X1-Hybrid-LV

User Manual

X1-Hybrid-3.0-LV / X1-Hybrid-3.7-LV / X1-Hybrid-4.0-LV
X1-Hybrid-4.6-LV / X1-Hybrid-5.0-LV / X1-Hybrid-6.0-LV

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Change History

Changes between document versions are cumulative. The latest version contains all updates made in previous versions.

Version 01 (October.18, 2023)
Updated the content in the parallel connection diagram: up to 10 inverters can be connected in a system.

Version 00 (September.27, 2023)
Initial release

Table of Contents

1 Note on this Manual

1.1 Scope of Validity

This manual, an integral part of X1-Hybrid-LV, provides information on the proper installation, commissioning, maintenance and troubleshooting for the inverter. Follow these instructions to help ensure that the inverter performs properly. Failure to follow these instructions can significantly affect the inverter's performance and reliability, and may adversely affect the equipment warranty. Please read it carefully.

X1-Hybrid-3.0-LV	X1-Hybrid-3.7-LV	X1-Hybrid-4.0-LV
X1-Hybrid-4.6-LV	X1-Hybrid-5.0-LV	X1-Hybrid-6.0-LV

Note: "X1-Hybrid-LV" Series, an energy storage inverter, supports photovoltaic grid-connected.

"3.0" indicates 3.0 kW, as well as 3.7, 4.0, 4.6, 5.0 and 6.0.

"LV" indicates low voltage.

Please keep the user manual properly.

1.2 Target Group

This manual is for qualified electricians. The tasks described in this manual only can be performed by qualified electricians.

1.3 Symbols Used

The following types of safety instructions and general information appear in this document as described below:

Danger!

"Danger" refers to a dangerous situation that, if not avoided, will result in a high level of risk such as serious injury or even death.

Warning!

"Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Caution!

"Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

Note!

"Note" provides tips that are valuable for the optimal operation of our product.

2 Safety

2.1 Important Safety Instructions

Danger!

Danger to life due to high voltages in the inverter!

The personnel responsible for the installation, electrical connection, debugging, maintenance and fault handling operation of this product need to be trained, master the correct operation method, have the corresponding electrician qualification and safety operation knowledge.

Caution!

When the inverter is working, it is strictly forbidden to touch the shell. The temperature of the shell can be high and there is a risk of scalding.

Caution!

Radiation may be harmful to health!

Do not stay for a long time and keep at least 20 cm away from the inverter.

Attention!

Ground PV system.

Perform PV modules and photovoltaic system grounding in accordance with local requirements to achieve optimal protection of systems and personnel.

Warning!

Ensure that the input DC voltage is below the inverter limit.

Excessive DC voltage and current may cause permanent damage or other losses to the inverter, which is not covered by the warranty.

Warning!

Authorized service personnel must disconnect the AC and DC power supply of the inverter before performing any maintenance, cleaning or operation of any circuit connected to the inverter.

Danger!
The inverter can not be operated when it is running.

Warning!
Risk of electric shock!

Strictly follow relevant safety specifications for product installation and testing. During installation, operation or maintenance, read carefully and follow the instructions and precautions on the inverter and user manual. If the operation is incorrect, it may cause personal and property losses. Keep the user manual properly after use.

This inverter can only use the accessories sold and recommended by us, otherwise it may cause fire, electric shock or casualties.
Without the authorization of our company, you may not open the inverter cover or replace the inverter parts, otherwise the warranty promise of the inverter will be invalid.

The use and operation of the inverter must be carried out in accordance with the instructions in this manual, otherwise this protection will fail and the warranty of the inverter will also fail.
During working, the inverter surface temperature may exceed 60°C, make sure the inverter cools down before touching, and make sure children can not touch.

When exposed to sunlight, photovoltaic arrays generate dangerous high DC voltages. Follow our instructions, otherwise it will be life-threatening.

All DC and AC power sources must be disconnected from the inverter for at least 5 minutes before any wiring or electrical operation is performed on the inverter to ensure complete isolation of the inverter and avoid electric shock.

A photovoltaic module used on the inverter must have a IEC61730A rating, and the total open circuit voltage of the photovoltaic string / array is lower than the maximum rated DC input voltage of the inverter. Any damage caused

by photovoltaic over voltage is not covered by warranty.

Installation position should be away from wet environment and corrosive substances.

After the inverter and power grid cut off the PV power supply, there will be a certain amount of residual current in a short time, be cautious or it may lead to serious personal injury and even high risk of death. Use a multimeter (impedance at least 1 MΩ) to measure the voltage between the UDC and the UDC- to ensure that the inverter port is discharged below the safe voltage before starting operation (35 VDC).

■ Surge protection devices (SPDs) for PV installation

Warning!

Over-voltage protection with surge arresters should be provided when the PV power system is installed.
The grid connected inverter is fitted with SPDs in both PV input side and MAINS side.

Direct or indirect lightning strikes can cause failures. Surge is the main cause of lightning damage to most devices. Surge voltage may occur at photovoltaic input or AC output, especially in remote mountain areas where long distance cable is supplied.

Consult professionals before installing SPDs.

The external lightning protection device can reduce the influence of direct lightning strike, and the lightning protection device can release surge current to the earth.

If the building installed with external light protection device is faraway from the inverter location, in order to protect the inverter from electrical and mechanical damage, the inverter should also install an external lightning protection equipment.

In order to protect DC system, two-stage surge protection equipment is needed between DC cable of inverter and photovoltaic equipment module.

In order to protect the AC system, the level 2 surge protection equipment should be installed at the AC output, located between the inverter and the grid. Installation requirements must comply with IEC61643-21 standard.

All DC cables shall be installed in a distance as short as possible, and the positive and negative cables of the same input need to be bundled together to avoid causing loops in the system. Minimum distance installation and binding requirements also apply to auxiliary grounding and shielding grounding conductors.

■ Anti-islanding Effect

The islanding effect means that when the power grid is cut off, the grid-connected power generation system fails to detect the power outage and still supplies power to the power grid. This is very dangerous for the maintenance personnel and the power grid on the transmission line.

This inverter use active frequency offset method to prevent islanding effect.

■ PE Connection and Leakage Current

• All inverter incorporate a certified internal Residual Current Device (RCM) in order to protect against possible electrocution and fire hazard in case of a malfunction in the PV array, cables or inverter. There are 2 trip thresholds for the RCM as required for certification (IEC 62109-2:2011).

• The default value for electrocution protection is 30mA, and for slow rising current is 300mA.

• The inverter, with built-in RCM, will exclude possibility of DC residual current up to 6mA.

• Check which type of RCD is required for the relevant grid code in your region. We strongly recommends to use an RCD Type B on the line connecting to the house loads.

Warning!
High leakage current!
Earth connection essential before connecting supply.

• A faulty ground connection can result in equipment failure, personal and death injuries, and electromagnetic interference.

• Ensure correct grounding according to IEC62109 and conductor diameter

according to STANDARD specification.

• Do not connect the grounding end of the equipment in series to prevent multi-point grounding.

• Electrical appliances must be installed in accordance with the wiring rules of each country.

For United Kingdom

• The installation that connects the equipment to the supply terminals shall comply with the requirements of BS 7671.

• Electrical installation of PV system shall comply with requirements of BS 7671 and IEC 60364-7-712.

• All protective devices cannot be changed.

• User shall ensure that equipment is so installed, designed and operated to maintain at all times compliance with the requirements of ESQCR22(1)(a).

■ Battery Safety Instructions

This inverter should pair with high voltage battery, for the specific parameters such as battery type, nominal voltage and nominal capacity etc., please refer to 4.4 Battery Data.

Refer to the matching battery specification for details.

2.2 Explanation of Symbols

This section gives an explanation of all the symbols shown on the inverter and on the type label.

■ Symbols on the Inverter

Symbols	Explanation
	Operating Display
	Battery status
	An error has occurred, inform your installer immediately.

■ Symbols on the Type Label

Symbols	Explanation
	CE mark. The inverter complies with the requirements of the applicable CE guidelines.
	UKCA mark. The inverter complies with the requirements of the applicable UKCA guidelines.
	Observe enclosed documentation.
	TUV certified.
	RCM remark
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger of high voltages. Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	The inverter can not be disposed together with the household waste. Disposal information can be found in the enclosed documentation.
	Do not operate this inverter until it is isolated from battery, mains and on-site PV generation suppliers.
	Danger to life due to high voltage. There is residual voltage existing in the inverter after powering off, which needs 5 min to discharge. Wait 5 min before you open the upper lid or the DC lid.

2.3 CE Directives

This section describes the requirements of the European low voltage regulations, including safety instructions and system licensing conditions, the user must comply with these regulations when installing, operating, and maintaining the inverter, otherwise personal injury or death may occur, and the inverter will be damaged.

Please read the manual carefully when operating the inverter .If you do not understand "Danger", "Warning", "Caution" and the description in the manual, please contact the manufacturer or service agent before installing and operating the inverter.

Make sure that the whole system complies with the requirements of EC(2014/35/EU, 2014/30/EU, etc.) before starting the module (i.e. to start the operation).

Standard of 2014/35/EU (LVD)
EN IEC 62109-1; EN IEC 62109-2
EN 62477-1
Standard of 2014/30/EU (EMC)
EN IEC 61000-6-1; EN IEC 61000-6-2;
EN IEC 61000-6-3; EN IEC 61000-6-4;
EN IEC 61000-3-2; EN 61000-3-3;
EN IEC 61000-3-11; EN 61000-3-12
EN 55011

The assembly shall be installed in accordance with the statutory wiring rules. Install and configure the system in accordance with safety rules, including the use of specified wiring methods. The installation of the system can only be done by professional assemblers who are familiar with safety requirements and EMC. The assembler shall ensure that the system complies with the relevant national laws. The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No. 70 or VDE regulation 4105.

3 Introduction

3.1 Basic Features

The series inverter is a high-quality inverter which combines solar inverter, solar charger, AC charger and emergency power supply (EPS) function together with IP65 degree of protection. The inverter can be used to optimize self-consumption, stored in batteries for future use or fed into the public grid. The way it works depends on user preferences.

3.2 System Diagram

The series of inverters are designed to have two EPS wiring schemes. Customers can choose between EPS compatible parts for loads and EPS compatibility for all load uses. There are different wiring methods in different countries. One method is to connect the N line with the PE line, while the other method is to separate the line wiring from the PE line. Please refer to the diagram below:

Diagram A: Neutral line and PE line are separated from each other, and the emergency load is connected to the EPS port; (For most countries)

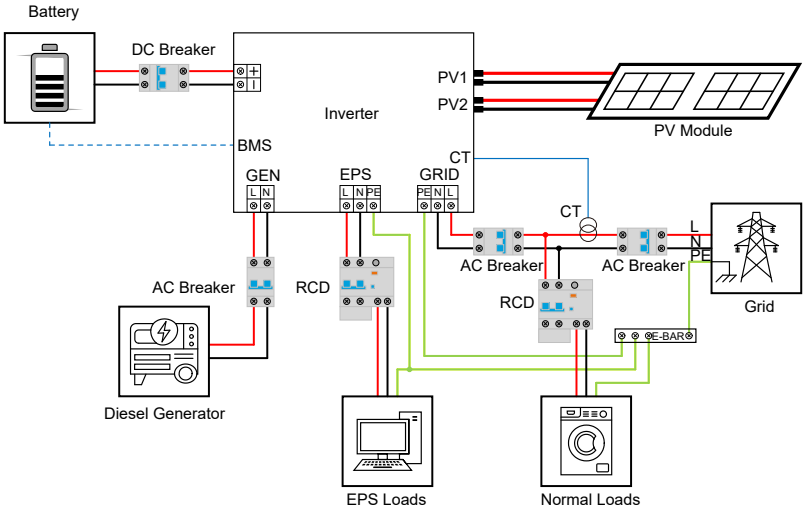
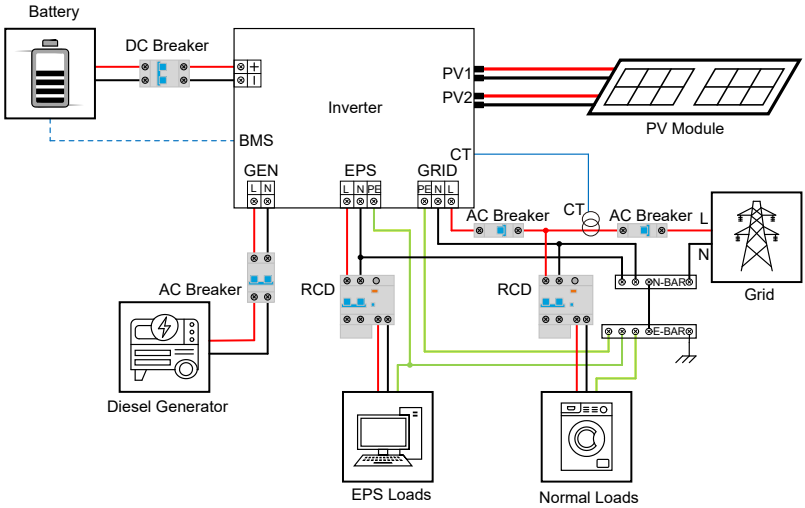


Diagram B: Neutral line and PE line are combined together, and the emergency load is connected to the EPS port. (For Australia)



Notice!

When power cuts suddenly, the inverter connects the N line of EPS load with the ground through relay, providing a fixed zero potential for EPS load and ensuring the safety of electricity use by users.

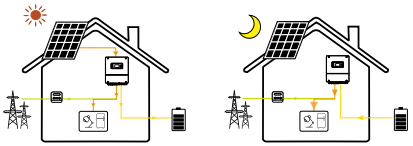
Ensure that the EPS load rated power is within the EPS rated output power range, otherwise, the inverter will report an **overload** warning.

Please confirm with the grid operator whether there are special regulations for grid connection.

3.3 Work Mode

There are a six work modes of the inverter based on different needs. Please note that SUB mode, SBU mode and MKS mode can only work under Pakistani Safety.

■ Self consumption mode



Self consumption mode	**The charging and discharging strategy of EMS battery:** This mode is suitable for the time when the electricity price is high and the internet is not allowed. This mode requires the installation of an electric meter. 1. The battery is in a state of real-time charging and discharging. The charging and discharging power of battery depends on PV power, load power and rated power of inverter. The goal is to always try to control the power of the electric meter to 0, that is, to make the output power of the inverter equal to the load power (or to control it to the set minimum power to take electricity from the power grid). 2. Electricity meter data is needed in this state. Zero-export is forced to be enabled, and it is not allowed to feed power into the power grid; 3. In this state, it is necessary to set the battery reserve SOC (if the battery is set to this SOC, it will stop discharging, and this SOC value can be set). 4. If the battery power is lower than the minimum SOC value (which can be set), the battery is forced to be charged to the reserved SOC.
	Notes: PV power is superior to power supply to the load, and the battery can be charged and discharged, but it can only be charged from PV. 1. When load power > inverter rated power: The PV power < inverter rated power, and the battery discharge power value = PV power-inverter rated power; *PV power > inverter rated power, battery charging power value = PV power-inverter rated power; 2. When the load power is less than the inverter rated power: *PV power < load power, battery discharge power value = PV power-load power; *PV power > load power, battery charging power value = PV power-load power; * This state of zero-expor is forced to be enabled. When the PV power > [battery charging power value+load power] the remaining power is not allowed to be fed into the power grid, and PV limits the power so that PV power = [battery charging power value+load power].

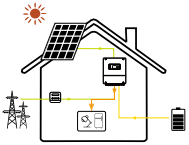
■ Surplus feed in tariff mode

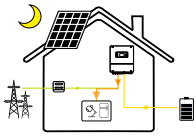
Surplus feed in tariff mode	**The charging and discharging strategy of EMS battery:** This model is suitable for the application scenarios where the electricity price is high, the surplus electricity is allowed to access the Internet, and there is less subsidy for accessing the Internet. The residual electricity here refers to the amount of electricity that PV needs to charge the battery and load. This mode requires the installation of an electric meter. 1. The only difference between this mode and Self consumption mode is that when PV power > battery charging power+load power, PV does not limit power, but feeds surplus power into the power grid; 2. In this state, electricity meter data is needed, and zero-export is invalid, allowing power to be fed into the power grid (the percentage can be set). 3. In this state, the battery reserve SOC needs to be set. When the battery reaches this SOC level, it will stop discharging. This SOC value can be set. 4. If the battery power is lower than the minimum SOC value (which can be set), the battery is forced to be charged to the reserved SOC.
	Notes: - Same as Self consumption mode. - When the PV power > [battery charging power value+load power], the remaining power is fed into the power grid.

■ Full feed in tariff mode

Full feed in tariff mode	**The charging and discharging strategy of EMS battery:** This mode is suitable for application scenarios with high Internet subsidies. Selecting this mode alone does not need to install an electric meter, but the PV should be oversized and good illumination is needed, otherwise the battery will not have a charging opportunity.
	Notes: * PV power > inverter rated power, battery charging power value = PV power-inverter rated power;.* PV power < inverter rated power, battery discharge power value = [PV power-inverter rated power].

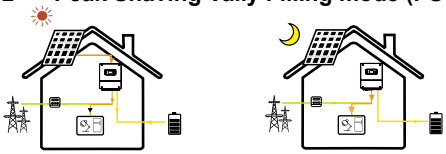
■ Priority feed in tariff mode





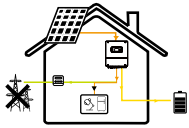
Priority feed in tariff mode	**The charging and discharging strategy of EMS battery:** This mode is suitable for the application scenarios with high electricity price and internet subsidy. If this mode is selected, the PV should be oversized and good lighting conditions are needed, otherwise the battery will have less charging opportunities and be prone to power loss. This mode requires the installation of an electric meter. 1. The PV power is preferentially fed to the grid. The battery can be charged and discharged, but it can only be charged when the PV power is greater than the rated power of the inverter. 2. When the PV power is less than the load power, the battery is discharged to make the inverter output power equal to the load power. 3. Electricity meter data is required in this state, and zero-export enabling is invalid. 4. In this state, the battery reserve SOC needs to be set. When the battery reaches this SOC level, it will stop discharging. This SOC value can be set; 5. If the battery power is lower than the minimum SOC value (the preset value), the battery is forced to be charged to the reserved SOC.
	Notes: * PV power < load power < inverter rated power, battery discharge power value = [PV power-load power]. * PV power > load power < inverter rated power, battery charging and discharging power value = 0. * PV power < load power > inverter rated power, battery discharge power value = [PV power-inverter rated power]. * PV power > load power > inverter rated power, battery charging power value = PV power-inverter rated power.

■ Peak Shaving Vally Filling mode (PSVF)



Peak shaving and valley filling mode	**The charging and discharging strategy of EMS battery:** This mode is suitable for the period when the electricity consumption of the power grid is normal, the electricity price is normal and the online subsidy is less. Choosing this mode alone does not need to install an electric meter, but it needs to set a peak-off period or a valley-filling period.
	Notes: * PV power > inverter rated power, battery charging power value = PV power-inverter rated power. * PV power < inverter rated power, battery discharge power value = 0.

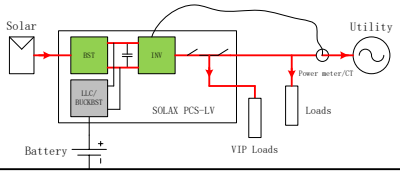
■ Backup Mode



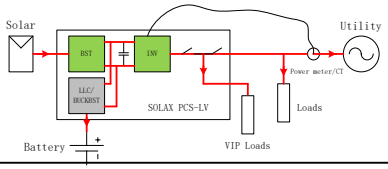
EPS mode	**The charging and discharging strategy of EMS battery:** This mode is suitable for using PCS as UPS or EPS. Using this mode alone does not require the installation of an electric meter. The battery is always fully charged when there is a power grid, so as to supply power to VIP load after the power grid fails. 1. In this state, whether there is PV or not, the battery is fully charged first, and the battery does not discharge; 2. In this state, when there is a power grid, the battery is always fully charged, which is suitable for using the energy storage system as backup power supply equipment when the power grid is cut off. 3. In this state, electricity meter data is needed, and zero-export is enabled effectively. 4. In this state, if the battery power is lower than the minimum SOC value (which can be set), the battery is forced to be charged to the reserved SOC.
	Notes: The PV power is superior to charging the battery, and the battery is only charged (PV and power grid have the same priority to charge the battery). * Battery charging power = maximum allowable charging power. If the PV power is less than the maximum allowable charging power of the battery, the remaining power will charge the battery from the power grid; * If the PV power is greater than the maximum allowable charging power of the battery, supply power to the load; if zero-expor is not enabled, when the PV power is greater than [battery charging power value+load power], the PV surplus power is fed into the power grid. If zero-export is enabled, PV limit power = maximum battery charging power+load power.

■ SUB mode

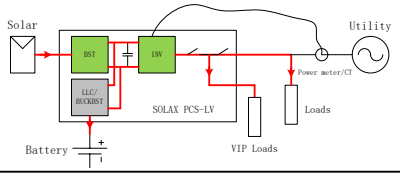
Sufficient Solar:
Solar power ≥(VIP Loads + Loads)power, but Solar power < Rated power of the PCS
Grid feeding is enabled.



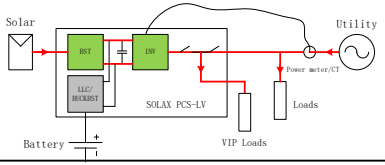
Sufficient Solar:
Solar power ≥(VIP Loads + Loads) power, and Solar power > Rated power of the PCS
Grid feeding is enabled.



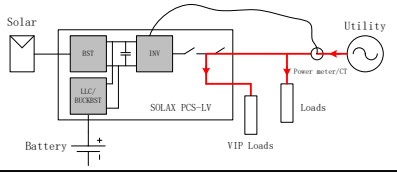
Sufficient Solar:
Solar power ≥(VIP Loads + Loads)power
Grid feeding is disabled: Solar power would be limited to equal to the loads power plus battery charging power.



Insufficient Solar:
Solar power <(VIP Loads + Loads)power
Solar and utility supply power to loads at the same time.



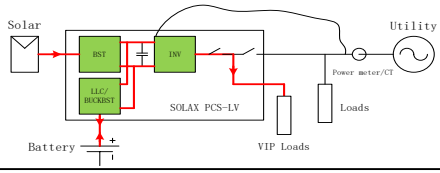
No Solar Availability:
Only utility supply power to loads.



Utility Unavailable

1. The PCS is running in the off-grid mode, and only VIP loads is supplied by PCS
2. If battery energy store is sufficient, VIP loads are powered. Otherwise, the PCS will be stop and VIP loads lose power
3. If solar power is higher than VIP loads power, surplus power will be charging the battery

(Here are same for all three modes of SUB , SBU and MKS)

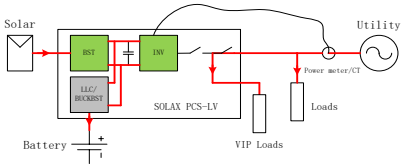


Sufficient Solar:

Charge the battery by solar power first and then utility power.

If solar power is not available, then charge the battery at the allowed maximum charging power by utility

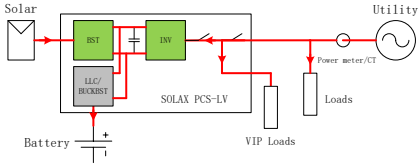
The end user could set this charging time period during electricity price is relatively low.



Charge the battery at the allowed maximum charging power by both solar power and utility power at the same time.

The end user could set this charging time period during electricity price is very low.

(Here are same for all three modes of SUB , SBU and MKS)



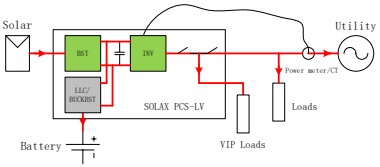
Charging Period:

To set the charging period, the battery charging source can be set to PV Only, PV Then Grid, or PV+Grid, with the option to set the Max Charge Current From Grid(A) for grid charging.

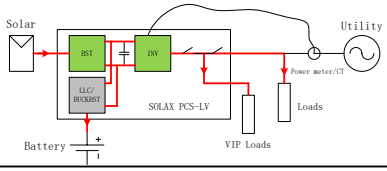
When the battery charging source is set to PV Only, only PV power is used to charge the battery, with any excess power being delivered to the load or grid. When the battery charging source is set to PV Then Grid, priority is given to using PV power to charge the battery, but if there is insufficient PV power available, grid power is used instead, with the power taken from the grid determined by the value set for Max Charge Current From Grid(A). When the battery charging source is set to PV+Grid, both PV and grid power are used together to charge the battery, with the power taken from the grid determined by the value set for Max Charge Current From Grid(A).

■ SBU mode

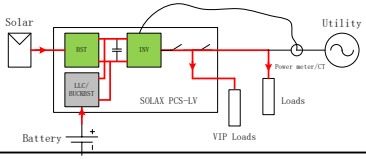
Sufficient Solar:
Solar power >(IP Loads + Loads + battery charging)power
Grid feeding is enabled. Solar power will never be limited. Battery will stop charge the power if the battery voltage reaches the maximum charge voltage



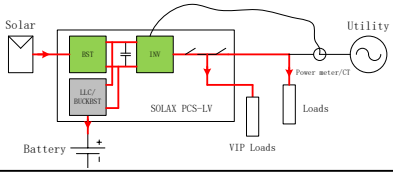
Grid feeding is disabled. Solar power would be limited to equal to the loads power plus battery charging power. Battery will stop charge the power if the battery voltage reaches the maximum charge voltage.



Insufficient Solar:
Solar power <(VIP Loads + Loads)power
Battery would discharge power to loads within its allows maximum discharging power. Battery will stop discharge the power if the battery voltage is below the minimum discharge voltage.



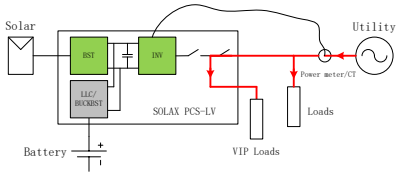
No Solar Availability:
Solar power ≥(VIP Loads + Loads)power
Battery would discharge power to loads within its allowed maximum discharging power. If loads power > battery discharging power, utility would supply power to loads at the same time. Battery will stop discharge the power if the battery voltage is below the minimum discharge voltage.



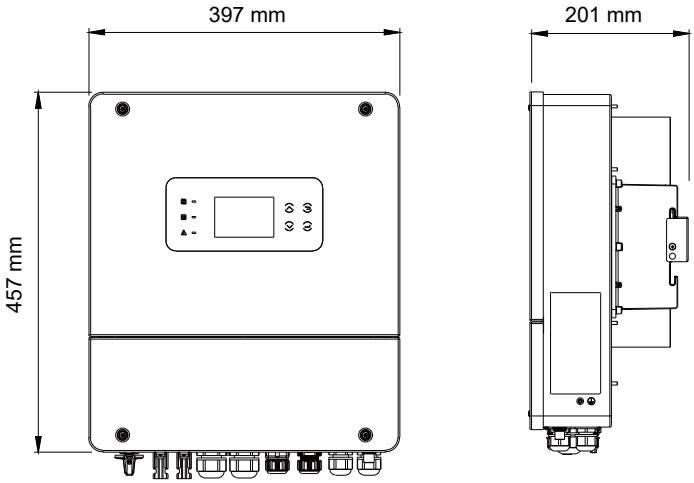
Utility Unavailable: Here are same for all three modes of SUB , SBU and MKS.

No Solar Availability: Here are same for all three modes of SUB , SBU and MKS.

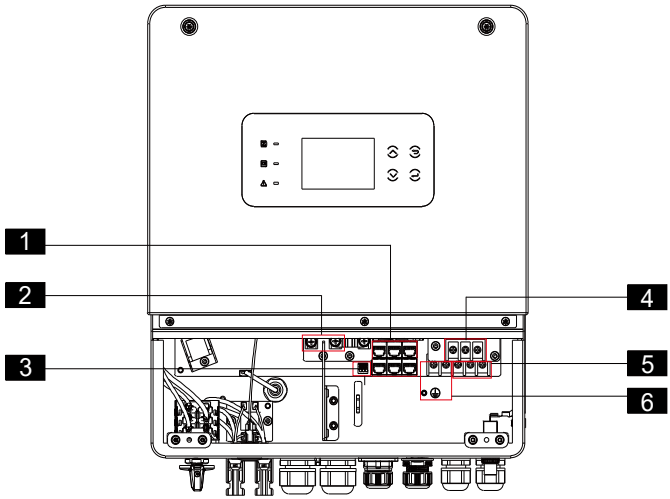
■ MKS mode

Sufficient Solar: Same as SBU mode.
Insufficient Solar: Same as SBU mode.
No Solar Availability: When no solar power is available, the battery would also stop discharging the power to loads at the same time no matter whatever the battery voltage is. The loads will be supply by utility at this moment 
Utility Unavailable: Here are same for all three modes of SUB , SBU and MKS.
No Solar Availability: Here are same for all three modes of SUB , SBU and MKS.

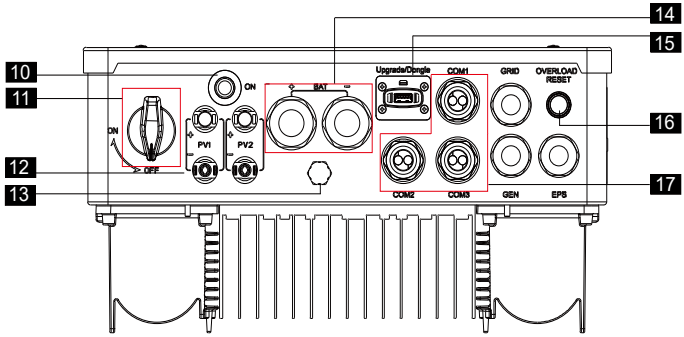
3.4 Dimensions



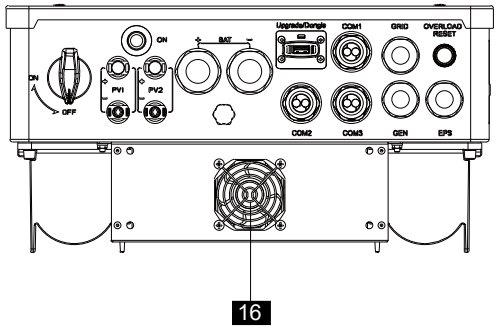
3.5 Terminals of Inverter



Object	Description
1	Communication ports
2	Battery input connectors
3	Dry-contact output
4	Grid
5	EPS
6	Generator input



Object	Description
10	Battery power on button
11	DC Switch
12	PV input with two MPPT
13	Waterproof valve
14	BAT+/BAT-
15	USB port for upgrading/External monitoring connection port
16	Overload reset button
17	COM1/COM2/COM3 (for communication connection)



Object	Description
16	Fan (Only for X1-Hybrid-5.0-LV and X1-Hybrid-6.0-LV)

Warning!

Qualified electrician required for the installation.

4 Technical Data

4.1 DC Input

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Max. PV array power [Wp]	4500	5500	6000	6900	7500	9000
Max. PV input voltage [V]	550					
Start output voltage[V]	110					
Nominal input voltage [V]	360					
MPPT voltage range[V]	80 ~ 520					
No. of MPPT/Strings per MPPT	2(1/1)					
Max. input current[A]	16/16					
Max. short circuit current[A]	20/20					
MPPT Voltage Range[V](Full Load)	115 ~ 440	140 ~ 440	150 ~ 440	175 ~ 440	190 ~ 440	230 ~ 440

4.2 AC Input&Output

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Nominal AC Output Current[A]	13	16	17.4	20	21.7	26.1
Nominal AC output power[W]	3000	3680	4000	4600	5000	6000
Max. AC output apparent power[VA]	3300	3680	4400	4600 (Germany 4600)	5000	6000
Max. AC output current [A]	15	16	20	20.9 (Germany 20)	22.7	27.3
Max. AC input apparent power [VA]	6000	7360	8000	9200	9200	9200
Max. AC input current [A]	26.1	32	34.8	40	40	40
Nominal voltage [V], frequency [Hz]	220/230/240, 50/60					
Displacement power factor	0.8 leading ~ 0.8 lagging					
THDi (rated power) [%]	<3					
AC Connection	L/N/PE					
DC Disconnection Switch	Optional					

4.3 EPS Output

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Nominal output power [W]	3000	3680	4000	4600	5000	6000
Peak apparent power[VA][1]	2 times the rated power,10s					
Nominal Output Current[A]	13	16	17.4	20	21.7	26.1
Nominal voltage [V], frequency [Hz]	230, 50/60					
Switch Time[ms]	<10					

4.4 Battery Data

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Battery type	Lithium/Lead-Acid					
Battery voltage range [V]	40~60					
Nominal Battery Voltage[V]	48					
Max. Charging Voltage[V]	<=60 (Adjustable)					
Max. Charging/Discharging Current[A]	75			120		
Charging Strategy for Li-Ion Battery	Self-adaption to BMS					
Charging Strategy for Lead-Acid Battery	3 stages curve					
Temperature Sensor	Optional					

4.5 System Data

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
MPPT Efficiency	>99.9%					
Max. efficiency [%]	97.6					
Euro. efficiency [%]	97.0					
Battery charge/discharge effciency [%][2]	96.0/95.0					

4.6 Protection Device

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Anti-Islanding Protection	Yes					
PV String Input Reverse Polarity Protection	Yes					
Insulation Resistor Detection	Yes					
Residual Current Monitoring Unit	Yes					
Output Over Current Protection	Yes					
Output Short Protection	Yes					
Output Over Voltage Protection	Yes					
Surge Protection	AC Type III/DC Type III					
Battery Terminal Temp Protection	Yes					

4.7 Power Consumption & Environment Limit

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Self Consumption(night) [W]	Standby < 40, Shutdown < 10					
Degree of protection	IP65					
Operating temperature range[℃]	-25 ~ +60 (derating above +45)					
Relative humidity [%]	0 ~ 100 (condensing)					
Max. operation altitude [m]	<3000					
Storage Temperature[℃]	-25 ~ +70					
Noise Emission(typical)[dB]	<39			<50		

4.8 General Data

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Dimensions(WxHxD) [mm]	397x490x201					
Net weight [kg]	16.5				17.5	
Cooling concept	Natural				Smart cooling	
Topology	Transformerless for PV Side/HF for battery Side					
HMI Interface	LED+LCD					
Communication interfaces	CAN, RS485, CT, Meter, WiFi, LAN, 4G (Optional), USB , NTC, wifi+lan, wifi+4G					

* The specific gross weight is subject to the actual situation of the whole machine, which may be a little different due to the influence of the external environment.

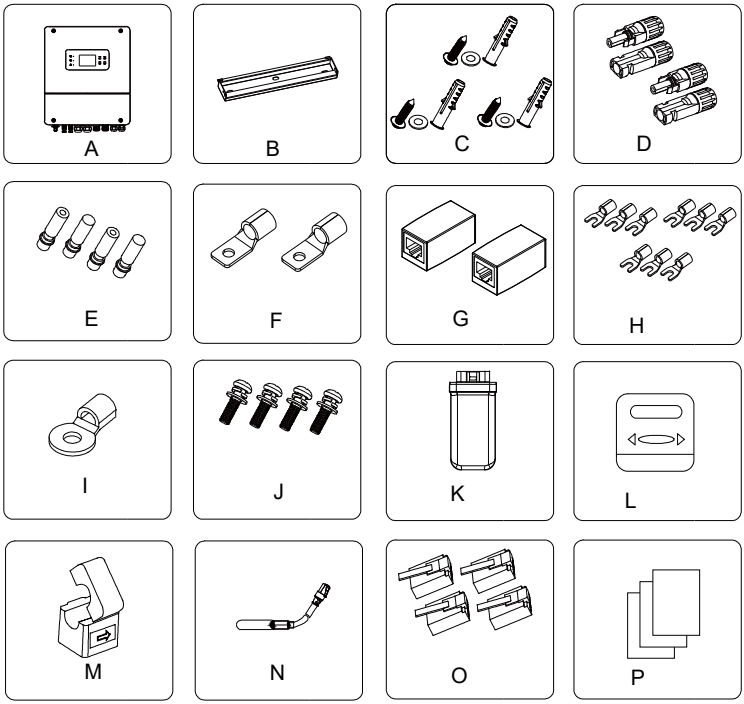
5 Installation

5.1 Check for Transport Damage

Ensure that the inverter is in good condition after delivery. If there is any visible damage such as cracks, contact the installer immediately.

5.2 Packing List

Open the package and check the materials and accessories according to the following list.



Number	Quantity	Description
A	1	Inverter
B	1	Bracket
C	3	(Expansion bolt, Gasket, Self-tapping bolt)
D	4	Positive & negative PV connector
E	4	Positive & negative PV pin contact
F	2	Battery connection terminal
G	2	RJ45 connector
H	9	Y terminals
I	1	OT terminal
J	4	Screw M4*12
K	1	WiFi dongle (optional)
L	1	Meter (optional)
M	1	CT
N	1	Battery temperature sensor
O	4	RJ45 terminals
P	/	Documents

* Please Refer to the actual delivery for the optional accessories.

5.3 Installation Precautions

The ingress protection level of the series inverters is IP65, so that the inverter can be installed outdoors.

Check the installation environment and pay attention to the following conditions when installing:

Do not install on flammable construction materials.

Do not install in proximity of flammable and explosive gases or liquids (e.g. where chemicals are stored).

Do not install in proximity of TV antennas or cables.

Do not place in areas above 3000 meters above sea level.

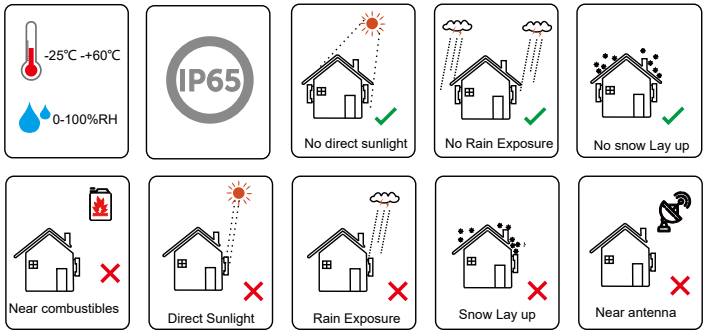
Do not install in areas directly exposed to precipitation, which may cause corrosion or damage Internal devices.

Keep the system out of reach of children.

If the inverter is installed in a narrow area, be sure to reserve appropriate space for heat dissipation.

The ambient temperature of the installation should be between -25°C ~ 60°C.

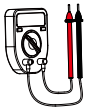
Avoid exposing the equipment to strong light, direct rain, and snow accumulation.

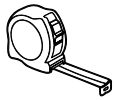


5.4 Tool preparation

5.4.1 Installation tools

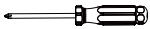

Hammer drill


Multimeter

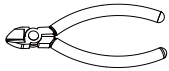

Measuring tape


Utility knife


Marker

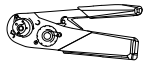

Cross screwdriver

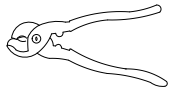

Flat-head screwdriver

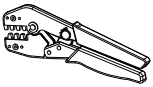

Diagonal plier

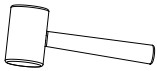

Wire stripper

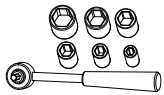

Crimping tool for RJ45


Crimping tool for PV terminal


Wire cutter


Crimping tool


Rubber mallet

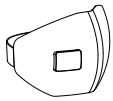

Torque wrench


Spirit level


Heat gun


Ø6 mm Heat shrink tubing


Safety goggles


Anti-dust mask


Safety gloves


Safety boots

5.4.2 Additionally required materials

No.	Required Material	Type	Conductor Cross-section
1	PV cable	Dedicated PV wire withstand voltage 600 V	4 mm^2
2	Communication cable	Network cable CAT5	0.2 mm^2
3	Additional PE cable	Conventional yellow and green wire	4 mm^2-6 mm^2
4	Battery power cable	Conventional copper wire	16-25mm^2 or 35-50 mm^2

Grid cable and micro-breaker recommended:

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable(copper)	4-6 mm^2	6-8 mm^2	6-8 mm^2	8-10 mm^2	8-10 mm^2	8-10 mm^2
Micro-Breaker	32A	40A	40A	50A	50A	50A

EPS cable and micro-breaker recommended:

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable(copper)	3-4 mm^2	3-4 mm^2	3-4 mm^2	4-6 mm^2	4-6 mm^2	6-8 mm^2
Micro-Breaker	25A	25A	25A	32A	32A	40A

GEN cable and micro-breaker recommended:

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Cable(copper)	3-4 mm^2	3-4 mm^2	3-4 mm^2	4-6 mm^2	4-6 mm^2	6-8 mm^2
Micro-Breaker	25A	25A	25A	32A	32A	40A

5.5 Installation Site Conditions

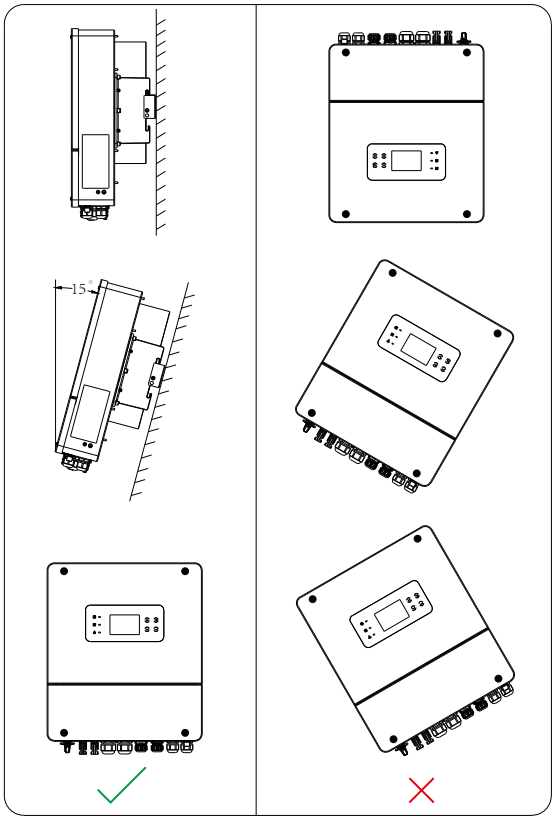
5.5.1 Installation Carrier Requirements

Install the inverter on a solid object that can withstand the weight requirements of the inverter and energy storage system.

Be careful not to install the inverter in the plasterboard wall or similar to the residential places with poor sound insulation, so as not to work with noise and interfere with the residents' life in the morning.

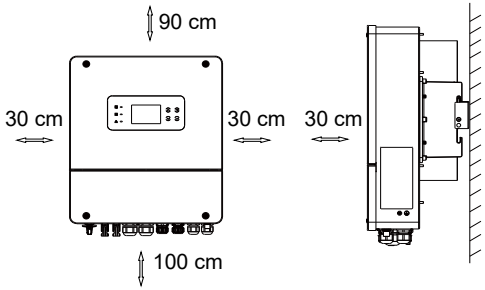
5.5.2 Installation Angle Requirements

Install the inverter at a maximum back tilt of 15 degrees, the inverter can not be tilted forward, installed upside down, excessively back tilted or side tilted.

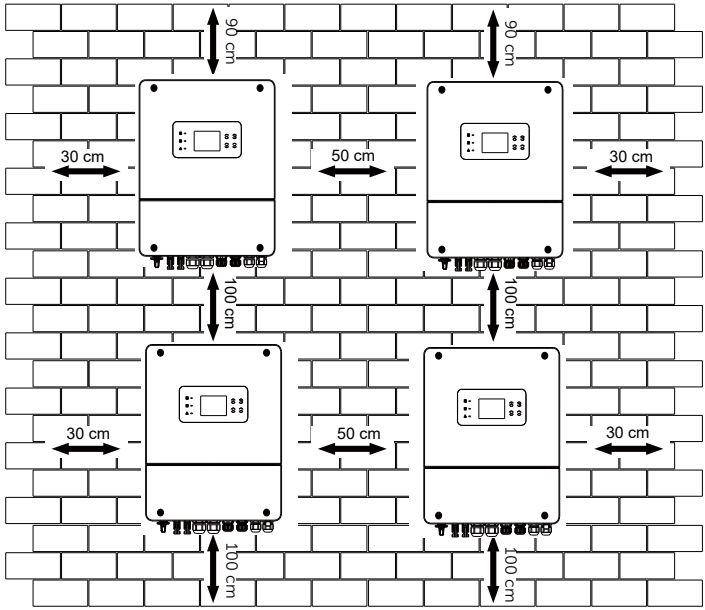


5.5.3 Installation Space Requirements

Reserve enough space when installing inverter (at least 30 cm) for heat dissipation. The heat dissipation space from inverter to the ground is 50 cm. It is recommended to install the inverter more than 100 cm above the ground.

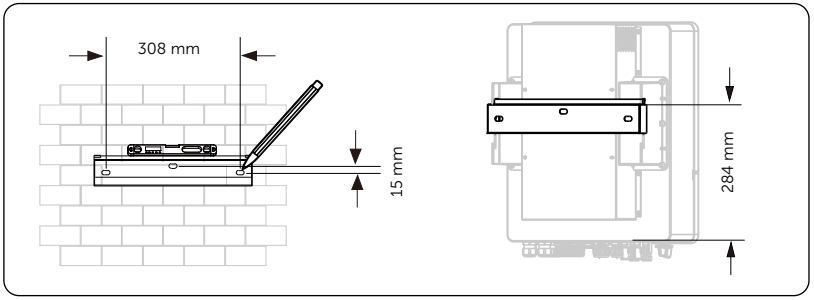


For multi-inverter installation scenarios, the inline installation method is recommended; it is not recommended to install multiple inverters in stacks. If you choose stack installation, please refer to the installation separation distance below.

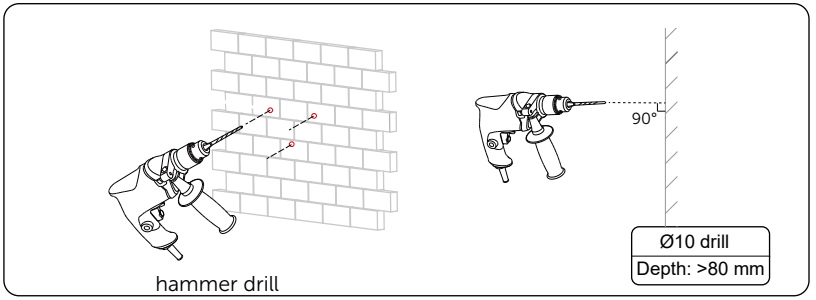


5.6 Mounting

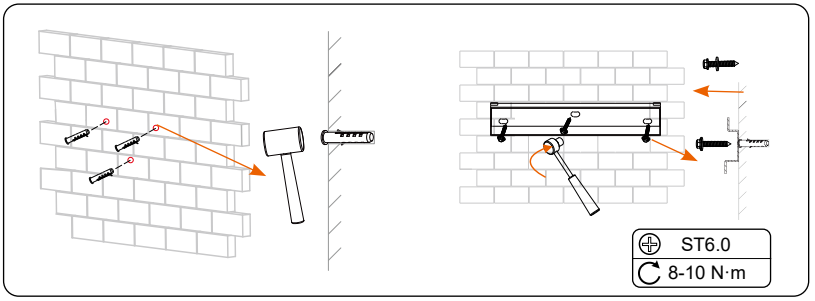
Step 1: Align the wall mounting bracket horizontally on the wall and mark the position of the drill holes. Take the height of the stacked battery into account when mounting the bracket. Observe the bubble of spirit level and adjust the wall bracket until the bubble stays in the middle.



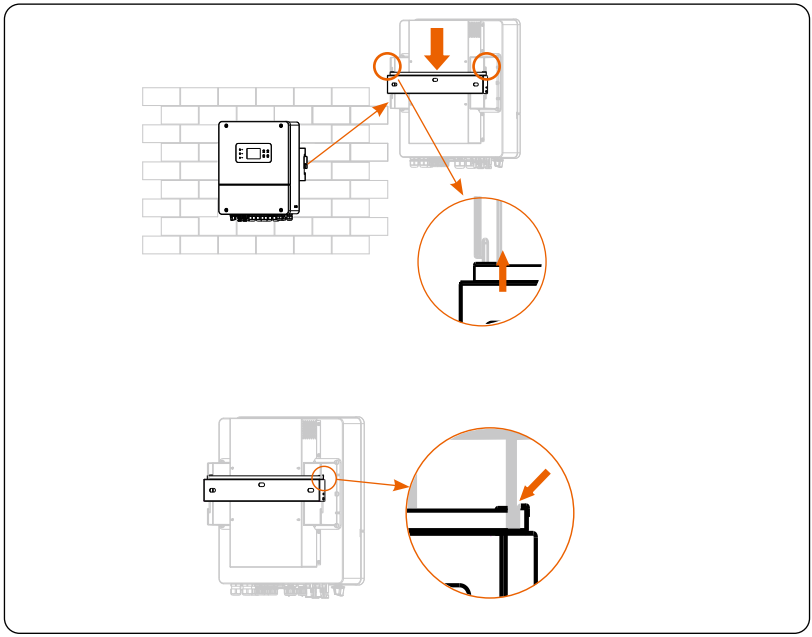
Step 2: Set the wall bracket aside and drill holes with Ø10 drill bit. The depth of the holes should be ＞ 80 mm. Do cover the inverter before drilling holes and clean up any dust in and around the holes using dust collector.



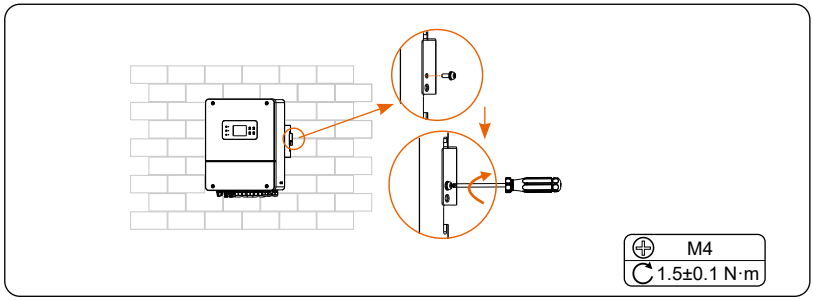
Step 3: Insert the expansion bolt into holes and secure the wall bracket to the wall withexpansion screws.



Step 4: Lift up the inverter by two installers and hang it on the wall bracket. The buckle on the back of the inverter must be hooked into the keyways of the wall bracket.



Step 5: Secure the inverter to the wall mounting bracket with M4 screw. Tight the M4 screws on both sides.



6 Electrical Connections

6.1 PV Connection

The series inverters have two PV inputs. Select photovoltaic modules with good performance and quality assurance. The open circuit voltage of the module array should be less than the maximum PV input voltage specified by the inverter, and the working voltage should be within the MPPT voltage range.

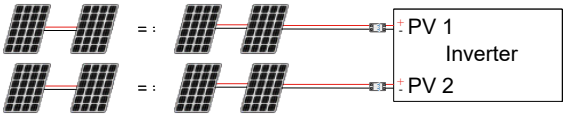
Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Max. PV input voltage	550V					
Start output voltage	110V					
Nominal input voltage	360V					
MPPT voltage range	80V ~ 520V					

Warning!
The voltage of photovoltaic modules is very high, and is dangerous voltage. When wiring, follow the safe electricity regulations.

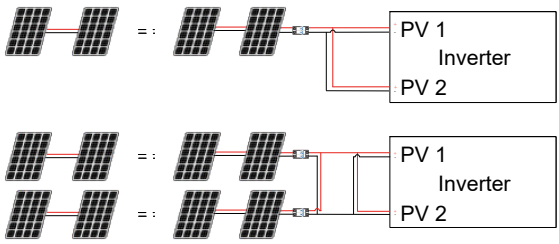
Caution!
Do not ground the positive or negative pole of the photovoltaic module!

Note!
The following PV module requirements need to be applied to each input range:
1. Same model
2. Same quantity
3. The same angle

Note!
The series inverters support the following PV module connection modes.
Method 1: Multi

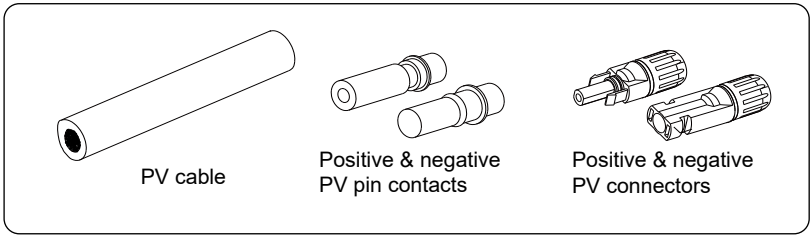


Method 2: Comm

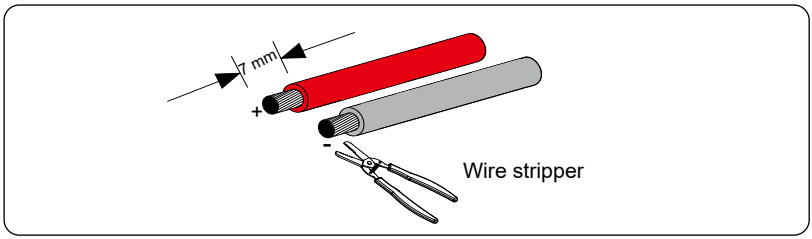


■ Connection steps

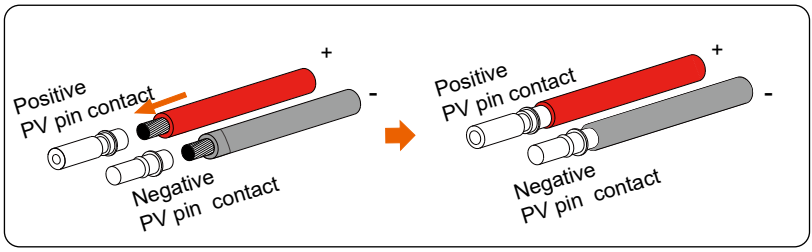
Step 1. Turn off the DC switch, prepare a 4 mm² PV cable, and find the PV (+) terminal and PV (-) terminal in the package.



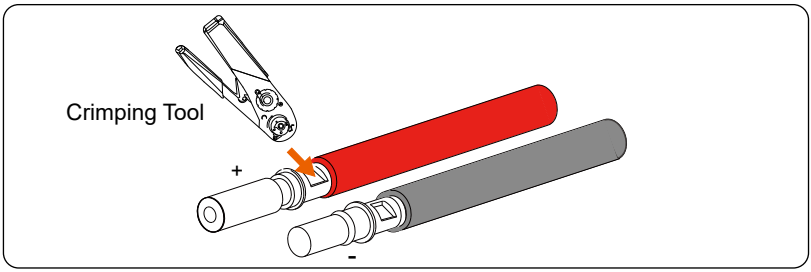
Step 2. Use a wire stripper to strip approx. 7 mm of the cable .



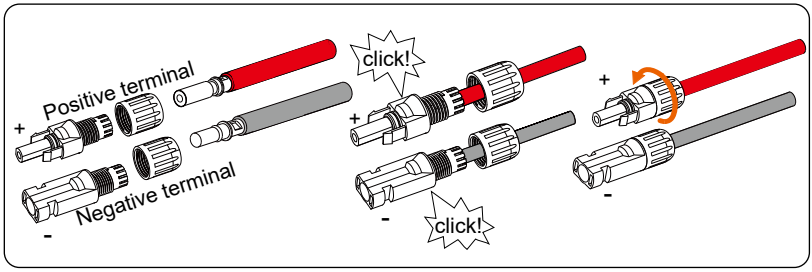
Step 3. Insert the stripped cable into the PV pin contact. Ensure that the stripped cable and the PV pin contact are of the same polarity.



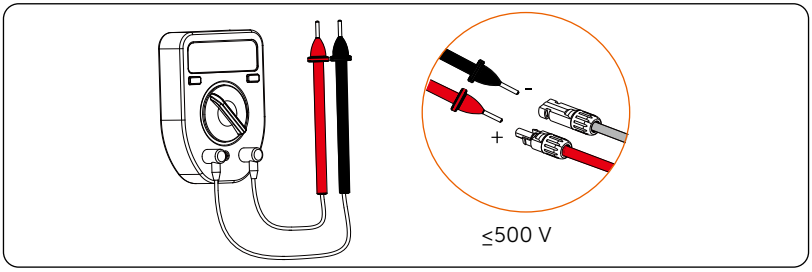
Step 4. Tighten the PV pin contact and the wiring harness to make the connection tight without looseness.



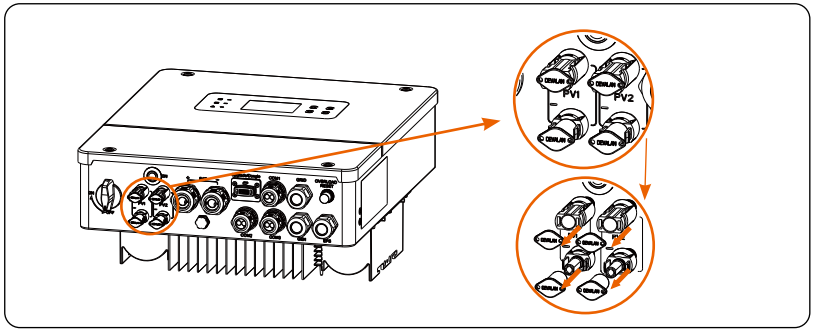
Step 5. Thread the PV cable through swivel nut and insert the cable into the PV connector until a "Click" is heard. Gently pull the cable backward to ensure firm connection. Tighten the swivel nut clockwise.



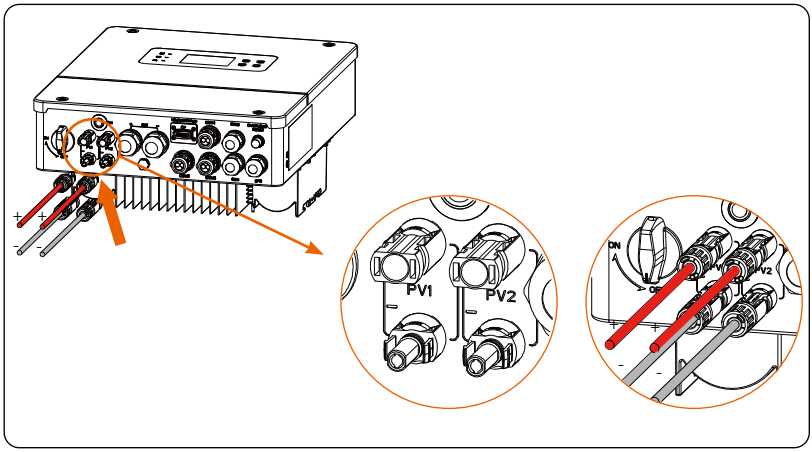
Step 6. Check whether the PV connectors have the correct polarity. Use a multimeter to measure the positive and negative voltage of the assembled PV connectors. Make sure the open circuit voltage does not exceed the input limit of 500 V.



Step 7. The inverter's positive and negative (PV-/PV+) ports are located as follows. Keep the other unused PV terminals with the terminal caps unsealed. Remove the waterproof plug from the port.



Step 8. Insert the cable into the corresponding positive and negative (PV-/PV+) ports of the inverter. Schematic diagram of the inverter PV connected are as follows.



6.2 Grid, GEN and EPS Output Connection

The series inverter are single-phase inverter. Suitable for rated voltage 220/230/240V, frequency 50/60Hz. For more technical requirments, consult the requirements of the local public grid.

The circuit breaker should be installed between the inverter and the mains, and the load should not be directly connected to the inverter.

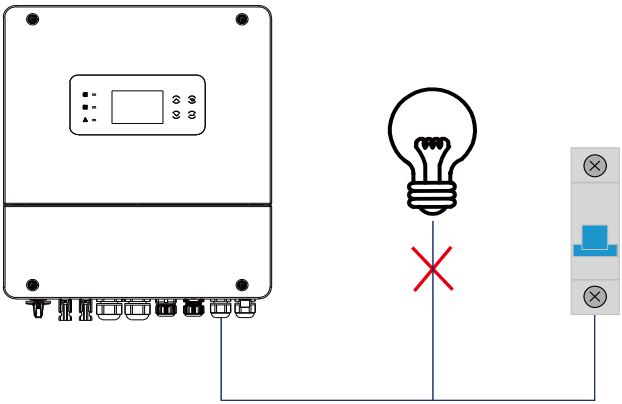


Figure: Wrong connection of load and inverter

The series inverters have an integrated EPS (Emergency Power Supply) function. When the grid is connected, the inverter outputs flows through the Grid port, and when the grid is disconnected, the inverter outputs flows through the EPS port.

Please refer to 3.2 System Diagram for wiring information.

To be compatible with all loads, you will need additional accessories. Please Refer to 5.4.2 Additionally required materials. If you need a solution, please contact our sales.

■ EPS load requirements

Warning!
Ensure that the EPS load rated power is within the EPS rated output power range, otherwise, the inverter will report an **overload** warning.

When **overload** occurs, adjust the load power to make sure it is within the EPS rated output power range, and the inverter will automatically return to normal operation.

For non-linear loads, ensure that the inrush current power is within the EPS rated output power range.

The following table shows some common loads for your reference.
Note: Check with the manufacturer for high-power inductive loads.

Content	Power		Common equipment	Instance		
	Start	Rated		Equipment	Start	Rated
Resistive load	X 1	X 1	 Incandescent lamp	 100W Incandescent lamp	100VA (W)	100VA (W)
Inductive load	X 3~5	X 2	 Fan  Fridge	 150W Fridge	450-750VA (W)	300VA (W)

■ Grid, GEN and EPS connection steps

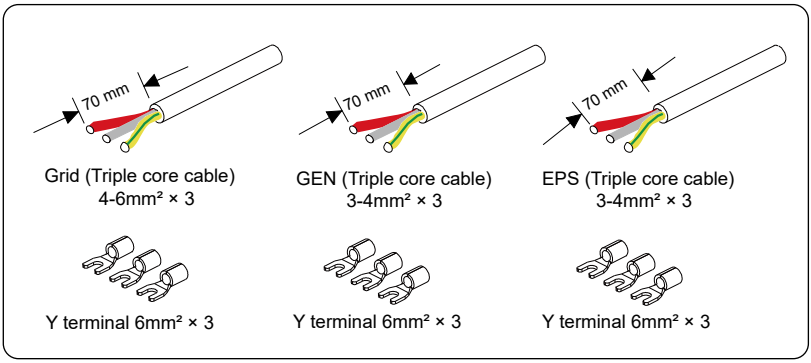
• Connection requirements

Check the grid voltage and compare with the voltage range (see 4.Technical Data for details).

Remember to disconnect all power sources to prevent electric shock.

• Connection steps

Step 1. Prepare a Grid cable (Triple core cable), an EPS cable (Triple core cable) and a GEN cable (Triple core cable), and then find the Y Terminals in the accessory bag. (Taking X1-HYB-3.0-LV as an example)



Note!

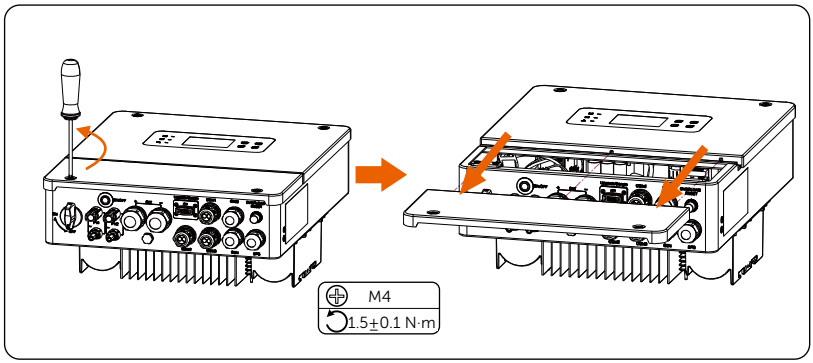
Please refer to the table in 5.4.2 Additionally required materials to view the recommended wire sizes for GRID, EPS, and GEN.

It is recommended to use copper wire. Non-triple or non-dual core cables shall be sealed with glue or fireproof mud.

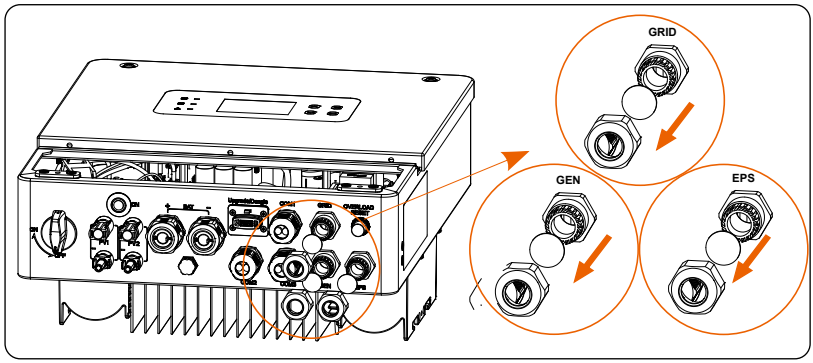
When using wire sizes of 6 mm² and above, only 2-core wires can be used because the 3-core wire cannot pass through the waterproof terminal. In the case of using 2-core wire, the PE wire should only be connected to the inverter shell and does not need to be connected to the internal terminals.

All connection diagrams provided here are based on the use of a 3-core wire, with X1-HYB-3.0-LV serving as an example.

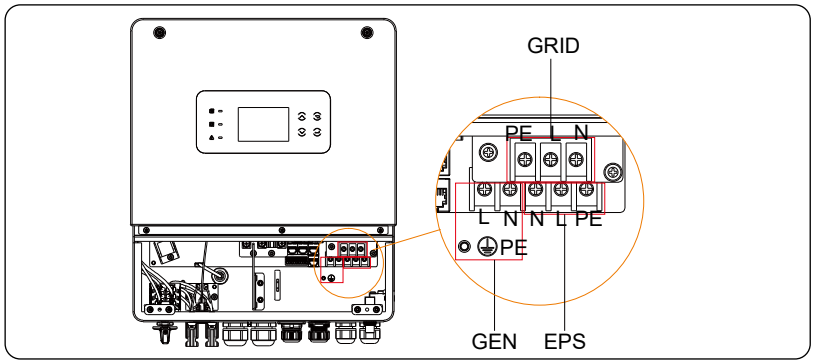
Step 3. Use cross screwdriver to loosen the screws on both sides of the inverter. Remove the lower cover of the inverter.



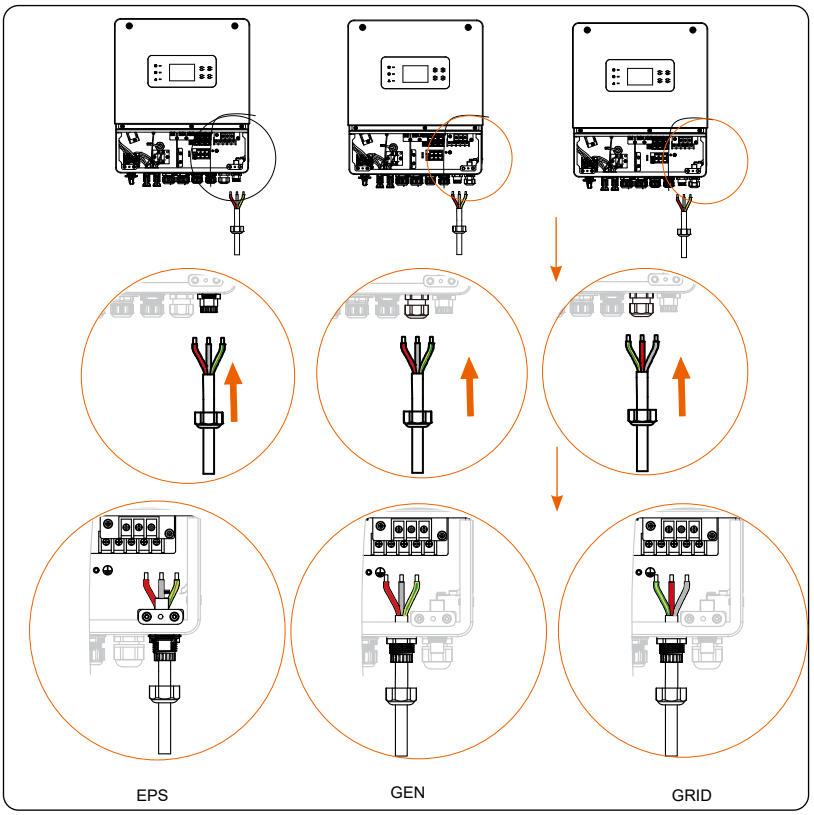
Step 3. Remove the plug of Grid, GEN and EPS ports.



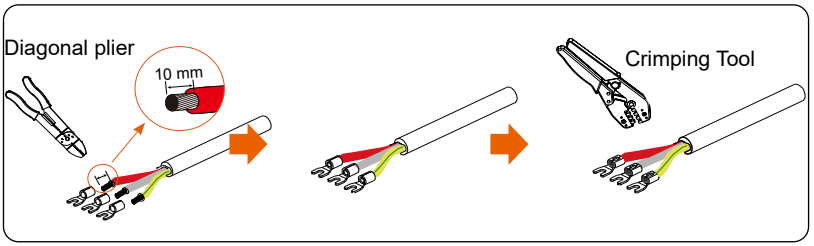
Step 4. Find the location of the AC interface and the Grid, GEN and EPS connection port are shown as below.



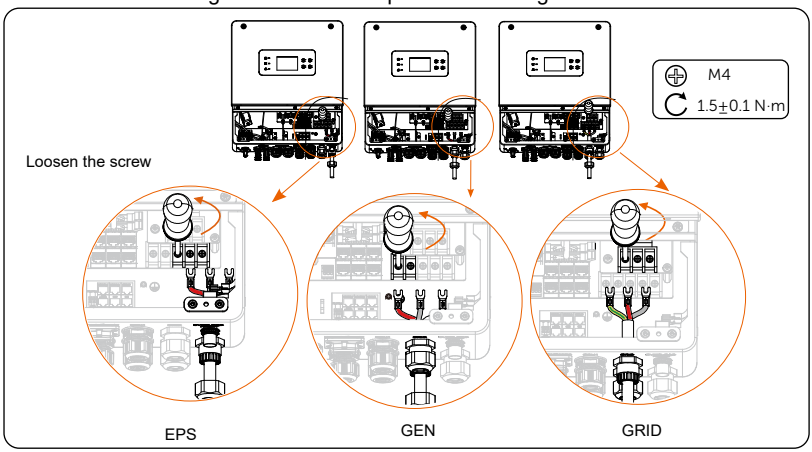
Step 5 Pass the previously prepared Grid, GEN and EPS cables through the corresponding screw caps and seals rings. The Grid, GEN and EPS cables go through the corresponding Grid, GEN and EPS ports.



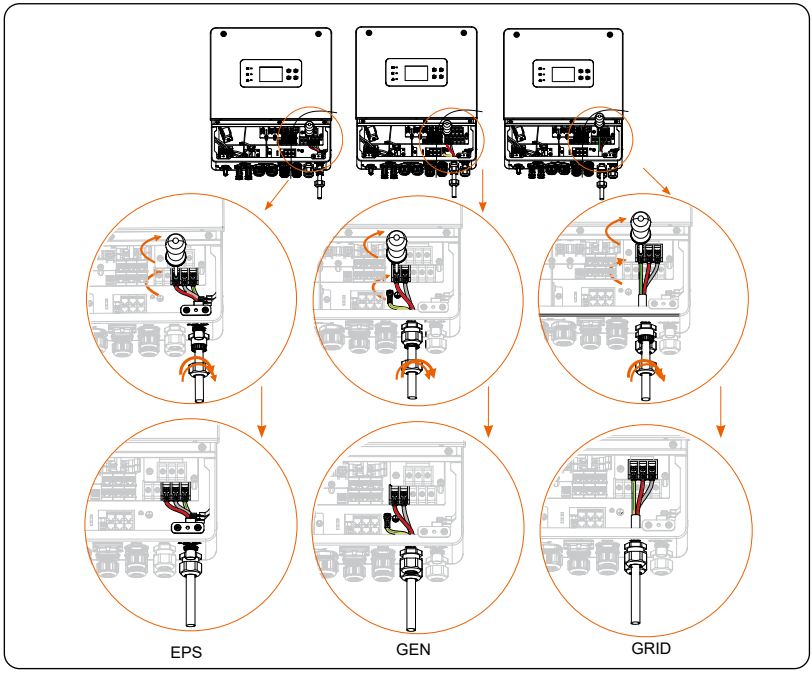
Step 6. Remove the 10 mm insulation layer at the end of the wire. Insert the Fork terminals respectively, and make sure that the stripped ends are inserted into the fork terminal, and finally use crimping pliers to press tightly.



Step 7 Insert the crimped cables into the corresponding L, N, and PE terminals according to the wire sequence and tighten the screws by cross screwdriver. Twist to tighten the screw caps and seals rings.



Schematic diagram of Grid, GEN and EPS (Off-grid) connected.



6.3 Battery Connection

6.3.1 Battery connection requirements

The series inverter system can be equipped with low voltage lithium battery and lead acid battery.

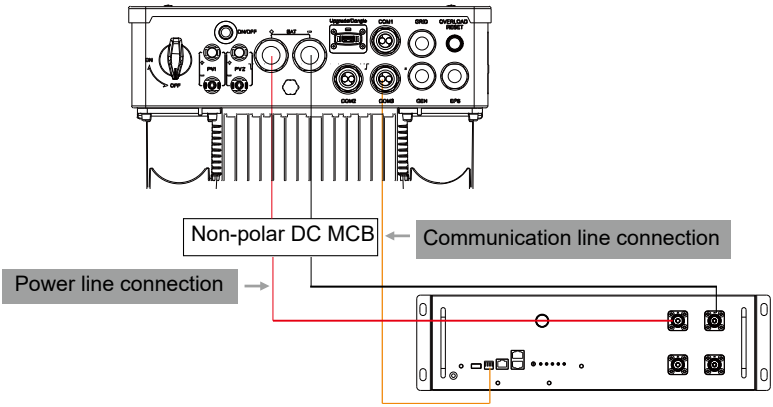
■ Battery Breaker

Before connecting the battery, a non-polar DC MCB must be installed to ensure safety.

Before maintenance, the inverter need to be safely disconnected.

Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Voltage	Nominal voltage of DC breaker should be larger than maximum voltage of battery.					
Current[A]	100 A			150 A		

■ Battery connection diagram



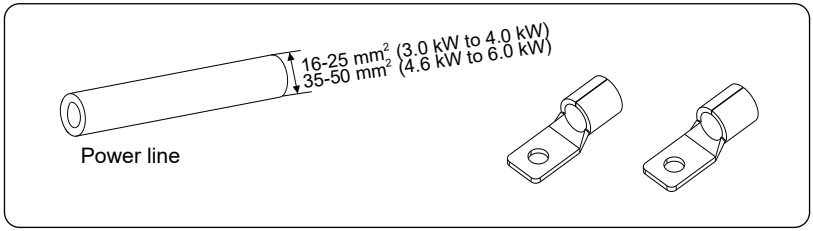
Model	X1-HYB-3.0-LV	X1-HYB-3.7-LV	X1-HYB-4.0-LV	X1-HYB-4.6-LV	X1-HYB-5.0-LV	X1-HYB-6.0-LV
Recommended battery power (kWh)	3~4.5	3.7 ~ 5.55	4.0 ~ 6.0	4.6 ~ 6.9	5.0 ~ 7.5	6.0 ~ 9.0

Note!

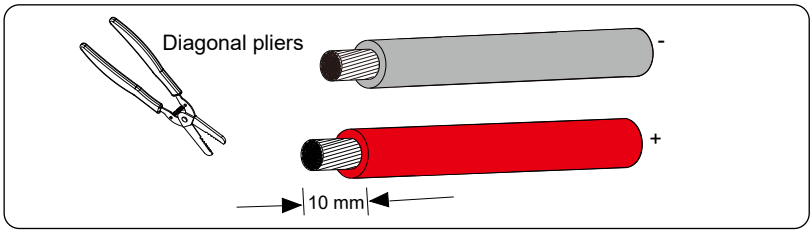
Please ensure that the BAT power line and BMS communication line are correctly connected when using the low-voltage batteries TP-LR25 and TP-LR36. Check T-BAT LR25 & T-BA LR36 Installation Manual for details.

■ Battery connection steps

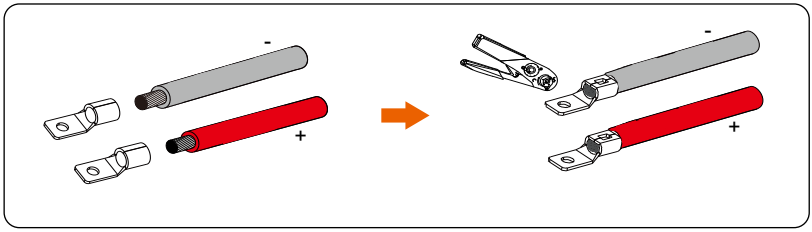
Step 1. Prepare a 16-25 mm² or 35-50 mm² battery power cable, find the OT terminals in the accessory bag.



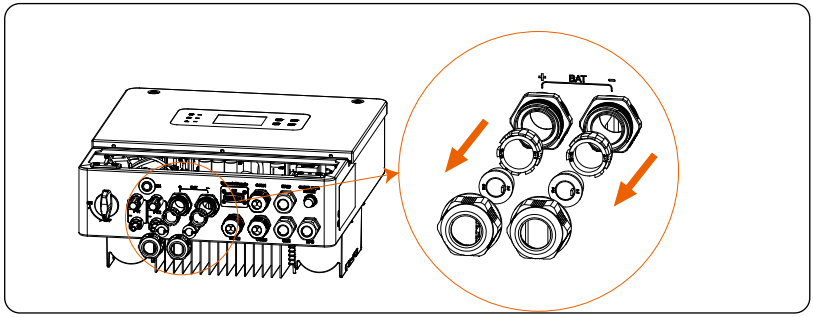
Step 2. Strip the insulation layer (length:10 mm) at one end of the power line.



Step 3. Insert the stripped cables into the OT terminals respectively and crimp the terminals tightly.

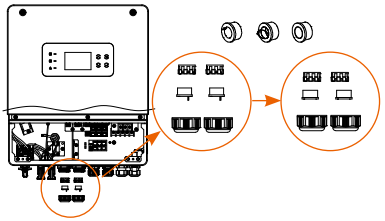


Step 4. Loosen the waterproof connector.

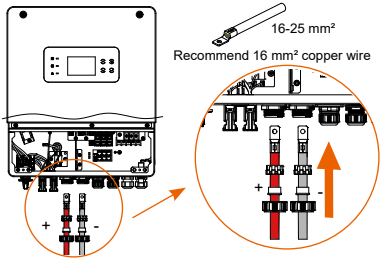


For battery connection from 3.0 kW to 4.0 kW:

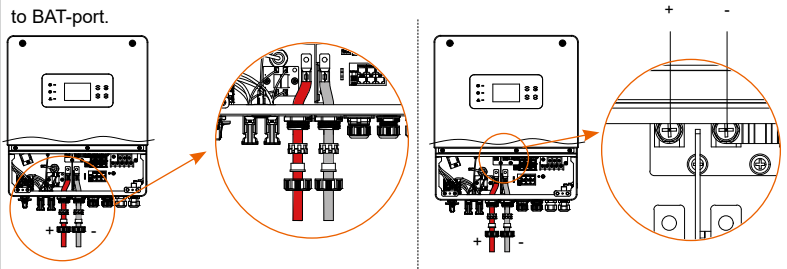
Step 5. Remove the sealing cover of the plug.



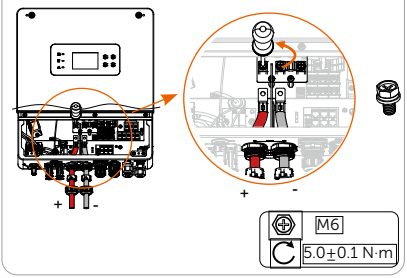
Step 6. Pass the previously assembled cables through the corresponding swivel nut.



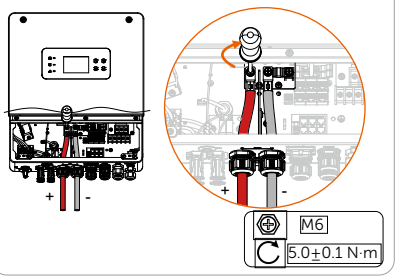
Step 7. Find the battery interface, insert the positive cable into BAT+ port and the negative cable to BAT-port.



Step 8. Remove the screw.

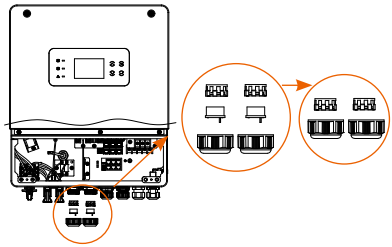


Step 9. Use cross screwdriver to tighten the screw. Twist to tighten the swivel nut.

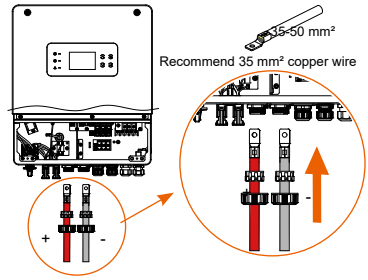


For battery connection from 4.6 kW to 6.0 kW:

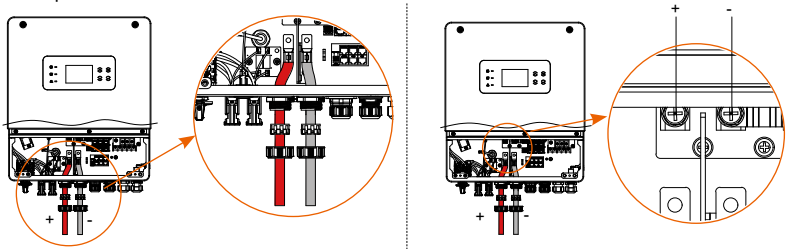
Step 5. Remove the plug.



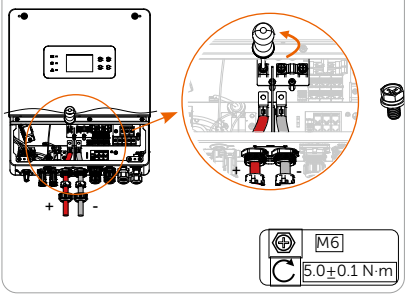
Step 6. Pass the previously prepared cables through the corresponding the swivel nut.



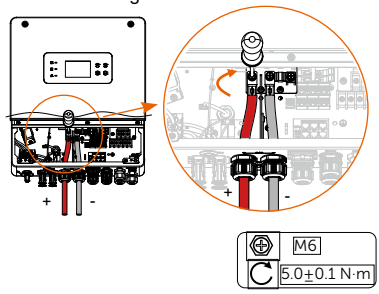
Step 7. Find the battery interface, insert the positive cable into BAT+ port and the negative cable to BAT-port.



Step 8. Remove the screw.



Step 9. Use cross screwdriver to tighten the screw. Twist to tighten the swivel nut. .

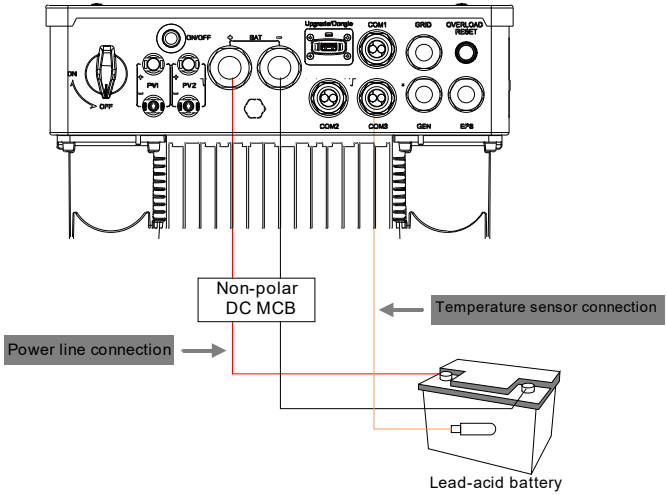


Note!

If only the battery is connected but the PV, GRID, and GEN are not connected, to start the inverter, press and hold the battery power on button until the screen is on.

6.3.2 Battery temperature sensor connection

■ **Battery temperature sensor connection diagram**

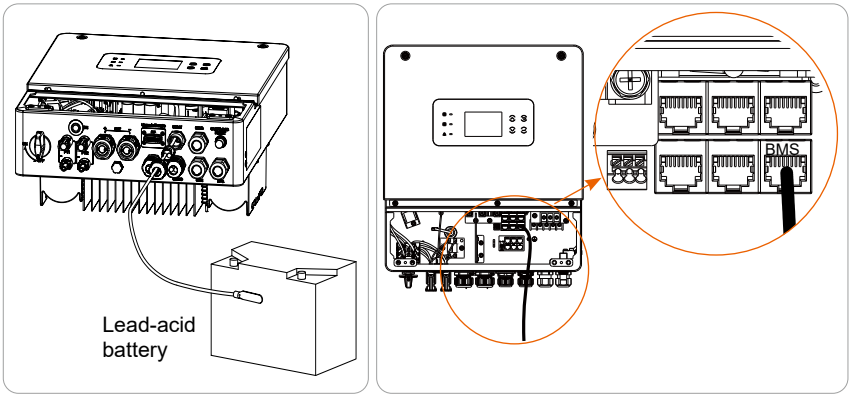


■ **Battery temperature sensor connection steps**

Step 1. Find the battery temperature sensor in the accessory bag.

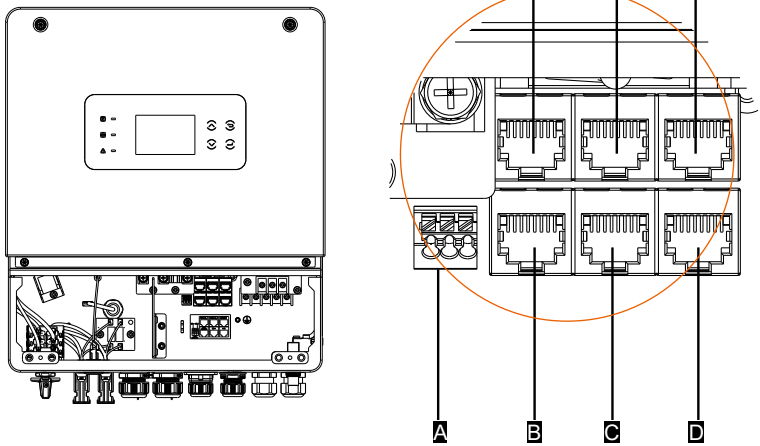
Step 2. Disassemble the swivel nut on COM1/2/3. Pass tthe battery temperature sensor through the COM port and insert the RJ45 connector of the battery temperature sensor into the BMS port located inside the inverter. You can select any port from COM1/2/3.

Step 3. Attach the terminal at the other end to the lead-acid battery in order to measure the battery temperature.



6.4 Communication Connection

■ **Communication port definition**



Number	Description
A	Dry-contact output
B	DRM(optional)
C	COM
D	BMS
E	Parallel_1
F	Parallel_2
G	Meter/CT

6.4.1 CT/meter port connnection

The inverter should work with an electric meter or current sensor (CT for short) to monitor household electricity usage. The electricity meter or CT can transmit the relevant electricity data to the inverter or platform, which is convenient for users to read at anytime.

Users can choose to use electric meters or CTs according to demand.

Please Notice that the meter/CT brand required by us must be used.

Note!

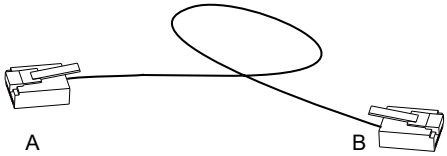
The meter or CT must be connected to the inverter, otherwise the inverter will shut down and alarm “meter failure” alarm.

Smart meters must be authorized by us, third party or other companies. Unauthorized meter may be incompatible with the inverter.

Our company will not be responsible for the impact caused by the use of other appliances.

Users can customize the length of the CT communication cable and the NTC cable (battery temperature sensor). The accessory package provides two RJ45 connectors.

When the CT cable is completed, connect the A terminal to the METER/CT port inside the inverter and securely tighten the waterproof screw. Connect the B terminal to the RJ45 terminal.

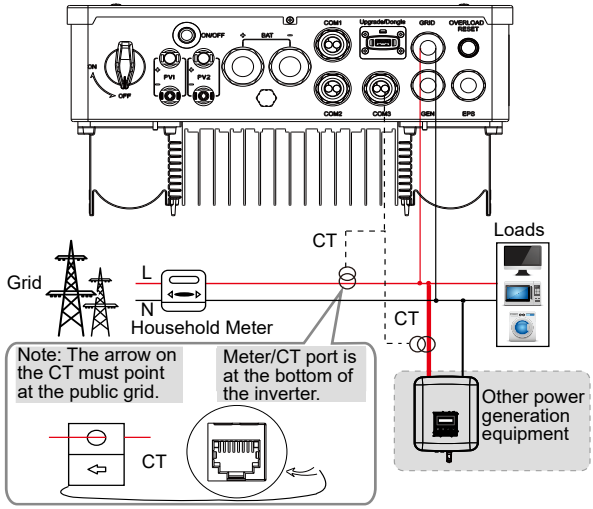


One end of the completed cable, which has a waterproof connector with RJ45, should be inserted into the inverter. The other end of the cable should have an RJ45 terminal that is inserted into the CT connection.

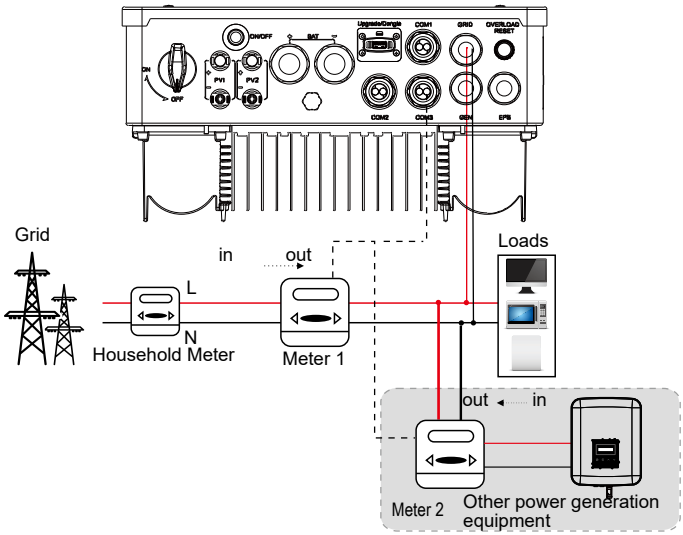
- **CT/ Meter port connection**

1. CT connection diagram

The current sensor measures the current on the live wire between the inverter and the public grid.



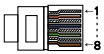
2. Meter connection diagram



Note!

If two meters are to be connected in the system, the communication cables of the meters should be connected in parallel. For example, the 485A of one meter should be connected with the 485A of the other meter, and the 485B of one meter should be connected with the 485B of the other meter.

3. Pin definition for CT/Meter



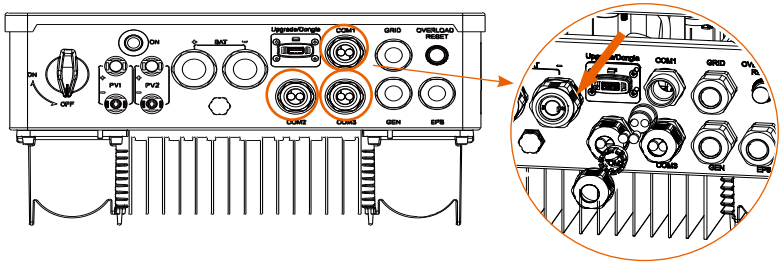
Pin	1	2	3	4	5	6	7	8
Pin Definition	CT1-1	X	X	RS485_A	RS485_B	X	X	CT1-2

Note!

Only one of the Meter and CT connections can be selected. Meter cable goes to pin terminal 4 and 5; CT cable goes to pin terminal 1 and 8; reserve CT cable goes to pin terminal 3 and 6. If you need this feature, please contact us for assistance.

■ **CT/Meter connection steps**

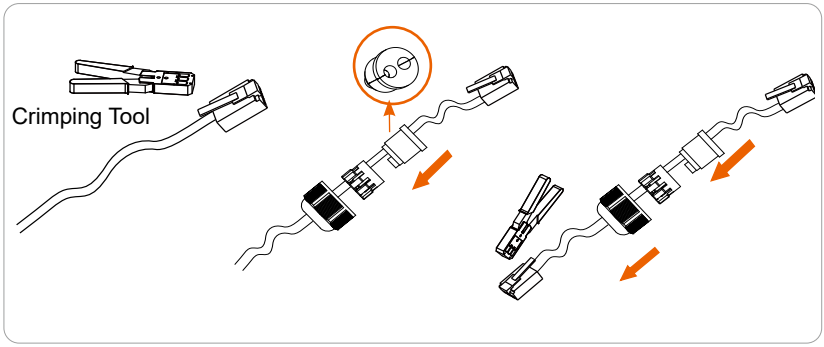
Step 1. Remove the plug. For Communication connection, you can select any port from COM 1, COM 2 and COM3.



Step 2. For meter connection, crimp only one RJ45 terminal.

For CT connection without RJ45 connector, there is no need to crimp another RJ45 terminal.

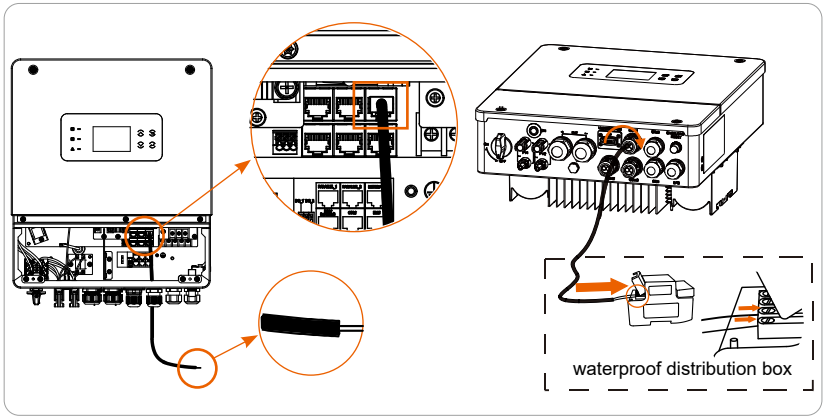
For CT connection with RJ45 connector, crimp two RJ45 terminal.



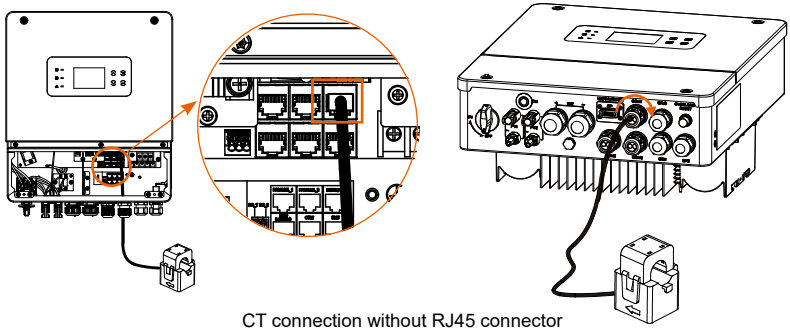
Note!

it is recommanded to use CAT5 Cable.

Step 3. For meter connection, insert one side of the cable (with no terminal) into the inverter, and the other side of the cable (with crimped RJ45 terminal) into the waterproof distribution box.

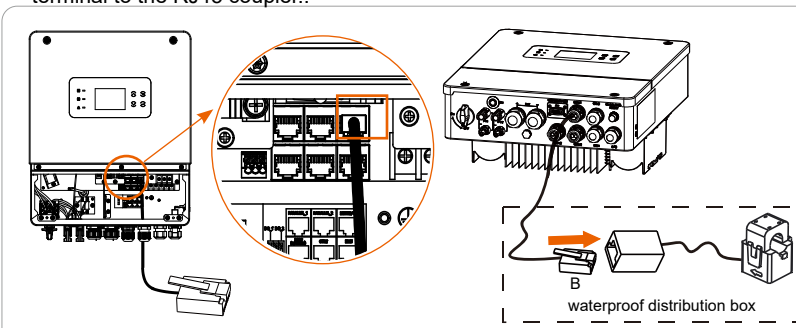


For CT connection without RJ45 connector, insert one side of the finished cable and the waterproof connectors with RJ45 into the Meter/CT port of the inverter, tighten the waterproof screw and insert the other side of the RJ45 terminal into the CT connection.



CT connection without RJ45 connector

For CT connection with RJ45 connector, connect the A terminal to the Meter/CT port of the inverter, tighten the waterproof screw and connect the B terminal to the RJ45 coupler..



CT connection with RJ45 connector

Note!

When installing, pay attention to water resistance. All the connected parts of CT must be placed into the distribution cabinet.

- Do not place the CT on the N wire or ground wire.
- Do not put CT on the N line and L line at the same time.
- Do not place the CT on the side where the arrow points to the inverter.
- Do not place the CT on non-insulated wires.
- After CT is connected, prevent the CT clip from falling off.
- It is recommended to wrap the CT clip with insulating tape.

Note!

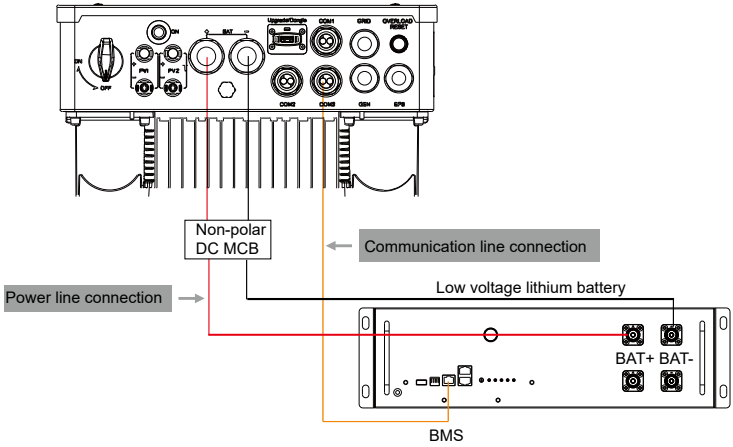
The cable length between the CT and inverter should not exceed a certain distance. Please refer to the following table:

	50Hz Power Grid		60Hz Power Grid	
99%	CAT4/5	CAT6	CAT4/5	CAT6
accuracy	23 meters	34 meters	27 meters	39 meters

6.4.2 BMS/DRM/COM port connnection

■ **BMS port definition**

1. Lithium battery connection diagrm



* The communication interface between the inverter and the battery uses the waterproof connector with RJ45.

2. Pin definition for BMS

Pin	1	2	3	4	5	6	7	8
Pin Definition	BMS_ 485B	BMS_ 485A	GND	BMS_ CANH	BMS_ CANL	X	GND	BAT_ TEMP

■ **DRM port definition (Only for Australia)**

1.Introduction to DRM communication

This inverter can support external control signal response, such as complying with AS4777 regulatory requirements.

Mode	Requirements
DRM0	Operation disconnect device

2.Pin definition for DRM

Pin	1	2	3	4	5	6	7	8
Pin Definition	DRM1/5	DRM2/6	DRM3/7	DRM4/8	RG/0	CL/0	X	X

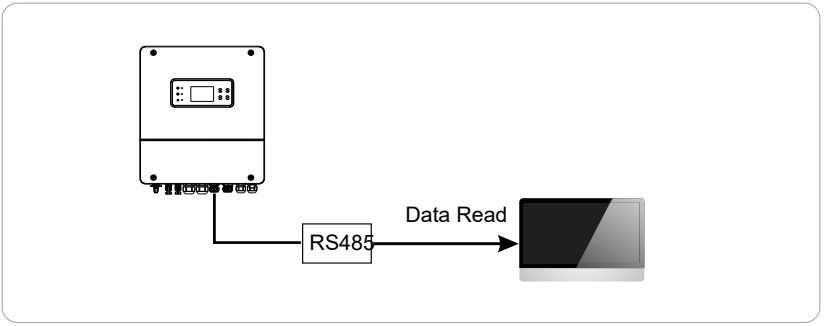
■ **COM Communication definition**

COM communication interface is mainly provided for customization the second step of development use. The inverter supports the control of external equipment or external equipment control through communication. For example, the inverter adjusts the working mode of the heat pump and so on.

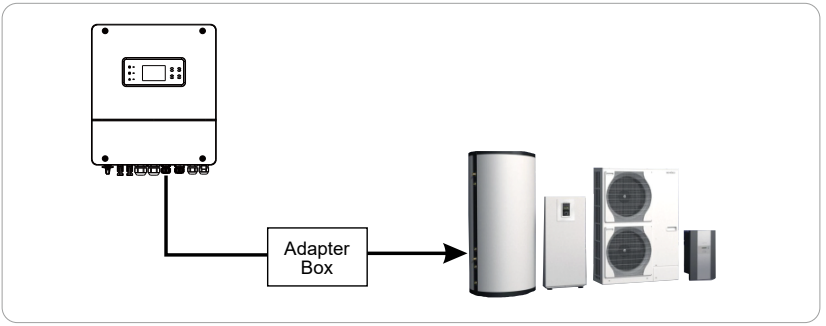
1. Application occasion

COM is a standard communication interface, through which the monitoring data of the inverter can be directly obtained. Also, external communication devices can be connected to carry out the secondary development of the inverter. For specific technical docking, please contact us.

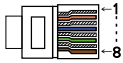
1.1 External communication



1.2 Inverter communication to control external equipment



2. Pin definition for COM



Pin	1	2	3	4	5	6	7	8
Pin Definition	Dry-contact_ in1	Dry-contact_ in2	X	RS485_A	RS485_B	GND	X	X

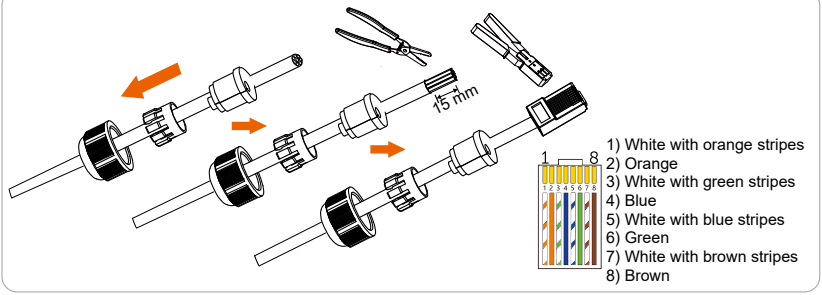
Notice!

Customers can communicate or control the inverter and external devices through the COM interface. Professional users can use pins 4 and 5 to realize data acquisition and external control functions. The communication protocol is Modbus RTU. For details, please contact us.

If the user wants to use the inverter dry contact to control external equipment (such as a heat pump), it can be used with our Adapter Box. Please refer to the quick installation manual of the Adapter Box for more details.

■ **BMS/DRM/COM connection steps**

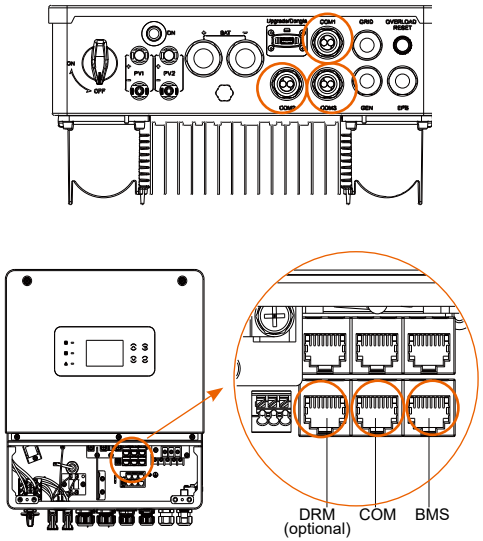
Step 1. Remove the plug. Pass the cable through the corresponding screw caps and seals rings. Strip the insulation layer (length: 15mm) at one end of the cable. Crimp a RJ45 terminal at the same end of the cable.



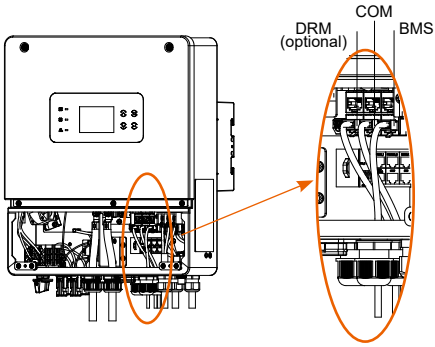
Note!

it is recommanded to use CAT5 Cable.

Step 2. Find the DRM(optional), COM, BMS port. For comunication connection, you can select any port from COM 1, COM 2 and COM 3.



Step 3. Insert the previously prepared cables into the corresponding ports.



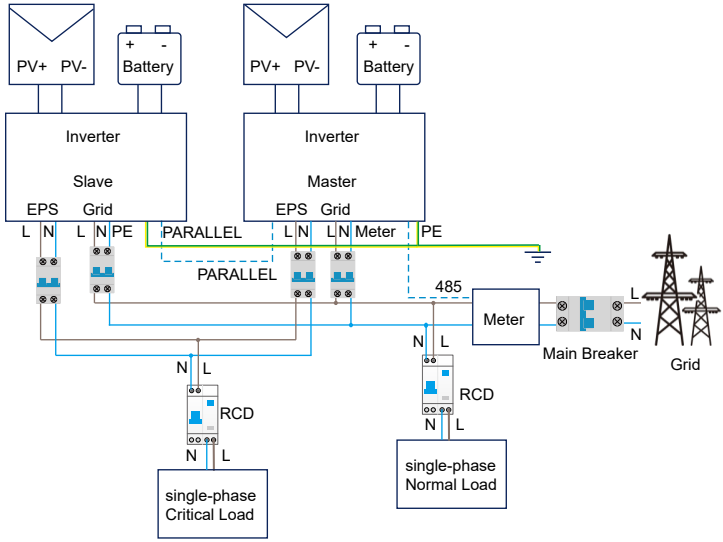
Note!

After the BMS communication between the battery and the inverter is finished, the battery will work normally.

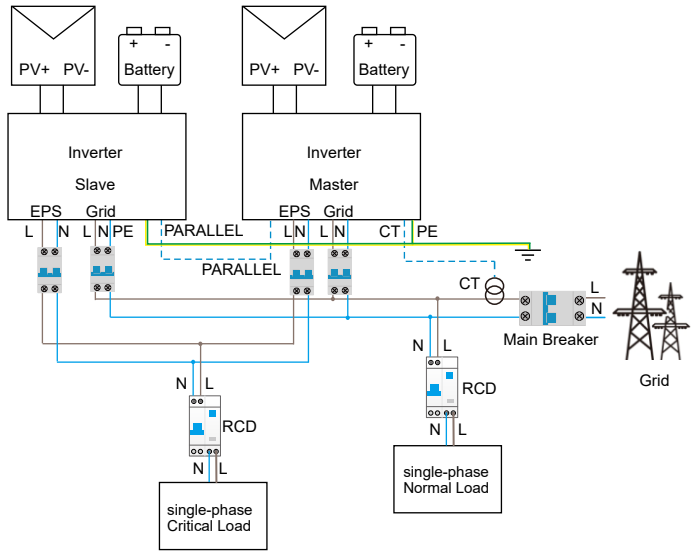
6.4.3 Parallel Connection

■ System Diagram

System diagram applicable with use of energy meter:



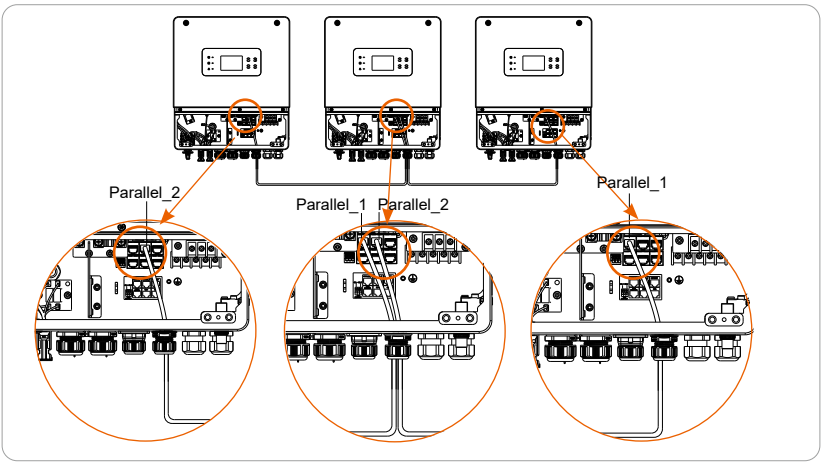
System diagram applicable with use of current sensor (CT):



■ **Parallel connection Diagram**

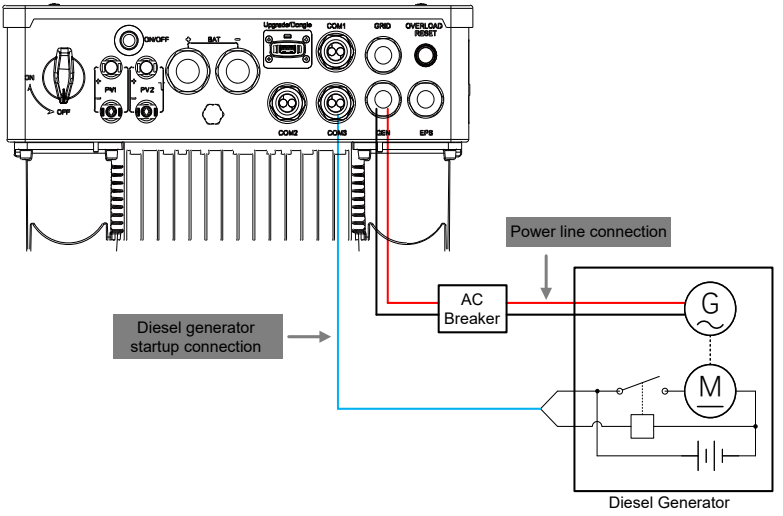
The series inverters provide parallel function, and up to 10 inverters can be connected in a system. In this system, one inverter is set as the “master inverter”, and the other inverter is switched to the “slave inverter” state, and the inverters are connected to communicate through the parallel line.

The parallel cable making method is the same as BMS/DRM/COM.



6.4.4 Dry-contact output connection

■ Dry-contact output connection diagram

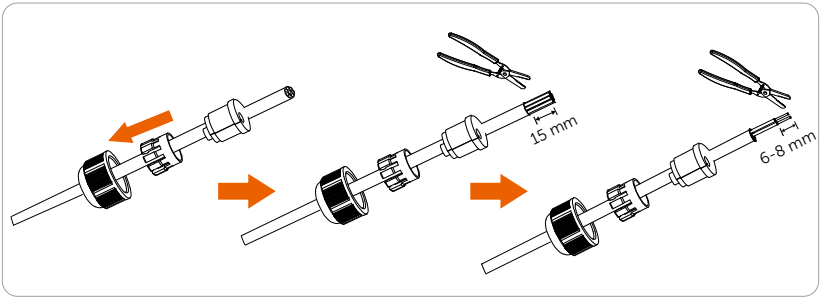


■ Dry-contact definition

DO_1 and DO_2 are dry contact output ports that can be used to start external devices such as generators and adaptor boxs.

■ Dry-contact output connection steps

Step 1. Strip the insulation layer (length: 15mm) at one end of the cable. And cut off the 6 cables (length:6-8mm), keep the rest 2 cables.



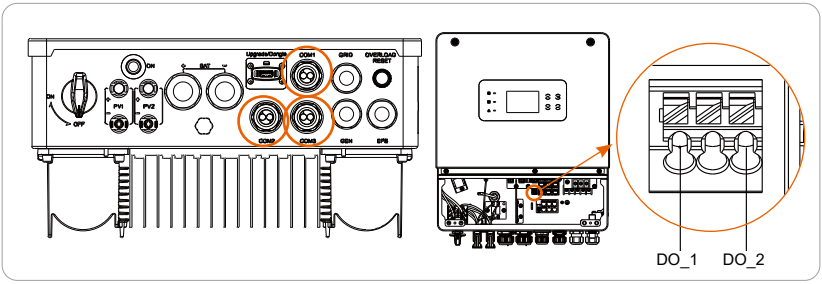
For dry-contact output connection, you can select any two cables from the following four groups: white with orange stripes, Orange; white with green stripes, blue; white with blue stripes, green; white with brown stripes, brown.

1) White with orange stripes
2) Orange
3) White with green stripes
4) Blue
5) White with blue stripes
6) Green
7) White with brown stripes
8) Brown

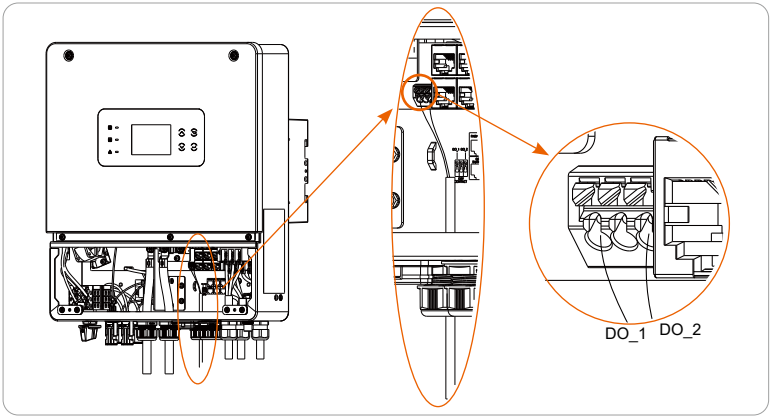
Note!

it is recommanded to use CAT5 Cable.

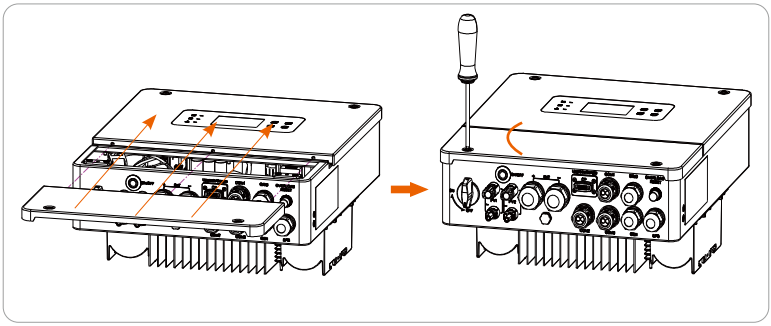
Step 2. Find DO_1 and DO_2 port. For Communication connection, you can select any port from COM 1, COM 2 and COM3.



Step 3. Insert the prepared cable into the corresponding ports.



Step 4. Slide to close the lower cover. Use cross screwdriver to tighten the screws on both sides of the inverter.



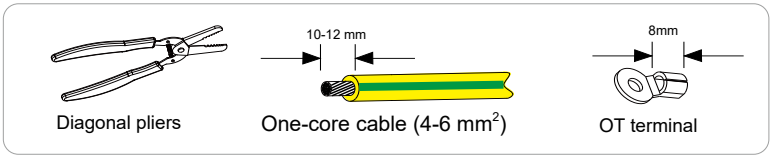
6.5 Grounding Connection (Mandatory)

Make sure that the ground wire port of this inverter has been connected.

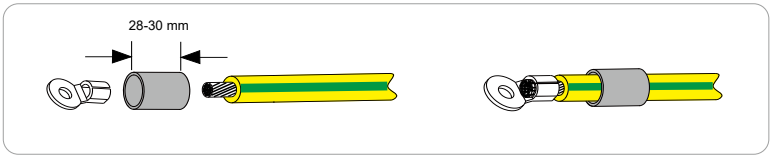
The user must perform shell grounding connections to prevents electric shock.

■ **Ground connection steps**

Step 1. Prepare a one-core cable (4-6 mm²), and then find the OT terminal in the accessories. Strip the grounding cable insulation (length:10-12 mm).

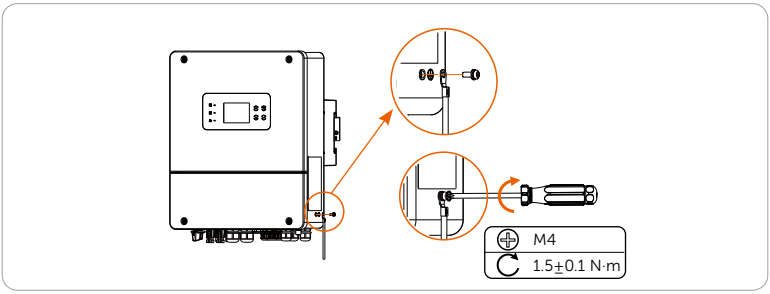


Step 2. Insert the stripped cable into OT terminal and put on heat-shrink tubing.



Step 3. Crimp OT terminal with a crimping tool. Pull the heat-shrink tubing over the stripped section of the OT terminal and use a heat gun to shrink it so that it can be firmly contacted with the terminal.

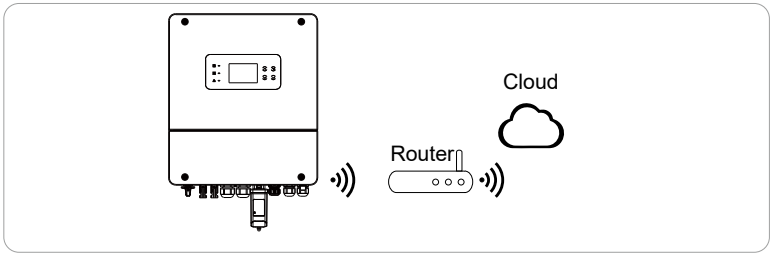
Step 4. Find the ground connection port on the inverter, and screw the ground wire on the inverter with an cross pan screw.



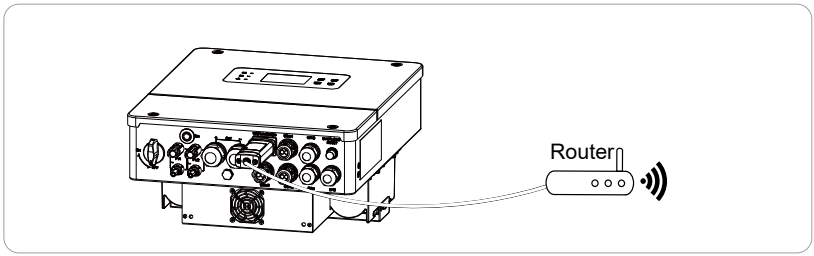
6.6 Monitoring Connection (Accessories)

The inverter provides a DONGLE port, which can transmit data of the inverter to the monitoring website via WiFi Plus Dongle, 4G Dongle, and LAN Dongle. (If necessary, purchase products from us)

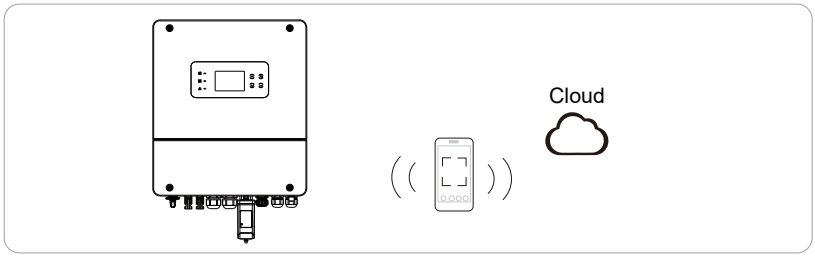
■ WiFi Connection diagram



■ LAN Connection diagram

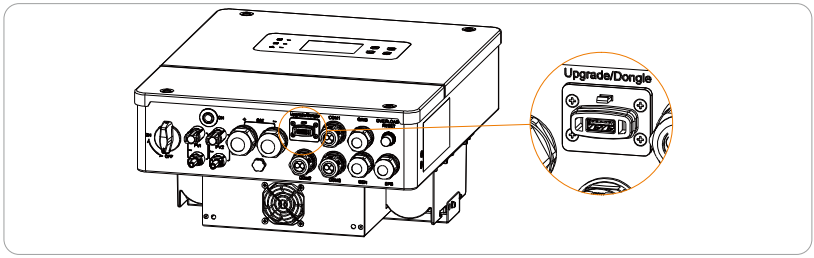


■ 4G Connection diagram

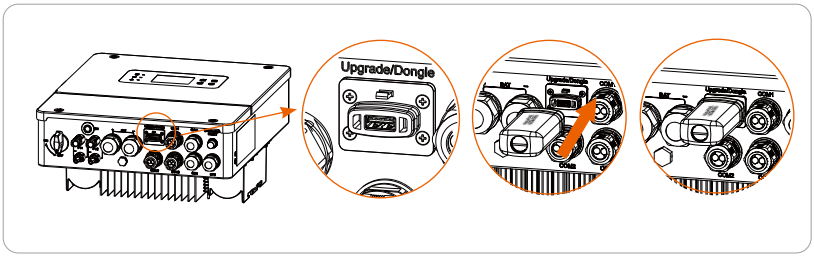


■ Communication adapter connection steps

Step 1. First find the DONGLE port of the inverter.



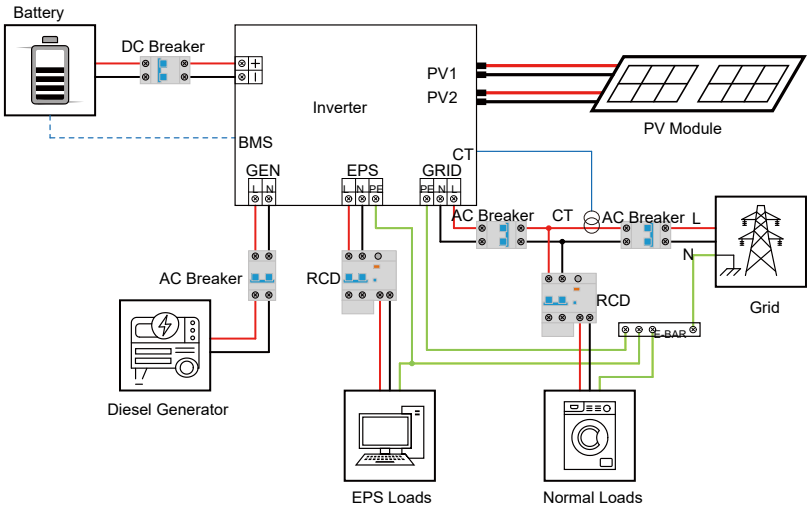
Step 2. Remove the waterproof plug. Plug the communication dongle into the DONGLE port. Remind to keep the "QR Code" upwards.



6.7 Check All Below Steps Before Starting The Inverter

■ Before operation, check the inverter according to the following steps

- Check the device installed correctly and securely;
- Make sure that all the DC breakers and AC breakers are OFF;
- All AC cables are connected correctly and securely;
- All DC cables are connected correctly and securely;
- All communication cables are connected correctly and securely;
- Make sure the meter/CT is connected correctly and securely;
- Make sure the battery is connected correctly and securely;
- Make sure all photovoltaic panels are connected correctly and securely;
- Make sure all the connectors which are not used should be sealed by covers;
- Make sure the external AC and DC connectors are connected;
- The covers and doors of the inverter is closed and the door screws are tightened.



6.8 Inverter Operation

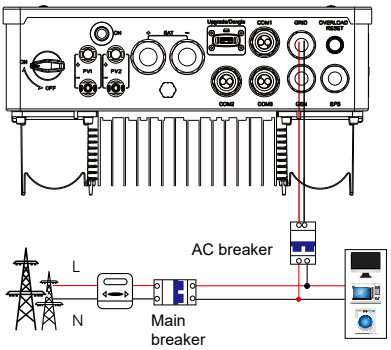
■ After the inverter is checked, then conduct the following steps

- Turn on the Load switch and EPS (Off-grid) switch.
- Turn on the battery switch.

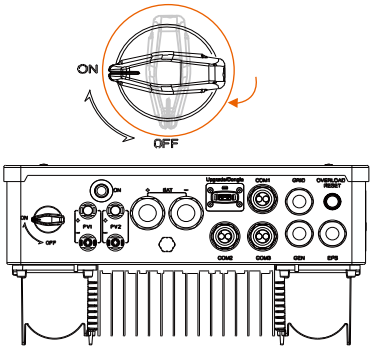
■ Start the inverter

- Steps to start the inverter

- Turn on the AC breaker between the inverter and the power grid.



- (Optional) Remove the locking screw from the DC switch.
- Turn on the DC switch between the PV string and the inverter if there is any.
- Turn on the DC switch at the bottom of the inverter .



• When the photovoltaic panel generates enough power, the inverter will start automatically.

• Check the status of the indicator lights and and LCD screen. If the inverter starts succefully, the indicator light will flash in green, and the LCD screen will display the main interface. The green light will flash when inverter is turned on, and it will always be on after grid connection. If the battery is connected, the blue light will always be on as long as the inverter is turned on, regardless of whether it is connected to the grid.

• If the indicator light does not light up and the interface does not appear on the screen, please check the following:

-All connections are correct.

-All external disconnect switches are closed.

-The DC switch of the inverter is set to the “ON” position.

■ States of operation

The following are 3 different states of inverter operation, which means that the inverter starts successfully.

Waiting:

When the DC output voltage of the photovoltaic panel is higher than 110V (lowest starting voltage) and lower than 80V (lowest working voltage), the inverter waits for checking.

Checking:

The inverter will automatically detect the DC input. When the DC input voltage of the photovoltaic panel is higher than 90V and the photovoltaic panel has enough energy to start the inverter, the inverter will enter the checking state.

Normal:

When the inverter is working normally, the green light is always on. At the same time, the power is fed back to the grid, and the LCD displays the output power.

If it is the first time to boot, please follow the prompts to enter the setting interface.

Warning!

The input terminal of the inverter can be opened only when all the installation work of the inverter has been completed. All electrical connections must be performed by professionals in accordance with local regulations.

7 Firmware Upgrade

■ Upgrade preparation

Step 1. Check the inverter version and prepare a U disk (USB 2.0/3.0) and personal computer before upgrading.

Caution!
Please make sure that the size of the U disk is smaller than 32GB, and the format is FAT16 or FAT32.

Step 2. Contact our service support to get the update files (“*.bin” and “*.txt” file), and store the two files in the root path of the U disk.

Files:

X1HybridLV_3_6kW_Iap.txt

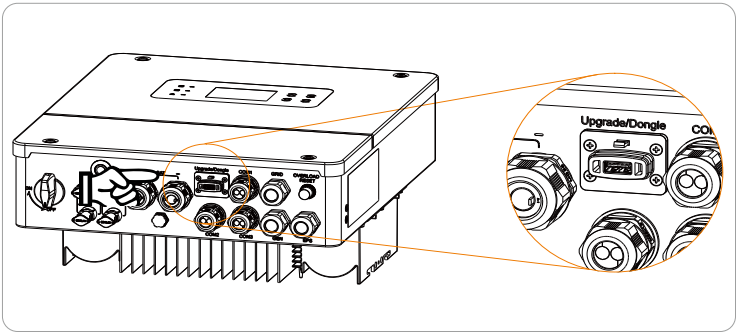
X1HybridLV_3_6kW_***.bin

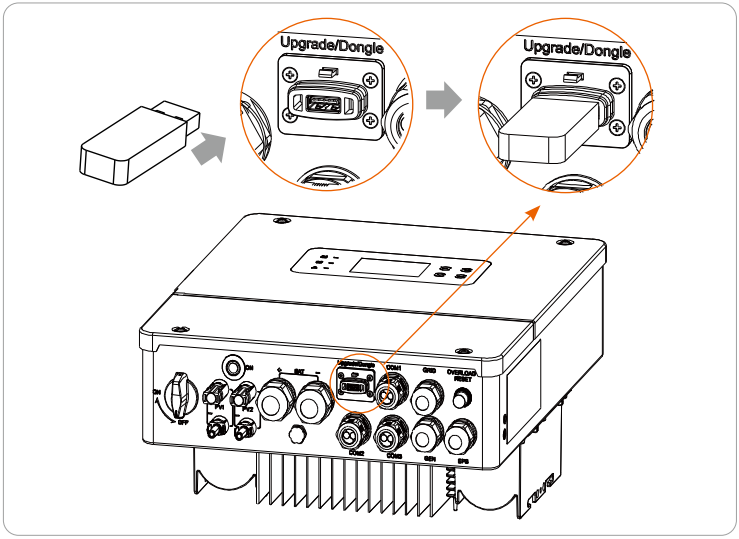
Caution!
The bin name listed in the “*.txt” file must be same as the “*.bin” name.

■ Upgrade steps

USB disk can be plugged when the inverter is in normal status.

Step 1. Plug the U disk into the upgrading port below: If the Wi-Fi dongle is connected to the port, please remove the dongle first.





Step 2. After U disk plugged in, the system will start upgrading, and the three indicator lights will flash in turns. (Operating indicator: green; battery indicator: blue; Error indicator: Red). Wait approximately 10-15 seconds.

Step 3. After the LCD screen is turned off, the buzzer will make a beep sound, and then the screen and three indicator lights will light up again and flash in turns.

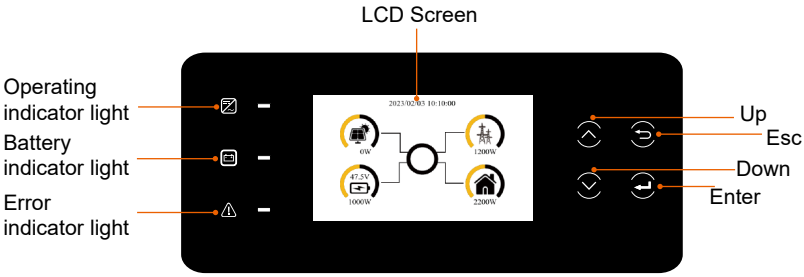
If the three indicators light up at the same time, it means that the upgrade has been successful. If only the red light is on, it means that the upgrade has been failed. If the upgrade fails, please contact our after-sales support.

Note!

After the upgrade is completed, the current state of the indicator will be maintained for 1 minute, and the inverter will be automatically switched on.

8 Setting

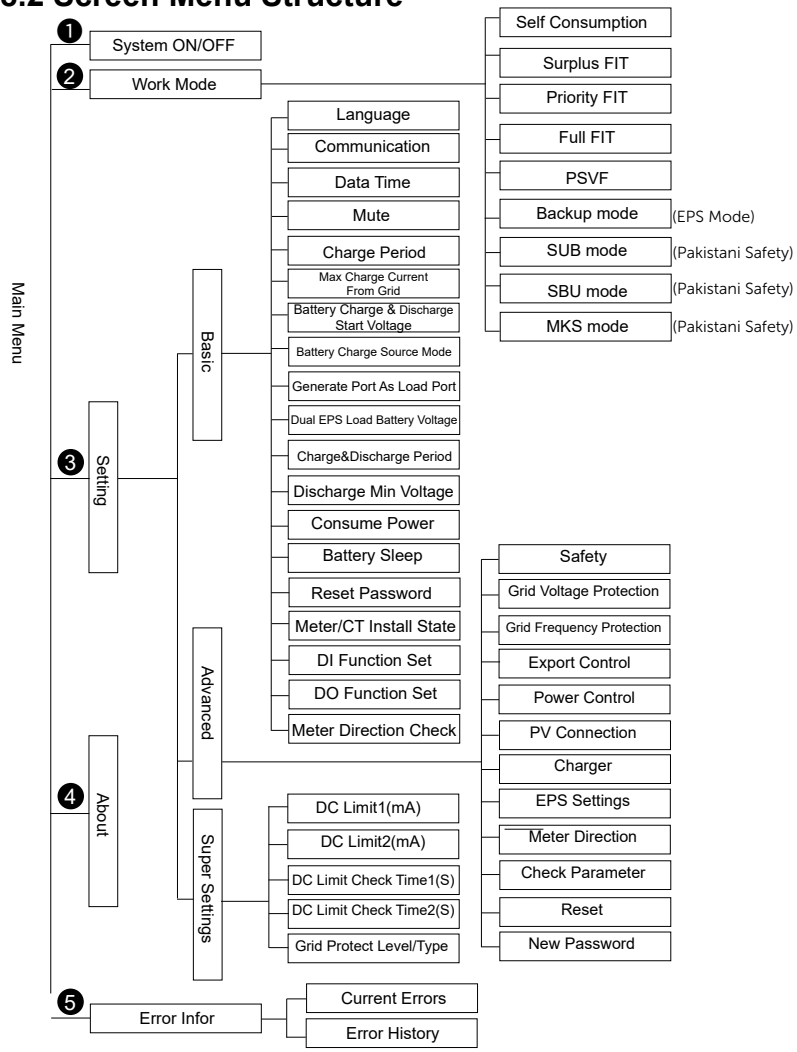
8.1 Control Panel



Item	Description
LCD screen	Display the information of the inverter.
Operating indicator light	Light in green: The inverter is in grid-connected operation state or off-grid operation state. Flash in green: The screen shows "STR". The inverter is in the process of grid connection or off-grid. Light off: The inverter is in a fault or manual shutdown state.
Battery indicator light	Light in blue: The battery is online and the voltage is normal. Light off: Low battery voltage or no battery.
Error indicator light	Light in red: The inverter is in fault status. Flash in red:The inverter has alarm information. Light off: There are no faults and alarms in the inverter.
Up key	Turn to the previous page.
Esc key	Return to the superior menu or cancel setting value.
Down key	Turn to the next page.
Enter key	Confirm the selection.

* While upgrading, the green, blue and red indicator lights will flash in turns, indicating that the upgrade is in progress.

8.2 Screen Menu Structure



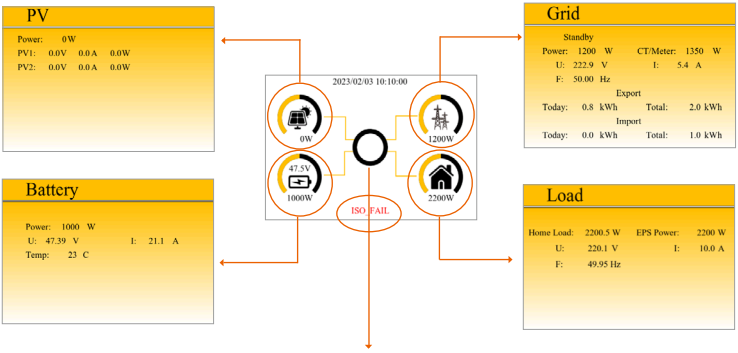
Note!

The "Basic" and "Advanced" buttons will appear if a password with advanced permission from the installer is used. All "Basic", "Advanced", and "Super" buttons will appear if a password with factory permission is used.

8.3 LCD Operation

8.3.2 Main interface

The main interface is the default interface, the inverter will automatically return to this interface when the system started up successfully or not operated for a period of time.The information of the interface is as below. You can tap the circles to check basic information of the inverter and battery.

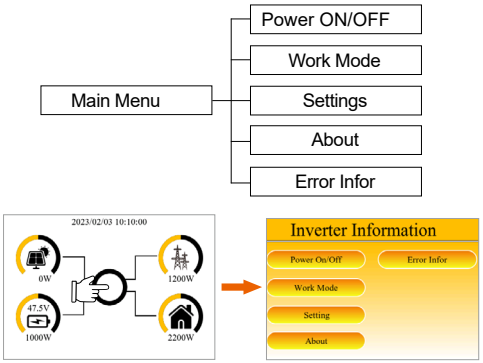


If there is a fault currently, one of the faults will be displayed on the main interface. To view details, please enter Main menu "Inverter information" -> "Error Infor" to check the current and historical faults.

8.3.1 Main menu

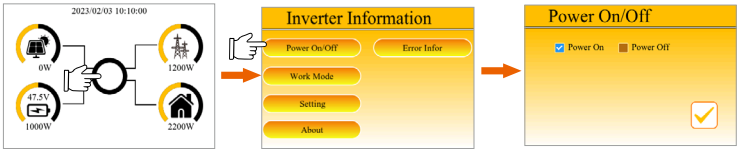
The menu interface is another interface for users to change settings or obtain information. When the LCD displays the main interface, tap the circle in the middle of the main interface screen to enter the main menu.

The user can press the up/down bottom or touch the screen to select up and down the menu, press the enter bottom or tap the "√" on the screen to save the settings, and press the Esc button to return to the superior interface.

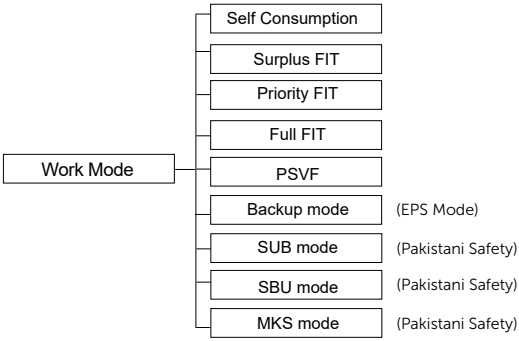


■ System ON/OFF

"Power On" indicates that the inverter is in working state, which is generally the default state. "Power Off" means that the inverter stops running and only the LCD screen is turned on. To set power on or off, users could tap the selection box and then press "√" to save the settings.



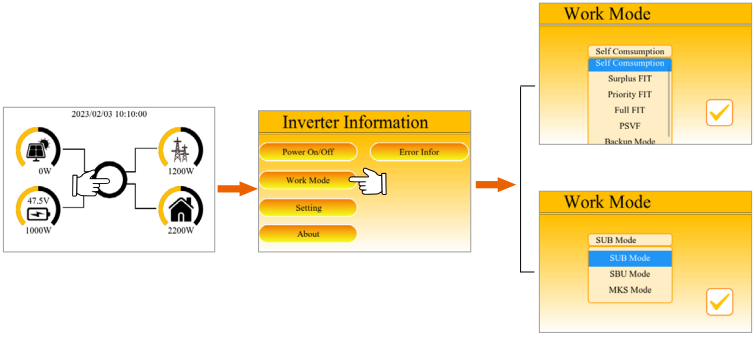
■ Work Mode



For mode selection, there are 9 working modes to choose from. Please refer to 3.3 Work mode for detailed explanation.

To select the three Pakistani modes, you need to enter advanced settings and select "safety" as "Pakistan" first. Check Advanced settings for details.

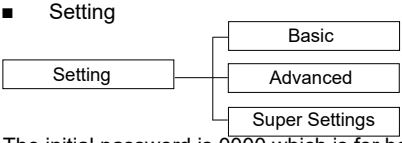
Note that the basic settings pages will be different when one of the three Pakistan modes are selected. Please refer to the basic settings section on next page for more details.



■ Error Infor

Here you can view the current faults and the historical faults. There are a total of five pages with a total of 20 records.

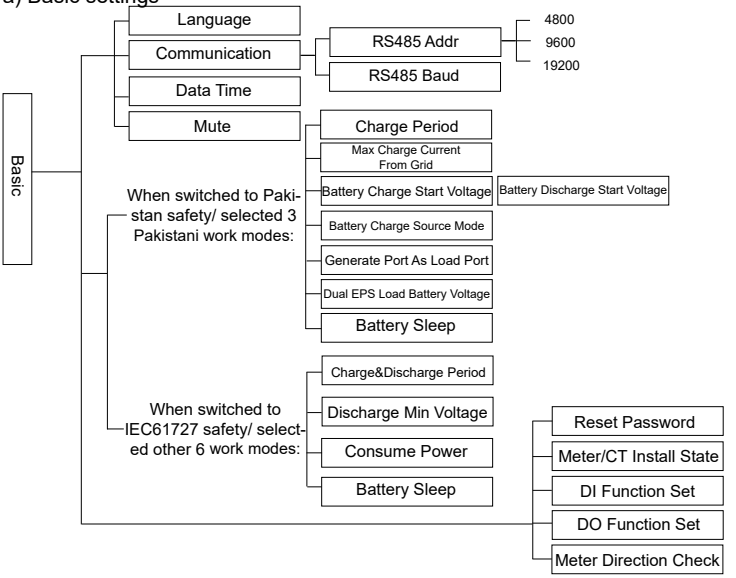
■ Setting



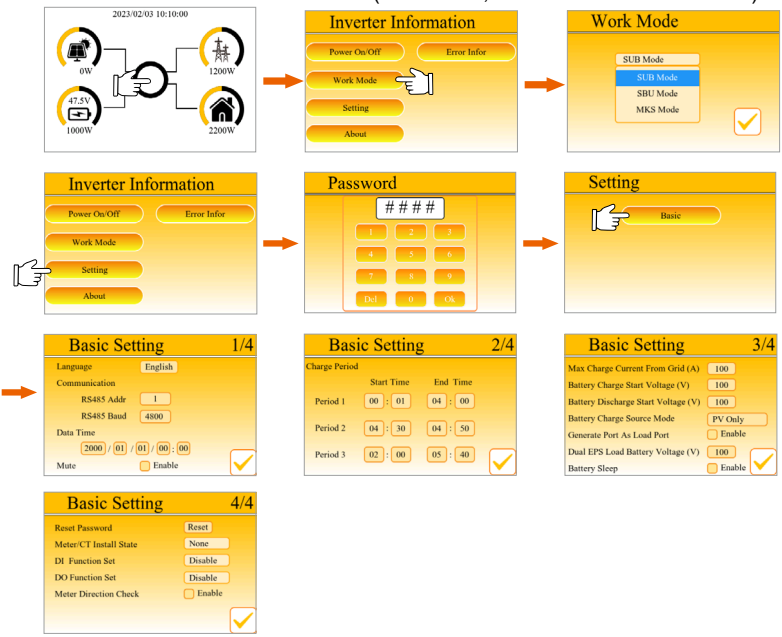
The initial password is 0000 which is for basic settings and should be changed for theconsideration of account security. The "Basic" and "Advanced" buttons will appear if a password with advanced permission from the installer is used. All "Basic", "Advanced", and "Super" buttons will appear if a password with factory permission is used.

Users can press the up or down buttom to switch pages. Tap the"√" on the screen or press the Enter button after completing the modification to save the setup.

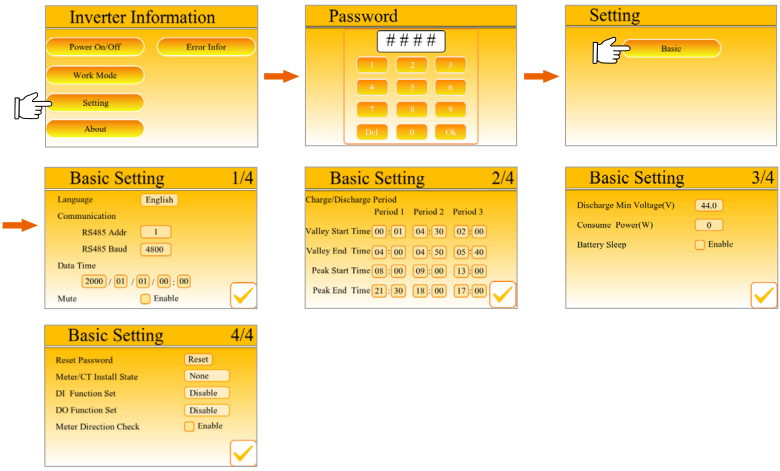
a) Basic settings



When selected 3 Pakistani modes (SUB mode, SBU mode and MKS mode):

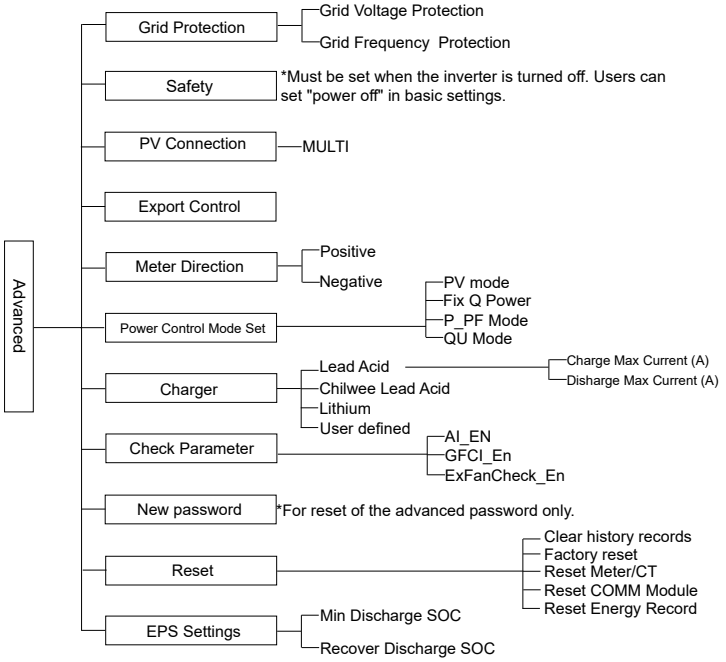


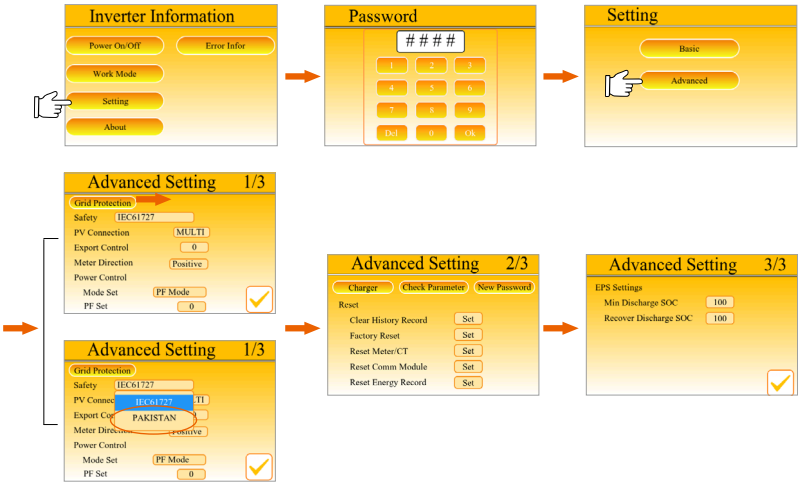
When selected 6 other modes (Self consumption mode, surlplus FIT mode, priority FIT mode, full FIT mode, PSVF mode and backup mode):



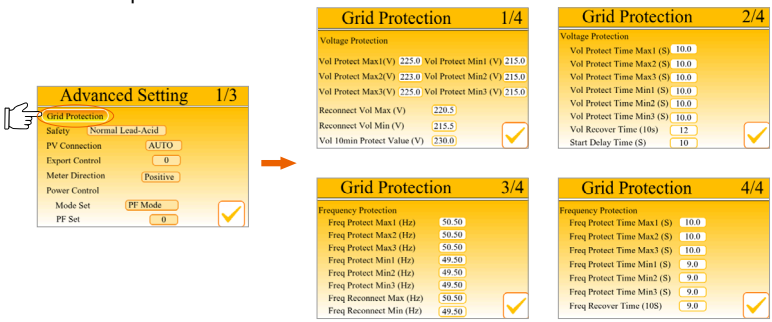
b) Advanced settings

Installer or factory can use the initial password 2014 to enter advanced settings.

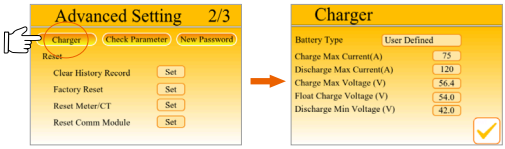




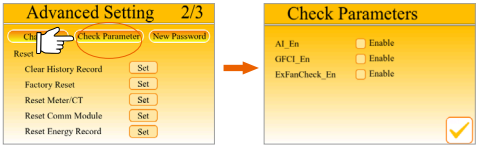
- Grid protection



- Charger



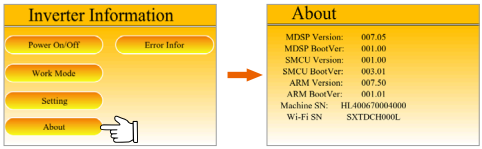
- Check Parameter



- New Password

■ About

Here you can see some basic information of the inverter and battery.



9 Troubleshooting

9.1 Troubleshooting

This section contains information and procedures for resolving possible problems with the inverter, and provides with troubleshooting tips to identify and solve most problems that may occur during the operation.

Please read the troubleshooting steps below carefully. If there is a warning or fault message on the system control panel or a fault code on the inverter information panel, check the message in the table below and perform the suggested actions.

Please contact the installer or supplier if the suggested method cannot solve the problem.

Type	Fault	Diagnosis and solution
INSTALL	ISO_FAIL	Insulation impedance detection failed. • Check whether the wire insulation is intact.
INSTALL	NO_PWR_METER	Electricity meter has no power. • Check the status of the meter.
INSTALL	REMOTE_TURN_OFF	Remote shutdown • Restart the inverter.
INSTALL	FREQ_CFG_UNMATCH	Frequency configuration mismatch • Check whether the frequency is within the correct range.
INSTALL	ARC_FAIL	Arc fault • Wait for a while to see if it returns to normal.
INSTALL	EPS_OVER-LOAD_110PER	1.1 times overload • Turn off high-power load.
INSTALL	EPS_OVER-LOAD_120PER	1.2 times overload • Turn off high-power load.
INSTALL	EPS_OVER-LOAD_LOCK	Overload self-locking • Turn off high-power load, PV, battery and power grid, and restart inverter.
INSTALL	PV_CONN_CFG_ERROR	PV connection configuration error. • Turn off PV, battery and power grid, restart inverter, and confirm whether PV connection is correct.
INSTALL	STARTUP_CONDITION_FAILL	Startup state failed. • Wait for a while to see if it returns to normal.
INSTALL	BUCKBST_CFG_MODE_ERR	BUCKBST configuration mode error. • Check whether the configuration mode of BUCKBST is correct.
PV	PV_01_RE-VERSE	PV1 reverse connection • Turn off PV, battery and power grid, restart inverter, and check the connection status of positive and negative poles of PV1.

Type	Fault	Diagnosis and solution
PV	PV_02_RE-VERSE	PV2 reverse connection • Turn off PV, battery and power grid, restart inverter, and check the connection status of positive and negative poles of PV2.
PV	PV_01_VOLT_HIGH	PV1 Voltage is too high • Check the output voltage of PV1.
PV	PV_02_VOLT_HIGH	PV2 Voltage is too high • Check the output voltage of PV2
BAT	BAT_TYPR_CFG_ERR	Battery type configuration error • Turn off PV, battery and power grid, restart inverter, and confirm whether the battery type is correct.
BAT	BATT_VOLT_HIGH	Battery voltage is too high • Check whether the battery output voltage is within the normal range.
BAT	BAT_BMS_CELL_FAULT	BMS battery failure • Please contact the battery supplier.
BAT	BAT_BMS_COMM_FAULT	BMS communication failure • Check whether the communication between battery and inverter is normal.
GRID	GRID_LOSS	Power grid loss • Check whether the battery input voltage is within the normal work ing range.
GRID	GRID_OVP1	The grid voltage exceeds the allowable value 1 • Check whether the grid voltage is within the normal working range.
GRID	GRID_OVP2	The grid voltage exceeds the allowable value 2 • Check whether the grid voltage is within the normal working range.
GRID	GRID_UVP1	The grid voltage is lower than the allowable value 1. • Check whether the grid voltage is within the normal working range.
GRID	GRID_UVP2	The grid voltage is lower than the allowable value 2. • Check whether the grid voltage is within the normal working range.
GRID	GRID_OFP1	Power grid frequency exceeds the allowable value 1. • Check whether the grid frequency is within the normal working range.
GRID	GRID_OFP2	Power grid frequency exceeds the allowable value 2 • Check whether the grid frequency is within the normal working range.
GRID	GRID_UFP1	The power grid frequency is lower than the allowable value 1. • Check whether the grid frequency is within the normal working range.
GRID	GRID_UFP2	The power grid frequency is lower than the allowable value 2. • Check whether the grid frequency is within the normal working range.

Type	Fault	Diagnosis and solution
INV	BST01_SW_OCP	BST1 software overcurrent • Wait for a while to see if it returns to normal.
INV	BST02_SW_OCP	BST2 software overcurrent • Wait for a while to see if it returns to normal.
INV	BST01_HW_OCP	BST1 hardware overcurrent • Wait for a while to see if it returns to normal.
INV	BST02_HW_OCP	BST2 hardware overcurrent • Wait for a while to see if it returns to normal.
INV	BST_OVER_PWR	BST overpower • Wait for a while to see if it returns to normal.
INV	BUCKBST_HW_OCP	BuckBst hardware overcurrent • Wait for a while to see if it returns to normal.
INV	BUCKBST_SW_OCP	BuckBst software overcurrent • Wait for a while to see if it returns to normal.
INV	BUCKBST_SW_OVP	BuckBst software overvoltage • Wait for a while to see if it returns to normal.
INV	BUCKBST_SW_UVP	BuckBst software undervoltage • Wait for a while to see if it returns to normal.
INV	LLC_HW_OCP	Llc hardware overcurrent • Wait for a while to see if it returns to normal.
INV	LLC_START_FAIL	Llc startup failed. • Wait for a while to see if it returns to normal.
INV	BUCKBST_START_FAIL	BuckBst startup failed. • Wait for a while to see if it returns to normal.
INV	DCBUS_INIT_CHK_FAIL	DCBUS initialization detection failed. • Turn off PV, battery and power grid, and restart inverter.
INV	DCBUS_HW_OVP	DCBUS hardware overvoltage • Wait for a while to see if it returns to normal.
INV	DCBUS_SW_OVP	DCBUS software overvoltage • Wait for a while to see if it returns to normal.
INV	DCBUS_SW_UVP	DCBUS software overvoltage • Wait for a while to see if it returns to normal.
INV	DCBUS_SHORT	DCBUS short circuit • Turn off PV, battery and power grid, and restart inverter.

Type	Fault	Diagnosis and solution
INV	DCBUS_INV_SS_FAIL	DCBUS inverter soft start failed. • Wait for a while to see if it returns to normal.
INV	DCBUS_BST_SS_FAIL	DCBUS BST soft start failed. • Wait for a while to see if it returns to normal.
INV	DCBUS_BUCKBST_SS_FAIL	DCBUS BUCKBST soft start failed. • Wait for a while to see if it returns to normal.
INV	INV_PLL_FAIL	Inverter phase-locked failure • Wait for a while to see if it returns to normal.
INV	INV_RLY_FLT	Inverter relay fault • Wait for a while to see if it returns to normal.
INV	INV_RLY_ON_FAIL	Pull-in fault of inverter relay • Wait for a while to see if it returns to normal.
INV	INV_EPS_RLY_FAULT	EPS end relay failure • Wait for a while to see if it returns to normal.
INV	INV_SS_ACVOLT_FAIL	Soft start AC voltage failed. • Wait for a while to see if it returns to normal.
INV	INV_SW_OCP	Inverter software overcurrent • Wait for a while to see if it returns to normal.
INV	INV_HW_WAVE_OCP	Inverter hardware half-wave overcurrent • Wait for a while to see if it returns to normal.
INV	INV_HW_OCP	Inverter hardware overcurrent • Wait for a while to see if it returns to normal.
INV	INV_GFCI_CT_FAIL	CT fault • Wait for a while to see if it returns to normal. Check whether CT works properly.
INV	INV_GFCI_PROT	GFCI fault • Wait for a while to see if it returns to normal.
INV	INV_FREQT_OCP	Inverter frequent overcurrent alarm • Wait for a while to see if it returns to normal. Check whether the inverter current works in the normal range.
COM	INTER_FAN_FAIL	Internal fan failed. • Check whether there is any foreign matter inside the fan.
COM	EXTERN_FAN_FAIL	External fan failed. • Check whether there is any foreign matter inside the fan.
OVER TEMP	INV_HTSK_OTP	Heat sink temperature is too high.\ • Check whether the heat sink temperature is too high.

Type	Fault	Diagnosis and solution
OVER TEMP	ENVIR_TMP_ HIGH	Ambient temperature is too high. • Check whether the ambient temperature is too high.
VER	TYPE_MODEL_ ERR	Model configuration error • Turn off PV, battery and power grid, and restart inverter. Check whether the inverter model is configured correctly.
INV	BAT_VOLT_OUT-RANGE	Battery voltage overrun • Ensure that the battery works in the normal voltage range.
INV	PV_VOLT_OUT-RANGE	Battery voltage overrun • Ensure that PV works in the normal voltage range.
INV	BAT_SOC_LOW_ ON_GRID	Low soc of grid-connected battery • Stop discharging and start charging.
INV	BAT_SOC_LOW_ OFF_GRID	Low soc of off-grid battery • Stop discharging and start charging.
INV	INV_PWR_DRT	Inverter power derating • Ensure that the inverter power is within the normal range.
INV	BAT_CHRG_ PWR_DRT	Battery charging power derating • Ensure that the battery charging power is within the normal range.
INV	BAT_DISCHRG_ PWR_DRT	Battery discharge power derating • Ensure that the battery discharge power is within the normal range.
INV	BAT_FLOATING_ CHRG	Battery floating charge • Check battery voltage.
INV	BAT_REPLEN-ISH_CHRG	Battery recharge • Check the battery voltage and replenish the power in time.
INV	BAT_PWR_IN_ CFG_MODE	Battery power configuration mode • Make sure that the battery works correctly.
INV	BST_IN_CVS_ MODE	BST constant voltage source mode. • BST operates in constant voltage source mode.
INV	PV_PWR_DRT_ INV_PWR_LMT	Inverter power limit • Ensure that the inverter output power is within the normal range.
INV	PV_PWR_DRT_ ZERO_EXPORT	Anti-reflux. • Ensure that it is in an anti-reflux state.
INV	PV_PWR_DRT_ CHRG_PWR_LMT	Charging power limit. • Ensure that the charging power is within the normal range.
INV	PV_PWR_DRT_ CURR_LMT	Current limiting • Ensure that the current works within the normal range.

Type	Fault	Diagnosis and solution
INSTALL	ALM_ID_EX-TERN_FAN_FAIL	External fan failure • Please check if the external fan is damaged or blocked..
INSTALL	ALM_ID_DSP_ UPDATE_FAIL	DSP upgrade failure • Please contact after-sales for assistance with software upgrade.
INSTALL	ALM_ID_ARM_ UPDATE_FAIL	ARM upgrade failure • Please contact after-sales for assistance with software upgrade.
INSTALL	ALM_ID_SMCU_ UPDATE_FAIL	SMCU upgrade failure • Please contact after-sales for assistance with software upgrade.
INSTALL	ALM_ID_NO_ME-TER	Meter loss • Please check if the meter is connected or if the meter commu-niction line works normally.
INSTALL	ALM_ID_NO_CT	CT loss • Please check if the CT is connected.
INSTALL	BMS_LOST	Communication loss between inverter and battery management system equipment. • Please check the connection status between the BMS device and the inverter.

■ Additional remarks

Please check the following list to ensure that the inverter is in the correct operation state if the information panel does not display the fault light.

------Is the inverter located in a clean, dry and well-ventilated place?

------Is the DC input circuit breaker open?

------Is the specification and length of the cable adequate?

------Are the input and output connections and wiring in good condition?

------Is the configuration set correct for your particular installation?

Please contact our customer service for further assistance. And please be prepared to describe the details of your system installation and provide the inverter serial number and the registration number.

9.2 Routine Maintenance

Inverters do not require any maintenance or correction in most cases, but if the inverter often loses power due to overheating, this can be attributed to the following reason:

- Heat sink behind the inverter is covered with dirt.

If necessary, clean the cooling heat sink with a soft dry cloth or brush. Only trained and authorized professionals familiar with safety requirements can perform maintenance and maintenance work.

■ Safety inspections

Safety checks should be conducted at least every 12 months, Contact the manufacturer to arrange for appropriate training, expertise, and practical experience in performing these tests.

(Note that this action is not covered by warranty).

These data should be recorded in the device log. If the equipment is not running properly or any test fails, the equipment must be repaired for details of safety inspections, refer to section 2 of this manual for safety instructions and Europe commission instructions.

■ Regular maintenance

Item	Check Notes	Maintenance Inverval
Safety check	• Check the items mentioned in section 1 “Safety” • The safety check shall be performed by manufacturer’s qualified person who has adequate training, knowledge, and practical experience.	Every 12 months
Fans	• Check if the cooling fans on the rear of the inverter are covered by dirt or there is abnormal sound. • Clean the cooling fans with a soft dry cloth or brush or replace it if necessary.	Every 6-12 months
Indicators	• Check if the indicators of the inverter are in normal state. • Check if the display of the inverter (if it has screen) is normal.	Every 6 months
Heat sink	Check whether the heat sink is covered with dirt, clean the machine and absorb dust if necessary	From time to time

Item	Check Notes	Maintenance Inverval
Input and output cables	• Cables are securely connected. • Cables are intact, and in particular, the parts touching the metallic surface are not scratched. Check whether the sealing caps of idle DC input terminals fall off. • Check that the idle COMM and USB ports are locked by waterproof caps.	Every 6 months
Grounding reliability	Check whether the grounding terminal and ground cable are securely connected and all terminals and ports are properly sealed.	Every 6 months

10 Decommissioning

10.1 Dismantling the inverter

- Remove DC input line and AC output line of inverter.
- Wait for at least 5 minutes to power off.
- Remove all cable connections from the inverter.
- Remove the inverter from the bracket.
- Remove the bracket if necessary.

10.2 Packaging

Load the inverter into the original package if possible.

If the original package can not be found, you can also use the following requirements of the carton packaging:

- Bearing capacity of more than 30kg.
- Easy to carry.
- Can completely seal the cover.

10.3 Storage and Transportation

Store the inverter in a dry, temperature -25°.C~ 65°C environment. Pay attention to less than four inverters on each stack board during storage and transportation.

10.4 Waste Disposal

If it is necessary to scrap the inverter or other related parts, be sure to send the waste inverter and packaging materials to the designated location for recycling by the relevant department.

11 Disclaimer

The series inverters are transported, used and operated under limited condition, such as environmental, electrical etc. We shall not be liable to provide the service, technical support or compensation under conditions listed below, including but not limited to:

- Inverter is damaged or broken by force majeure (such as earthquake, flooding, thunderstorm, lighting, fire hazard, volcanic eruption etc).
- Inverter's warranty is expired and not extended.
- Can't provide the inverter's SN, warranty card or invoice.
- Inverter is damaged by man-made cause. Inverter is used or operated against any items in local policy.
- Inverter's installation, configuration, commissioning doesn't follow the requirements mentioned in this manual.
- Inverter is installed, refitted or operated in improper ways mentioned in this manual without authority from us.
- Inverter is installed, operated under improper environment or electrical condition mentioned in this manual without authority from us.
- Inverter is changed, updated or disassembled on hardware or software without authority from us.
- Obtain the communication protocol from other illegal channels.
- Build monitoring, control system without authority from us.
- Connect to other brands batteries without authority from us.

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