V1.0

USER MANUAL

IRON PRO SERIES

Hibryd Solar Inverter

SUNBEAT
ENERGY FOR BETTER LIVING

Preface

Thank you for choosing SunBeat products. We are pleased to provide you first-class products and exceptional service.

This manual provides information about installation, operation, maintenance, troubleshooting and safety. Please follow the instructions of this manual so that we can ensure delivery of our professional guidance and whole-hearted service.

Customer-orientation is our forever commitment. We hope this document proves to be of great assistance in your journey for a cleaner and greener world.

We make constant improvements on the products and their documentation. This manual is subject to change without notice; these changes will be incorporated in new editions of the publication. To access the latest documentation, visit the SunBeat website at https://www.sunbeatenergy.com.

SunBeat Energy

TABLE OF **CONTENTS**

1.

SAFETY PRECAUTIONS

1.1. About this document

1.1.1. Overview

This *User Manual* provides introductions and instructions of installing, operating, maintaining, and troubleshooting of the SunBeat IRON PRO series products. For details, refer to the model types listed in section 2.2 "Product Models".

Read the user manual carefully before any installation, operation and maintenance and follow the instructions during installation and operation. Keep this manual all time available in case of emergency.

Failure to follow any of the instructions or warnings in this document can result in device damage, potentially rendering it inoperable; or even causes electrical shock, serious injury, or death. SunBeat shall take no responsibility for any personal injuries or property damage caused by improper use.

1.1.2. Target audience

This document is applicable to:

- Installers
- Users

The qualified and trained installers must have knowledge and experience in:

- Installing electrical equipment. Applying all applicable installation codes.
- Analyzing and reducing the hazards involved in performing electrical work.
- Installing and configuring batteries.
- Selecting and using Personal Protective Equipment (PPE).

1.2. Safety

CAUTION:
ONLY qualified and trained electricians who have read and fully understood all safety regulations contained in this manual can install, maintain, and repair the equipment. Access to the equipment is by the use of a tool, lock and key, or other means of security.

1.2.1. Safety levels

DANGER
Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING
Indicates a hazardous situation which, if not avoided, can result in death or serious injury or moderate injury.

⚠ CAUTION
Indicates a hazardous condition which, if not avoided, can result in minor or moderate injury.

! NOTICE
Indicates a situation that can result in potential damage, if not avoided.

1.2.2. Symbol explanation

Symbol	Description
	**Danger:** Electrical shock hazard This device is directly connected to public grid, thus all work to the device shall only be carried out by qualified personnel.
	**WARNING:** No open flames Do not place or install near flammable or explosive materials.
	**WARNING:** Hot surface The components inside the device will release a lot of heat during operation. Do not touch metal plate housing during operating.
	**Attention:** Install the product out of reach of children.
	**Attention:** Check the user manual before service. If an error has occurred, refer to the troubleshooting chapter to remedy the error.
	**Attention:** This device shall NOT be disposed of in residential waste.
	**Attention:** This device shall NOT be disposed of in residential waste.

	**DANGER:** Risk of electric shock from energy stored in capacitor. Do not remove the cover until 5 minutes after disconnecting all sources of supply.
	**CE Mark** Equipment with the CE mark fulfills the requirements of the Low Voltage Directive and Electro Magnetic Compatibility.
	**RoHS compliant mark** Equipment with the RoHS mark does not exceed the allowable amounts of the restricted substances defined in Restriction of Hazardous Substances in Electrical and Electronic Equipment.
	**RCM compliant mark** Equipment with the RCM mark is in compliance with AS/NZS 4417.1 & 2 and the EESS.
	**Recyclable**

1.2.3. Safety instructions

For safety, be sure to read all the safety instructions carefully prior to any works, and observe the appropriate rules and regulations of the country or region where you install the all-in-one energy storage system.

 **DANGER**
• There is possibility of fatal personnel injuries due to electrical shock and high voltage. • Do not touch the operating component of the inverter; it might result in burning or death. • To prevent risk of electric shock during installation and maintenance, please make sure that all AC and DC terminals are disconnected prior to work. • Do not touch the surface of the inverter while the housing is wet, otherwise, it might cause electrical shock. • Do not stay close to the inverter while there are severe weather conditions including storm, lightning, etc. • Before opening the housing, the SunBeat inverter must be disconnected from the grid and PV generator; you must wait for at least five minutes to let the energy storage capacitors completely discharge after disconnecting from power source. • Please keep the power off prior to any operations.

⚠ WARNING

- Any unauthorized actions including modification of product functionality of any form may cause lethal hazard to the operator, third parties, the units or their property. SunBeat is not responsible for the loss and these warranty claims.
- Do not touch non-insulated parts or cables.
- For personal and property safety, do not short-circuit the positive (+) and negative (-) electrode terminals.
- Disconnect the PV array from the inverter by using an external disconnection device. If no external disconnection device is available, wait until no more DC power is applied to the inverter.
- Disconnect the AC circuit breaker, or keep it disconnect if it is tripped, and secure it against reconnection.
- The SunBeat inverter must only be operated with the PV generator. Do not connect any other source of energy to the SunBeat inverter.
- Be sure that the PV generator and inverter are well grounded in order to protect properties and persons.

⚠ CAUTION

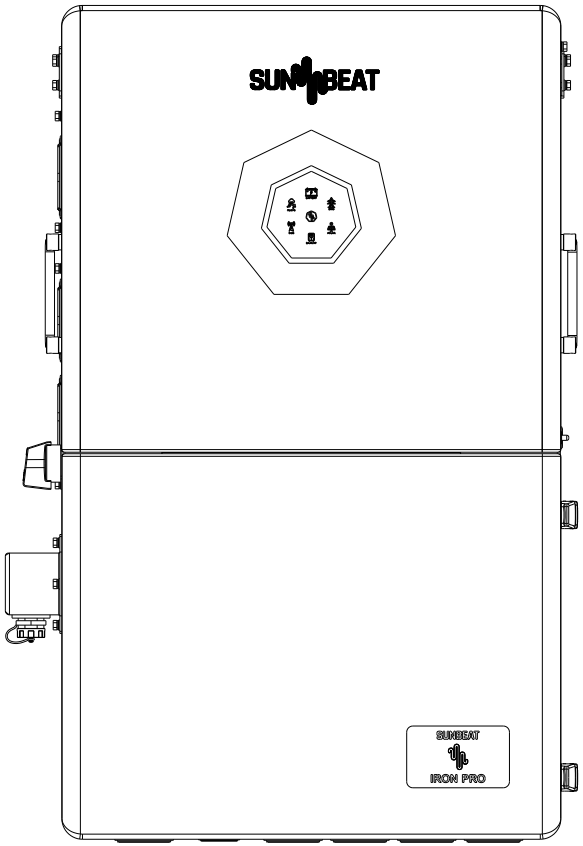
- The inverter will become hot during operation. Please do not touch the heat sink or peripheral surface during or shortly after operation.
- Risk of damage due to improper modifications.

NOTICE

- Moving or reinstall the inverter to another location might void the warranty without prior written permission from SunBeat.

1.3. Safe handling

- Only qualified electricians who have read and fully understood all safety regulations in this manual can install, maintain, and repair the inverter.
- When the inverter is working, do not touch the internal components or cables to avoid electric shock.
- When the inverter is working, do not plug in or out the cables.
- Make sure the AC input voltage and current are compatible with the rated voltage and current of the inverter; otherwise, components might be damaged, or the device cannot work properly.


SUNBEAT
SUNBEAT
IRON PRO

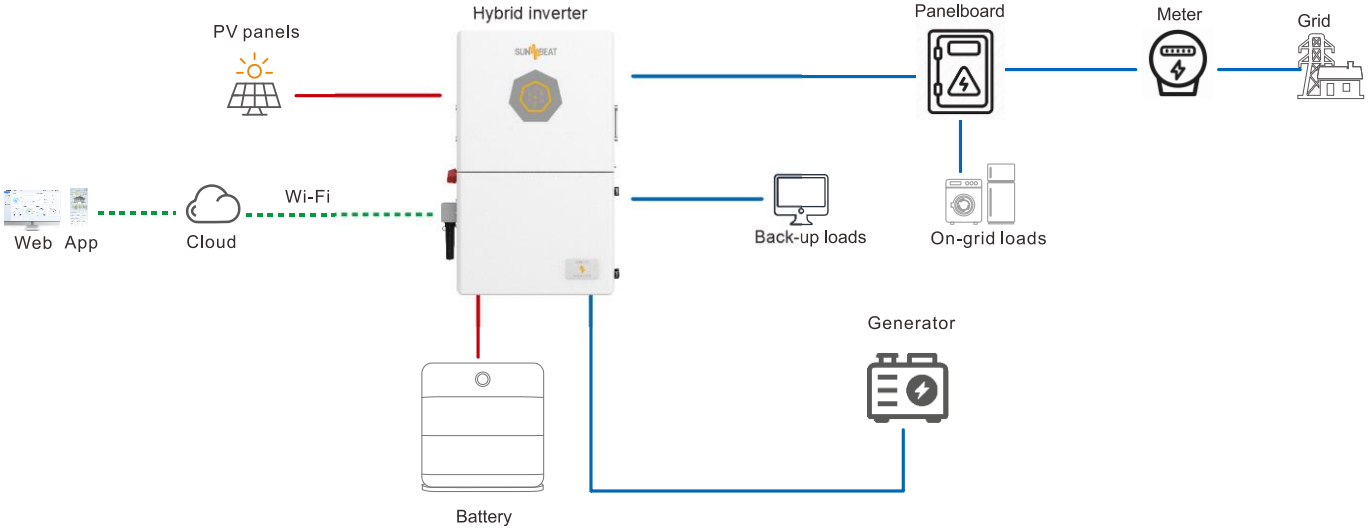
2.

PRODUCT INFORMATION

2.1. General introduction

The IRON PRO series low-voltage inverter is a transformer-less hybrid solar inverter, which is a key component of a complete energy storage system.

The inverter contains maximum power point tracking (MPPT), battery charging/discharging circuit and full-bridge inverting circuit. It converts solar power to grid-compliant AC power for home loads and sell extra power to the grid. The solar power can also be stored into the battery for later use when grid is down or during peak electricity price period.



When power outage occurs, the inverter transfers the back-up loads to battery power immediately without any supply interruption to the back-up loads.

2.2. Product Models

The SunBeat IRON PRO series low-voltage inverter includes the following models:

- IRON PRO 5
- IRON PRO 8
- IRON PRO 10
- IRON PRO 12

2.3. Dimension

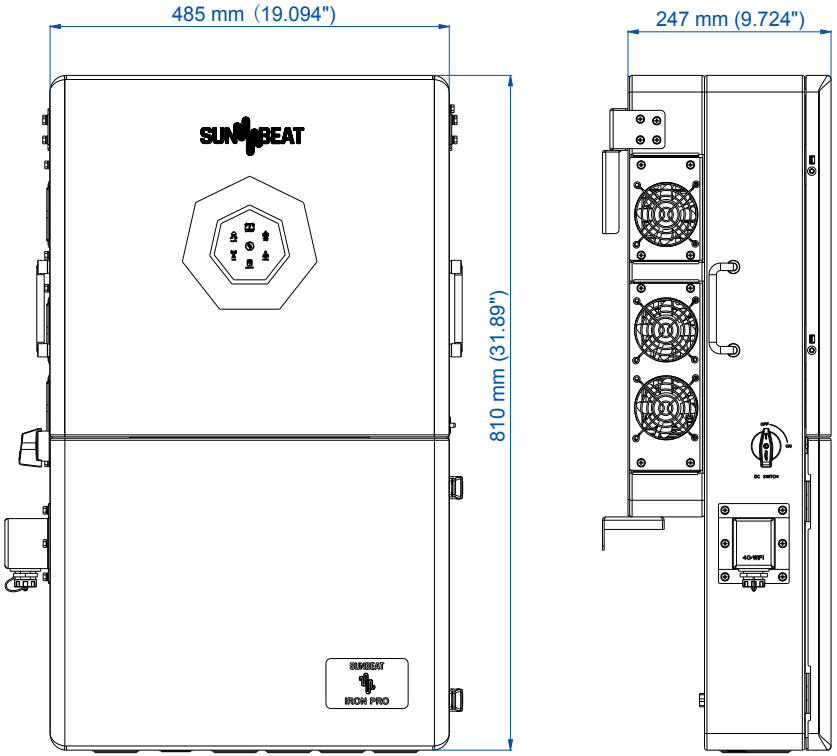
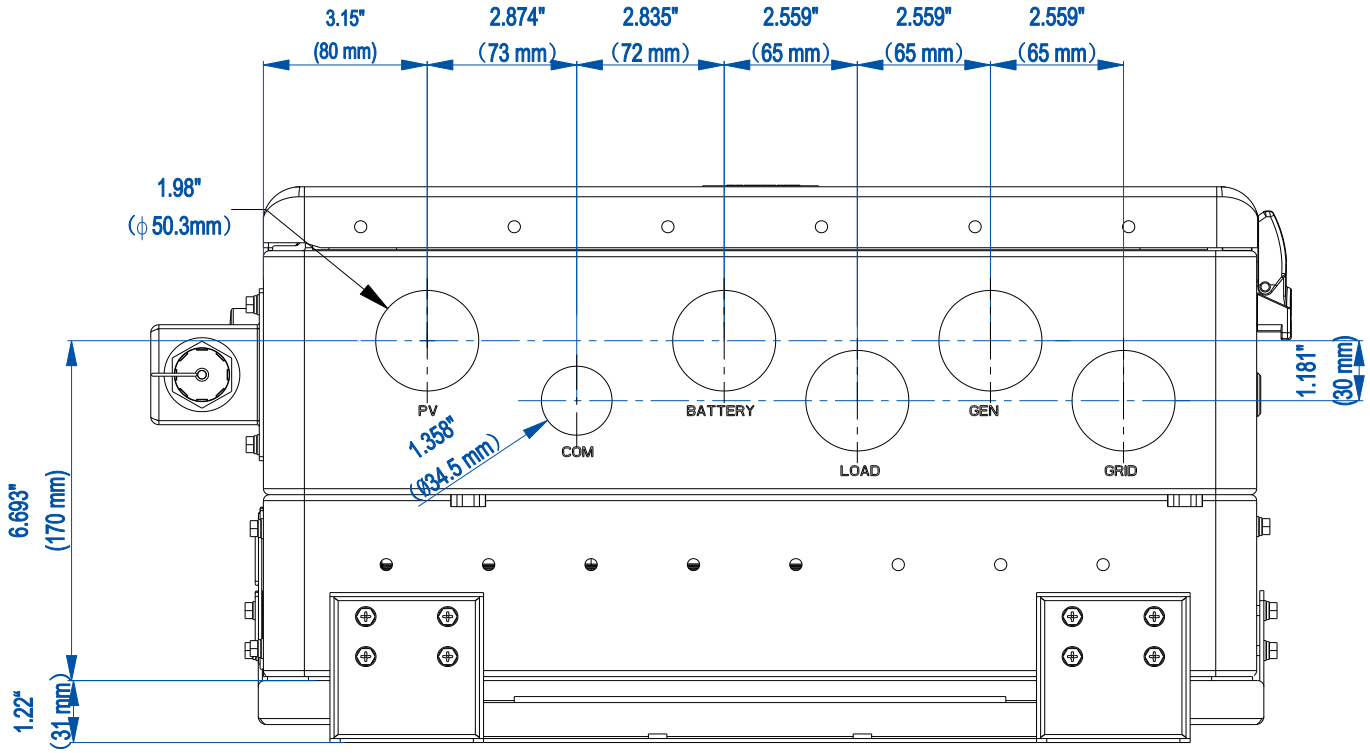


Figure 2.1. Inverter dimension



Knockout hole	Dimension	Knockout hole	Dimension
PV	ϕ50.3 mm (ϕ1.98")	COM	ϕ34.5mm (ϕ1.358")
BATTERY	ϕ50.3 mm (ϕ1.98")	LOAD	ϕ50.3 mm (ϕ1.98")
GEN	ϕ50.3 mm (ϕ1.98")	GRID	ϕ50.3 mm (ϕ1.98")

2.4. Knockout holes, switch, and button

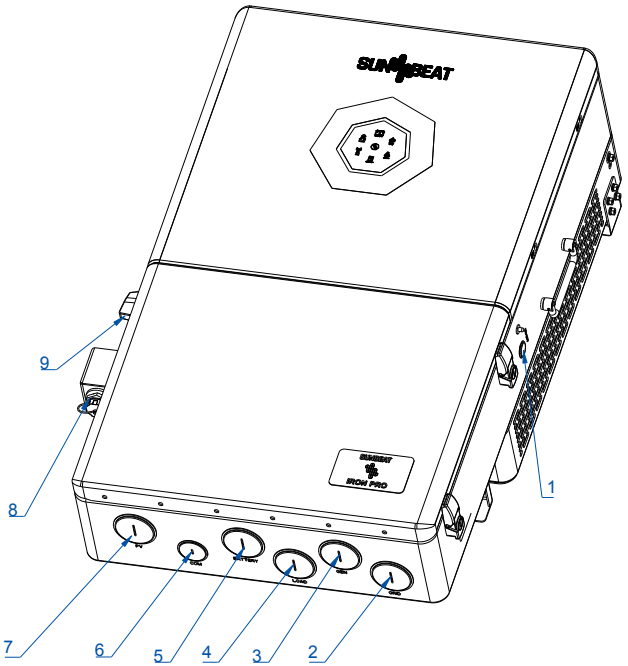


Figure 2.2. Knockout holes, switch, and button

Callout	Silkscreen	Description
1	ON/OFF	Press this button to shut down the inverter in an emergency.
2	GRID	For connecting the grid cable.
3	GEN	For connecting the generator cables.
4	LOAD	For connecting load cables.
5	BATTERY	For connecting battery cables.
6	COM	For connecting communication cables.
7	PV	For connecting PV cables.
8	4G/WIFI	For connecting the communication module.
9	DC Switch	For controlling the PV input to the inverter.

Table 2.1. Description of the knockout holes, switch, and button

2.5. Electrical terminals in the junction box

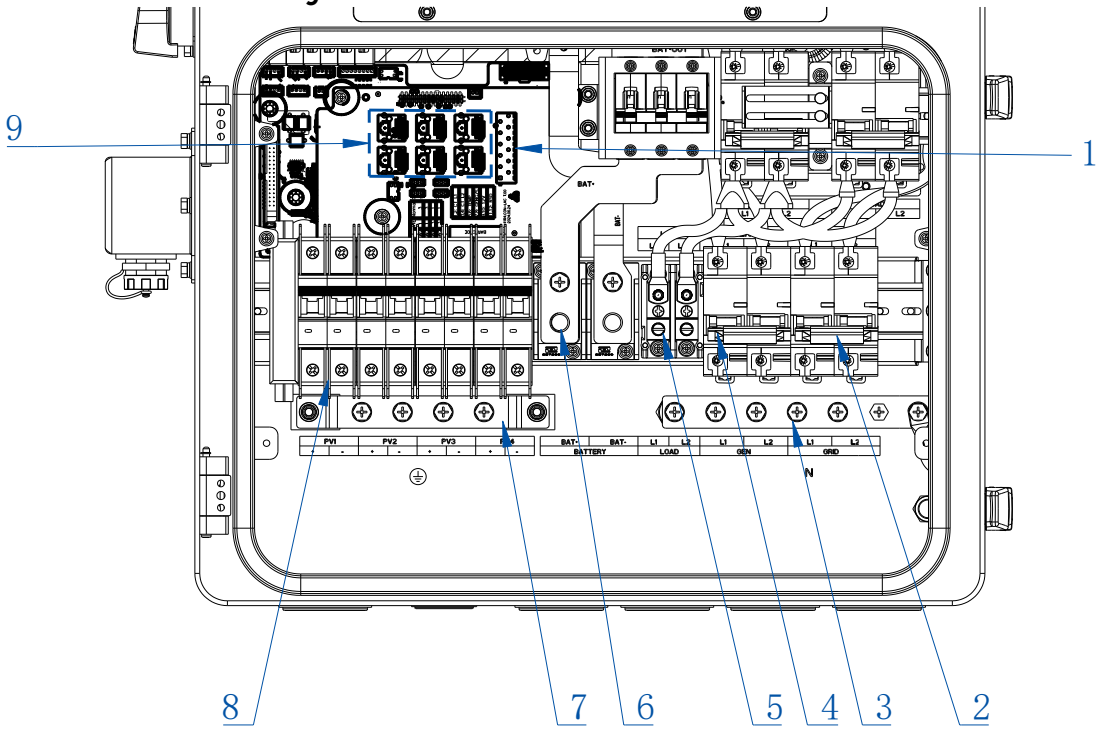


Figure 2.3. Electrical terminals in the junction box

Callout	Description	Callout	Description
1	CN89 terminal (with 12 pins)	2	GRID (L1 and L2)
3	N bar	4	GEN (L1 and L2)
5	LOAD	6	BAT (BAT+ and BAT-)
7	PE bar	8	PV (PV1, PV2, PV3, and PV4)
9	Six RJ45 communication ports		

2.6. LED indicators

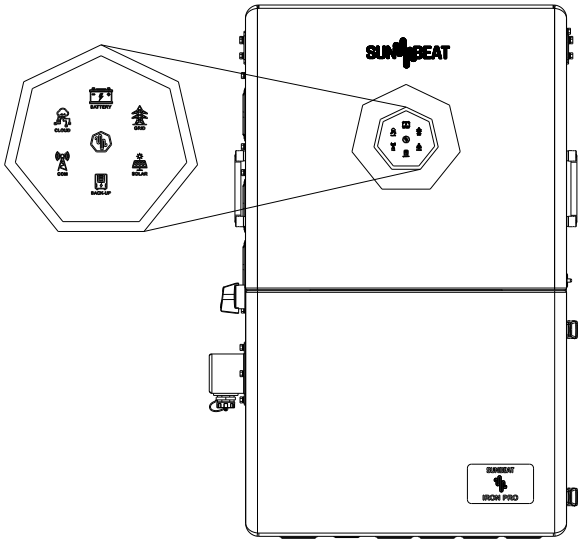


Figure 2.4. LED indicators

LED indicator	Status	Description
	Off	The inverter is powered off.
	Orange: Breathing with a 6s cycle	The inverter is in initialization or standby state.
	Orange: Solid on	The inverter is working properly.
	Red: Breathing with a 6s cycle	The inverter is upgrading.
	Red: Solid on	The inverter is not working properly.
	Solid on	The battery is importing electricity from the grid.
	On 1s, off 1s	The battery is exporting electricity to the grid.
	On 1s, off 3s	No electricity is imported from or exported to the grid.
	Off	The inverter is disconnected from the grid.

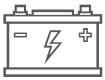
	Solid on	The battery is in discharging status.
	On 1s, off 1s	The battery is in charging status.
	On 1s, off 3s	The battery SOC is lower than the set value.
	Off	The battery is disconnected or inactive.
	Solid on	The grid is connected and working properly.
	On 1s, off 1s	The inverter is trying to connect to the grid.
	On 1s, off 3s	The grid is not working properly.
	Off	No grid is detected.
	Solid on	The PV array is working properly.
	On 1s, off 1s	The PV array is not working properly.
	Off	The PV array is not working.
	Solid on	The AC-side load is working properly.
	On 1s, off 1s	The AC-side load is overloaded.
	Off	The AC-side load is disconnected or off.
	Solid on	In good communication with both the meter and BMS.
	On 1s, off 1s	In good communication with the meter but lost communication with the BMS.
	On 1s, off 3s	In good communication with the BMS but lost communication with the meter.
	Off	Lost communication with the meter and the BMS.
	Solid on	The inverter is connected to the cloud.
	On 1s, off 1s	The inverter is trying to connect to the cloud.
	Off	The inverter is disconnected from the cloud.

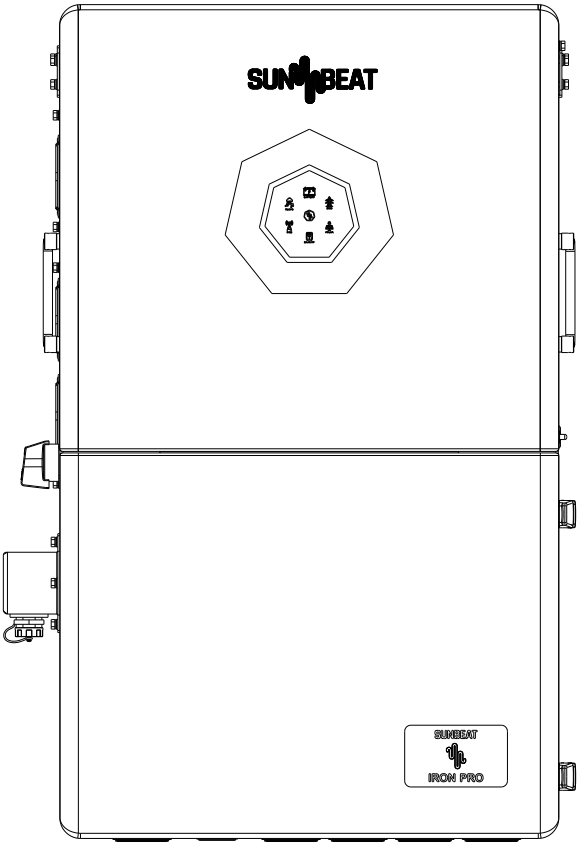
Table 2.2. Description of the LED indicators

2.7. Datasheet

Model	IRON PRO 5	IRON PRO 8	IRON PRO 10	IRON PRO 12
PV String Input				
Max PV array power [Wp]@STC	7500	11400	14400	17100
Max DC voltage[V]	600			
MPPT voltage range[V]	90–510			
Nominal DC voltage[V]	380			
Start voltage/Min. Input voltage [V]	100			
Min. input voltage[V]	80			
Max. input current[A]	16/16/16		16/16/16/16	
Max. short current [A]	19.2/19.2/19.2		19.2/19.2/19.2/19.2	
No. of strings per MPPT	1/1/1		1/1/1/1	
No. of MPPT	3		4	
DC switch	Integrated			
Battery Input				
Battery type	Lead-acid battery/Lithium battery			
Voltage range (V)	40–60			
Start voltage [V]	42–60			
Max. charging/discharging current [A]	152		228	
AC Output [On-grid]				
Rated AC power [W]@208 V AC	4330	6580	8320	9880
Rated AC power [W]@240 V AC	5000	7600	9600	11400
Rated AC current [A]@208/240 V AC	20.8	31.7	40	47.5
Rated AC voltage/Range	L1/L2/N/PE, 208V, 120/240V; 183V–229V/211V–264V			
Rated output frequency and range [Hz]	60 Hz: 57–63			
Power factor [cosφ]	0.8 leading–0.8 lagging			
Total harmonic distortion [THDi]	< 3%			
AC Output [Back-up Mode]				
Rated AC power [W]@208 V AC	4330	6580	8320	9880

Model	IRON PRO 5	IRON PRO 8	IRON PRO 10	IRON PRO 12
Rated apparent power [VA]@240 V AC	5000	7600	9600	11400
Rated AC current [A]@208/240 V AC	20.8	31.7	40	47.5
Peak output power (VA, 1min)	6000	8360	10560	12540
Peak output power (W, 10ms)	7500	11400	14400	17100
Rated output voltage [V]	208, 240/120			
Rated output frequency and range [Hz]	60 Hz: 55~65			
Output THDV (@ Liner Load)	< 3%			
Switching time	< 10 ms			
AC Input [GEN]				
Max. continuous input power@240V	5000	7600	9600	11400
Rated voltage [V]	240/120			
Rated current	20.8	31.7	40	47.5
Efficiency				
Maximum efficiency	97.20%			
CEC efficiency	96.50%			
AC-Bat maximum efficiency	94.20%			
Protection &Features				
Overvoltage protection	Integrated			
ISO monitoring	Integrated			
DC component monitoring	Integrated			
Monitoring of ground fault current	Integrated			
Grid monitoring	Integrated			
AC output short circuit protection	Integrated			
AC grounding detection	Integrated			
DC surge protection	Type II			
AC surge protection	Type II			
Island protection monitoring	Integrated			
AFCI	Integrated			

Model	IRON PRO 5	IRON PRO 8	IRON PRO 10	IRON PRO 12
RSD	Integrated			
Interface				
Display	LED; App (via Bluetooth)			
Communication port	RS485, Wi-Fi, CAN			
Communication	Wi-Fi; Bluetooth			
Load monitor	24 hours			
General Data				
Topology type	Transformer-less (DC-AC)			
Standby power consumption [W]	< 35			
Operating temperature range	-40℃ to +60℃ (-40℉ to 140℉) [Load shedding operation above 45 ℃]			
Cooling method	Air fan cooling			
Allow environmental humidity	0%-100% No condensation			
Max. operating altitude [m]	2000			
Noise [dBA]	< 50			
Ingress protection	NEMA 4X			
Mounting manner	Wall mounting			
Dimension [H x W x D]	810 x 485 x 247 mm (31.89 x 19.094 x 9.724 inch)			
Weight	50 kg (110.23 lb)			
Warranty [year]	10			
Applicable standard	UL 1741 and 1741SB; IEEE1547 and 1547.1; UL1699B, UL1998; CSA STD. C22.2 No.107.1, FCC, Part15, Class B, Rule21, HE CO 14H			


SUNBEAT
SUNBEAT
IRON PRO

3.

TRANSPORTATION AND STORAGE

3.1. Transportation

- The transportation service provider must be qualified to transport dangerous goods.
- Before transportation, check that the device package is intact and that there is no abnormal odor, leakage, smoke, or sign of burning.
- Keep no more than 5 inverter cartons in one stack.

3.2. Storage

- Store it in a dry and ventilated environment and keep it away from heat sources.
- Keep the inverter in an environment with storage temperature as -40 ℃ to +60 ℃ (-40℉ to 140℉), humidity 5% to 95% RH.
- Do not unpack the device package if it will be stored for a long time.
- Ensure that the ground surface is flat (for long-term or temporary storage).

4.

INSTALLATION

4.1. Precautions

For safety, be sure to read all the safety instructions carefully prior to any works and observe the appropriate rules and regulations of the country or region where you installed the energy storage system.

DANGER

- Dangerous to life due to potential fire or electricity shock.
- Do not install the inverter near any inflammable or explosive items.

NOTICE

- This equipment meets the pollution degree.
- Inappropriate or the harmonized installation environment may jeopardize the life span of the inverter.
- Installation directly exposed under intensive sunlight is not recommended.
- The installation site must be well ventilated.

4.2. Networking application

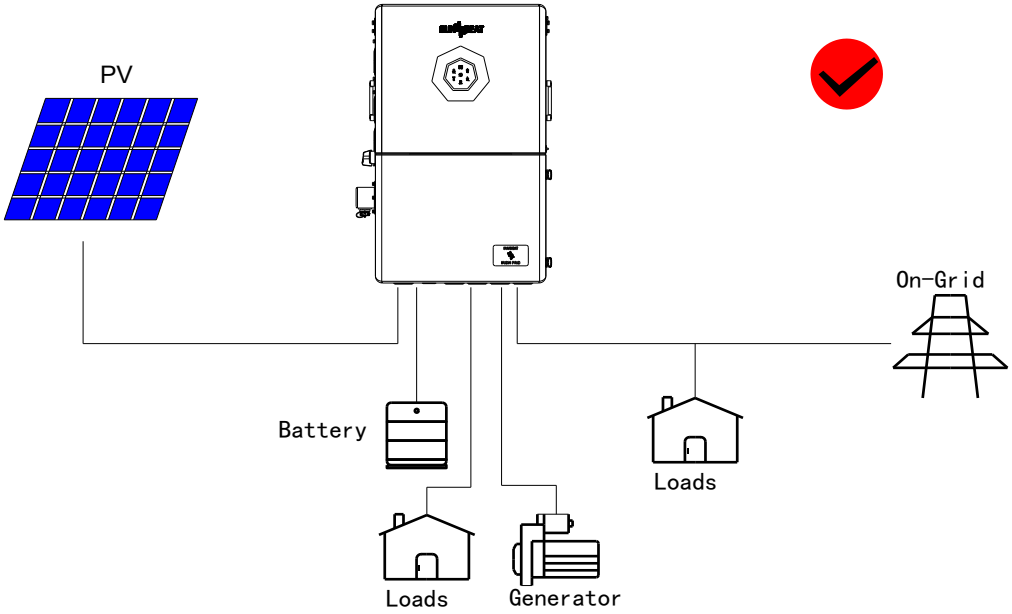
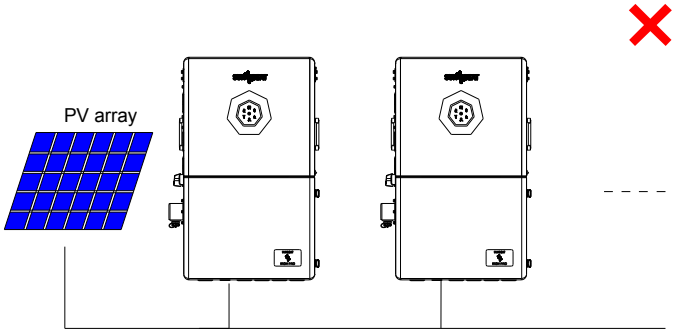
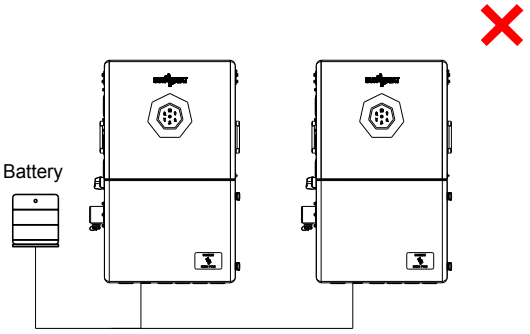


Figure 4.1. Networking application

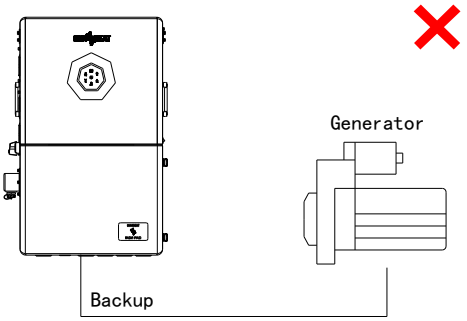
The following installation examples should be avoided. Any damage caused will not be covered by the warranty policy.



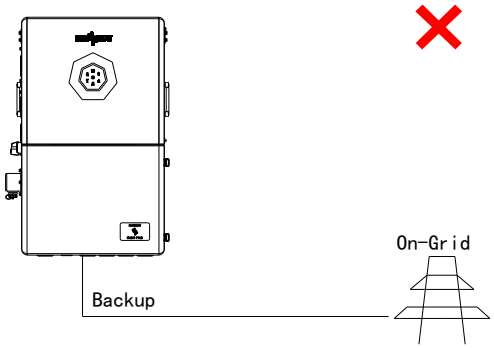
Single PV string can not be connected to multiple inverters.



Single battery bank can not be connected to multiple inverters.



Back-up side can not be connected to any AC generator.



Back-up side can not be connected to grid.

Figure 4.2. Incorrect networking applications

4.3. Determine the installation site

Read the following sections to cautiously determine the installation site.

The safety regulations vary in different countries and regions. Follow local safety regulations.

4.3.1. Installation environment requirements

- The device employs natural convection cooling, and it can be installed indoor or outdoor.
  - Indoor requirement: The device CANNOT be installed in the habitable rooms.
  - Outdoor requirement: The height of the device from the ground should be considered to prevent the device from soaking in water. The specific height is determined by the site environment.

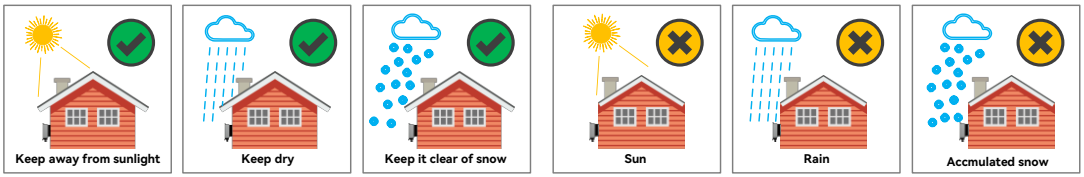


Figure 4.1. Installation location

- Do not expose the device to direct solar irradiation as this could cause power derating due to overheating.
- The installation environment must be free of inflammable or explosive materials.
- The device must be installed in a place away from heat sources.
- Do not install the device at a place where the temperature changes extremely.
- Keep the device away from children.
- Do not install the device at daily working or living arears, including but not limited to the following areas: bedroom, lounge, living room, study, toilet, bathroom, theater, and attic.
- When installing the device at the garage, keep it away from the driveway.
- Keep the device from water sources such as taps, sewer pipes and sprinklers to prevent water seepage.
- It is recommended that the device be installed in an area where its status can be easily checked and maintained in case of failure or emergency.
- Choose a solid and smooth wall to ensure that the inverter can be installed securely on the wall. Make sure that the wall can bear the weight of the inverter and accessories.

4.3.2. Installation location requirements

- Install the device vertically. Do not install it forward-tilted, horizontally or upside down. The maximum allowable backward-tilted angle is 15 degrees.

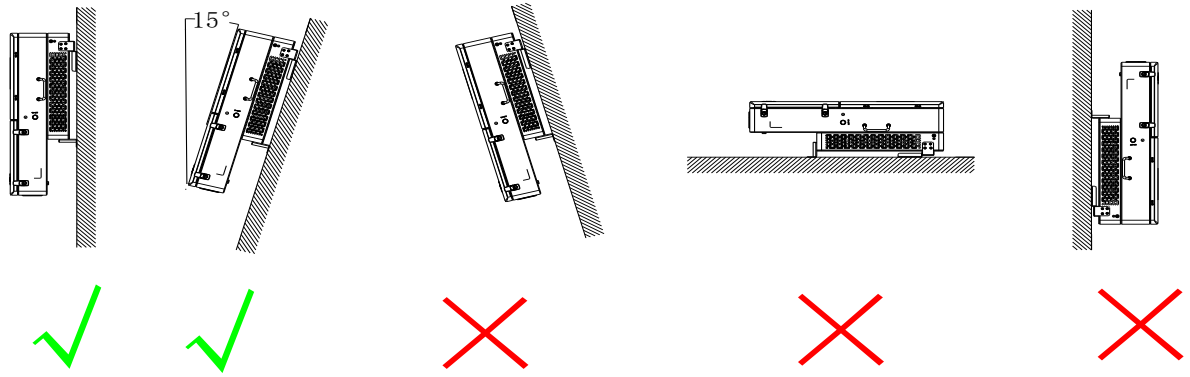


Figure 4.2. Installation requirements

- Reserve enough clearance around the inverter to ensure a good air circulation at the installation area, especially when multiple inverters need to be installed in the same area.

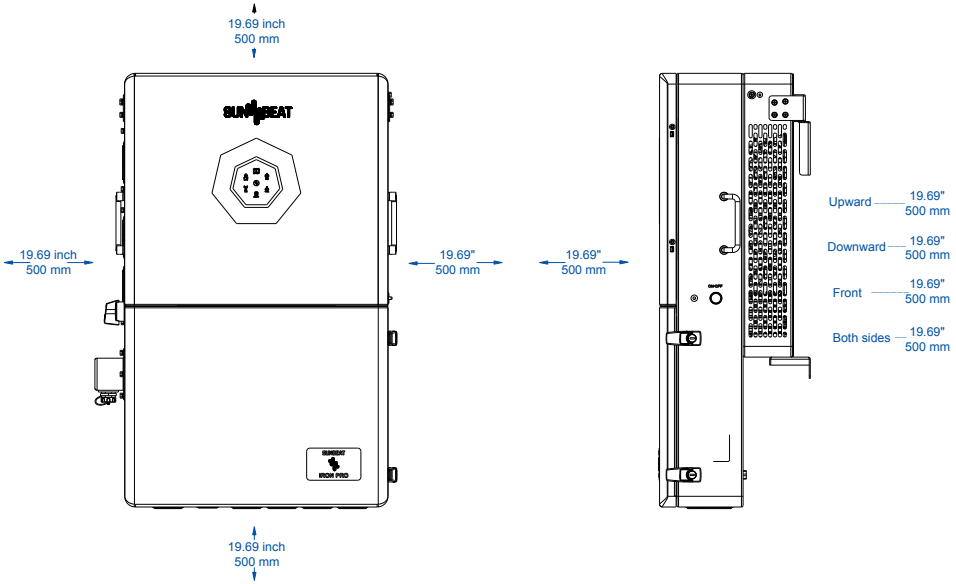


Figure 4.3. Installation clearance

4.4. Prepare installation tools

The tools illustrations are for your reference. Installation tools include but are not limited to the following recommended ones. Use other auxiliary tools based on site requirements.

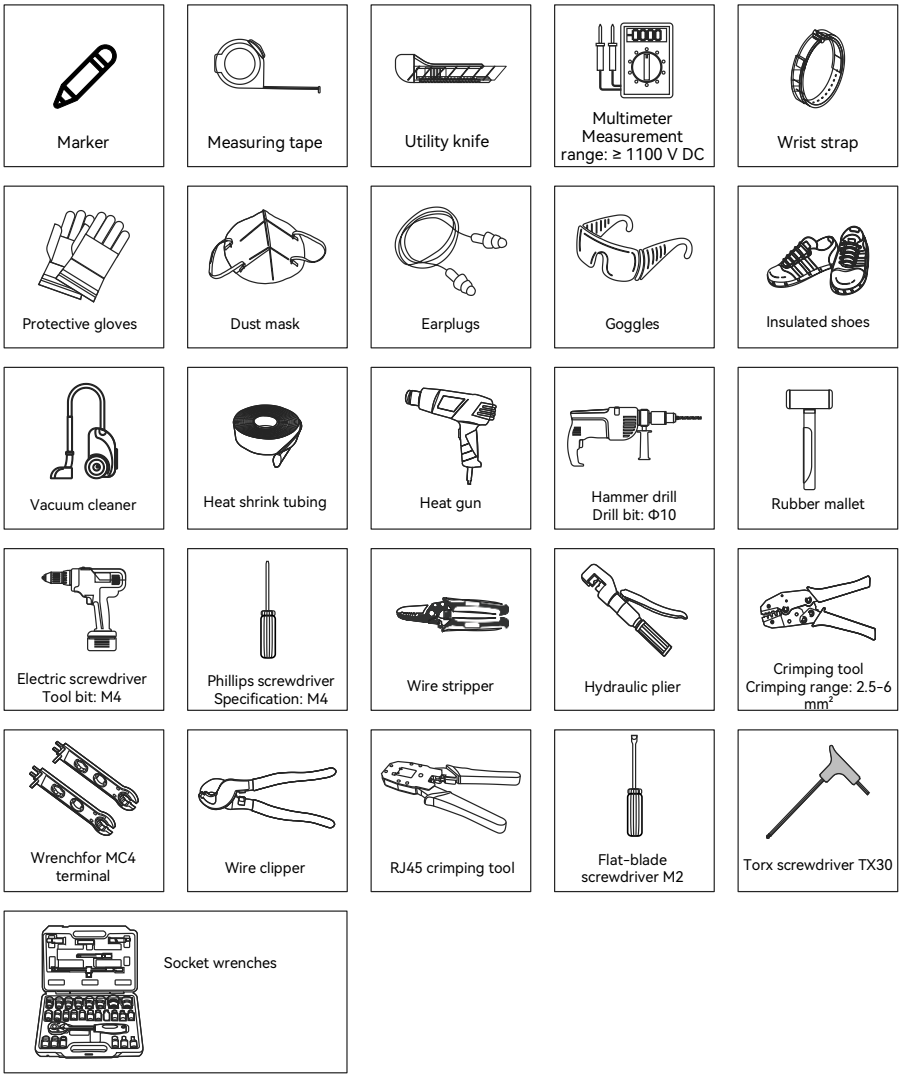


Figure 4.4. Suggested installation tools

4.5. Check before installation

4.5.1. Check the outer packing

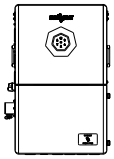
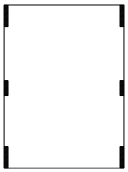
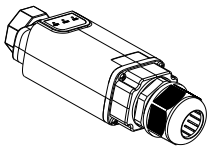
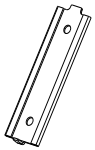
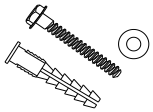
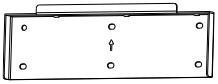
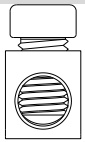
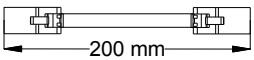
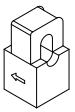
Although SunBeat's products have been thoroughly tested and checked before delivery, the products may suffer damages during transportation.

1. Check the outer packing package for any damage, such as holes and cracks.
2. Check the equipment model.

If any serious damage is found or the model is not what you requested, do not unpack the product, and contact your dealer as soon as possible.

4.5.2. Check the package contents

1. Verify that the shipment contains everything that you expected to receive. Contact after sales if there are missing or damaged components.
2. Place the connectors separately after unpacking to avoid confusion for connection of cables.

			
Inverter	Cardboard	Communication module	Flathead tool
			
Key x4	Allen wrench	M6*50 screw x8 Gasket x8 Expansion tube x8	Mounting plate
			
AC cable lug x2	Communication cable x2	Current transformer x2	[1] Printed documents

[1] The printed documents include a warranty card, a user manual, and a quick guide.

4.6. Install the inverter

Before you start

Make sure that the wall can bear the weight of the inverter and accessories.

Procedure

Step 1. Place the provided cardboard on to the desired location on the wall. Drill eight holes on the wall.

Note: If metal cable conduits need to be installed at the bottom of the inverter, you need to reserve more space at the bottom of the inverter.

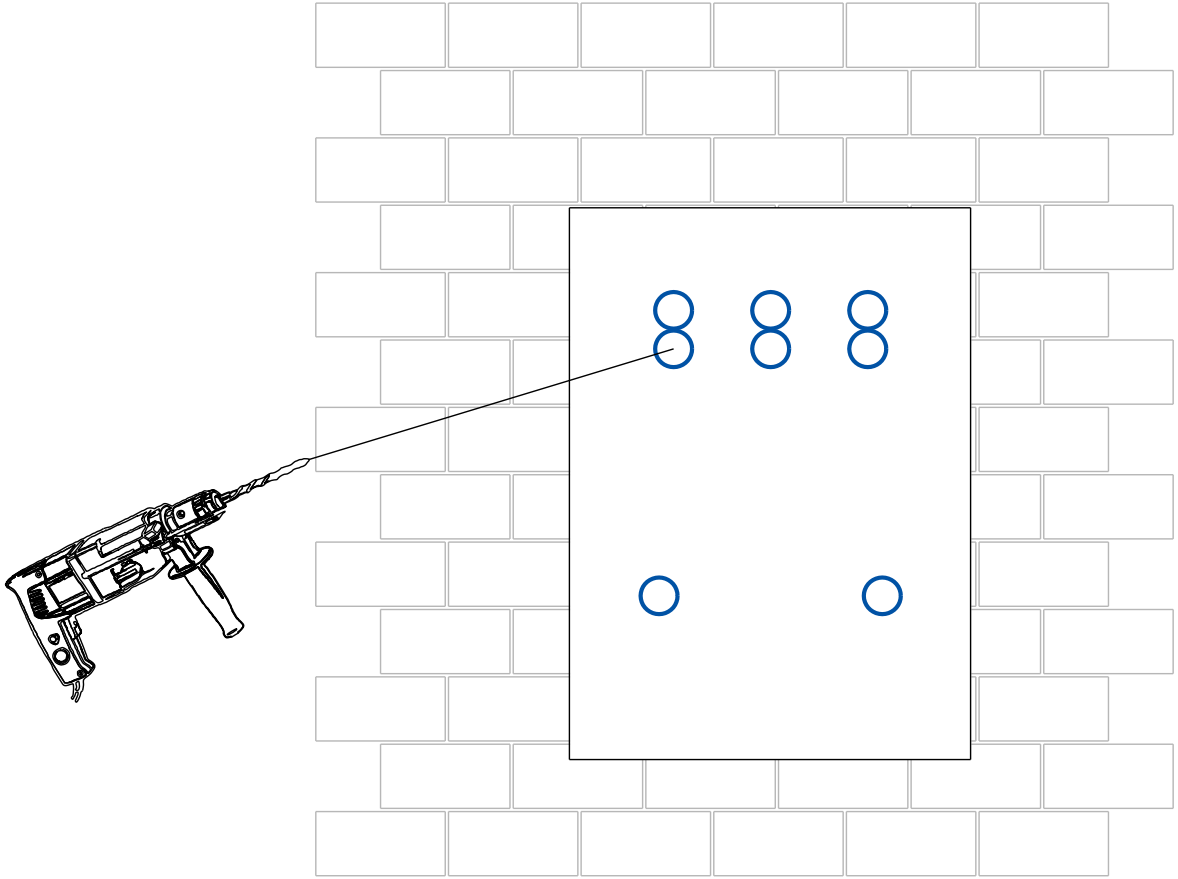


Figure 4.5. Drilling holes

The upper six holes are used to install the upper mounting plate while the bottom two holes are used to secure the bottom locking brackets of the inverter.

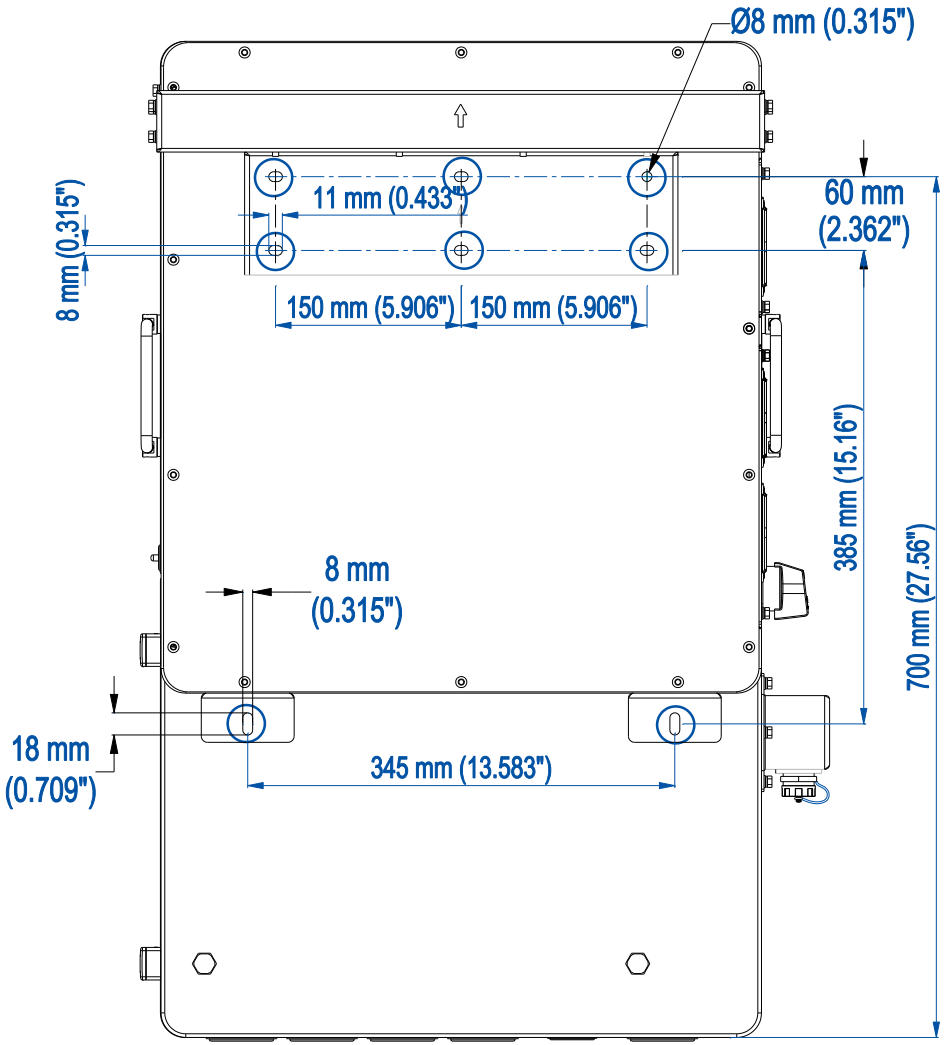


Figure 4.6. Eight holes for installing the mounting bracket

Step 2. Use a rubber mallet to insert eight expansion tubes into the holes.

Note: You can either remove the paper or keep it on the wall.

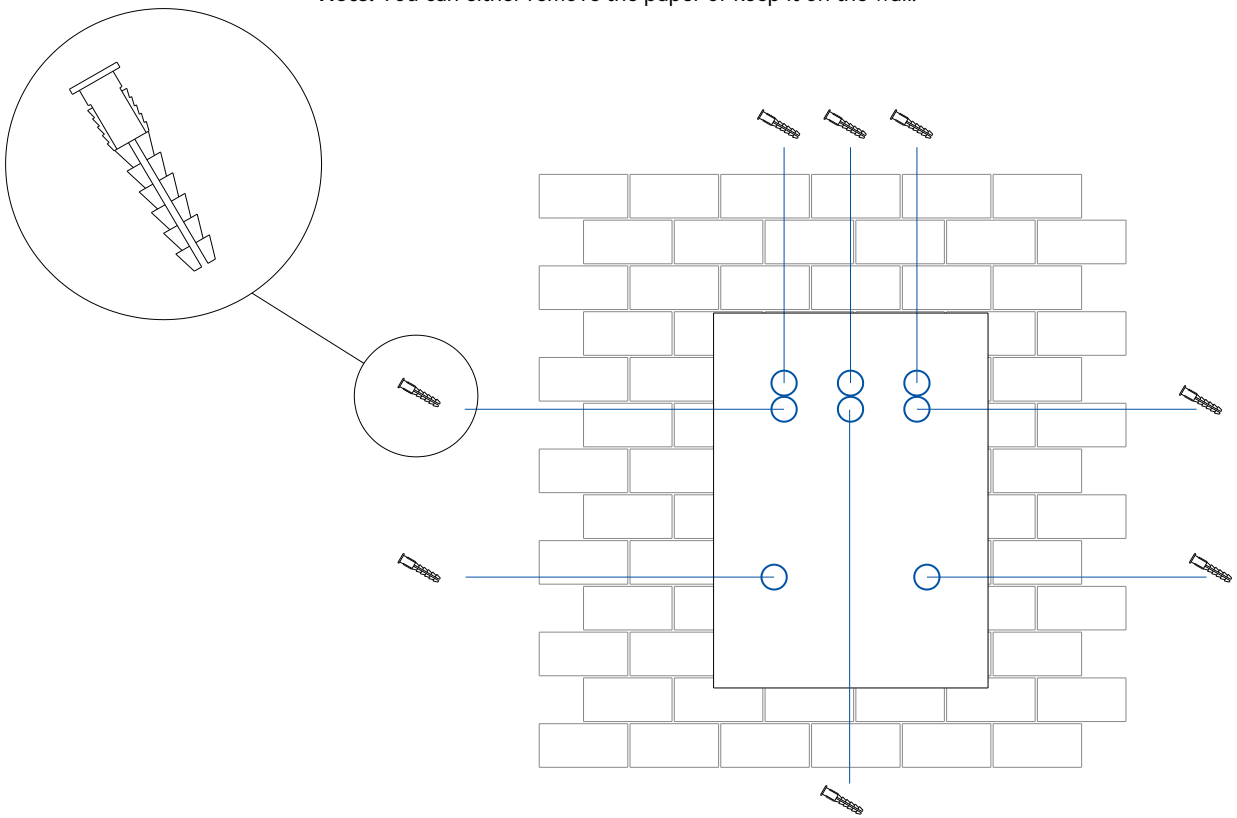


Figure 4.7. Inserting eight expansion tubes into the holes

Step 3. Insert six M6*50 screws to install the mounting plate to the wall.

Note: If the device is installed outdoors, it is suggested to remove the cardboard which is not waterproof.

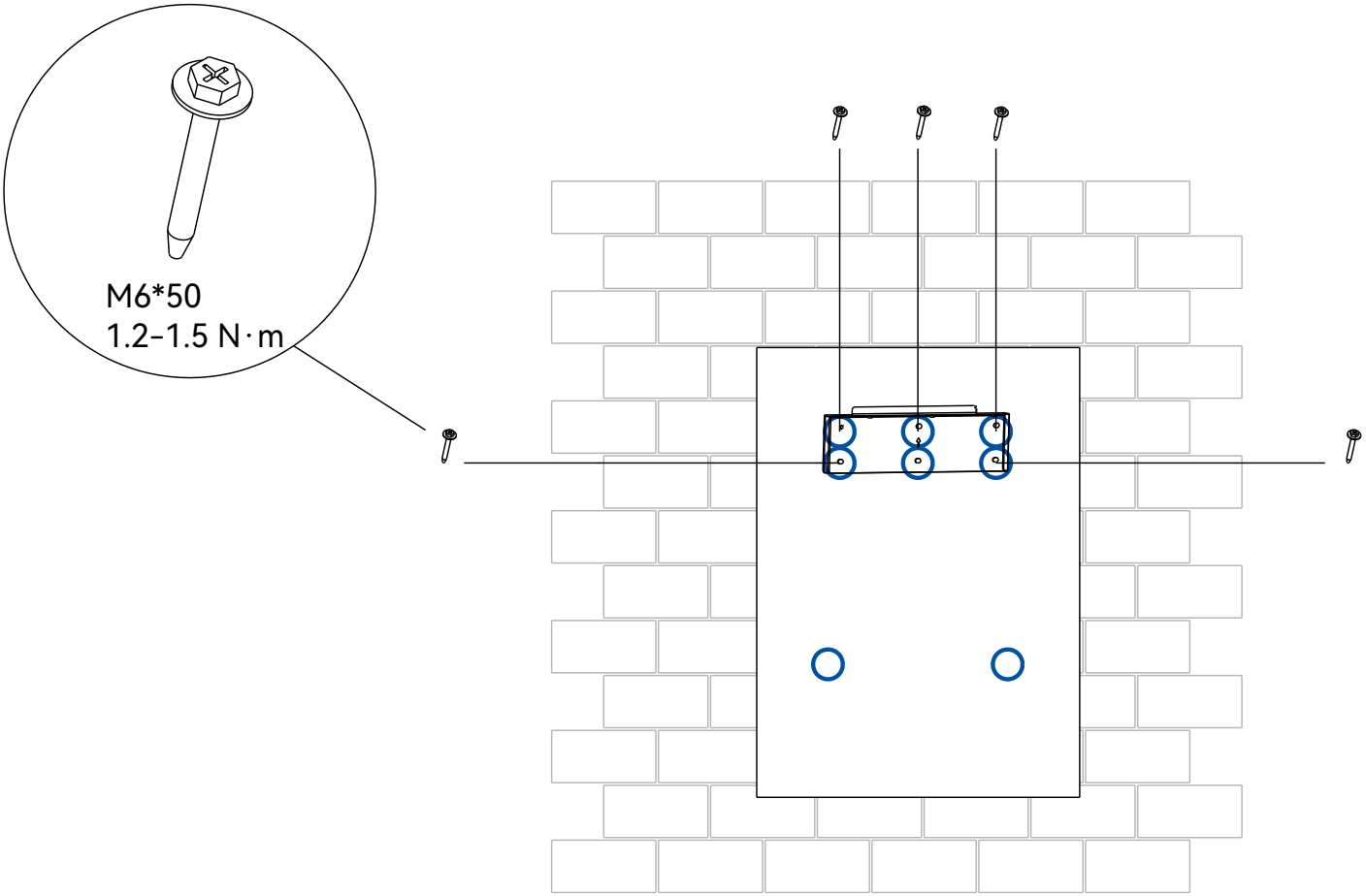


Figure 4.8. Securing the mounting plate

Step 4. Mount the inverter onto the mounting plate. Install two M6*50 screws on each bottom side of the inverter to secure it to the wall.

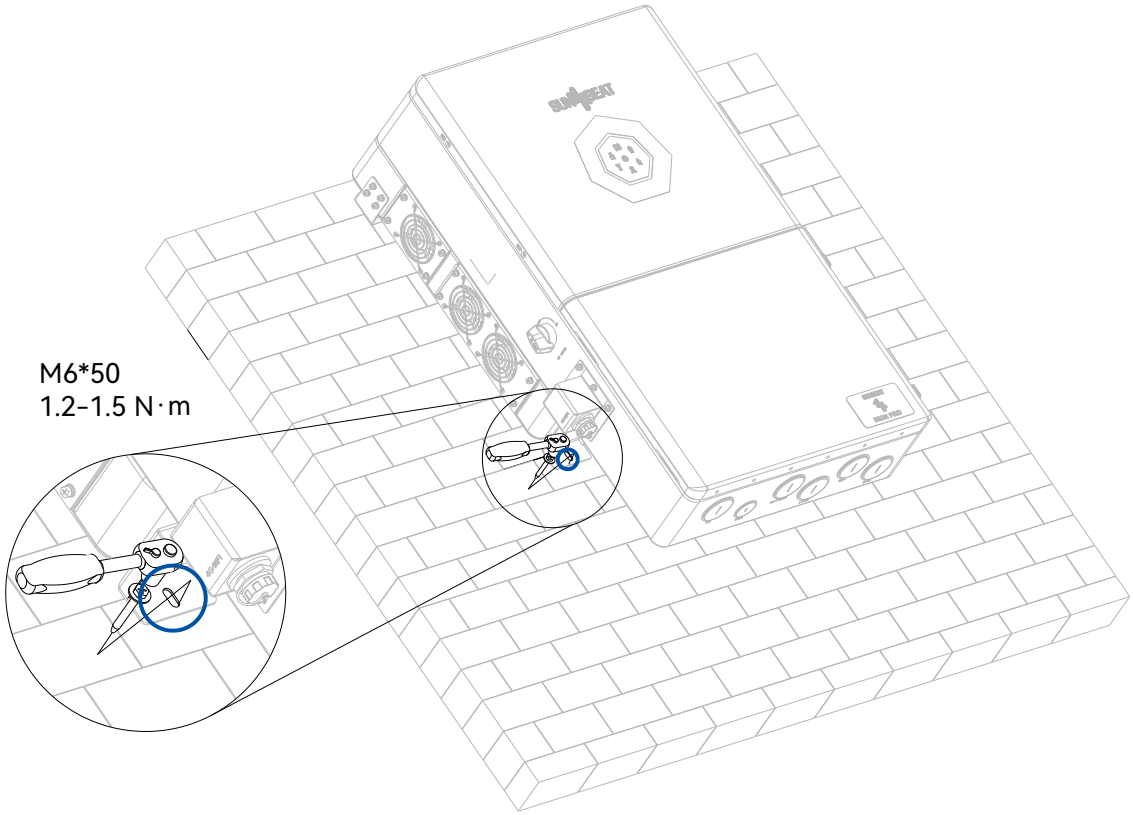


Figure 4.9. Securing the bottom locking brackets

5.

ELECTRICAL CONNECTION

5.1. Safety instructions

Electrical connection must only be operated on by professional technicians. Operators must be aware that the inverter is a bi-power supply equipment. Before connection, necessary protective equipment must be employed by technicians including insulating gloves, insulating shoes, and safety helmet.

DANGER

- Danger to life due to potential fire or electricity shock.
- Do not install the inverter near any inflammable or explosive items.
- Dangerous to life due to potential fire or electricity shock.
- When it is powered on, the equipment should in conformity with national rules and regulations.
- The direct connection between the inverter and high voltage power systems must be operated by qualified technicians in accordance with local and national power grid standards and regulations.

WARNING

- The PV arrays will produce a DC voltage when exposed to sunlight.

NOTICE

- Any improper operation during cable connection can cause device damage or personal injury.
- Electrical connection should in conformity with proper stipulations, such as stipulations for cross-sectional area of conductors, fuses, and ground protection.
- The overvoltage category of the DC input port is II and that of the AC output port is III.

5.2. Connect the grounding cable

About this task

This additional grounding cable must be connected before other electrical connection.

The cable needs to be prepared by the user. It is recommended to use a cable of 6 AWG.

Note: The inverter cannot be used with functionally earthed PV arrays.

Procedure

Step 1. Assemble the cable and OT/DT terminal.

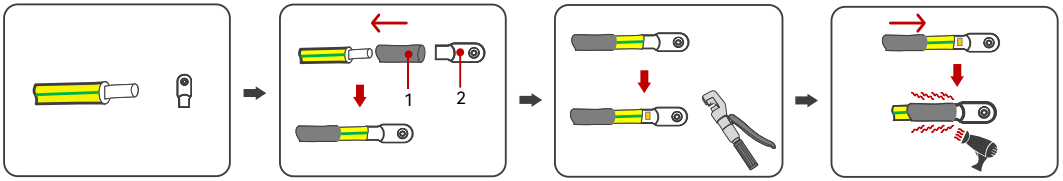


Figure 5.1. Preparing the grounding cable

1	Heat shrink tube	2	OT/DT terminal

Step 2. Loosen the screw and connect the grounding cable.

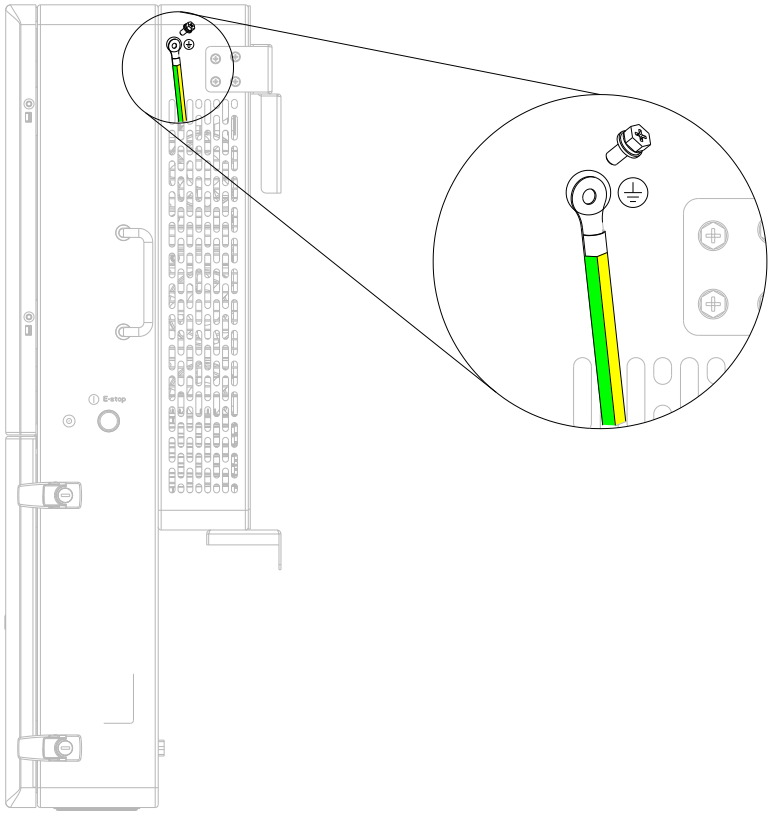


Figure 5.2. Connecting the grounding cable

5.3. Opening the junction box of the inverter

Step 1. Use the provided key to open the two tabs on the right side of the inverter. Then, open the cover. Keep the key to a safe place.

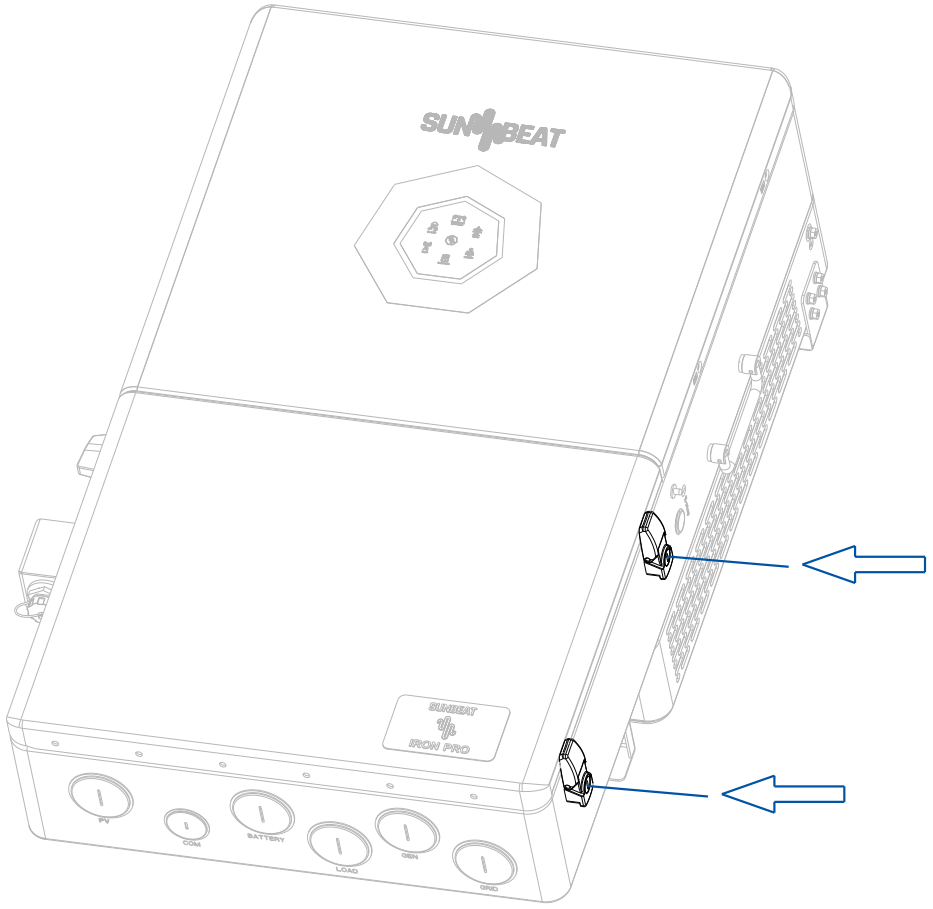


Figure 5.1. Opening the cover

Figure 5.2. Locking the cover

Step 2. Remove six screws to unlock the internal metal plate. Lift the plate outwards.

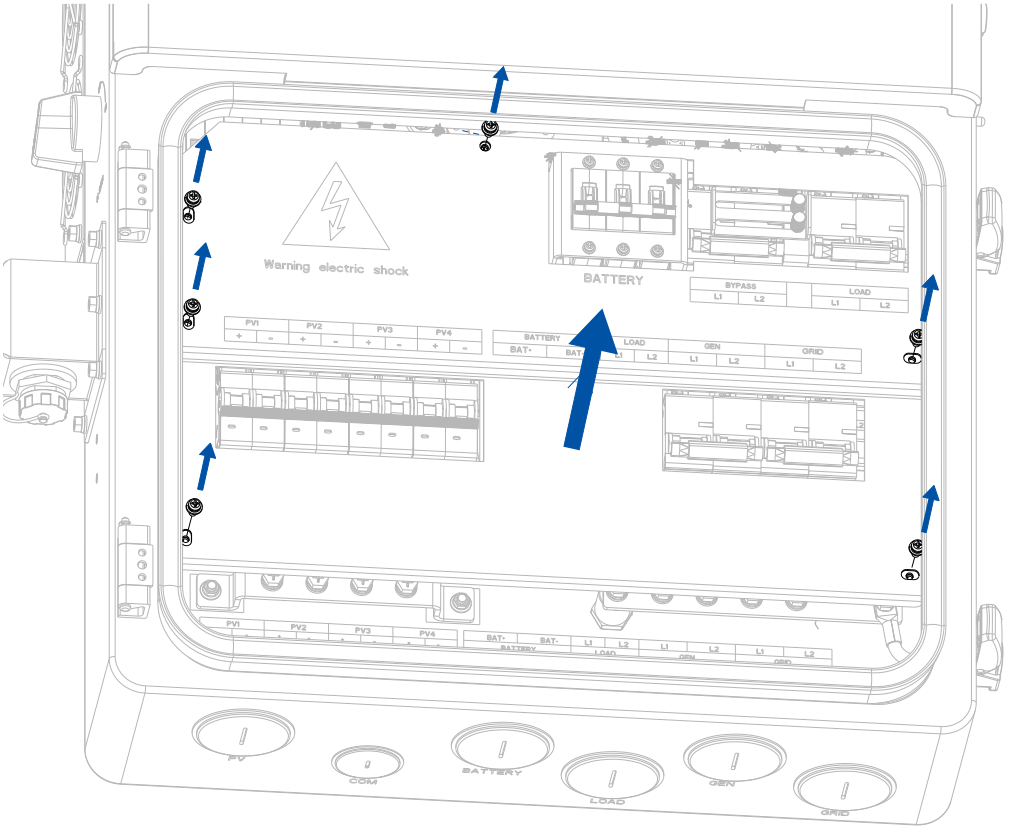


Figure 5.3. Removing the internal metal plate

5.4. Assemble the AC-side electrical connection

About this task

For safety operation and regulation compliance, a circuit breaker is required to be installed between the grid and the inverter.

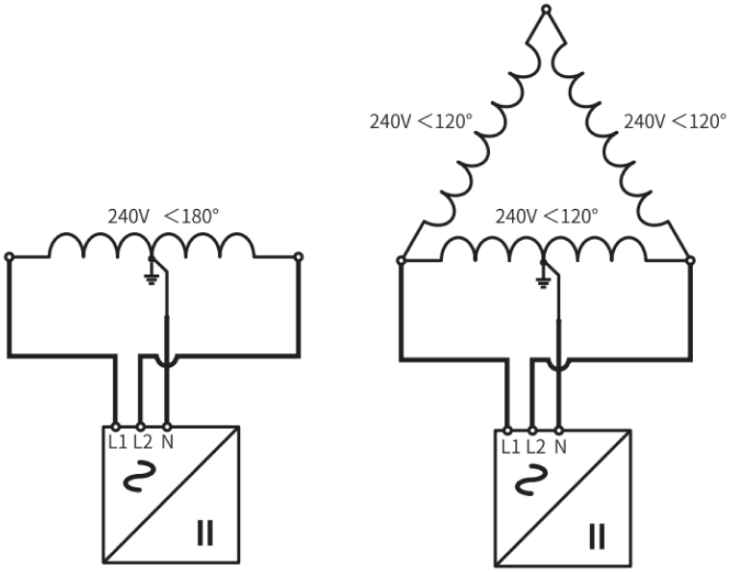


Figure 5.4. AC grid

Choose the breaker and cables according to the following table.

Note: If the inverter is installed far away from the grid connection point, select a larger cable size to ensure that the voltage drop from the grid connection point to the inverter is within 2% of the grid voltage.

Inverter model	AC breaker	Cable size
IRON PRO 5	45 A	8 AWG
IRON PRO 8	70 A	6 AWG
IRON PRO 10	85 A	4 AWG
IRON PRO 12	125 A	2 AWG

Table 5.1. Recommended cable specifications

⚠ WARNING

- Risk of personal injury due to electric shock!
- Ensure that the equipment is powered off before performing wiring operations.
- Improper wiring of AC conductors will result in risk of electrical failure or equipment damage. Please ensure that all connections are made correctly in accordance with the instructions in this document and in accordance with local wiring codes and regulations before applying power to the unit.

Procedure

Step 1. Strip the insulation on the cable ends. (20-mm/0.79-inch length for LOAD and GRID cables; 10-mm/0.39-inch length for GEN cables)

Step 2. Prepare the applicable cable terminals according to the cable specification and crimp the terminals according to the following table:

Cable	Applicable terminal type	Prepared by
L1, L2, L3	Tubular	Customer
N	OT	Customer
	Tubular + AC cable lug	Tubular: Customer AC cable lug: Delivered in the package
PE	OT	Customer

Table 5.2. AC cable terminals

For example, crimp the cable ends as follows:

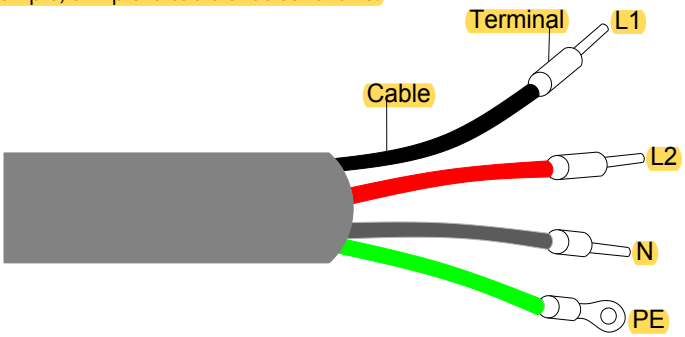


Figure 5.5. Crimping the cable terminals

Step 3. Insert the flathead tool to the hole on the knockout filler and rotate it anti-clockwise.

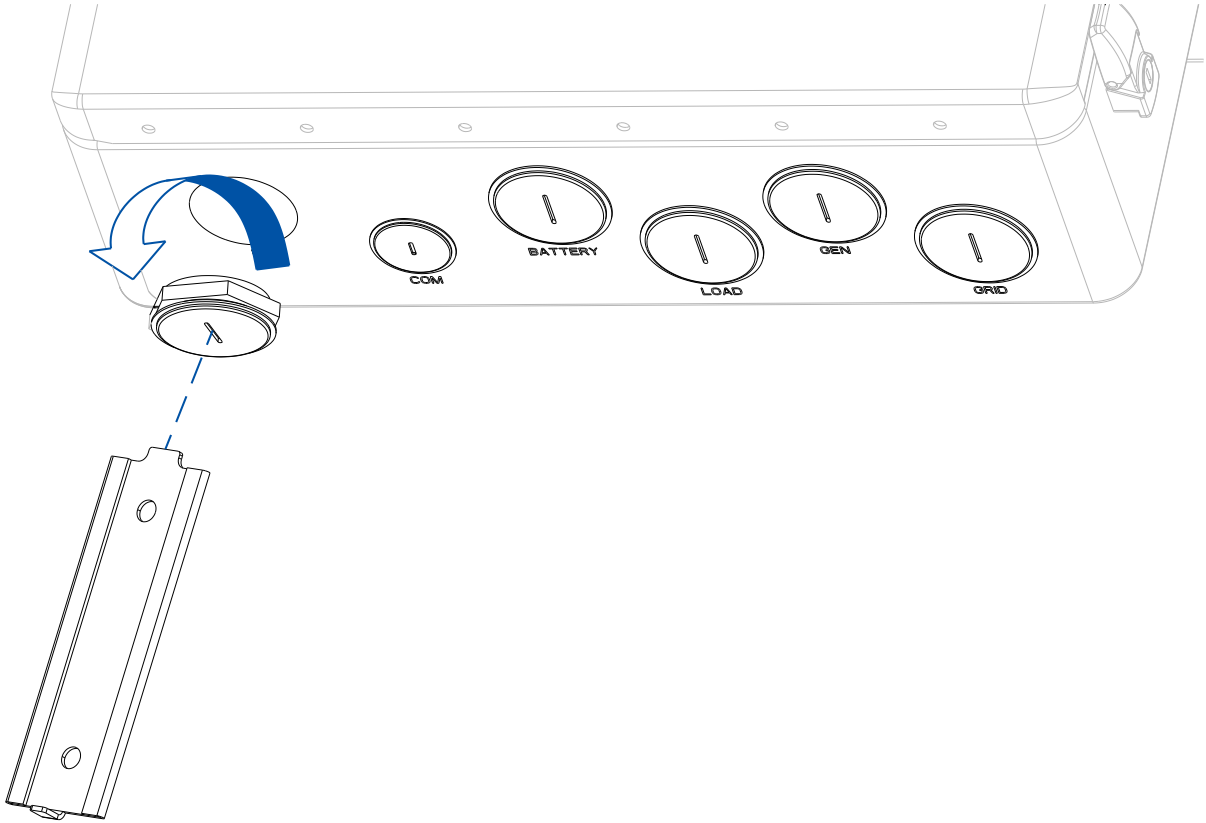


Figure 5.6. Removing the knockout hole fillers

Step 4. (Optional) If required, after the knockout fillers are removed, install a metal cable conduit on each knockout hole.

Step 5. Based on your needs, connect the grid, load, or generator cables.

a . Insert the cables through the corresponding knockout holes and connect them to corresponding terminals L1, L2, L3, N, and PE.

For cable N connection, when tubular terminal and AC cable lug are selected, secure the cable lug to the N terminal first, and then secure the cable to the lug. Otherwise, skip this step.

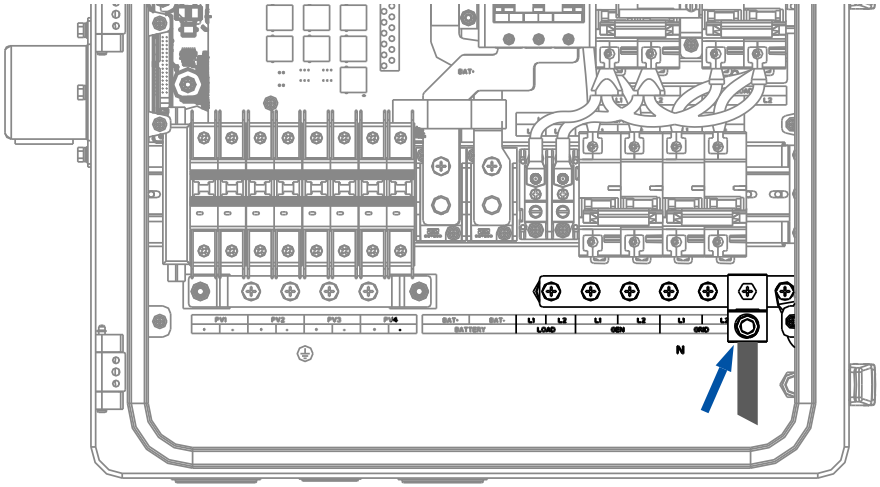


Figure 5.7. Connecting the AC cable lug

b . For cables with tubular or OT terminals, use a standard torque to tighten the screws on the terminals to secure the cable connection.

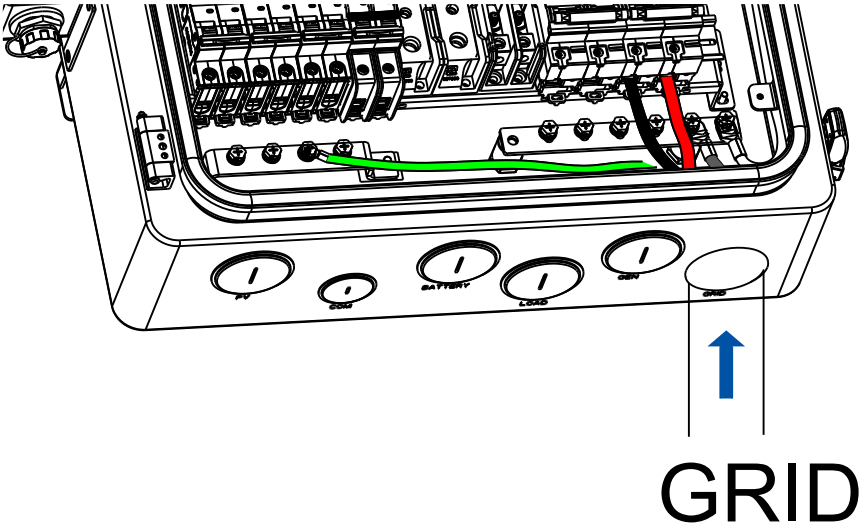


Figure 5.8. Connecting the grid cables

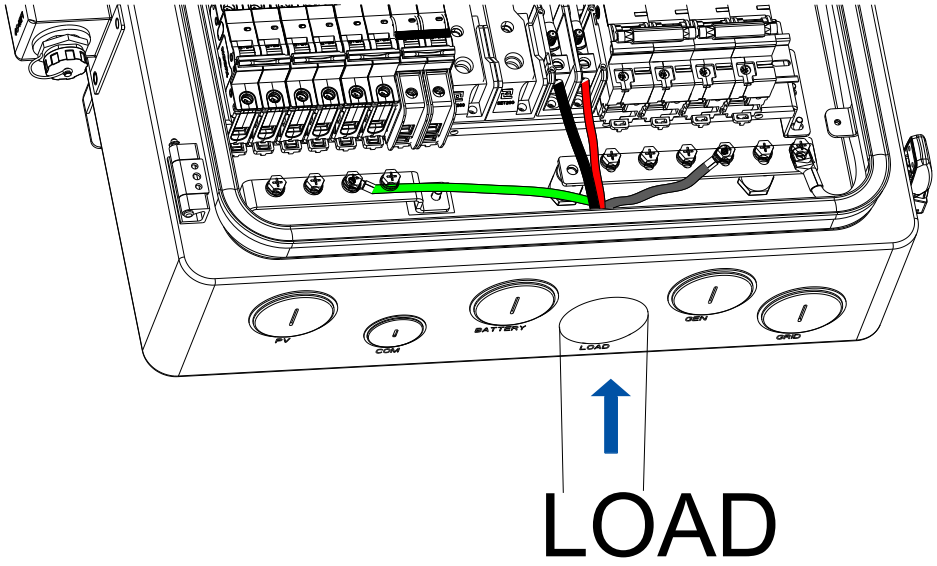


Figure 5.9. Connecting the load cables

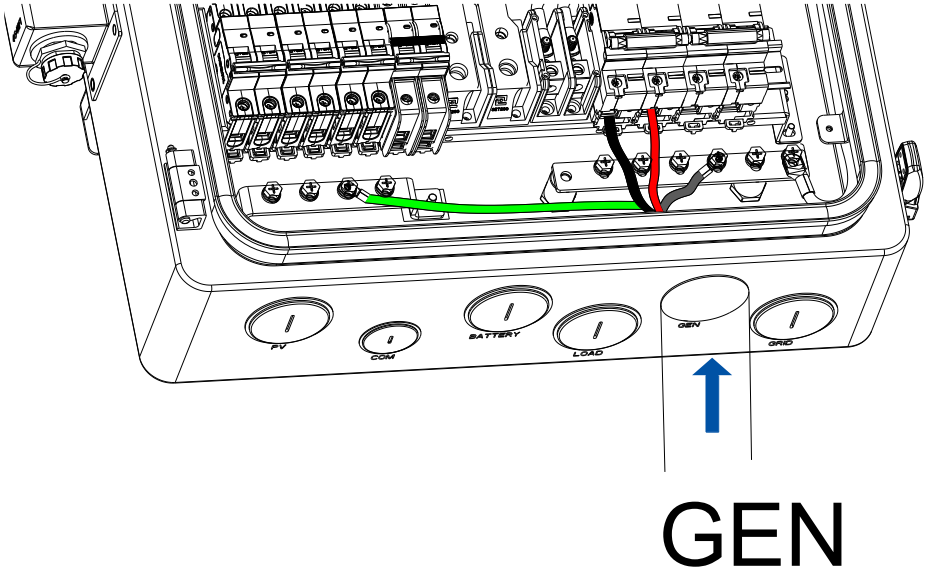


Figure 5.10. Connecting the generator cables

5.5. Connect the battery to the inverter

About this task

- For battery details, refer to its product documentation.
- For regulation compliance, a battery isolator (greater than or equal to 70A) might be required to be installed near the inverter. However, the battery isolator is not required if you are using the battery with a built-in DC isolator.

Procedure

Step 1. Strip the insulation (20-mm/0.79-inch length) on the cable ends.

Cable	Recommended cable	Recommended torque
BAT+ and BAT-	4/0 AWG	80 LB-IN (9. N·m)

Step 2. Crimp an OT terminal on the cable end if needed.

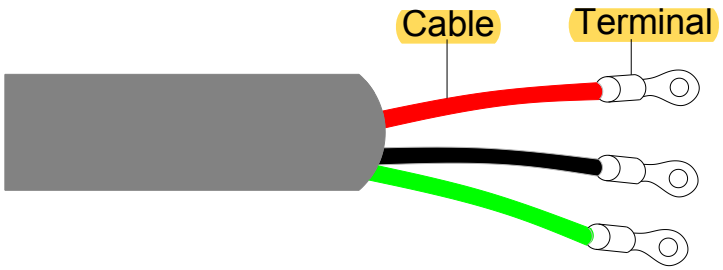


Figure 5.11. Crimping the cable ends

Step 3. Insert the cables through the BATTERY knockout hole and connect it to the battery terminals. Use a standard torque to tighten the screws on the terminals to secure the cable connection.

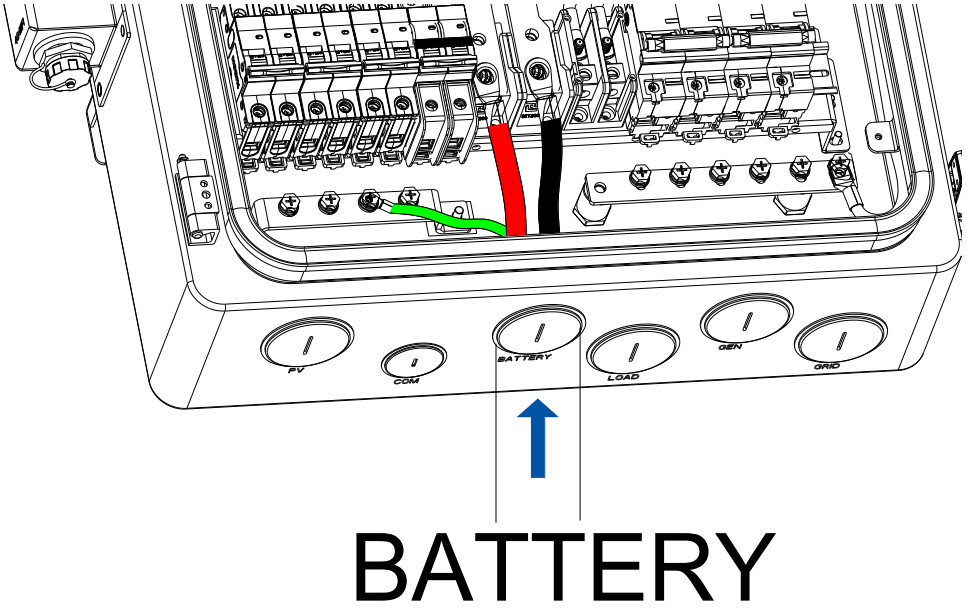


Figure 5.12. Connecting the battery cables

5.6. Assemble the PV-side electrical connection

Step 1. Strip off the insulation (20-mm/0.79-inch length) of the cable ends. User cable ferrules if the cable is of multi-strand type.

Cable	Recommended cable
PV+, PV-	12 AWG

Step 2. Crimp the cable end with a tubular terminal if needed.

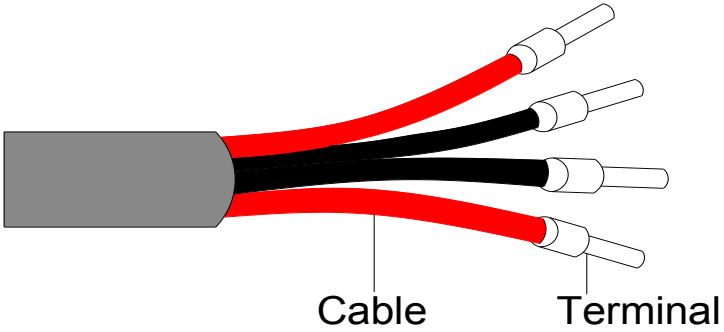


Figure 5.13. Crimping the cable ends

NOTICE
Connect the positive connector to the positive side of the solar panels and connect the negative connector to the negative side of the solar side. Be sure to connect them in right position.

Step 3. Ensure that the DC switch on the left side of the inverter is in OFF position.

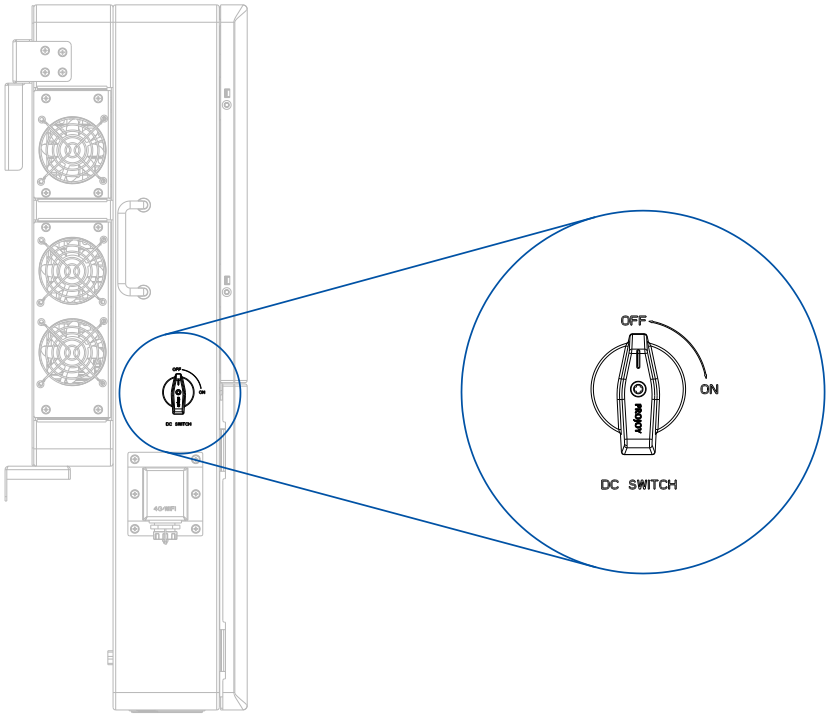


Figure 5.14. DC SWITCH in OFF

Step 4. Insert the PV cables through the knockout holes and connect them to the PV terminals.

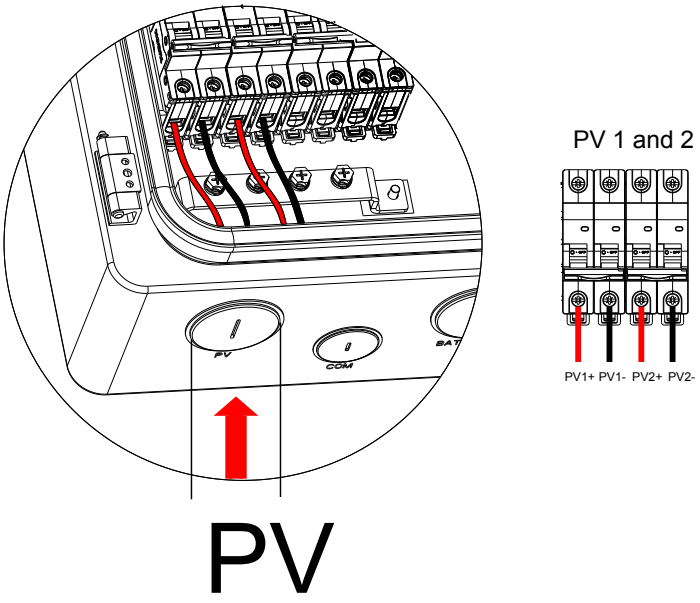


Figure 5.15. Connecting the cables to PV1 and PV2

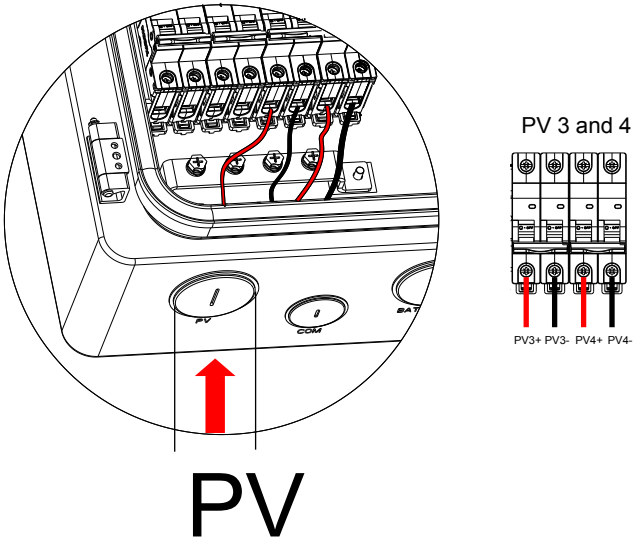


Figure 5.16. Connecting the cables to PV3 and PV4

5.7. Assemble the communication connection

5.7.1. Install the communication module

About this task

On the left side of the inverter, an RS232 USB communication port is provided for connecting the communication module. For the details about the communication module, refer to the Stick Logger quick guide.

The communication module provides both Wi-Fi and LAN connections to the inverter.

Procedure

Step 1. On the left side of the inverter, loosen the cover of the 4G/WIFI port.

Step 2. Insert the communication module to the 4G/WIFI port and rotate the module clockwise to secure the connection.

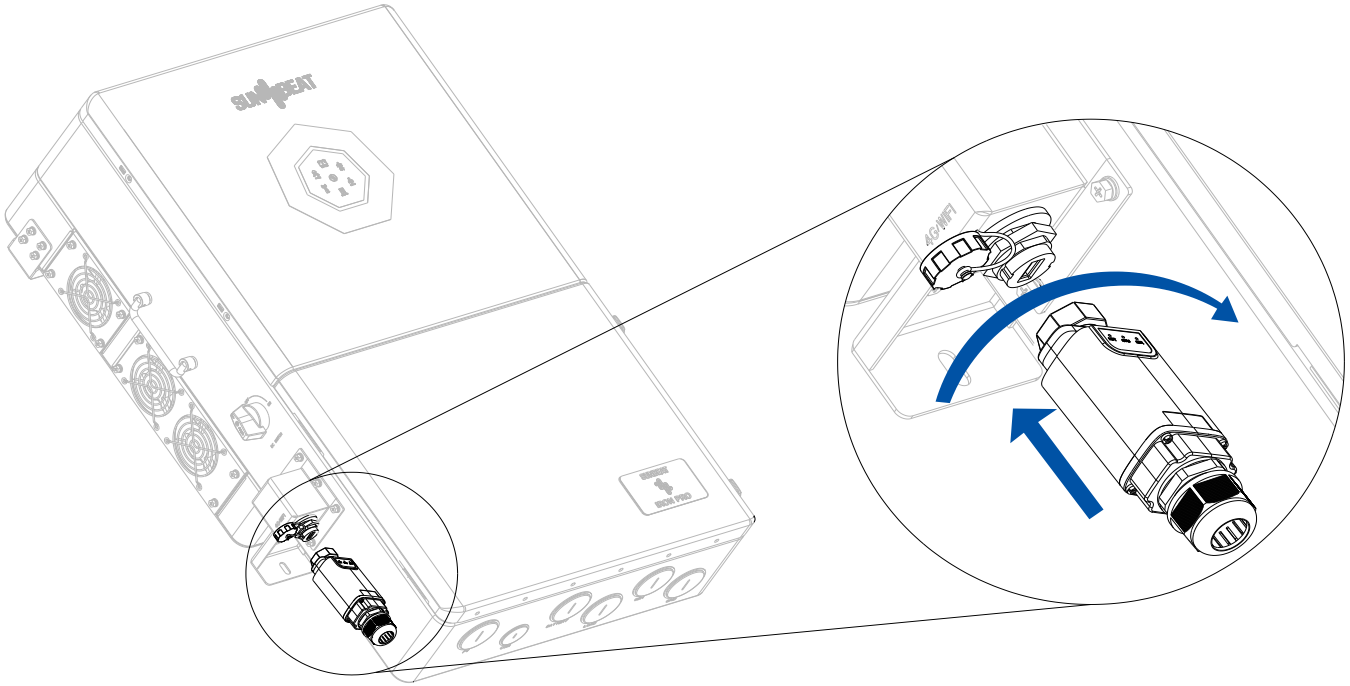
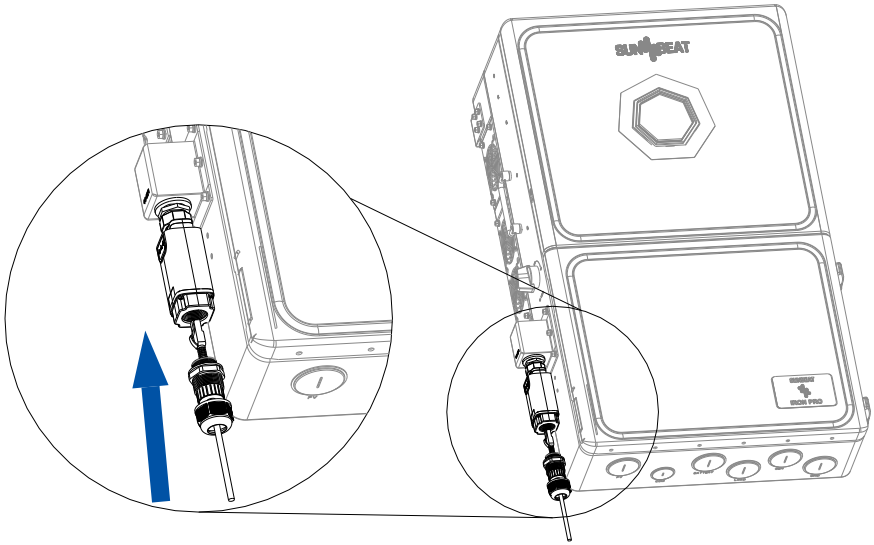


Figure 5.17. Connecting the communication module

Step 3. Install the communication cable between the communication module and the router when LAN connection is needed.

a . Loosen the waterproof nut from the communication module.

b . Pass one end of the communication cable through the nut and connectors and insert the cable to the RJ45 terminal of the communication module.



c . Connect the other cable end to the router.

d . Fasten the waterproof nut on the communication module.

5.7.2. Connect the communication cables between the inverter and the battery

Step 1. Prepare communication cables according to the pins shown as below.

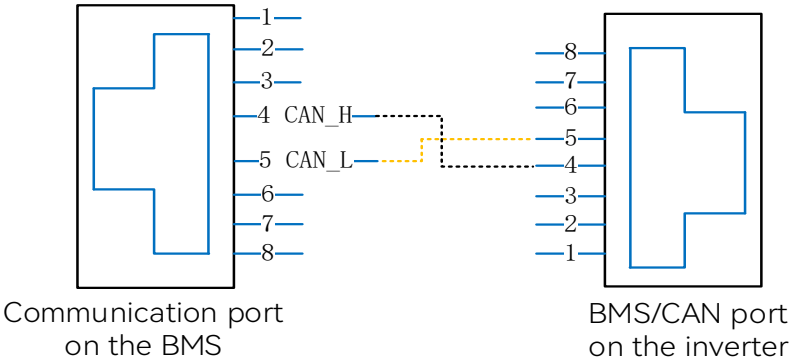


Figure 5.18. Communication connection

Step 2. Insert the prepared communication cable through the BATTERY knockout hole at the bottom of the inverter and then install the cable to the BMS_CAN port on the inverter. Connect the other end of the cable to the communication port on the battery.

5.7.3. Connect the communication cables between inverters (in parallel deployment)

About this task

This task is only applicable to the parallel mode, in which one inverter work as the primary inverter and the other inverters (up to three) work as the secondary inverters.

Procedure

Use standard network cables to connect the Parallel_1 and Parallel_2 ports of each inverter as follows. The Parallel_1 and Parallel_2 ports are for inverter parallel deployment and either port can be used for connection in parallel deployment.

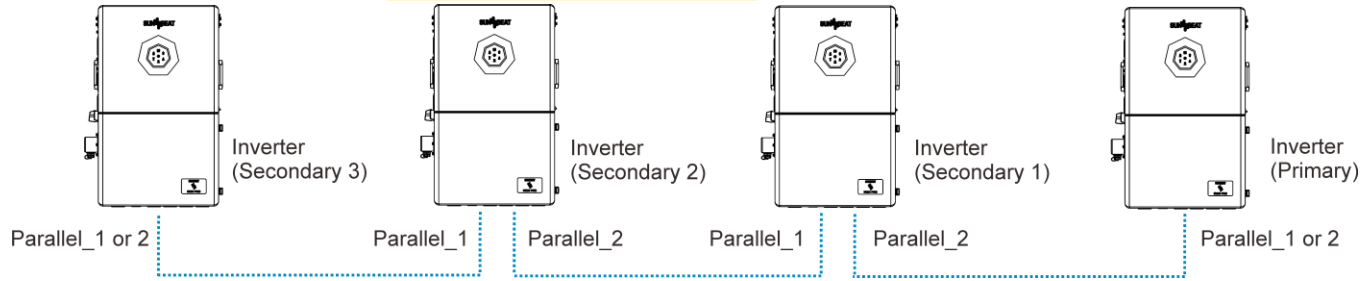


Figure 5.19. Communication connection in the parallel scenario

5.8. Connect the CTs

Connect the CT wires to pin 1, 2 ,3, and 4 on the CN89 terminal in the junction box of the inverter.

From the CT		To the CN89 terminal of the inverter
CT GRID-L1	Blue wire	1
	White wire	2
CT GRID-L2	Red wire	3
	Black wire	4

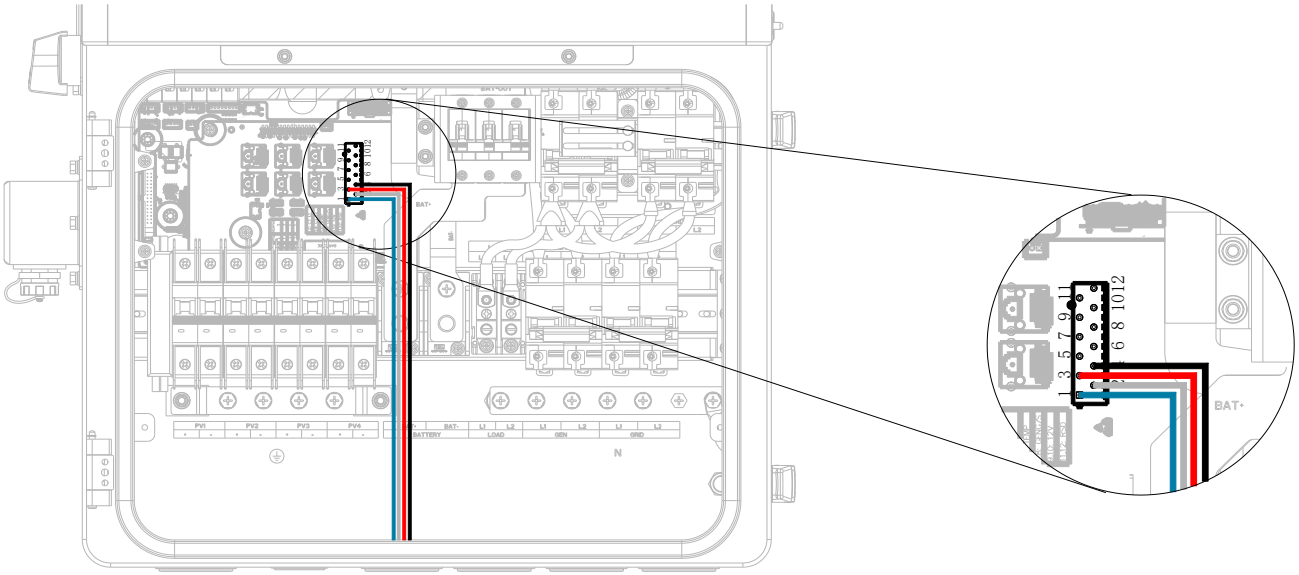


Figure 5.20. CT connection

5.9. Install an external rapid shutdown switch

About this task

According to local safety regulations, an external rapid shutdown switch is required in case of emergency. After the switch is turned off, the system stops working immediately.

Procedure

Connect the wires of the external rapid shutdown switch to pins 11 and 12 on the CN89 terminal in the junction box of the inverter.

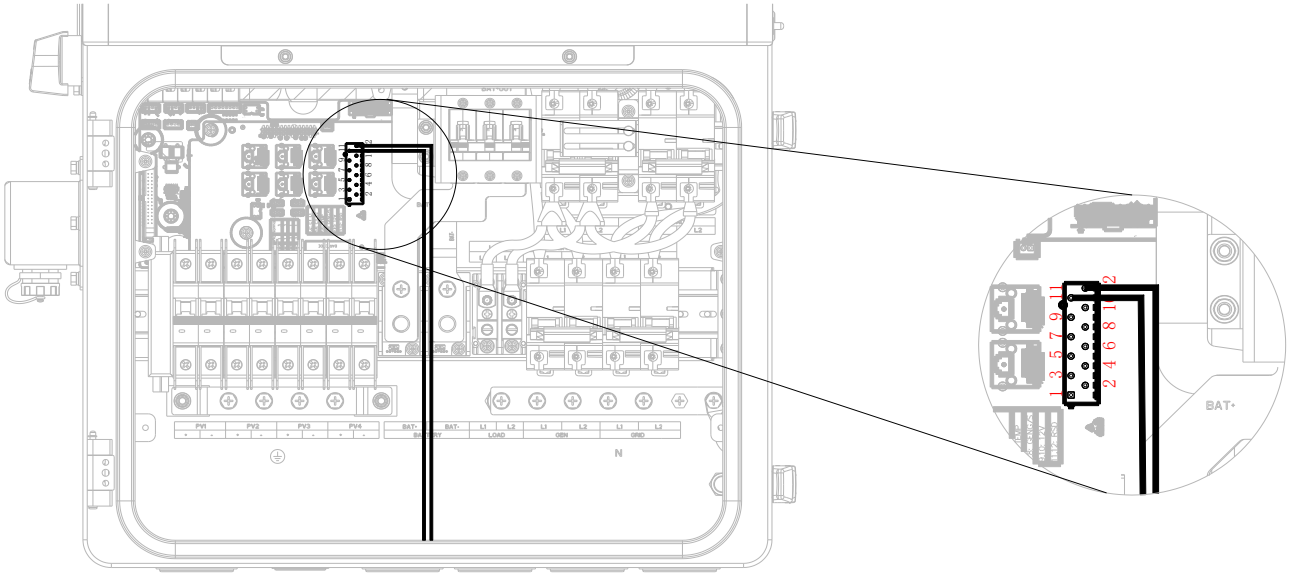


Figure 5.21. Connection of the external rapid shutdown switch

5.10. Close the junction box of the inverter

Step 1. Align the holes on the metal plate with the holes in the junction box. Push the plate downwards. Tighten six screws to lock the internal metal plate.

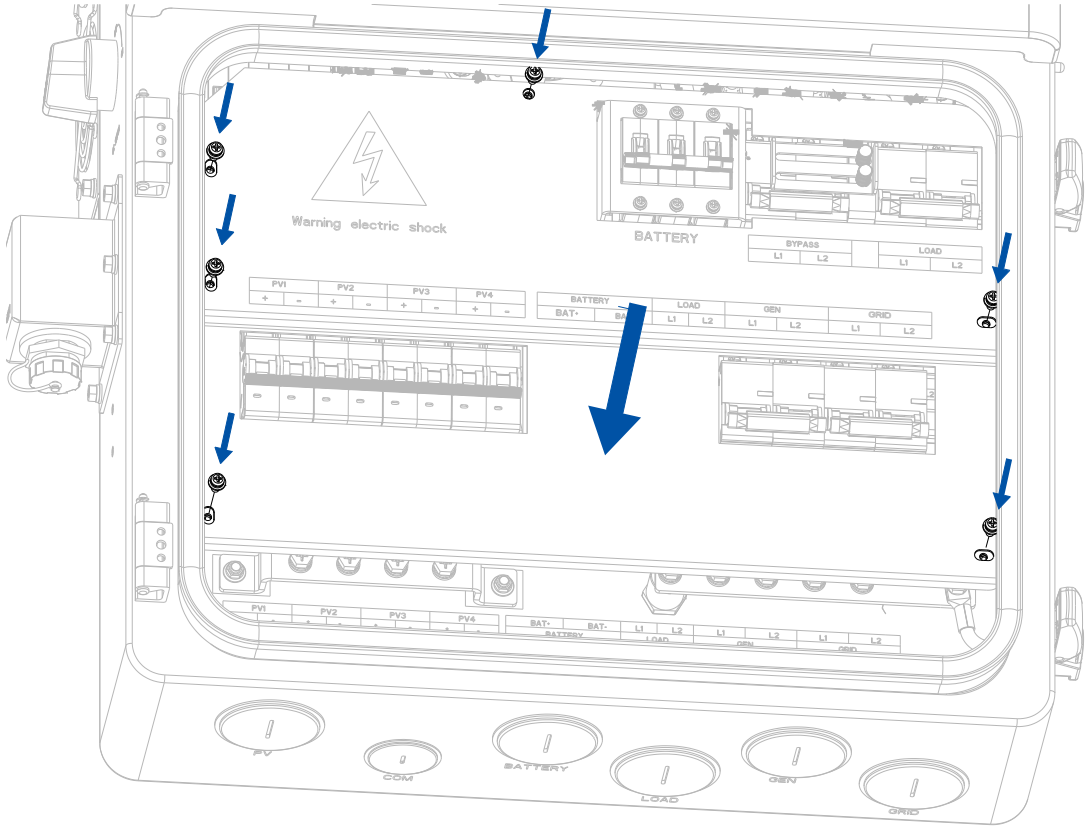


Figure 5.22. Installing the internal metal plate

Step 2. Close the cover. Use the tabs to secure the cover and use the key to lock the cover. Keep the key to a safe place.

Figure 5.23. Closing the cover

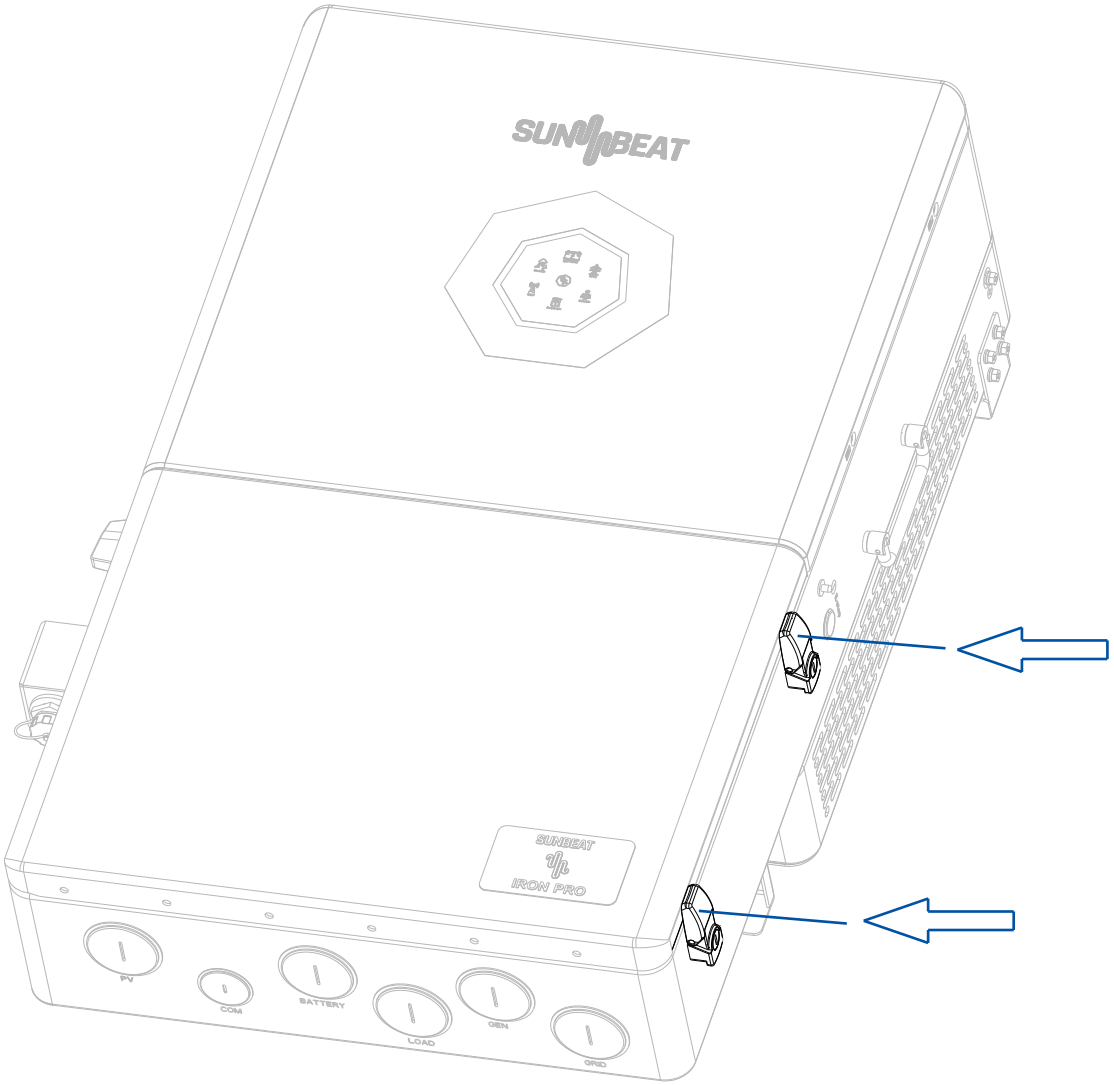
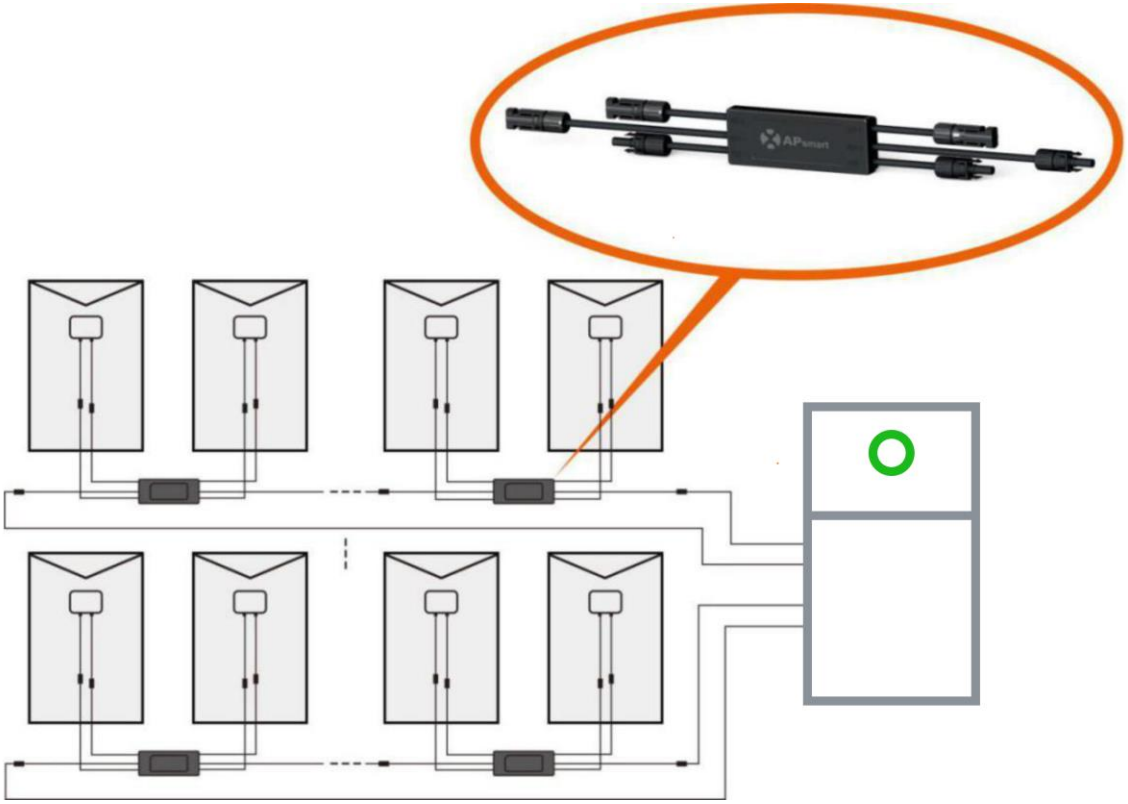


Figure 5.24. Locking the cover

5.11. Install an RSD (optional)

The SunBeat inverter provides RSD protection with a built-in transmitter (Transmitter-PLC-1P). To enable RSD protection, use an APsmart RSD-D model to connect to PV panels. For more details about the cable connections, refer to the RSD-D manual.



5.12.System connection overview

5.12.1. Single inverter deployment

The following figure shows the system connection of a single inverter:

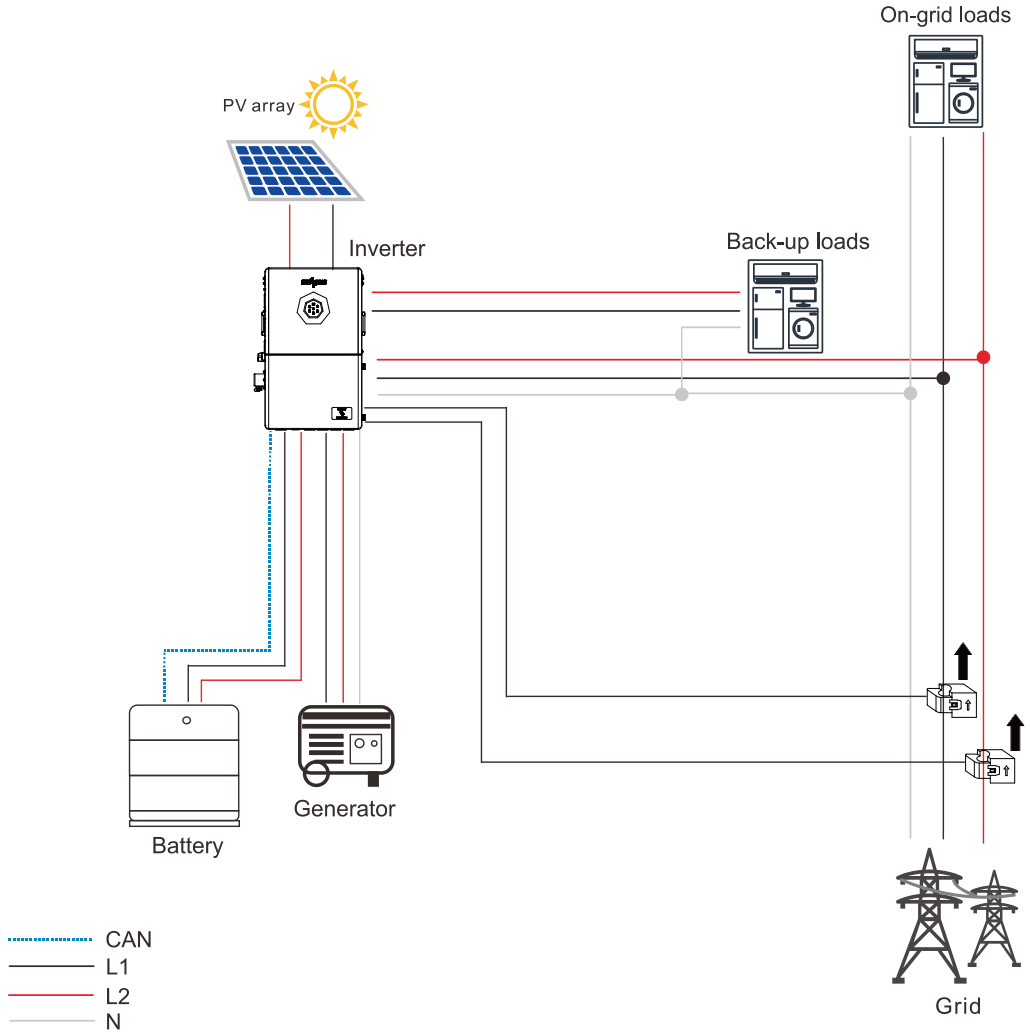


Figure 5.25. Split-phase (single inverter)

5.12.2. Parallel inverters deployment

A maximum of four inverters can be deployed in parallel.

The following figure shows the system connection of two inverters, one working as the primary, the other working as the secondary. The primary inverter is required to connect to the CTs.

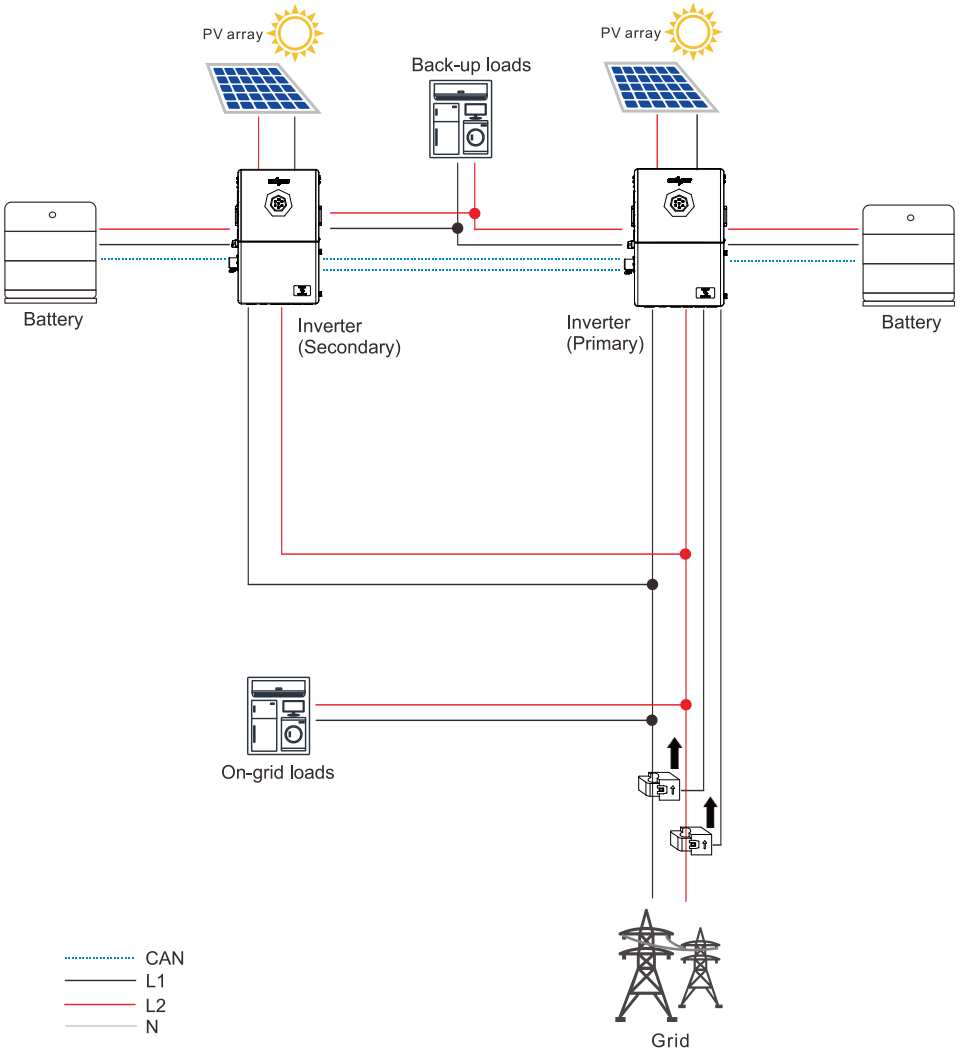


Figure 5.26. Split-phase (one primary inverter and one secondary inverter)

The following figure shows the cable connection details of two-inverter deployment. The cable connections of three or four inverters are similar.

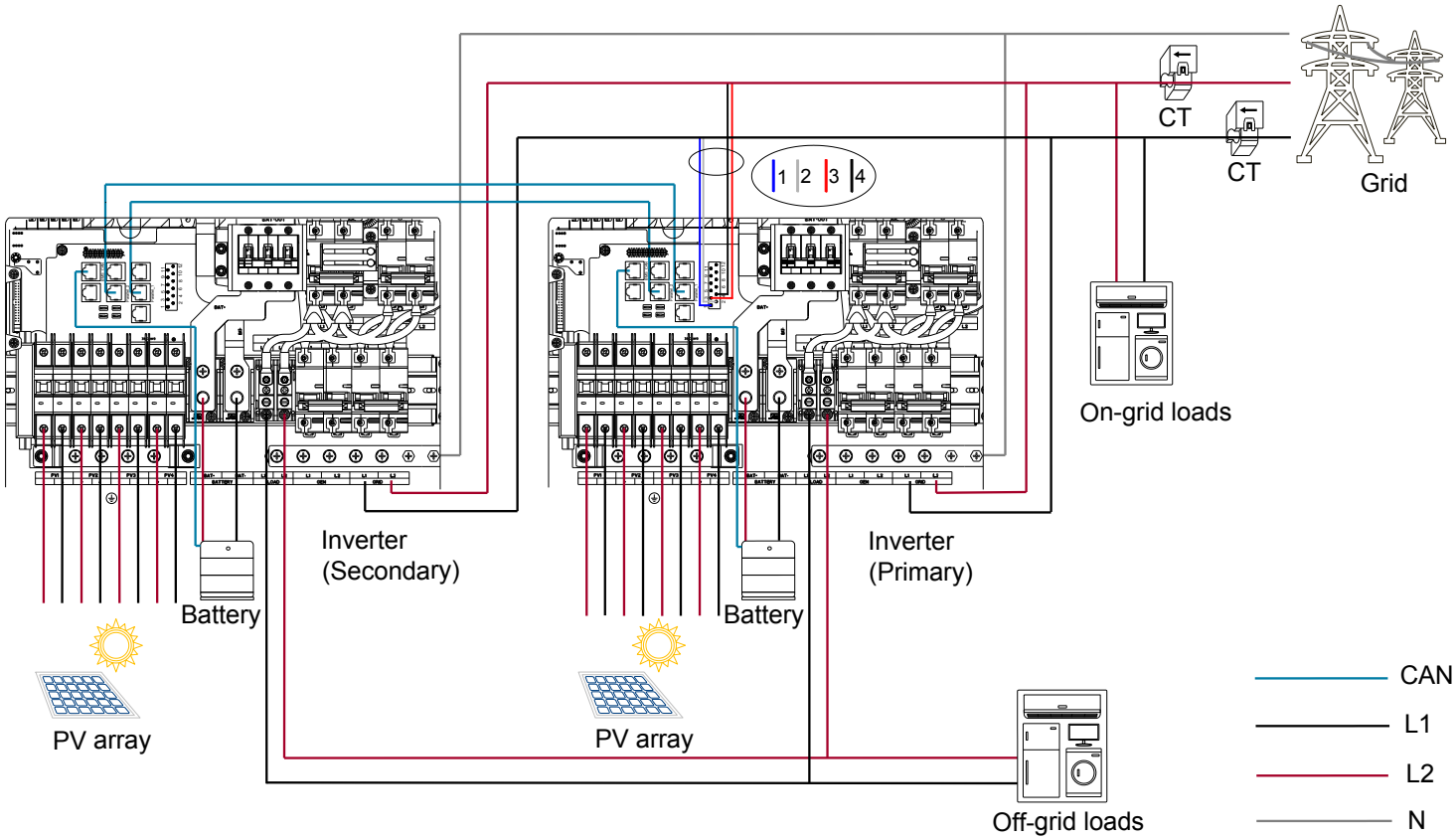


Figure 5.27. Split-phase (one primary inverter and one secondary inverter)

The following figure shows the system connection of four inverters, one working as the primary, the other three working as the secondary:

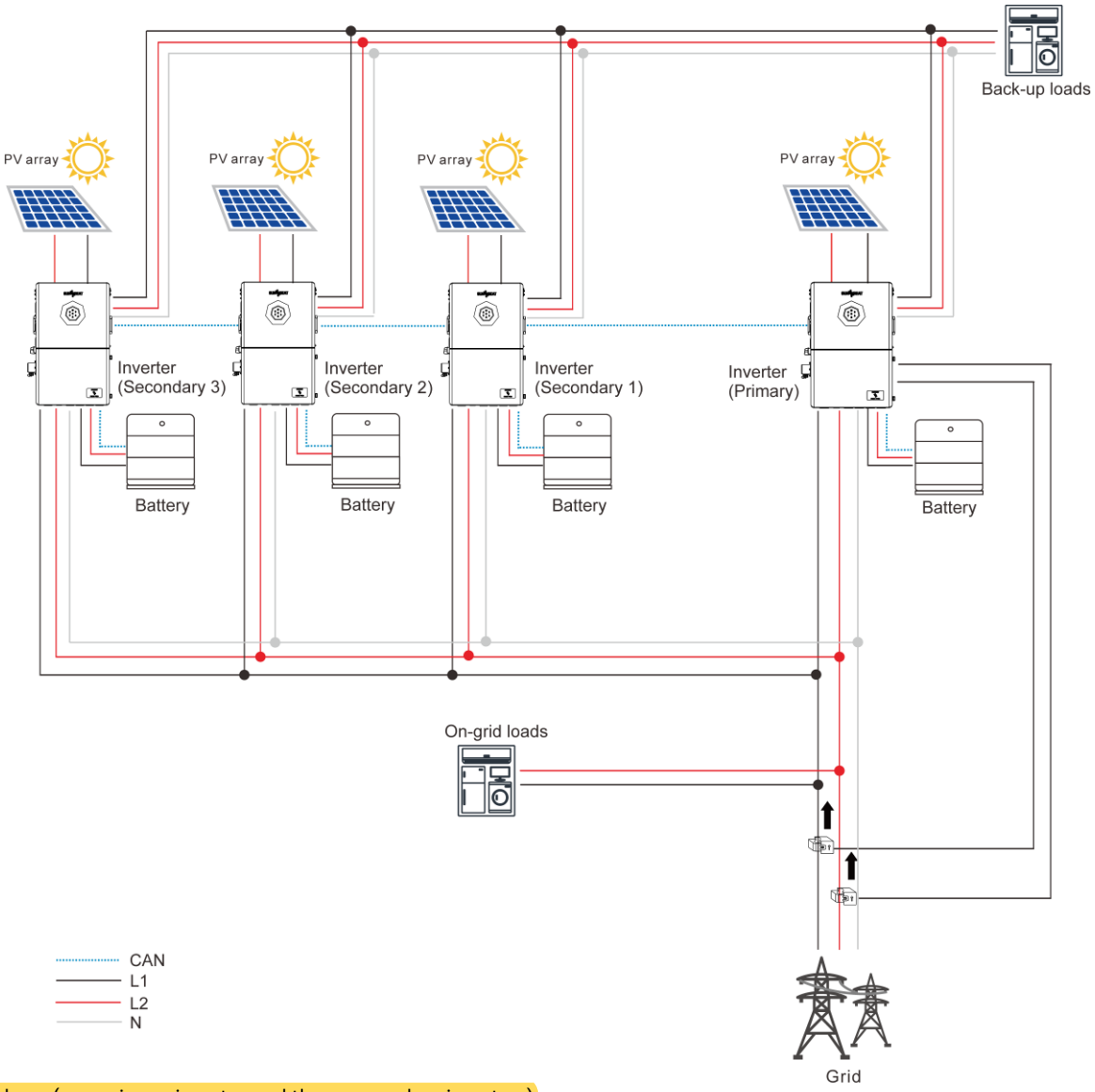
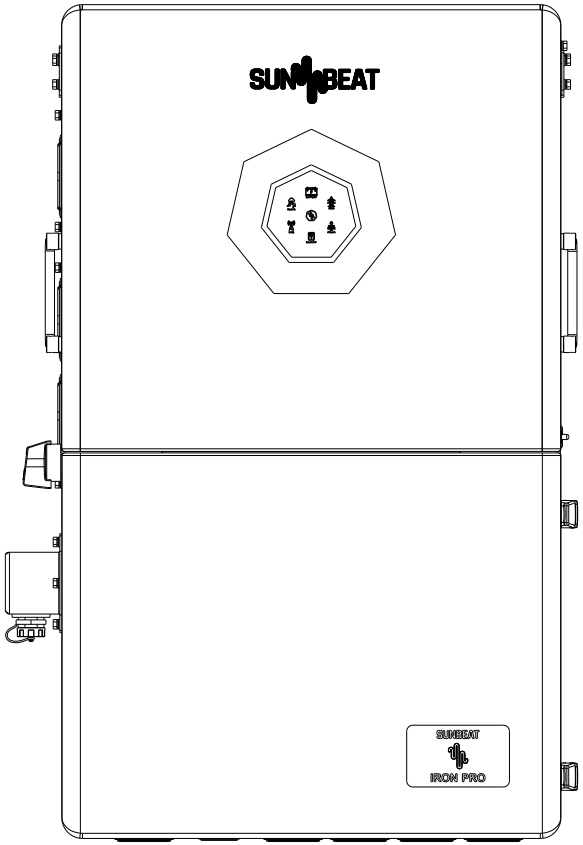


Figure 5.28. Split-phase (one primary inverter and three secondary inverters)


SUNBEAT
SUNBEAT
IRON PRO

6.

STARTUP AND SHUTDOWN

6.1. Startup

NOTICE
In a parallel system, start all secondary devices and then the primary devices.

Step 1. Open the junction box. Turn on the following breakers by pushing their handles upwards:

a. Load breaker (1) or bypass breaker (2) (optional, only when loads are connected)

Note: Either the load breaker or the bypass breaker can be turned on, but not both. When the load breaker is turned on, the inverter provides electricity to the back-up loads; when the bypass breaker is turned on, the grid, instead of the inverter, provides electricity to the back-up loads.

b. Grid breaker (3)

c. Battery breaker (5)

d. Generator breaker (4) (optional, only if a generator has been installed)

e. PV input breaker (6)

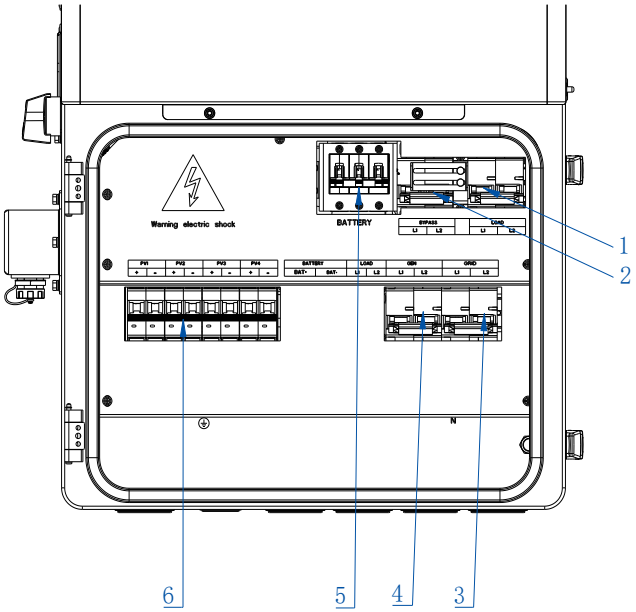


Figure 6.1.Breakers

Step 2. Turn on DC SWITCH on the left side of the inverter.

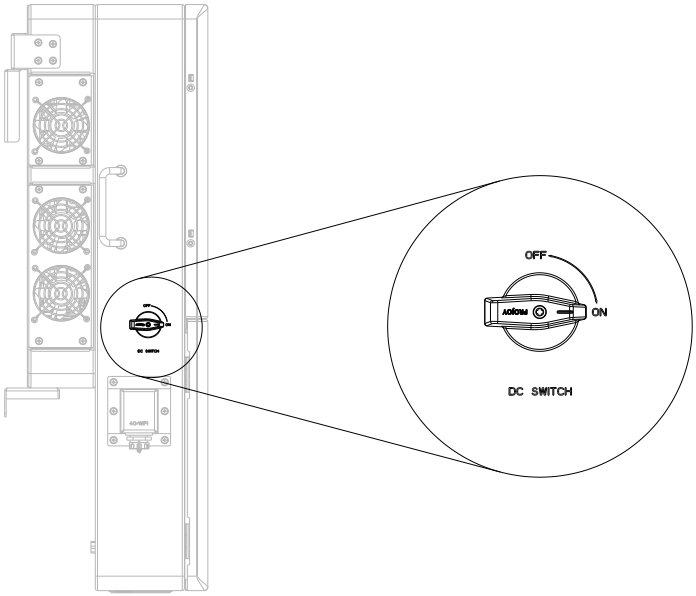


Figure 6.2.DC switch in ON

Step 3. Turn on the breaker on the grid side.

Step 4. Turn on the battery switch on the battery. For details, refer to the battery user manual.

Step 5. Press down the ON/OFF button on the right side of the inverter.

Step 6. Check the LED indicator status on the inverter panel to ensure that the inverter is running properly. For details, refer to section 2.6 "LED indicators".

6.2. Shutdown

Step 1. Press the ON/OFF button on the right side of the inverter to shut down the system.

When the button is bounced, the system stops running.

Step 2. Turn off DC SWITCH on the left side of the inverter.

Step 3. Turn off the battery switch on the battery.

Step 4. Turn off the breaker on the grid side.

6.3. Emergency shutdown

If there is an emergency, turn off the external rapid shutdown switch to shut down the system immediately.

6.4. Restart after emergency shutdown

After the emergency is subsided, turn on the external rapid shutdown switch to restart the system.

7.

COMMISSIONING

7.1. About the SUNBEAT ENERGY App

The SUNBEAT ENERGY App can be used for both nearby and remote monitoring of your energy storage system (ESS).

7.2. Download the App

On your mobile phone, search for “SUNBEAT ENERGY” in the App store and download the App.

7.3. Use the App

Before you start

Check the Stick Logger indicator status and make sure that it is running normally. For the details about the communication module, refer to the Stick Logger quick guide.

Procedure

For details on the commissioning operations on the App, refer to the App user manual.

Note: The detailed operations on the App might vary, depending on the version you are using.

8.

TROUBLESHOOTING

For any errors reported as below, contact the after-sales for service support. The operations and maintenance must be performed by authorized technicians.

Error message	Description
Master Bus Voltage High	The DC input voltage exceeds the allowed input limit of the inverter.
Master HW Bus Voltage High	The DC input voltage exceeds the allowed input limit of the inverter.
Master Bus Voltage Low	The bus voltage of the inverter is too low.
Master PV Voltage High	The DC input voltage of the inverter is too high.
Slaver Adc Sample Error	The inverter sampling circuit is faulty.
Master Adc Sample Error	The inverter sampling circuit is faulty.
Consistent Adc Adc Sample Error	The inverter sampling circuit is faulty.
Master Pv Input Error	PV reverse connection or sensor abnormality.
Frequency Config Error	The center frequency of the safety configuration does not match the real frequency of the power grid.
Master HW PV Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master SW PV Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master HW Inv Current High	1. The positive and negative poles of the string are reversely connected. 2. Internal damage to the inverter.
Master SW Inv Current High	The grid-side output current exceeds the inverter limit.
Master HW BAT Current High	The grid-side output current exceeds the inverter limit.
Master SW BAT Current High	The battery charging and discharging current exceeds the inverter limit.
Master HW BLC Current High	The battery charging and discharging current exceeds the inverter limit.
Master SW BLC Current High	The operating current of the balancing bridge exceeds the inverter limit.
Master Grid NE Voltage Error	Live line grounding occurs on the grid side
Master Arc Device Error	Arc equipment failure.
Master Arc Error	DC arcing caused by DC short circuit or poor terminal contact.
Arc Permanent Err	Permanent arc error
Master Battery Voltage Error	1. Bad battery connection.

Error message	Description
	2. Lithium battery is turned off.
Gen Output OverLoad	The load connected to the generator output is greater than the maximum output power.
Battery Open Circuit	Inverter cannot detect battery voltage.
Master Battery Discharge Voltage Low	Low voltage detected during battery discharge and overload.
Lost Communication between M<->H	Internal communication of the inverter is lost.
Lost Communication between M<->S	Internal communication of the inverter is lost.
Lost Communication between S<->H	Internal communication of the inverter is lost.
Master Grid Rly Errot	1. A live wire grounding occurs on the power grid side. 2. The grid voltage is too low. 3. The inverter relay circuit is faulty.
Master Inv Rly Errot	1. A live wire grounding occurs on the power grid side. 2. The grid voltage is too low. 3. The inverter relay circuit is faulty.
Master Temperature High Error	Inverter temperature is too high.
Master Temperature Low Error	Inverter temperature is too low.
GFCI Device Error	Inverter leakage current detection equipment fails.
Grid Voltage High	The grid voltage is higher than the inverter safety regulations allow.
Grid Voltage 10Min High	The grid voltage is higher than the inverter safety regulations allow.
Grid Voltage Low	The grid voltage is lower than the allowable range of the inverter safety regulations.
EpsPort Voltgae Error	Before leaving the grid, detect abnormal voltage at the off-grid port.
Master Grid Frequency High	The grid frequency is higher than the upper limit specified by the local power grid.
Master Grid Frequency Low	The grid frequency is lower than the lower limit specified by the local power grid.
Output OverLoad	The load connected to the back-up end is greater than the maximum output

Error message	Description
	power of the inverter.
Output Volt DCV High	The DC component of the AC output exceeds the limit range.
Output Current Dci High	The DC component of the AC output exceeds the limit range.
Master No Grid Error	The inverter cannot detect the grid voltage.
Master BMS com Lost	BMS does not start normally.
Gen Rly Errot	1. Diesel engine sampling circuit abnormality. 2. Diesel engine relay failure.
GFCI Error	A ground leakage current fault was detected in the power station system.
ISO Error	The insulation resistance between the string and the ground is less than the set value.
Bus Voltage Imbalance	Bus voltage imbalance.
Lost Communication between H<->M	Internal communication of the inverter is lost.
Lost Communication between H<->S	Internal communication of the inverter is lost.
HMI EEPROM Error	memory failure.
Lost Communication between Master and Meter	Abnormal communication between inverter and meter.
Lost Communication between inverter and SEC	Communication abnormality between inverter and load monitoring module.
HMI RTC Error	RTC failure
BMS Device Error	Battery abnormality
BMS Lost.Conn	BMS does not start normally.
CT Device Err	CT equipment failure
AFCI Lost Com.Err	AFCI board communication interrupted.
Master FAN Error	Master FAN Error
Master Bat Midbus Error	Battery voltage is too high or too low

9.

APPENDIX

9.1. Recycling and disposal

This device should not be disposed as a residential waste.

An inverter that has reached the end of its operation life is not required to be returned to your dealer; instead, it must be disposed by an approved collection and recycling facility in your area.

9.2. Warranty

Check the product warranty conditions and terms on the SunBeat Energy website: http://www.sunbeatenergy.com

9.3. Contacting support

SunBeat Energy

Address: 6900 Tavistock Lakes Blvd., Suite 400 Orlando, FL 32827

Bo. Sabana Abajo Carr. 190 KM 1.5 Lot 6 Industrialville industrial Park Carolina, PR 00983

Website: http://www.sunbeatenergy.com

Technical Support & Service

Tel: 1-833-786-2328

E-mail: service@sunbeatenergy.com

Sales

Tel: 1-833-786-2328

E-mail: sales@sunbeatenergy.com

9.4. Trademark

SUNBEAT is the trademark of SunBeat Energy.

SUNBEAT
ENERGY FOR BETTER LIVING

SUNBEAT ENERGY PUERTO RICO

Calle 190 K.M 1.5 - 6 BO
Carolina, PR 00983
1-833-SUN-BEAT
info@sunbeatenergy.com

SUNBEAT ENERGY NORTH AMERICA

6900 Tavistock Lakes Blvd - Suite 400
Orlando, FL 32827
1-833-SUN-BEAT
info@sunbeatenergy.com

www.sunbeatenergy.com

USER MANUAL
V1.0