HIGH VOLTAGE THREE PHASE HYBRID INVERTER

User Manual

JKS-6H-EI

JKS-8H-EI

JKS-10H-EI

JKS-12H-EI

JKS-15H-EI

JKS-20H-EI

Version: 30.11.2023

About This Manual

This manual provides information and guidelines for the installation, operation, and maintenance of the JKS-(6-20)H-EI inverter. Please note that it does not contain comprehensive information about the photovoltaic (PV) system.

The content of this manual is primarily focused on the on-grid mode of operation. If you intend to use the inverter in an off-grid mode, kindly get in touch with Jinko, and we will supply you with separate guidelines tailored to your requirements.

How to Use This Manual

Before undertaking any operation involving the inverter, it is crucial to thoroughly read this manual and any associated documents. Ensure that these documents are stored safely and are readily accessible at all time.

Please be aware that the contents of this manual may undergo periodic updates or revisions as a result of ongoing product development. Consequently, the information contained herein is subject to change without prior notice.

We would like to express our sincere gratitude for choosing JinkoSolar as your trusted partner. Thank you for entrusting us with your energy solutions.

Important Notices and Recommendations

1. **Interference with Induction Cooking Devices and Inductive Hair Dryers:** This product may cause interferences with induction cooking devices and inductive hair dryers. Please consult your provider of those electrical devices to check compatibility with PV systems. We are excluded from any responsibility regarding incompatibilities.
2. **Software Updates:** During software updates, the inverter will be temporarily turned off for a period of up to 30 minutes and will automatically be turned on after the update. During this time, please be aware that all loads connected to the Load Port will experience an electrical power interruption.
   Smart Device Restart: When the inverter is restarted or after automatic updates, some home smart devices powered by the inverter may not automatically turn on. Please check that all house loads are working properly after a restart of the inverter.
   Preventing Blackouts during Updates: To avoid a complete blackout of critical loads or home loads during inverter updates, we recommend installing a bypass connection from the grid to the loads to directly feed them from the grid during the time the inverter is off.
3. **Interference with smart homes:** This products may not be compatible with some smart devices or smart homes. Please, consult your provider of those devices or Jinko to check the compatibility with the systems before
4. **Technical Service Contact:** Contact our technical service if you intend to perform an installation or functionality of the inverter that is different from the ones described in this manual.

Email: ESS.EU@jinkosolar.com
Hotline: +49 40 2 853 851 820

Contents

1. Safety and operation instructions

This chapter contains crucial safety and operating instructions for your inverter. Please read it carefully and keep this manual for future reference.

- ✓ **Check the Instructions before Using the Inverter**: Carefully review the instructions and warnings in the manual.
- ✓ **Professional Maintenance:** Do not attempt to disassemble the inverter. For maintenance or repairs, always seek assistance from a qualified service center. Improper reassembly can lead to electric shock or fire hazards. Opening the device will lead to the void of warranty.
- ✓ **Safety during Maintenance:** To minimize the risk of electric shock, disconnect all wires before attempting any maintenance or cleaning. Note that simply turning off the unit will not reduce this risk.
- ✓ **Qualified Installation:** Caution: Only qualified personnel should install the inverter.
- ✓ **Cable Selection:** For optimal inverter performance, ensure that you follow the specified requirements for cable size selection. Correctly operating this inverter is crucial.
- ✓ **Caution with Tools:** Exercise extreme caution when using metal tools near the inverter. Accidental tool drops can pose hazards.
- ✓ **Proper Disconnection:** Strictly follow the installation procedures when disconnecting AC or DC terminals. Refer to the "Installation" section of this manual for detailed instructions.
- ✓ **Grounding:** Adhere to grounding instructions. This inverter should be connected to a permanently grounded wiring system. Comply with local requirements and regulations during installation.
- ✓ **Prevent Short Circuits:** Never create short circuits between AC output and DC input.
- ✓ **Battery Compatibility:** This inverter is intended to be used with battery model JKS-BXXX37-CS. For detailed information about the recommended battery, its care, and compatibility with this inverter, please refer to the separate battery manual provided.

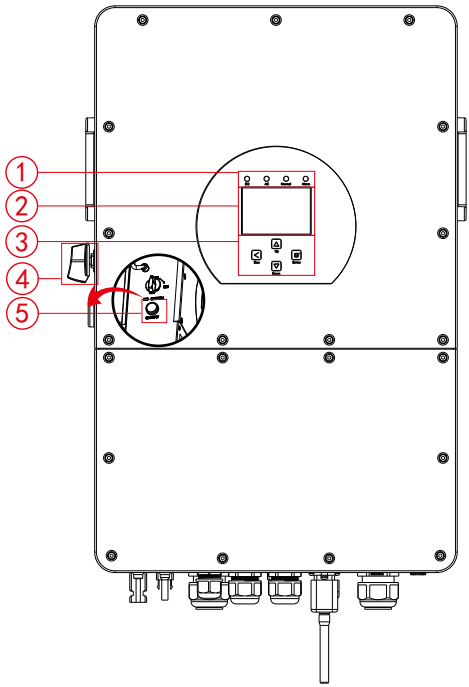
Symbology Table

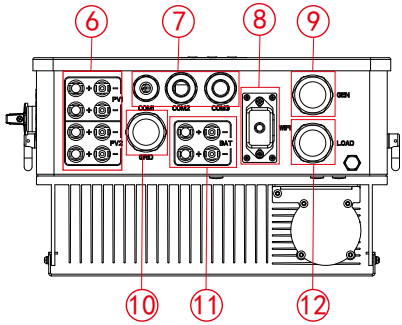
Symbol	Meaning
	*Safety Hint:* Pay Attention and Take Precautions. This symbol indicates a situation that requires caution or draws attention to potential risks, but it doesn't necessarily indicate an immediate danger of injury or damage. Follow safety guidelines and instructions.
	*Warning:* Immediate Risk of Shock or Hazardous Damage. This symbol signifies a critical situation that poses a direct threat to safety, property, or equipment. Immediate action or avoidance is required to prevent harm or damage.

2. Product Introductions

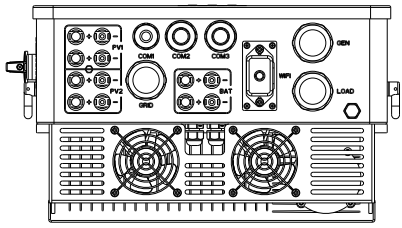
This is a versatile three-phase hybrid inverter designed to work seamlessly with various battery sizes, supporting both PV power input, with a ratio up to 1.3 and a generator. Its intuitive LCD display simplifies the configuration and operation of a wide range of functions, including battery charging, AC/alternative power source charging, and input voltage adjustments, all tailored to suit different applications.

2.1 Product Overview

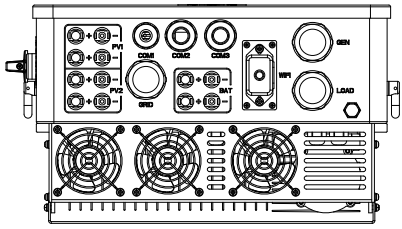




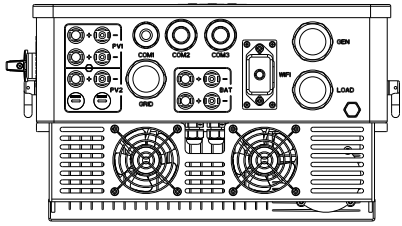
JKS-6H-EI



JKS-8/10/12H-EI



JKS-20H-EI

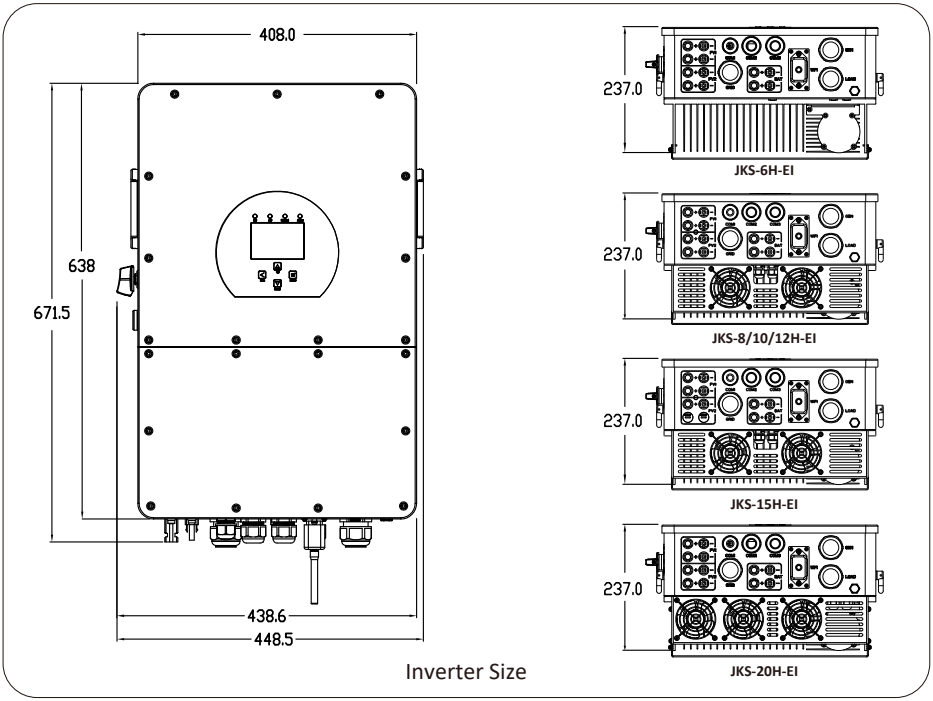


JKS-15H-EI

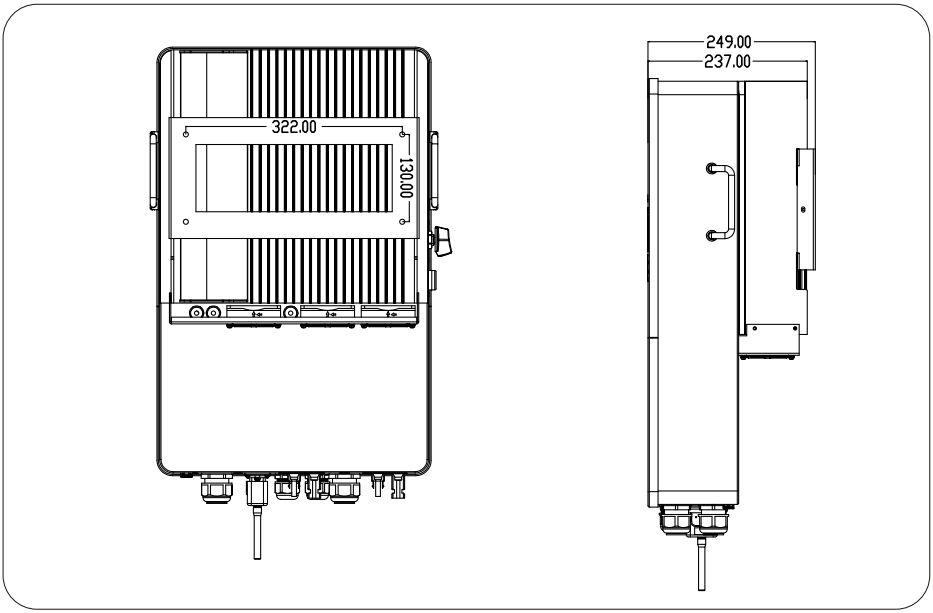
1: Inverter indicators
2: LCD display
3: Function buttons
4: DC switch
5: Power on/off button
6: PV input with two MPPT
7: COM
8: WiFi Interface
9: Generator input
10: Grid
11: Battery input*
12: Load

*Only one battery input can be used simultaneously. To avoid any damage at the system or missbalance of the batteries please connect only one battery tower per inverter.

2.2 Product Size



Inverter Size



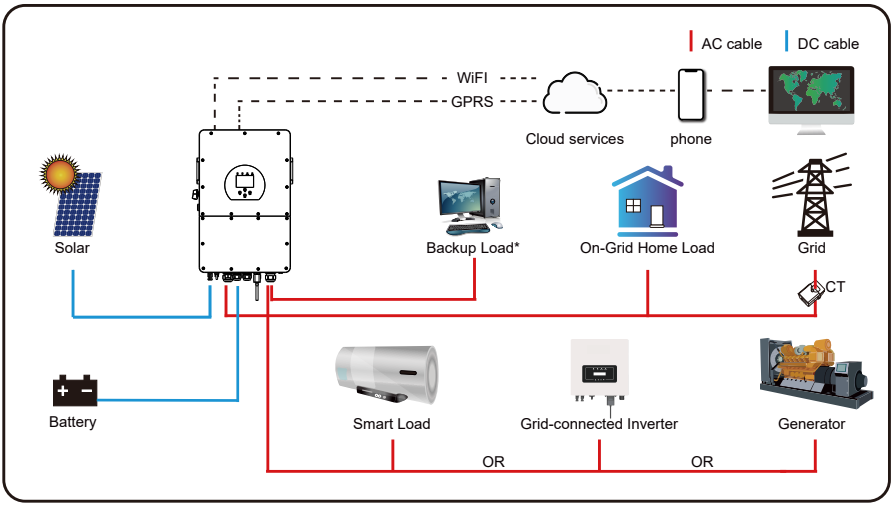
2.3 Product Features

- 230V/400V three phase pure sine wave inverter.
- 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 setting.
- 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 for 1 MPP tracker, 1 string for 1 MPP tracker.
- Smart settable three stages MPPT charging for optimized battery performance.
- Time of use function.
- Smart Load Function.

2.4 Basic System Architecture

The following illustration shows basic application of this inverter.
It also requires the following devices to have a complete running system.
- Grid or Generator (only for off grid mode)
- PV modules or Battery

Consult with your system integrator and Jinko for other possible system architectures depending on your requirements.
- This inverter is designed to power a range of appliances commonly found in homes and offices, including motor-driven devices like refrigerators and air conditioning units. Before use, it is advisable to verify appliance compatibility with this inverter.



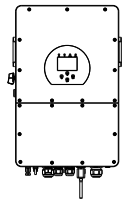
*Connected to the LOAD port

Pic 2.1 System Architecture

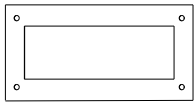
3. Installation

3.1 Parts List

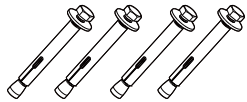
Check the equipment before installation. Please make sure nothing is damaged in the package. You should have received the following items at the package:



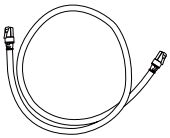
Hybrid inverter
x1



Wall mounting bracket x1

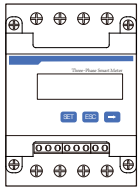


Stainless steel anti-collision bolt M6×60
x4



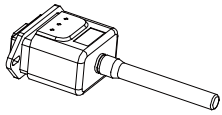
Parallel communication cable x1

L-type Hexagon wrench x1

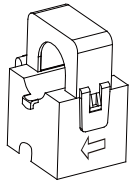


Meter x1

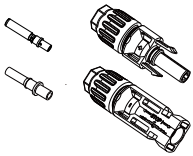
User manual x1



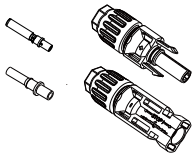
Wi-Fi-Plug x1



Bulit-in CTs x3



Battery Plug connectors including metal terminal x2(blue)



DC+/DC- Plug connectors including metal terminal xN*(black)

N*: JKS-6/8/10/12H-EI: x4
JKS-15H-EI: x3
JKS-20H-EI: x4

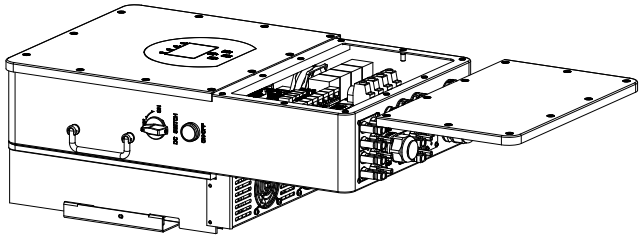
3.2 Mounting instructions

3.2.1 Installation Precautions

This Hybrid inverter is designed for outdoor use (IP65), Please make sure the installation site meets below conditions:

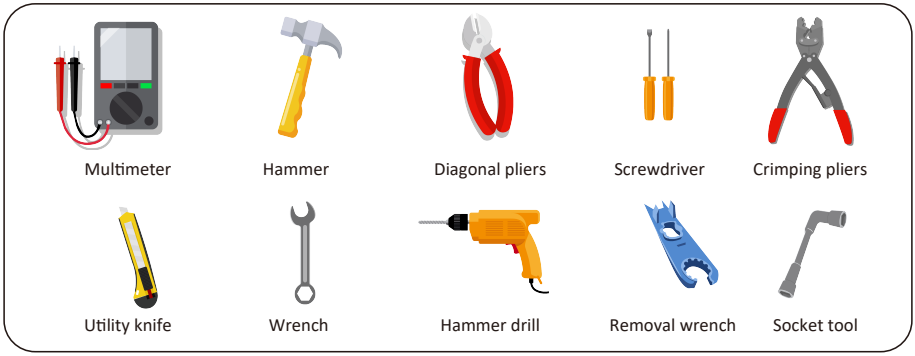
· Not in direct sunlight, rain exposure, snow laying up during installation and operation
· Not in areas where highly flammable materials are stored.
· Not in potential explosive areas.
· Not directly expose to the cold air of the air conditioner to avoid condensation inside the inverter casing.
· Not 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%)

Excessive heat buildup, heavy rainfall or water pooloing, can impact the performance and longevity of the inverter. Before connecting all wires, please take off the metal cover by removing screws as shown below:



Pic 3.1

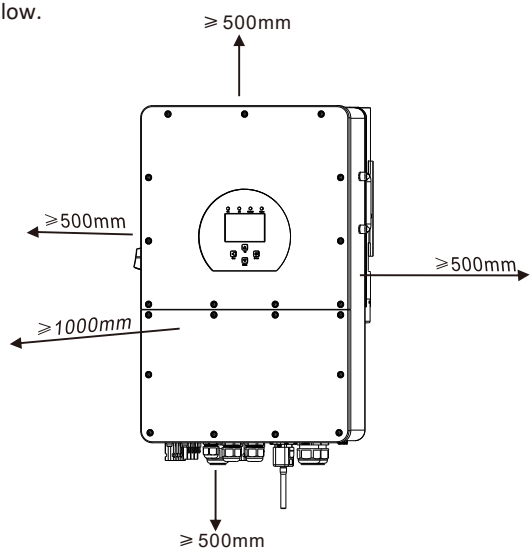
Tools Preparation



Consider the following points before selecting where to install:

· Please select a vertical wall with load-bearing capacity for installation. The inverter is suitable for installation on concrete or other non-flammable surfaces.
· Install this inverter at eye level in order to allow the LCD display to be read at all times.
· The inverter functions within a temperature range of -40°C to 60°C but begins derating when the ambient temperature exceed 45°C or the internal temperature is over 75°C.

For a proper ventilation of the inverter and avoid overheating, allow a clearance of approximately 50 cm around the inverter and at least 100 cm to the front as it can be seen at the picture below.



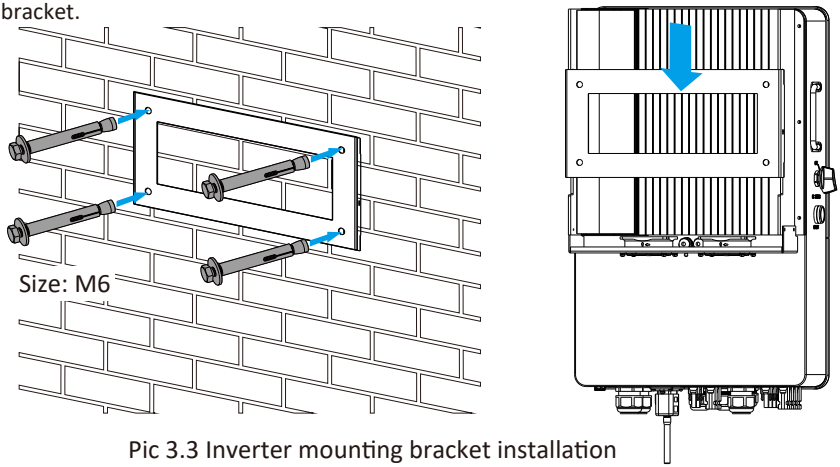
Pic 3.2 Installation Gap

3.2.2 Mounting the inverter

Installation procedure is described below:

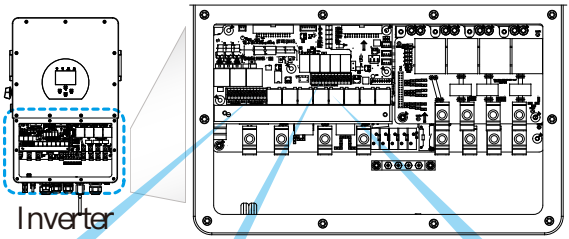
Remember that this inverter is heavy, please be careful when lifting out from the package. Choose the recommend drill head(as shown in below pic) to drill 4 holes on the wall with 62-70mm deep.

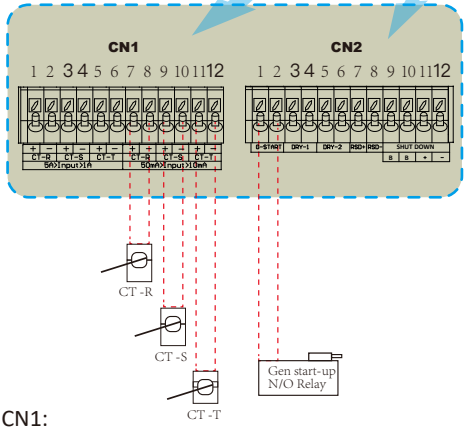
1. Use a proper hammer to fit the expansion bolt into the holes.
2. Screw out the nuts of the expansion bolts, align the holes of the mounting bracket with the 4 expansion bolts, and then push in the mounting bracket, tighten the nuts of expansion bolts.
3. Mount the inverter on the mounting bracket and use screws to fix the inverter with mounting bracket.



Pic 3.3 Inverter mounting bracket installation

3.3 Function port definition





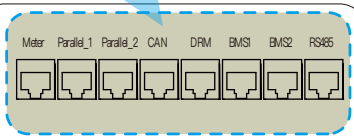
CN1:

CT-R (1,2,7,8):current transformer*(CT-R) for"zero export to CT"mode clamps on L1 when in three phase system.

CT-S (3,4,9,10):current transformer*(CT-S) for"zero export to CT"mode clamps on L2 when in three phase system.

CT-T (5,6,11,12): current transformer* (CT-T) for "zero export to CT"mode clamps on L3 when in three phase system.

*Built-in CT´s



Meter: for energy meter communication.

Parallel_1: Parallel communication port 1.

Parallel_2: Parallel communication port 2 .

CAN: reserved.

DRM: Logic interface for AS/NZS 4777.2:2020.

BMS1: BMS port for battery communication port 1.

BMS2: reserved.

RS485: RS485 port(Support Modbus protocol).

Definitions of these ports are post on Chapter 10 (page 46&47).

CN2:

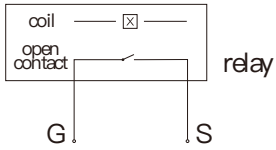
G-start (1,2): dry contact signal for startup the diesel generator (1A DC when connected). When the "GEN signal" is active, the open contact (GS) will switch on (no voltage output).

DRY-1 (3,4): Dry contact output. When the inverter is in off-grid mode and the "signal island mode" is checked, the dry contact will switch on.

DRY-2 (5,6): reserved (no use).

RSD+,RSD- (7,8): When battery is connected and the inverter is in "ON" status, it will provide 12Vdc.

SHUT DOWN (9,10,11,12): when the terminal "B" & "B" is short-circuited with additional wire connection, or there's 12Vdc input at the terminal "+ & - ", then the 12Vdc of RSD+ & RSD- will disappear immediately, and the inverter will shutdown immediately.

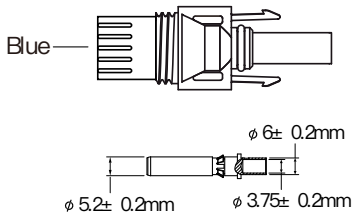


GS (diesel generator startup signal)

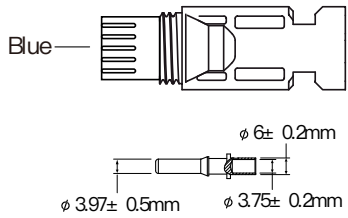
3.4 Battery connection

NOTE: Only one BMS port can be used simultaneously. If you intend to connect two batteries in parallel, please consult Jinko technical service for guidance. In the event that both ports are used simultaneously, Jinko disclaims any responsibility for damage to the inverter or the batteries.

For safe operation and compliance, a separate DC over-current protector or disconnect switch is required between the battery and the inverter. In certain applications, a disconnect switch may not be necessary, but it is always essential to have DC overcurrent protection in place. Refer to the typical amperage in the table below for the required fuse or circuit breaker size, being a 80A DC breaker the recommended one.



Pic 3.4 DC+ male connector



Pic 3.5 DC- female connector

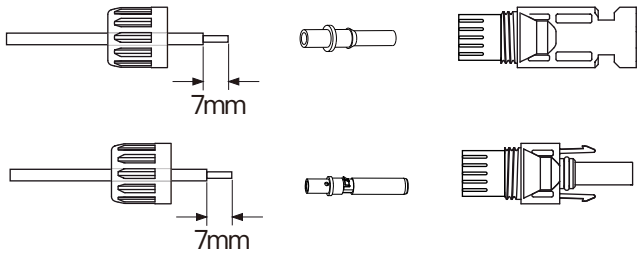
Safety Hint:
Please use approved DC cable for battery system.

Cable type	*Cross section* (mm²)	
	Range	*Recommended value*
Industry generic PV cable	6.0~10.0 (10~8AWG)	10.0 (8AWG)

Chart 3-1

The steps to assemble the DC connectors are listed as follows:

a) Strip the insulation of the battery wire by 7 mm, disassemble the cap nut of the MC4 connetctor, thread one battery wire through the cap nut of the connector (see picture 3.6). Repeat the process with the other wire, paying special attention to their polarity and the connector.



Pic 3.6 Disassemble the connector cap nut

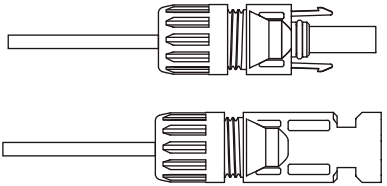
b) Crimp metal terminals with crimping pliers as shown in picture 3.7.

Pic 3.7 Crimp the contact pin to the wire

Crimping tool for cold forming contact

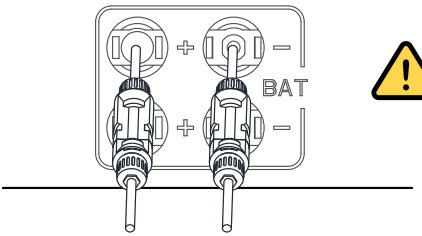
Crimping die for cold forming contact

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector completely (as shown in picture 3.8).



Pic 3.8 connector with cap nut screwed on

d) Finally insert the DC connector into the corresponding positive and negative battery input of the inverter, shown as picture 3.9.



Only one set of battery input is usable.

Pic 3.9 DC input connection

3.5 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 avoid any malfunction, do not connect any PV modules with possible leakage current to the inverter. For example, grounded PV modules will cause leakage current 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.

3.5.1 PV Module Selection:

When selecting proper PV modules, please be sure to consider below parameters:

1) Open circuit Voltage (Voc) of PV strings can not exceed maximum PV array open circuit voltage of inverter.
2) Open circuit Voltage (Voc) of PV strings should be higher than minimum start voltage of the inverter.
3) The PV modules used to connect to this inverter shall be Class II rating certified according to lEC 61730.

Inverter Model	*6kW*	*8kW*	*10kW*	*12kW*	*15kW*	*20kW*
PV Input Voltage	600V (180V~1000V)					
PV Array MPPT Voltage Range	150V-850V					
No. of MPP Trackers	2					
No. of strings per MPP Tracker	1+1			2+1		2+2

Chart 3-2

For inverter size between 6-10kW, each MPPT can support the connection of only one PV string.

3.5.2 PV Module Wire Connection:

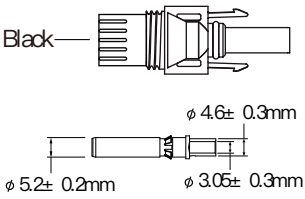
1. Switch the Grid Supply Main Switch(AC) OFF.
2. Switch the DC breaker OFF.
3. Assemble PV input connector to the inverter.

Safety Hint:

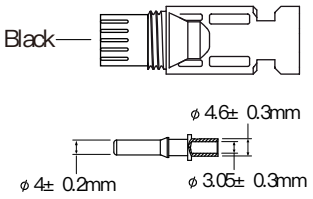
Before connection, please make sure the polarity of PV array matches the “DC+” and “DC-” symbols.

Safety Hint:

Before connecting inverter, please make sure the PV array open circuit voltage is lower than the maximum 1000V of the inverter.



Pic 3.10 DC+ male connector



Pic 3.11 DC- female connector

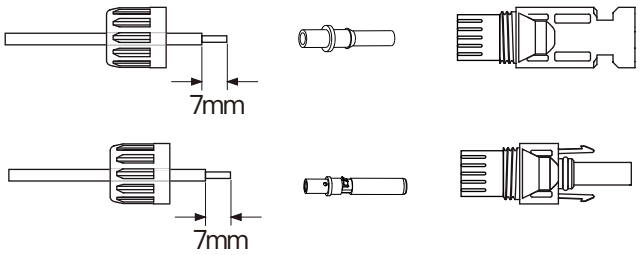
Safety Hint:
Please use approved DC cables for PV systems.

Cable type	***Cross section*** (mm²)	
	Range	***Recommended value***
Industry generic PV cable (model: PV1-F)	2.5-6 (12~10AWG)	6(10AWG)

Chart 3-3

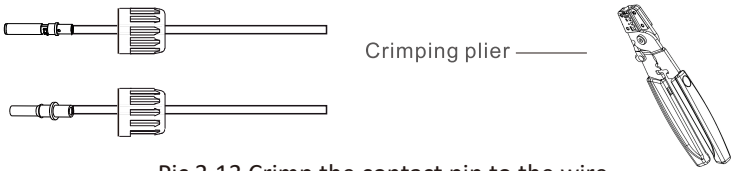
The steps to assemble the DC connectors are listed as follows:

a) Strip the insulation of the PV wire by 7 mm, disassemble the cap nut of the MC4 connetctor, thread one PV wire through the cap nut of the connector (see picture 3.12). Repeat this operation with all the PV wires, paying special attention to their polarity and the connector.



Pic 3.12 Disassemble the connector cap nut

b) Crimp metal terminals with crimping pliers as shown in picture 3.13.

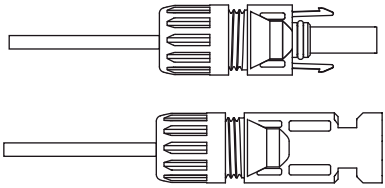


Pic 3.13 Crimp the contact pin to the wire

Crimping tool for cold forming contact

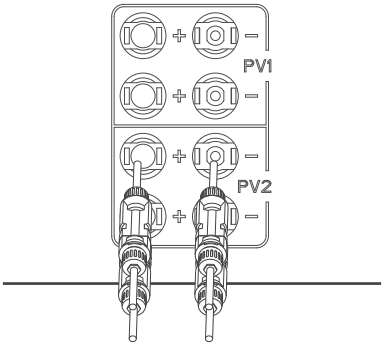
Crimping die for cold forming contact

c) Insert the contact pin to the top part of the connector and screw up the cap nut to the top part of the connector completely (as shown in picture 3.14).



Pic 3.14 connector with cap nut screwed on

d) Finally insert the DC connector into the corresponding positive and negative input of the inverter, shown as picture 3.15.



Pic 3.15 DC input connection

Safety hint:

Use the DC power connector of the accessories. Do not interconnect the connectors of different manufacturers.

Warning:

When operating an inverter connected to PV modules, be aware that sunlight exposure can generate high voltages in the module strings. Avoid contact with exposed electrical connections or terminals to prevent electrical shock or injury. For safety, it is best to operate the inverter at night or when PV modules are not exposed to sunlight. If daytime operation is necessary, cover the PV modules to minimize sunlight exposure and prevent high voltage generation. Remember to turn off the DC breaker or switch before performing any maintenance or adjustments. Do not turn off the switch when high voltage or high current is present to avoid damage or hazards. Prioritize personal safety.

3.6 Grid connection and Load port connection

Before connecting to the grid, a separate AC breaker must be installed between the inverter and the grid, and also between the back up loads connected to the load port and the inverter. This will ensure the inverter can be securely disconnected during maintenance and fully protected from over current. Check below values with local regulations of each country.

AC Breaker for Back up loads connected to Load port

Model	*AC breaker Recommended*	*Model*	*Recommended AC breaker*
6kW	16A	15kW	40A
8kW	25A	20kW	50A
10/12kW	32A		

AC Breaker For Grid

Model	*Recommended AC breaker*	*Model*	*Recommended AC breaker*
6/8/10kW	50A	12/15/20kW	100A

Chart 3-4 Recommended AC breaker

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 wire for AC input connection. To reduce risk of injury, please use the proper recommended wire as below.

Wires are recommended according to the maximum continuous AC Passthrough current of inverter (40A for 6-10 kW and 80A for 12-20 kW), you can choose the proper wire according to the actual current and local regulations.

Connection of Backup loads to the Load port

Model	*Wire Size*	*Cable(mm²)*	*Torque value(max)*
6/8/10kW	8AWG	10	3.4Nm
12/15/20kW	4AWG	25	4.0Nm

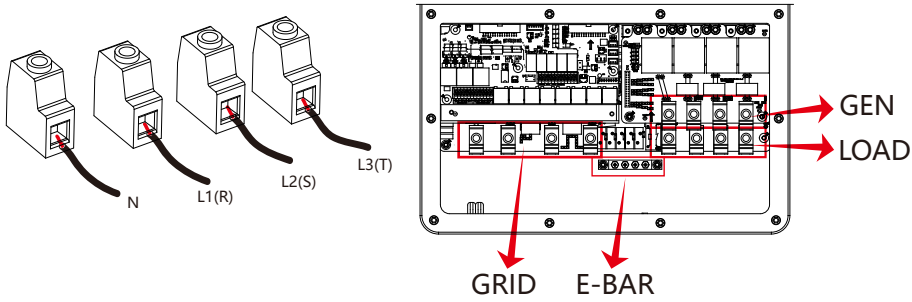
Grid Connection

Model	*Wire Size*	*Cable(mm²)*	*Torque value(max)*
6/8/10kW	8AWG	10	3.4Nm
12/15/20kW	4AWG	25	4.0Nm

Chart 3-5 Recommended size for AC wires

Please follow below steps to implement Grid, Load and Gen port connection:

1. Before making Grid, Load and Gen port connection, be sure to disconnect the main power supply by turning off the circuit breaker or AC disconnect switch.
2. Remove the insulation sleeve of 10mm length and insert the wires according to the polarities indicated at the terminal block. Make sure that the connection is successfully done.



Be sure that AC power source is completely disconnected during all the installation process.

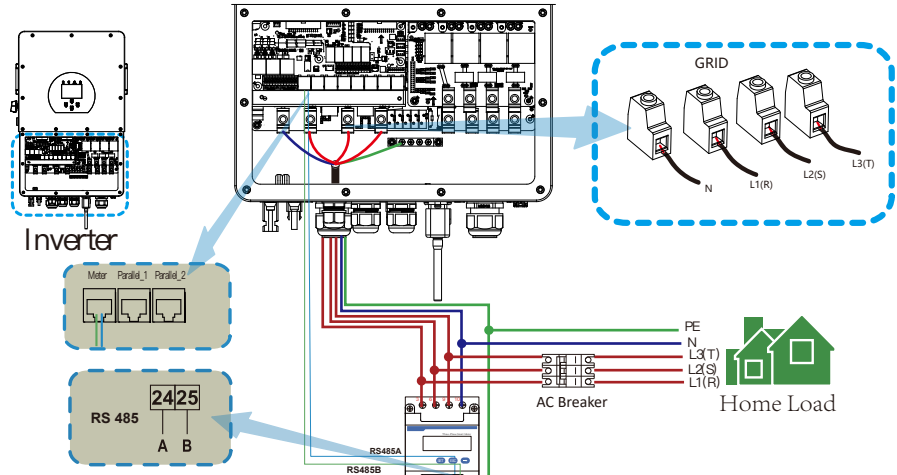
3. Insert AC output wires according to polarities indicated on the terminal block and tighten terminal. Be sure to connect corresponding N wires and PE wires to related terminals.
4. Some appliances, such as air conditioners and refrigerators, may need a time delay before reconnecting them after a power outage. This delay allows the refrigerant gas to stabilize and prevents potential damage.
   Check if your appliance has a built-in time-delay function before connecting it to our inverter.
   Examples of appliances that may require a delay include:
   Air conditioners: Balancing refrigerant gas.
   Refrigerators: Stabilizing the compressor.
   Freezers: Allowing the cooling system to balance.
   Heat pumps: Protecting against power fluctuations.
   JinKO's inverter will protect your appliance by triggering an overload fault if no time delay is present.
   However, internal damage may still occur. Refer to the manufacturer's documentation for specific time-delay requirements.

3.7 Meter or CT installation

There are three approved installation methods to measure the power consumption and to ensure zero energy export to grid. Nevertheless, it is highly recommended to follow 3.7.1 Meter connection without CTs.

3.7.1 Meter connection without CTs

For this method, please, use the CHINT meter provided at the package and connect it directly to the grid before any home loads as it is shown at the diagram below.

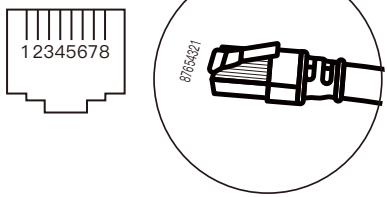


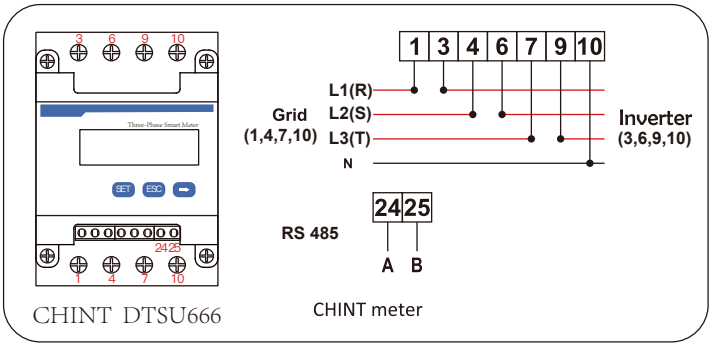
Definition of RJ45 Port Pin for Meter

Both of pin 1, 2 and 3 and pin 4, 5 and 6 can be used for RS485 communication.

No.	Meter-485 Pin
1	METER-485_B
2	METER-485_A
3	GND_COM
4	METER-485_B
5	METER-485_A
6	GND_COM
7	—
8	—

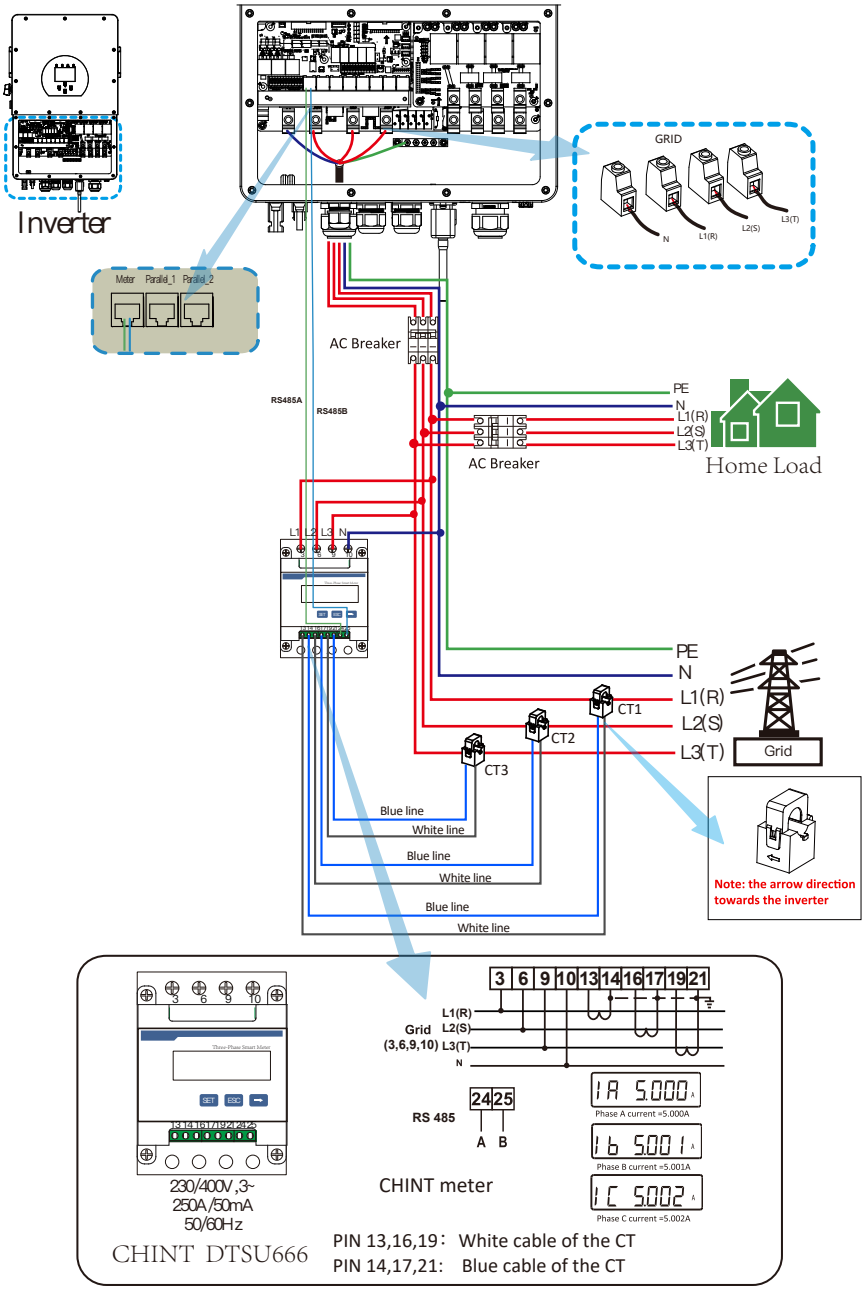
Meter Port





3.7.2 Meter connection with CTs

In case of using a different meter than the one provided by JinKO take into consideration that the supported brands are exclusively CHINT or Eastron.
For this method, the meter must be connected to the grid line to get the voltage reference while the compatible CTs must be installed also at the grid line before any home load to get the current reference. See diagram below.



Warning:

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

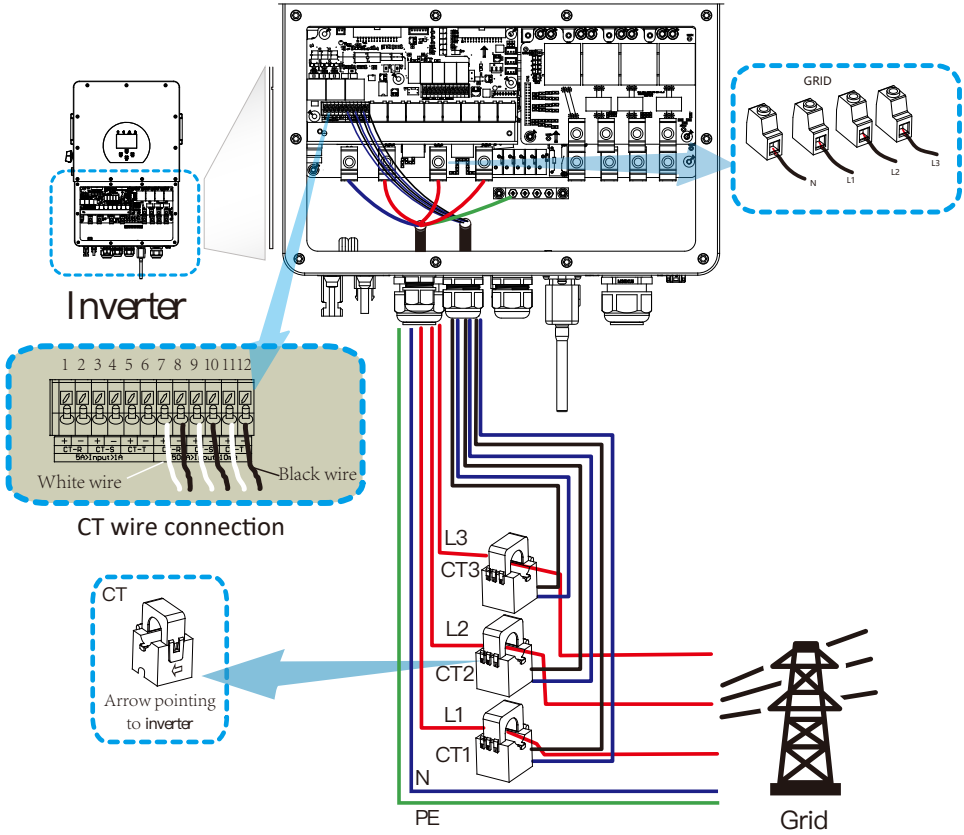
Safety hint:

In final installation, a breaker certified according to IEC 60947-1 and IEC 60947-2 shall be installed with the equipment. As to where to install breakers and which specification breakers to choose, please refer to the chapter 3.9 and 3.10.

3.7.3 Bulit-in Cts connection (alternative method)

Before choosing this method, please confirm the compatibility of this installation method with your local regulations. JinKO does not recommend this installation method and it is is exempt from any non-compliance with local regulations.

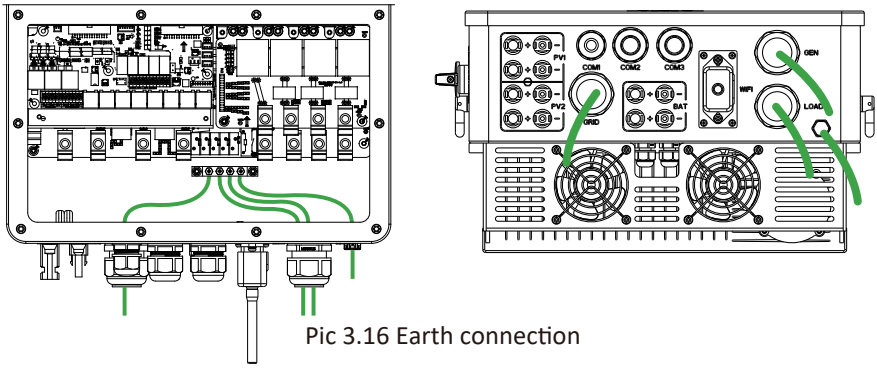
For installing the bulit-in CTs, please follow the diagram above paying special attention to the direction of the arrows of the CTs. To insert the cables into the inverter use one COM port through the gland and connect it at the corresponding ports of the CN1 as described as section 3.3 Function Port Definition.



*Note： when the reading of the load power on the LCD is not correct, please reverse the CT arrow.

3.8 Earth Connection (mandatory)

To prevent electric shocks in the event of current leakage in the circuit, ground wires (copper ones) shall be connected to the ground plate on the grid side.



Pic 3.16 Earth connection

Earth connection(Copper wires)

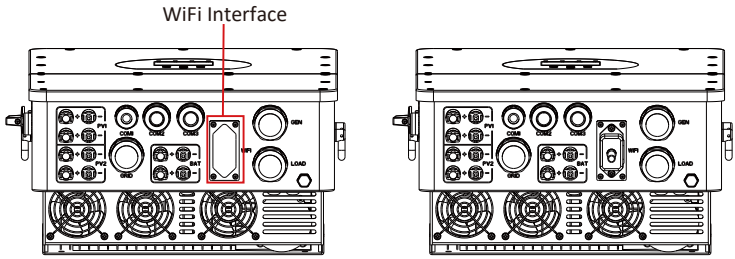
Model	*Wire Size*	*Cable(mm²)*	*Torque value(max)*
6/8/10/ 12/15/20K	5AWG	16	12.4Nm

Chart 3-6 Recommended size for ground wires

The conductor should be made of the same metal as the phase conductors. Use a copper wire to pass through the grounding screw hole in the lower right corner of inverter bottom. Connect one end to the ground plate inside the inverter and the other end to the E-BAR of the house.

3.9 WIFI Connection

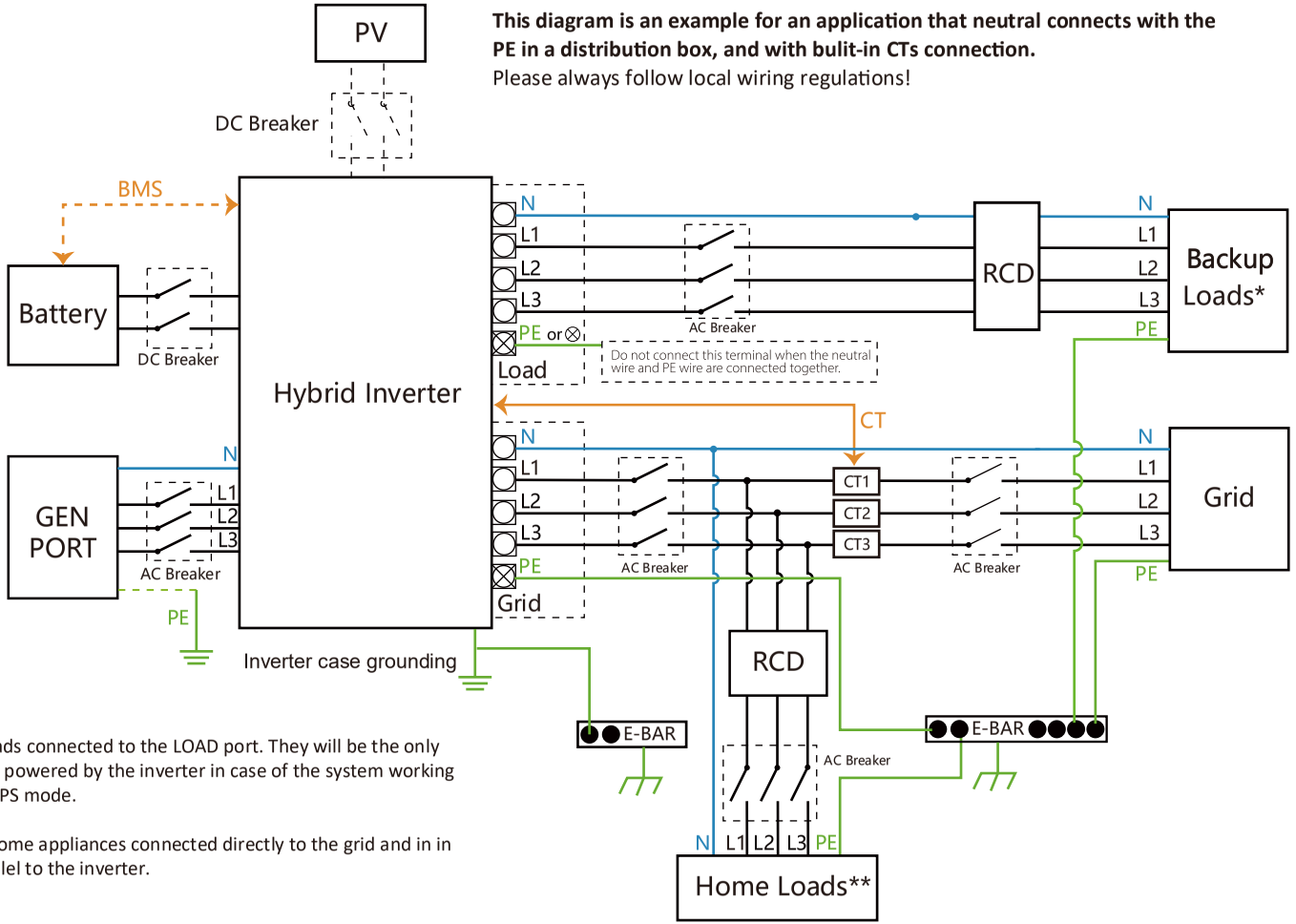
The Wi-Fi Plug must be connected at the input aimed for it, as it can be seen at the pictures below. For setting the Wi-Fi Plug, please consult the "Wi-Fi Plug User Manual".



Pic 3.17 Connection space for the Wi-Fi Plug

WiFi connection is included as default, in case you need a LAN connection, please consult JinKO in advance for guidance.

This diagram is an example for an application that neutral connects with the PE in a distribution box, and with bulit-in CTs connection.
Please always follow local wiring regulations!



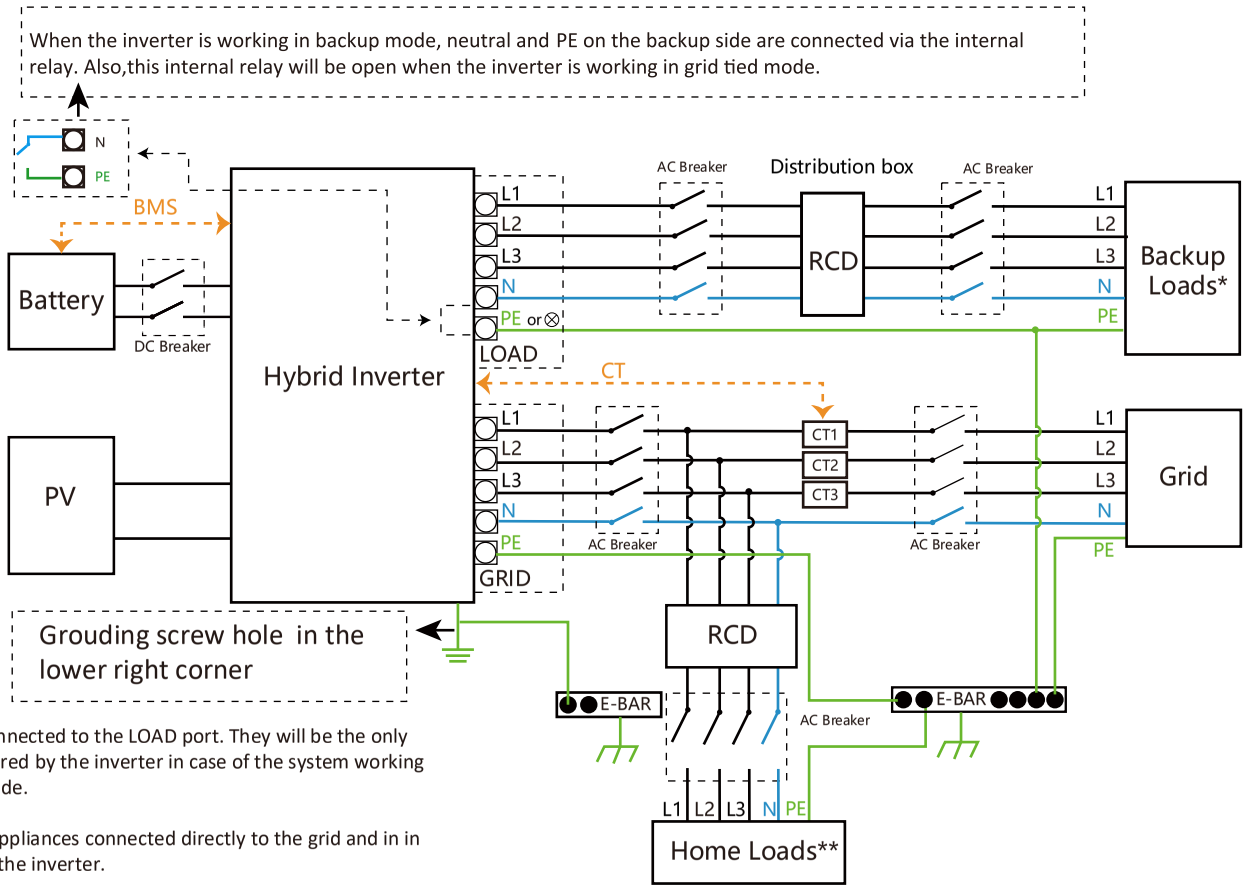
*Loads connected to the LOAD port. They will be the only load powered by the inverter in case of the system working as UPS mode.

**Home appliances connected directly to the grid and in in paralel to the inverter.

This diagram is an example for an application in which neutral is separated from the PE in the distribution box, and with bulit-in CTs connection.

Please always follow local wiring reguations!

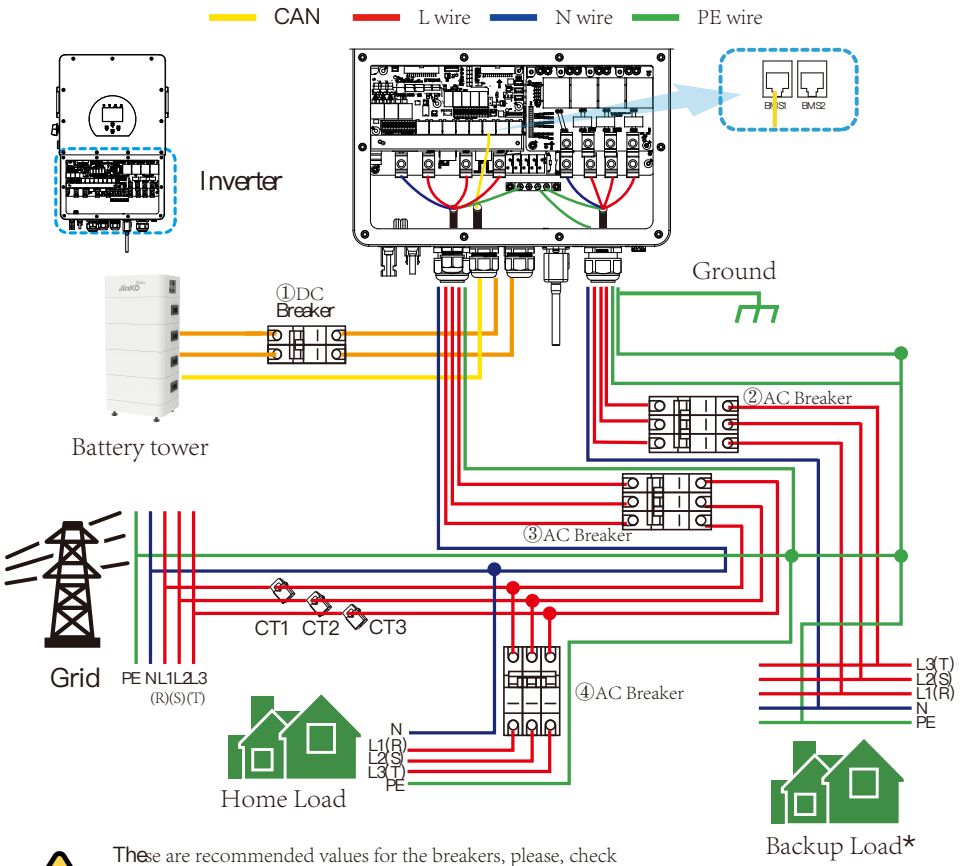
Note: UPS function is optional in German market. Please leave LOAD port empty if this functionality is not desired.



*Loads connected to the LOAD port. They will be the only load powered by the inverter in case of the system working as UPS mode.

**Home appliances connected directly to the grid and in in paralel to the inverter.

3.11 Connection diagram of basic mode



These are recommended values for the breakers, please, check your local regulations for selecting the adequate AC and DC breakers your circuit needs.

*Loads connected directly to LOAD port

① DC Breaker for Battery
JKS-6H-EI: 80A DC breaker
JKS-8H-EI: 80A DC breaker
JKS-10H-EI: 80A DC breaker
JKS-12H-EI: 80A DC breaker
JKS-15H-EI: 80A DC breaker
JKS-20H-EI: 80A DC breaker

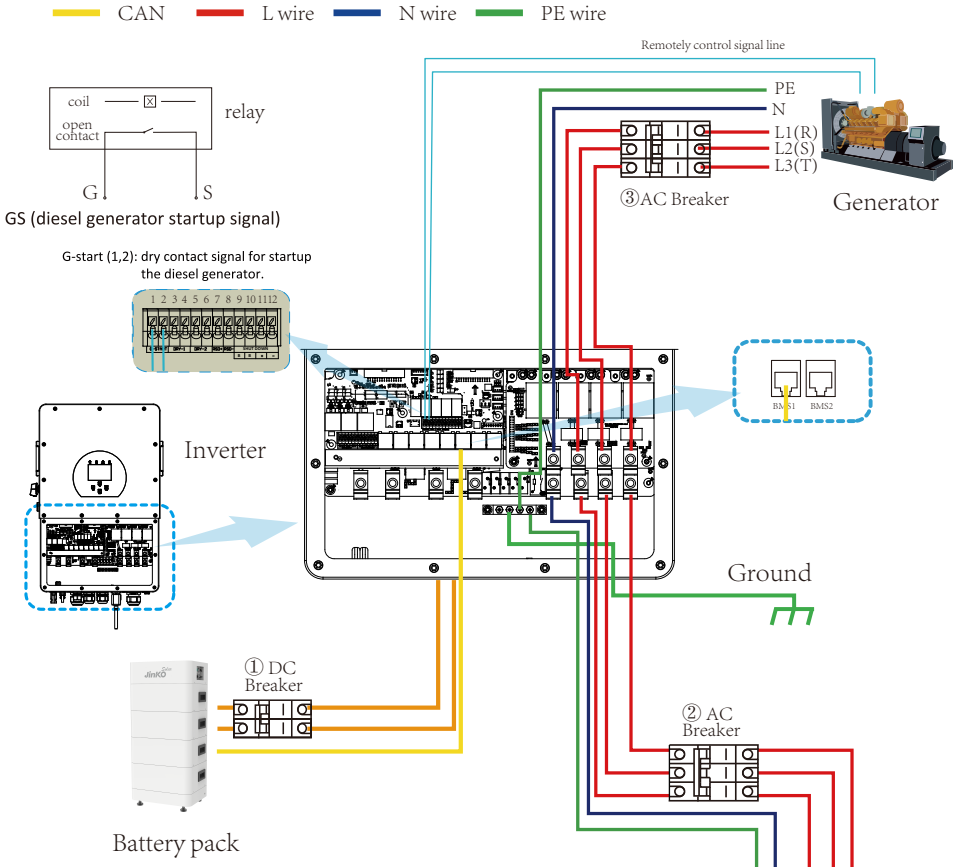
② AC Breaker for Load port
JKS-6H-EI: 16A AC breaker
JKS-8H-EI: 25A AC breaker
JKS-10H-EI: 32A AC breaker
JKS-12H-EI: 32A AC breaker
JKS-15H-EI: 40A AC breaker
JKS-20H-EI: 50A AC breaker

③ AC Breaker for Grid *
JKS-6H-EI: 50A AC breaker
JKS-8H-EI: 50A AC breaker
JKS-10H-EI: 50A AC breaker
JKS-12H-EI: 100A AC breaker
JKS-15H-EI: 100A AC breaker
JKS-20H-EI: 100A AC breaker

④ AC Breaker for Home Load
Depends on household loads

*Multiply the inverter's maximum continuous output current from the datasheet by a typical safety factor of 1.25, as determined by applicable standards or common practice. For example, with a 40A output, this becomes 50A.

3.12 Typical application diagram for Off-grid Mode with a diesel genetator



These are recommended values for the breakers, please, check your local regulations for selecting the adequate AC and DC breakers your circuit needs.

① DC Breaker for Battery

For safety reasons, it is recommended to install a DC breaker here.

JKS-6H-EI: 80A DC breaker
JKS-8H-EI: 80A DC breaker
JKS-10H-EI: 80A DC breaker
JKS-12H-EI: 80A DC breaker
JKS-15H-EI: 80A DC breaker
JKS-20H-EI: 80A DC breaker

② AC Breaker for Load port

JKS-6H-EI: 16A AC breaker
JKS-8H-EI: 25A AC breaker
JKS-10H-EI: 32A AC breaker
JKS-12H-EI: 32A AC breaker
JKS-15H-EI: 40A AC breaker
JKS-20H-EI: 50A AC breaker

③ AC Breaker for Generator port

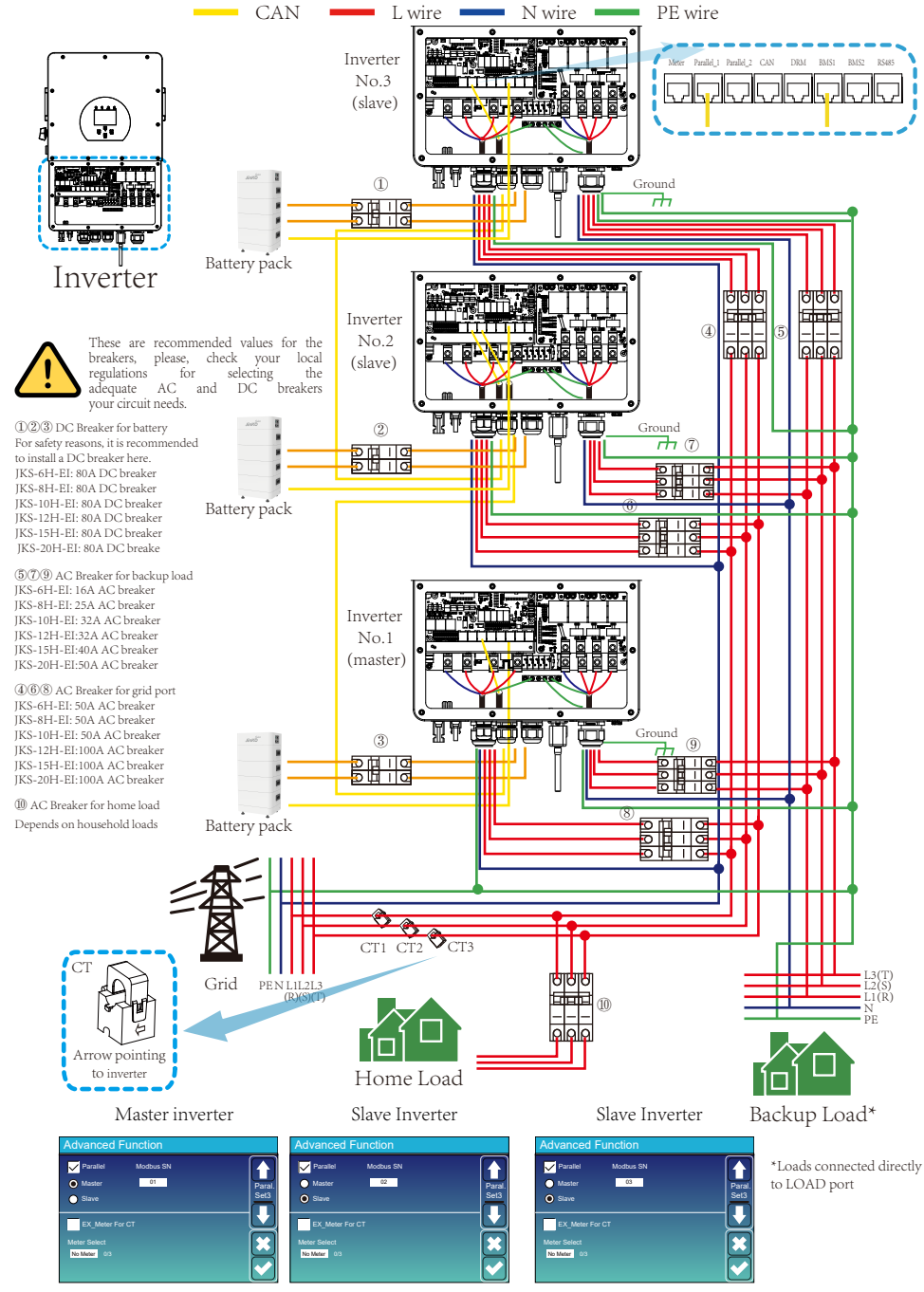
JKS-6H-EI: 16A AC breaker
JKS-8H-EI: 25A AC breaker
JKS-10H-EI: 32A AC breaker
JKS-12H-EI: 32A AC breaker
JKS-15H-EI: 40A AC breaker
JKS-20H-EI: 50A AC breaker

*Loads connected directly to LOAD port

Contact JinKO for specific guidelines for Off-grid mode connection of the inverter.

3.13 Three phase inverter parallel connection diagram

⚠ All inverters connected in parallel must have the same rated power and be connected though the grid port.
Contact Jinko for specific guidance.



*Loads connected directly to LOAD port

4. OPERATION

4.1 Power ON/OFF

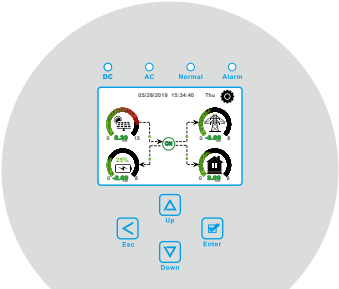
Once the system has been properly installed and the battery is connected to the inverter, follow the steps below to turn on the system, starting from the inverter:

1. Turn all the breakers of the installation on.
2. Turn the DC switch of the inverter on and the power button of battery (If there is one battery installed at the system), no matter the order.
3. Press the ON/OFF button (located on the left side of the inverter case) to turn on the inverter.

When a system connected to either PV or Grid (without battery) is switched on, the LCD will still be lighted up displaying "OFF". In this situation, after switching ON/OFF button on, select NO battery at the inverter settings to make the system 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 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 normal
Alarm	Red LED solid light	Malfunction or warning

Chart 4-2 LED Indicators

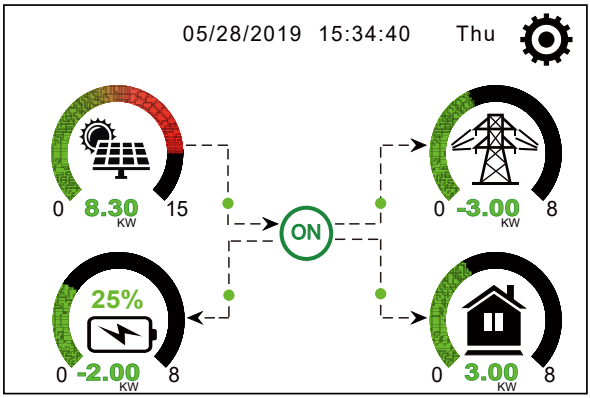
Function Key	*Description*
Esc	To exit setting mode
Up	To go to previous selection
Down	To go to next selection
Enter	To confirm the selection

Chart 4-3 Function Buttons

5. LCD Display Icons

5.1 Main Screen

The LCD is a touch screen that shows the overall information of the inverter.



1. The icon at the center of the screen indicates if the system is under normal operation, displaying "ON" or if there is an error at the system by displaying a code "Comm./F01-F64". Please, see Section 8. Error code list of alarms and errors to find guidance about the error.

2. At the top-center of the screen is the date and local time that must be set during commissioning.

3. At the top-right of the screen is System Setup Icon, pressing this set button, you can enter into the system setup screen which includes Basic Setup, Battery Setup, Grid Setup, System Work Mode, Generator port use, Advanced function and Li-Batt info.

4. The main screen includes the icons for PV Installation (left up), grid (right up), load (right bottom) and battery (left bottom). It also displays the energy flow direction by moving dots. When the power is approaching to a high level, the color on the panels will change from green to red, showing vividly the system status on the main screen.

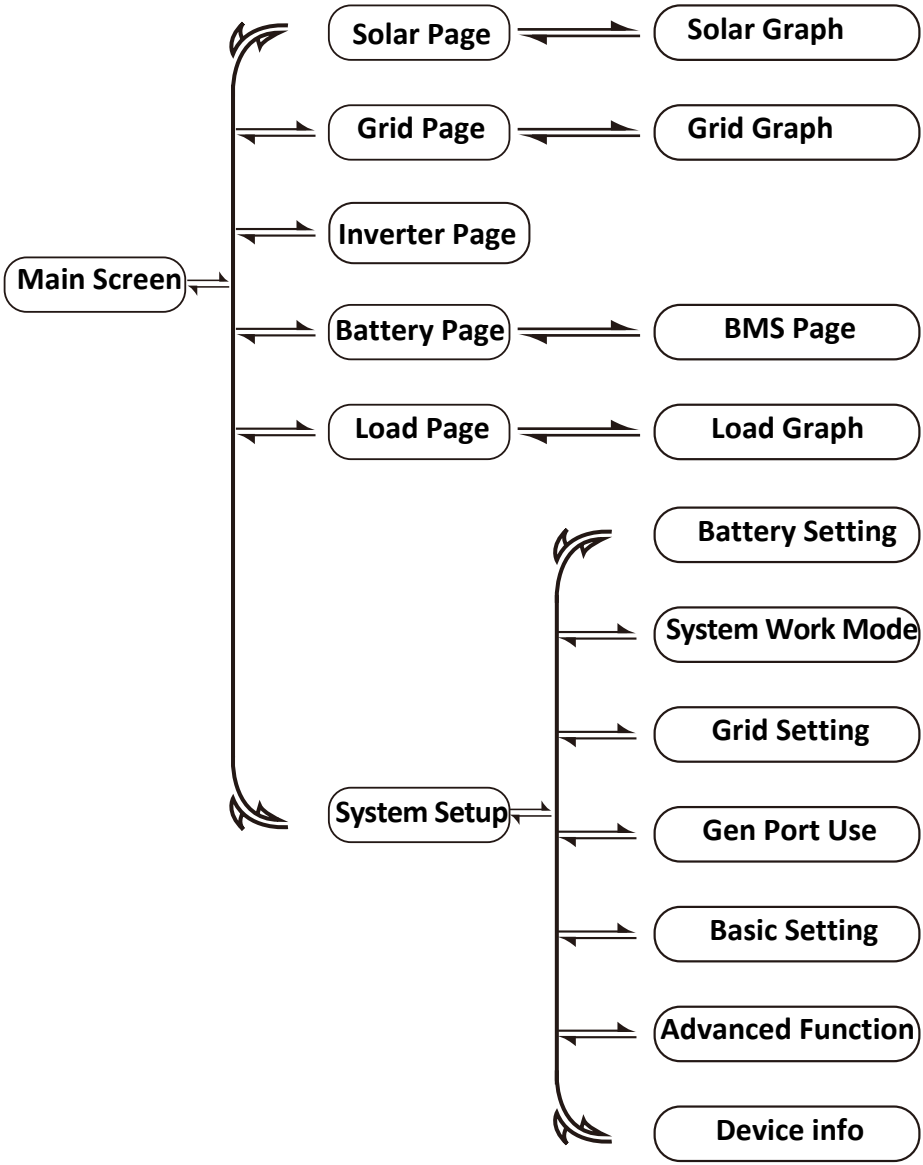
Some clarifications about the system status are:

-PV and Load power will always be positive.

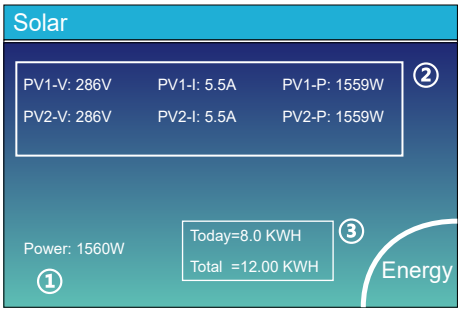
-A negative Grid power means energy being exported to the grid (sold), whereas positive means energy being imported form the grid (purchased).

-Negative battery power means charge, positive means discharge.

5.1.1 LCD operation flow chart



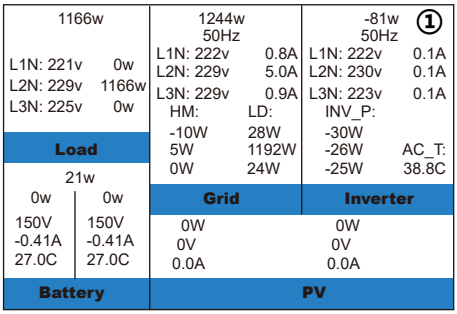
5.2 Detail pages



SOLAR SYSTEM (PANELS) DETAIL PAGE

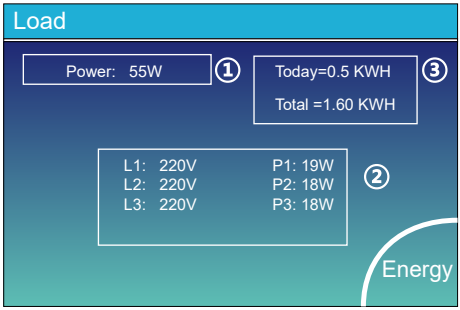
① Solar Panel Generation.
② Voltage, Current, Power for each MPPT.
③ Daily and total PV production.

By pressing "Energy" button you will enter into the power curve page.



SYSTEM DETAIL PAGE

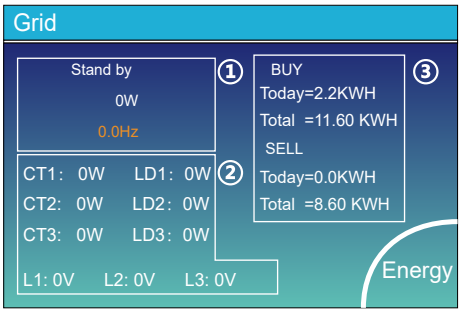
① Inverter Generation.
Voltage, Current, Power for each Phase.
AC-T: mean Heat-sink temperature.



LOAD DETAIL PAGE

① Load Power.
② Voltage, Power for each Phase.
③ Daily and total Load consumption .

When you select “Selling First” or “Zero export to Load” on the System Work Mode page, the information displayed is about loads connected to Load port of the hybrid inverter.
When selecting “Zero export to CT”on the System Work Mode page, the information on this page includes all loads: backup load connected to Load port and home loads.

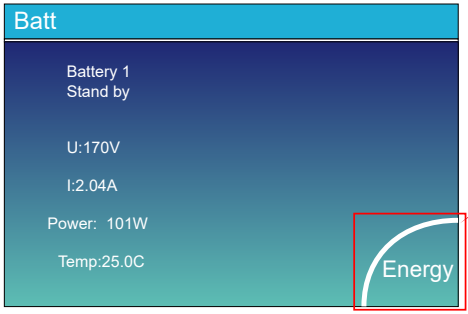


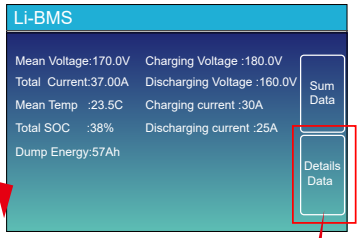
GRID DETAIL PAGE

① Status, Power, Frequency.
② L: Voltage for each Phase.
CT: Power detected by the Built-in CTs
LD: Power detected by internal sensors

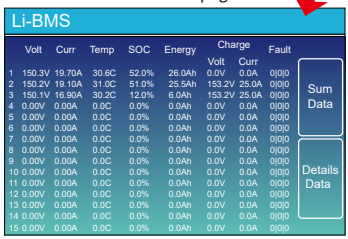
③ BUY: Energy from grid to inverter.
SELL: Energy from inverter to grid.

By pressing "Energy" button you will enter into the power curve page.





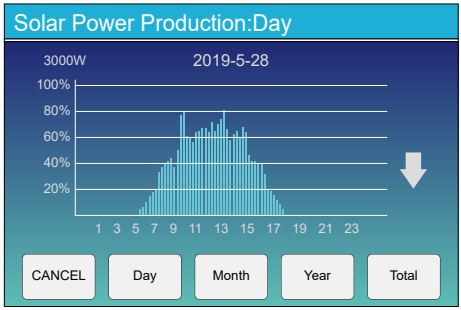
By clicking “Details Data” icon on the right side of BMS page, you can access the “Details Data” page.

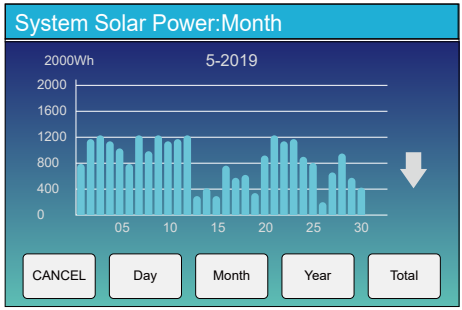


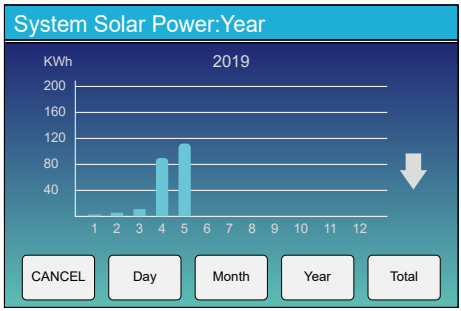
BATTERY DETAIL PAGE

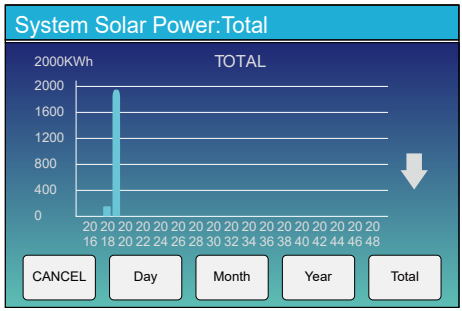
Click the “Energy” icon on the lower right corner of Battery detail page, you can enter the BMS page.

5.3 Curve Page-Solar & Load & Grid



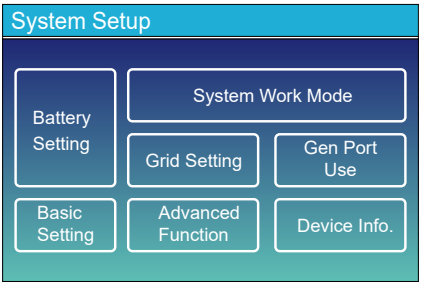






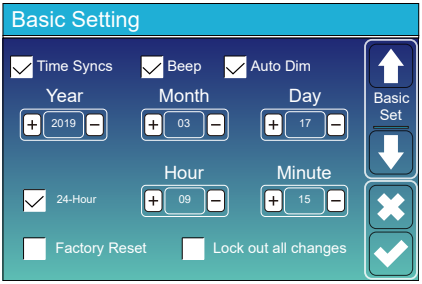
The Solar Power curve for the daily, monthly, yearly and total energy production can be consulted on the LCD screen. For more accuracy power generation information, please check the remote monitoring platform. Click the down arrow to select the Power curves for different periods.

5.4 System Setup Menu



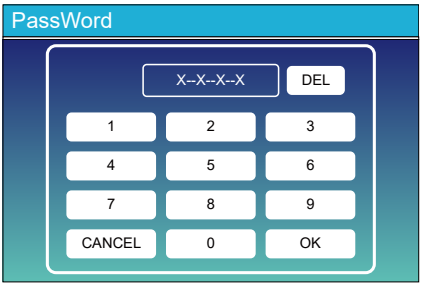
SYSTEM SETUP PAGE
This screen allows to access all the settings and information available in the inverter.

5.4.1 Basic Setup Menu

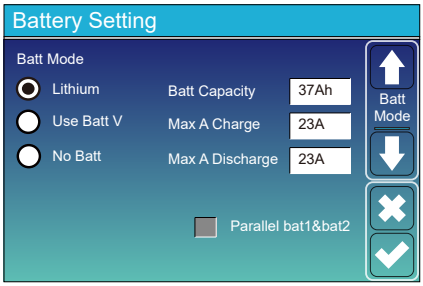


Factory Reset: Reset all parameters of the inverter.
Lock out all changes: Enable this menu for setting parameters that require locking and cannot be set up. Before performing a successful factory reset and locking the systems, to keep all changes you need to type in a password to enable the setting.

If the engineer does not know the password, please contact JinKO.



5.4.2 Battery Settings

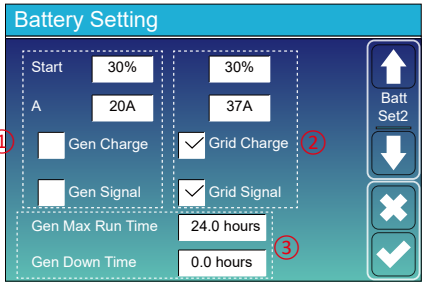


BATTERY SETUP PAGE

Battery capacity: it shows the capacity in Ah of the battery connected to the inverter.
Use Batt V: When selected, the battery voltage (V) rather than current (A) can be used for all the settings.

Max. A charge/discharge: Max battery charge/discharge current rate (0-30A for 6kW model, 0-37A for 8/10/12/15/ 20kW model). It is recommended to set it at a maximum of 23A or lower value.
In case of connecting a different battery than JinKO's, please, consult us and follow manufacturer's instructions.

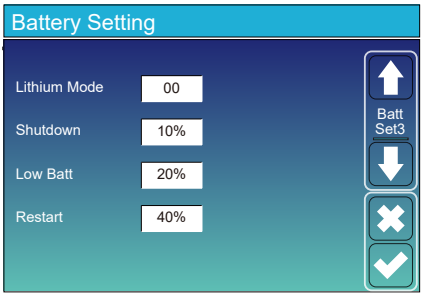
No Batt: select this option when there is no battery is connected to the system.
Parallel bat1&bat2: This function is not available and can not be selected.



BATTERY SETUP PAGE

This screen allows to select whether the battery is going to charge from a generator or grid.
① ③ Refer to the Gen settings and ② to grid.

Start: A SOC percent below the settled will make the system to automatically start a connected generator to charge the battery. It has no effect when Grid Charge is selected.
A: Sets the charging rate from the connected generator in Amps. (20A is the default value and can be adjusted based on site requirements). For the Grid, it is recommended to set this value to the battery charging current or lower.
Gen Charge: When selected, it uses the gen input of the system to charge battery from the connected generator.
Gen Signal: This parameter must be selected when connecting a generator. The inverter will be able to turn on the dry contact to send start or stop signal to generator.
Gen Max Run Time: longest time Generator can run in one day. When time is up, the Generator will be turned off. 24H means that it does not shut down all the time.
Gen Down Time: delay time of the Generator to shut down after it has reached the running time.
Grid Charge: when selected, the grid will charge the battery. This parameter must be selected to avoid possible overdischarge of the battery when there is not enough PV power.
Grid Signal: It has no use.



BATTERY SETTING PAGE

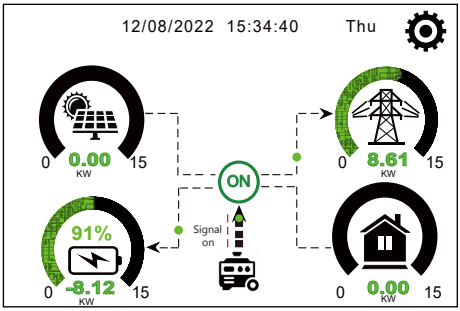
This page allows selecting the battery type and setting protection parameters.

Lithium Mode: BMS protocol that must always be 00.

Shutdown 10%: Only for off-grid mode. It indicates the inverter will shutdown if the SOC below this value.

Low Batt 20%: Minimum SOC for on-grid mode."Grid Charge" has to be enabled at Battery Settings and at "Time of Use -Grid charge" for being activated. When an unexpected overdischarge occurs when on-grid, the battery will automatically charge from the grid until reaching this value.

Restart 40%: Only for off-grid mode. When the SOC of battery resumes to this value, the inverter will restart the battery.

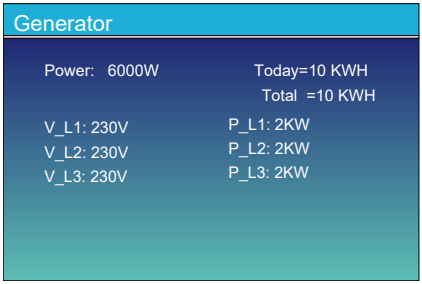


MAIN SCREEN

This is the main screen of the inverter were all the components of the energy system can be seen.

In this example, it shows the PV, grid, battery and loads, as well as the diesel generator connected to the Gen port.

In case there is no generator connected, the screen wont display this device.



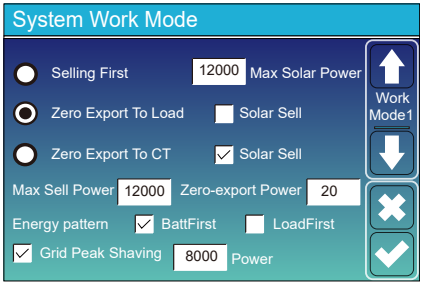
GENERATOR DETAIL INFORMATION

This page shows the generator main characteristics when working: output voltage, frequency, power, and the amount of energy used from it.

⚠ **The diesel generator must be three-phase and its Phase-Neutral voltage should be in range of 175-265V, its frequency should be in range of 45-55Hz, further more, its voltage and frequency should be stable enough. The maximum power of the generator must be the same as the inverter name plate.**

⚠ **For connecting a diesel generator, a micro inverter or any other device to the GEN Port of the inverter, please, contact JinKo in advance for proper and detailed guideance.**

5.4.3 System Work Mode Setup Menu



WORK MODE SELECTION SCREEN

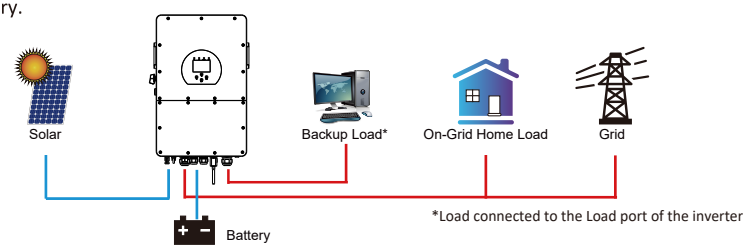
Selling First: This Mode allows hybrid inverter to sell back any excess power produced by the solar panels to the grid. If time of use is active, the battery energy also can be sold into grid.

The PV energy will be used to power the load and charge the battery and then excess energy will flow to grid.

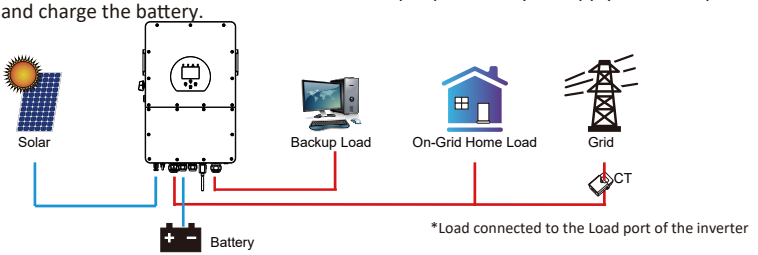
Power source priority for the load is as follows:

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* but also feed the home load connected in parallel with the inverter. If PV power and battery power is insufficient, it will take grid energy as supplement. The hybrid inverter will only sell power to grid when the function "Solar Sell" is selected. In this mode, a meter must be installed, either using the recommended method (meter without CTs) or with the second option (meter with CTs). For the installation method of the meter, please refer to the section 3.6.1. The external meter will detect whether there is power flowing back to the grid, if there is, then the inverter will reduce the output power only to supply the backup load*, home load and charge the battery.



Solar Sell: "Solar sell" is selectable for Zero export to load or Zero export to CT. When activating it, the surplus of the energy generated by the PV can be sold back to grid. When it is active, the energy generated by the inverter will first power the loads, then charge the battery and finally export to grid.

Max. sell power: Maximum output power allowed to flow to grid.

Zero-export Power: this parameter will ensure the zero-export by taking from the grid a small amount of energy that has been settled with this value. It is recommended to set it as 20-100W to ensure the hybrid inverter won' t feed power to grid and the grid consumption is reduced.

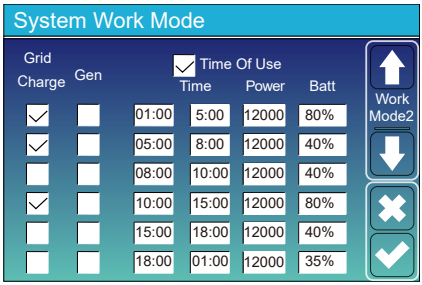
Energy Pattern: Allows choosing the priority for the energy produced by the inverter to flow:

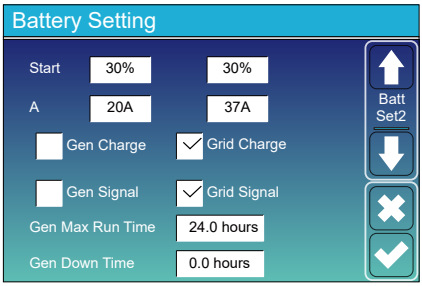
Batt First: PV power is firstly used to charge the battery and then used to power loads. If PV power is insufficient, grid will make supplement for battery and load simultaneously.

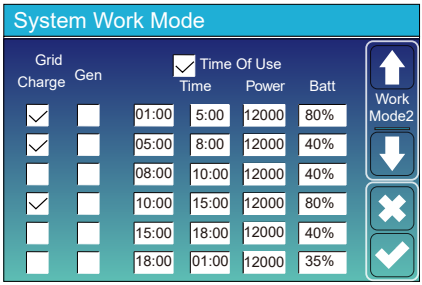
Load First: PV power is firstly used to power the load and then used to charge the battery. If PV power is insufficient, grid will provide power only to load.

Max Solar Power: Fill it with the maximum power of your PV plant.

Grid Peak-shaving: When it is active, grid input power will be limited within the setted 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: This option allows to control the usage of the battery by programming when to use the grid or generator for charging and when to discharge the battery to power your load.

⚠**When working in on-grid mode, in case "Time Of Use" is not selected, the battery won't discharge even when the battery SOC is full.**

⚠**When working in off-grid mode, the battery will discharge without selecting "Time Of Use" following "Battery settings".**

⚠**In Selling First, when "Time Of Use" is selected , the battery power can be sold into grid.**

Gen charge: uses the generator to charge the battery in the selected period of time.

Grid charge: uses the grid to charge the battery in the selected period of time.

⚠**To avoid overdischarge and damage of the battery, it is mandatory to select at least one period of time to be charged from the grid at a minimum of 10% SOC.**

Time: Range of 01:00-24:00.

Power: Max. discharge power of battery allowed for the corresponding period of time.

Batt(SOC %): Indicates the discharge SOC limit for each period of time. When the SOC reaches the settled value, the battery will start charging from the PV in case nor Grid or Gen charge is selected, or from Grid or Gen in case one of those is selected. The battery will keep charging until reaching the next range time. In case the actual SOC surpasses this settled value for the following time range, the battery can discharge, and on the contrary it will keep charging.

Example:

From 01:00 to 5:00, if battery SOC is lower than 80%, it will use grid to charge it until reaching 80%. In case the SOC is higher than 80%, it will discharge until reaching that value.

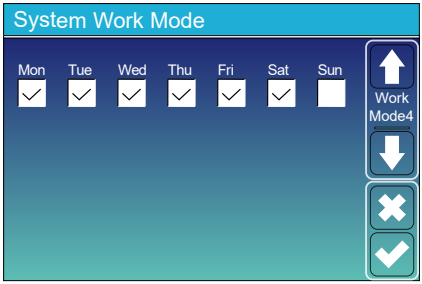
From 05:00 to 08:00, if battery SOC is higher than 40%, the inverter will discharge it until the SOC reaches 40%. On the contrary, if battery SOC is lower than 40%, grid will charge it until a SOC of 40%.

From 08:00 to 10:00, if battery SOC is higher than 40%, hybrid inverter will discharge the battery until the SOC reaches 40%. If no, it will charge it until reaching 40%.

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

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

From 18:00-01:00, when battery SOC is higher than 35%, hybrid inverter will discharge the battery stopping when 35% is reached.

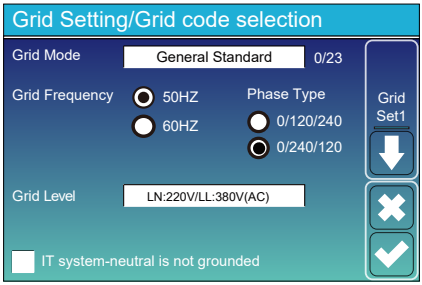


The screen allows choosing which day the setting of "Time of Use" will be executed.

Example:

The inverter will execute the time of use page on Mon/Tue/Wed/Thu/Fri/Sat only. On Sunday the battery will only be able to charge but nor discharge.

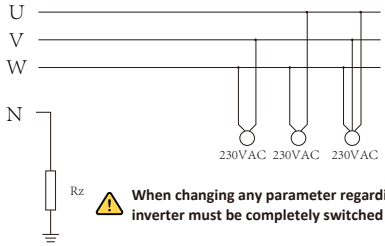
5.4.4 Grid Setup Menu



Grid Mode:
General Standard, UL1741 & IEEE1547, CPUC RULE21, SRD-UL-1741, CEI_0_21_Internal, EN50549_CZ-PPDS(>16A), Australia_A, Australia_B, Australia_C, AS4777_NewZealand, VDE4105, OVE-Directive R25, EN50549_CZ_PPDS_L16A, NRS097, G98, G99, EN50549_1_Norway_133V, EN50549_1_Norway_230V, Japan_200VAC_3P3W, CEI_0_21_External, CEI_0_21_Areti, Japan_400VAC_3P3W, Japan_415VAC_3P4W, EN50549_1_Switzerland.
Please follow the local grid code and then choose the corresponding grid standard.
Grid level: there are several voltage levels for the inverter output voltage when it is in off-grid mode.
LN:220V/LL:380V(AC), LN:230V/LL:400V(AC).

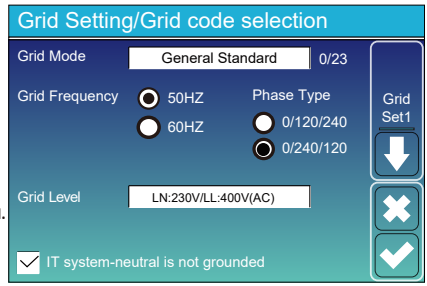
IT system: enable this option if the grid system is IT system. For example, the IT grid system voltage is 230Vac (the Line voltage between any two live lines in a three-phase circuit is 230Vac, and the diagram is as follow) then please enable "IT system" and tick the "Grid level" as LN:230V/LL:400V(AC) as below picture shows.

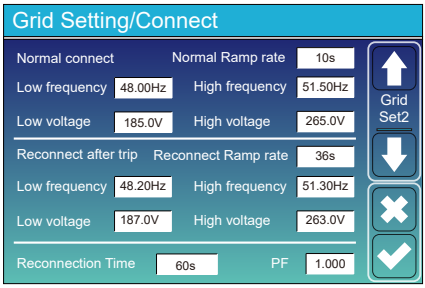
⚠ **In EU, Phase Type must be 0/240/120. In case your grid differs, please contact JinKo.**



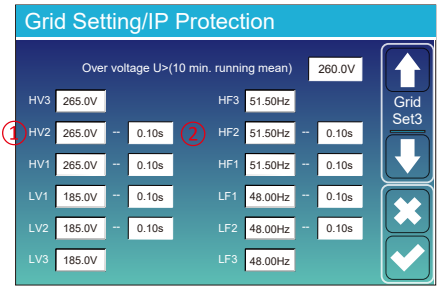
⚠ **When changing any parameter regarding grid, the inverter must be completely switched off and restarted.**

Rz: Large resistance ground resistor. Or the system doesn't have Neutral line





Next settings will be automatically set when grid mode is selected.
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 to reconnect the grid after the inverter trips from the grid.
Reconnect Ramp rate: It is the reconnection power ramp.
Reconnection time: The waiting time period for the inverter to reconnect the grid again.
PF: Power factor which is used to adjust inverter reactive power.

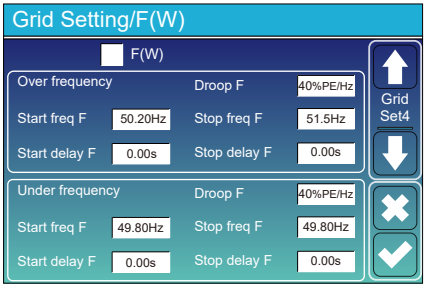


HV1: Level 1 overvoltage protection point;
①**HV2:** Level 2 overvoltage protection point; ② 0.10s—Trip time.
HV3: Level 3 overvoltage protection point.

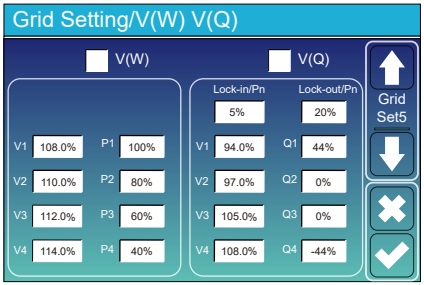
LV1: Level 1 undervoltage protection point;
LV2: Level 2 undervoltage protection point;
LV3: Level 3 undervoltage protection point.

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.

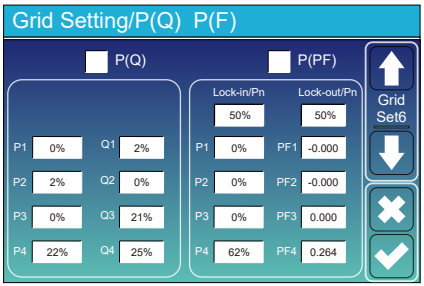


F(W): this series inverter is able to adjust inverter output power according to grid frequency.
Droop F: percentage of nominal power per Hz
For example, "Start freq F＞50.2Hz, Stop freq F＜51.5, Droop F=40%PE/Hz" when the grid frequency reaches 50.2Hz, the inverter will decrease its active power at Droop F of 40%. And then when grid system frequency is less than 50.1Hz, the inverter will stop decreasing output power.
For the detailed setup values, please follow the local grid code.

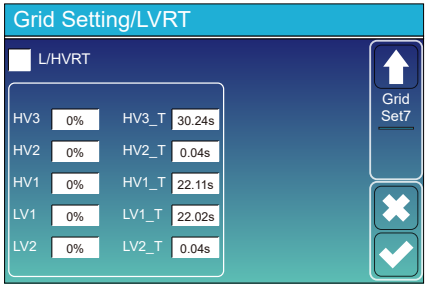


V(W): It is used to adjust the inverter active power according to the set grid voltage.
V(Q): It is used to adjust the inverter reactive power according to the set grid voltage.
This function is used to adjust inverter output power (active power and reactive power) when grid voltage changes.
Lock-in/Pn 5%: When the inverter active power is less than 5% rated power, the V(Q) mode will not take effect. **Lock-out/Pn 20%**: If the inverter active power is increasing from 5% to 20% rated power, the V(Q)mode will take effect again.

Example: Setting V2=110% and P2=80%, when the grid voltage reaches the 110% times of rated grid voltage, inverter output power will reduce its active output power to 80% rated power.
Example: For V1=94%, Q1=44%. When the grid voltage reaches the 94% 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.

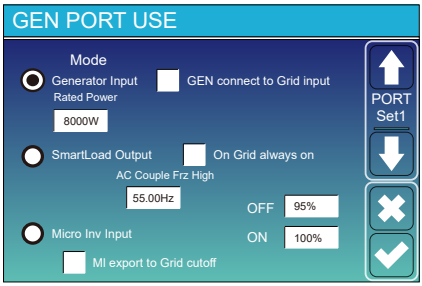


P(Q): It is used to adjust the inverter reactive power according to the setted active power.
P(PF): It is used to adjust the inverter PF according to the setted active power.
For the detailed setup values, please follow the local grid code.
Lock-in/Pn 50%: When the inverter output active power is less 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 part will be automatically set when Grid mode is selected, these default values don't need to been changed.

5.4.5 Generator Port Use Setup Menu

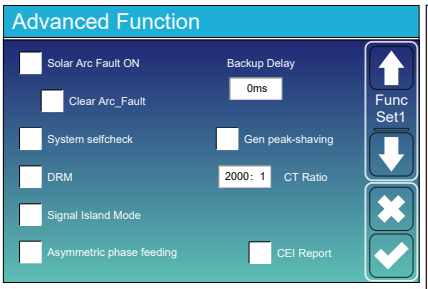


Generator input rated power: Nominal power of the generator connected to the inverter.
GEN connect to grid input: For off grid mode, when the diesel generator is connected to the Grid port of hybrid inverter.
Smart Load Output: This mode utilizes the Gen input connection as an output which only receives power when the battery SOC is above a user programmable threshold using the OFF and ON inputs described below.
- Smart Load OFF Batt: Battery SOC at which the Smart load will be switched off.
-Smart Load ON Batt: Battery SOC at which the Smart load will be switched off.
Example, ON at 100%, OFF at 95%: When the battery SOC reaches 100%, Smart Load Port will switch on automatically and stored energy will power the load connected to the Gen port. When the battery bank SOC is lower than 95% the Smart Load Port will switch off automa cally.
On Grid always on: When selecting "On Grid always on" the smart load will switch on when the grid is present, powered directly from it.
Micro Inv Input: This option allows the use of the Gen port of the inverter as a micro-inverter on grid inverter input (AC coupled), this feature will also work with "Grid-Tied" inverters.

⚠ **Before connecting a micro-inverter, contact JinKo for specific guidance and support.**

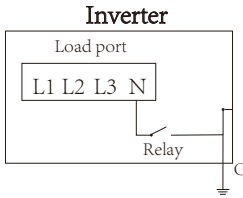
-Micro Inv Input OFF: When the hybrid inverter operates in off-grid mode and the battery SOC exceeds this set value, the microinverter or on-grid inverter will be turned off. In case of operating in on-grid mode and the battery SOC exceeds this set value, the microinverter or on-grid inverter will stop charging the battery, and its energy will be used to power the load or, is allowed, feed into the grid.
-Micro Inv Input ON: when the battery SOC is lower than setting value, Microinveter or grid-tied inverter will start to work.
AC Couple Frz High: If choosing"Micro Inv input", as the battery SOC reaches gradually setting value (OFF), during the process, the microinverter output power will decrease linearly. When the battery SOC equals to the setting value (OFF), the system frequency will become the setting value (AC couple Frz high) and the Microinverter will stop working.
MI export to grid cutsoff: Stop exporting power produced by the microinverter to the grid.

5.4.6 Advanced Function Setup Menu



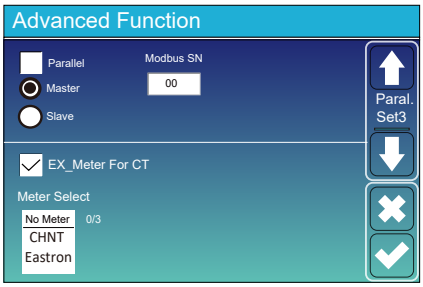
Solar Arc Fault ON: This is only for US.
System selfcheck: Reserved function, this is only for factory.
Gen Peak-shaving: When the power of the generator exceeds it's rated value, the inverter will provide support energy to ensure that the generator will not overload.
DRM: For AS4777 standard.
Backup Delay: For backup operation of the inverter, in case the grid goes off, the inverter will give output power after the setting time.
Example: if backup delay is set to 3ms, the inverter will give output power after 3ms when the grid cuts off.

Signal island mode: Select "Signal island mode" when the inverter is installed in off grid mode. This parameter will allow the relay on the neutral line (load port N line) to be switched ON and the N line (load port N line) will be bound to the inverter ground.



⚠ **When selecting "Asymetric phase feeding", please restart the inverter by switching it off and on for saving the configuration**

Asymmetric phase feeding: When the loads connected to the Load port have an unbalanced distribution on the three phases and the inverter is working at on-grid mode, enabling this function will ensure an equal power absorption from the three phases of grid.



ADVANCED FUNCTION SCREEN

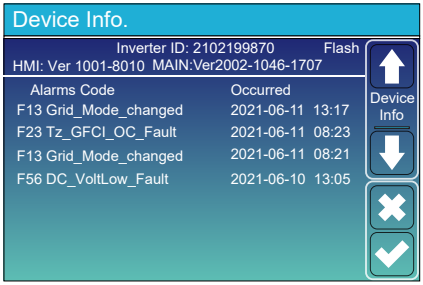
Parallel: by selecting this option, the inverter will recognice other inverters connected in parallel. The current the inverter when connected in parallel with other devices by choosing Master or Slave.

Modbus SN: Insert the Modbus number for the communication between the inverters connected in parallel.

Ex_Meter For CT: select the installed meter for the zero-export to CT mode. Only CHINT or Eastron are allowed.

⚠ ***All inverters connected in master-slave configuration must have the same rated power.***

5.4.7 Device Info Setup Menu



INFORMATION SCREEN

This screen shows the device information including the serial number, software version and alarm history.

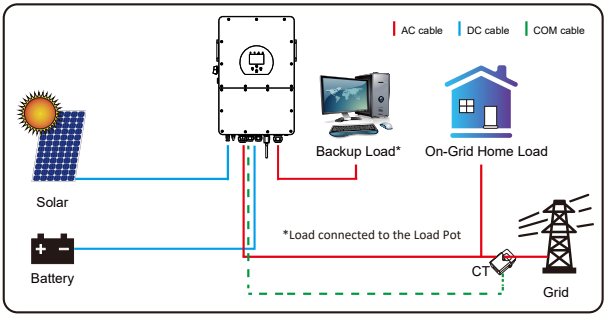
HMI: LCD version

MAIN: Control board FW version

6. Modes

6.1 Basic Mode

This is the standard on-grid configuration of the system consisting in a connection of:



- PV as an energy resource.
- Battery tower for energy storage.
- Grid connection to the Grid port.
- Home loads connected directly to grid in parallel to the inverter.
- Backup loads connected to the Load Port (powered by the inverter in case of a grid outage

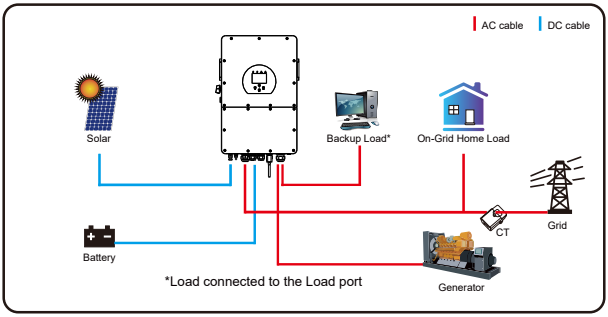
⚠ **For this setup, choose "Zero export to CT" mode and ensure a meter connection**

⚠ **When using the load port, ensure the connected load matches the inverter's rated power.**

⚠ **Avoid connecting an EV charger or all house loads to the Load port.**

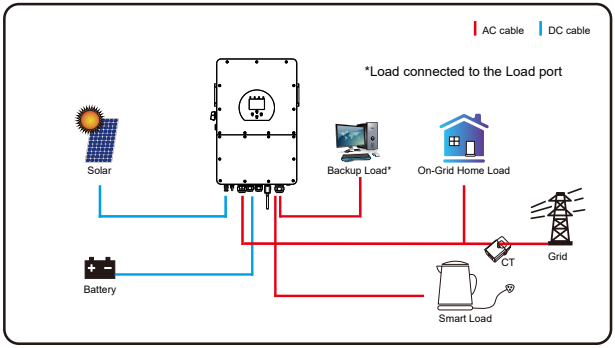
⚠ **The Load Port will be without power during inverter updates**

Mode II: With Generator



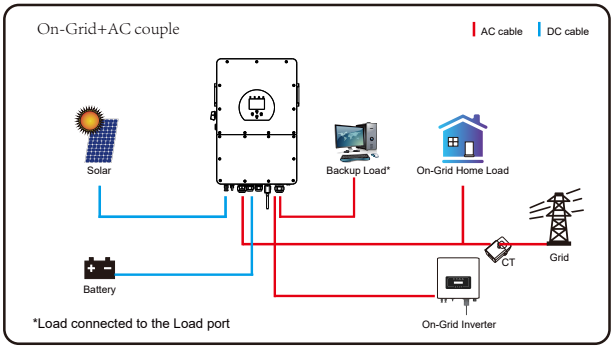
⚠ **Please consult Jinko for specific and detailed guidance on generator connection**

Mode III: With Smart-Load



⚠ **Please consult Jinko for specific and detailed guidance on for Smart load usage of the Gen port.**

Mode IV: AC Couple



⚠ **Please check the compatibility of inverters intended for parallel connection and consult Jinko for specific and detailed guidance on this connection.**

⚠ The 1st priority power of the system is always the PV power, then 2nd and 3rd 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.

7. Warranty

As to Warranty terms, please refer to 《Limited Warranty for Residential ESS-JKS》.

Under the guidance of our company, customers can return our products in order us to provide service of maintenance or replacement of products of the same value. JinKO is not responsible of the shipping cost of the defective elements or other related costs as installer's labour. 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 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 the equipment;
· Damage caused by incorrect installation or commissioning of the system;
· Damage caused by not following the information included at the User Manual and other documents regarding the installation, operation and maintenance instructions of the system;
· 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 not following the applicable safety standards or regulations;
· Damage caused by natural disasters or force majeure (e.g. floods, lightning, overvoltage, storms, fires, etc.)

Normal wear, tear or any other external faults of the case shall not affect the basic functioning of the product.

In this case, any external scratches, stains or natural mechanical wear and tear are not consideted a defect of the product and thus wont be covered by the warranty.

Warranty won't cover any incompatibility of the inverter with electronic devices such as thermomix, cooking pads or hairdryers. Please, check with the providor the compatibility of those electronic devices with PV systems.

Warranty wont cover any damage of the inverter due to its miss-usage or clear signs of not having followed the information described in this manual.

8. Error code list

When errors or alarms occur, they are displayed at the center of the main screen of the inverter. Please, check the following instructions at the above table to understand and solve the error. In case you can't solve them, please contact JinKO tecnical service for support.

Error code	*Description*	*Solutions*
W01	Reserve	Check the PV input polarity.
W02	FAN WARN	1. check the operating status of the fan. 2. if the fan is running abnormally, open the cover of the inverter to check the connection of the fan.
W03	Grid Phase Wrong	1. check the phase sequence connection of the power grid. 2. try to change the grid type, 0, 240/120. 3. if there is still no solution to check the wiring at the grid end.
F01	DC_Inversed_Failure	Check the PV input polarity.
F07	DC_START_Failure	1. The BUS voltage can't be reached by PV or battery. 2. Restart the inverter.
F13	Working_Mode_change	1. When the grid type and frequency have changed it will report F13. 2. When the battery mode has been changed to "No battery" mode, it will report F13. 3. For some old FW version, it will report F13 when the system's work mode has been changed. 4. Generally, this error will disappear automatically. 5. If it remains the same, turn off DC and AC switches for one minute, then turn on the DC and AC switches.
F15	AC_OverCurr_SW_Failure	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 normal.
F16	GFCI_Failure	Leakage current fault 1. Check the PV side cable ground connection. 2. Restart the system 2-3 times.
F18	Tz_Ac_OverCurr_Fault	AC side over current fault 1. Please check whether the backup load power and commonload power are within the range. 2. Restart and check whether it is normal.
F20	Tz_Dc_OverCurr_Fault	DC side over current fault 1. Check PV module connection and battery connection; 2. When in the off-grid mode, starting the inverter under a high power load may report F20. Please reduce the load power connected. 3. If it remains the same, turn off DC and AC switches for one minute, then turn on the DC and AC switches.

Error code	*Description*	*Solutions*
F21	Tz_HV_Overcurr_fault	BUS over current 1. Check the PV input current and battery current setting. 2. Restart the system 2~3 times.
F22	Tz_EmergStop_Fault	Remotely shutdown It means the inverter is remotely controlled.
F23	Tz_GFCI_OC_Fault	Leakage current fault 1. Check PV side cable ground connection. 2. Restart the system 2~3 times.
F24	DC_Insulation_Fault	PV isolation resistance is too low 1. Check the connection of PV panels and inverter is firm and correct. 2. Check whether the PE cable of inverter is connected to ground.
F26	BusUnbalance_Fault	1. Please wait for a while and check whether it is normal. 2. When the load power of 3 phases has a big different, it will report the F26. 3 .When there's DC leakage current, it will report F26. 4. Restart the system 2~3 times.
F29	Parallel_Comm_Fault	1. When inverters are connected in parallel, check the parallel communication cable connection and hybrid inverter communication address setting. 2. During the parallel system startup period, inverters will report F29. But when all inverters are in ON status, it will disappear automatically.
F34	AC_Overload_Fault	Check the backup load connection, make sure it is within the allowed power range.
F41	Parallel_system_Stop	Check the hybrid inverter work status. If there is at least one hybrid inverter shutdown, all hybrid inverters will report F41 fault.
F42	Parallel_Version_Fault	Grid voltage fault 1. Check whether the AC voltage is within grid standard protection limits. 2. Check whether grid AC cables are firmly and correctly connected.

Error code	*Description*	*Solutions*
F47	AC_OverFreq_Fault	Grid frequency out of range 1. Check whether the frequency is in the range of the specification or not. 2. Check whether AC cables are firmly and correctly connected.
F48	AC_UnderFreq_Fault	Grid frequency out of range 1. Check whether the frequency is in the range of the specification or not. 2. Check whether AC cables are firmly and correctly connected.
F52	DC_VoltHigh_Fault	BUS voltage is too high 1. Check whether battery voltage is too high. 2. check the PV input voltage, make sure it is within the allowed range.
F53	DC_VoltLow_Fault	BUS voltage is too low 1. Check whether battery voltage is too low. 2. If the battery voltage is too low, use PV or grid to charge the battery.
F54	BAT2_VoltHigh_Fault	1. Check the battery 2 terminal voltage is high. 2. Restart the inverter 2 times and restore the factory settings.
F55	BAT1_VoltHigh_Fault	1. Check the battery 1 terminal voltage is high. 2. Restart the inverter 2 times and restore the factory settings.
F56	BAT1_VoltLow_Fault	1. Check the battery 1 terminal voltage is low. 2. Restart the inverter 2 times and restore the factory settings.
F57	BAT2_VoltLow_Fault	1. Check the battery 2 terminal voltage is low; 2. Restart the inverter 2 times and restore the factory settings.
F58	Battery_comm_Lose	1. It means that the communication between the hybrid inverter and the battery BMS is disconnected when “BMS_Err-Stop” is active. 2. To avoid this error, disable "BMS_Err-Stop" item on the LCD.
F62	DRMs0_stop	Check the DRM function is active or not.
F63	ARC_Fault	1. ARC fault detection is only for US market. 2. Check PV module cable connection and clear the fault.
F64	Heatsink_HighTemp_Fault	Heat sink temperature is too high 1. Check whether the working environment temperature is too high. 2. Turn off the inverter for 10 minutes and restart.

Chart 8-1 Fault information

9. Datasheet

Model	JKS-6H-EI	JKS-8H-EI	JKS-10H-EI	JKS-12H-EI	JKS-15H-EI	JKS-20H-EI
Battery Input Date						
Battery Type	Li-ion					
Battery Voltage Range(V)	160~700					
Max. Charging Current(A)	30	37				
Max. Discharging Current(A)	30	37				
Number of battery input	1					
Charging Strategy for Li-Ion Battery	Self-adaption to BMS					
PV String Input Data						
Max. DC Input Power(W)	7800	10400	13000	15600	19500	26000
Max. DC Input Voltage (V)	1000					
MPPT Range(V)	150-850					
Start-up Voltage(V)	180					
Full Load DC Voltage Range (V)	195-850	260-850	325-850	340-850	420-850	500-850
Rated DC Input Voltage (V)	600					
PV Input Current(A)	20+20	20+20	20+20	26+20	26+20	26+26
Max.PV Isc(A)	30+30	30+30	30+30	39+30	39+30	39+39
No. of MPPT Trackers	2					
No. of Strings Per MPPT Tracker	1+1	1+1	1+1	2+1	2+1	2+2
AC Output Data						
Rated AC Output and UPS Power(W)	6000	8000	10000	12000	15000	20000
Max. AC Output Power(W)	6600	8800	11000	13200	16500	22000
Peak Power(off grid)	1.5 time of rated power, 10 S					
AC Output Rated Current(A)	9.1/8.7	12.2/11.6	15.2/14.5	18.2/17.4	22.8/21.8	30.4/29.0
Max. AC Current(A)	10/9.6	13.4/12.8	16.7/16	20/19.2	25/24	33.4/31.9
Max. Three-phase Unbalanced Output Current（A）	13	18	22	25	30	35
Max. Continuous AC Passthrough(A)	40			80		
Generator input/Smart load /AC couple current (A)	9.1/40 /9.1	12.2/40 /12.2	15.2/40 /15.2	18.2/80 /18.2	22.8/80 /22.8	30.4/80 /30.4
Power Factor	0.8 leading to 0.8 lagging					
Output Frequency and Voltage	50/60Hz; 3L/N/PE 220/380, 230/400Vac					
Grid Type	Three 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						
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					
Over Voltage Category	DC Type II / AC Type III					
Battery Over Current Protection	Fuses					

Model	JKS-6H-EI	JKS-8H-EI	JKS-10H-EI	JKS-12H-EI	JKS-15H-EI	JKS-20H-EI
Certifications and Standards						
Grid Regulation	IEC 61727,IEC 62116,CEI 0-21,EN 50549,NRS 097,RD 140, UNE 217002,OVE-Richtlinie R25,G99,VDE-AR-N 4105					
EMC/Safety Regulation	IEC/EN 61000-6-1/2/3/4, IEC/EN 62109-1, IEC/EN 62109-2					
General Data						
Operating Temperature Rande(℃)	-40~60 ℃, >45 ℃ Derating					
Cooling	Free cooling	Smart cooling				
Noise(dB)	≤55 dB					
Communication with BMS	CAN					
Weight(kg)	30.5					
Cabinet size(mm)	408W×638H×237D (Excluding connectors and brackets)					
Protection Degree	IP65					
Installation Style	Wall-mounted					
Warranty	5 years					

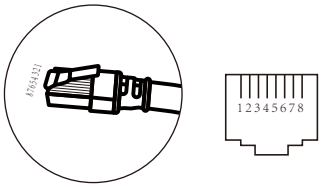
10. Appendix I

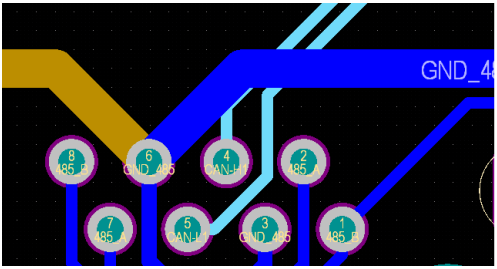
Definition of communication ports and Wifi port.

Definition of RJ45 Port Pin for BMS1

No.	RS485 Pin
1	485_B
2	485_A
3	GND_485
4	CAN-H1
5	CAN-L1
6	GND_485
7	485_A
8	485_B

BMS1 Port

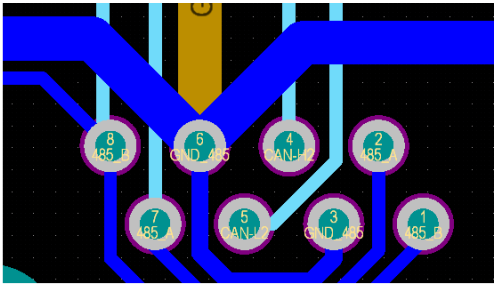




Definition of RJ45 Port Pin for BMS2 (It is reserved)

No.	RS485 Pin
1	485_B
2	485_A
3	GND_485
4	CAN-H2
5	CAN-L2
6	GND_485
7	485_A
8	485_B

BMS2 Port

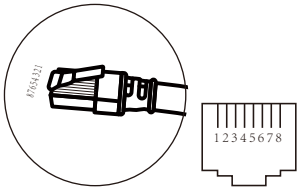


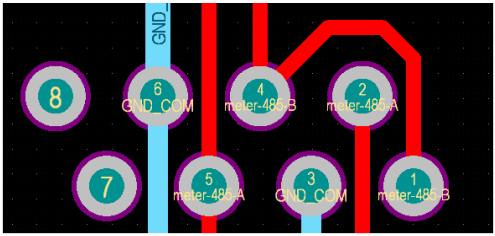
Definition of RJ45 Port Pin for Meter

Both of pin 1,2&3 and pin 4,5&6 can be used for RS485 communication.

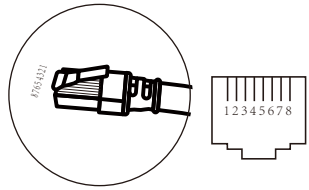
No.	Meter-485 Pin
1	METER-485_B
2	METER-485_A
3	GND_COM
4	METER-485_B
5	METER-485_A
6	GND_COM
7	--
8	--

Meter Port



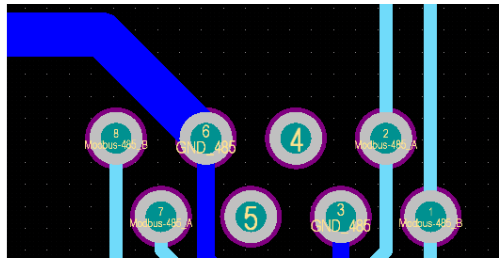


Definition of RJ45 Port Pin for RS485



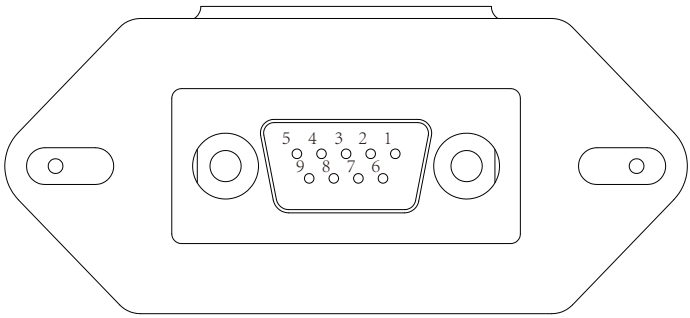
No.	RS485 Pin
1	Modbus-485_B
2	Modbus-485_A
3	GND_485
4	--
5	--
6	GND_485
7	Modbus-485_A
8	Modbus-485_B

RS485 Port



RS232

No.	WIFI/RS232
1	
2	TX
3	RX
4	
5	D-GND
6	
7	
8	
9	12Vdc



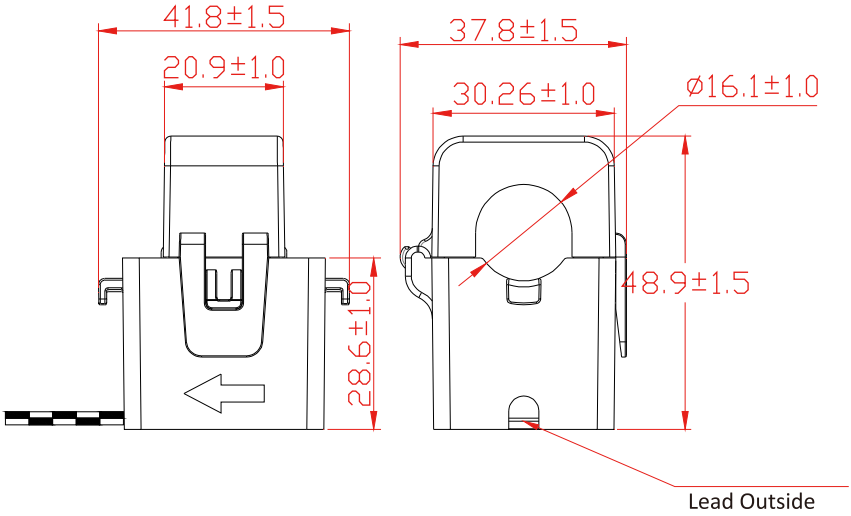
WIFI/RS232

This RS232 port is used to connect the wifi datalogger

11. Appendix II

Bulit-in current transformers

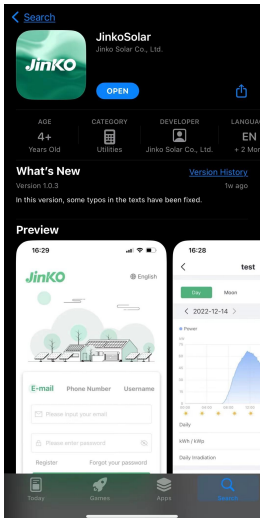
1. Split Core Current Transformer (CT) dimension: (mm)
2. Secondary output cable length is 4m.



12. App download

App QR code (For Android and IOS)

You can also download App from AppStore or Google play, Please search [JinkoSolar](No blank between [Jinko] and [Solar])



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