

3-WAY HYBRID INVERTER



10kW Hybrid Inverter (3-Phase)

USER MANUAL

V2.0

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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.

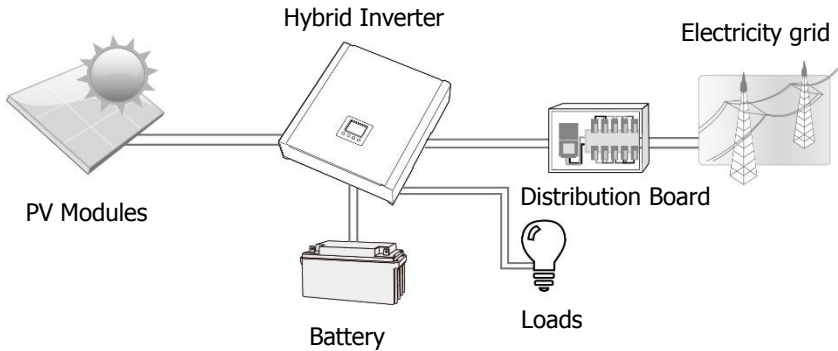


Figure 1 Basic Hybrid PV System Overview

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 details), this inverter is able to generate power to feed into the grid (utility) and charge the battery. Do not connect the positive or negative terminal of the solar panel to ground. See *Figure 1* above for a single line diagram of a typical solar system with this hybrid inverter.

Note: As per EEG standards, inverters sold to German area are not allowed to charge battery from utility. This function is automatically software disabled.

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 are to be performed by qualified personnel only.

General Precaution:

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

CAUTION! Caution identifies conditions or operations that could result in damage to the unit or connected devices.



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 floating 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 remain charged for 5 minutes after disconnecting all power sources.



CAUTION! Do not disassemble this inverter. It contains no user-serviceable parts.

Attempts to service this inverter yourself may cause a risk of electrical shock or fire and will void the warranty.



CAUTION! To avoid a 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! In a high temperature environment, the cover of this inverter can 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 / tools from installer. Any substandard 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 any cooling fan.



CAUTION! Do not operate the Inverter if it has been dropped or otherwise 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 should be easily accessible.

Before working on this circuit

- Isolate Inverter/Uninterruptible Power Supply (UPS)
- Check for Hazardous Voltages between all terminals including the protective earth.



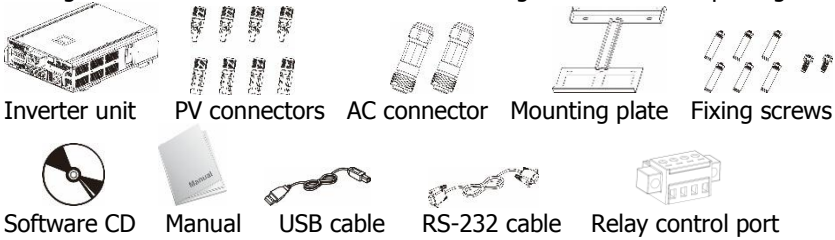
Symbols used in Equipment Markings

	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

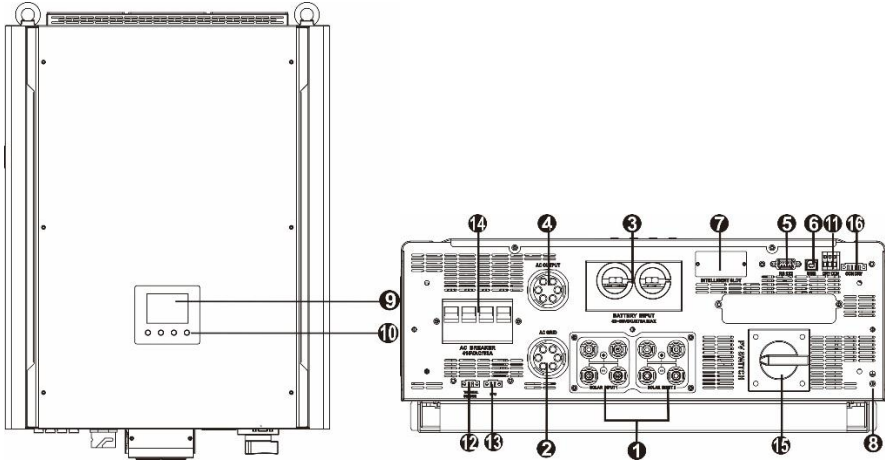
3. Unpacking & Overview

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 the package:



3-2. Product Overview



- 1) PV connectors
- 2) AC Grid connectors
- 3) Battery connectors
- 4) AC output connector (Load connection)
- 5) RS-232 communication port
- 6) USB communication port
- 7) Intelligent slot
- 8) Ground
- 9) LCD display panel (Check section 10 for detailed LCD operation)
- 10) Control buttons
- 11) Dry contacts
- 12) Battery temp sensor
- 13) EPO [Emergency Power Off]
- 14) AC Input circuit breaker
- 15) DC Switch
- 16) Relay control port

4. Installation

4-1. Selecting Mounting Location

Consider the following points before installation:

- Do not mount the inverter onto 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 so the LCD display can be read at all times.
- For proper air circulation and to dissipate heat, allow a clearance of ± 20 cm on both sides and ± 50 cm above and below the unit.
- Dusty conditions 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 recommended installation position must 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 where the temperature and humidity is beyond the specific limits. (Please check the specs for the limitations.)
- Installation position must permit access to all the connectors.
- This inverter is designed with a rating of IP20 for indoor applications only.
- Regularly clean the fan filter.

4-2. Mounting Unit

WARNING!! This inverter is heavy! Take care when lifting.

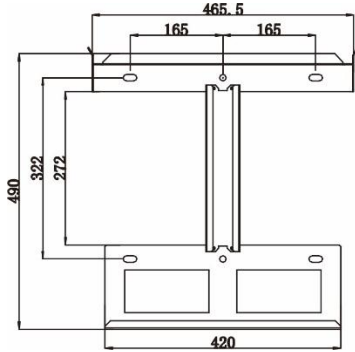
Installation onto the wall should be carried out with the suitable bolts. The device should be bolted on securely.

The inverter can only be used in a CLOSED OPERATING AREA. Only service personnel should enter this area.

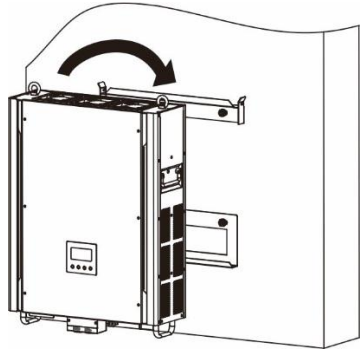
WARNING!! FIRE HAZARD.
SUITABLE FOR MOUNTING ON CONCRETE OR OTHER NON-COMBUSTIBLE SURFACES ONLY.

4. Installation

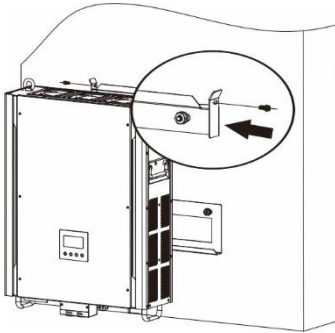
1. Drill six holes at the marked locations for six screws supplied. The tightening torque is 35 N.m.



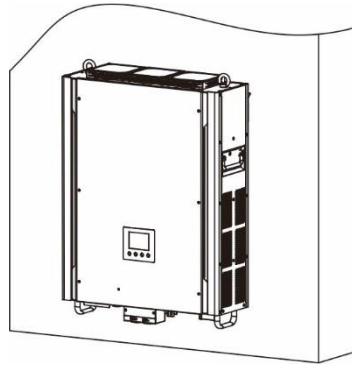
2. Lift the inverter and place it over the mounting plate.



3. Secure the inverter in position with the supplied two screws (M4*12) located on the top sides of the inverter.



4. Check if the inverter is secure.



5. Grid (Utility) Connection

5-1. Preparation

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

NOTE2: The inverter has a built-in 63A/400V breaker for protection.

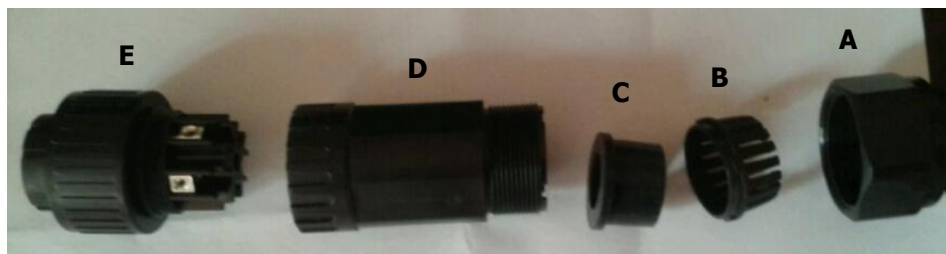
WARNING! For system safety and efficient operation, use appropriate cable for grid (utility) connection. To reduce risk of injury, please use the proper recommended cable size as below.

Suggested cable requirement for AC wire

Nominal Grid Voltage	230VAC per phase
Conductor cross-section (mm ²)	6-10
AWG no.	9-7

5-2. Connecting to the AC Utility

Overview of AC Connection Socket



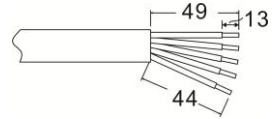
Component	Description
A	Compression nut
B	Clip
C	Seal
D	Protective cover
E	Socket terminal

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

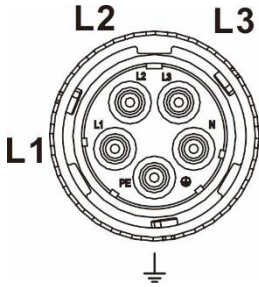
Step 2: Switch off the AC input circuit breaker.

Step 3: Remove insulation by 13 mm on all five conductors.

Step 4: Feed the five cables through compression nut (A), clip (B), seal (C) and connect to socket terminal (D).



Step 5: Connect five cables at socket terminal (E) according to polarities indicated and tighten the screws.



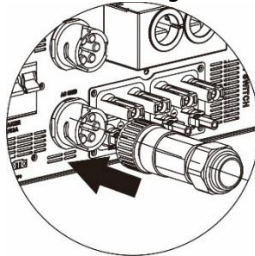
- L1** → **LINE 1 (Black)**
- L2** → **LINE 2 (Grey)**
- L3** → **LINE 3 (Brown)**
-  → **Ground (Yellow-Green)**
- N** → **Neutral (Blue)**

The tightening torque is 1.5-2.5 N.m.

Step 6: Push protective cover (D) on to socket terminal (E) until both are locked tightly. Then, turn protective cover (D) and compression nut (A) so that all cables are firmly connected.



Step 7: Plug the AC connection socket into AC grid terminal of the inverter.



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

6. PV Module (DC) Connection

CAUTION: Before connecting to PV modules, install an **additional** fuse/DC circuit breaker between inverter and PV modules.

NOTE1: Please use 1000VDC/20A circuit breaker or 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 non-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 possibility of leakage current to the inverter. Earthed PV modules will cause leakage current to the inverter.

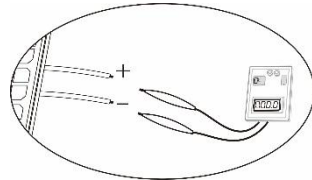
Do **NOT** ground CIGS modules.

CAUTION: A PV combiner box with surge protection is required.

Without that, inverter damage through lightning on PV modules is likely.

Step 1: Check the input voltage of PV array modules. The acceptable input voltage of the inverter is 350VDC - 900VDC. This system comes with two PV array strings.

The maximum current per each PV input connector is 18.6A.



CAUTION: Exceeding the maximum input voltage can destroy the unit!!

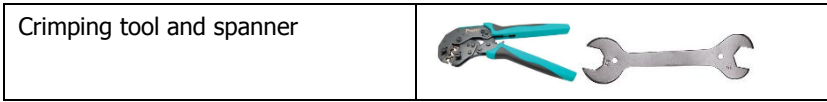
Check the system before connecting.

Step 2: Switch off the circuit breaker and the DC switch.

Step 3: Assemble provided PV connectors with PV modules as per the following steps.

Components for PV connectors and Tools:

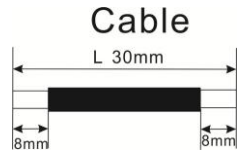
Female connector housing	
Female terminal	
Male connector housing	
Male terminal	



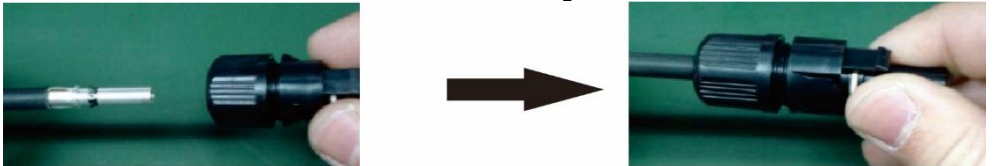
Cable preparation and connector assembly process:

Strip cable 8 mm from both ends, be careful NOT to nick strands.

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



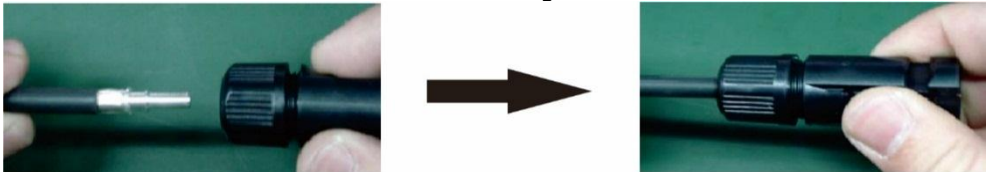
Insert assembled cable into female connector housing as shown below.



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



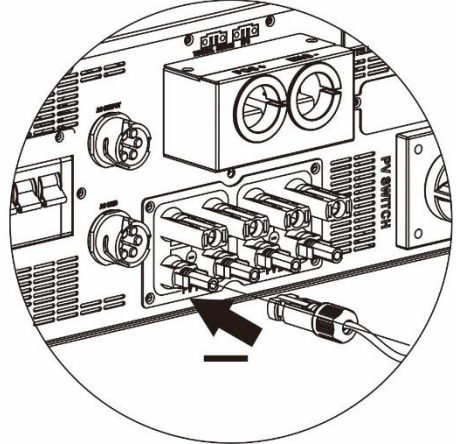
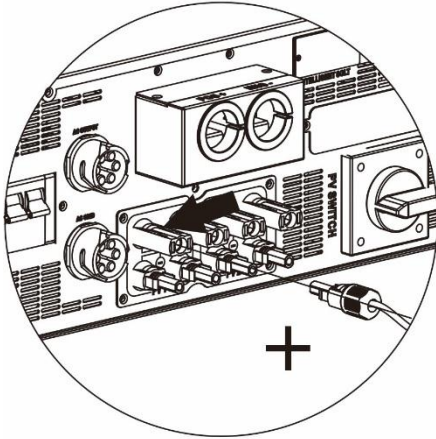
Insert assembled cable into male connector housing as shown below.



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



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



WARNING! For system safety and efficient operation, use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Conductor cross-section (mm ²)	AWG no.
6	9

CAUTION: Do NOT touch inverter terminals. It will cause lethal electric shock.

Recommended Panel Configuration

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

Solar Panel Spec. (reference)	SOLAR INPUT 1	SOLAR INPUT 2	Q'ty of panels	Total Input Power
	Min in series: 11panels Max in series: 18panels			
- 250Wp - Vmp: 36.7Vdc - Imp: 6.818A - Voc: 44Vdc - Isc: 7.636A - Cells: 72	11 in series	x	11	2750W
	x	11 in series	11	2750W
	11 in series	11 in series	22	5500W
	11 in series 2 strings parallel	x	22	5500W
	x	11 in series 2 strings parallel	22	5500W
	18 in series	18 in series	36	9000W
	14 in series 2 strings parallel	14 in series	42	10500W
	18 in series 2 strings parallel	18 in series	54	13500W
	15 in series 2 strings parallel	15 in series 2 strings parallel	60	15000W

7. Battery Connection

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

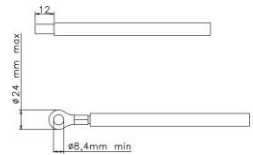
NOTE1: Use only sealed lead acid, vented or Gel battery. Check maximum charging voltage and current before using this inverter. For Lithium iron or NiCad battery, please consult with installer for details.

NOTE2: Please use 60VDC/300A fuse / circuit breaker.

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

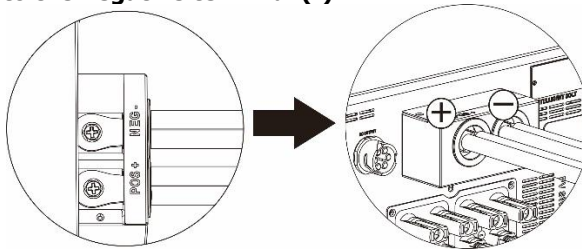
Step 1: Check the nominal voltage of batteries. The nominal inverter input voltage is 48VDC.

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 the positive terminal (+);
BLACK cable to the 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.

7. Battery Connection

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

Nominal Battery Voltage	48V
Conductor cross-section (mm ²)	95
AWG no.	3/0

8. Load (AC Output) Connection

8-1. Preparation

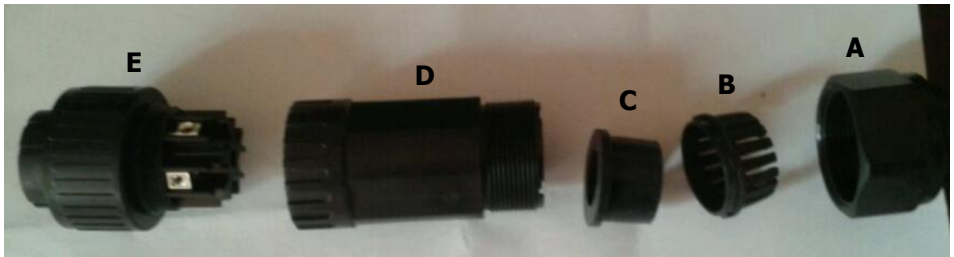
CAUTION: To isolate the load from the inverter during any mode of operation, an **additional** disconnection device must be installed in the distribution board.

WARNING! For system safety and efficient operation, use appropriate cable for AC connection. To reduce risk of injury, please use the proper recommended cable size as below.

Nominal Grid Voltage	208/220/230/240 VAC per phase
Conductor cross-section (mm ²)	5.5-10
AWG no.	10-8

8-2. Connecting to the AC output

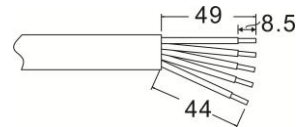
Overview of Load Connection Socket



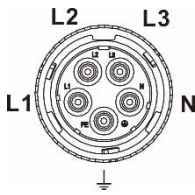
Component	Description
A	Compression nut
B	Clip
C	Seal
D	Protective cover
E	Socket terminal

Step 1: Remove insulation 8.5 mm of all five conductors.

Step 2: Feed the conductors through compression nut (A), clip (B), seal (C) and protective cover (D) in sequence.




Step 3: Connect five conductors to socket terminal (E) as per polarities indicated on it and tighten the screws to secure conductors.



L1 → **LINE 1 (Black)**

L2 → **LINE 2 (Grey)**

L → **LINE 3 (Brown)**

 → **Ground (Yellow-Green)**

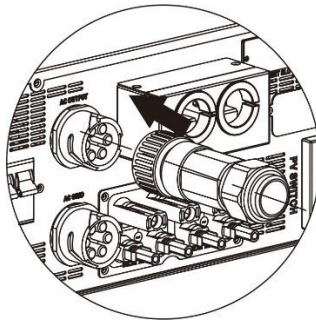
N → **Neutral (Blue)**

The tightening torque is 1.0-1.5 N.m.

Step 4: Push protective cover (D) on to socket terminal (E) until both are locked tightly. Then, turn protective cover (D) and compression nut (A) so that all cables are firmly connected.



Step 5: Plug the socket into the terminal.

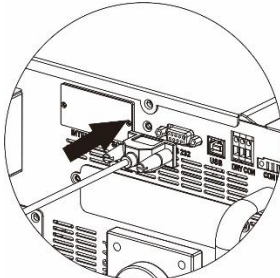
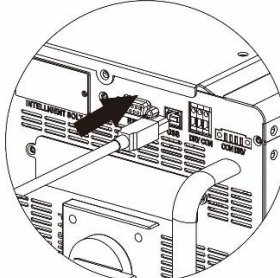
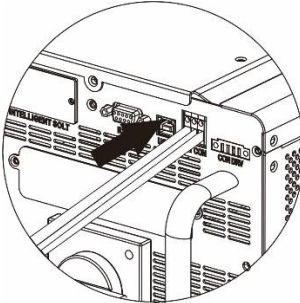
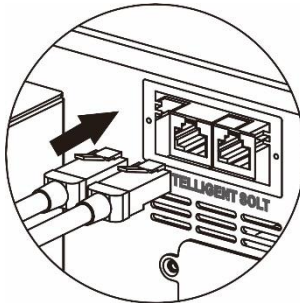


CAUTION: Only connect load to "AC Output Connector". Do **NOT** connect the utility to "AC Output Connector".

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.

9. Communication

The inverter comprises several communication ports and a slot for alternative communication interfaces in order to communicate with a PC with corresponding software. This intelligent slot is suitable to install an 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 8 mm of three wires and insert them 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 may start the monitoring software and extract data via communication port.

10. Dry Contact Signal


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

10-1. 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 parameters above. Exceeding these values will damage the relay.

10-2. Function Description

Unit Status	Condition	Dry contact port: 	
		NO&C	NC&C
Power Off	Unit is off and output is not powered.	Open	Close
Power On	Battery voltage is below battery cut-off discharging voltage setting while grid is available.	Close	Open
	Battery voltage is below battery cut-off discharging voltage setting when grid is not available.	Close	Open
	Battery voltage exceeds below 2 setting values: 1. Battery re-discharging voltage when grid is available. 2. Battery re-discharging voltage when grid not available.	Open	Close

10. Dry Contact Signal

Related parameters are settable 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: 10,000 W <input type="button" value="Apply"/>
Max. grid-connected frequency: 51.5 Hz <input type="button" value="Apply"/>	


Min. PV input voltage: 300 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: 350 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"/>	Feeding grid power calibration: 0 W <input type="button" value="Apply"/>
Start LCD screen-saver after: None Sec. <input type="button" value="Apply"/>	Max. battery discharge current in hybrid mode: 10 A <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"/>	Activate Li-Fe battery while commissioning: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="button" value="Apply"/>
Mute alarm in battery 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"/>

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

 Any schedule change will affect the power generated and shall be conservatively made.

System time: 2014-10-27 

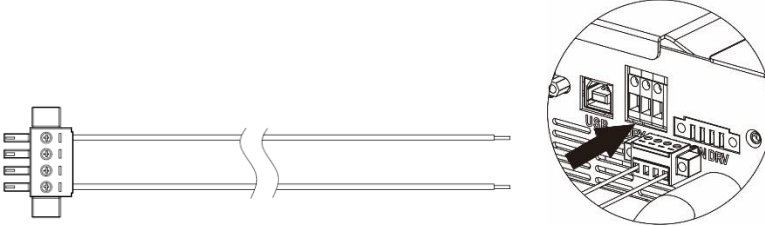
14:03:21

11. Relay Control Port

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

11-1. 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.



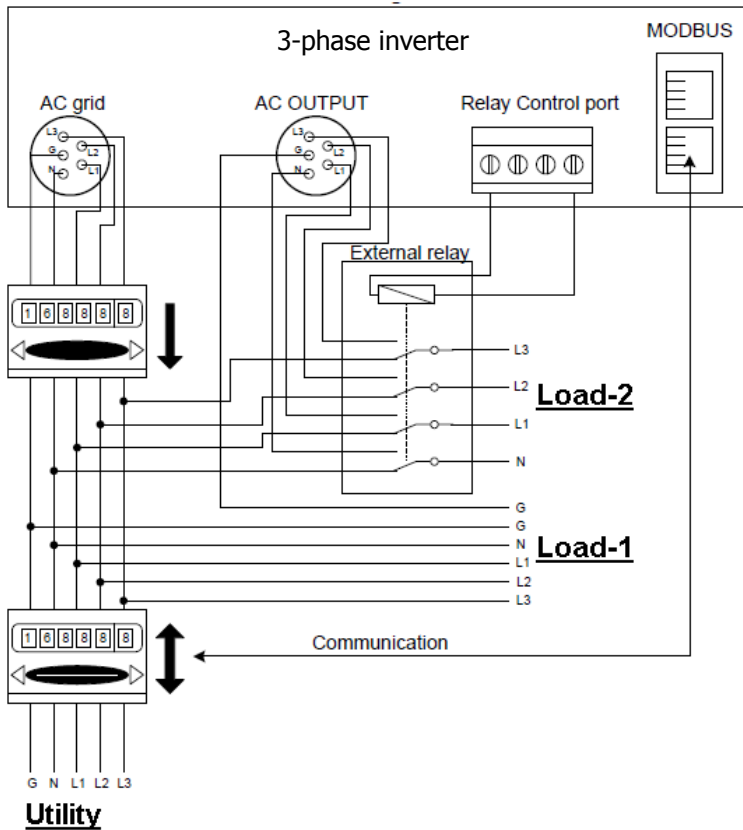
11-2. Function Description

Unit status	Condition	Output voltage from relay control port
Power Off	Unit is off and output is not powered.	0V
Power On	<p>When the unit is operating in inverter mode and grid is not available.</p> <p>Condition 1:</p> <p>Condition 2:</p>	230V

Power on	<p>Condition 3:</p>	230V
	When the unit is not operating in inverter mode and grid is available.	0V

11-3. Application

Recommended wiring.

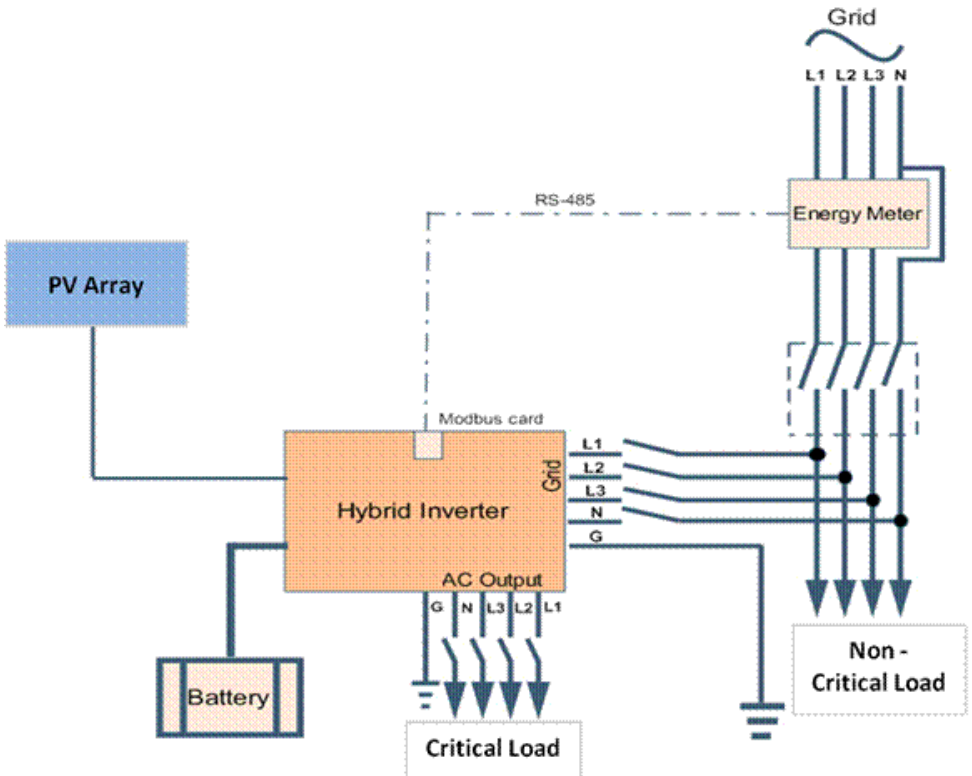


12. Application with Energy Meter

With Modbus card II and an energy meter, the hybrid inverter can easily be integrated into the existing household system. 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, the hybrid inverter is connected to an energy meter (via??) with RS485 communication port. This controls self-consumption via Modbus card, power generation and battery charging of the inverter.



13. 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 requirements (Refer to Section 6)
- Check if the utility voltage is in line with the nominal expected value from local utility company.
- Check if connection of AC cable to grid (utility) is correct, if applicable.
- All PV module connections.
- AC circuit breaker (only applicable when the utility is required), battery fuse / circuit breaker, and solar panel DC fuse/circuit breaker are installed correctly.

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

- If LCD displays the current inverter status, commissioning has been successful. After pressing "ON" button for 1 second when the utility is detected, the inverter will supply power to the loads. If no utility exists, simply press "ON" button for 3 seconds. Then the inverter will supply power to the loads.
- If a warning/fault indicator appears in LCD, an error has occurred in the inverter. Please inform your installer.

Step 3: Please 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.

NOTE: If using Modbus card as communication interface, please install bundled software. Ask your dealer for the details.

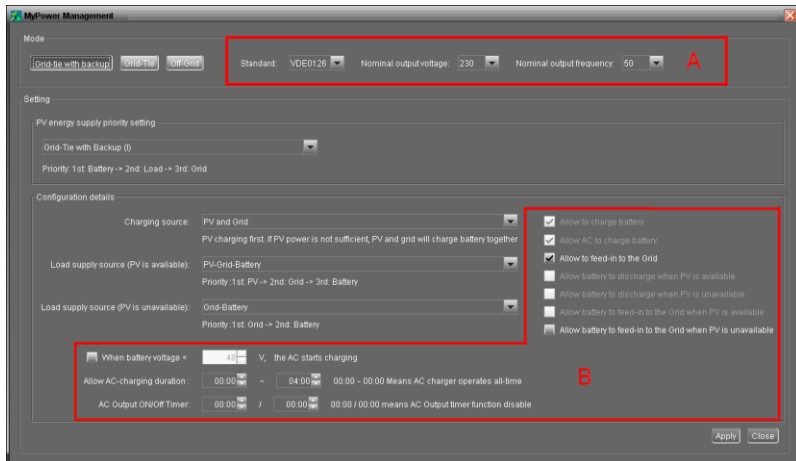
14. Initial Setup

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

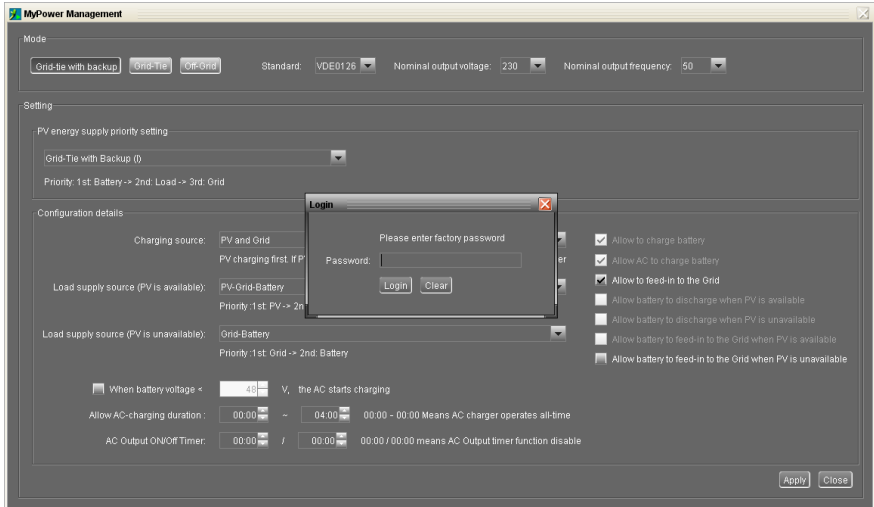
There are three operation modes: Grid-tie with backup, Grid-Tie and Off-Grid.

- **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.

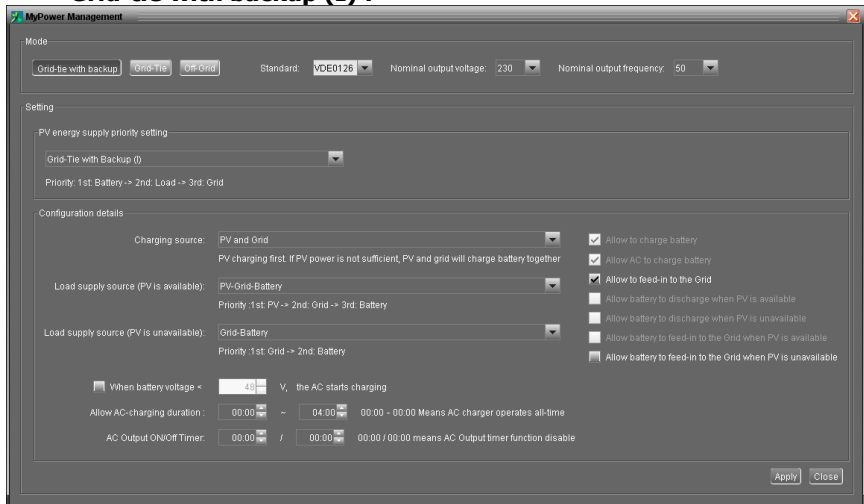
Allow battery to discharge when PV is unavailable: This option is automatically determined by setting in "Load supply source (PV is unavailable)". When "Battery" is higher priority than "Grid" in Load supply source (PV is unavailable), this option is default selected. Under Grid-tie mode, this option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

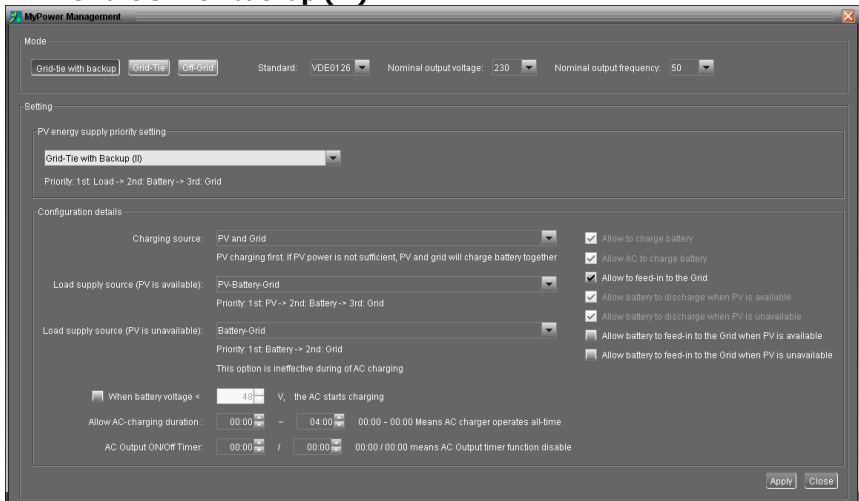
If battery is not fully charged, PV will first charge battery. Remaining PV power will feed the load. If PV power is insufficient, grid will feed the load. If grid is not available, battery will back up.

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.

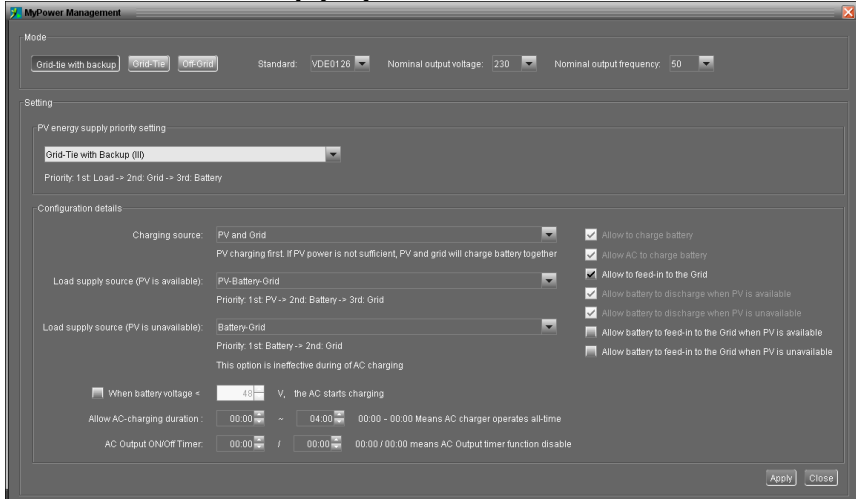
When PV power is not available:

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:

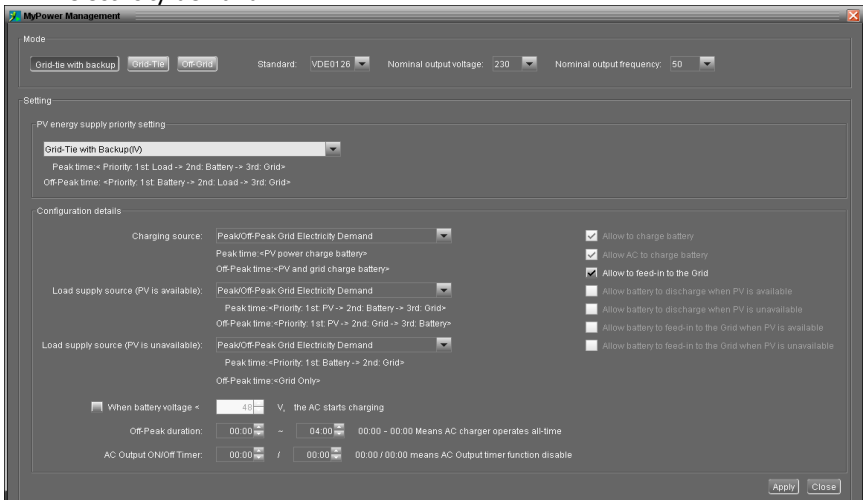
1. 1st PV, 2nd Battery, 3rd Grid
PV power will feed the load first. If insufficient, battery will feed the load. When battery power is running low or not available, grid will back up the load.
2. 1st PV, 2nd Grid, 3rd Battery
PV power will feed the load first. If insufficient, grid will feed the load.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

When PV power is not available:

- 1st Grid, 2nd Battery: Grid will feed 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.

- **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

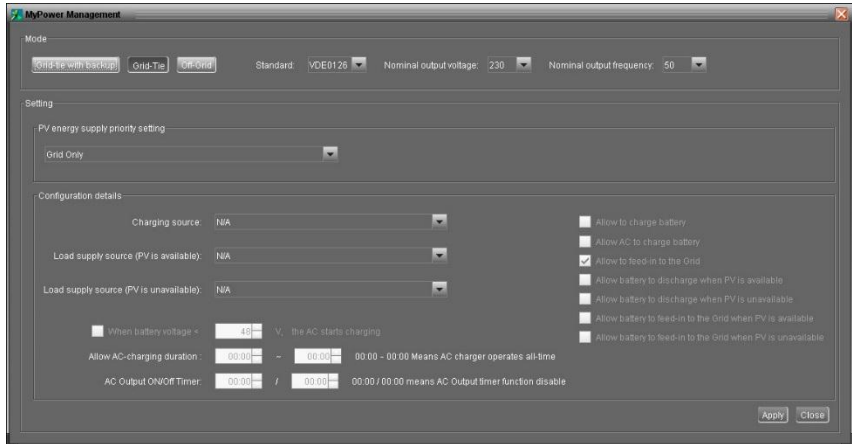
PV power will charge battery first during off-peak time. If insufficient, grid will charge battery.

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.

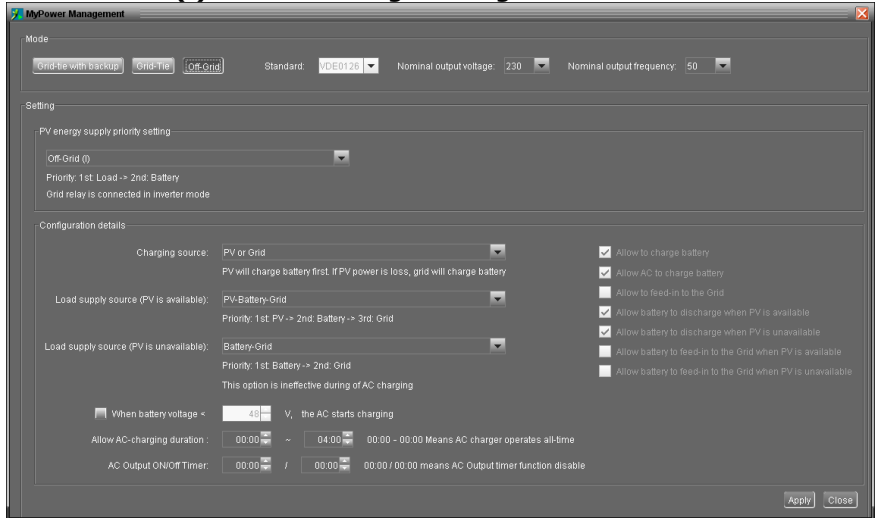
GRID-TIE

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

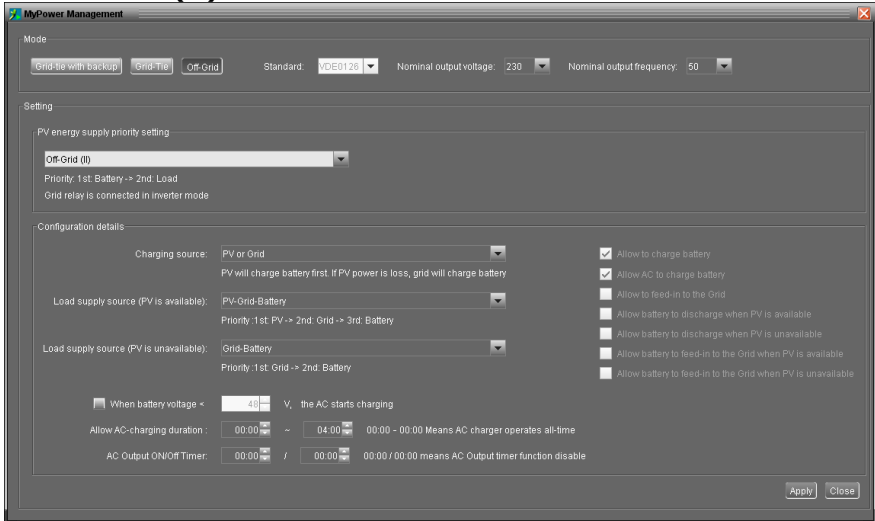
Grid will feed the load first. If grid is not available, battery will provide backup.

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

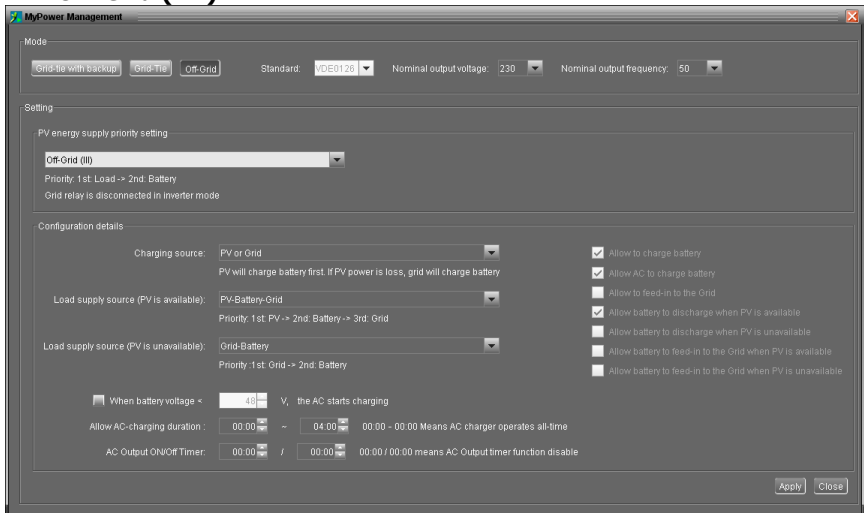
PV will feed the load first. If insufficient, grid will feed the load. If grid is not available, battery will back up.

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.

15. Operation

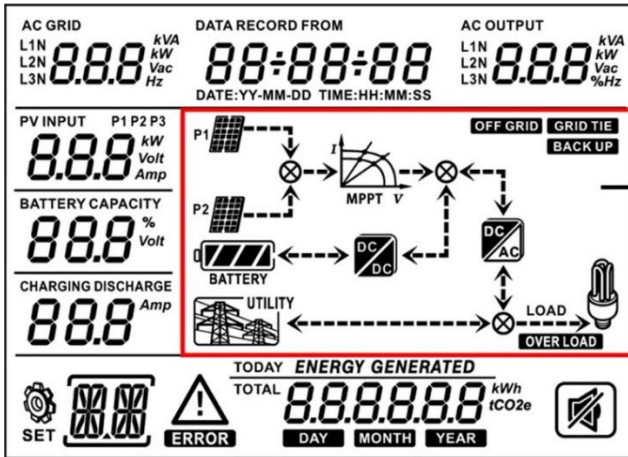
15-1. Interface



The display is controlled with four buttons.

















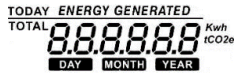
NOTICE: To accurately monitor and calculate the energy generation, please calibrate the timer of this unit via software on a monthly basis. For calibration details, check the user manual.

15-2. LCD Information Define



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

Display	Function
AC GRID L1N L2N 8.8.8 Vac L3N Hz	Indicates AC input voltage or frequency. Vac: Voltage, Hz: Frequency, L1N/L2N/L3N: Line voltages
AC OUTPUT L1N L2N 8.8.8 kVA L3N Vac %Hz	Indicates AC output power, voltage, frequency, or load percentage. KVA: Apparent power, KW: Active power, Vac: Voltage, %: Load percentage, Hz: Frequency, L1N/L2N/L3N: AC output voltages
PV INPUT P1 P2 L1N L2N 8.8.8 kW Volt	Indicates PV input voltage or power. Volt: Voltage, KW: Power, P1: PV input 1, P2: PV input 2

	Indicates battery voltage or percentage. Volt: Voltage, %: Percentage
	Indicates charging or discharging current to or from battery.
	Indicates a warning.
	Indicates a fault.
	Indicates the fault or warning code.
	Indicates date and time, or the date and time user set for querying energy generation.
	Indicates solar panels. Flashing icon indicates PV voltage or is out of range.
	Indicates utility. Flashing icon indicates utility voltage or frequency out of range.
	Indicates battery condition. The bars of the icon indicate battery capacity.
	Flashing icon  indicates battery is not allowed to discharge.
	Flashing icon  indicates battery voltage is too low.
	Indicates AC output for loads is enabled and inverter is providing power to the connected loads.
	Indicates AC output for load is enabled but there is no power provided from inverter. Neither battery nor the utility are available. Only PV power is available but is not able to provide power to the connected load.
	Indicates overload.
	Indicates PV energy generated.

15-3. Button Definition

Button	Operation	Function
ENTER/ON	Short press.	Enter query menu. If already 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	The inverter can provide power to connected load.

	or 3 seconds without the utility.	
ESC/OFF	Short press.	Return to previous menu.
	Press and hold the button until the buzzer sounds continuously.	Turn off power to the load.
Up	Short press.	Select last selection or increase value.
Down	Short press.	If already in query menu, press this button to jump to next selection or decrease value.
		Mute alarm in standby or battery mode.

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

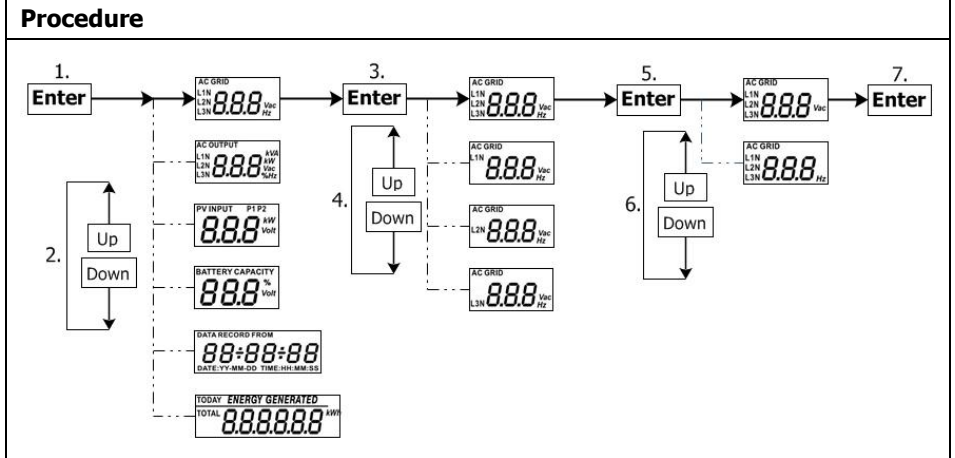
15-4. Query Menu Operation

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:

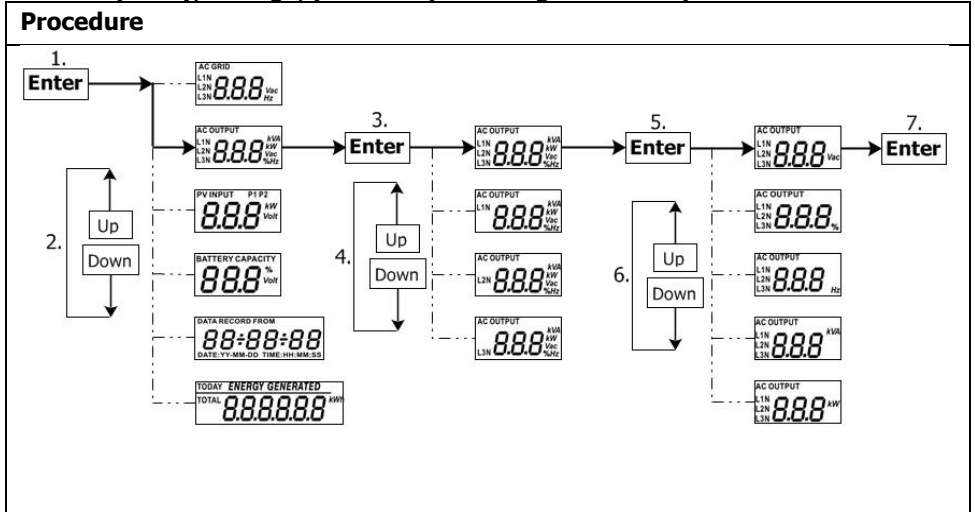
- AC input voltage or frequency.
- AC output frequency, voltage, power or load percentage.
- PV input voltage or power.
- Battery voltage or capacity percentage.
- Date and time.
- Today's or total energy generated.
- Mode of query energy generated.

Setting Display Procedure

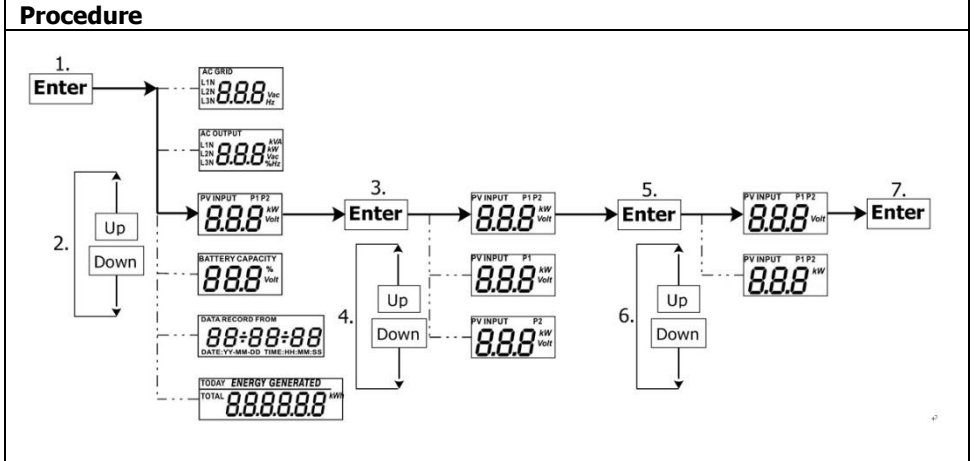
● Input voltage or frequency of AC input



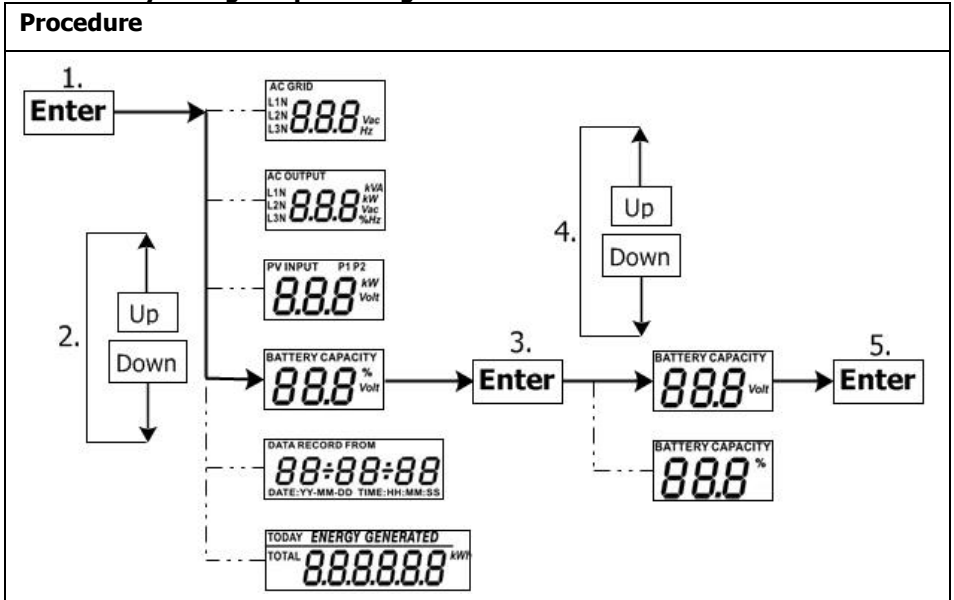
● Frequency, voltage, power or percentage of AC output



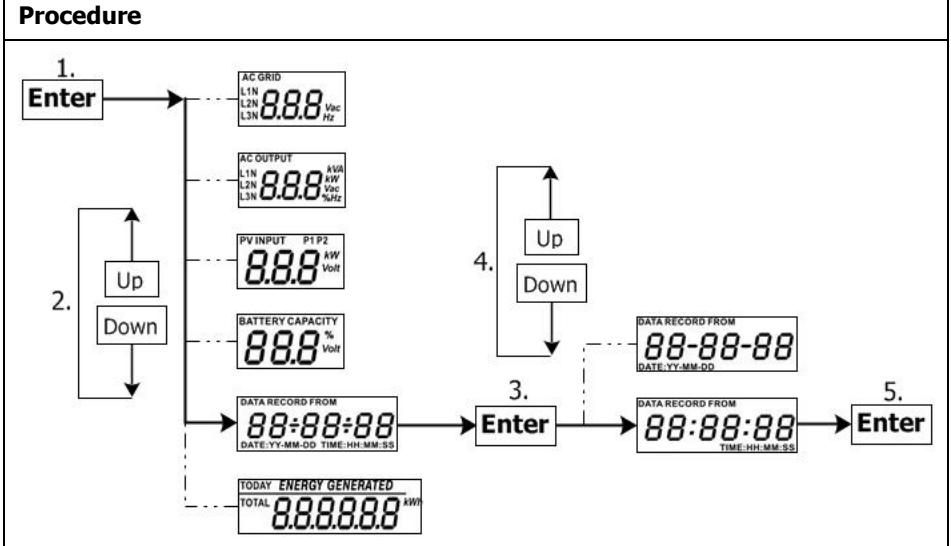
PV input voltage or power.



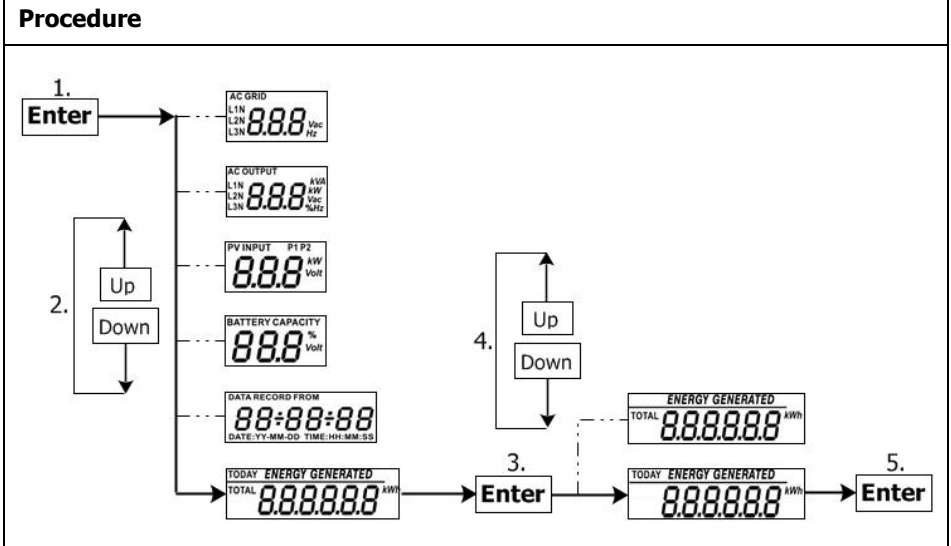
Battery voltage or percentage.



- **Date and time.**



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

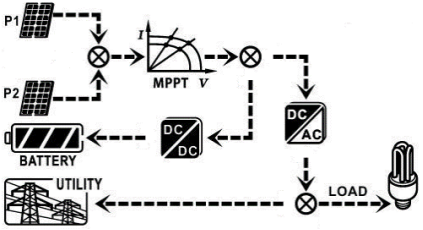
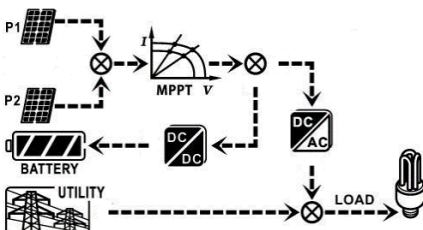
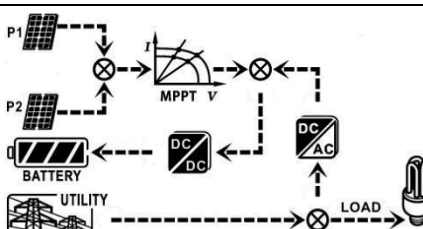
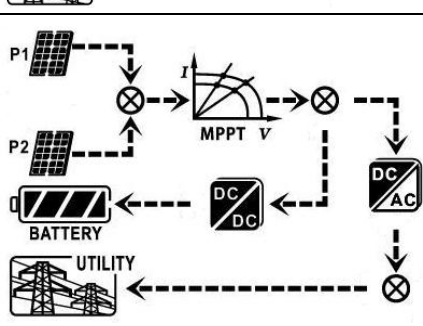


15-5. Operation Mode & Display

Below applies only to LCD display for **grid-tie with backup mode (I)**. For any other operational modes with LCD display, please check with installer.

Inverter mode with grid connected

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

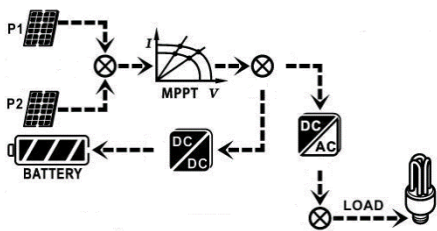
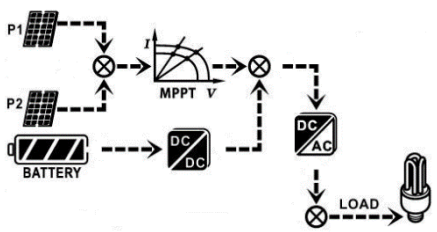
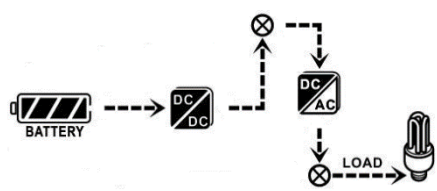
LCD Display	Description
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT V controller. The MPPT controller outputs DC power to a BATTERY. A DC/DC converter is connected between the battery and the MPPT controller. The MPPT controller also outputs DC power to a DC/AC converter. The DC/AC converter outputs AC power to a LOAD (light bulb). The DC/AC converter also outputs AC power to a UTILITY grid. The MPPT controller has a graph showing current (I) vs voltage (V) with a peak at the operating point.</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 V controller. The MPPT controller outputs DC power to a BATTERY. A DC/DC converter is connected between the battery and the MPPT controller. The MPPT controller also outputs DC power to a DC/AC converter. The DC/AC converter outputs AC power to a LOAD (light bulb). The DC/AC converter also outputs AC power to a UTILITY grid. The MPPT controller has a graph showing current (I) vs voltage (V) with a peak at the operating point.</p>	<p>PV power is sufficient to charge the battery first. Remaining PV power is insufficient to back up the load. As a result, excess PV power and the utility are feeding the load.</p>
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT V controller. The MPPT controller outputs DC power to a BATTERY. A DC/DC converter is connected between the battery and the MPPT controller. The MPPT controller also outputs DC power to a DC/AC converter. The DC/AC converter outputs AC power to a LOAD (light bulb). The DC/AC converter also outputs AC power to a UTILITY grid. The MPPT controller has a graph showing current (I) vs voltage (V) with a peak at the operating point.</p>	<p>PV power is generated, but is insufficient to charge battery. PV power and the utility are charging battery simultaneously. Utility is also feeding the load.</p>
 <p>The diagram shows two PV panels (P1, P2) connected to an MPPT V controller. The MPPT controller outputs DC power to a BATTERY. A DC/DC converter is connected between the battery and the MPPT controller. The MPPT controller also outputs DC power to a DC/AC converter. The DC/AC converter outputs AC power to a UTILITY grid. The DC/AC converter also outputs AC power to a LOAD (light bulb). The MPPT controller has a graph showing current (I) vs voltage (V) with a peak at the operating point.</p>	<p>This inverter is disabled to generate power to the loads. PV power is sufficient to charge battery. Excess PV power is fed back into grid.</p>

15. Operation

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

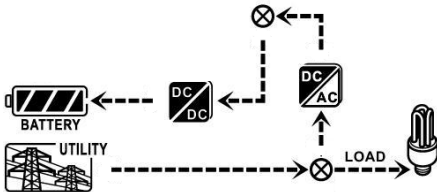

Inverter mode without grid connected

This inverter is operating in DC/INV mode and not connected to the grid.

LCD Display	Description
 <p>The diagram illustrates the inverter's operation when PV power is sufficient. Two PV panels (P1 and P2) provide power to a DC/DC converter. The Maximum Power Point Tracking (MPPT) graph shows a high current (I) and low voltage (V). The DC/DC converter feeds a DC/AC inverter, which then feeds the load. The battery is also connected to the DC/DC converter, indicating it is being charged.</p>	<p>PV power is sufficient to charge battery and feed the load.</p>
 <p>The diagram illustrates the inverter's operation when PV power is insufficient to support the load. Both PV panels and the battery provide power to the DC/DC converter. The MPPT graph shows a lower current (I) and higher voltage (V). The DC/DC converter feeds the DC/AC inverter, which then feeds the load.</p>	<p>PV power is generated, but insufficient to support load by itself. PV and battery are feeding the load simultaneously.</p>
 <p>The diagram illustrates the inverter's operation when only the battery is available to feed the load. The battery provides power to the DC/DC converter, which feeds the DC/AC inverter, which then feeds the load.</p>	<p>Battery only is available to feed load.</p>

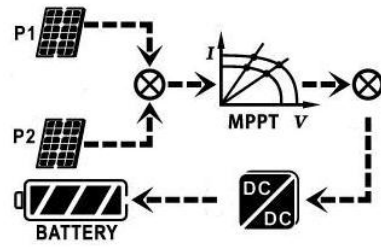
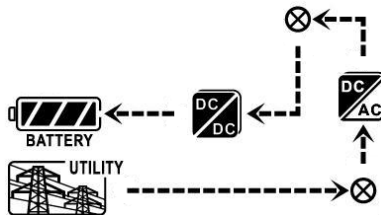

Bypass mode

The inverter is operating, excluding DC/INV mode and connected to the load.

LCD Display	Description
	<p>Only utility is charging battery and feeding the load.</p>
	<p>Only utility is available to feed the load.</p>

Standby mode :

The inverter is operating, excluding DC/INV mode and load disconnected.

LCD Display	Description
	<p>The AC output is disconnected even though it is enabled, as an error occurred on AC output. PV power is sufficient to charge battery.</p>
	<p>The inverter is blocked from feeding the load. PV power is not detected or available at this moment. Utility is available to charge battery.</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>

16. Charging Management

Charging Parameter	Default Value	Note
Charging current	60A	Software adjustable from 10Amp to 200Amp.
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><i>3 stages:</i></p> <p><i>First:</i> charge voltage increases to 56V; at max current</p> <p><i>Second:</i> charge voltage maintained at 56V until charge current is below 12 Amp;</p> <p><i>Third:</i> floating charge at 54V.</p>		

The inverter can be connected to: Sealed lead acid, vented, gel battery or lithium battery. Details for the installation and maintenance of the external battery pack are provided in the battery manufacturer's manual.

When using sealed lead acid batteries, set up the max charge current according to below formula:

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

When using a 300 Ah battery, the maximum charge current is $300 \times 0.2 = 60$ (A). Use at least 50Ah batteries because the minimum settable value of charge current is 10A. When using AGM/Gel or other battery types, contact your battery supplier for details.

Below is setting screen from software:

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: 10,000 W <input type="button" value="Apply"/>	
Max. grid-connected frequency: 51.5 Hz <input type="button" value="Apply"/>		
Min. PV input voltage: 300 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: 350 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"/>	Feeding grid power calibration: 0 W <input type="button" value="Apply"/>	
Start LCD screen-saver after: None Sec. <input type="button" value="Apply"/>	Max. battery discharge current in hybrid mode: 10 A <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"/>	Activate Li-Fe battery while commissioning: <input type="radio"/> Yes <input checked="" type="radio"/> No <input type="button" value="Apply"/>	
Mute alarm in battery 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"/>	
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 <input type="button" value="Apply"/>
<input checked="" type="radio"/> Any schedule change will affect the power generated and shall be conservatively made.		
System time: 2014-10-27 <input type="button" value="Apply"/>		
14:03:21 <input type="button" value="Apply"/>		
<input type="button" value="Close"/>		

17. Maintenance & Cleaning

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

- Ensure all connectors of the inverter are not corroded.
- Before cleaning the solar panels, be sure to turn off PV DC breakers.
- Clean the solar panels whenever they are dirty, during low sunshine hours.
- Periodically inspect the system to make sure that all cables and supports are securely fastened.

WARNING: There are no user-replaceable parts inside of the inverter. Do not attempt to service the unit yourself. **This will void warranty!**

Battery Maintenance

- Servicing of batteries should be performed or supervised by personnel knowledgeable about batteries with the required precautions.
- When replacing batteries, replace only with the same type and quantity of batteries or battery packs.
- The following precautions should be observed when working on batteries:
 - Remove watches, rings, or other conducting objects.
 - Use tools with insulated handles.
 - Wear rubber gloves and boots.
 - Do not put conducting tools / items on top of batteries.
 - Disconnect charging source prior to connecting or disconnecting battery terminals.
 - Determine if battery is inadvertently grounded. If inadvertently grounded, remove connection from ground. Contact with any part of a [grounded] battery can result in electrical shock. The likelihood of such shock can be reduced if ground connections are removed during installation and maintenance.

CAUTION: Batteries present a risk of electrical shock and can deliver extremely high short-circuit currents.

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.


















18. Trouble Shooting

If no information is displayed on the LCD, check if PV modules/battery/grid connections are correct.

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

18-1. Warning List

There are 17 conditions defined as warnings. When a warning occurs,  icon will flash and  will display the warning code. If there are multiple codes, they will be displayed in sequence. In case of problems, contact your installer.

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 high for extended time		Grid voltage is higher than 253V.
06	Ground Loss		Ground connection not detected.
07	Island detected		Island operation is detected.
08	Line waveform loss		The grid waveform is unsuitable for inverter.
09	Line phase loss		Bad phase rotation or a missing phase
10	EPO detected		EPO is open.
11	Overload		Load exceeds rated value.
12	Over temperature		The inside temperature is too high.
13	Battery voltage low		Battery discharged to low alarm point.
14	Battery under-voltage when grid is lost		Battery discharged to shutdown point.
15	Battery open		Battery disconnected or to low.
16	Battery under-voltage when grid is OK		Battery not charging while grid is OK.
17	Solar over voltage		PV voltage is too high.

18-2. Fault Reference Codes

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

Situation			Solution
Fault Code	Fault Event	Possible cause	
01	Bus over voltage	Surge	1. Restart the inverter. 2. If error message persists, contact installer.
02	BUS under voltage	PV or battery disconnected momentarily	1. Restart the inverter 2. If 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 error message persists, contact installer.
06	Over temperature	Internal temperature is too high.	1. Check the ambient temperature and fans. 2. If 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 power above limits if voltage is higher than 850V.	1. Check if solar input voltage exceeds 850V. 2. Contact installer.
11	Solar over current	Surge	1. Restart the inverter. 2. If error message persists, contact installer.

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

19. Specifications

MODEL	10kW
RATED POWER	10000 W
PV INPUT (DC)	
Maximum DC Power	14850 W
Nominal DC Voltage	720 VDC
Maximum DC Voltage	900 VDC
Operating DC Voltage Range	300 VDC to 900 VDC
Start-up Voltage / Initial Feeding Voltage	320 VDC / 350 VDC
MPP Voltage Range / Full Load MPP Voltage Range	350 VDC to 850 VDC / 400 VDC to 800 VDC
Maximum Input Current	2*18.6 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 (P-N) / 400 VAC (P-P)
Output Voltage Range	184 - 265 VAC per phase
Output Frequency Range	47.5 to 51.5 Hz or 59.3 to 60.5Hz
Nominal Output Current	14.5 A per phase
Inrush Current/Duration	17 A per phase / 20ms
Maximum Output Fault Current/Duration	51 A per phase / 1ms
Maximum Output Overcurrent Protection	51 A per phase
Power Factor Range	0.9 lead – 0.9 lag
AC INPUT	
AC Start-up Voltage	120-140 VAC per phase
Auto Restart Voltage	180 VAC per phase
Acceptable Input Voltage Range	170 - 280 VAC per phase
Nominal Frequency	50 Hz / 60 Hz
AC Input Power	10000VA/10000W
Maximum AC Input Current	40 A
Inrush Input Current	40 A / 1ms
BATTERY MODE OUTPUT (AC)	
Nominal Output Voltage	230 VAC (P-N) / 400 VAC (P-P)
Output Frequency	50 Hz / 60 Hz (auto sensing)
Output Waveform	Pure sine wave
Output Power	10000VA/10000W
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	275 A
Maximum Charging Current	200 A

GENERAL	
PHYSICAL	
Dimension, D X W X H (mm)	622 x 500 x 167.2
Net Weight (kgs)	45
INTERFACE	
Communication Port	RS-232/USB
Intelligent Slot	Optional SNMP, Modbus or AS-400 cards available
ENVIRONMENT	
Protective Class	I
Ingress Protection Rating	IP20
Humidity	0 to 90% RH (Non - condensing)
Operating Temperature	-10 to 55°C (Power derating above 50°C)
Altitude	Max. 2000m*

* Power derating is 1% per 100m over 1000m.

20. 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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