Hybrid Parity (Super) Inverter

INSTALLER MANUAL

3.6kW/5.5kW/8.8kW PLUS PARALLEL VERSION

SUNSYNK-8K-SG01LP1 SUNSYNK-5K-SG03LP1 SUNSYNK-8K-SG02LP1 SUNSYNK-7.6K-SG02LP1 SUNSYNK-6K-SG02LP1 SUNSYNK-5K-SG02LP1 SUNSYNK-3.6K-SG02LP1

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Version 3.0 (12/08/2020)

All these models fall into two cabinet / PCB types 5.5kW (Small) and 8.8kW (Large):
5kW Type:
SUNSYNK-5K-SG02LP1
SUNSYNK-3.6K-SG02LP1
SUNSYNK-6K-SG02LP1
SUNSYNK-5K-SG03LP1

8.8 kW Type
SUNSYNK-8K-SG01LP1
SUNSYNK-8K-SG02LP1
SUNSYNK-7.6K-SG02LP1

3.6kW / 5.5kW 8.8kW

Index

1. SAFETY

⚠ CAUTION

WARNING !!! HIGH LIFE RISK DUE TO FIRE OR ELECTROCUTION.

The Sunsynk Parity Hybrid Inverter can only be installed by a qualified licensed electrical contractor. This is not a DIY product.

- Be sure to read this manual thoroughly before installation.
  Do not attempt to install the inverter by yourself. Installation work must be performed following national wiring standards by authorized personnel only. Do not turn on the power until all installation work is complete.

- Always use an individual power supply line protected by a circuit breaker and operating on all wires with a distance between contacts of at least 3mm for this unit.

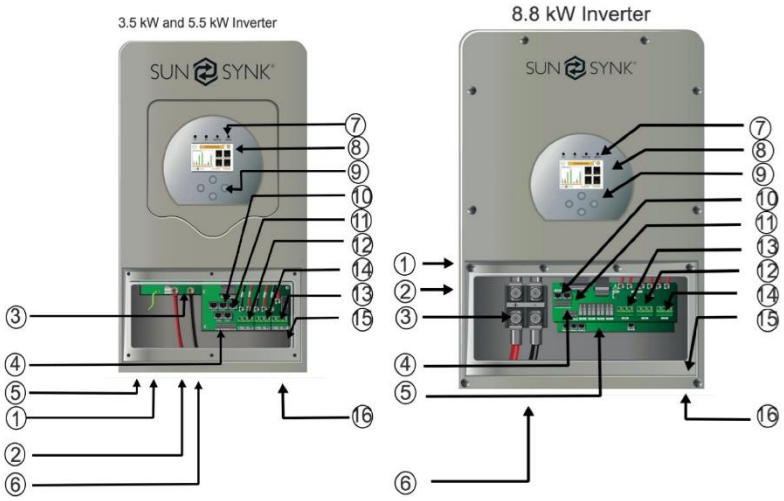
- The unit must be correctly grounded and the supply line must be equipped with a suitable breaker and RCD to protect people.

- The unit is not explosion-proof, so it should not be installed in an explosive atmosphere.

- Never touch electrical components immediately after the power supply has been turned off since the system can still have residual energy, so electric shock may occur. Therefore, after turning off the power, always wait 5 minutes before touching electrical components.

- This unit contains no user-serviceable parts. Always consult an authorized contractor for repairs.

1.1. System Overview



1. PV isolator
2. Power ON/OFF
3. Battery input connectors
4. I/O Ports
5. MPPT 1 and MPPT 2 inputs
6. Battery cable compression gland
7. Inverter LED indicators
8. LCD display
9. Function buttons
10. RS485 port
11. CAN bus port
12. Generator / Aux IN/OUT
13. On-grid inverter
14. Load off-grid inverter
15. Ground connection
16. Data logger

The Sunsynk Hybrid Parity Inverter is a highly efficient power management tool that allows the user to hit those 'parity' targets by managing power flow from multiple sources such as solar, main electrical grids, and generator, and then effectively storing and releasing electric power as the utilities require.

INTERACTIVE

- Easy and simple to understand display
- Supporting Wi-Fi or GSM monitoring
- Visual power flow screen
- Built-in 2 strings of MPP trackers
- Smart settable 3-stage MPPT charging for optimized battery performance
- Auxiliary load function
- Parallel / multi invert function grid-tied and off-grid

COMPATIBLE

- Compatible with main electrical grid voltages or power generators
- Compatible with wind turbines
- 220V single phase, pure sinewave inverter
- Self-consumption and feed-in to the grid
- Auto restart while AC is recovering
- Auto earth bond feature (Via a relay)

CONFIGURABLE

- Fully programmable controller
- Programmable supply priority for battery or grid
- Programmable multiple operation modes: on-grid/off-grid & UPS
- Configurable battery charging - current/voltage based on applications by LCD setting

- Configurable AC / solar / generator charger priority by LCD setting

SECURE

- Overload/over-temperature/short-circuit protection
- Smart battery charger design for optimized battery protection
- Limiting function installed to prevent excess power overflow to grid

APPLICATIONS

- Marine (vessel power management)
- Power shedding (home/office/factory)
- UPS (fuel-saving systems)
- Remote locations with solar and wind generators
- Building sites
- Military locations
- Telecommunication

2. TECHNICAL SPECIFICATION

■ **SUNSYNK-3.6K-SG02LP1 and SUNSYNK-5K-SG03LP1**

Model	**SUNSYNK-3.6K-SG02LP1**	**SUNSYNK-5K-SG03LP1**
Battery Input Data		
Battery Type	Lead-acid or Lithium-ion	
Battery Voltage Range (V)	40~60V	
Max. Charging Current (A)	90A	120A
Max. Discharging Current (A)	90A	120A
Charging Curve	3 Stages/Equalisation	
External Temperature Sensor	Optional	
Charging Strategy for Li-Ion Battery	Self-Adaptation to BMS	
PV String Input Data		
Max. DC Input Power (W)	4680W	6500W
PV Input Voltage (V)	370V (100V~500V)	
MPPT Range (V)	125~425V	
Full Load DC Voltage Range (V)	240~425V	
Start-up Voltage (V)	150V	
PV Input Current (A)	11A+11A	
No. of MPPT Trackers	2	
No. of Strings Per MPPT Tracker	1+1	
AC Output Data		
Rated AC Output and UPS Power (W)	3600W	5000W
Max. AC Power (W)	3960W	5500W
Peak Power (off-grid)	2 times of rated power, 10 S	
AC Output Rated Current (A)	15.7A	21.7A
Max AC Output Current (A)	18A	25A
Max Continuous AC Passthrough (A)	35A	
Power Factor	0.8 leading to 0.8 lagging	
Output Frequency and Voltage	50/60Hz; 220/230/240Vac (single phase)	
Grid Type	Single Phase	
Current Harmonic Distortion	THD<3%(Linear load<1.5%)	
Efficiency		
Max. Efficiency	97.60%	
MPPT Efficiency	96.50%	
Euro Efficiency	99.90%	
Protection		
PV Input Lightning Protection	Integrated	
Anti-islanding Protection	Integrated	
PV String Input Reverse Polarity Protection	Integrated	
Insulation Resistor Detection	Integrated	
Residual Current Monitoring Unit	Integrated	
Output Over Current Protection	Integrated	
Output Shorted Protection	Integrated	
Output Over Voltage Protection	Integrated	
Certifications and Standards		
Grid Regulation	VDE 0126, AS4777, NRS2017, G98, G99, IEC61683, IEC62116, IEC61727, RD1699:2011, XP C15-712-3:2019-05	
Safety Regulation	IEC62109-1, IEC62109-2	
EMC	EN61000-6-1, EN61000-6-3	
General Data		
Operating Temperature Range (℃)	-25~60°C, >45°C Derating	
Cooling	Fan	
Noise (dB)	<30	

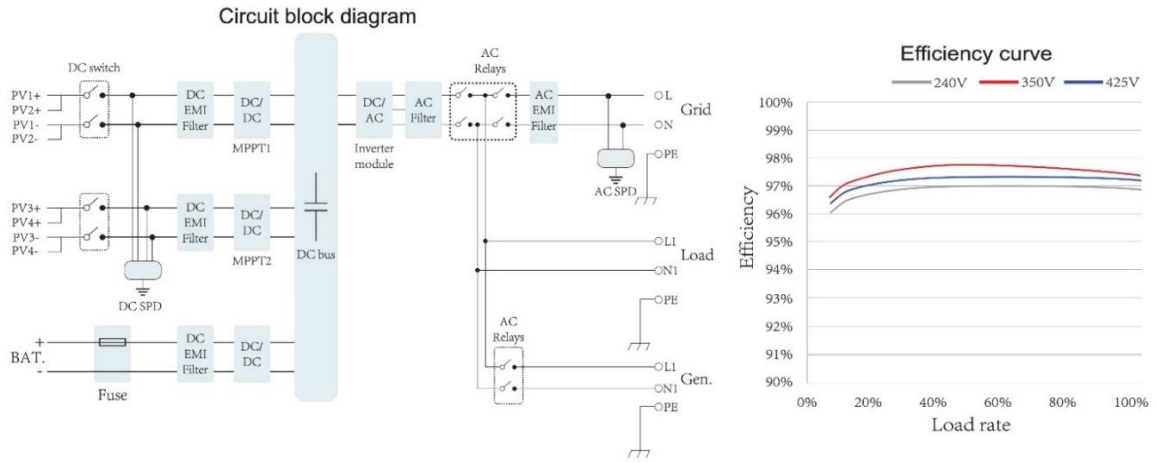
Communication with BMS	RS485; CAN
Weight (kg)	20.5
Size (Length x Width x Height)	580 x 330 x 208 mm
Protection Degree	IP65
Installation Style	Wall-mounted
Warranty	5 years

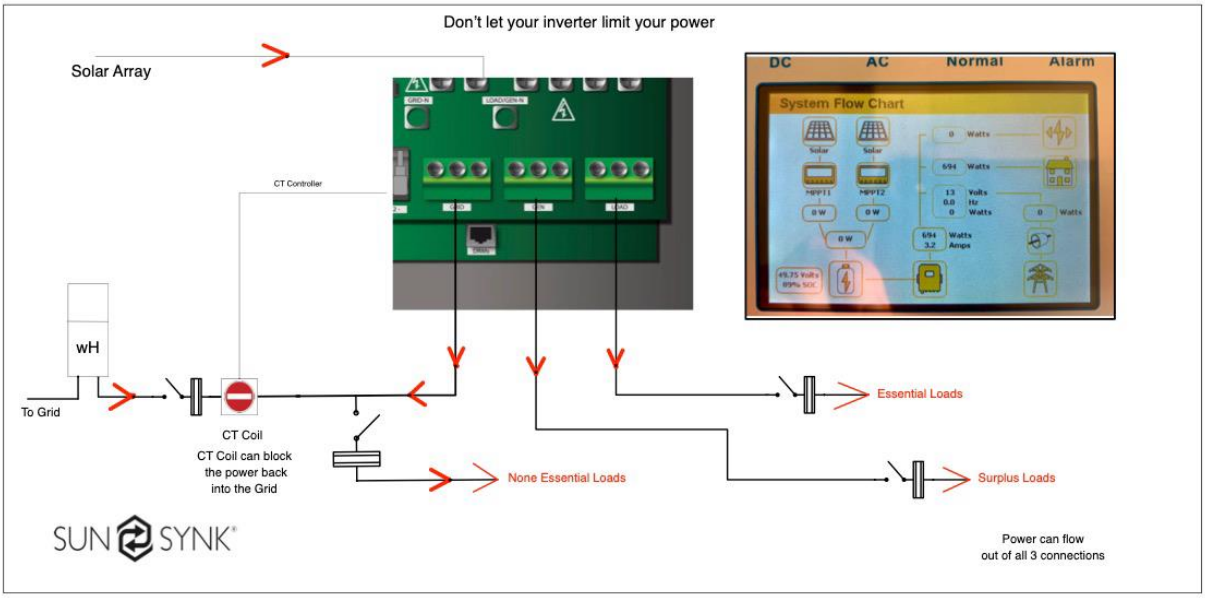
■ **SUNSYNK-5K-SG02LP1, SUNSYNK-6K-SG02LP1, SUNSYNK-7.6K-SG02LP1, SUNSYNK-8K-SG01LP1, and SUNSYNK-8K-SG02LP1**

Model	**SUNSYNK-5K-SG02LP1**	**SUNSYNK-6K-SG02LP1**	**SUNSYNK-7.6K-SG02LP1**	**SUNSYNK-8K-SG01LP1/ SUNSYNK-8K-SG02LP1**
Battery Input Data				
Battery Type	Lead-acid or Lithium-ion			
Battery Voltage Range (V)	40~60V			
Max. Charging Current (A)	120A	135A	190A	190A
Max. Discharging Current (A)	120A	135A	190A	190A
Charging Curve	3 Stages/Equalisation			
External Temperature Sensor	Optional			
Charging Strategy for Li-Ion Battery	Self-Adaptation to BMS			
PV String Input Data				
Max. DC Input Power (W)	6500W	7800W	9880W	10400W
PV Input Voltage (V)	370V (100V~500V)			
MPPT Range (V)	125~425V			
Start-up Voltage (V)	150V			
PV Input Current (A)	11A+11A	18A+9A	22A+22A	22A+22A
No. of MPPT Trackers	2			
No. of Strings Per MPPT Tracker	1+1	2+1	2+2	2+2
AC Output Data				
Rated AC Output and UPS Power (W)	5000W	6000W	7600W	8000W
Max. AC Power (W)	5500W	6600W	8360W	8800W
Peak Power (off-grid)	2 times of rated power, 10 S			
AC Output Rated Current (A)	20.8A	25A	31.7A/33A	33.4A/35A
Max AC Output Current (A)	24A	28.8A	36.4A/38A	38.3A/40A
Max Continuous AC Passthrough (A)	48A	80A	90A	90A
Output Frequency and Voltage	50/60Hz; 120/240Vac(split phase), 208Vac(2/3), 230Vac(single phase)			
Grid Type	Split phase, 2/3 phase, Single phase			
Current Harmonic Distortion	THD<3%(Linear load<1.5%)			
Efficiency				
Max. Efficiency	97.60%			
MPPT Efficiency	96.50%			
Euro Efficiency	99.90%			
Protection				
PV Arc Fault Detection	Integrated (Except European Type)			
PV Input Lightning Protection	Integrated			
Anti-islanding Protection	Integrated			
PV String Input Reverse Polarity Protection	Integrated			
Insulation Resistor Detection	Integrated			
Residual Current Monitoring Unit	Integrated			
Output Over Current Protection	Integrated			
Output Shorted Protection	Integrated			
Output Over Voltage Protection	Integrated			

Certifications and Standards	
Grid Regulation	UL1741, IEEE1547, RULE21, VDE0126, AS4777, NRS2017, G98,G99, IEC61683, IEC62116, IEC61727
Safety Regulation	IEC62109-1, IEC62109-2
EMC	EN61000-6-1, EN61000-6-3, FCC 15 Class B
General Data	
Operating Temperature Range (℃)	-25~60°C, >45°C Derating
Cooling	Fan
Noise (dB)	<30
Communication with BMS	RS485; CAN
Weight (kg)	32
Size (Length x Width x Height)	670 x 420 x 233 mm
Protection Degree	IP65
Installation Style	Wall-mounted
Warranty	5 years

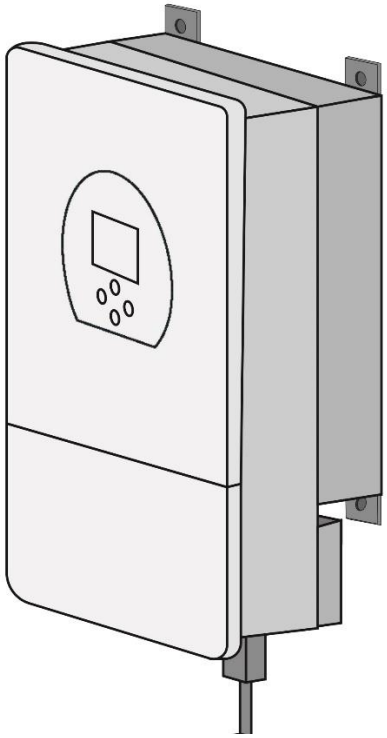
2.1. System Diagram





3. INSTALLATION

3.1. Selecting the Mounting Area



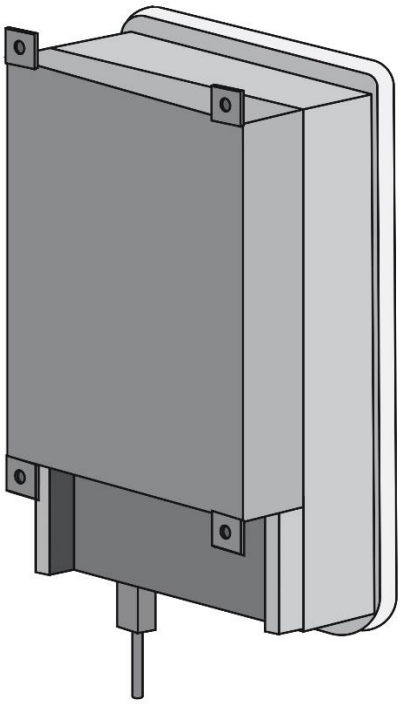
DO NOT install the inverter in the following areas:

- Areas with high salt content, such as the marine environment. It will deteriorate metal parts, causing the parts to fail or the unit to leak water.
- Areas filled with mineral oil or containing a large amount of splashed oil or steam, such as a kitchen. It will deteriorate plastic parts, causing the parts to fail or the unit to leak water.
- Areas that generates substances that adversely affect the equipment, such as sulfuric gas, chlorine gas, acid, or alkali. It will cause the copper pipes and brazed joints to corrode, which can cause refrigerant leakage.
- Areas that can cause combustible gas to leak, which contains suspended carbon-fiber or flammable dust, or volatile inflammable such as paint thinner or gasoline.
- Areas where there may be gas leaks and settles around the unit. It can cause fires.
- Areas where animals may urinate on the unit or ammonia may be generated.
- High altitude areas above 4000 meters above sea level.
- Environments where precipitation or humidity are above 95%
- Areas where the air circulation is too low.

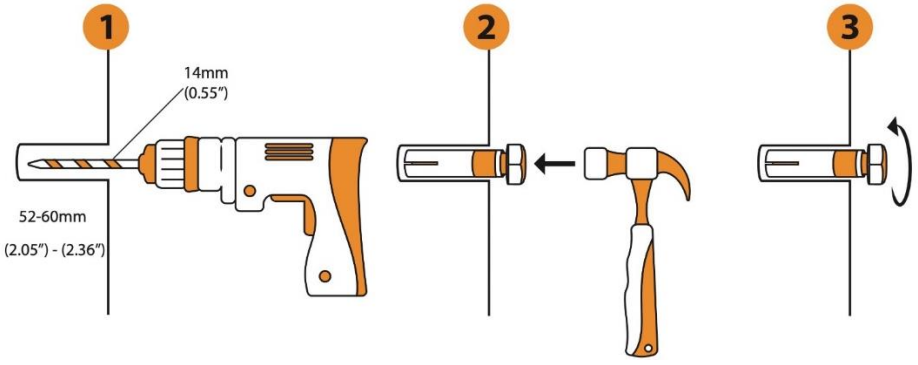
ALSO CONSIDER:

- Install the indoor unit, outdoor unit, power supply cable, transmission cable, and remote control cable at least 1m away from a television or radio receivers. This will prevent TV reception interference or radio noise. Even if they are installed more than 1m apart, it is still possible to receive noise under some signal conditions.
- If children under 10 years old may approach the unit, take preventive measures so that they cannot reach and touch the unit.
- Install the indoor unit on the wall where the height from the floors is higher than 1600mm.

3.2. Mounting the Inverter



- Select installation locations that adequate to support the weight of the converter.
- Install this inverter at eye-level to allow the LCD to be read anytime.
- An appropriate ambient temperature is between -25 ~ 60°C to ensure optimal operation.
- Be sure to keep other objects and surfaces as shown in the figure to guarantee sufficient heat dissipation and have enough space to remove wires.
- For proper air circulation to dissipate heat, allow a clearance of approximately 50cm to the side.



⚠ CAUTION

Risk of injury when lifting and from falling inverter

Remember that this inverter is heavy (See section 2 “Technical Data”)! Please be careful when removing the inverter from the packaging and mounting it onto the wall.

3.3. Battery Connection

- **Battery connection of the 3.6kW/5.5kW model**

- **Battery connection of the 8kW model**

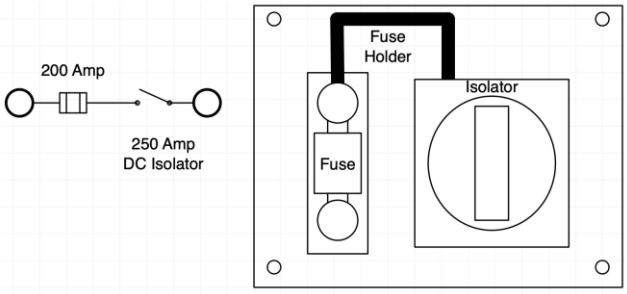
For safe operation and compliance, an individual DC overcurrent protector or disconnection device is required for the connection of the battery and the inverter. It is recommended to utilize a suitable fuse and DC isolator (see next page). In some applications, switching devices may not be required but overcurrent protectors are still required.

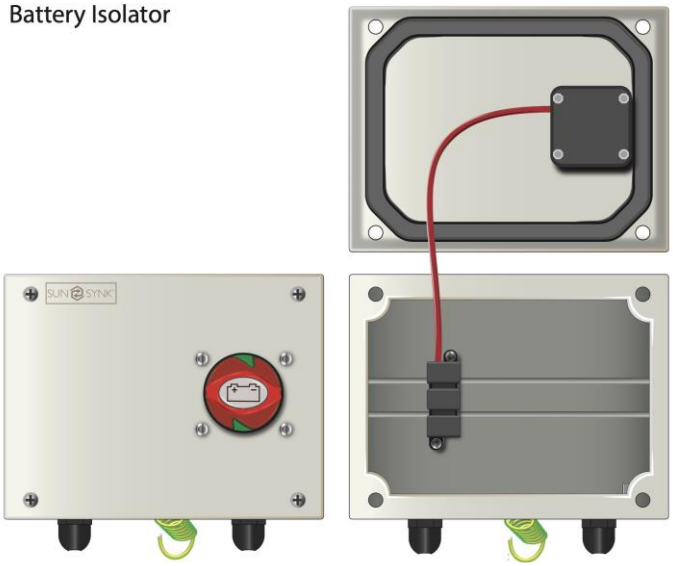
A minimum battery cable size of 35mm diameter and 50mm diameter is recommended for the 5.5 kW and 8.8kW inverter, respectively.

⚠ CAUTION

Before making the final DC connection or closing the DC breaker/disconnection device, ensure that the inverter is wired properly. Reverse polarity connection on the battery will damage the inverter.

- **Recommended DC Surge Protector:**





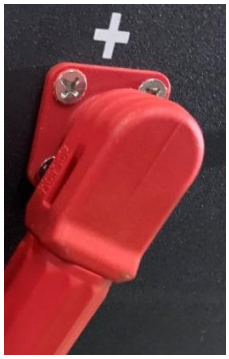
3.3.1 Connecting a Lithium Battery

When connecting a Lithium battery, follow the connection steps bellow and then check section 4.13 “Setting Up a Lithium Battery” for setting it up in the inverter:

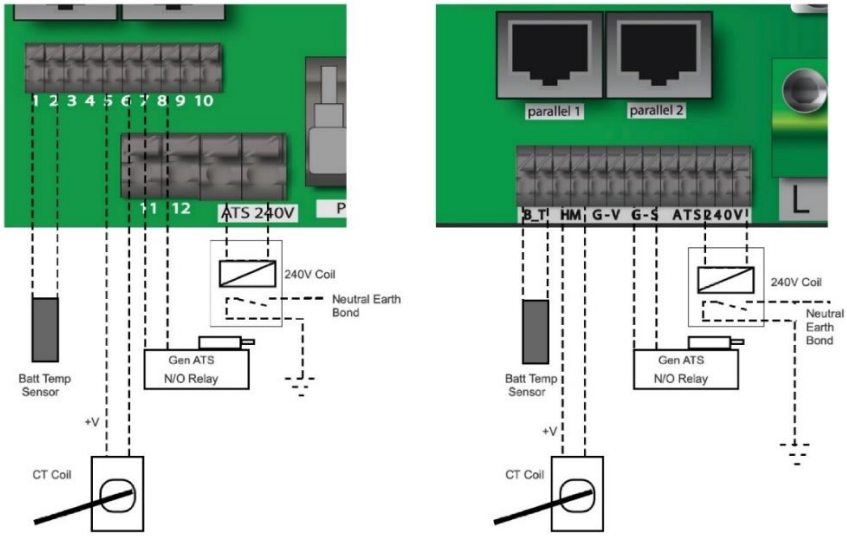
1. Connect a properly power cable following the battery manufacturer specification and recommend safety devices.

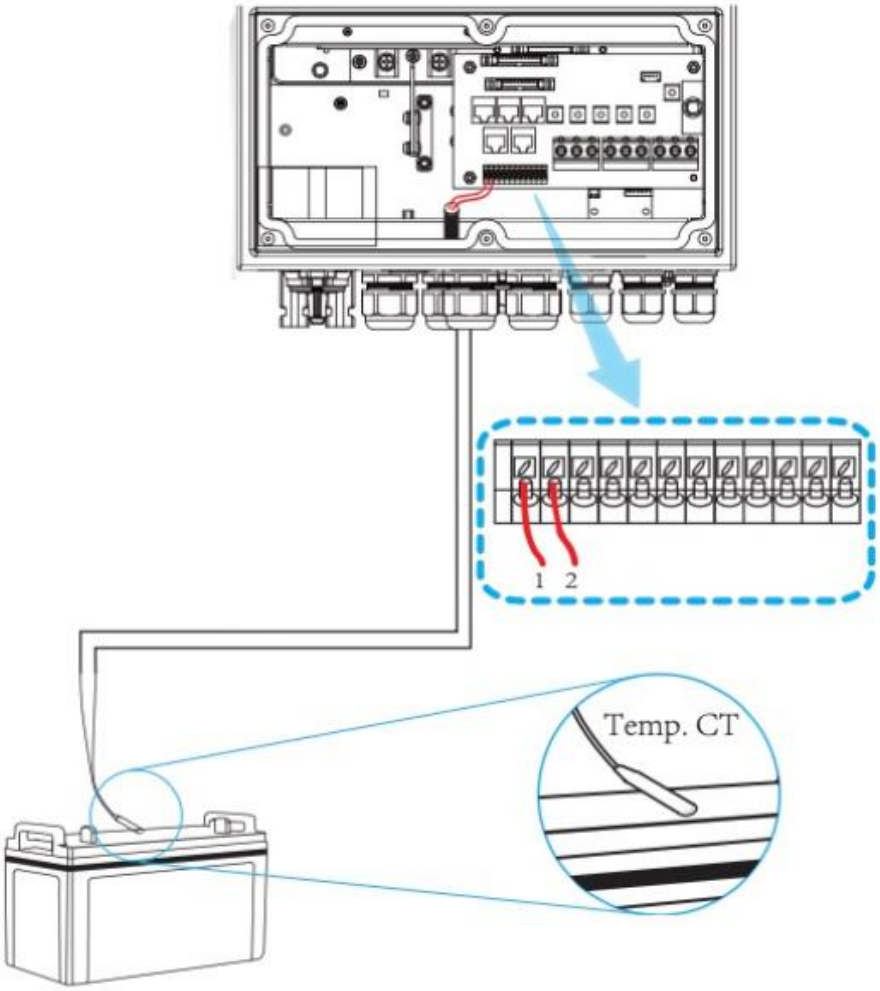
2. Connect communication cable properly following the battery manufacturer specification.

3. Connect to the inverter correctly.



3.3.2. Battery Temperature Connection





Without a remote temperature sensor, lead-acid batteries may undercharge or overcharge depending on the ambient temperature of the installation environment. This may result in a fire hazard.

3.4. Connecting the AC

⚠ CAUTION

All wiring and cable sizing must be following the country wiring regulations and code of practices.

Ensure that suitable disconnection devices and RCDs are fitted.

NOTES

- Depending on the battery type, the inverter should be capable of controlling the batteries BMS. Therefore, you need to set the protocol of the BMS on both the battery and the inverter.
- WHEN USING MORE THAN ONE BATTERY, THE FIRST BATTERY WILL BE THE MASTER, AND THE OTHER BATTERIES WILL BE THE SLAVES. PLEASE, CHECK THE BATTERY MANUFACTURER SPECIFICATION FOR PROPER OPERATION.
- To verify if the battery is actually communicating access the Li BMS menu as detailed in section 4.13 “Setting Up a Lithium Battery” and check whether the values are realistic or not. It is important that the charge and discharge limits in that page match the numbers expected for the number of batteries physically connected.

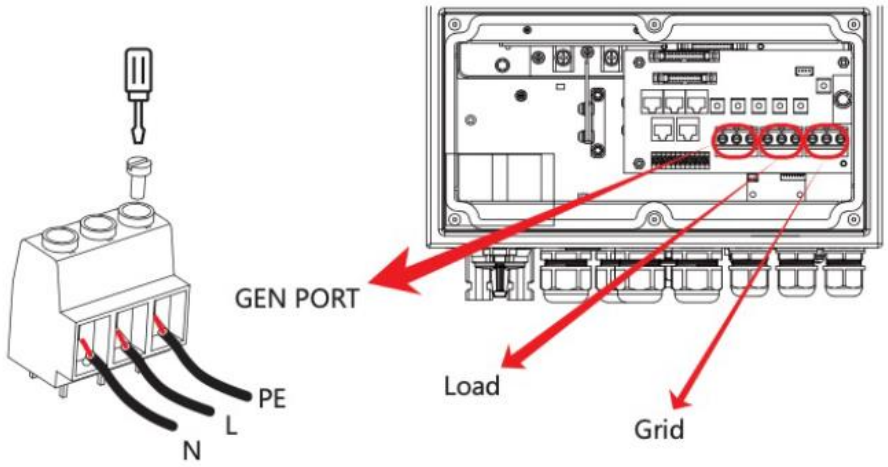
- **Bottom view of the 3.6kW/5.5kW model**

- **Bottom view of the 8kW model**

GEN/AUX	**Connection for a generator**
GRID	**This works like a conventional grid-tied inverter. It is both an in and out connection for non-essential load and supply**
LOAD	**Connection of essential loads such as lighting, security systems, and internet**

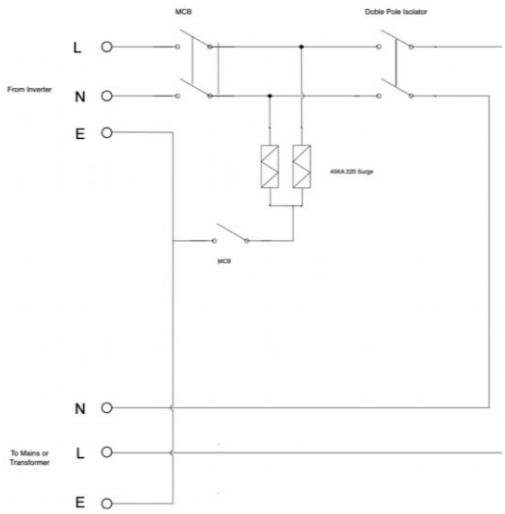
Please follow below steps to make the AC input/output connection:

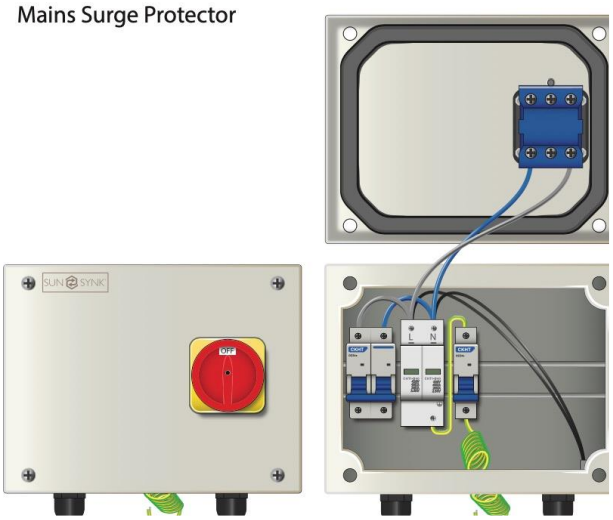
1. Before making AC input/output connections, be sure to open DC protector or disconnector first.
2. Remove insulation sleeve 10mm length, unscrew the bolts, insert the AC input wires according to polarities indicated on the terminal block and tighten the terminal screws.
3. Ensure that the connection was made properly.



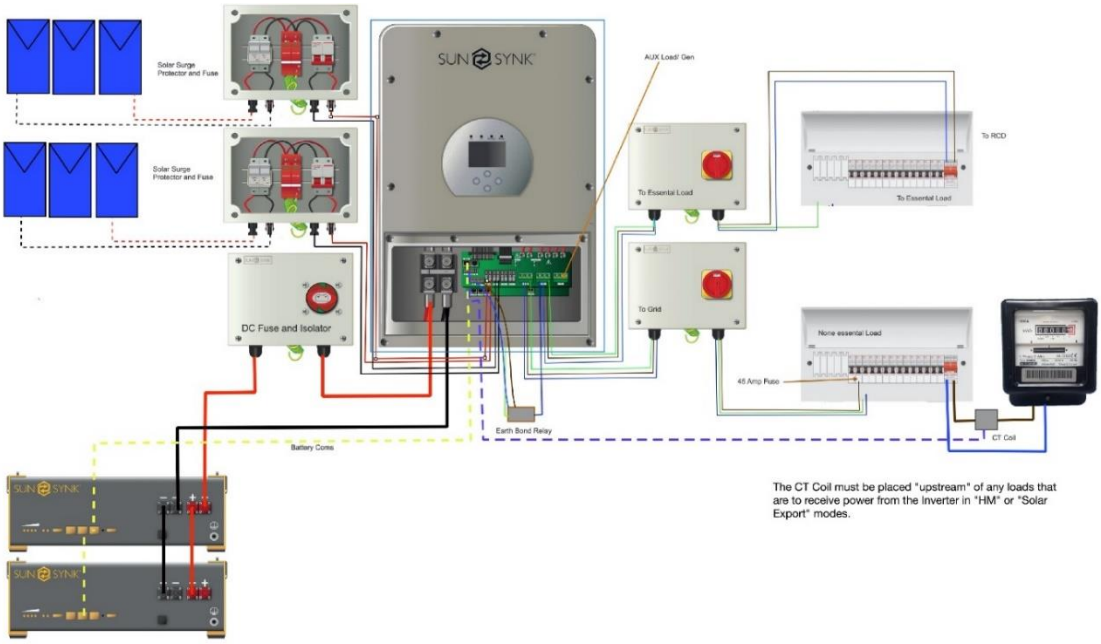
Check that AC power source is isolated before attempting to wire it to the inverter Insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals and ensure the wires are securely connected.

■ **Recommended AC Surge Protector**





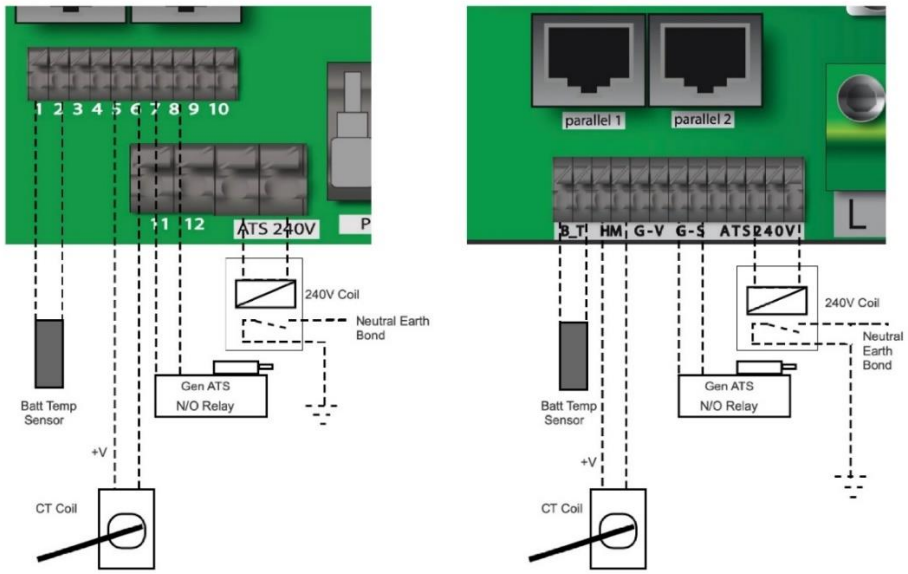
Please ensure you use suitable protection devices. Switchgear and fuses must be following the local wiring standards. A figure of the complete system is presented bellow.



3.4.1. Installing the CT Coil

The CT coil is one of the most important parts of the Sunsynk Parity inverter. This device reduces the power of the inverter to prevent feeding power to the grid. This feature is also known as "Zero Export".

- Fit the coil (sensor) around the live cable on the main fuse feeding the building and run the cable back to the inverter. This cable can be extended up to an extra 10m using a similar cable.
- Connect the other end of the CT coil into the inverter terminals marked as CT coil



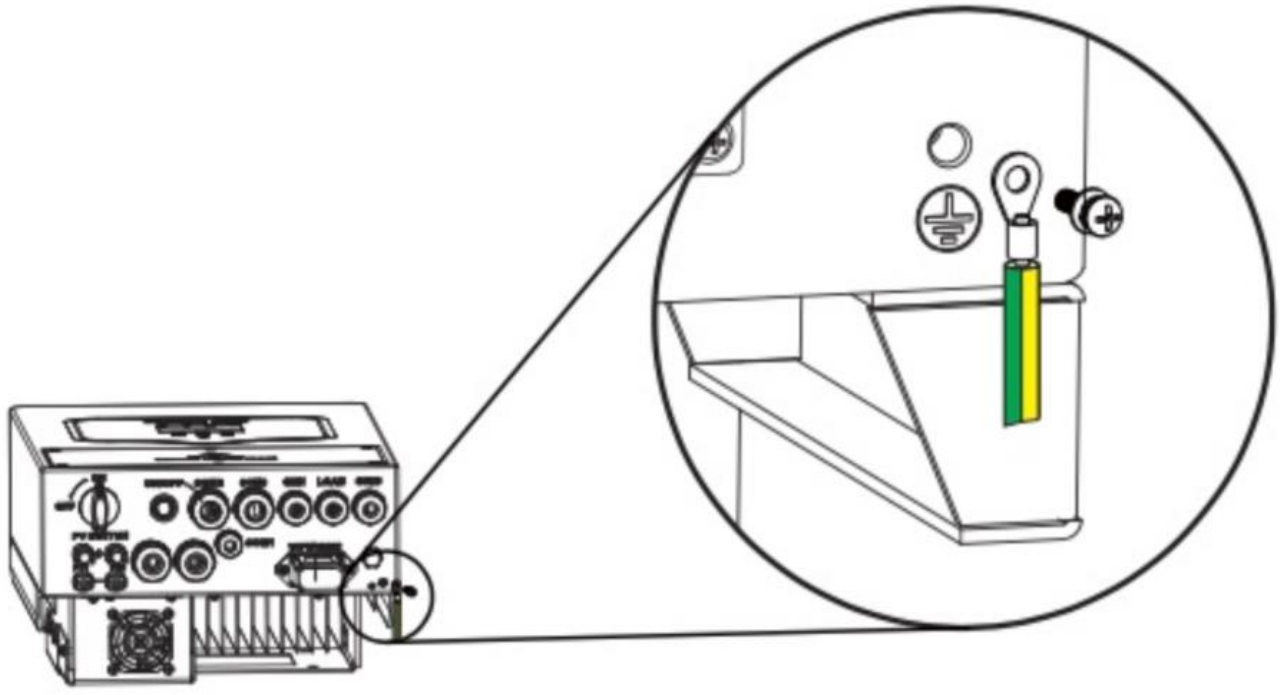
0 Watts 0.00 V 0.00 Amps 0.0 C	0 watts 0 Hz 0 Volts 0.0 Amps CT:0Watts LD: 0Watts	0 Watts 0.00 Volts 0.0 Amps
Battery	Grid Power	Solar Power 1
0 watts 0 Hz 0 Volts 0.0 Amps DC:100.0 C AC:100.0 C	0 Watts 0.00 Volts 0.0 Amps	0 Watts 0.00 Volts 0.0 Amps
Inverter Power	Load Power	Solar Power 2

IMPORTANT

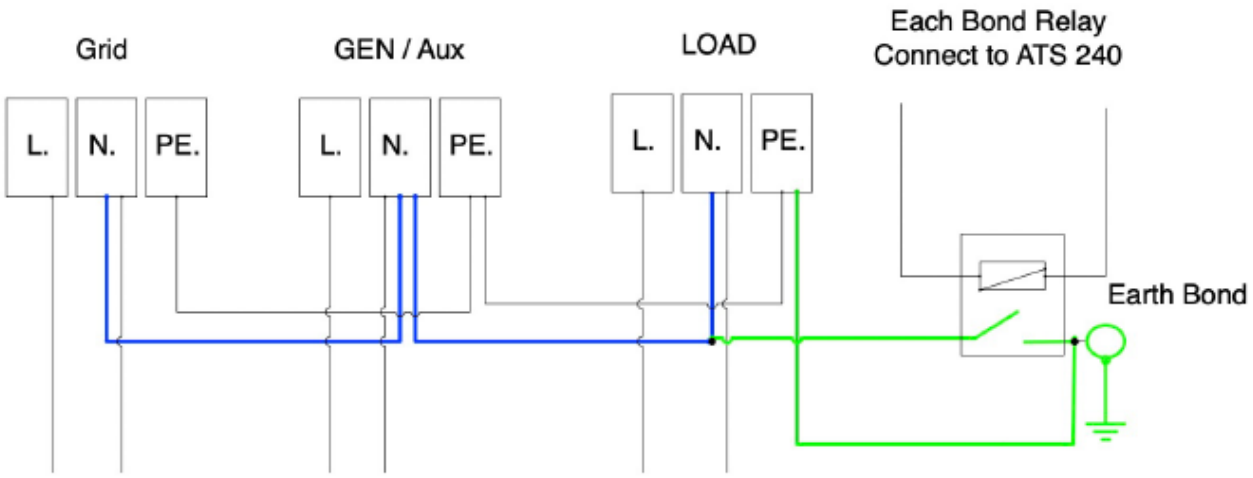
If the CT coil is fitted in the wrong way then this variable will have negative instead of positive values when the power is flowing into the house/inverter. Also, the inverter export limiting function will not work properly.

3.4.2 Earth Connection (mandatory)

Ground cable shall be connected to ground plate on grid side this prevents electric shock. if the original protective conductor fails.

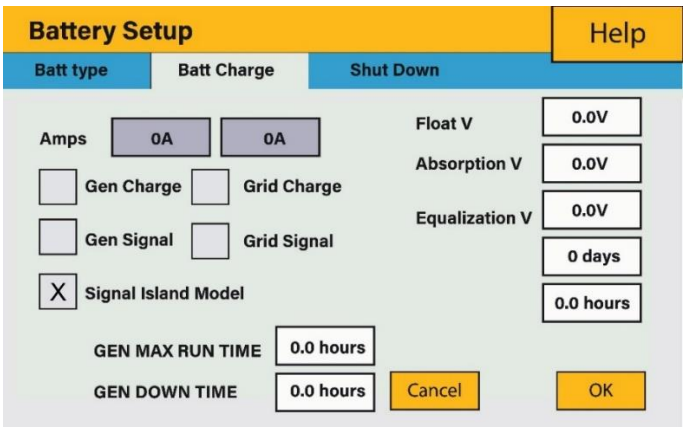


All neutrals can be linked together to maintain the neutral bond. When Neural Earth bond is required for off-grid, then it has to be removed on grid-tied operation.



If an earth bond is required between neutral and earth and your system is a hybrid system then you can have a permanent earth wire since this can cause faults with an RCD before the inverter.

Since the inverter is a true hybrid then the bond must only be made when the inverter is operating in Islanding Mode. To accommodate this, Sunsynk provides an AC output, which is connected to the A/T/S connections whenever the inverter is running on Island Mode. Therefore, you can simply connect the coil of an AC relay to the ATS 240 connections. Next, you need to select Signal Island Mode on the battery charge menu (click on the gear icon -> battery icon), as shown in the figure below.



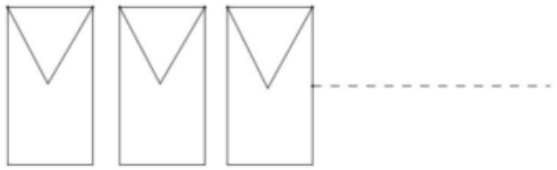
NOTE

The grid may still be present, but the inverter is not draining power from it since the unit is working in Island Mode.

You can verify if there is a voltage when the inverter is disconnected from the grid by using a simple multimeter.

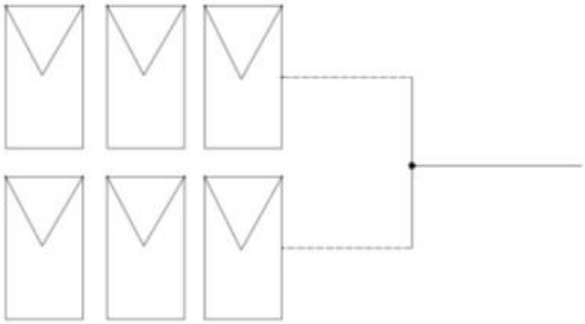
3.5. Connecting the PV

The 3.6kW and 5.5kW models have only one MPPT controller with a maximum input current of 9Amp.



Single String

The 8.8kW inverter has two built-in MPPT controllers, MPPT 1 and MPPT 2. Therefore, two individual arrays can be connected to each MPPT for better performance. The maximum current of the array connected to each MPPT is 18Amp.

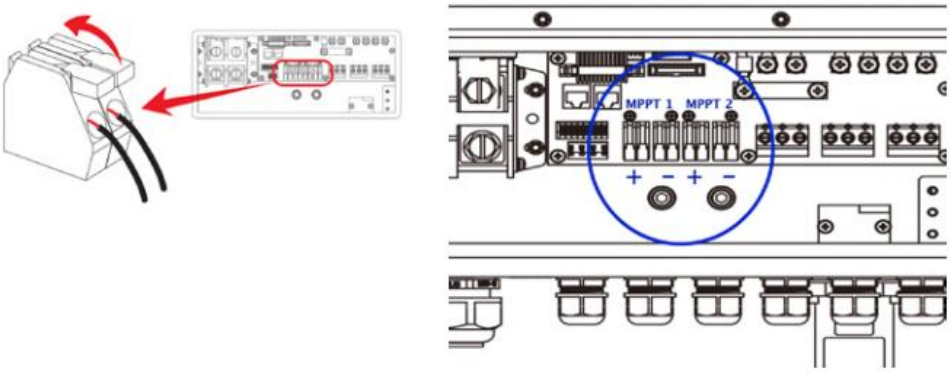


Two Strings in
Parallel per MPPT

- Before connecting to PV modules, install a separate DC circuit breaker between the inverter and PV modules.

- To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. Open-circuit voltage (Voc) of PV modules does not exceed max. PV array open-circuit voltage open-circuit voltage (Voc) of PV modules should be higher than min. start voltage.

8.8 kW PV Connection

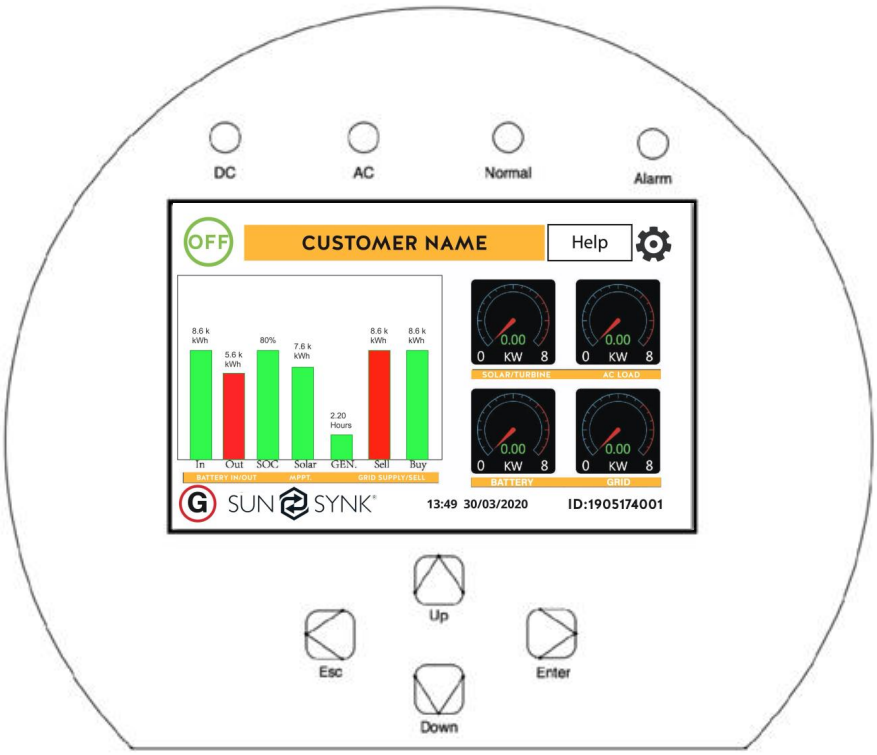


5.5 KW PV panels are connected via the MC4 connectors located at the bottom of the inverter

- Before connecting to PV modules, install a separate DC circuit breaker between the inverter and PV modules.
- To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. Open-circuit voltage (Voc) of PV modules does not exceed max. PV array open-circuit voltage open-circuit voltage (Voc) of PV modules should be higher than min. start voltage.

4. OPERATION

4.1. Display



LED indicator		Meaning
DC	Green LED solid light	PV connection normal
AC	Green LED solid light	Grid connection normal
Normal	Green LED solid light	Inverter functioning normally
Alarm	Red LED solid light	Fault

Function Key	Description
Esc	To exit the previous mode
Up	Increase the value of a setting
Down	Decrease the value of a setting
Enter	Confirm setting change (If not pressed each time the setting will not be saved)

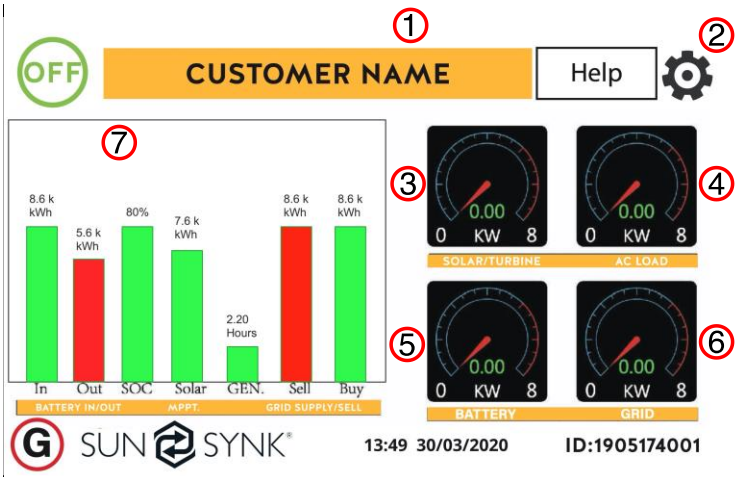
4.2. Switching ON/OFF

Once the inverter has been properly installed and the batteries are connected, press the on/off button (located on the left side of the case) to turn-on the system.

When the system is connected without a battery but connected with either PV or grid and the on/off button is switched off, the LCD will still light up (display will show off). In this condition, when switching on the on/off button and selecting no battery, the system can still work.

4.3. Home Page

Press Esc button any page to access the home page:



1. Customer name
2. Access settings menu page
3. Access solar history
4. Access system status page
5. Access system status page
6. Access grid history
7. Access system flow page

Daily readings **Real time readings**

What this page displays:

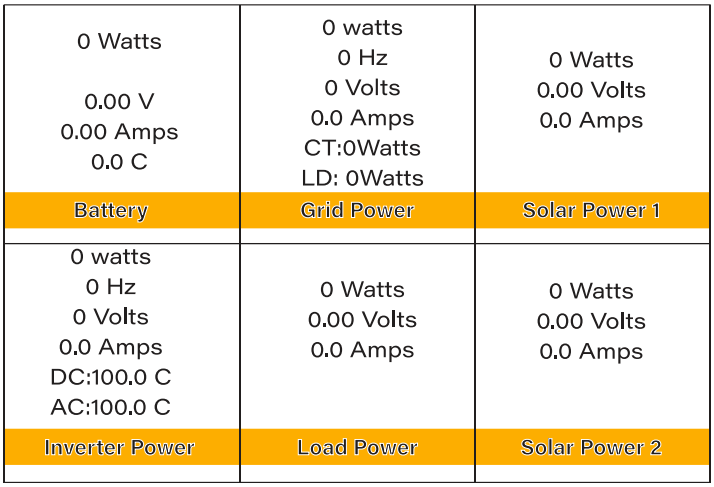
- Total daily power into the battery (kWh).
- Total daily power out of the battery (kWh).
- SOC (State of charge of the battery) (%).
- Total daily solar power produced in (kWh).
- Total hourly usage of the generator (Time).
- Total daily power sold to the grid (kWh).
- Total daily power bought from the grid (kWh).
- Real-time solar power in (kW).
- Real-time load power in (kW).
- Real-time battery charge power in (kW).
- Real-time grid power in (kW).
- Serial number.
- Time date.
- Fault condition.
- Access stats pages.
- Access status page.
- Access fault diagnostic page.

4.4. Status Page

To access the Status page, click on the “Battery” or “AC Load” dial on the Home page.

What this page displays:

- Total solar power produced.
- MPPT 1 power/voltage/current.
- MPPT 2 power/voltage/current.
- Grid power.
- Grid frequency.
- Grid voltage.
- Grid current.
- Inverter power.
- Inverter frequency.
- Inverter voltage.
- Inverter current.
- Load power.
- Load voltage.
- Battery power charge/discharge.
- Battery SOC.
- Battery voltage.
- Battery current.
- Battery temperature.



Solar Column: Shows total PV power at the top and then details of each of the two MPPT’s below L1 & L2 voltage.

Grid Column: Shows grid total power, frequency, voltage, and current. When selling to grid the power is negative. When receiving from the grid the power is positive. If the sign of the grid and HM powers are not the same when the PV is disconnected and the inverter is only taking energy from the grid and using the HM CT connected to Limit-2 then please reverse the polarity of the HM current sensor. **Important**: See section on CT coil.

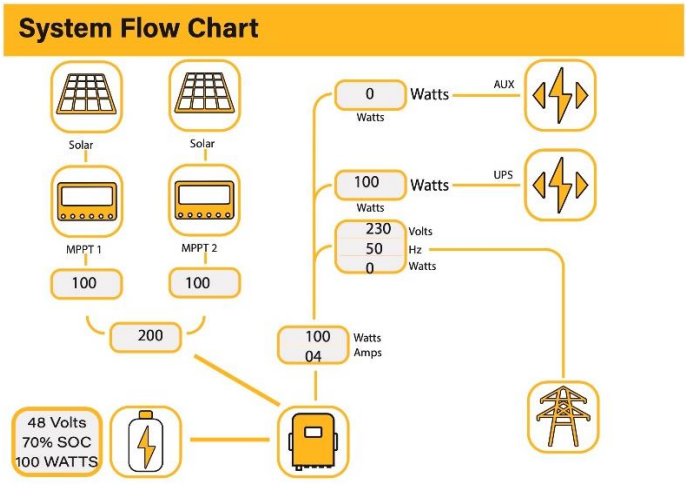
Inverter Column: Showing inverter total power, frequency, L1, L2, voltage, current, and power.

Load Column: Showing total load power, load voltage, and power on L1 and L2.

Battery Column: Showing total power from the battery, battery SOC, battery voltage, battery current (negative means charge, positive means discharge) battery temperature (shows zero if the battery temperature sensor is not connected). DC transformer temperature and AC heatsink temperature (When the temperature reaches 90°C it will show in red and start deteriorating when it reaches 110°C. Next, the inverter will shut down to allow it to cool and reduce its temperature.

4.5. System Flow Page

Access by clicking on the “Bar Chart ” on the home page

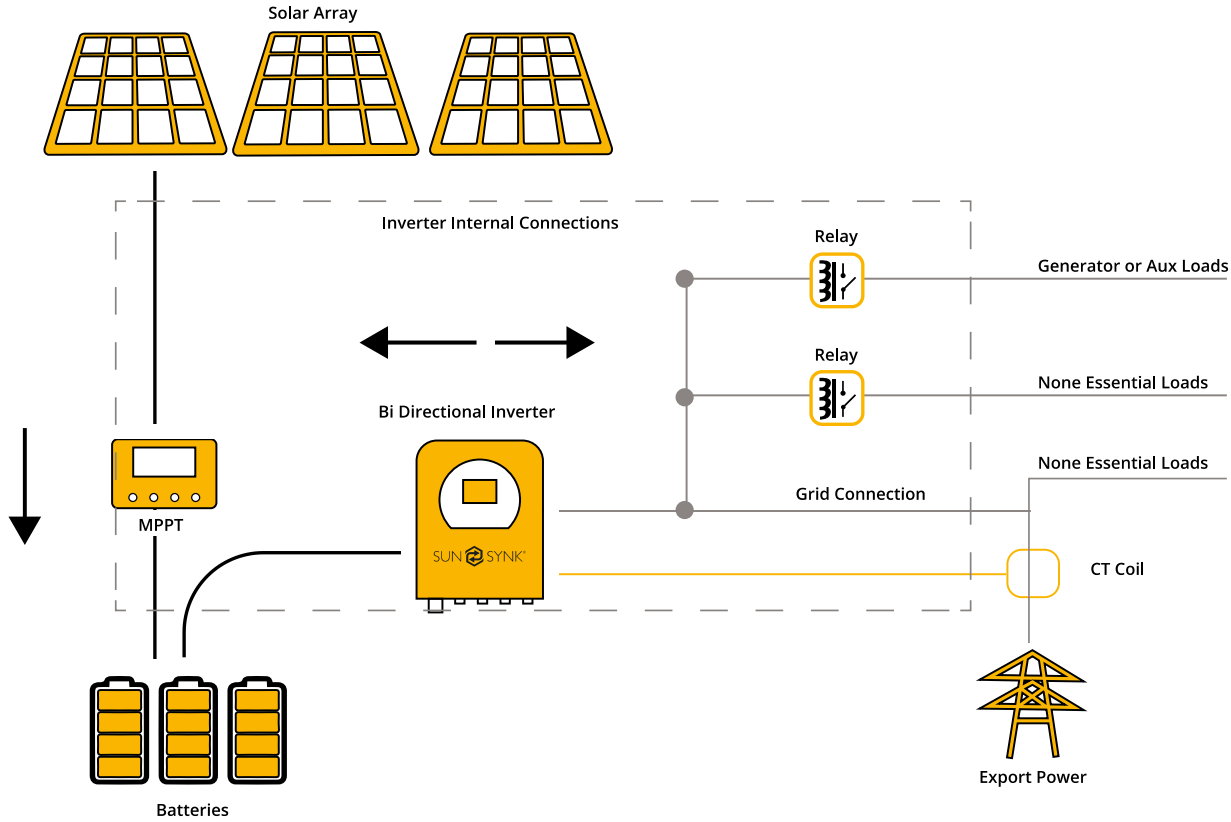


What this page displays:

- The system flow.
- MPPTs power.
- Battery status.
- Power distribution to load or grid.

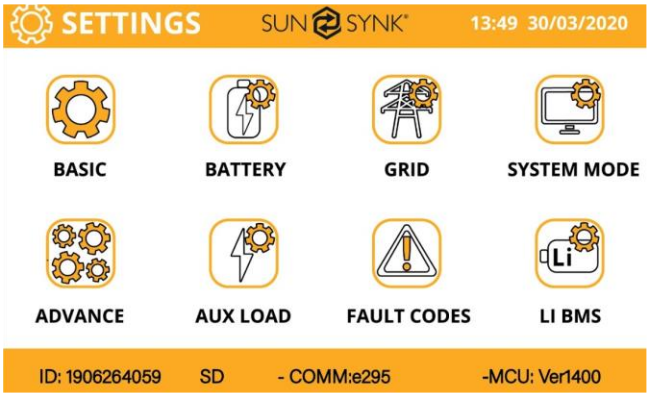
To better understand the functioning of your system, take a look at the figure bellow:

1. The PV modules charge the batteries.
2. When the batteries reach a specific level (programmable) the battery power is fed into the inverter.
3. The inverter can then supply power to the grid (export or no export), load, and auxiliary or smart load.
4. CT coil controls the export power.



4.6. Setup Page

To access the Setup page click on the gear icon on the right top of the navigation menu.



What this page displays:

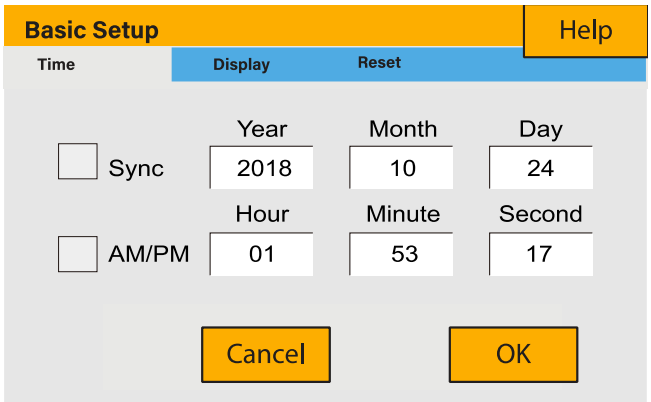
- Serial number.
- Software version.
- Time, Date, and MCU.

What you can do from this page:

- Access the basic setup page (press basic setup).
- Access the battery setup page (press battery setup).
- Access the real-time programmable timer/system mode (press system mode).
- Access the advanced settings such as paralleling and wind turbine (press advanced).
- Access the auxiliary load/smart load settings (press aux load).
- Access the fault code register (press fault codes).
- Set up Li BMS (press Li BMS).

4.7. Set Time (Clock)

To set time click on the “Basic“ icon and then on “Time”.



What this page displays:

- Time.
- Date.
- AM/PM.

What you can do from this page:

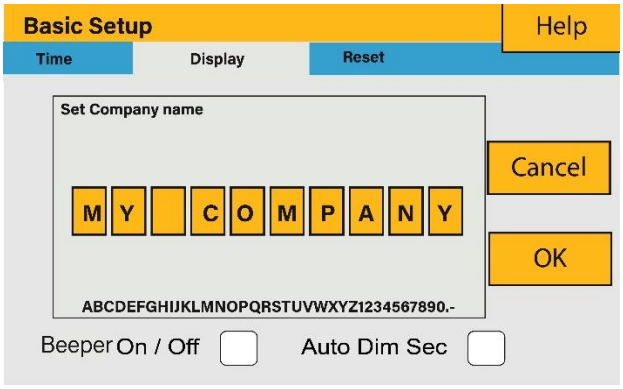
- Adjust / set time.
- Adjust / set date.
- Adjust / set AM/PM.

How to set up (step-by-step):

1. Touch the screen on the variable that you want to change.
2. Change the number up and down using the up and down buttons.
3. Press OK to set the changes.

4.8. Set Company Name / Beeper / Auto dim

To set company name click on the “Basic“ icon and then on “Display”.

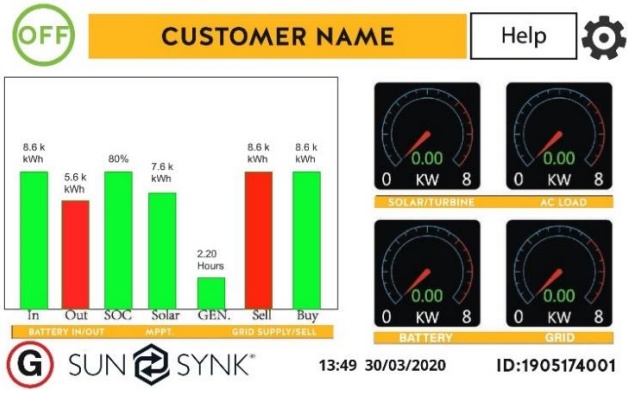


What this page displays:

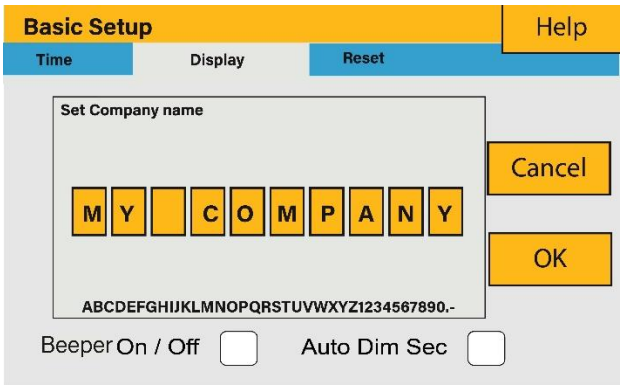
- Beeper status (ON/OFF).
- Installers names.

What you can do from this page:

- Set up your company name.
- Switch the beeper ON or OFF.
- Set the LCD backlight to auto dim.



How to change the company name:
Change the letters in each box by moving the arrows up and down and then select ok. This will change the name on the home screen.



How set the auto dim

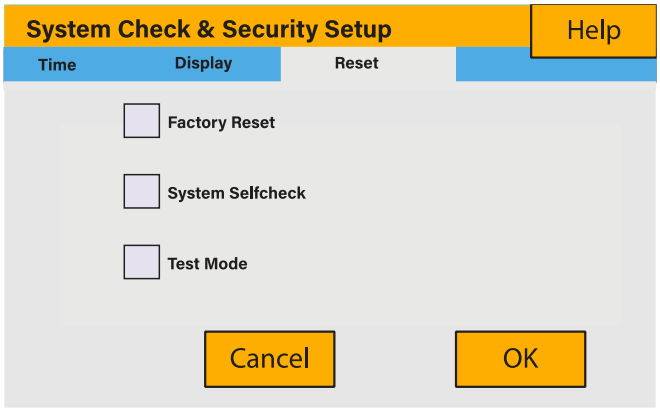
Set a number in the auto dim box to dim the LEO after a number of seconds.

How to activate / deactivate the beep:

Mark or unmark the beep box and the press OK to configure it as you prefer.

4.9. Factory reset and Lock Code

To set time click on the “Basic“ icon and then on “Reset”.



What this page displays:

- Reset status.
- Whether lock code is used or not.

What you can do from this page:

- Reset the inverter to the factory settings.
- System diagnostics.
- Change or set lock code.

Factory Reset: Reset all parameters of the inverter
Lock out all changes: Enable this menu for setting parameters that require locking and cannot be reset.

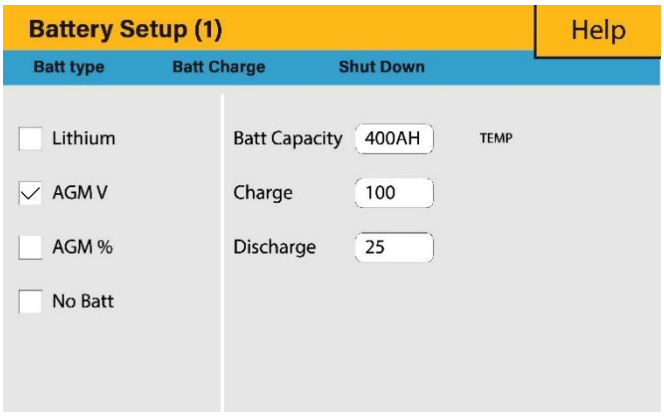
*Before performing a successful factory reset and locking the systems, to keep all changes you need to type in a password to enable the setting. The password for factory settings is 9999 and for lock out is 7777.

System self-check: Makes a diagnosis of the system.

Test mode (only for engineers): Performs tests.

4.10. Battery Setup Home Page

To configure battery settings click on the “Battery” icon and then on “Batt type”.



What you can do from this page:

- Use battery voltage for all settings (V).
- Use battery SOC for all settings (%).

What this page displays:

- Battery capacity in (Ah) Min. AGM battery 200Ah.
- Min. Lithium batt 100Ah.
- Max battery charge current (Amps).
- Max battery discharge current (Amps), which should be 20% of the Ah rating for AGM only. For Lithium, please refer to the battery manufacturer documentation. **Note:** This is a global max. discharge current for both "grid-tied" and "backup" modes of operation and if the current exceeds this value inverter will shut down with an overload fault.
- TEMPCO settings - Temperature coefficient “the error introduced by a change in temperature.

- No battery: tick this box if no battery is connected to the system.
- BMS setting.
- Active battery - This feature will help recover a battery that is 100% discharged by slowly changing from the solar array. Until the battery reaches a point where it can change normally.

IMPORTANT TO PROTECT YOUR BATTERY AND INVERTER

200Ah AGM battery max. charge/discharge current 40Amps

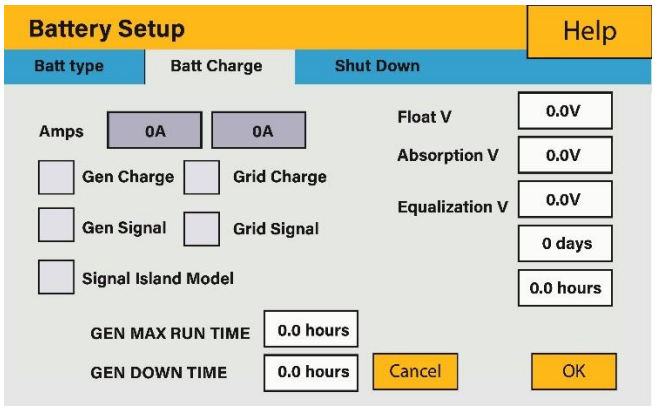
400Ah AGM battery max. charge/discharge current 80Amps

100Ah AGM battery max. charge/discharge current 75Amps

200Ah AGM battery max. charge/discharge current 100Amps

4.11. Generator and Battery Page

To configure battery charging settings click on the “Battery” icon and then on “Batt Charge”.



What you can do from this page:

- Generator start voltage/or SOC %.
- Grid power start voltage/or SOC %.
- Float is for AGM battery 55.20V.
- Absorption is for AGM battery 57.60V.
- Float V is the voltage at which a battery is maintained after being fully charged.
- Absorption V the level of charge that can be applied without overheating the battery.
- Equalization V 58.80.
- Equalizing charge/overcharge to remove sulfate crystals that build-up on the plates over time on lead-acid batteries.

What you can do from this page:

- Tick Gen Charge to charge the batteries from the gen I/P.
- Tick Grid Charge to charge the batteries from the grid I/P.
- Tick Gen Charge signal to auto-switch a relay box.
- Tick Grid Charge signal to auto-switch a relay box.

IMPORTANT

Do not run this too often since it will damage the battery.

Using a generator with a Sunsynk inverter:

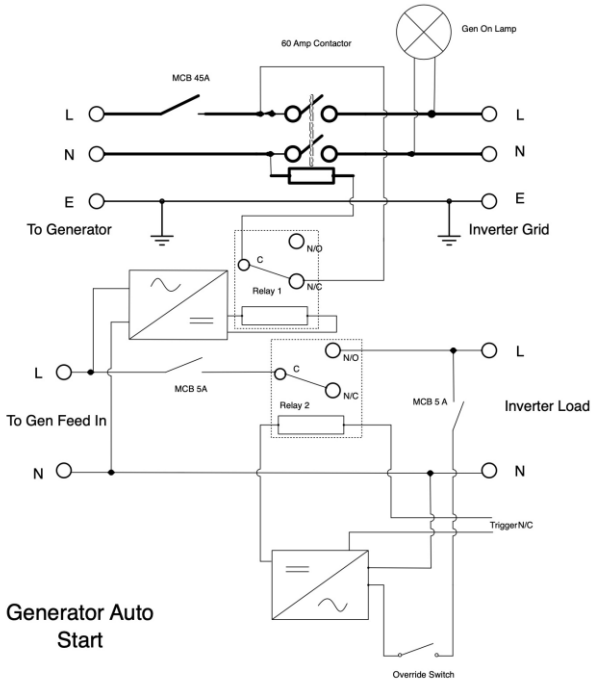
The generator can be connected either to the grid side or to the gen connection. When connected to the grid input, the inverter will consider it a grid supply. However, you need to take care to do not export any power since this could damage the generator. Therefore, you must limit your power to load only.

The nice thing about connecting the generator to the grid input is that it can be paralleled whereas the Gen/Aux input cannot be paralleled. Also, the inverter will extract what it needs from the grid supply to charge its batteries.

If you connect the generator to the Gen in part when there is a Gen signal, the inverter will switch 100% of the load to the generator and then slowly step up the charging currents of the batteries. Therefore, the generator must be able to supply both the charge current for the battery and the total load current.

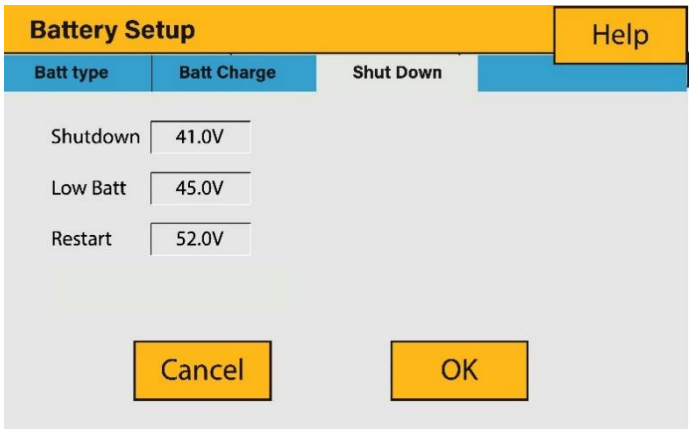
The generator can be controlled via a relay, which is a set of dry contacts. The current on these contacts is limited to 1 Amp 12v, approximately.

Below is a simple reference circuit that I used to auto-start generators on a boat. Sunsynk will release a new OS E406 with better Gen control.



4.12. Battery Discharge Page

To configure inverter shutdown settings click on the “Battery” icon and then on “Shut Down”.



What this page displays:

- Inverter shut down the voltage as a voltage or % .
- Inverter low battery warning voltage or %.
- Restart voltage as a voltage or %.

What you can do from this page:

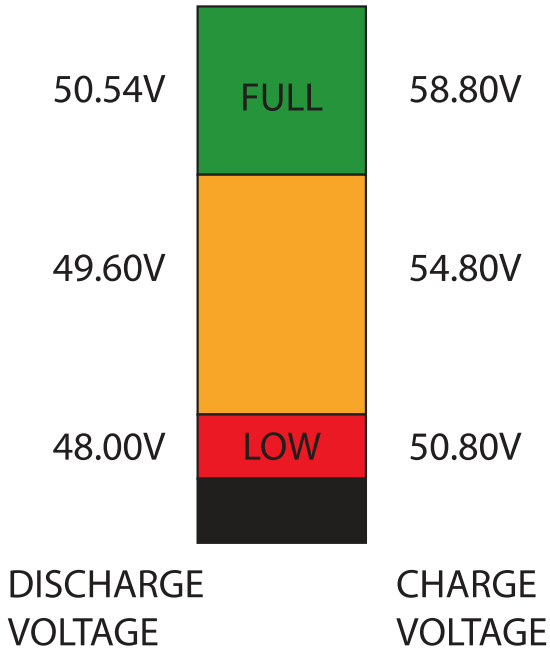
- Adjust battery shut down (voltage or %)
- Adjust low battery warning (voltage or %)
- Adjust restart (voltage or %)

NOTE

Shutdown causes the inverter to enter standby mode. It will not completely shut down the inverter. The total shutdown is below 19V.

The voltage displayed on the Sunsynk Parity Inverter will vary depending on whether the inverter is charging or discharging the batteries.

SUNSYNK PARITY INVERTER CHARGE VOLTAGE



Since the batteries are 48V the figure on the left is x4:

- Fully Charged 50.54V (Discharge Mode)
- Fully Charged 58.50V (Charge Mode)
- 75% Charged 49.60V (Discharge Mode)
- 75% Charged 54.80V (Charge Mode)
- 25% Charged 48.00V (Discharge Mode)
- 25% Charged 50.80V (Charge Mode)
- Completely Discharged 47.50V

Setting the cut-off higher is better for the batteries.

The batteries normally used in the recommended Sunsynk systems are AGM lead acid or lithium battery bank. (‘AGM’ The Absorbed Glass Matt construction allows the electrolyte to be suspended near the plate's active material. In theory, this enhances both the discharge and recharge efficiency.)

State of Charge

Bulk: Involves about 80% of the recharge in which the charger current is held constant (in a constant current charger), and voltage increases. The properly sized charger will give the battery as much current as it will accept up to charger capacity (25% of battery capacity in Amp hours)

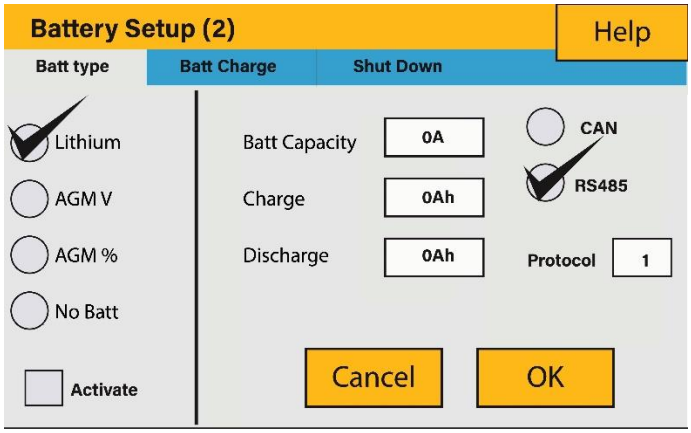
Absorption: Remaining charge equals 20%, approximately. It makes the charger to hold the voltage at the charger’s absorption voltage (between 14.1 VDC and 14.8 VDC, depending on charger set points) and decreasing the current until the battery is fully charged.

Float: The charging voltage is reduced to between 13.0 VDC and 13.8 VDC and held constant, while the current is reduced to less than 1% of battery capacity. This mode can be used to maintain a fully charged battery indefinitely.

Equalisation: This is essentially a controlled overcharge (the peak voltage the charger) that attains at the end of the BULK mode (absorption voltage) an equalisation voltage, but technically it’s not. Higher capacity wet (flooded) batteries sometimes benefit from this procedure, particularly the physically tall batteries. The electrolyte in a wet battery can stratify over time, if not cycled occasionally. In equalisation, the voltage is brought up above typical peak charging voltage well into the gassing stage and maintained for a fixed (but limited) period. This stirs up the chemistry in the entire battery, “equalising” the strength of the electrolyte, and knocking off any loose sulfating that may be on the battery plates.

4.13. Setting Up a Lithium Battery

To set up a Lithium battery click on the “Battery” icon.



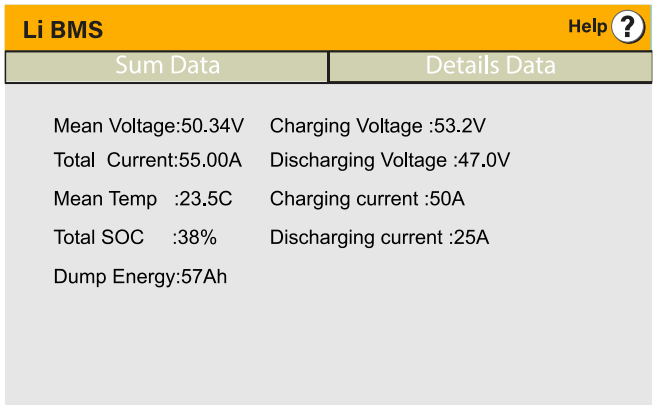
What this page displays:

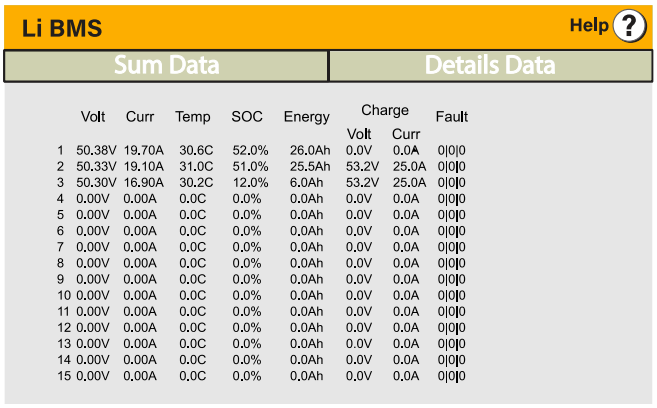
- This will only display if you select the Lithium battery in the battery option.
- They type of communion protocol.
- Approved batteries.

What you can do from this page:

- Set up your lithium battery.

After installing a lithium battery, check on the communications page by clicking on “Li BMS” icon to see if the BMS information is visible. If some information are not displayed correctly on the page as shown in the figures below, there is a communication error.





Therefore, if a communication error shows up on the display:

1. Check if your data cable is the correct type.
2. Check if you are plugging the cable into the correct sockets. Usually, RS 485 is employed, but some battery manufacturers use others.

NOTE

Some types of lithium battery the BMS cannot be controlled by Sunsynk inverter. In this case, treat the battery as a lead-acid type and set the charging and discharging protocol following the battery manufacturer specification.

It is important to always refer to the documentation of the battery manufacturers when installing the battery. Below there is a list of batteries that has been examined, tested, and approved by Sunsynk.

Brand	Model	48V Storage Inverter	RS485 or CAN	Inverter Setup	Notes
Pylon or Equivalent	US2000	✓	CAN	0	
			RS485	5	
	US20000-PLUS	✓	CAN	0	
			RS485	5	
DYNESS	B4850	✓	CAN	0	
	B48100	✓	CAN	0	Short Lione 6&7 at inverter side
	POWERBOX F	✓	CAN	0	
	POWERBOX 9.6	✓	CAN	0	
SolarMD	SS4037	✓	CAN		To be used with V2 Logger http://solarmd.co.za/inverter-
	SS4074	✓	CAN		

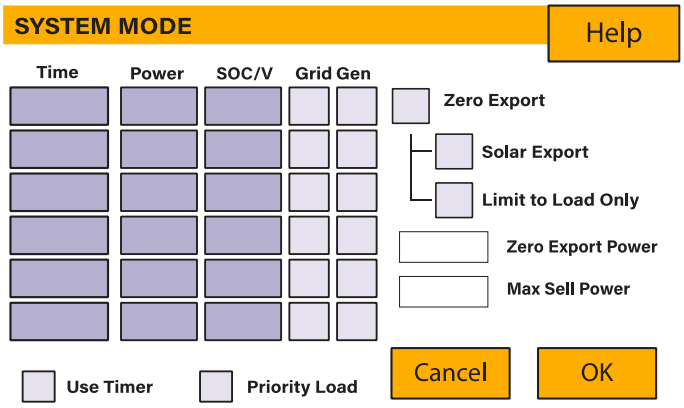
	SS202	✓	CAN		compatibility-solarmd/sunsynk-and-solar-md/
Freedomwon	Freedom Lite Commercial 52V and HV Models	✓	CAN		www.freedomwon.co.za/storage/2019/09/freedom-lite-commercial-installation-manual-rev-2-september-2019.pdf
REVOV	1st and 2nd life	✓	RS485		PINS 1&2 must be Swopped at Battery side.
SHOTO			No		Voltage Base Charge settings must be used.
HUBBLE			No		Voltage Base Charge settings must be used.
CCGX	48Vxxxx	✓	CAN	0	Need confirm CAN_H CAN_L
SACRED SUN	48Vxxxx	✓	RS485	1	Cut Line 3, 6, 8
SOLAX	48Vxxxx	✓	CAN	0	
KOK	48Vxxxx	✓	RS485	2	
UZ ENERGY	UZ-EB51.2-100-A11	✓	CAN	0	
Topakpower	48Vxxxx	✓	RS485	4	
Hai Ying	HY48050	✓	CAN	0	
Re-Power	LS4850	✓	CAN	0	

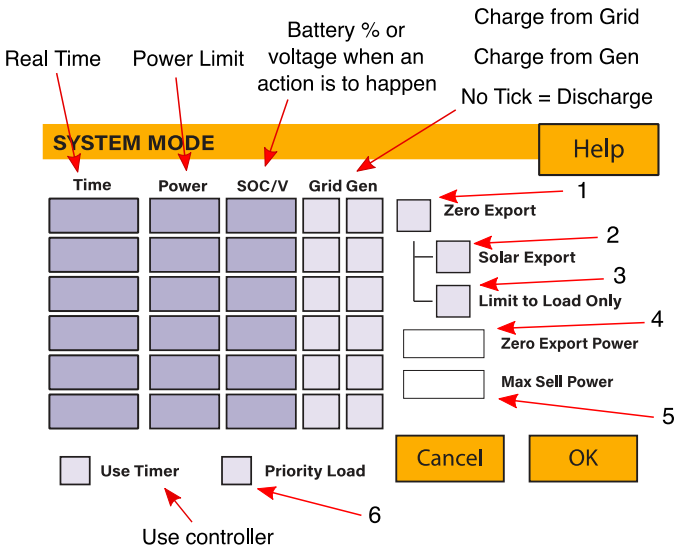
IMPORTANT

- When not using communications between battery and inverter, never overcharge your battery bank concerning current and voltage. Many lithium batteries are limited to 100A, some are lower and some are higher. Ensure that voltage and current specifications provided by the battery manufacturer are followed.
- If you're using lead-acid batteries then a good rule of thumb is C X 25, which means that the maximum charge of discharge you can apply to the battery is a quarter of the AH rating of the overall battery array. For example, for a 200AH battery array that could be composed of 4×200 power batteries in series has a maximum charge and discharge of only 50A.
- Also, ensure the cable is thick enough to support the current and proper fuse following the recommendations of the battery manufacturers.

4.14. Program Charge / Discharge Times Page

To program charge and discharge times click on the “System Mode” icon after clicking on the gear icon.





What this page displays:

- Prevent export power to the grid with "Zero Export".
- Limit power to supply to only all the house loads with "Solar Export".
- Limit power to supply only the loads connected to LOAD port with "Limit to Load only".

What you can do from this page:

- Define a real time to charge or discharge the battery.
- Choose to charge the battery from the grid or generator.
- Limit export power to the grid.
- Define to charge the battery from the grid or generator ticking Grid or Gen and define when it needs to occur.
- Define the time to discharge to the load or

Concerning the detailed figure above:

1. Tick this box to do not export power back to the grid (the CT coil will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load).

2. Tick this box if you wish to export your solar power back to the grid.

3. Tick this box if you only want to supply power to the load side of the inverter.

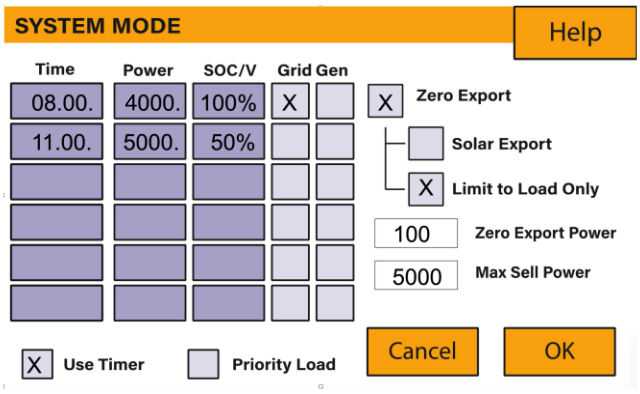
4. Zero export power is the amount of power flowing from the grid to the inverter. Set this value to 20 – 100W to force the inverter to always take this amount of power from the grid to minimise nuisance “Reverse Power Detection” tripping of sensitive prepaid electricity meters.

5. This controls the maximum overall power, both to the load and grid ports combined. It is set to low if an over current fault occurs.

6. Tick this box if you wish that the solar panels prioritize power to the load. But, if you untick the solar will prioritize the power to charge the batteries.

Example:

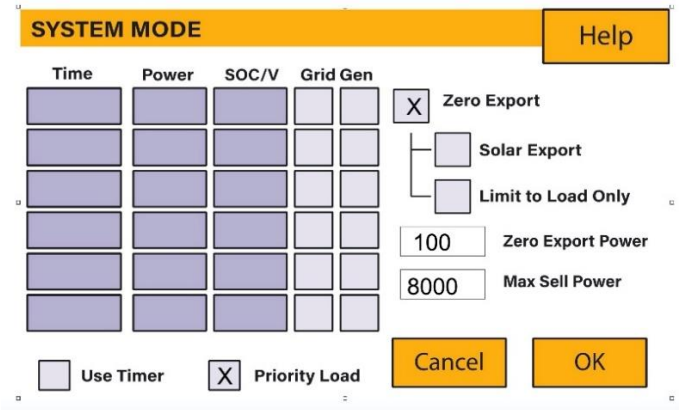
This example shows the battery being charged up to 100% from the grid and PV from 8 AM to 11 AM and then being allowed to supply up to 4kW of battery power to the “essential” loads on the LOAD port until the battery SOC drops to 50%. **Important:** When charging the batteries from the grid or generator please ensure you have set the correct battery charging settings on the battery charge page as shown in Section 4.10 “Battery Setup Home Page”. If “Use Timer” is enabled then the inverter will use battery power according to your settings when the grid is present. If this function is not set the batteries WILL ONLY be used fot backup when there is no utility grid power.



Example:

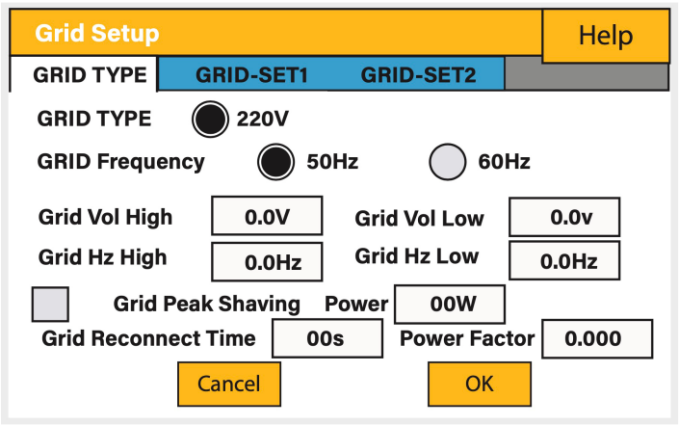
This is a zero export power to the grid example.

Power is supplying the non-essential load and maximum power of the inverter is set as 8kW. The inverter is connected to the grid, but no export is performed. It allows small amounts of power to flow from the grid (set as 100W in this case) to prevent any backflow. In this example, the PV generator prioritizes to supply the load first and then to charge the battery secondarily,



4.15. Grid Supply Voltage and Frequency - Grid Supply Page

On the Settings menu click on the “Grid” icon.



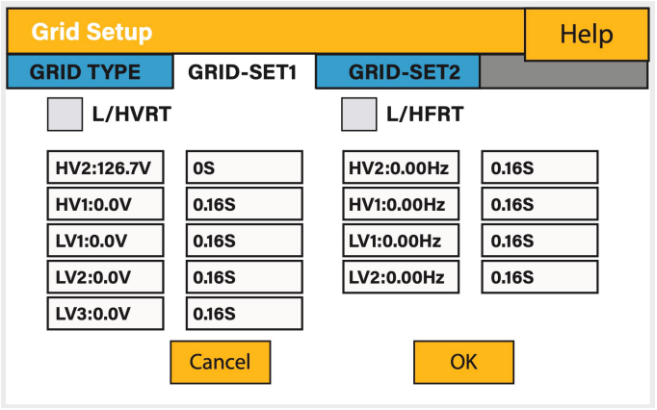
What this page displays:

- Grid frequency setting
- Grid type (normally 220V single phase)
- 120V and split phase is for the USA

What you can do from this page:

- Change grid frequency setting (normally 50 Hz)
- Max. grid input voltage set
- Min. grid input voltage set
- Max. grid frequency Hz
- Min. grid frequency Hz

✓ Select the correct Grid Mode in your local area. If you are not sure, please choose General Standard.
✓ Select the correct Grid Type in your local area, otherwise the machine will not work or be damaged.
✓ Select the correct Grid Frequency in your local area.



Active power and reactive power setting: The inverter is capable of producing reactive power and feeding it into the grid through the setting.

Feed-in management can be controlled directly by the grid company through a dedicated communication port.

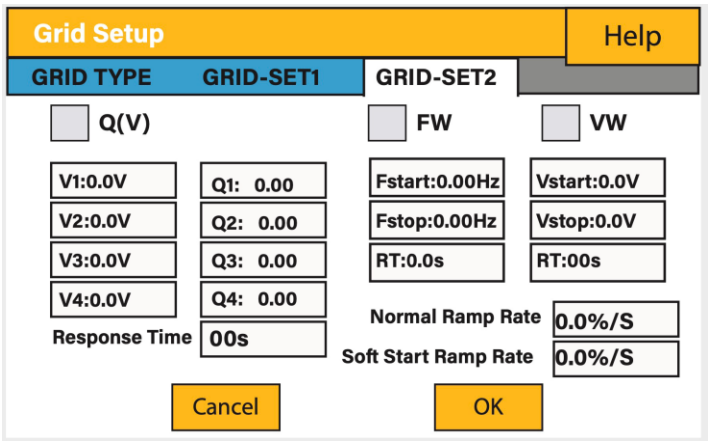
Reactive power setting (QV): For example, if setting V1=207V and Q1=0.3. When grid voltage reaches 207V, the inverter will output reactive power at 30% of its rated power.

Active power setting (VW): For example, if setting V start: 250V and Vstop=260V. When the grid voltage reaches 250V and gradually increases to 260V, the inverter output power will gradually decrease. When the voltage reaches to 260V, its output power will decrease to 20% of P start.

DRMs, logic interface for AS/NZS 4777.2: 2015, is used to receive and response commands from grid company and then adjust inverter output power.

The power output or input will vary in response to the AC grid voltage. This function is switched off by default.

1. Click Q(V) for Volt-Var
2. Click VW for Volt-Watt set points, and adjust if needed



Voltage Trip and Ride-Through (L/HVRT)
Frequency Trip and Ride-Through (L/HFRT)

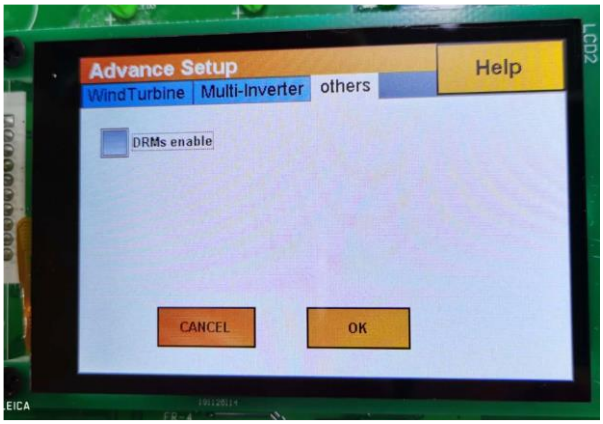
II.A.2Volt-var (VV) – UL1741 SA13

When operating in this Volt-var (VV) mode, and consistent with Section II.A (Reactive Power Capabilities), the Inverter shall provide reactive power output as a function of voltage as an illustrative example in Figure 2 and the default values in Table 2.[4] The Inverter shall have minimum and maximum adjustable ranges per Table 2.

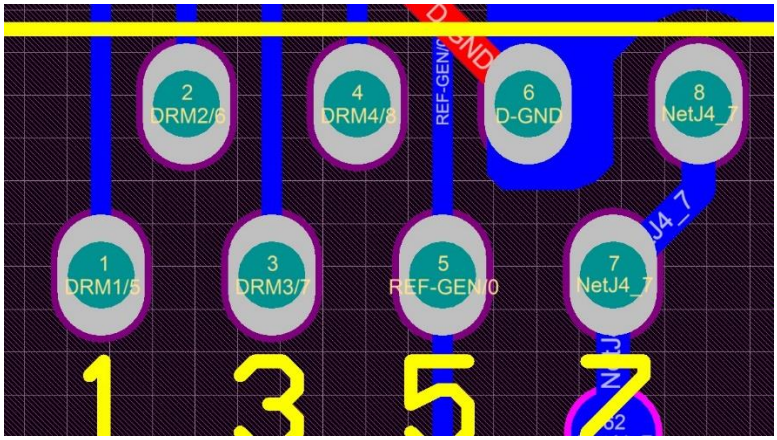
Volt-var Parameters	Default Value	Minimum Adjustable Range	Maximum Adjustable Range
V_{Ref}	Nominal Voltage (V_N) (e.g. 120 volts)	0.95 of V_N	1.05 of V_N
V_2	V_{Ref} – 0.03 of V_N	V_{Ref} – 0.03 of V_N	V_{Ref}
Q_2	0	100% of nameplate reactive power capability, absorption(1)	100% of nameplate reactive power capability, injection(1)
V_3	V_{Ref} + 0.03 of V_N	V_{Ref}	V_{Ref} + 0.03 of V_N
Q_3	0	100% of nameplate reactive power capability, absorption(1)	100% of nameplate reactive power capability, injection(1)
V_1	V_{Ref} – 0.06 of V_N	0.82 of V_N	V2 – 0.02 of V_N
Q_1	44% of nameplate apparent power	0	100% of nameplate reactive capability, injection(1)
V_4	V_{Ref} + 0.06 of V_N	V_3 + 0.02 of V_N	1.18 of V_N
Q_4	44% of nameplate apparent power	100% of nameplate reactive capability, absorption(1)	0
Response Time	10 seconds	1 second	90 seconds

Connecting the DRM'S

This can be selected under advance settings.



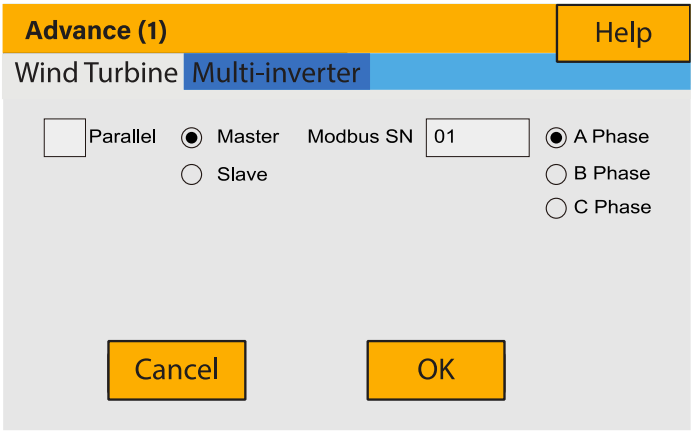
Plug the LAN cable into the socket marked DRMS



1. DRM 1/5
2. DRM 2/6
3. DRM 3/7
4. RDRM 4/8
5. Ref 0
6. D Ground
7. Net J 4-7
8. Net J 4-7

4.16. Advanced Settings for Paralleling Inverters

To configure multi-inverter settings click on the “Advance” icon.



What this page displays:

- If the inverter operates as a master or a slave.
- Modbus Device ID, which must be unique for each inverter connected to the bus/wire.

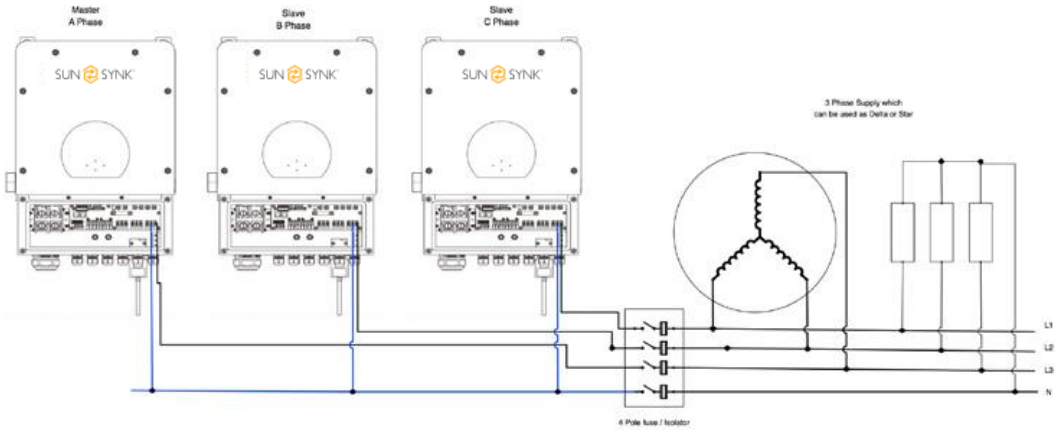
What you can do from this page:

- Set the inverter as a master or slave per bus/wire.
- Set the phase in which the inverter will be paralleled.
- Set the Modbus SN for paralleling.

The Sunsynk parity inverter can be wired standalone or where more power is required it can be connected in parallel either single or 3 phase configuration. The maximum number of inverters that can be paralleled in a single phase utility grid is three (10.8kW, 16.5kW, and 26.4kW for the 3.6kW, 5.5kW, and 8.8 kW model, respectively) and the maximum number that can be paralleled in a three phase utility grid is nine (32.4kW, 49.5kW, and 79.2kW for the 3.6kW, 5.5kW, and 8.8 kW model, respectively).

To parallel six inverters in a three phase utility grid is necessary to set three inverters as master and three as slaves:

- Phase A: Master A and Slave A
- Phase B: Master B and Slave B
- Phase C: Master C and Slave C



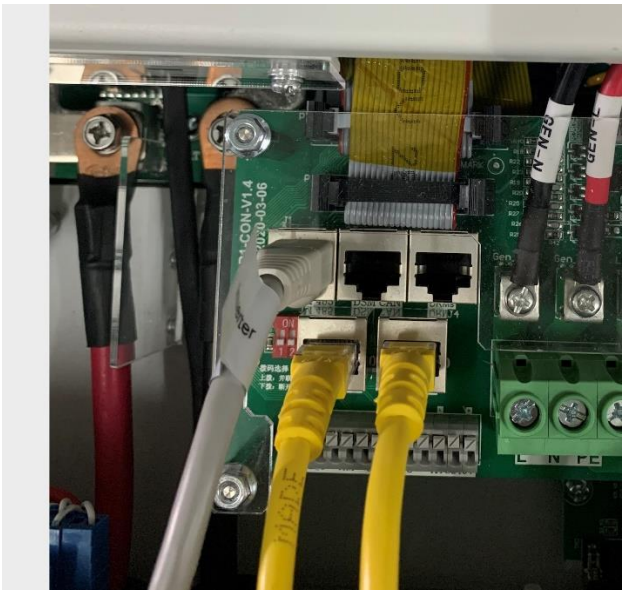
For stability, all the batteries need to be connected in parallel. It is recommended a minimum cable size of 50mm diameter with fuse isolators to each inverter.

Each invert will require a fuse isolator with surge protection and each group circuit will require an RCD. If the batteries as supplying power to the main load during the outage then a change over switch will also be required or a split load can be used.

IMPORTANT

- Be careful with bus bar sizes.
- The CT coils used to limit export power must only be connected to the master. Therefore, if six inverters are paralleled, three CT coils will be required.
- Connect a RJ45 communication cable between each inverter; the order is not important since both sockets are the same, so there is no IN or OUT.
- Each phase must only have one master and the others set to slave.
- Each inverter must have a unique Modbus number.
- Each set of inverters must be set to the same phase. For example, when paralleling three inverters in a three phase utility grid all must be set as Master (Phase A, Phase B, Phase C).
- The maximum length of the communication cables is 2 meters (do not exceed this value)
- All batteries must be connected in parallel and the MPPTs must be kept separate.

The picture below shows the data cable between the inverters. It doesn't matter which way round these go, but their length must not exceed 2 meters.



NOTE

IMPORTANT

- The load outputs can be connected in parallel.
- The grid input can also be connected in parallel.
- You cannot connect the Aux/Gen port in parallel, because this causes a conflict between the frequency of the generator and the frequency of the grid.

If you need further help please refer to the Sunsynk website where you will find training videos and frequently asked questions www.sunsynk.com. From here you can also update the inverter operating system if required, but generally, if the inverter is working fine we recommend do not upgrade

Some common questions when paralleling inverters:

What is the sequence to install/connect/commission?
First of all, leave the main supplies off. Next, connect all communication cables, set up all LCDs and then, finally, turn-on the main supplies.

What are the indications that the communication and the system are ok or not?
Parallel errors will be shown as fault F46 on the display.

What are the consequences of not setting one inverter in a parallel mode?
It can damage the inverter.

What are the consequences of having more than one master, or none set to master for that matter?
It can damage the inverter. There are cases in which it is possible to have more than one master. For example, as aforementioned, six inverters paralleled in a three phase utility grid (three masters)..

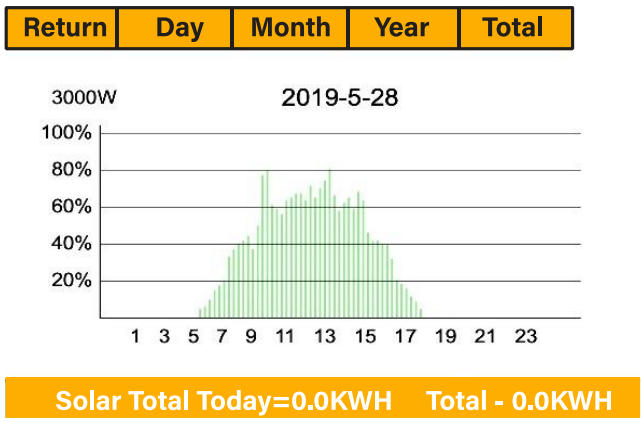
What are the consequences of setting A, B, or C phase wrong on the LCD?
It can damage the inverter. Recommend checking the phase rotation with a meter before switching on.

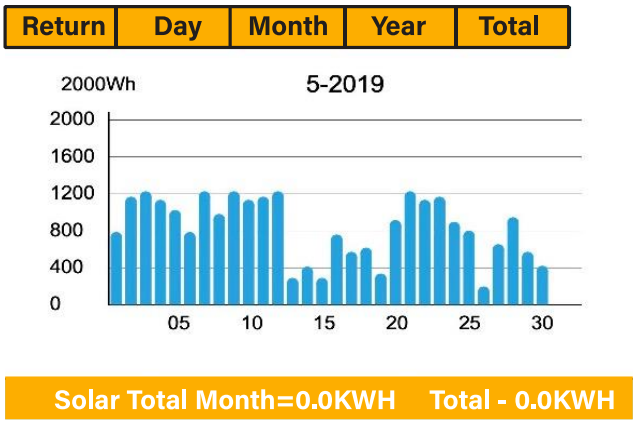
What are the consequences of factory resetting, power cycling, or firmware updating one inverter in a parallel system?
There is no consequence, but the master inverter will keep controlling the slaves.

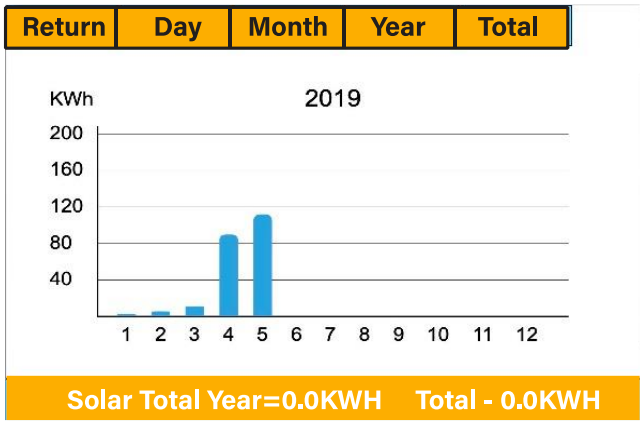
What consequences for changing ALL/ANY settings while operating in parallel mode?
It can damage the inverter and fault F46 will be indicated on the display.

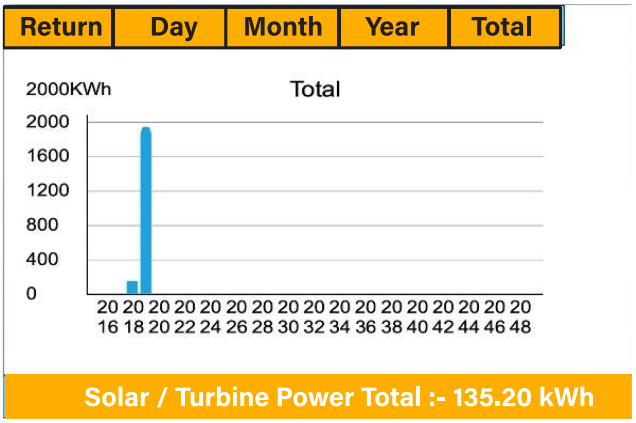
4.17. Solar Power Generated

This page shows the daily, monthly, yearly, and total solar power produced. Access this page by clicking on the “Solar/Turbine” icon on the home page.



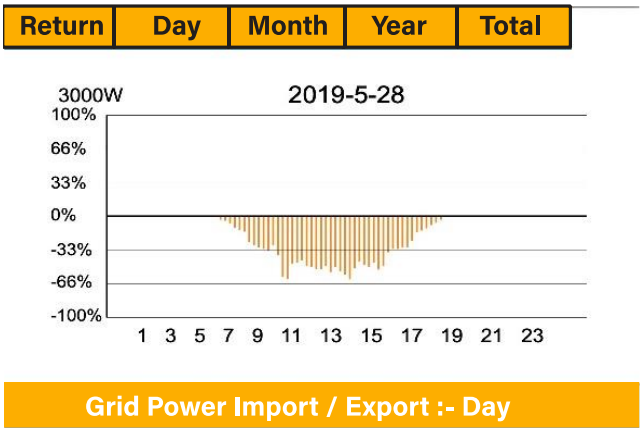


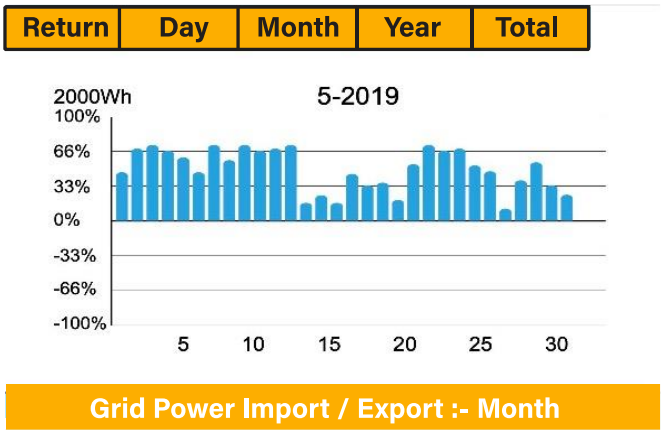


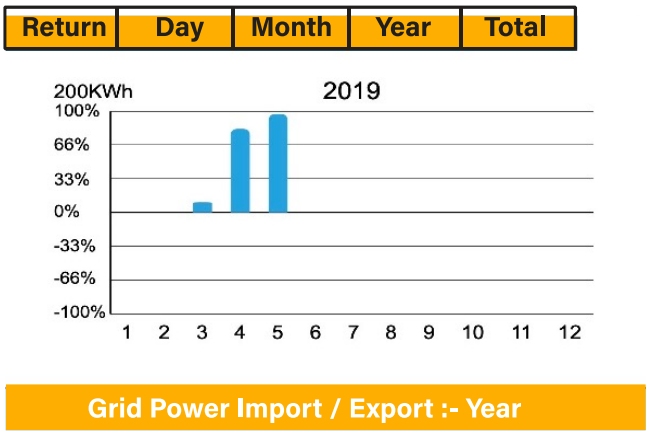


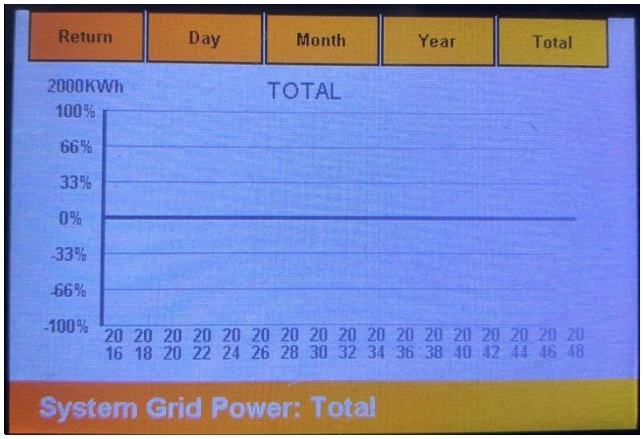
4.18. Grid Power

This page shows the daily, monthly, yearly, and total grid power export or consumed. Access this page by clicking on the “Solar/Turbine” icon on the home page.



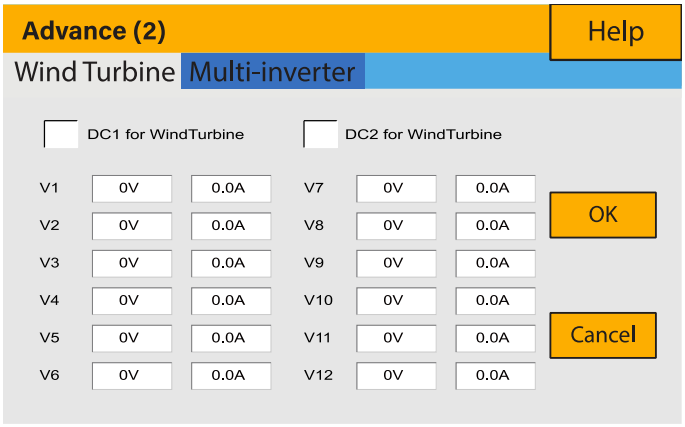






4.19. Advanced Settings for Wind Turbine

To configure wind turbine settings click on the “Advance” icon.



What this page displays:

- If one or both of the MPPTs are connected to a wind turbine.

What you can do from this page:

- Select the MPPT to be used as a turbine input.

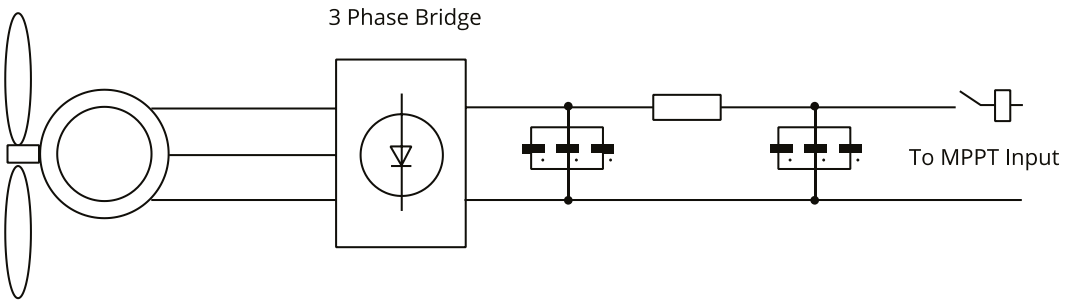
The table bellow shows the maximum current depending on the voltage of the wind turbine.

Voltage	Max. Current (Amps)	Power (W)
150	23.33	3500
200	17.50	3500
250	14.00	3500
300	11.67	3500
400	8.75	3500

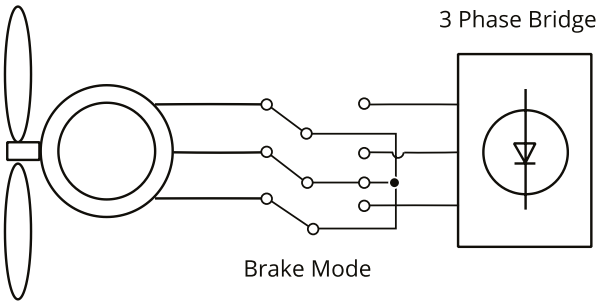
IMPORTANT

- DO NOT use a wind turbine that exceeds 400V.
- **Use a self breaking wind turbine**. Once the batteries are fully charged and the inverter is not exporting any power the load can drop. This can cause the turbine to speed up dramatically, which can be very dangerous and usually happens suddenly. Thus, it is essential to use a self breaking turbine.

Most wind turbines are three-phase PM type. Therefore, either a wind turbine controller or a direct connection to the MPPT via a simple protection circuit will be required.

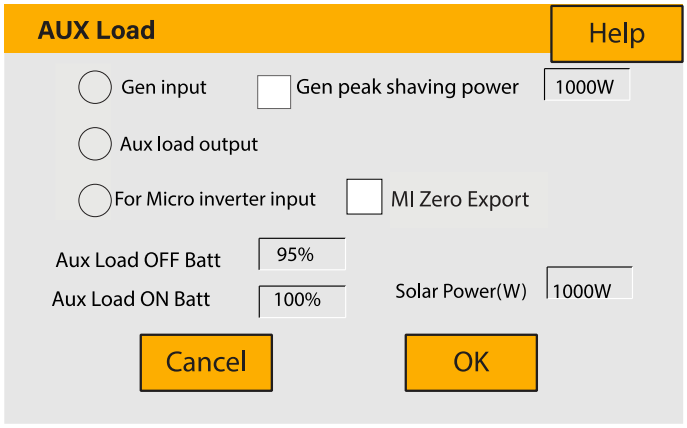


Dump Load: When the battery (battery bank) is fully charged and the water turbine/wind turbine/solar module is still generating power, a dump load will provide the electricity a path to flow. This can be done using a switch on by the smart load option or utilizing a wind turbine controller with a built-in dump load. Also, the hot water tank controlled via smart load can act as a good dump load, but in very windy conditions it may be necessary to shunt the output.



4.20. Advanced Settings for Auxiliary Load

To configure auxiliary load (previously known as smart load) settings click on the “Aux Load” icon.



What this page displays:

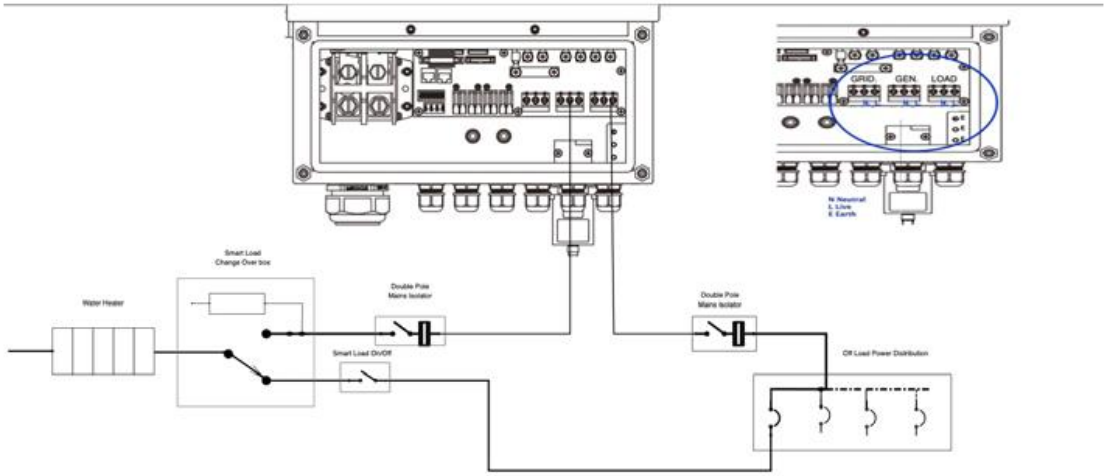
- Use of the Gen (Aux) input or output.

What you can do from this page:

- Set up a generator input.
- Set up an auxiliary (smart) load.
- Set up peak power shaving.
- Use an additional inverter or micro inverter.

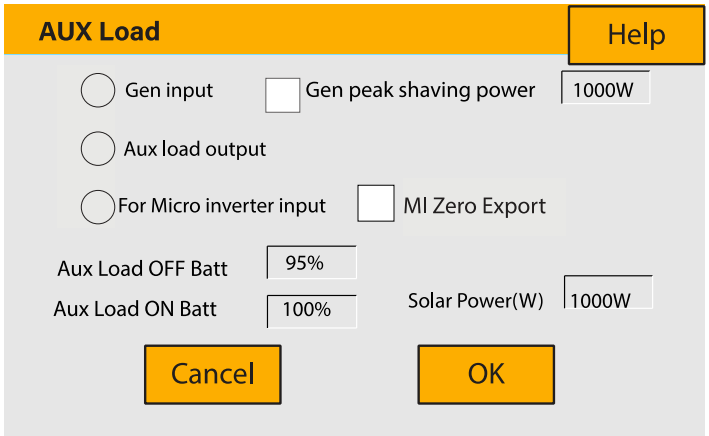
A nice feature is when the batteries are fully charged and the inverter is still producing energy from the PV or the turbine it is possible to direct the energy to another load such as a water heater.

Aux Load off Battery % or Voltage	Battery level when the Aux load switches off
Aux Load on Battery % or Voltage	Battery level when the Aux load switches on.
Solar Power	Power limiter to the maximum power allowed to the Aux load.
Gen Input	Tick this box if using a Generator.
Aux Load Output	Tick this box if using an Aux or Smart Load.
For Micro inverter Input	Tick this box if intending to connect a supplementary inverter or micro inverter (Max. 4kW).
Zero Export	Tick this box to stop exporting power produced by the Aux Load.
Gen Peak Shaving	Tick this box to use peak power shaving.



4.21. Advanced Settings for Peak Power Shaving

To configure auxiliary load (previously known as smart load) settings click on the “Aux Load” icon.



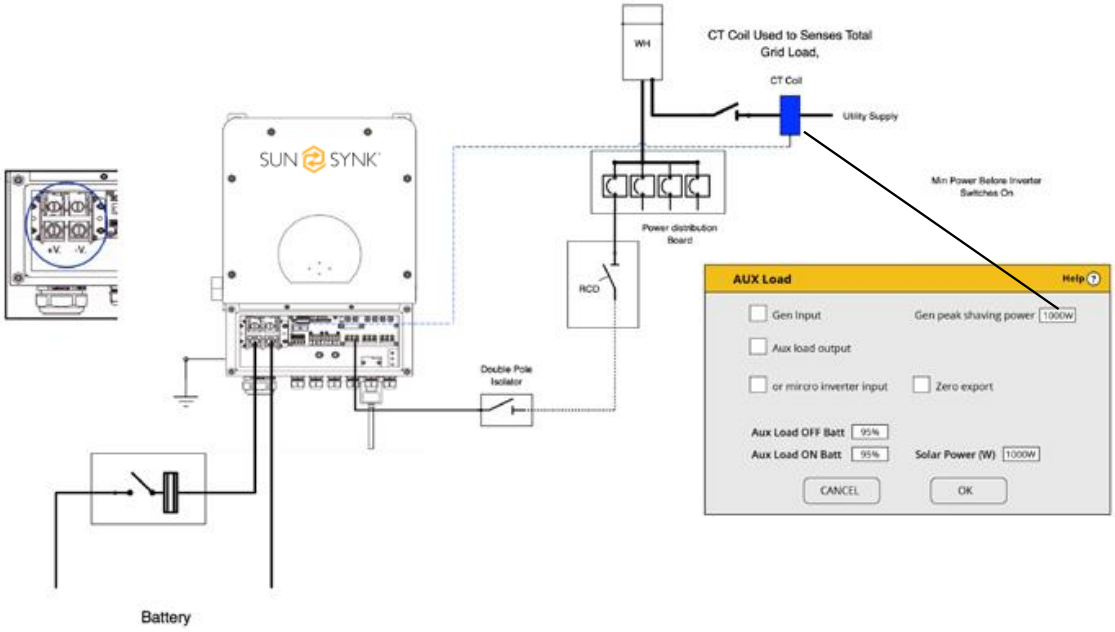
What this page displays:

- Generator peak shaving is ON or OFF.
- Grid peak shaving is ON or OFF.

What you can do from this page:

- Switch on the generator and/or grid peak power saving and set the power shaving value.

Peak Shaving: It is a technique used to reduce electrical power consumption during periods of maximum demand on the utility grid. Thus, one can save substantial amounts of money due to peaking charges.



4.22. Fault Codes

To check fault codes click on the “Fault Codes” icon on the settings menu.

Fault Codes	Help
Alarms	Occurred
F56 DC_VoltLow_Fault	2018-10-24 01:07
F56 DC_VoltLow_Fault	2018-10-24 01:07
F56 DC_VoltLow_Fault	2018-10-24 01:00
F56 DC_VoltLow_Fault	2018-10-24 00:55
F56 DC_VoltLow_Fault	2018-10-24 00:43
F56 DC_VoltLow_Fault	2018-10-24 00:10
F56 DC_VoltLow_Fault	2018-10-24 00:08
F56 DC_VoltLow_Fault	2018-10-24 00:07

If any of the fault messages listed in the following table appear on your inverter and the fault has not been removed after restarting, please contact your local vendor or service center. The following information is required:

1. Inverter serial number.
2. Distributor or service center of the inverter.

3. On-grid power generation date.
4. The problem description (including the fault code and indicator status displayed on the LCD) is as detailed as possible.
5. Your contact information.

Error Code	Description	Solutions
F13	Working Mode Change	Inverter work mode changed 1. Reset the inverter. 2. Seek help from Sunsynk.
F18	AC over current fault or hardware	AC Slide over current fault. 1. Check if the backup load power is within the range of the inverter. 2. Restart, and check if it is normal.
F20	DC over current fault of the hardware	DC Over current fault 1. Check if PV module and battery connections. 2. Reset the system.
F23	AC leakage current is trans over current	Leakage current fault 1. Check the PV module and inverter cables. 2. You may have a faulty PV panel (earth short) 3. Restart inverter
F24	DC insulation impedance failure	PV isolation resistance is too low 1. Check if the connection of PV panels and inverter are firmly connected. 2. Check if the earth bond cable on inverters is connected to the ground.
F26	The bus bar is unbalanced	1. Please wait 5 minutes to see if it returns to normal. 2. Fully reset the inverter.
F35	No at: grid	1. Check if the inverter's connected to the AC grid. 2. Check if the RSCD had not tripped. 3. Check if the switch and fuses between the inverter and grid are all switched on.
F42	AC line low voltage	Grid voltage fault 1. Check if the voltage is in the range of standard voltage in specification this can be adjusted via the grid set up page. 2. Check if grid cables are correctly connected.

F47	AC over frequency	Grid voltage fault 1. Check if the voltage is in the range of standard voltage in specification this can be adjusted via the grid set up page. 2. Check if grid cables are correctly connected.
F48	AC lower frequency	Grid frequency out of range 1. Check if the frequency is in the range of specification 2. You may need to adjust the frequency on the grid set up page.
F56	DC bus bar voltage is too low	Battery low voltage 1. Check if the battery voltage is too low. 2. If the battery voltage is too low use the PV or grid to charge the battery. 3. Check the battery BMS **Important:** Especially with Lithium batteries, ensure that the batteries Max. discharge current or power specification is the same or higher than the inverter specification.
F64	Heat sink high-temperature failure	Heat Sink temp is too high 1. Check if the working environment temperature is too high. 2. Turn off the inverter for 30 minutes and restart.

Fault Information	Instruction	Fault Information	Structure
F01	DC_Inversed_Failure	F33	AC_OverCurr_Fault
F02	DC_Insulation_Failure	F34	AC_Overload_Fault
F03	GFDI_Failure	F35	AC_NoUtility_Fault
F04	GFDI_Ground_Failure	F36	AC_GridPhaseSeque_Fault
F05	EEPROM_Read_Failure	F37	AC_Volt_Unbalance_Fault
F06	EEPROM_Write_Failure	F38	AC_Curr_Unbalance_Fault
F07	GFDI_Fuse_Failure	F39	INT_AC_OverCurr_Fault
F08	GFDI_Relay_Failure	F40	INT_DC_OverCurr_Fault
F09	IGBT_Failure	F41	AC_WU_OverVolt_Fault
F10	AuxPowerBoard_Failure	F42	AC_WU_UnderVolt_Fault
F11	AC_MainContactor_Failure	F43	AC_VW_OverVolt_Fault
F12	AC_SlaveContactor_Failure	F44	AC_VW_UnderVolt_Fault
F13	Working_Mode_change	F45	AC_UV_OverVolt_Fault

F14	DC_OverCurr_Failure	F46	AC_UV_UnderVolt_Fault
F15	AC_OverCurr_Failure	F47	AC_OverFreq_Fault
F16	GFCI_Failure	F48	AC_UnderFreq_Fault
F17	Tz_COM_OC_Fault	F49	AC_U_GridCurr_DcHigh_Fault
F18	Tz_Ac_OverCurr_Fault	F50	AC_V_GridCurr_DcHigh_Fault
F19	Tz_Integ_Fault	F51	AC_W_GridCurr_DcHigh_Fault
F20	Tz_Dc_OverCurr_Fault	F52	AC_A_InductCurr_DcHigh_Fault
F21	Tz_GFDI_OC_Fault	F53	AC_B_InductCurr_DcHigh_Fault
F22	Tz_EmergStop_Fault	F54	AC_C_InductCurr_DcHigh_Fault
F23	Tz_GFCI_OC_Fault	F55	DC_VoltHigh_Fault
F24	DC_Insulation_Fault	F56	DC_VoltLow_Fault
F25	DC_Feedback_Fault	F57	AC_BackFeed_Fault
F26	BusUnbalance_Fault	F58	AC_U_GridCurr_High_Fault
F27	DC_Insulation_ISO_Fault	F59	AC_V_GridCurr_High_Fault
F28	DCIOver_M1_Fault	F60	AC_W_GridCurr_High_Fault
F29	AC_AirSwitch_Fault	F61	AC_A_InductCurr_High_Fault
F30	AC_MainContactor_Fault	F62	AC_B_InductCurr_High_Fault
F31	AC_SlaveContactor_Fault	F63	ARC_Fault
F32	DCIOver_M2_FaulT	F64	Heatsink_HighTemp_Fault

NOTE

- The energy storage inverter is designed according to the grid-connected operation.
- The inverters meets the safety and electromagnetic compatibility requirements as established in the main standards. Moreover, before leaving the factory, the inverter undergoes several rigorous tests to ensure that the inverter can operate reliably, as presented in Section 2 “Technical Specification”.

If you need further help please refer to the Sunsynk website where you will find training videos and frequently asked questions www.sunsynk.com.

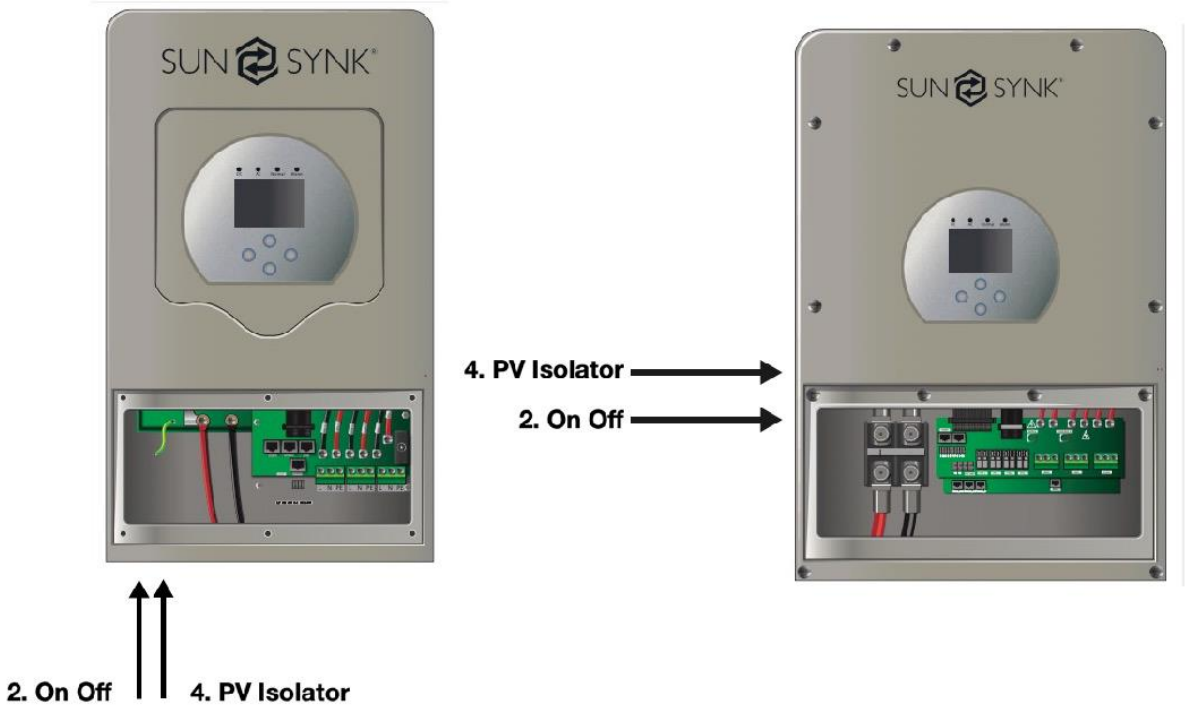
5. Commissioning

5.1. Startup / Shutdown Procedure

The inverter must be installed by a qualified / licensed electrical engineer in accordance to the countries wiring regulations.
Only after the engineer has completed the Earth Bond, RCD, and Earth Leakage Tests, check the solar panel Voc voltage (Must not exceed 480V) and check the battery voltage. Then, the inverter can now be switched on.

Power on Sequence:

1. Switch on AC
2. Press Start Button
3. Switch on Battery and battery breaker
4. Switch on the DC (PV Isolator)



Shutdown Sequence:

1. Switch off AC
2. Press the start button
3. Switch off the battery and the battery breaker
4. Switch off the DC (PV isolator)

5.2. Information for Commissioning Inverter

After you have successfully powered up the inverter, the inverter must be programmed and set up as per the programming feature above.

 **Solar**	Check the each bond on the solar panels	Check the VOC does not exceed 480V	Ensure both MPPTs are balanced
 **GRID**	Measure the supply voltage check it matches the settings of the inverter	If it falls our of the setting range it will cause the inverse shut down and alarm	See Grid set up page
 **BATTERY**	Check the battery charge and discharge is within the C rating of the battery. Too high will damage the battery		Check the battery BMS is communicating with the inverter
 **SYSTEM MODE**	This is the heart of the system this controller everything	Ensure you are familiar with this, if you fully understand the controller you will fully appreciate the capabilities of there inverter	See section 4.14
 **ADVANCE**	This is for paralleling systems, and wind turbine	If paralleling inverters in 3 Phase check you phase rotation before switching on the AC Load, in 3 Phase the output voltage will increase across phase to 400V	If using a wind turbine please ensure you have the correct limiting resistor, caps and rectifier
 **FAULT CODES**	Familiar your self with common fault codes		

5.3. GFDI Fault

Before the inverter starts to connect to the grid, the inverter will first detect the impedance of PV + to ground, and the impedance of PV – to ground. If any of these impedance values is less than 33 k, the inverter will not connect to the grid and will report an error F24 on its LCD.

6. Maintenance of the System

The inverter is low maintenance, however, it is important that at least twice a year (for dusty environments this may need to be carried out weekly) all the cooling fans, air ducts are cleaned and dust free.

Check if there are no fault codes and Lithium battery communication is correct.

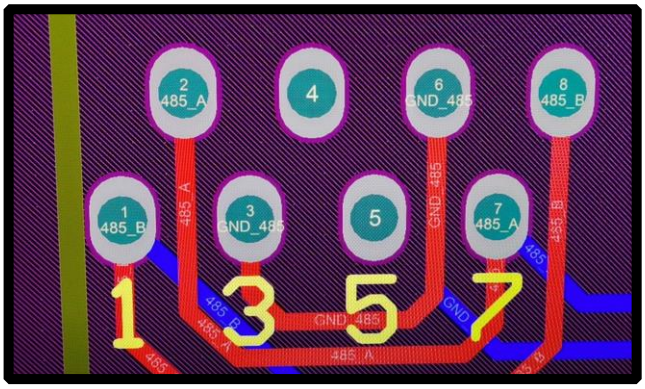
Weekly cleaning statement: Suggest micromesh filters as an available option.
Micro ants here are a real problem.

Appendix A

Def nition of RJ45 Port Pin

NO	RS485 Pin	Can Pin
1	RS485B	
2	RS485A	GND
3	GND	
4		CANH
5		CANL
6	GND	
7	RS485B	
8	RS485A	

RS485



CAN

Appendix B

Inverters sold in Australia will be set to the Default Australian standards

Appendix C

The Sunsynk inverter is compatible with the SolarMan app, via a Wifi or GSM data logger (See solarman instruction manual).
Copy enclosed

Appendix D

If an external residual current device (RCD) is used, a device of type (A/AC, etc.) should be employed, with a tripping current of 30mA or higher.

Use of RCDs
Residual current devices (RCDs): An RCD dedicated for an IES may be used to meet the mechanical cable protection requirements and isolation requirements of AS/ NZS3000 for the cable from the switchboard to the IES. If an RCD is used, the RCD shall

1. disconnect all live conductors (including the actives and neutral); and
2. be of the type specified in the inverter manufacturer's instructions or as labelled on the inverter.

We recommend the use of an RCD on all circuits and sub circuits connected to the Sunsynk inverter. Residual current breaker with overcurrent protection (RCBO)

Earth-leakage protection class	Type A
Earth-leakage sensitivity	30mA
Curve code	C
Network type	AC
Poles description	2P
Earth-leakage protection time delay	Instantaneous

Appendix E

The Sunsynk inverter can be connected to the internet, but you need to add a data logger to do this.
The inverter is compatible with Solar Man data-loggers, which you can obtain from us with your distributor
1. LAN type of data logger
2. Wi-Fi type data logger
3. GSM type data-logger
For setting up the Internet/data logger, please refer to the App user manual.
The data logger is connected into the bottom of the inverter and uses the connection marked as WIFI.

■ **Bottom view of the 3.6kW/5.5kW model**

■ **Bottom view of the 8kW model**

Appendix F

For more information, training videos, software upgrades, help line, forum please refer to http://sunsynk.com/ Tech Support (Do not forget to register first on the website).

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