LEDVANCE USER MANUAL
HYBRID INVERTER

LHS-LV-8K F1

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CONTENTS

SAFETY LNTRODUCTIONS

About this manual

The manual mainly describes the product information, guidelines for installation, operation and maintenance. The manual cannot include complete information about the photovoltaic (PV) system.

How to use this manual

Read the manual and other related documents before performing any operation on the inverter. Documents must be stored carefully and be available at all times.
Contents may be periodically updated or revised due to product development. The informationin this manual is subject to change without notice.

Safety introductions

Safety signs

Label	Description
	Prohibit disassembling inverter case, there existing shock hazard, which may cause serious injury or death, please ask qualified person to repair.
	The DC input terminals of the inverter must not be grounded.
	Surface high temperature, Please do not touch the inverter case.
	The AC and DC circuits must be disconnected separately, and the maintenance personnel must wait for 5 minutes before they are completely powered off before they can start working.
	Do Not put it in the waste bin! Recycle it by licensed professional!
	Please read the instructions carefully before use

SAFETY LNTRODUCTIONS

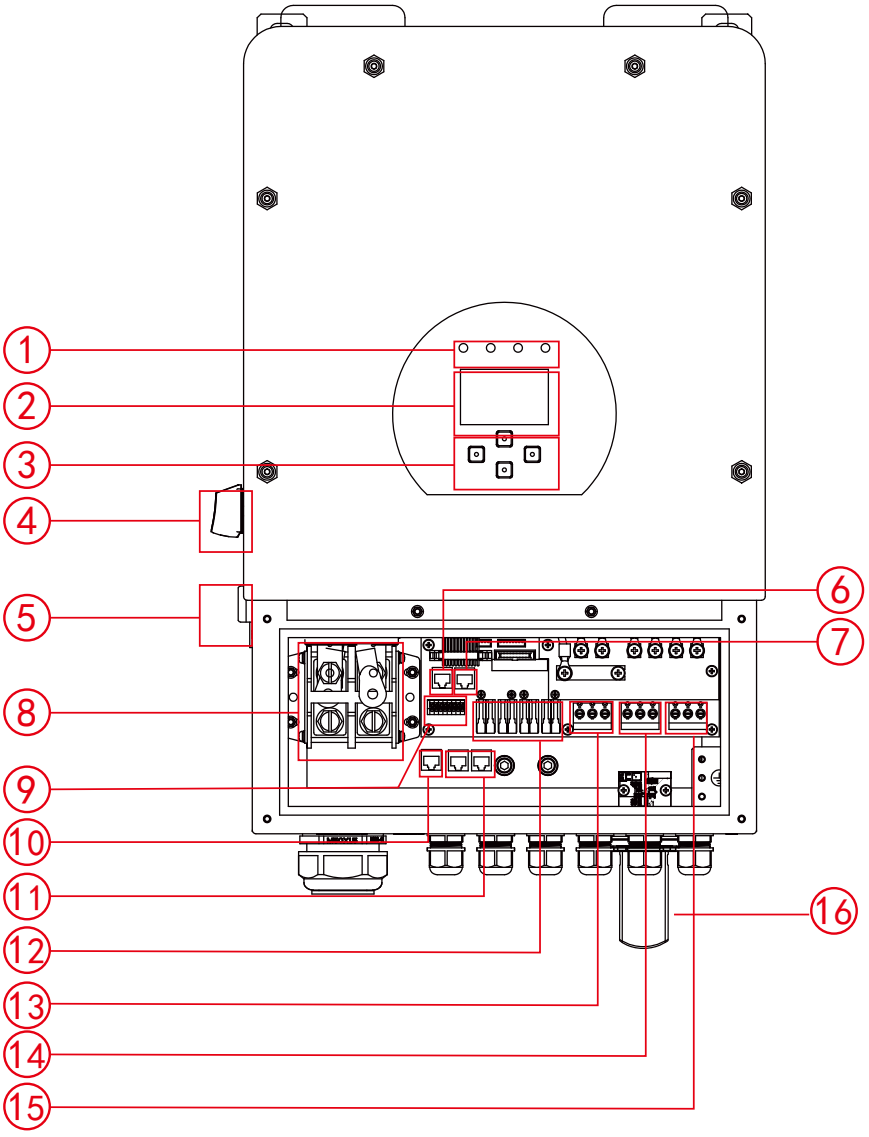
- This chapter contains important safety and operating instructions. Read and keep this manual forfuture reference.
- Before using the inverter, please read the instructions and warning signs of the battery and corresponding sections in the instruction manual.
- Do not disassemble the inverter. If you need maintenance or repair, take it to a professional seryice center.
- Improper reassembly may result in electric shock or fire.
- To reduce risk of electric shock, disconnect all wires before attempting any maintenance or cleaning.Turning off the unit will not reduce this risk.
- Caution: Only qualified personnel can install this device with battery.
- Never charge a frozen battery
- For optimum operation of this inverter, please follow required specification to select appropriate cable size. It is very important to correctly operate this inverter.
- Be very cautious when working with metal tools on or around batteries. Dropping a tool may cause a spark or short circuit in batteries or other electrical parts, even cause an explosion.
- Please strictly follow installation procedure when you want to disconnect AC or DC terminals Please refer to “Installation” section of this manual for the details.
- Grounding instructions - this inverter should be connected to a permanent grounded wiring system, Be sure to comply with local requirements and regulation to install this inverter.
- Never cause AC output and Dc input short circuited. Do not connect to the mains when DC input short circuits.

CONTENTS

Product instructions

This is a multifunctional inverter, combining functions of inverter, solar charger and battery charger to offer uninterruptible power support with portable size. its comprehensive LCD display offers user confgurable and easy accessible button operation such as battery charging AC / solar charging, and acceptable input voltage based on different applications.

Product overview



1: Inverter Indicators

2: LCD display

3: Function Buttons

4: DC switch

5: Power on / off button

6: RS 485 port

7: CAN port

8: Battery input connectors

9: Function port

10: Meter_CON port

11: Parallel port

12: PV input with two MPPT

13: Grid

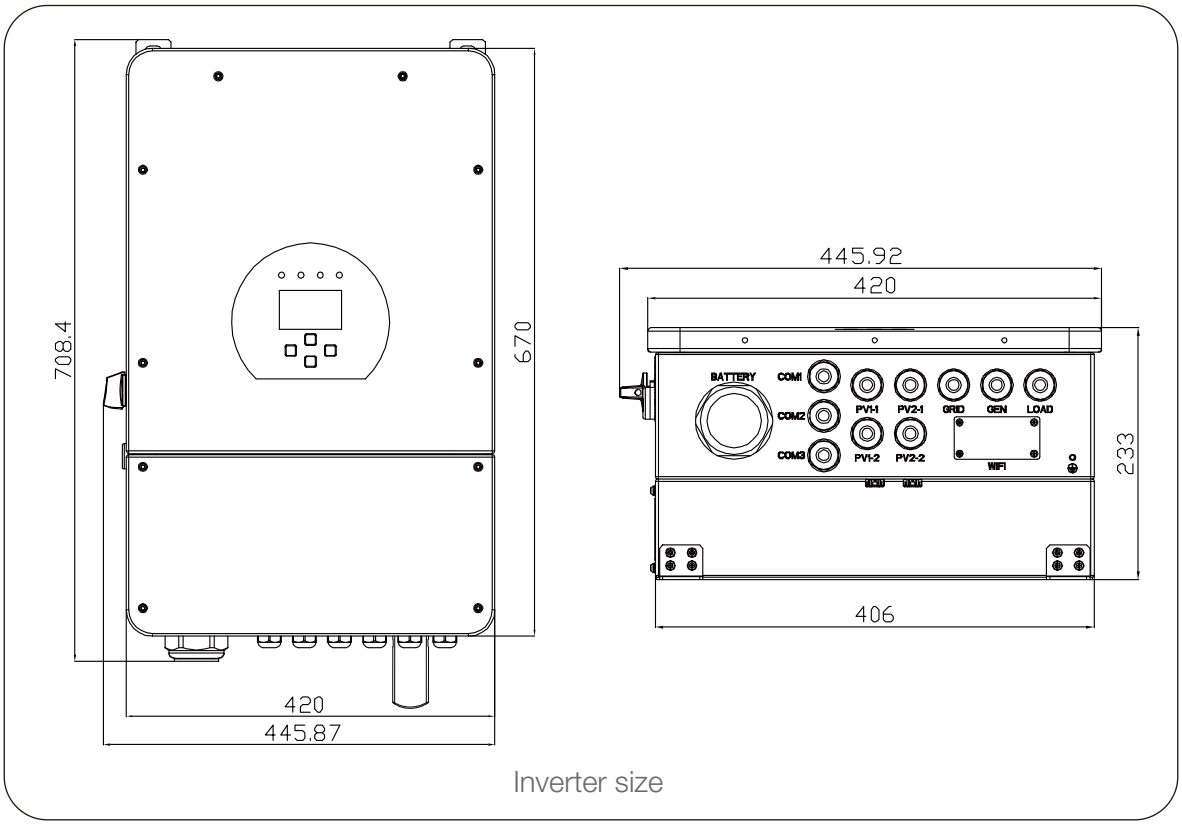
14: Generator input

15: Load

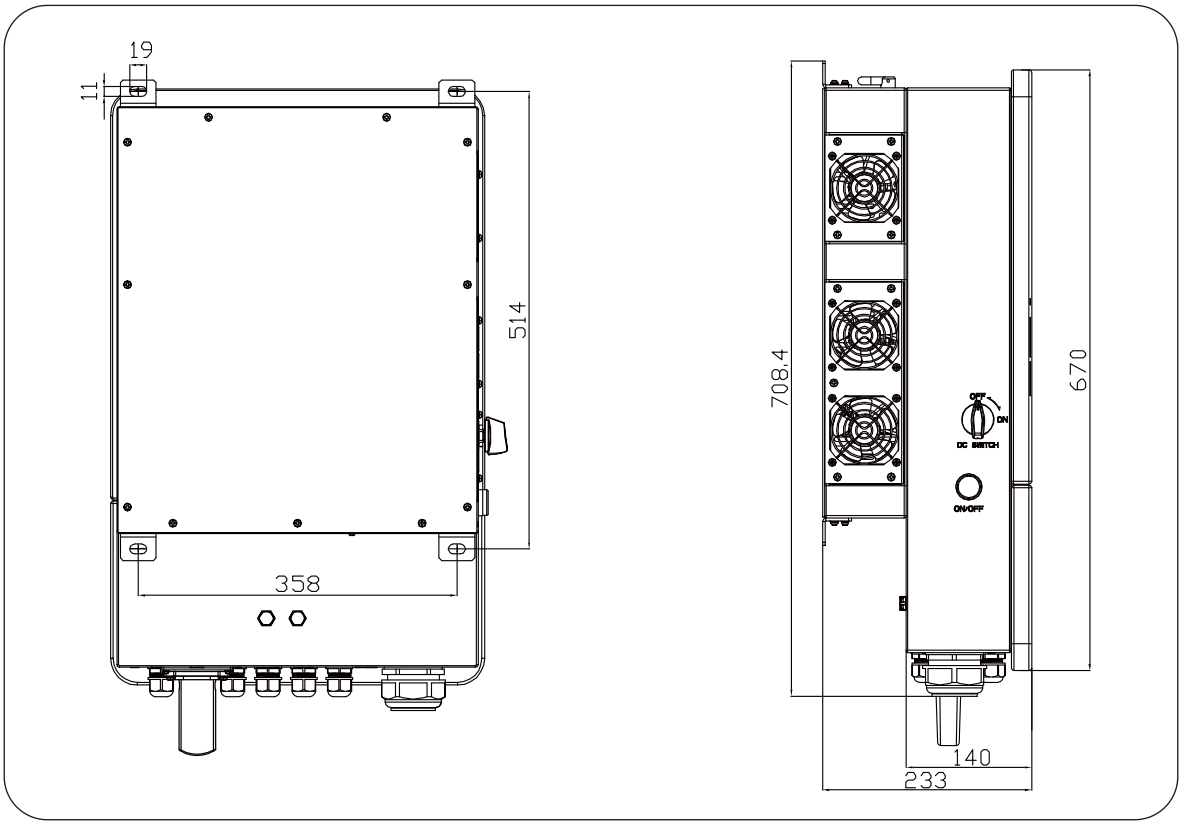
16: WiFi interface

PRODUCT INSTRUCTIONS

Product size



Inverter size



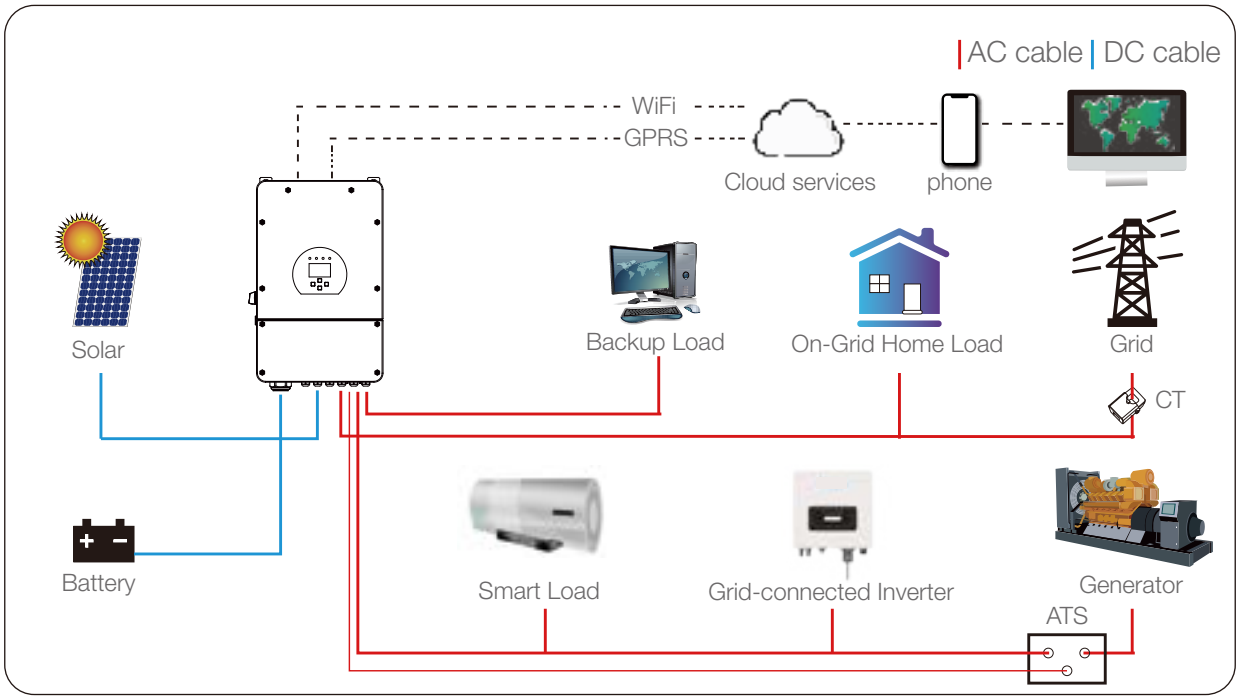
PRODUCT INSTRUCTIONS

Product features

— Self-consumption and feed-in to the grid.
— Auto restart while AC is recovering.
— Programmable supply priority for battery or grid.
— Programmable multiple operation modes: On grid, off grid and UPS.
— Configurable battery charging current / voltage based on applications by LCD setting.
— Configurable AC / Solar / Generator Charger priority by LCD settng.
— Compatible with mains voltage or generator power.
— Overload / over temperature / short circuit protection.
— Smart battery charger design for optimized battery performance.
— With limit function, prevent excess power overflow to the grid.
— Supporting WiFi monitoring and build-in 2 strings of MPP trackers.
— Smart settable three stages MPPT charging for optimized battery performance.
— Time of use function.
— Smart Load function.

Basic system architecture

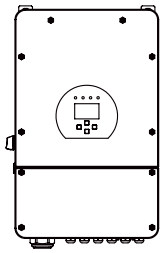
The following illustration shows basic application of this inverter.
It also includes following devices to have a Complete running system.
— Generator or Utility
— PV modules
Consult with your system integrator for other possible system architectures depending on your requirements.
This inverter can power all kinds of appliances in home or office environment, including motor type appliances such as refrigerator and air conditioner.



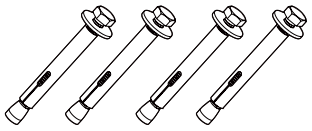
INSTALLATION

Parts list

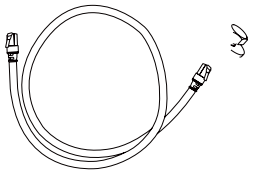
Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the items in the following package:



Hybrid inverter
x 1



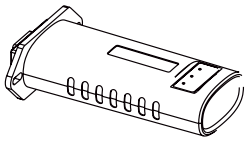
Stainless steel
anti-collision bolt M8*80
x 4



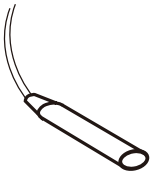
Parallel communication
cable x 1

L-type hexagon wrench
x 1

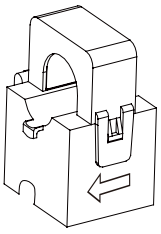
Quick installment
manual x 1



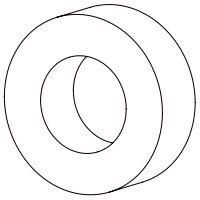
WiFi-plug
x 1



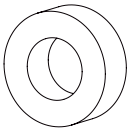
Battery temperature sensor
x 1



Sensor clamp EU
x 1



Magnetic ring for battery
x 1



Magnetic ring for BMS
communication cable
x 1

INSTALLATION

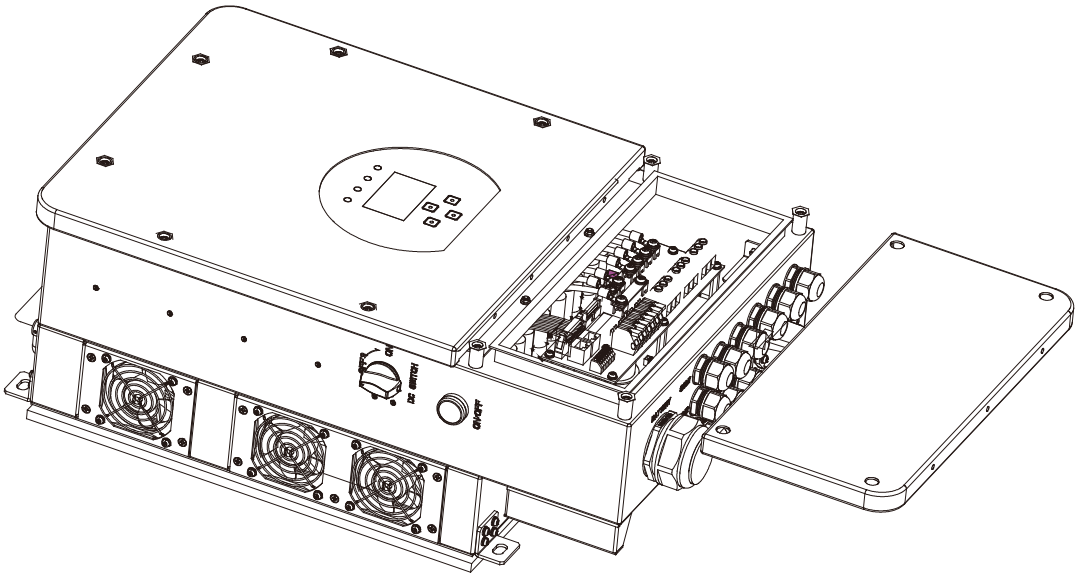
Mounting instructions

Installation precaution

This Hybrid inverter is designed for outdoor use (IP65) , Please make sure the installation site meets below 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 Antenna or antenna cable.
— Not higher than altitude of about 2000 meters above sea level.
— Not in environment of precipitation or humidity (> 95 %)

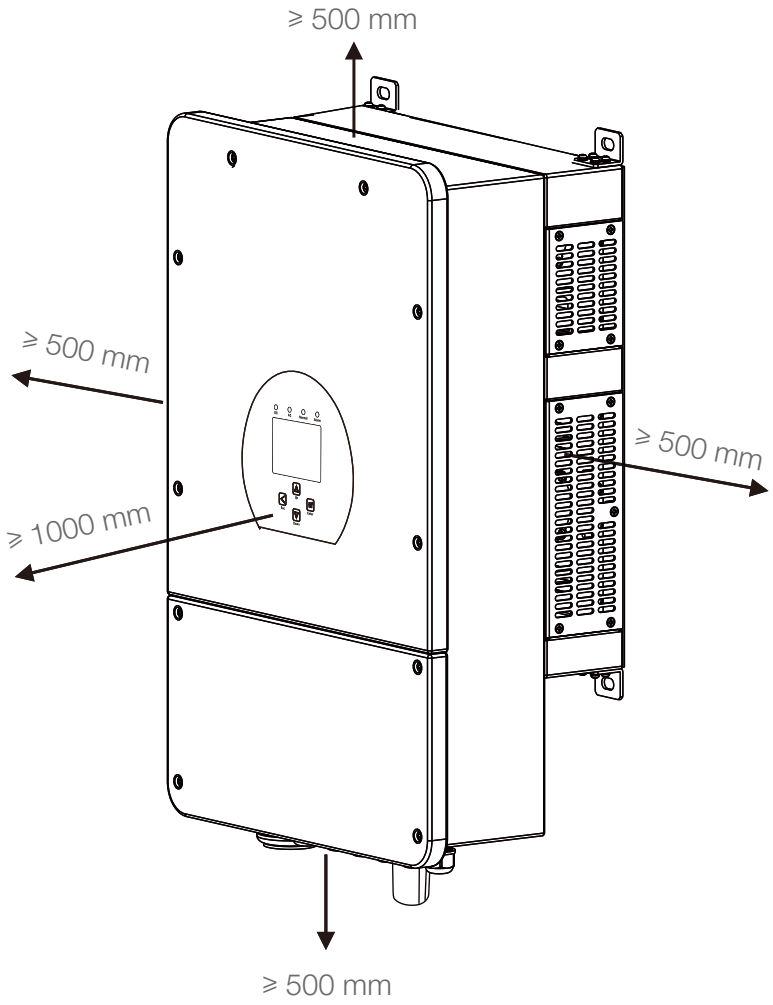
Please AVOID direct sunlight, rain exposure, snow laying up during installation and operation. Before connecting all wires, please take off the metal cover by removing screws as shown below:



Considering the following points before selecting where to install:

— Please select a vertical wall with load-bearing capacity for installation, suitable for installation on concrete or other non-flammable surfaces, installation is shown below.
— Install this inverter at eye level in order to allow the LCD display to be read at all times.
— The ambient temperature is recommeded to be between -40~60 °C to ensure optimal operation.
— Be sure to keep other objects and surfaces as shown in the diagram to guarantee sufficient heat dissipation and have enough space for removing wires.

INSTALLATION



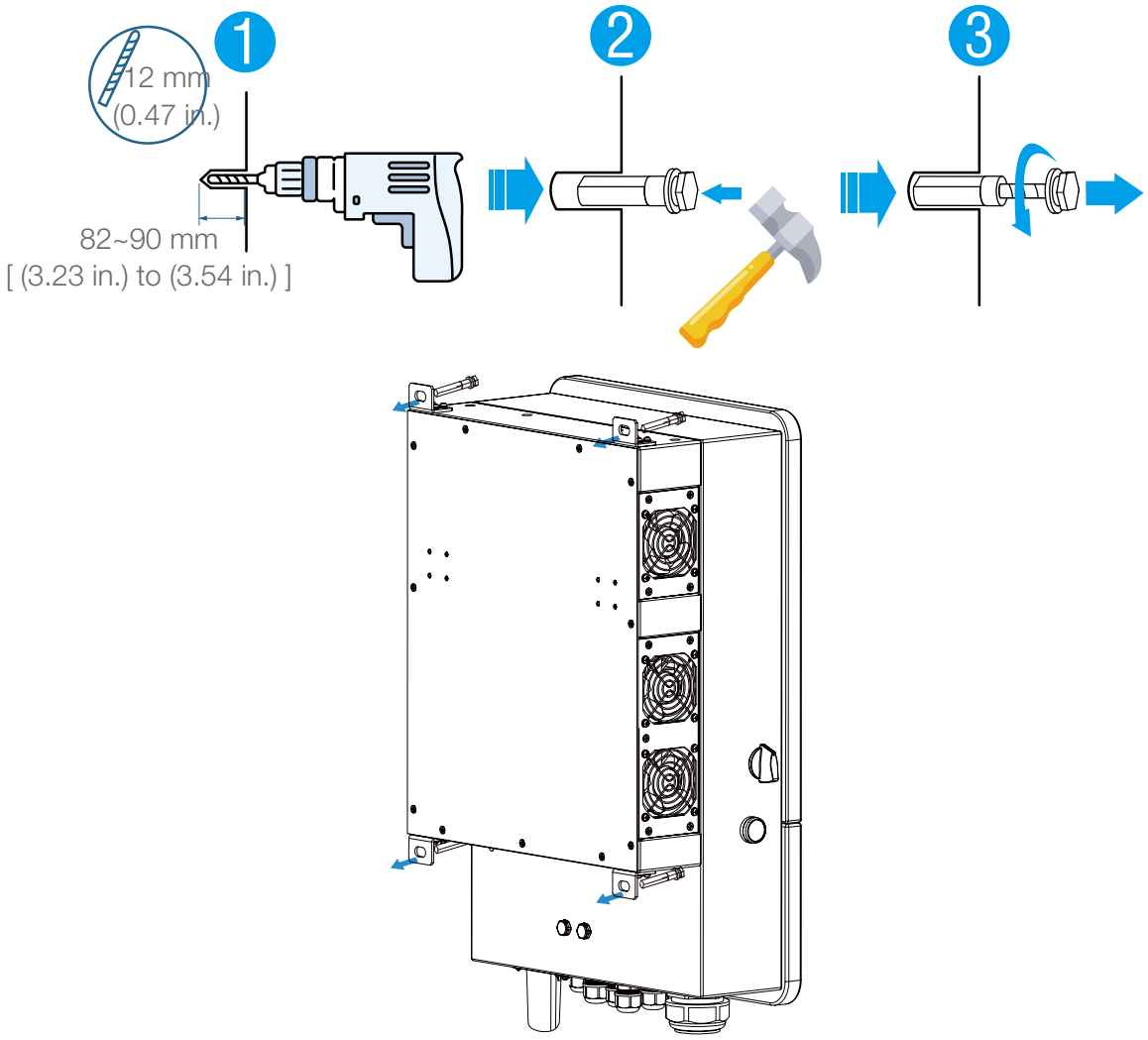
For proper air circulation to dissipate heat, allow a clearance of approx. 50 cm to the side and approx. 50 cm above and below the unit. And 100 cm to the front.

Mounting the inverter

Remember that this inverter is heavy! Please be careful when lifting out from the package. Choose the recommend drill head (as shown in below pic) to drill 4 holes on the wall, 82-90 mm deep.

— Use a proper hammer to fit the expansion bolt into the holes.
— Carry the inverter and holding it, make sure the hanger aim at the expansion bolt, fix the inverter on the wall.
— Fasten the screw head of the expansion bolt to finish the mounting.

INSTALLATION



Battery connection

For safe operation and compliance, a separate DC over-current protector or disconnect device is required between the battery and the inverter. In some applicztions, switching devices may not be required but over-current protectors are still required. Refer to the typical amperage in the table below for the required fuse or circuit breaker size.

Model	Wire Size	Cable (mm²)	Torque value (max)
8 kW	1 AWG	50	24.5 Nm

Cable size

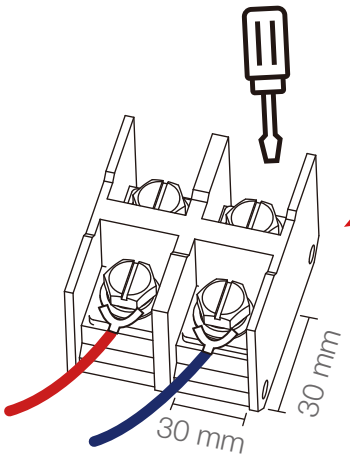
INSTALLATION

All wiring must be performed by a professional person.

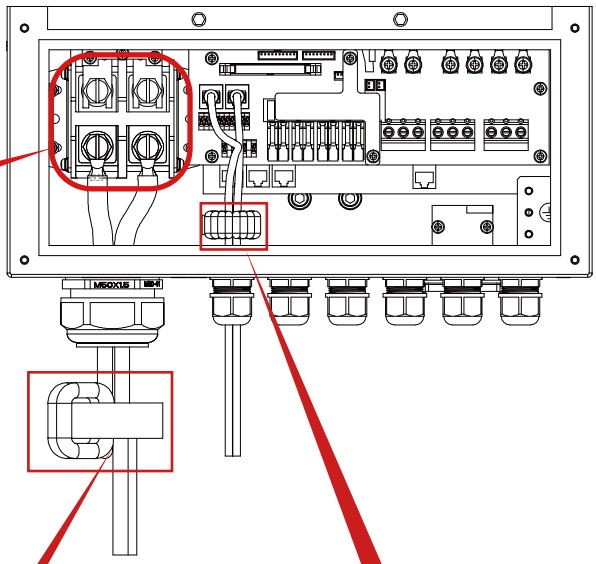
Connecting the battery with a suitabte cable is important for safe and efficient operation of the system. To reduce the risk of injury, refer to Chart 3-2 for recommended cables.

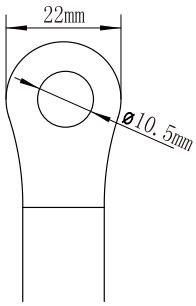
Please follow below steps to implement battery connection:

- Please choose a suitable battery cable with correct connector which can well fit into the battery terminals.
- Use a suitable screwdriver to unscrew the bolts and fit the batteryconnectors in, then fasten the bolt by the screwdriver, make sure the bolts are tightened with torque of 24.5 Nm in clockwise direction
- Make sure polarity at both the battery and inverter is correctly connected.

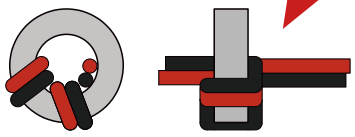


For 8 kW model, battery connector screw size: M10

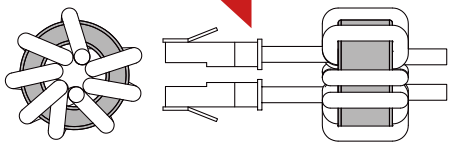




DC Battery Input



Pass the battery power cable through the magnetic ring and wrap it around the magnetic ring two times.



Pass the BMS communication cable through the magnetic ring and wrap it around the magnetic ring four times.

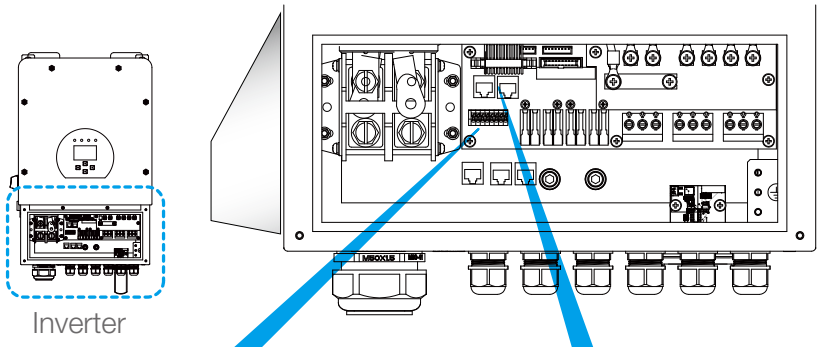
- In case of children touch or insects go into the inverter, Please make sure the invert connector is fasten to waterproof position by twist it clockwise.

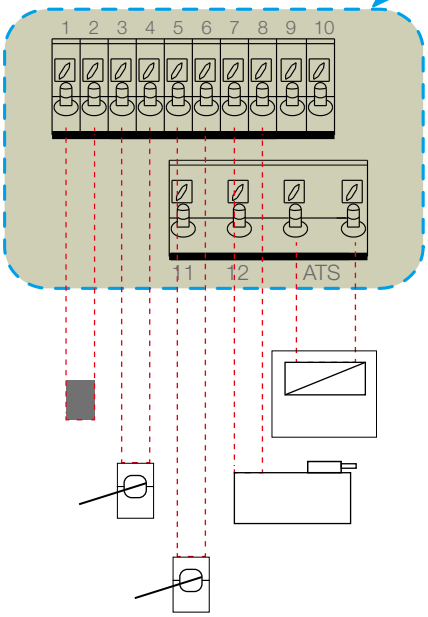
Installation must be performed with care.

Before making the final DC connection or closing DC breaker / disconnect, be sure positive (+) must be connect to positive (+) and negative (-) must be connected to negative (-) . Reverse polarity connection on battery will damage the inverter.

INSTALLATION

Function port definition





TEMP (1,2) : battery temperature sensor for lead acid battery.

CT-L1 (3,4) : current transformer (CT1) for “zero export to CT” mode clamps on L1 when in split phase system.

CT-L2 (5,6) : current transformer (CT2) for “zero export to CT” mode clamps on L2 when in split phase system.

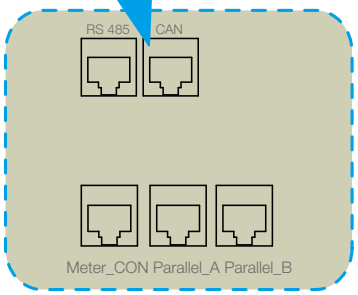
G-start (7,8) : dry contact signal for startup the diesel generator

When the “GEN signal” is active, the open contact (GS) will switch on (no voltage output) . G-valve (9,10) : reserved.

RSD (11,12): provide 12 Vdc output when inverteris on.

ATS: 230 V output port when inverteris on

Note: For - EU model (8 kW, 230 V @50 Hz) , 1pcs CT is needed only, and the secondary side of the CT should be connected to 5&6 port (CT-L2).



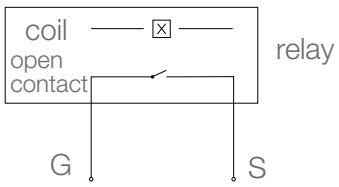
RS 485: RS 485 port for battery communication.

CAN: CAN port for battery communication.

Parallel A: Parallel communication port 1 (CAN interface) .

Parallel B: Parallel communication port 2 (CAN interface) .

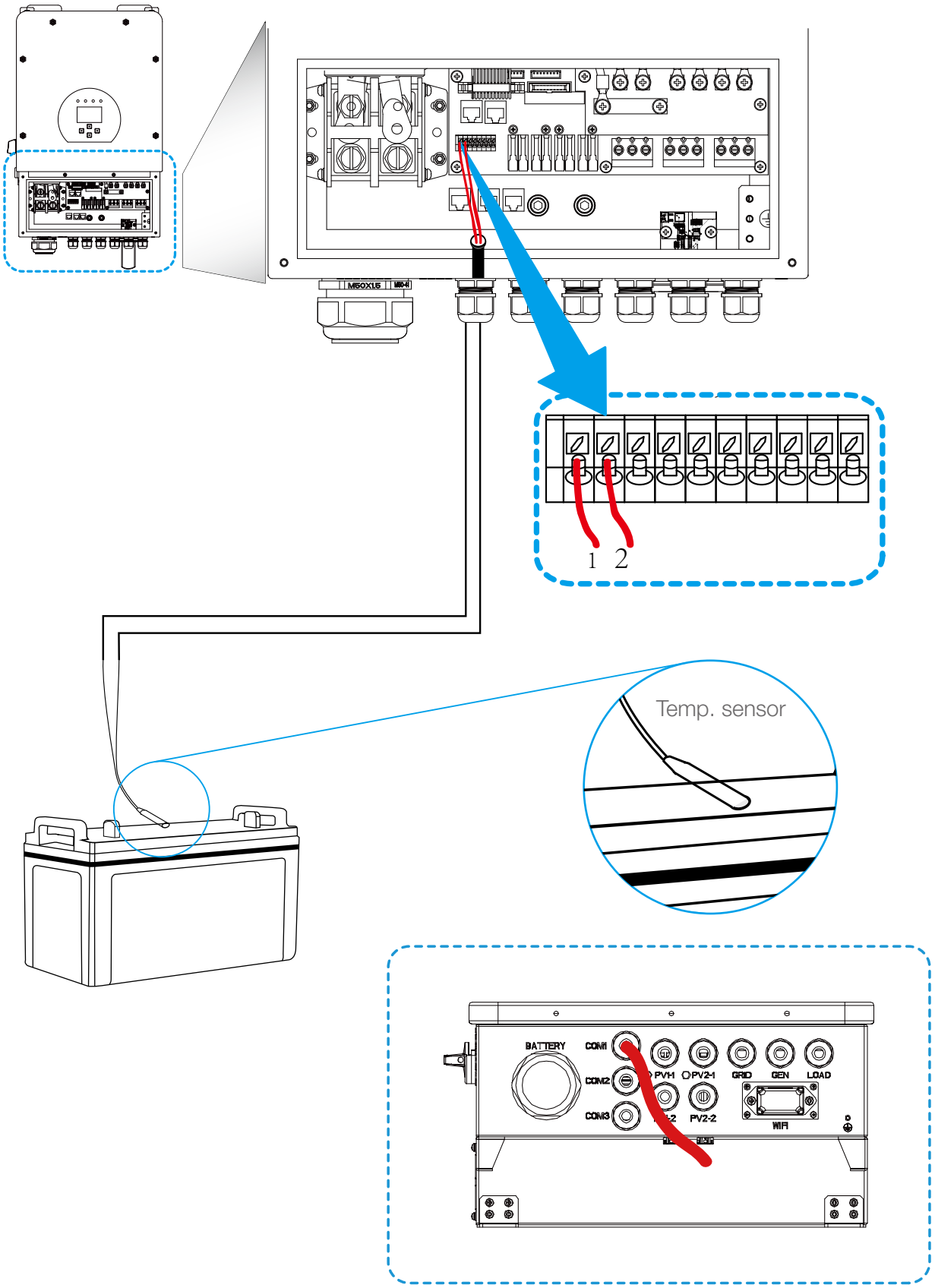
*Meter_CON: for energy meter communication.
*Some hardware versions don't have this port.



GS (diesel generator startup signal)

INSTALLATION

Temperature sensor connection for lead-acid battery



INSTALLATION

Grid connection and backup load connection

- Before connecting to the grid, a separate AC breaker must be installed between the inverter and the grid, and also between the backup load and the inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. The recommended of AC breaker is 63 A for 8 kW.
- There are three terminal blocks with “Grid” “Load”and “GEN” markings. Please do not misconnect input and output connectors.

All wiring must be performed by a qualified personnel.It is very important for system safety and efficient operation to use appropriate cable for AC input connection. To reduce risk of injury, please use the proper recommended cable as below.

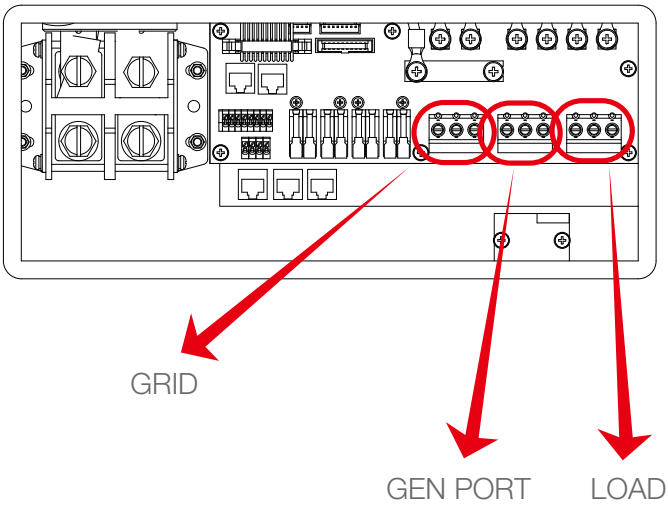
Model	Wire Size	Cable (mm²)	Torque value (max)
8 kW	10 AWG	6	1.2 Nm

Recommended Size for AC wires

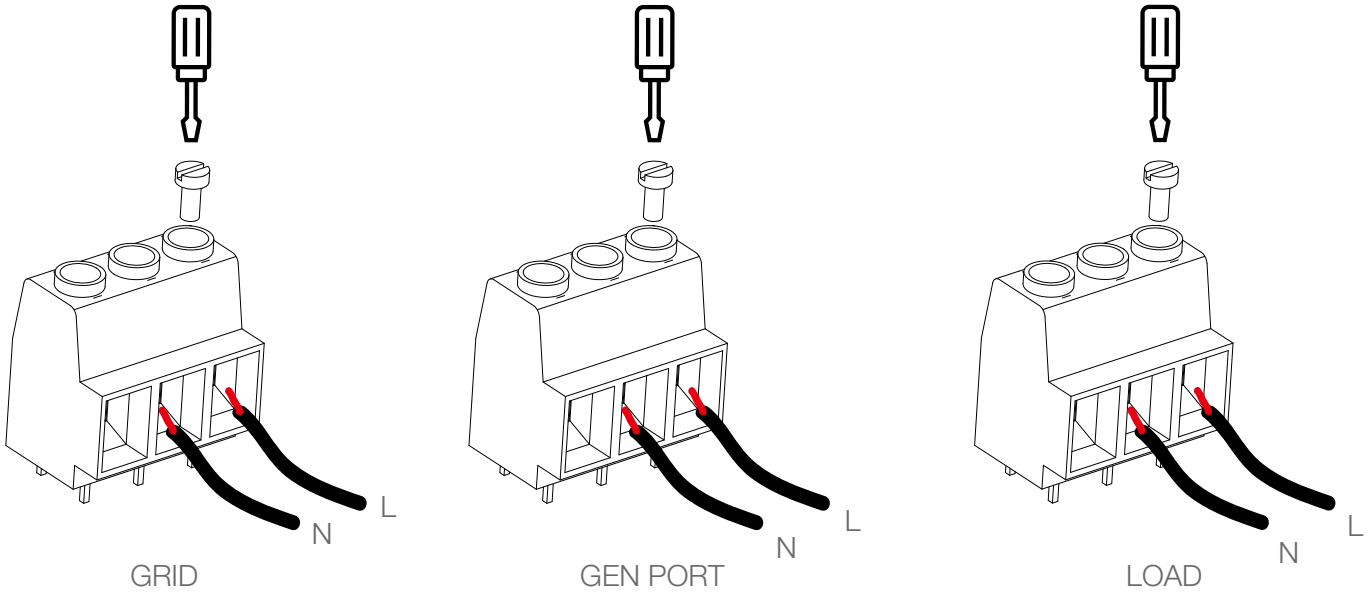
Please follow below steps to implement battery connection:

- Before making Grid, load and Gen port connection, be sure to turn off AC breaker or disconnector first.
- Remove insulation sleeve 10 mm length, unscrew the bolts, insert the wires according to polarities indicated on the terminal block and tighten the terminal screws. Make sure the connection is complete.

INSTALLATION



(Region: EU)



INSTALLATION

Be sure that AC power source is disconnected before attempting to wire it to the unit.

- Then, insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals as well.
- Make sure the wires are securely connected.
- Appliances such as air conditioner are required at least 2-3 minutes to restart because it is required to have enough time to balance refrigerant gas inside of circuit. If a power shortage occurs and recovers in short time, it will cause damage to your connected appliances. To prevent this kind of damage, please check manufacturer of air conditioner if it is equipped with time-delay function before installation. Otherwise, this inverter will trigger overload fault and cut off output to protect your appliance but sometimes it still causes internal damage to the air conditioner.

PV connection

Before connecting to PV modules, please install a separately DC circuit breaker between inverter and PV modules. It is very important for system safety and efficient operation to use appropriate cable for PV module connection. To reduce risk of injury, please use the proper recommended cable size as below.

Model	Wire Size	Cable (mm²)
8 kW	12 AWG	4

Cable size

To avoid any malfunction, do not connect any PV modules with possible current leakage to the inverter. For example, grounded PV modules will cause current leakage to the inverter. When using PV modules, please ensure the PV + & PV - of solar panel is not connected to the system ground bar.

It is requested to use PV junction box with surge protection. Otherwise, it will cause damage on inverter when lightning occurs on PV modules.

INSTALLATION

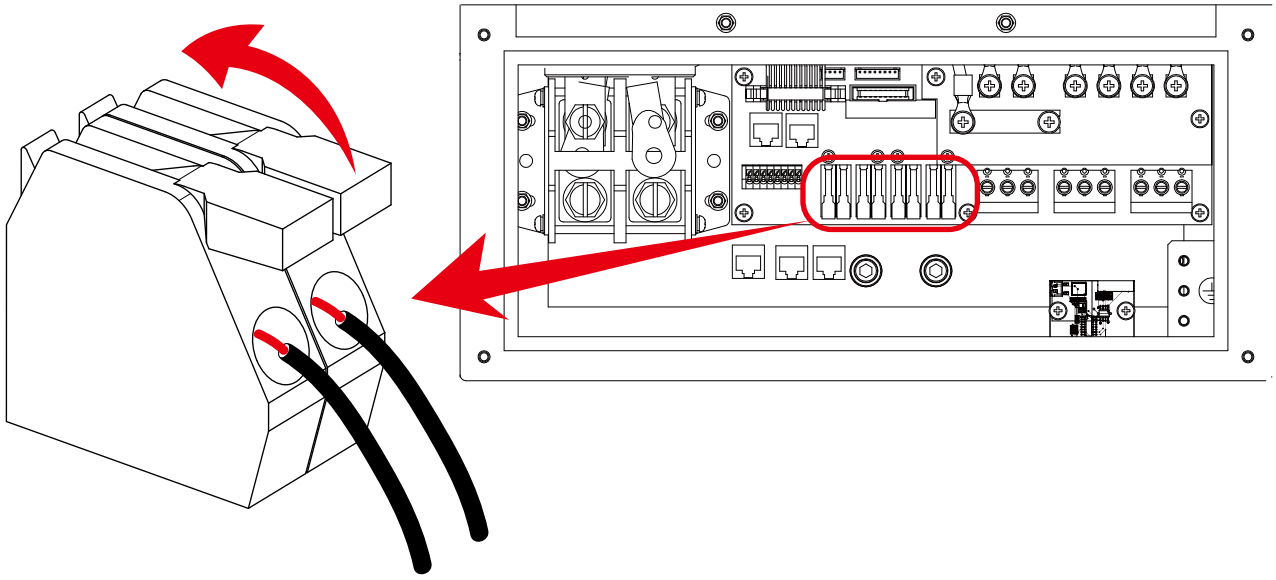
PV module selection:

When selecting proper PV modules, please be sure to consider below parameters:
- Open circuit Voltage (Voc) of PV modules not exceeds max. PV array open circuit voltage of inverter.
- Open circuit Voltage (Voc) of PV modules should be higher than min. start voltage.
- The PV modules used to connected to this inverter shall be Class A rating certified according to IEC 61730.

Inverter model	8 kW
PV Input Voltage	370 V (125 V~500 V)
PV Array MPPT Voltage Range	150 V-425 V
No. of MPP Trackers	2
No. of Strings per MPP Tracker	2+2

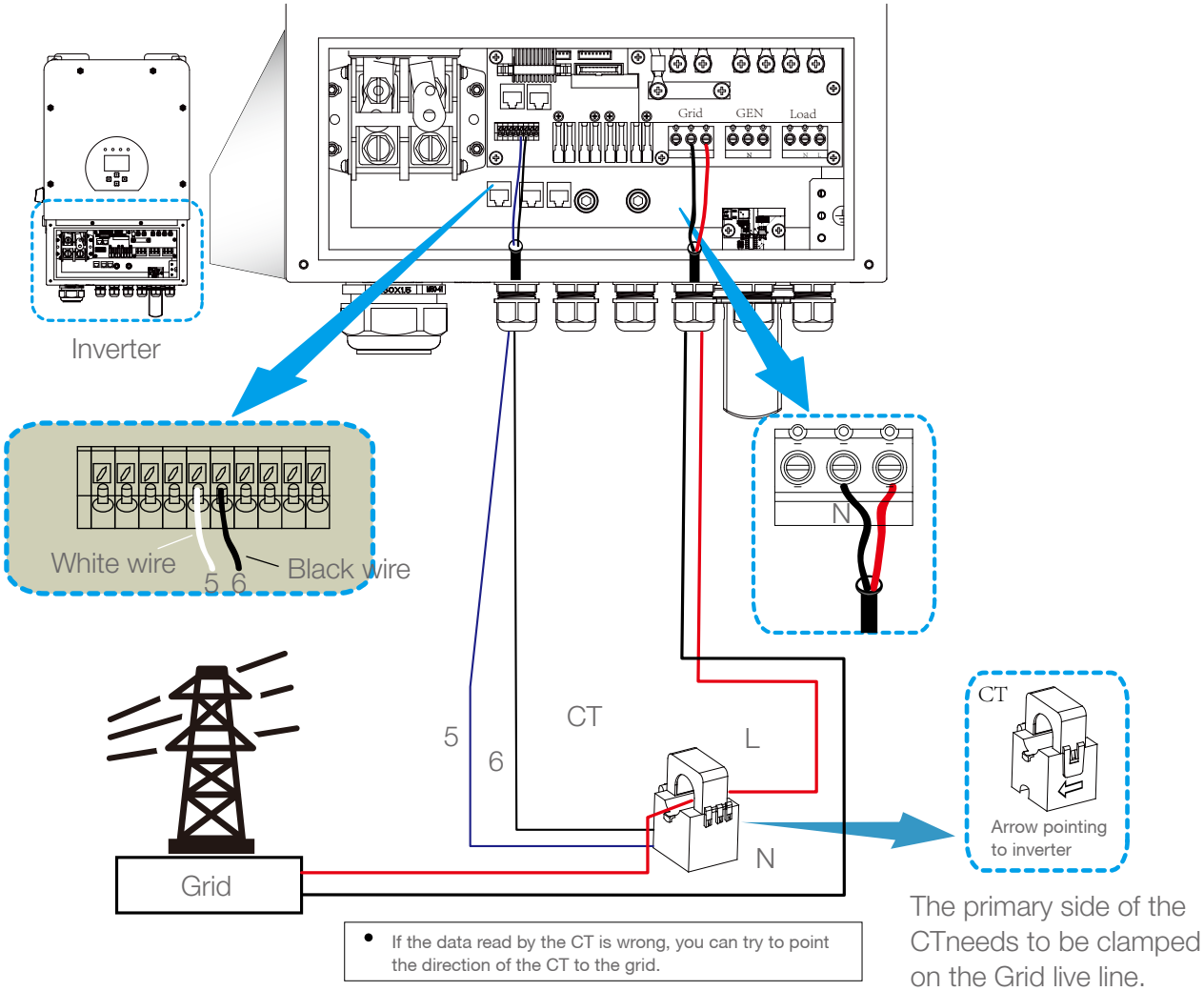
PV module wire connection:

Please follow below steps to implement PV module connection:
- Remove insulation sleeve 10 mm for positive and negative conductors.
- Suggest to put bootlace ferrules on the end of positive and negative wires with a proper crimping tool.
- Check correct polarity of wire connection from PV modules and PV input connectors. Then, connect positive pole (+) of connection wire to positive pole (+) of PV input connector. Connect negative pole (-) of connection wire to negative pole (-) of PV input connector. Close the switch and make sure the wires are tightly fixed.



CT connection

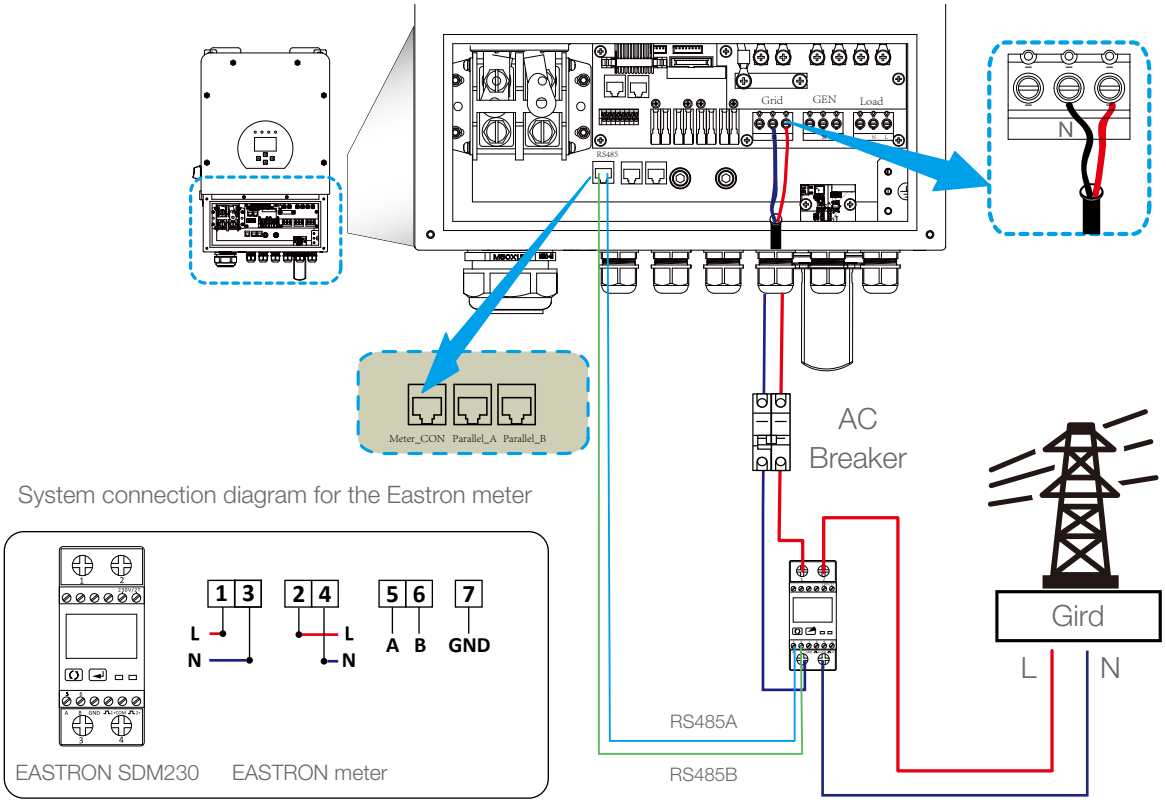
(Region: EU)



- If the data read by the CT is wrong, you can try to point the direction of the CT to the grid.

The primary side of the CTneeds to be clamped on the Grid live line.

Meter connection



System connection diagram for the Eastron meter

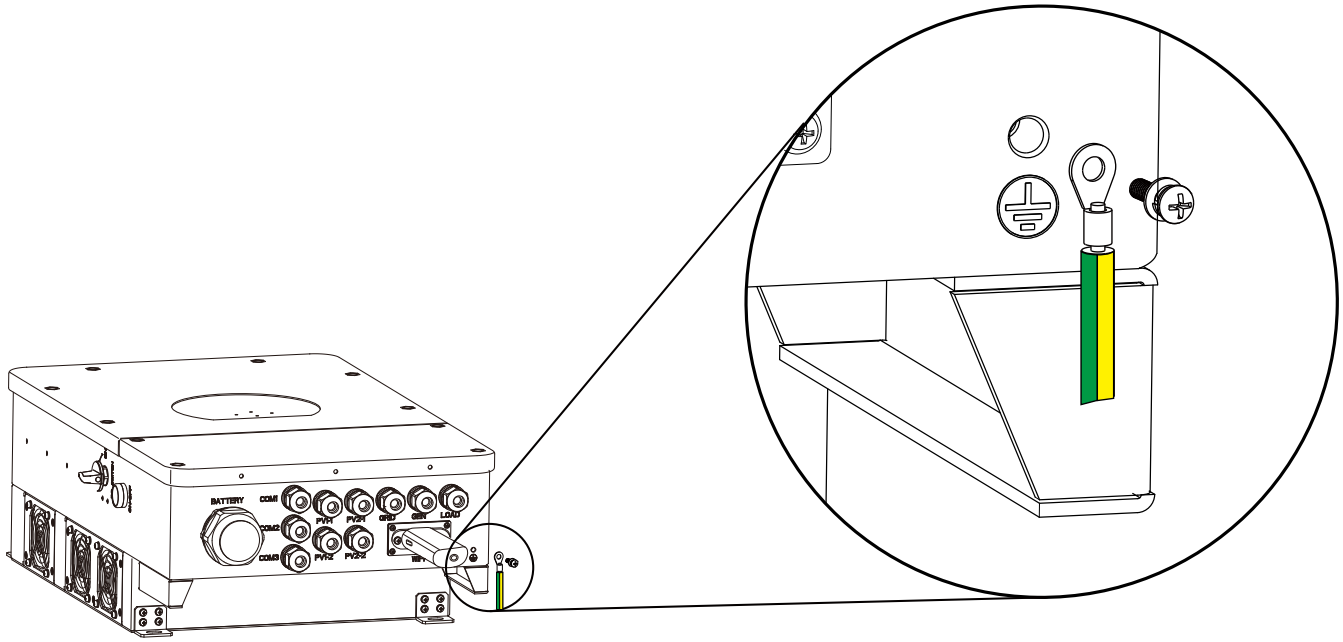
INSTALLATION

Note:
When the inverter is in the off-grid state, the N line needs to be connected to the earth.

Note:
In final installation,breaker certified according to IEC 60947-1 and IEC 60947-2 shall be installed with the equipment.

Earth connection (mandatory)

Ground cable shall be connected to ground plate on gridid dede t s prevents electric shock. if the original protective conductor fails.



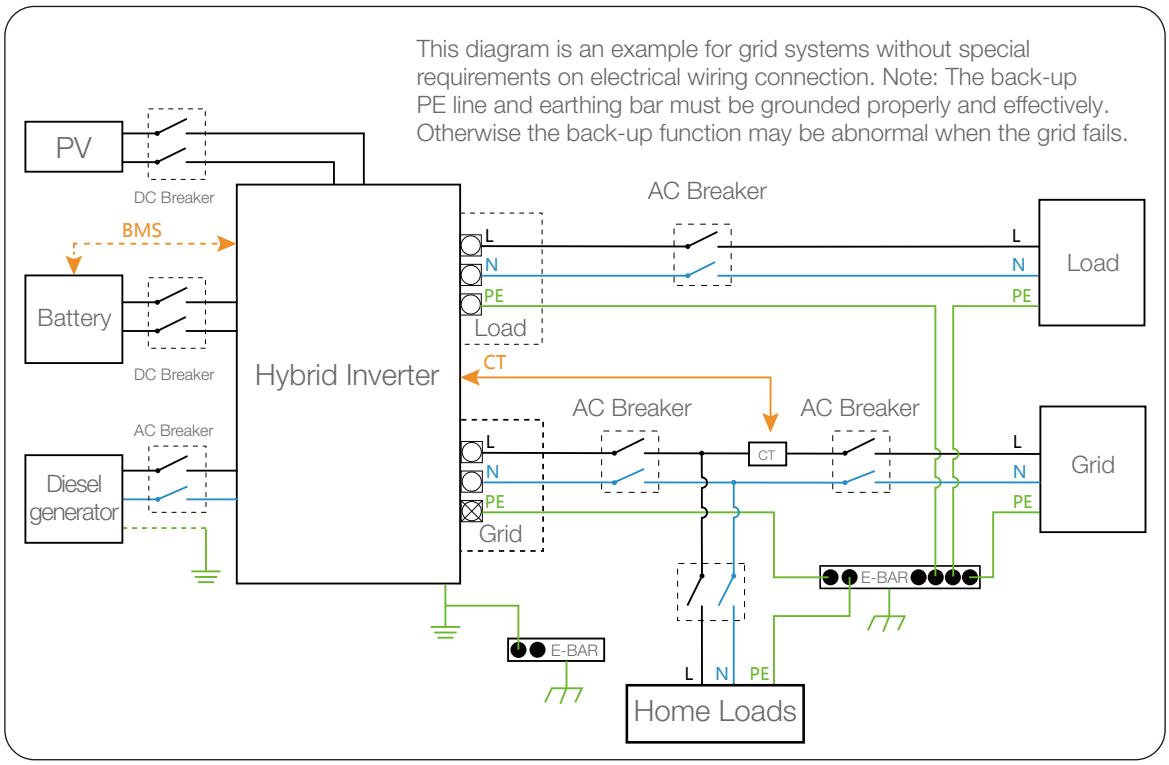
WiFi connection

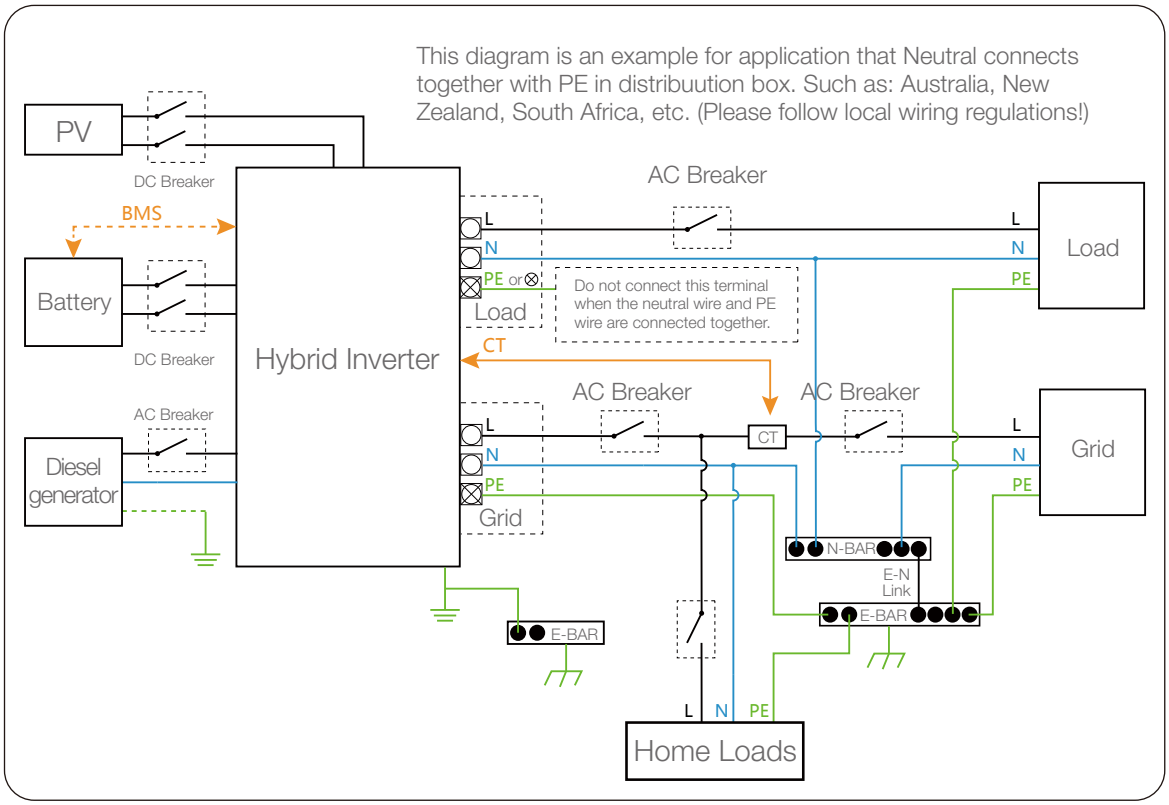
For the configuration of Wi-Fi Plug, please refer to illustrations of the Wi-Fi Plug.

INSTALLATION

Wiring system for inverter

(Region: EU)

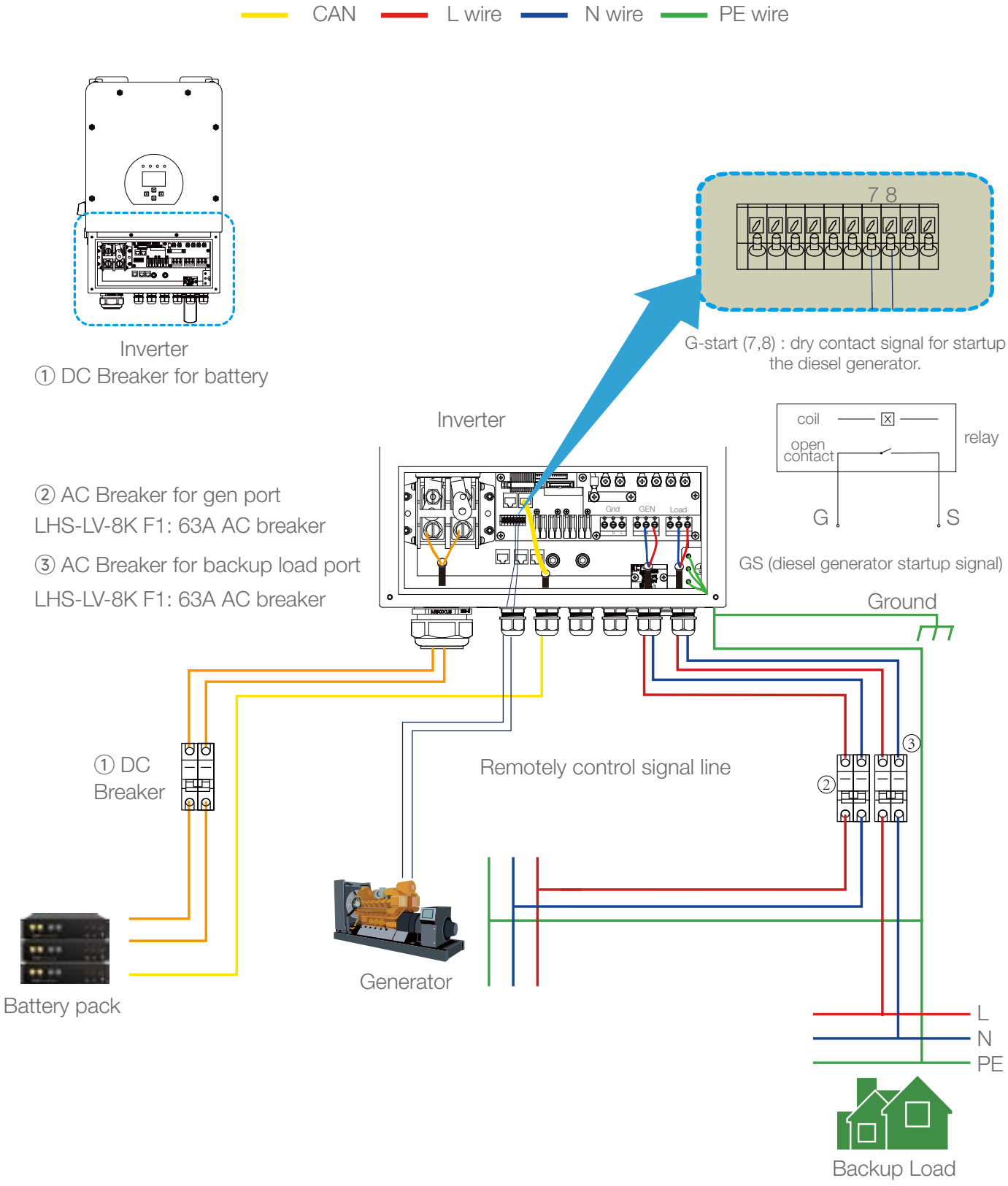




INSTALLATION

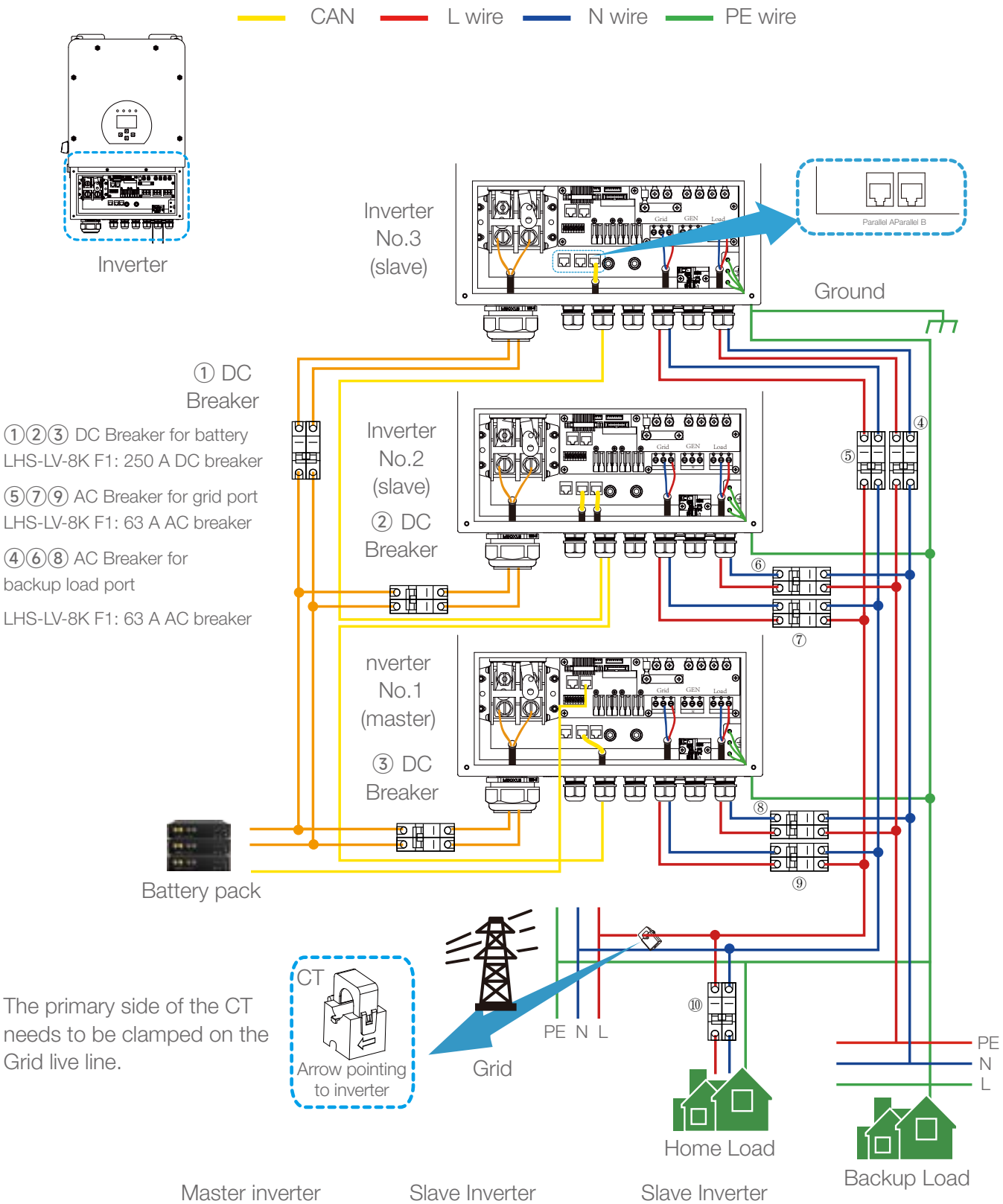
Typical application diagram of diesel generator

(Region: EU)



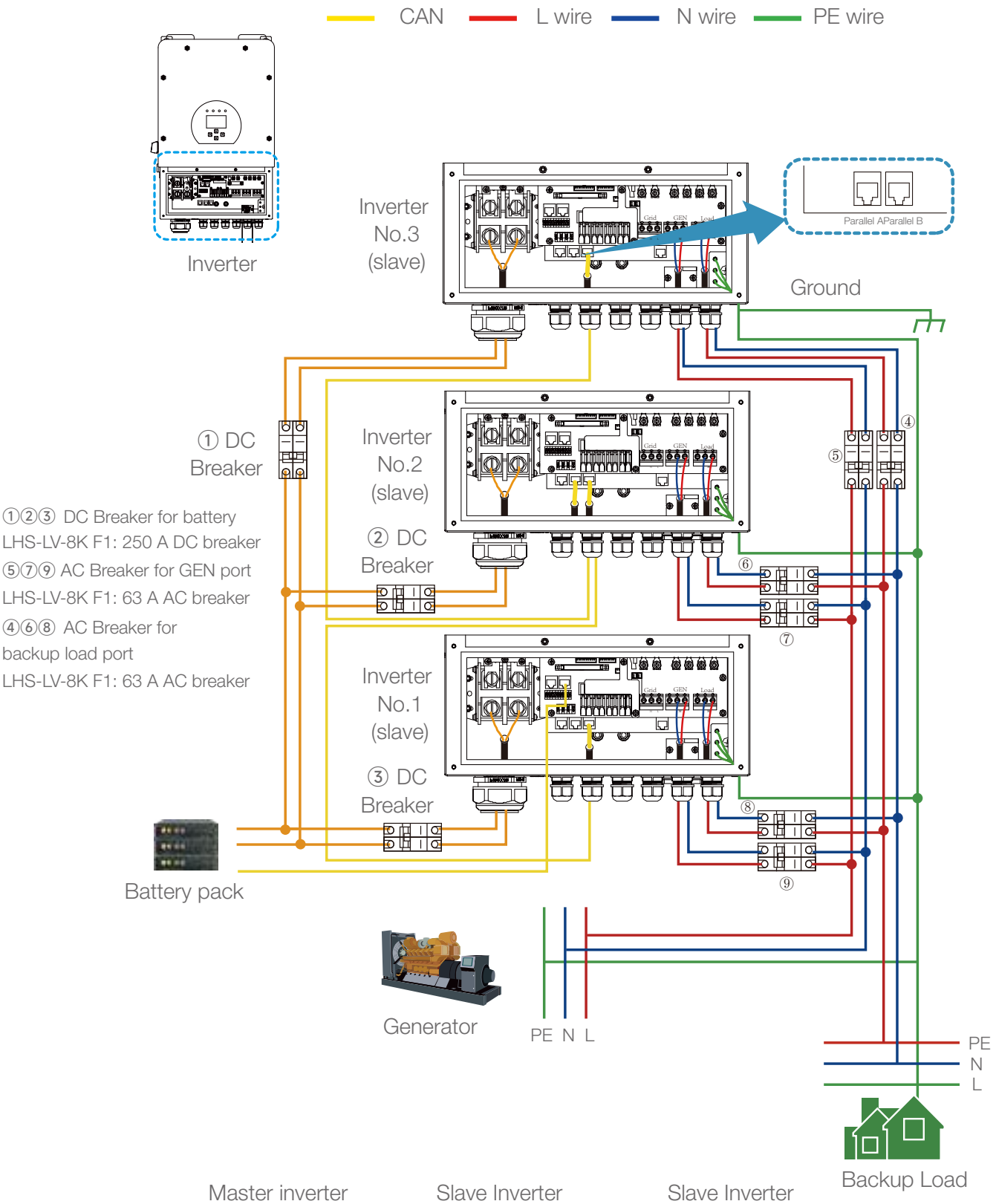
INSTALLATION

Single phase (230 Vac) parallel connection diagram



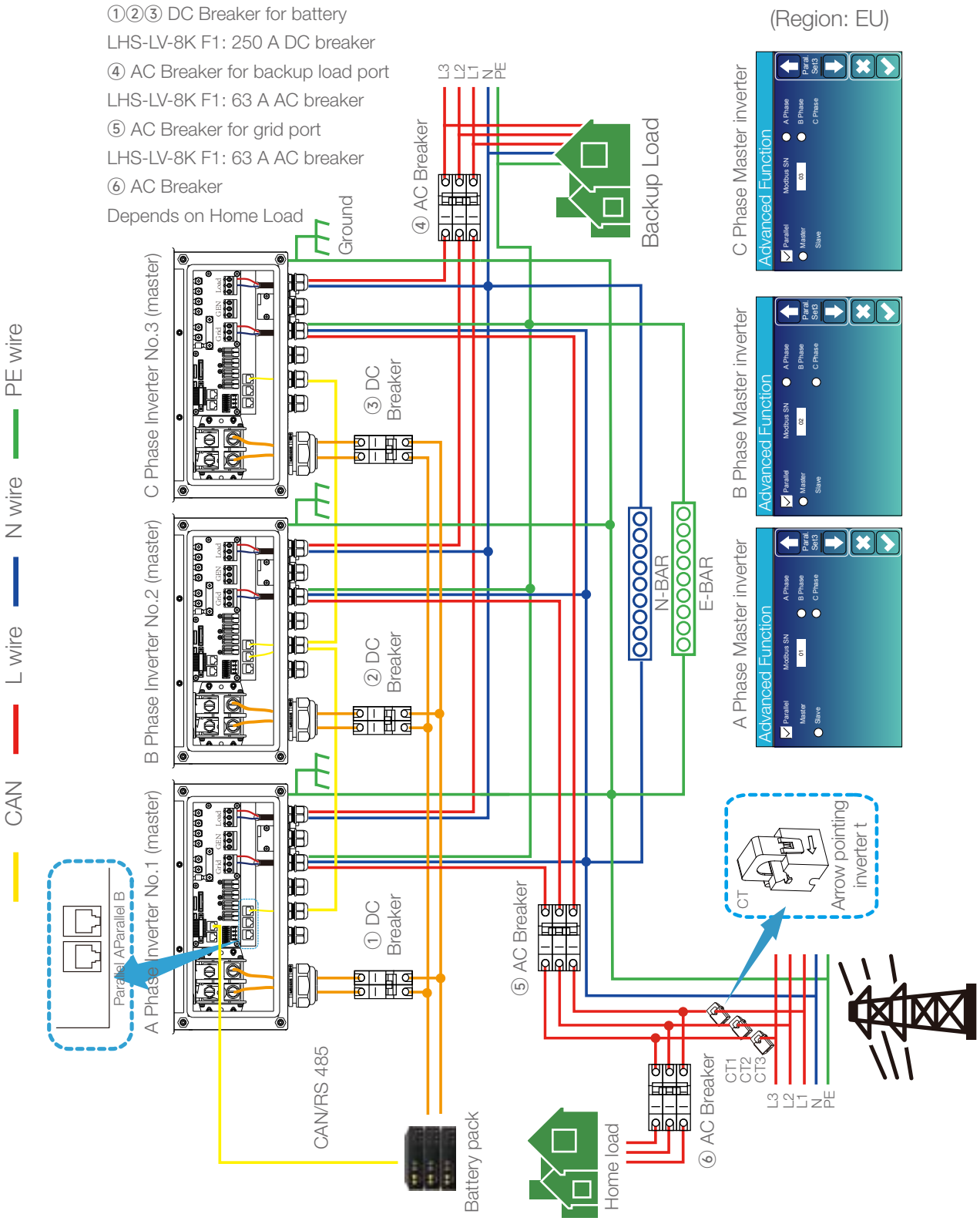
INSTALLATION

Split phase (120 / 240 Vac) parallel connection diagram



INSTALLATION

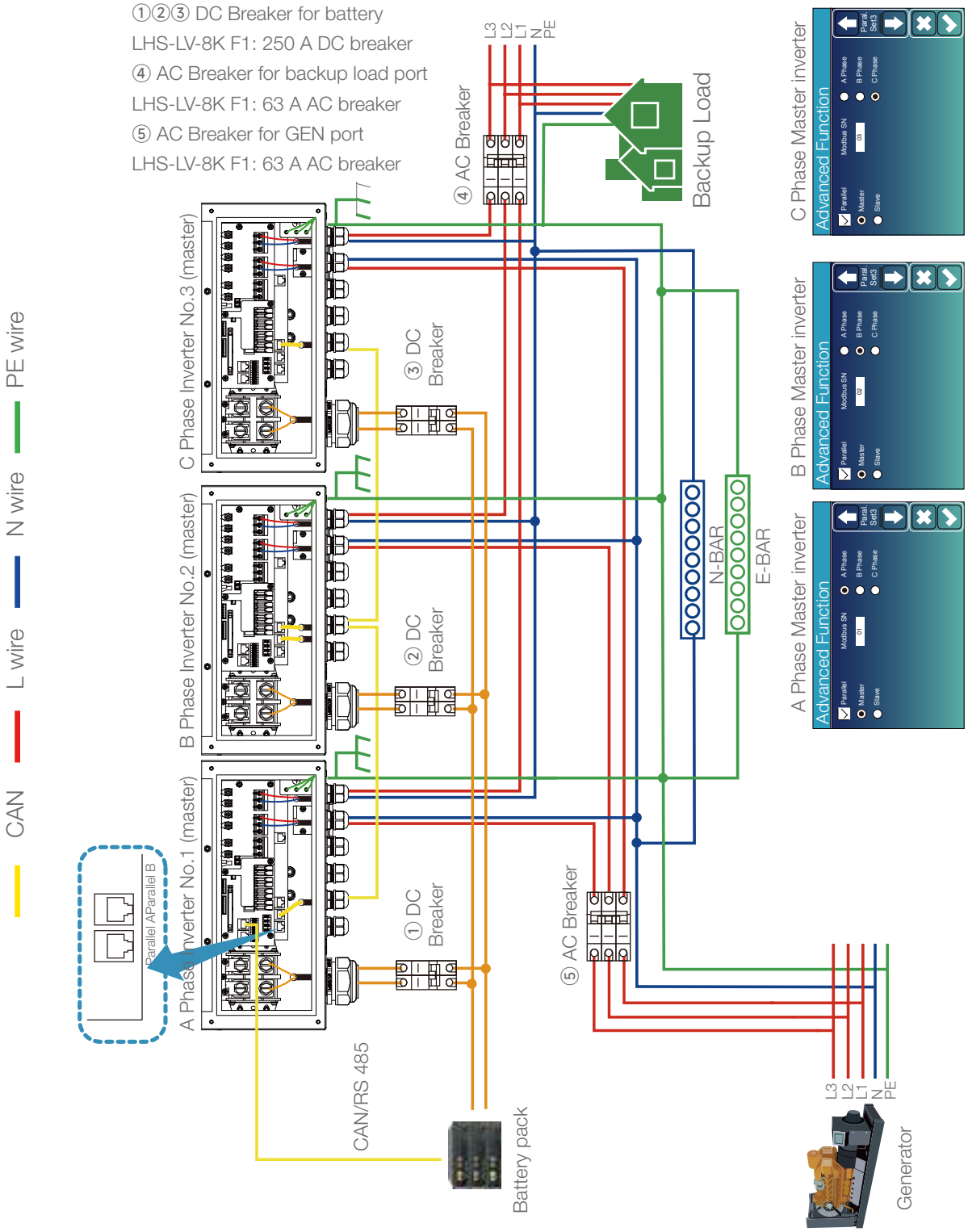
Parallel connection for 230 / 400 Vac three phase



INSTALLATION

Parallel connection for 120 / 208 Vac three phase

(Region: EU)



OPERATION

Power ON / OFF

Once the unit has been properly installed and the batteries are connected well, simply press On/Off button (located on the left side of the case) to turn on the unit. When system without battery connected, but connect with either PV or grid, and ON / OFF button is switched off, LCD will still light up (Display will show OFF) , In this condition, when switch on ON / OFF button and select NO battery, system can still work.

Operation and display panel

The operation and display panel, shown in below chart, is on the front panel of the inverter.
It includes four indicators, four function keys and a LCD display, indicating the operating status and input / output power information.

LED indicator		Messages
DC	Green led solid light	PV Connection normal
AC	Green led solid light	Grid Connection normal
Normal	Green led solid light	Inverter operating norma
Alarm	Red led solid light	Malfunction or warning

LED indicators

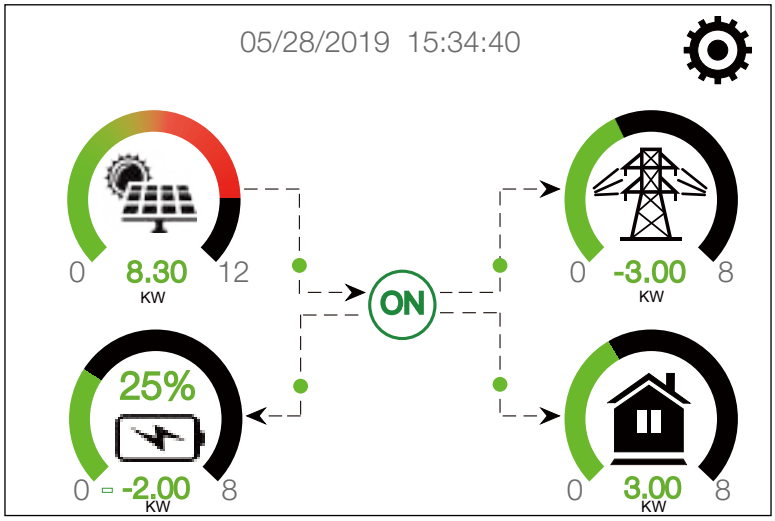
Function key	Description
ESC	To exit setting mode
Up	To go to previous selection
Down	To go to next selection
Enter	To confirm the selection

Function Buttons

LCD DISPLAY LCONS

Main screen

The LCD is touchscreen, below screen shows the overall information of the inverter.



1. The icon in the center of the home screen indicates that the system is Normal operation. If it turns into “comm / F01~F64” , it means the inverter has communication errors or other errors, the error message will display under this icon (F01-F64 errors, detail error info can be viewed in the System Alarms menu).

2. At the top of the screen is the time.

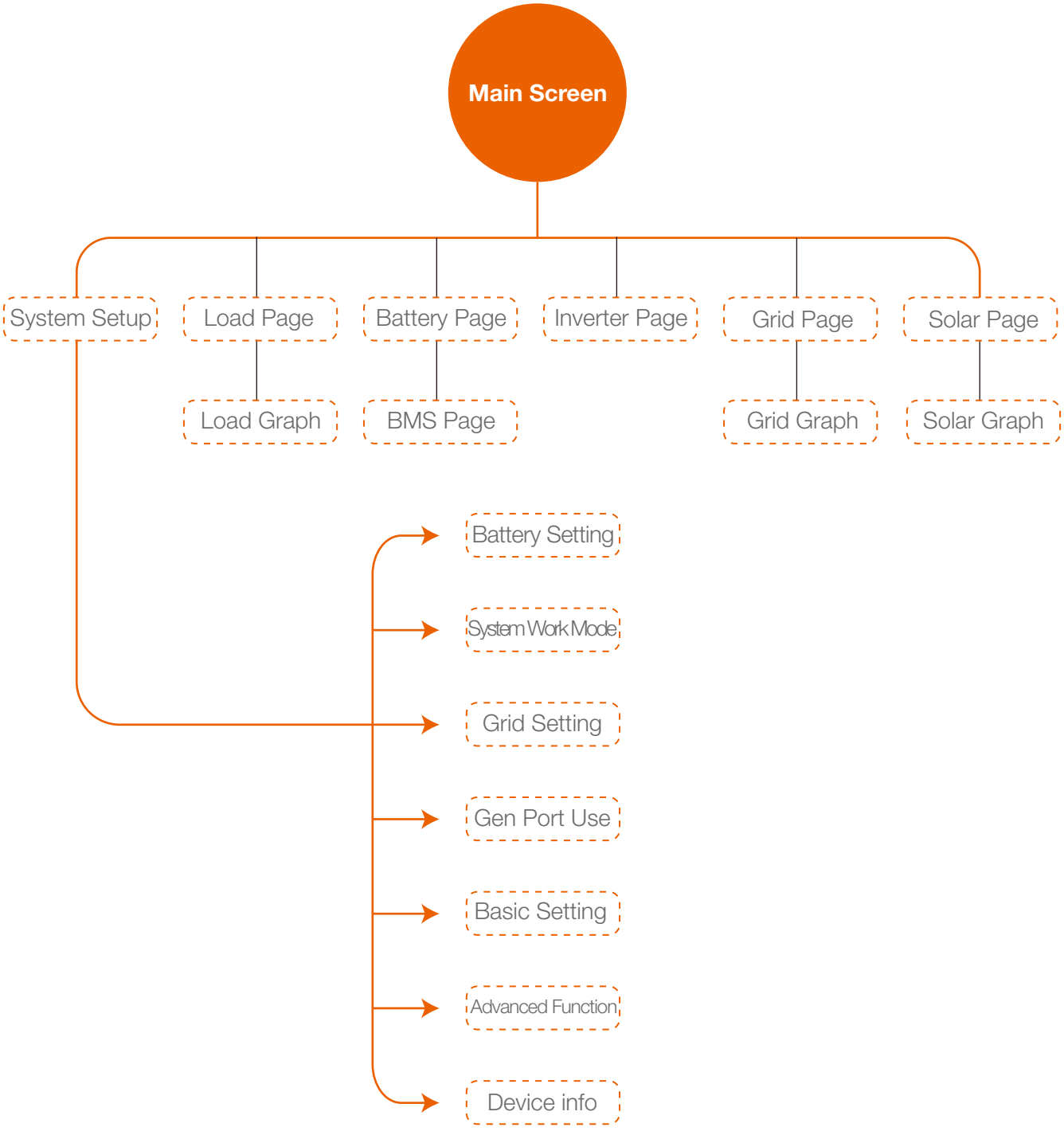
3. System Setup Icon, Press this set button, you can enter into the system setup screen which including Basic Setup, Battery Setup, Grid Setup, System Work Mode, Generator port use, Advanced function and Li-Batt info.

4. The main screen showing the info including Solar, Grid, Load and Battery. Its also displaying the energy flow direction by arrow. When the power is approximate to high level, the color on the panels will changing from green to red so system info showing vividly on the main screen.

- PV power and Load power always keep positive.
- Grid power negative means sell to grid, positive means get from grid.
- Battery power negative means charge, positive means discharge.

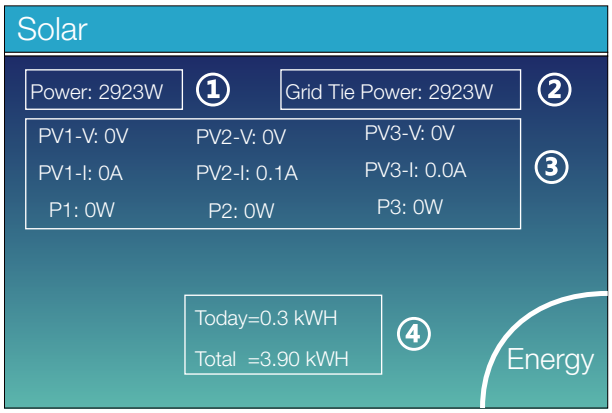
LCD DISPLAY LCONS

LCD operation flow chart



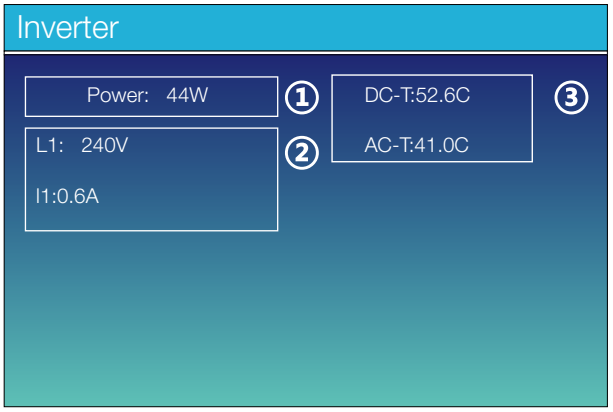
LCD DISPLAY LCONS

Solar power curve



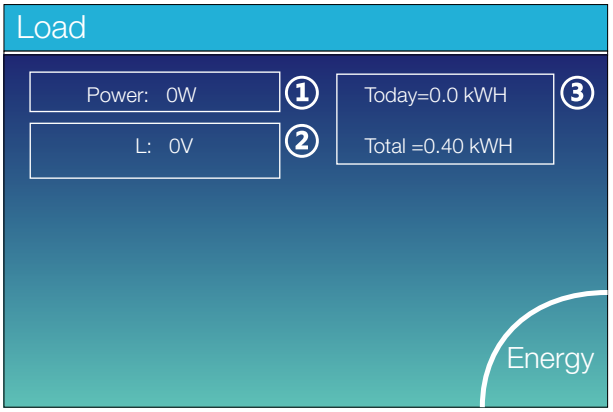
This is Solar Panel detail page.

1. Solar Panel Generation.
2. Grid Tie Power: when there's a string inverter AC couple at the grid or load side of hybrid inverter and there's a meter installed for the string inverter, then the hybrid inverter LCD will show the string inverter output power on its PV icon. Please make sure the meter can communicate with the hybrid inverter successfully.
3. Voltage, Current, Power for each MPPT.
4. Solar Panel energy for Day and Total.
   Press the "Energy" button will enter into the powercurve page.



This is Inverter detail page.

1. Inverter Generation.
2. Voltage, Current, Power for each Phase.
3. *DC-T: mean DC-DC temperature,
   AC-T: mean Heat-sink temperature.
   *Note: this part info is not avaiable for someLCD FW.



This is Back-up Load detail page.

1. Back-up Power.
2. Voltage, Power for each Phase.
3. Back-up consumption for Day and Total.

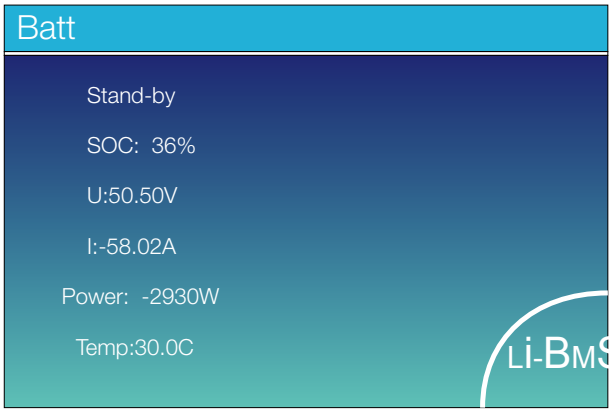
Press the "Energy" button will enter into the powercurve page.

This is Grid detail page.

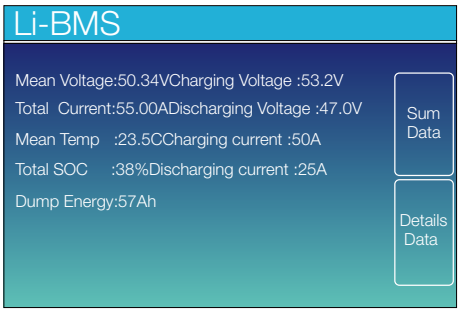
1. Status, Power, Frequency.
2. L1&L2: Voltage for each Phase
   CT1&CT2: Power detected by the external current sensors
   LD1&LD2: Power detected using internal sensors on AC grid in/out breaker
3. BUY: Energy from Grid to Inverter,
   SELL: Energy from Inverter to grid.

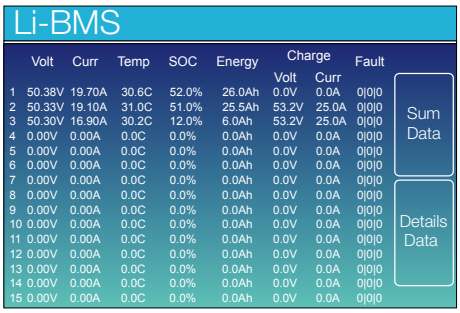
Press the "Energy" button will enter into the power curve page.

LCD DISPLAY LCONS

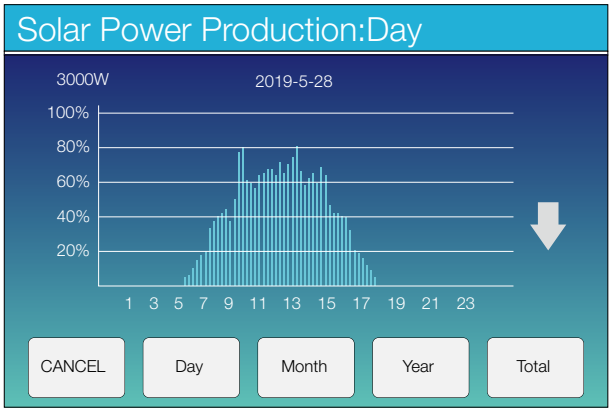


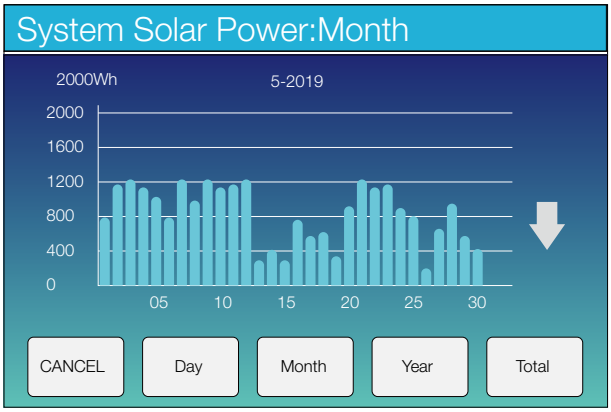
This is Battery detail page
if you use Lithium Battery, you can enter BMs page

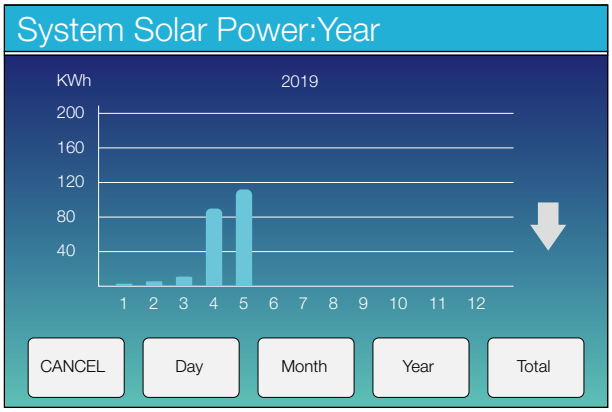


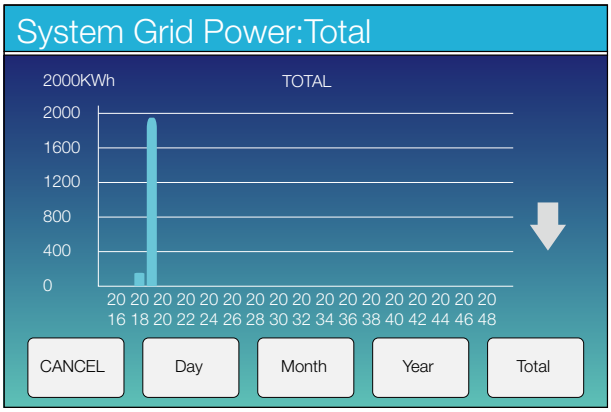


Curve page-solar & load & grid





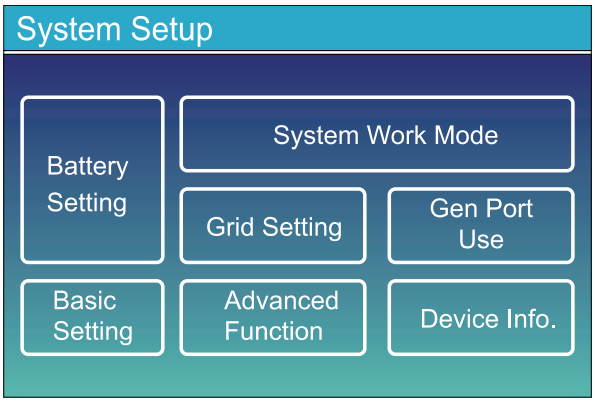




Solar power curve for daily, monthly, yearly and total can be roughly checked on the LCD, for more accuracy power generation, pls check on the monitoring system. Click the up and down arrow to check power curve of different period.

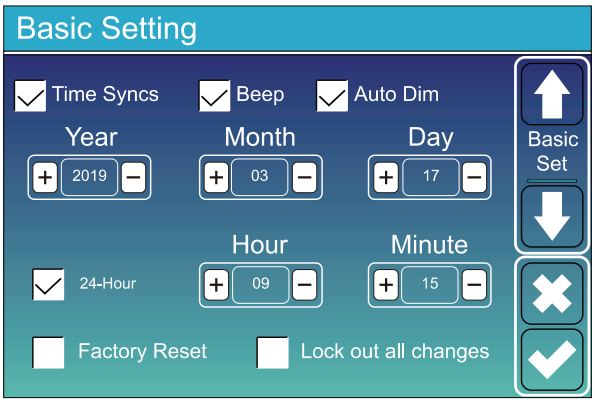
LCD DISPLAY LCONS

System setup menu



This is System Setup page.

Basic setup menu

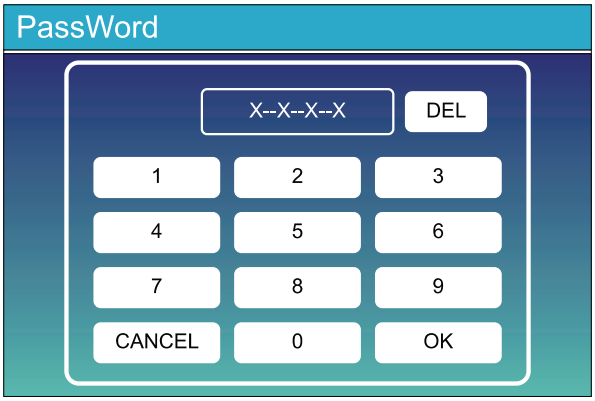


Factory Reset: Reset all parameters of the inverter.

Lock out all changes: Enable this menu for setting parameters that require locking and cannot be set up.

Before performing a successful factory reset and locking the systems, to keep all changes you need to type in a password to enable the setting.

The password for factory settings is 9999 and for lock out is 7777.



Factory Reset Password: 9999

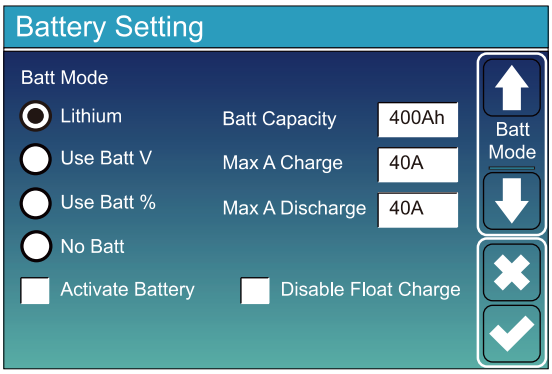
Lock out all changes Password: 7777

System selfchek: After ticking this item it needs input the password.

The default password is 1234

LCD DISPLAY LCONS

Battery setup menu



Battery capacity: it tells LEDVANCE hybrid inverter to know your battery bank size.

Use Batt V: Use Battery Voltage for all the settings (V) .

Use Batt %: Use Battery SOc for all the settings (%) .

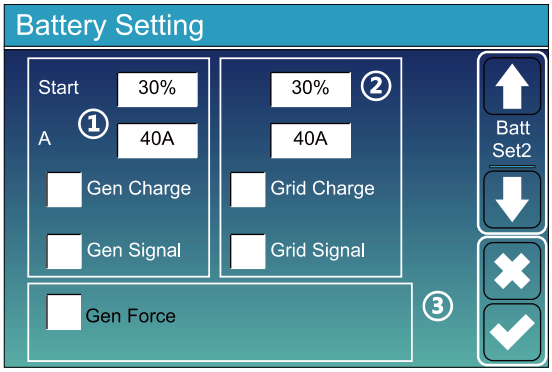
Max. A charge / discharge: Max battery charge / discharge current (0-90 A for 3.6 kW model, 0-120 A for 5 kW model, 0-135 A for 6 kW model, 0-190 A for 7.6 / 8 kW model) . Use Batt % Max A Discharge 40 A For AGM and Flooded, we recommend Ah battery No Batt size x 20 %= Charge /Dischargeamps.

. For Lithium, we recommend Ah battery size x 50 %= Charge / Discharge amps.

. For Gel, folow manufacturer's instructions.

Active battery: This feature will help recover a battery that is over discharged by slowly charging from the solar array or grid.

Disable Float Charge: For the lithium battery with BMS communication, the inverter will keep the charging voltage at the current voltage when the BMS charging current requested is 0. It is used to help prevent battery from being overcharged.



This is Battery Setup page. ① ③

Start =30 %: Percent S.O.C at 30 % system will AutoStart a connected generator to charge the battery bank.

A= 40 A: Charge rate of 40 A from the attached generator in Amps.

Gen Charge: uses the gen input of the system to charge battery bank from an attached generator.

Gen Signal: Normally open relay that closes when the Gen Start signal state is active.

Gen Force: When the generator is connected, it is forced to start the generator without meeting other conditions.

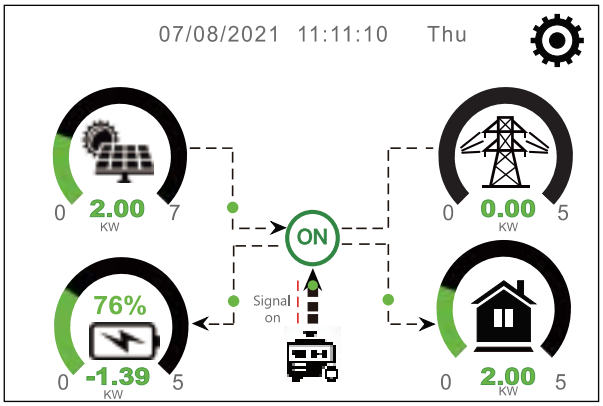
This is Grid charge, you need select. ②

Start =30 %: No use, Just for customization.

A= 40 A: It indicates the Current that the Grid charges the Battery.

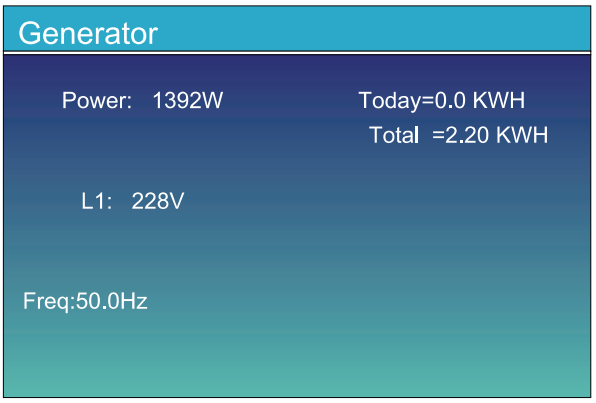
Grid Charge: It indicates that the grid charges the battery.

Grid Signal: Disable.

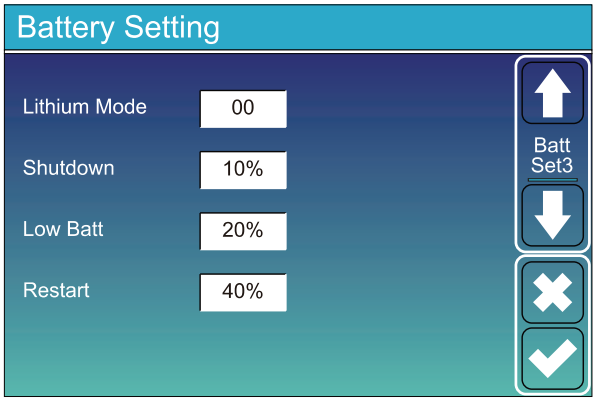


This page tells the PV and diesel generator power the load and battery

LCD DISPLAY LCONS



This page tells generator output voltage, frequency, power. And, how much energy is used from generator.

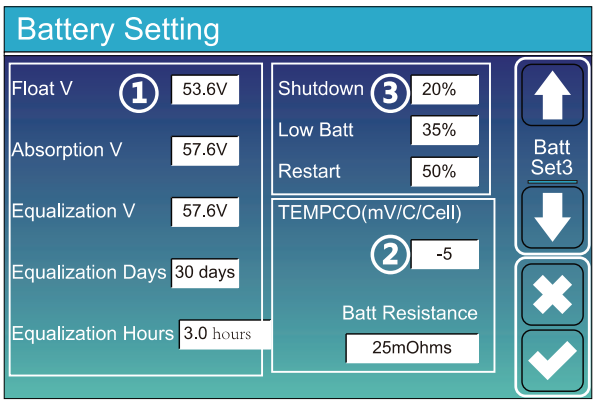


Lithium Mode: This is BMS protocol. Please reference the document (Approved Battery) .

Shutdown 10 %: It indicates the inverter will shutdown if the soc below this value.

Low Batt 20 %: It indicates the inverter will alarm if the SOC below this value.

Restart 40 %: Battery voltage at 40 % AC output will resume.



There are 3 stages of charging the Battery

① This is for professional installers, you can keep it if you do not know.

② Shutdown 20 %: The inverter will shutdown if the SOC below this value.

Low Batt 35 %: The inverter will alarm if the SOC below this value.

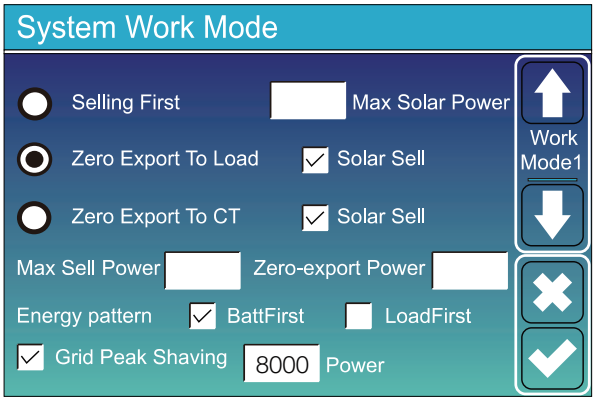
③ Restart 50 %: Battery SOC at 50 % AC output will resume.

Recommended battery settings

Battery Type	Absorption Stage	Float Stage	Torque value (every 30 days 3 hr)
AGM (or PCC)	14.2 V (57.6 V)	13.4 V (53.6 V)	14.2 V (57.6 V)
Gel	14.1 V (56.4 V)	13.5 V (54.0 V)	
Wet	14.7 V (59.0 V)	13.7 V (55.0 V)	14.7 V (59.0 V)
Lithium	Follow its BMS voltage parameters		

LCD DISPLAY LCONS

System work mode setup menu



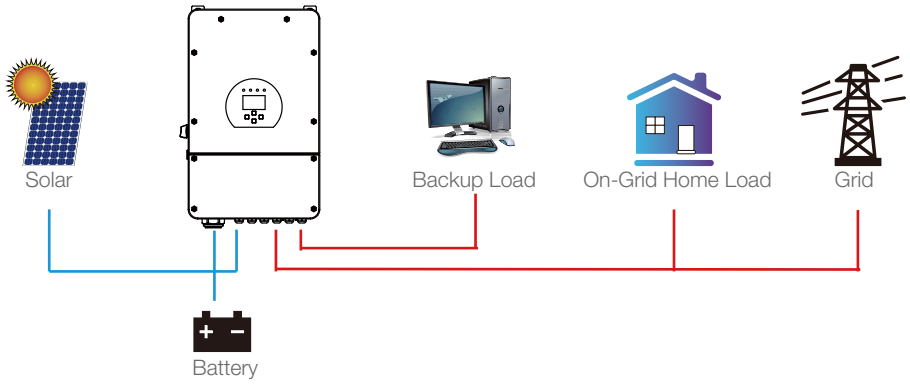
Work Mode

Selling First: This Mode allows hybrid inverter to sell back any excess power produced by the solar panels to the grid. If time of use is active, the battery energy also can be sold into grid.

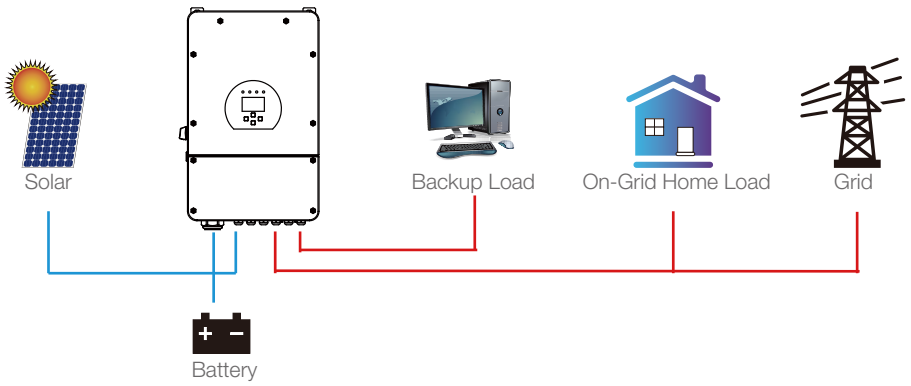
The PV energy will be used to power the load and chargethe battery and then excess energy will flow to grid. Power source priority for the load is as follows:

1. Solar Panels.
2. Grid.
3. Batteries (until programable % discharge is reached) .

Zero Export To Load: Hybrid inverter will only provide power to the backup load connected. The hybrid inverter will neither provide power to the home load nor sell power to grid. The built-in CT will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load and charge the battery.



Zero Export To CT: Hybrid inverter will not only provide power to the backup load connected but also give power to the home load connected. If PV power and battery power is insufficient, it will take grid energy as supplement. The hybrid inverter will not sell power to grid. In this mode, a CT is needed. The installation method of the CT please refer to chapter 3.6 CT Connection. The external CT will detect power flowing back to the grid and will reduce the power of the inverter only to supply the local load, charge battery and home load.



LCD DISPLAY LCONS

Solar Sell: “Solar sell” is for Zero export to load or Zero export to CT: when this item is active, the surplus energy can be sold back to grid. When it is active, PV Power source priority usage is as follows: load consumption and charge battery and feed into grid.
Max, sell power: Allowed the maximum output power to flow to grid.

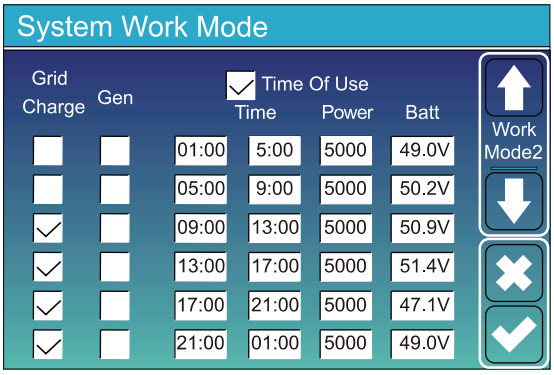
Zero-export Power: for zero-export mode, it tells the grid output power. Recommend to set it as 20-100 W to ensure the hybrid inverter won' t feed power to grid.

Energy Pattern: PV Power source priority

Batt First: PV power is firstly used to charge the battery and then used to power the load. If PV power is insufficient, grid will make supplement for battery and load simultaneously.
Load First: PV power is firstly used to power the load and then used to charge the battery. If PV power is insufficient, grid will make supplement for battery and load simultaneously.

Max Solar Power: allowed the maximum DC input power

Grid Peak-shaving: when it is active, grid output power will be limited within the set value. If the load power exceeds the allowed value, it will take PV energy and battery as supplement. If still can’t meet the load requirement, grid power will increase to meet the load needs.



Time of use: it is used to program when to use grid or generator to charge the battery, and when to discharge the battery to power the load. Only tick “Time Of Use” then the follow items (Grid, charge, time, power etc) . will take effect.

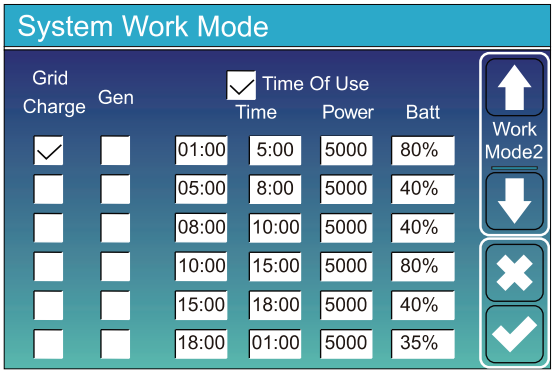
Note: when in selling first mode and click time of use, the battery power can be sold into grid.

Grid charge: utilize grid to charge the battery in a timeperiod.

Gen charge: utilize diesel generator to charge the battery in a time period.

Time: real time, range of 01:00-24:00.

Batt (V or SOC %): battery SOC % or voltage at when the action is to happen.



For example:

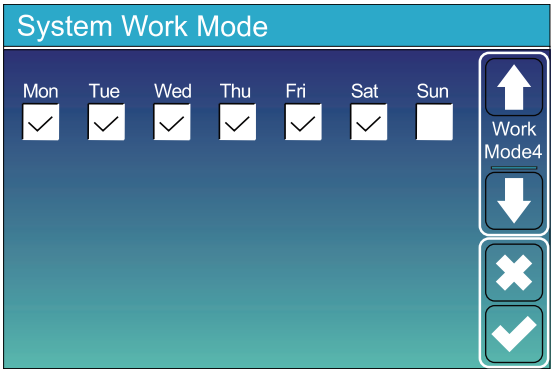
During 01:00-05:00, when battery SOC is lower than 80 %, it will use grid to charge the battery until battery SOC reaches 80 %.

During 05:00-08:00 and 08:00-10:00, when battery SOC is higher than 40 %, hybrid inverter will discharge the battery until the SOC reaches 40 %.

During 10:00-15:00, when battery SOC is higher than 80 %, hybrid inverter will discharge the battery until the SOC reaches 80 %.

During 15:00-18:00, when battery SOC is higher than 40 %, hybrid inverter will discharge the battery until the SOC reaches 40 %.

During 18:00-01:00, when battery SOC is higher than 35 %, hybrid inverter will discharge the battery until the SOC reaches 35 %.

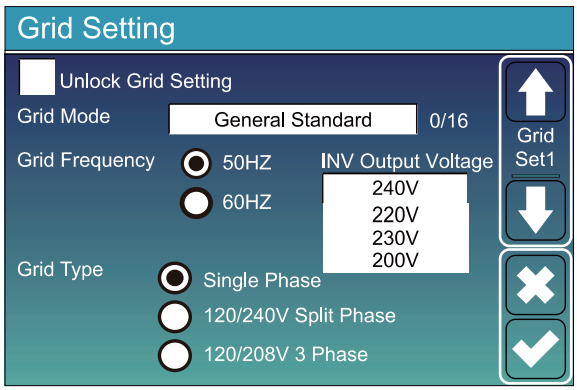


It allows users to choose which day to execute the setting of “Time of Use”.

For example, the inverter will execute the time of use page on Mon / Tue / Wed / Thu / Fri / Sat only.

LCD DISPLAY LCONS

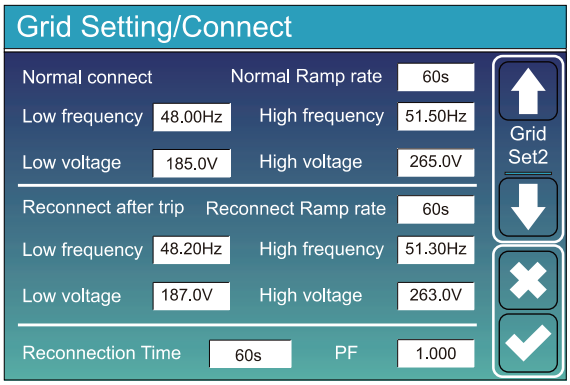
Grid setup menu



Unlock Grid Setting: before changing the grid parameters, please enable this with password of 7777. Then it is allowed to change the grid parameters.

Grid Mode: General Standard、UL1741&IEEE1547、CPUC RULE21、SRD-UL-1741、CEI 0-21、EN50549_CZ、Australia_A、Australia_B、Australia_C、NewZealand、VDE4105、OVE_Directive_R25、EN50549_CZ_PPDS_L16A、NRSO97、G98 / G99、G98 / G99_NI、ESB Networks (Ireland) .

Please follow the local grid code and then choose thecorresponding grid standard.



Normal connect: The allowed grid voltage / frequency range when the inverter first time connect to the grid.

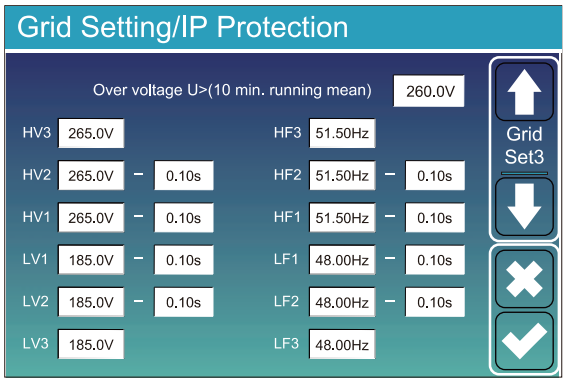
Normal Ramp rate: It is the startup power ramp.

Reconnect after trip: The allowed grid voltage / frequency range for the inverter connects the grid after the inverter trip from the grid.

Reconnect Ramp rate: It is the reconnection power ramp.

Reconnection time: The waiting time period for theinverter connects the grid again.

PF: Power factor which is used to adjust inverter reactive power.

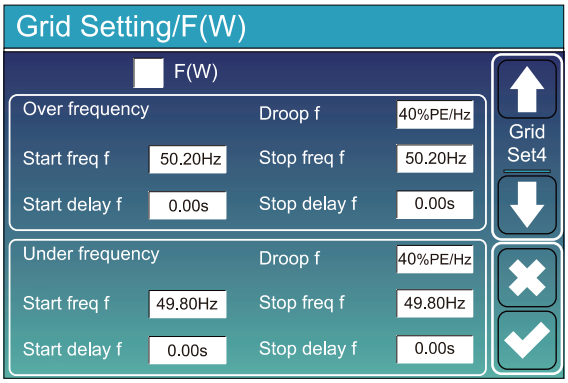


① HV1: Level 1 overvoltage protection point; ② 0.10 s-Trip time.
HV2: Level 2 overvoltage protection point;
HV3: Level 3 overvoltage protection point.

LV1: Level 1 undervoltage protection point;
LV2: Level 2 undervoltage protection point;
LV3: Level 3 undervoltage protection point.

HF1: Level 1 over frequency protection point;
HF2: Level 2 over frequency protection point;
HF3: Level 3 over frequency protection point.

LF1: Level 1 under frequency protection point;
LF2: Level 2 under frequency protection point;
LF3: Level 3 under frequency protection point.



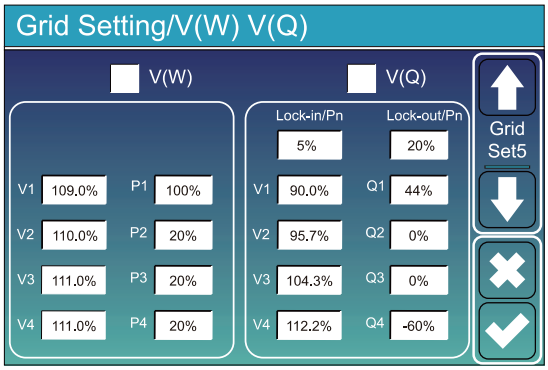
FW: this series inverter is able to adjust inverter output power according to grid frequency.

Droop f: percentage of nominal power per Hz
For example, “Start freq f > 50.2 Hz, Stop freq f < 50.2,

Droop f = 40 % PE / Hz” when the grid frequency reaches 50.2 Hz, the inverter will decrease its active power at Droop f of 40 %. And then when grid system frequency is less than 50.2 Hz, the inverter will stop decreasing output power.

For the detailed setup values, please follow the local grid code.

LCD DISPLAY LCONS



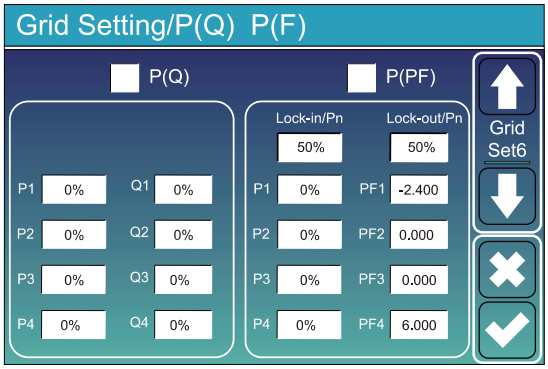
V (W) : It is used to adjust the inverter active power according to the set grid voltage.

V (Q) : It is used to adjust the inverter reactive power according to the set grid voltage.
This function is used to adjust inverter output power (active power and reactive power) when grid voltagechanges.

Lock-in / Pn 5 %: When the inverter active power is lessthan 5 % rated power, the VQ mode will not take effect.

Lock-out / Pn 20 %: If the inverter active power is increasing from 5 % to 20 % rated power, the VQ mode will take effect again.

For example: V2 = 110 %, P2 = 20 %. When the grid voltage reaches the 110 % times of rated grid voltage, inverter output power will reduce its active output power to 20 % rated power.
For example: V1 = 90 %, Q1 = 44 %. When the grid voltage reaches the 90 % times of rated grid voltage, inverter output power will output 44% reactive output power.
For the detailed setup values, please follow the local grid code.



P (Q) : It is used to adjust the inverter reactive power according to the set active power.

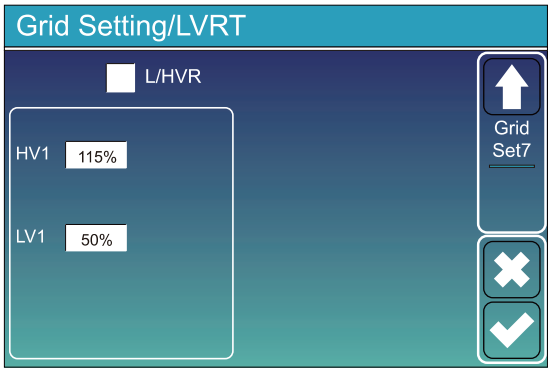
P (PF) : It is used to adjust the inverter PF according to the set active power.

For the detailed setup values, please follow the local grid code.

Lock-in / Pn 50 %: When the inverter output active power is less then 50 % rated power, it won't enter the P (PF) mode.

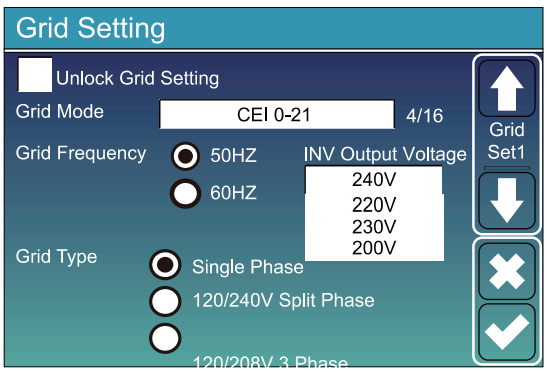
Lock-out / Pn 50 %: When the inverter output active power is higher then 50 % rated power, it 'will enter the P (PF) mode.

Note : only when the grid voltage is equal to or higher than 1.05 times of rated grid voltage, then the P (PF) mode will take effect.



Reserved: This function is reserved. It is no trecommended.

Generator port use setup menu



Firstly, tick the “CEI-021” and “Single phase / 50Hz” on the grid setting menu.

LCD DISPLAY LCONS

Smart Load OFF Batt

— Battery SOC at which the Smart load will switch off.

Smart Load ON Batt

— Battery SOC at which the Smart load will switch on. Also, the PV input power should exceed the seting value (Power) simultaneously and then the Smart load will switch on.

On Grid always on: When click “on Grid always on” the smart load will switch on when the grid is present.

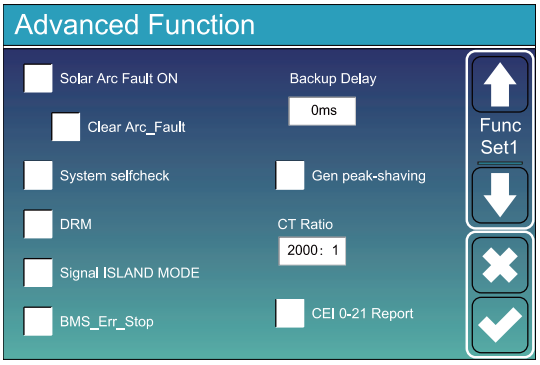
Micro Inv Input: To use the Generator input port as a micro-inverter on grid inverter input (AC coupled) , this feature will also work with “Grid-Tied” inverters.

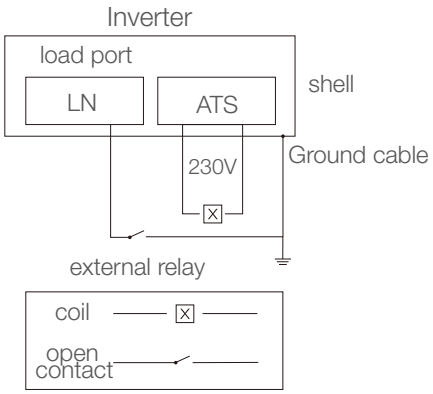
*Micro Inv Input OFF: when the battery SOC exceeds seting value, Microinveter or grid-tid inverter will shut down.
*Micro Inv Input ON: when the battery SOC is lower than seting value, Microinveter or grid-tied inverter will start to work.

AC Couple Fre High: If choosing “Micro Inv input” , as the battery SOC reaches gradually seting value (OFF) , During the process, the microinverter output power will decrease linear. When the battery SOC equals to the seting value (OFF) , the system frequency will become the seting value (AC couple Fre high) and the Microinverter will stop working. Stop exporting power produced by the microinverter to the grid.

*Note: Micro Inv Input OFF and On is valid for some certain FW version only.
*AC couple on load side: connecting the output of on-grid inverter at the load port of the hybrid inverter. In this situation, the hybrid inverter will not able to show the load power correctly.
*Ac couple on grid side: this function is reserved.
*Note: Some firmware versions don't have this function.

Advanced function setup menu





Solar Arc Fault ON: This is only for US.

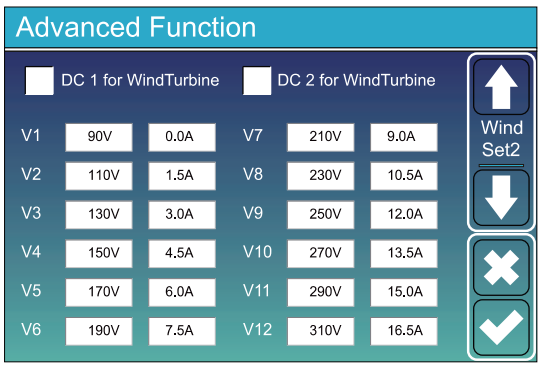
System selfcheck: Disable. this is only for factory.

Gen Peak-shaving: Enable When the power of the generator exceeds the rated value of it, the inverter will provide the redundant part to ensure that the generator will not overload.

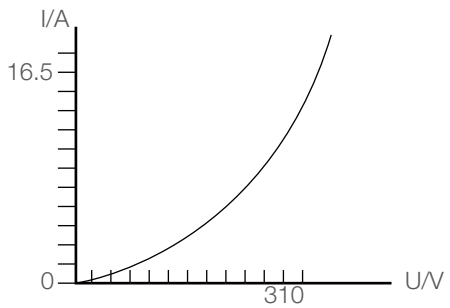
DRM: For AS4777 standard.

Backup Delay: (0-300) S adjustable

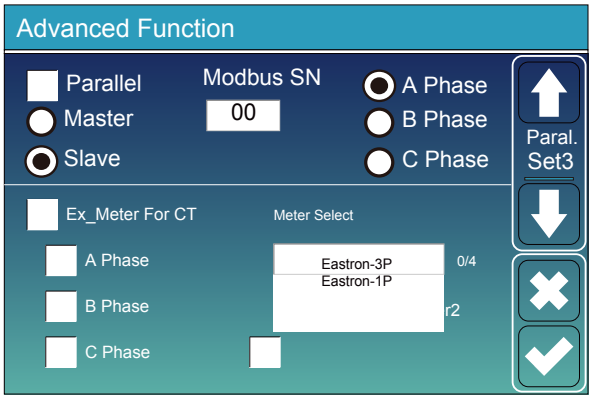
Signal ISLAND MODE: when “signal island mode” is checked and the inverter connects the grid, the ATS port voltage will be 0. When “signal island mode” is checked and the inverter disconnected from the grid, the ATS port voltage will output 230 Vac voltage. With this feature and outside NO type relay, it can realize N and PE disconnection or bond.
More details, please refer to left side picture.



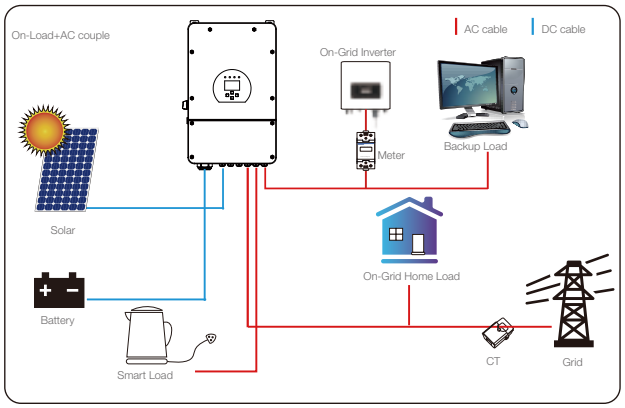
This is for Wind Turbine

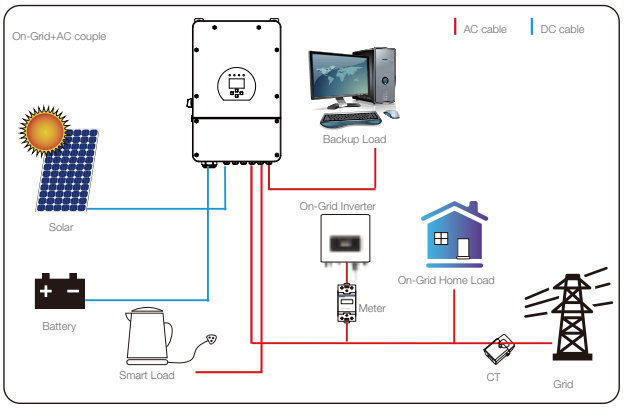


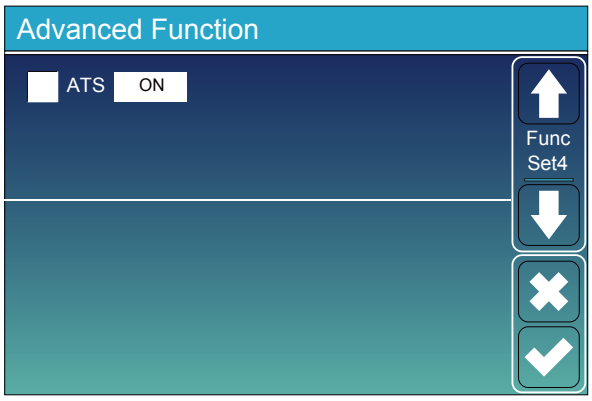
LCD DISPLAY LCONS



Meter Select: select the corresponding meter type according to the meter installed in the system.
Grid Side INV Meter2: when there's a string inverter AC couple at the grid or load side of hybrid inverter and there's a meter installed for the string inverter, then the hybrid inverter LCD will show the string inverter output power on its PV icon. Please make sure the meter can communicate with the hybrid inverter successfully.

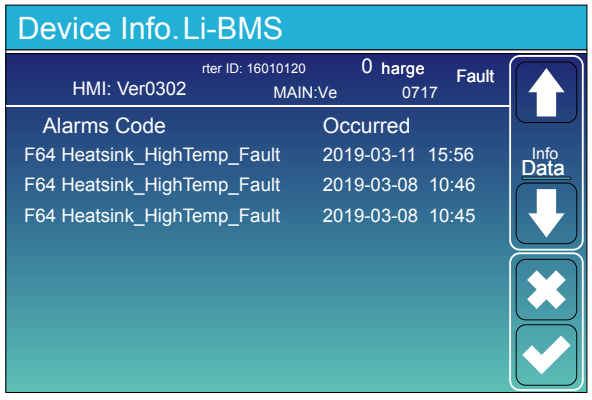






ATS: It is related with ATS port voltage. it is better in "uncheck" position.

Device info setup menu



This page show Inverter ID, Inverter version and alarmcodes.

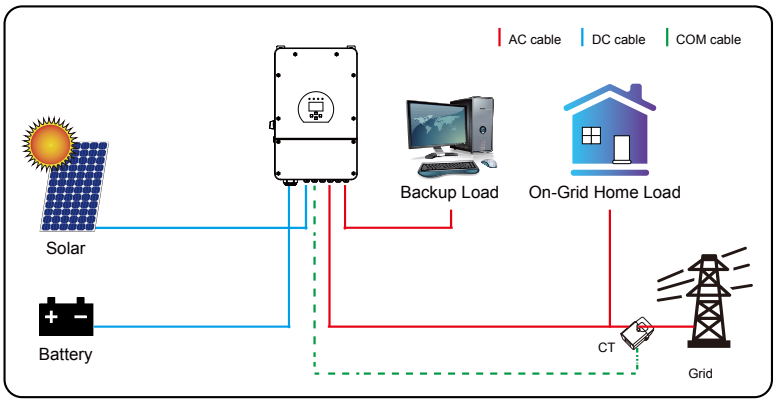
HMI: LCD version

MAIN: Control board FW version

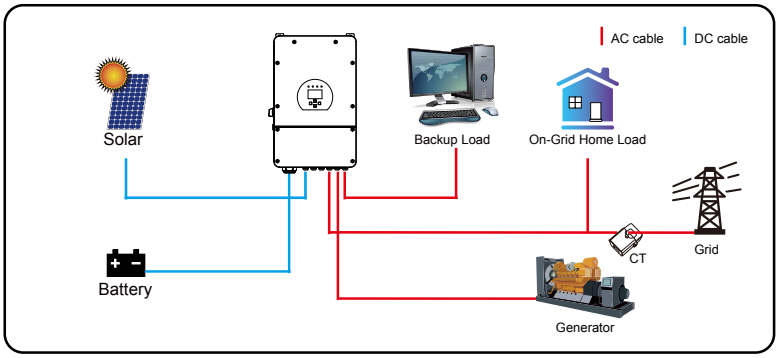
MODE

Mode

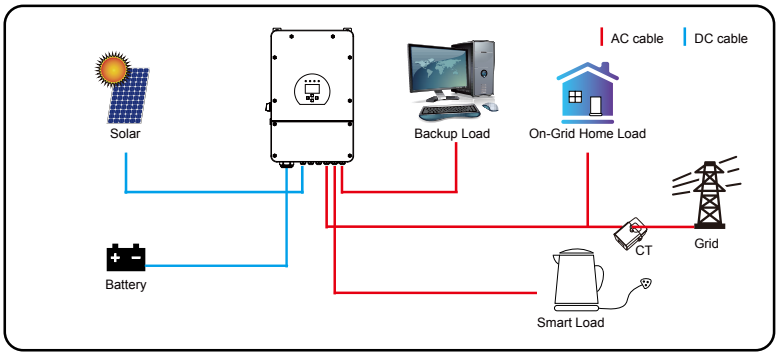
Mode I: Basic



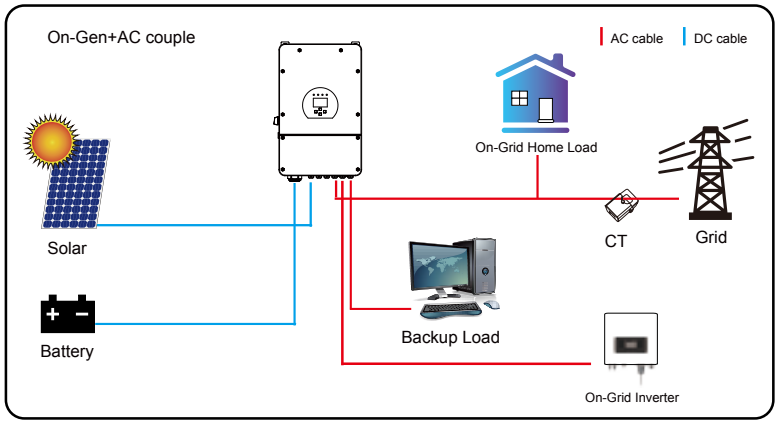
Mode II: With Generator



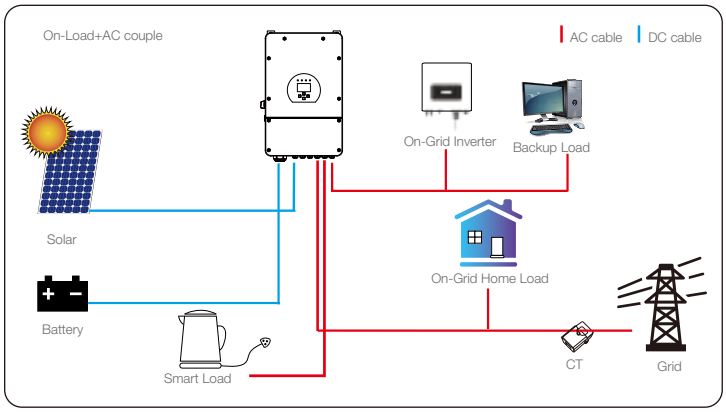
Mode III: With Smart-Load

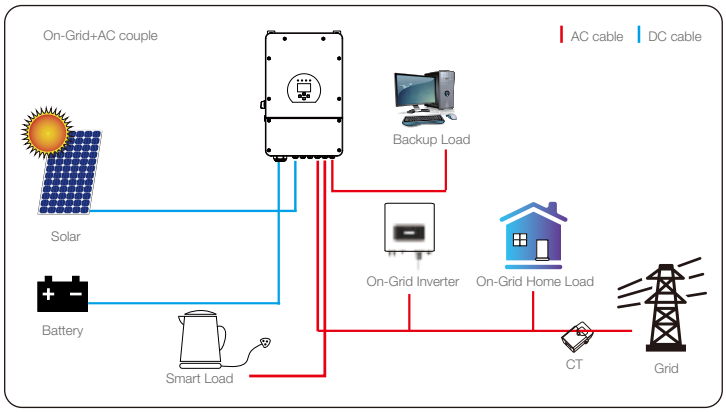


Mode IV: AC Couple



MODE





The 1st priority power of the system is always the PV power, then 2 nd and 3 rd priority power will be the battery bank or grid according to the settings.
The last power backup will be the Generator if it is available.

Fault information and processing

The energy storage inverter is designed according to the grid-connected operation standard and meets the safety requirements and electromagnetic compatibility requirements. Befor eleaving the factory, the inverter undergoes several rigorous tests to ensure that the inverter can operate reliably.

If any of the fault messages listed in Table below appear on your inverter and thefault has not been removed after restarting, please contact your local dealer or service center. You need to have the following information ready.

- Inverter serial number;
- Distributor or service center of the inverter;
- On-grid power generation date;
- The problem description (including the fault code and indicator status displayed on the LCD) is as detailed as possible.
- Your contact information. In order to give you a clearer understanding of the inverter's fault information, we will list all possible fault codes and their descriptions when the inverter is not working properly.

FAULT INFORMATION AND PROCESSING

Error code	Description	Solutions
FO8	GFDI_Relay_Failure	1. When inverter is in Split phase (120 / 240 Vac) or three-phase system (120 / 208 Vac) system, the backup load port N line needs to connect ground; 2. If the fault still exists, please contact us for help.
F13	Working mode change	1. When the grid type and frequency changed it will report F13; 2. When the battery mode was changed to “No battery” mode, it will report F13; 3. For some old FW version, it will report F13 when the system work mode changed; 4. Generally, it will disappear automatically when shows F13; 5. If still same, and turn off the DC switch and AC switch and wait for one minute and then turn on the DC / AC switch; 6. Seek help from us, if can not go back to normal state.
F18	AC over current fault of hardware	AC side over current fault 1. Please check whether the backup load power and common load power are within the range; 2. Restart and check whether it is in normal; 3. Seek help from us, if can not go back to normal state.
F20	DC over current fault of the hardware	DC side over current fault 1. Check PV module connect and battery connect; 2. When in the off-grid mode, the inverter startup with big power load, it may report F20. Please reduce the load power connected; 3. Turn off the DC switch and AC switch and then wait one minute, then turn on the DC / AC switch again; 4. Seek help from us, if can not go back to normal state.
F22	Tz_EmergStop_Fault	Please contact your installer for help.
F23	AC leakage current is transient over current	Leakage current fault 1. Check PV side cable ground connection. 2. Restart the system 2~3 times. 3. If the fault still exists, please contact us for help.
F24	DC insulation impedance failure	PV isolation resistance is too low 1. Check the connection of PV panels and inverter is firmly and correctly; 2. Check whether the PE cable of inverter is connected to ground;
F26	The DC busbar is unbalanced	1. Please wait for a while and check whether it is normal; 2. When the hybrid in split phase mode, and the load of L1 and load of L2 is big different, it will report the F26. 3. Restart the system 2~3 times. 4. Seek help from us, if can not go back to normal state.
F29	Parallel CANBus fault	1. When in parallel mode, check the parallel communication cable connection and hybrid inverter communication address setting; 2. During the parallel system startup period, inverters will report F29. when all inverters are in ON status, it will disappear automatically; 3. If the fault still exists, please contact us for help.

FAULT INFORMATION AND PROCESSING

Error code	Description	Solutions
F34	AC Overcurrent fault	1. Check the backup load connected, make sure it is in allowed power range; 2. If the fault still exists, please contact us for help.
F35	No AC grid	No Utility 1. Please confirm grid is lost or not; 2. Check the grid connection is good or not; 3. Check the switch between inverter and grid is on or not; 4. Seek help from us, if can not go back to normal state.
F41	Parallel system stop	1.Check the hybrid inverter working status. If there's 1 pcshybrid inverter is in OFF status, the other hybrid invertersmay report F41 fault in parallel system. 2.If the fault still exists, please contact us for help.
F42	AC line low voltage	Grid voltage fault 1.Check the AC voltage is in the range of standard voltage in specification; 2.Check whether grid AC cables are firmly and correctly connected; 3.Seek help from us, if can not go back to normal state.
F47	AC over frequency	Grid frequency out of range 1. Check the frequency is in the range ofspecification or not; 2. Check whether AC cables are firmly and correctly connected; 3. Seek help from us, if can not go back to normal state.
F48	AC lower frequency	Grid frequency out of range 1. Check the frequency is in the range ofspecification or not; 2. Check whether AC cables are firmly and correctly connected; 3. Seek help from us, if can not go back to normal state.
F56	DC busbar voltage is too low	Battery voltage low 1. Check whether battery voltage is too low; 2. If the battery voltage is too low, using PV or grid to charge the battery; 3. Seek help from us, if can not go back to normal state.
F58	BMS communication fault	1. it tells the communication between hybrid inverter and batteryBMS disconnected when “BMS Err-Stop” is active; 2. if don’t want to see this happen, you can disable “BMS Err-Stop” item on the LCD; 3. If the fault still exists, please contact us for help.
F63	ARC fault	1. ARC fault detection is only for US market; 2. Check PV module cable connection and clear the fault; 3. Seek help from us, if can not go back to normal state.
F64	Heat sink high temperature failure	Heat sink temperature is too high 1. Check whether the work environment temperature is too high; 2. Turn off the inverter for 10mins and restart; 3. Seek help from us, if can not go back to normal state.

LIMITATION of LIABILITY

Under the guidance of our company, customers return our products so that our company can provide service of maintenance or replacement of products of the same value. Customers need to pay the necessary freight and other related costs. Any replacement or repair of the product will cover the remaining warranty period of the product. If any part of the product or product is replaced by the company itself during the warranty period, all rights and interests of the replacement product or component belong to the company.
Factory warranty does not include damage due to the following reasons:

Damage during transportation of equipment;
Damage caused by incorrect installation or commissioning;
Damage caused by failure to comply with operation instructions, installation instructions or maintenance instructions;
Damage caused by attempts to modify, alter or repair products;
Damage caused by incorrect use or operation;
Damage caused by insufficient ventilation of equipment;
Damage caused by failure to comply with applicable safety standards or regulations;
Damage caused by natural disasters or force majeure (e.g, floods, lightning, overvoltage, storms, fires, etc.

In addition, normal wear or any other failure will not affect the basic operation of the product Any external scratches, stains or natural mechanical wear does not represent a defect in the product.

Limitation Of Liability

In addition to the product warranty described above, the state and local laws and regulations provide financial compensation for the product's power connection (including violation of implied terms and warranties). The company hereby declares that the terms and conditions of the product and the policy cannot and can only legally exclude all liability within a limited scope.

DATASHEET

Datasheet

Model	LHS-LV-8K F1
Battery Input Data	
Battery Type	Lead-acid or Lithium-ion
Battery Voltage Range (V)	40-60
Max. Charging Current (A)	190
Max. Discharging Current (A)	190
Charging Curve	3 Stages / Equalization
External Temperature Sensor	yes
Charging Strategy for Li-Ion Battery	Self-adaption to BMS
PV String Input Data	
Max. DC Input Power (W)	10400
PV Input Voltage (V)	370 (125~500)
MPPT Range (V)	150-425
Start-up Voltage (V)	125
PV Input Current (A)	26+26
Max.PV Isc (A)	44+44
No. of MPPT Trackers	2
No. of Strings Per MPPT Tracker	2+2
AC Output Data	
Rated AC Output and UPS Power (W)	8000
Max. AC Output Power (W)	8000
Peak Power (off grid)	2 times of rated power, 10 S
AC Output Rated Current (A)	36.4 / 34.8
Max. AC Current (A)	40 / 38.3
Max. Continuous AC Passthrough (A)	50
Power Factor	0.8 leading to 0.8 lagging
Output Frequency and Voltage	50 / 60 Hz; 120 / 240 Vac (split phase) , 208 Vac (2 / 3 phase) , 220 / 230 Vac (single phase)
Grid Type	Split phase; 2 / 3 phase; Single Phase
Total Harmonic Distortion (THD)	< 3 % (of nominal power)
DC current injection	< 0.5% In
Efficiency	
Max. Efficiency	97.60 %
Euro Efficiency	97.00 %
MPPT Efficiency	> 99 %
Protection	
PV Arc Fault Detection	Integrated
PV Input Lightning Protection	Integrated
Anti-islanding Protection	Integrated
PV String Input Reverse Polarity Protection	Integrated
Insulation Resistor Detection	Integrated
Residual Current Monitoring Unit	Integrated
Output Over Current Protection	Integrated
Output Shorted Protection	Integrated
Surge Protection	DC Type II / AC Type II
DC Terminal insulation Impedance Monitoring	DC Type II / AC Type III

DATASHEET

Model	LHS-LV-8K F1
Certifications and Standards	
Grid Regulation	EN 50549, UNE 217002, NRS 097, IEEE 1547.1, SRD V2.0
Communication interface	IEC / EN 61000-6-1 / 2 / 3 /4, IEC / EN 62109-1, IEC / EN 62109-2, FCC, UL 1741
General Data	
Operating Temperature Range (℃)	-40-60 ℃ , > 45 ℃ Derating
Cooling	Intelligent Air cooling
Noise (dB)	< 30 dB
Communication with BMS	RS485; CAN
Weight (kg)	30
Cabinet size (mm)	420 W × 670 H × 233 D (Excluding connectors and brackets)
Protection Degree	IP65
Installation Style	Wall-mounted
Warranty	10 years