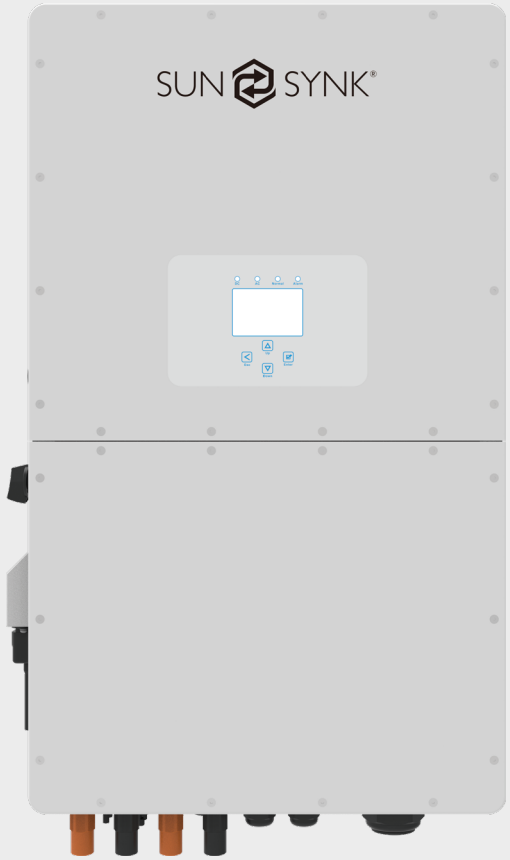
THREE-PHASE HYBRID INVERTER



USER MANUAL

SUNSYNK-29.9K-SG01HP3-EU-BM3
SUNSYNK-30K-SG01HP3-EU-BM3
SUNSYNK-35K-SG01HP3-EU-BM3
SUNSYNK-40K-SG01HP3-EU-BM4
SUNSYNK-50K-SG01HP3-EU-BM4

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v.33 (22/08/25)

PLEASE RETAIN FOR FUTURE REFERENCE

PREFACE

This User Manual contains information for proper installation, operation, maintenance, and care of the Sunsynk Three-Phase Hybrid Inverter. A deep understanding of the instructions described in this document will help you get the most out of your new inverter.

This document should be read thoroughly, and all the procedures described in this manual should be followed carefully. If you have questions or concerns about this product's operation and maintenance, please get in touch with our customer support.

All personnel involved in this machine's installation, setup, operation, maintenance, and repair should read and understand this manual, mainly its safety instructions. Substandard performance and longevity, property damage, and personal injury may result from not knowing and following these instructions.

In order to ensure long product life, Sunsynk recommends that you utilize the product and perform maintenance by correctly following the instructions described in this guide. The manufacturer's warranty does not cover any damage resulting from the neglect of these instructions.

Sunsynk assumes no liability for damage caused by the operation contrary to what is specified in this operating manual.

All information in this User Manual is based on the latest product information available at the time of printing approval. Sunsynk reserves the right to make changes at any time without notice and without incurring any obligation.

Please always keep this manual with the inverter as a reference for everyone using this product.

TABLE OF CONTENTS

LEGAL INFORMATION

Warning Notice System

This manual includes important safety warnings that help ensure your safety and prevent damage to the equipment. These warnings are clearly identified with symbols, which are categorised according to the level of risk associated with each potential hazard. It is essential to read and adhere to these warnings carefully.

DANGER

Indicates an immediate hazard that, if not avoided, will result in serious injury or death. This is the highest level of risk.

WARNING

Indicates a potential hazard that could result in serious injury or death if not avoided. It is slightly less severe than "DANGER".

CAUTION

Highlights a potential hazard that could cause minor injuries or property damage if not avoided.

NOTICE

Provides helpful information that does not indicate any hazard.

Qualified Personnel

The Sunsynk Hybrid Inverter described in this manual must only be installed, operated, and maintained by qualified personnel. Qualified personnel are individuals who have received formal training in electrical systems and photovoltaic (PV) installations. They must be familiar with local electrical codes and regulations and capable of identifying potential risks associated with handling high-voltage equipment.

To ensure safe and efficient installation, Sunsynk strongly recommends engaging an installer approved by Sunsynk. These installers undergo specific training on Sunsynk products, ensuring they possess the necessary knowledge for secure and optimal installation, commissioning, and operation.

Improper installation or operation of the Sunsynk Hybrid Inverter by unqualified personnel may lead to personal injury, property damage, or voiding of the warranty.

WARNING

- Always use only components and accessories that are recommended or approved by Sunsynk.
- Follow all procedures outlined in this manual for transport, storage, installation, commissioning, operation, and maintenance.
- Ensure compliance with local and national safety codes and regulations.
- Operate the product only within the specified environmental conditions as outlined in this manual.

Proper Use of Sunsynk Products

The Sunsynk Hybrid Inverter is designed for use in energy storage and management in photovoltaic systems. To ensure safe and reliable operation, it is imperative to follow the instructions provided in this manual. Failure to do so may lead to unsafe operation, product damage, or invalidation of the warranty.

Warranty

For warranty details, please refer to the Warranty Statement supplied by Sunsynk.

Under our company's guidance, customers may return products for maintenance or replacement of equivalent value. Customers are responsible for shipping and associated costs. Any replaced or repaired product retains the remaining warranty period. If a product or component is replaced by the company during the warranty period, ownership rights of the replacement belong to the company.

Factory warranty does not cover damages resulting from:

- Transportation mishaps
- Incorrect installation or commissioning
- Failure to follow operation, installation, or maintenance instructions
- Attempts to modify, alter, or repair products
- Incorrect usage or operation
- Inadequate equipment ventilation
- Non-compliance with safety standards or regulations
- Natural disasters or force majeure (e.g., floods, lightning, overvoltage, storms, fires, etc.)

Normal wear or minor failures that do not affect product functionality are not considered defects. External scratches, stains, or mechanical wear do not indicate product defects.

Trademarks

All names and logos identified in this document are the property of Sunsynk. Unauthorised use of Sunsynk trademarks is strictly prohibited. All other trademarks mentioned remain the property of their respective owners.

Disclaimer of Liability

This document is the property of Sunsynk. Any reproduction, modification, or distribution of this manual without prior written consent from Sunsynk is strictly prohibited.

The content of this manual has been thoroughly reviewed for accuracy and is consistent with the product described. However, due to ongoing product improvements and updates, Sunsynk cannot guarantee complete consistency. Any necessary corrections or updates will be included in subsequent editions of this manual.

Retention of This Manual

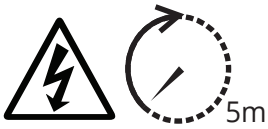
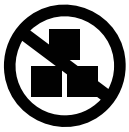
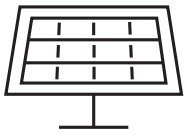
This manual contains essential information for the assembly, installation, commissioning, and maintenance of the Sunsynk Hybrid Inverter. It must be retained for future reference and made accessible to all qualified personnel involved in the operation and maintenance of this product.

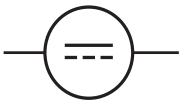
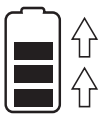
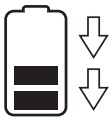
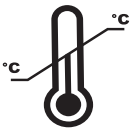
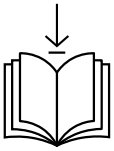
SAFETY

General Safety

- This device must be used only as described in this manual and in compliance with all local, regional, and national laws and regulations. Ensure that installation, operation, maintenance, and repair are only performed by qualified personnel who have read and fully understood this manual. The manual should be passed to any third party who handles the device.
- DO NOT allow minors, untrained personnel, or individuals with physical or mental impairments to operate or maintain this device. Only trained individuals should interact with the device during installation, operation, or maintenance. If untrained individuals are near the device during operation, they must be informed of potential hazards and given proper instructions to avoid injury.
- Periodically inspect the device for any signs of damage or wear. Always ensure that all connections are secure and that there are no exposed wires or components that may pose a risk of electric shock.

Symbols/Safety Signs

Symbol	Description	Symbol	Description
	Risk of danger.		Warning: Hot surface.
	Risk of electric shock. DO NOT touch the terminal or remove the shell within 5 minutes after disconnecting all power.		The battery is heavy and can cause injury if not handled safely.
	This product's batteries contain an explosive, self-reactive material that could blow up when heated.		Do not disassemble or alter the battery in any way. Do not strike or puncture the battery.
	Do not place near open fire or incinerate. Do not use near heaters or hot temperature sources.		ONLY qualified personnel should install or perform maintenance work on the units.
	Be careful when touching the inverter.It is an electrical product with risk of electric shock and heating.		Warranty void if seal is broken.
	Do not step, stand, or climb on this surface.		Avoid unsuitable shoes for installing and operating the inverter.
	Do not step or put any objects onto the battery.		Do not drop, deform, or impact the battery.
	Single-phase.		Three-phase.
	Protective conductor terminal or earth ground terminal.		Rechargeable.
	Do not submerge the battery in water or expose it to moisture or liquid.		Keep out of reach of children, animals, and insects.
	Do not expose the product to sunlight.		Inverter DC to AC.
	Li-ion battery.		Net weight in kilograms.
	**BATTERY INPUT** Battery Discharge Voltage, Battery Discharge Current, Input Voltage Type, Battery Discharge Power.		**PV INPUT** PV Input Voltage, Number of MPPT's, MPPT Input Current & Max PV ISC.

Symbol	Description	Symbol	Description
	Direct current.		Indicates that this product is recyclable.
	**AC OUTPUT** Output Voltage, Input Voltage Type, Ac Output Rated Current, Max AC Current, Output Frequency, Max AC ISC, Power Factor & AC Output Rated Power.		**CONTINUOUS OUTPUT CURRENT** Maximum Continuous Output Current, Output Frequency and Voltage, & AUX (programmable AC output on battery SOC).
	Charging.		Discharging.
	Follow the indicated temperatures.		**TEMPERATURE** Ambient, Min & Max.
	**MANUAL DOWNLOAD** Download the latest version of the instruction manual by scanning the QR code.		**WARRANTY REGISTRATION** Scan the QR code to access our website and sign up for the manufacturer's warranty.
	Do not dispose the device, accessories, and packaging with regular waste. Follow local ordinances or contact the manufacturer for disposal guidance.		Refer to the operating instructions. Contact the supplier within 24 hours if there is anything wrong. In case of leakage contact with eyes or skin, immediately clean with water and seek help from a doctor.
	CE mark is attached to the solar inverter to verify that the unit follows the provisions of the European Low Voltage and EMC Directives.		The UKCA marking is used for products placed on the market in Great Britain (England, Scotland and Wales). The UKCA marking applies to most products for which the CE marking could be used.

Safety Instructions

This section provides essential safety and operational guidelines. Please read carefully and keep this manual for future reference.

DANGER

Electric Shock Hazard from Live Components or DC Cables

- DC cables from a battery or PV (photovoltaic) module can be live. This is a serious electric shock risk.
- Before you do any work, disconnect all power sources from the system. Make sure power cannot be reconnected accidentally.
- Do not touch bare (non-insulated) parts or cables.
- Always use your personal protective equipment (PPE) suitable for high voltage work.

Electric Shock Risk from Touching an Ungrounded PV Module or Array Frame

- Touching ungrounded PV modules or array frames may result in fatal electric shock.
- Ground the PV modules, array frame, and all electrically conductive surfaces properly. Follow local safety regulations to ensure safety.

Risk of Electric Shock Due to Ground Fault

- Ground faults can leave parts of the system live, creating a significant electric shock risk.
- Disconnect the system from all voltage sources and wait for five minutes before touching any parts of the system.
- Only touch the cables by their insulated parts to avoid contact with live conductors.

Risk of Fire or Explosion from Flammable Atmospheres

- Do not place the inverter in areas with flammable or explosive gas or smoke, and do not perform any operations in such environments.
- Do not store flammable or explosive materials near the inverter.
- Keep the inverter away from heat sources and fire sources. Examples include fireworks, candles, and heaters. This can damage the inverter or cause a fire.

Hazard from Conductive or Magnetic Dust

- Do not install the inverter in environments with metal or magnetic conductive dust, as this may cause dangerous short circuits or fires.

Risk of Electric Shock or Damage from Flooding

- Do not install the inverter in areas prone to flooding or where water can accumulate.
- The installation site's ground level must be above the highest known water level in the area. Flooding can cause severe electric shock or irreparable damage.

WARNING

Fire or Explosion Risk from Charging Fully Discharged Batteries

- Never charge a fully discharged battery. Attempting to do so may cause fire or explosion.
- Verify the battery's charge status before commissioning the inverter. If the battery is fully discharged, contact the manufacturer for further guidance.

Electric Shock Risk Due to Missing Surge Protection in Case of Overvoltage

- Ensure surge protection devices are in place to prevent damage from overvoltage (e.g., lightning).
- Verify that all devices in the system, including the inverter and battery, are connected to the surge protection network before use.

Electric Shock Risk from Measuring Device Damage Due to Overvoltage

- Use measuring devices only with voltage ranges suitable for the inverter's output and the battery's maximum DC voltage.
- Do not use devices not rated for the inverter's voltage range as this may result in electric shock.

Risk of Damage or Short Circuit from Liquids

- Install the inverter in a dry area, away from liquids.
- Do not install the inverter under water pipes, air outlets, air conditioner ports, air vents, or cable windows where water or condensation could enter.
- Liquid entering the inverter can cause faults, short circuits, electric shock, or fire.

Risk of Overheating or Fire from Blocked Ventilation

- When the equipment is running, do not block the vents or heat dissipation system, and do not cover the inverter with any objects.
- Ensure there is adequate clearance around the inverter for airflow (minimum 20 mm between units).
- Blocked ventilation can cause high temperatures, damaging the equipment or causing a fire.

Risks from Operating in Bad Weather

- Do not install, use, or work on outdoor equipment or cables in bad weather. Bad weather includes thunderstorms, rain, snow, or strong winds.
- This applies to carrying equipment, operating equipment, connecting or disconnecting cables, working at height, and opening the inverter enclosure.

Performance and Safety Risks from Harsh Environments

- Do not install in environments with:
  - Dust, smoke, or volatile gases
  - Corrosive gases or fumes
  - High salt concentrations (e.g., coastal areas without rated protection)
  - Infrared radiation or organic solvents
  - Fungi, mould, or other microorganisms
  - Strong vibrations, excessive noise, or strong electromagnetic fields

CAUTION

Burn Hazard from Hot Inverter Parts

- Inverter housing and internal components can become hot during operation.
- Avoid touching the inverter during operation. Wait for the unit to cool down before handling.

Prevent Cable Obstruction of Airflow

- Do not allow cables to pass through the inverter's air inlet or outlet, as this can block airflow, cause overheating, or create trip hazards.

Adhere to Specified Operating Conditions

- Only install and operate the inverter within its specified technical limits (e.g., temperature, altitude, humidity). Refer to the "Technical Specifications" section.
- Operating outside these limits can affect performance, reduce lifespan, and void the warranty.

Ensure Solid and Stable Installation Ground

- Ensure the installation ground is solid and level. Avoid unstable ground like soft soil or areas prone to sinking (subsidence). This prevents the inverter from becoming unstable or falling.

Ensure Adequate Mounting Surface Strength

- Make sure the mounting surface (wall or floor) is strong enough to hold the inverter's weight securely. An insecure mounting can cause injury or damage if the inverter falls.

Prevent Debris Ingress During Maintenance

- Before opening the inverter door for installation, operation, or maintenance, clear any water, snow, ice, or debris from its top surface. This stops debris from falling inside and damaging components.

NOTICE

Installation and Operating Environment Requirements

- Store and operate the inverter in a clean, dry, well-ventilated location within the temperature and humidity limits specified in the "Technical Specifications" section.
- Do not operate outside these limits, as performance and lifespan may be affected.

Compliance with Laws and Standards

- Site selection must comply with local laws, regulations, and applicable installation standards.

Mounting Surface Strength

- Ensure the mounting surface is solid, stable, and strong enough to support the inverter's weight.

Clearing Packaging Materials

- Remove and properly dispose of all packaging materials (e.g., boxes, foam, plastic sheeting, cable ties) after installation in accordance with local waste regulations.

Professional Risk Assessment Advice

- If unsure about environmental conditions or site suitability, contact a qualified survey company for a site audit or risk assessment.

Disposal of this Product

- Do not dispose of the inverter with household waste.
- Follow local electronic waste (e-waste) disposal regulations. Contact your supplier or local waste authority for assistance.

PRODUCT INTRODUCTION

The Sunsynk Three-Phase 50 kW Hybrid Inverter is a multifunctional energy solution that integrates an inverter, solar charger, and battery charger into a single compact and efficient unit. Designed to provide uninterrupted power support, it enables seamless integration of solar energy generation, battery storage, and grid connection, making it an ideal solution for residential and small commercial solar energy systems.

This versatile inverter supports both grid-tied and off-grid configurations, offering flexibility in energy management. It optimises solar energy use by allowing users to store surplus power for later use, thereby reducing dependence on the grid and lowering electricity costs.

Key Features

INTERACTIVE & USER-FRIENDLY:

- Colourful touch LCD display: Easy-to-understand, interactive display with real-time monitoring of system performance and power flow.
- Wi-Fi and GSM monitoring: Provides remote monitoring capabilities through Wi-Fi or GSM, allowing users to track system data from anywhere.
- Visual power flow screen: Displays the power flow between the solar panels, battery, inverter, and grid in a clear and simple visual format.
- MPPT inputs: BM3 features three MPPT inputs, each supporting two string connections. BM4 includes four MPPT inputs with two string connections per input, ensuring optimal energy capture.
- PV DC Switch 1: Connects/Disconnects PV Input 1&2. PV DC Switch 2: Connects/Disconnects PV Input 3&4.
- Smart settable 3-stage MPPT charging: Optimises battery charging with a smart 3-stage MPPT (Maximum Power Point Tracking) charging system to ensure efficient energy use and battery health.
- Auxiliary load function: Allows for managing additional loads within the system, providing flexibility for more complex installations.

COMPATIBLE & VERSATILE:

- Supports multiple power sources: Compatible with main electrical grid voltages, power generators, and wind turbines, providing flexibility for various energy sources.
- Pure sine-wave output: Delivers a 230/400 V three-phase, pure sine-wave output, ensuring smooth operation of sensitive electronics and appliances.
- Load compatibility: The inverter can power both single-phase and three-phase loads, offering versatile energy support for various applications.
- Self-consumption & grid feed-in: Supports both self-consumption (using generated solar energy) and feeding excess power back into the grid, reducing energy bills and increasing efficiency.
- Auto restart on AC recovery: Automatically restarts when AC power is restored, ensuring uninterrupted power supply after grid failures.
- System compatibility: The inverter can be DC and AC coupled, allowing for easy retrofit of existing solar systems.
- Battery compatibility: The inverter is compatible with high-voltage batteries, supporting an operating battery input voltage range of 500-800 Vdc.

CONFIGURABLE & FLEXIBLE:

- Fully programmable controller: Offers full programmability for battery/grid supply priority, enabling users to control energy flow based on personal preferences.
- Multiple operation modes: Select from on-grid, off-grid, or UPS modes, allowing flexible use in various environments such as homes, offices, and remote locations.

- Configurable battery charging: Adjust charging current/voltage settings via the LCD display based on specific application requirements, ensuring the optimal charging profile for different battery types.
- AC/Solar/Generator charger priority: Customise charging priority settings for solar, AC, or generator inputs via the LCD for maximum flexibility.

SECURE & RELIABLE:

- Overload, over-temperature, and short-circuit protection: Built-in protections to prevent damage to the inverter and connected components, ensuring long-term reliability.
- Smart battery charger design: Optimised charging design to protect the battery from overcharging and undercharging, extending battery life and enhancing performance.
- Power limiting function: Prevents excess power overflow to the grid, ensuring compliance with local regulations and optimising energy use.

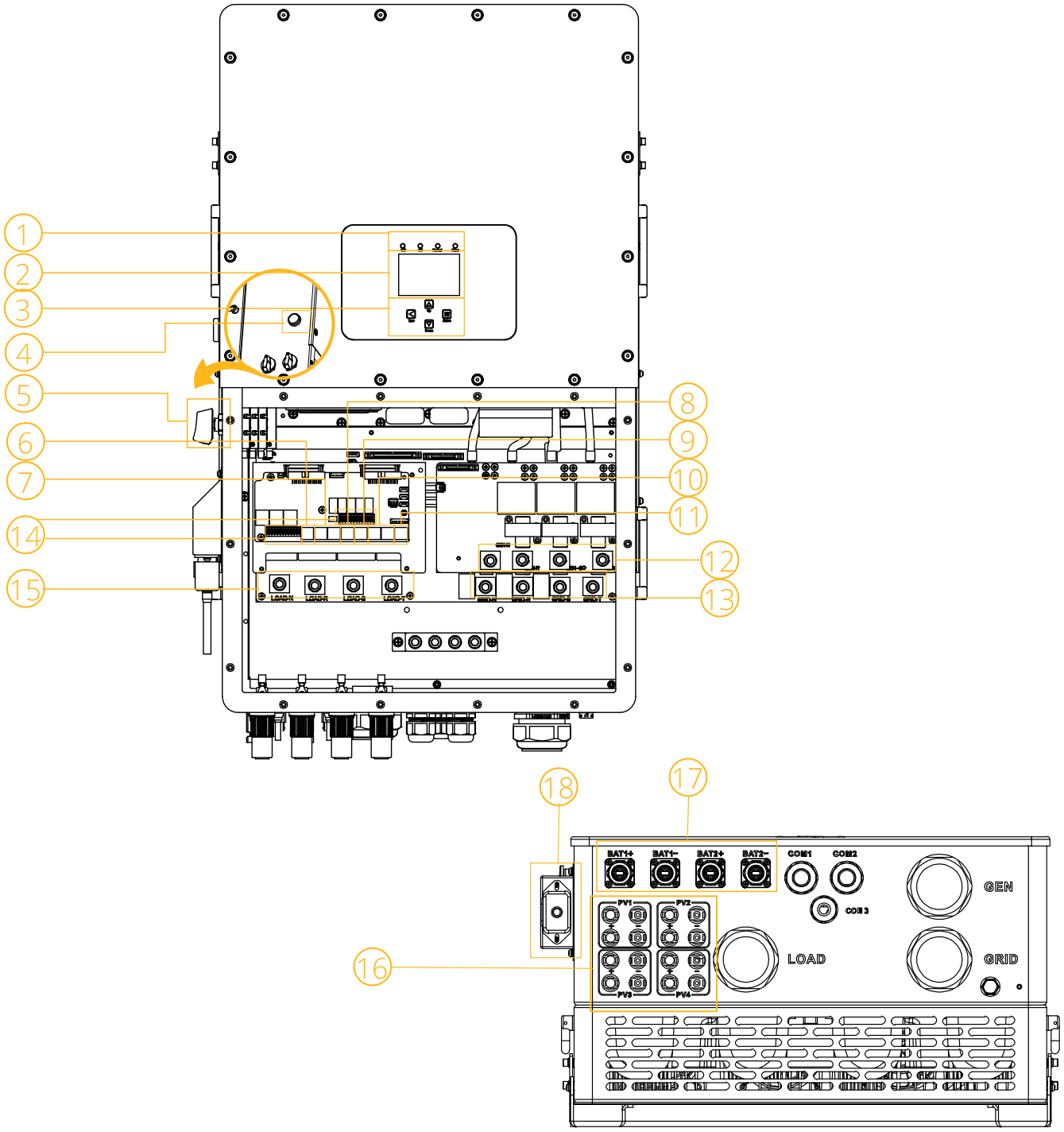
APPLICATIONS:

- Marine (vessel power management): Ideal for managing power on boats and ships, offering a reliable source of energy for marine systems.
- Power shedding (home/office/factory): Perfect for applications requiring power shedding, such as in homes, offices, and factories, to manage energy consumption and ensure availability.
- UPS (fuel-saving systems): In UPS systems, it minimises fuel consumption by efficiently managing battery and grid power usage, reducing operational costs.
- Remote locations: Suitable for off-grid applications in remote areas, integrating solar, battery, and generator power to provide reliable energy in isolated locations.
- Construction sites & military locations: Provides temporary power solutions for building sites, military installations, and other mobile or temporary infrastructure.
- Telecommunications: Offers reliable backup power for telecommunication towers, ensuring continuous operation even during power outages.

ADDITIONAL FEATURES:

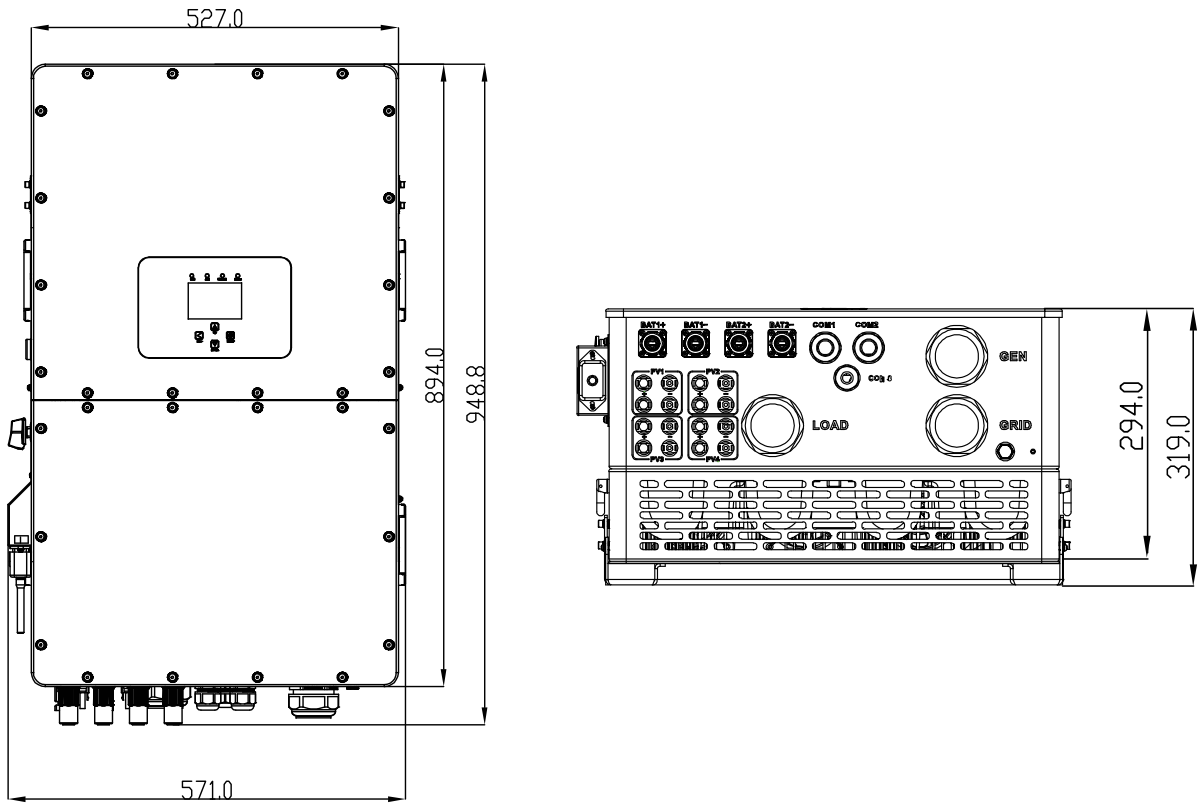
- Supports parallel connections: Can connect up to 10 inverters in parallel for both on-grid and off-grid applications, supporting large-scale installations and multiple battery banks.
- Max charging/discharging current: 50 A + 50 A for 29.9/30/35/40/50 kW model. Provides efficient energy storage and retrieval for the inverter.
- 6 time periods for battery charging/discharging: Users can set specific time periods for optimised charging and discharging cycles, maximising battery life and operational efficiency.

System Overview

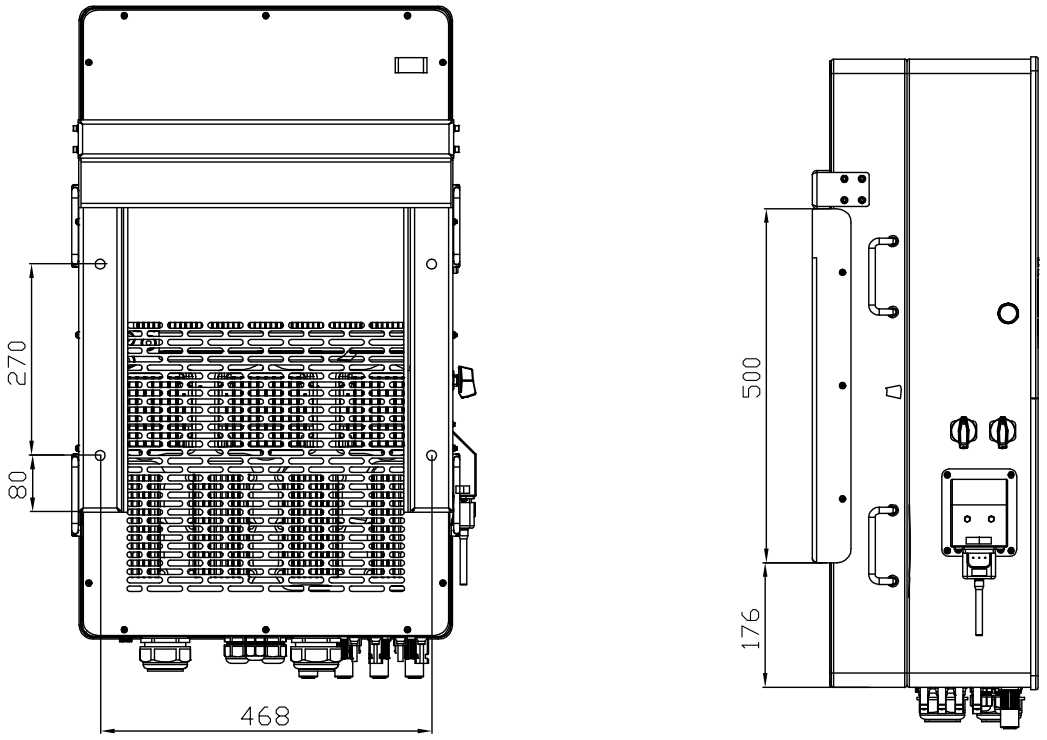


1. Inverter Indicators
2. LCD Display
3. Function Buttons
4. Power on/off button
5. DC switch
6. Meter Port
7. Parallel Port
8. CAN Port
9. DRM Port
10. BMS Port
11. RS485 Port
12. Generator Input
13. Grid
14. Function Port
15. Load
16. PV Input
17. Battery Input
18. WiFi Interface

Product Size



Inverter Size



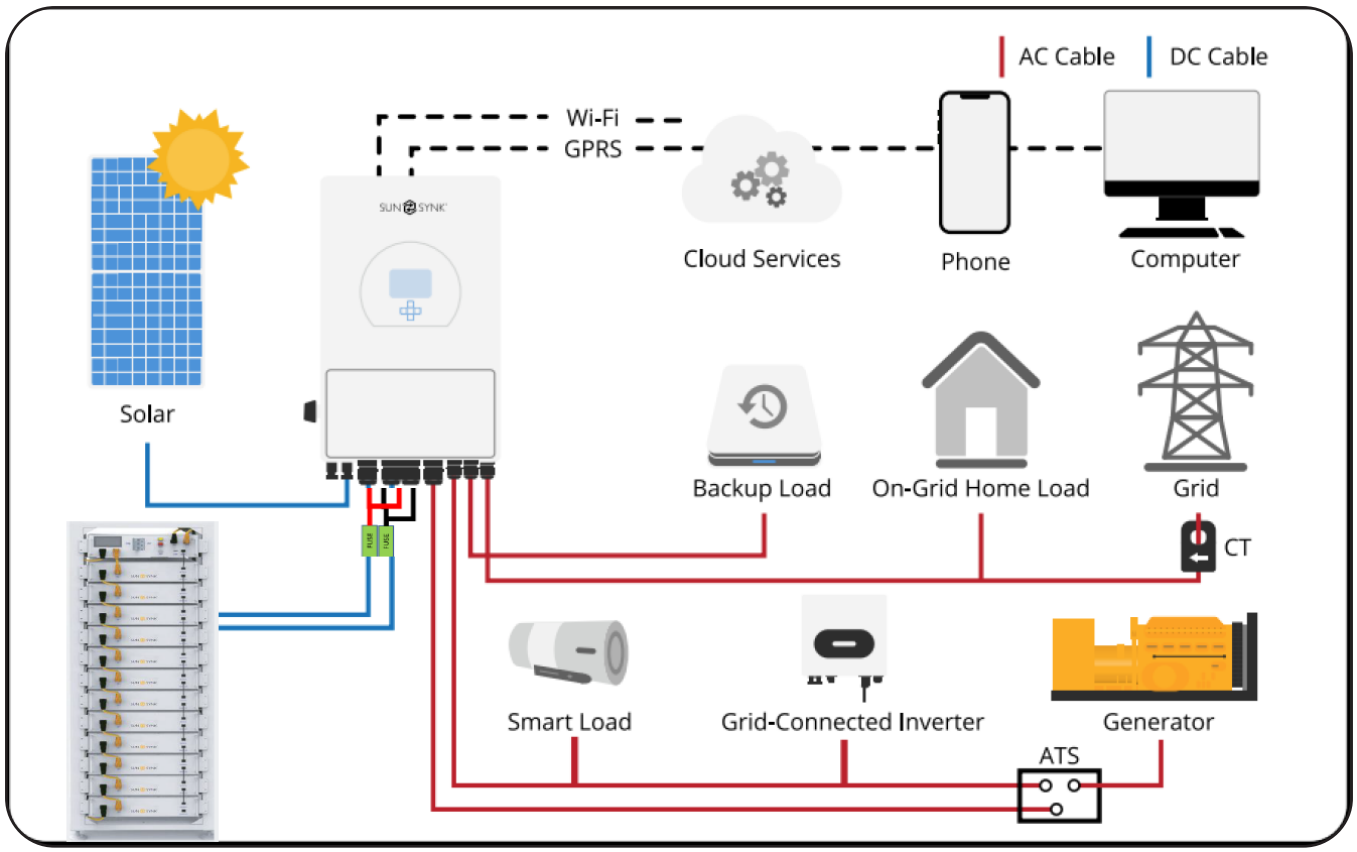
Basic System Architecture

The diagram below illustrates a typical configuration of the Sunsynk 3.6 kW Hybrid Inverter within a complete operational system. The following key components are essential for optimal performance and energy management:

- PV Modules (Solar Panels): Capture sunlight and convert it into DC (direct current) power.
- Sunsynk Hybrid Inverter: Converts the DC power from the solar panels and battery into AC (alternating current) power for household or business use.
- Battery: Stores excess solar energy for use when sunlight is insufficient (e.g., at night or during cloudy days).
- Generator or Utility Grid: Provides power to the system when solar energy and stored battery power are unavailable. It can also serve as a backup power source.
- Grid-Connected Load (AC Loads): Powers everyday household or business appliances such as lights, refrigerators, and other electrical devices.
- Backup Load: Ensures essential appliances (e.g., medical equipment, emergency lighting) continue to operate during power outages.
- Smart Load: Enables efficient energy use by intelligently prioritising or controlling the use of appliances based on available power.

In addition, the system integrates the following features for flexibility and smart operation:

- Wi-Fi/GPRS: Allows remote monitoring of the inverter's performance via a mobile app or cloud-based services.
- Automatic Transfer Switch (ATS): Automatically switches between power sources (e.g., grid, generator, and battery) to ensure a continuous power supply without interruption.



TECHNICAL SPECIFICATIONS

Model	SUNSYNK-29.9K-SG01HP3-EU-BM3	SUNSYNK-30K-SG01HP3-EU-BM3	SUNSYNK-35K-SG01HP3-EU-BM3	SUNSYNK-40K-SG01HP3-EU-BM4	SUNSYNK-50K-SG01HP3-EU-BM4
Battery Input Data					
Battery Type	Lithium-ion				
Battery Voltage	160~800V				
Max. Charging Current	50+50A				
Max. Discharging Current	50+50A				
Max. Charging/Discharging Power	29900W	33000W	38500W	44000W	55000W
Charging Strategy for Li-Ion Battery	Self-Adaptation to BMS				
Number of Battery Input	2				
PV String Input Data[1]					
Max. PV Input Power	38870W	39000W	45500W	52000W	65000W
Max. PV Input Voltage	1000V				
Start-up Voltage	180V				
MPPT Range	150~850V				
Full Load MPPT Voltage Range	360-850V		420-850	360-850V	450-850V
Rated PV Input Voltage	600V				
Max. Input Short Circuit Current	55+55+55A			55+55+55+55A	
Max. Operating PV Input Current	36+36+36A			36+36+36+36A	
No. of MPPT/No. of String per MPPT	3/2+2+2			4/2+2+2+2	
Max. Inverter Backfeed Current To the Array	0				
AC Output Data					
Rated AC Input/Output Active Power	29900W	30000W	35000W	40000W	50000W
Max. AC Input/Output Apparent Power	29900W	33000W	38500W	44000W	55000W
Peak Power (off-grid)	1.5 times rated power, 10sec				
Rated AC Input/Output Current	45.4/43.4A	45.5/43.5A	53.1/50.8A	60.7/58.0A	75.8/72.5A
Max. AC Input/Output Current	45.4/43.4A	50/47.9A	58.4/55.8A	66.7/63.8A	83.4/79.8A
Max. Continuous AC Passthrough (grid to load)	200A				
Max Three Phase Unblanaced Output Current	60A			70A	83.4A
Rated Input/Output Voltage Range	220/380V, 230/400V 0.85Un-1.1Un				
Grid Connection Form	3L+N+PE				
Rated Input/Output Grid Friquency	50Hz/45-55Hz, 60Hz/55-65Hz				
Power Factor Adjustment Range	0.8 leading to 0.8lagging				
Total Current Harmonic Distortion THDi	<3% (of nominal power)				
DC Injection Current	<0.5% In				
Efficiency					
Max. Efficiency	97.60%				
Euro Efficiency	97.00%				
MPPT Efficiency	>99.00%				
Communication					
Communication Interface	RS485/RS232/CAN				
Monitor Mode	GPRS/WIFI/Bluetooth/4G/LAN(optional)				
Protection					
Integrated	DC Polarity Reverse Connection Protection, AC Output Overcurrent Protection, AC Output Overvoltage Protection, AC Output Short Circuit Protection, Thermal Protection, DC Terminal Insulation Impedance Monitoring, DC Component Monitoring, Ground Fault Current Monitoring, Power Network Monitoring, Island Protection Monitoring, Earth Fault Detection, DC Input Switch, Overvoltage Load Drop Protection, Residual Current (RCD) Detection, Surge protection level				
Surge Protection Level	TYPE II (DC), TYPE II (AC)				

Certifications and Standards	
Grid Connection Standard	EN 50549-1, AS-NZS 4777.2, NRS 097-2-1; Additional connections available upon request
EMC/Safety Standards	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2
General Data	
Operating Temperature Range	-40 to +60ºC, >45ºC Derating
Permissible Altitude Humidity	0~100%
Permissible Altitude	2000m
Noise	<65 dB
Ingress Protection (IP)	IP65
Protective Class	Class I
Inverter Topolgy	Non-Isolated
Over Voltage Category	OVC II (DC), OVC III (AC)
Size	527*894*294mm
Weight	80kg
Warranty	5 years (10 when installed with a Sunsynk battery)
Type of Cooling	Intelligent Cooling
Pollution degree	PD2 (Inside) PD3 (Outside)
Manufacturer Country	China

[1] The inverter's minimum operating voltage (180V) refers to the threshold at which the inverter powers on, while the MPPT voltage range (150V–850V) defines the range within which the MPPTs actively track and optimize power. These values are not the same and serve different operational purposes.

NOTICE

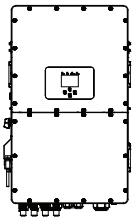
Safe Transport and Handling of the Inverter

When transporting the equipment, always use its original packaging and keep it intact as a complete unit. Store the product in a dry environment, avoiding direct sunlight, and maintain a temperature range between -40°C and 60°C. As the equipment can be quite heavy, always consider its total weight when moving, transporting, or installing it, ensuring that the installation site has adequate load-bearing capacity. Transporting and installing the inverter should only be carried out by qualified personnel.

INSTALLATION

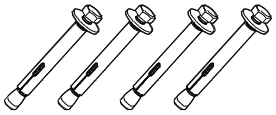
Parts List

Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the items in the following package:

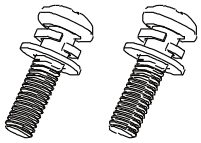


Hybrid Inverter x1

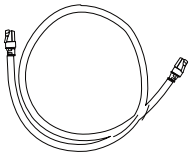
Wall Mounting Bracket x1



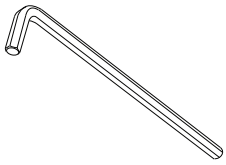
Stainless Steel Anti-Collision Bolt M12x60 x4



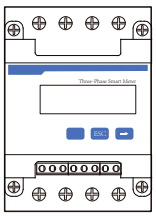
Stainless Steel Mounting Screws M4*12 x2



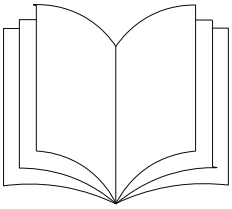
Parallel Communication Cable x2



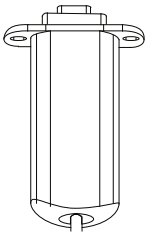
L-type Hexagon Wrench x1



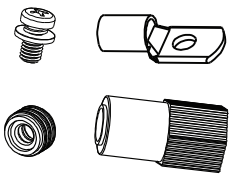
Meter (Optional) x1



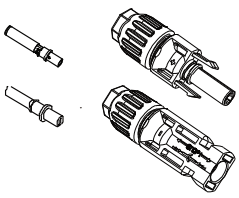
User Manual x1



Data Logger x1

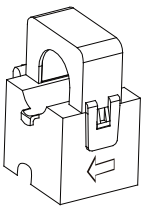


Battery Plug Connectors x4

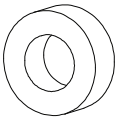


DC+/DC- Plug Connector Including Metal Terminal xN

T-type Wrench x1



Sensor Clamp x3

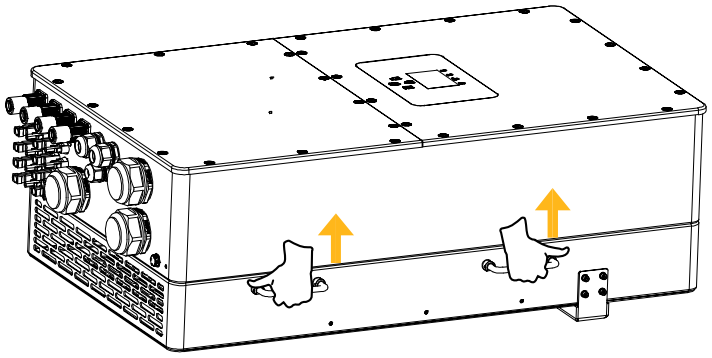


BMS Magnetic Ring x2

SUN SYNK

Product Handling Requirements

Lift the inverter out of the packing box and transport it to the designated installation location.



Transport

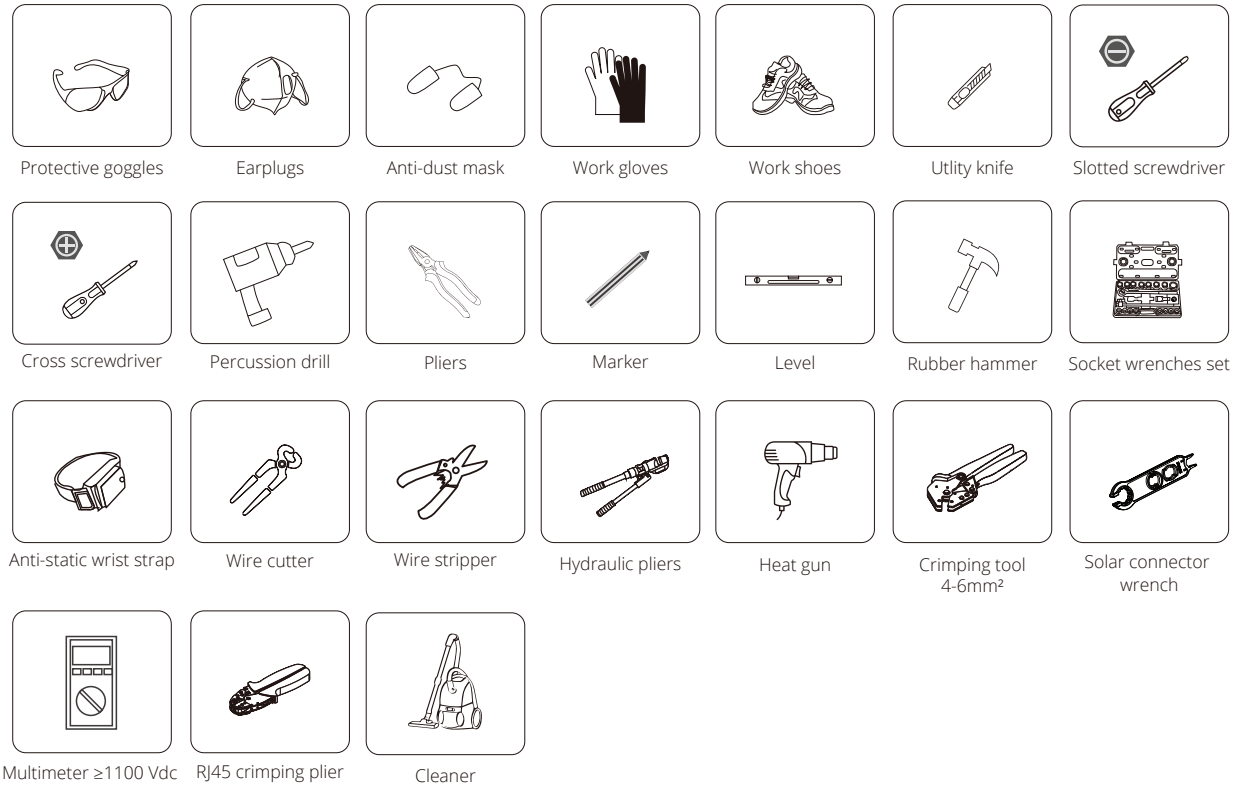
WARNING

Improper handling can result in personal injury!

- Ensure an adequate number of personnel are present to lift the inverter safely, considering its weight. Installation personnel should wear protective gear, including anti-impact shoes and gloves.
- Avoid placing the inverter directly on hard ground, as this can damage its metal enclosure. Use protective materials like sponge pads or foam cushions underneath the inverter.
- Move the inverter with one or two people or utilise appropriate transport tools.
- When moving the inverter, always hold it by the handles. Do not attempt to move it by holding the terminals.

Installation Tools

Installation tools can include the following recommended items. Additionally, utilise any other auxiliary tools available on-site.



Selecting the Mounting Area

The Sunsynk Hybrid Inverter is rated IP65 and is suitable for outdoor installation. However, do not install the inverter in the following locations:

- Coastal or high-salt areas: Salt can corrode metal parts and allow moisture to enter the unit.
- Kitchens or oily environments: Oil mist, steam, or splashed liquids can damage plastic parts and compromise the inverter's sealing.
- Chemically active areas: Avoid areas with sulphuric gases, chlorine, acids, or alkalis, which can corrode internal copper components and reduce electrical conductivity.
- Flammable or explosive atmospheres: Do not install near areas with a risk of gas leaks, flammable dust, paint thinners, or volatile chemicals.
- Enclosed gas-prone spaces: Avoid spaces where leaked gases may collect around the inverter, as this presents a fire risk.
- Animal-exposed areas: Do not install where animals may urinate or where ammonia is present, as this can damage internal components.
- High altitude: Installation above 2,000 metres (sea level) is not recommended due to reduced cooling efficiency and potential derating.
- Excessive humidity: Do not install in environments with humidity levels above 95%.
- Poor air circulation: Ensure there is sufficient ventilation to allow for proper cooling.

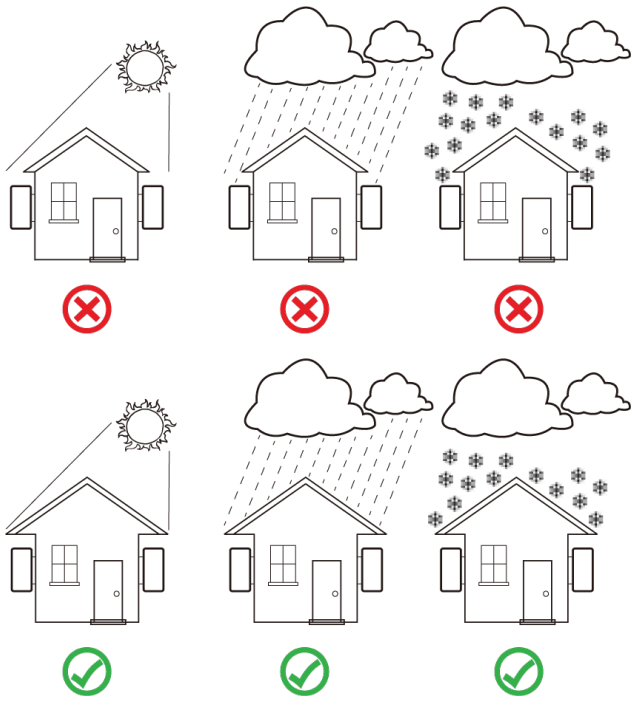
DANGER

Risk of Fire or Explosion

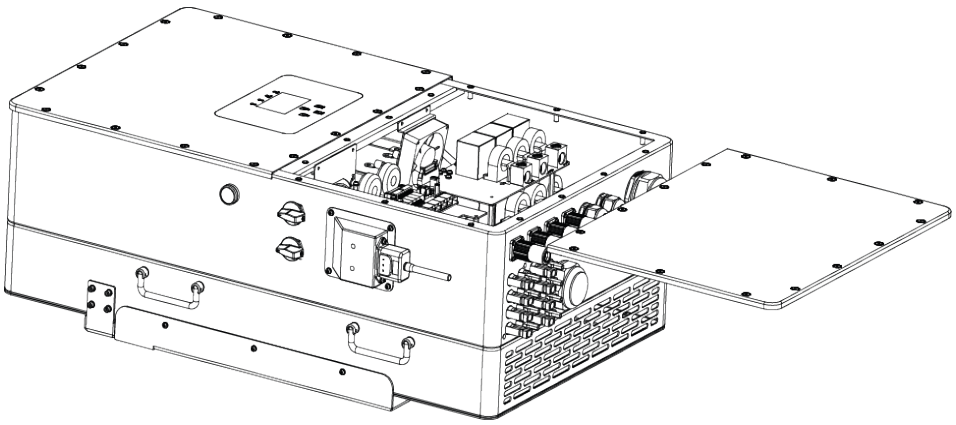
- Despite careful construction, electrical devices can cause fires, resulting in death or serious injury.
- Do not mount the system in areas containing highly flammable materials or gases.
- Do not mount the system in potentially explosive atmospheres.

NOTICE

Avoid direct sunlight, rain, or snow accumulation during installation and operation. These environmental factors may reduce the inverter's efficiency and lifespan.



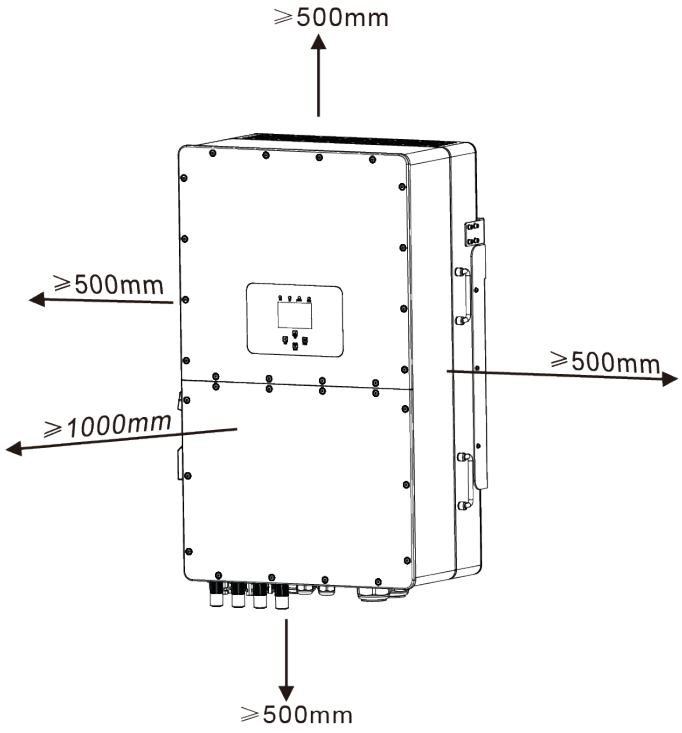
Before connecting any wires, remove the inverter's metal cover by loosening the screws, as shown in the diagram below.



INSTALLATION GUIDELINES

- Install on a vertical wall: Choose a vertical wall with sufficient load-bearing capacity, such as concrete or another non-flammable surface. This will ensure proper stability.
- Mount at eye level: Position the inverter at eye level to allow easy access to the LCD display for continuous monitoring and configuration.
- Temperature range: Ensure the ambient temperature is between -40°C and 60°C for optimal inverter performance.
- Clearance for heat dissipation: Ensure there is adequate clearance around the inverter for heat dissipation and ease of wire management:
  - 500 mm clearance on each side
  - 500 mm above and below the unit
  - 1,000 mm in front of the unit for proper air circulation
- Indoor installation: If installing indoors, ensure the floor height is greater than 1,600 mm to allow proper airflow and clearance.

This layout ensures that the inverter operates efficiently and safely, while also protecting it from potential environmental factors that could reduce its performance or lifespan.



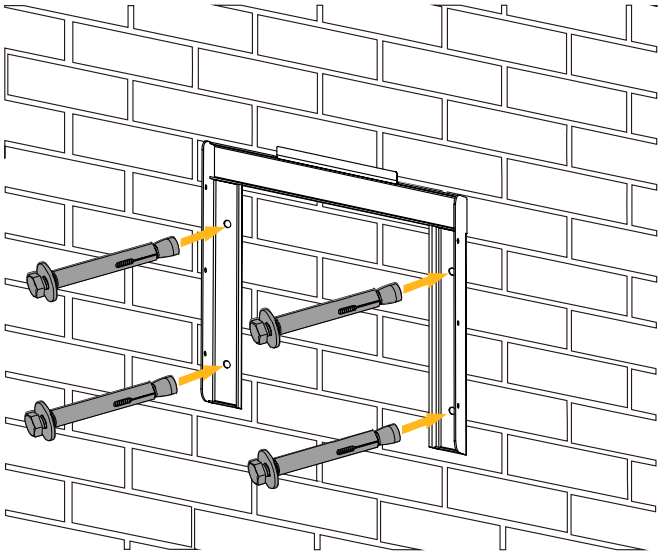
Mounting the Inverter

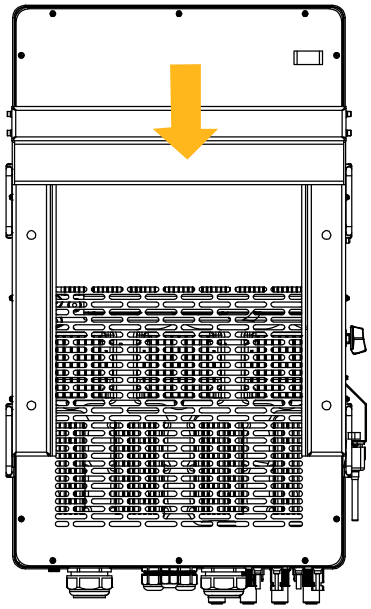
- Prepare the wall for mounting: Select the recommended drill bit (as shown in the image) and drill four holes into the wall to a depth of 62–70 mm.
- Fit the expansion bolts: Use an appropriate hammer to insert the expansion bolts into the drilled holes, ensuring a secure fit.
- Hang the inverter: Carefully lift and hold the inverter, aligning the hanger arms with the expansion bolts. Secure the inverter onto the wall, ensuring it is properly positioned.
- Fasten the expansion bolts: Tighten the heads of the expansion bolts to securely fix the inverter to the wall.

CAUTION

Risk of Injury (Heavy Object)

The inverter is heavy. Ensure the unit is handled carefully during installation, especially when mounting or removing it from the wall. Always use proper lifting techniques, and where possible, have two people assist with the mounting process to avoid injury.





Inverter Hanging Plate Installation

Battery Connection

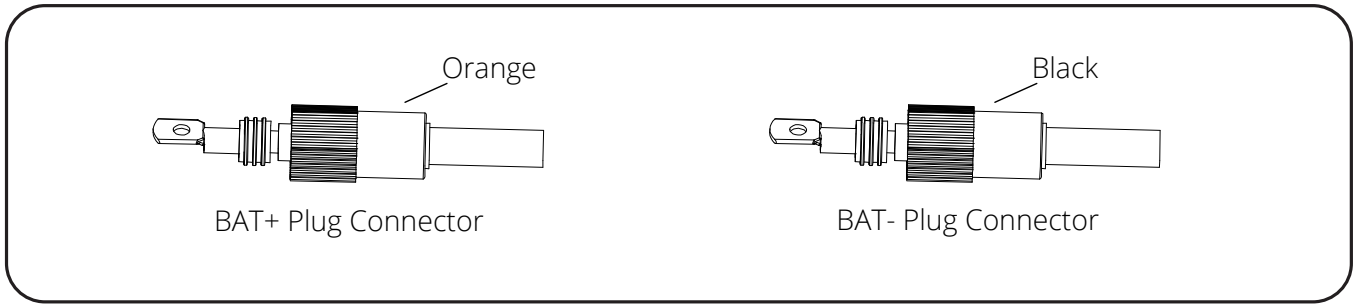
For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. While switching devices may not be necessary in some applications, over-current protectors are still mandatory.

Model	Cross Section (mm^2)	
	Range	Recommended Value
29.9/30/35/40/50kW	10.0~16.0 (6~4AWG)	10.0 (6AWG)

WARNING

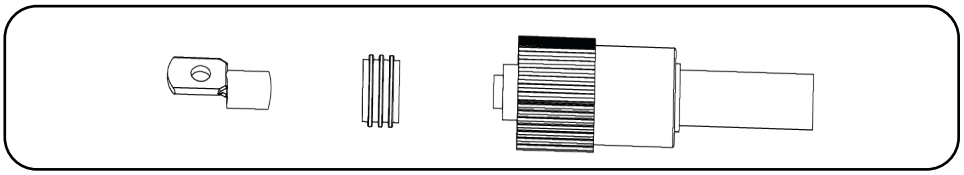
Qualified Personnel Required

All wiring and connections must be performed by qualified personnel. Before making the final DC connection or closing the DC breaker/disconnection device, ensure the inverter unit is wired correctly. A reverse-polarity connection to the battery can cause irreparable damage to the inverter.

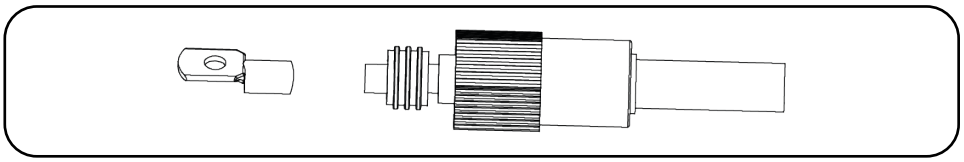


Please follow below steps to implement battery connection:

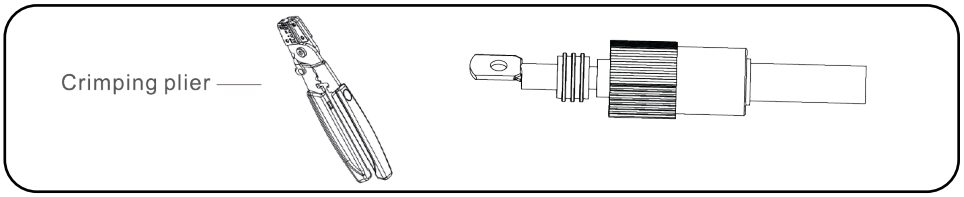
1. Pass the cable through the terminal:



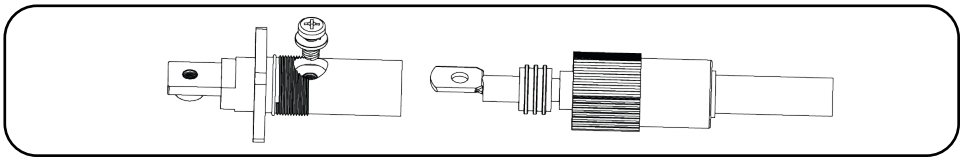
2. Put on the rubber ring:



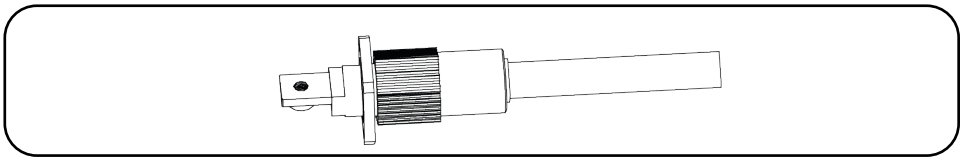
3. Crimp terminals:

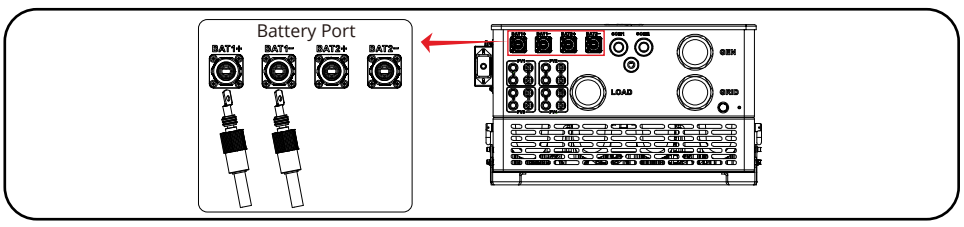


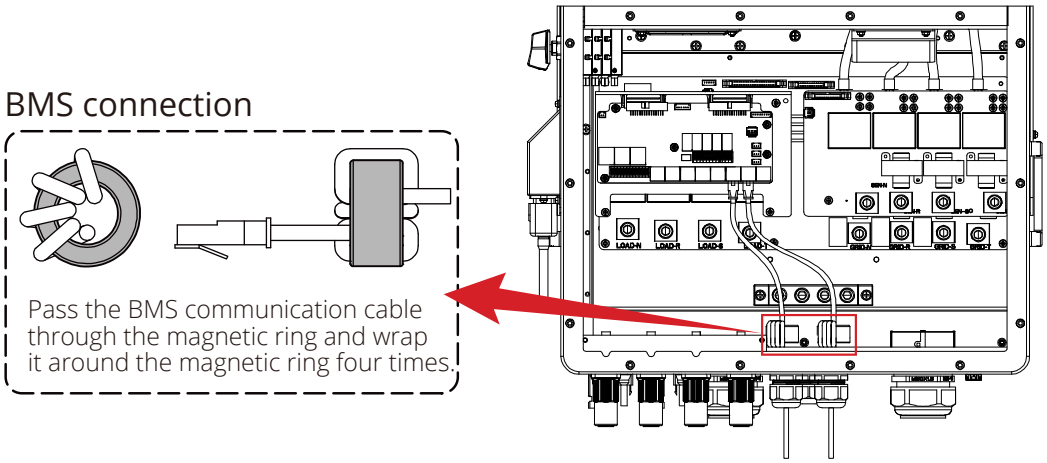
4. Fasten terminal with a bolt:



5. Fasten the terminal with outer cover:







Recommended Batteries

To check which batteries work with this inverter, please refer to the Sunsynk High Voltage (HV) Battery Compatibility Lists.

NOTICE

- Ensure the cable is thick enough to support the current and that the connected fuses are of the correct rating per the battery manufacturers' recommendations.
- If communication between the inverter and the battery BMS is not established, ensure that charging and discharging parameters are manually configured according to the battery manufacturer's specifications.
- Overcharging or exceeding current limits can damage the battery and void warranties.
- Most lithium batteries have a maximum continuous current limit of around 100 A. Some models may support higher or lower limits. Always check the battery datasheet to confirm allowable voltage and current ranges.
- Ensure all DC cables are appropriately sized to carry the expected current without overheating.
- Use correctly rated fuses or breakers as specified by the battery manufacturer to maintain system safety and compliance.

Recommended DC Battery Protection

DC battery protection is a crucial component of any solar energy system that includes batteries and inverters. It ensures the safe operation of the system by protecting against electrical faults such as overcurrent, short circuits, and reverse polarity.

The key components of DC battery protection typically include fuses, circuit breakers, and isolators, all of which help prevent equipment damage, electrical fires, or personal injury.

OVERCURRENT PROTECTION (FUSES & CIRCUIT BREAKERS)

- Fuses or circuit breakers are installed to protect the battery and the inverter from overcurrent situations.
- An overcurrent protector (usually a fuse or circuit breaker) prevents excessive current flow that could damage the inverter or battery. If the current exceeds a safe level, the fuse blows or the breaker trips, stopping the flow of electricity.

ISOLATOR SWITCHES

- Isolator switches allow the user to disconnect the battery from the rest of the system for maintenance, troubleshooting, or emergency situations.
- The isolator switch typically works in conjunction with the fuse or circuit breaker, ensuring that the system is properly isolated and safe for working.

VOLTAGE AND REVERSE POLARITY PROTECTION

- Voltage regulators or protection circuits are often installed to prevent damage caused by voltage spikes.
- Reverse polarity protection ensures that if the positive and negative terminals are connected incorrectly, it will not cause damage to the inverter or battery. This is critical to prevent costly repairs.

EARTH FAULT ALARM AND MONITORING

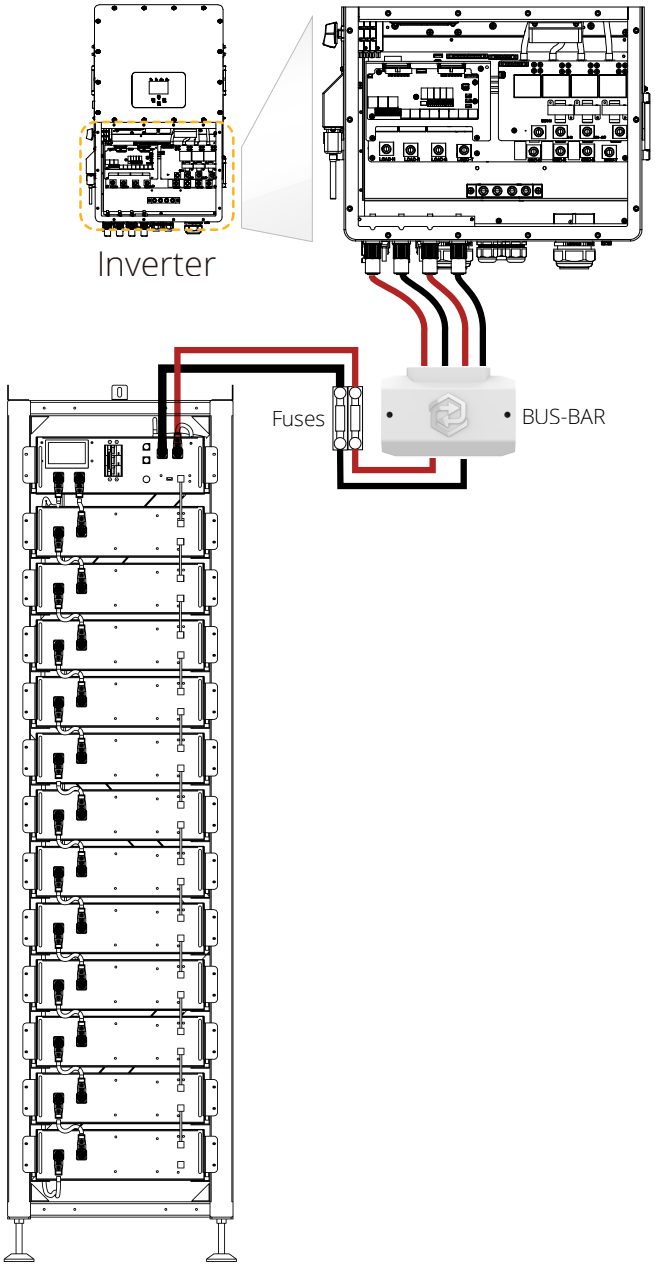
WARNING

To ensure safe operation and compliance, install an external earth fault alarm and monitoring device on the battery system if required by local regulations or project specifications.

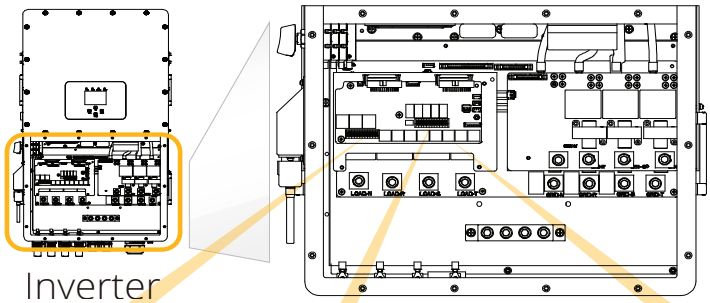
- Always refer to the battery manufacturer's manual for correct earth fault monitoring procedures.
- Follow the battery manufacturer's specified earth leakage levels that indicate a fault condition.

NOTICE

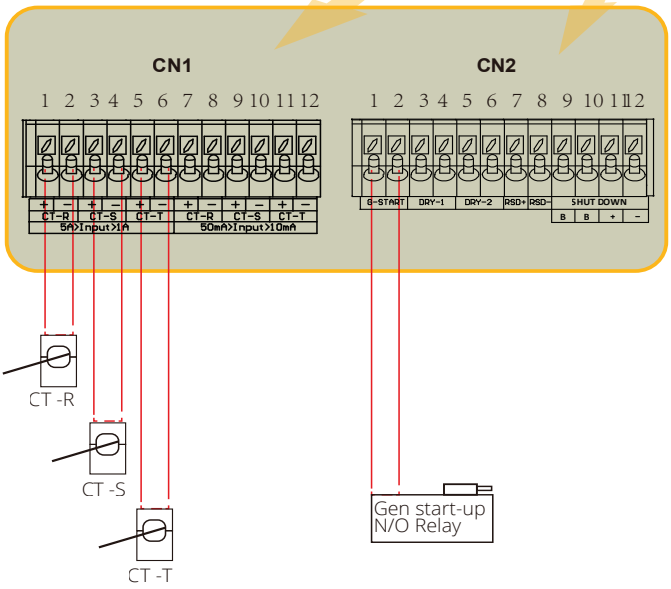
This inverter is compatible with various battery systems listed in the Battery Compatibility list.
When using batteries from any manufacturer, the battery manufacturer's instructions must be followed for earth fault monitoring and earth leakage fault level settings.

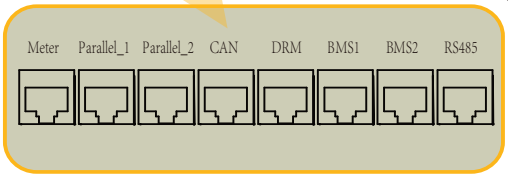


Function Port Definition



Inverter





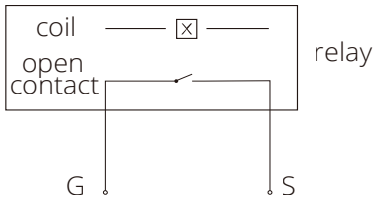
Meter: For energy meter communication.
Parallel A: Parallel communication port 1 (CAN interface).
Parallel B: Parallel communication port 2 (CAN interface).
CAN: Reserved.
DRM: Logic interface for AS/NZS 4777.2:2020.
BMS1: BMS port for battery communication port 1.
BMS2: BMS port for battery communication port 2.
RS485: RS485 port.

CN1:

CT-R (1,2,7,8): Current transformer (CT-R) for "zero export to CT" mode clamps on L1 when in three phase system.
CT-S (3,4,9,10): Current transformer (CT-S) for "zero export to CT" mode clamps on L2 when in three phase system.
CT-T (5,6,11,12): Current transformer (CT-T) for "zero export to CT" mode clamps on L3 when in three phase system.

CN2:

G-Start (1,2): Dry contact signal for startup the diesel generator. When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).
Dry-1 (3,4): Dry contact output. When the inverter is in off-grid mode and the "Signal ISLAND MODE" is checked, the dry contact will switch on.
Dry-2 (5,6): Reserved.
RSD+, RSD- (7,8): When the battery is connected and the inverter is in "ON" status, it will provide 12Vdc.
SHUT DOWN (9,10,11,12): When the terminal "B" & "B" is short-circuited with additional wire connection, or there is 12Vdc input at the terminal "+ & -", then the 12Vdc of RSD+ & RSD- will disappear immediately.



GS (diesel generator startup signal)

Grid, Load, and Generator Connections

Before connecting the inverter, ensure the installation of dedicated AC breakers on the Grid, Load, and GEN/AUX connections. These breakers ensure safe isolation during maintenance, protect against overcurrent, and enhance system safety.

The inverter system includes three terminal blocks, labelled "Grid", "Load", and "GEN", which must be correctly identified and connected to their respective input and output terminals.

For the 29.930/35/40/50 kW model, a 240 A AC breaker is recommended for the grid and backup load connections.

GEN/AUX, GRID, AND LOAD CONNECTIONS

1. GEN/AUX – Generator Connection: The GEN/AUX terminal connects to a generator or auxiliary power source. It provides an input connection to the inverter, allowing it to receive power from the generator during periods when solar energy is insufficient, ensuring a continued power supply to the system.

   Explanation: The inverter can work in parallel with a generator (e.g., diesel, wind, or hybrid systems) to provide power when the solar system or battery is insufficient. It ensures that the inverter can always keep essential loads powered, regardless of available solar power.

2. GRID – Grid Connection: The GRID terminal operates similarly to a conventional grid-tied inverter. It functions as both an input and an output connection:

   - Input: The inverter receives grid power when solar generation is insufficient or when battery levels are low.
   - Output: The inverter can supply excess energy back to the grid or provide power to non-essential loads when required.

   Explanation: In grid-connected systems, the GRID terminal facilitates power flow both from and to the grid. When there is excess solar power, it can be fed back to the grid, while during cloudy days or at night, the inverter will draw power from the grid to meet energy demand.

3. LOAD – Essential Load Connection: The LOAD terminal is dedicated to connecting essential loads within your system. These typically include critical systems such as:

   - Lighting
   - Security systems
   - Communication systems (e.g., internet or telecommunication devices)

   This ensures that these essential loads receive power directly from the inverter, even during grid outages or when other non-essential loads are disconnected.

   Explanation: By isolating non-essential loads and prioritising essential ones, the system ensures that critical appliances or systems remain operational, even in an off-grid scenario.

WARNING

- During final installation, ensure that a breaker certified according to IEC 60947-1 and IEC 60947-2 is installed with the equipment.
- All wiring must be carried out by qualified personnel to ensure system safety and proper operation.
- Use appropriate cables for the AC input connection as specified below.
- To minimise the risk of injury and ensure safe operation, always use the recommended cables.

Grid connection and backup load connection (Copper wires) (bypass)

Model	Wire Size	Cable (mm²)	Torque Value (max)
29.9/30/35/40/50kW	4/0 AWG	95	28.2Nm

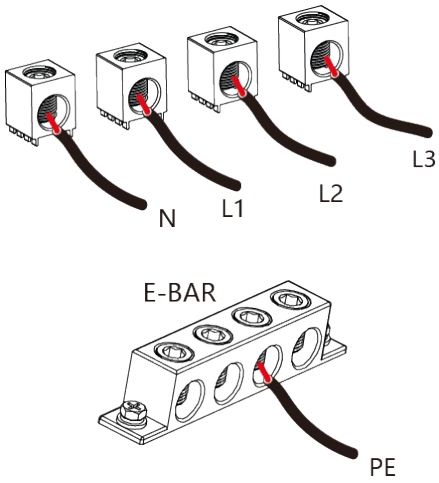
Grid connection and backup load connection (Copper wires)

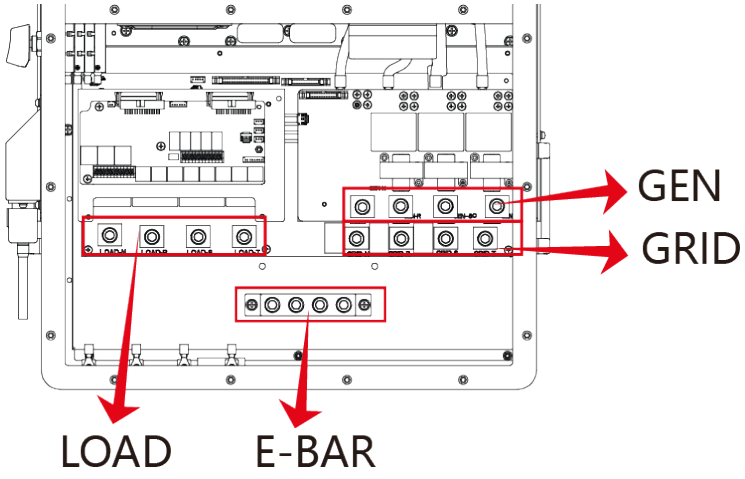
Model	Wire Size	Cable (mm²)	Torque Value (max)
29.9/30/35kW	6 AWG	10	12.4Nm
40kW	4 AWG	16	12.4Nm
50kW	2 AWG	25	16.9Nm

INSTALLATION PROCEDURE

Follow the steps below to complete the AC input and output connections. This procedure must be carried out by qualified personnel.

1. Isolate power sources: Before connecting the Grid, Load, and Generator terminals, ensure that the AC breaker or disconnector is switched off to prevent electrical hazards.
2. Prepare the wires:
   - Strip 10 mm of insulation from each wire end.
   - Loosen the terminal screws and ensure the terminals are ready to receive the wires.





NOTICE

Ensure all AC terminals are securely connected. Loose terminals may cause overheating, arcing, or system faults.

3. Pass through magnetic ring: Thread each AC wire through the magnetic ring as shown in the installation diagram. This step is required for EMC (electromagnetic compatibility) compliance.
4. Connect to terminal block:
   - Insert the wires into the terminal block according to the indicated polarity (L – Live, N – Neutral, PE – Protective Earth).
   - Tighten the terminal screws securely to ensure firm and safe connections. Verify that all wires are correctly and securely fastened.
5. Connect the AC output:
   - Insert the AC output wires into the appropriate terminals, again observing the correct polarity.
   - Connect the Neutral (N) and Earth (PE) wires to their corresponding terminals.

APPLIANCE RESTART WARNING

- Check with the appliance manufacturer to confirm whether a built-in time-delay function is included.
- If no such function is present, the inverter may enter overload protection mode and disconnect the output to protect the appliance.
- However, sudden reconnection without delay can still result in permanent damage to sensitive equipment like air conditioners.

CAUTION

Compressor-based appliances, such as air conditioners, require a restart delay of 2–3 minutes to allow refrigerant pressure to stabilise.

If power is interrupted and restored too quickly, this may damage the appliance's internal components.

Recommendations:

- Always follow proper torque values for secure terminal tightening.
- Ensure correct wire routing through the magnetic ring for compliance.
- Use only recommended cable sizes as per model specification.
- Do not skip the restart delay check for compressor-based loads.

Recommended AC Surge Protector

An AC surge protector is highly recommended for every inverter installation. It protects the inverter, battery system, and connected loads from transient overvoltages caused by lightning strikes, grid switching events, or other electrical disturbances.

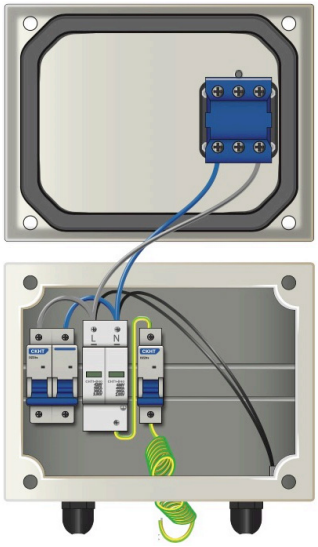
The AC surge protector absorbs high-voltage surges and diverts excess energy safely to earth, preventing damage to the system's internal components.

Key Benefits:

- Prevents damage to sensitive inverter electronics.
- Increases the lifespan of the inverter and other connected devices.
- Ensures system reliability, especially in areas with unstable grid voltage or frequent lightning activity.
- Required for compliance with local and international electrical installation standards.

INSTALLATION GUIDELINES

1. Install between the grid and inverter:
   - The surge protection device should be installed between the AC grid supply and the inverter's AC input terminal.
   - It must be connected as close as possible to the point of entry of the AC supply to ensure maximum protection.
2. Connect to earth:
   - Ensure the surge protector is properly earthed. A poor or missing earth connection will render the device ineffective and unsafe.
   - The earth connection must be stable and reliable to protect the entire system effectively.
3. Enclosure requirements:
   - The AC surge protection system should be installed in a weatherproof IP-rated enclosure if mounted outdoors.
   - The diagram shows an example of a surge protection box with an integrated rotary isolator, MCBs (Miniature Circuit Breaker), and SPD (Surge Protection Device).



NOTICE

Surge protection devices cannot replace the need for proper grounding. Always verify that the inverter, SPD, and distribution board are connected to a properly tested earth point to ensure complete system safety.

PV Connection

Before connecting the PV modules to the inverter, a separate DC circuit breaker must be installed between the inverter and the solar array. This is critical for ensuring system safety and efficient operation.

WARNING

Do not connect any PV modules that may have potential leakage to the inverter. Leakage could cause malfunction or even damage to the inverter. When connecting the PV modules, ensure the positive (+) and negative (-) terminals are correctly aligned and not grounded.

It is recommended to use a PV junction box with surge protection to prevent damage from lightning strikes or other electrical disturbances affecting the solar modules.

PV Module Selection

When selecting PV modules, please consider the following parameters to ensure proper operation and compliance with system requirements:

1. Open circuit voltage (Voc): The Voc must not exceed the maximum input voltage rating of the inverter to prevent overvoltage conditions and ensure the system operates safely.
2. Voc should be higher than the inverter's minimum start-up voltage: The Voc should exceed the startup voltage of 180V of the while remaining within the maximum MPPT operating range of 850V of the inverter. This ensure that the inverter can begin operating correctly under all conditions.
3. Class II certification: The PV modules connected to this inverter must be Class II rated and certified according to IEC 61730. This certification ensures the modules meet international safety standards and are suitable for use with the inverter.
4. Short-circuit current (Isc): The short-circuit current (Isc) of the PV array must not exceed the maximum input current rating of the inverter. Exceeding this value could cause damage to the inverter and pose a safety risk.
5. Ensure proper system compatibility:
   - The modules must be selected in accordance with the inverter's maximum voltage and current ratings.
   - Always verify that the system's design allows for safe operation under various conditions, including shading and environmental factors that may affect performance.

Inverter Model	29.9kW	30kW	35kW	40kW	50kW
PV Input Voltage	600V (180~1000V)				
PV Array MPPT Voltage Range	150-850V				
No. Of MPP Trackers	3			4	
No. Of Strings per MPP Tracker	2+2+2			2+2+2+2	

PV Module Wiring

1. Switch off the grid supply main switch (AC): Ensure the AC grid connection is turned off by switching the Grid Supply Main Switch to the OFF position. This will isolate the inverter from the grid and prevent any electrical hazards during installation.
2. Turn off the DC isolator: Switch the DC isolator to the OFF position to disconnect the solar array from the inverter. This step is critical for isolating the DC side of the system and preventing any accidental electrical contact during the wiring process.
3. Assemble the DC input connector: Assemble the DC input connector (according to the manufacturer's guidelines) and securely connect it to the inverter's DC input terminals. Ensure the connector is firmly seated and locked in place to avoid loose connections.
4. Use the MC4 connectors supplied by Sunsynk with the inverter: Ensure that you use the MC4 connectors provided by Sunsynk, as they are specifically designed for compatibility with the inverter. These connectors ensuring safe and reliable connections between the inverter and the PV system. Using connectors from other manufacturers may affect performance and warranty coverage

WARNING

Never connect the positive (+) and negative (-) terminals of the PV array to the ground. Doing so can cause severe damage to the inverter's internal components.

Before connecting, double-check the polarity of the PV array's output voltage to ensure it matches the "DC+" and "DC-" markings on the inverter's terminals.

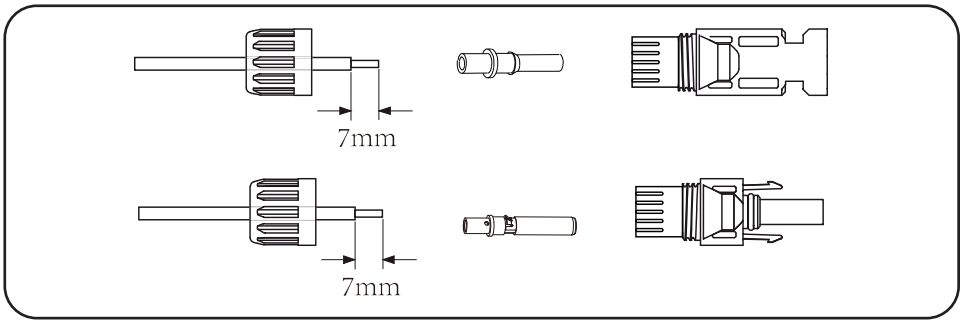
NOTICE

Always use approved DC cables that comply with the required electrical standards. This ensures the system operates safely and efficiently, protecting both the inverter and other connected equipment from potential electrical faults.

Cable Type	Cross Section (mm^2)	
	Range	Recommended Value
Industry generic PV cable (model: PV1-F)	2.5~4 (12~10AWG)	2.5 (12AWG)

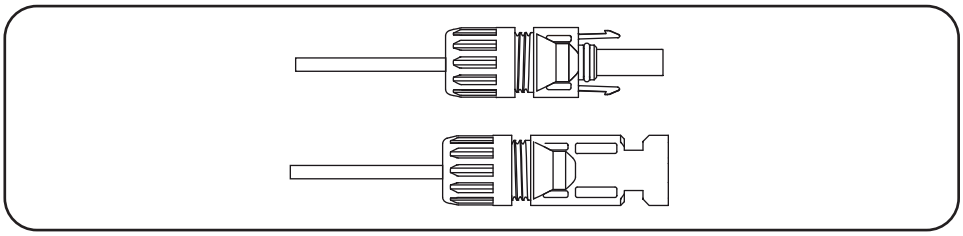
The correct steps in assembling the DC connector are explained below:

1. Strip 7mm of the plastic coating off the DC wire and disassemble the connector cap nut.

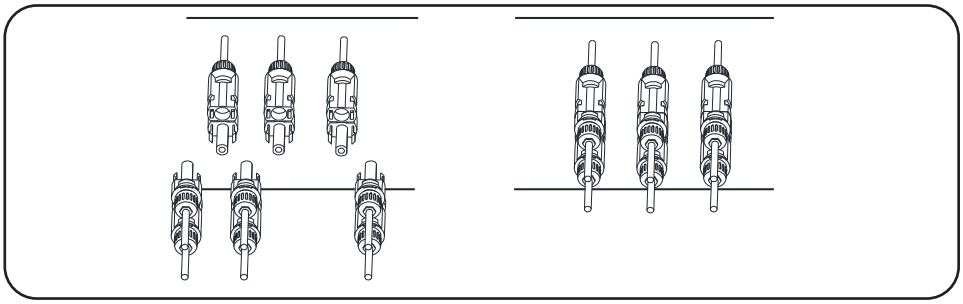


2. Crimp metal terminals with crimping pliers.

3. Insert the contact pin into the connector housing until it locks into place. Then screw the cap nut onto the connector housing. Torque to 2.5-3 N.m.



4. Finally, insert the DC connector into the positive and negative input of the inverter.



WARNING

Risk of Electric Shock

Solar panels generate voltage as soon as they are exposed to light. A series-connected PV array can produce dangerously high voltage, even under cloudy conditions.

- Before handling any DC wiring, cover the solar panels with an opaque material to prevent power generation.
- Ensure the DC switch is in the OFF position before beginning work.
- Failure to do so may result in life-threatening electric shock.

PV Protection

The Sunsynk PV Combiner Box is an integral component of the solar power system, providing both protection and simplification for connecting multiple solar panel strings to the inverter. The PV Combiner Box combines the outputs of multiple PV strings, ensuring optimal operation and safeguarding the system against overvoltage and overcurrent conditions.

IMPORTANCE OF PV PROTECTION

1. Surge protection: The Surge Protection Device (SPD) in the PV Combiner Box protects the system from voltage spikes caused by lightning or grid surges by safely diverting excess voltage to the ground.
2. Overcurrent protection: Fuses in the combiner box protect each solar string from short circuits or overloads, ensuring the system operates safely.
3. System safety: DC disconnect switches allow safe isolation of the strings and inverter for maintenance or in case of faults, reducing the risk of electrical hazards.
4. Easy installation: The Sunsynk PV Combiner Box is pre-configured for easy installation. It simplifies the process, ensuring a reliable and quick setup.

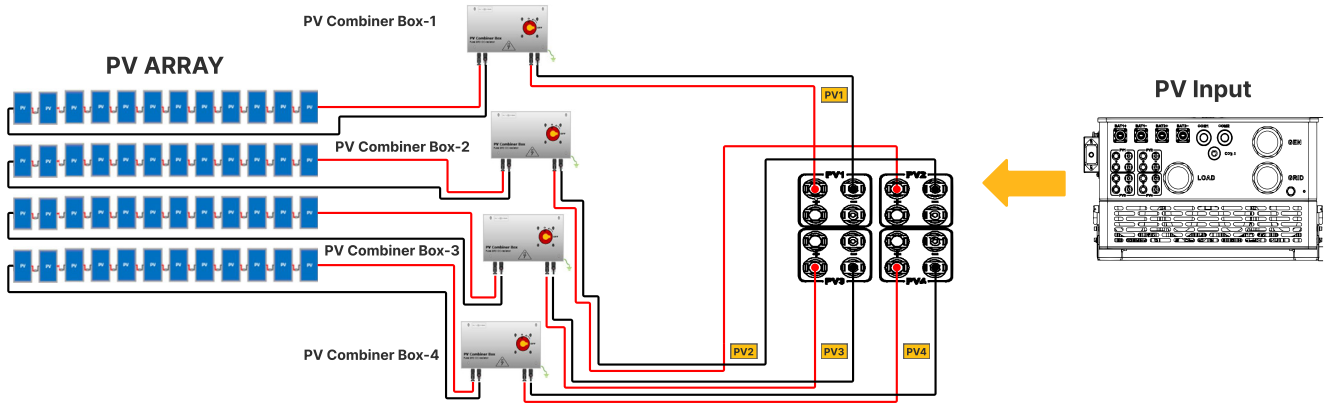
PV COMBINER BOX INSTALLATION GUIDELINES

1. Choose the correct location:
   - Install the PV Combiner Box near the solar array to minimise voltage drop.
   - Place it in a ventilated, weatherproof area (IP-rated if outdoors) for easy maintenance.
2. Ensure proper grounding: The PV Combiner Box must be properly earthed to protect against electrical faults and lightning.
3. Connect the PV strings:
   - Connect the positive and negative terminals of each solar string to the appropriate inputs in the PV
   - Combiner Box using correctly rated cables.
4. DC disconnect: Use the DC disconnect switches to isolate the system when needed, especially for maintenance.
5. Install surge protection: Ensure the surge protection devices (SPDs) are installed and connected to the grounding system.
6. Follow manufacturer's specifications: Always refer to the manufacturer's installation manual to ensure correct installation and compliance with local electrical codes.

NOTICE

The Sunsynk PV Combiner Box is pre-configured and ready for installation. No additional assembly is required by the installer, making the installation process quicker and safer.

Ensure that qualified personnel perform the installation and that all electrical connections are made according to local regulations.

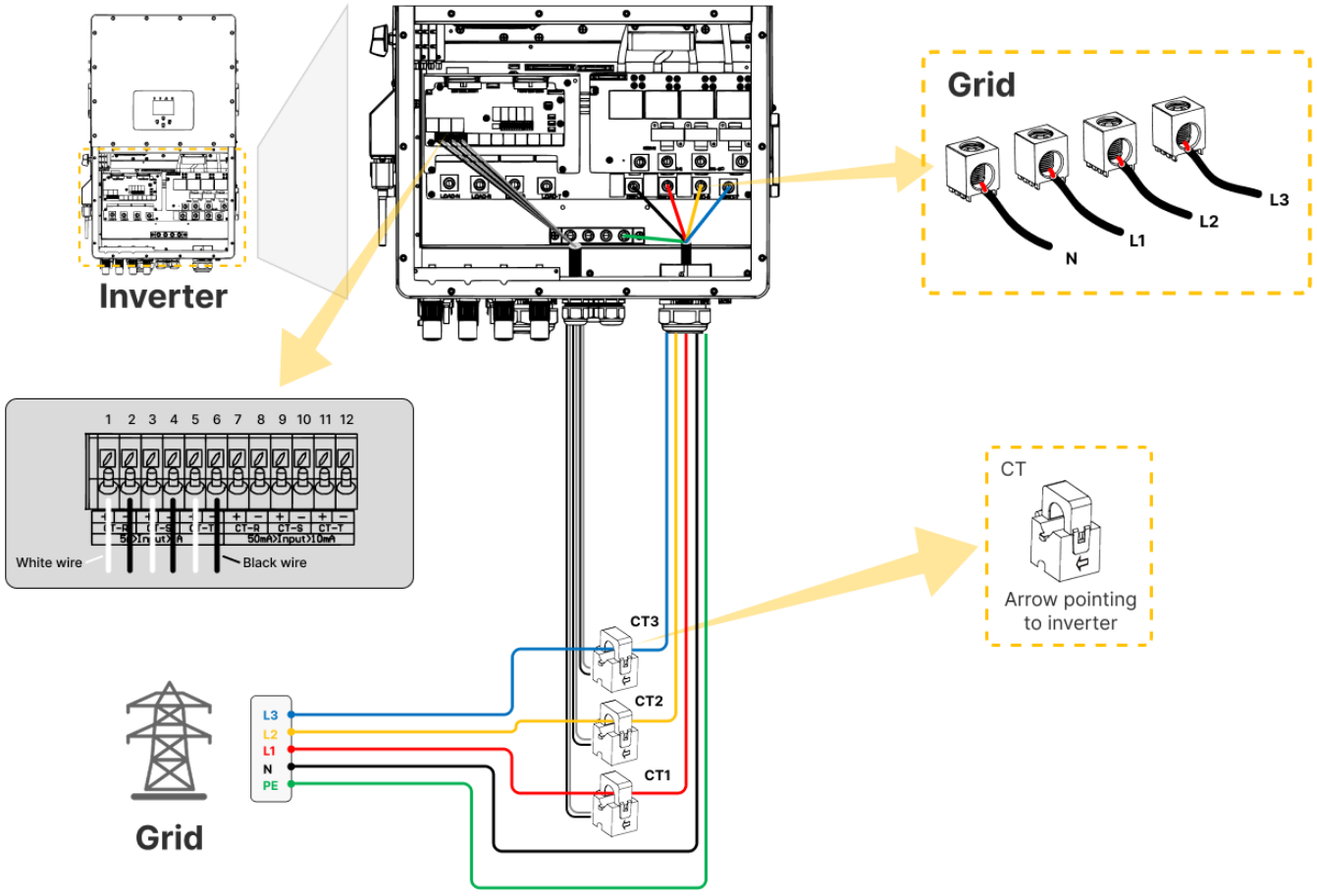


Connecting the CT Coil

The CT (Current Transformer) coil is a crucial component of the Sunsynk Parity inverter, responsible for enabling the Zero Export feature. This feature prevents the inverter from feeding excess power back to the grid by monitoring the flow of power.

INSTALLATION STEPS

1. Fit the CT coil:
   - Position the CT coil (sensor) around the live cable of the main fuse that supplies power to the building.
   - Ensure that the coil is installed correctly to measure the current flow accurately.
2. Run the cable to the inverter:
   - Extend the cable from the CT coil to the inverter. The cable length can be extended beyond 10 meters if you're using an external meter.
   - Always refer to the meter's manual to confirm the maximum allowed cable length for your installation.
3. Connect to the inverter: Connect the other end of the CT coil cable to the inverter's CT coil terminals, which are clearly marked as "CT coil".



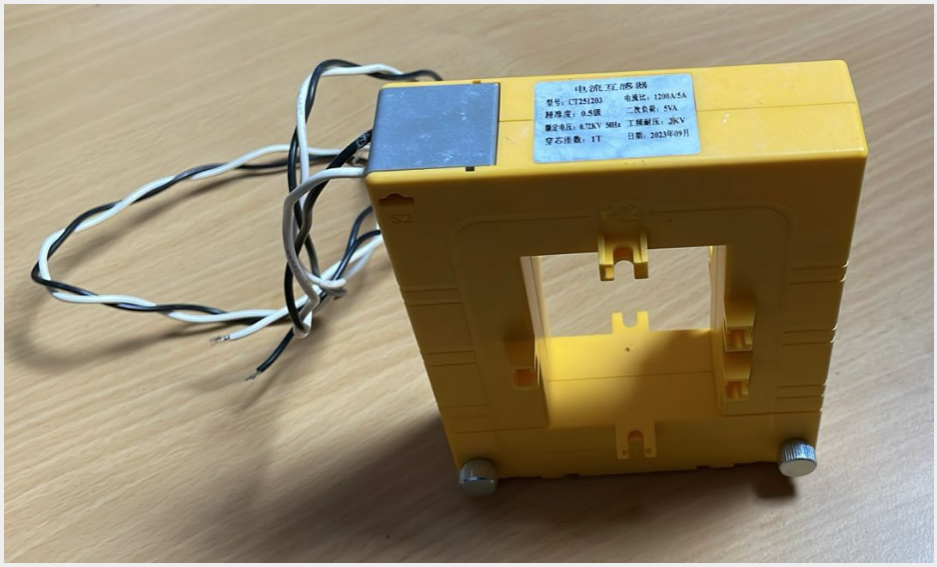
WARNING

If the load power reading on the LCD display is incorrect, reverse the CT arrow to correct the reading.

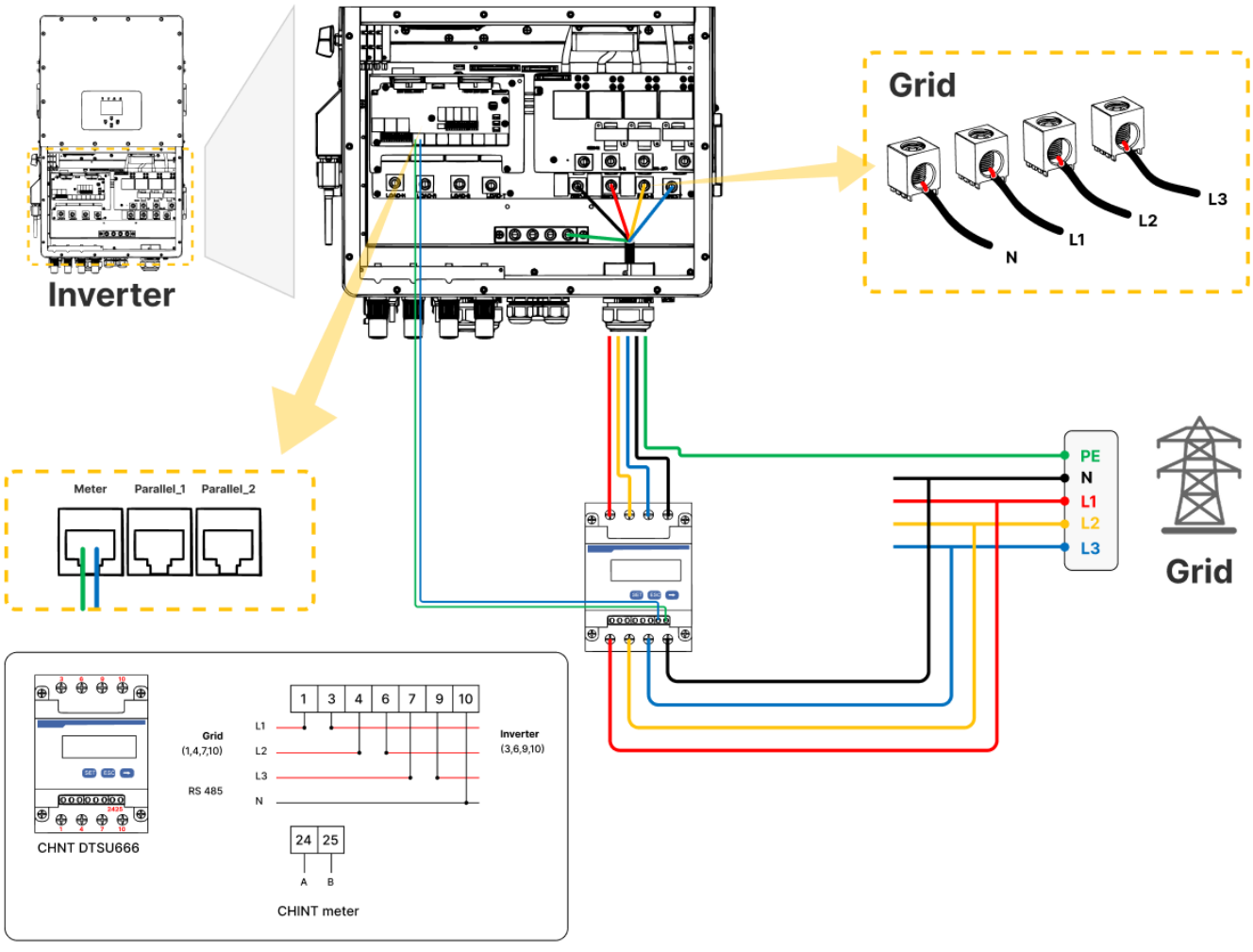
NOTICE

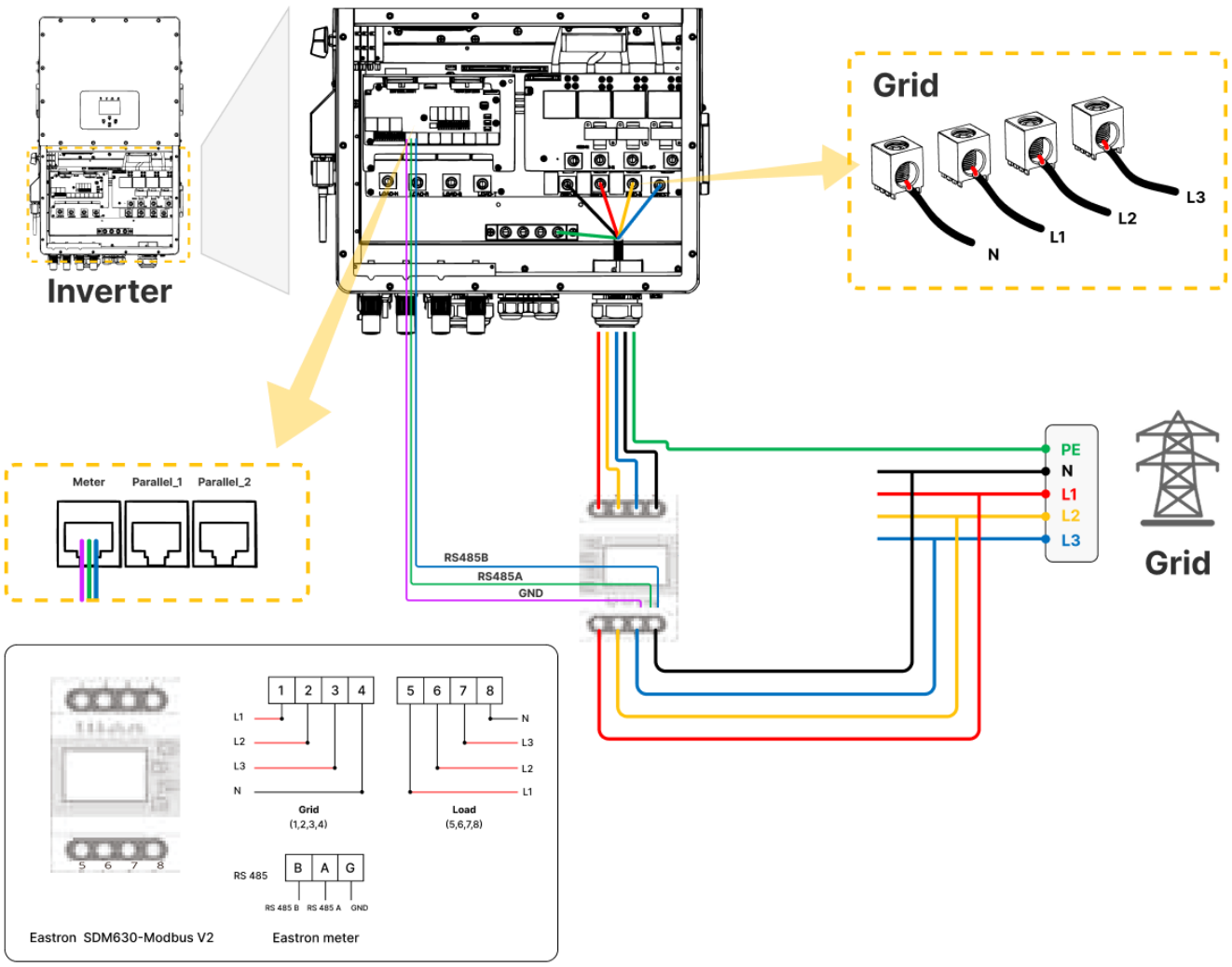
When the inverter operates in off-grid mode, the neutral (N) line must be connected to earth.

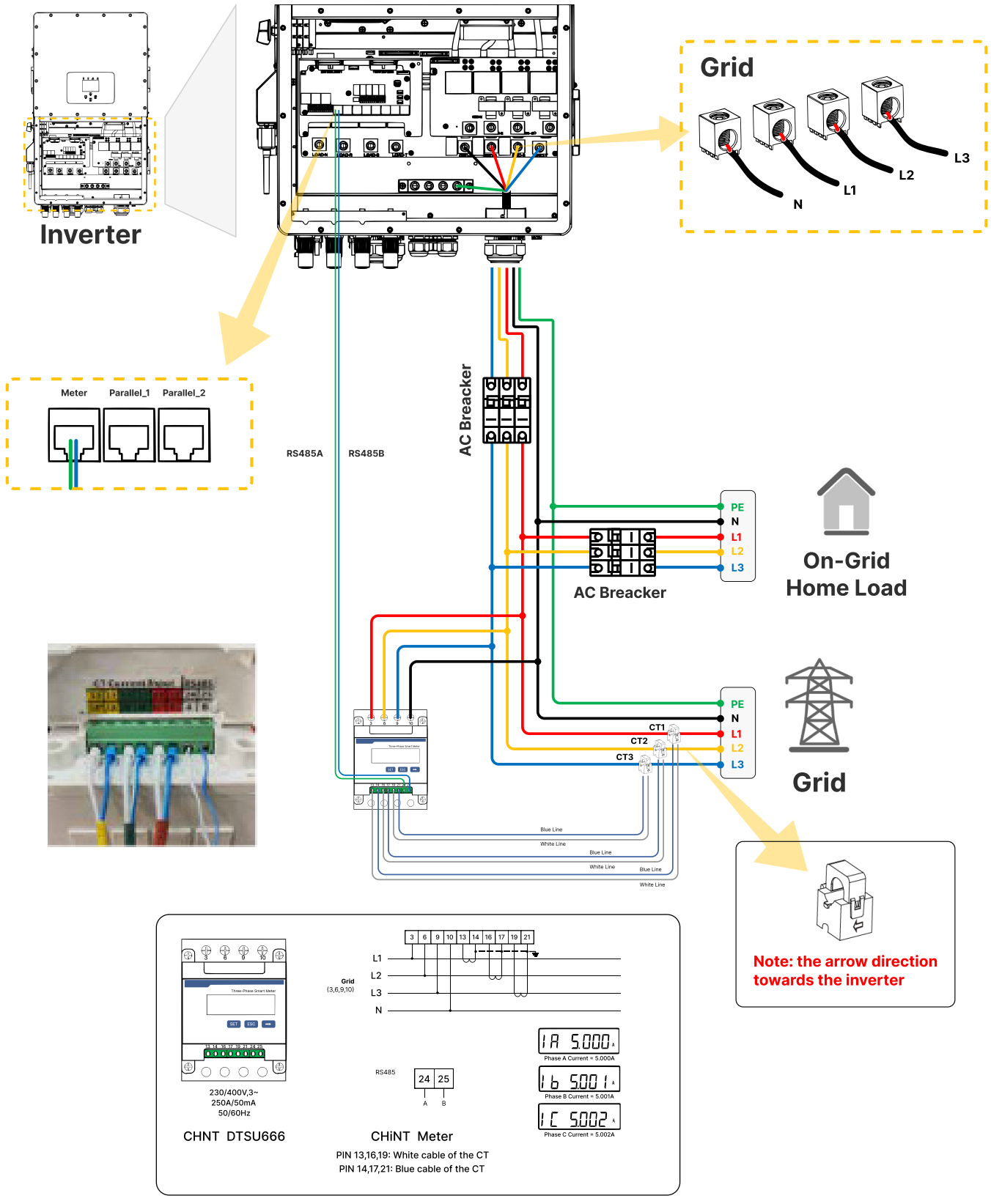
For systems with three or more inverters and grid currents exceeding 300 A, larger current transformers (CTs) should be used. We recommend using 1200 A / 5 A CTs when the grid current goes above 300 A.

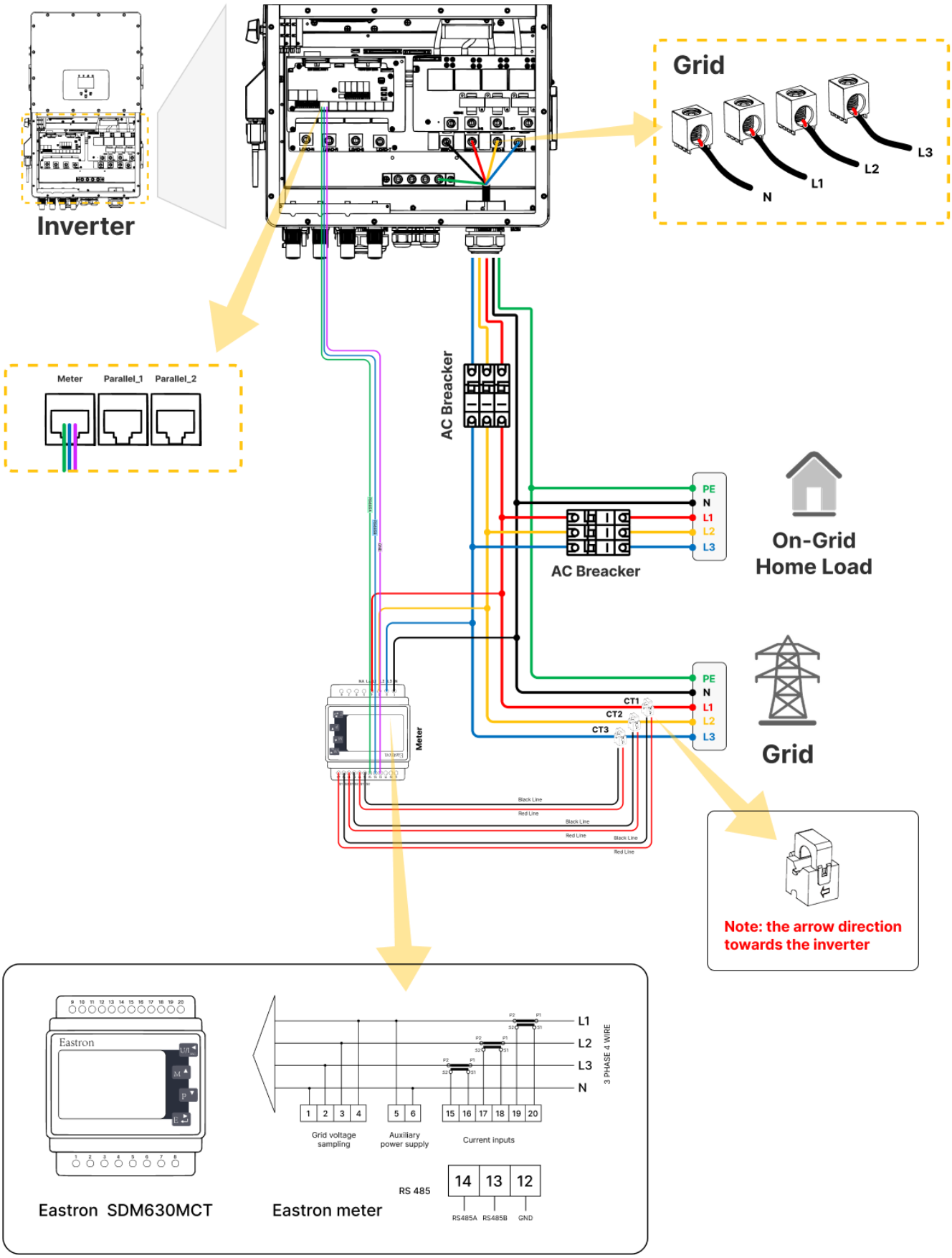


Meter Connection




Inverter
Grid
L3
L2
L1
N
Meter
Parallel_1
Parallel_2
RS485B
RS485A
GND
PE
N
L1
L2
L3
Grid
1 2 3 4
L1
L2
L3
N
Grid
(1,2,3,4)
5 6 7 8
N
L3
L2
L1
Load
(5,6,7,8)
RS 485
B A G
RS 485 B
RS 485 A
GND
Eastron SDM630-Modbus V2
Eastron meter


Inverter
Grid
L3
L2
L1
N
Meter
Parallel_1
Parallel_2
RS485A
RS485B
AC Breacker
PE
N
L1
L2
L3
AC Breacker
On-Grid
Home Load
CT1
CT2
CT3
Grid
Blue Line
White Line
Note: the arrow direction towards the inverter
230/400V,3~
250A/50mA
50/60Hz
CHNT DTSU666
Grid
(3,6,9,10)
RS485
24
25
Phase A Current = 5.000A
Phase B Current = 5.001A
Phase C Current = 5.002A
CHiNT Meter
PIN 13,16,19: White cable of the CT
PIN 14,17,21: Blue cable of the CT



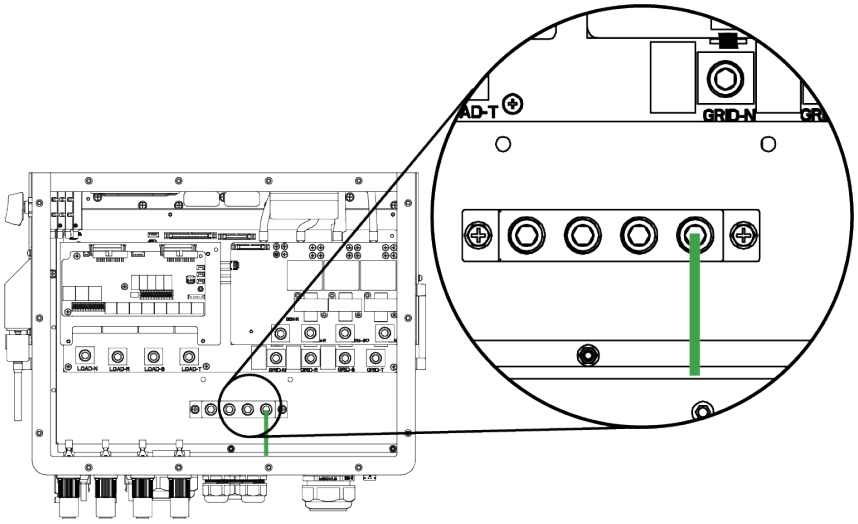
NOTICE

In the final installation, a breaker certified according to IEC 60947-1 and IEC 60947-2 shall be installed with the equipment

Earth Connection (MANDATORY)

To ensure electrical safety and compliance, an Earth Cable must be connected to the earth plate on the grid side of the inverter. This connection protects users and equipment in the event of a fault or insulation failure by providing a safe path for fault current. Please see below the purposes of correct earthing:

- Prevents electric shock during fault conditions.
- Ensures proper functioning of RCDs (Residual Current Devices).
- Protects the inverter and loads from surge damage and leakage current.
- Reduces the risk of fire due to electrical faults.



The inverter includes a dedicated earth terminal on its chassis. Use the values below when selecting and installing earth cables:

Earth Connection (Copper wires) (bypass)

Model	Wire Size	Cable (mm²)	Torque Value (max)
29.9/30/35/40/50kW	0 AWG	50	28.2Nm

Earth Connection (Copper wires)

Model	Wire Size	Cable (mm²)	Torque Value (max)
29.9/30/35kW	6 AWG	10	12.4Nm
40kW	4 AWG	16	12.4Nm
50kW	4 AWG	16	16.9Nm

The conductor should be made of the same metal as the phase conductors.

WARNING

Ensure the earth cable is securely tightened using the correct torque value to maintain reliable grounding.

NEUTRAL-EARTH BONDING AND SYSTEM TYPES

- All neutrals can be linked together to maintain the neutral-earth bond.

CAUTION

If a permanent earth bond is used between neutral and earth in a hybrid system, it may cause unwanted RCD tripping unless properly managed.

NOTICE - For South Africa

- It is recommended to install a permanent PE/N bond on the Load Output terminal.
- The AC supply to the grid port should be taken upstream of the main RCD to avoid nuisance tripping.
- This bond must be clearly marked (e.g. “Permanent PE/N Bond”) and installed in accordance with local regulations.
- Always consult your local authority or electrical inspector when installing in regions with specific bonding rules.

LEAKAGE CURRENT DETECTION AND RDC USE

The inverter is equipped with built-in leakage current detection. You may connect a Type A RCD to the inverter’s AC output for additional protection.

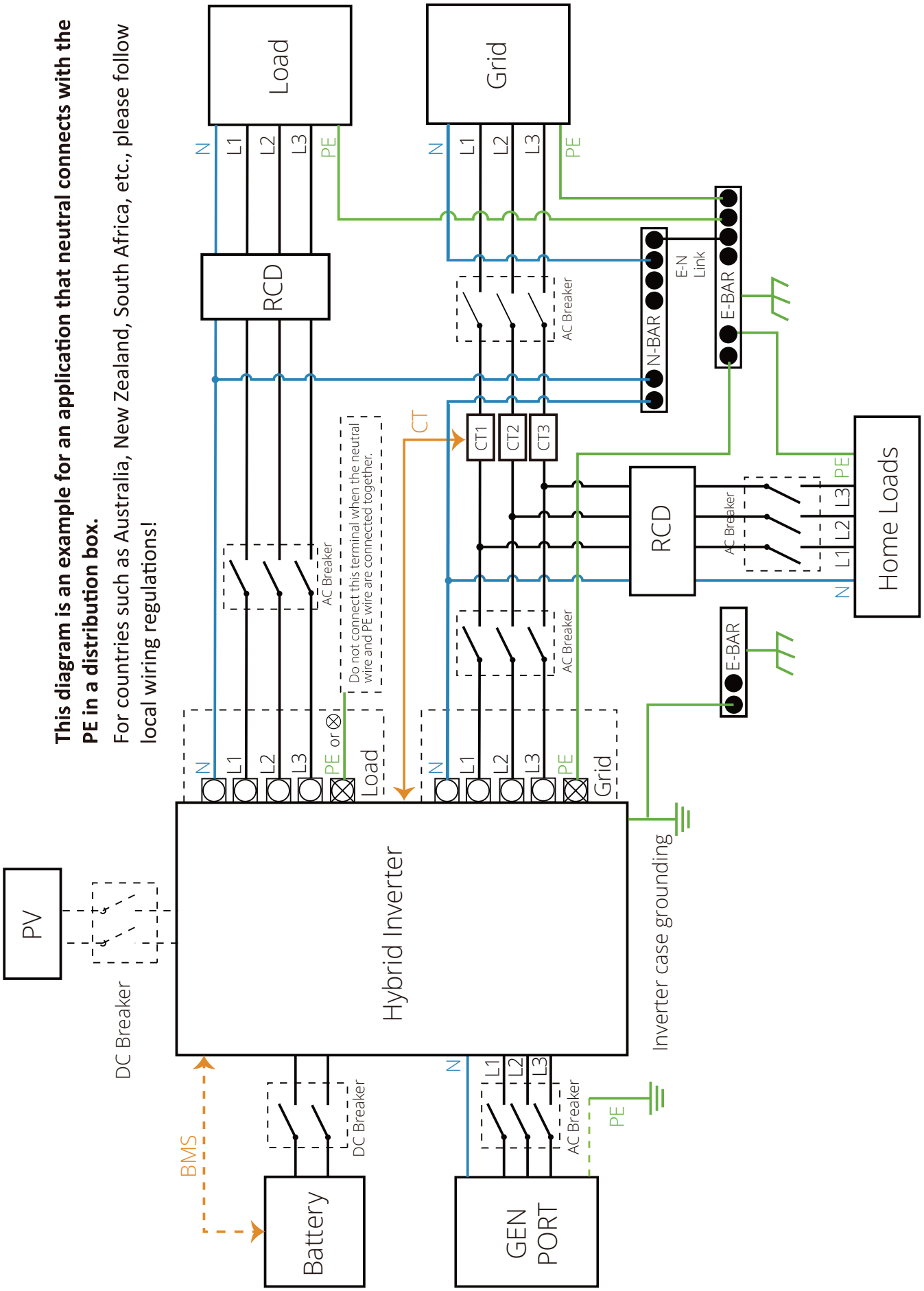
WARNING

If using an external RCD, its rated residual operating current must be ≥ 300 mA. Lower-rated RCDs may trip unnecessarily due to inverter switching behaviour.

Wiring Diagram with N Line Grounded

This diagram is an example for an application that neutral connects with the PE in a distribution box.

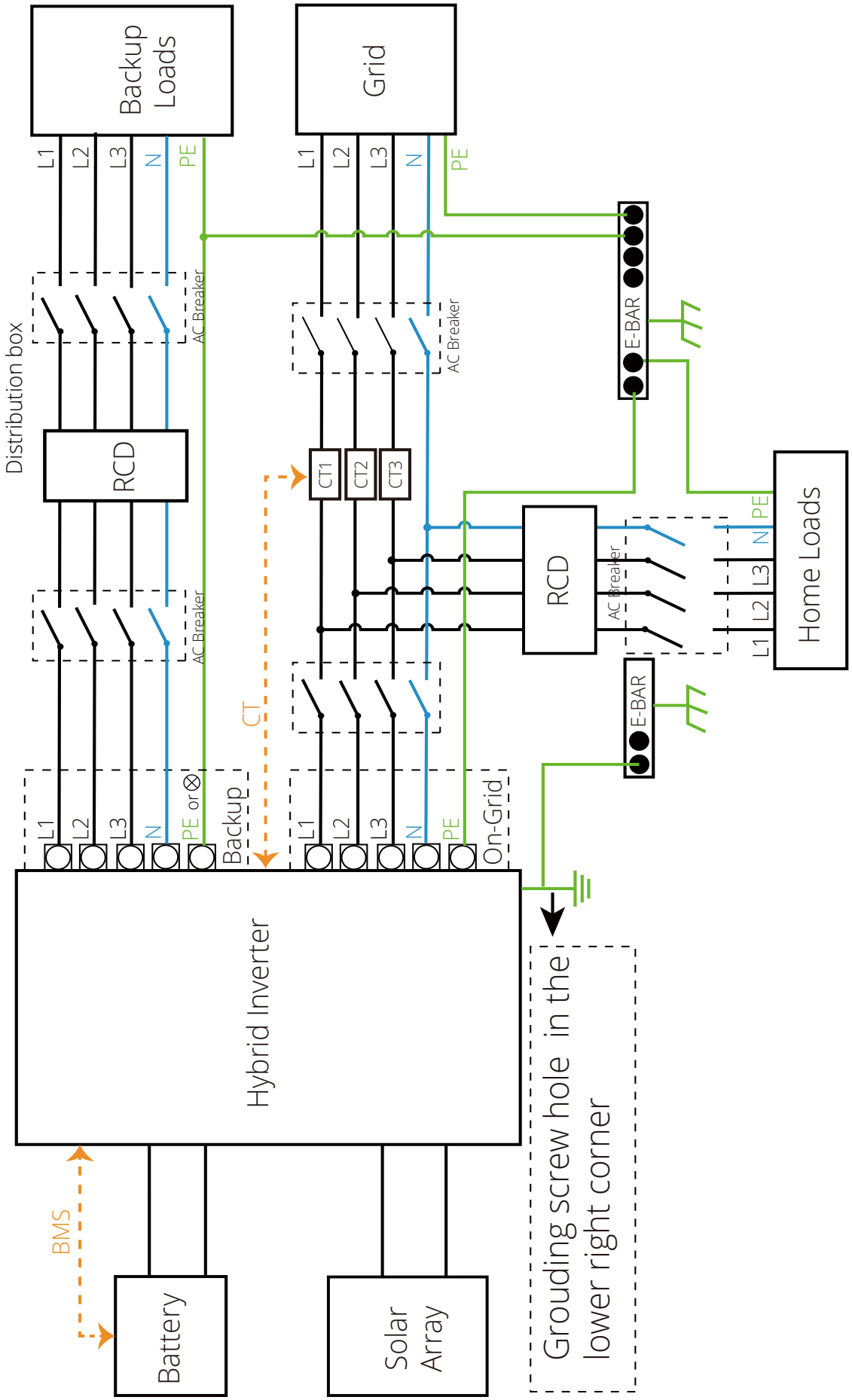
For countries such as Australia, New Zealand, South Africa, etc., please follow local wiring regulations!



SUN SYNK

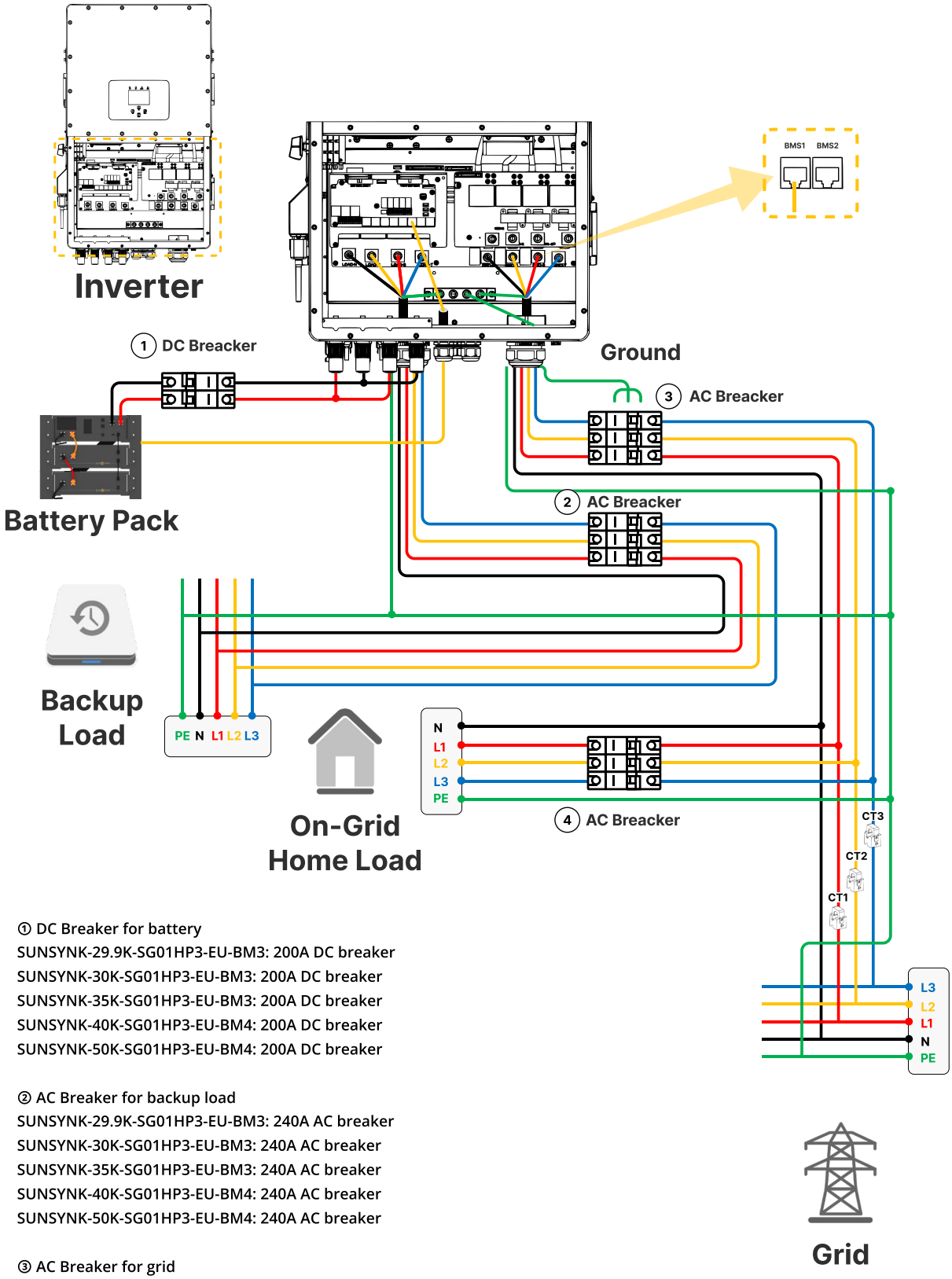
Wiring Diagram with N Line Ungrounded

This diagram is an example for an application in which neutral is separated from the PE in the distribution box.
For countries such as China, Germany,the Czech Republic, Italy, etc., please follow local wiring regulations!



Typical Application Diagram of On-Grid

Please use both battery inputs rating on battery input is 50A for each input.



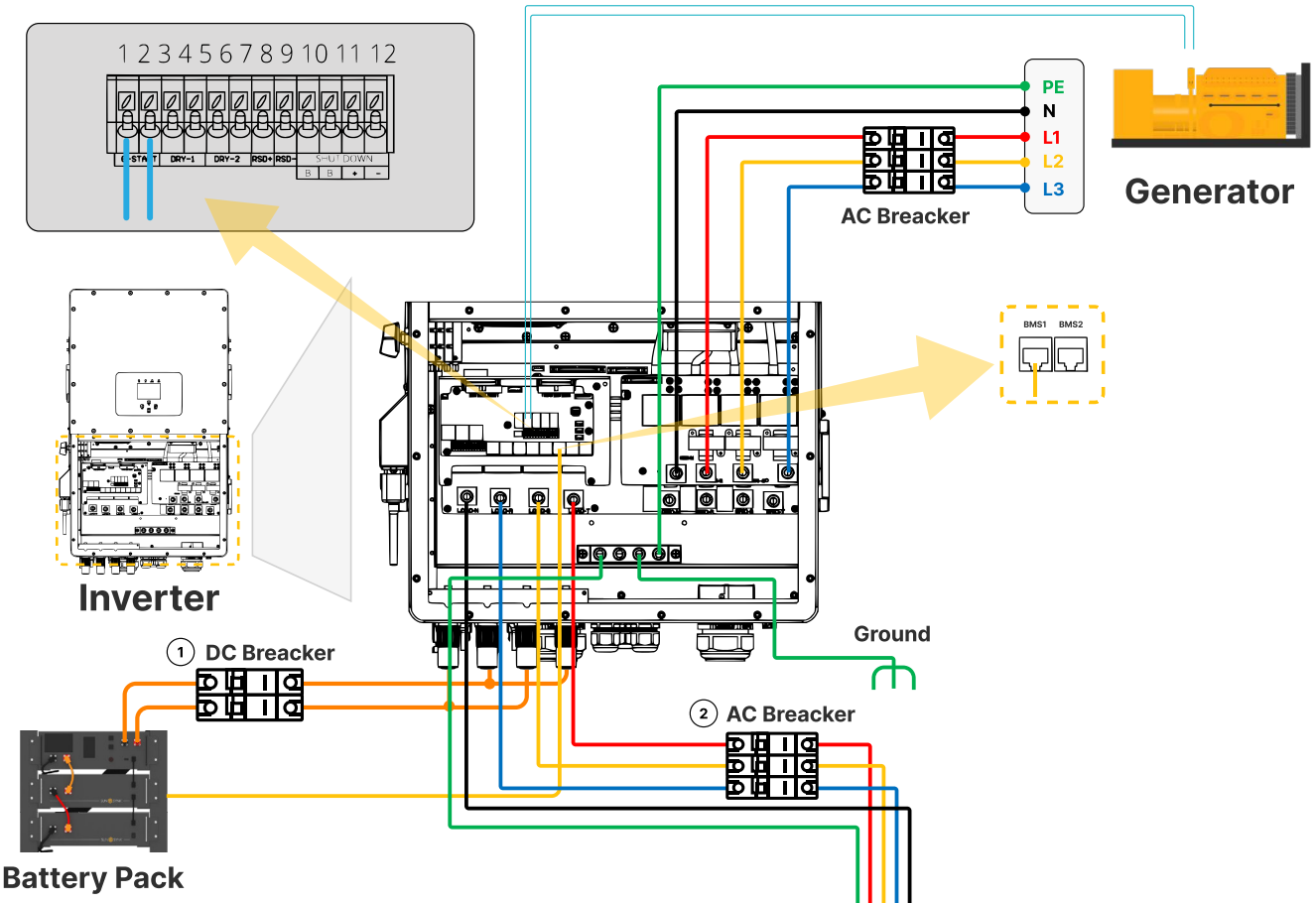
① DC Breaker for battery
SUNSYNK-29.9K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 200A DC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 200A DC breaker

② AC Breaker for backup load
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

③ AC Breaker for grid
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

④AC Breaker for home load
Depends on household loads

Typical Application of Diesel Generator



① DC Breacker for battery
SUNSYNK-29.9K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 200A DC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 200A DC breaker

② AC Breacker for backup load
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

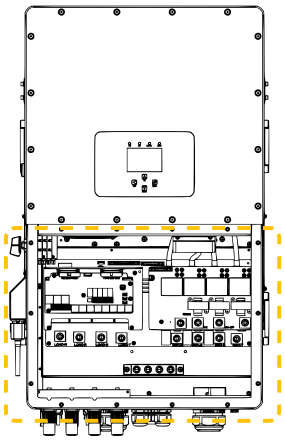
③ AC Breacker for grid
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

④AC Breacker for home load
Depends on household loads

Three-Phase Parallel Connection

NOTICE

- High Voltage Inverters are compatible exclusively with High Voltage Lithium Batteries.
- Please set dip switches on for master and when more than 2 inverters all dip switches on



Inverter

NOTE:

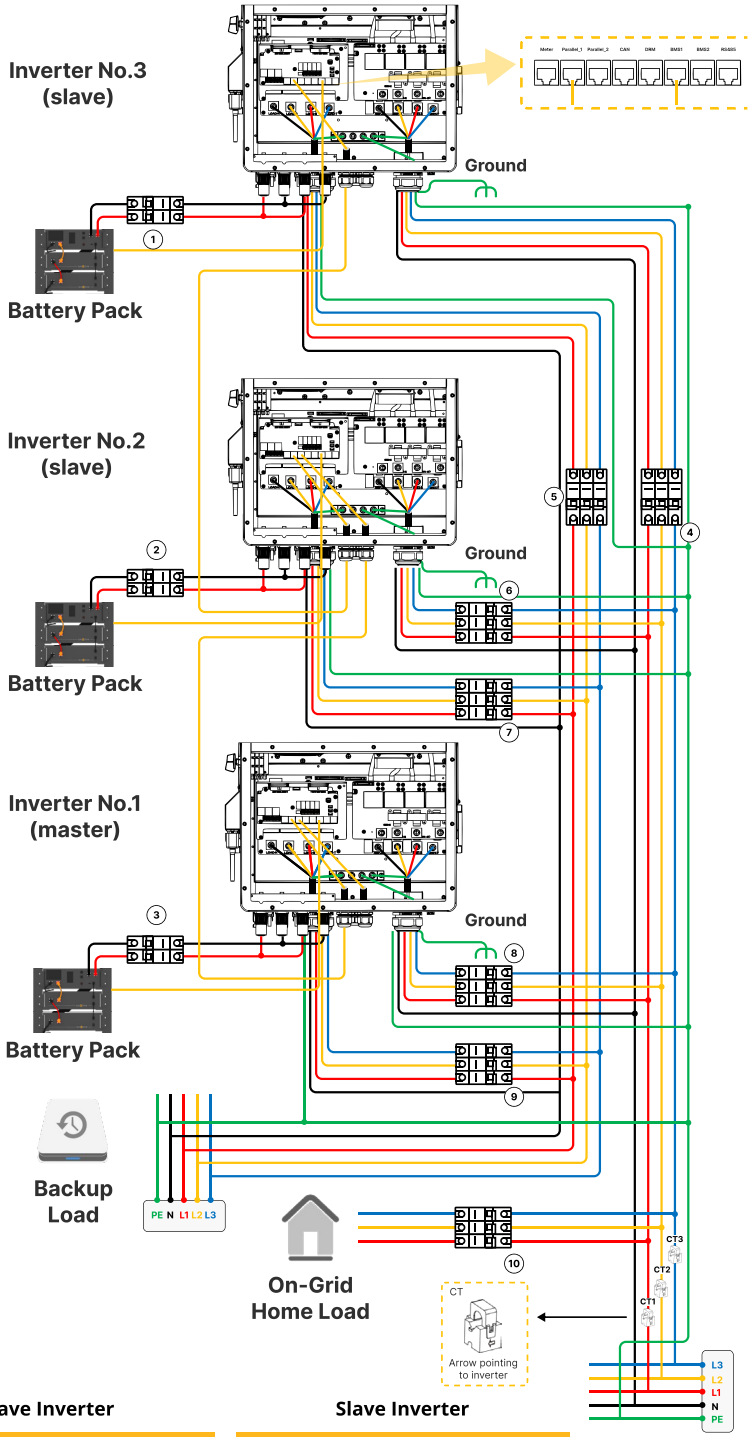
Unlike cases of other hybrid inverter with LV battery, HV battery can only be connected separately to HV hybrid inverters.

④⑥⑧ AC Breaker for grid port
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

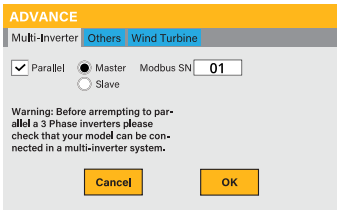
⑤⑦⑨ AC Breaker for backup load
SUNSYNK-29.9K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 240A AC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 240A AC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 240A AC breaker

①②③ DC Breaker for battery
SUNSYNK-29.9K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-30K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-35K-SG01HP3-EU-BM3: 200A DC breaker
SUNSYNK-40K-SG01HP3-EU-BM4: 200A DC breaker
SUNSYNK-50K-SG01HP3-EU-BM4: 200A DC breaker

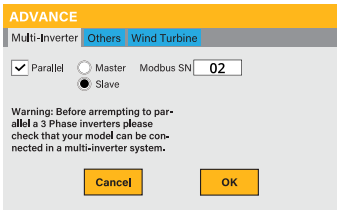
⑩ AC Breaker for home load
Depends on household loads



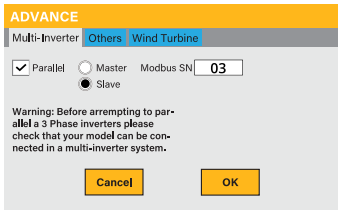
Master Inverter



Slave Inverter

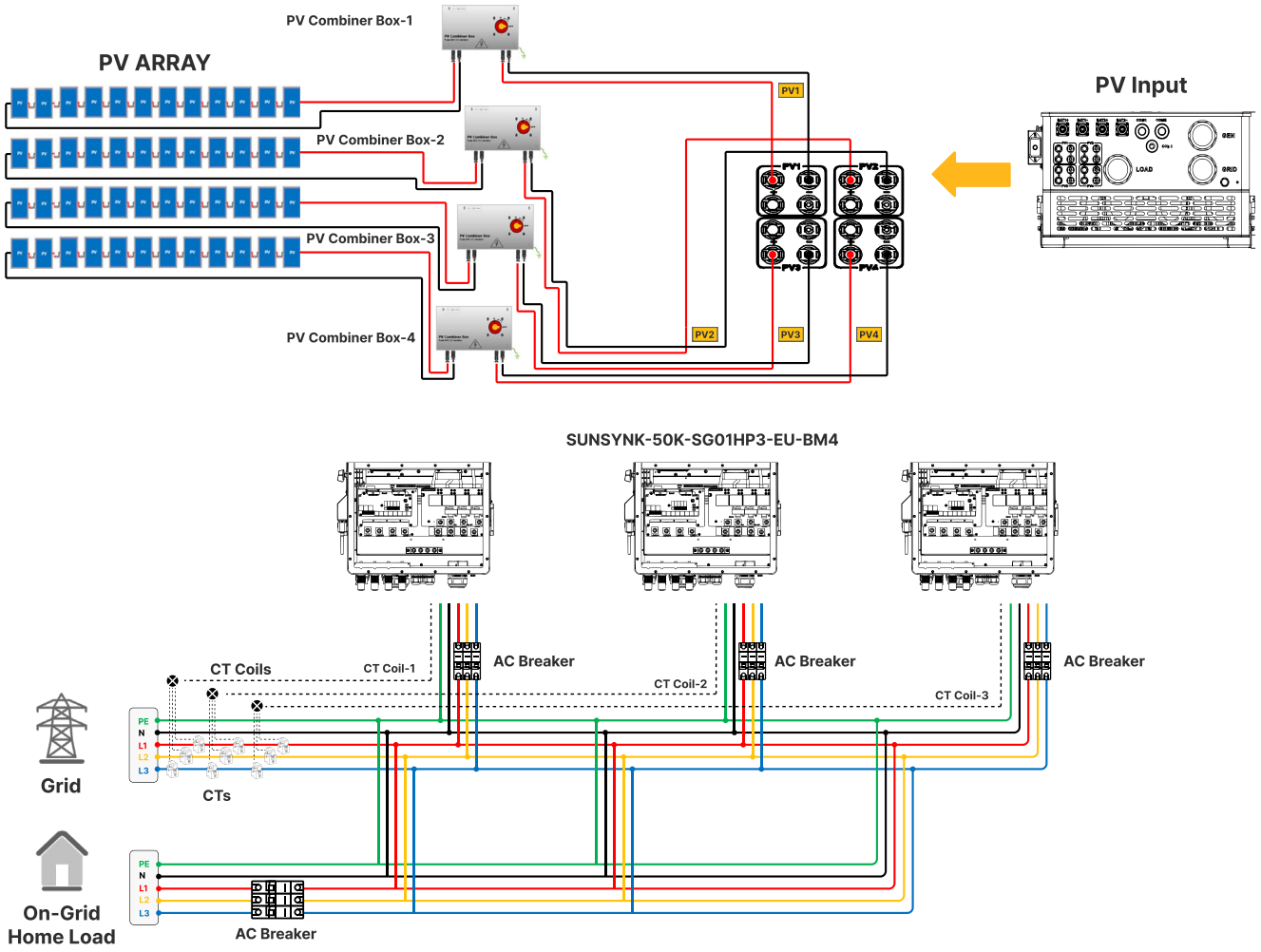


Slave Inverter



Three-Phase Grid-Tied Connection

- There are no active connections to the GEN and LOAD ports.
- Inverters cannot be connected in parallel configuration. Since there are no batteries, they can only operate with the GRID and SOLAR and will always remain synchronized when the grid is connected.
- Each inverter must be equipped with its own current transformers (CTs).
- All CTs must be installed before establishing the initial inverter connection to ensure comprehensive plant-wide monitoring.
- BM3 model features three MPPT inputs, each supporting two string connections. BM4 model includes four MPPT inputs with two string connections per input. The current and voltage ratings for each input as well as the overall ratings per MPPT must be carefully considered.
- Details regarding DC breakers, AC breakers, fuses, photovoltaic (PV) components, surge protectors, and cable sizes are not specified.



OPERATION

Switching ON/OFF

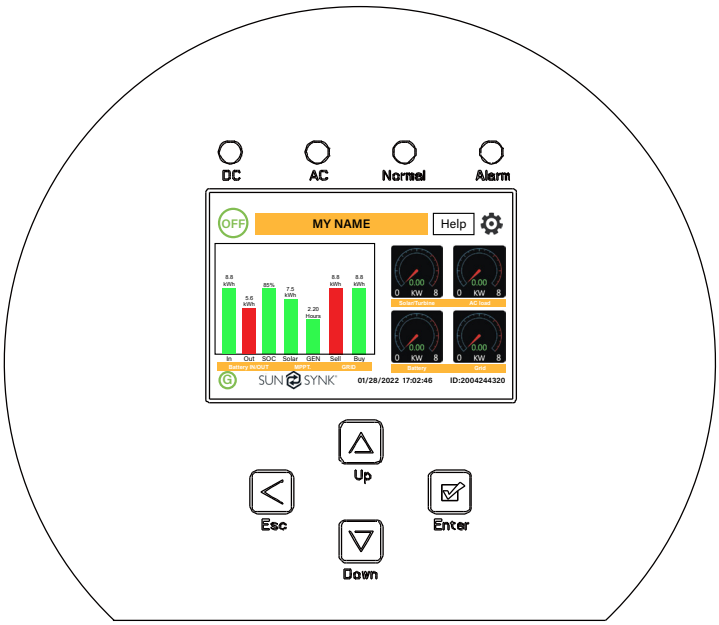
Before switching on the inverter, ensure that all wiring is complete and the battery connection is secure.

- To turn on the inverter, press the ON/OFF button located on the left side of the inverter case.
- When the inverter is powered by PV or grid supply but has no battery connected, the LCD screen will still illuminate, even if the ON/OFF button is off. The display will indicate that the system is in standby mode.
- In this state, press the ON/OFF button, then select 'No Battery' from the startup options. The system will begin operating using available PV or grid power only.

NOTICE

The inverter can operate without a battery if either PV or grid input is present. However, battery features such as backup and storage will not be available in this mode.

Display



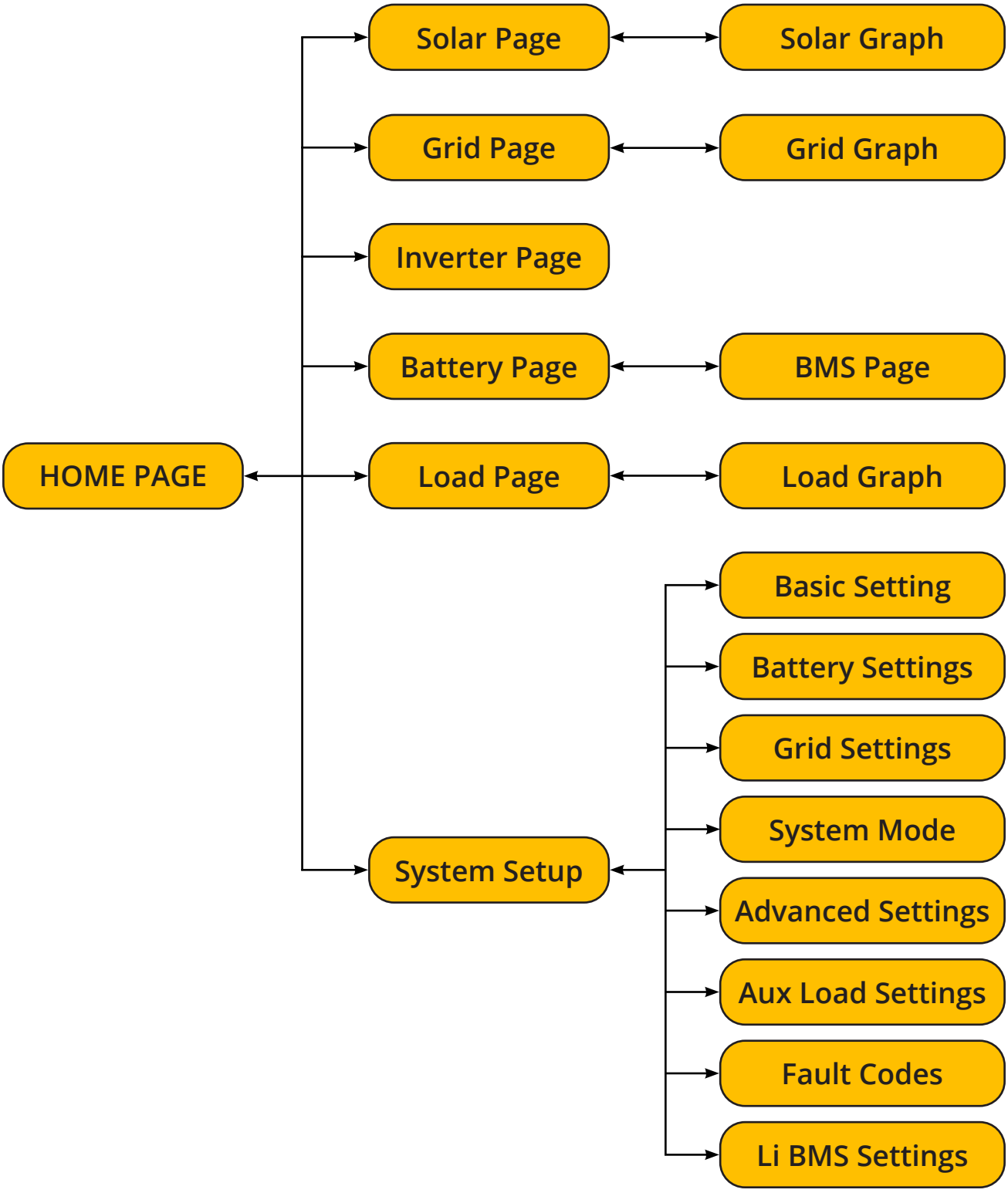
LED Indicators

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 Buttons

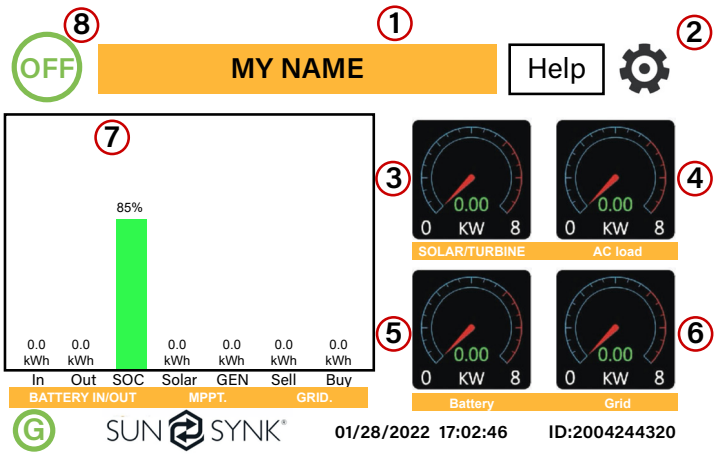
Function Key	Description
Esc	To exit the previous mode
Up	Increase the value of a setting
Down	Decrease the value of a setting
Enter	Confirm setting change (If not pressed each time the setting will not be saved)

LCD Operation Flow Chart



Home Page

Press the Esc button any page to access the home page:



1. Customer name
2. Access the settings menu page
3. Access solar page
4. Access load page
5. Access battery page
6. Access grid page
7. Access system flow page
8. Access fault code displays.

The icon (8) indicates that the system is in Normal operation. If it turns into "comm./F01~F64", the inverter has communication errors or other errors, and the error message will display under this icon (F01-F64 errors, detail error info can be viewed in the System Alarms menu).

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.
- Access the status page.
- Access the fault code displays.

Status Page

This page shows the status of Solar Power, Grid Power, Inverter Power, UPS LD Power, Battery and Generator Power. To access the Status page, click on the BATTERY or AC LOAD dial on the Home page.

Solar	Grid	INV	UPS LD	Batt
0W	0W	0W	0W	0W
0V / 0.0A M1: 0W 0V / 0.0A M2: 0W	0.0Hz L1: 0V L2: 0V L3: 0V HM1: 0A HM2: 0A HM3: 0A	0.0Hz L1: 0V L2: 0V L3: 0V L1: 0A L2: 0A L3: 0A	L1: 0V L2: 0V L3: 0V L1: 0W L2: 0W L3: 0W	0.0V / 0% 0.00A -100.0 C
			Gen 0.0Hz 0W	
TEMP AC -100.0	LD1: 0W LD2: 0W LD1: 0W	L1: 0W L2: 0W L1: 0W	L1: 0V L2: 0V L3: 0V	L1: 0W L2: 0W L3: 0W

What this page displays:

- Solar Column:
  - Total solar power produced – Displays the overall solar power generated.
  - MPPT 1 power/voltage/current – Shows the power, voltage, and current for MPPT 1.
  - MPPT 2 power/voltage/current – Shows the power, voltage, and current for MPPT 2.
  - MPPT 3 power/voltage/current – Shows the power, voltage, and current for MPPT 3.
  - MPPT 4 power/voltage/current – Shows the power, voltage, and current for MPPT 4.
- Grid Column:
  - Grid power – Displays the total power imported from or exported to the grid.
  - Grid frequency – Shows the current frequency of the grid.
  - Grid voltage – Displays the grid's voltage.
  - Grid current – Displays the current being supplied or received from the grid.

NOTICE

When exporting power to the grid, the grid power will be shown as a negative value. When consuming power from the grid, it will show as a positive value. If the grid and load power signs are different (when the PV is disconnected and the inverter is only receiving energy from the grid with the CT connected to Limit-2), please reverse the polarity of the CT coil.

Important: Refer to the section 'Connecting the CT Coil' for more details.

- Inverter Column:
  - Inverter power – Displays the total power generated or consumed by the inverter.
  - Inverter frequency – Shows the inverter's operating frequency.
  - L1, L2 and L3 inverter voltage – Displays the voltage output from the inverter on each phase.
  - L1, L2 and L3 inverter current – Displays the current being drawn or supplied by the inverter on each phase.
  - L1, L2 and L3 inverter power – Displays the power being supplied by or drawn from the inverter on each phase.
- UPS LD Column:
  - UPS LD power – Shows the total power consumed by the connected load.
  - L1, L2 and L3 voltage – Displays the L1, L2 and L3 voltages supplied to the load.
  - Power on L1, L2 and L3 – Displays the power consumption for each phase (L1, L2 and L3).
- Battery Column:
  - Battery power charge/discharge – Displays the current charge or discharge rate of the battery.
  - Battery SOC – Shows the current state of charge (SOC) of the battery.
  - Battery voltage – Displays the current voltage of the battery.
  - Battery current – Shows the current flowing to or from the battery (negative means charging, positive means discharging).
  - Battery temperature – Displays the temperature of the battery (will show as zero if the battery temperature sensor is not connected).

- Generator Column:
  - Generator power – Displays the total power being supplied by the generator.
  - Generator frequency – Displays the operating frequency of the generator.
  - L1, L2 and L3 generator voltage – Displays the voltage output from the generator on each phase.
  - L1, L2 and L3 generator power – Displays the power being supplied by the generator on each phase.
- Transformer and Heatsink Temperature:
  - DC transformer temperature – Displays the temperature of the DC transformer.
  - AC heatsink temperature – Displays the temperature of the AC heatsink.

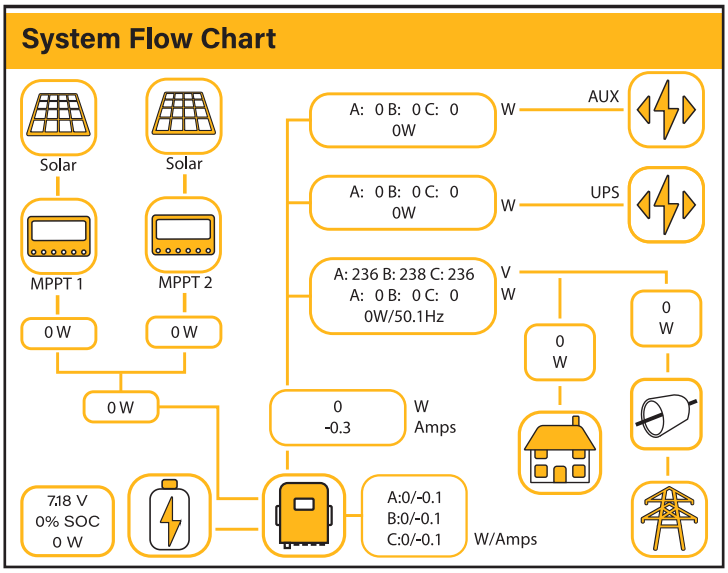
NOTICE

If the temperature reaches 90°C, it will be displayed in red. The inverter's performance will degrade at this temperature. If it reaches 110°C, the inverter will automatically shut down to cool and protect itself.

System Flow Page

Access this page by clicking on the bar chart on the Home Page.

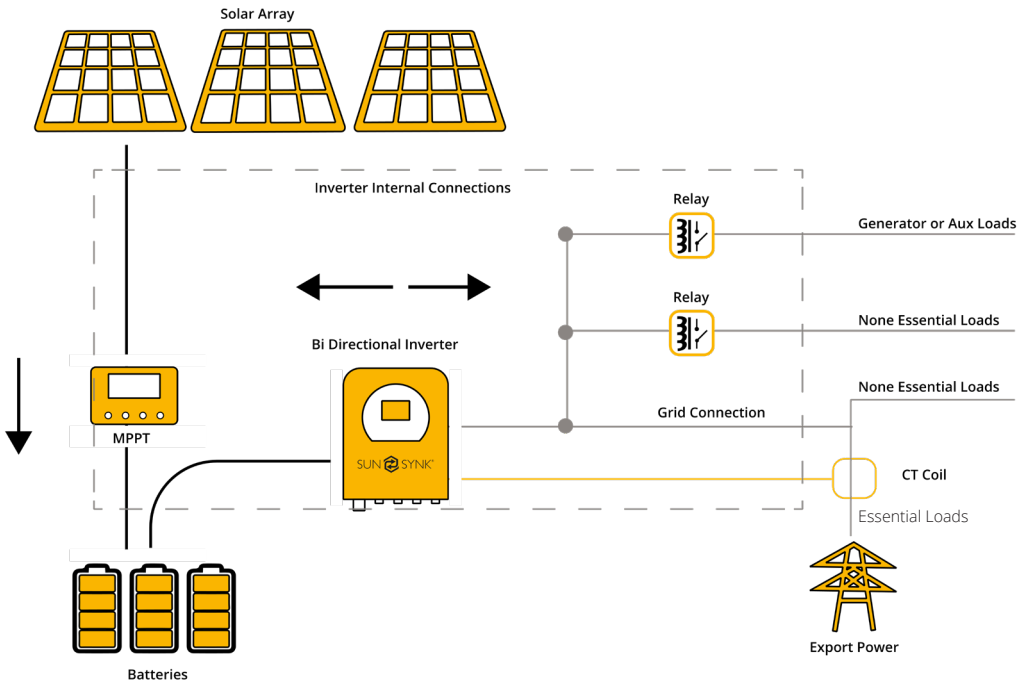
To better understand the functioning of your system, take a look at the flow diagram below:



1. PV modules charge the batteries: The solar panels collect energy and charge the batteries.
2. Battery power is fed into the inverter: Once the batteries reach a pre-programmed charge level, the battery power is fed into the inverter.
3. Power supply to load, grid, or auxiliary load: The inverter can supply power to the grid (export or no export), to the load, or to auxiliary devices or smart loads.
4. CT coil controls the export power: The CT coil monitors the power export to the grid and controls it to ensure proper functioning.

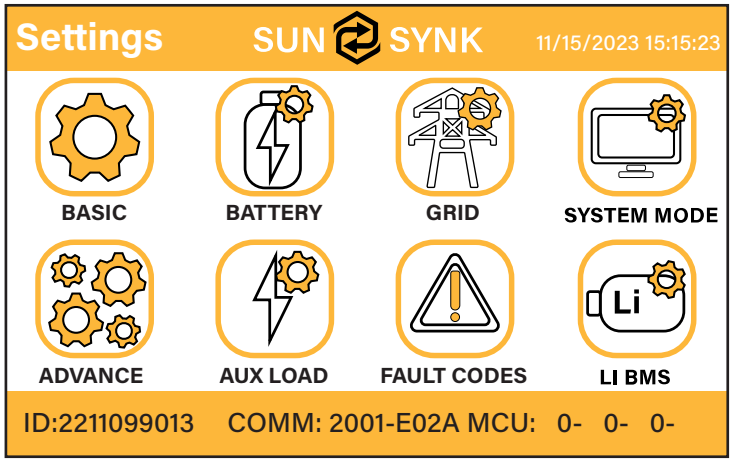
What This Page Displays:

- The system flow: Overview of how energy flows within the system, from solar generation to power distribution.
- MPPT power: The power being generated by each MPPT (Maximum Power Point Tracking).
- Battery status: Displays the current state of charge (SOC) of the batteries and their condition.
- Power distribution: Information on whether power is being supplied to the load, the grid, or auxiliary loads.



Setup Page

To access Settings, 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.

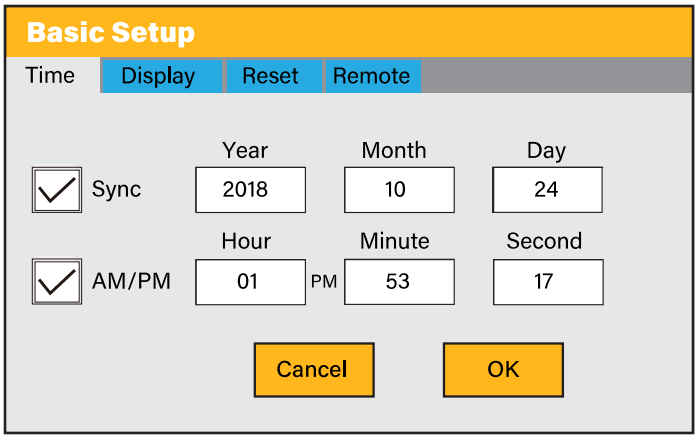
What you can do from this page:

- Access the Basic Setup Page: Click the "BASIC" icon to configure basic settings.
- Access the Battery Setup Page: Click the "BATTERY" icon to configure battery settings.
- Access the Grid Setup Page: Click the "GRID" icon to configure grid-related settings.
- Access the Real-Time Programmable Timer/System Mode: Click the "SYSTEM MODE" icon to set the operational mode of the inverter.
- Access the Advanced Settings: Click the "ADVANCE" icon for settings related to paralleling, wind turbine configurations, and more.
- Access the Auxiliary Load/Smart Load Settings: Click the "AUX LOAD" icon to set up auxiliary or smart load functions.
- Access the Fault Code Register: Click the "FAULT CODES" icon to view any fault codes and system alerts.
- Set up Li BMS: Click the "LI BMS" icon to configure the Battery Management System (BMS) settings.

Basic Setup

Set Time (Clock)

To set time, click on the BASIC icon and then on 'Time'



What this page displays:

- Time: The current time of the inverter.
- Date: The current date.
- AM/PM: The time period format (AM or PM).

What you can do from this page:

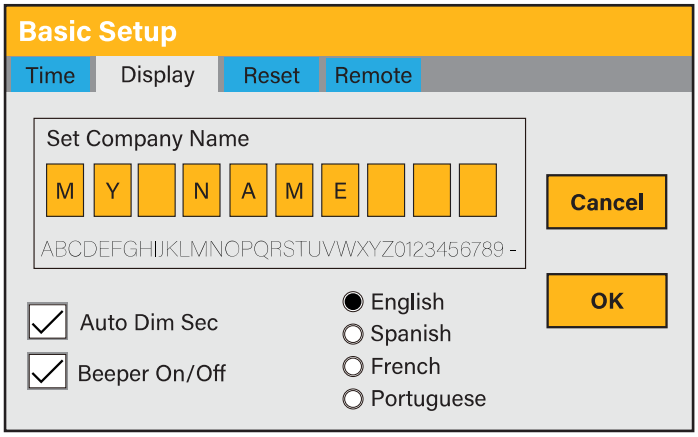
- Adjust or set the time.
- Adjust or set the date.
- Adjust or set AM/PM.

How to set up:

- Touch the screen on the box you wish to change.
- Change the number (increase/decrease) using the UP and DOWN buttons.
- Press OK to set the changes.

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): Allows you to toggle the beeper sound on or off for notifications.
- Installers' names: Option to enter and display the name of the installer for easier identification.

What you can do from this page:

- Set your company name: Customise the name that appears on the display.
- Switch the beeper ON/OFF: Enable or disable the beeping sound for alerts.
- Set the LCD backlight to auto dim: Adjust the time delay for the screen to automatically dim when inactive.

How to change the name:

- Touch the screen in each box where you wish to change the letter.
- Use the up and down arrows to change each letter.
- After selecting the desired name, press OK to update and save the new company name that will appear on the home screen.

How to set the auto dim:

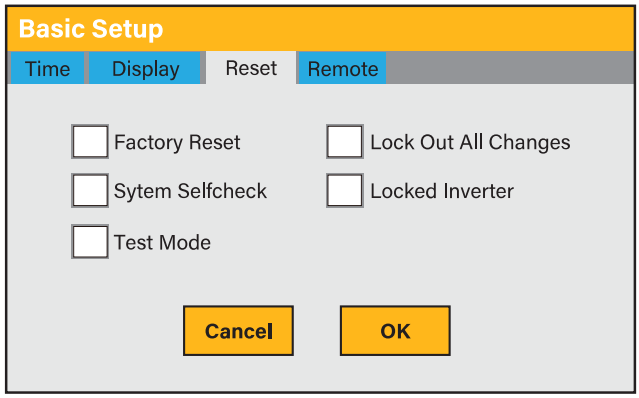
- Check or uncheck the Auto Dim Sec box, then press OK to configure as per your preference.
- This helps conserve energy and prolong the lifespan of the screen.

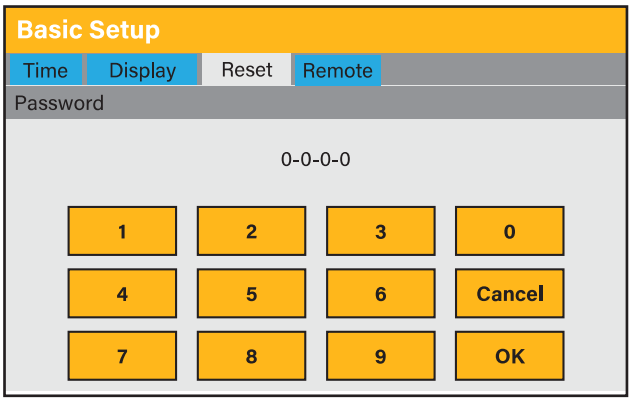
How to turn the beep on or off:

- Check or uncheck the Beep On box, then press OK to configure as per your preference.
- When the beeper is on, the system will provide audible alerts for notifications and warnings.

Factory Reset and Lock Code

To access the Settings, click on the gear icon on the right top of the menu.





What this page displays:

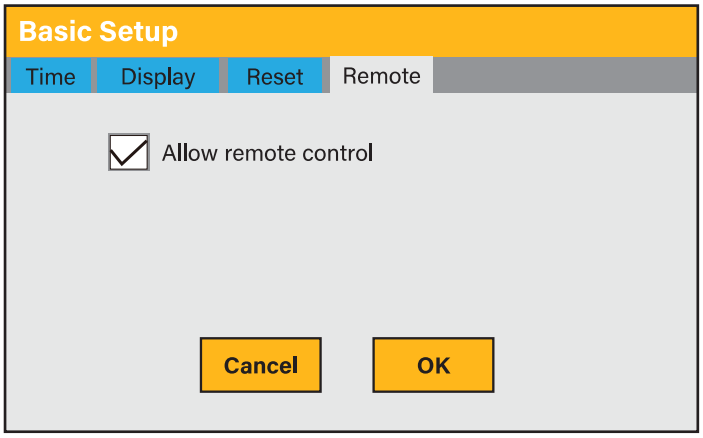
- Factory Reset: Resets all parameters of the inverter to their factory defaults. This will restore the inverter to its original settings. Before performing a factory reset, you must enter the password. The password for the factory reset is 9999.
- Lock Out All Changes: Enables the setting of parameters before locking the unit. Once locked, the inverter cannot be reset or reconfigured unless the correct password is provided. The password for locking the inverter is 7777.
- System Selfcheck: This allows the user to run a diagnostic on the system. After ticking this option, the password must be entered (default password: 1234) to proceed.
- Locked Inverter: When activated, this function locks the inverter completely, preventing any changes or configurations. It requires a 5-digit code, which is only available through Sunsynk's technical support team. This ensures secure operation.
- Test Mode (for Engineers): This mode is designed for engineers to conduct tests on the inverter, often used during troubleshooting or when performing specific diagnostic checks.

What you can do from this page:

- Reset the inverter to the factory settings.
- Perform system diagnostics to check the operational health of the inverter.
- Change or set the lock code to prevent unauthorised access.

Inverter Remote Control

To control the inverter remotely, tick the box that allows it.



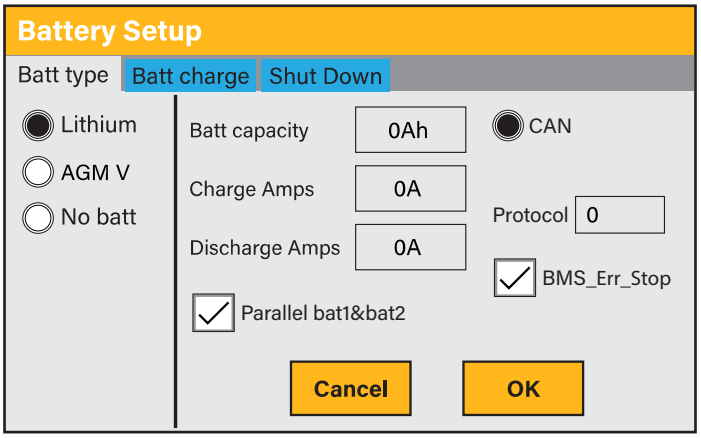
What this page displays:

- Remote control option: The setting that allows or disables remote control.

What you can do from this page:

- Allows remote control of the inverter: Tick the box to enable remote control functionality. This feature allows you to control the inverter from a remote location, providing flexibility and ease of operation.

Battery Setup Page



To configure battery settings:

1. Press the BATTERY icon.
2. Select the Batt type tab.

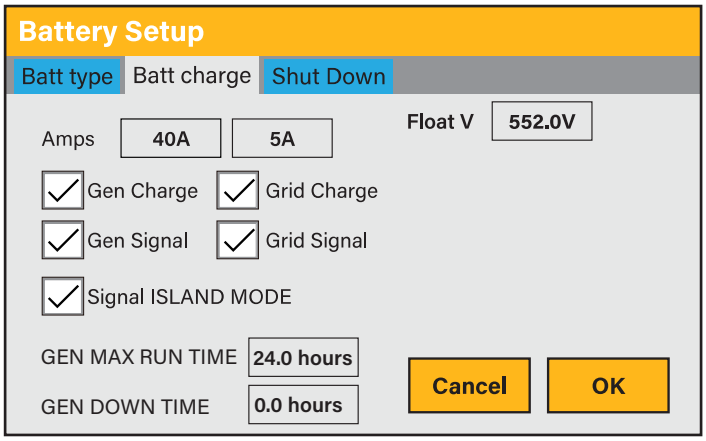
BATTERY TYPE OPTIONS

- Lithium: For BMS-enabled lithium batteries. Always refer to the Approved Battery List.
- AGM V: Uses voltage values to control charging behaviour.
- No batt: Tick this box if no battery is connected. The inverter will operate in grid-tied mode using only solar or grid input.

KEY DISPLAY VALUES

- Batt capacity (Ah): Enter battery capacity. Range is 0–2000Ah for non-BMS batteries. For lithium batteries, the inverter reads this from the BMS.
- Charge/Discharge Amps: Maximum battery charge and discharge current.
  - Max: 50 A for 29.9/30/35/40/50 kW model
- BMS_Err_Stop: When it is active, if the battery BMS fails to communicate with inverter, the inverter will stop working and report fault.
- Parallel Bat1 & Bat2: It is mandatory to enable the Bat1 & Bat2 setting, particularly when using a single HV battery. Both battery input terminals on the inverter must be connected to ensure a balanced current supply of 50 A + 50 A to the inverter.

Generator & Battery Charge Page



To configure battery charging:

1. Press the BATTERY icon.
2. Select the Batt charge tab.

CHARGING SOURCE OPTIONS

- Gen Amps: Charging current rate of 40 A from the generator.
- Grid Amps: Charging current rate of 5 A from the grid.
- Grid Charge: Tick to allow the grid to charge the battery.
- Grid Signal: Tick to stop grid charging when not needed.

GENERATOR CONTROL OPTIONS

- Gen Charge: Enables charging from the generator when connected.
- Gen Signal: A normally open (NO) dry contact that closes when Gen Start is activated.
- Gen Max Run Time: It indicates the longest time generator can run in one day, when time is up, the generator will be turned off. A setting of 24H means that it does not shut down all the time.
- Gen Down Time: It indicates the delay time of the Generator to shut down after it has reached the running time.

ISLAND MODE SETTINGS

- Signal ISLAND MODE. When enabled:
  - If the inverter is connected to the grid, the ATS port voltage is 0 V.
  - If the inverter is disconnected from the grid, the ATS port voltage outputs 230 V AC.
  - This function allows automatic management of neutral–earth bonding using an external NO relay.

BATTERY VOLTAGE SETTINGS

- Float V: Voltage maintained after a full charge. (AGM Float Voltage: 552.0 V)

NOTICE

Do not alter these settings too often on the same battery, as it may damage the battery.

Recommended Battery Settings

Battery Type	Absorption Stage	Float Stage	Voltage (every 30 days 3hr)
Lithium	Follow its BMS voltage parameters		

Generator Connection & Auto Start

A generator may be connected to either of the following:

- The Grid Input: The inverter treats generator input as grid power. Important: In this case, ensure that all power is used for Load only and is not exported, as this could damage the generator.
- The GEN port: When a GEN signal is received, the inverter will:
  - Switch 100% of the load to the generator.
  - Gradually begin charging the battery.

WARNING

The generator must be capable of supplying both the load current and battery charging current simultaneously.

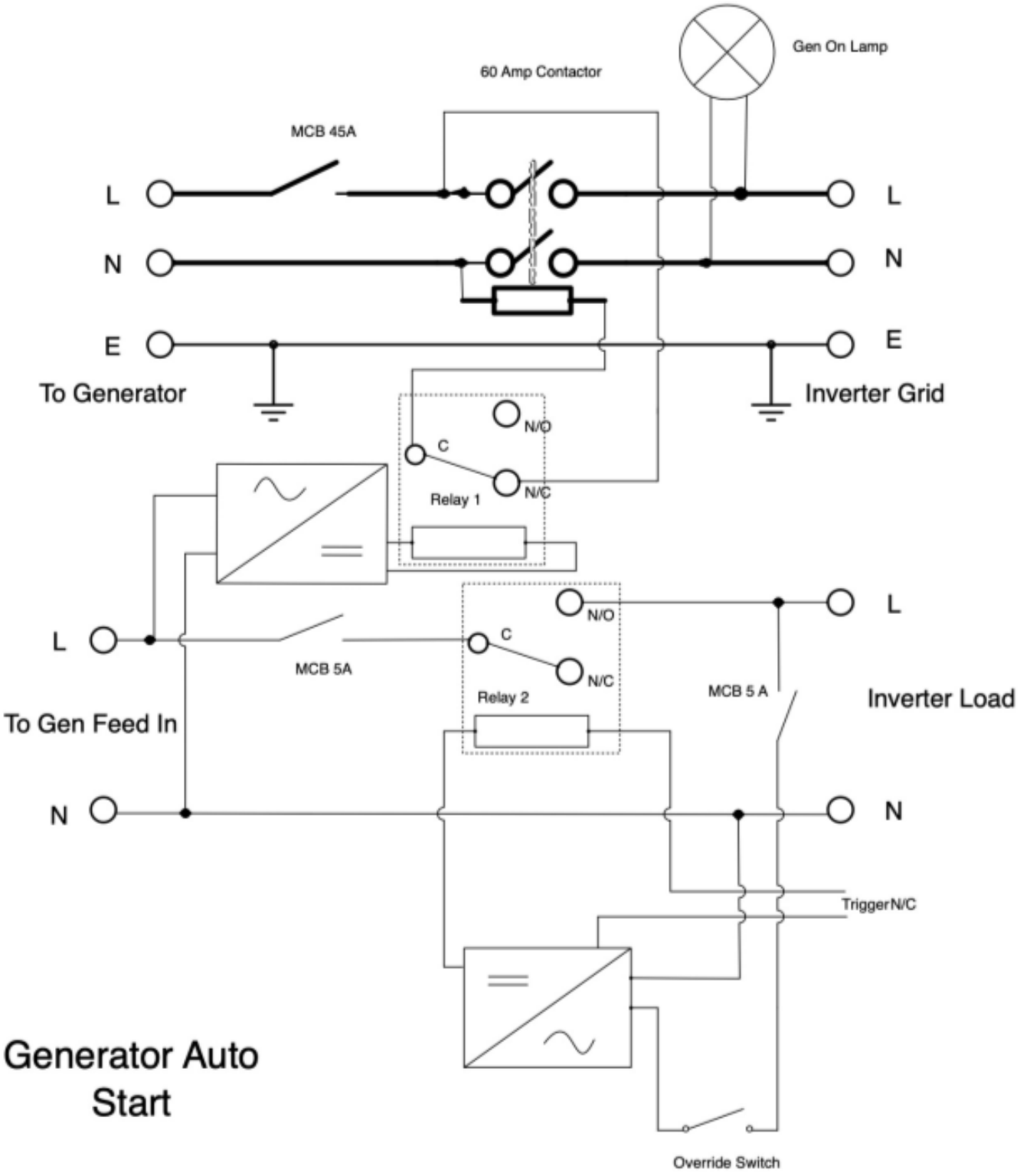
Generator Start Signal (Dry Contact)

The inverter can control a generator using a dry contact relay. This signal:

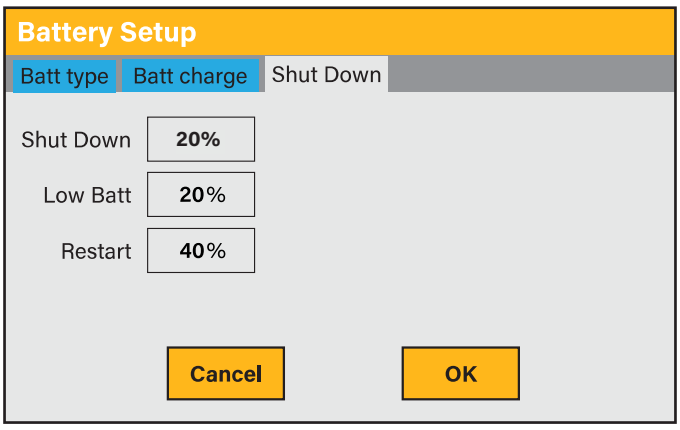
- Is voltage-free (no output voltage).
- Supports up to 1 A at 12 V DC.
- Can be used to trigger the generator's auto-start system.

Generator Auto-Start Circuit

Below is a reference diagram of a typical generator auto-start system used in marine and off-grid installations. The inverter activates relays to manage the switch-over between generator and load/grid connection.


Gen On Lamp
60 Amp Contactor
MCB 45A
L
N
E
To Generator
L
N
E
Inverter Grid
N/O
C
N/C
Relay 1
N/O
C
N/C
Relay 2
L
MCB 5A
To Gen Feed In
N
MCB 5 A
L
Inverter Load
N
TriggerN/C
Override Switch
Generator Auto Start

Battery Discharge Page



To configure inverter shutdown behaviour based on battery status:

1. Tap the BATTERY icon.
2. Select the "Shut Down" tab.

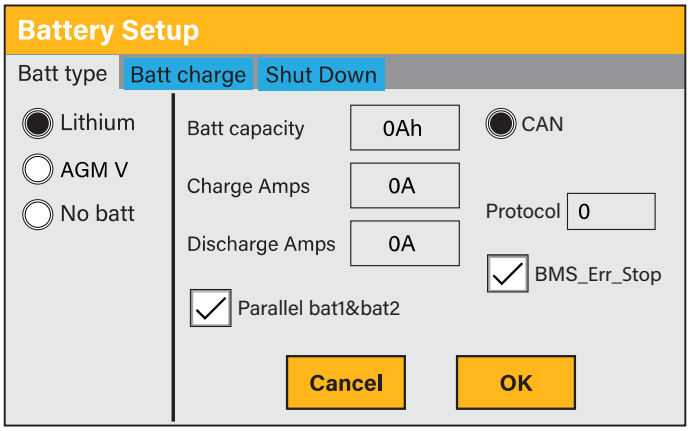
What this page displays:

- Shutdown 20%: The inverter will automatically shut down if the battery SOC (State of Charge) drops below 20%.
- Low Batt 20%: Triggers a low battery warning alarm when SOC falls below this threshold.
- Restart 40%: When the battery SOC recovers to 40%, AC output will resume automatically.

What you can do from this page:

- Adjust battery shutdown point (voltage or %).
- Adjust low battery warning threshold.
- Set the restart threshold after shutdown.

Setting Up a Lithium Battery



To configure a lithium-ion battery:

1. Press the BATTERY icon.
2. Select Lithium under the Batt Type menu.

What This Page Displays:

- Lithium battery setup and protocol selection.
- Charging/discharging current limits.
- Battery capacity (for non-BMS batteries).

- CAN communication protocol.
- Parallel Bat1 & Bat2: It is mandatory to enable the Bat1 & Bat2 setting, particularly when using a single HV battery. Both battery input terminals on the inverter must be connected to ensure a balanced current supply of 80 A + 80 A to the inverter.

What You Can Do From This Page:

- Configure lithium BMS communication.
- After installing a lithium battery, verify the connection by selecting the 'Li BMS' icon on the inverter's display. This page should show live battery data including voltage, current, temperature, and state of charge. If the data does not appear or displays incorrectly (see reference example below), it indicates a communication error.

In Case of Communication Errors:

- Ensure the data cable is the correct type (CAN for lithium battery).
- Check that the cable is firmly connected to the correct communication port.
- Refer to the battery manufacturer's manual for communication protocol, pin configuration, and setup values.

Li BMS Help

Sum Data	Details Data
	LiBms1:Deye-HV
Battery Voltage: 530.6V	Battery capacity: 100Ah
Battery Current: -1A	Battery Chage Voltage: 580.1V
Battery Temp: 22.0C	Charge Current Limit: 100A
SOC: 85% SOH: 100%	Discharge Current Limit: 100A
Battery SW: 0x 306	Alarms: 0x0000 0x0000
Battery HW: 0x 201	

Li BMS Help

Sum Data	Details Data
	LiBms2:Not matched
Battery Voltage: 530.6V	Battery capacity: 100Ah
Battery Current: -1A	Battery Chage Voltage: 580.1V
Battery Temp: 22.0C	Charge Current Limit: 100A
SOC: 85% SOH: 100%	Discharge Current Limit: 100A
	Alarms: 0x0000 0x0000

Li BMS Help

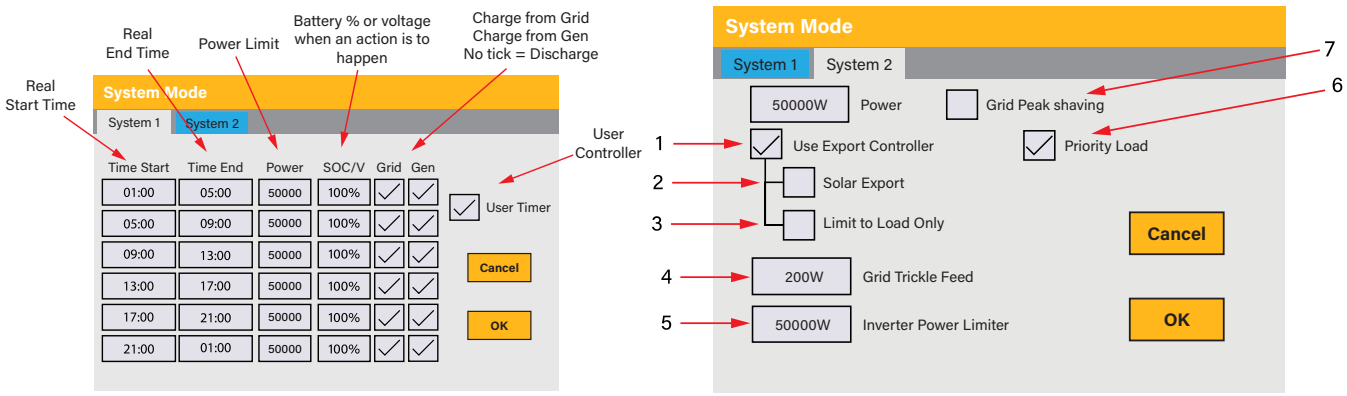
Sum Data					Details Data			
	Volt	Curr	Tem	SOC	Energy	Charge Volt	Charge Curr	Fault
1	503.1V	19.70A	29.6C	33.0%	26.0Ah	0.0V	0.0A	0|0|0
2	503.8V	31.70A	37.6C	51.0%	25.5Ah	532V	25.0A	0|0|0
3	503.5V	25.10A	29.9C	52.0%	6.0Ah	532V	25.0A	0|0|0
4	503.7V	30.70A	32.1C	12.0%	26.0Ah	0.0V	0.0A	0|0|0
5	503.5V	00.00A	30.6C	48.0%	32.0Ah	0.0V	0.0A	0|0|0
6	503.6V	15.40A	30.6C	52.0%	39.1Ah	0.0V	0.0A	0|0|0
7	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
8	503.8V	19.30A	31.0C	52.0%	25.5Ah	0.0V	0.0A	0|0|0
9	503.9V	16.30A	30.6C	52.0%	26.0Ah	0.0V	0.0A	0|0|0
10	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
11	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
12	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
13	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
14	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0
15	000.0V	00.00A	0.0C	00.0%	00.0Ah	0.0V	0.0A	0|0|0

NOTICE

Some lithium BMS types cannot be controlled by Sunsynk. In such cases, treat the battery as lead-acid and follow the manufacturer's voltage/current specifications.

It is crucial to consult the manuals provided by the battery manufacturer. Doing so significantly reduces the risk of configuration errors during installation and ensures correct operation.

System Work Mode Setup Menu



To configure charge and discharge time settings, click on the System Mode icon, then select the gear icon to access the timer settings.

What this page displays:

1. Use Export Controller: Select this option to prevent power from being exported back to the grid. The CT coil detects power flowing back to the grid and will reduce the inverter's output to only supply local load.
2. Solar Export: Enable this setting to export surplus solar power to the grid.
3. Limit to Load Only: Enable this to ensure the inverter only supplies power to the connected load, preventing export to the grid.
4. Grid Trickle Feed: Set the range from '20 W' to '200 W' to instruct the inverter to take a minimal amount of power from the grid, reducing the likelihood of triggering the 'Reverse Power Detection' on sensitive pre-paid meters.
5. Inverter Power Limiter: Limits the total output power from the inverter to both the 'Load' and 'Grid' ports combined. This setting reduces power in the event of an over-current fault.
6. Priority Load: Enable this to prioritise supplying power to the connected load from solar energy. If disabled, the solar power will be used to charge the batteries.
7. Grid Peak Shaving: When this is selected, the grid output power will be limited within the set value. If the load power exceeds the allowed value, it will take PV energy and stored battery energy to supplement. If there is not enough PV energy or stored energy to meet the load requirement, grid power will increase to meet the load needs.

What you can do from this page:

- Set a specific time to start and stop charging or discharging the battery.
- Select the charging source: Choose between the grid or a generator to charge the battery.
- Limit export power to the grid.
- Charge from the grid or generator: Tick 'Grid' or 'Gen' and set the desired times for charging.
- Set the discharge time: Discharge the unit to the load or export to the grid by unticking 'Grid' and 'Gen'.

If nothing is ticked:

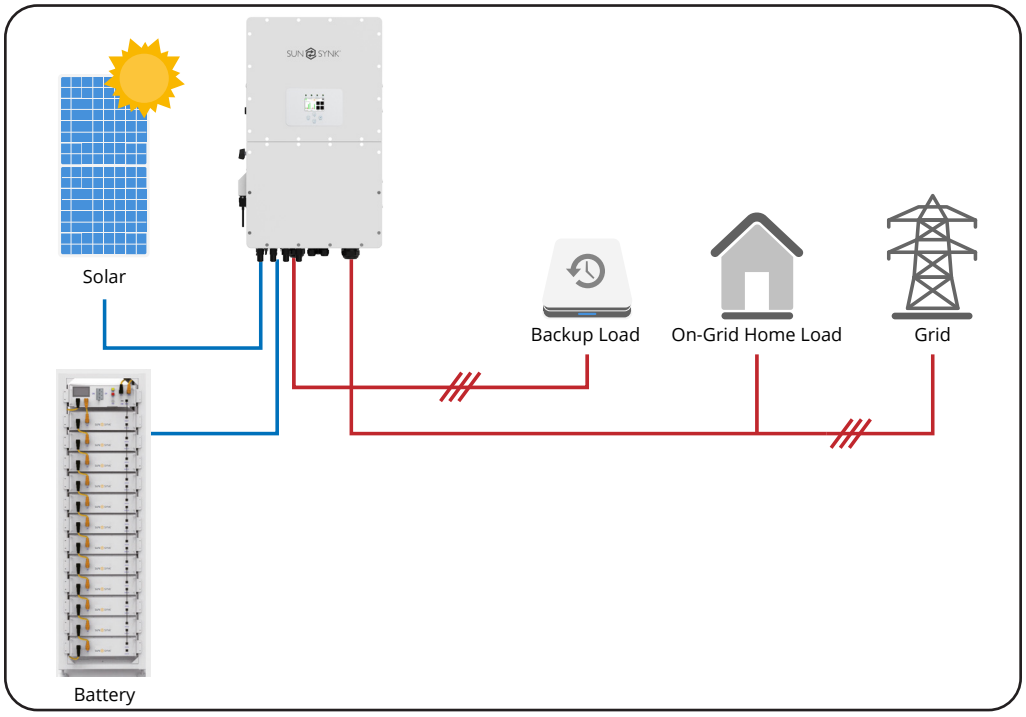
This mode allows the hybrid inverter to sell back any excess power generated by the solar panels to the grid. If the use time is active, the energy from the battery can also be sold to the grid. The PV energy will be used to power the load and charge the battery, with any surplus energy flowing to the grid. The power source priority for the load is:

- Solar Panels
- Grid
- Batteries (until the programmable % discharge is reached)

ZERO EXPORT + LIMIT TO LOAD ONLY:

In this mode, the Sunsynk hybrid inverter supplies power exclusively to the connected backup loads. It will not provide energy to any other household loads, nor will it export power back to the grid. The built-in current transformer (CT) continuously monitors any power flowing from the inverter to the grid. If reverse power is detected, the CT will automatically adjust the inverter's output to ensure that only the local load is supplied and that the battery continues to charge.

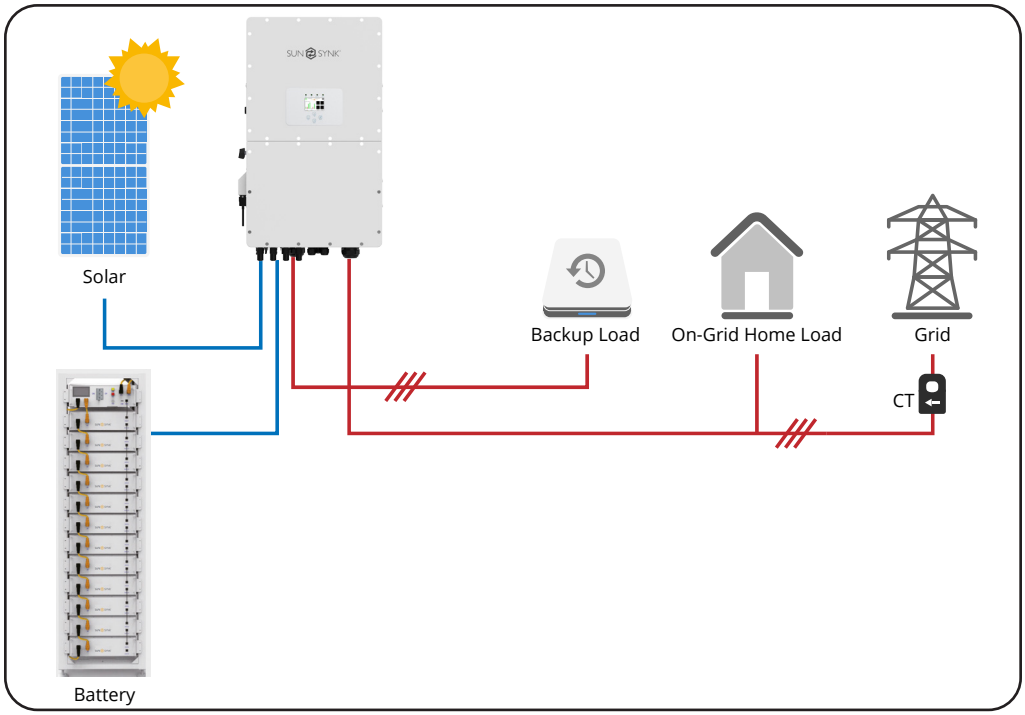
- Function: Prevents power export to the grid while ensuring that the backup loads are powered.
- CT role: Ensures no power is exported to the grid by dynamically adjusting the inverter's output.



ZERO EXPORT TO CT:

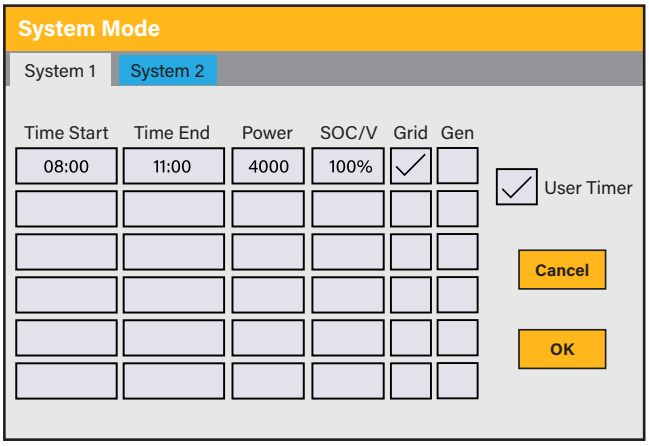
This mode enables the inverter to supply power not only to the backup loads but also to the household loads. In the event that the combined power from the solar and battery is insufficient to meet the household's demand, the grid will provide supplemental power. However, no power will be exported to the grid under any circumstances.

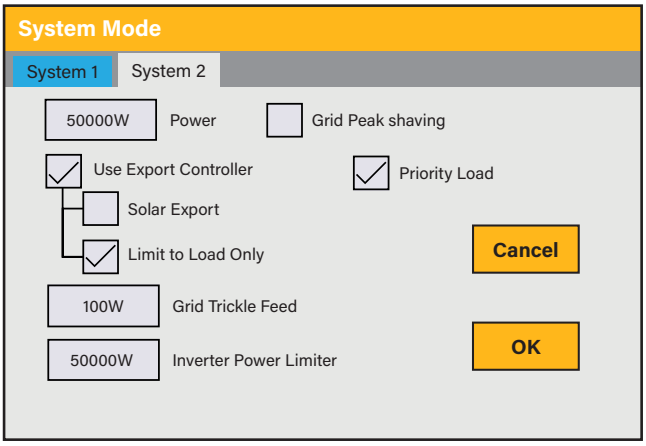
- CT requirement: A current transformer (CT) is necessary for proper operation. The CT will detect grid-bound power and modify the inverter's output accordingly.
- System adjustment: When the CT detects power flowing to the grid, it reduces the inverter's output to match the local load requirements and continue charging the battery.
- Configuration: Please refer to the "CT Connection" section for detailed installation instructions to ensure accurate CT integration.



Example 1:

From 8 a.m. to 11 a.m., the battery is charged to 100% using both solar PV and grid power. After reaching full charge, the system supplies up to 4 kW of power to essential loads via the Load Port until the battery's state of charge (SOC) drops to 50%.

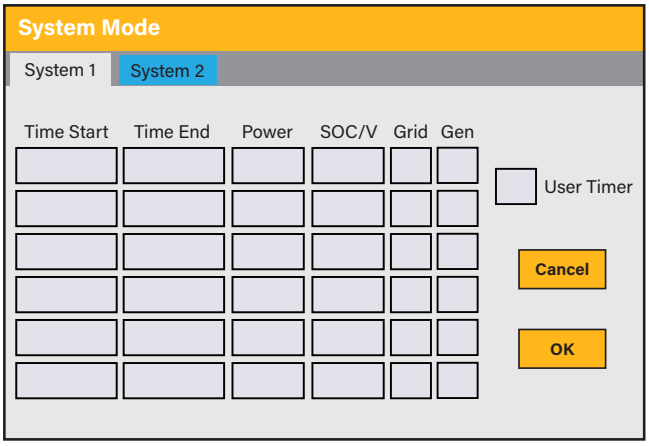


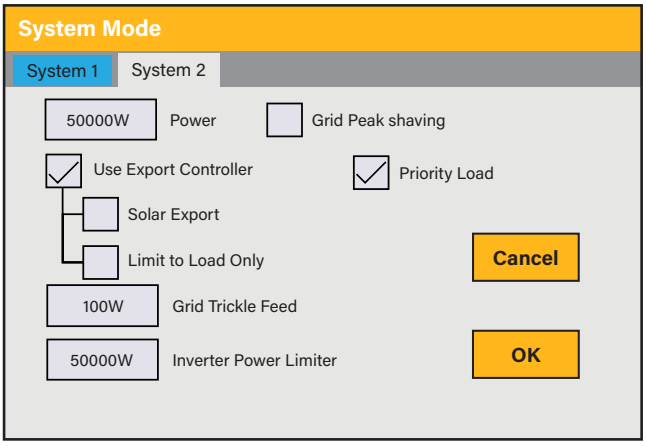


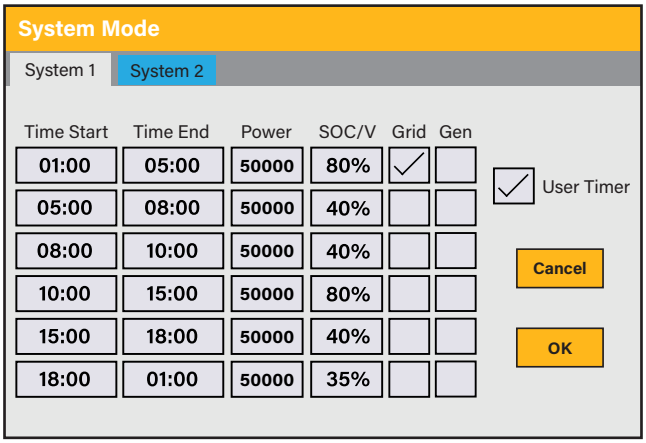
IMPORTANT - When charging the batteries from the grid or generator, ensure the correct battery charge settings are applied, as detailed in the "Battery Setup" section. If the 'Use Timer' function is enabled, the inverter will follow the preset timings for using battery power when grid power is available. Without this setting, batteries will only be used when there is no grid power available.

Example 2:

The export limit for feeding power back to the grid is governed by the inverter's configured power limiter setting. When the "Solar Export" feature is enabled, any surplus solar energy produced after the batteries are fully charged and the load requirements are met is exported to the grid. It should be noted that the 100W grid trickle feed is independent of the export limit and does not influence or determine the export value.







Example:

During 01:00-05:00, when the battery SOC is lower than 80%, it will use the grid to charge the battery until the battery SOC reaches 80%.

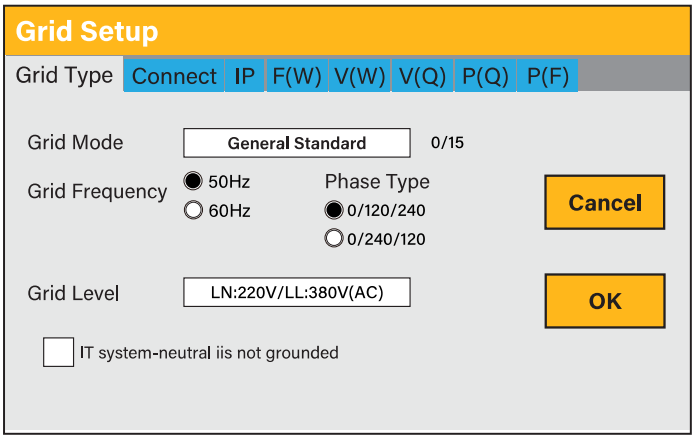
During 05:00-08:00 and 08:00-10:00, when battery SOC is higher than 40%, the hybrid inverter will discharge the battery until the SOC reaches 40%.

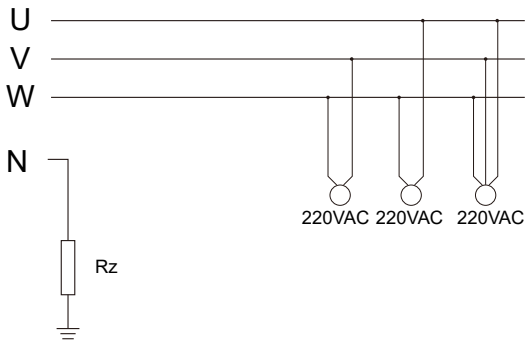
During 10:00-15:00, when the battery SOC is higher than 80%, the hybrid inverter will discharge the battery until the SOC reaches 80%.

During 15:00-18:00, when the battery SOC is higher than 40%, the hybrid inverter will discharge the battery until the SOC reaches 40%.

During 18:00-01:00, when the battery SOC is higher than 35%, the hybrid inverter will discharge the battery until the SOC reaches 35%.

Grid Supply Page



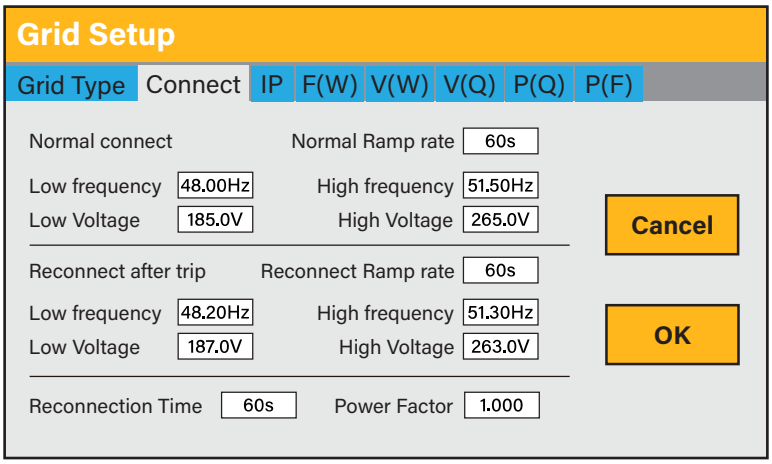


Rz: Large resistance ground resistor. Or the system doesn't have a Neutral line.

To configure the grid supply settings, click on the GRID icon in the Settings menu.

What this page displays:

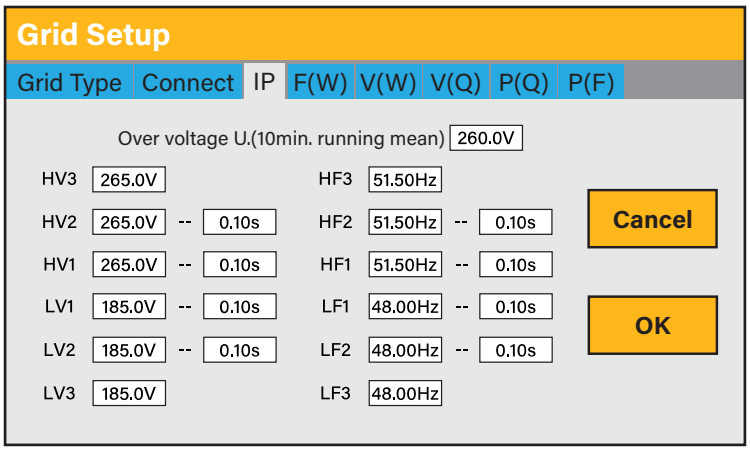
- Grid Mode: Select the grid mode according to your local grid regulations (General Standard - for example, UL1741 & IEEE1547, EN50549_CZ_PPDS_L16A, NRS097, G98/G99). Choose the appropriate grid standard from the drop-down menu. If your local grid standard is not listed, please input the grid settings manually as per the instructions provided below.
- Grid Frequency: This field indicates the required grid frequency (usually 50 Hz or 60 Hz depending on your region).
- Phase Type: Select the correct phase type based on your local requirements:
  - 0/120/240 or 0/240/120
- Grid Level: Defines the inverter's output voltage level in off-grid mode. Available options include:
  - LN: 220 V / LL: 380 V (AC) or LN: 230 V / LL: 400 V (AC)
- IT system: For the IT grid system, the Line voltage (between any two lines in a three-phase circuit) is 230 Vac. If your grid system is an IT system, please enable "IT system" and tick the "Grid level" as LN: 230 V / LL: 400 V (AC), as the picture above shows.



What this page displays:

- Normal connect: Defines the allowed grid voltage/frequency range when the inverter first connects to the grid.
- Normal Ramp rate: This is the rate at which the inverter ramps up to the grid voltage. The ramp rate helps prevent damage to the inverter or grid by ensuring a smooth transition to full operation.
- Reconnect after trip: Defines the allowed grid voltage/frequency range when the inverter reconnects to the grid after a disconnect.

- Reconnect Ramp Rate: Sets the rate at which the inverter reconnects to the grid after a disconnect.
- Reconnection Time: Defines the waiting period for the inverter before attempting to reconnect to the grid after a disconnect event.
- Power Factor: This parameter allows the inverter to adjust its reactive power output to match the grid's requirements, ensuring efficient grid integration.



What this page displays:

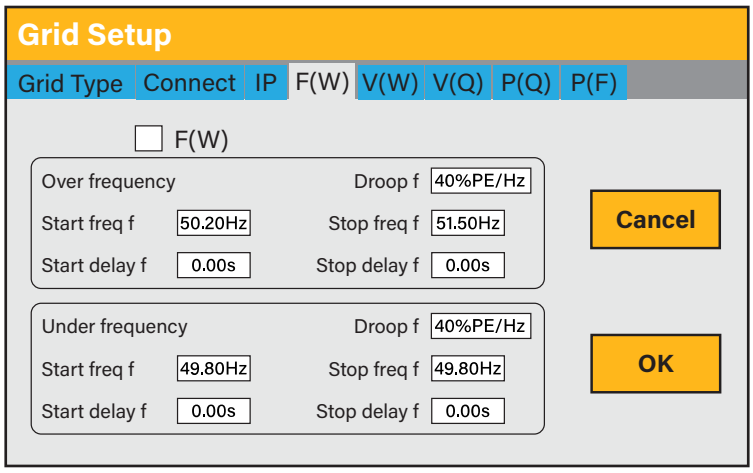
- HV1: Level 1 overvoltage protection point;
- HV2: Level 2 overvoltage protection point;
- HV3: Level 3 overvoltage protection point.
- LV1: Level 1 undervoltage protection point;
- LV2: Level 2 undervoltage protection point;
- LV3: Level 3 undervoltage protection point.
- HF1: Level 1 over frequency protection point;
- HF2: Level 2 over frequency protection point;
- HF3: Level 3 over frequency protection point.
- LF1: Level 1 under frequency protection point;
- LF2: Level 2 under frequency protection point;
- LF3: Level 3 under frequency protection point;
- 0.10s: Trip time.

What you can do from this page:

- Set voltage protection points:
  - Over-voltage protection (HV): Set the protection thresholds for over-voltage conditions. The inverter will disconnect from the grid if the grid voltage exceeds these thresholds.
  - Under-voltage protection (LV): Set the protection thresholds for under-voltage conditions. The inverter will disconnect from the grid if the grid voltage falls below these values.
- Frequency protection:
  - Over-frequency protection (HF): Set the protection thresholds for over-frequency conditions. The inverter will disconnect if the frequency exceeds the set limits.
  - Under-frequency protection (LF): Set the protection thresholds for under-frequency conditions. The inverter will disconnect if the frequency falls below these values.
- Trip time: Adjust the trip time to determine how quickly the inverter disconnects after the overvoltage, undervoltage, over-frequency, or under-frequency conditions are detected. The default trip time is 0.10 seconds.

Example:

- Over-voltage (HV1 set to 265.0 V, HV2 set to 265.0 V, HV3 set to 265.0 V): The inverter will disconnect from the grid if the voltage exceeds 265.0 V for a duration greater than the set trip time.
- Under-voltage (LV1 set to 185.0 V, LV2 set to 185.0 V, LV3 set to 185.0 V): The inverter will disconnect if the voltage drops below 185.0 V.



What this page displays:

- **FW:** This series inverter is able to adjust inverter output power according to grid frequency.
- **Droop f:** The percentage of nominal power per Hz.

Frequency Settings:

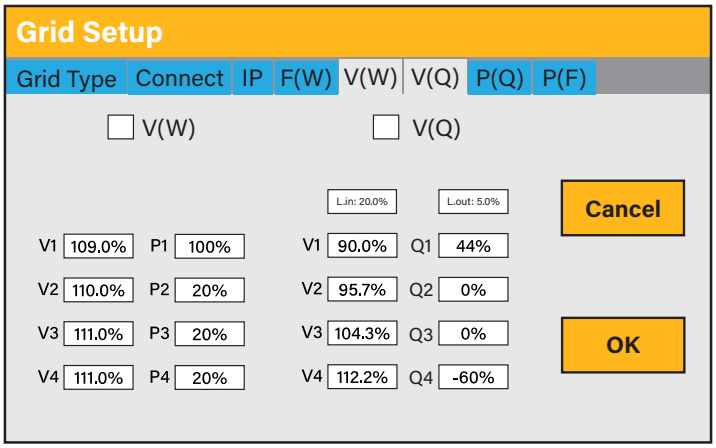
- Over Frequency:
  - Start freq f: The frequency at which the inverter begins reducing output.
  - Stop freq f: The frequency where the inverter stops reducing power.
  - Start delay f: The time before starting power reduction.
- Under Frequency:
  - Start freq f: The lower frequency at which power reduction starts.
  - Stop freq f: The frequency at which power reduction stops.
  - Start delay f: Delay before initiating power reduction.

What you can do from this page:

- Adjust frequency settings: Set the start and stop frequencies to determine at which grid frequency the inverter will reduce its power output.
- Set Droop f: Configure the inverter's response to frequency changes. For example, setting a higher percentage means the inverter will reduce power more aggressively as the frequency deviates from the nominal value.
- Control grid frequency response: Fine-tune the inverter's sensitivity to frequency fluctuations, ensuring it reacts appropriately in various grid conditions.

Example:

- Over-frequency (Start frequency: 50.2 Hz, Stop frequency: 51.5 Hz, Droop f: 40% PE/Hz): In this case, when the grid frequency reaches 50.2 Hz, the inverter will start to reduce its output power at a rate of 40% for each Hz drop. When the grid frequency reaches 51.5 Hz, the inverter will stop reducing its output power.
- Under-frequency (Start frequency: 49.8 Hz, Stop frequency: 49.8 Hz, Droop f: 40% PE/Hz): This will cause the inverter to decrease power if the grid frequency drops below 49.8 Hz.

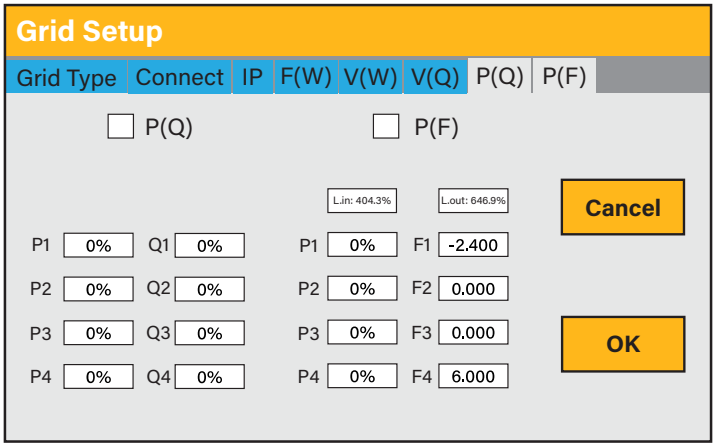


What this page displays:

- V(W): This adjusts the inverter's active power based on the set grid voltage.
- V(Q): This adjusts the inverter's reactive power according to the grid voltage. It modifies both the active and reactive output power when grid voltage changes.
- Lock-in/Pn 5%: This condition applies when the inverter's active power is less than 5% of the rated power. In such cases, the VQ mode will not activate.
- Lock-out/Pn 20%: If the inverter's active power rises above 20% of the rated power, the VQ mode will not take effect.

Examples:

- V2 = 110%, P2 = 20%: When the grid voltage reaches 110% of the rated grid voltage, the inverter's output power will decrease to 20% of the rated power.
- V1 = 90%, Q1 = 44%: When the grid voltage reaches 90% of the rated grid voltage, the inverter output will produce 44% of reactive power.



What this page displays:

- P(Q): It adjusts the inverter reactive power according to the set active power.
- P(PF): It adjusts the inverter PF according to the set active power.
- Lock-in/Pn 50%: When the inverter output active power is less than 50% of the rated power, it will not enter the P(PF) mode.
- Lock-out/Pn 50%: When the inverter output active power is higher than 50% of the rated power, it will enter the P(PF) mode.

NOTICE

The P(PF) mode will only take effect when the grid voltage is equal to or greater than 1.05 times the rated grid voltage.

Paralleling Inverters Advanced Settings

NOTICE

Parallel feature is max up to 10 inverters.

In parallel operation, the setting “Limit to load only” falls away, and the inverter can only be used to power essential and non-essential loads, and the CT position needs to be correct.

To configure multi-inverter settings, click on the ADVANCE icon.

What this page displays:

- Master/Slave selection: This option allows you to designate whether the inverter operates as a master or a slave.
- Modbus Device ID: The 'Modbus SN' must be unique for each inverter connected to the bus/wire.

What you can do from this page:

- Set the inverter to operate as either a master or slave in the parallel configuration.
- Assign a Modbus SN to each inverter for proper paralleling.

PARALLELING CONFIGURATION

Stability Considerations:

- For installation and operation of our 50 kW inverter the RCD is not an essential requirement. However, make sure that the overcurrent and earth fault protection on the feeder line to the inverter comply with national standards and regulations. If the batteries supply power to the main load during an outage, you must also install a changeover switch or configure a split load setup.

Communication and Wiring:

- CT coils for limiting export power should only be connected to the master inverter. For six inverters in parallel, three CT coils are required.
- Use an RJ45 communication cable to connect inverters in parallel. The order does not matter as both sockets are identical.
- Each inverter must have a unique Modbus number.
- The maximum communication cable length should not exceed 2 meters.

Important Notes:

1. Firmware consistency: Ensure that all inverters in a parallel or three-phase system are running the same firmware version. It's recommended to request firmware updates for all inverters before configuring them in parallel.
2. Load breaker isolation: Each inverter in a parallel system must have its own isolating load breaker before it is connected to the parallel breaker. This ensures that the load outputs are isolated during programming.
3. Final connection: Only after confirming that all inverters are correctly programmed in parallel or three-phase configuration, can the isolating breakers be switched on. This then feeds into the main load output breaker.

NOTICE

The communication cables have two specific ends: one for connecting to the BMS and another for connecting to the inverter. Do not swap these cables. If communication issues arise, check the settings and ensure the data cables are correctly connected.

Grid input can also be connected in parallel to accommodate multiple inverters.

TROUBLESHOOTING AND FAQS FOR PARALLELING INVERTERS

For additional assistance, please visit the Sunsynk website at www.sunsynk.com, where you will find training videos and Frequently Asked Questions (FAQs).

Important: Before installation, ensure that the firmware on all inverters is updated to the latest version. It is crucial that all inverters in parallel or in a three-phase system run the same firmware to avoid compatibility issues.

Q1: 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, last of all, turn on the main supplies.

Q2: 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.

Q3: What are the consequences of not setting one inverter in a parallel mode?

It can damage the inverter.

Q4: What are the consequences of having more than one Master Inverter or having no inverter set as 'Master'?

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).

Q5: What are the consequences for setting A, B, or C phases wrong while in parallel mode?

It can damage the inverter. Recommend checking the phase rotation with a meter before switching on.

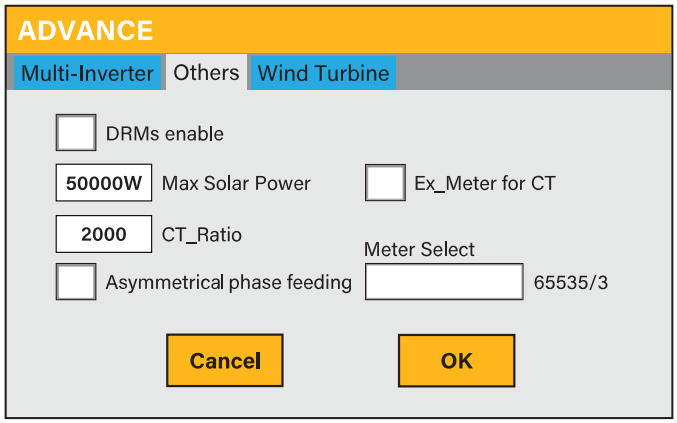
Q6: What are the consequences of factory resetting, power cycling, or firmware updating one inverter in a parallel system?

It can damage the inverter. Inverters needs to be isolated from each other before factory reset or firmware update.

Q7: 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.

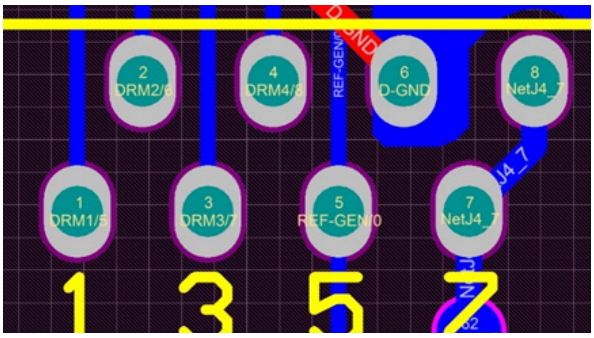
Connecting the DRM's



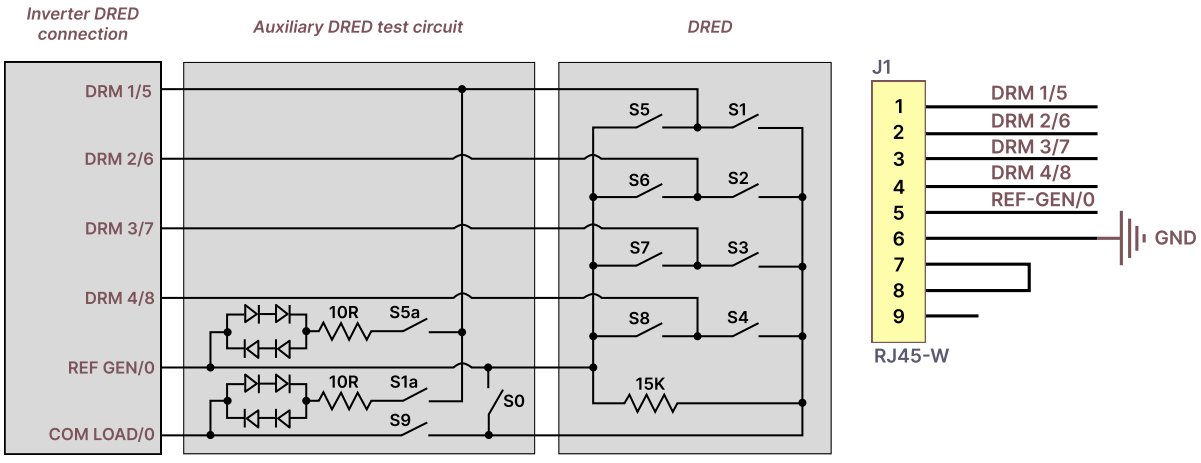
To configure and enable DRMs (Demand Response Management) functionality, you can access the related settings under the Advanced Settings menu. *For AS4777 Standard.

What this page displays:

- In the Advanced Settings menu, select DRMs Enable to activate DRM functionality.
- You can also configure the Max Solar Power and CT Ratio settings according to your system requirements. Below is an example of how these options appear in the settings:
  - 50000W: This sets the maximum solar power limit.
  - 2000: Sets the CT ratio, which helps the inverter adjust power levels for the grid connection. Choose the meter type based on the system setup.
- Ex_Meter for CT: In a three-phase system using a CHiNT three-phase energy meter (DTSU666), select the corresponding phase to which the hybrid inverter is connected. For example, if the inverter output is connected to A Phase, select "A Phase".
- Asymmetrical phase feeding: When enabled, the inverter will draw power from the grid using the available balance across each phase (L1/L2/L3), as needed.
- Meter connection: Select the appropriate meter connection type based on your system configuration.



1. DRM 1/5
2. DRM 2/6
3. DRM 3/7
4. DRM 4/8
5. Ref 0
6. COM LOAD/0
7. Net J 4-7
8. Net J 4-7



Solar Power Generated

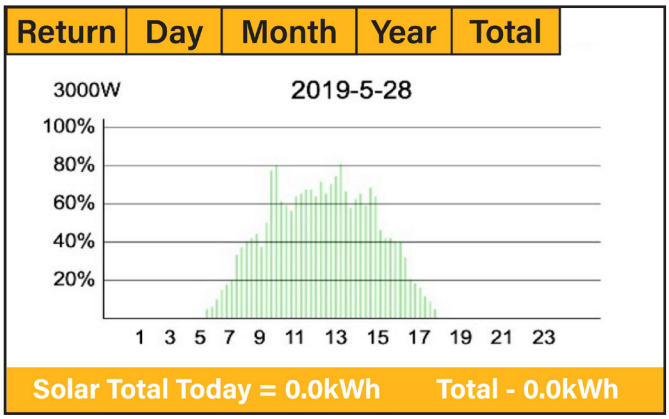
This page displays the solar power produced on a daily, monthly, yearly, and total basis. To access this page, click on the Solar/Turbine icon on the Home Page.

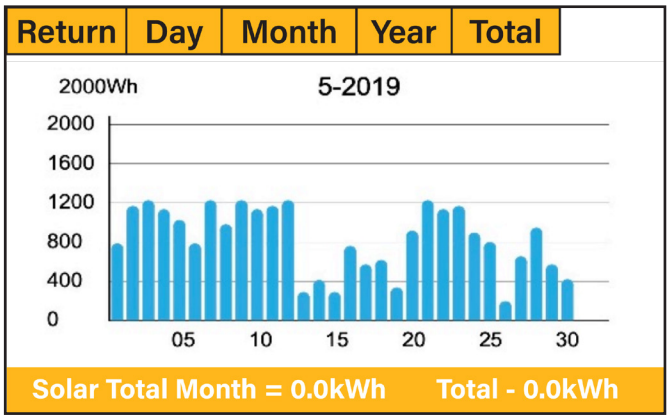
What this page displays:

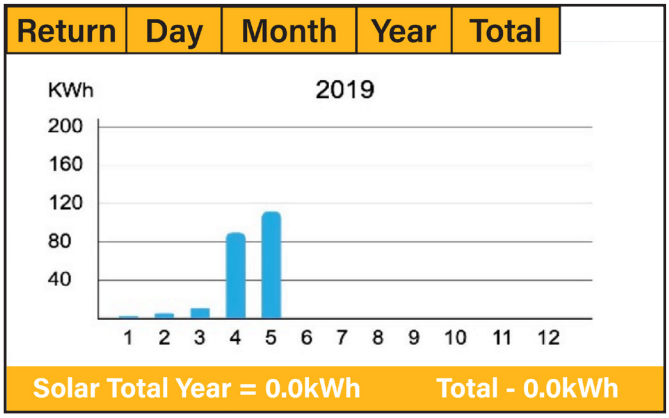
- Return/Day/Month/Year/Total: This shows the total solar energy generated for the current day, month, year, and overall total.
- Solar Total Today: Displays the total amount of energy produced for the current day.
- Solar Total Month: Shows the cumulative solar power generated for the current month.
- Solar Total Year: Displays the total solar power generated in the current year.
- Solar/Turbine Power Total: This displays the total solar/turbine power generated over the entire operating period of the inverter, giving a complete overview of the system's total energy production from the beginning to the current date.

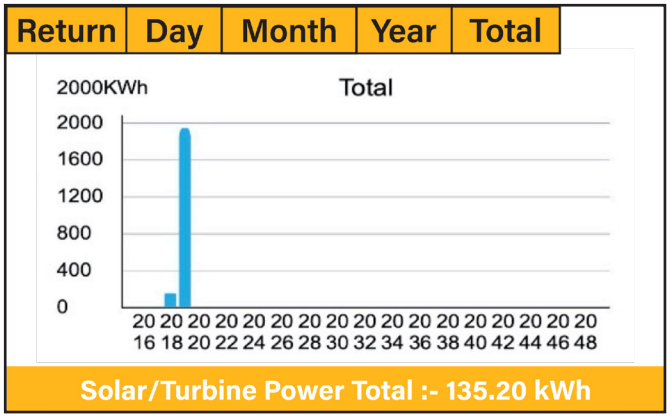
The graphical display will include:

1. A daily power generation graph for the current day.
2. A monthly power generation graph for the current month.
3. A yearly power generation graph for the current year.
4. A total power generation display for the entire period.









Grid Power

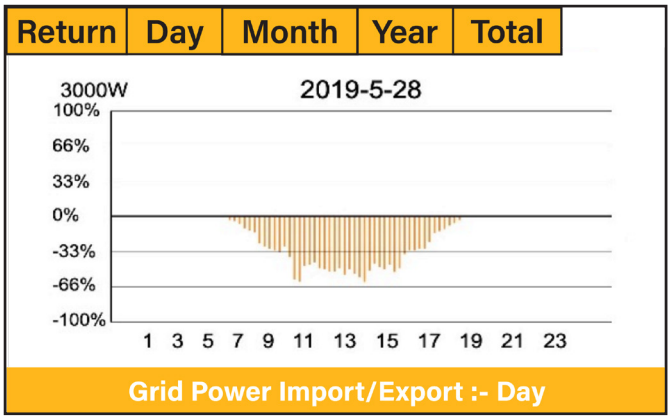
This page displays the daily, monthly, yearly, and total grid power export or consumption. To access this page, click on the Solar/Turbine icon on the Home Page.

What this page displays:

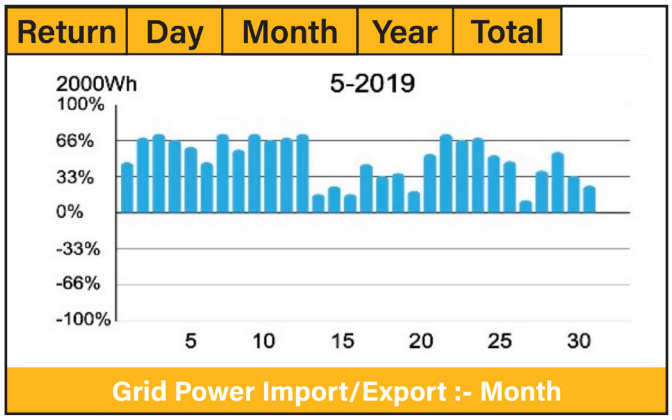
- Return/Day/Month/Year/Total: Shows the total grid power exported or consumed for the current day, month, year, and overall total.
- Grid Power Import/Export Day: Displays the total amount of power imported from or exported to the grid for the current day.
- Grid Power Import/Export Month: Shows the total amount of grid power imported or exported for the current month.
- Grid Power Import/Export Year: Displays the total amount of grid power imported or exported for the current year.
- Grid Power Import/Export Total: This displays the total amount of grid power consumed or exported over the entire operational period of the inverter, providing a comprehensive overview of grid-related energy exchanges.

The graphical display will include:

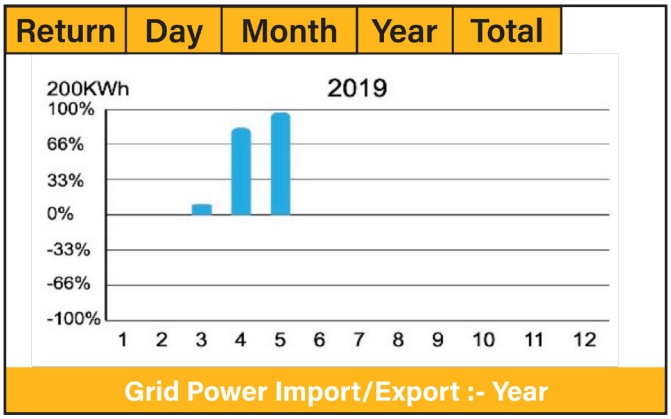
1. A daily power consumption or export graph for the current day.
2. A monthly power consumption or export graph for the current month.
3. A yearly power consumption or export graph for the current year.
4. A total grid power export or consumption display for the entire period.



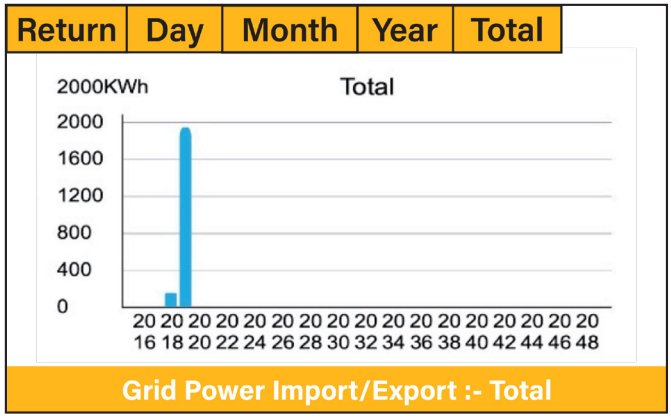
Grid Power Import/Export :- Day



Grid Power Import/Export :- Month

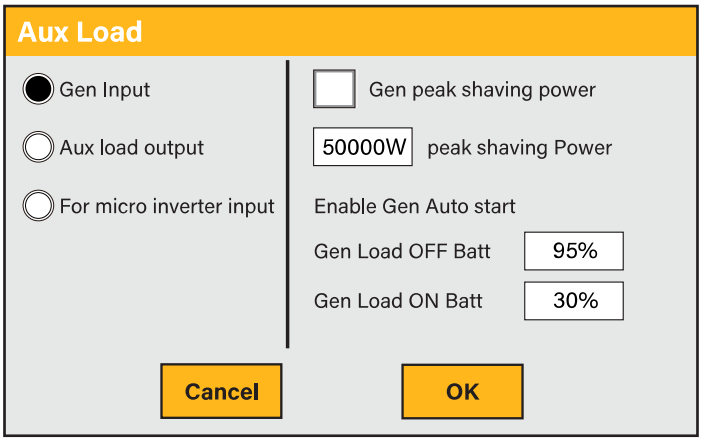


Grid Power Import/Export :- Year



Grid Power Import/Export :- Total

Advanced Settings for Auxiliary Load



To configure Auxiliary Load (previously known as “smart load”) settings, click on the AUX LOAD icon in the menu.

What this page displays:

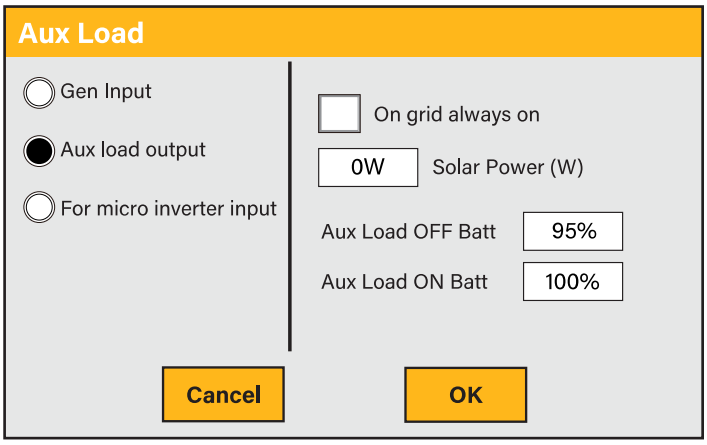
- Use of the Gen (Aux) input or output: Allows you to select whether the generator peak shaving function is active.
- Gen peak shaving: This feature helps reduce electricity consumption during peak hours by managing the load between the inverter and the generator.
- Peak power shaving value: Defines the maximum power output from the generator to meet the demand while managing costs and avoiding excessive grid usage.

What you can do from this page:

- Set up a generator input: Configure the input for the generator, enabling peak shaving power functionality.
- Set up an auxiliary load: Configure the settings to manage additional loads efficiently.
- Switch on generator and/or grid peak shaving: Enable peak shaving functionality for generator or grid connections, ensuring cost-effective operation during peak demand periods.
- Use additional inverters or micro inverters: Optionally, connect additional inverters or micro inverters for more flexible load management.

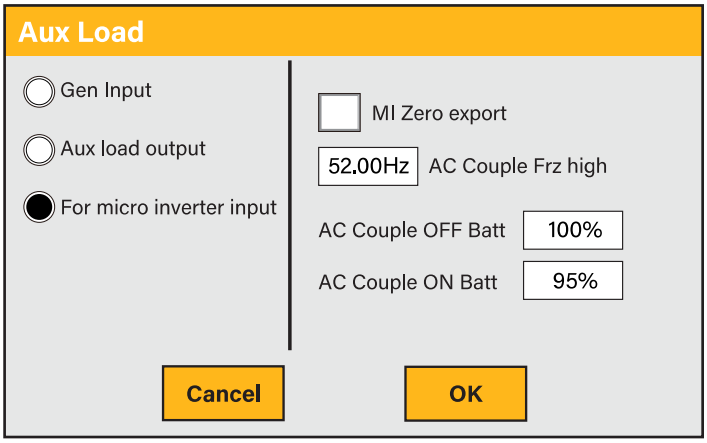
FOR GEN INPUT MODE

- Gen Input: Tick this box if using a generator. You can set the maximum allowed power from the diesel generator.
- Peak Shaving Power: This function helps reduce electrical consumption during peak hours by diverting power from the grid or generator to manage demand efficiently.
- Gen Load OFF Batt: Defines the battery level at which the inverter switches to auxiliary load operation when the battery level is too low.
- Gen Load ON Batt: Configures the battery level at which auxiliary load will turn on. This ensures that the battery power is available when needed.



FOR AUX LOAD OUTPUT MODE

- Aux Load Output: This mode utilizes the Gen input connection as an output, which only receives power when the battery State of Charge (SOC) and PV power are above a user-programmable threshold.
  - For example: Power=500W, ON: 100%, OFF=95%. When the PV power exceeds 500W, and the battery bank SOC reaches 100%, the Smart Load Port will automatically switch on to power the connected load.
  - When the battery bank SOC < 95% or PV power < 500W, the Smart Load Port will switch off automatically.
- On Grid Always On: When this option is selected, the Smart Load will switch on when the grid is present.
- Solar Power: Power limiter to control the maximum power allowed to the Auxiliary load.
- Aux Load OFF Batt: Defines the battery SOC at which the Smart Load will switch off.
- Aux Load ON Batt: Defines the battery SOC at which the Smart Load will switch on. The PV input power should exceed the set value (Power) at the same time for the Smart Load to turn on.



FOR MICRO INVERTER INPUT MODE

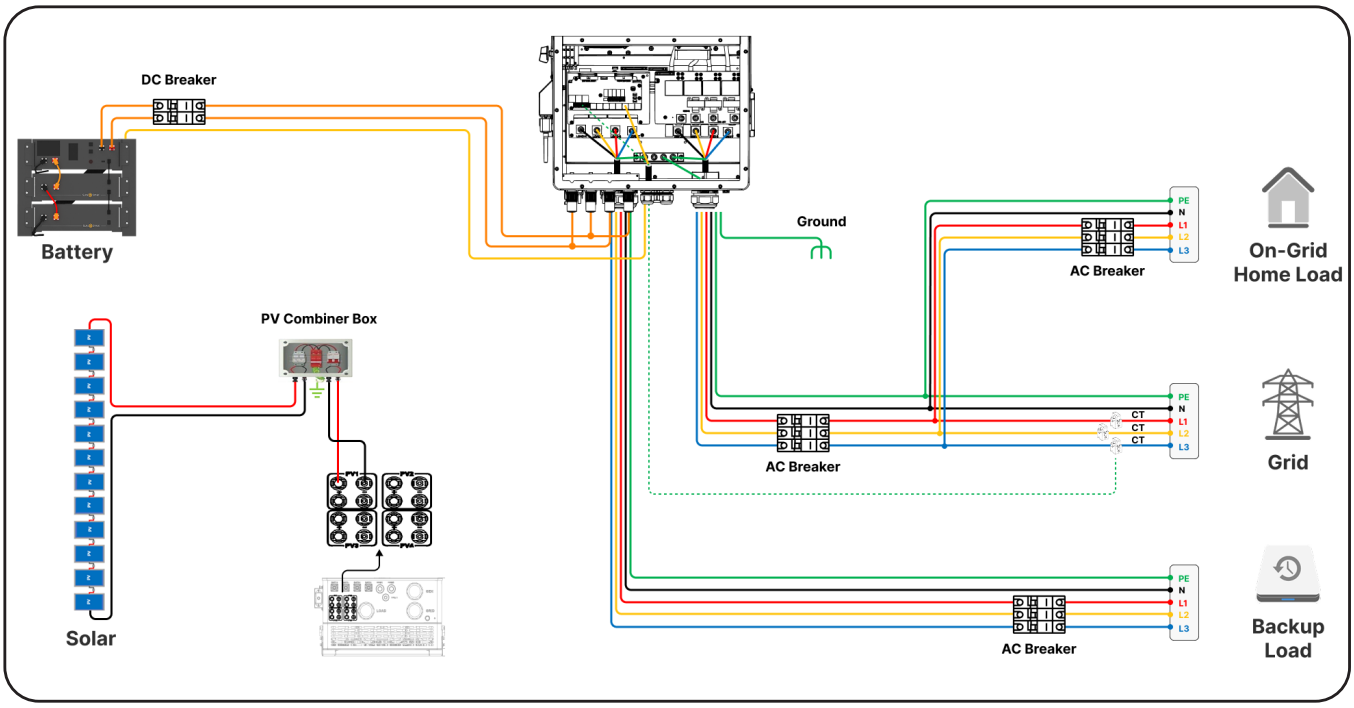
- Micro Inverter Input: This feature allows the Generator input port to be used as a micro-inverter on the grid inverter input (AC coupled). It works with "Grid-Tied" inverters. Tick this box if intending to connect a supplementary inverter or micro inverter (Max. 4 kW).
- AC Couple OFF Batt: When the battery SOC exceeds the set value, the Microinverter or grid-tied inverter will shut down.
- AC Couple ON Batt: If "Micro Inv input" is selected, as the battery SOC reaches the set value (OFF), the output power from the microinverter will gradually decrease. When the battery SOC equals the set value (OFF), the system frequency will match the set value (AC couple Frz high), and the microinverter will stop working, halting the export of power to the grid. The microinverter input to the 80kW is a 1:1 ratio.

NOTICE

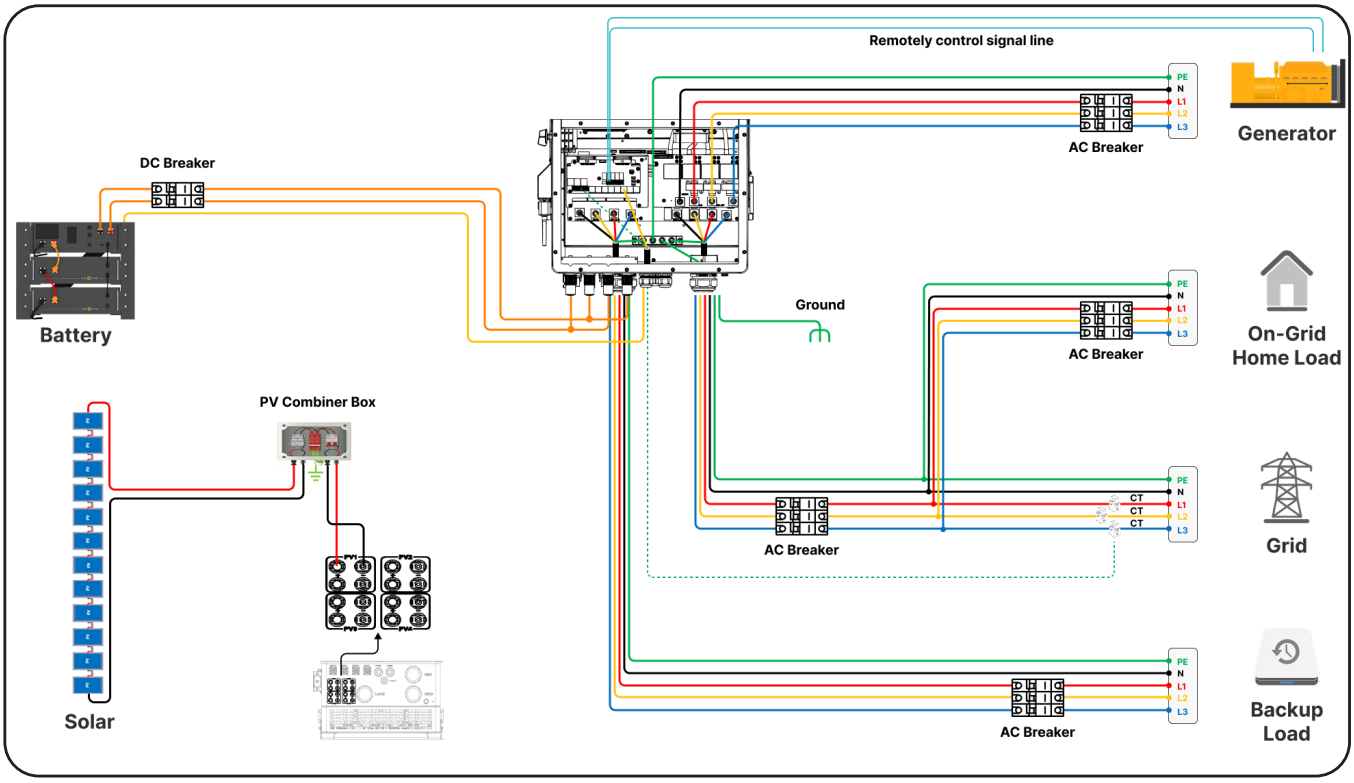
Micro Inv Input OFF and ON: This setting is valid for specific firmware versions only.

OPERATION MODES

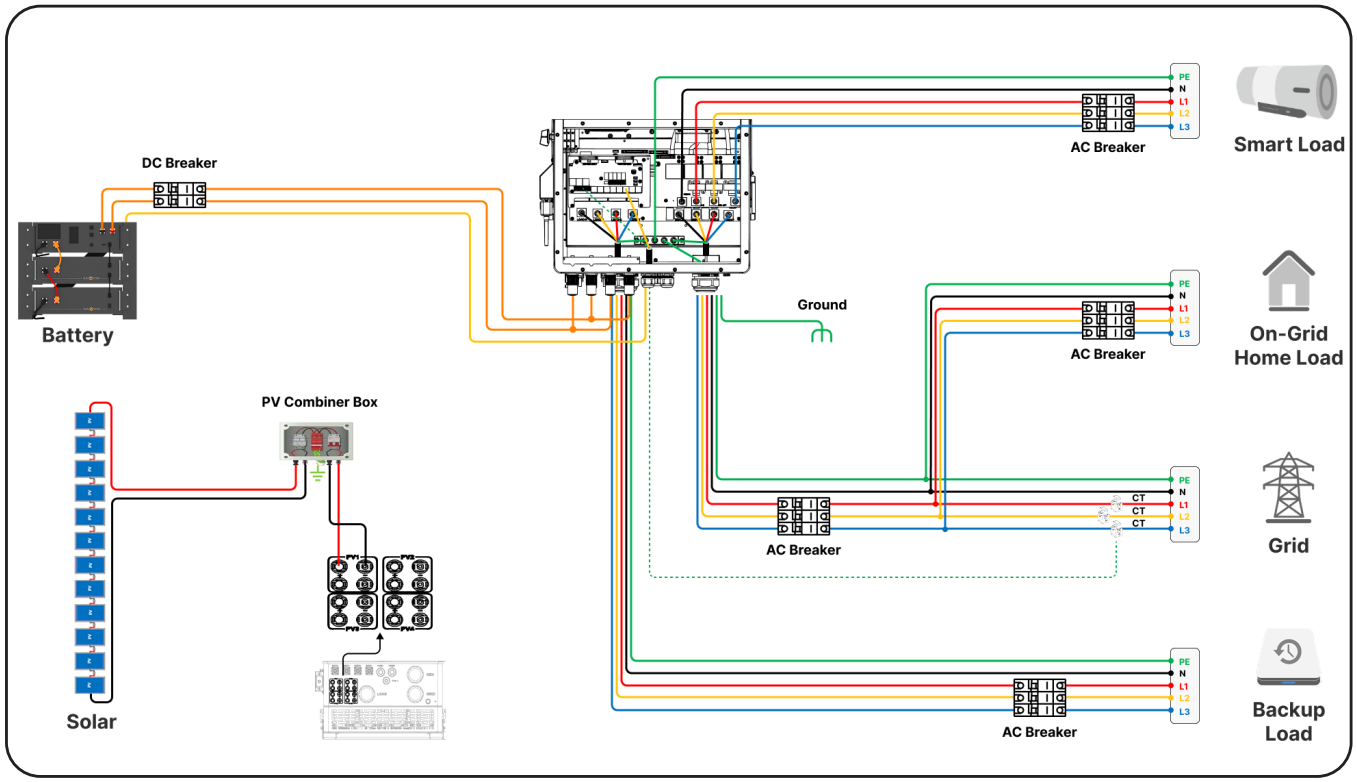
Mode I: Basic



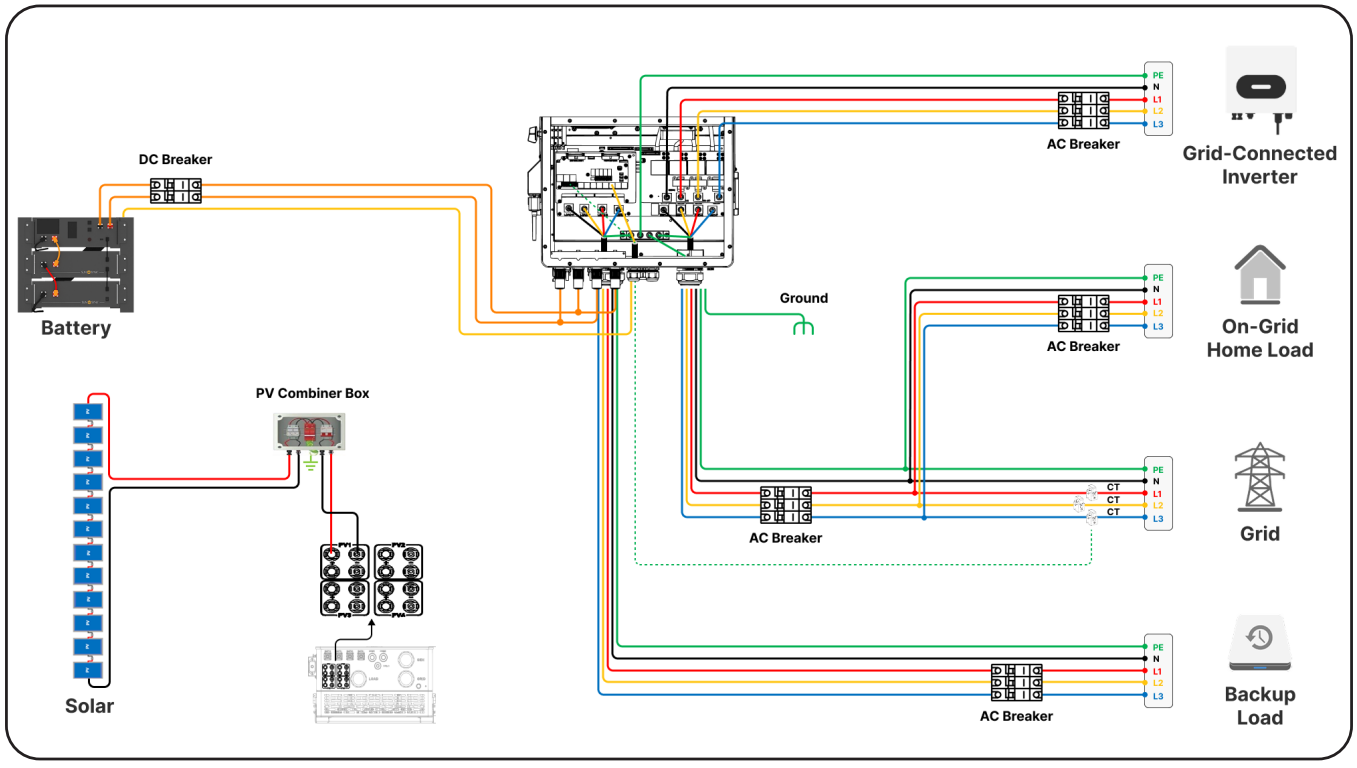
Mode II: With Generator



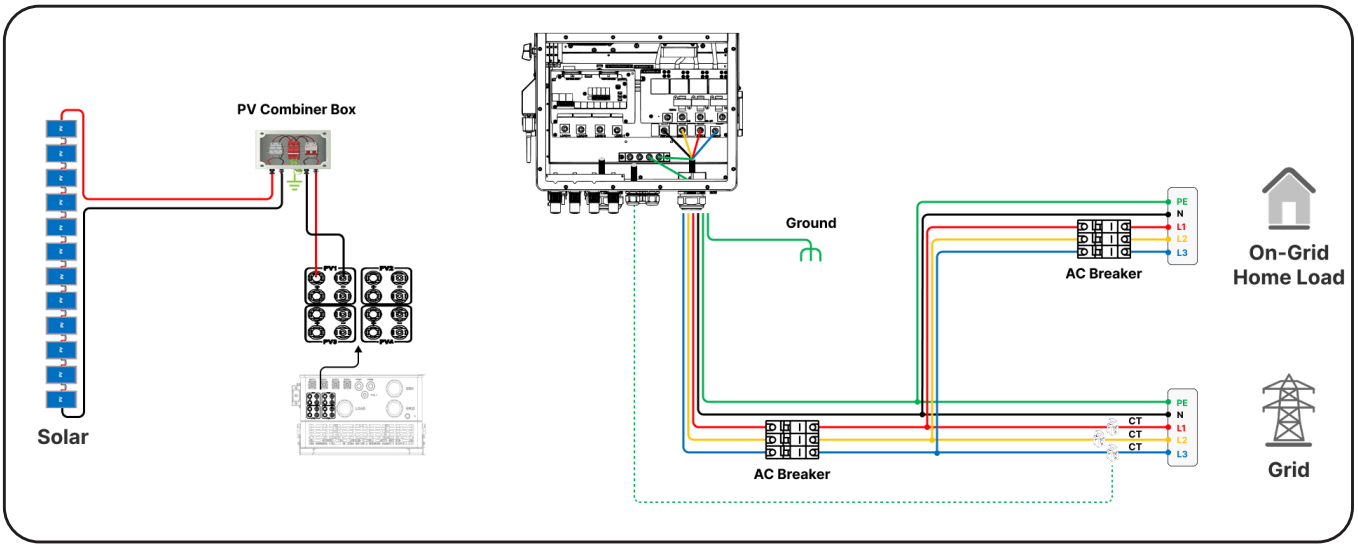
Mode III: With Aux-Load



Mode IV: AC Couple



Mode V: Grid-Tied



WARNING

The system's first priority power source is always solar (PV) power. The second and third priority power sources are the battery bank or grid power, depending on the configuration settings. Generator power will be used as a last resort if available.

FAULT CODES

FAULT CODES			
Alarms Code		ID:2004244320	Occured
F56	DC_VoltLow_Fault		2022-01-26 12:45
F56	DC_VoltLow_Fault		2022-01-24 11:00
F56	DC_VoltLow_Fault		2022-01-07 18:19
F56	DC_VoltLow_Fault		2022-01-08 01:58
F56	DC_VoltLow_Fault		2021-11-09 13:22
F56	DC_VoltLow_Fault		2021-11-03 17:48
F56	DC_VoltLow_Fault		2021-10-27 16:31
F56	DC_VoltLow_Fault		2021-10-20 19:17

To check the fault codes, click on the FAULT CODES icon in the settings menu.

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

- Inverter serial number.
- Distributor or service centre of the inverter.
- On-grid power generation date.
- A detailed description of the problem (including the fault code and indicator status displayed on the LCD), as much information as possible.
- Owner's contact information.

In order to give you a clearer understanding of the inverter's fault information, we will list all possible fault codes and their descriptions when the inverter is not working properly.

Error Code	Description	Solutions
W01	Reserved	
W02	FAN_IN_Warn	1. Check the operating status of the fan. 2. If the fan is running abnormally, open the cover of the inverter to check the connection of the fan.
W03	Grid_phase_warn	1. Check the phase sequence connection of the power grid. 2. Try to change the grid type, 0, 240/120. 3. If there is still no solution to check the wiring at the grid end.
W04	Meter_offline_warn	Meter communication failure Check whether the meter has successful communication and whether the wiring is normal.
W05	CT_WRONG_direction_warn	Check whether the arrow on CT's case point to the inverter or not , and check if the installation location of CTs are correct.
W06	CT_Notconnect_warn	Check whether the wires of CTs are connected correctly or not.
W07	FAN_OUT1_Warn	Check whether the FAN are connected correctly and operating normally.
W08	FAN_OUT2_Warn	Check whether the FAN are connected correctly and operating normally.
W09	FAN_OUT3_Warn	Check whether the FAN are connected correctly and operating normally.
W10	VW_activate	1. Measure whether the grid port voltage is too high. 2. Check whether the AC cable is too thin to carry current.
W31	Battery_comm_warn	Abnormal battery communication 1. Check whether the BMS connection is stable. 2. Check whether the BMS data is abnormal.
W32	Parallel_comm_warn	Unstable parallel communication 1. Check the connection of the parallel communication line. Please do not wind the parallel communication line with other cables. 2. Check whether the parallel dip switch is on.
F01	DC_Inversed_Failure	Check the PV input polarity
F02	DC_Insulation_Failure	Check whether the PV is grounded, secondly, check whether the impedance of the PV to the ground is normal.
F03	GFDI_Failure	1.Check whether the PV modules are grounded. 2. Check whether the impedance of the PV to the ground is normal, whether there is leakage current.
F04	GFDI_Ground_Failure	Check whether the PV is grounded.
F05	EEPROM_Read_Failure	Restart the inverter 3 times and restore the factory settings.
F06	EEPROM_Write_Failure	Restart the inverter 3 times and restore the factory settings.
F07	DCDC1_START_Failure	The BUS voltage can't be reached by PV or battery. 1. Switch off the DC switches and restart the inverter
F08	DCDC2_START_Failure	The BUS voltage can't be reached by PV or battery. 1. Switch off the DC switches and restart the inverter
F09	IGBT_Failure	Restart the inverter 3 times and restore the factory settings.
F10	AuxPowerBoard_Failure	1. First check whether the inverter switch is open. 2. Restart the inverter 3 times and restore the factory settings.

Error Code	Description	Solutions
F11	AC_MainContactor_Failure	Restart the inverter 3 times and restore the factory settings.
F12	AC_SlaveContactor_Failure	Restart the inverter 3 times and restore the factory settings.
F13	Working_Mode_Change	1. When the grid type and frequency changed it will report F13. 2. When the battery mode was changed to "No Battery" mode, it will report F13. 3. For some old FW version, it will report F13 when the system work mode changed. 4. Generally, it will desappear automatically when shows F13; 5. If it remains same, turn on DC and AC switches for one minute, then turn on the DC and AC switches.
F14	DC_OverCurr_Failure	Restart the inverter 3 times and restore the factory settings.
F15	AC_OuverCurr_SW_Failure	AC side over current fault 1. Please check whether the backup load power and common load power are within the range. 2. Restart and check whether it is normal.
F16	GFCI_Failure	Leakage current fault 1. Check the PV side cable ground connection. 2. Restart the system 2-3 times.
F17	Tz_PV_OverCurr_Fault	1. Check the PV connection and whether the PV is unstable. 2. Restart the inverter 3 times.
F18	Tz_AC_OverCurr_Fault	AC side over current fault 1. Please check whether the backup load power and commonload power are within the range. 2. Restart and check whether it is normal.
F19	Tz_Integ_Fault	Restart the inverter 3 times and restore the factory settings.
F20	Tz_Dc_Overcurr_Fault	DC side over current fault 1. Check PV module connect and battery connect. 2. When in the off-grid mode, the inverter startup with a big power load, and it may report F20. Please reduce the load power connected. 3. Turn off the DC and AC switches, wait one minute, and then turn on the DC/AC switch again.
F21	Tz_HV_Overcurr_fault	BUS over current. 1. Check the PV input current and battery current settings. 2. Restart the system 2-3 times.
F22	Tz_EmergStop_Fault	Remotely shutdown 1. It tells the inverter is remotely controlled.
F23	Tz_GFCI_OC_Fault	Leakage current fault 1. Check PV side cable ground connection. 2. Restart the system 2~3 times.

Error Code	Description	Solutions
F24	DC_Insulation_Fault	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.
F25	DC_Feedback_Fault	Restart the inverter 3 times and restore the factory settings.
F26	BusUnbalance_Fault	1. Please wait for a while and check whether it is normal. 2. When the load power of 3 phases is big different, it will report the F26. 3 .When there's DC leakage current, it will report F26. 4. Restart the system 2~3 times.
F27	DC_Insulation_Fault	Restart the inverter 3 times and restore the factory settings.
F28	DCIOver_M1_Fault	Restart the inverter 3 times and restore the factory settings.
F29	Parallel_Comm_Fault	1. When in parallel mode, check the parallel communication cable connection and hybrid communication address settings. 2. During the parallel system startup period, inverters will report F29. When all inverters are in ON status, it will disappear automatically.
F30	AC_MainContactor_Fault	Restart the inverter 3 times and restore the factory settings.
F31	AC_SlaveContactor_Fault	1. Check whether the grid orientation is correct. 2. Restart the inverter 3 times and restore the factory settings.
F32	DCIOver_M2_Fault	Restart the inverter 3 times and restore the factory settings.
F33	AC_OverCurr_Fault	1. Check whether the grid current is too large. 2. Restart the inverter 3 times and restore the factory settings.
F34	AC_Overload_Fault	Check the backup load connected, make sure it is in allowed power range.
F35	AC_NoUtility_Fault	Check the grid voltage and frequency, whether the connection of the power grid is normal.
F36	Reserved	
F37	Reserved	
F38	Reserved	
F39	INT_AC_OverCurr_Fault	Inverter AC overcurrent, restart the inverter.
F40	INT_DC_OverCurr_Fault	Inverter DC overcurrent, restart the inverter.
F41	Parallel_system_Stop	Check the hybrid inverter working status. If there's 1pcs hybrid inverter is in OFF status, the other hybrid inverters may report F41 fault in parallel system.
F42	Parallel_Version_Fault	1. Check whether the inverter version is consistent. 2. Please contact us to upgrade the software version.
F43	Reserved	
F44	Reserved	
F45	AC_UV_OverVolt_Fault	Grid voltage out of range 1. Check the voltage is in the range of specification or not. 2. Check whether AC cables are firmly and correctly connected

Error Code	Description	Solutions
F46	AC_UV_UnderVolt_Fault	Grid voltage out of range 1. Check the voltage is in the range of specification or not. 2. Check whether AC cables are firmly and correctly connected.
F47	AC_OverFreq_Fault	Grid frequency out of range 1. Check the frequency is in the range of specification or not. 2. Check whether AC cables are firmly and correctly connected.
F48	AC_UnderFreq_Fault	Grid frequency out of range 1. Check the frequency is in the range of specification or not. 2. Check whether AC cables are firmly and correctly connected.
F49	AC_U_GridCurr_DcHigh_Fault	Restart the inverter 3 times and restore the factory settings.
F50	AC_V_GridCurr_DcHigh_Fault	Restart the inverter 3 times and restore the factory settings.
F51	Battery_Temp_High_Fault	Check wether the temperature data of BMS is too high.
F52	DC_VoltHigh_Fault	BUS voltage is too high 1. Check whether battery voltage is too high. 2. Check the PV input voltage, make sure it is within the allowed range.
F53	DC_VoltLow_Fault	BUS voltage is too low 1. Check whether battery voltage is too low. 2. If the battery voltage is too low, using PV or grid to charge the battery.
F54	BAT2_VoltHigh_Fault	1. Check the battery 2 terminal voltage is high. 2. Restart the inverter 2 times and restore the factory settings.
F55	BAT1_VoltHigh_Fault	1. Check the battery 1 terminal voltage is high. 2. Restart the inverter 2 times and restore the factory settings.
F56	BAT1_VoltLow_Fault	1. Check the battery 1 terminal voltage is low. 2. Restart the inverter 2 times and restore the factory settings.
F57	BAT2_VoltLow_Fault	1. Check the battery 2 terminal voltage is low. 2. Restart the inverter 2 times and restore the factory settings.
F58	Battery_comm_Lose	1. It tells the communication between hybrid inverter and battery BMS disconnected when “BMS_Err-Stop” is active”. 2. If don’t want to see this happen, you can disable “BMS_Err-Stop” item on the LCD.
F59	Reserved	
F60	GEN_FAULT	Check whether the voltage and frequency of the generator are normal, and then restart.
F61	INVERTER_Manual_OFF	Check whether the switch of the inverter is turned on, restart the inverter, and restore the factory settings.
F62	DRMs0_stop	Check the DRM function is active or not.
F63	ARC_Fault	1. ARC fault detection is only for US market. 2. Check PV module cable connection and clear the fault.
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.

COMMISSIONING

Start-Up / Shutdown Procedure

The inverter must be installed by a qualified and licensed electrical engineer, following the relevant national wiring regulations. Prior to powering on, the installation engineer must complete the following checks:

- Earth bond test.
- RCD (Residual Current Device) test.
- Earth leakage tests.
- Ensure the solar panel Voc voltage does not exceed 850 V.
- Verify battery voltage.

Although the maximum allowable PV input voltage is 1000 V, the 850 V limit provides an additional safety margin to protect the system from potential voltage fluctuations or operational variations that could cause damage.

Power ON Sequence:

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

Shutdown Sequence:

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

Inverter Commissioning Info

After you have successfully powered up the inverter, it must be programmed and set up according to the programming feature above.

 **Solar**	Check each bond on the solar panels.	Check the VOC does not exceed 850 V MPPT Range.	Ensure both MPPTs are balanced.
 **GRID**	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 Setup 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 controls everything.	Ensure you are familiar with this, if you fully understand the controller you will fully appreciate the capabilities of there inverter.	See section 'Program Charge / Discharge Times'.
 **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 400 V.	If using a wind turbine please ensure you have the correct limiting resistor, caps and rectifier.
 **FAULT CODES**	Familiarise yourself with common fault codes.		

GDFI Fault

Before the inverter connects to the grid, it will check the impedance (effective resistance) of the solar PV+ to ground and the impedance of the solar PV- to ground. If either impedance value is found to be less than 33 kΩ, the inverter will prevent grid connection and display an F24 error on the LCD. This is a safety feature designed to protect the system and ensure proper grounding.

MAINTENANCE

The inverter is designed to require minimal maintenance. However, to ensure optimal performance, it is important to follow these maintenance practices:

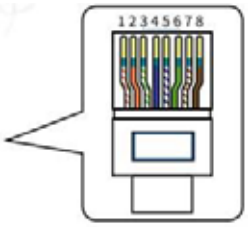
- General Cleaning: At least twice a year, and more frequently in dusty environments (weekly recommended), clean the cooling fans and air ducts to prevent dust accumulation. This will ensure proper ventilation and prevent overheating.
- Check Fault Codes: Regularly check the inverter's display for any fault codes. If fault codes are present, they should be addressed immediately to ensure the system operates effectively.
- Lithium Battery Communication: Verify that communication with the Lithium battery is functioning correctly. This can be done through the inverter's monitoring system or the battery management system (BMS).
- Weekly Cleaning: In environments with high dust accumulation or micro-ants, it is recommended to use micromesh filters. These filters can help keep dust, insects, and other particles out of the inverter's internal components, preventing damage and ensuring proper airflow.

APPENDIX A

Definition of RJ45 Ports

The table below provides the details of the wiring for the RJ45 port connections, which are used for communication with various devices:

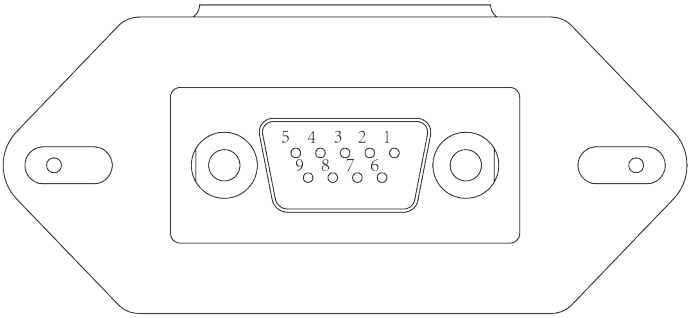
No.	Color	BMS1	BMS2	Meter	RS485	DRM
1	Orange&White	485_B	485_B	Meter-485_B	Modbus-485_B	DRM1/5
2	Orange	485_A	485_A	Meter-485_A	Modbus-485_A	DRM2/6
3	Green&White	GND_485	GND_485	GND_COM	GND_485	DRM3/7
4	Blue	CAN_H1	CAN_H2	Meter-485_B	-	DRM4/8
5	Blue&White	CAN_L1	CAN_L2	Meter-485_A	-	REF-GEN/0
6	Green	GND_485	GND_485	GND_COM	GND_485	COM LOAD/0
7	Brown&White	485_A	485_A	-	Modbus-485_A	NetJ1_7
8	Brown	485_B	485_B	-	Modbus-485_B	NetJ1_7



RS232 Ports

The RS232 port is used to connect the WiFi data logger, allowing communication between the inverter and monitoring systems.

No.	WIFI/RS232
1	
2	TX
3	RX
4	
5	D-GND
6	
7	
8	
9	12Vdc



WIFI/RS232

This RS232 port is used to connect the wifi datalogger

APPENDIX B

Inverters sold in Australia will be set to the Default Australian standards, ensuring compliance with local regulations and grid compatibility.

APPENDIX C

The Sunsynk Three-Phase Hybrid Inverter is compatible with the Sunsynk Connect app via Wi-Fi or GSM data logger (see Sunsynk Connect instruction manual for setup details). This integration allows for remote monitoring and control of the inverter system, ensuring ease of use and real-time data access.

APPENDIX D

If an external Residual Current Device (RCD) is used, it should be a Type A/C with a tripping current of 30 mA or higher.

Important Guidelines for Installing RCDs:

1. Disconnect all live conductors (including both active and neutral conductors).
2. Use 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. Below are the recommended specifications for a Residual Current Breaker with Overcurrent Protection (RCDO).

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

APPENDIX E

The Sunsynk inverter can be connected to the internet, but a data logger must be added.

The inverter is compatible with Sunsynk Connect data-loggers, which you can obtain from your distributor.

Available types include:

- LAN-Type Data Logger
- Wi-Fi Type Data Logger
- GSM-Type Data Logger

To set up the internet connection for Sunsynk Connect, please refer to the App User instructions. The Data Logger should be connected to the bottom of the inverter via the connection socket marked WiFi.

For more information on training videos, software updates, help, and forum posts, please visit:

www.sunsynk.com - Tech Support

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