

USER MANUAL

MARSTEK

Mars Series Energy Storage System (ESS) All-in-One for three phase



Revised History

VERSION	ISSUED	COMMENTS
1	20th-Jan.2024	First release

This manual is valid for the following system (Inverter+battery module)

- M6KH3-P5000H Pro
- M8KH3-P5000H Pro
- M10KH3-P5000H Pro
- M12KH3-P5000H Pro
- M15KH3-P5000H Pro

The system must only be installed by professional technicians. The professional technician is required to meet requirements as follows:

- Know electronic, electrical wiring and mechanical expertise, and be familiar with electrical and mechanical schematics.
- Be familiar with local standards and relevant safety regulations of electrical systems.
- Have received professional training related to the electrical equipment installation and commissioning.
- Be able to quickly respond to hazards or emergencies that occur during installation and commissioning.

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1.Safety Precautions

Safety signs in this manual:



DANGER indicates high-risk potential hazards that, if not avoided, may lead to death or serious injury.



WARNING indicates moderate-risk potential hazards that, if not avoided, may lead to death or serious injury.



CAUTION indicates low-risk potential hazards that, if not avoided, may lead to minor or moderate injury.



NOTE provides valuable tips on the best operation of our products.



1.1 Important Safety Instructions

Danger to life due to a high voltage inside the inverter!

- All work must be performed by a qualified electrician.
 - Children and persons with reduced physical sensory abilities, mental capabilities, or lack of experience and knowledge should not use this equipment unless supervised or instructed.
-



Danger of burns

- When the product is working, the upper of the enclosure and the enclosure body may become hot.
- During operation, only the touch screen needs to be operated.



Radiation may cause damage to health.

- Do not stay at a place less than 20cm away from the inverter for a long time.



Ground the PV generator.

- Comply with the local requirements for grounding the PV modules and the PV generator.
- It is recommended that generator frames and other conductive surfaces be connected in a manner that ensures continuous conduction and grounding for optimum protection of the system and personnel.



Make sure the input DC voltage is less than the maximum value. Over-voltage may cause permanent damage to the inverter or other losses, which will not be covered by the warranty!



Before attempting any maintenance, cleaning or working on any circuits connected to inverter, authorized service personnel must disconnect both AC and DC power from inverter.



Do not operate the inverter while the equipment is running.



Risk of electric shock!

-
- It is recommended to use only accessories that are compatible with the inverter, otherwise it may lead to the risk of fire, electric shock or personal injury.
 - Make sure the existing wiring is in good condition, and the wires are not undersized.
 - Do not disassemble any parts of inverter which are not mentioned in installation guide. It contains no user-serviceable parts. See Warranty for service. Unauthorized repairs may result in a risk of electric shock or fire and will void your warranty, and will void the warranty.
 - Keep away from flammable, explosive materials to avoid fire disaster.
 - The installation location should be away from humid or corrosive sstance.
 - Authorized service personnel must use insulated tools when installing or working with this equipment.
 - PV modules should have IEC 61730 Class A rating.
 - Do not touch either the positive or negative pole of PV connecting device. Strictly prohibit touching both of them at the same time.
 - The unit contains capacitors that remain charged to a potentially lethal voltage when the MAINS , battery and PV supply has been disconnected.
 - Hazardous voltages may remain present for up to 5 minutes after disconnection.
-

- CAUTION-The energy stored in the capacitor is a shock hazard, do not operate the inverter, coupler, power cable, battery cable, PV cable or PV generator while energized. After turning off the PV, battery and power supply, always wait 5 minutes to allow the intermediate circuit capacitors to discharge before unplugging the DC, battery and power coupler.
- When accessing the internal circuit of inverter, it is very important to wait 5 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device beforehand since the capacitors require time sufficiently discharge!
- Measure the voltage between terminals U_{DC+} and U_{DC-} with a multi-meter(impedance at least 1Mohm) to ensure that the device is discharged (<35VDC) before starting to work inside the device.

1.1.1 Install surge protection devices (SPDs) for PV



- Over-voltage protection with surge arresters should be provided when installing PV power generation system.
 - The grid connected inverter does not have SPDs installed on both PV input side and MAINS side.
-
- Lightning will cause a damage either from a direct strike or from surges due to a nearby strike.
 - Induced surges are the most likely cause of lightning damage in majority or installations, especially in rural areas where electricity is usually provided by long overhead lines. Surge may be included on both the PV array conduction and the AC cables leading to the building.
 - Specialists in lightning protection should be consulted during the end
-

use application.

- Using appropriate external lightning protection, the effect of a direct lightning strike into a building can be mitigated in a controlled way, and the lightning current can be discharged into the ground.
- Installation of SPDs to protect the inverter against mechanical damage and excessive stress include a surge arrester in case of a building with external lightning protection system (LPS) when separation distance is kept.
- To protect the DC system, surge suppression device (SPD type2) should be fitted at the inverter end of the DC cabling and at the array located between the inverter and the PV generator, if the voltage protection level (VP) of the surge arresters is greater than 1100V, an additional SPD type 3 required for surge protection for electrical devices.
- To protect the AC system, surge suppression devices (SPD type2) should be fitted at the main incoming point of AC supply (at the consumer's cutout), located between the inverter and the meter/distribution system; SPD (test impulse D1) for signal in according I to EN 61632-1.
- All DC cables should be installed to provide as short a run as possible, and positive and negative cables of the string or main DC supply should be bundled together. Avoiding the creation of loops in the system.
- Spark gap devices are not suitable to be used in DC circuits once conducting, they won't stop conducting until the voltage across their terminals is typically more than 30 volts.

1.1.2 Anti-Islanding Effect

The islanding effect is a special phenomenon where a grid-connected PV system still delivers power to the nearby grid when voltage losses occur in the power system. This can be dangerous for maintenance personnel and

the plic.The Mars series inverters offer Active Frequency Drift (AFD) to prevent the islanding effect.

1.1.3 PE Connection and Leakage Current

- The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current $I_{fn} \leq 240\text{mA}$ which automatically disconnects the device in case of a fault.The device is intended to connect to a PV generator with a capacitance limit of about 700nf.
-



WARNING

High leakage current!

Earth connection essential before connecting supply.









- Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.
- Make sure that grounding conductor is adequately sized as required by safety regulations.
- Do not connect the ground terminals of the unit in series in case of a multiple installation. This product can cause current with a DC component, Where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.





1.1.4 Battery Safety Instructions

- 1: Do not wear watches, rings or similar metallic items.
 - 2: Use insulated tools.
 - 3: Put on rubber shoes and gloves.
 - 4: Do not place metallic tools and similar metallic parts on the batteries.
 - 5: Switch off load connected to the batteries before dismantling battery connection terminals.
 - 6: Only personal with proper expertise can carry out the maintenance of accumulator batteries.
-

1.2 Important Safety Symbol

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

Symbol	Explanation
	CE mark. The inverter complies with the requirements of the applicable CE
	TUV
	RCM remark
	SAA certification
	Beware of hot surface. The inverter can become hot during operation. Avoid contact during operation.
	Danger to life due to high voltages in the inverter!
	Danger. Risk of electric shock!
	Please note the provisions of the instruction manual.

Symbol	Explanation
	The inverter can't be disposed together with the household waste. Disposal information can be found in the enclosed documentation.
	Do not operate 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 Introduction

2.1 Model Description for inverter and battery module

Naming rules, For example: M6KH3-P5000H Pro

“M” means “Marstek energy storage system”.

“6K” means “output power 6kw ”.

“H” means “battery high voltage”

“3” means “three-phase output”

“P5000H” means “High voltage battery with capacity 5120Wh”

2.2 Basic features

Mars Hybrid Series is a high performance inverter that converts solar energy to DC power and stores the energy in batteries.

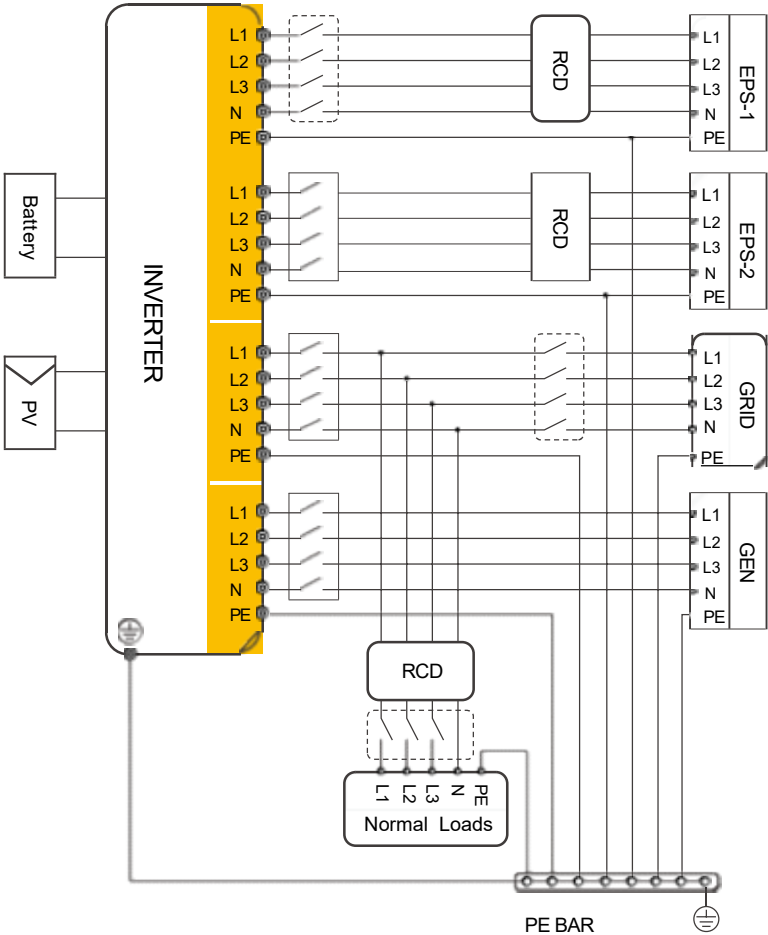
The inverter can be used to optimize its own energy consumption, to store energy in batteries for future use or to connect to the plic grid. The mode of operation depends on the PV energy source and user preferences. It can use the energy from the batteries and the inverter (generated by the PV) to provide emergency power in case of grid outages.

Mars Hybrid Series is designed in two EPS versions for customers to choose from based on local rules.



E-Version applies to wiring rules that require the N (neutral) wire of the EPS to be disconnected from the N (neutral) wire of the grid (applicable to most countries).

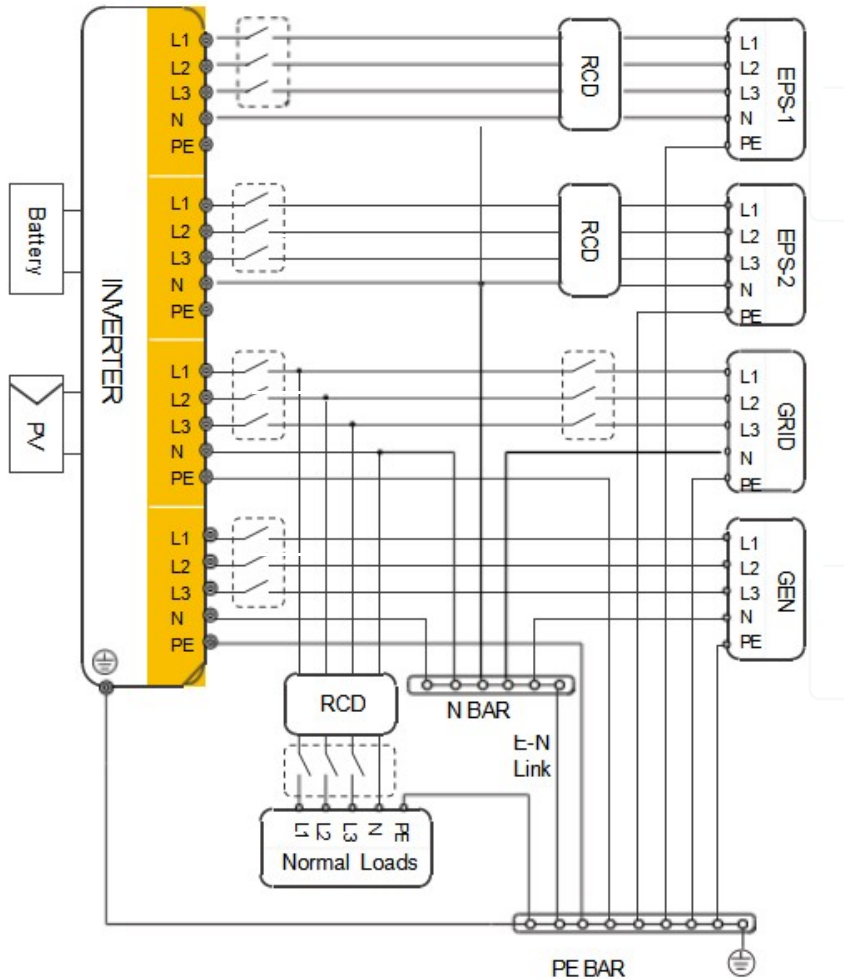
E-Version system diagram



The grounding screw hole of inverter is at the lower right corner.

I-Version applies to wiring rules that require that the N (neutral) wire of other power sources must not be isolated or switched (applicable to Australian and New Zealand wiring rules AS/NZS_3000:2012).

I-Version system diagram



The grounding screw hole of inverter is at the lower right corner.



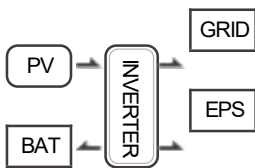
- Please control the household load and make sure it is within the "EPS output rating" in EPS mode, otherwise the inverter will shut down and issue an "overload fault" warning.
- Please check with the main grid operator for any special grid connection regulations.
- The wiring diagram is for reference only and the complete electrical connection should comply with the local regulations.
- Do not mis-connect the phase sequence. Otherwise, the inverter will not operate properly.

2.3 Work Modes

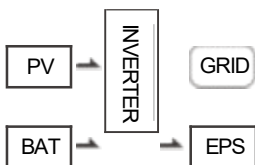
The inverter offers multiple working modes according to different requirements.

Work mode: self-use

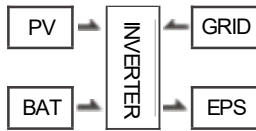
- I. When PV, Grid, Battery is available:



Solar energy provides power to the loads as first priority. If solar energy is sufficient to power all connected loads, solar energy excess power will provide to charge battery, and then redundant power will feed to grid.

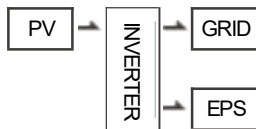


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, battery energy will supply power to the loads at the same time.

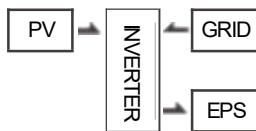


Solar energy provides power to the loads as first priority, if solar energy and battery are not sufficient to power all connected loads, utility energy (Main Grid) will supply power to the loads with solar energy at the same time.

II. When PV, Grid is available(without battery):

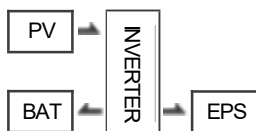


Solar energy provides power to the loads as first priority.if solar energy is Inverter sufficient,the excess power will feed to grid.

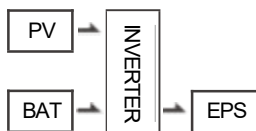


Solar energy provides power to the loads as first priority, if solar energy is not sufficient to power all connected loads, Grid energy will supply power to the loads at the same time.

III. When PV, Battery is available (Grid is disconnected):



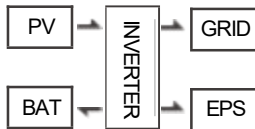
Solar energy provides power to the loads as first priority .if solar energy is sufficient to power all connected loads, solar energy will provides to charge battery.



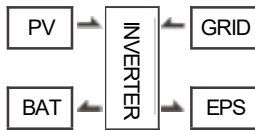
Solar energy provides power to the loads as first priority.if solar energy is not sufficient to power all connected loads, battery energy and solar energy will supply power to the loads at the same time.

Work mode: peak shift

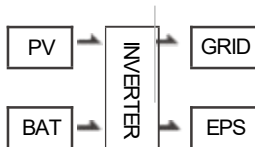
I. When PV, Grid, Battery is available:



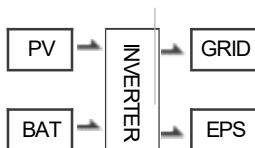
On charge time, solar energy will charge battery as first priority. The excess energy will supply power to the loads. If solar energy is sufficient to supply loads and charge battery, and if there's still some extra energy, then the excess power will feed the power to the grid.



On charge time, solar energy will charge battery as first priority. Then the excess solar energy will supply power to loads. If solar energy is not sufficient to charge battery and supply loads, the grid will supply all the connected loads with solar energy together.

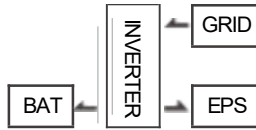


On discharge time, solar energy provides power to the loads as first priority. If solar energy is sufficient to supply loads, and if there's still some extra energy from solar energy, then the excess power and battery will deliver the power to the grid at the same time.

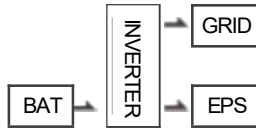


In the period of no charge or discharge, the solar power supply loads at first priority, excess energy to the grid.

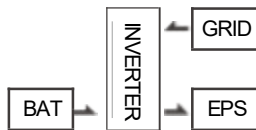
II. When Grid, Battery is available (PV is disconnected):



On charge time,grid will charge battery and supply power to the connected loads at the same time.



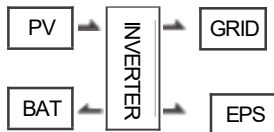
On discharge time,if load power is less than battery power,battery will supply power to loads as first priority.the excess power will be feed to grid.



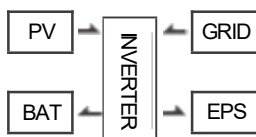
On discharge time,if load power is more than battery power.battery and grid will supply power to the loads at the same time.

Work mode: BAT priority

I. When PV, Grid, Battery is available:

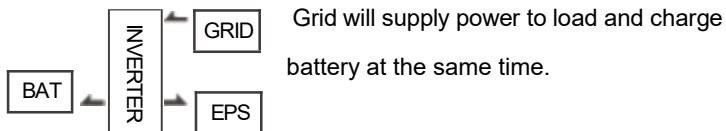


Solar energy will charge battery as first priority, if solar energy is excess the excess power will supply load. If there's still some extra energy. then the excess power feed the power to grid will feed the power to Grid.



Solar energy will charge battery as first priority, if solar energy is excess the excess power will supply load.If solar energy is not sufficient to charge battery and supply loads, grid will supply power to loads.

II. When Grid, Battery is available(PV is disconnected):

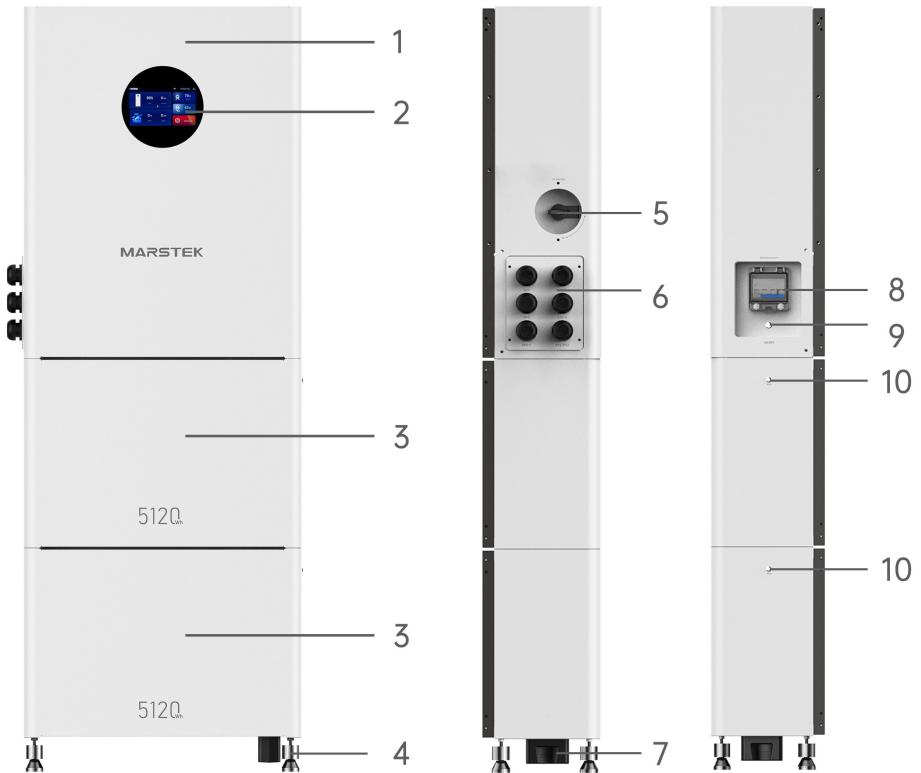


If the anti-reverse function is set to be allowable, the system will not feed power to grid in self-use, peak shift, battery priority modes.

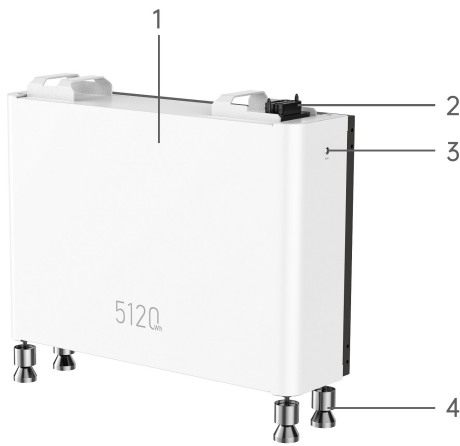
2.4 Dimensions (Unit:mm)



2.5 Interface & Definitions

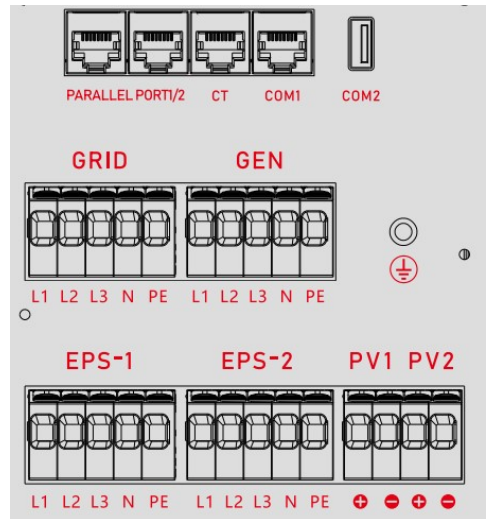
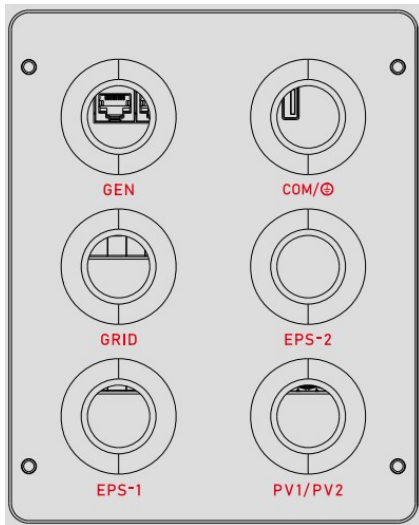


- 1 Inverter
- 2 7 inch LCD screen
- 3 Battery modules
- 4 Base feet
- 5 PV switch
- 6 Interface panel with Grentau connector
- 7 Connector plug for system short connection
- 8 Breaker
- 9 ON/OFF button for system
- 10 Running light for battery



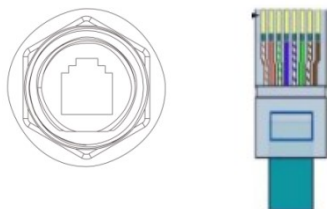
- 1 P5000H Pro Battery module
- 2 Stack-able connection port x1
- 3 LED light for running statusx1
- 4 Base feet x4

Outside and Inside of Interface panel with Grentau connectors



Parallel Port 1/2	Reserved
CT	Connect to CT (current transformer)
COM1	BMS Port for upgrading software by RJ45
COM2	PCS Port for upgrading software by USB
PV1+	PV string 1 positive input
PV1-	PV string 1 negative input
PV2+	PV string 2 positive input
PV2-	PV string 2 negative input

Pin Definition for COM1



PIN	1	2	3	4	5	6	7	8
Definition	PCS_CANH	PCS_CANH	X	Debug_CANH	Debug_CANL	X	X	X

X: this pin is vacant(not define) at this moment.

EPS-1		
L1	EPS1 line	A phase
L2	EPS1 line	B phase
L3	EPS1 line	C phase
N	EPS1 line	Null line
PE	EPS1 line	ground electrode
EPS-2		
L1	EPS2 line	A phase
L2	EPS2 line	B phase
L3	EPS2 line	C phase
N	EPS2 line	Null line
PE	EPS2 line	ground electrode

GRID (Diesel generator function is unreleased currently)	
L1	Grid line A phase
L2	Grid line B phase
L3	Grid line C phase
N	Grid line null line
PE	Grid line ground electrode
GEN	
L1	A phase
L2	B phase
L3	C phase
N	Null line

2.6 Parameters

General data	
Model	M6KH3-P5000H Pro M8KH3-P5000H Pro M10KH3-P5000H Pro M12KH3-P5000H Pro M15KH3-P5000H Pro
Power factor at rated power / adjustable displacement	0.99 / 0.8 leading to 0.8 lagging
Dimensions (W / H / D)	610*770* 252 mm(Inverter) 610x252x415mm(single battery module)
Device weight	65kg(Inverter),55kg(battery)
Installation	Stackable
Operating temperature range	-25 °C~+60 °C (Inverter) /0 °C~50 °C(battery)
Noise emissions (typical)	< 35 dB(A)
Standby consumption	< 15 W
Cooling method	Natural convection
Ingress protection rating (as per IEC 60529)	IP65
Max. permissible value for relative humidity (non-condensing)	0~95%
Max. operating altitude	4000m (>2000m power derating)

PV Input					
Model	M6KH3	M8KH3	M10KH3	M12KH3	M15KH3
Max. power of PV array	9kW	12kW	15kW	18KW	22.5KW
Max. input voltage	1000 V				
MPPT voltage range	180 V~850 V				
Min. input voltage/start voltage	125 V/235 V				
No. of independent MPPT trackers per MPPT input	2				
No. of independent MPPT strings per MPPT Input	1/1			2/2	
Max. input current per MPPT tracker	13A/13A			20A/20A	
Max. short-circuit current per MPPT tracker	16A/16A			30A/30A	

AC Output					
Model	M6KH3	M8KH3	M10KH3	M12KH3	M15KH3
Nominal AC voltage	3W+N+PE, 220 / 380 V; 230 / 400V; 240 / 415 V				
AC voltage range	360V~440V				
Rated AC grid frequency	50 Hz / 60 Hz				
AC grid frequency range	50±5Hz / 60±5Hz				
Rated active power	6 kW	8Kw	10 kW	12Kw	15 kW
Rated apparent power	6kVA	8kVA	10kVA	12kVA	15kVA
Max. apparent power	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Rated grid output current (@400V)	8.7A	11.5A	14.4A	17.3A	21.7 A
Max. grid output current	9.5A	12.7A	15.9A	19.1A	23.8A
Harmonics THDI (@ Nominal power)	< 3%				

AC Input					
Model	M6KH3	M8KH3	M10KH3	M12KH3	M15KH3
Rated grid voltage	3W+N+PE, 220 / 380 V; 230 / 400V; 240 / 415 V				
Rated grid frequency	50Hz / 60Hz				
Rated active power	12 kW	16Kw	20 kW	24Kw	30 kW
Max. apparent input power from grid	13.2kVA	17.6kVA	22kVA	26.4kVA	33.3kVA
Rated input current from grid	17.3A	23.1 A	28.9A	34.7A	43.4A
Max. input current from grid	19A	25.5 A	31.9A	38.2 A	47.6A

Efficiency					
Model	M6KH3	M8KH3	M10KH3	M12KH3	M15KH3
MPPT efficiency	≥99.5%				
Max efficiency	97.90%	97.90%	98.20%	98.20%	98.50%
Euro efficiency	97.20%	97.20%	97.50%	97.50%	97.60%
Max. battery to load efficiency	97.50%	97.50%	97.50%	97.60%	97.80%

EPS Output

Model	M6KH3	M8KH3	M10KH3	M12KH3	M15KH3
Rated grid voltage	3W+N+PE, 220 / 380 V; 230 / 400V; 240 / 415 V				
Rated grid frequency	50Hz / 60Hz				
Rated active power	6kVA	8kVA	10kVA	12kVA	15kVA
Max.apparentoutput power	6kVA	8kVA	10kVA	12kVA	15kVA
Peak active output power	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Rated Current (@400V)	6.6kVA	8.8kVA	11kVA	13.2kVA	16.5kVA
Max. output current	9.5A	12.7A	15.9A	19.1A	23.8A
Max. switch time	≤10ms				
Output THDI (@ Linear load)	<2%				

Parameters for Single Battery P5000H Pro

Capacity	5120Wh	Battery Type	LiFeO4
Voltage	102.4V	Current	50A
DoD	0.9	Charge/Discharge Current	50A
Operation Voltage	92.8V~116.8V	Charge Voltage	97.6V~116.8V
Peak Charge/ Discharge Current	60A(Peak@6s)	Network Interface	RS485/CAN
Charge Temperature	0°C~50°C	Discharge Temperature	0°C~50°C
Storage Temperature	-20°C~60°C	Max. Series Connection	5
Life Cycle (Times)	>6000(25°C)	Lifespan	10+Year (20°C)




Parameters for Power cluster(e.g: 10KW with 2pcs power modules)	
Battery Voltage Range	(92.8~116.8V)*N (N is power module No.)
Charge Voltage	(97.6V~113.6V)*N (N is power module No.)
Max. Charging Voltage	600V
Charge/Discharge Current	50A/50A
Suggested Parallel Connection No.	2~5
Installation space	300~600mm between 2 groups of stable batteries



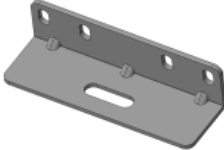
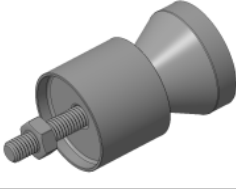
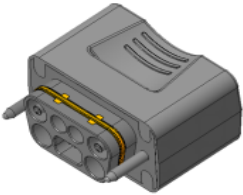
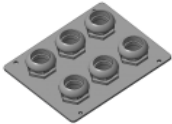

3 Installation







3.1 Packing list

Open the package and take out the products, please check the accessories.

Below list for references with 10KW(2pcs battery module+inverter)

No.	Photos	Description	Q'ty
1		Three phase inverter	1
2		Battery module(P5000H Pro)	2
3		L=1m,USB Cable for upgrading	1

4		CT line	1
5		bracket ear for fixing inverter	4
6		bracket ear for fixing battery module	4
7		base feet	4
8		short connection plug for system	1
9		interface panel with Grentau connector	1
10		M6*60 Expansion screws	8

11		Allen key,23*58MM,45# stell	1
12		M5*12 screw	16
13		Metal terminals for wires crimping	24
14		User manual	1
15		Quick Installation guide	1
16		Warranty card	1

3.2 Tools & Instruments

Tools and Instruments



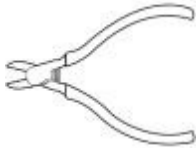
Hammer drill (with a drill bit of 8 mm)



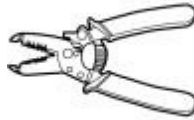
Torque socket wrench



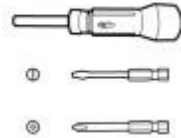
Torque wrench



Diagonal pliers



Wire strippers



Torque screwdriver



Rber mallet



Utility knife



Cable cutter



Crimping tool (recommended model: PV-CZM-19100 or other crimping tools that meet the requirements)



Cord end terminal crimping tool



Disassembly tool (model: PV-MS-HZ open-end wrench)



Cable tie



Vacuum cleaner



Multi-meter (DC voltage measurement range ≥ 600 V DC)



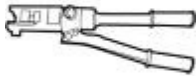
Marker



Steel measuring tape



Level



Hydraulic pliers



Heat-shrink tubing



Heat gun



Safety gloves



Safety goggles



Dust mask



Safety boots

-

-

3.3 Installation Precaution & Steps

Mars Series energy storage system(ESS) is designed for outdoor installation (IP 65).

Please ensure that the installation location meets the following conditions:

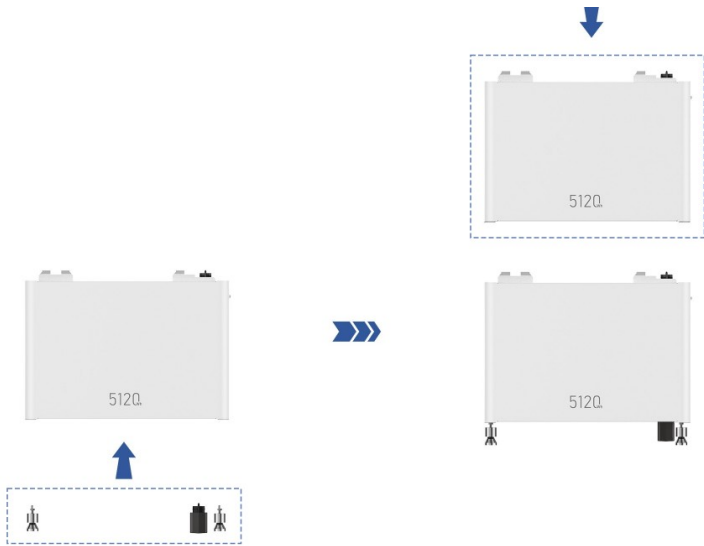
- Not in direct sunlight.
- Not in areas where highly flammable materials are stored.
- Not in potential explosive areas.
- Not in the cool air directly.
- Not near the television antennas or antenna cables.
- Not higher than altitude of about 2000m above sea level.
- Not in environment of precipitation or humidity (>95%).
- Under good ventilation conditions.

Please **AVOIDE** direct sunlight, rain exposure, snow accumulation during installation and operation.



Installation Steps

- Screw the base feet(4pcs) and assembly short connecting plug at bottom of battery module
- Stack 2nd battery on 1st one
- Stack inverter on 2nd battery
- Tighten bracket ears on battery and inverter
- Installation finish



1 Screw the base feet(4pcs) and assembly short connecting plug at bottom of battery module

2 Stack 2nd battery on 1st one





3 Stack inverter on 2nd battery

4 Tighten bracket ears on battery and inverter

5 Installation finish



4 Electrical Connection

4.1 PV connection

Mars series Hybrid can be connected in series with 2-strings PV modules for 6KW, 8KW, 10KW, 12KW, 15KW . Select PV modules with excellent function and reliable quality. The open- circuit voltage of module arrays connected in series should be less than Max. DC input voltage. Operating voltage should be in accordance with MPPT voltage range.

Max. DC Voltage Limitation

Model	M6KH3/M8KH3/M10KH3/M12KH3/M15KH3
Max. DC Voltage (V)	1000
MPPT Voltage Range (V)	180~850



WARNING

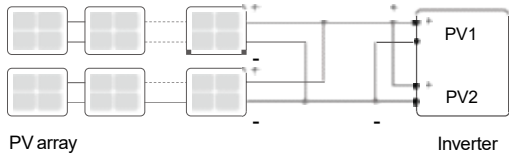
- PV module voltage is very high, which already achieve dangerous voltage range, please comply with electric safety rules when connecting.
- **DO NOT** ground the PV positive and negative terminals.



- The following requirements of PV modules need to be applied for each input area.
- **DO NOT** ground the PV positive and (or) negative terminals.
- To save cables and reduce DC losses, it is recommended to install inverters near the PV modules.



❌ The following PV connection mode is **NOT** allowed!



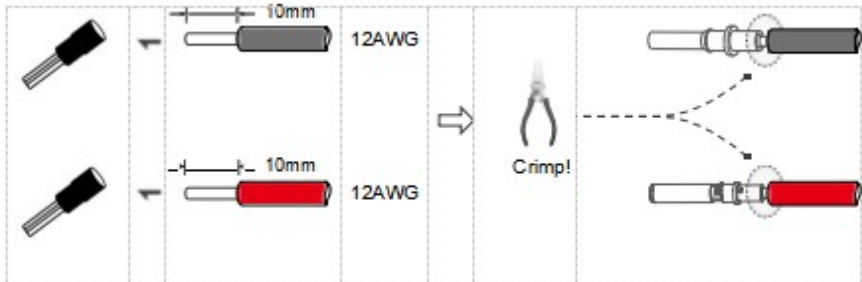
Connection steps:

Step 1 : Inspect PV modules

1. Measure the module array voltage with a voltmeter.
2. Check the PV+ and PV- from the PV string combiner box correctly.
3. Please make sure the impedance between the positive pole and negative pole of PV to ground should be MΩ level.

Step 2 : Wiring crimping to round metal terminals

1. Remove 10mm of insulation from the end of the wire.
2. Thread the end of the wire(12AWG) into the metal terminal and use crimping pliers to crimp it tightly.



Step 3. Insert metal pin to Green housing.

Thread the cable through the waterproof connector on interface panel, and insert the terminals into each grid pin of green house while heard a “click” sound, it is contact OK.



4.2 Grid connection

The Mars series inverters are designed for three-phase grids. The voltage is 380/400/415V and the frequency is 50/60Hz. Other technical requirements should be in accordance with the requirements of the local plic grid.

Recommended cables and micro-breakers

Model	M6KH3 M8KH3 M10KH3	M12KH3 M15KH3
Cable (mm ²)	4~6	6~10
Micro-breaker (A)	20	32

Micro-breaker should be installed between inverter and grid, and no load should be connected directly to the inverter.

Connection steps:

Step 1 : Check the grid voltage

1. Check the grid voltage and compare it with the allowed voltage range (Refer to technical data).
2. Disconnect the board from all phases and ensure that it is not reconnected.

Step 2 : Make the AC wires.

1. Select the appropriate wire (Cable size: refer to above table).
2. It is recommended to keep about 60mm length of cable for crimping.
3. Remove 10mm of insulation from the end of wire.
4. Thread the end of the wire into the metal terminal and use crimping pliers to crimp it tightly.
5. Thread the cable through the waterproof connector on interface panel, and insert the terminals into each grid pin and heard a “click” sound, it is assembly OK. (Similar like PV connection)

4.3 EPS Connection (apply to I Version and E Version only)

The Mars series hybrid inverters have both off-grid and on-grid functions. The inverters output power through the AC port when the grid is on and through the EPS port when the grid is off.

I Version & E Version

Mars series inverter provides two versions for customer to choose based on the local rules. Version I applies to wiring rules that require EPS load-side ground to be isolated from grid-side ground (applies to wiring rules in Australia and New Zealand AS/NZS_3000:2012)

Version E applies to wiring rules that require the load-side ground of the EPS to be un-isolated from the grid-side ground (applicable in most countries).

Auto & Manual

For the "E version" inverters, the EPS function can be triggered automatically or manually, depending on the user's preference.

For the "I version" inverter, the EPS function can only be triggered automatically.

If the user wants to use this function manually, an external switch needs to be installed. Please refer to the specific wiring diagram below.

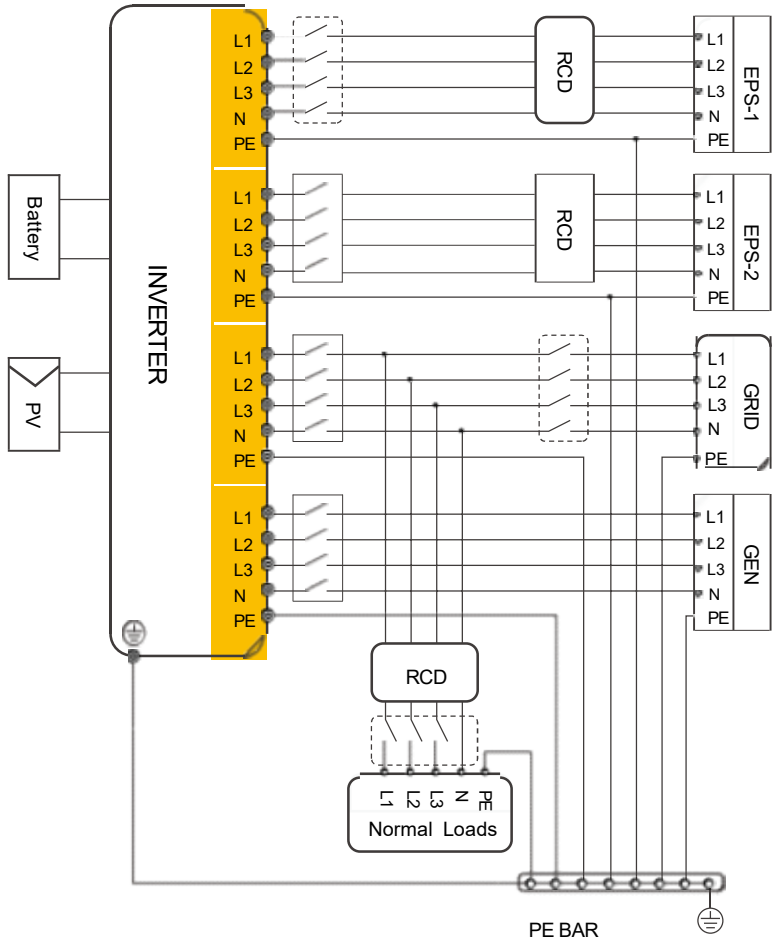
For solutions, please contact our sales.

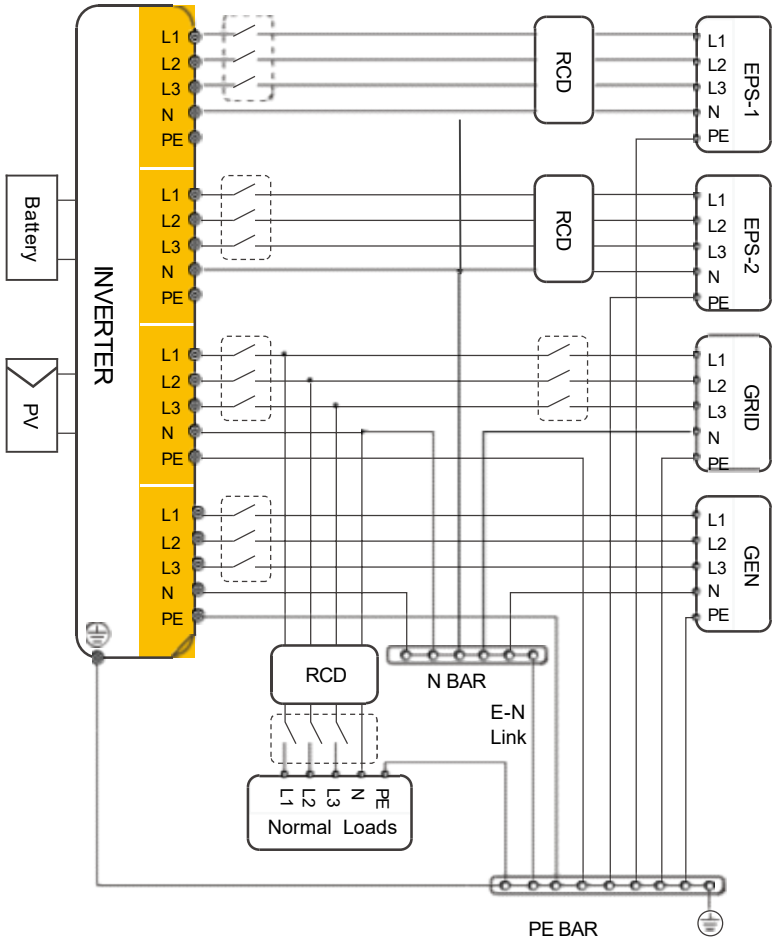
E Version Auto

Transfer switch required.

I Version Auto

No transfer switch required.







If local policies dictate a wiring pattern that is inconsistent with the above operating guidelines, especially for N (neutral) wire, earth and RCD, please contact us before operating! This wiring diagram is for reference only and complete electrical connections should be made in accordance with local regulations.

The Mars series hybrid inverters have grid-on and grid-off functions. When the grid is on, the inverter will output power through the AC port, while when the grid is off, it will output power through the EPS ports. EPS1 for very important load, EPS2 for important or normal load. When there is a power outage or no grid,

- If the battery does not report low voltage or under voltage alarm, the inverter will supply power to both EPS1 and EPS-2.
- If the battery has a low voltage or under voltage alarm, the inverter only supplies power to EPS-1.
- The total output power of the EPS-1 and EPS-2 must not exceed the rated output power.

Recommended cables and Micro-breakers

Model	M6KH3 M8KH3 M10KH3	M12KH3 M15KH3
Cable (mm ²)	4~6	6~10
Micro-breaker (A)	20	32

Connection steps:

Step 1 : Make EPS wires.

1. Select the appropriate wire (Cable size: refer to Table 4-2).
 2. It's recommended to keep about 60mm length of cable for crimping.
 3. Remove 10mm of insulation from the end of wire.
-

4. Thread the end of the wire into the metal terminal and use crimping pliers to crimp it tightly.
5. Thread the cable through the waterproof connector on interface panel, insert the terminals into each EPS pin of green house and heard a "click" sound, it's contact OK. (Similar like PV connection)

Requirements for EPS loads

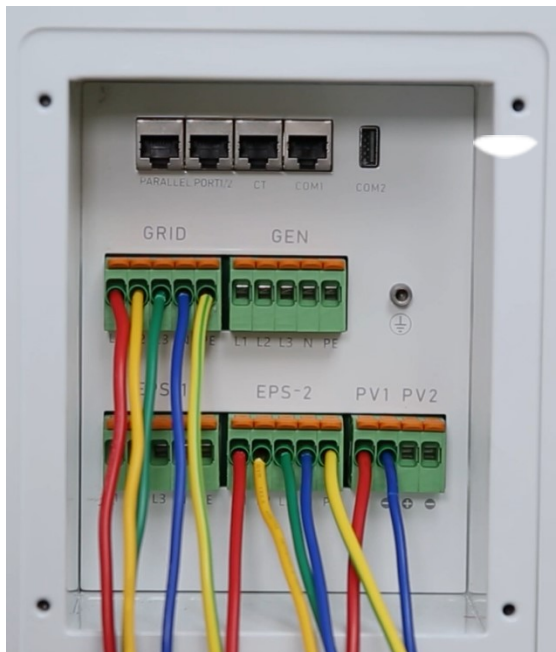


WARNING

Make sure the rated load power of the EPS is within its rated output range, otherwise the inverter will shut down with an "overload" warning.

When an "overload" occurs, adjust the load power to ensure it is within the EPS output power range before turning on the inverter.

For non-linear loads, make sure that the surge power should be within the output power range of the EPS.

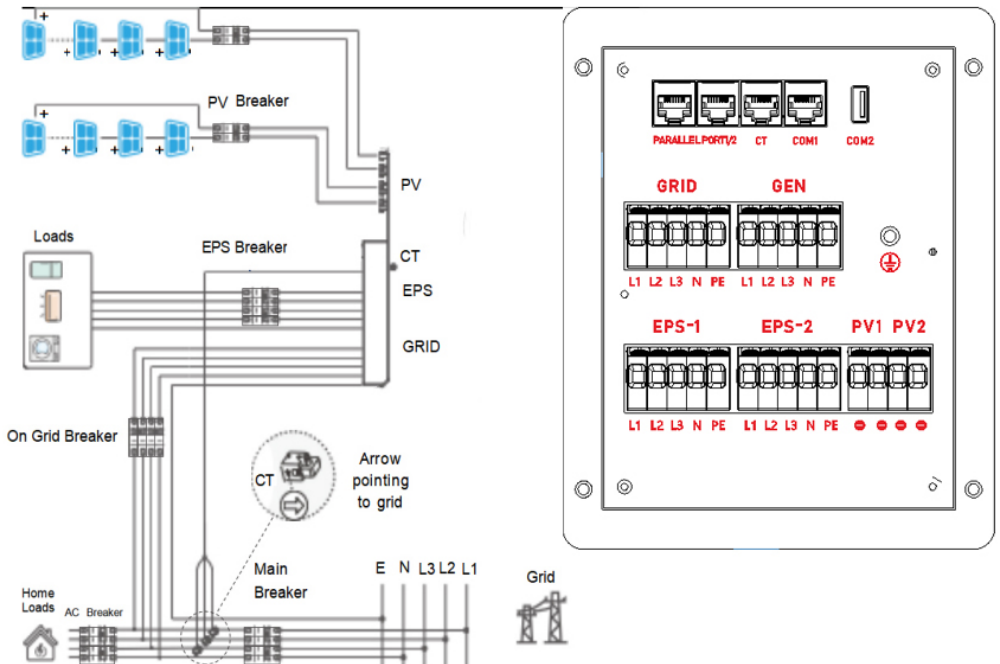


4.4 CT Connection and Phase instruction

CT is used for monitoring the power usage for entire house, at the meantime, inverter will also need the data from Meter to achieve the Export Control Function.



CT connection and phase wiring diagram



The CT arrow points to the grid, otherwise the inverter will display wrong data or the machine will not work properly. Pay attention to phase sequence when wiring. With incorrect phase sequence, the inverter will not operate properly.

CT connection steps:

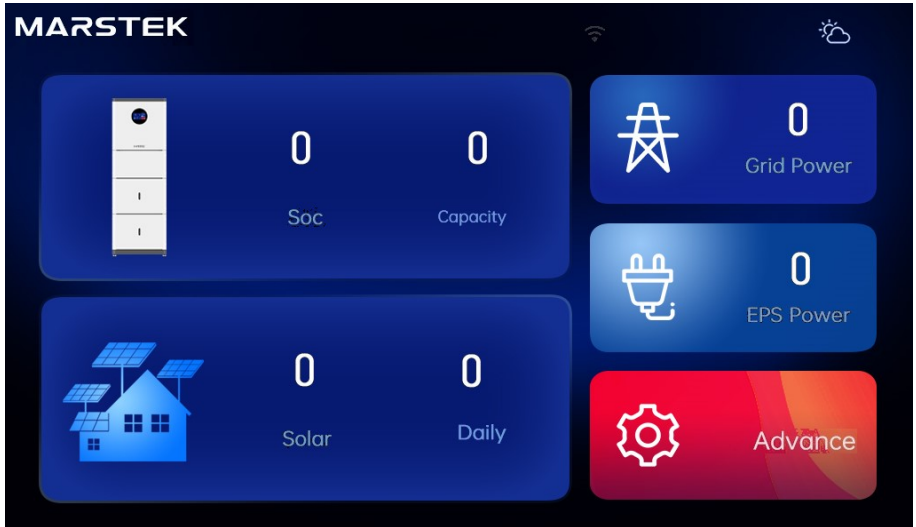
1. Connect RJ45 internet cable with CT line connector and thread into the waterproof connector on interface panel
2. Insert RJ45 end of the CT cable into the CT port (COM1) of the inverter.

4.5 WiFi and Bluetooth Connection

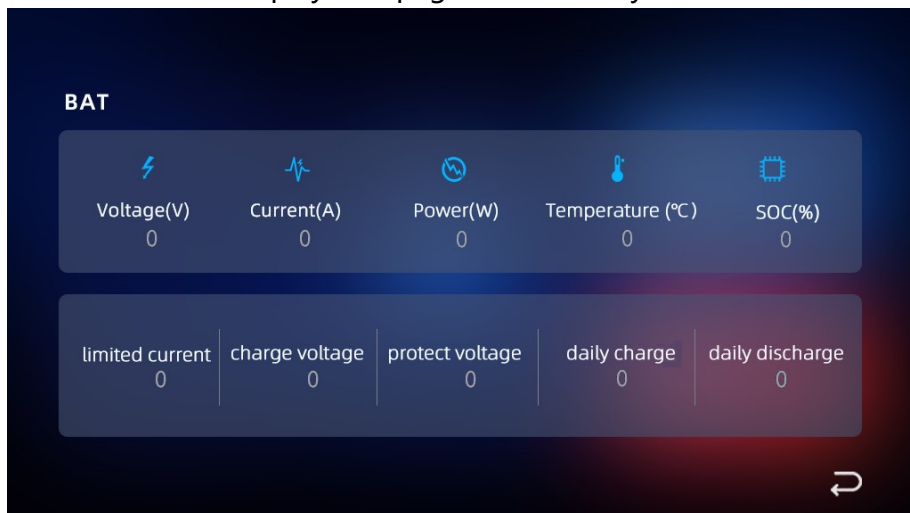
Wifi & BT module is build-in inside of inverter,pls refer to APP remote control section.

5. LCD Screen display and settings

Standby home page *



Touch SOC to display BAT page show battery info



Touch Grid power show Grid info



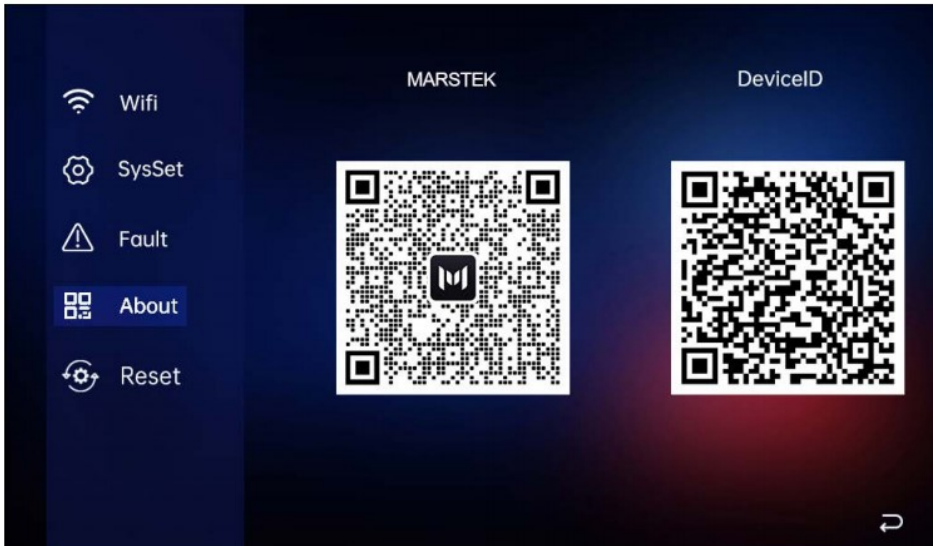
Touch EPS Power show EPS-1/2 info,next page is EPS-2



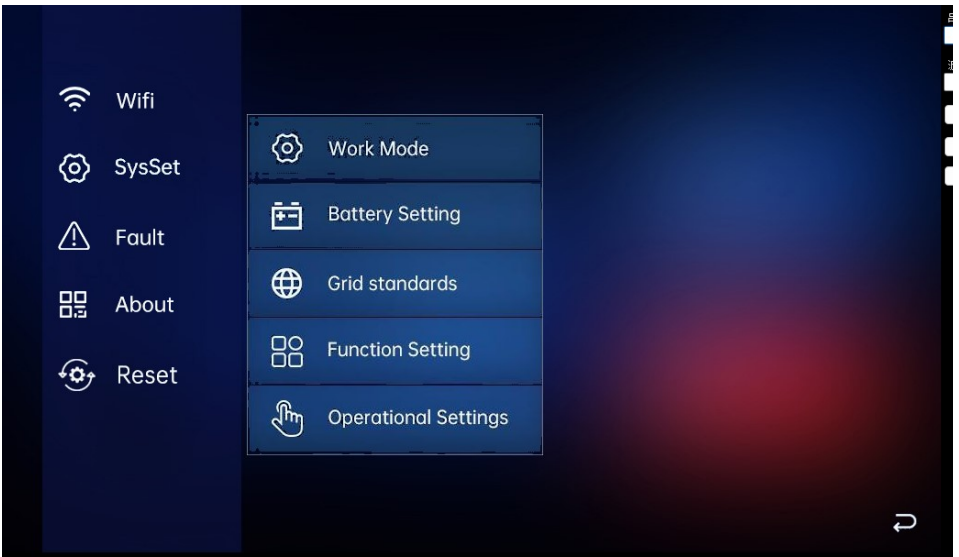
Touch Solar display MPPT info with PV1/2



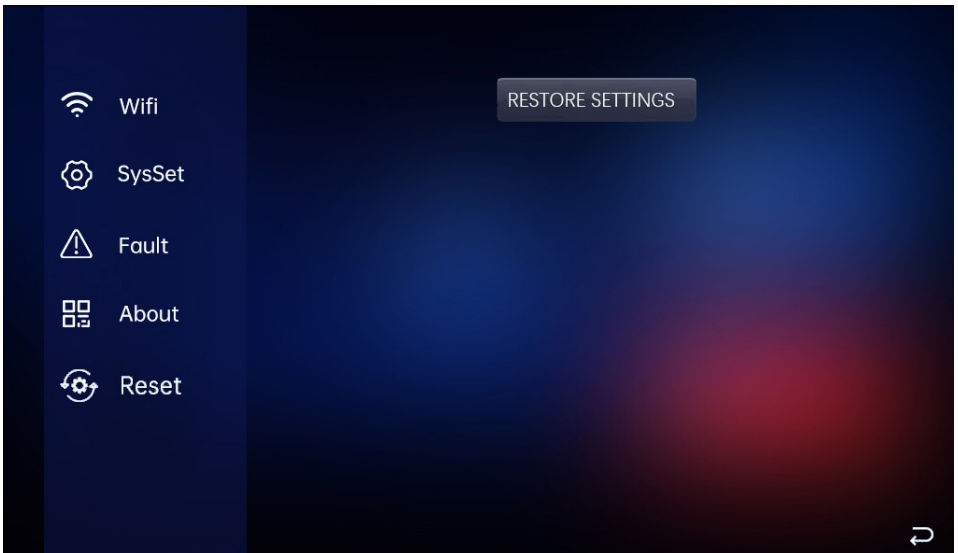
Touch Advance to start details setting



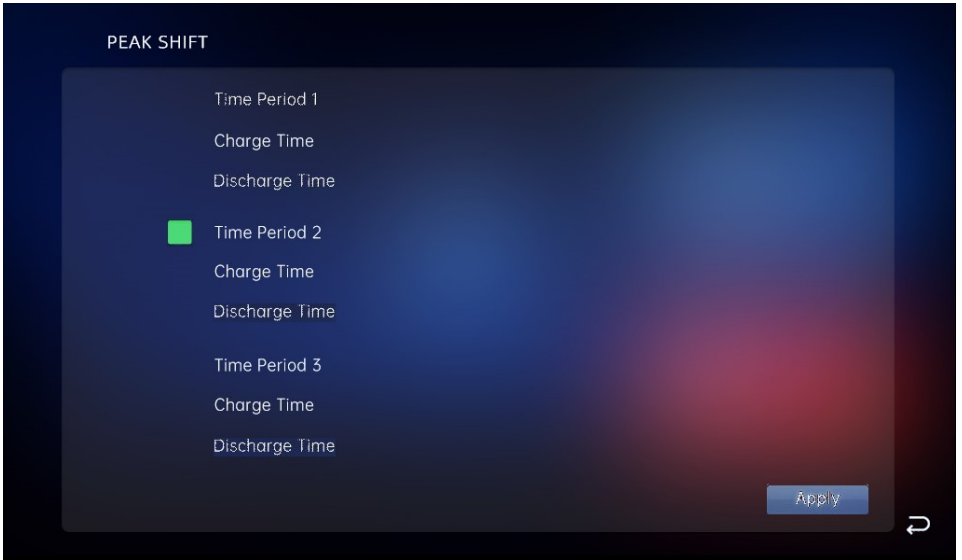
Touch SysSet to set personal options and other settings.



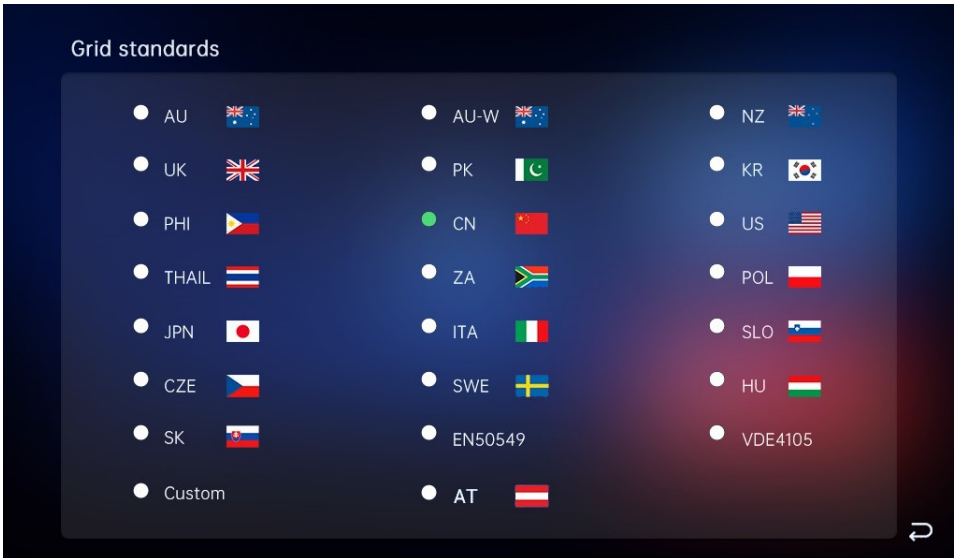
Touch Reset to restore settings



Touch work mode and set peak shift per different time period.



Touch Grid standards to choose right country for power exported.



Touch battery setting to to set battery.

Battery Settings

Discharge Depth: 90 Apply

Charge Current: 25 Apply



Touch function setting to set function items.

Function Setting

EPS

BAT-Wakeup

Remote Control

Anti Reverse

HOME LOAD

CT Ratio Apply

PV Input Mode:

Independent Parallel CV

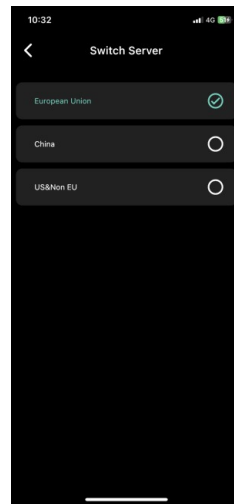


6. APP Remote Control by Marstek Energy

6.1 Scan the QR and Install the APP

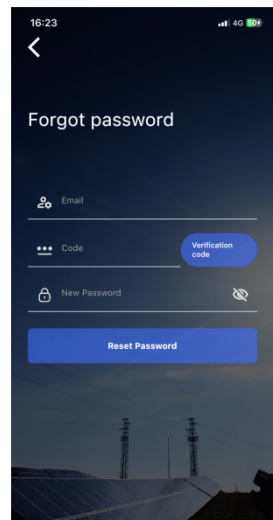
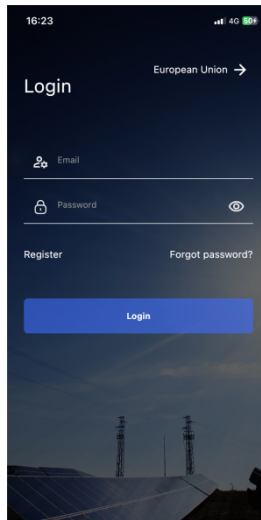
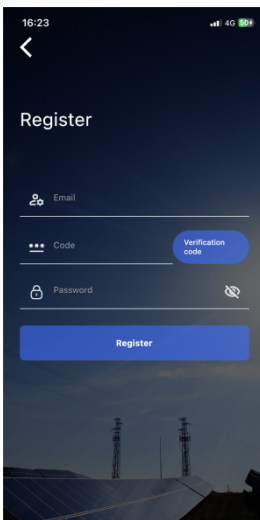
IOS & Android System Scan QR on equipment, download Marstek Energy from APP Store and install by instructions.

Install successfully, click the logo to log in APP, the first time need choose correct server (such as European Union, China, US & Non EU), or you cannot see history data with wrong server.



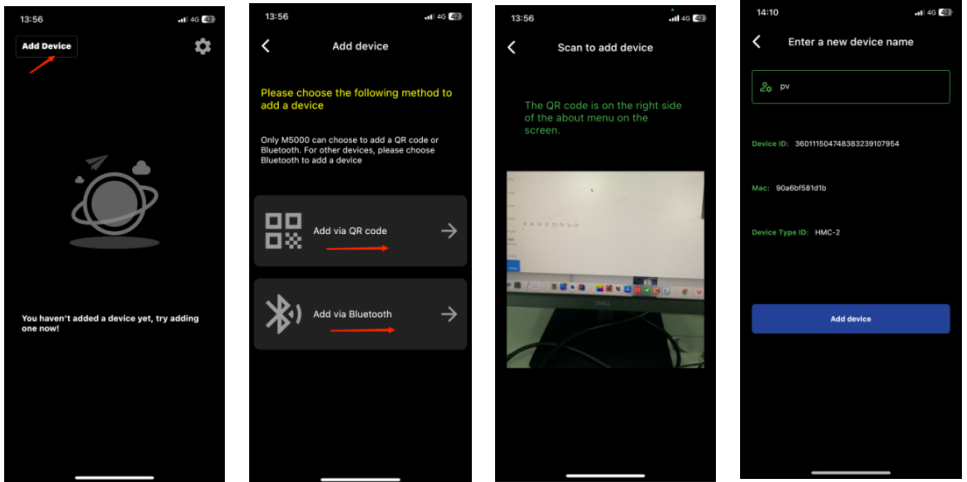
6.2 Register your Account

Input your E-mail and password to register, if you forget the password, pls touch "Forgot Password" and re-set by instructions.



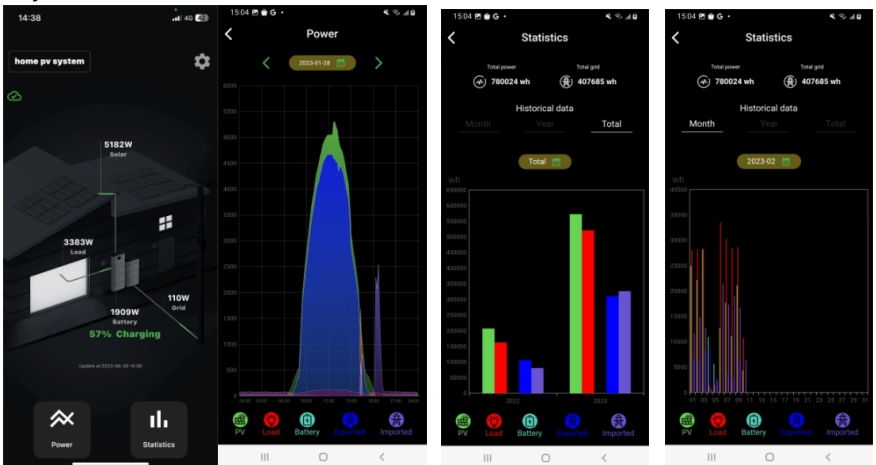
6.3 Recognize the Equipment by SN

Log in successfully and show below page, touch **Add Device** and turn to page "Add device", scan the QR on equipment (Setting-->About, scan QR on right) or via Bluetooth (turn on Bluetooth and location on mobile phone). Named for your device, it will show on home page.

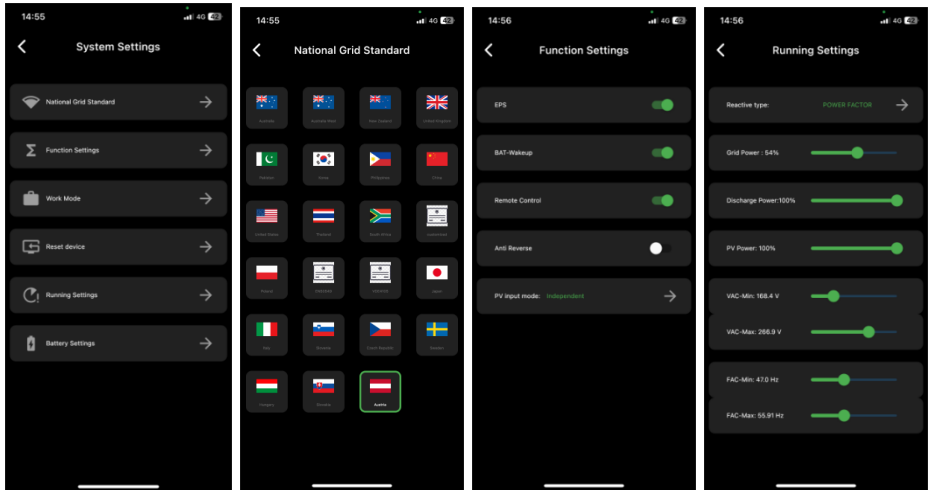


6.4 Check the data on home page

such as PV, Load, Battery, Exported and Imported per daily, monthly and yearly.



6.5 System setting



6.6 Share equipment

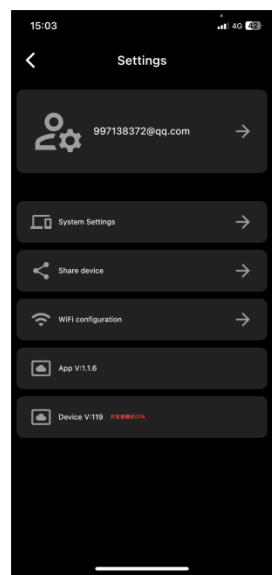
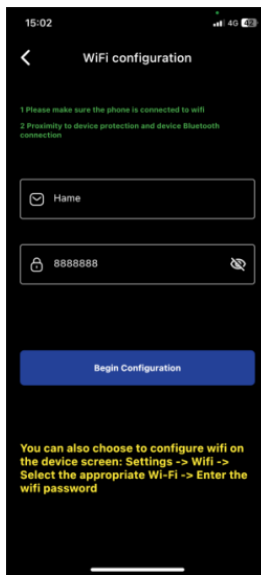
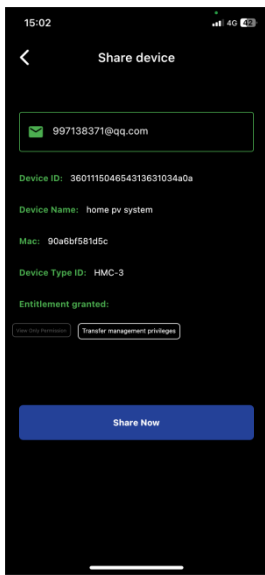
Click Setting -> Share Device, input the e-mail you want to share and see the data

6.7 WiFi connect

App normally work, click Setting -> WiFi configuration, input the correct wifi SSID &PWD.

6.8 Check App and Device Rev.

Click Setting to check App and Device Rev.



7. Fault diagnosis and solutions

The following table lists some basic problems that may occur in practice and the corresponding basic solutions. When you encounter the following problems, please refer to the following solutions. If the problem is still not solved, please contact your local distributor.

Content	Codes	Explain	Solutions
DischgOverCur	00	Battery discharge over current.	<ol style="list-style-type: none"> (1) Nothing need to do, Wait one minute for the inverter to restart. (2) Check whether the load is in compliance with the specification. (3) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check

Over Load	01	The load power is greater than other power(PV,BAT).	<ol style="list-style-type: none"> (1) Check whether the load is in compliance with the maximum power of the machine. (2) Cut off all the power and shut down all the machines; disconnect the load and plug in to restart machines, then check whether the load is short circuited if the fault has been eliminated. (3) Contact customer service if error warning continues.
BatDisconnect	02	Battery Disconnect. (Battery voltage not identified)	<ol style="list-style-type: none"> (1) Check whether the battery is connected. (2) Check if battery wiring port is open circuited. (3) Contact customer service if error warning continues.
Bat Under Vol	03	Battery voltage low that normal range.	<ol style="list-style-type: none"> (1) Checking System Settings, If so, power off and restart. (2) Check if the grid power down. If so, waiting for the grid power up, the inverter will automatically charge. (3) Contact customer service if error warning continues.
Bat Low capacity	04	Bat Low capacity	(1) Battery Low that setting capacity.(SOC<100%-DOD)
Bat Over Vol	05	The battery voltage is greater than the Inverter maximum voltage.	<ol style="list-style-type: none"> (1) Checking System Settings, If so, power off and restart. (2) Contact customer service if error warning continues.
Gird low vol	06	Grid voltage is	(1) Check if the grid is abnormal.

Grid over vol	07	abnormal	<ul style="list-style-type: none"> (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid low freq	08	Grid Frequency is abnormal.	<ul style="list-style-type: none"> (1) Check if the grid is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Grid overFreq	09		
gfcI over	10	Inverter GFCI exceeds standard.	<ul style="list-style-type: none"> (1) Check PV string for direct or indirect grounding phenomenon. (2) Check peripherals of machine for current leakage. (3) Contact the local inverter customer service if fault remains unremoved.
bus under vol	13	BUS voltage is lower than normal.	<ul style="list-style-type: none"> (1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
bus over vol	14	BUS voltage is over maximum value..	<ul style="list-style-type: none"> (1) Check the input mode setting is correct. (2) Restart the inverter and wait until it functions normally.
Inv over cur	15	The inverter current exceeds the normal value.	<ul style="list-style-type: none"> (1) Restart the inverter and wait until it functions normally.
Chg over cur	16	Battery charge current over than the Inverter maximum voltage.	<ul style="list-style-type: none"> (1) Restart the inverter and wait until it functions normally.

Bus vol osc	17	Bus voltage instability.	<ol style="list-style-type: none"> (1) Check the input and output mode setting is correct. (2) Restart the inverter and wait until it functions normally.
Inv under vol	18	INV voltage is abnormal	<ol style="list-style-type: none"> (1) Check if the INV voltage is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
Inv over vol	19		
InvFreqAbnor	20	INV frequency is abnormal	<ol style="list-style-type: none"> (1) Check if the INV frequency is abnormal. (2) Restart the inverter and wait until it functions normally. (3) Contact customer service if error warning continues.
igbt temp high	21	The inverter temperature is higher than the allowed value	<ol style="list-style-type: none"> (1) Cut off all the power of the machine and wait one hour, then turn on the power of the machine.
bat over temp	23	Battery temperature is higher than the allowed value.	<ol style="list-style-type: none"> (1) Disconnect the battery and reconnect it after an hour.
bat UnderTemp	24	Battery temperature is low than the allowed value.	<ol style="list-style-type: none"> (1) Check the ambient temperature near the battery to see if it meets the specifications.
BMS comm.fail	27	Communication between lithium battery and inverter is abnormal.	<ol style="list-style-type: none"> (1) Check the cable, crystal, Line sequence. (2) Checking the Battery switch.

Fan fail	28	Fan fail	(1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly.(If you can see it)
Grid Phase err	30	The grid fault phase.	(1) Check power grid wiring
Arc Fault	31	PV Arc Fault	(1) Check Photovoltaic panels, PV wire. (2) Contact customer service if error warning continues.
bus soft fail	32	The inverter may be damaged	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
inv soft fail	33		
bus short	34		
inv short	35		
fan fault	36	Fan fault.	(1) Check whether the Inverter temperature is abnormal. (2) Check whether the fan runs properly.(If you can see it)
PV is low	37	PV is too low	(1) Check if the PE line is connected to the inverter and is connected to the ground. (2) Contact customer service if error warning continues.
Bus Relay Fault	38	The inverter may be damaged	(1) Restart the inverter and wait until it functions normally. (2) Contact customer service if error warning continues.
Grid Relay Fault	39		
EPS rly fault	40		
Gfci fault	41		
Selftest fail	44		
System fault	45		
Current DCover	46		
Voltage DCover	47		

Note: If an error occurs that is not listed in the table, Please Contact customer service.

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