

SUN SYNK

LIFELYNK ALL-IN-ONE HYBRID INVERTER



INSTALLER MANUAL

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1. SAFETY

1.1. General Safety Information

- This device should only be used in accordance o instructions within this manual and in compliance with local, regional and national laws and regulations. Only allow this device to be installed, operated, maintained, repaired by other persons who have also read and understood this manual. Ensure the manual is included with this device should it be passed to a third party.
- DO NOT allow minors, untrained personnel, or person(s) suffering from a physical or mental impairment that would affect their ability to follow this manual, install, maintain or repair this device.
- Any untrained personnel who might get near this device while it is in operation MUST be informed that it is dangerous and instructed carefully on how to avoid injury.



1.2. Symbols

 WARNING	This symbol indicates information that if ignored, could result in personal injury or even death due to incorrect handling.
 CAUTION	This symbol indicates information that if ignored, could result in personal injury or physical damage due to incorrect handling.
NOTICE	Indicates information that is considered important, but not hazard-related.

1.3. Safety Instructions

WARNING

HIGH LIFE RISK DUE TO FIRE OR ELECTROCUTION.

The Sunsynk Lifelynk 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 carried out in compliance with national wiring standards and by suitably qualified personnel only. Do not turn on the power until all installation work is complete.
- Do not disassemble the inverter. If you need repair or maintenance, contact a professional service centre.
- 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.
- Disconnect all wires before performing any maintenance or cleaning to reduce the risk of electric shock.
- 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 authorised contractor for repairs.

1.4. Disposal Remarks

DO NOT dispose this product with domestic waste!



Electrical devices should be disposed of in accordance with regional directives on electronic and/ or electronic-waste disposal. In case of further questions, please consult your supplier. In some cases, the supplier can take care of proper disposal.

supplier. In some cases, the supplier can take care of proper disposal.

2. PRODUCT INTRODUCTION

The Sunsynk Lifelynk Hybrid 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, mains power (grid) and generators, and then effectively storing and releasing power as and when utilities require.

INTERACTIVE

- Easy and simple to understand LCD display;
- Supporting Wi-Fi or GSM monitoring;
- Visual power flow screen;
- Built-in MPPT trackers;
- Smart settable 3-stage MPPT charging for optimised battery performance.

COMPATIBLE

- Compatible with main electrical grid voltages or power generators;
- Compatible with wind turbines;
- 230V single phase, pure sinewave inverter;
- Auto restart while AC is recovering.

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 the application;
- Configurable AC / solar / generator charger priority by LCD setting.

SECURE

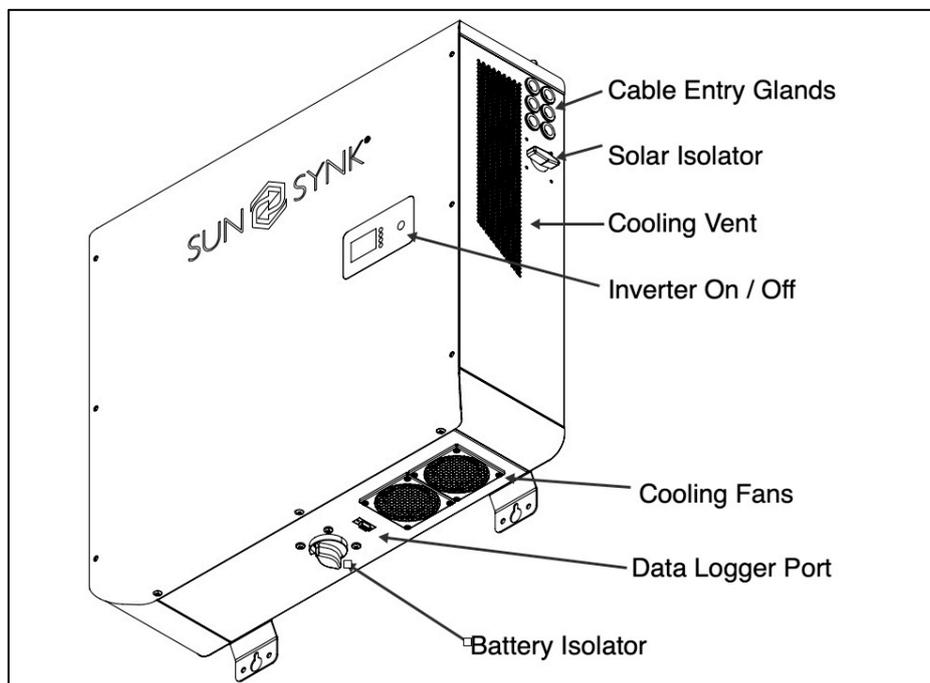
- Overload/over-temperature/short-circuit protection;
- Smart battery charger design for optimized battery protection;
- Limiting function installed to prevent excess power overflow to grid.

APPLICATIONS

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

3. TECHNICAL SPECIFICATION

- Pure sine wave inverter with a maximum input power of 4kW;
- High nominal output power of 3.6 kW that can run several appliances;
- With batteries, the power capacity is 2880Wh;
- MPPT charge controller feature;
- Bi-directional inverter that can rapidly charge its internal batteries in just one hour;
- Generator Autorestart feature.

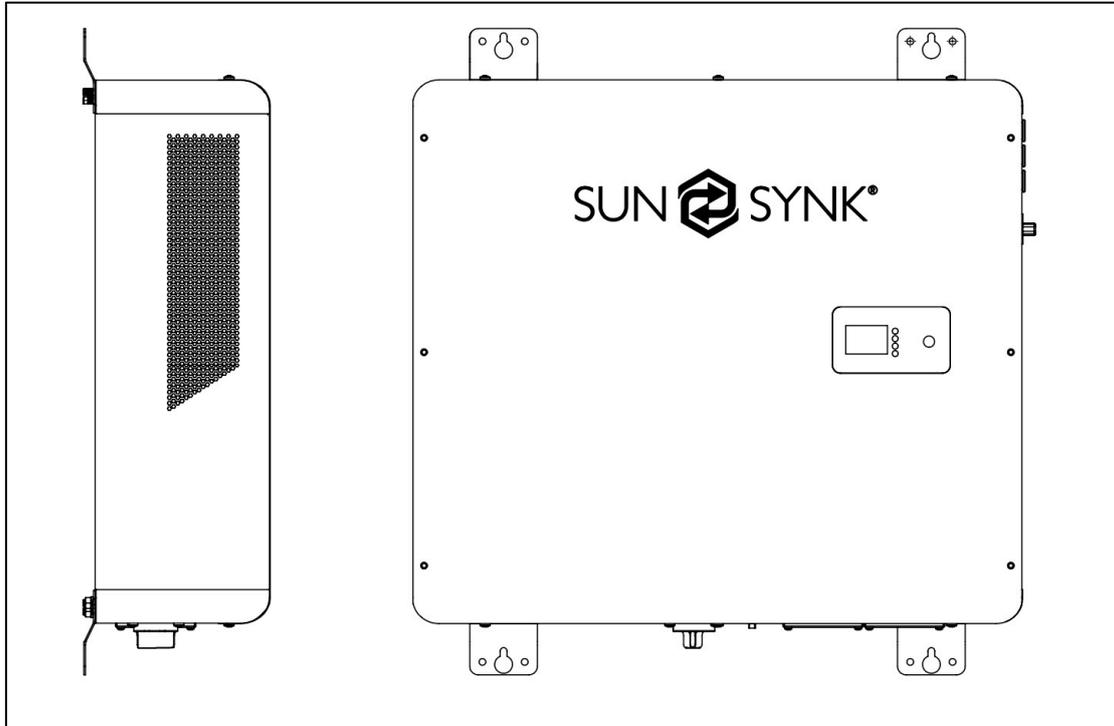


Model	Life3.5Hyb02
PV Input data	
Max. PV Input Voltage	500V
Max. PV Current	10A
Max. PV Isc	12A
AC Output / Input Data	
Maximum Input Power	4000W
Nominal Input / Output Power	3600W
Max. Output Apparent Power	3960VA
Nominal Voltage	230VAC
Max. Input / Output Current	18A
Nominal Frequency	50Hz
Power Factor Range	0.8 Leading ~ 0.8 Lagging

Standalone Data	
Nominal Output Power	3600W
Nominal Output AC Voltage	230VAC
Nominal AC Frequency	50Hz
Battery Data	
Battery Voltage Range	40V ~ 59V
Max. Charging and Discharging Current	90A
Battery Type	Lithium-ion
Power of Each Battery	576Wh
Number of Batteries	5
Ingress Protection	IP20
Protective Class	Class I
Operating Temperature Range	-25°C ~ +60°C (
FW Version	VerX1234(DSP), Slave MCU(VER1.1), LCD MCU(VER6.2)

4. INSTALLATION

4.1. Selecting the Mounting Area



DO NOT install the inverter in the following areas:

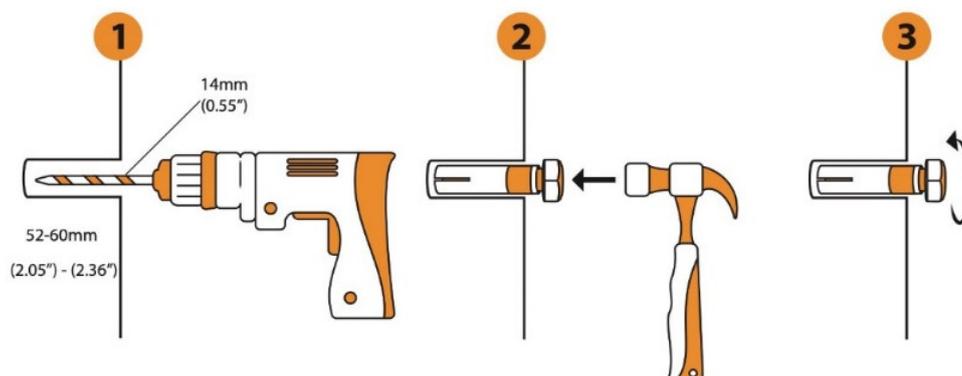
- Areas with high salt content, such as the marine environment. It will deteriorate the metal parts and possibly lead to water/dampness penetrating the unit.
- Areas filled with mineral oil or containing splashed oil or steam such as found in kitchens. It will deteriorate plastic parts of the unit, causing those parts to fail or allow water/damp to penetrate the unit.
- Areas that generate substances that adversely affect the equipment, such as sulphuric gas, chlorine gas, acid, or alkali. These can cause the copper pipes and brazed joints to corrode and fail to conduct electricity reliably.
- Areas that can cause combustible gas to leak, which contains suspended carbon-fibre or flammable dust, or volatile inflammable such as paint thinner or gasoline.
- Areas where there may be gas leaks and where gas may settle around the unit as this is a fire risk.
- Areas where animals may urinate on the unit or ammonia may be generated.
- High altitude areas (over 4000 metres above sea level).
- Environments where precipitation or humidity are above 95%
- Areas where the air circulation is too low.

ALSO CONSIDER:

- Installing the indoor unit, outdoor unit, power supply cable, transmission cable, and remote control cable at least 1 metre away from any television or radio receiver. This will prevent TV reception interference or radio noise. This will prevent radio signal interference from external units that might interfere with the Wi-Fi or GSM monitoring.
- 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.
- For proper heat dissipation, allow a clearance of approximately 500mm to the side, 500mm above and below the unit, and 1000mm to the front of the unit.

4.2. Mounting the Inverter

- Select a location that provides adequate to support the weight of the inverter.
- Install this inverter so that the LCD screen is eye-level for easy operation.
- An appropriate ambient temperature lies between $-25 \sim 60^{\circ}\text{C}$ for optimal operation.
- Ensure other objects and surfaces are outside of the recommended spaces (500mm each side / above and below / front) to guarantee heat dissipation and easy access to the wiring/cabling.



⚠ CAUTION

Risk of injury (Heavy Object)

Remember that this inverter is heavy so users must be careful in handling the unit during installation especially when mounting or removing from a wall.

4.3. Connecting the Batteries

Before mounting the inverter on the wall, it is better to install the batteries using the fixings supplied with the product like in the figures below.



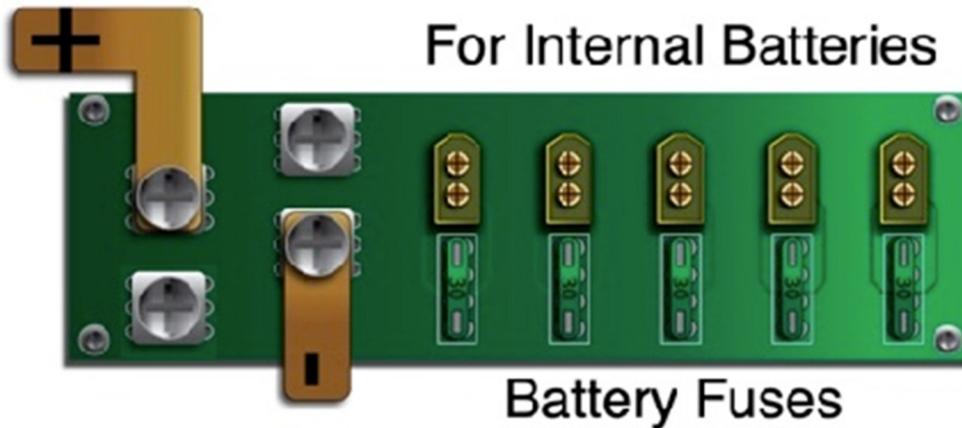
A minimum battery cable size of 35mm diameter is recommended.

The Lifelynk uses a set of batteries that provide 2880Wh of energy. Therefore, if fewer batteries are installed, the power capacity will be reduce accordingly.

No. of Batteries	Power Capacity
1	576 Wh
2	1152 Wh
3	1728 Wh
4	2304 Wh
5	2880 Wh

⚠ CAUTION
Setting a power limit higher than maximum will damage the battery fuse.

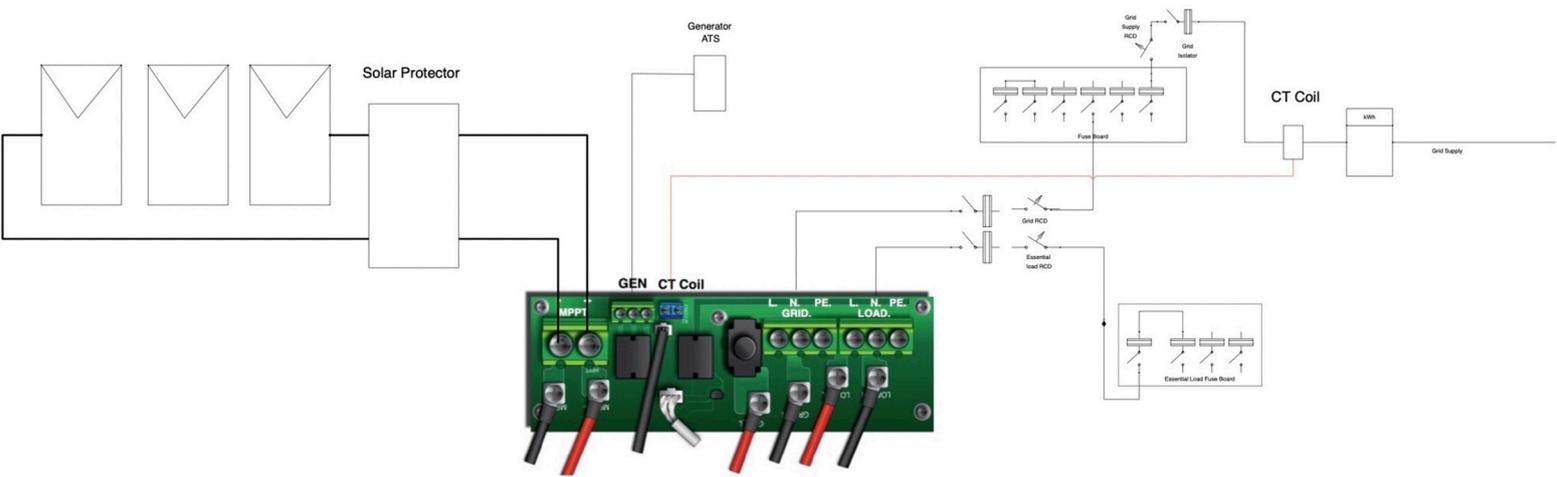
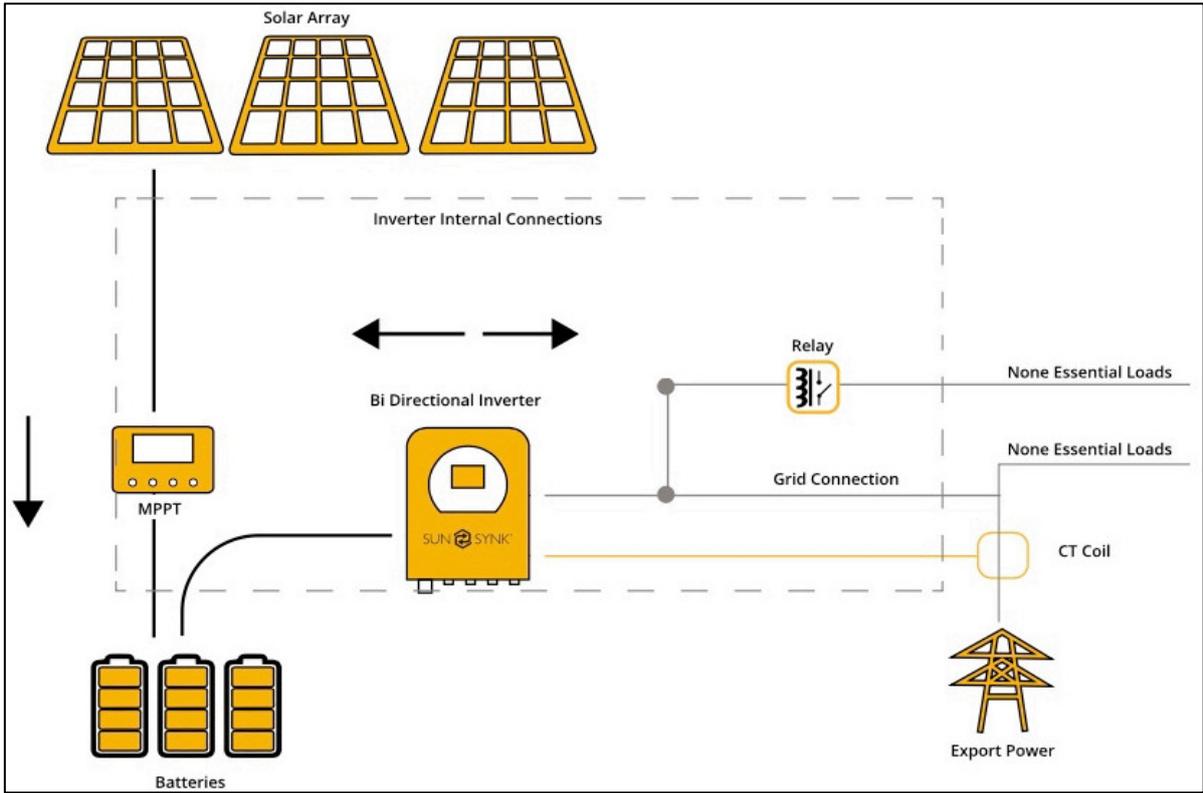
If using an external battery, connect it to the +V and V- bus bar, but please be sure to select a suitable fuse and battery isolator.



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

It is also important to set a power limit lower than the maximum power of the inverter. If you set a “Max Sell Power” greater than the limit, it will damage the battery fuse.

System Config	
Max Discharge Cur	30A
Max Sell Power	2500W
Max Battery Vol	53.0V
Time Of Use	Use <input checked="" type="radio"/>
AC Type	Gen <input type="radio"/> Grid <input checked="" type="radio"/>
Signal Island	Enable <input type="radio"/>



4.4. Connecting to the Mains / Grid

1. Connect the Lyfelynk Hybrid Inverter to the electrical grid via the "Grid" ports, using a suitable RCD and a 20 A fuse on the consumer board.
2. Now, using a 4 mm cable, connect only the essential loads to the "Load" ports (Output) to a secondary consumer board, considering the maximum limit of 3.6 kW.
3. Ensure the main consumer unit and the secondary consumer unit are correctly grounded to the Lifelynk Hybrid Inverter.

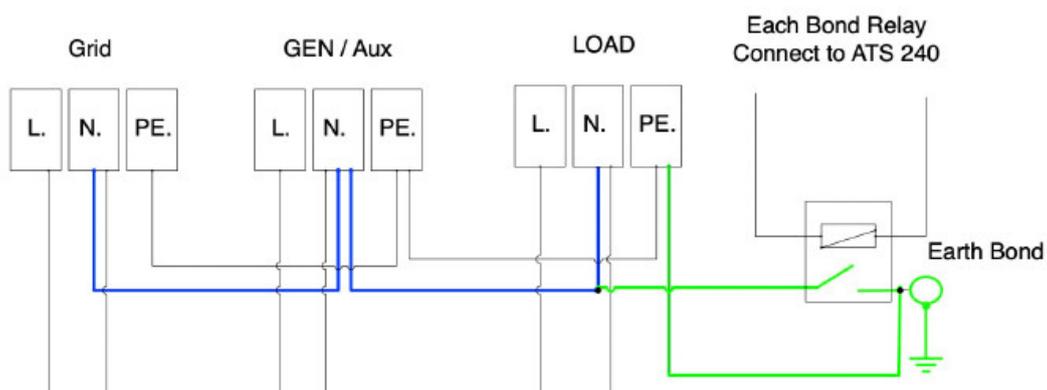


4.5. Earth Bond (Mandatory)

An earth cable shall be connected to earth plate on the grid size in order to prevent electric shock if the original protective conductor fails.

4.5.1 Neutral Earth Bond

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

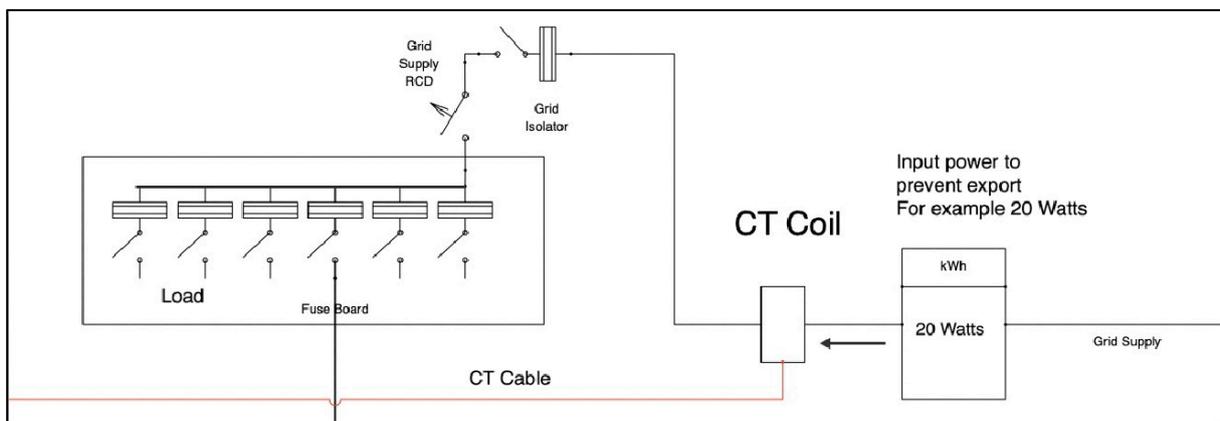


If an earth bond is required between neutral and earth and your system is a hybrid system then you can have a permanent earth wire since this can cause faults with an RCD before the inverter.

4.6. Wiring the PV Panels

- The Lifelynk Hybrid Inverter has an MPPT controller with a maximum input current of 9 A.
- Before connecting to PV modules, install a separate DC circuit breaker between the inverter and PV array.
- 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.
- Also, the open-circuit voltage (Voc) of the PV modules does not exceed the maximum input voltage of the inverter. Also, the Voc of the PV array should be higher than the minimum starting voltage of the inverter.
- Connect the PV panels into the MPPT terminal.

4.7. CT Coil and Load Power Settings



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 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".

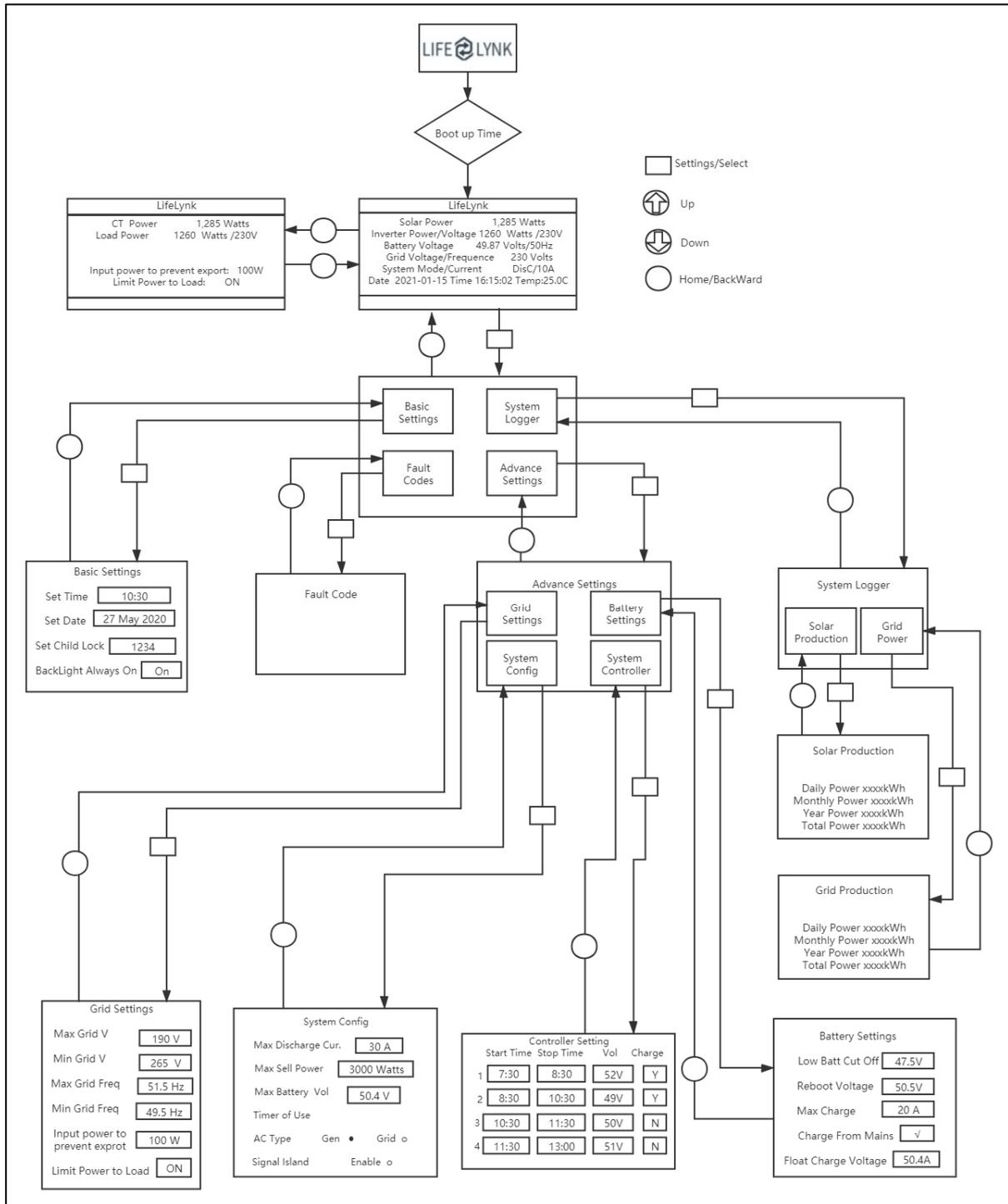


You can access the CT Coil Screen directly from the Home Screen.

SUN  SYNK®	
CT Power	Load Power
16W	112W
Input power to prevent export :20W	
Limit power to load : ON	

5. OPERATION

5.1. System Flow



5.2. Switching ON/OFF

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

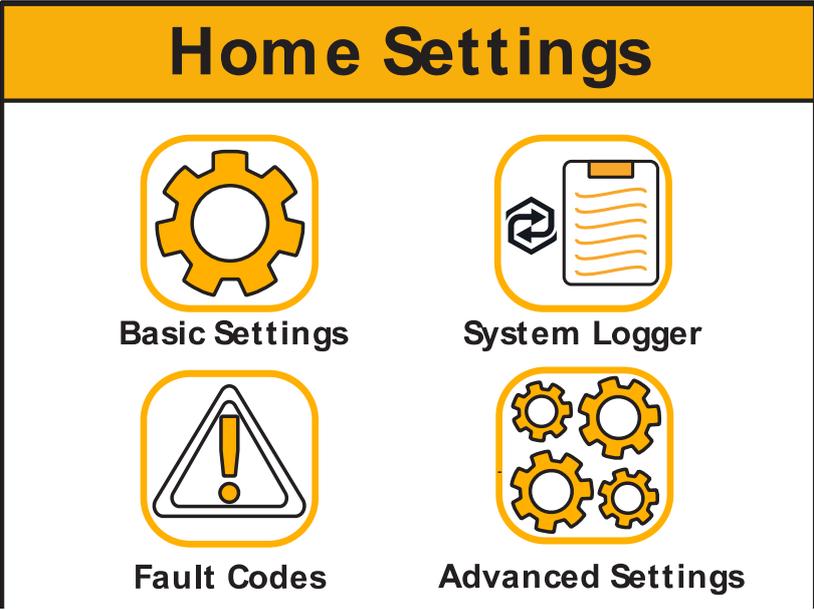
When the system is connected without a battery but connected with either PV or grid and the on/off button is switched off, the LCD will still light up (display will show off). In this condition, when switching on the on/off button and selecting no battery, the system can still work.

5.3. Home Screen

SUN  SYNK [®]	
Solar Power 209W	Inverter Power/Voltage 188W/240V
Battery Voltage 52.7V	Gen Voltage/Frequence 240V/50.0Hz
System Mode / Current Chg/0.8A	DATE: 17-07-2021 TIME: 11:33:25 Temp 23.6C

What this page displays?
Solar MPPT Input Power
Battery Voltage
System Status
Inverter Current Power
Grid Voltage
Time Date / Time
What you can do from this page
If you press the select button you can navigate to the Basic Setup menu

5.4. Home Settings



What this page displays?
Basic Setting Icon
System Logger Icon
Fault Codes Icon
Advanced Settings Icon
What you can do from this page
You can navigate through the function by clicking on each icon

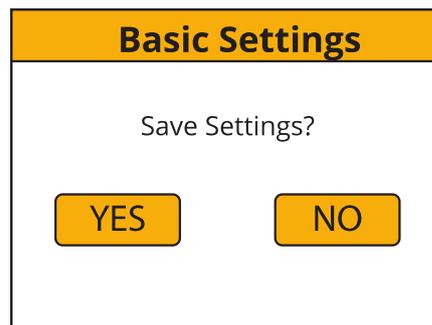
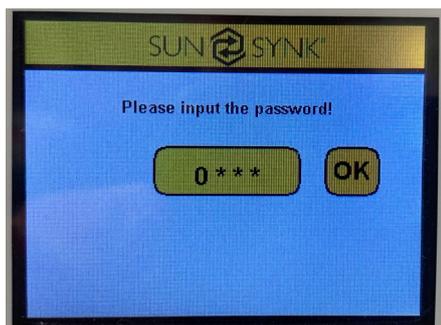
5.5. Basic Settings

Basic Settings	
Set Time	11:34
Set Date	17-07-2021
Set Child Lock	0000
Backlight Always On	On

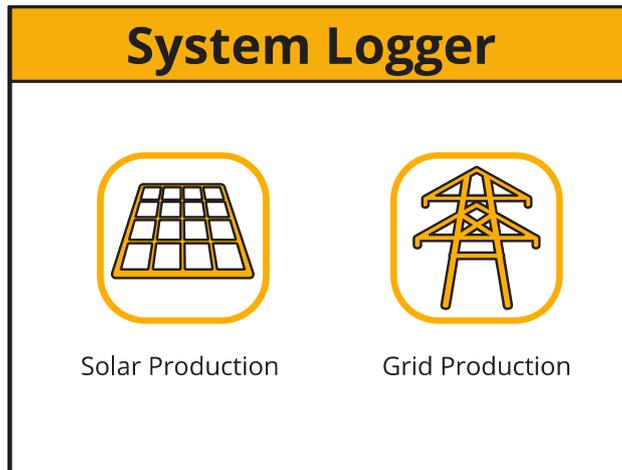
What this page displays?
Time
Date
Child Lock
Backlight Always On/Off
What you can do from this page
Set the system's time
Set the system's date
Set child lock code (default is 0000)
Set backlight always on

After changing the settings, do not forget to click Save Settings.

The Child Lock function prevents children from operating the device. The child lock set 0000 and no changes can be made without this valid password. Therefore, if the user types another code, then when pressing the Enter button or clicking "OK", it will request the code again.



5.6. System Logger



Solar Production

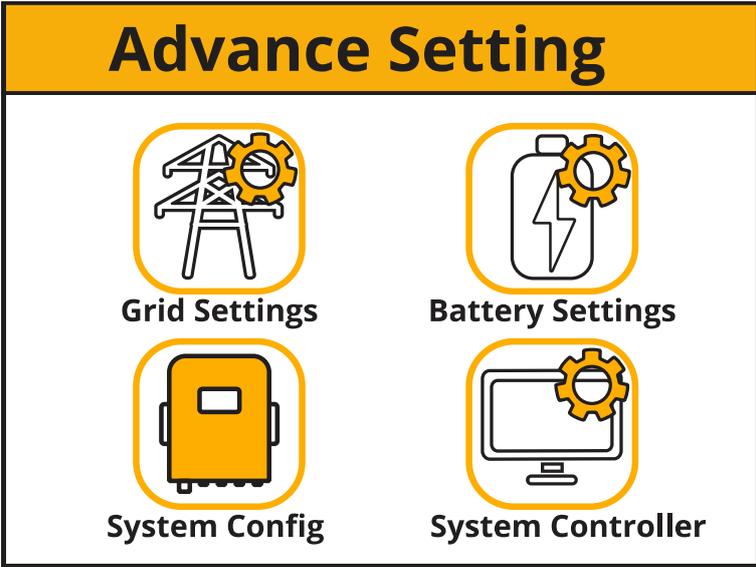
Solar Production	
Daily Power	1KWh
Monthly Power	30KWh
Year Power	3600KWh
Total Power	7200KWh

Grid Production

Grid Production	
Daily Power	1KWh
Monthly Power	30KWh
Year Power	3600KWh
Total Power	7200KWh

What this page displays?
Solar Production Icon
Grid Production Icon
What you can check in this page
Daily solar power produced
Monthly solar power produced
Yearly solar power produced
Total solar power produced
Daily grid power used
Monthly grid power used
Yearly grid power used
Total grid power produced

5.7. Advance Settings



What this page displays?
Grid Settings Page Icon
System Settings Page Icon
Inverter Settings Page Icon
Battery Settings Page Icon
What you can do from this page
You can access the Grid, System, Inverter, and Battery setting pages.

5.7.1 Grid Settings

Grid Settings	
Max Grid Volt	260V
Min Grd Volt	185V
Max Grid Freq	51.5Hz
Min Grid Freq	49.5Hz
Input power to prevent export	0020W
Limited Power to Load	ON

What this page displays?
Maximum Grid Voltage Allowed
Minimum Grid Voltage Allowed
Maximum Grid Frequency
Minimum Grid Frequency
What you can do from this page
You can set these limits. But, remember that these values need to be in accordance to your local grid conditions. If the grid reaches limits outside the set values, the inverter will shut down.

- Maximum grade voltage is the maximum allowable voltage from the grid. Set a realistic value for this parameter, because it will protect your equipment if the voltage is exceeded
- Minimum grid voltage again you should set this to a realistic value
- Input power to prevent export is where the inverter will pull a small amount of power from the grid.
- Limit power to load will prevent any export

After changing the settings, do not forget to click “Save Settings”.

Grid Settings
Save Settings?
<input type="button" value="YES"/> <input type="button" value="NO"/>

5.7.2 Battery Settings

Battery Settings	
Low Battery Cut Off	45.0V
Reboot Voltage	48.0V
Maximum Charge	10A
Charge from Main	YES
Float Charge Voltage	50.4V

What this page displays?
Low Battery
Reboot Voltage
Maximum Charge Current
Charge from the Mains
Float Charge Voltage
What you can do from this page
The battery setting page set a Low Voltage Cut-Off for the batteries. Before setting this, please refer to the battery characteristics.
The 'Reboot Voltage' is the voltage that the batteries must reach before the inverter switches on again.
'Maximum Charge' is the maximum current that the system will provide to charge the batteries. This is normally rated at 0.5C, the battery's Ah (s) x 0.5. For example, if you have installed a 20 Ah battery, then the maximum charge current should be set at 10A. The lower the setting, the longer the batteries will last.
If 'Charge from the Mains' is set as 'YES' the batteries will charge from the mains grid.
'Float Charge Voltage' must be set accordingly to the specifications of the battery used.

5.7.3 System Settings

System Config

Max Discharge Cur	<input type="text" value="30A"/>
Max Sell Power	<input type="text" value="2500W"/>
Max Battery Vol	<input type="text" value="53.0V"/>
Time Of Use	Use <input checked="" type="radio"/>
AC Type	Gen <input checked="" type="radio"/> Grid <input checked="" type="radio"/>
Signal Island	Enable <input checked="" type="radio"/>

What this page displays?
Max Inverter Power Limiter
UPS Mode
Solar Mode
Use System Timer
What you can do from this page
Set the maximum discharge current from the batteries
Set the maximum inverter power - please refer to the number of batteries and type of batteries being used
Set Time of Use Controller – please ensure this is switched on if this function will be used.
If a generator is used to charge the inverter please ensure Gen is ticked.
If Island Earth bond is required, this is where you can use the generator relay as an earth bond relay.

5.8. System Controller

System Controller				
	Start Time	Stop Time	Vol	Charge
1	07:30	08:30	52.0V	N
2	09:30	10:30	52.0V	N
3	11:30	12:30	52.0V	N
4	13:30	14:30	52.0V	N

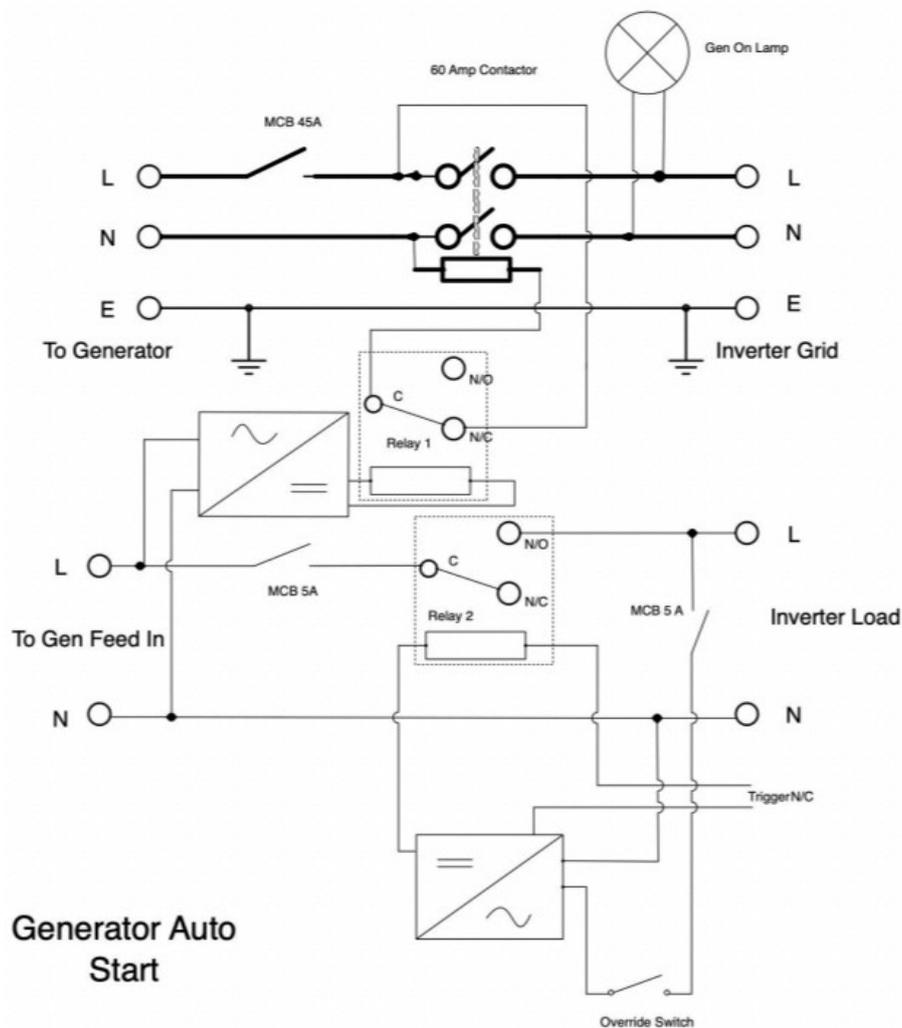
What this page displays?
Start Time
Stop Time
System to Charge
System to Discharge
What you can do from this page
This is the heart of the system. From here, you can select a time when you would like the batteries to charge from the AC rather than from the solar.
Set the charge time start, set the charge time stop, and tick the charge box. Here you will set the real time when the inverter will charge its batteries from the AC (Grid Supply). To charge the batteries from the AC Grid, set 'Y'. It does not affect the solar charging operation.
If you want to run off the batteries, similar to a standard hybrid inverter, you need to select the time of use when you want to run from the batteries only.
Set the time when the inverter will switch on, set the time when the inverter will switch off, and click the discharge icon. This will select the time when the inverter will be running from the batteries. During the period of discharge, the inverter will be running directly from the battery, and the AC grid will be disconnected.

5.9. Using a Generator

The generator can be connected to the grid side connection. When connected to the "Grid" input, the inverter will consider it a grid supply. However, if you connect the generator to the "Gen", 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 charging current for the battery and the total load current.

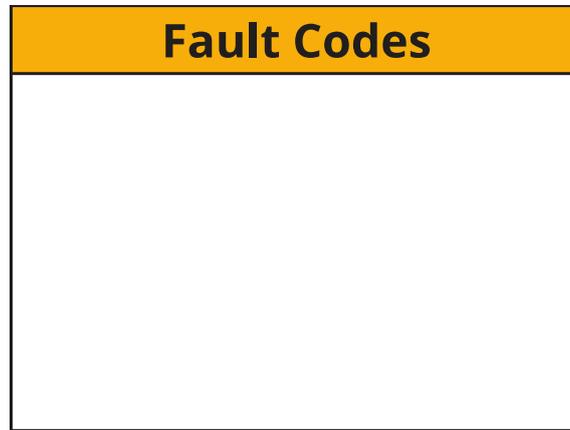
The generator can be controlled via a relay, which is a set of dry contacts. The current on these contacts is limited to 1 A / 12 V approximately.

A simple reference circuit to auto-start generators on a boat is shown in the figure below. Sunsynk will release a new OS E406 with better Gen control.



5.10. Fault Codes

To check fault codes, click on the “Fault Codes” icon on the Home Settings menu.



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 centre 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
- 5) detailed as possible.
- 6) 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	<p>PV isolation resistance is too low</p> <ol style="list-style-type: none"> 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	<ol style="list-style-type: none"> 1. Please wait 5 minutes to see if it returns to normal. 2. Fully reset the inverter.
F35	No at: grid	<ol style="list-style-type: none"> 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	<p>Grid voltage fault</p> <ol style="list-style-type: none"> 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	<p>Grid voltage fault</p> <ol style="list-style-type: none"> 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	<p>Grid frequency out of range</p> <ol style="list-style-type: none"> 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	<p>Battery low voltage</p> <ol style="list-style-type: none"> 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 <p>Important: Especially with Lithium batteries, ensure that the batteries Max. discharge current or power specification is the same or higher than the inverter specification.</p>
F64	Heat sink high-temperature failure	<p>Heat Sink temp is too high</p> <ol style="list-style-type: none"> 1. Check if the working environment temperature is too high. 2. Turn off the inverter for 30 minutes and restart.

6. COMMISSIONING

6.1. 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)

6.2. Information for Commissioning the Inverter

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

	Check the earth bond on the solar panels	Check the VOC does not exceed 480V	Ensure both MPPTs are balanced
	Measure the supply voltage check it matches the settings of the inverter	If it falls out of the setting range it will cause the inverse shut down and alarm	See Grid set up page
	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

	<p>This is the heart of the system this controller everything</p>	<p>Ensure you are familiar with this, if you fully understand the controller you will fully appreciate the capabilities of there inverter</p>	<p>See section 4.14</p>
	<p>This is for paralleling systems, and wind turbine</p>	<p>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</p>	<p>If using a wind turbine please ensure you have the correct limiting resistor, caps and rectifier</p>
	<p>Familiar yourself with common fault codes</p>		

6.3. 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.

7. MAINTENANCE

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 insects here are a real problem.

APENDIX A

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)
- 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

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



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