

HYBRID INVERTER

USER MANUAL

**MODEL NUMBER:
M1-S(3-6)K**



Warning notices: Before using this product, please read this manual carefully and keep it for future reference. The design and specifications are subject to change without prior notice for product improvement. Consult with your dealer or manufacturer for details. The diagram above is just for reference. Please take the appearance of the actual product as the standard.

THANK YOU LETTER

Thank you for choosing Midea! Before using your new Midea product, please read this manual thoroughly to ensure that you know how to operate the features and functions that your new appliance offers in a safe way.

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1. ABOUT THIS MANUAL

This manual contains important safety information that must be observed during installation and maintenance of the device.

Carefully read this manual before use and retain it for future reference!

This manual must be treated as an integral component of the device. The manual must be kept in close proximity to the device, including when it is handed over to another user or moved to a different location.

1.1 Structure of the manual

This manual contains important safety and installation instructions that must be observed during installation and maintenance of the device.

1.2 Scope

This product manual describes the installation, electrical connection, commissioning, maintenance and fault elimination procedures of the Hybrid Inverter.

1.3 Target group

This manual is intended for specialist electrical engineers who are responsible for the installation and commissioning of the inverter in the PV Storage system, as well as the PV Storage system operators.

1.4 Symbols used

This manual contains information on safe operation and uses symbols to ensure the safety of persons and property as well as the efficient operation of the inverter. Please read through the following symbol explanations carefully in order to prevent injury or property damage.

DANGER

Non-observance will result in death or serious injury.

- Follow the warnings in order to prevent death or serious injury!

WARNING

Non-observance will result in death or serious injury.

- Follow the warnings in order to prevent serious injury!

CAUTION

Non-observance may result in minor injury.

- Follow the warnings in order to prevent injury!

ATTENTION

Non-observance may result in property damage!

- Follow the warnings in order to prevent damage to or destruction of the product.

NOTE

- Provides tips essential to the optimal operation of the product.

2. BASIC SAFETY INFORMATION

NOTE

If you have any questions or problems after reading the following information, please contact your installer.

This chapter details the safety information pertaining to the installation and operation of the device.

2.1 Safety information

Read and understand the instructions within this manual and familiarize yourself with the relevant safety symbols in this chapter before beginning with the installation of the device and eliminating any faults.

Before connecting to the power grid, you must obtain official authorization from the local power grid operator in accordance with the corresponding national and state requirements. Furthermore, operation may only be carried out by qualified electricians.

Please contact the nearest authorized service center if any maintenance or repairs are required. Please contact your dealer to obtain information about your nearest authorized service center. Do NOT carry out repairs on the device yourself; this may lead to injury or property damage.

Before installing the device or carrying out maintenance on it, you must open the DC switch in order to interrupt the DC voltage of the PV generator. You can also switch off the DC voltage by opening the DC switch in the generation junction box. Not doing this may result in serious injury.

2.1.1 Qualified personnel

Personnel tasked with the operation and maintenance of the device must have the qualifications, competence and experience required to perform the described tasks, while also being capable of fully understanding all instructions contained within the manual. For safety reasons, this inverter may only be installed by a qualified electrician who:

- has received training on occupational safety, as well as the installation and commissioning of electrical systems.
- is familiar with the local laws, standards and regulations of the grid operator.

The manufacturer assumes no responsibility for the destruction of property or any injuries to personnel caused by improper usage.

2.1.2 Installation requirements

Please install the inverter according to the information contained in the following section. Mount the inverter to a suitable object with a sufficient load-bearing capacity (e.g. walls, PV frames etc.) and ensure that the inverter is upright. Choose a suitable place for the installation of electrical devices. Ensure that there is sufficient space for an emergency exit which is suitable for maintenance. Ensure sufficient ventilation in order to guarantee an air circulation for the cooling of the inverter.

2.1.3 Transport requirements

The factory packaging is specifically designed to prevent transport damage, i.e. violent shocks, moisture and vibrations. However, the device must not be installed if it is visibly damaged. In this case, notify the responsible transport company immediately.

2.1.4 Labelling on the device

The labels must NOT be concealed by items and foreign objects (rags, boxes, devices, etc.); they must be regularly cleaned and kept clearly visible at all times.

2.1.5 Electrical connection

Observe all applicable electrical regulations when working with the Solar inverter.

DANGER

Dangerous DC voltage

- Before establishing the electrical connection, cover the PV modules using opaque material or disconnect the PV generator from the inverter. Solar radiation will cause dangerous voltage to be generated by the PV generator!

Danger through electric shock!

- All installations and electrical connections may only be carried out by trained electricians!

IMPORTANT

Authorization for grid feed-in

- Obtain authorization from the local power grid operator before connecting the inverter to the public power grid.

NOTE

Voiding of guarantee

- Do not open the inverter or remove any of the labels. Otherwise, the shall assume no guarantee.

2.1.6 Operation

DANGER

Dangerous voltage!

- Before carrying out any repair work, first switch off the AC circuit breaker between the inverter and power grid, and then the DC switch.
- After switching off the AC circuit breaker and the DC switch, wait a minimum of 5 minutes before starting any maintenance or repair work.

Electric shock

- Contact with the electrical grid or the device's terminals may result in an electric shock or fire!
- Do not touch the terminal or the conductor which is connected to the electrical grid.
- Follow all instructions and observe all safety documents that refer to the grid connection.

⚠ CAUTION

Burning due to hot housing

- While the inverter is being operated, several internal components will become very hot.
- Please wear protective gloves!
- Keep children away from the device!

2.1.7 Repair and maintenance

IMPORTANT

Unauthorized repairs!

- Following the elimination of any faults, the inverter should be fully functional once more. Should any repairs be required, please contact a local authorized service center.
- The internal components of the inverter must NOT be opened without the relevant authorization.
- The hardware and software after-sale service can be received from the authorized dealer. Software updates service will be available for warranty years from the manufacture date via the OTA(Over-The-Air) download technology. Please contact the authorized dealer in your region for detailed information.

2.2 Symbols and signs

⚠ CAUTION

Beware of burning hazards due to the hot housing!

- While the inverter is in operation, only touch the display and the buttons, as the housing can become hot.

ATTENTION

Implement Grounding!









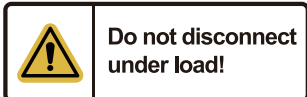
- The PV generator must be earthed in accordance with the requirements of the local power grid operator!
- For reasons of personal safety, we recommend that all PV module frames and inverters of the PV system are reliably earthed.

⚠ WARNING

Damage due to overvoltage

- Ensure that the input voltage does not exceed the maximum permissible voltage. Overvoltage may cause long-term damage to the inverter, as well as other damage that is not covered by the warranty!

Several symbols pertaining to safety can be found on the inverter. Please read and understand the content of these symbols before starting the installation.

symbols	Description
	Residual voltage is present in the inverter! Before opening the inverter, you should wait five minutes to ensure that the capacitor has been fully discharged.
	Caution! Danger through electric shock.
	Caution! Hot surface.
	Disconnect the inverter from all the external power sources before maintenance!
	The product is compliant with EU guidelines.
	Do not dispose of the inverter together with household waste.
	Please read the manual before installing the inverter.
	Grounding point.
	Do not remove the DC input connector or AC output connector when the inverter is running.

3. PRODUCT OVERVIEW

3.1 Product Introduction

The Hybrid Inverter is a Single-phase grid-tied PV string inverter with battery interfaces that converts the DC power generated by PV strings into AC power and feeds the power into the power grid.

Besides, hybrid inverters are applicable to both on-grid and off-grid PV systems, With the integrated energy management System (EMS), it can control and optimize the energy flow so as to maximize the self-consumption of PV system.

3.2 Appearance

The following figure shows the appearance of the inverter. The image shown here is for Reference only. The actual product received may differ.

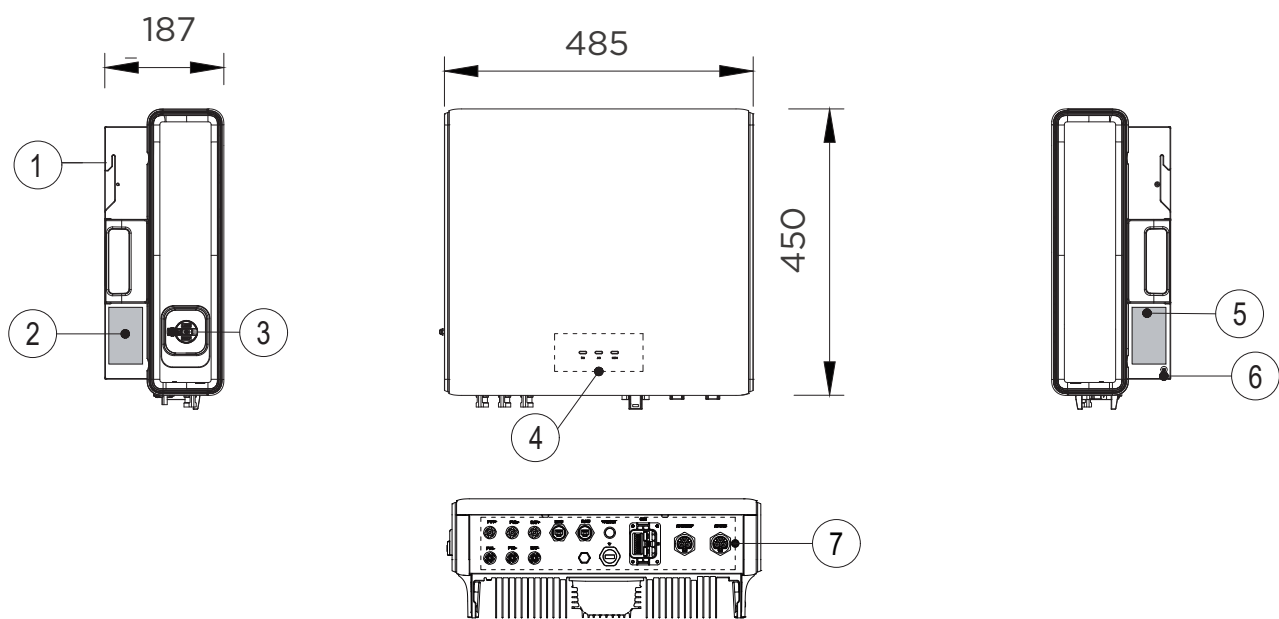


Figure 3-1 Inverter Appearance

Table 3-1 Appearance Description

NO.	Name	Description
1	Hanger Plate	To hang the inverter on the wall-mounting bracket.
2	Led Indicator Label	To explain the current working state of the inverter.
3	DC Switch	To safely disconnect the DC circuit whenever necessary.
4	Indicator	To indicate the current working state of the inverter.
5	Nameplate	To identify the product, including device model, S/N , important specifications, etc.
6	Grounding terminal	To connect system to earth.
7	Electrical connection area	PV terminals, battery terminal, AC terminal, additional grounding terminal and communication terminals.

3.3 LED indicators

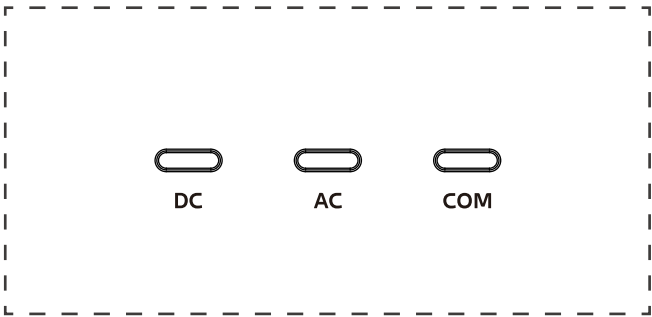


Figure 3-2 LED Panel

Table 3-2 Indicator Function Illustration

INDICATOR	COLOR	STATUS	EXPLANATION
D C	Green	Steady on	PV power available
	Yellow	Steady on	PV power not available/ too low
	Red	Steady on	Fault
	-	Off	System is power-off
A C	Green	Steady on	Inverter is operating
	Green	Blinking at long intervals (on for 1s and then off for 1s)	Inverter in standby in grid-tied mode
	Yellow	Steady on	Inverter is operating in off-grid mode
	Yellow	Blinking at long intervals (on for 1s and then off for 1s)	Inverter in standby in off-grid mode
	Red	Steady on	Fault
	-	Off	System is power-off
C O M	Green	Blinking at long intervals (on for 0.2s and then off for 0.2s)	Wireless waiting for connection
	Green	Blinking at long intervals (on for 1s and then off for 1s)	Establishing wireless connection
	G reen	Steady on	Wireless connected
	Yellow	Steady on	B luetooth connected
	-	Off	No wireless/bluetooth connected

3.4 PV Grid-connected System

3.4.1 Introduction

The following figure shows Hybrid inverter application in PV grid-connected System.

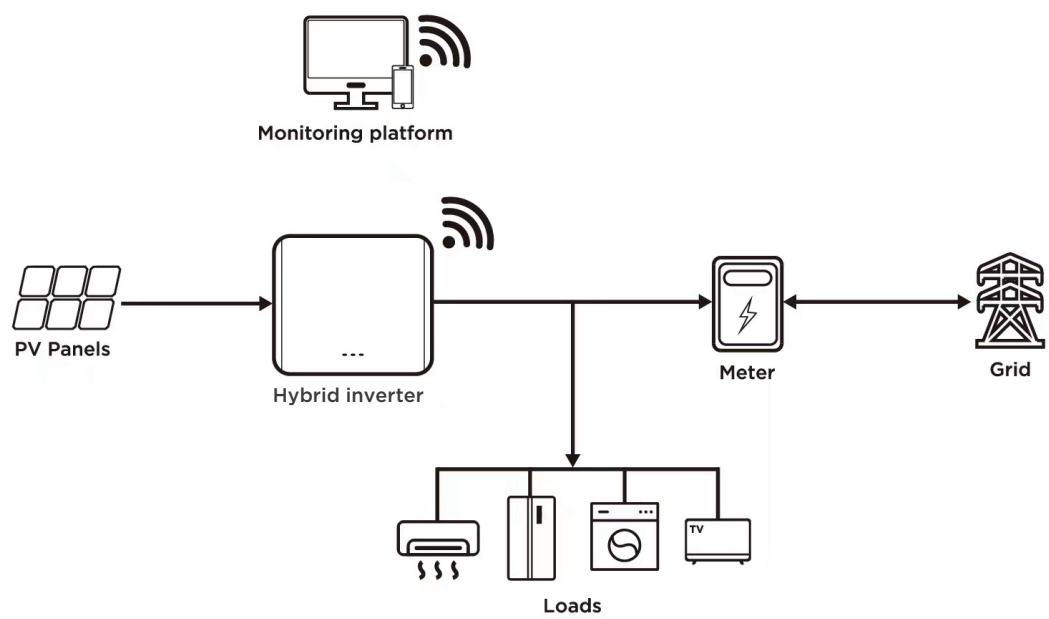


Figure 3-3 PV grid-connected System

ATTENTION

- Please be sure that the potential voltage between N and PE line is not higher than 30V, otherwise, inverter will stop generating power.
- The system cannot be used to supply emergency power through backup port.

3.4.2 Working mode

The Hybrid Inverter can work in standby, operating, or shutdown mode.

Table 3-3 Working model Illustration

Working mode	Description
Standby	<p>The Hybrid Inverter enters Standby mode when the external environment does not meet the operating requirements. In Standby mode:</p> <ul style="list-style-type: none">• The Hybrid Inverter continuously performs status check and enters the Operating mode once the operating requirements are met.• The Hybrid Inverter enters Shutdown mode after detecting a shutdown command or a fault after startup.
Operating	<p>In Operating mode:</p> <ul style="list-style-type: none">• The Hybrid Inverter converts DC power from PV strings into AC power and feeds the power to the power grid.• The Hybrid Inverter tracks the maximum power point to maximize the PV string output.• If Hybrid Inverter detects a fault or a shutdown command, it enters the Shutdown mode.• The Hybrid Inverter enters Standby mode after detecting that the PVstring output power is not suitable for connecting to the power grid for generating power.

Working mode	Description
Shutdown	<ul style="list-style-type: none"> • In Standby or Operating mode, the Hybrid Inverter enters Shutdown mode after detecting a fault or shutdown command. • In Shutdown mode, the Hybrid Inverter enters Standby mode after detecting a startup command or that the fault is rectified.

Table 3-3 Working model Illustration

3.5 PV Energy Storage System (PV ESS)

3.5.1 Introduction

By directly connecting a battery module to the inverter, the conventional PV system can be upgraded to be an PV Energy Storage System(PV ESS). The system is capable of operating off-grid to ensure an emergency power supply for protected loads in the event of a grid interruption or blackout, which may be caused by:

- islanding;
- under-voltage;
- under-frequency or over-frequency.

ATTENTION

- Only 2 or 3 battery packs can be connected to one battery cluster. please configuring as required.
- Under any connection, either grid-connection or off-grid application, please be sure that the potential voltage between N and PE line is not higher than 30V, otherwise, inverter will stop generating power.
- The system is not suitable for supplying life-sustaining medical devices. It cannot guarantee backup power in all circumstances. The PV generator must be earthed in accordance with the requirements of the local power grid operator!

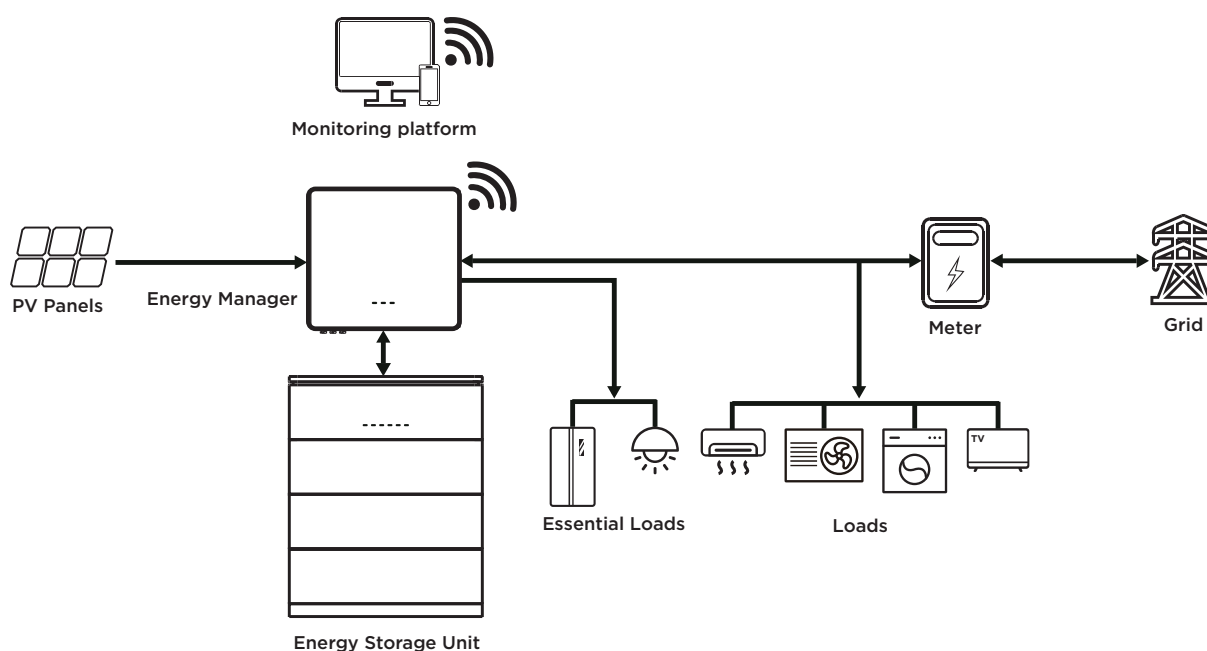


Figure 3-4 PV Energy Storage System

3.5.2 Declaration for Back-Up Function

The following statement involves general policies about the inverters described in this document.

1. For hybrid inverters, the electrical installation typically includes connection of the inverter to both PV modules and batteries. If there is no available power from batteries or PV modules in backup mode, the backup power supply will be automatically terminated. The inverters shall hold no liability for any consequences arising from failing to observe this instruction.

2. Normally, the Back-Up switching time is less than 3 s. However, some external factors may cause the system to fail on Back-Up mode. Therefore, the users must be aware of conditions and follow the instructions as below:

- Do not connect loads that are dependent on a stable energy supply for a reliable operation.
- Do not connect the loads whose total capacity is greater than the maximum Back-Up capacity.
- Do not connect the loads that may cause very high start-up current surges, such as nonfrequency conversion air conditioning, vacuum cleaner or half-wave loads such as hair dryer, heat gun, hammer drill. Refer to 3.5.3 The Compatibility for Backup under Off-grid Scenario" for recommended loads.
- 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.
- BACK-UP is not recommended if the PV system is not configured with batteries. Otherwise, the risk in system power usage is beyond the equipment manufacturer's warranty scope.
- When single overload protection occurs, the inverter can restart automatically; however, the restarting time will be extended if it happens several times.
- When the grid is disconnected, the off-grid function of the inverter will be closed automatically if the load capacity exceeds the inverter's rated power; to enable it, turn off the large loads and ensure the load power is less than the rated power of the inverter.

Declaration for Back-Up Overload Protection

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.

3.5.3 The Compatibility for Backup under Off-grid Scenario

The information below is about the compatibility for backup of Hybrid Inverter with energy storage unit under off-grid scenario. Please refer to this information before you use the back-up function of the inverter under off-grid situation.

Table 3-4 Recommended backup loads

Type	Load Power
Dust collector	1.3kW
Water heater/Kettle /Iron /Oven /Toaster /Geothermal blanket / Rice cooker	3 kW
Microwave oven	1.5kW
Refrigerator	1 kW
TV / Computer	1 Kw
Bath heater	2.5kW
Fluorescent / LED lights	1.3kW
Electric fan / Ceiling fan	2kW
Conditioner(frequency conversionmodulation)	1.5P

- The data of the compatibility for backup of Hybrid Inverter are based on the test with batteries (-20 ~ 55 °C, 5~100% SOC). For the actual application, please refer to the maximum output capacity of the battery used.

For those loads that not covered in this document, please contact your installer to make sure the compatibility of the specific loads under off-grid scenario. The manufacturer will not be held responsible for the usage of any load without confirmation. We will keep updating this document, please contact the manufacturer if there are any relevant issues.

3.5.4 Working modes

Mode1: Maximize Self-consumption

This mode is suitable for areas with high electricity tariff. When the PV power is sufficient, priority is given to the local load, and the excess electricity goes to energy storage, and if there is still energy left, it is sold to the grid. When the PV power is insufficient/there is no PV power, the battery is discharged for the local load, and when the battery discharge power and photovoltaic power can not meet the load demand, the insufficient power will be purchased from the grid.

Mode2: Maximize Feed-in

This mode is suitable for areas with high feed-in tariff. When the PV power is greater than the inverter capacity, the excess electricity will be stored by energy storage. When PV power is less than the inverter capacity, the excess electricity will be sold to the grid.

Mode3: Backup power

This mode is suitable for areas where grid outages occur frequently or to prevent grid outages. Reserved Backup SOC setting value can be adjusted, when battery SOC is less than reserved SOC value, battery can only be charged, until SOC reaches reserved value, the battery will be stopped charging; when SOC is larger than SOC setting value, battery will behave as Self-use mode.

Mode4: Charge and discharge schedule

This mode is suitable for areas with peaks and valleys in electricity prices Battery charging period and discharging period can be set, during charging period, battery can only be charged, while in discharging period, battery can only be discharged, the rest of the period, battery will behave as Self-use mode.

Mode5: Peak shaving

This function is to avoid exceeding peak kW limit from grid, by dynamically overriding the max kW limit on the battery. Users can set the peak kW value.

NOTE

- If there is no power from PV, The inverter will take power from grid firstly.so it is normal that you will find 20-50W power from grid when the inverter is on standby mode.
- The battery discharges to provide energy to loads. If the battery is empty or there is not enough power from the battery system, the grid shall supply power to backup loads and normal loads.
- If the smart meter is abnormal or not equipped, the inverter will run normally, however, the battery can be charged but not allowed to discharge. In this case the feed-in limitation setting will be inactive.

4. FUNCTION DESCRIPTION

4.1 Protection

Several protective functions are integrated in the inverter, including short circuit protection, grounding insulation resistance surveillance, residual current protection, anti-islanding protection, DC overvoltage / over-current protection, etc.

4.2 Energy Conversion and Management

The inverter converts the DC power from the PV array or the battery to the AC power, in conformity with the grid requirements. It also transmits the DC power from the PV panel to the battery. With the bidirectional converter integrated inside, the inverter can charge or discharge the battery. Multiple string MPP trackers are used to maximize the power from PV strings with different orientations, tilts, or module structures.

4.2.1 Power Deration

Power deration is a way to protect the inverter from overload or potential faults. In addition, the deration function can also be activated following the requirements of the utility grid. Situations requiring inverter power deration are:

- over-temperature (including ambient temperature and module temperature)
- high input voltage
- grid under-voltage
- grid over-frequency
- power factor (when values out of the rated values)
- high altitude

4.2.2 Regular Operational Voltage Range

The inverters can operate within the allowable voltage range for at least the specified observation time. The setting of the conditions depends on whether the connection is due to a normal operational start-up or an automatic reconnection after tripping of the interface protection. When the voltage level is out of the operational levels, the inverter will disconnect from the grid within the protection time. If a disturbance lasts less than the required protection time, the inverter can reconnect to the grid once the voltage level goes back to normal levels after the disturbance.

4.2.3 Regular Operational Frequency Range

The inverter can operate within its frequency range for at least the specified observation time. The setting of conditions depends on whether the connection is due to a normal operational start-up or an automatic reconnection after tripping of the interface protection. When the frequency level is outside the operational levels, the inverter will disconnect from the grid. If a disturbance lasts less than the required protection time, the inverter can reconnect to the grid once the frequency level goes back to normal levels after the disturbance.

4.2.4 Reactive Power Regulation

The inverter is capable of operating in reactive power regulation modes for the purpose of providing support to the grid. The reactive power regulation mode can be set via the App.

4.2.5 Load Control

The inverter has an integrated multiple-function dry-contact (DO relay), which can be used for load control via a contactor.

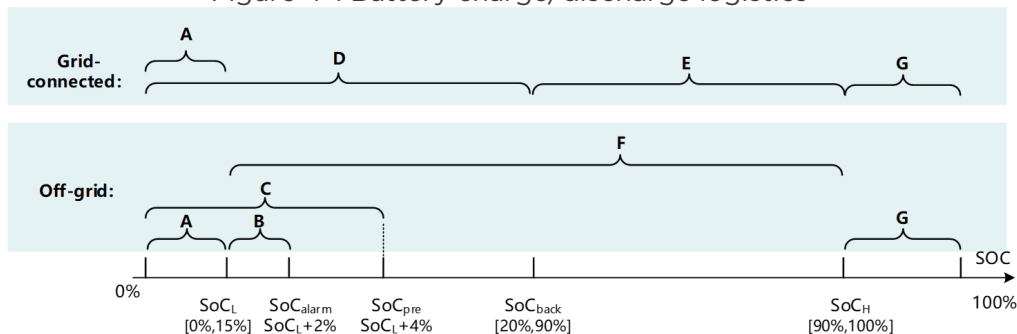
4.3 Battery Management

The maximum allowable charge/discharge current is limited to the smaller value among the following:

- Temperature;
- the maximum power of inverter;
- the maximum / recommended charge/discharge current from the battery manufacturer.

For this reason, the battery charge power may not reach the nominal power.

Figure 4-1 Battery charge/discharge logistics



The inverter cannot respond to discharge/charge command when operating off-grid.

Table 3-3 Battery management behavior

Range	Battery management behavior
A	In this range, the battery is no longer discharged, even in battery-backup operation. SoCL can be set from 0 to 15% in APP. See 8.4 APP commissioning.
B	When operating off grid, the system reports the low SoC state.
C	When starting up in off -grid condition, the system does not output AC power, so as to charge the battery by all PV power.
D	When operating grid-connected, the system charges / discharges the battery for PV power economy. SoCback can be set from 20 to 90% in APP. See 8.4 APP commissioning.
E	When operating grid-connected, the system charges / discharges the battery for PV power economy.
F	When operating off -grid, the system charges / discharges the battery to support the system and obtain PV power economy.
G	The battery can be discharged to support the system or for PV power economy, while it cannot be charged. The inverter cannot respond to charge command in this range. SoCH can be set from 90 to 100% in APP. See 8.4 APP commissioning.

4.4 Feed-in limitation function

The function of the feed-in limitation is to control the amount of power injected in the grid by the plant. In some situations, this function is also called as Export limitation or Zero export. The feed-in limitation function requires a power measurement device must be installed.

Feed-in limitation: The sum of the feeding-in phases must not exceed the set power limitation value. The power of phases drawing power from the grid is disregarded here.

4.5 Charge-from-grid limitation function

The function of the Charge-from-grid limitation is to limit the amount of power charging the battery from the grid. The Charge-from-grid limitation function requires a power measurement device must be installed according to system A, B, or C.

Charge-from-grid limitation: The sum of the Charge-from-grid phases must not exceed the set power limitation value. The power of phases drawing power from the grid is disregarded here.

5. Unpacking and Storage

5.1 Unpacking and inspection

The product 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 product.

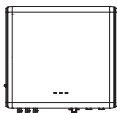

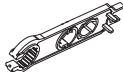
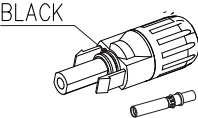
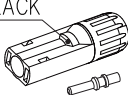
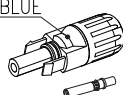
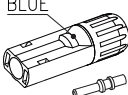
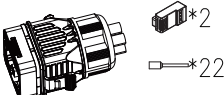
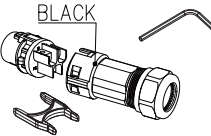
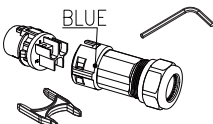






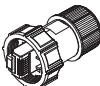

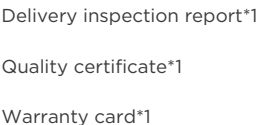
- Check the packing case for any visible damage.
- Check the scope of delivery for complete ness according to the packing list.
- Check the inner contents for damage after unpacking.

Contact After-sales service provider or the transport company in case of any damage or incompleteness, and provide photos to facilitate services. Do not dispose of the original packing case .It is recommended to store the device in theoriginal packing case when the product is decommissioned.

5.2 Cope of Delivery

The following product and accessories just for reference. And the actual product received may differ.

Figure 5-1 Scope of Delivery

 Energy manager*1	 Smart meter+ current transformer*1	 D4 Disassembly tool*1	 BLACK Photovoltaic connector - straight male*2	 BLACK Photovoltaic connector - Straight female*2
 BLUE Battery connector - straight male*1	 BLUE Battery connector - straight female*1	 Multi-COM (2-RJ45+22pin)	 BLACK Backup connector	 BLUE Grid-connected
 ground terminal*2	 Wireless module*1	 mounting bracket*1	 Electric meter communication Line*1	 expansion bolt*4
 SEM screw M4X12*4	 RJ45 connector*1	 Quick guide*1 Packing list*1 User manual*1	 Delivery inspection report*1 Quality certificate*1 Warranty card*1	

5.3 Storage

The following requirements should be met if the M1 series inverter is not put into use directly:

- Do not unpack the M1 series inverter.
- Keep the storage temperature at -40°C to $+70^{\circ}\text{C}$ and the humidity at 5%- 95% RH.
- The M1 series inverter should be stored in a clean and dry place and be protected from dust and water vapor corrosion.
- A maximum of 6 units can be stacked. To avoid personal injury or device damage, stack M1 series inverter with caution to prevent them from falling over.
- Periodic inspections are required during the storage. Replace the packing materials if necessary.
- If the M1 series inverter has been long-term stored, inspections and tests should be conducted by qualified personnel before it is put into use.

6. Mechanical Mounting

6.1 Safety Instructions

WARNING

- Respect all local standards and requirements during mechanical installation.

DANGER

Fire hazard

- Do not install the inverter on flammable material.
- Do not install the inverter in an area in which flammable or explosive material is stored.
- Make sure there is no electrical connection before installation. Before drilling, avoid the water and electricity wiring in the wall.

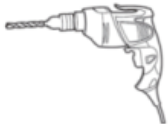


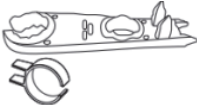
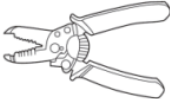

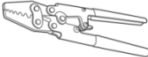


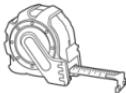


CAUTION



Personal hazard

- When moving the inverter, be aware of its weight and keep the balance to prevent it from tilting or falling.
- Wear proper protective equipment before performing operations on the inverter.
- The bottom terminals and interfaces of the inverter cannot directly contact the ground or other supports. The inverter cannot be directly placed on the ground.
- Do NOT install the inverter in places where it can be accidentally touched. The housing and heat sink may become very hot while the inverter is being operated.

6.2 Installation Tools

Installation tools include but are not limited to the following recommended ones. If necessary, Use other auxiliary tools on site.

No.	Tool	Model	Function
01		Hammer drill Recommended drill diameter: 8mm	Used to drill holes in the wall
02		Screwdriver	Wiring
03		Phillips screwdriver	Used to remove and install the screws of the AC termina
04		Removal tool	Used to remove the PV battery terminal
05		Wire stripper	Used to strip the wire
06		6mm Allen key	Used to turn the screw to connect the rear panel to the inverter
07		Crimping tool	Used to crimp power cables
08		Multimeter	Used to check the Grounding
09		Marker	Used for marking
10		Measuring tape	Used to measure distances
11		Spirit level	Used to align the wall bracket
12		ESD gloves	For the installer

No.	Tool	Model	Function
13		Safety goggles	For the installer
14		Anti-dust respiratory mask	For the installer

6.3 Environment Requirements

6.3.1 Basic requirements

- The Hybrid Inverter is protected to IP65 and can be installed indoors or out doors.
- Do not install the Hybrid Inverter in a place where personnel are easy to come into contact with its enclosure and heat sinks, because these parts are extremely hot during operation.
- Do not install the Hybrid Inverter in areas with flammable or explosive materials.
- Do not install the Hybrid Inverter at a place within children's reach.
- Do not install the Hybrid Inverter outdoors in salt areas because it will be corroded there and may cause fire. A salt area refers to the region within 500 meters from the coast or prone to sea breeze. The regions prone to sea breeze vary depending on weather conditions (such as typhoons and monsoons) or terrains (such as dams and hills).
- The Hybrid Inverter must be installed in a well-ventilated environment to ensure good heat dissipation.
- Recommended: Install the Hybrid Inverter in a sheltered place or a place with an awning.

6.3.2 Mounting requirements

The mounting structure where the Hybrid Inverter is installed must be fireproof.

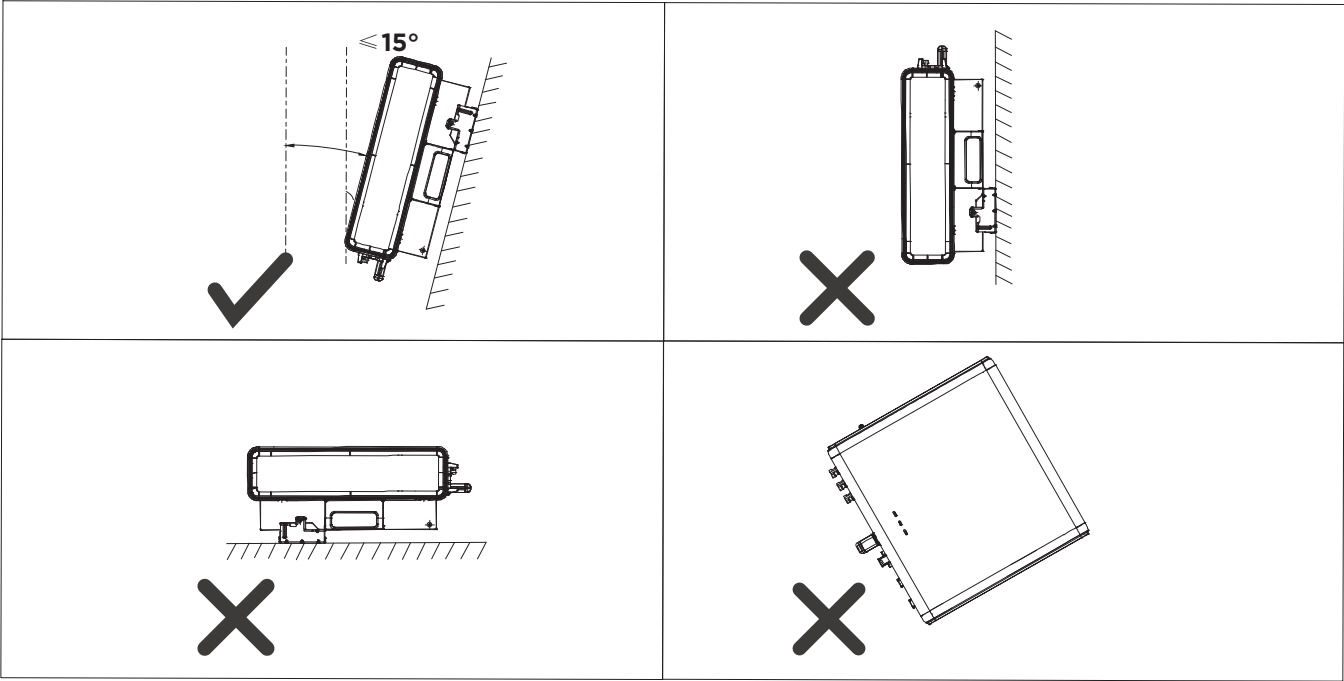
- Do not install the Hybrid Inverter on flammable building materials.
- The Hybrid Inverter is heavy. Ensure that the installation surface is solid enough to bear the weight load.
- In residential areas, do not install the Hybrid Inverter on drywalls or walls made of similar materials which have a weak sound insulation performance because the noise generated by the Hybrid Inverter is noticeable.

6.3.3 Space Requirements

Angle Requirements

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

Figure 6-1 Angle Requirements When installation



Space Requirements

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

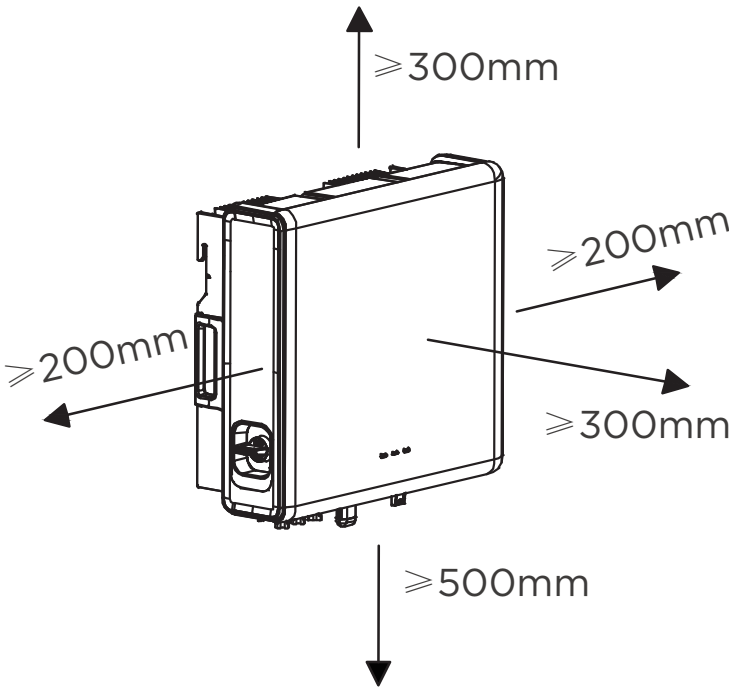


Figure 6-2 Space Requirements When installation

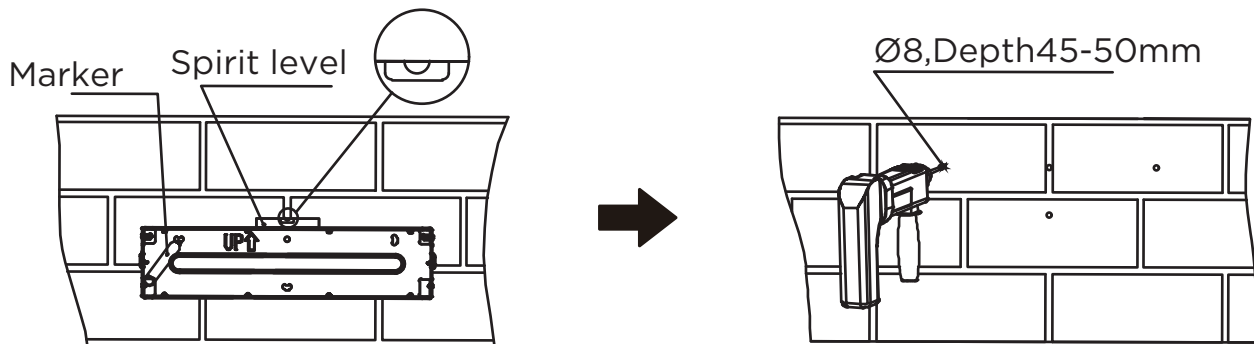
6.4 Installing the inverter

ATTENTION

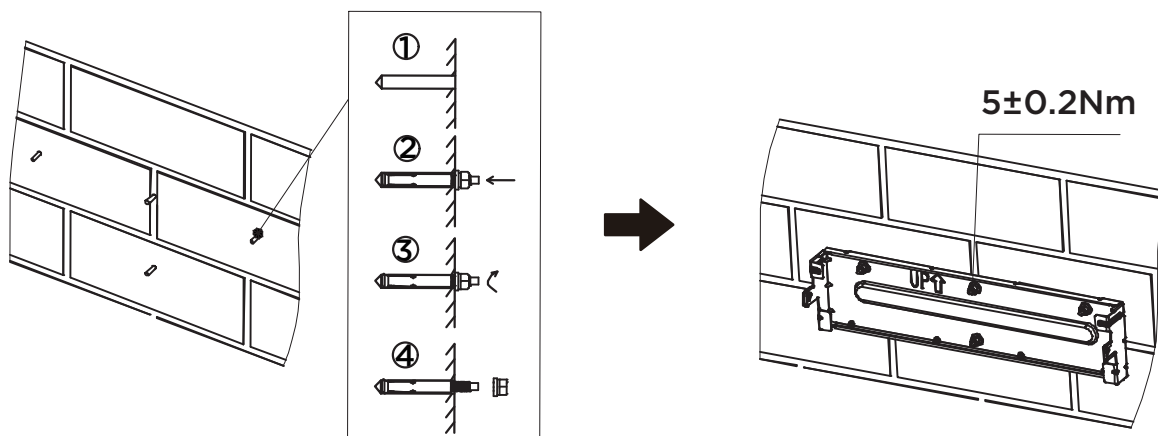
Mechanical damage

- In order to prevent injuries and damage to the device, ensure that the inverter is kept balanced while it is being moved - it is very heavy.
- Do not place the inverter on its connections, as these are not designed to bear its weight. Place the inverter horizontally on the ground.
- When you place the inverter on the ground, place foamed material or paper underneath it in order to protect its housing.

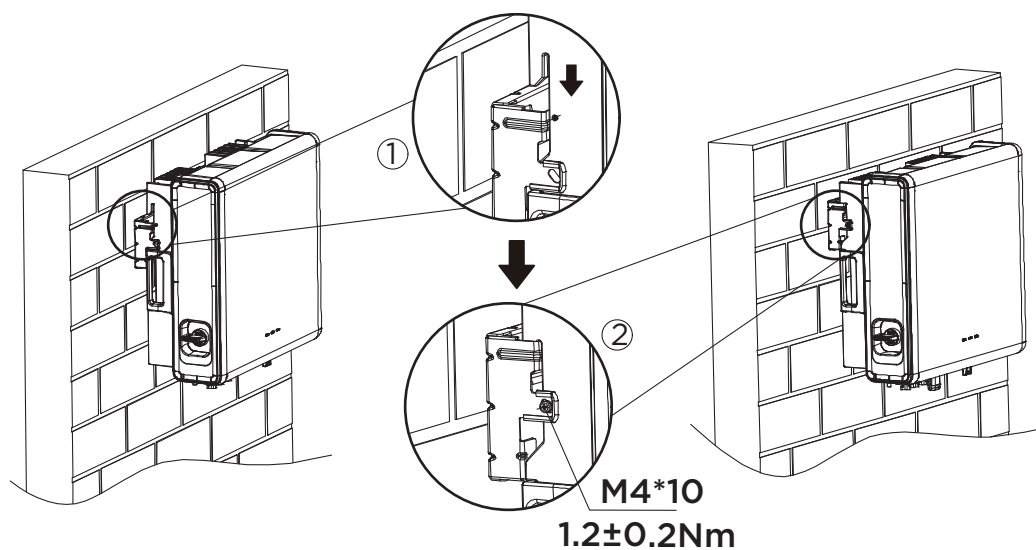
Step1. Placing the wall-mounting bracket to a proper position on the wall. Mark the positions by marker and drill the holes. (Observe the level on the bracket and adjust until the bubble is in the middle position).



Step2. Placing and fixing the expansion Bolts in the holes, and Installing the mounting bracket.



Setp3. Lift the inverter and slide it down along the wall mounting bracket to make sure they match perfectly. Use two screw sets to lock both left and right sides



7. ELECTRICAL CONNECTION

7.1 Safety instructions

This topic describes the electrical connections of the inverter. Read this section thoroughly and carefully before connecting the cables.

DANGER

Electrical voltage at the DC connections.

- Ensure that the DC switch is OFF before establishing the electrical connection. The reason is that the electrical charge remains in the capacitor after the DC switch has been switched off. Therefore, at least 5 minutes must lapse before the capacitor has been electrically discharged.

DANGER

Electrical voltage.

- PV modules generate electrical energy when exposed to sunlight, and this may present an electrical shock hazard. Therefore, cover the PV modules with an opaque sheet before connecting to the DC input power cable.

DANGER

Electrical voltage at the DC connections.

- Wear rubber gloves and protective clothing (safety goggles and boots) when working on high voltage/high current systems such as inverter and battery systems.

ATTENTION

Qualification

- The installation and maintenance of the inverter must be carried out by an electrician.

NOTE

- The open-circuit voltage of the modules connected in series must be lower than or equal to 600 V.

The connected PV modules must be compliant with IEC 61730 class A.

Table 7-1 Recommended backup loads

Device	Isc PV (absolute maximum)	Maximum output overvoltage protection
Hybrid Inverter	20A/20A	600V

The DVC (decisive voltage classification) is the circuit voltage which constantly occurs between two arbitrary live parts during proper use in a worst-case scenario:

Table 7-1 Description of limits for DVC

DVC	Operating voltage limit (V)		
	AC voltage (RMS)	AC voltage (PK)	DC voltage (AVG)
A	25(16)	35.4(22.6)	60(35)
B	50(33)	71(46.7)	120(70)
C	1000	4500	1500

Note:The values in brackets apply when the inverter is installed in a humid environment.

7.2 Terminal Description

All electrical terminals are located at the bottom of the inverter.

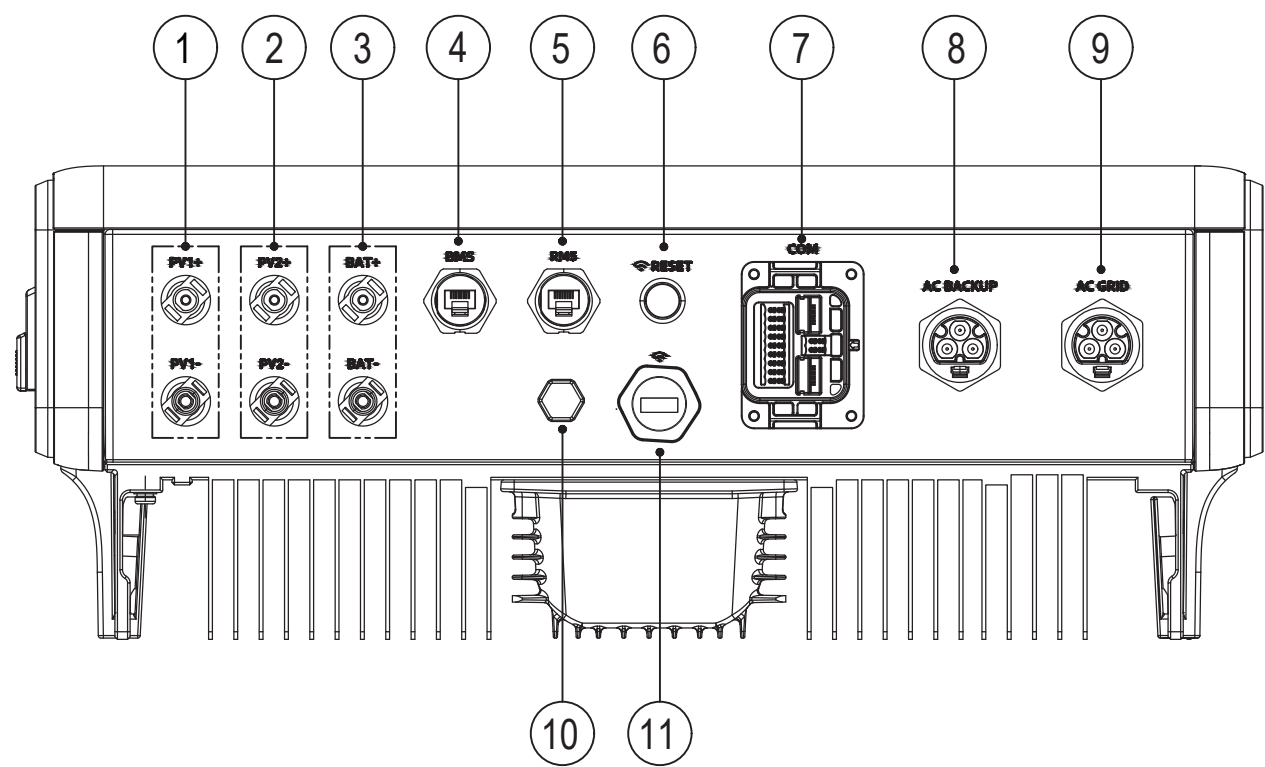


Figure 7-1 Terminals Review

*The image shown here is just for reference only.The actual product received may differ.

Table 7-2 Terminal Description

No.	Name	Description	DVC
1	PV input terminal (PV1+/PV1-)	MC4 terminals for PV 1 input.	DVCC
2	PV input terminal (PV2+/PV2-)	MC4 terminals for PV 2 input.	DVCC
3	BAT input terminal (BAT+/BAT-)	Connectors for the battery power cables.	DVCC
4	Communications port(BMS)	Communication connection for Battery BMS.	DVCA
5	Communications port(RJ45)	Communication port Reserved.	DVCA
6	Wireless button	Used to enable WiFi distribution network mode or OTA.	/
7	Communications port(COM)	Communication connection for smart energy meter, DI/DO RSD .ect.	DVCA
8	AC-Backup output port	AC terminal for Backup loads.	DVCC
9	AC-Grid output port	AC terminal to connect to the grid.	DVCC
10	Ventilation valve	/	/
11	Wireless Communications	Communication accessory port to be connected to WiNet-S communication module.	DVCA

7.3 Electrical Diagram

There are different system configurations possible depending on the user's requirements, existing electrical infrastructure and local regulations. The distribution box must be configured to comply to the grid operator requirements. The inverter has an integrated AC relay to disconnect all phases and Neutral from the grid in case of grid fault or grid outage.

The electrical connection should be realized as follows:

The inverter's generation and feed-in limitation functions require the use of an external measurement device to obtain grid information.

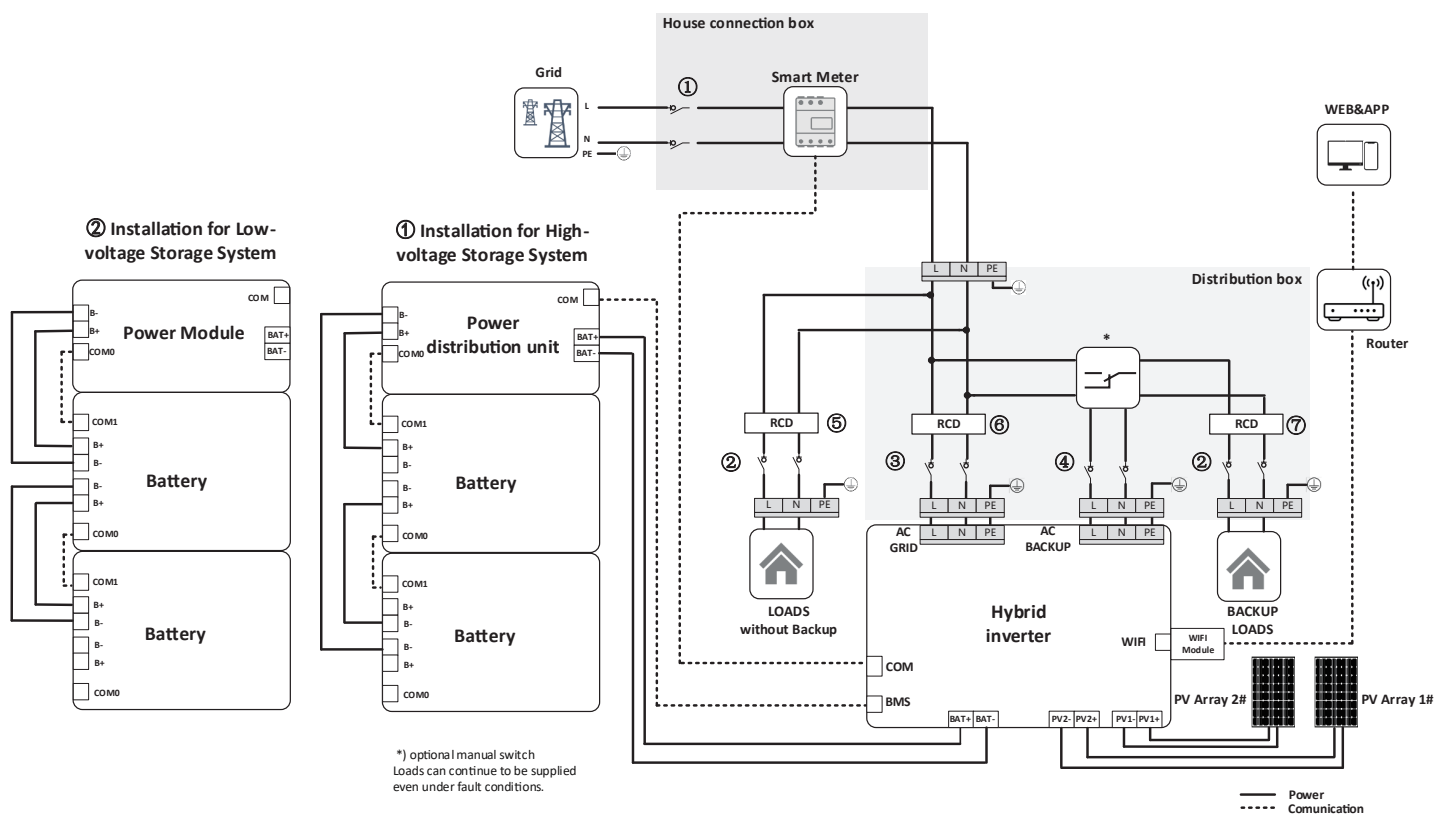


Figure 7-2 Electrical Diagram

* optional manual switch Loads can continue to be supplied even under fault conditions.

Table 7-3 Installation Requirement

1	Depends on household loads and inverter capacity
2	Depends on loads
3	$\leq 63A/230V/400V$ AC breaker
4	$32A/230V/400V$ AC breaker
5	30mA RCD
6	300mA RCD
7	30mA RCD

NOTE

- The values in the table are recommended values and can be set to other values according to actual conditions.

Table 7-4 Cable Requirements

NO.	Cable	Type	Cable Diameter	Cross-section
1	PV cable	Complying with 600V and 16A standard	6-9mm	4-6 mm ²
2	AC-Backup cable	Outdoor 3-core copper wire cable	10-21mm	4-6 mm ²
3	AC-Grid cable	Outdoor 3-core copper wire cable	12-25.8mm	6-16 mm ²
4	BAT Power cable	Complying with 600V and 35A standard	5.5-8mm	6 mm ²
5	Communication cable	CAT 5E outdoor shielded network cable	4.8-6mm	0.08-0.2 mm ²
6	Grounding cable	Single-core copper wire cable	The same as PE wire in AC cable	

ATTENTIONS:

- If local standard have other requirements for cables, set the cable specification according to the local standard.
- The factors that affect cable selection include rated current, cable type, routing mode, ambient temperature, and maximum expected line loss.
- The cabling distance between the battery and the inverter should be less than 10m, and within 5m is recommended.

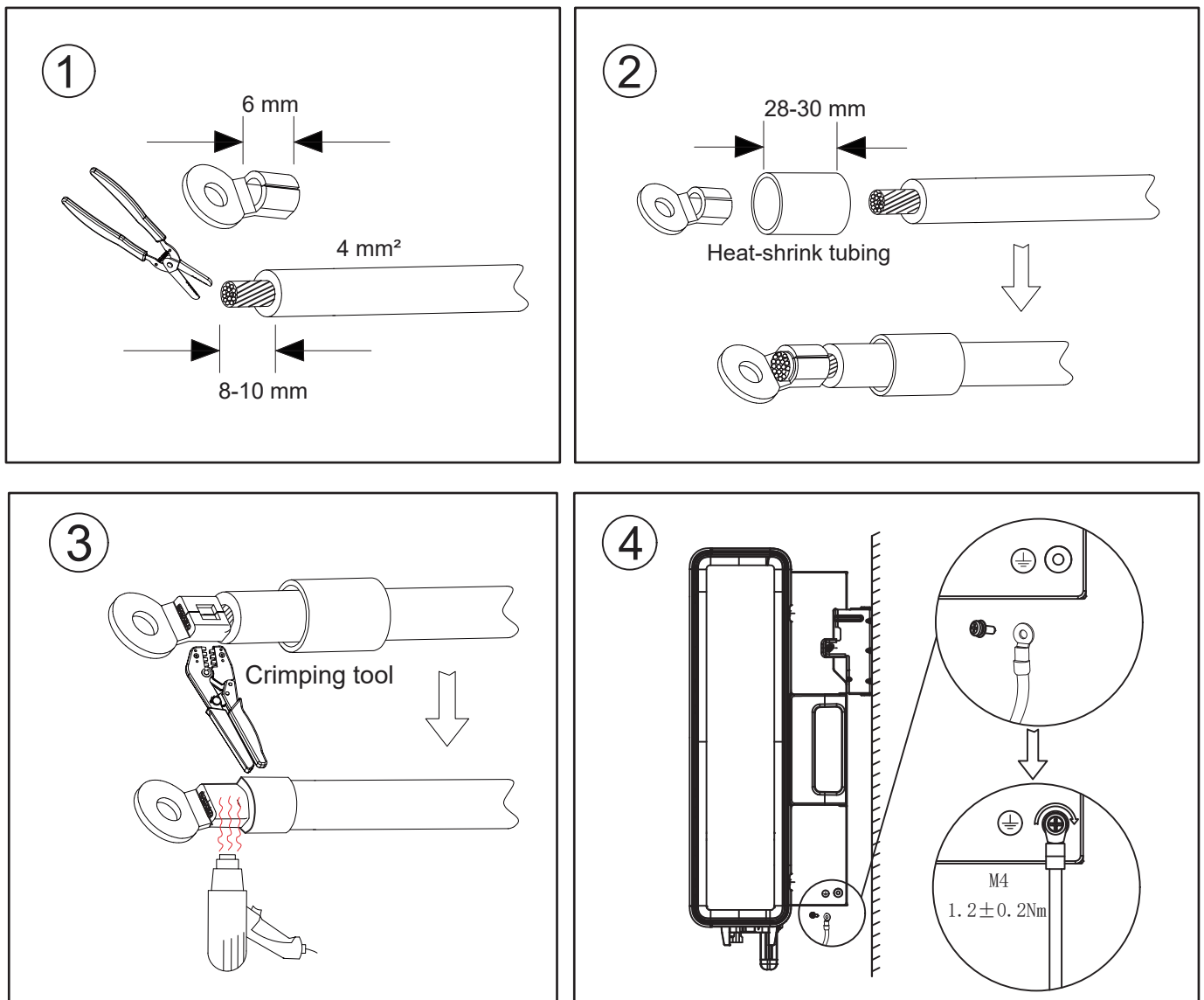
7.4 Ground Connection

Connect the inverter to the equipotential bonding bar by using the protective earth cable (PE) for grounding.

ATTENTION

Pole Grounding not permissible!

- As the inverter is transformerless, the plus and minus poles of the PV generator must NOT be earthed. Otherwise, the inverter will malfunction. In the PV system, not all live metal parts (e.g. PV module frames, PV frame, generator connection box housing, inverter housing) require Grounding.



7.5 AC Output Connection

The AC power cables are used to connect the inverter to the critical loads (through the AC-BACKUP port), and the AC power distributor or the power grid.

⚠ CAUTION

AC connection

- Each inverter must have its own circuit breaker.
- The AC disconnecting device must be easily accessible.

Connector Type

The blue connector is for grid, and black connect is for backup. Installation and line connection is same, so please follow below steps to install the AC connector.

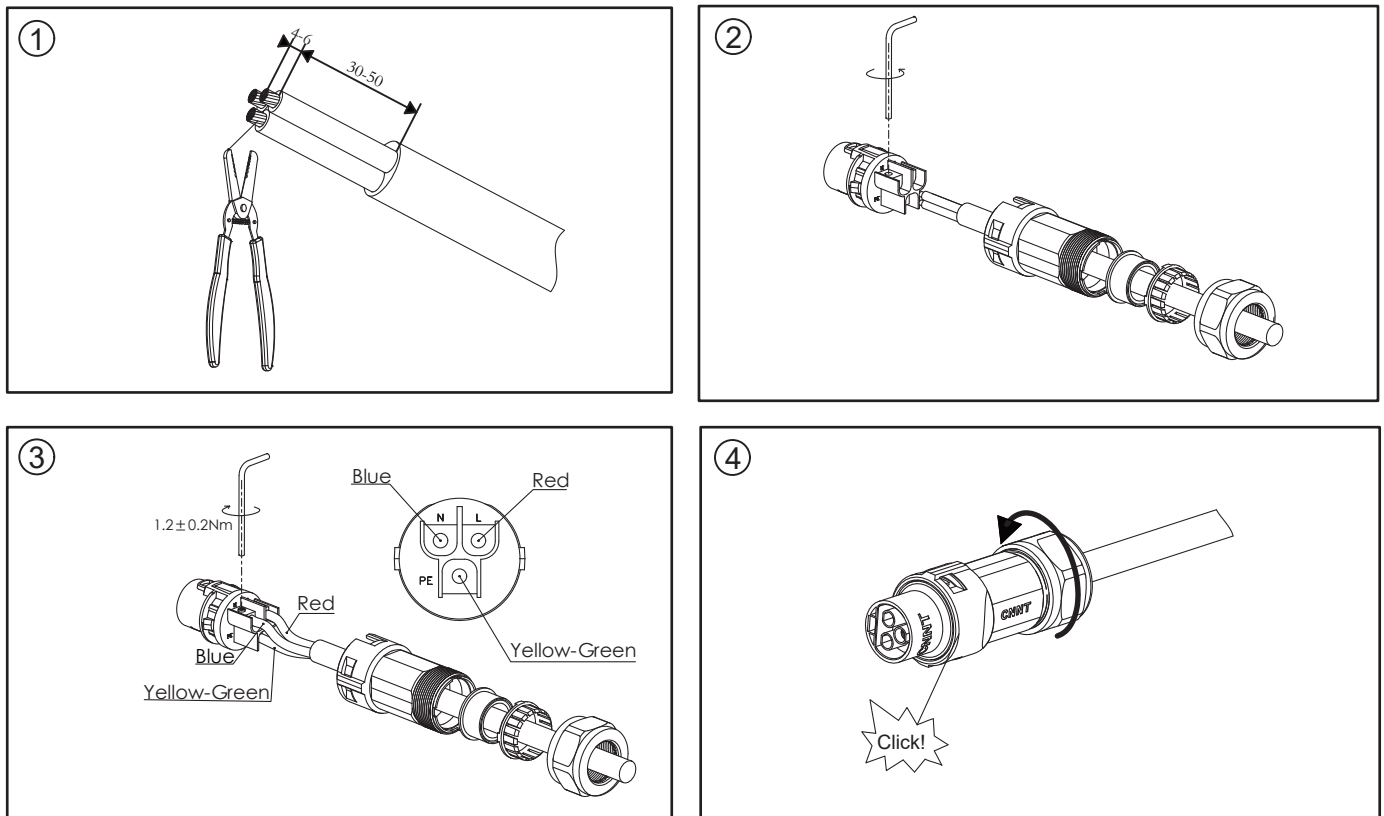
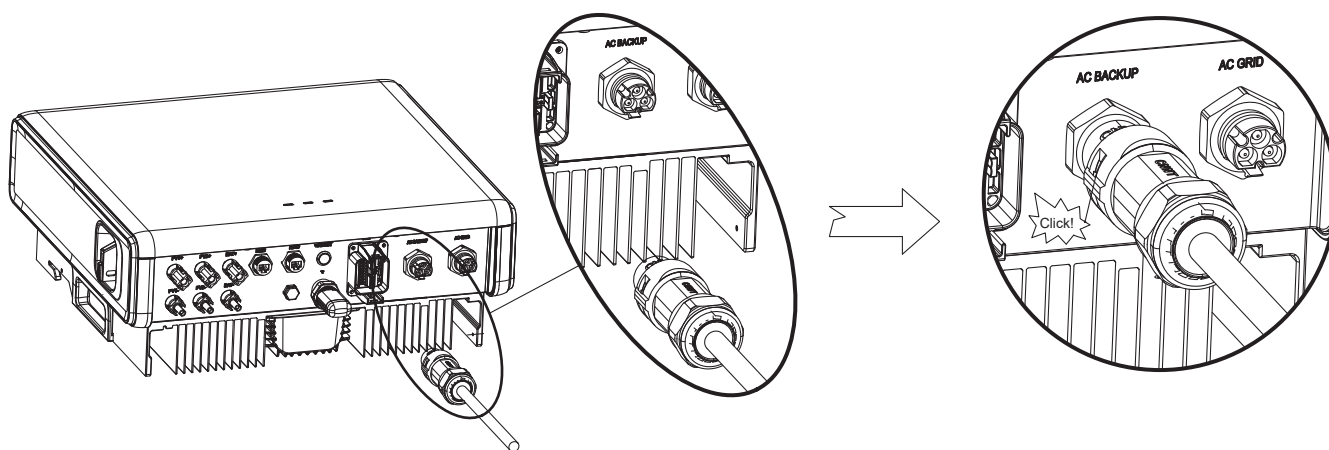


Table 7-6 AC cable explanation

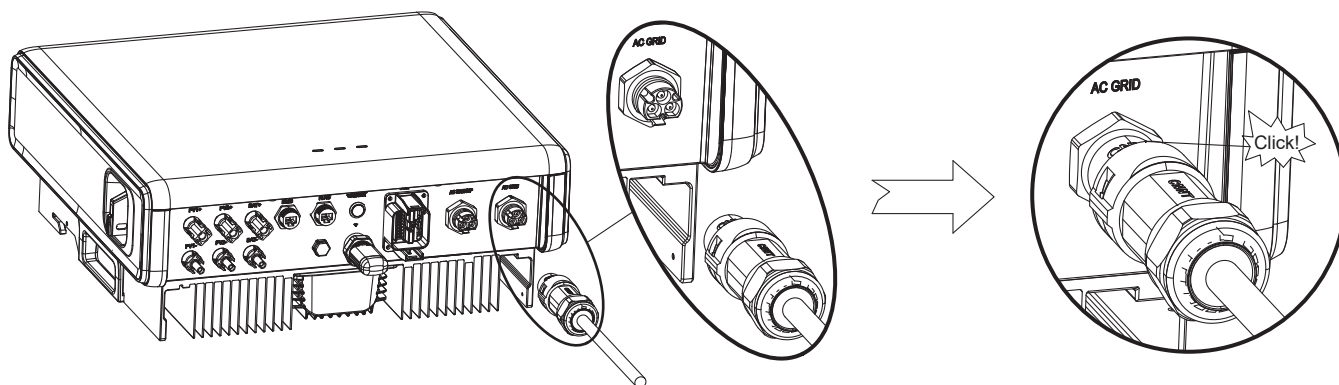
Connection	Cable
L	Phase 1 (brown)
N	Neutral conductor (blue)
PE	Grounding cable (yellow-green)

- 1) Assemble the connector housing and screw the cable gland tight.
- 2) Connect the AC connector to the AC connector of the inverter by turning it clockwise until it locks into place.

- Black backup connector connection



- Blue grid connector connection



NOTE

- Remove the AC connector by turning it anticlockwise.
- When you use the meter connection function, make sure that the AC terminal cable corresponds to the meter cable one by one(L、 N and PE cables).

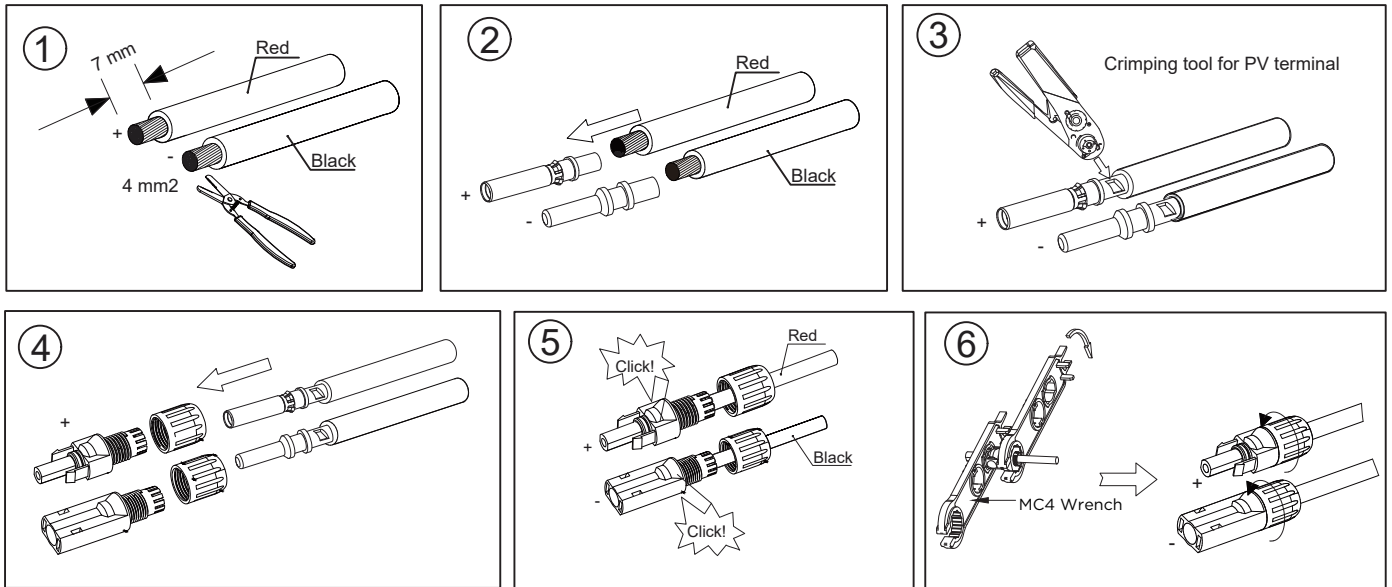
7.6 DC cable connection

7.6.1 Installing the PV connectors

NOTE

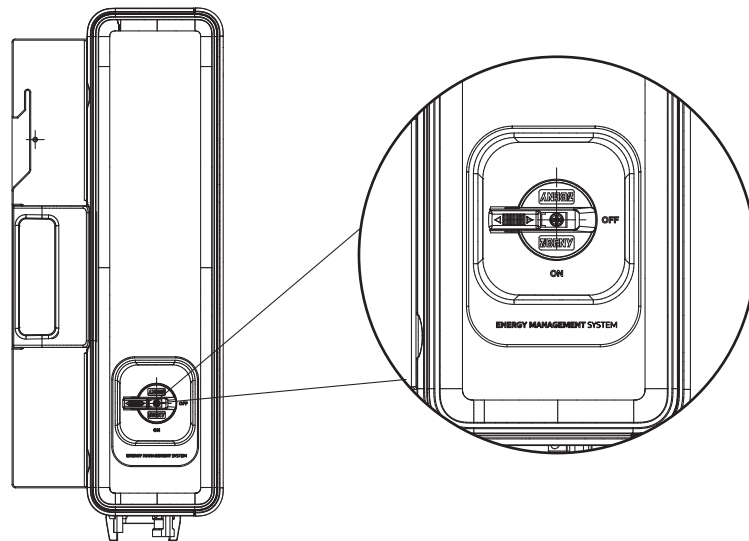
- The connection steps of the battery and PV are the same, only the terminal specifications are different. The colour of the battery terminal is blue, the colour of PV terminal is black.

Please refer to the following step to make the PV connectors:

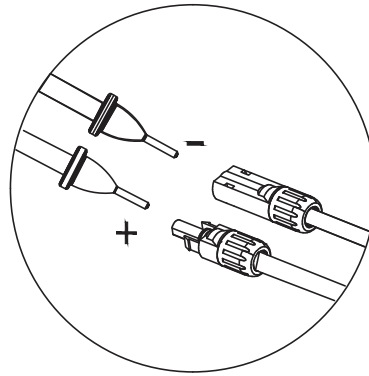
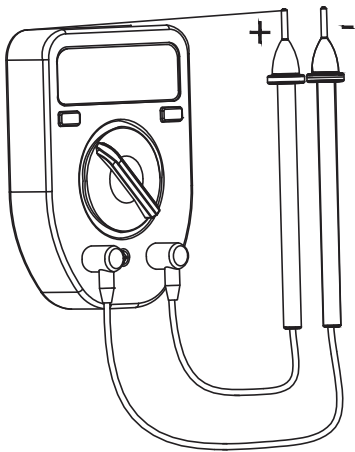


7.6.2 Installing PV connector

step 1 Rotate the DC switch to “OFF” position.

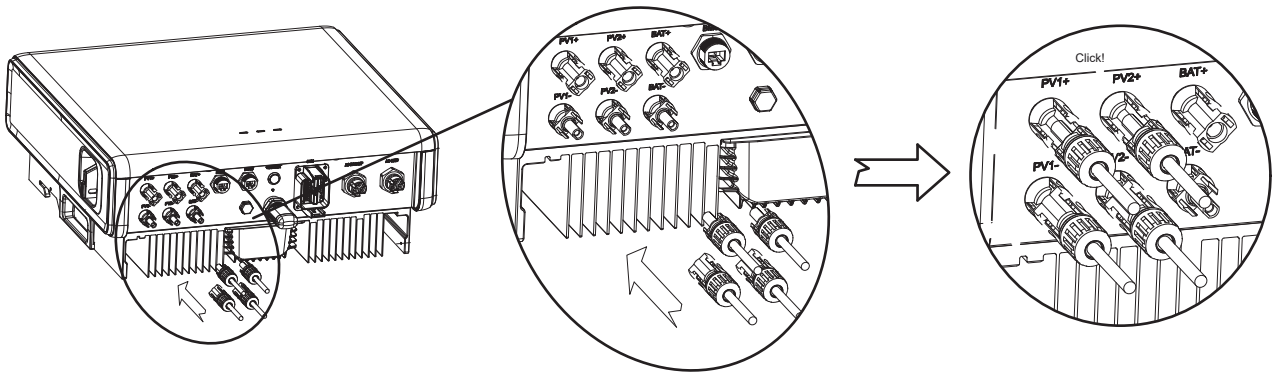


step 2 Check the cable connection of the PV string for polarity correctness and ensure that the open circuit voltage in any case does not exceed the inverter input limit of 600V.

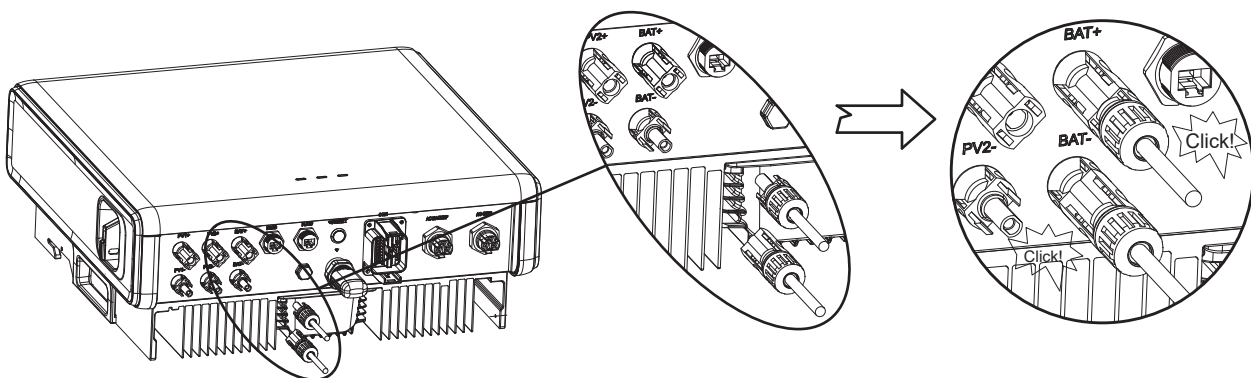


≤600 V

step 3 Connect the PV connectors to corresponding terminals until there is an audible click.



7.6.3 Installing Battery connector



NOTE

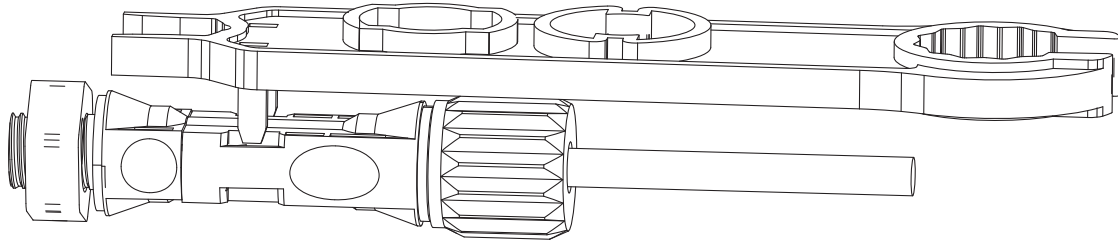
- Insert the protective caps into the unused DC connections. Removing the connectors.

CAUTION

Danger of DC arcing

- Before removing the plus and minus connector, ensure that the DC switch has been set to OFF.

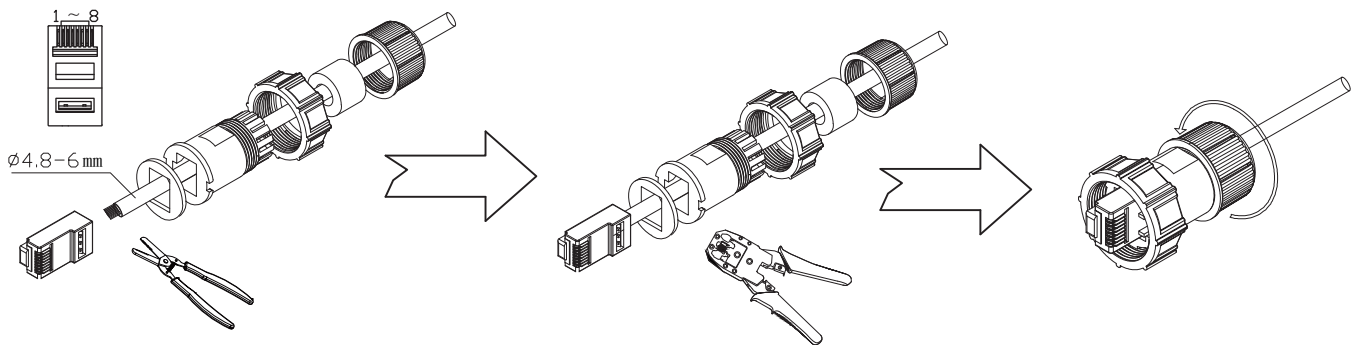
In order to remove the plus and minus connection from the inverter, insert a removal key into the locking and press on the key with the adequate force as shown in the following illustration:



7.7 BMS RJ45 connection

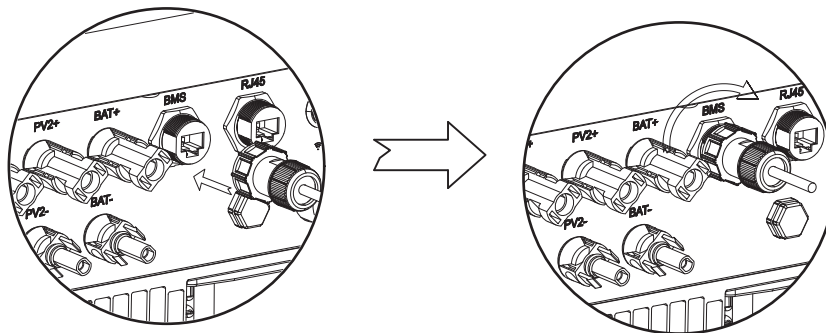
The Enable cable along with the RJ45 cable, are used for communication between the inverter and the Li-ion battery, For detailed connection description of the RJ45 cable, please follow steps below.

Step1 (optional) Thread the communication cable through the waterproof component, and Strip the insulation layer of the cable with an Ethernet wire stripper, and then lead the corresponding signal cables out. Insert the stripped communication cable into the RJ45 plug in the correct order, and crimp it with a crimper. Before install the connector, Tighten the waterproof cover.



* Skip this step if a standard network cable with RJ45 plug is prepared.

Step 2 Find the BMS terminal under the inverter. and insert the cable terminal to BMS terminal ,after confirming the RJ45 plug insert correctly, and then Tighten the waterproof Screw cap.



7.8 Smart Meter Connection

The integrated energy management functions integrated of the inverter require to measure the power flow at the point of grid interconnection. The current Transformer, also called CT, is usually installed on the L wire between the house loads and the power grid. and you can find the CT parameters in table 7-8.

Table 7-8 CT parameters

Technical Data	
Voltage	AC 230 V
Current	100A/100mA
Frequency	50/60 Hz
Pulse	1000 Imp / kWh

NOTE

The energy meter is mainly used to detect the direction and magnitude of the current. And the energy meter data may not be used for billing purposes.

7.8.1 Communication terminal definition

Please refer to below table for the PIN assignments for the RS485 connection between the inverter and the energy meter.

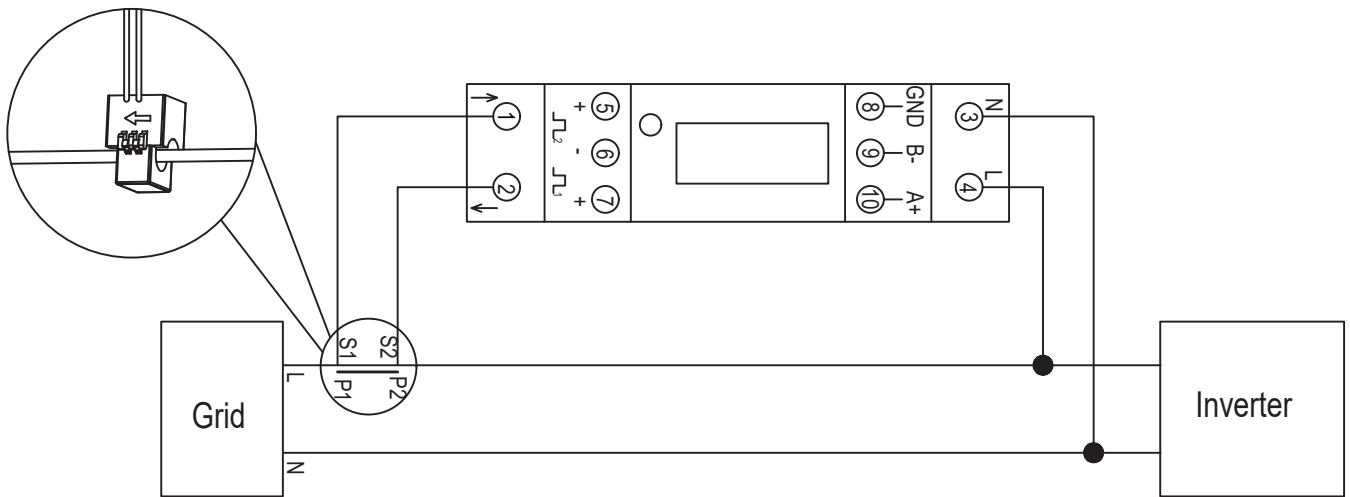
Table 7-9 Communication terminal definition

Inverter Multi-com P1	Function	Meter Pin	Communication Cable
RJ45 Pin 1	RS485+ (A2)	Pin 10	Red line
RJ45 Pin 2	RS485- (B2)	Pin 9	Black line

7.8.2 Smart meter with CT connection

The Meter can be installed in the AC combiner box or other places that are unable to be touched by children .and you just need to follow below diagram to connect the smart meter and CT.

Figure 7-3 Electrical Diagram



Meter terminals definition as shown in table below:

Table 7-10 Meter terminals definition

NO.	Definition	Function
1	L-S1	To detect the CT current and direction
2	L-S2	
3	N	Power supplied from grid
4	L	
5	/	
6	/	
7	/	
8	GND	Ground connection
9	B-	Communicate with hybrid inverter
10	A+	

7.8.3 Smart meter parameter setting

The energy meter is preconfigured to be used with the inverter with settings, In case you want to change or check the settings, please refer to below procedure:

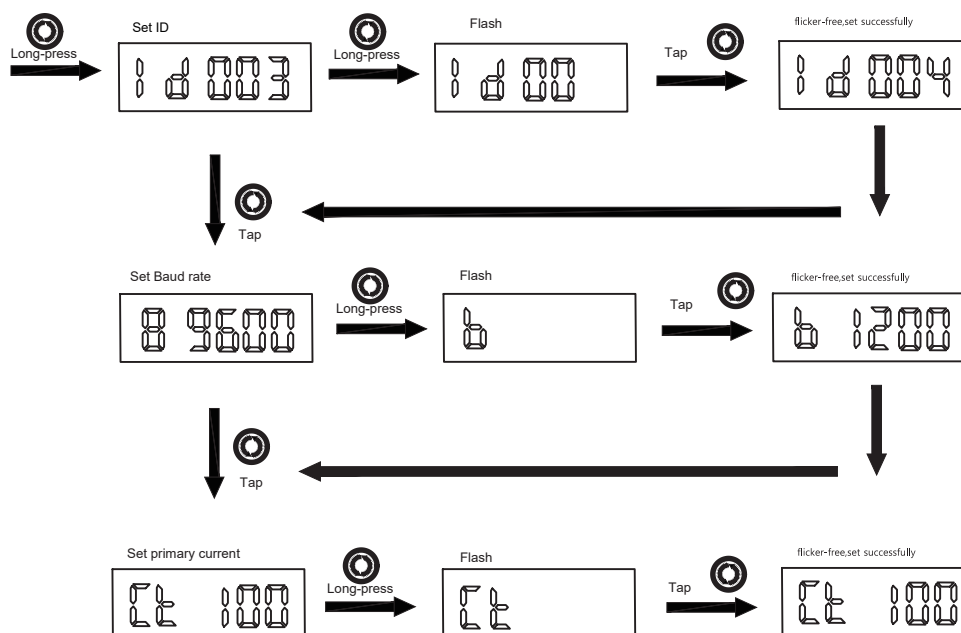


Figure 7-4 Meter Parameter Setting

NOTE

- The inverter connected to the meter is a power generation device, and the function of the meter connected to the traditional load (electrical device) is opposite. Therefore, for our product, when the power is output to the grid, the electricity meter will show a positive value, and when the power is purchased from the grid, it will show a negative value;
- The energy meter comes with 2 terminal resistors, In the actual configuration, the customer can parallel a terminal resistor at each end of the cable to reduce signal reflection in the communication cable.

7.9 Wireless Module Connection

Procedure:

1. Remove the protective cap from the USB interface.
2. Install the Wireless stick.
3. Tighten the connecting nut.

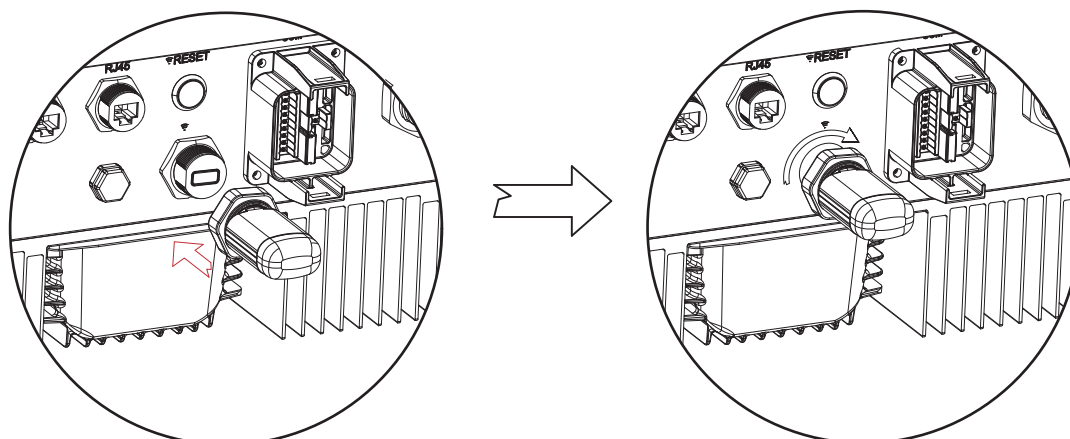


Table 7-11 Communication Port definition

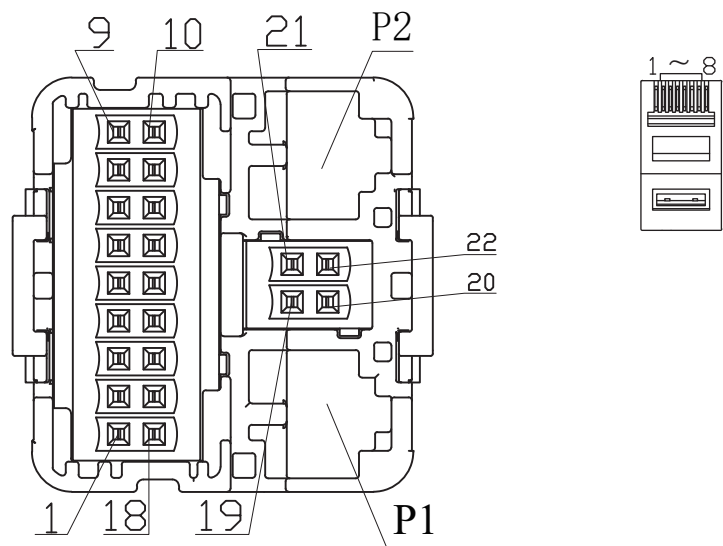
PIN	Definition	Function
P1 RJ45	RS485+(A2)/RS485-(B2)	Communicate with smart meters
P2 RJ45	RS485+(A2)/RS485-(B2)	Communicate with heat pump
1	DO1+	Dry contacts of load control
2	DO1-	
3	DO2	Dry contacts of load control
4	DO3	
5	DO_COM	
6	DRM1/5	Demand response modes (DRED For Australia and New Zealand RCR For Germany and some other European countries)
7	DRM2/6	
8	DRM3/7	
9	DRM4/8	
10	COM	12V power supply
11	COM_LOAD/O	Demand response modes
12	ES	For WSD(wired shut down)/NS protection
13	Grid on	For grid operator
14	COM	12V power supply
15	RS485B1	Communicate with inverter
16	RS485A1	
17	RS485B1	
18	RS485A1	
19	RS485B3	Communicate with upper computer
20	RS485A3	
21	/	Reserved
22	/	Reserved

Table 7-12 RJ45 terminal definition

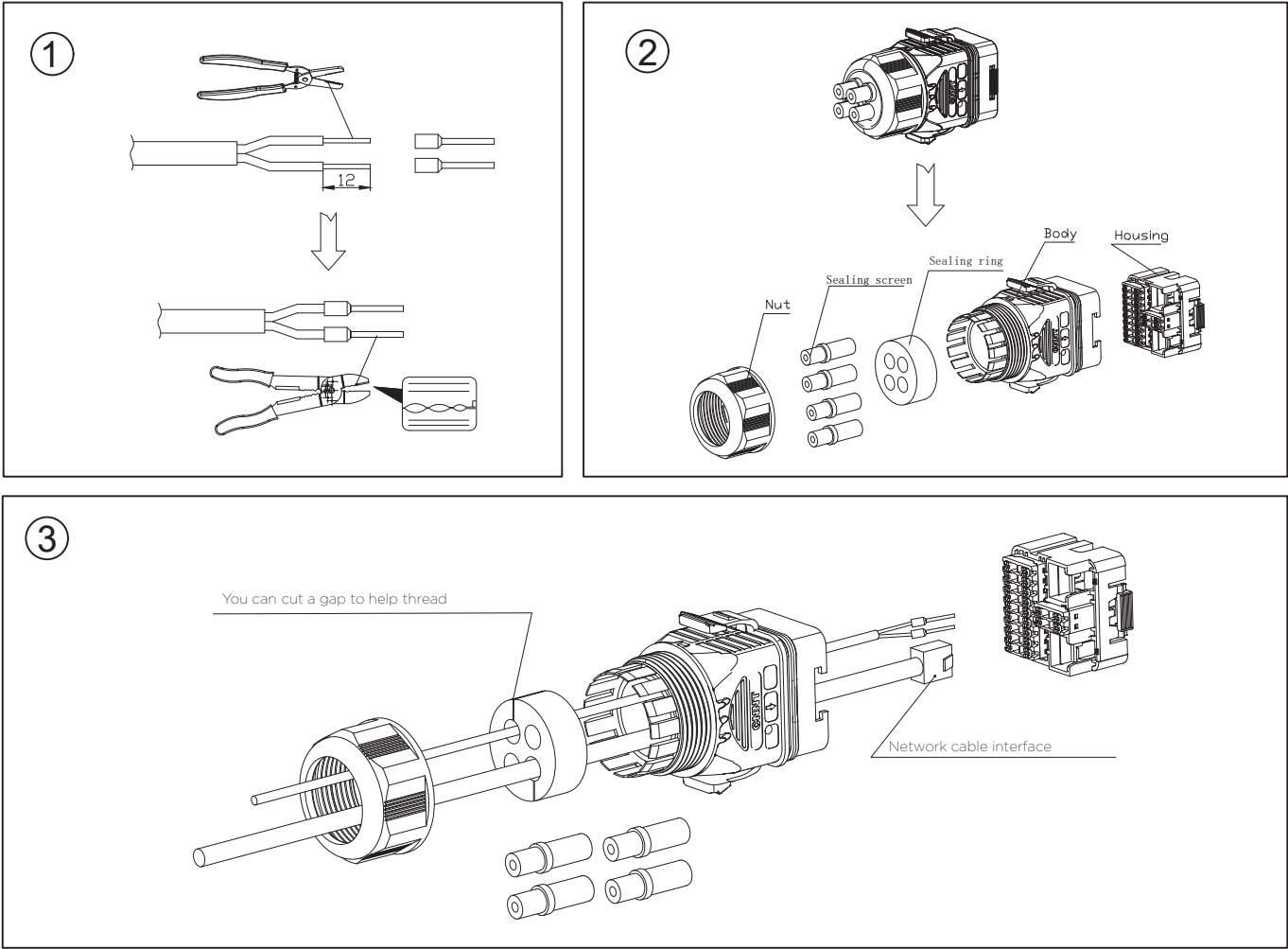
No.	Color	P1 RJ45(Smart meters)	P2 RJ45(Heat pump)
1	White with orange stripes	RS485+(A2)	RS485+(A2)
2	Orange	RS485-(B2)	RS485-(B2)
3	White with green stripes	NC	NC
4	Blue	NC	NC
5	White with blue stripes	NC	NC
6	Green	NC	NC
7	White with brown stripes	NC	NC
8	Brown	NC	NC

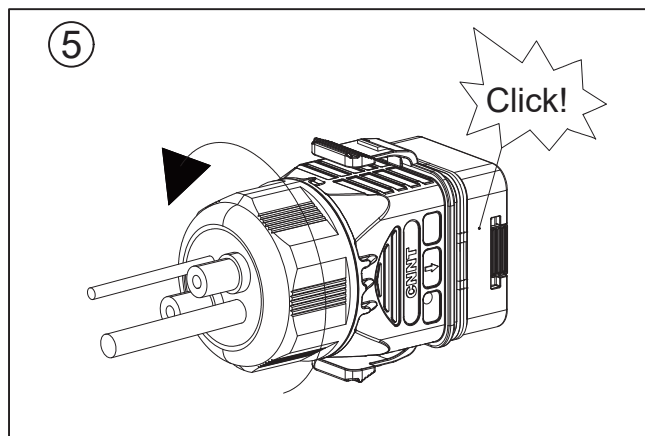
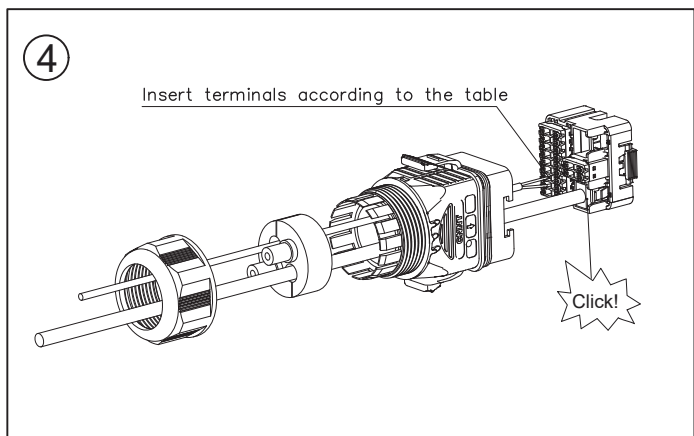
Order number of Multi-com terminal

Figure 7-5 Multi-com terminal Schematic diagram

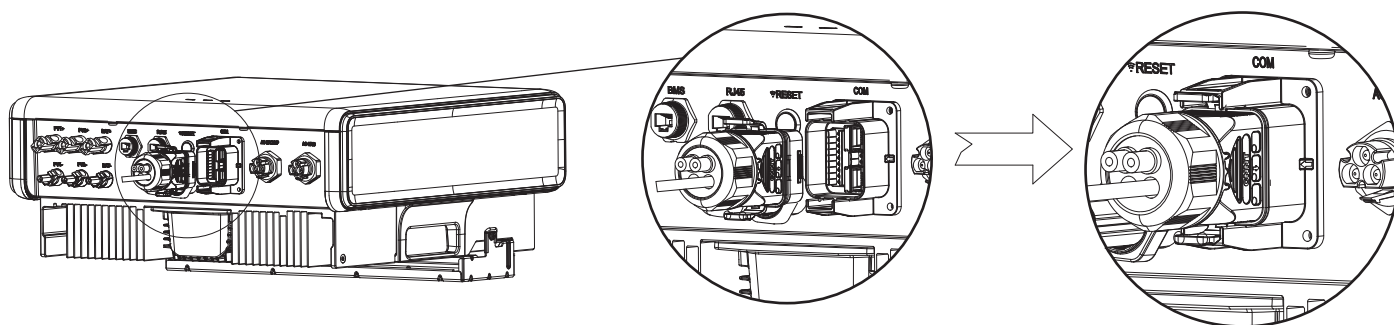


7.10.1 Installing the cable and Multi-com





7.10.2 Installing the Multi-COM to inverter



8. COMMISSIONING

8.1 Safety test before commissioning

ATTENTION

Check the voltage range

- Ensure that the DC and AC voltages are within the permissible range of the inverter.

8.2 Check before power-on

No.	Item	Acceptance Criterion
1	Inverter installation	The Inverter is installed correctly and securely.
2	Battery installation (optional)	The Energy Storage Unit is installed correctly and securely.
3	Wireless module	The Wireless module is installed correctly and securely.
4	Cable routing	The cables are routed properly as required by the customer.
5	Cable ties	Cable ties are secured evenly and no burr exists.
6	Reliable grounding	The PE cable is connected correctly and securely.
7	Switch	DC switches and all the switches connecting to the Inverter are OFF.
8	Cable connection	The AC output power cable, DC input power cables, battery cable, and signal cable are connected correctly and securely
9	Unused terminals and ports	Unused terminals and ports are locked by watertight caps.
10	Installation environment	The installation space is proper, and the installation environment is clean and tidy.

8.3 System power-on

1. If a battery is connected, turn on the battery switch.
2. Turn on the AC switch between the inverter and the power grid.
3. Turn on the DC switch (if any) between the PV string and the inverter.
4. Turn on the DC switch at the bottom of the inverter.
5. Wait for about 1 minute and observe the LED indicators on the inverter to check its running status.

INDICATOR	COLOR	STATUS	EXPLANATION
DC	Green	Steady on	PV power available
	Yellow	Steady on	PV power not available/ too low
	Red	Steady on	Fault
	-	Off	System is power-off
AC	Green	Steady on	Inverter is operating
	Green	Blinking at long intervals (on for 1s and then off for 1s)	Inverter in standby in grid-tied mode
	Yellow	Steady on	Inverter is operating in off-grid mode
	Yellow	Blinking at long intervals (on for 1s and then off for 1s)	Inverter in standby in off-grid mode
	Red	Steady on	Fault
	-	Off	System is power-off
COM	Green	Blinking at long intervals (on for 0.2s and then off for 0.2s)	Wireless waiting for connection
	Green	Blinking at long intervals (on for 1s and then off for 1s)	Establishing wireless connection
	Green	Steady on	Wireless connected
	Yellow	Steady on	Bluetooth connected
	-	Off	No wireless/bluetooth connected

8.4 APP commissioning

Download and install the app. Search goMsolar and MSmartHome in the Apple or Google Play store, or use the following QR codes:

- MSmartHome (for end users):



- goMsolar (for installers):



NOTE

Please refer to the App user manual for detailed operations. Scan the QR code to download the APP user manual.



9.MAINTENANCE

9.1 System power-off

If the inverter needs to be shut down for electrical inspection, please follow the following steps:

1. Turn off the AC switch between the inverter and the power grid.
2. Turn off the DC switch at the bottom of the inverter.
3. If there is a DC switch between the inverter and PV string, turn off the DC switch.
4. Turn off the DC switch at the battery(Optional).
5. Wait for 5 minutes before checking the inverter.

NOTE

- The alarm information can be viewed on the monitoring portal and retrieved via the smartphone app.

9.2 Routine Maintenance

Inverters do not generally require daily or routine maintenance. Before carrying out cleaning, ensure that the DC switch and AC circuit breaker between the inverter and power grid have been switched off. Wait at least 5 minutes before carrying out cleaning.

9.2.1 Cleaning the inverter

Clean the inverter using an air blower and a dry, soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, cleaning agents etc.

9.2.2 Cleaning the heat sink

In order to help guarantee correct long-term operation of the inverter, make sure that there is sufficient space for ventilation around the heat sink. Check the heat sink for blockages (dust, snow etc.) and remove them if present. Please clean the heat sink using an air blower and a dry, soft cloth or a soft bristle brush. Do not clean the heat sink with water, corrosive chemicals, cleaning agents etc.

9.3 Troubleshooting

This section contains information and procedures pertaining to the remedying of potential problems with the inverter.

To carry out troubleshooting, proceed as follows:

- Check the warnings, error messages or error codes displayed on the screen of the app.

If no error information is displayed on the screen, check whether the following requirements have been fulfilled:

- Has the inverter been set up in a clean, dry, well-ventilated area?
- Is the DC switch set to ON?
- Are the cables sufficiently dimensioned and short enough?
- Are the input connections, output connections and the wiring all in good condition?
- Are the configuration settings for the relevant installation correct?
- Are the the communication cables correctly connected and undamaged?

9.3.1 Earth fault alarm

This inverter is compliant with IEC 62109-2 Clause 13.9 for earth fault protection. If an earth fault alarm occurs, the error is displayed on the LED indicators, the red light illuminate.

9.3.2 Error list

This section describes the potential errors for this product. Please read carefully for the following tips when doing the troubleshooting:

Alarm severities are fin as follows

Major: The inverter is faulty. As a result, the output power decreases or the grid-tied power generation is stopped.

Minor: Some components are faulty without affecting the grid-tied power generation.

Warning: The inverter works properly. The output power decreases or some authorization functions fail due to external factors.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Trouble shooting
1001	String reverse connection	Major	The PV string polarity is reversed.	Check whether the PV string is reversely connected to the inverter. If so, wait until the PV string current decreases to below 0.5 A. Then, turn off the DC switch and correct the PV string polarity.
1002	Abnormal residual current	Major	The input-to-ground insulation impedance has decreased during the inverter operation.	1. If the alarm occurs accidentally, the external power cable may be abnormal temporarily. The inverter automatically recovers after the fault is rectified. 2. If the alarm persists or lasts a long time, check whether the impedance between the PV string and ground is too low.
1003	Low insulation resistance	Major	1. A short circuit exists between the PV array and the ground. 2. The PV array is in a moist environment and the circuit is not well.	1. Check the impedance between the PV array output and the ground. If a short circuit occurs or the insulation is insufficient, rectify the fault. 2. Check whether the PE cable of the inverter is correctly connected. 3. If you have confirmed that the impedance is lower than the specified protection threshold in a cloudy or rainy environment, log in to WEB and APP set the Insulation resistance protection threshold.
1004	Cabinet over temperature	Major	1.The inverter is installed in a place with poor ventilation. 2. The ambient temperature exceeds the upper threshold. 3. The inverter is not operating properly.	1.Check the ventilation and ambient temperature at the inverter installation position. 2. If the ventilation is poor or the ambient temperature exceeds the upper threshold, improve the ventilation and heat dissipation. 3.If the ventilation and ambient temperature are normal, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Trouble shooting
1005	Grid loss	Major	1. Power grid outage occurs. 2. The AC circuit is disconnected or the AC switch is off.	1. The alarm is cleared automatically after the power grid recovers. 2. Check whether the AC circuit is disconnected or the AC switch is off.
1006	Power Module Communication failure	Major	The battery communication is abnormal	Check that the communications cable is correctly installed, and that the communication parameters are the same as the inverter RS485 configurations.
1007	BMS Communication failure	Major	The battery communication is abnormal	Check that the communications cable is correctly installed, and that the communications parameters are the same as the inverter RS485 configurations.
1008	Meter Communication failure	Major	The meter communication is abnormal	Check that the communications cable is correctly installed, and that the communication parameters are the same as the inverter RS485 configurations.
1009	Equipment fault	Major	An unrecoverable fault occurs on a circuit inside the inverter.	Turn off the AC output switch and DC input switch, and then turn them on after 5 minutes. If the alarm persists, replace the monitoring board or contact your dealer or technical support.
1010	Grid overvoltage	Minor	The grid voltage exceeds the upper threshold or the high voltage duration has lasted for more than the value specified by high voltage ride-through (HVRT).	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the WEB and APP with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and cannot be rectified for a long time, contact the power operator.
1011	Grid undervoltage	Minor	The grid voltage is below the lower threshold or the low-voltage duration has lasted for more than the value specified by low voltage ride-through (LVRT).	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the WEB and APP with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and cannot be rectified for a long time, contact the power operator.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Trouble shooting
1012	Grid over frequency	Minor	Power grid exception: The actual power grid frequency is higher than the requirements for the local power grid code.	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the WEB and APP with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and cannot be rectified for a long time, contact the power operator.
1013	Grid under frequency	Minor	Power grid exception: The actual power grid frequency is lower than the requirements for the local power grid code.	<ol style="list-style-type: none"> 1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the WEB and APP with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and cannot be rectified for a long time, contact the power operator.
1014	AC-grid output overcurrent	Minor	The power grid voltage drops dramatically or the power grid is short circuited. As a result, the inverter transient output current exceeds the upper threshold, and protection is triggered.	<ol style="list-style-type: none"> 1. The inverter monitors its external operating conditions in real time and automatically recovers after the fault is rectified. 2. If the alarm persists and affects the energy yield of the power plant, check whether the output is short circuited. If the fault persists, contact your dealer or technical support.
1015	AC-backup output overcurrent	Minor	The backup load power exceeds the upper threshold.	<ol style="list-style-type: none"> 1. Try to reduce the load power; 2. If it doesn't work out, contact your dealer or technical support.
2001	Power module over temperature	Major	<ol style="list-style-type: none"> 1. The installation position of the battery power control module is not well ventilated. 2. The ambient temperature is excessively high. 3. The battery power control module is abnormal. 	<ol style="list-style-type: none"> 1. Check the ventilation and whether the ambient temperature of the power control module exceeds the upper threshold. 2. If the ventilation is poor or the ambient temperature is excessively high, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature are normal, contact your dealer or technical support.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Trouble shooting
2002	Low battery DC input bus voltage	Major	1. The DC bus voltage of the battery is low. 2. The battery DC switch is OFF. 3. The battery cables are not correctly connected.	1. If the alarm occurs occasionally, the power grid may be abnormal temporarily. The inverter automatically recovers after detecting that the power grid becomes normal. 2. If the alarm persists, check whether the power grid voltage is within the acceptable range. If not, contact the local power operator. If yes, modify the grid overvoltage protection threshold through the WEB and APP with the consent of the local power operator. 3. Check whether the peak voltage of the power grid is too high. If the alarm persists and cannot be rectified for a long time, contact the power operator.
2003	Battery expansion module undervoltage	Major	The voltage of a battery expansion module is low.	If the sunlight is insufficient or AC reverse charging is allowed, the battery expansion modules can be charged when the inverter is running.
2004	Power module reversely connected	Major	The positive and negative terminals are reversely connected when the power module connects to the inverter.	1. Turn off the inverter AC output switch, inverter DC input switch, and battery DC switch, and wait for 5 minutes. 2. Check the cable connections to the power control module by referring to the quick installation guide. 3. After checking that the battery power cables are correctly connected, turn on the battery DC switch, AC output switch, and inverter DC input switch in sequence. 4. If the alarm persists, contact your dealer or technical support.
2005	Abnormal BMS communication	Major	The power module fails to communicate with the battery expansion modules.	1. Turn off the battery DC switch. 2. Check that the power cables and communications cables are correctly connected to the battery expansion modules. 3. After checking that cables are correctly connected, turn on the battery DC switch. 4. If the alarm persists, contact your dealer or technical support.
2006	Equipment fault	Major	An unrecoverable fault occurs on a circuit inside the device.	Turn off the DC switch, and then turn them on after 5 minutes. If the alarm persists, replace the monitoring board or contact your dealer or technical support.
2007	Black start-up failed	Major	1. The battery level is less than 10%. 2. The energy storage DC switch is not turned on.	1. Turn off the PV switch and AC output switch, and wait for 1 minute for the device to turn off all LED lights. 2. Turn on the PV switch and AC output switch, and start black again.

Alarm ID	Alarm Name	Alarm Severity	Possible Cause	Trouble shooting
2008	Battery reversal connection	Major	Battery reversal connection	Check whether the battery is reversely connected to the power module. If so, turn off the DC switch and correct the battery polarity.
3001	Battery Pack Undervoltage	Minor	<ol style="list-style-type: none"> 1. The voltage of the battery pack or its cell is too low. 2. The battery pack has been stored for a long period of time. 3. The battery pack has been idle for a long time after grid connection. 	<ol style="list-style-type: none"> 1. Connect to the power grid and charge batteries in a timely manner. 2. If the alarm persists after the battery has been charged for one hour, contact your dealer or technical support.
3002	Battery module over temperature	Minor	<ol style="list-style-type: none"> 1. The battery installation position is not well ventilated. 2. The ambient temperature is excessively high. 3. The battery power control module is abnormal. 	<ol style="list-style-type: none"> 1. Check the ventilation and whether the ambient temperature of the battery expansion modules exceeds the upper threshold. 2. If the ventilation is poor or the ambient temperature is excessively high, improve the ventilation and heat dissipation. 3. If the ventilation and ambient temperature are normal, contact your dealer or technical support.
3003	Battery module low temperature	Major	<ol style="list-style-type: none"> 1. The ambient temperature is excessively low. 2. A battery expansion module is abnormal. 	<ol style="list-style-type: none"> 1. Check whether the ambient temperature in the installation positions of the battery expansion modules is lower than the lower threshold. 2. If the ambient temperature is excessively low, improve the installation environment. 3. If the alarm persists after the ambient temperature becomes normal, contact your dealer or technical support.

10. HANDLING THE INVERTER

10.1 Removing the inverter

NOTICE

Before removing the inverter, power off the AC and DC (batteries).

Perform the following operations to remove the inverter:

1. Disconnect all cables from the inverter, including RS485 communications cables, DC input power cables, AC output power cables, and PGND cables.
2. Remove the inverter from the mounting bracket.
3. Remove the mounting bracket.

10.2 Packing the inverter

- If the original packing materials are available, put the inverter inside them and then seal them by using adhesive tape.
- If the original packing materials are not available, put the inverter inside a suitable cardboard box and seal it properly.


10.3 Disposing of the inverter

If the inverter service life expires, dispose of it according to the local disposal rules for electrical equipment waste.

11.TECHNICAL DATA

Model	M1-S3K	M1-S3.68K	M1-S4K	M1-S4.6K	M1-S5K	M1-S6K
DC Input (PV)						
Max. PV array power (Wp)	6000	7400	8000	9200	10000	12000
Max. PV input power (Wp)	4500	5500	6000	6900	7500	10000
Max. input voltage (V)	600					
MPPT operating voltage range (V)	60~550					
Start-up voltage (V)	75					
Rated input voltage (V)	360					
Max. input current (input PV1 /input PV2)	16/16					
Max. short-circuit current	20/20					
No. of MPP trackers / Strings per MPP tracker	2					
Battery connection						
Battery type	Li-ion					
Voltage range (V)	85-460					
Max. charge current (A)	30					
Max. discharging current (A)	30					
Max. charge power (W)	4500	5500	6000	6000	6000	6000
max. discharge power (W)	3000	3680	4000	4600	5000	6000
AC Output Data (on-grid)						
Nominal AC output power (W)	3000	3680	4000	4600	5000	6000
Max. AC output apparent power (VA)	3300	3680	4400	5000	5500	6000
Nominal Output Current(A)	13.0	16.0	17.4	20.0	21.7	26.1
Max. AC output current (A)	15.0	16.0	20.0	23.0	25.0	27.3
Max. AC input apparent power (VA)	6300	7360	8400	9600	10000	10000
Max. AC input current (VA)	27.4	32.0	36.5	41.7	43.5	43.5
Nominal AC voltage (V)	220Vac /230Vac/ 240Vac,L/N/PE					
Nominal AC Grid Frequency (Hz)	50 /60					
Adjustable power factor	0.8 leading ... 0.8 lagging					
Max. total harmonic distortion	≤3%					
AC Output Data (back-up)						
Nominal output power (W)	3000	3680	4000	4600	5000	6000
Max. continous current (A)	13.0	16.0	17.4	20.0	21.7	26.1
Nominal voltage (V)	230Vac,L/N/PE					
Frequency (Hz)	50/60					
General Data						
Operating temperature range (°C)	-25°C to + 60°C(Derating above 45°C @ Rated output power)					
Weight (kg)	24.5					
Max. operating altitude (m)	4000					
Dimension(W/H/D) (mm)	485/450/187					
Degree of protection	IP66					

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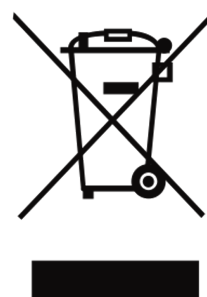
All the described functions and instructions were up to date at the time of printing this manual. However, the actual product may vary due to improved functions and designs.

13. DISPOSAL AND RECYCLING

Important instructions for environment(European Disposal Guidelines)

Compliance with the WEEE Directive and Disposing of the Waster Product:
This product complies with EU WEEE Directive. This product bears a classification symbol for waster electrical and electronic equipment (WEEE).

This symbol indicates that this product shall not be disposed with other household wastes at the end of its service life. Used device must be returned to official collection point for recycling of electrical electronic devices. To find these collection systems please contact to your local authorities or retailer where the product was purchased. Each household performs important role in recovering and recycling of old appliance. Appropriate disposal of used appliance helps prevent potential negative consequences for the environment and human health.



14.DATA PROTECTION NOTICE

For the provision of the services agreed with the customer, we agree to comply without restriction with all stipulations of applicable data protection law, in line with agreed countries within which services to the customer will be delivered, as well as, where applicable, the EU General Data Protection Regulation (GDPR).

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2.尺寸：A4

3.颜色：黑白

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