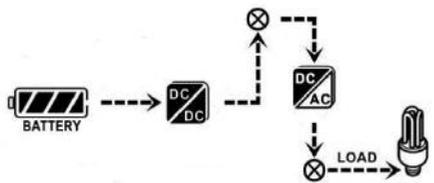
This inverter is connected to the grid and working with DC/INV operation.

LCD Display	Description
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT controller. The MPPT controller outputs DC power to a battery and a DC/AC inverter. The DC/AC inverter outputs AC power to a load and the grid. The battery is being charged. The grid is receiving power from the inverter.</p>	<p>PV power is sufficient to charge battery, provide power to load, and feed into the grid.</p>
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT controller. The MPPT controller outputs DC power to a battery and a DC/AC inverter. The DC/AC inverter outputs AC power to a load and the grid. The battery is being charged. The grid is supplying power to the load.</p>	<p>PV power is sufficient to charge the battery. Remaining PV power is insufficient to back up the load. Part PV power / part utility is supplying the load.</p>
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT controller. The MPPT controller outputs DC power to a battery and a DC/AC inverter. The DC/AC inverter outputs AC power to a load and the grid. The battery is being charged. The grid is supplying power to the load.</p>	<p>PV power is generated, but insufficient to charge battery. PV power and the utility are charging battery simultaneously. Utility is also supplying power to the load.</p>
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT controller. The MPPT controller outputs DC power to a battery and a DC/AC inverter. The DC/AC inverter outputs AC power to the grid. The battery is being charged. The grid is receiving power from the inverter.</p>	<p>This inverter is disabled to generate power to the load. PV power is sufficient to charge battery. Excess PV power feeds back into grid.</p>

	<p>This inverter is disabled to generate power to the load. PV and utility are charging battery simultaneously due to insufficient PV power.</p>
	<p>This inverter is disabled to generate power to the load. PV is feeding power back to the grid.</p>
	<p>PV power is sufficient to provide power to loads and feed power back to the grid.</p>
	<p>PV power and utility are feeding the load due to insufficient PV power.</p>

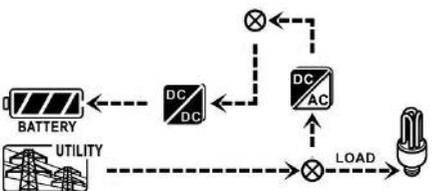
Inverter mode without grid connected

This inverter is working in DC/INV operation and not connected to the grid.

LCD Display	Description
	<p>PV power is sufficient to charge battery and provide power to the load.</p>
	<p>PV power is generated, but insufficient to support load on its own. PV and battery are providing power to the load simultaneously.</p>
	<p>Battery only is available to provide power to load.</p>

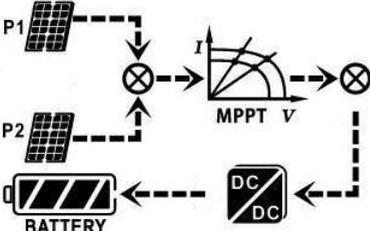
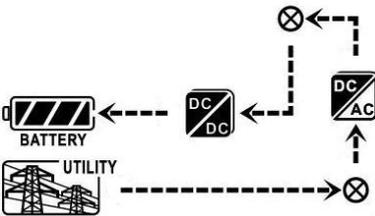
Bypass mode

The inverter is working without DC/INV operation and connected to the loads.

LCD Display	Description
	<p>Utility is charging battery and feeding the load.</p>
	<p>Utility only is feeding the load.</p>

Standby mode :

The inverter is working without DC/INV operation and load connected.

LCD Display	Description
 <p>The diagram illustrates the standby mode where the AC output is disabled. It shows two PV panels (P1 and P2) connected to a battery and a DC/DC converter. An MPPT (Maximum Power Point Tracking) graph is shown with current (I) and voltage (V) axes. The AC output is disabled, indicated by a circled X on the AC output line.</p>	<p>This inverter AC output is disabled; if AC output is enabled, an error has occurred on AC output. PV power is sufficient to charge battery.</p>
 <p>The diagram shows a battery, a utility source, and a DC/AC converter. The DC/AC converter is blocked from feeding power to the load, indicated by a circled X on the AC output line. The utility source is available to charge the battery.</p>	<p>This inverter is blocked from feeding power to the load. PV power is not detected or available. Only utility is available to charge battery.</p>
 <p>The diagram shows icons for PV panels (P1, P2), a battery, and a utility source.</p>	<p>If PV, battery or utility icons are flashing, they are outside acceptable operating range. If they are not displayed, they are not detected.</p>

18. Charging Management

Charging Parameter	Default Value	Note
Charging current	60A	Software adjustable from 10Amps to 100Amps.
Floating charging voltage (default)	54.0 Vdc	Software adjustable from 50Vdc to 60Vdc.
Max. absorption charging voltage (default)	56.0 Vdc	Software adjustable from 50Vdc to 60Vdc.
Battery overcharge protection	62.0 Vdc	
<p>Charging process based on default setting.</p> <p>3 stages:</p> <p><i>First</i> – Charge voltage increases to 56V, at max current;</p> <p><i>Second</i>– Charge voltage will remain at 56V until charge current drops below 12 Amp;</p> <p><i>Third</i>– Float charging at 54V.</p>		

This inverter is compatible with sealed lead acid, vented, gel and lithium batteries. Installation and maintenance details of these batteries are provided in the battery manufacturer's manual.

If using sealed lead acid battery, please set up the max charge current according to below formula:

$$\text{The maximum charging current} = \text{Battery capacity (Ah)} \times 0.2$$

For a 300 Ah battery, the maximum charge current is $300 \times 0.2 = 60$ (A). Use at least 50Ah battery because the minimum charge current is 10A.

When using AGM/Gel or other battery types, consult battery supplier for details.

Below is setting screen from software:

The screenshot shows the 'Parameters setting' window with the following parameters:

Parameter	Value	Unit	Action
Min. grid-connected voltage:	184	V	Apply
Max. grid-connected voltage:	264.6	V	Apply
Min. grid-connected frequency:	47.48	Hz	Apply
Max. grid-connected frequency:	51.6	Hz	Apply
The waiting time before grid-connection:	60	Sec.	Apply
Max. grid-connected average voltage:	253	V	Apply
Max. feed-in grid power:	10,000	W	Apply
Min. PV input voltage:	300	V	Apply
Max. PV input voltage:	900	V	Apply
Min. MPP voltage:	350	V	Apply
Max. MPP voltage:	850	V	Apply
Max. charging current:	60	A	Apply
Max. AC charging current:	60	A	Apply
Bulk charging voltage (C.V. voltage):	56	V	Apply
Start LCD screen-saver after:	None	Sec.	Apply
Floating charging voltage:	54	V	Apply
Battery cut-off discharging voltage when Grid is available:	48	V	Apply
Battery re-discharging voltage when Grid is available:	54	V	Apply
Battery cut-off discharging voltage when Grid is unavailable:	42	V	Apply
Battery re-discharging voltage when Grid is unavailable:	48	V	Apply
Battery temperature compensation:	0	mV	Apply
Feeding grid power calibration:	0	W	Apply
Max. battery discharge current in hybrid mode:	10	A	Apply
Mute Buzzer alarm:	<input type="radio"/> Enable <input checked="" type="radio"/> Disable		Apply
Generator as AC source:	<input type="radio"/> Enable <input checked="" type="radio"/> Disable		Apply
Mute the buzzer in the Standby mode:	<input type="radio"/> Enable <input checked="" type="radio"/> Disable		Apply
Activate Li-Fe battery while commissioning:	<input type="radio"/> Yes <input checked="" type="radio"/> No		Apply
Mute alarm in battery mode:	<input type="radio"/> Enable <input checked="" type="radio"/> Disable		Apply
Wide AC input range:	<input type="radio"/> Enable <input checked="" type="radio"/> Disable		Apply
When float charging current is less than X (A) and continued T (Min), then charger off, when battery voltage is less than Y (V), then charger on again.			
X:	0	A	
T:	60	Min.	
Y:	53	V	Apply
Any schedule change will affect the power generated and shall be conservatively made.			
System time:	2014-10-27		
	14:03:21		Apply
Close			

19. Maintenance & Cleaning

Check the following points to ensure proper operation of your complete solar system at regular intervals.

- Ensure all connectors of this inverter are clean.
- Before cleaning the solar panels, be sure to turn off PV DC breakers.
- Clean the solar panels, early or late in the day, when they are visibly dirty.
- Periodically inspect the system to make sure that all wires and supports are securely fastened.

WARNING: There are no user-replaceable parts inside the inverter. Do not attempt to service the unit yourself. If the unit is under warranty, this will be void.

Battery Maintenance

- Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries and the required precautions.
- When replacing batteries, replace with the same type and number of batteries or battery packs.
- The following precautions should be observed when working on batteries:
 - Remove watches, rings, or other metal objects.
 - Use tools with insulated handles.
 - Wear rubber gloves and boots.
 - Do not put tools or metal parts on top of batteries.
 - Disconnect charging source prior to connecting or disconnecting battery terminals.
 - Determine if battery is inadvertently grounded. If inadvertently grounded, remove source from ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance (applicable to equipment and remote battery supplies not having a grounded supply circuit).

CAUTION: A battery can present a risk of electrical shock with extremely high short circuit current capabilities.

CAUTION: Do not dispose of batteries in a fire. Batteries may explode.

CAUTION: Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.

20. Trouble Shooting

When there is no information displayed in the LCD, please check if PV module/battery/grid connection is correctly connected.

NOTE: The warning and fault information can be recorded by remote monitoring software.

20-1. Warning List

There are 17 situations defined as warnings. When a warning situation occurs, 

icon will flash and  display a warning code. If there are several codes, it will display them in sequence.

Code	Warning Event	Icon (flashing)	Description
01	Line voltage high		Grid voltage is too high.
02	Line voltage low		Grid voltage is too low.
03	Line frequency high		Grid frequency is too high.
04	Line frequency low		Grid frequency is too low.
05	Line voltage out of range for long time		Grid voltage is higher than 253V.
06	Ground Loss		Ground wire is not detected.
07	Island detect		Island operation is detected.
08	Line waveform		Grid wave shape is unacceptable to inverter.
9	EPO detected		EPO is open.
10	Overload		Load exceeds rated value.
11	Over temperature		Inside temperature is too high.
12	Batter voltage low		Battery discharged to low alarm point.
13	Battery under-voltage		Battery discharged to shutdown point.
14	Battery open		Battery is disconnected or too low.
15	Battery under-voltage with grid OK		Battery discharged while the grid is OK.
16	Solar over voltage		PV voltage is too high.
17	Inverter cuts off main output in battery mode		Inverter will cut off main output in battery mode due to low battery but maintain power on EMS connector.

20-2. Fault Reference Codes

When a fault occurs, the icon **ERROR** will flash as a reminder. See below fault codes for reference.

Fault Code	Situation		Solution
	Fault Event	Possible cause	
01	Bus over voltage	Surge	1. Restart the inverter. 2. If the error message persists, contact installer.
02	BUS under voltage	PV or battery disconnected suddenly	1. Restart the inverter 2. If the error message persists, contact installer.
03	BUS soft start time out	Internal component failure.	Contact installer.
04	INV soft start time out	Internal component failure.	Contact installer.
05	INV over current	Surge	1. Restart the inverter. 2. If the error message persists, contact installer.
06	Over temperature	Internal temperature is too high.	1. Check the ambient temperature and fans. 2. If the error message persists, contact installer.
07	Relay fault	Internal component failure.	Contact installer.
08	CT sensor fault	Internal component failure.	Contact installer.
09	Solar input power abnormal	1. Solar input driver damaged. 2. Solar input power is too high if voltage is above 850V.	1. Please check if solar input voltage is above 850V. 2. Contact installer.
11	Solar over current	Surge	1. Restart the inverter. 2. If the error message persists, contact installer.

12	GFCI fault	Leakage current exceeds the limit.	1. Check wires and panels which may cause the leakage. 2. If the error message persists, contact installer.
13	PV ISO fault	The resistance between PV and ground is too low.	
14	INV DC over current	Utility fluctuates.	1. Restart the inverter. 2. If the error message persists, contact installer.
16	GFCI sensor fault	GFCI sensor failed.	Contact your installer.
22	Battery high voltage fault	Battery voltage exceeds the limit.	1. Check the battery voltage. 2. If the error message persists, contact installer.
23	Over load	Inverter is loaded above 110%, timer has lapsed.	Reduce connected load.
26	INV short	Output short circuited.	Check for faulty wiring and/or remove defective load.
27	Fan lock	Fan failed.	Contact installer.
32	INV DC over voltage	Load fluctuates	1. Restart the inverter. 2. If the error message persists, contact installer.
33	INV voltage low	Internal component failure.	Contact installer.
34	INV voltage high	Internal component failure.	Contact installer.
35	Wire connection fault	Internal wires loose.	Contact installer.
36	OP voltage fault	Grid connected to output terminal	Rewire connections.

21. Specifications

MODEL	5KW
RATED POWER	5000 W
PV INPUT (DC)	
Maximum DC Power	10000 W
Nominal DC Voltage	720 VDC
Maximum DC Voltage	900 VDC
Working DC Voltage Range	200 VDC to 900 VDC
Start-up Voltage / Initial Feeding Voltage	250 VDC / 300 VDC
MPP Voltage Range	250 VDC to 850 VDC
Full Load MPP Voltage Range	500 VDC to 850 VDC
Maximum Input Current	2 x 10 A
Isc PV (absolute maximum)	25 A
Max. inverter back feed current to the array	0 A
GRID OUTPUT (AC)	
Nominal Output Voltage	230 VAC
Output Voltage Range	184 - 265 VAC
Output Frequency Range	47.5 to 51.5 Hz or 59.3 to 60.5Hz
Nominal Output Current	21.8 A per phase
Inrush Current/Duration	25 A / 20ms
Maximum Output Fault Current/Duration	65 A / 1ms
Maximum output Overcurrent Protection	65 A
Power Factor Range	0.9 lead – 0.9 lag
AC INPUT	
AC Start-up Voltage	120-140 VAC
Auto Restart Voltage	180 VAC
Acceptable Input Voltage Range	170 - 280 VAC
Nominal Frequency	50 Hz / 60 Hz
AC Input Power	5000VA/5000W
Maximum AC Input Current	40 A
Inrush Input Current	40 A / 1ms
BATTERY MODE OUTPUT (AC)	
Nominal Output Voltage	230 VAC
Output Frequency	50 Hz / 60 Hz (auto sensing)
Output Waveform	Pure sine wave
Output Power	5000VA/5000W
Efficiency (DC to AC)	91%
BATTERY & CHARGER (Lead-acid/Li-ion)	
DC Voltage Range	40 – 60 VDC
Nominal DC Voltage	48 VDC
Maximum Battery Discharging Current	138A
Maximum Charging Current	100 A

GENERAL	
PHYSICAL	
Dimension, D x W x H (mm)	600x460x204.2
Net Weight (kgs)	29
INTERACE	
Communication Port	RS-232/USB
Intelligent Slot	Optional SNMP, Modbus and AS-400 cards available
ENVIRONMENT	
Protective Class	I
Ingress Protection Rating	IP20
Humidity	0 to 90% RH (No condensing)
Operating Temperature	-10 to 55°C (Power derating above 50°C)
Altitude	Max. 2000m*

* Power derating of 1% per 100m above 1000m.

22. Limited Product Warranty

2 Years Limited Warranty

Sinetech Pty (Ltd) warrants that the Unit will be free from defects for 2 years following the date it was purchased.

Please Note: The Limited Warranty is subject to a number of important exclusions and limitations. This Limited Warranty does not apply to any defect resulting from any of the following, each of which may result in your Limited Warranty being voided:

- Abuse, misuse or negligence.
- The removal of the Serial Number.
- Accidents or force majeure events, including but not limited to lightning, flood, earthquake, fire, extreme cold weather, or other events outside the reasonable control of Sinetech.
- Failure to operate or maintain the Unit in accordance with the User Manual.

In addition, this Limited Warranty does not cover normal wear and tear or deterioration, or superficial defects, dents or marks that do not impact the performance of the Unit, noise or vibration that is not excessive or uncharacteristic and does not impact your Unit's performance, damage or deterioration that occurs after the expiration or voiding of the warranty period or theft of the Unit or any of its components.

Limitations of Liability: To the greatest extent permitted by law, Sinetech shall not be liable for any consequential, incidental, indirect, special, and exemplary or punitive damages arising out of or related to this limited warranty, regardless of the form of action and regardless of whether Sinetech has been informed of, or otherwise might have anticipated, the possibility of such damages. To the greatest extent permitted by law, Sinetech's liability arising out of a claim under this limited warranty shall not exceed the amount you paid for the Unit. Some countries and regions do not allow, or restrict, the exclusion or limitation of damages, including incidental or consequential damages, so the above limitation or exclusion may not apply to you, or may only apply to a limited extent.

Limitation on Use: The Unit is not to be used as a primary or back-up power source for life-support systems, other medical equipment, or any other application where product failure could lead to injury to persons or loss of life or catastrophic property damage. Sinetech disclaims any and all liability arising out of any such use of the Unit. Further, Sinetech reserves the right to refuse to service any Unit used for these purposes and disclaims any and all liability arising out of Sinetech's service or refusal to service the Unit in such circumstances.



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