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Apollo Hybrid Inverter User Manual



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1. About This Manual

This manual is an integral part of Apollo series three-phase high-voltage hybrid inverters (hereinafter referred to as the inverter). It mainly introduces the assembly, installation, electrical connection, debugging, maintenance and troubleshooting of the products. The products, services or features purchased are subject to the commercial contracts and terms of SR Portables all or part of the products, services or features described in this document may not be within the scope of purchase. This document serves only as a guide to use, and all statements, information and recommendations in this document do not constitute any express or implied guarantee.

1.1 How to Use This Manual

Before installing and using inverters, please read this manual carefully, understand the safety information and be familiar with the functions and characteristics of inverters. The manual content of subsequent versions of the inverter may be subject to change. The latest manual can be found at www.srportables.com

1.2 Target Groups

This manual is applicable to electrical installers with professional qualifications and end-users, who should have the following skills:

- ① Training for installation and commissioning of the electrical system, as well as dealing with hazards.
- ② Knowledge of the manual and other related documents.
- ③ Knowledge of the local regulations and directives.

1.3 Symbols

Important instructions contained in this manual should be followed during installation, operation and maintenance of the inverter. They will be highlighted by the following symbols.



Indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.



Indicates a hazard with a medium level of risk that, if not avoided, could result in death or serious injury.



Indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.



Indicates a situation that, if not avoided, could result in equipment or property damage, data loss, equipment performance degradation.



Indicates additional information, emphasized contents or tips that may be helpful, e.g., to help you solve problems or save time.

2 Safety Instructions

2.1 Safety Notes

- ① Before installation, please read this manual carefully and follow the instructions in this manual strictly.
- ② Installers need to undergo professional training or obtain electrical related professional qualification certificates.
- ③ When installing, do not open the front cover of the inverter. Apart from performing work at the wiring terminal (as instructed in this manual), touching or changing components without authorization may cause injury to people, damage to inverters and annulment of the warranty.
- ④ All electrical installations must conform to local electrical safety standards.
- ⑤ If the inverter needs maintenance, please contact the local designated personnel for system installation and maintenance.
- ⑥ To use this inverter for power generation needs the permission of the local power supply authority.
- ⑦ The temperature of some parts of the inverter may exceed 60°C during operation. To avoid being burnt do not touch the inverter during operation. Let it cool before touching it.
- ⑧ When exposed to sunlight, the PV array generates dangerous high DC voltage. Please operate according to our instructions, or it will result in danger to life.
- ⑨ When wiring the lithium battery terminals, please disconnect the breaker or switch of the lithium battery in case of a physical injury caused by the high voltage.

2.2 Statement

SR Portables has the right not to undertake quality assurance in any of the following circumstances:

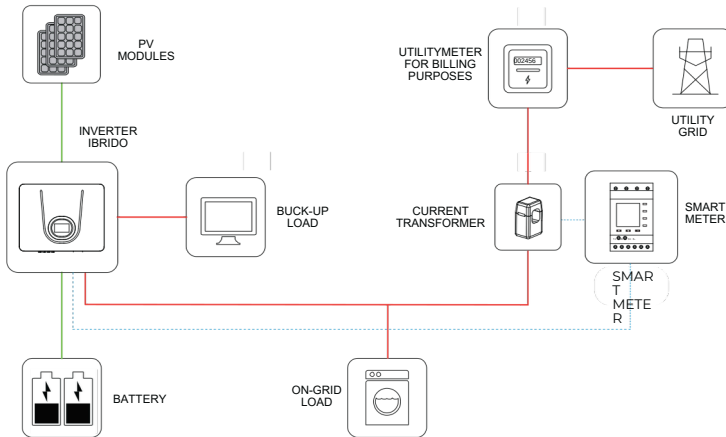
- ① Damages caused by improper transportation.
- ② Damages caused by incorrect storage, installation or use.
- ③ Damages caused by installation and use of equipment by non- professionals or untrained personnel.

- ④ Damages caused by failure to comply with the instructions and safety warnings in this document.
- ⑤ Damages of running in an environment that does not meet the requirements stated in this document.
- ⑥ Damages caused by operation beyond the parameters specified in applicable technical specifications.
- ⑦ Damages caused by unauthorized disassembly, alteration of products or modification of software codes.
- ⑧ Damages caused by abnormal natural environment (force majeure, such as lightning, earthquake, fire, storm, etc.).
- ⑨ Any damages caused by the process of installation and operation which don't follow the local standards and regulations.
- ⑩ Products beyond the warranty period.

3. Product Description

3.1 System Introduction

The hybrid solar system is usually composed of the PV array, hybrid inverter, lithium battery, loads and power grid.



NOTICE

The system is not suitable for supplying life-sustaining medical devices. It cannot guarantee backup power in all circumstances.

The applicable grid types for the Apollo series are TN-S, TN-C, TN-C-S and TT. When applied to the TT grid, the voltage of N to PE suggests less than 30V.

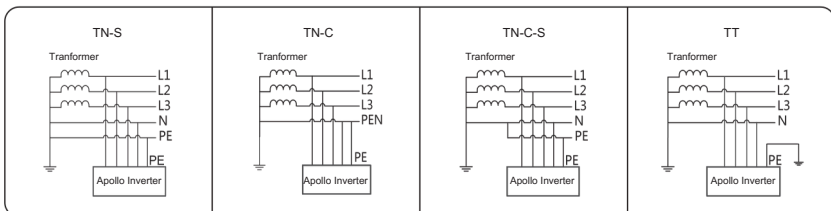


Figure 3-2 Applicable grid types

3.2 Product Introduction

The Apollo series inverter is also known as hybrid inverter or storage inverter, which is mainly used to combine the PV array, lithium battery, loads and power grid to realize intelligent power management and dispatching.

3.2.1 Models

The Apollo series hybrid inverter includes 6 models which are listed below:

Apollo Series 5KT, 8KT, 10KT, 12KT, 15KT, and 20KT.

3.2.2 Appearance

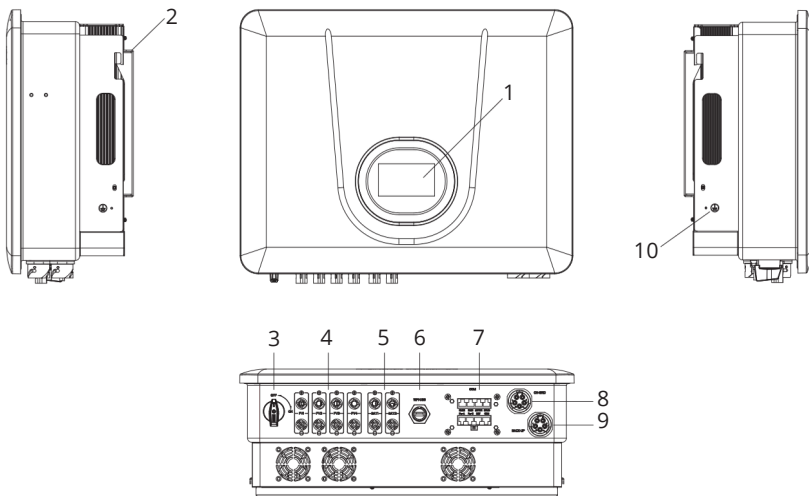


Figure 3-3 Inverter Appearance

Wiring terminals are at the bottom of the inverter, as shown in the table below.

| Item | Terminal | Note |
|------|-------------------------|---|
| 1 | Display and LED panel | Display the operation information and working states of the inverter. |
| 2 | Hanger | Used to hang the inverter on the wall-mounting bracket. |
| 3 | DC switch | Used to safely disconnect the DC circuit. |
| 4 | DC input terminal | PV connector |
| 5 | Battery input terminal | Battery connector |
| 6 | COM1 port | WiFi/LAN/4G module connector |
| 7 | COM2 port | Multifunction Connector (Meter/BMS/RS485/DRMs) |
| 8 | On-grid output terminal | Used for On- grid output cable connection |
| 9 | Backup output terminal | Used for Back- up output cable connection |
| 10 | Grounding screw | for grounding |

3.2.3 Indicator

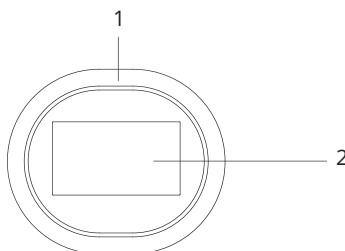









Figure 3-4 Inverter display interface

| Item | Indicator | Status | Description | |
|------|---------------------------|--|------------------|--|
| 1 | Power and Alarm Indicator | Off | No power | |
| | | Green | Quick flashing | Inverter entered self-test status. |
| | | | Slow flashing | Inverter entered waiting status. |
| | | | Breathe flashing | Inverter works normal. |
| | | Orange | Breathe flashing | Low battery warning, the battery power is about to reach the SOC protection value. |
| Red | Always on | An fault is detected, view the fault info on the display. | | |
| 2 | Display | Display dims to to save power, Click anywhere on the display to light it up. | | |

3.3 Symbols on the Inverter

| Symbol | Description |
|---|---|
|  | To avoid the potential effects on the environment and human health as a result of the presence of hazardous substances in electrical and electronic equipment, end-users of electrical and electronic equipment should understand the meaning of the crossed-out wheeled bin symbol. Do not dispose of WEEE as unsorted municipal waste and have to collect such WEEE separately. |
|  | Please read the instructions carefully before installation. |
|  | Do not touch any internal parts of the inverter being disconnected from the mains, battery and PV input for 10 minutes. |
|  | CE mark, the inverter complies with the requirements of the applicable CE guidelines. |
|  | Danger. Risk of electric shock! |
|  | The surface is hot during operation and do not touch. |
|  | Additional grounding point. |

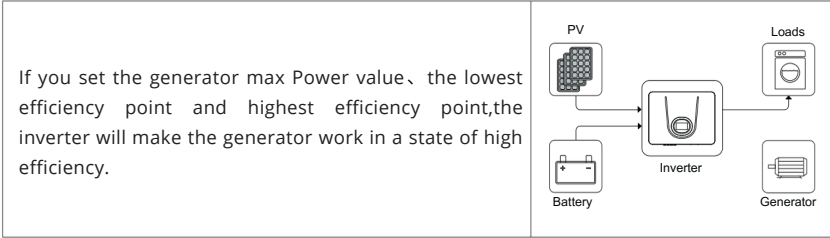
3.4 Operation Modes

Apollo Hybrid inverter has the following basic operation modes and you can configure the operation mode as per your preference in the App.

| Match Load Mode | |
|--|--|
| <p>In this working mode, when the power from the PV array is sufficient, PV power will supply the loads, battery, and grid in the order of loads first, battery second, and grid last. (You can set the power to the grid to 0W when the local grid doesn't allow inverter power to feed to the grid).</p> | |
| <p>When the PV power is insufficient, the battery will discharge to supply loads, and the grid will join in if the battery is not enough to supply loads.</p> | |

| Economic Mode | |
|---|--|
| <p>The economic mode is also called timing match load mode. In this working mode, you should set "PV+Grid Charge" and time when the grid is valley price. Then the power from PV or grid to charge the battery until the battery reaches a set stop Soc. And only PV power will supply the loads, grid after the battery reaches a set stop Soc.</p> | |
| <p>In this working mode, you should set "PV Only" and time when the grid is parity price. Then the power from PV will supply the loads firstly, battery secondly, and grid last. The battery always won't discharge.</p> | |
| <p>In this working mode, you should set "Match Load" and time when the grid is peak price, inverter will perform The Match Load Mode, the battery will discharge. In the above three settings, PV power will supply loads firstly, battery secondly, and grid last when the time out of range, as shown on the right, the battery always won't discharge.</p> | |

| Peak Valley Mode | |
|---|--|
| <p>In this working mode, when you set charge power and time , inverter will use the power from PV or grid to charge the battery until the battery reaches a set stop Soc.And PV power will supply the loads, grid when the battery reaches a set stop Soc or the time out of range.</p> | |
| <p>In this working mode, when you set discharge power and time , inverter will use the power from PV or battery to discharge the grid.And PV power will supply the loads, grid when the battery reaches DOD or the time out of range.</p> | |
| Backup Mode | |
| <p>In this working mode, the inverter will use the power from PV or grid to charge the battery until the battery reaches a set stop Soc, then PV power will supply the loads firstly, grid secondy. And as long as the grid is there, the battery won't discharge.</p> | |
| <p>When the grid fails, power from PV and battery will supply loads connected on the back-up side.</p> | |
| Generators Mode | |
| <p>In this working mode if you need the inverter to control the generator ON/OFF, you can turn on the Gen Ctrl and set start working SOC and stop working SOC. When the battery discharge to start working SOC or generator mode is setted for the first time,the PV and generator charge the battery and load until the battery reaches stop working SOC and inverter will stop the generator.</p> | |



3.5 Back-Up and Off-Grid Output

Normally, the Back-Up switching time is less than 20ms. However, some external factors may cause the system to fail on switching to Back-Up mode. Therefore, the conditions for using the Back-Up function smoothly are as follows for your awareness.

- ① Do not connect loads that are dependent on a stable energy supply for a reliable operation.
- ② Do not connect the loads whose total capacity is greater than the maximum Back-Up capacity.
- ③ Do not connect the loads that may cause very high start-up current surges, such as non-frequency conversion air conditioning, vacuum cleaner or half-wave loads such as hair dryer, heat gun, hammer drill.
- ④ Due to the condition of the battery itself, battery current might be limited by some factors, including but not limited to the temperature and weather. Apollo hybrid inverter overloading ability in off-grid work mode describes as follows:

| Off-grid Overloading Ability Illustration | | | | | |
|---|-----------------------|------------|------------|------------|------------|
| Status | Mode | Phase 1 | Phase 2 | Phase 3 | Duration |
| Off-grid | Balance Output Mode | 1.1times | 1.1times | 1.1times | Continuous |
| | | 2times | 2times | 2times | 60s |
| | Unbalance Output Mode | 1.25times* | 1.25times* | 1.25times* | Continuous |

The multiples above are calculated based on rated output power.

Apollo instantaneous max output power is 22kW.

*Only one of the three phases can reach up to 1.25 times, and the other two phases should be less than 1.1times.

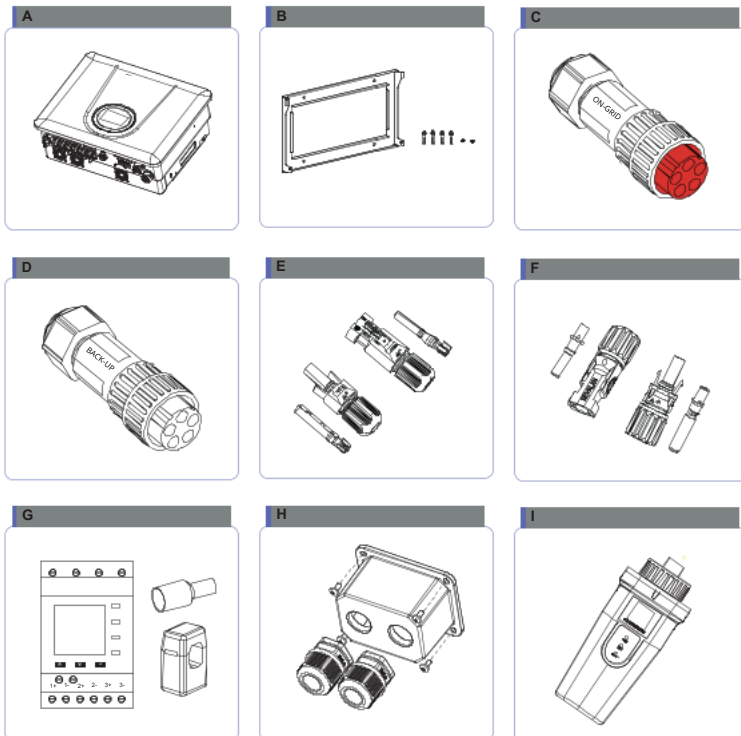
The inverter will restart in case of overload protection. The time required for restarting will increase (5 min at most) if overload protection repeats. Try to reduce Back-Up load power within maximum limitation or remove the loads which may cause very high start-up current surges.

3.6 Unpacking and Storage

The device is thoroughly tested and strictly inspected before delivery. Nonetheless, damage may still occur during shipping. For this reason, please conduct a thorough inspection after receiving the device. Contact SR Portables or the transport company in case of any damage or incompleteness, and provide photos to facilitate services.

3.6.1 Packing List

The package of the inverter includes the following accessories. Please check whether the accessories in the packing box are complete when receiving the goods.



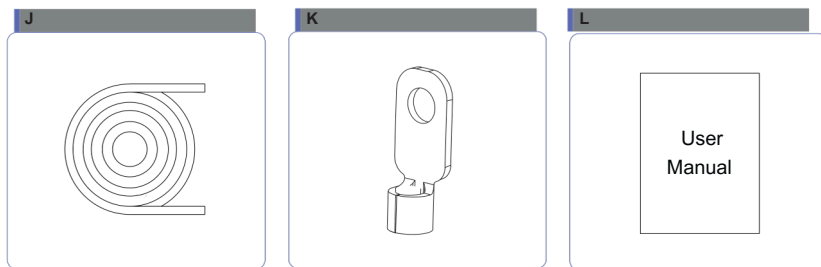


Figure 3-5 Packing list

| Item | Name and Quantity | Note |
|------|---|-------|
| A | Inverter (1pcs) | / |
| B | Wall-mounting bracket (1pcs), Expansion plug set (4pcs), M4-16 screws(2pcs) | / |
| C | On-grid connector set (1pcs) | Red |
| D | Back-up connector set (1pcs) | Black |
| E | PV terminal | Black |
| F | Battery terminal | Blue |
| G | Meter with 3 CTs (1pcs) | / |
| H | COM connector set (1pcs) | / |
| I | Monitoring device (1pcs) | / |
| J | 10m meter communication cable (1pcs), 3m battery communication cable | / |
| K | PE terminal(1pcs) | / |
| L | User guide | / |

3.6.2 Inverter Storage

- ① Do not dispose of the original packing case. It is recommended to store the device in the original packing case when the device is decommissioned.
- ② The storage temperature and humidity should be in the range of -30°C and+ 60°C, and less than 90%, respectively.
- ③ If a batch of inverters needs to be stored, the height of each pile should be no more than 6 levels.

4 Installation

4.1 Location

The Apollo series inverters are designed with IP65 protection enclosure for indoor and outdoor installations. When selecting an inverter installation location, the following factors should be considered:

- ① The wall on which the inverters mounted must be able to withstand the weight of the inverter.
- ② The inverter needs to be installed in a well-ventilated environment.
- ③ Do not expose the inverter directly to strong sunlight to prevent excessive temperature operation. The inverter should be installed in a place with shelter to prevent direct exposure to sunlight and rain.
- ④ Install the inverter at eye level for easy inspection of screen data and further maintenance.
- ⑤ The ambient temperature of the inverter installation location should be between -30°C and 60°C .
- ⑥ The surface temperature of the inverter may reach up to 75°C . To avoid risk of burns, do not touch the inverter while it's operating and inverter must be installed out of reaching of children.

4.1.1 Installation location

Select an optimal mounting location for safe operation, long service life and expected performance.

- ① The inverter with protection rating IP65 can be installed both indoors and outdoors.
- ② Install the inverter at a place convenient for electrical connection, operation, and maintenance.

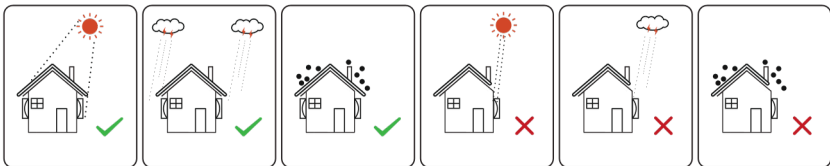


Figure 4-1 Recommended installation location



Do not put flammable and explosive articles around the inverter.

4.1.2 Installation Spacing

Reserve enough clearance around the inverter to ensure sufficient space for heat dissipation.

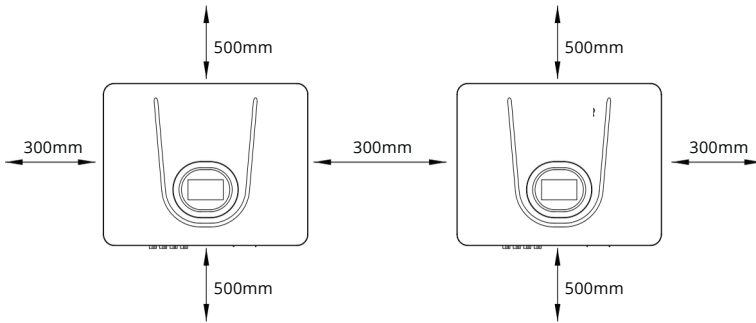


Figure 4-2 Recommended installation spacing

4.1.3 Installation Angle

Install the inverter vertically. Never install the inverter horizontally, or at forward/backward tilted, or upside down.

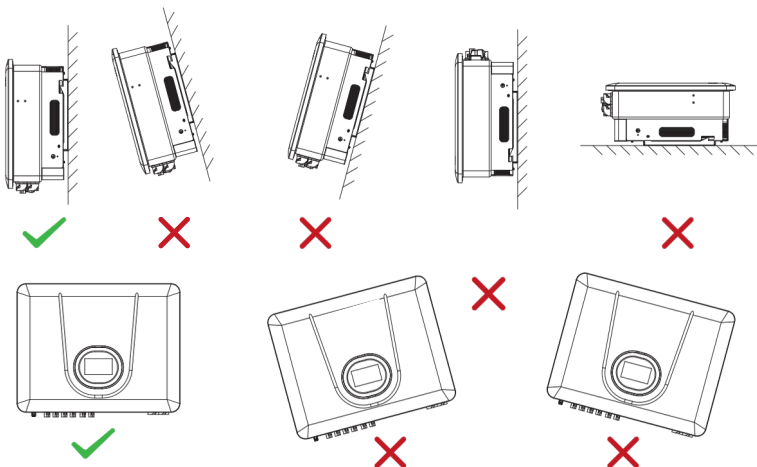


Figure 4-3 Permitted and prohibited mounting positions

4.2 Mounting the Inverter

4.2.1 Wall Bracket Installation

Dimensions of wall bracket (mm)

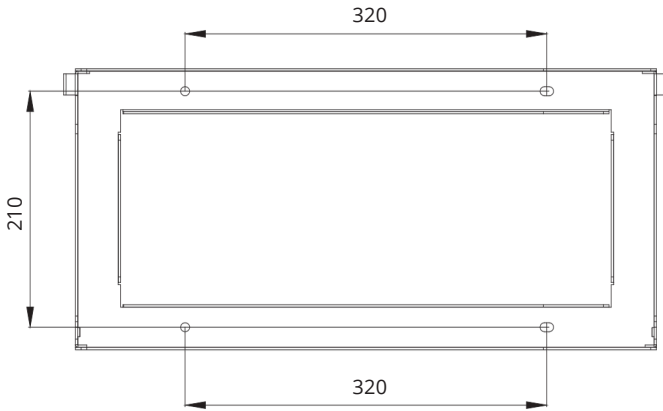


Figure 4-4 Dimensions of wall bracket

① Use the wall bracket as the template to mark the position of 4 holes on the wall.

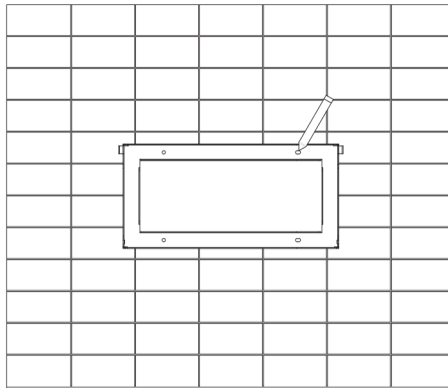


Figure 4-5 Marking hole position using installation bracket

- ② Use an electrical driller with 8mm diameter bit to drill 4 holes in the wall with 40mm depth.



Before drilling, make sure to avoid any buried water tube and electric wires in the wall.

- ③ Insert the expansion tubes into the holes and tighten them, then fix the bracket onto the wall with expansion screws by using a cross screwdriver.

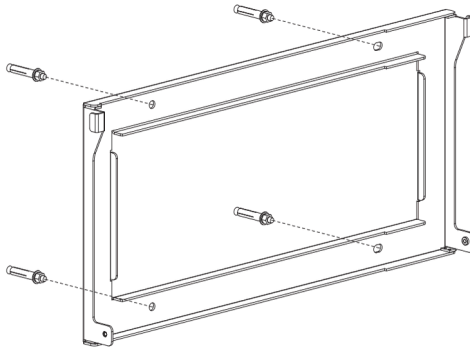


Figure 4-6 Fixing the wall bracket

4.2.2 Mounting the Inverter

Lift the inverter, hang the back rail on the fixed wall bracket carefully. The lower left and right side of the inverter should be locked by two M4-16 cross head screws.

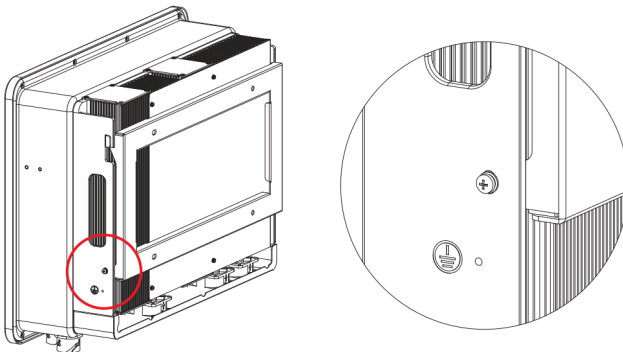


Figure 4-7 Mounting the inverter

4.2.3 External Ground Connection

Connect the inverter and ground bar through PE wire to achieve the purpose of grounding protection. Please always remember wiring the PE wire before wiring other wires.



Do not connect the N-wire as a protective ground wire to the inverter casing. Otherwise, it may cause electric shock.



Reliable grounding is good for resisting surge voltage shock and improving EMI performance.

Inverters must be well-grounded.

For a system with only one inverter, just ground the PE cable.

For a multi-inverter system, all inverters PE wire need to be connected to the same grounding copper bar to ensure equipotential bonding.

Ground terminal connection steps:

- ① The external grounding terminal is located in on the lower right side of the inverter.
- ② Fix the grounding terminal to the PE wire with a proper tool and lock the grounding terminal to the grounding hole in the lower right side of the inverter.

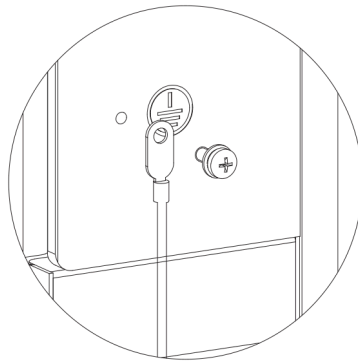


Figure 4-8 Grounding terminal connection

5 Electrical Connection



A high voltage in the conductive part of the inverter may cause an electric shock. When installing the inverter, make sure that the AC and DC sides of the inverter are completely de-energized.



Do not connect the N-wire as a protective ground wire to the inverter casing. Otherwise, it may cause electric shock.



Do not ground the positive or negative pole of the PV string, otherwise it will cause serious damage to the inverter.



Static may cause damage to the electronic components of the inverter. Anti-static measures should be taken during installation and maintenance.



Do not use other brands or other types of terminals other than the terminals in the accessory package. SR Portables has the right to refuse all damages caused by the mixed-use of terminals.



Moisture and dust can damage the inverter, ensure the cable gland is securely tightened during installation. The warranty claim will be invalidated if the inverter is damaged as a result of a poorly connected cable connector.

5.1 Electrical Wiring Diagram

This diagram shows Apollo series hybrid inverter wiring structure and composition, concerning the real project, the installation and wiring have to be in line with the local standards.

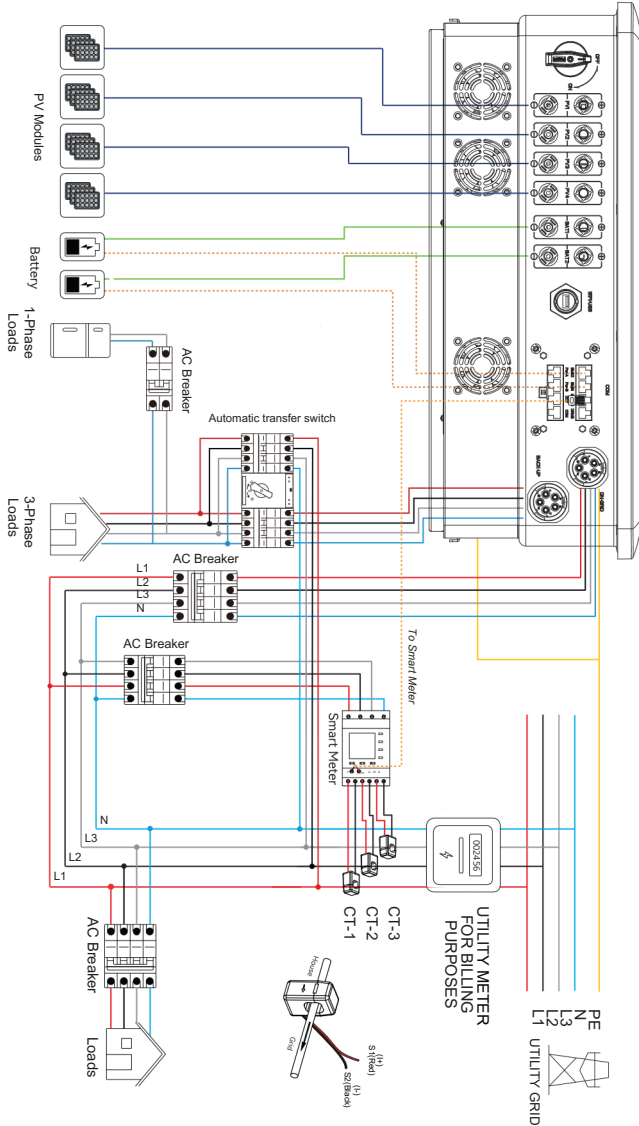


Figure 5-1 Electrical wiring diagram

*Smart Meter consists of ADL400N and RMM. Define the cable connections for the meter based on the actual meter model and refer to Section 5.4. This cable diagram is for reference only.

Single inverter wiring diagram This diagram is an example without special requirement on electrical wiring connection. Neutral line of AC supply can be isolated or switched.

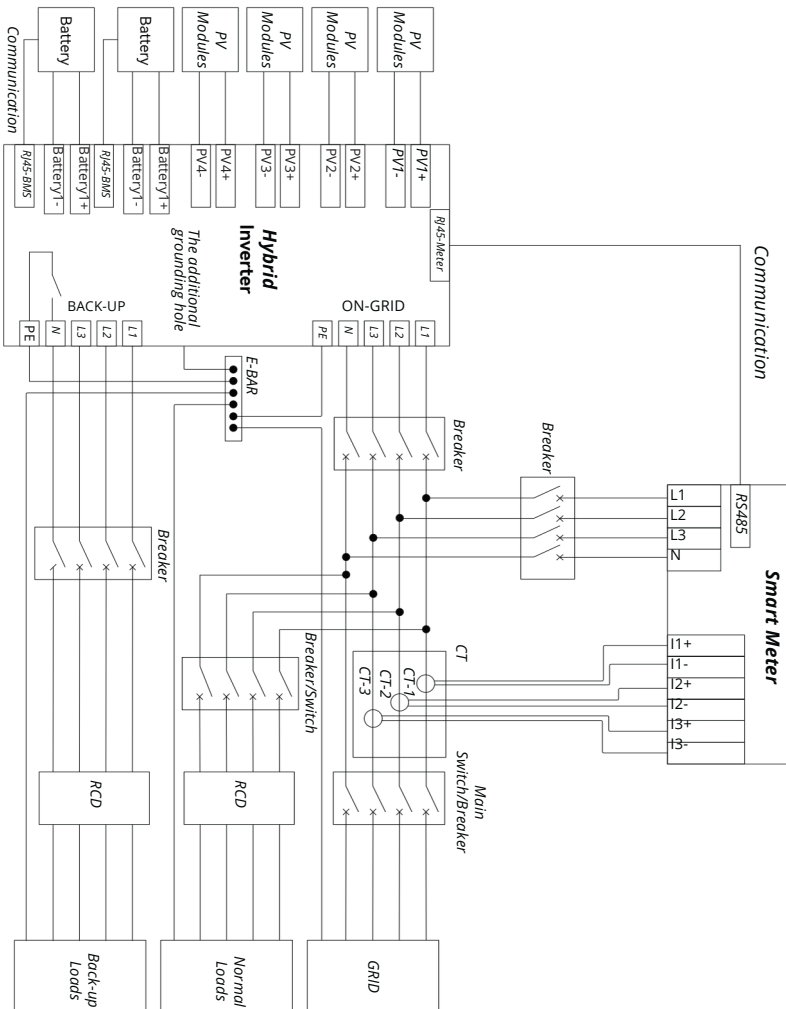


Figure 5-2 Standard wiring diagram

*Smart Meter consists of ADL400N and RMM. Define the cable connections for the meter based on the actual meter model and refer to Section 5.4. This cable diagram is for reference only.

This diagram is an example for Australia and New Zealand. Neutral line of AC supply must not be isolated or switched, and the neutral line of GRID side and BACK-UP side must be connected together according to the wiring rules AS/NZS_3000. Otherwise, BACK-UP function will not work.

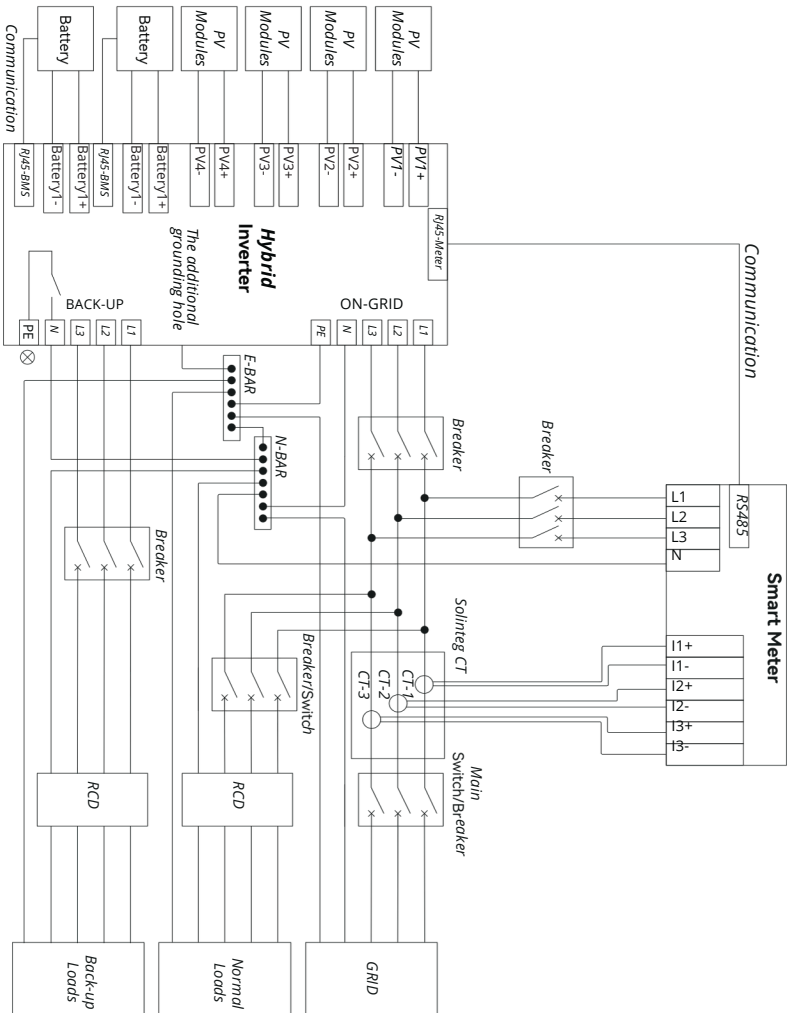


Figure 5-3 Australia wiring diagram

*Smart Meter consists of ADL400N and RMM. Define the cable connections for the meter based on the actual meter model and refer to Section 5.4. This cable diagram is for reference only.

5.2 AC Connection

5.2.1 AC Side Requirements

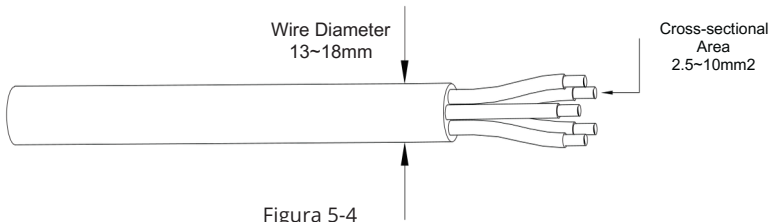
The Apollo series inverters are designed with IP65 protection enclosure for indoor and outdoor installations. When selecting an inverter installation location, the following factors should be considered:

- ① The wall on which the inverters mounted must be able to withstand the weight of the inverter.
- ② The inverter needs to be installed in a well-ventilated environment.
- ③ Do not expose the inverter directly to strong sunlight to prevent excessive temperature operation. The inverter should be installed in a place with shelter to prevent direct exposure to sunlight and rain.
- ④ Install the inverter at eye level for easy inspection of screen data and further maintenance.
- ⑤ The ambient temperature of the inverter installation location should be between -30°C and 60°C .
- ⑥ The surface temperature of the inverter may reach up to 75°C . To avoid risk of burns, do not touch the inverter while it's operating and inverter must be installed out of reaching of children.



- ① An independent AC breaker is required in both on-grid and back-up output side, and any loads cannot be connected with inverter directly.
- ② Before making the connection of AC cable, please confirm all DC & AC power source are disconnected from the inverter.
- ③ The Apollo series three-phase high voltage hybrid inverter applies to the three-phase power grid with a voltage of 230/400V and a frequency of 50/60Hz.
- ④ Connect the inverter to the grid only after getting an approval from the local electric power company.

A three-phase AC breaker needs to be installed on the AC side of the Apollo. To ensure that the Apollo can safely disconnect itself from the power grid when an exception occurs, select a proper overcurrent protection device in compliance with local power distribution regulations and Max. input (output) current of Apollo AC side. The allowable AC cable of wire diameter and cross-sectional area for Apollo are as shown in the following:



Determine whether an AC circuit breaker with greater overcurrent NOTICE capacity is required based on actual conditions.

Residual Current Monitoring Device With an integrated universal current-sensitive residual current monitoring unit included, the inverter will disconnect immediately from the mains power once a fault current with a value exceeding the limit is detected. However, if an external residual current device (RCD) is mandatory, the switch must be triggered at a residual current of 300 mA (recommended), or it can be set to other values according to local regulations. For example, in Australia, the inverter can use an additional 30mA (type A) RCD in installations.

5.2.2 Assembling the AC Connector

The AC terminal block is on the bottom side of the inverter.

- ① Take the AC connector out of the accessory bag and disassemble it.

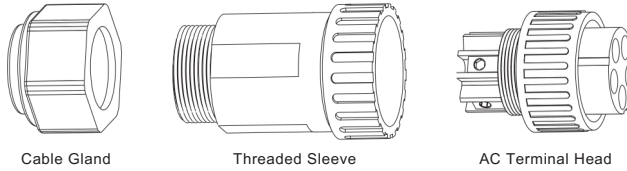


Figure 5-5

- ② According to the figure 5-4, select an appropriate cable, peel the insulation sleeve of AC cable off for 50mm, and peel off the end of 3L /PE / N wires for 8mm.

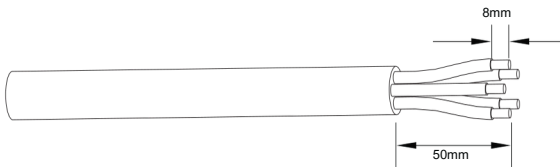


Figura 5-6

- ③ Insert the stripped end of the five wires into the appropriate hole of the terminal head. Please try to pull out the cable to make sure it is well connected.

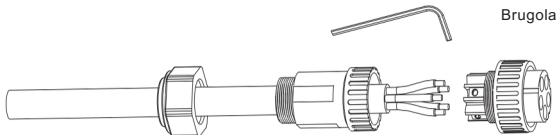


Figura 5-7



The cord end terminals must be locked tightly, and make sure it won't be loose after a long period of use.

④ According to the arrow direction push the threaded sleeve to make it connected with the AC terminal head and then rotate the cable gland clockwise to lock it.

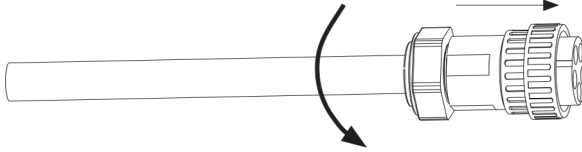


Figura 5-8

5.2.3 Installing the AC Connector



High voltage may be present in inverter!
Ensure all cables are voltage-free before electrical connection.
Do not connect the AC circuit breaker until all inverter electrical connections are completed.

Connect the AC connector to the inverter AC terminal, and rotate the AC connector buckle clockwise until its tight enough.

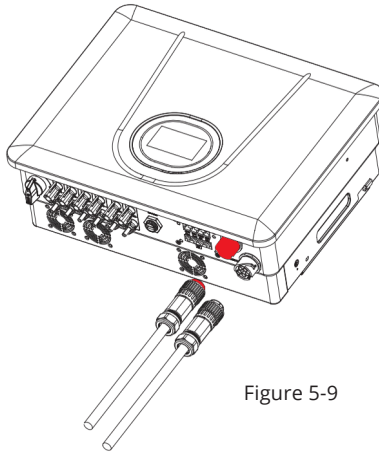


Figure 5-9



Please distinguish the on-grid and back-up port, and don't mix up the on-grid port and back-up port when making the connection.

5.3 Monitoring Device Installation

Apollo series hybrid inverter supports WIFI, LAN, and 4G communication. Plug the WIFI, LAN, or 4G module into the WIFI/USB port in the bottom of inverter. A slight "click" sound during the installation represents that the assembly is in place.

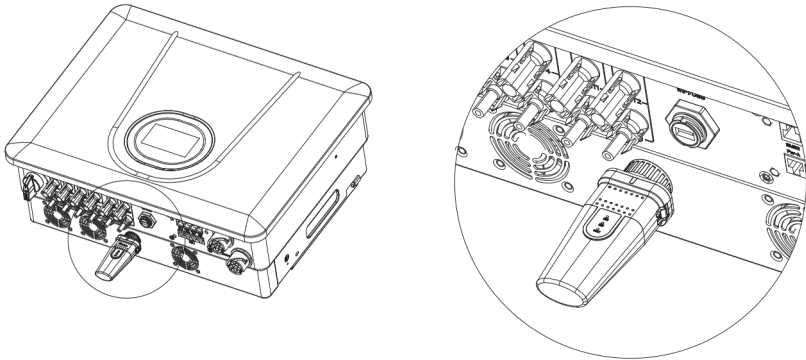


Figure 5-10 Monitoring device installation



NOTE

Refer to "WiFi-Plug Quick Installation Guide" in the accessory box for more information.

5.4 Meter and CT Connection

The current Transformer, also called CT, is usually installed on the L wires between the house loads and the power grid. The Meter can be installed in the AC combiner box or other places that are unable to be touched by children. CT cable with length of 2m, it's fixed and can't be extended. The CTs have been connected to the Smart Meter when you received them, and you just need to follow the wiring diagram in the Meter to connect CT.

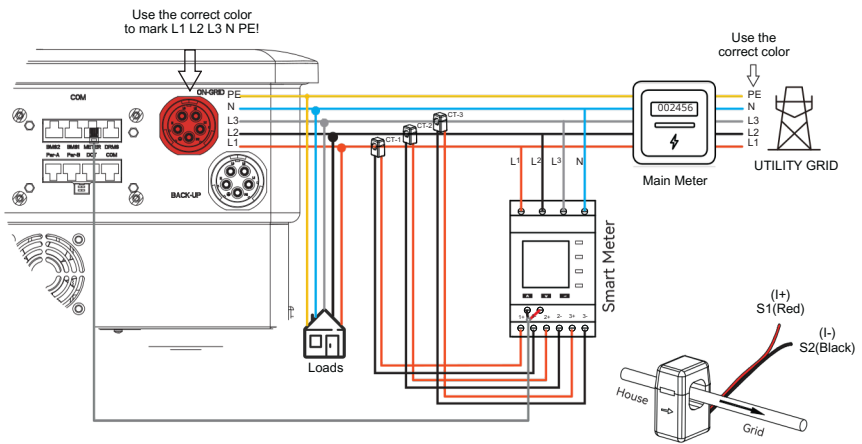


Figure 5-11



NOTICE

CT installation direction should strictly follow the instruction in the user manual, otherwise, the inverter may not be working normally. The CT has to be corresponding with the port in the meter, and the connection between CT and Meter needs to be reliable, otherwise, the CT measurement accuracy may be affected.



NOTE

Please choose the appropriate CT size according to your needs.

Meter terminals definition as shown in table below:

| No. | Definition | Function |
|-----|------------|---|
| I1+ | L1-S1 | To detect the CT current and direction |
| I1- | L1-S2 | |
| I2+ | L2-S1 | |
| I2- | L2-S2 | |
| I3+ | L3-S1 | |
| I3- | L3-S2 | |
| L1 | L1 L2 | L1/L2/L3/N connect to grid to detect power grid voltage |
| L2 | L3 N | |
| L3 | | |
| N | | |
| A | RS485 | Communicate with inverter |
| B | | |

5.5 Communication Connection

All communication ports are in the multifunction communication Port at the bottom of inverter which including BMS port, Meter port, DRMS port, PARL port, DCT port, EMS port.

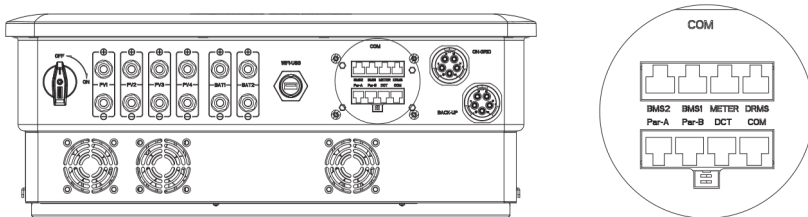


Figure 5-12

| RJ45 | Definition | Function |
|-------|-------------------|--------------------------------------|
| BMS1 | CAN1 | Communicate with BMS1 |
| BMS2 | CAN2 | Communicate with BMS2 |
| METER | RS 485 | Communicate with Mete |
| DRMS | PIN1~PIN5 | DRMs For Australia and New Zealand |
| PAR-A | SYN1~3,CAN,RS 485 | Parallel connection of inverters,EMS |
| PAR-B | SYN1~3,CAN,RS 485 | Parallel connection of inverters,EMS |
| DCT | DCT1/2~DCT3/4 | Multifunction Relay |
| COM | DI+,DI-,DI1+~DI4+ | RCR and Fast stop |

5.5.1 Assembling the Multi-com Connector

① Unscrew the swivel nut from the connector. Remove the seal and lead the cable through the cable gland.

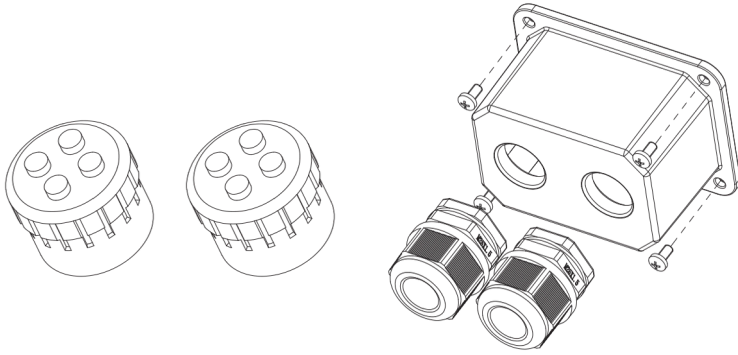


Figure 5-13

5.5.2 Connect the Meter and BMS Communication Cables



NOTE

The communication between meter/BMS and inverter is RJ45 interface cable.

① Thread the RJ45 plug of appropriate length through the swivel nut, and insert it into the open side of the rubber gasket.

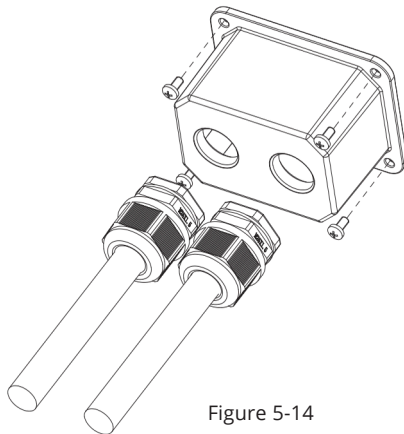


Figure 5-14

- ② Insert one side of the RJ45 plug into the RJ45 port of terminal block.

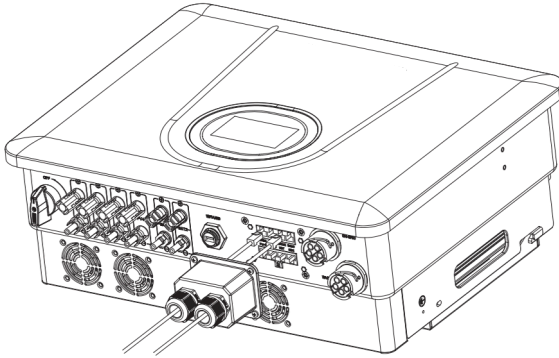


Figure 5-15

- ③ Insert another side of the communication cable into the meter RS485 port or BMS1/BMS2 CAN port.

5.5.3 Meter and BMS Communication



NOTE

Before purchasing the battery, you need to make sure the battery you selected is in the battery approval list of SR Portables, otherwise, the system may not work properly. Please contact your installer or SR Portables service team for confirmation if you're not sure about it.

BMS and Meter RJ45 terminal connection sequence and definition as below.

| No. | Color | BMS1 side | BMS2 side | Meter side |
|-----|----------------|-----------|-----------|------------|
| 1 | Orange & White | / | / | / |
| 2 | Orange | / | / | / |
| 3 | Green & White | / | / | RS485_B1 |
| 4 | Blue | CANH1 | CANH2 | / |
| 5 | Blue & White | CANL1 | CANL2 | / |
| 6 | Green | / | / | RS485_A1 |
| 7 | Brown & White | / | / | / |
| 8 | Brown | / | / | / |

Figure 5-16 RJ45 BMS&Meter RJ45 terminal connection sequence and definition

5.5.4 EMS Communication

An EMS communication cable needs to be connected when to control the operation of a hybrid inverter through the EMS, and communication between EMS and inverter is RS485.

5.5.5 DRMs

DRMs and Ripple Control support only one function at the same time
DRMs

DRMs RJ45 terminal connection sequence and definition as below.

| No. | Color | DRMs side |
|-----|----------------|-----------|
| 1 | Orange & White | DRM1/5 |
| 2 | Orange | DRM2/6 |
| 3 | Green & White | DRM3/7 |
| 4 | Blue | DRM4/8 |
| 5 | Blue & White | REF D/0 |
| 6 | Green | COM D/0 |
| 7 | Brown & White | / |
| 8 | Brown | / |

Figure 5-17 DRMs RJ45 terminal connection sequence and definition

DRMs (Demand Response Modes) interface is special reserved for Australia and New Zealand according to their safety regulation, and SR Portables doesn't provide the DRMs device for the customer. The inverter supports the demand response modes as specified in the standard AS/NZS 4777. The inverter has integrated a terminal block for connecting to a DRMs.

DRMs wiring diagram (hybrid inverter) as below:

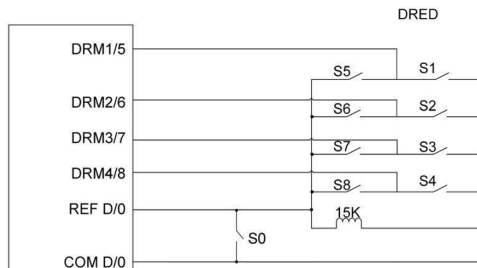


Figure 5-18

DRMs mode as shown in table below:

| Mode | Function |
|----------|---|
| DRM 0 | Operate the disconnection device |
| DRM 1 | Do not consume power |
| DRM 2 | Do not consume at more than 50% of rated power |
| DRM 3 | Do not consume at more than 75% of rated power and source reactive power if capable |
| DRM 4 | Increase power consumption (subject to constraints from other active DRMs) |
| DRM 5 | Do not generate power |
| DRM 6 | Do not generate at more than 50% of rated power |
| DRM 7 | Do not generate at more than 75% of rated power and sink reactive power if capable. |
| DRM 8 | Increase power generation (subject to constraints from other active DRMs) |
| Priority | DRM1 > DRM2 > DRM3 > DRM4 |
| | DRM5 > DRM6 > DRM7 > DRM8 |

5.5.6 RCR&Fast Stop

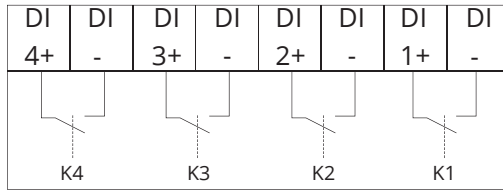
COM RJ45 terminal connection sequence and definition as below.

|  | No. | Color | COM side |
|---|-----|---------------|----------------|
| | | 1 | Orange & White |
| | 2 | Orange | / |
| | 3 | Green & White | DI1+ |
| | 4 | Blue | DI2+ |
| | 5 | Blue & White | DI3+ |
| | 6 | Green | DI4+ |
| | 7 | Brown & White | DI+ |
| | 8 | Brown | DI- |

Figure 5-19 COM RJ45 terminal connection sequence and definition

RCR (Ripple Control Receiver) interface is special reserved for Germany and some other European country according to their safety regulation, and SR Portables doesn't provide the RCR device for the customer. In Germany and some European areas, a ripple control receiver is used to convert a power grid dispatching signal to a dry contact signal. The dry contact is required for receiving the power grid dispatching signal.

RCR wiring diagram (hybrid inverter) as below:



Ripple Control Receiver

Figure 5-20

RCR operation mode as shown in table below:

| Switch mode (External RCR device) | Feed-in output power (in % of the Rated AC output power) |
|-----------------------------------|--|
| K1 turn on | 100% |
| K2 turn on | 60% |
| K3 turn on | 30% |
| K4 turn on | 0% |
| RCR priority: K4>K3>K2>K1 | |

Apollo hybrid inverter comes standard with fast stop function, and you can use this function by connecting an external switch into the fast stop interface if it requires in the installation place. The external switch doesn't include in our accessory box.

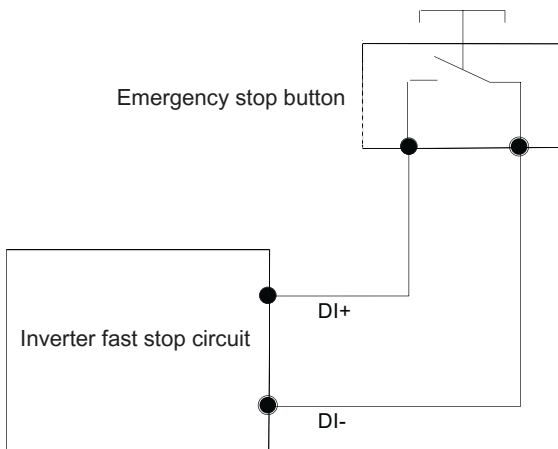


Figure 5-21 Fast stop connection diagram

5.5.7 Multifunction Relay

DCT RJ45 terminal connection sequence and definition as below.

| 1 2 3 4 5 6 7 8 | No. | Color | DCT side |
|-----------------|-----|----------------|----------|
| | | | DCT3 |
| | 1 | Orange & White | DCT3 |
| | 2 | Orange | |
| | 3 | Green & White | DCT4 |
| | 4 | Blue | |
| | 5 | Blue & White | DCT1 |
| | 6 | Green | |
| | 7 | Brown & White | DCT2 |
| | 8 | Brown | |

Figure 5-22 DCT RJ45 terminal connection sequence and definition

The inverter is equipped with two multifunction dry contact relay, which helps turn the loads on or off when an extra contactor is connected, or startup the diesel generator when the diesel generator startup signal is connected.



Maximum voltage and current at DCT1/2, DCT3/4 dry contact port:
125VAC 0.5A/ 30VDC 2A.



For more installation and setup information, please contact SR Portables.

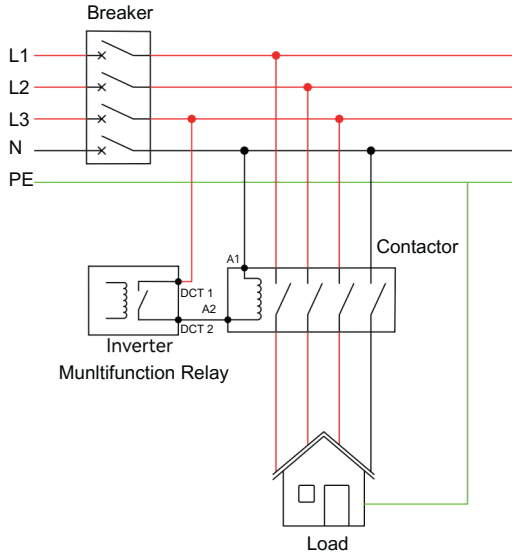


Figure 5-23 Load control connection diagram



NOTE

The AC contactor should be placed between the inverter and the loads. Do not connect the load to DCT port directly. The contactor is not supplied by the SR Portables. Connect the load to the DCT port of the inverter directly if the load is designed with a DI port. When the controlled load is connected to ONGRID, the contactor coil must also be connected to ONGRID. When the controlled load is connected to BACKUP, the contactor coil must also be connected to BACKUP.

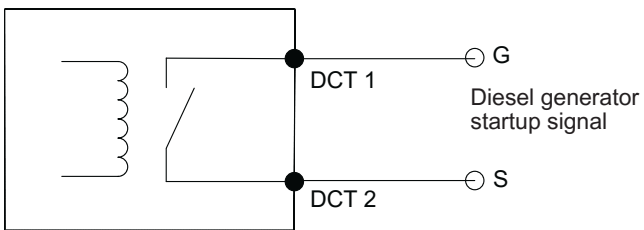


Figure 5-24 Generator Control connection diagram

5.5.8 Parallel System

PAR RJ45 terminal connection sequence and definition as below.

| No. | Color | Par-A side | Par-B side | Function |
|-----|----------------|------------|------------|----------------------------|
| 1 | Orange & White | SYN1 | SYN1 | Synchronous signal |
| 2 | Orange | SYN2 | SYN2 | |
| 3 | Green & White | SYN3 | SYN3 | |
| 4 | Blue | GND | GND | EMS communication |
| 5 | Blue & White | RS485_A2 | RS485_A2 | |
| 6 | Green | RS485_B2 | RS485_B2 | Parallel CAN communication |
| 7 | Brown & White | Par.CANH | Par.CANH | |
| 8 | Brown | Par.CANL | Par.CANL | |

Figure 5-25 PAR RJ45 terminal connection sequence and definition

The connection mode of parallel machine is as follows:

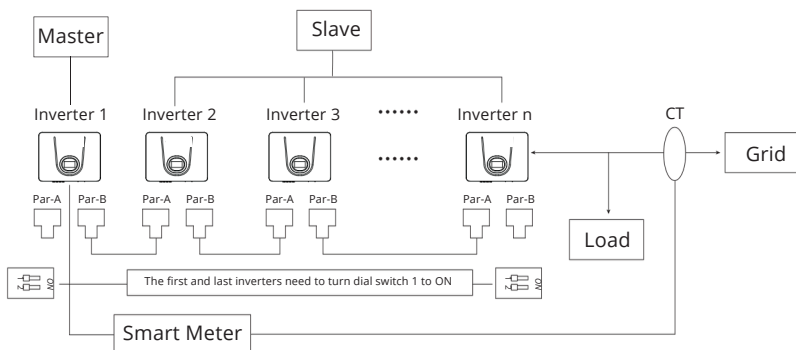


Figure 5-26 The connection mode of parallel machine



NOTE

1. The first and last inverters need to dial the dial switch 1 to the ON position.
2. It is recommended that the Back-up output wiring of all machines be confluent and connected to the LOAD by AC circuit breakers. It is not recommended that each machine be connected to the LOAD by AC circuit breakers alone.
3. It is recommended that the ON-GRID output wiring of all machines be confluent and connected to the GRID by AC circuit breakers. It is not recommended that each machine be connected to the GRID by AC circuit breakers alone.
4. The length of the cable from the LOAD end to the Back-up LOAD end of each machine should be the same as the length specification.
5. When the LOAD power is greater than the maximum allowable Back-up LOAD power of the parallel system, the LOAD can not be connected to the AC LOAD terminal, need access to the AC GRID side.
6. All machines in the parallel system must be in a consistent state.
7. The Master AC switch must be turned off for machine maintenance.

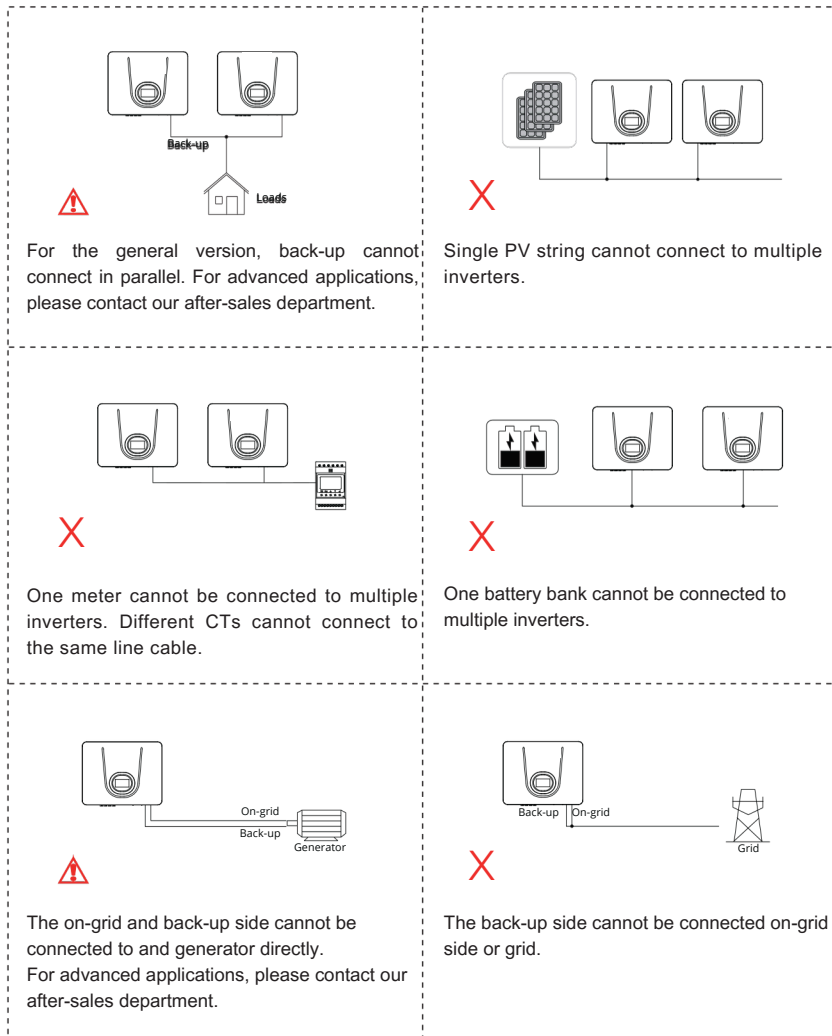



Figure 5-27



NOTE

- 1、 When using a parallel system, Please refer to the system setting of the inverter settings page in this manual.
- 2、 For more installation and setup information about parallel system, please contact SR Portables.

5.6 PV String Connection



High voltage may be present in the inverter!
Ensure all cables are voltage-free before performing electrical operations.
Do not connect the DC switch and AC circuit breaker before finishing electrical connection.



For best practice, ensure PV modules of the same model and specifications are connected in each string.



PV Max. Input voltage is 960V without battery, or 850V with battery, otherwise inverter will be waiting

5.6.1 PV Side Requirements

System Layout of Units with external DC Switch

- ① Local standards or codes may require PV systems that fit with an external DC switch on the DC side. The DC switch must be able to safely disconnect the open-circuit voltage of the PV array plus a safety reserve of 20%. Install a DC switch to each PV string to isolate the DC side of the inverter.
- ② The DC switch has to be certified by AS 60947.3:2018 and AS/NZS IEC 60947.1:2020 in Australia and New Zealand market. The Max. current of the DC switch matching with Apollo inverter is no less than 40A. We recommend the following electrical connection.

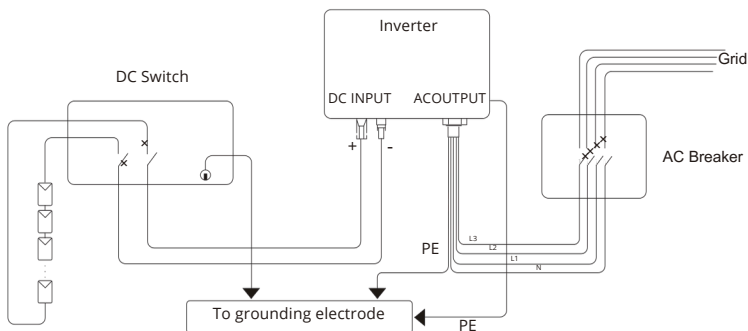



Figure 5-28

Select the appropriate photovoltaic cable

| Cable requirements | | Cable stripping length |
|--------------------|------------------------|------------------------|
| Outside diameter | Conductor core section | |
| 5.9-8.8 mm | 4 mm ² | 7 mm |

5.6.2 Assembling the PV Connector



WARNING

Before assembling the DC connector, make sure that the cable polarity is correct.

- ① Peel off the DC cable insulation sleeve for 7 mm.



Figure 5-29

- ② Disassemble the connector in the accessory bag.

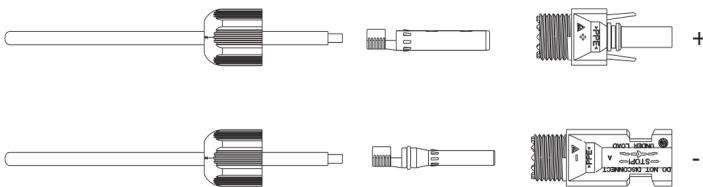


Figure 5-30

- ③ Insert the DC cable through the DC connector nut into the metal terminal and press the terminal with a professional crimping plier (pull back the cable with some power to check if the terminal is well connected to the cable).

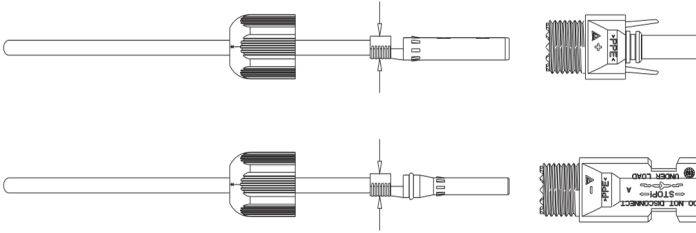


Figure 5-31

- ④ Insert the positive and negative cables into the corresponding positive and negative connectors, pull back the DC cable to ensure that the terminal is tightly attached in the connector.
- ⑤ Use an open-end wrench to screw the nut to the end to ensure that the terminal is well sealed.

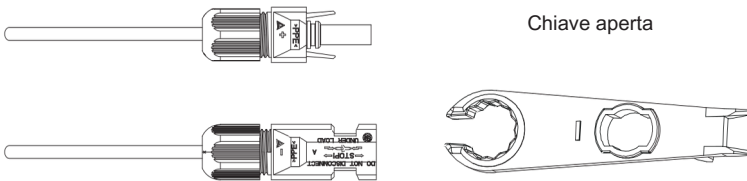


Figure 5-32

5.6.3 Installing the PV Connector

- ① Rotate the DC switch to "OFF" position.

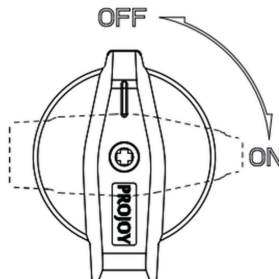


Figure 5-33

② Check the cable connection of the PV string for polarity correctness and ensure that the open circuit voltage in any case does not exceed the inverter input limit of 1,000V.PV Max. Input voltage is 960V without battery, or 850V with battery, otherwise inverter will be waiting.

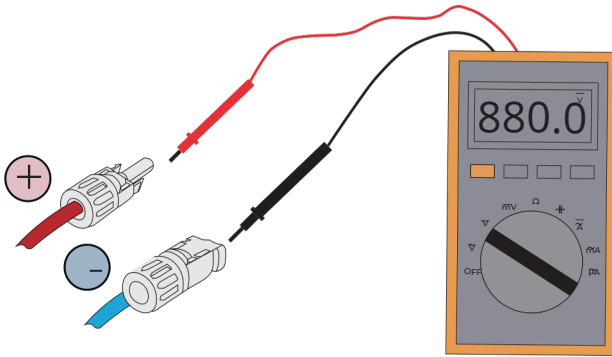


Figure 5-34

③ Insert the positive and negative connectors into the inverter DC input terminals respectively, a click sound should be heard if the terminals are well connected.

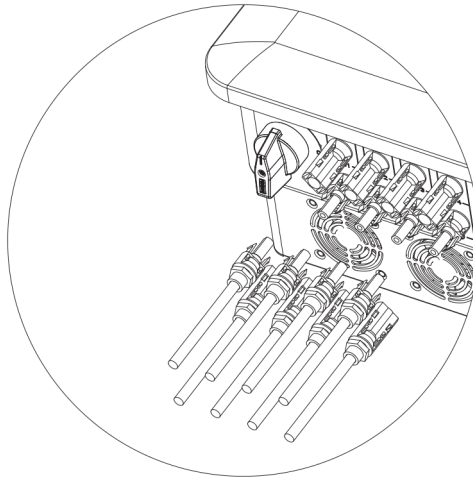


Figure 5-35

④ Seal the unused PV terminals with the terminal caps.

5.7 Power Cable of the Battery Connection



Please contact your battery supplier for detailed battery installation information.

5.7.1 The following principles must be considered when making battery connection:

- ① Disconnect the AC breaker on the grid side.
- ② Disconnect the breaker on the battery side.
- ③ Turn the inverter DC switch to the“OFF”position.
- ④ Make sure the maximum input voltage of battery is within the inverter limitation.

5.7.2 Lithium battery connector assembly procedures

Select an appropriate DC cable

| Cable requirements | | Cable stripping length | Applicable models |
|--------------------|------------------------|------------------------|-------------------|
| Outside diameter | Conductor core section | | |
| 5.0-8.0 mm | 6 mm ² | 8 mm | Apollo |



If the conductor core of the battery cable is too small, which may cause poor contact between the terminal and the cable, please use the cable specified in the above table, or contact SR Portables to purchase terminals of other specifications.

- ① Peel off the battery cable insulation sleeve for 10 mm.



Figure 5-36

② Disassemble the connector in the accessory bag.

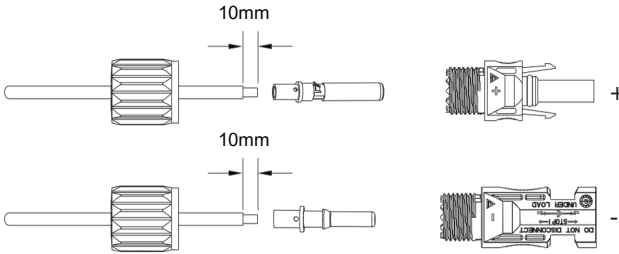


Figure 5-37

③ Insert the battery cable through the battery connector nut into the metal terminal and press the terminal with a professional crimping plier (pull back the cable with some power to check if the terminal is well connected to the cable).

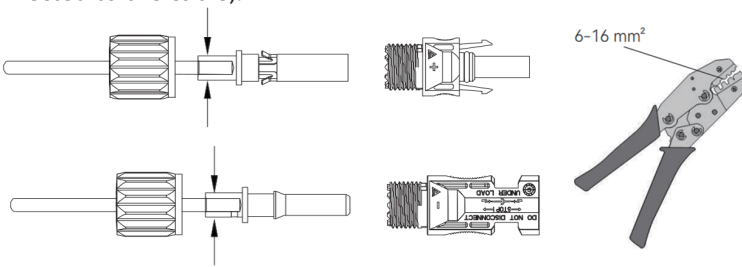


Figure 5-38

④ Insert the positive and negative cables into the corresponding positive and negative connectors, pull back the battery cable to ensure that the terminal is tightly attached in the connector.

⑤ Use an open-end wrench to screw the nut to the end to ensure that the terminal is well sealed.

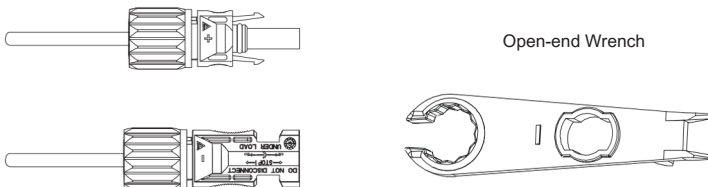


Figure 5-39



- ① Before making the battery connector, please make sure the polarity of the cable is correct.
- ② Use a multimeter to measure the voltage of the battery pack and make sure the voltage is within the inverter limitation and the polarity is correct.

⑥ Insert the positive and negative connector into the inverter battery terminals respectively, and a “click” sound represents the assembly in place.

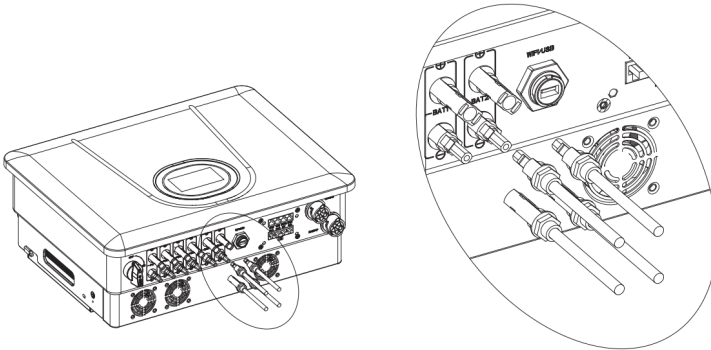


Figure 5-40

6 Commissioning

6.1 App Preparation

- ① Install the Local configuration App and Cloud monitoring App with latest version.
- ② Register an account on the Cloud monitoring App. If you have got the account and password from the distributor/installer, skip this step.

6.2 Inspection Before Commissioning

Check the following items before starting the inverter:

- ① All equipment has been reliably installed.
- ② DC switch and AC circuit breaker are in the "OFF" position.
- ③ The ground cable is properly and reliably connected.
- ④ The AC cable is properly and reliably connected.
- ⑤ The DC cable is properly and reliably connected.
- ⑥ The communication cable is properly and reliably connected.
- ⑦ The vacant terminals are sealed.
- ⑧ No foreign items, such as tools, are left on the top of the machine or in the junction box (if there is).
- ⑨ The AC circuit breaker is selected in accordance with the requirements of this manual and local standards.
- ⑩ All warning signs & labels are intact and legible.

6.3 Commissioning Procedure

If all of the items mentioned above meet the requirements, proceed as follows to start up the inverter for the first time.

- ① Turn on the AC breaker.
- ② Turn on the lithium battery switch. Power on the battery pack manually if a battery is equipped.
- ③ Turn on the DC switch, the DC switch may be integrated in the inverter or installed by the customer.
- ④ The inverter will work properly after turning on the DC and AC breakers on the condition the weather and grid meet requirements. The time for entering the operating mode may vary according to the chosen safety code.
- ⑤ Observe the LED indicator to ensure that the inverter operates normally.
- ⑥ After the inverter is started, please refer to the [QUICK USE GUIDE] which is attached to the access to configure the inverter.



NOTE

If the inverter does not work properly, check the country code and battery ID Settings.

- ① Select the safety code suitable for the country (region) where the inverter is installed at.
- ② Select the battery ID suitable for the battery is installed.



NOTE

CT AUTO TEST FUNCTION

Apollo hybrid inverter has the function of detecting the installation direction and phase sequence of CT. The system is installed, this function can be enabled on the APP for detection.



SOC RESET FUNCTION When the inverter is turned on for the first time, the battery will be automatically charged to calibrate the battery SOC. After the battery is charged, this function will be turned off automatically (If you confirm that it is not necessary, you can manually turn off the function. We recommend to enable this function.) If you need to calibrate the SOC during system use, you can manually enable the function to calibrate the battery SOC on app or inverter screen. After the battery is fully charged, the function is automatically disabled again.

6.4 Stop the Inverter

When turning off the inverter, please follow the steps below:

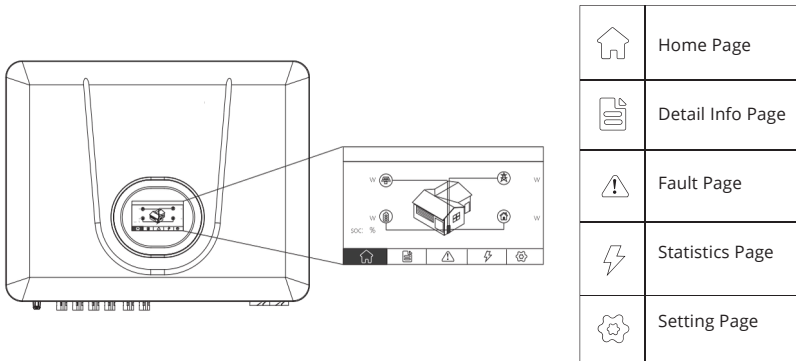
- ① First set "System Maint" to "Power off" through the system setting of the inverter setting page on the display.
- ② Disconnect the breakers on the grid and load side.
- ③ Turn off the battery switch, and disconnect the DC breaker on the battery side (if any).
- ④ Wait 30 seconds and then turn the inverter DC switch to the "OFF" position. At this time, there is remaining power in the inverter capacitor. Wait for 10 minutes until the inverter is completely de-energized before operating.
- ⑤ Disconnect the AC and DC cables.

7 Operation

When the inverter is turned on, the following interfaces will be displayed on the LCD display, and the LCD display allows the user to check various operation information and to modify the settings of the inverter.

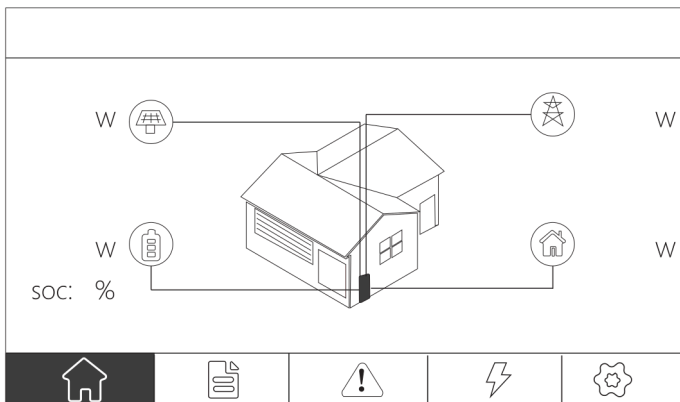
7.1 Local Interface Introduction

Apollo has a touch screen on the front of inverter.



7.2 Home Page





This page shows the total PV input power, AC grid power, battery power and SOC, load power.




7.3 Detail Info Page

7.3.1 PV Info Page





This page shows the voltage, current and power of four different PV inputs.


|     | | | | | | | |
|---|---|---------|---|---------|---|---------|---|
| PV1 | | PV2 | | PV3 | | PV4 | |
| Volt | V | Volt | V | Volt | V | Volt | V |
| Current | A | Current | A | Current | A | Current | A |
| Power | W | Power | W | Power | W | Power | W |



7.3.2 Grid Info Page

This page shows the voltage, current, power and frequency of AC grid.

|     | | | | | | | |
|---|----|---------|---|---------|---|---------|---|
| Phase A | | Phase B | | Phase C | | | |
| Volt | V | Volt | V | Volt | V | Volt | V |
| Current | A | Current | A | Current | A | Current | A |
| Power | W | Power | W | Power | W | Power | W |
| Freq | HZ | | | | | | |



7.3.3 Load Info Page

This page shows the voltage, current and power of the loads. Backup A\B\C is the load information of the inverter Back-up port, Bypass A\B\C is the load information of the ON-GRID port.

| Back-up A | | Back-up B | | Back-up C | |
|--------------------|---|-----------|---|-----------|---|
| Volt | V | Volt | V | Volt | V |
| Current | A | Current | A | Current | A |
| Power | W | Power | W | Power | W |
| Total Bypass Power | | | | | W |

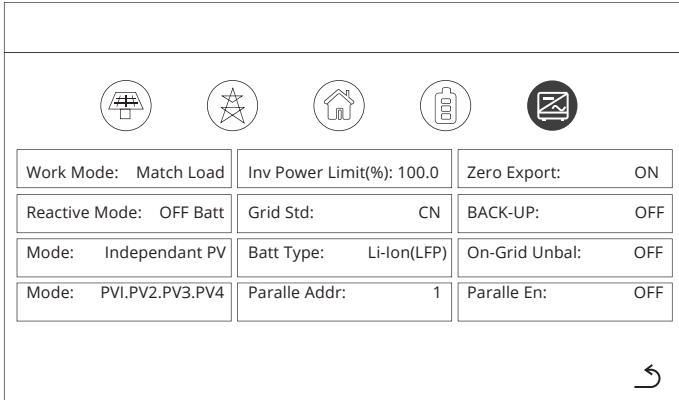
7.3.4 Battery Info Page

This page shows the voltage, SOC, temperature, current, power and charging/discharging limit of the Bat1\2.

| Battery1 | | | Battery2 | | |
|----------|---|--|----------|---|--|
| Volt | V | | Volt | V | |
| Current | A | | Current | A | |
| Power | W | | Power | W | |
| SOC | % | | SOC | % | |

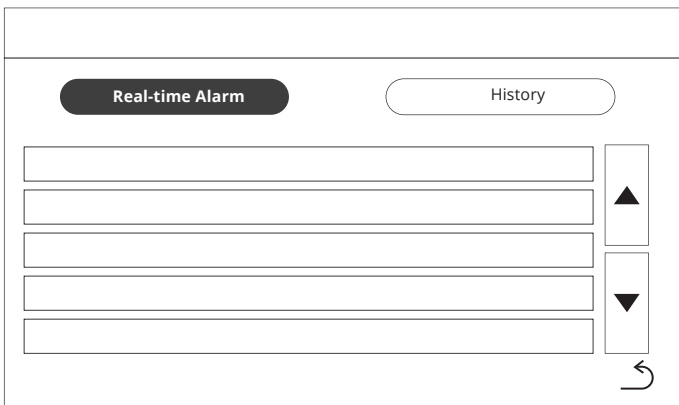
7.3.5 Inverter Info Page

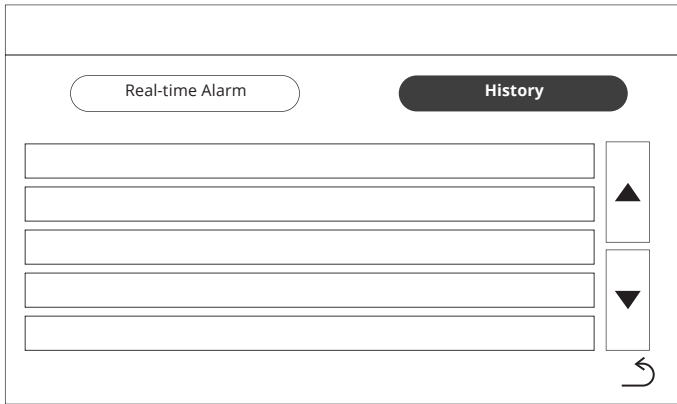
This page shows the basic main settings of the inverter.



7.4 Fault Page

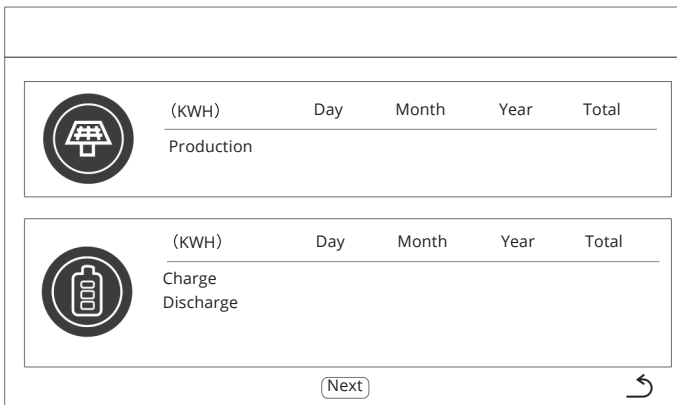
This page shows the real-time fault alarm and fault history of the storage unit.





7.5 Statistics Page

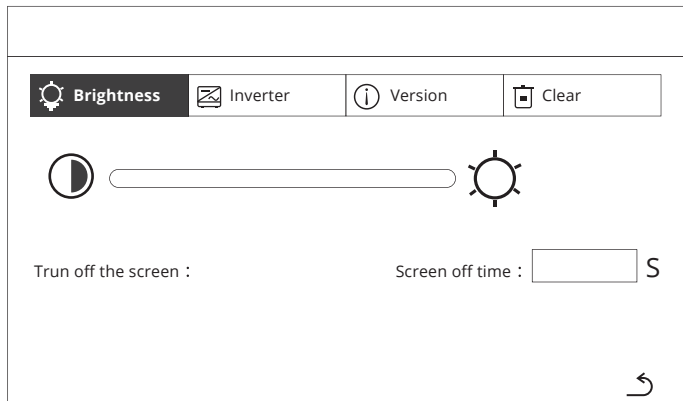
These two pages show statistics info of Grid, Battery, PV and Load.



7.6 Setting Page

7.6.1 Brightness Setting Page

This page shows the brightness setting and screen off time setting.

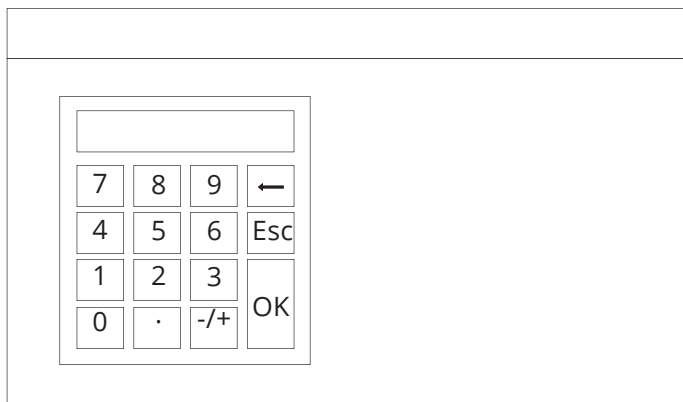


The value range is shown as below:

| Item | Description | Range |
|---------------------|---------------------------------|-----------|
| Brightness | the brightness of screen | Min - Max |
| Trun off the screen | make the screen to trun on/off | ON/OFF |
| Screen off time | the time to turn off the screen | 5 - 500 s |

7.6.2 Inverter Setting Page

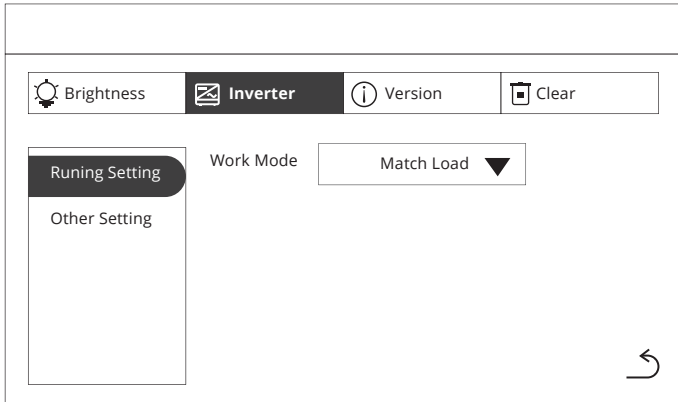
This page needs a password. The default password is "12345". Installer can change it in this menu.



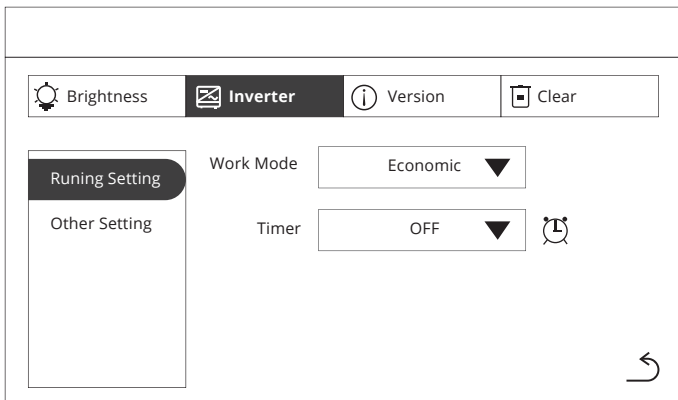
1) System Setting

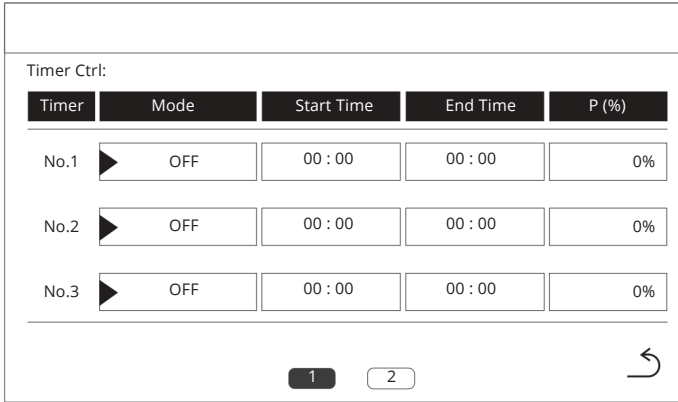
This page shows the work mode setting: Match Load Mode、Economic Mode、Peak Valley Mode、Backup Mode、Generators Mode.

1.1) Match Load Mode: This mode is the default working mode, mainly used for self-use.

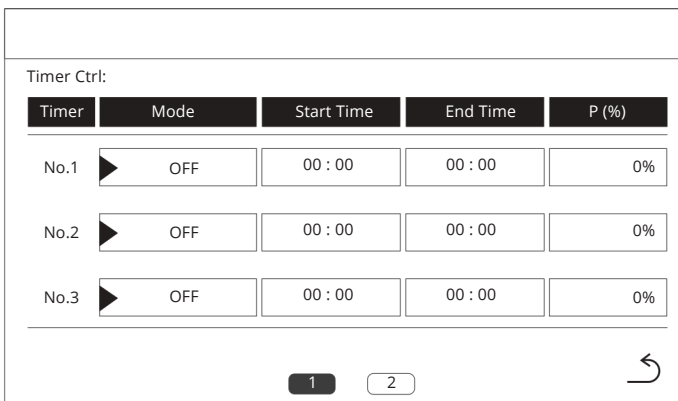
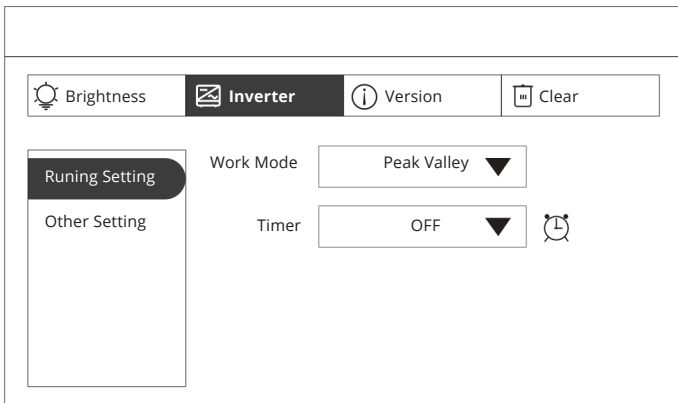


1.2) Economic Mode: This mode is also called timing match load mode. Choose the timer ON to enter the setup screen, then you have six time periods to set work mode including Match Load、PV.Grid.Charge、PV.Only. Only choosing PV.Grid.Charge mode, you should set the Power percentage.

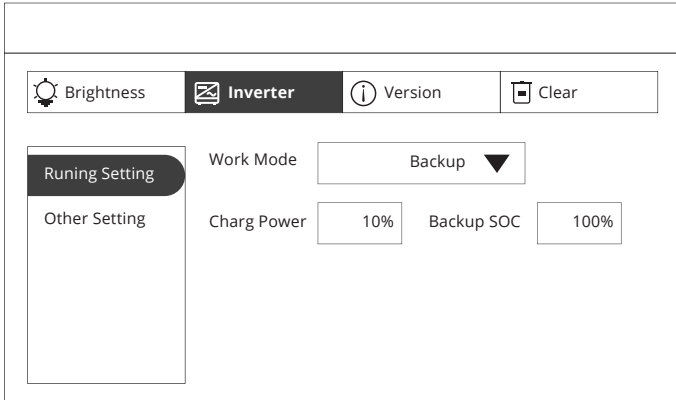




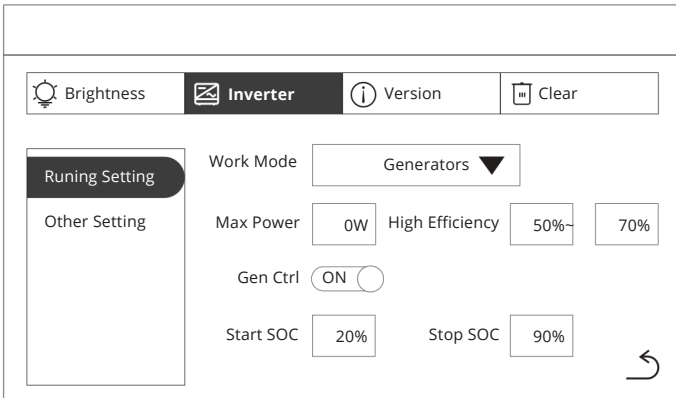
1.3) Peak Valley Mode: Choose the timer ON to enter the setup screen, then you have six time periods to set Charge or Discharge, including the working time and the Power percentage.



1.4) Backup Mode: The inverter will charge the battery to the cut-off point(Backup SOC) according to the set charge power percentage.

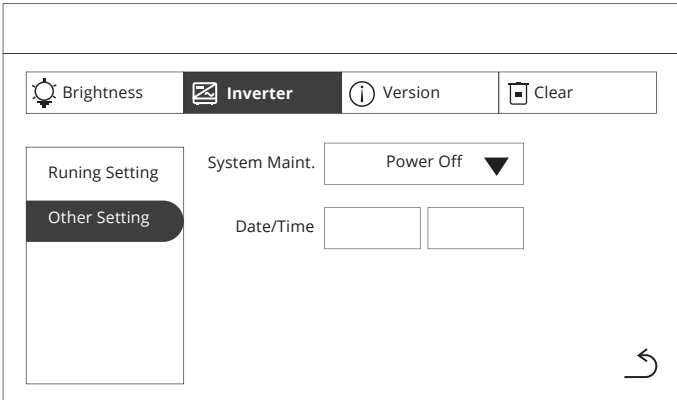


1.5) Generators Mode: The inverter has two working modes to control the generator. One is to set the generator max Power value, the lowest efficiency point and highest efficiency point. The other one is to set the Gen Ctrl ON/OFF, start working SOC and stop working SOC.



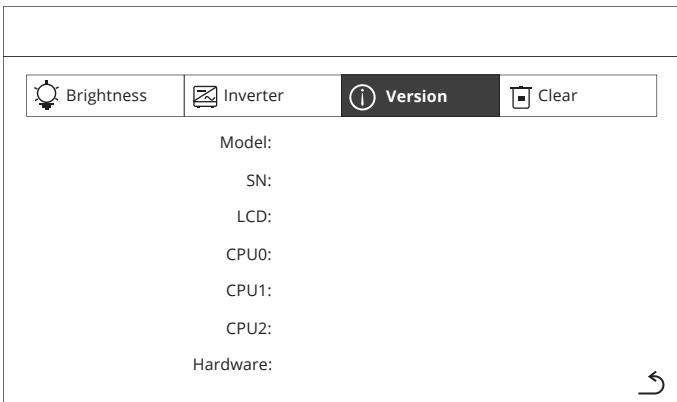
2) Other Setting

This page shows the System Maint, Date setting and Time setting.



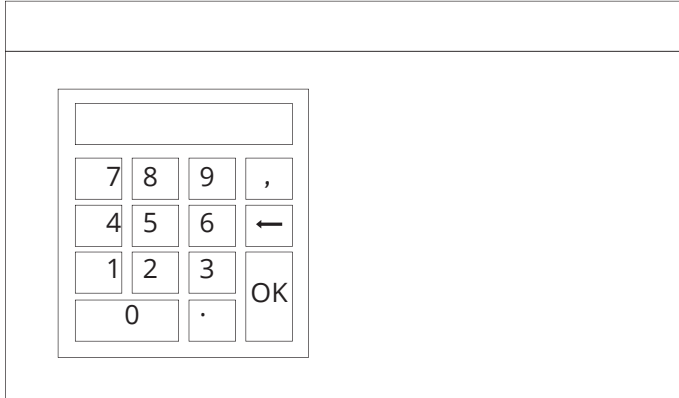
7.6.3 Version Page

This page shows the version and serial number of the inverter.

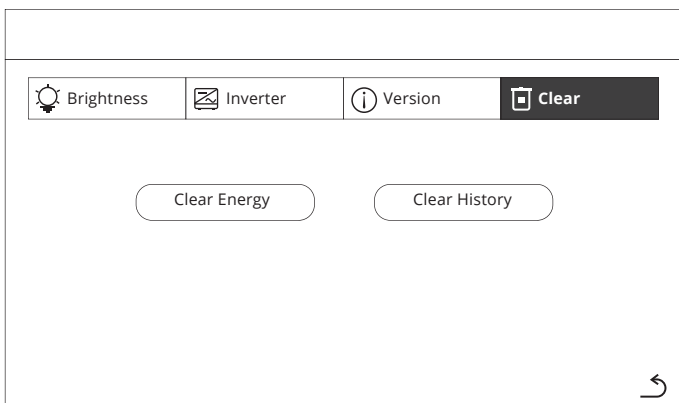


7.6.4 Clear Page

This page needs a password. The default password is "12345". Installer can change it in the inverter setting.



This page shows the clear options of the storage.



| Item | Description | Default Setting | Range |
|---------------|--------------------------------|-----------------|-----------|
| Clear Energy | Clean generation | - | Cancel/OK |
| Clear History | Clear historical alarm records | - | Cancel/OK |



NOTE

- All the data can not be restored after the clearance!

7.7 Start up the System

The system shall be turned ON in the correct sequence as follows:

- 1) Connect the battery, PV ,AC power cables and communication cables.
- 2) Turn ON the BAT switch of the batteries, Then press power button of the batteries to turn on batteries.
- 3) Turn ON the PV switch at the left side of the inverter.
- 4) Turn on external AC switch, and set "BACK-UP" to ON in the Running Setting menu, then select 'Power on' option in Other Setting menu on inverter screen or monitoring app to start inverter at the last.
- 5) If the system is running normal, please do commission configuration. If the system is not work normally, please re-check the wiring and setting until the system runs normal.
- 6) Set the details on the local screen.

7.8 Shut Down the System

System shall be turned OFF in the correct sequence as follows:

- 1) Select 'Power off' option on inverter screen or monitoring app to shut down inverter.
- 2) Turn off the external grid AC switch.
- 3) Turn off the PV switch at the left side of the inverter.
- 4) Press the POWER button of the battery.
- 5) Turn OFF the Battery switch of the batteries.

8 Troubleshooting

8.1 Error Message

Apollo series hybrid inverter is designed in accordance with grid operation standards, and conform to the requirements of safety and EMC. The inverter had passed a series of rigorous tests to ensure it runs sustainably and reliably before shipment. When a fault occurs, the corresponding error message will be shown on the LCD display, and in this case, the inverter might stop feeding into grid. The fault messages and their corresponding troubleshooting methods are listed below:

| Codes | Content | Explanation | Solution |
|-------|---------------------|---|--|
| 129 | Arm DC Commu. ERR | ARM failed to communicate with DC | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 130 | Arm AC Commu. ERR | ARM failed to communicate with AC | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 131 | Arm EEprom ERR | EEPROM failure | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 132 | Arm Init SPI ERR | SPI initialization failure | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 133 | Arm RTC ERR | RTC failure | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 134 | Arm SPI Commu. ERR | SPI communication failure | 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 135 | Arm Bat1 Commu. ERR | BAT1 communication failure | 1. Check whether the battery ID selection is correct. 2. Check whether the communication connection between inverter and BMS is reliable 3. Check the working status of battery. |
| 136 | Arm Bat2 Commu. ERR | BAT2 communication failure | 1. Check whether the battery ID selection is correct. 2. Check whether the communication connection between inverter and BMS is reliable 3. Check the working status of battery. |
| 137 | Arm Bat3 Commu. ERR | BAT3 communication failure | 1. Check whether the battery ID selection is correct. 2. Check whether the communication connection between inverter and BMS is reliable 3. Check the working status of battery. |
| 138 | Arm Bat4 Commu. ERR | BAT4 communication failure | 1. Check whether the battery ID selection is correct. 2. Check whether the communication connection between inverter and BMS is reliable 3. Check the working status of battery. |
| 139 | Bat Vol Above Set | The maximum charging voltage of the battery reaches the set value | 1 . Check the setting value |
| 140 | Bat Vol Below Set | The minimum battery discharge voltage reaches the set value | 1 . Check the setting value |
| 141 | Pv Offline Fault | PV off-grid fault | 1. Check whether the AC or BAT cable is correct and well connected. |
| 161 | Arm Fan1 Alarm | Fan 1 alarm | 1. Check whether the fan is blocked by foreign matters, clean them if necessary. |
| 162 | Arm Fan2 Alarm | Fan 2 alarm | 1. Check whether the fan is blocked by foreign matters, clean them if necessary. |
| 163 | Arm Fan3 Alarm | Fan 3 alarm | 1. Check whether the fan is blocked by foreign matters, clean them if necessary. |
| 164 | Arm Fan4 Alarm | Fan 4 alarm | 1. Check whether the fan is blocked by foreign matters, clean them if necessary. |
| 193 | GridUVP | Power Grid undervoltage | 1. Check whether the safety code is correct. 2. Check whether the AC cable wiring is correct. 3. Extend the voltage protection limit with the permission of the Electricity Authority. |
| 195 | GridUFP | Power Grid underfrequency | 1. Check whether the AC cable is correct and well connected. 2. Change to another country with wider protection range if it's allowed by the local electricity company. |
| 196 | GridOFP | Power Grid overfrequency | 1. Check whether the AC cable is correct and well connected. 2. Change to another country with wider protection range if it's allowed by the local electricity company. |

| | | | |
|-----|-----------------|--------------------------------------|---|
| 197 | VLvrtlow | Low voltage ride through failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 200 | HwBusUnb | Bus hardware imbalance | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 201 | InvOVP | Inverter over-voltage protection | <ol style="list-style-type: none"> 1. Check whether there is an impact load on the back-up side and whether the load power is too high. 2. Check whether back-up side is short circuit. |
| 202 | DciOCP | DCI overcurrent protection | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 203 | DcvOVP | DCV overvoltage protection | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 204 | AcRmsOCP | AC current overcurrent | <ol style="list-style-type: none"> 1. Check whether there is an impact load on the back-up side and whether the load power is too high. 2. Check whether back-up side is short circuit. |
| 205 | HwLoadOCP | Load hardware overcurrent | <ol style="list-style-type: none"> 1. Check whether there is an impact load on the back-up side and whether the load power is too high. 2. Check whether back-up side is short circuit. |
| 206 | HwInvOCP | INV hardware overcurrent | <ol style="list-style-type: none"> 1. Check whether there is an impact load on the back-up side and whether the load power is too high. 2. Check whether back-up side is short circuit. |
| 207 | HwADFaultDCV | DCV sampling failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 208 | HwADFaultInv | INV current sampling hardware fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 209 | HwADFaultGrid | Grid current sampling hardware fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 210 | HwADFaultDCI | DCI sampling hardware failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 211 | HwADFault_VGRID | Grid voltage sampling hardware fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 212 | HwADFault_GFCI | GFCI sampling failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Check whether the PV panels, cables, and connectors are waterlogged or damaged. 3. Seek help from the installer or manufacture. |
| 213 | HwRChipFault | The slave port failed | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 214 | HwADFaultLoad | Load current sampling fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 215 | HwADFaultVLoad | Load voltage sampling fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 216 | HwADFaultVInv | INV voltage sampling fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 217 | GFCIFault | GFCI failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Check whether the PV panels, cables, and connectors are waterlogged or damaged. 3. Seek help from the installer or manufacture. |
| 218 | GFCIDeviceFault | GFCI equipment failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Check whether the PV panels, cables, and connectors are waterlogged or damaged. 3. Seek help from the installer or manufacture. |
| 219 | BusUVP | Bus undervoltage | <ol style="list-style-type: none"> 1. Check whether the battery voltage or PV input voltage is normal |
| 220 | BusOVP | Bus overvoltage | <ol style="list-style-type: none"> 1. Check whether the input voltage exceeds the limit. 2. Restart the inverter. 3. Seek help from the installer or manufacture. |
| 221 | VbusUnbalance | Bus is unbalanced | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 222 | BusUpFail | BUS soft start failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 223 | SwOCPInstant | INV software overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |

| | | | |
|-----|-----------------------|---------------------------------------|---|
| 224 | HwSpdHappen | Hardware Lightning protection failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 225 | PvOVP | PV overvoltage | <ol style="list-style-type: none"> 1.Reduce the number of PV panels to make sure that the open-circuit voltage of each string is lower than the inverter maximum allowed input voltage. |
| 226 | IpvUnbalance | PV current uneven current | <ol style="list-style-type: none"> 1.Check that the PV is fully connected. 2. Restart the inverter. 3. Seek help from the installer or manufacture. |
| 227 | BatOVP | Bat overvoltage | <ol style="list-style-type: none"> 1. Check working status of battery. 2. Check if battery is alarming. |
| 228 | IbatUnbalance | The current of the battery is uneven | <ol style="list-style-type: none"> 1.Check that the BAT is fully connected. 2. Restart the inverter. 3. Seek help from the installer or manufacture. |
| 229 | PVUVP | PV undervoltage | <ol style="list-style-type: none"> 1.Reduce the number of PV panels to make sure that the open-circuit voltage of each string is lower than the inverter maximum allowed input voltage. |
| 230 | BatUVP | Bat undervoltage | <ol style="list-style-type: none"> 1. Check working status of battery. 2. Check if battery is alarming. |
| 231 | PVInModeSetFault | Error setting PV input mode | <ol style="list-style-type: none"> 1.Check that the PV input mode is set correctly. 2. Seek help from the installer or manufacture. |
| 232 | BATInModeSetFault | Error setting BAT input mode | <ol style="list-style-type: none"> 1.Check that the BAT input mode is set correctly. 2. Seek help from the installer or manufacture. |
| 233 | HwPv1Ocp | PV1 hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 234 | HwPv2Ocp | PV2 hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 235 | HwBat1Ocp | BAT1 hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 236 | HwBat2Ocp | BAT2 hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 237 | HwBusOcp | BUS hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 238 | HwBusOvp | BUS hardware overvoltage | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 239 | HwDcOcp | DC hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 240 | HwAcOcp | AC hardware overcurrent | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 241 | CnsistntFau_VGrid | Grid Voltage consistency failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 242 | ConsistentFault_FGrid | Grid Frequency consistency failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek help from the installer or manufacture. |
| 243 | ConsistentFault_DCI | DCI conformance failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 244 | CnsistntFault_GfCI | GfCI conformance failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 245 | SpiCommLose | SPI failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2.Seek for help from the installer or manufacture. |
| 246 | SciCommLose | SCI failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2.Seek for help from the installer or manufacture. |
| 247 | RecoverRelayFail | Recoverable relay failure | <ol style="list-style-type: none"> 1. Use multimeter to measure the voltage between N&PE cable on AC side. If the voltage is higher than 10V, which means the neutral or ground connection is abnormal. 2. restart the inverter. 3. Seek help from the installer or manufacture. |
| 248 | PvisoFault | ISO failure | <ol style="list-style-type: none"> 1. Check whether PV panels, cables, and connectors are waterlogged or damaged. 2. Seek help from the installer or manufacture. |

| | | | |
|-----|---------------------------|--|--|
| 249 | OTAmb | Ambient Over-temperature | <ol style="list-style-type: none"> 1. Check whether the inverter installation location is well ventilated. 2. Try to turn it off for a while, and then power it back on when it cools down. 3. Seek help from the installer or manufacture. |
| 250 | OTInv | INV Over-temperature | <ol style="list-style-type: none"> 1. Check whether the inverter installation location is well ventilated. 2. Try to turn it off for a while, and then power it back on when it cools down. 3. Seek help from the installer or manufacture. |
| 251 | OTBoost | PV Over-temperature | <ol style="list-style-type: none"> 1. Check whether the inverter installation location is well ventilated. 2. Try to turn it off for a while, and then power it back on when it cools down. 3. Seek help from the installer or manufacture. |
| 252 | OTBid | Bat Over-temperature | <ol style="list-style-type: none"> 1. Check whether the inverter installation location is well ventilated. 2. Try to turn it off for a while, and then power it back on when it cools down. 3. Seek help from the installer or manufacture. |
| 253 | BatSSFault | Bat soft-start relay failure | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 257 | unrecoverBusOVP | Bus overvoltage permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 258 | unrecoverVbusUnbalance | Bus voltage unbalance permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 259 | unrecoverIpvUnbalance | PV current unbalance permanent fault in parallel mode | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 260 | unrecoverIbatUnbalance | BAT current unbalance permanent fault in parallel mode | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 261 | unrecoverOCPInstant | INV overcurrent permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 262 | unrecoverBusSoftOCP | Bus software overcurrent permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 263 | unrecoverPvSoftOCP | PV software overcurrent permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 264 | unrecoverBatSoftOCP | BAT software overcurrent permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 267 | unrecoverEEPROM_R | IIC reading permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 268 | unrecoverEEPROM_W | IIC write permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 269 | unrcvryRelayFault | AC relay permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |
| 270 | unrcvryPhaseSequenceFault | AC phase permanent fault | <ol style="list-style-type: none"> 1. Restart the inverter. 2. Seek for help from the installer or manufacture. |

8.2 Inverter Maintenance



DANGER

Incorrect operation do cause the risk of inverter damage or personal injury. Please strictly follow the steps below.

- ① select 'Power off' option on inverter screen or monitoring app to shut down inverter.
- ② Turn off the AC breaker on utility grid side.
- ③ Turn off inverter DC switch.
- ④ Turn off the battery switch, and disconnect the DC breaker on the battery side (if any).
- ⑤ Wait for 10 minutes to ensure the energy of capacitor is fully dissipated.
- ⑥ Confirm all the indicator lights are off.



CAUTION

Keep unprofessional person away. A temporary alarm sign or barrier must be posted to keep unprofessional person away while performing electrical connection and maintenance.



NOTICE

Any Arbitrary replacement of internal components is forbidden. Please seek help from SR Portables for maintenance support. Otherwise, we will not take any responsibility.



NOTE

Please remember not to do the self-maintenance before being familiar with the proper instruction of the whole process.

| Items | Methods | Period |
|-----------------------|--|------------------|
| System clean | Check dust or foreign matter on the heat-sink, air inlet and outlet. | Once 6-12 months |
| Electrical connection | Check whether the cables are in good connection. | Once 6-12 months |
| Sealing | Check whether all the terminals and ports are properly sealed. Reseal the cable hole if it is aging or not sealed. | Once a year |

8.3 Battery Maintenance

Installation and maintenance of batteries should be performed or supervised with professional knowledge about batteries.

Please contact your battery supplier for detailed installation and maintenance information.



Do not dispose battery in fire, or it may explode.

Do not dismantle or break the battery. The electrolyte inside would be harmful to your body.



The battery has risk of electrical shock, the following scenario should be noticed during the operation.

- a) Remove metal items from your body.
- b) Use insulated tools.
- c) Remove metal items from battery.
- d) Turn off the DC breaker of the battery before assembling or disassembling battery terminals.
- e) There is a risk of electrical shock if battery is unexpectedly grounded. Remove the grounding cable to avoid the electrical shock.

9 Appendix

9.1 Technical Parameters

| Model | 5K | 8K |
|---|---------------------------------|---------------------------------|
| PV Input | | |
| Start-up voltage (V) | 135 | 135 |
| Max. DC input voltage (V)* | 1000* | 1000* |
| Rated DC input voltage (V) | 600 | 600 |
| MPPT voltage range (V)* | 120-960* | 120-960* |
| No. of MPP trackers | 2 | 4 |
| No. of DC inputs per MPPT | 1/1 | 1/1/1/1 |
| Max. input current (A) | 18/18 | 18/18/18/18 |
| Max. short-circuit current (A) | 25/25 | 25/25/25/25 |
| Battery Side | | |
| Battery type | Lithium Battery (with BMS) | |
| Battery communication mode | CAN | CAN |
| Battery voltage range (V) | 135-750 | 135-750 |
| No. of battery input | 1 | 2 |
| Maximum charging current (A) | 25 | 25/25 |
| Maximum discharge current (A) | 25 | 25/25 |
| Grid Side | | |
| Rated output power (kW) | 5 | 8 |
| Max. output power (kW) | 5.5 | 8.8 |
| Rated output apparent power (kVA) | 5 | 8 |
| Max. output apparent power (kVA) | 5.5 | 8.8 |
| Max. input apparent power (kVA) | 10 | 16 |
| Max. charging power of battery (kW) | 5 | 8 |
| Rated AC voltage (V) | 3L/N/PE, 220/380V, 230/400V | 3L/N/PE, 220/380V, 230/400V |
| Rated AC frequency (Hz) | 50/60 | 50/60 |
| Rated output current (A) | 7.6 | 12.1 |
| Max. output current (A) | 8.3 | 13.3 |
| Max. input current (A) | 15.2 | 24.2 |
| Power factor | 0.8 leading ... 0.8 lagging | 0.8 leading ... 0.8 lagging |
| Max. total harmonic distortion | <3% @Rated output power | <3% @Rated output power |
| DCI | <0.5%ln | <0.5%ln |
| Back-up Side | | |
| Rated output power (kW) | 5 | 8 |
| Max. output power (kW) | 5.5 | 8.8 |
| Rated output apparent power (kVA) | 5 | 8 |
| Max. output apparent power (kVA) | 5.5 | 8.8 |
| Rated output current (A) | 7.6 | 12.1 |
| Max. output current (A) | 8.3 | 13.3 |
| UPS switching time | <10ms | <10ms |
| Rated output voltage (V) | 3/N/PE, 220/380V, 230/400V | 3/N/PE, 220/380V, 230/400V |
| Rated output frequency (Hz) | 50/60 | 50/60 |
| Peak output apparent power (kVA) | 10, 60s | 16, 60s |
| Voltage harmonic distortion | <3% @Linear load | <3% @Linear load |
| Efficiency | | |
| Max. efficiency | 98.10% | 98.20% |
| European efficiency | 97.30% | 97.40% |
| Protection | | |
| DC reverse polarity protection | Integrated | Integrated |
| Battery input reverse connection protection | Integrated | Integrated |
| Insulation resistance protection | Integrated | Integrated |
| Surge protection | Integrated | Integrated |
| Over-temperature protection | Integrated | Integrated |
| Residual current protection | Integrated | Integrated |
| Islanding protection | Integrated (Frequency shift) | Integrated (Frequency shift) |
| AC over-voltage protection | Integrated | Integrated |
| Overload protection | Integrated | Integrated |
| AC short-circuit protection | Integrated | Integrated |
| General Data | | |
| Over voltage category | PV: II ; Main: III | PV: II ; Main: III |
| Dimensions (mm) | 500*450*180(W*H*D) | 570*450*200(W*H*D) |
| Weight (KG) | 25 | 34 |
| Protection degree | IP65 | IP65 |
| Standby self-consumption (W) | <15 | <15 |
| Topology | Transformerless | Transformerless |
| Operating Temperature Range (°C) | -30~60 | -30~60 |
| Relative Humidity (%) | 0~100 | 0~100 |
| Operating Altitude (m) | 3000 (>3000m derating) | 3000 (>3000m derating) |
| Cooling | Natural Convection | Natural Convection |
| Noise Level (dB) | <25 | <25 |
| Display | LCD | LCD |
| Communication | CAN, RS485, WiFi/LAN (Optional) | CAN, RS485, WiFi/LAN (Optional) |

| Model | 10K | 12K | 15K | 20K |
|---|---------------------------------|-------------|------------------------------|-------------|
| PV Input | | | | |
| Start-up voltage (V) | 135 | 135 | 135 | 135 |
| Max. DC input voltage (V)* | 1000* | 1000* | 1000* | 1000* |
| Rated DC input voltage (V) | 600 | 600 | 600 | 600 |
| MPPT voltage range (V)* | 120-960* | 120-960* | 120-960* | 120-960* |
| No. of MPP trackers | 4 | 4 | 4 | 4 |
| No. of DC inputs per MPPT | 1/1/1/1 | 1/1/1/1 | 1/1/1/1 | 1/1/1/1 |
| Max. input current (A) | 18/18/18/18 | 18/18/18/18 | 18/18/18/18 | 18/18/18/18 |
| Max. short-circuit current (A) | 25/25/25/25 | 25/25/25/25 | 25/25/25/25 | 25/25/25/25 |
| Battery Side | | | | |
| Battery type | Lithium Battery (with BMS) | | Lithium Battery (with BMS) | |
| Battery communication mode | CAN | CAN | CAN | CAN |
| Battery voltage range (V) | 135-750 | 135-750 | 135-750 | 135-750 |
| No. of battery input | 2 | 2 | 2 | 2 |
| Maximum charging current (A) | 25/25 | 25/25 | 25/25 | 25/25 |
| Maximum discharge current (A) | 25/25 | 25/25 | 25/25 | 25/25 |
| Grid Side | | | | |
| Rated output power (kW) | 10.0 | 12.0 | 15.0 | 20.0 |
| Max. output power (kW) | 11.0 ^① | 13.2 | 16.5 ^② | 22.0 |
| Rated output apparent power (kVA) | 10.0 | 12.0 | 15.0 | 20.0 |
| Max. output apparent power (kVA) | 11.0 ^③ | 13.2 | 16.5 ^④ | 22.0 |
| Max. input apparent power (kVA) | 20 | 24 | 30.0 | 30.0 |
| Max. charging power of battery (kW) | 10.0 | 12.0 | 15.0 | 20.0 |
| Rated AC voltage (V) | 3LN/PE, 220/380V; 230/400V | | 3LN/PE, 220/380V; 230/400V | |
| Rated AC frequency (Hz) | 50/60 | 50/60 | 50/60 | 50/60 |
| Rated output current (A) | 15.1 | 18.2 | 22.7 | 30.3 |
| Max. output current (A) | 16.7 ^⑤ | 20.0 | 25.0 ^⑥ | 33.3 |
| Max. input current (A) | 30.3 | 36.4 | 45.5 | 45.5 |
| Power factor | 0.8 leading ...0.8 lagging | | 0.8 leading ...0.8 lagging | |
| Max. total harmonic distortion | <3% @Rated output power | | <3% @Rated output power | |
| DCI | <0.5%In | <0.5%In | <0.5%In | <0.5%In |
| Back-up Side | | | | |
| Rated output power (kW) | 10.0 | 12.0 | 15.0 | 20.0 |
| Max. output power (kW) | 11.0 | 13.2 | 16.5 | 22.0 |
| Rated output apparent power (kVA) | 10.0 | 12.0 | 15.0 | 20.0 |
| Max. output apparent power (kVA) | 11.0 | 13.2 | 16.5 | 22.0 |
| Rated output current (A) | 15.1 | 18.2 | 22.7 | 30.3 |
| Max. output current (A) | 16.7 | 20.0 | 25.0 | 33.3 |
| UPS switching time | <10ms | <10ms | <10ms | <10ms |
| Rated output voltage (V) | 3N/PE, 220/380V; 230/400V | | 3LN/PE, 220/380V; 230/400V | |
| Rated output frequency (Hz) | 50/60 | 50/60 | 50/60 | 50/60 |
| Peak output apparent power (kVA) | 20, 60s | 20, 60s | 25, 60s | 25, 60s |
| Voltage harmonic distortion | <3% @Linear load | | <3% @Linear load | |
| Efficiency | | | | |
| Max. efficiency | 98.2% | 98.2% | 98.4% | 98.4% |
| European efficiency | 97.4% | 97.4% | 97.5% | 97.5% |
| Protection | | | | |
| DC reverse polarity protection | Integrated | | Integrated | |
| Battery input reverse connection protection | Integrated | | Integrated | |
| Insulation resistance protection | Integrated | | Integrated | |
| Surge protection | Integrated | | Integrated | |
| Over-temperature protection | Integrated | | Integrated | |
| Residual current protection | Integrated | | Integrated | |
| Islanding protection | Integrated (Frequency shift) | | Integrated (Frequency shift) | |
| AC over-voltage protection | Integrated | | Integrated | |
| Overload protection | Integrated | | Integrated | |
| AC short-circuit protection | Integrated | | Integrated | |
| General Data | | | | |
| Over voltage category | PV: II ; Main: III | | PV: II ; Main: III | |
| Dimensions (mm) | 570*450*200(W*H*D) | | 570*450*200(W*H*D) | |
| Weight (KG) | 34 | 34 | 38 | 38 |
| Protection degree | IP65 | IP65 | IP65 | IP65 |
| Standby self-consumption (W) | <15 | <15 | <15 | <15 |
| Topology | Transformerless | | | |
| Operating Temperature Range (°C) | -30~60 | -30~60 | -30~60 | -30~60 |
| Relative Humidity (%) | 0~100 | 0~100 | 0~100 | 0~100 |
| Operating Altitude (m) | 3000 (>3000m derating) | | | |
| Cooling | Natural Convection | | Smart Fan | |
| Noise Level (dB) | <25 | <25 | <25 | <25 |
| Display | LCD | | | |
| Communication | CAN, RS485, WIFI/LAN (Optional) | | | |

9.2 Contact Information

Should you have any question about this product, please contact us.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Date of the device
- Fault code/name
- Brief description of the problem