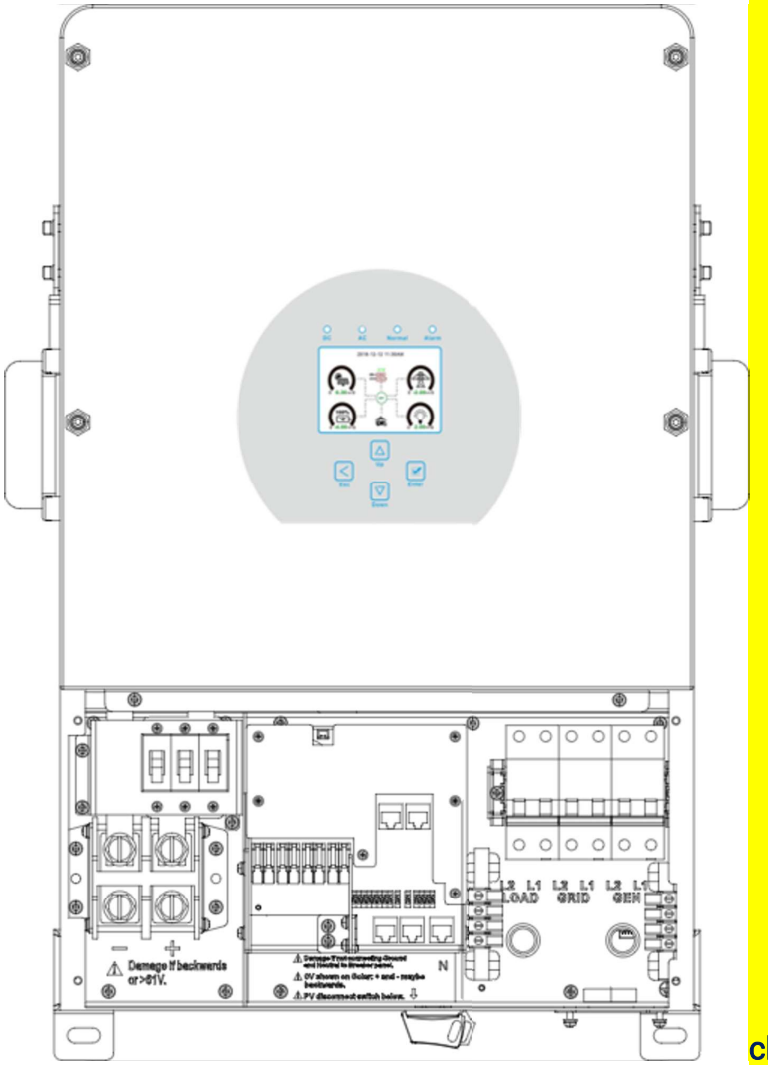
Deye Hybrid Inverter



change

USER MANUAL

SUN-8K – SG01LP1-US/EU

Ningbo Deye Inverter Technology Co., Ltd.

26, Southern YongJiang Road, BeiLun, Ningbo, China

Tel：+8618740594232

E-mail：Wangam@deye.com.cn

www.deyeinverter.com

Index Page

1 General Safety instruction

The manual covers important safety and operation instruction. Before using the inverter, please read all instructions and cautionary markings on the unit and this manual. Store the manual where it can be accessed easily. In the following technical description, the detailed functions are explained to the installer, as well as the user, which are required for the installation, operational start-up and handling of the inverter.

High risk of fire and electrocution, only qualified personal can install the Deye Inverter device.

1. To reduce risk of electric shock, disconnect all wirings before attempting any maintenance or cleaning. Turning off the unit will not reduce this risk
2. It's 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 size as below
3. Please strictly follow installation procedure when you want to connect or disconnect AC or DC terminals. Please refer to INSTALLATION section of this manual for the details.
4. Incorrect operation or work may cause of injury or death to the operator or a third party; or also damage the inverter

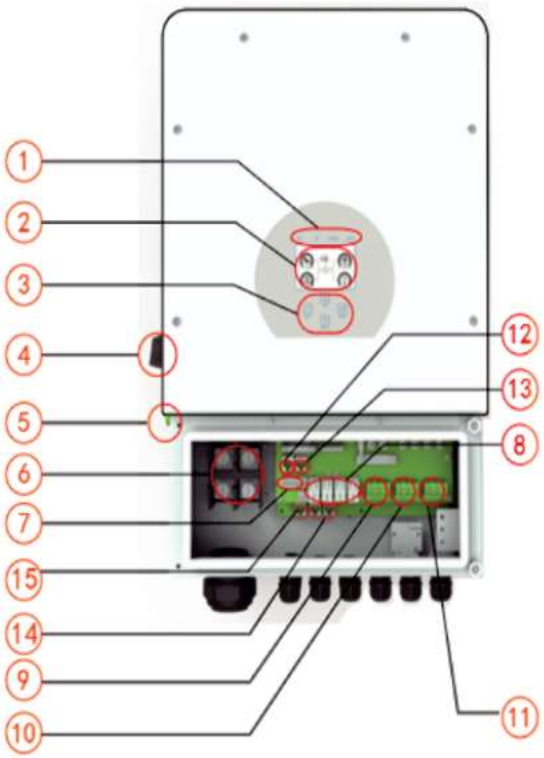
5. For optimum operation of inverter, please follow required specification to select appropriate cable size. It's very important to operate inverter reliably.

➢ GROUNDING Instruction before installation

1. PV solar arrays produce hazardous voltages and currents when exposed to light which can create an electrical shock hazard. Use dark opaque sheets to cover the PV solar array before wiring or connecting cable terminations.
2. This inverter should be connected to a permanent grounded wiring system. Be sure to comply with local requirements and regulation to install this inverter.
3. NEVER cause AC output and DC input short circuited. Do NOT connect to the mains when DC input short circuits.

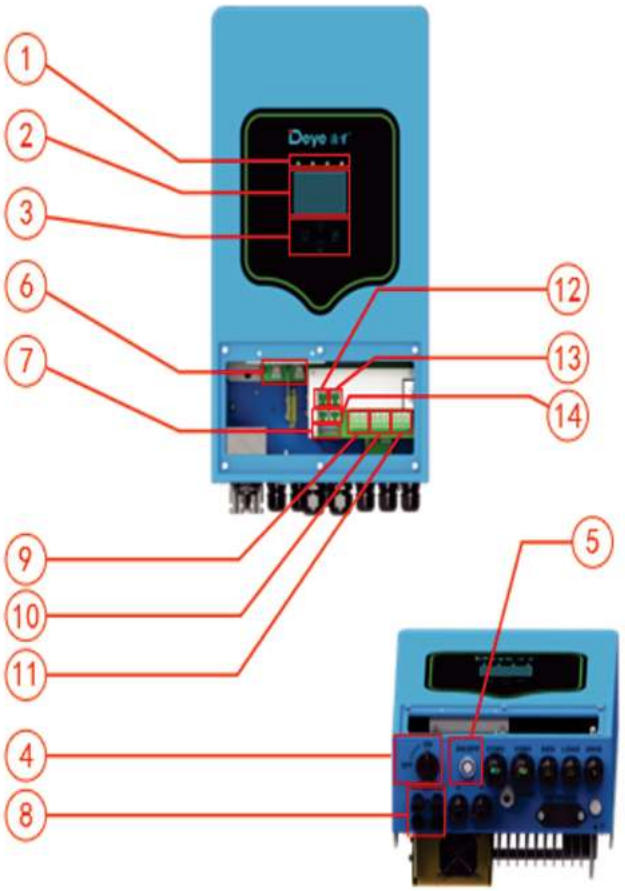
2 Product Introduction

The Deye Hybrid Inverter is multifunctional and fully equipped with power management tool which allows multiple sources such as solar and wind energy, storage device, main Grid and generator, to fulfill the electric power demand with respect to the user requirement.



1. Inverter indicators
2. LCD display
3. Function Buttons
4. DC switch
5. Power ON/OFF button
6. Battery input connections
7. Function Port
8. PV input with 2-MPPT
9. Grid input/output terminal
10. Generator input terminal
11. Load output terminal
12. RS 485 port
13. CAN Port
14. Parallel Port
15. Parallel box (Master)

Fig.1 Product view SUN-8K – SG01LP1-US/EU



1. Inverter indicators
2. LCD display
3. Function Buttons
4. DC switch
5. Power ON/OFF button
6. Battery input connections
7. Function Port
8. PV input with 2-MPPT
9. Generator input terminal
10. Load output terminal
11. Grid input/output terminal
12. RS 485 port
13. CAN Port
14. Parallel Port

Fig. 2 Product view SUN-5K – SG01LP1-US/EU

The generating energy fully utilize without any waste on the other hand "Hybrid Inverter" mean highly efficient power multifunctional managing tool which can manage generated power in a smooth way or stored for the coming load demand.

Deye "Hybrid inverter" recommended according to the following usage and applications;

- Marine [vessel power management]
- Power shedding [home/office/factory]
- Ups [uninterrupted power supply]
- Fuel saving system

- Remote area with solar system and wind turbine
- Building site
- Military site
- Telecommunication site

2.1.1 Product Feature

- **Ac coupled**
  Updated excited solar on- grid system to hybrid
- **Smart load function**
  Use generator input as crucial load output
- **Battery management system**
  Program able supply Compatible with battery system
- **Multiple output**
  120/240Vsplit phase, 220V single phase, 120V/208V, Pure sine wave inverter
- **Display**
  Configurable battery charging current/ voltage based of applications by LCD setting also configurable AC / solar / generator charger preferable with LCD setting
- **Protections**
  PV rapid shutdown control, PV arc fault detection, PV input lightning protection, **Programmable Multiple working mode**
  Grid tie, Hybrid, Grid off mode. Stimulatingly manage power to/from solar, battery, load and generator, also provide multiple inverter parallel operation function with on grid and off grid.
- **Additional feature**
  Ups time less than 5ms. Six stages time of use setting. Charge and discharge up to 185A 8Kw (120A 5Kw), load or home power firstly with zero export to grid.
- **Communication and Configuration**
  The inverter records running information and error information. They are displayed on the LCD screen. Supporting WiFi monitoring and built in 2 strings of MPPT tracker also Smart 3-stage MPPT charging for optimized battery performance

2.1.2 Product specification

Technical Data	SUN-5K-SG01LP1-US/EU	SUN-8K-SG01LP1-US/EU
Battery Input Data		
Battery Type	Led-acid or Li-Ion	
Battery Voltage Range (V)	40V-60V	
Max. Charging Current (A)	120A	185A
Max. Discharging Current (A)	120A	185A
Charging curve	3 Stages/equalization	
External temperature sensor	Optional	
Charging Strategy for Li-Ion Battery	Self-adaption to BMS	
PV String Input Data		
Max. DC Input Power (W)	6500W	10000W
Max. DC Input Voltage (V)	500V	
MPPT Range (V)	125V-425V	
Start-up Voltage (V)	150V	
Max. Input Current (A)	18A+9A	18A+18A
No. of MPP Trackers	2	2
No. of Strings per MPP Tracker	2+1	2+2
AC Output Data		
Rated AC output and UPS power	5000W	8000W
Peak power(off grid)	2 times of rated power, 10 S	
Max. AC current(A)	20.8A	33A
Output frequency and voltage	50/60Hz	
Grid type	Split phase/two phase/Single Phase	
Current harmonic distortion	THD<3%(Linear loading) <1.5%	
Efficiency		
Max. Efficiency	97.60%	
Euro Efficiency	97.00%	
MPPT Efficiency	99.90%	
Protection		

PV Arc Fault t detection	Integrated (Except European Type)
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 Short Protection	Integrated
Output Over Voltage Protection	Integrated
Certifications and Standards	
Grid Regulation	UL1741,IEEE1547,VDE-ARN 4105,VDE0126
Safety Regulation	IEC62109-1&2, IEC62040-1
EMC	EN61000-6-1, EN61000-6-3, FCC 15 class B
General Data	
Operating Temperature Range	-25~60℃ >45℃ De-rating
Noise (dB)	<30
Communication with BMS	RS485; CAN
Weight (kg)	32KG
Size (Width*Height*Depth mm)	680*420*233mm
Installation style	Wall-mounted
Warranty	5 years

3 Hybrid Inverter Installation

No	Parts list Description	Qty
1	Hybrid inverter	1
2	Stainless-steel mounting screws M4*12	2
3	Stainless-steel expansions Bolts M8*80	4
4	User Manual	1
5	WiFi Connector	1
6	L-type Hexagon wrench	1
7	Current Transformer (optional)	2

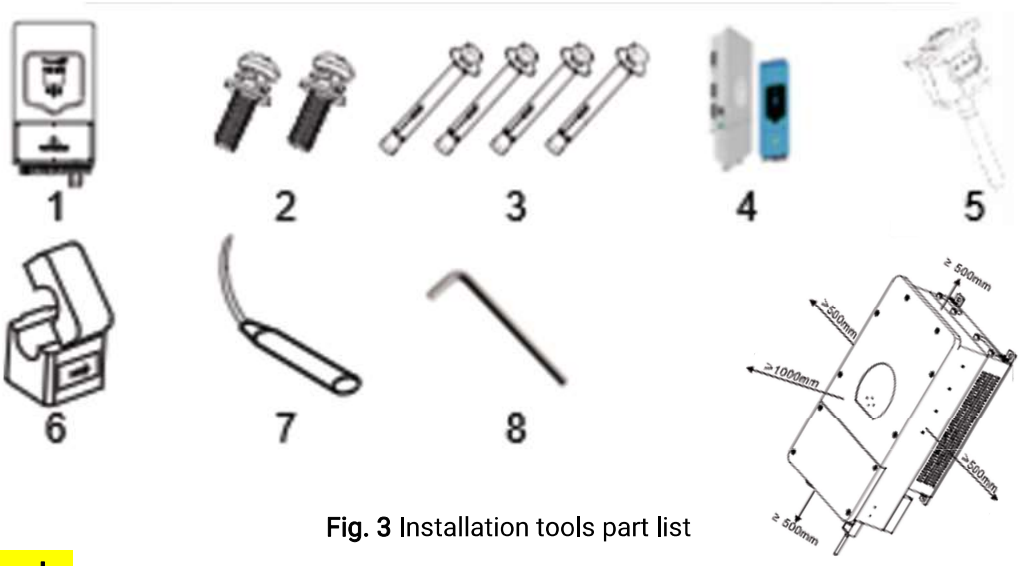
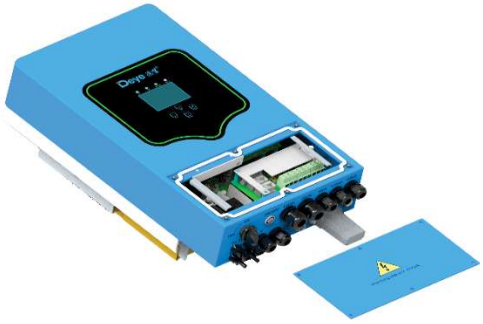


Fig. 3 Installation tools part list

Remake

3.1.1 Visual inspection

All Deye inverters are 100% tested, packaged in a heavy-duty cardboard shipping carton, and visually inspected before leaving our manufacturing Plant. If you receive the inverter in a damaged shipping carton, please reject



the shipment.

Fig. 4 Visual Diagram

Verify Deye inverter shipping carton contains:

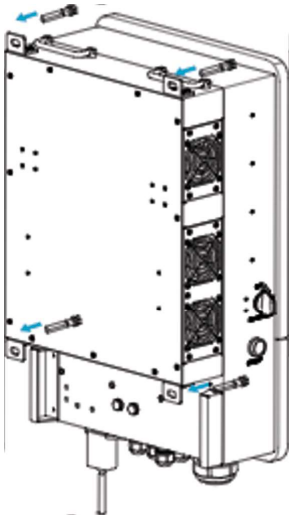
- Correct Deye Hybrid inverter model: SUN-5K-SG01LP1- US/EU and SUN-8K-SG01LP1- US/EU
- Mounting plate
- Operation and Quick Installation Guide

Visually inspect the Deye Hybrid inverter for any physical damage such as a bent heatsink fin and dented chassis. If the inverter appears to be damaged or if the inverter needs to be returned, please contact your local Deye service center representative.

No user serviceable parts are contained in the inverter section. Do not attempt to open or repair the inverter. opening the top cover of the power head will invalid the inverter warranty.

3.1.2 Mount inverter at Safe location

The inverter can be installed indoors or outdoors. Selecting an optimal location for the inverter is critical for its operating safety as well as the expected efficiency and service life.



Remember that the inverter is heavy! Be careful while mounting the inverter

Fig. 5 wall Fixing dimensions for inverter

Install the inverter on the wall by means of the wall-mounting bracket and expansion plug sets as follows:

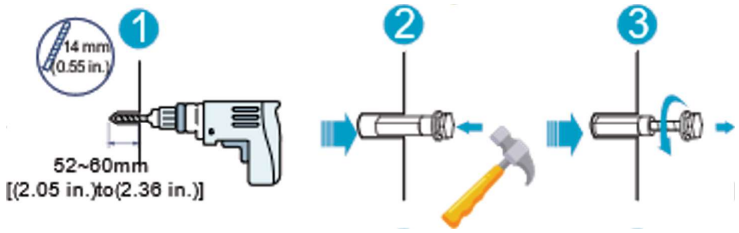


Fig. 6 Fixing Tools for Inverter

1. Install the wall-mounting bracket correctly.
2. Mount the inverter to the bracket.
3. Do not Mount the inverter horizontally, inverter should mount in vertical position. Place it at eye level for easy operation and reading
4. The ambient temperature should be between -25~60°C to ensure optimal operation
5. Install this inverter at eye-level in order to allow the LCD display to be read at all times.
6. Chose recommended drill head to drill the hole on the wall, 52-60mm deep
7. Use the proper hammer to fit the expansion bolt into the hole
8. Secure the inverter with two screws and washers to finish the mounting

3.2 Inverter Electrical Connections

Read all of these instructions, cautions, and warnings for the Deye Hybrid inverter and associated PV array documentation

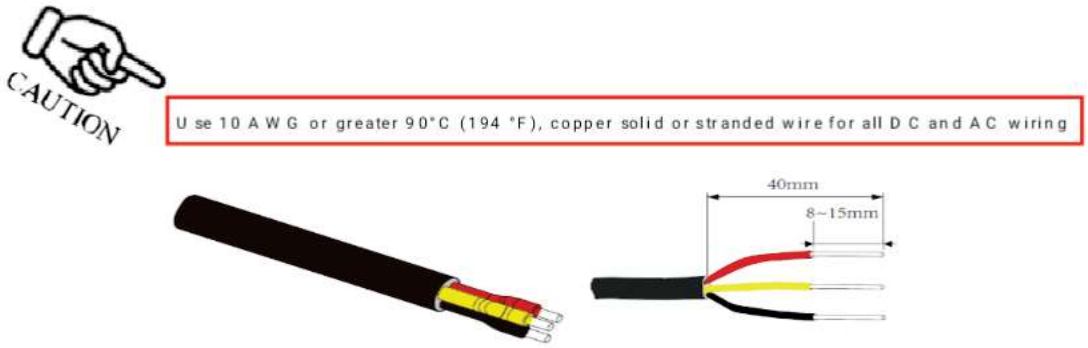


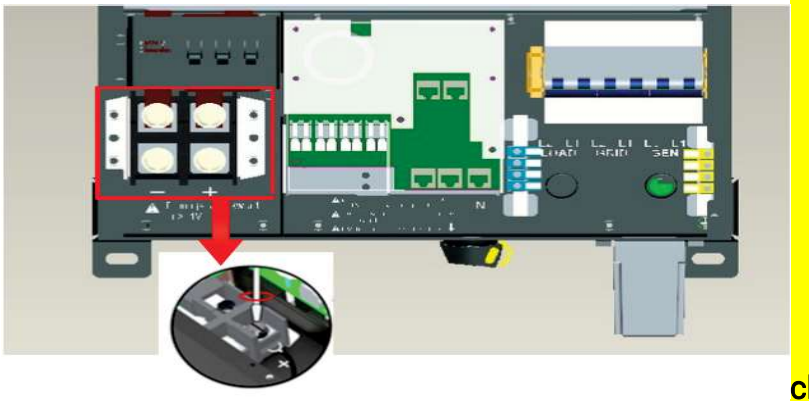
Fig.7 Strip Cable

Model	Cable (mm^2)	Torque value
SUN-5K-SG01LP1-US/EU	6	1.2Nm
SUN-8K-SG01LP1-US/EU	10	1.2Nm

3.2.1 Battery connection

To use the battery function, like all hybrid inverters an additional '**energy meter**' is required to monitor energy flow to and from the grid and household circuits.

For safety operation and regulation compliance, it's requested to install a separate DC over-current protector or disconnect device between battery and inverter. It may not be requested to have a disconnect device in some applications, however, it's still requested to have over-current protection installed. Please refer to typical amperage in below table as required fuse or breaker size.



change 8 k

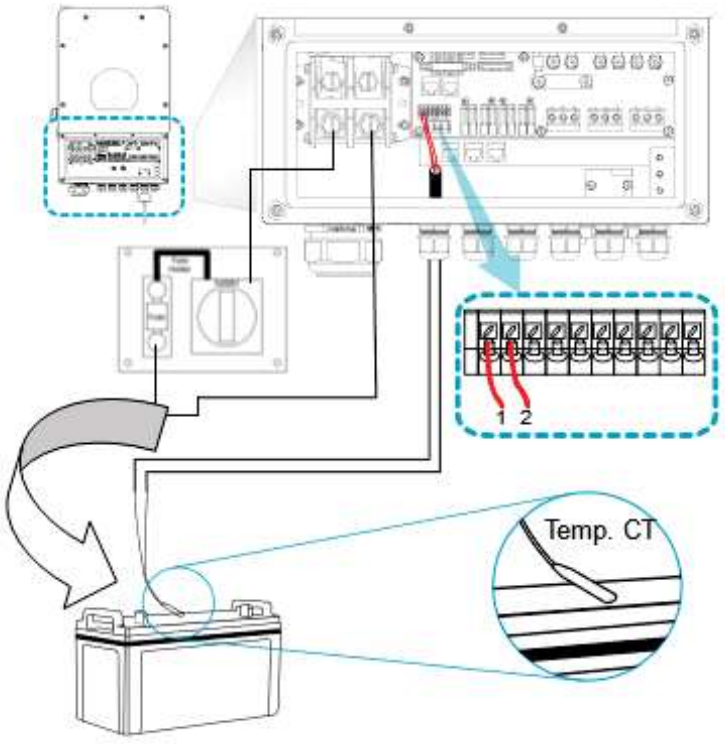
Fig. 8 Battery connection terminals

It's very important for system safety and efficient operation to use appropriate cable for battery connection. To reduce risk of injury, please use the proper recommended cable and terminal size as below.

Model	Wire size	Cable mm^2	Torque value	Fuse/Breaker
5kw	2AWG	35	2Nm	100AMP
8kw	2AWG	50	2Nm	250AMP

Please follow below steps to implement battery connection:

1. Assemble battery ring terminal based on recommended battery cable and terminal size.
2. Insert the ring terminal of battery cable flatly into battery connector of inverter and make sure the bolts are tightened with torque of 2-3 Nm. Make sure polarity at both the battery and the inverter/charge is correctly connected and ring terminals are tightly screwed to the battery terminals.



remake

Fig. 9 Battery connections with temperature sensor

3. In case of children touch or insects go into the inverter, please install a plastic pipe in the battery knockout holes, the hole dimension is offered below to inform user to choose correct size of pipe. To firmly secure wire connection,
4. Verify that the exposed wires are at least 6 inches in length to provide adequate strain relief and wire end strip length required.
   Connect the positive lead to Battery (+) Positive fuse holder (A).
   Connect the negative lead to Battery (-) Negative fuse holder (B).

you may fix the wires to strain relief with cable tie.

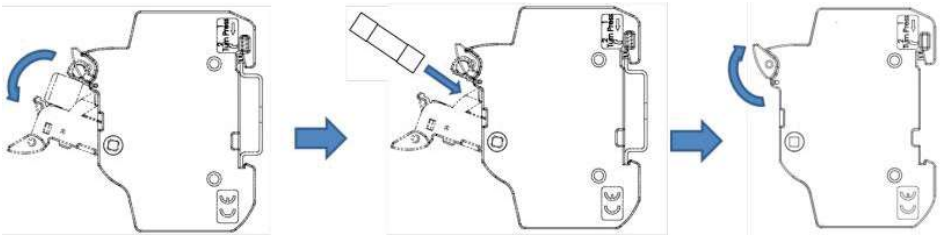
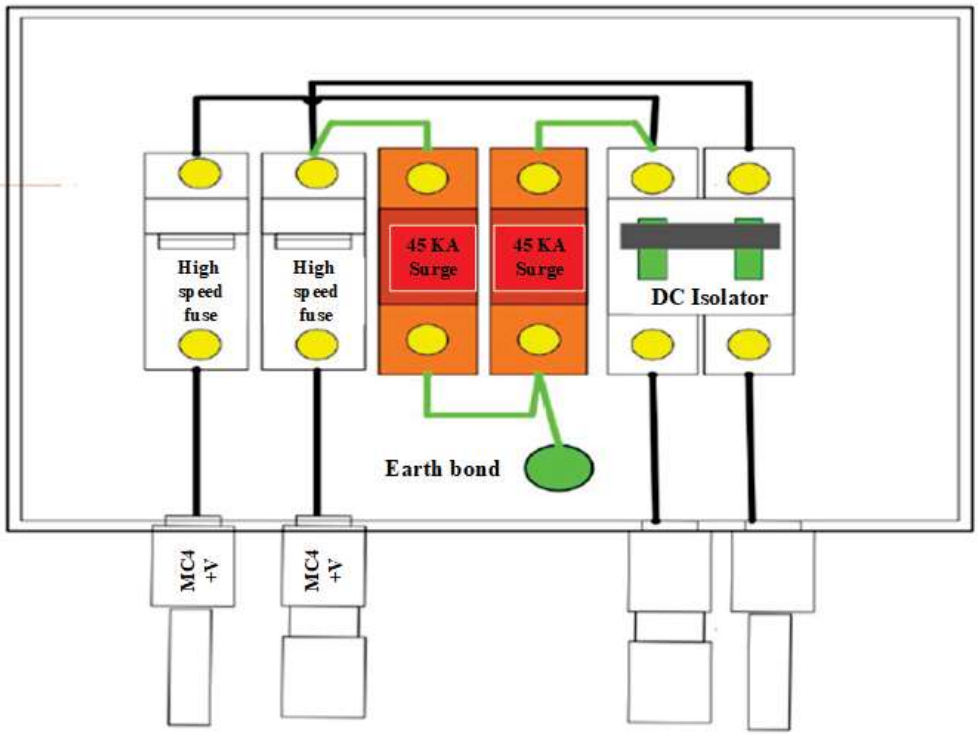


Fig. 10 Recommend use a suitable fuse and DC Isolator

Can change the fuse as following picture, recommended fuse type is: little fuse KLKD 600V,30A.

Battery Hook up cable 50mm Isolator switch 250 / 350 amp DC Fuse 200 Amp



make it

Fig.11 Recommend use a suitable DC Surge protector circuit

3.2.2 AC Input/output Connection

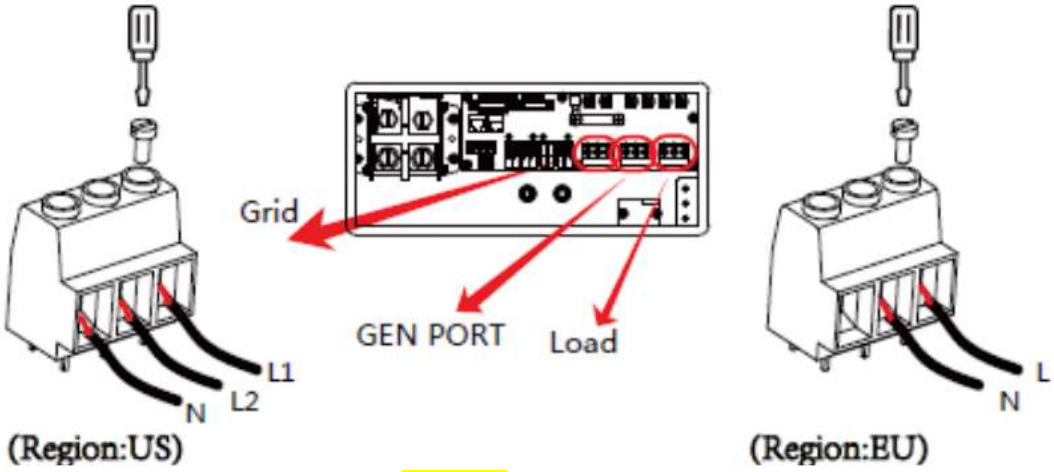
Before making AC input/output connection, be sure to open DC protector or disconnect first and ensure no live voltages are present on PV input and AC output circuits, and verify that the DC disconnect, AC disconnect, and dedicated AC branch circuit breaker are in the "OFF" position, before inverter installation. Verify that dedicated 2-pole 240 Vac / 208 Vac circuit breaker in the building electrical service panel is turned-off.

There are 3-terminal blocks with "IN" and "OUT" markings [Grid, Load and Generator]. Please do NOT misconnect 230V input and output connectors.

CAUTION	Before connecting to AC input power source, please install a separate AC breaker between inverter and AC input power source. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current of AC input. The recommended of AC breaker is 50A 5KW and 80A for 8KW

Remove insulation sleeve 10mm for six conductors. And shorten phase L and neutral conductor N3 mm. Insert AC input wires according to polarities indicated on terminal block and tighten the terminal screws. Be sure to connect PE protective conductor first.

G→Ground (yellow-green)
L→LINE (brown or black)
N→Neutral (blue)
Make sure the wires are securely connected



change 8k

Fig.12 Connection port for Gen, Load and Grid

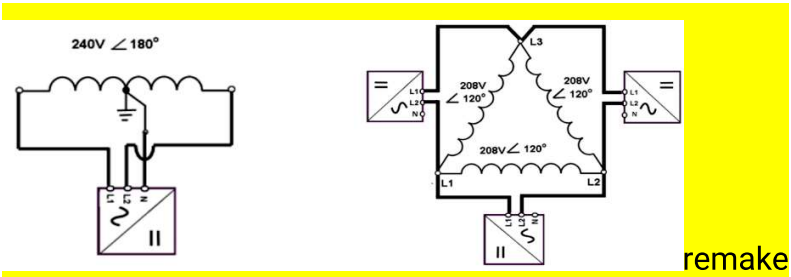
Be sure that AC power source is disconnected before attempting to hardwire it to the unit.

Voltage range for 208 V nominal, line to line	183V-228V
Voltage range for 240 V nominal, line to line	211V-264V
Frequency Range	59.3 Hz - 60.5 Hz

Table: AC connection voltage and frequency limits

The Deye Hybrid inverters are grid-tied to the public utility. These inverters are software configurable via the user display panel for various 208 Vac or 240 Vac 60 Hz public utility grid as shown in figures 13-18.

Public grid configurations allowed:



remake

Fig. 13: 240V / 120V Split Phase AC Grid

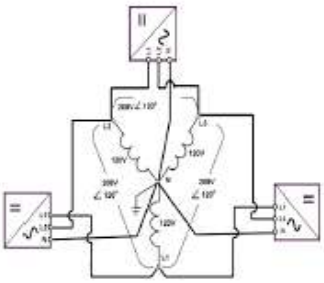


Fig.14: 208V Delta Connection AC Grid

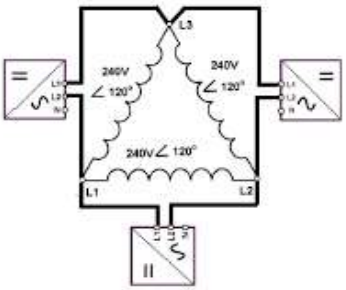


Fig. 14: 208V / 120V WYE AC Grid

Fig.16: 240V Delta AC Grid

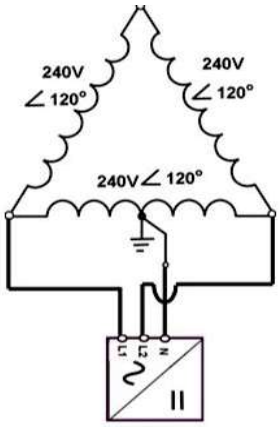
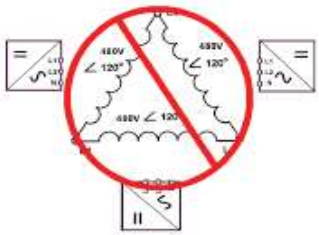


Fig. 17: 240V / 120V Stinger AC Grid

Public Grid Configurations NOT Allowed:



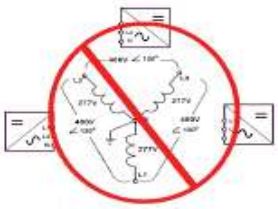


Fig. 18: 480V Delta connection AC Grid

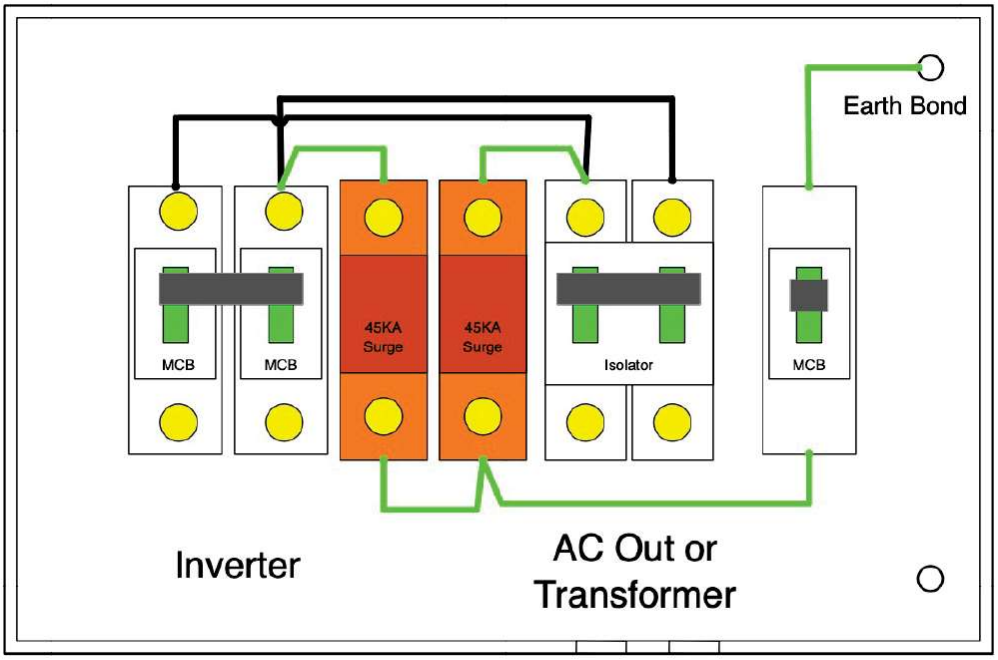
Fig.19: 480V / 277V WYE AC Grid

3.2.3 AC circuit breaker requirements

A dedicated circuit breaker in the building circuit panel is required for each Deye hybrid inverter that is installed. There should be a circuit breaker or fuse to protect each AC line, L1 and L2. The circuit breaker should be able to handle the rated maximum output voltage and current of the inverter.

Please refer to the table below to determine the appropriate circuit breaker size to avoid potential fire hazards.

Inverter Model	Recommended AC branch protection
SUN-5K-SG01LP1-US/EU	2-pole, 30 A 240 Vac
SUN-8K-SG01LP1-US/EU	2-pole, 50 A 240 Vac



make

Fig. 20 Recommend use a suitable AC Surge protector circuit

3.3 Deye Inverter system Architecture

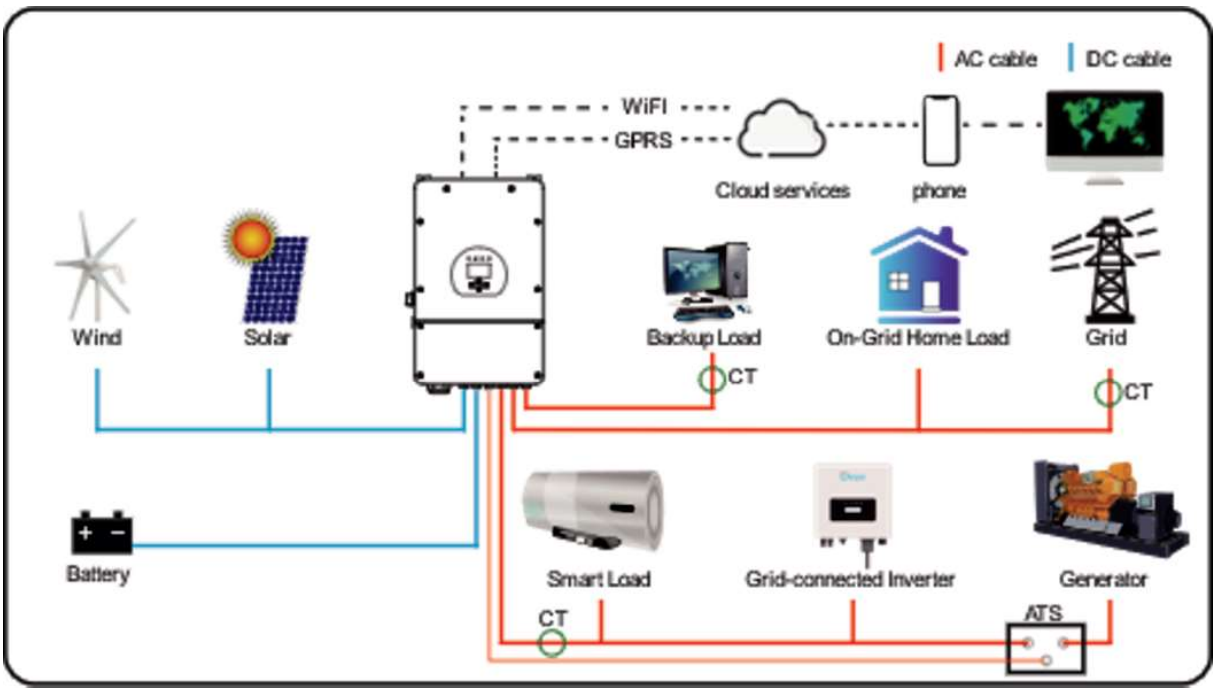


Fig. 21 System architecture

The Hybrid inverter converts direct current from the solar cells into alternating current. This enables you to feed your self-produced solar energy into the public grid. Thanks to efficient MPP tracking, maximum capacity utilization of the solar energy plant is ensured even in cases of misty and cloudy weather. The string concept means that PV modules are always connected in series (in a string) and/or that strings with the same voltage are connected in parallel to the Hybrid inverter with the aim of significantly reducing the photovoltaic system's cabling requirements. The fact that the modules are connected in strings also means that the photovoltaic system can be perfectly matched to the hybrid inverter's input voltage range.

The inverter is transformer-less type without galvanic isolation. Therefore, the inverter may only be operated with ungrounded PV arrays. Furthermore, the PV array must be installed in accordance with the Ungrounded Photovoltaic Power Systems and the locally valid regulations for ungrounded PV arrays. Additionally, the PV array (PV modules and cabling) must have protective insulation and the PV modules used must be suitable for use with this Hybrid inverter. PV modules with a high capacity to ground may only be used if their coupling capacity does not excess to 1,200 nF with 60Hz grid.

The Deye Hybrid inverter manages battery and system energy. The following illustration shows basic application of this inverter. It also includes following devices to have a Complete running system.

PV Panel

For DC-couple system, PV panel works in MPPT mode or power reduction mode according to system operational mode and the maximum number of PV string is three. For AC-couple system, there may be no solar module connected to Deye Hybrid inverter, and the PV power option will be deactivated.

LV Battery

If a (48V) Low voltage (LV) battery is connected to the Deye Hybrid inverter, it must be activated before use. This setting can be done in factory test or via APP after installation. LV battery communicates with Mario inverter through RS485 or CAN.

ATS Generator controller

There are several groups of switches mounted inside ATS Generator controller and it can be used for realizing automatic transfer from grid connection mode to off grid mode, or from off grid mode to grid connection mode. It also realizes when is generator allow to turn on and turn off.

RSD

The RSD provides an automatic disconnect of residential or small commercial PV systems, fully compliant with the Rapid Shutdown requirements.

Meter

Meter is used by the inverter for import / export or consumption readings, and manages the battery charge / discharge accordingly for smart energy management applications, for example self-consumption, zero-export. Meter reports its electricity measuring value to inverter via RS485 following Modbus

Grid

240V / 208V grid are supported, and it can be configured via Deye smart client APP interface

Android/iOS APP

A very powerful tool for monitoring, configuration or diagnosis. APP is connected to inverter via App (Smart Client).

Deye Internet Cloud

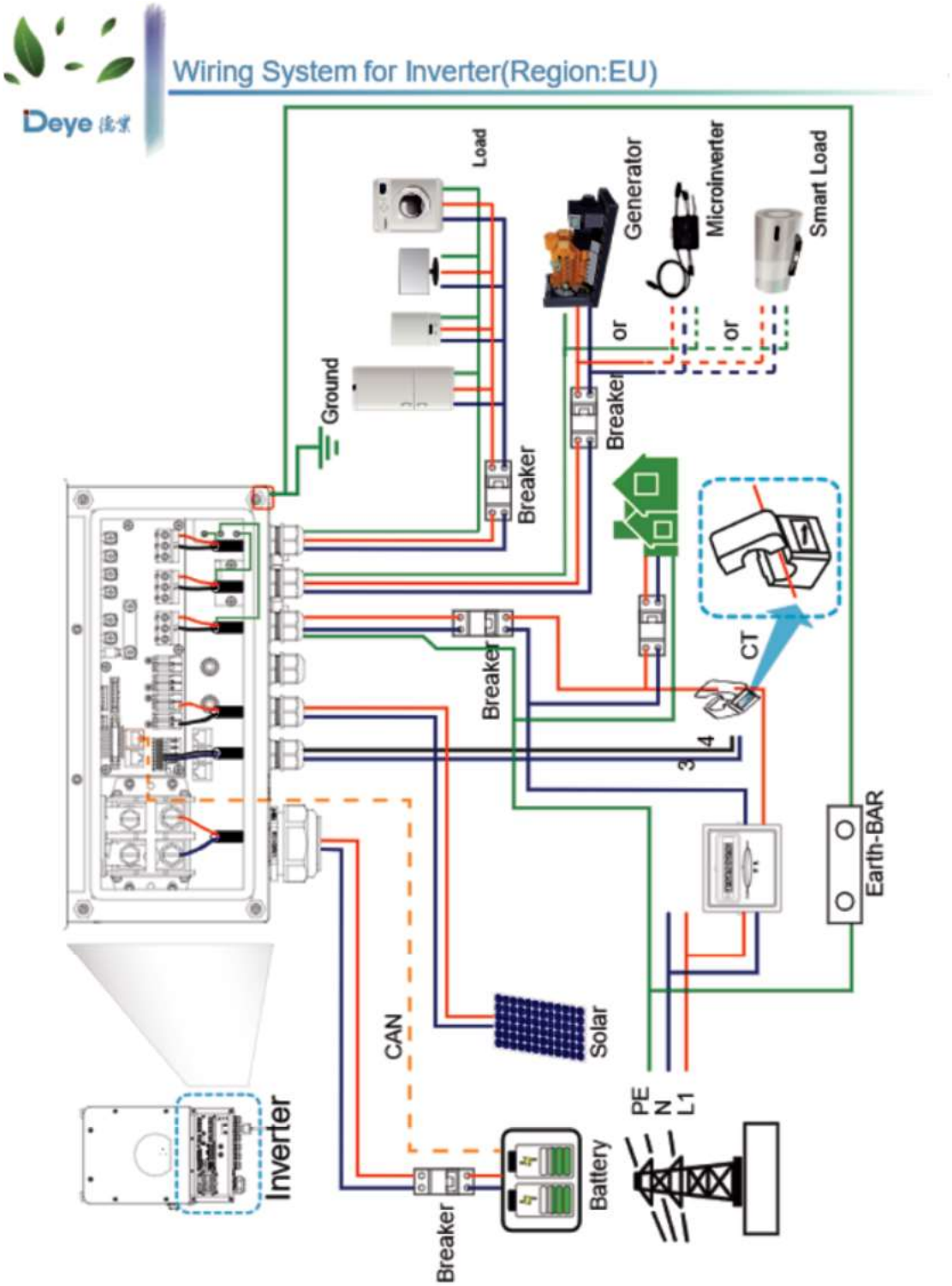
Deye Hybrid inverter can exchange with Deye Internet cloud using gateway (Wi-Fi / Ethernet / Cellular) which can be installed in the AC wiring box of inverter. Also, gateway can push data directly to customer's cloud or

third-party cloud.

Note: 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 tube light, fan, refrigerator and air conditioner.

3.4 Wiring system of Inverter

All wiring must be done in accordance with the country wiring regulations and code of practices



remake

Fig. 22 Wiring System for Inverter Region: EU

The C.T coil is the most important part Hybrid inverter. It's a device that sense any export power and reduce inverter current to obtain the Zero export.

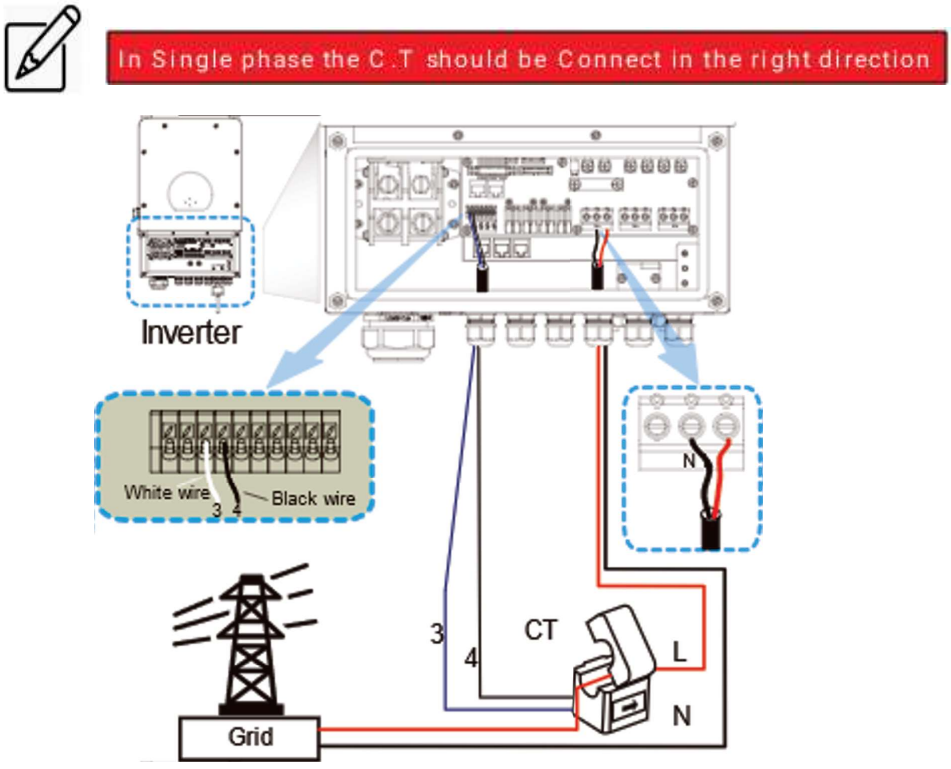


Fig. 23 C.T connection for single phase

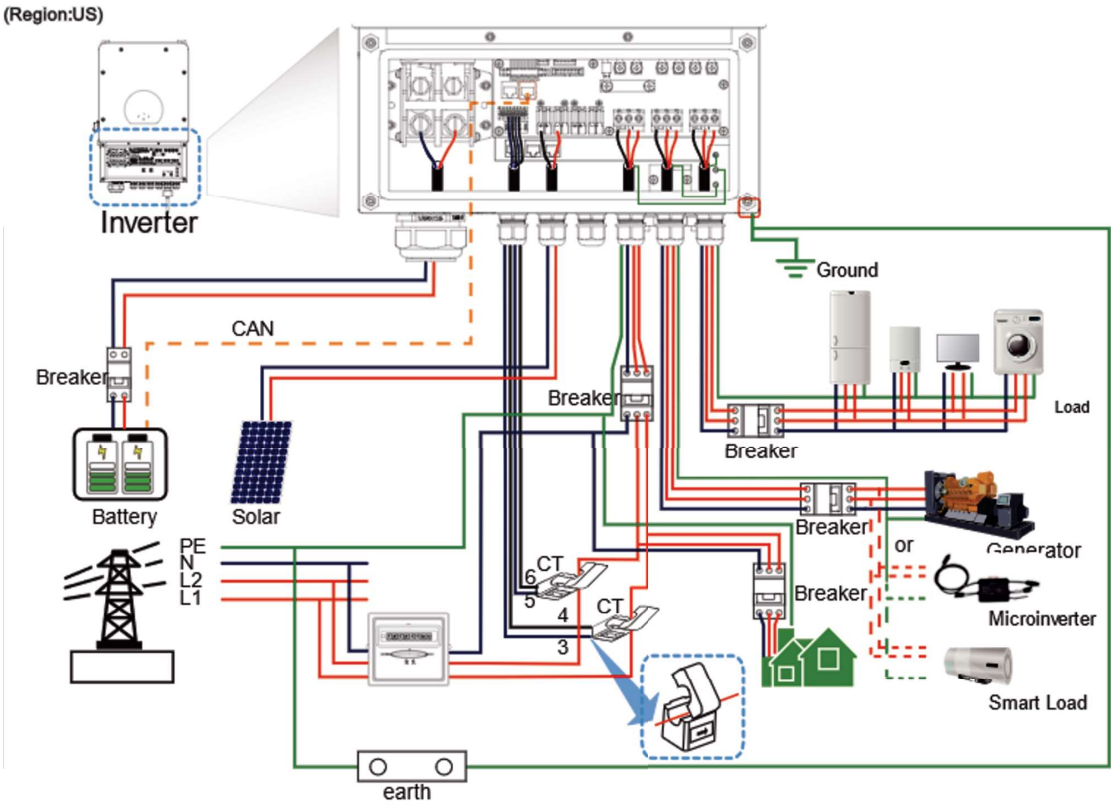


Fig. 24 Wiring System for Inverter Region: US

Fix the C.T in right direction around the live cable and connect its wire back to the inverter given points, C.T white and black wire should be connected according to the diagram. Like white connected to the port number 3 and black connected as number 4.

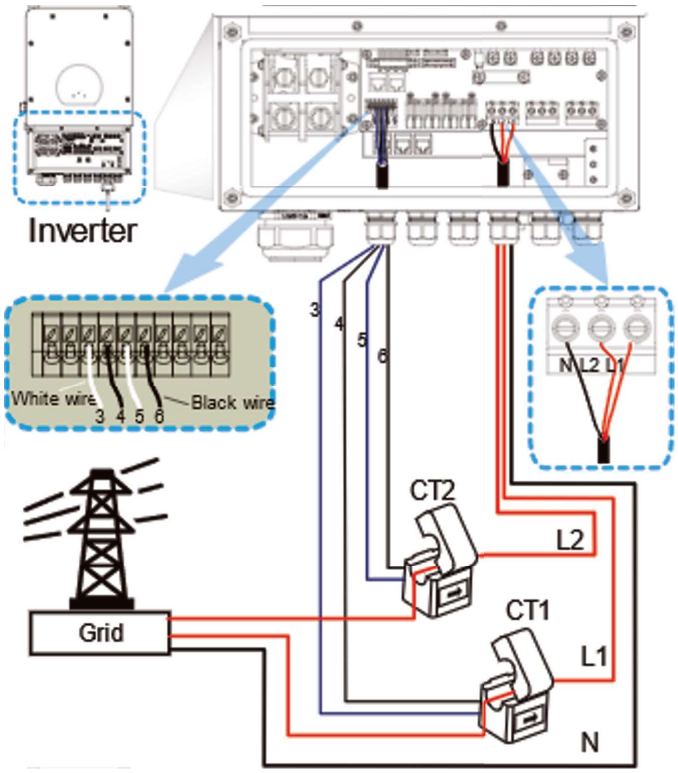
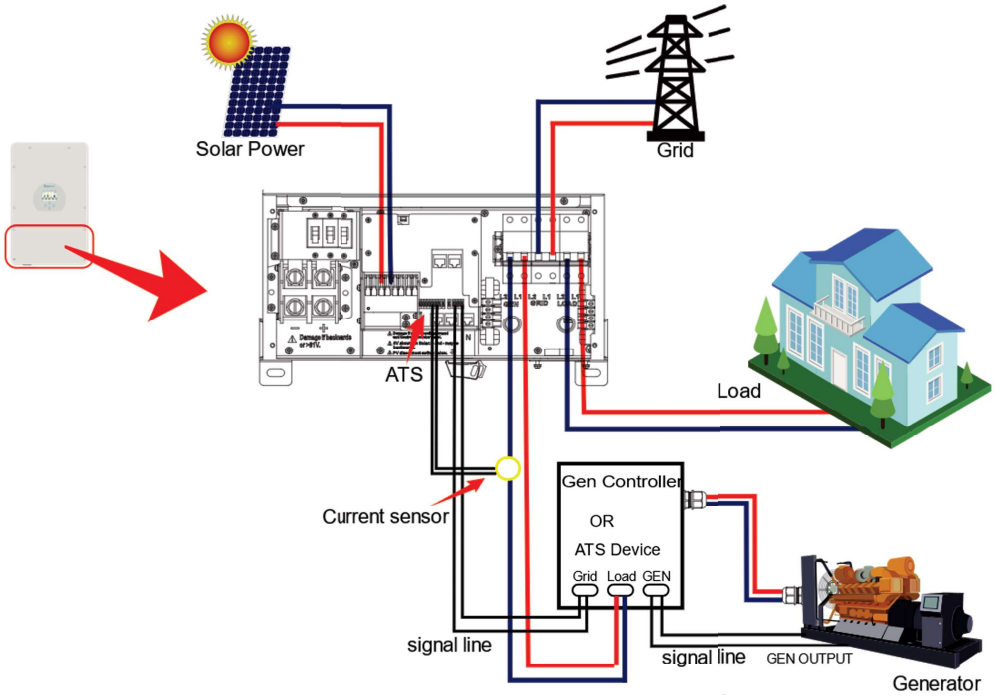


Fig. 25 C.T connection for 2-phase

In split phase the C.T should be connected at live phase on both Line

3.4.1 Deye Inverter Advance Features



remake

Fig. 26 System overview

This is the diagram of the Hybrid System.

1. The inverter has Generator controller or ATS Device, when the Grid is on, it has 230V AC on the line, when the Grid is off, it has no voltage on the line, so the ATS or Generator controller will work automatically and start the Generator.

2. The inverter has external (C.T) Current sensor connector it is used to calculate Generator power.

3.4.1.1 Energy Management During the Day

When the Grid is on, the inverter will stay on Grid mode, the solar power will charge the Battery and feed power to the Load. When the battery is full, and the solar power is bigger than the Load power, current sensor can decide whether feed the energy to the Grid (this is Zero Export function), also the inverter's ATS connector have 230V AC voltage, so the Generator will not start.

3.4.1.2 UPS Mode

When the Grid is off, the inverter has UPS function which will use battery and solar energy to hold the whole Load. At the same time, the inverter detected the Solar Panel's, if voltage is higher than 100V the inverter ATS device or Generator controller signal will shut down and ATS generator controller device will auto start the Generator after few seconds and then the inverter will

switch on the Generator to hold the Load. The whole process is automatic, and the Load will not shutdown.

Note: use the recommended ATS device or Generator controller

3.4.1.3 Peak shaving

The Current sensor is to calculate Generator power. When the power is higher than 1.5kw, the inverter will reduce the amount of energy and feed out power, when Generator's power is less than 1. 5kw. Inverter can let your setup the Rated power of Generator on the LCD screen, so it can suitable for different level Generator.

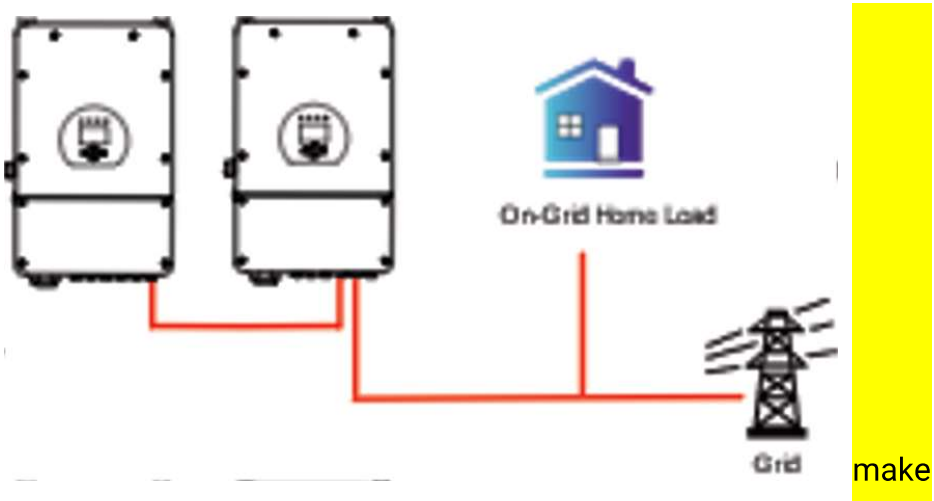
3.4.1.4 Energy Management during Night

1. When the Grid is on. Whole system work On Grid mode, mean normal condition.

2. When the Grid is off. The inverter works Off Grid mode. At the same time, the inverter detected the Solar Panel's voltage is less than 50V. so inverter ATS generator controller signal will not shutdown. And your Generator will not start. That mean use battery energy first. And when is Battery being empty will start the Generator.

3.4.1.5 Parallel Operation Function

Deye Hybrid inverter provide the inverter parallel operation modes for both SUN-8K – SG01LP1 US/EU and SUN-5K – SG01LP1-US/EU inverter.



Parallel connected inverter

1. Maximum 3 inverter operate parallel and supported maximum output power is 24KW. Three- inverter unit support one – phase maximum and the supported maximum output power is 48KW and one-phase can be up to 16KW.

2. If the inverter units increase from 3 to work together in parallel to support three-phase equipment it will need parallel box to operate.

NOTE: If this unit is bundled with share current cable and parallel cable, this inverter is default supported parallel operation.

Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters.

SUN-8K – SG01LP1 US/EU inverter have 3 CAN ports for connecting inverter in parallel connection. Parallel Box and Parallel L1 and Parallel L2. If the demand in parallel unit is increase the inverter has option to connect with the Parallel box through Parallel box CAN port.

NOTE: Parallel Box is only supported to the 8KW Hybrid Inverter

3.5 Technical structure of the Hybrid inverter

Metal fins designed into the rear side of the inverter chassis are used to dissipate heat and protect the unit. An internal temperature control protects the interior of the device. In case of high ambient temperatures, the maximum transferable power is limited. The inverter is controlled by microcontrollers which provide interface communication and the values and messages by APP or cloud

AC grid monitoring is done by an independent dedicated microcontroller set up to meet the requirements. This enables a connection of the hybrid inverter to the in-house grid. Operator protection requirements are met by electrically isolating the grid from the PV module. The electrical isolation between the grid and the PV module is equivalent to basic insulation. Maximum operator protection is ensured by reinforced isolation between the grid, PV modules, battery and accessible interfaces (display, RS485and CAN interface). Relevant standards concerning electromagnetic compatibility (EMC) and safety are fulfilled. The inverter is functional in grid-parallel operation exclusively. An automatically anti-islanding function, which was accepted by a certification agency, guarantees secure disconnection in case of circuit isolation or interruptions in power supply and avoid isolated operation.

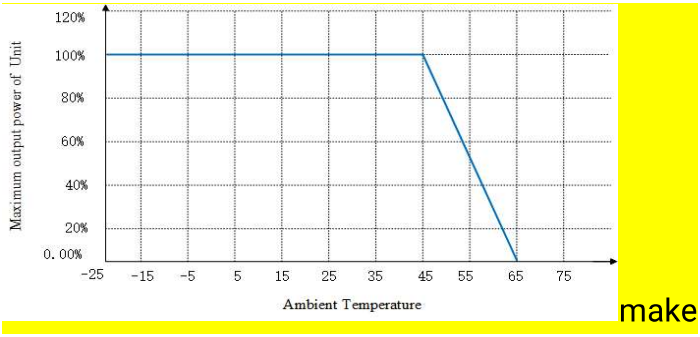
The DC arc-fault circuit interrupt is integrated into to detect the series arc faults.

3.5.1 Ambient temperature

The inverter can be operated in an ambient temperature from 22 °F to 149 °F (-30°C to +65°C). The following diagram illustrates how the output power of

the Hybrid inverter is reduced automatically in accordance with ambient temperature.

The device should be installed in a well-ventilated, cool and dry location. Due to tolerance of temperature sensor and efficiency difference under different PV voltage, this derating curve may be a little different from actual behaviors of unit.

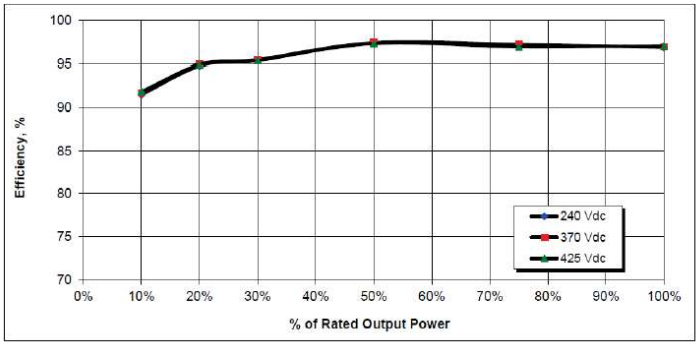


make

Fig. 27 Typical derating curve of hybrid inverter

3.5.2 Efficiency

The best efficiency of the solar inverter is obtained at input voltages > 320V for 208V grid, and input voltages > 380V for 240V grid. The curve is obtained at 240V from PV port to utility grid.



make

Fig. 28 Efficiency plot of Deye Hybrid Inverter

4 Operation and Display panel

4.1 Power ON/OFF

Once the unit has been properly installed and the batteries are connected well, simply press On/Off switch (located on the button of the case) to turn on the unit.

When the system has no battery connected but have connected to either PV or Main Grid and the ON/OFF switch is in the OFF position, in this condition, the LCD will still Light up with empty display and the system can still work

4.2 Operation and Display Panel

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

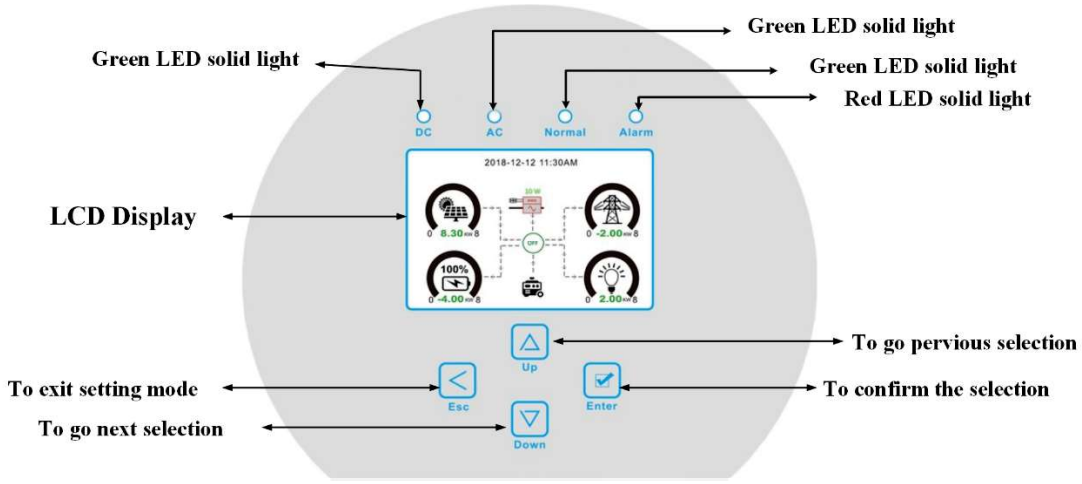
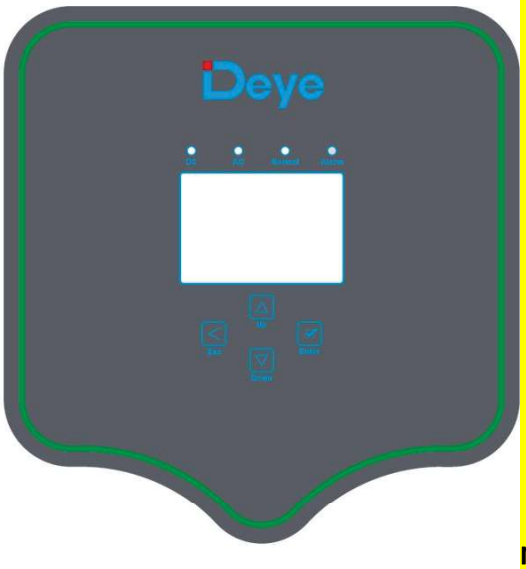


Fig.29 Display Panel SUN-8KW make



make like 8 k above

Display Panel SUN-5KW

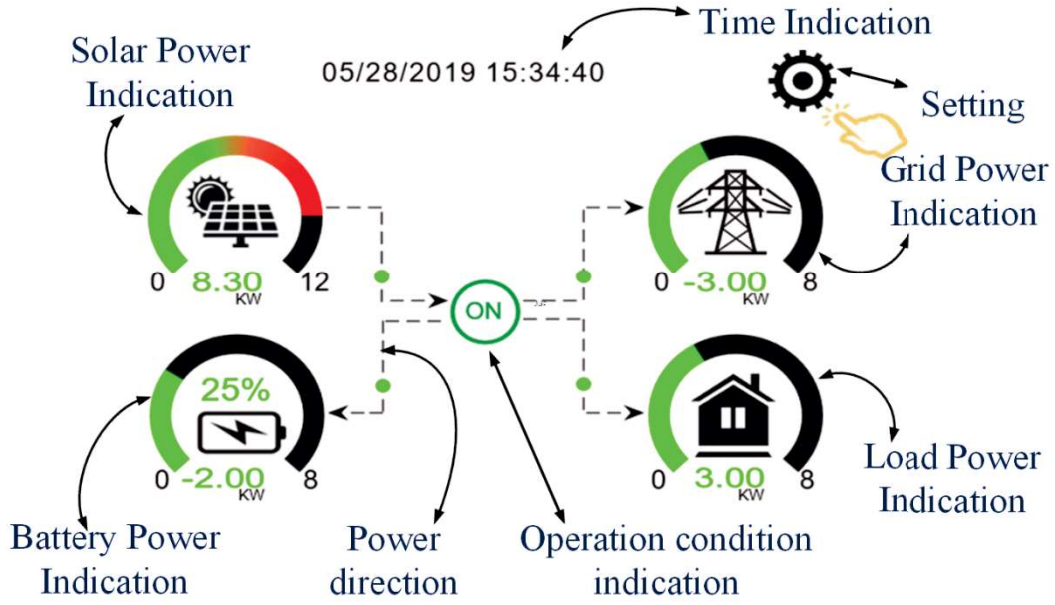
LED indicator		Message
DC	Green LED solid light	PV connection normal
AC	Green LED solid light	Grid connection normal
Normal	Green LED solid light	Inverter operation normal
Alarm	Red LED solid light	Malfunction and warning

Table: LED indicators

4.3 LCD screen icons

4.3.1 Main screen Home Page

This is a touchscreen LCD and shows the overall information of the inverter



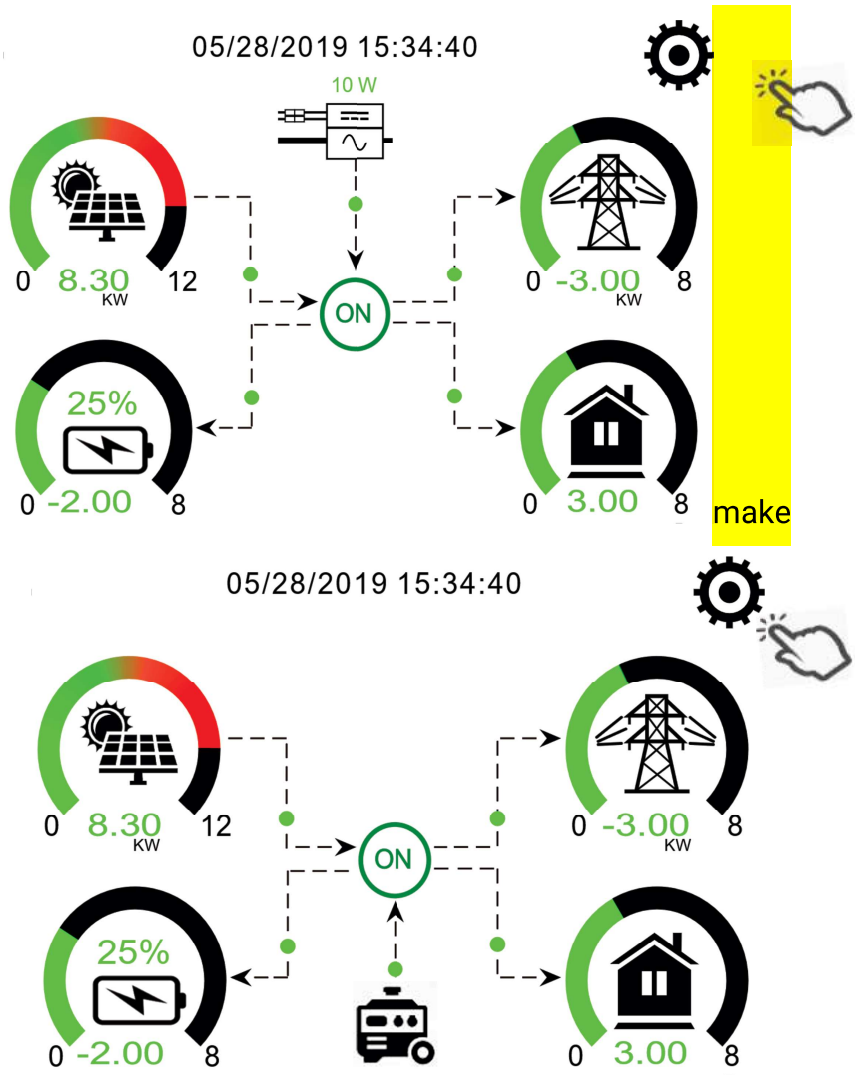
make

Fig.30 Home Page

The main screen showing the information including solar, Grid, Load, battery and Generator. It's also display the energy flow direction indication through moving arrow. When the power is approximately on high level the color on the panel will changing from green to read and the system showing brightly on the main screen.

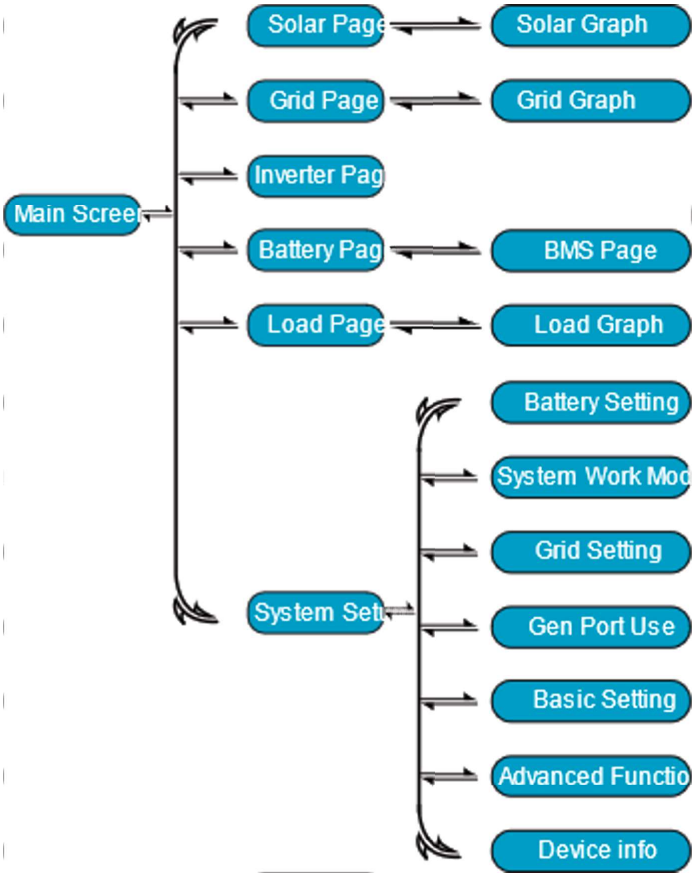
- Time indication shown on the top of screen
- PV power and load power always keep positive
- Grid power negative mean, power supply to the grid or sell to the grid and positive mean power get from the Grid
- Battery power negative mean it's on charging mode and positive mean

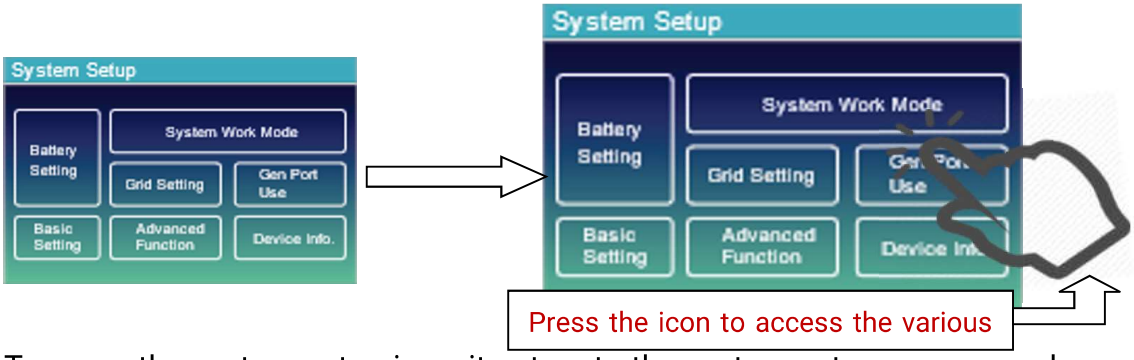
discharging mod



The icon is the center of the home screen indicates that the system operates normal condition. If its turn “Comm ./F01~F64” it means the inverter has communication error or other error. The error message will display under this icon (F01~F64 error, detail error info can be viewed in the system Alarm menu.

4.3.2 LCD operation flowchart


Solar Page
Solar Graph
Grid Page
Grid Graph
Inverter Pag
Main Scree
Battery Pag
BMS Page
Load Page
Load Graph
Battery Setting
System Work Mod
Grid Setting
System Set
Gen Port Use
Basic Setting
Advanced Functio
Device info

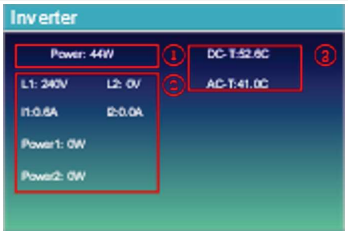


To press the system setup icon, it enters to the system setup screen as show above, which indicate battery setting, Grid setting, Generator port use, system work mode, advance function and device information.

Solar panel detail page

1. solar panel generation
2. solar panel energy for day and total.
3. voltage, current and power for each MPPT.

By Pressing the "Energy" button, it will enter into the power curve page



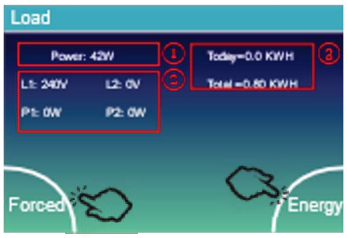
Inverter detail page

1. Inverter generation.
2. voltage, current and power for each phase
3. DC-T mean DC-DC temperature, AC-T mean Heat sink . .

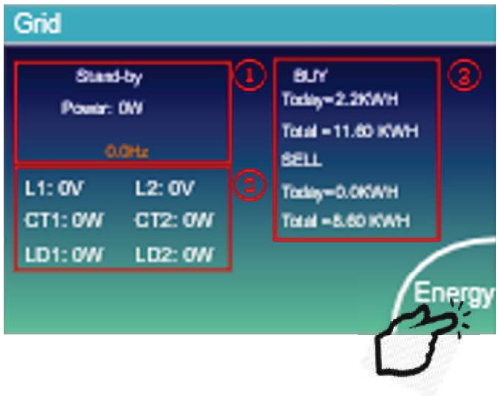
Back-up load detail page

1. Back-up power
2. Voltage, current and power for each phase
3. Back-up consumption for day and total.

By Pressing the "Energy" button, it will enter into the power curve



By Pressed the "Forced" button, it will open the smart Load (While GEN port utilized as smart Load output)



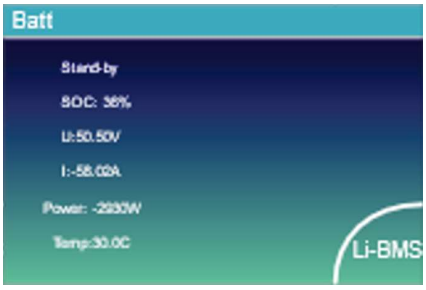
Grid detail page

1. Status power and frequency
2. L_1 and L_2 voltage for each phase

CT1 and CT2 external current sensor
LD1 and LD2 internal current sensor

3. BUY: Energy from Grid to inverter, SELL: energy from inverter to load

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



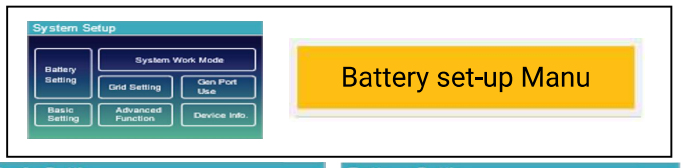
Back-up load detail page

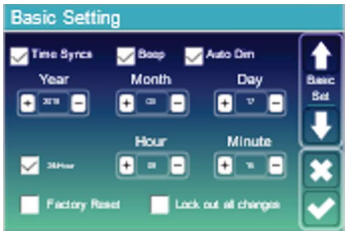
- Back-up power
- Voltage, current and power for each phase
- Back-up consumption for day and total.

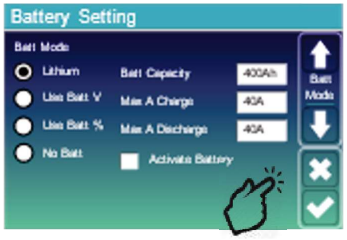
If the connected battery is Lithium the refer to BMS

4.3.2.1 Curve Page-Solar and Load And Grid

Solar power curve for daily, monthly, yearly and total roughly can be check on LCD. Check the monitoring system for more accuracy power generation. By clicking up and down arrow different period power curve can be check







Lithium Battery

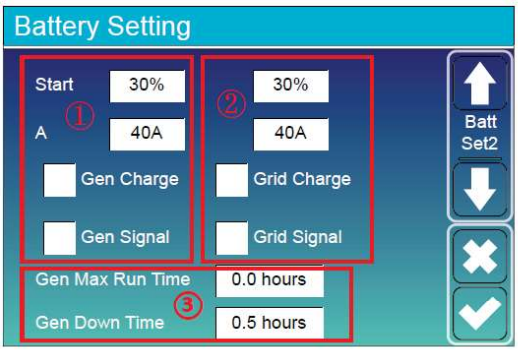
Batt Mode-------- Lithium
Max A charge——— 0-185A
Max A Discharge——0-185A
Activate Battery——Enable

AGM Battery

Batt Mode——— Use Batt V or Use Batt
Batt Capacity——— 50-2000Ah
Max A charge——— 0-185A
Max A Discharge——0-185A
Activate Battery ——Enable

No Batt — No need to set other parame
keep the default value.

4.3.3 Battery Setup Manu



This is Grid Charge, you need select. ②

Start =30%---no use， for customization.

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

Grid Charge---The Switch that the Generator charges the Battery.

Grid Signal ---Disable.

This is Battery Setup page. ① ③

Start =30%---It indicates that the Generator will start when the Battery capacity is less than 30% in the condition of Off-grid mode.

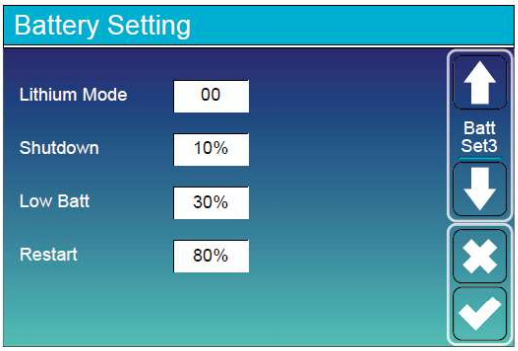
A = 40A---It indicates the Current that the Generator charges the Battery after started.

Gen Charge---The Switch that the Generator charges the Battery.

Gen Signal ---It indicates whether the Generator's ATS signal is on.

Max RunTime(x.xhous)Indicates that the generator is the longest in a day,The time x.xhours can be run, and the generator will be turned off when the time is up. 24.0hours (default) means that It keeps running without shutting down.

DownTime(x.xhours)It indicates the delay of the Generator to shut down after it has reached the run time.

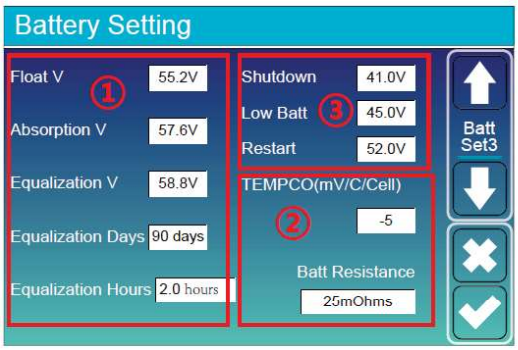


Lithium Mode--This is BMS protocol.default is 0 please reference the document （Approved Battery-Deye）.

Shutdown 10%--the inverter will shutdown if the SOC is below this.

Low Batt 20% --the inverter will shutdown if the SOC is below this.

Restart 40% --Restart level when inverter shutdown.



This is Battery 4 tages charge voltage. ①

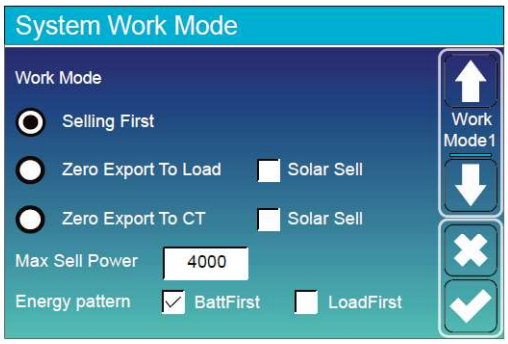
This is for professional installers,you can hold default if you do not know. ②

Shutdown 10%--the inverter will shutdown if the SOC is below this.

Low Batt 20% --the inverter will alarm if the SOC is below this.

Restart 40% --Restart level when inverter shutdown. ③

4.3.3.1 System work mode setup Manu



Work Mode

Selling First : It means that the excess energy has priority in grid connection.

Zero Export To Load : It means output power according to it consumed by the load.

Zero Export To CT : It means output power according to the CT position.

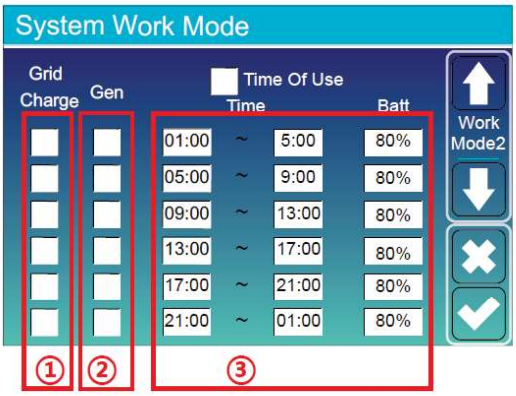
Solar Sell : It means that the excess solar energy can be integrated into the grid.

Max Sell Power 0-8000W

Energy Pattern

BattFirst--- It means solar power will charge battery first, when battery is full then feed-out power to the Load or Grid.

LoadFirst-- The solar energy will be used to supply the local load first,then to charge the battery.The redundant power will export to the public grid.



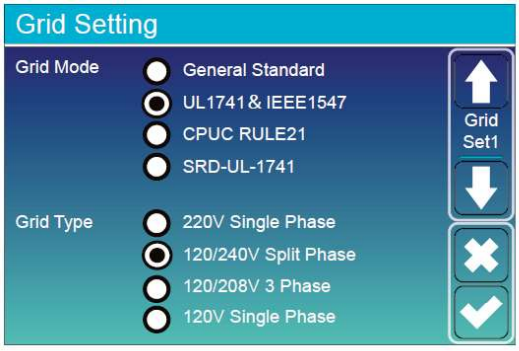
Time of use

① Switch for Grid charging the battery.

② Switch for Den charging the battery.

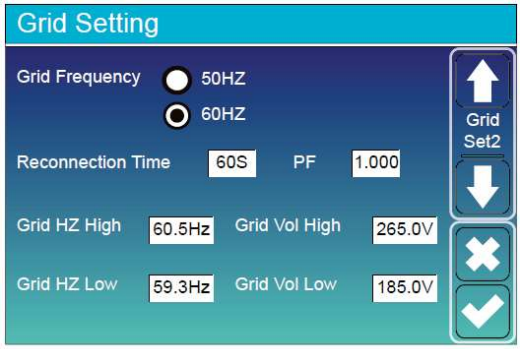
③ There are six time period can be set, each period must from small to large.

4.3.3.2 Grid set-up Manu



Please select the correct Grid Mode in your local area. If you are not sure, please choose General Standard.

Please select the correct Grid Type in your local area, otherwise the machine will not work or be damaged.

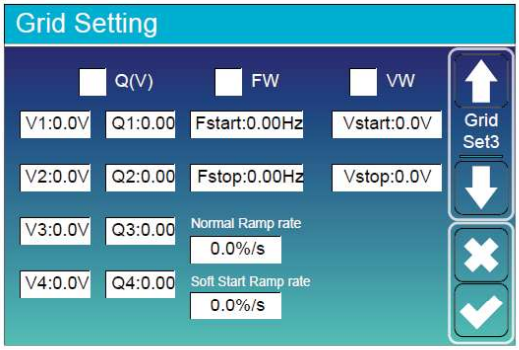


UL1741&IEEE1547, CPUC RULE21, SRD-UL-1741

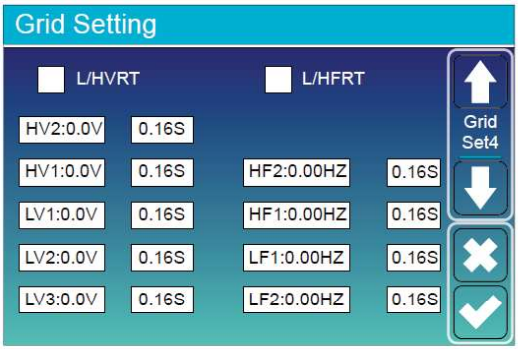
No need to set the function of this interface.

General Standard

Please select the correct Grid Frequency in your local area. You can hole this in default value。

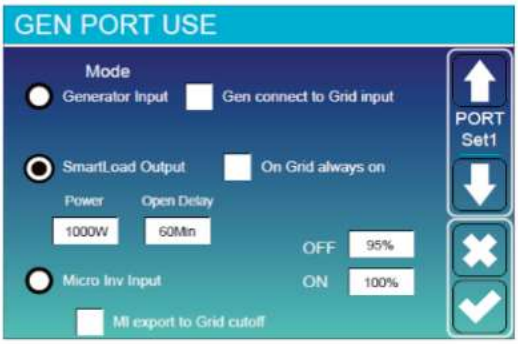


For California only.



For California only.

4.3.3.3 Generator Use port Manu



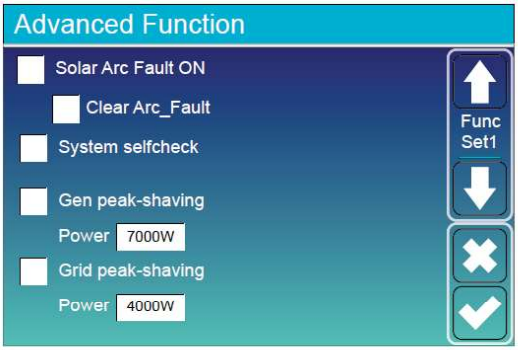
Genertor Input:use Genertor

SmartLoad Output: if the SOC is up than "ON" and solar power is high than 1000W. the inverter will open smartload.

On Grid always on:mean when have Grid,the smartload will always on

Micro Inv Input:Inverter will open Microinverter.if the SOC if below the "ON" and close if the SOC if up than the "OFF"

4.3.3.4 Advance Function setup Manu

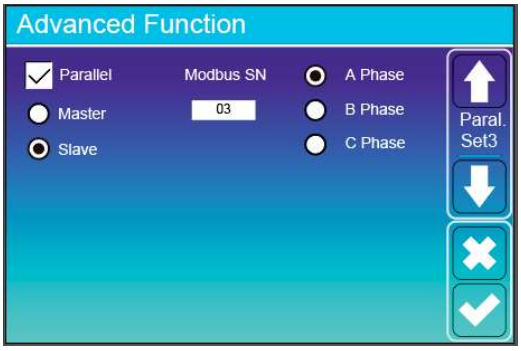


Solar Arc Fault ON---This is only for US.

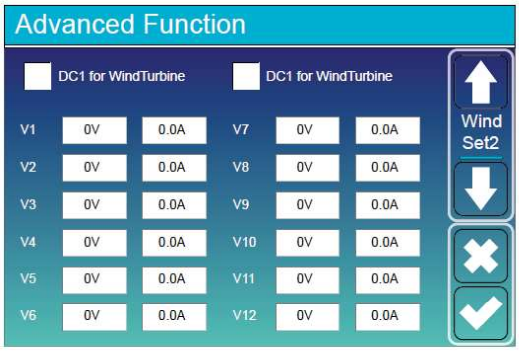
System selfcheck ---Disable. this is only for factory.

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.

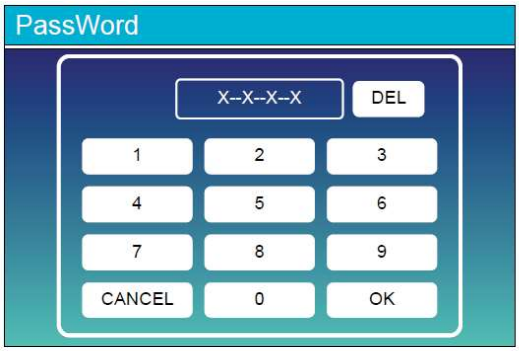
Grid Peak-shaving---Enable When the power of the grid exceeds the set value, the inverter will provide the redundant part to ensure that the grid power does not exceed the set value.



This is for parallel operating function
Select one inverter master and another slave
Modbus and phase should be selected according to the position number of the inverter

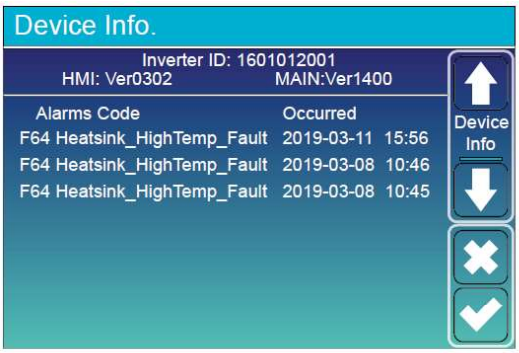


This is for WindTurbine



Factory restart: 9999
Lock out all changes:7777

4.3.3.5 Device info setup Manu

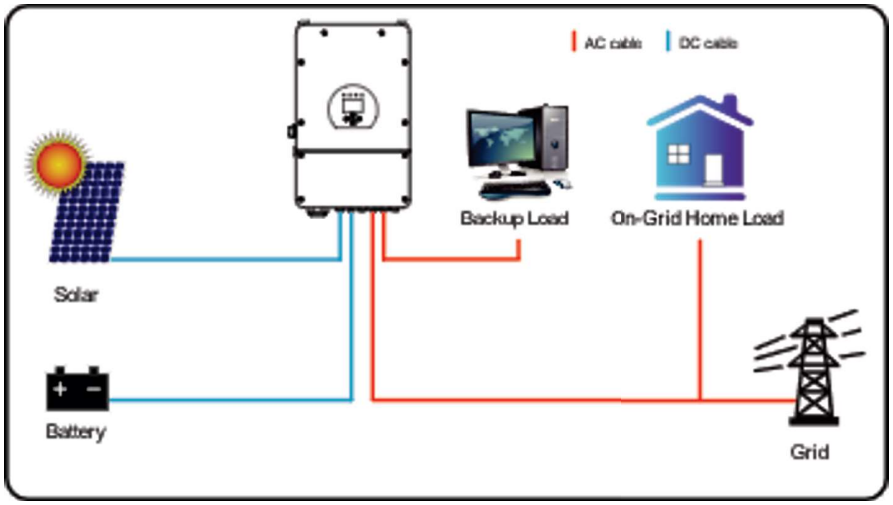


This page show Inverter ID, Inverter version and alarm codes.

HMI: LCD version
MAIN: MCU version

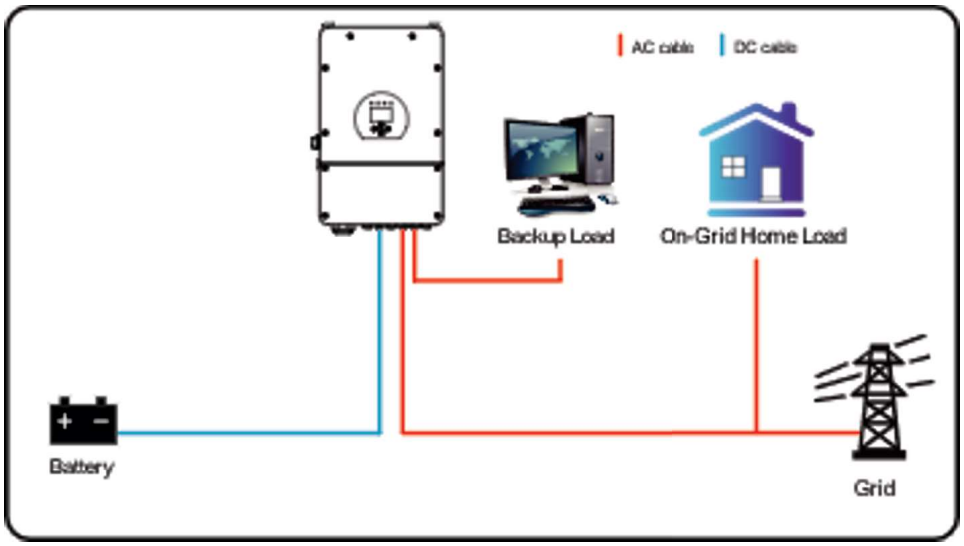
4.4 Operation Modes

4.4.1 Mode1: on grid with PV or without PV



On Grid with PV

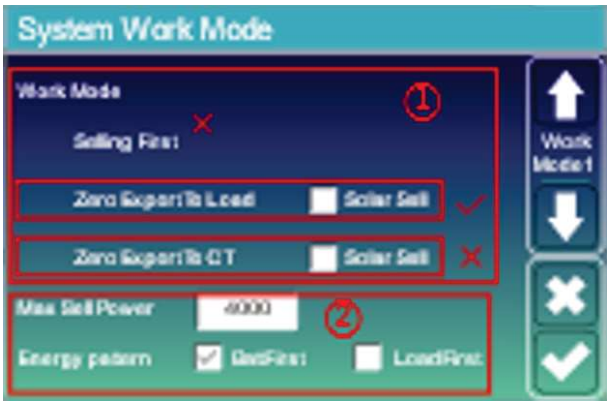
100% self-consumption PV will charge the battery first. The inverter connected to the grid at the same time take power from the solar if you don't want to sell power to grid when the battery is fully charged then you can turn on the smart load. This ability of inverter can store power at night and during the day



On Grid without PV

The system having On grid with no solar can charge and discharge the batteries

system configurations

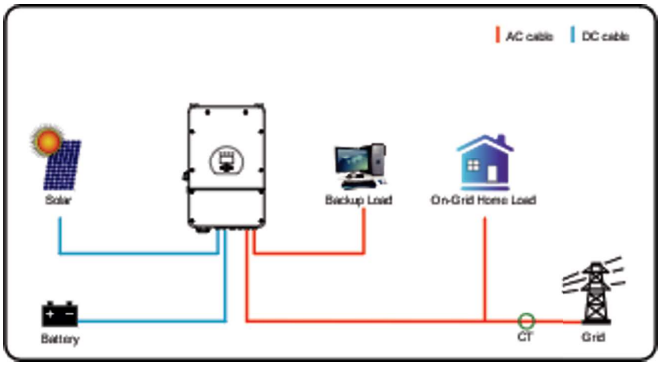


1. Zero-export to Load + Disable solar sell
2.

Max cell Power--- Modify by your self
BattFirst--- Solar will charge battery first
LoadFirst---Solar will feed out to the load first then to the battery

Time of use --- Disable
We have six options for the time of use, every time period must be from small to large
Grid charge ---Unable, when the actual SOC is smaller than the set value, the grid will charge the battery
Gid charge ---Disable, the grid does not charge the battery

4.4.2 Mode :2 Zero-Export to Smart Load



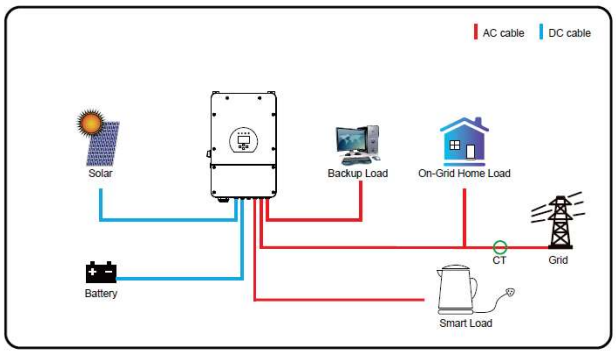
◆ Zeor-export to Home(CT)

Energy generated by the inverter will not exceed your Home Load.

Customer needs to install the external CT.

Single Phase--need one Current sensor.
Split Phase--need two Current sensors.

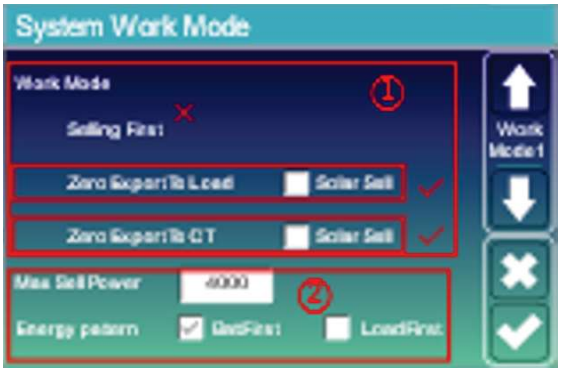
when the battery is Full and you do not want to sell power to Grid, then you can turn on the Smart-Load function.
100% Self Consumption.



◆ Zeor-export to Load

Energy generated by the inverter will not exceed your Backup Load.Inverter has Integrated with Current Sensor.Do not need external CT.

when the battery is Full and energy does not need to be fed out to Grid,open Smart-Load.100% Self Consumption.



1. Zero-export to Home + Disable solar sell

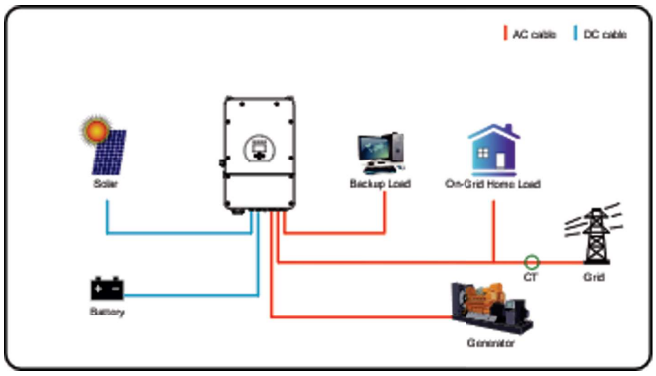
Or Zero-export to Home + Disable solar sell

2.

Max cell Power--- Modify by your self
BattFirst--- Solar will charge battery first
LoadFirst---Solar will feed out to the load

Time of use --- Disable

4.4.3 Mode :3 with Generator



•Maximize Benefits,Six time of use

Increasing Self-Consumption & Control the Solar
During the Day, energy will charge the Battery.At night the Battery energy will feed to the Home-Load.

•Peak Shaving-To Grid

You can enable Peak Shaving function,and set the peaking shaving power on the LCD or APP.

•UPS,Power Supply for Important Loads

Connected to the backup side of the inverter,such as computers. When the grid fails, the system automatically switches to backup mode within 10ms.

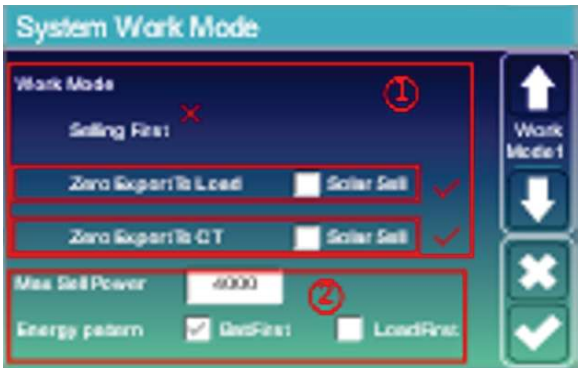
•Generator connector/ATS Single

Automatically start and shutdown Generator---Microgrid.

•Peak Shaving-To Generator

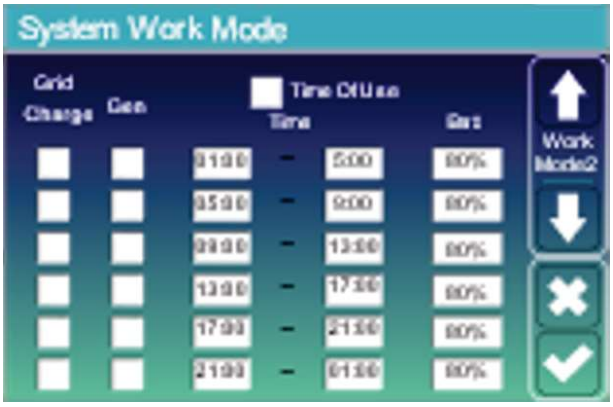
You can enable Peak Shaving function,and set the peaking shaving power on the LCD or APP.

System configuration



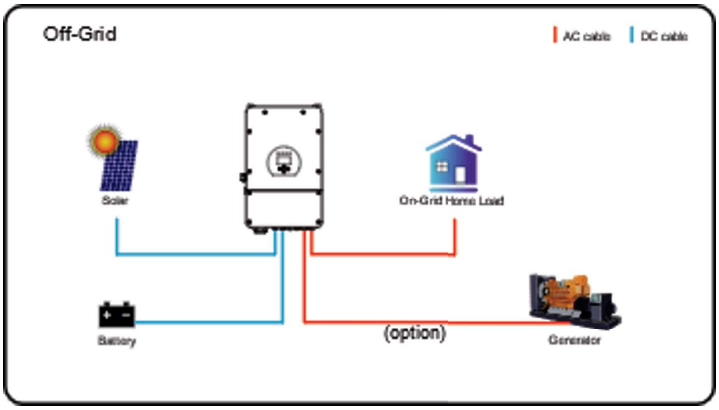
3. Zero-export to Home + solar sell
Or Zero-export to Home + Disable solar sell
4.

Max cell Power--- Modify by your self
BattFirst--- Solar will charge battery first
LoadFirst---Solar will feed out to the load first then to the battery



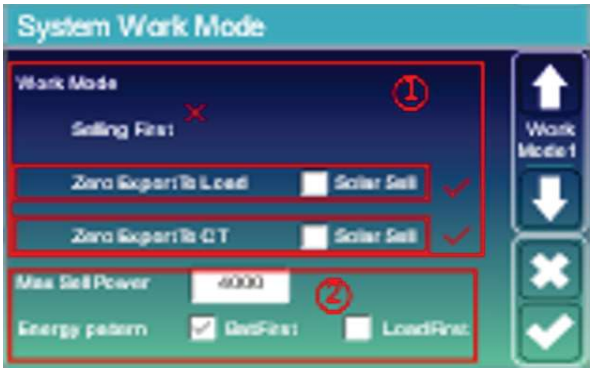
Time of use --- Disable
We have six options for the time of use, every time period must be from small to large
Grid charge ---Unable, when the actual SOC is smaller than the set value, the grid will charge the battery
Gid charge ---Disable, the grid does not charge the battery

4.4.4 Off Grid with Generator



- 48v battery DC/DC Isolator
- 230V signal Phase, 120/240V split phase
- Peak power 16000W10s
- Up to 185A fast charge from Generator
- Peak shaving to Generator
- Generator Max Run Time and down

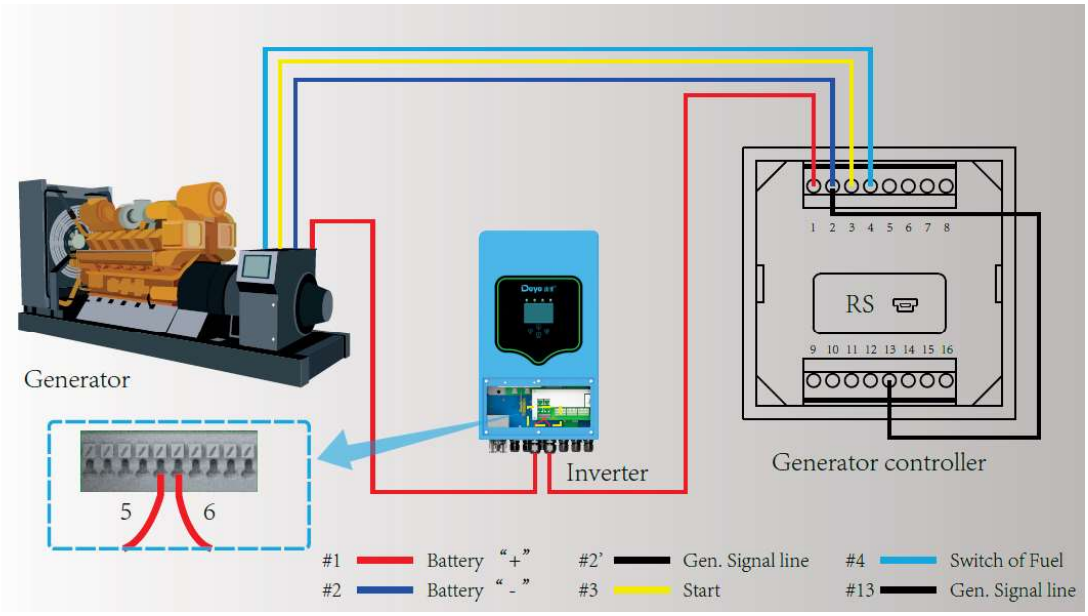
System Configuration



In off Grid Mode no need to set this page

In off Grid Mode no need to set this page

To sync the Generator to the system, follow the recommended circuit

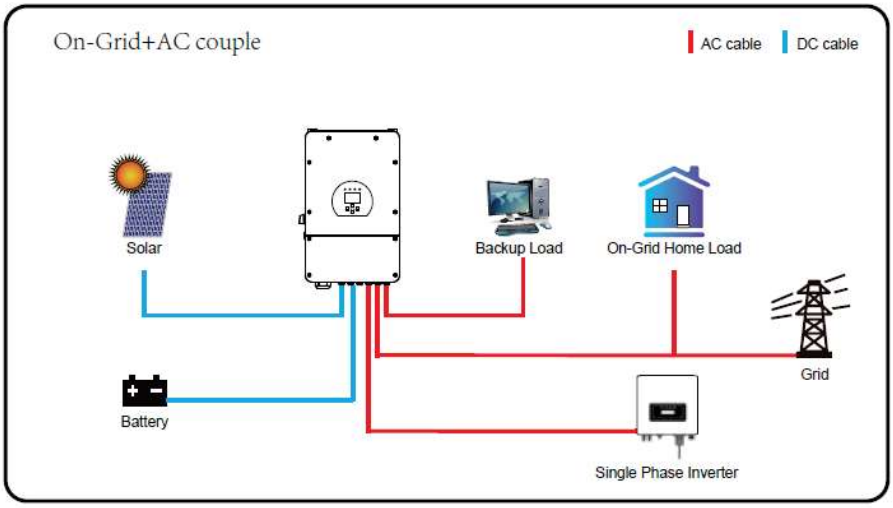


Make it 8k and 5k

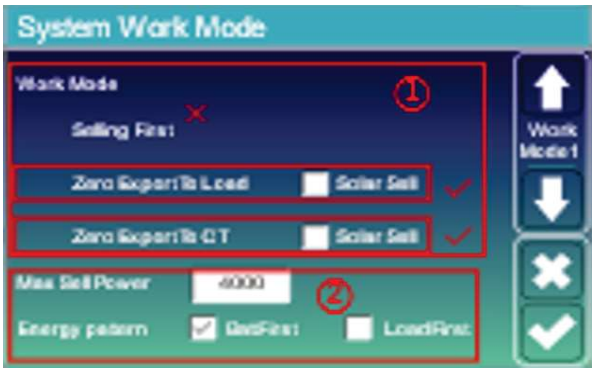
Include generator controller circuit diagram and visual picture need to fix

Use a stable generator interface box if not available use our recommended

4.4.5 Mode5: with Microinverter AC Couple (on Grid/ Off Grid)



System Configuration



1. Zero-export to Home + solar sell
   Or Zero-export to Home + Disable solar sell
2.

Max cell Power--- Modify by your self
BattFirst--- Solar will charge battery first
LoadFirst---Solar will feed out to the load first then to the battery

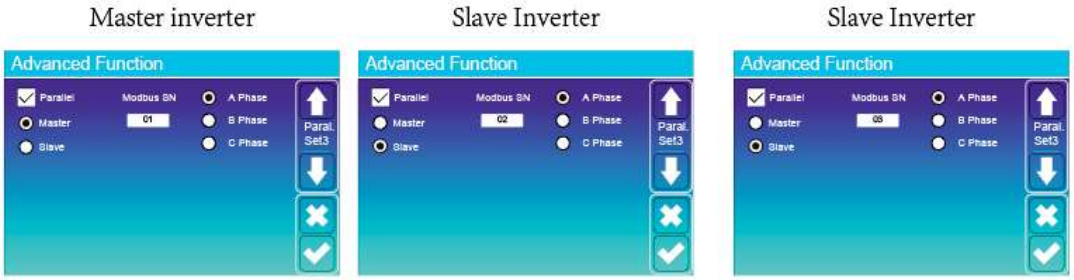
Time of use --- Disable
We have six options for the time of use, every time period must be from small to large
Grid charge ---Unable, when the actual SOC is smaller than the set value, the grid will charge the battery
Gid charge ---Disable, the grid does not charge the battery

PV power delivery always on the 1st priority in the system 2nd will be the Battery Bank and 3rd will be the Grid according to the setting and the last power delivery backup will be Generator if its available

4.4.6 Parallel mode

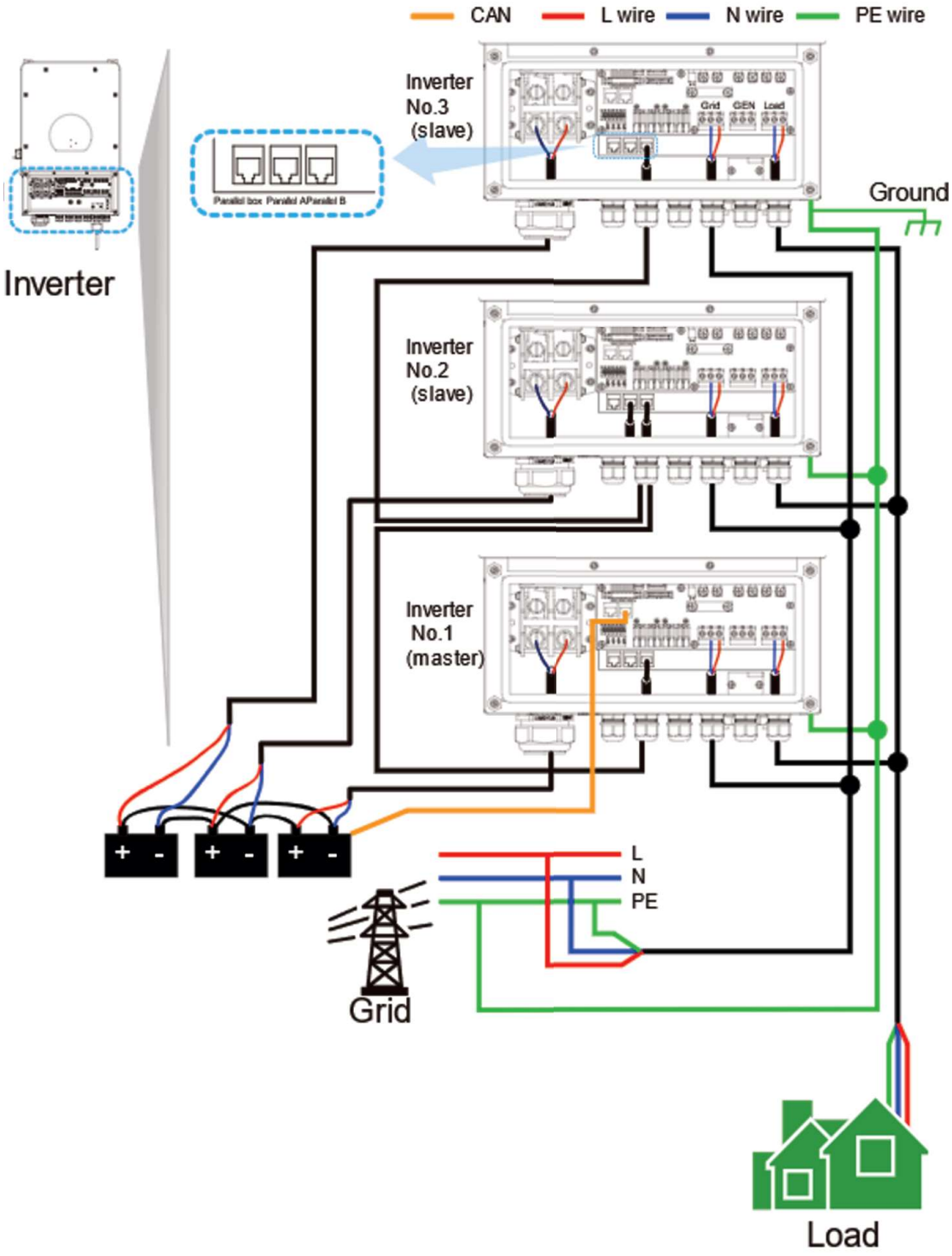
Single Phase Parallel operation

In Single Phase wiring system maximum 3 inverter can connect parallel to support 24Kw normal operation. The inverter is designed according to the Master -Slave topology, before connecting inverter in parallel see the user guide to make the proper connection For detail see the wiring diagram for configuration



Single phase Interface configurations

Single phase Parallel Inverter

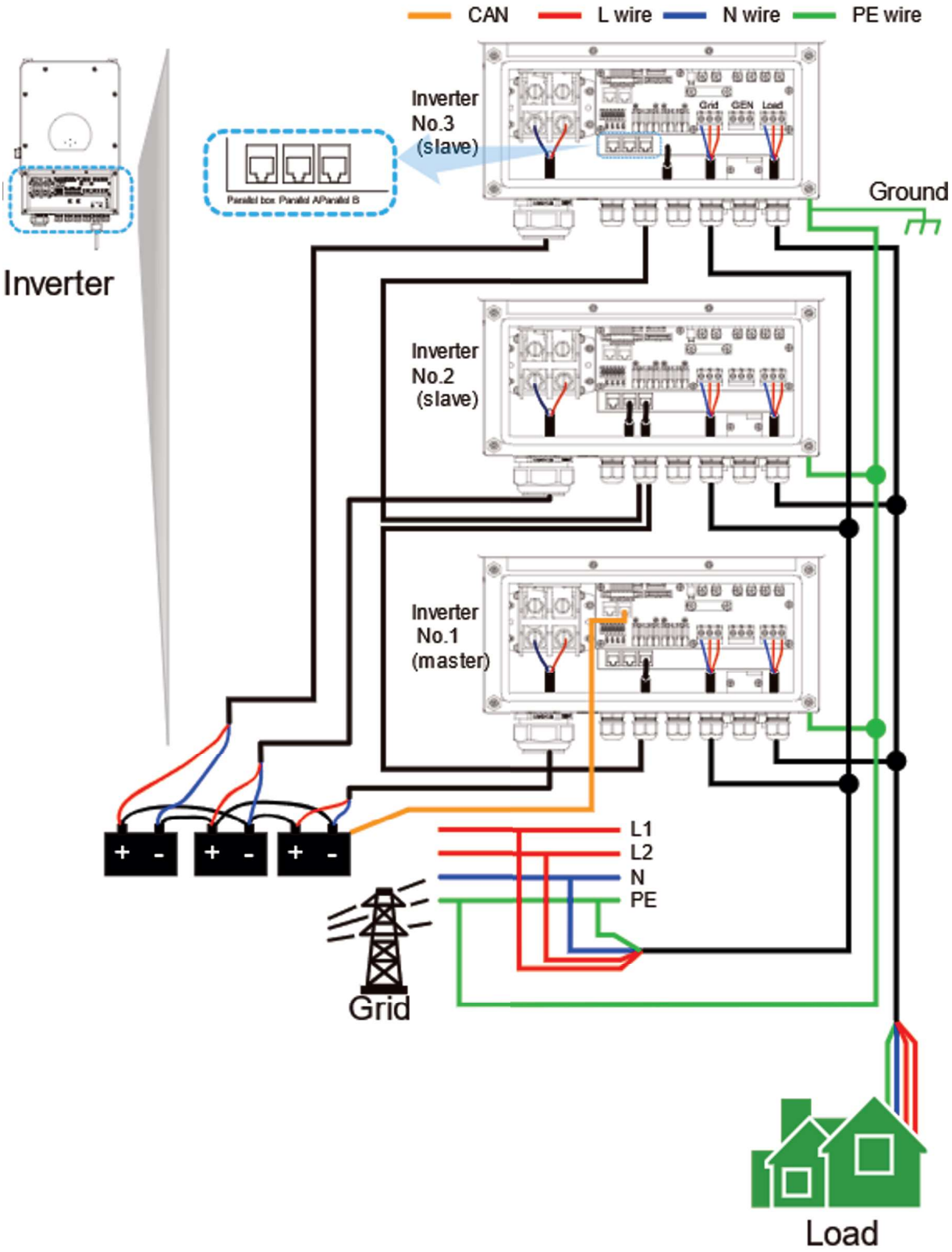


Change battery to battery bank

Split Phase Parallel operation

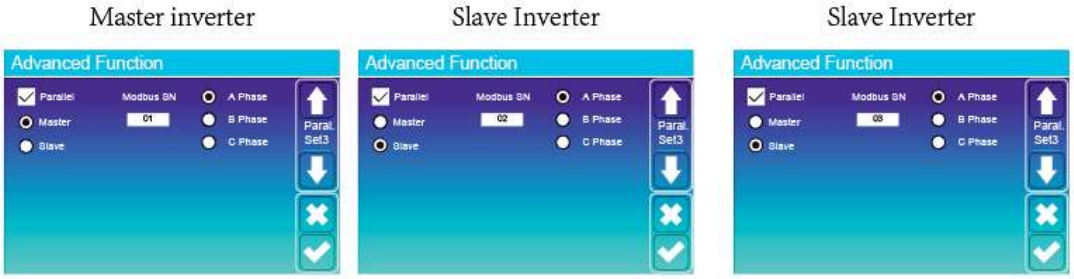
In Split Phase wiring system inverter can connect parallel to support the normal operation. The inverter is designed according to the Master -Slave topology, before connecting inverter in parallel see the user guide to make the proper connection

Split phase Parallel Inverter



Change battery to battery bank

For detail see the wiring diagram for configuration



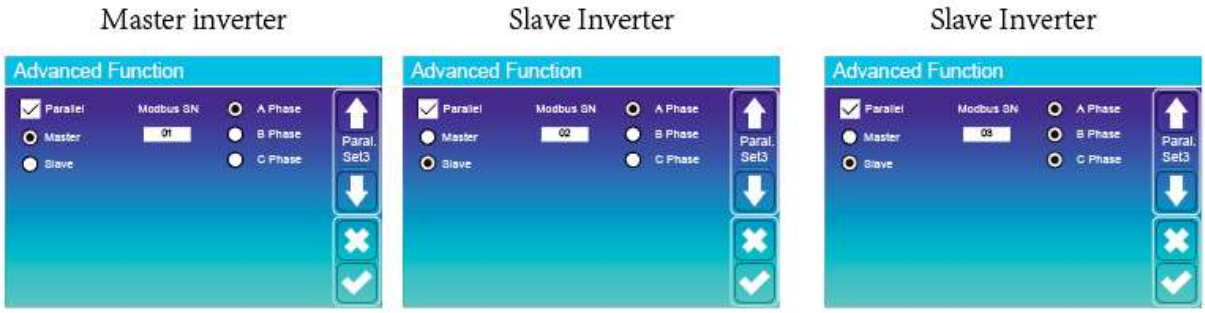
Split Phase Interface configurations

Do not connect the current sharing cable between the inverters which are in different phases. Otherwise, it may damage the inverters

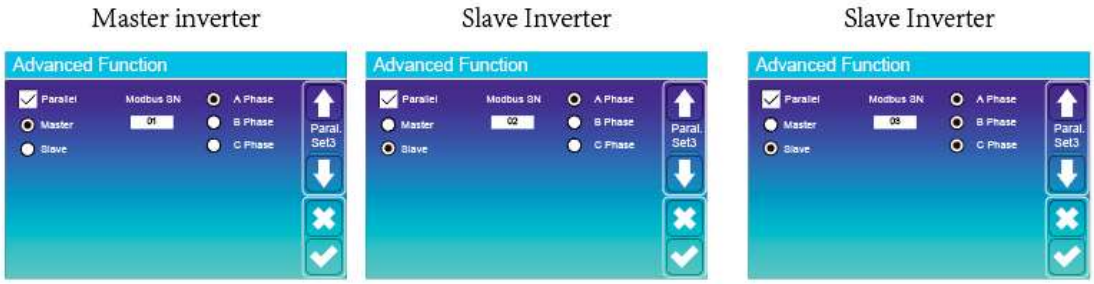
Three Phase Parallel operation

In Three Phase wiring system maximum the inverter can connect parallel to support the normal operation. The inverter is designed according to the Master -Slave topology, before connecting inverter in parallel see the user guide to make the proper connection

For detail see the wiring diagram for configuration



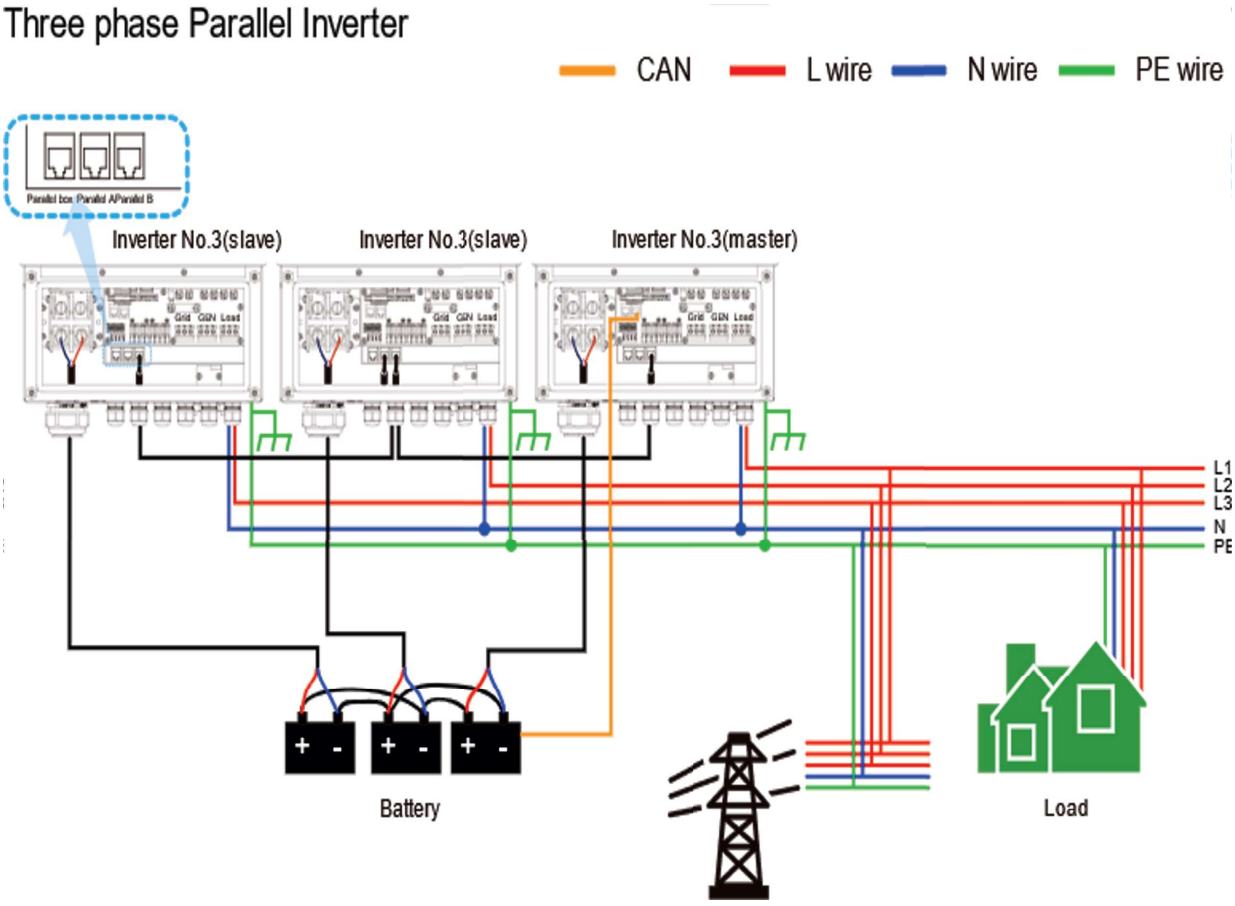
Change according to 6 inverter



Three Phase Interface Configurations

Hybrid Inverter have 3 CAN ports for connecting inverter in parallel connection. Parallel Box and Parallel L1 and Parallel L2. If the demand in parallel unit is

increase the inverter has option to connect with the Parallel box through Parallel box CAN port.



Change 6 inverter and change battery to battery bank

Maximum 3 inverter operate parallel and supported maximum output power is 24KW. Three- inverter unit support one – phase maximum and the supported maximum output power is 48KW and one-phase can be up to 16KW.

If the inverter units increase from 3 to work together in parallel to support three-phase equipment it will need parallel box to operate

4.5 Fault information and processing

This Hybrid energy storage inverter is designed according to the standard of grid connected operation. It meets the safety requirements and (EMC) Electromagnetic Compatibility requirements. According to the Realtime operation inverters undergoes several rigorous test before leaving the factory to ensure the inverter reliability.

In case of any fault message (listed in the table) appear on inverter and after restarting the fault has not remove, please contact to the local dealer or service center.

In order to give the clear understanding of the inverter faults. When the inverter is not working properly, we list all the possible codes and their descriptions.

Fault	Instruction	Fault	Instruction
F01	DC_Inversed Failure	F33	AC_OverCurr_Fault
F02	DC_Installation Failure	F34	AC_Overload_Fault
F03	GFDI_Failure	F35	AC_NoUtility_Fault
F04	GFDI_Ground Failure	F36	AC_GridPhaseSeque_Fault
F05	EEPROM_Read Failure	F37	AC_Volt_unbalance_Fault
F06	EEPROM_Write Failure	F38	AC_Cuee_Unbalance_Fault
F07	GFDI_Fuse Failure	F39	INT_AC_OverCurr_Fault
F08	GFDI_Relay Failure	F40	INT_DC_OverCurr_Fault
F09	IGBT_ Failure	F41	AC_WU_OverVolt_Fault
F10	AuxPower Board_ Failure	F42	AC_WU_underVolt_Fault
F11	AC_Main Contactor Failure	F43	AC_VW_OverVolt_Fault
F12	AC_Slave Contactor Failure	F44	AC_VW_UnderVolt_Fault
F13	Working_Mode_charging	F45	AC_UV_Overvolt_Fault
F14	DC_Over Curr Failure	F46	AC_UV_UnderVolt_Fault
F15	AC_Over Curr Failure	F47	AC_OverFreq_Fault
F16	GFCI_Failure	F48	AC_UnderFreq_Fault
F17	Tz_COM_OC_Fault	F49	AC_U_GridCurr_DCHigh_Fault
F18	Tz_AC_OverCurr_Fault	F50	AC_V_GridCurr_DCHigh_Fault
F19	Tz_Integ_Fault	F51	AC_W_GridCurr_DCHigh_Fault
F20	Tz_DC_OverCurr_Fault	F52	AC_A_GridCurr_DCHigh_Fault
F21	Tz_GFDI_OC_Fault	F53	AC_B_GridCurr_DCHigh_Fault
F22	Tz_EmergStop_Fault	F54	AC_C_GridCurr_DCHigh_Fault
F23	Tz_GFCI_OC_Fault	F55	DC_VoltHigh_Fault
F24	DC_Installation_Fault	F56	DC_VoltLow_Fault
F25	DC_Feedback_Fault	F57	AC_FeedBack_Fault
F26	BusUnbalance_Fault	F58	AC_U_InductCurr_High_Fault
F27	DC_Innstallation_ISO_Fault	F59	AC_V_InductCurr_High_Fault
F28	DCIOver_M2_Fault	F60	AC_W_InductCurr_High_Fault
F29	AC_AirSwitch_Fault	F61	AC_A_InductCurr_High_Fault
F30	AC_MainController_Fault	F62	AC_B_InductCurr_High_Fault
F31	AC_SlaveContactor_Fault	F63	ARC_Fault

F32	DCIOver_M2_Fault	F64	Heatsink_HighTemp_Fault

Table: Fault information

5 Production information

All production information is provided for orientation purposes only. The measuring devices and meters provided by the electricity supply company are the authoritative source of information for invoicing.

5.1 Repair

Danger!

Danger of death from hazardous voltage.

- Hazardous voltage is applied to the solar power inverter during operation. Hazardous voltage is still present 5 minutes after all power sources have been disconnected.
- Never open the hybrid inverter. The inverter contains no components that are to be maintained or repaired by the operator or installer. Opening the cover will void the warranty

5.2 Decommissioning, transport, storage, disposal

Danger!

- **Danger of death or severe injuries from dangerous voltage**
- Disconnect the solar inverter from the grid before removing or inserting the AC connector.
- Dangerous voltages can be present at the DC connections of the hybrid inverter.
- Never disconnect the PV modules when the solar power inverter is under load. First switch off the grid connection so that the hybrid inverter cannot feed energy into the grid. Then open the DC disconnect or Secure the DC connections against being touched.

Danger of injury due to heavy weight

The Hybrid inverter is heavy. Incorrect handling can lead to injuries. The solar power inverter must be lifted

and carried by two people.

5.2.1 Decommissioning

Switch off the AC cable to be free of voltage. Open the DC disconnect or Remove all cables from the solar power inverter. Unscrew the solar power inverter from the wall bracket. Lift the solar power inverter from the wall bracket.

5.2.2 Packaging

Use the original packaging or packaging of the same quality.

5.2.3 Transport

Always transport the solar power inverter in the original packaging or packaging of the same quality.

5.2.4 Storage

Always store the solar power inverter in the original packaging or packaging of the same quality.

5.2.5 Dispose

Dispose of the solar power inverter in a technically appropriate manner according to the legal requirements of your country.

5.2.6 warranty service

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 Ningbo Deye Inverter Technology Co., Ltd.

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
- 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.

5.3 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.