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# Preface

## Notice

The products, services or features you purchased shall be subject to the company's commercial contracts and terms. All or part of the products and services described in this document may not within the scope of your purchase. Unless additional terms and conditions in your contract, the company does not make any statement or guarantee on the contents of this document. In addition, the term "Product" as described in this document refers broadly to "ESI Series products"

## Save this Instruction

This manual must be considered as an integral part of the equipment. Customer can print the electronic version to hard copy and keeping properly for future reference. Anyone who operates the device at any time must operate in accordance with the requirements of this manual.

## Copyright Declaration

The copyright of this manual belongs to SHENZHEN SOFARSOLAR Co., Ltd. Any corporation or individual should not plagiarize, partially cope or fully copy (including software, etc.), not allow to duplication and publishment in any form and any way. All rights reserved, SOFARSOLAR reserves the right of final interpretation. This manual subject to modify according to user's or customer's feedback. Please check our website at <http://www.sofarsolar.com> for lasted version.

## Document Updates

V1.0    2023-01-10

## ● Outline

Please read the product manual carefully before installation,operation or maintenance.This manual contains important safety instructions and installation instructions that must be followed during installation and maintenance of the equipment.

## ● Scope of Validity




This product manual describes the installation, electrical connections, commissioning, maintenance and troubleshooting of ESI Series products.

## ● Target Group



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

## ● Symbols Used

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

	“Danger”indicates a hazardous situation which, if not avoided, will result in death or serious injury.
Danger	
	“Warning”indicates a hazardous situation which, if not avoided, could result in death or serious injury
Warning	
	“Caution”indicates a hazardous situation which, if not avoided, could result in minor or moderate injury
Caution	



	<p>“Attention” indicates there are potential risks, if fail to prevent, may lead to equipment cannot normally or property damage.</p>
<b>Attention</b>	
	<p>“Note” provides additional information and tips that are valuable for the optimal operation of the product, will help you to solve a problem or save your time.</p>
<b>Note</b>	

# 1. Basic Safety Information

## Outlines of this Chapter

Please read the instruction carefully. Faulty operation may cause serious injury or death .



Note

If you have any question or problem when you read the following information, please contact SHENZHEN SOFARSOLAR CO., Ltd.

## 1.1. Requirement for Installation and Maintenance

### Common Requirements

The product must be installed in full compliance with national and local power grid standards and regulations.

Before installing and adjusting the produce, please read all of instructions, cautions and warnings in this manual

Before connecting the product to the electrical utility grid, contact the local utility company for allowance. Also, this connection must be made only by qualified electrician.

When any maintenance or repair is required, please contact the nearest authorized maintenance center. If you don't know which service center is closest to you, please contact your local distributor. Don't repair the product by yourself, which may lead serious injury or damage.

Before installing and maintaining the device, using the DC switch to cut off the high voltage direct current of the photovoltaic array. Otherwise, the high voltage may cause serious injury.

- ✧ The product should be placed in a well-ventilated place. Do not place the product in a sealed or air-tight position or cabinet, otherwise it will affect the operation performance and system life of the energy storage system.
- ✧ Avoid direct sunlight. Do not place this product near stoves and fire sources. Otherwise, the lithium battery in the product system will leak or even explode.
- ✧ The maintenance personnel of this product must understand the knowledge and skills related to inverter and battery maintenance.
- ✧ ESI Series products are transformerless inverter which requires the positive pole and negative pole of the PV array are NOT grounded. Otherwise, it will cause inverter failure. In the PV system, all non-current-carrying metal parts (such as mounting frame, combiner box enclosure, etc.) should be connected to earthed.
- ✧ Caution: Comply with the following requirements during the installation and maintenance of the product:
  - ✧ A) Remove watches, rings and other metal objects from your body.
  - ✧ B) Use tools with insulated handles.
  - ✧ C) Wear rubber gloves and shoes.
  - ✧ D) Do not place tools or metal objects on the battery.
  - ✧ E) Close the inverter before connecting/disconnecting the battery and the energy storage inverter.
  - ✧ F) Battery +/- pole shall be isolated from ground.
- ✧ Installation and maintenance personnel requirements
- ✧ When the product is in the running state, some parts may be electrified and hot. Improper use, improper installation or operation may result in serious injury to person or property. Transport, loading, unloading, installation, start-up and maintenance operations must be performed by a qualified electrical engineer (all accident precautions in force in the user's country must be followed!) SOFARSOLAR will not be responsible for any personal injury or property injury

caused by improper use.

- ✧ Installation location requirement
- ✧ Please install the product according to the following section. Place inverter in an appropriate bearing capacity objects (such as solid brick wall, or strength equivalent mounting surface, etc.) and make sure inverter vertical placed. A proper installation location must have enough space for fire engine access in order for maintenance if faulty occur. Ensure the inverter is installed in a wall ventilated environment and have enough air cooling cycle. Air humidity should less than 90%.

### **Transportation Requirement**




Inverter is in the good electrical and physical condition when it ship out from factory. During transport, inverter must be placed in its original package or other proper package. Transportation company should responsible for any damage during transport period.

If you find any packing problems that may cause the damage of inverter or any visible damage, please notice the responsible transportation company immediately. You can ask your installer or SOFARSOLAR for help is necessary.



This product contains battery module through UN38.3, belongs to the ninth category of dangerous goods. Therefore, loading and unloading must comply with local laws and regulations and industry standards during transportation. Rough loading and unloading may cause short circuit or damage to batteries in containers, which may result in battery leakage, breakage, explosion, or fire.

### **Electrical Connection**



Please comply with all the current electrical regulations about accident prevention in dealing with the current inverter.

 <b>Danger</b>	<p>Before the electrical connection, use opaque material to cover the PV modules or disconnect PV string DC switch. PV arrays will produce dangerous voltage if it is exposure under sun. When installing a battery, check the positive and negative terminals of the battery and turn off the battery.</p>
 <b>Warning</b>	<p>All operation must accomplish by certified electrical engineer</p> <ul style="list-style-type: none"> <li>● Must be trained;</li> <li>● Completely read the manual operation and understand all information.</li> </ul>
 <b>Attention</b>	<p>Must get permission by local utility company before connecting to grid and the connection must be done by certified electrical engineers.</p>

## Operation Cautions

 <b>Danger</b>	<p>Touching the utility grid or the terminal conductors can lead to lethal electric shock or fire!</p> <p>Do not touch non-insulated cable ends, DC conductors and any live components.</p> <p>Attention to any electrical relevant instruction and document.</p>
 <b>Attention</b>	<p>Enclosure or internal components may get hot during operation. Please wear insulated gloves.</p>

## Maintenance and Repair Cautions


 <b>Danger</b>	<p>Before any repair work, turn OFF the AC circuit breaker between the product and electrical grid first, then turn OFF the DC switch. After turning OFF the AC circuit breaker and DC switch wait for at least 5 minutes before carry any maintenance or repair work.</p>
 <b>Attention</b>	<p>Product should not work again until removing all faults. If any repair work is required, please contact local authorized service centre. Should not open the product cover without authorized permit, SOFARSOLAR does not take any responsibility for that.</p>

## EMC/Noise Level





Electromagnetic compatibility (EMC) refers to that on electrical equipment functions in a given electromagnetic environment without any trouble or error, and impose no unacceptable effect upon the environment. Therefore, EMC represents the quality characters of an electrical equipment.

- The inherent noise-immune character: immunity to internal electrical noise
- External noise immunity: immunity to electromagnetic noise of external system

Noise emission level: influence of electromagnetic emission upon environment








 <b>Danger</b>	<p>Electromagnetic radiation from the product may be harmful to health! Please do not continue to stay away from the product in less than 20cm when it is working</p>
--	---




## 1.2. Symbols and signs

 <b>Danger</b>	<p>High voltage of inverter may be harmful to health! Only certified engineer can operate the product; Juveniles, Disable, should not use this product; Keep this product out of the reach of children;</p>
 <b>Caution</b>	<p>Caution of burn injuries due to hot enclosure! Only touch the screen and pressing key of the product while it is working</p>
 <b>Attention</b>	<p>PV array should be grounded in accordance to the requirements of the local electrical grid company</p>
 <b>Warning</b>	<p>Ensure the maximum DC voltage input is less than the product's maximum DC voltage (including in low temperature condition). Any damage cause by over-voltage, SOFARSOLAR will not take the responsibility including warranty</p>

The product has some safety symbols on it. Please read and fully understand the content of the symbols before installation.

### Sings on the inverter module

Symbols	Name	Explanation
	This is a residual voltage in the inverter module!	After disconnect with the DC side, there is a residual voltage in the inverter module, operator should wait for 5 minutes to ensure the capacitor is completely discharged.
	Caution of high voltage and electric shock	The inverter module operates at high voltages. Prior to performing any work on the product, disconnect the product from voltage sources. All work on the product must be carried out by qualified persons only.
	Caution of hot surface	The inverter module can get hot during operation. Avoid contact during operation. Prior to performing any work on the product, allow the product to cool down sufficiently
	Comply with European standard (CE) certification	The product comply with the CE Certification
	Grounding Terminal	Connect the inverter module to the ground bar for grounding protection
	Observe the documentation	Read all documentation supplied with the product before install
	Positive pole and negative pole	Positive pole and negative pole of the input voltage (DC)

	Temperature	Indicated the temperature allowance range
	This side up	Inverter must always be transported, handled and stored in such a way that the arrows always point upwards.
	RCM (Regulatory Compliance Mark)	The product complies with the requirements of the applicable Australian standards



## 2. Product Introduction

### 2.1. Product overview

#### 2.1.1. Product brief introduction

ESI 3-6K-S1 series inverters support multi-power segment operation. Including PV, energy storage, grid connection, EPS and other corresponding functions in one. PV is two independent MPPT tracking channels, suitable for different installation environments. The ESI 3~6K-S1 inverter can be installed with or without batteries. If the inverter needs to be used with batteries, it can only use BTS 5K battery model. The battery type is LiFePO<sub>4</sub> (LFP), which is one of the lithium battery types. The maximum energy storage capacity is 5KWH-30KWH. The inverter has the advantages of multiple working modes in operation. Under different modes, energy can be managed and distributed according to the actual situation to meet different needs. Display screen support touch function, multi-language display, use process is more user-friendly. Flexible monitoring mode, support RS485. At the same time: WIFI/Bluetooth remote control function.

Notes: Inverter has not been tested to Section 5 of AS/NZS 4777.2:2020 so the inverter has not been tested to AS/NZS 4777.2:2020 for multiple inverters combinations.

The main features are as follows:

- Stack integrated design, convenient installation, simple maintenance;
- Photovoltaic maximum input current 16A, applicable to large current and double-sided module;
- UPS function to ensure the stable operation of critical load;
- Supports battery switch off with a button;

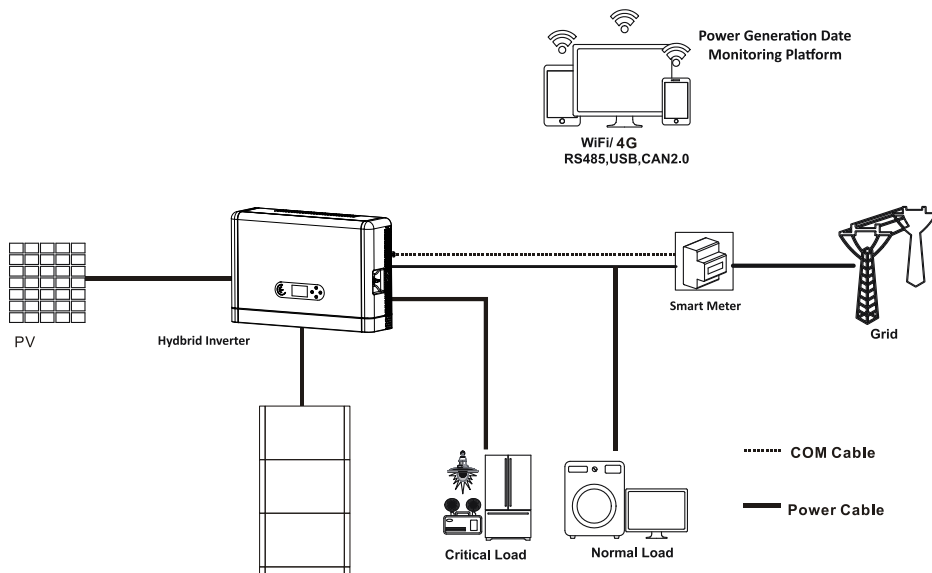


Figure 2.1.1-1 ESI Inverter application principle diagram

## 2.2. Product Model Description

ESI series inverter model:

**ESI 5K-S1**

① ② ③

Figure 2.2-1 Inverter Model Identifiers

Table 2.2-1 Inverter Model demonstration

Identifiers	Meaning	Specification
①	Product Model	Stacked optical storage all in one machine

②	Power Grade	5K, the power grade of inverter is 5kw Power grade list : 3kw/3.68kw/4kw/4.6kw/5kw/6kw
③	Inverter Model	Single-phase hybrid energy storage inverter

## 2.3. Product Appearance

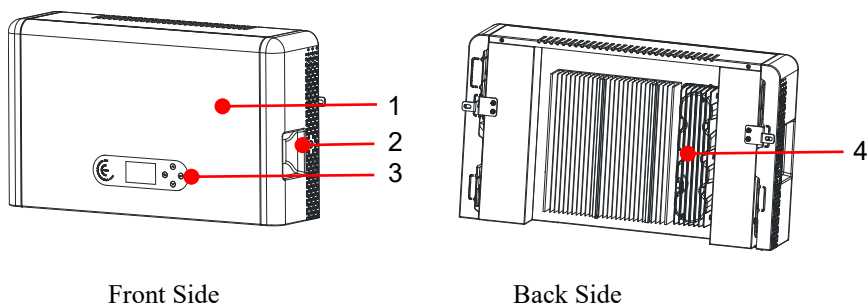


Figure 2.4-1 Product front side and back side

1 Inverter

2 DC Switch

3 LCD display screen

4 Inverter Radiato

## 2.3.1. Inverter Port

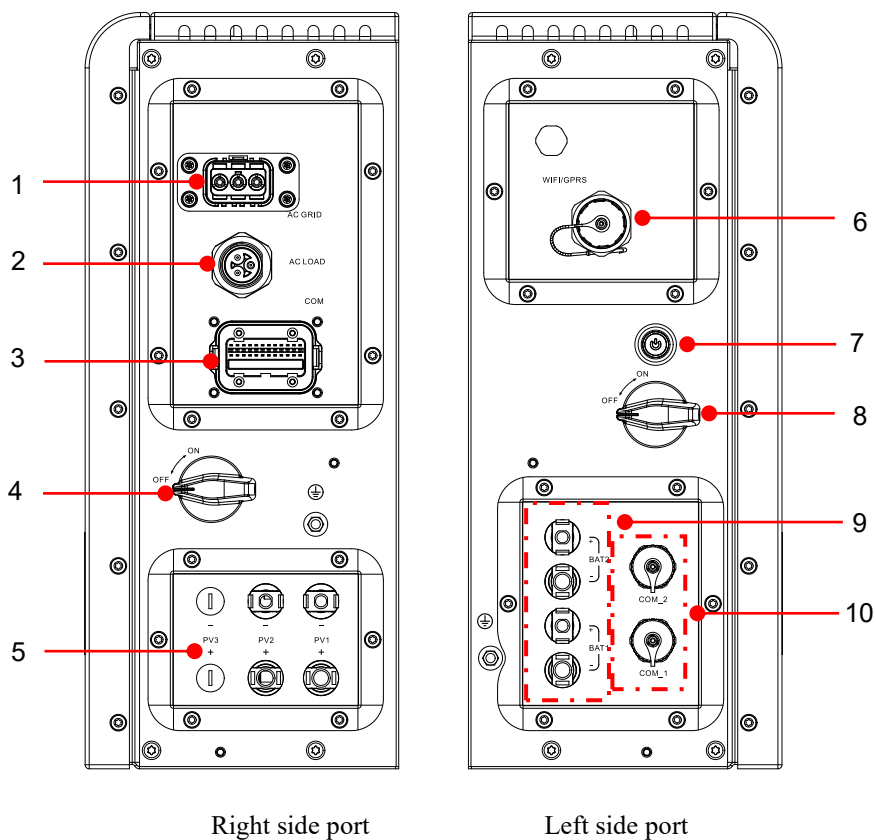


Figure 2.4.1-1 Inverter port diagram

- |                        |                           |                              |             |
|------------------------|---------------------------|------------------------------|-------------|
| 1 Grid connection port | 2 Load connection port    | 3 Inverter signal port       | 4 DC Switch |
| 5 PV input port        | 6 WIFI/4G port            | 7 Battery black start switch |             |
| 8 Battery input switch | 9 Battery connection port | 10 Battery signal port       |             |

## 2.4. Buttons and indicator lights

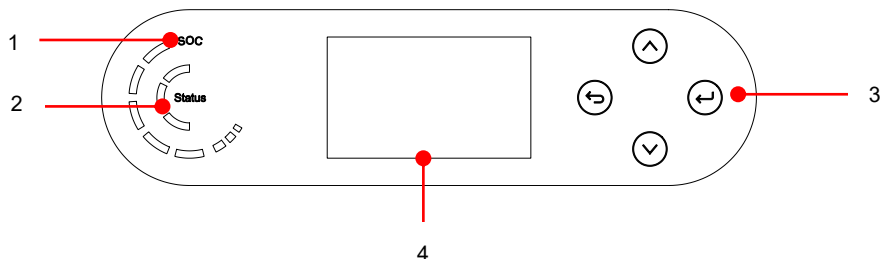






Figure 2.5-1 Buttons and indicator lights

1 System power indicator 2 System status indicator 3 Buttons 4 LCD screen






### 2.4.1.Buttons

- ✧ Press  “back” to the previous screen or enter the main interface.
- ✧ Press  “up” to the upper menu option or value plus 1.
- ✧ Press  “down” to the lower menu option or value minus 1.
- ✧ Press  “ok” to select the current menu option or switch to the next digit.

### 2.4.2.System status indicator

System Status	Indicator		
	Blue light	Green light	Red light
On-grid	ON		
Standby(On-grid)	Flashing		
Off-grid		ON	
Alarm			Flashing

### 2.4.3.Battery capacity indicator

Icon	Battery capacity	Capacity explanation
	80%-100%	The battery capacity is full
	60%-80%	
	40%-60%	
	20%-40%	
	0-20%	The battery capacity is insufficient, and the battery generates a low voltage alarm.

## 2.5. Product label



 Inverter Module	
Model No:	ESI 5K-S1-A
Max.DC Input Voltage	550V
Operating MPPT Voltage Range	85~520V
Max.PV Isc	2x22.5A
Battery Voltage Range	300~435V
Rated Battery Voltage	400V
Max.Charging/Discharging Current	20A
Max.Charging/Discharging Power	5000W
Rated Grid Voltage	230V,50/60Hz
Rated Output Voltage	230V,50/60Hz
Rated Output Current	21.7A
Max.Output Current	22.7A
Power Factor	1(adj. +/-0.8)
Rated Output Power	5000W
Rated Apparent Power	5000VA
Backup Rated Current	21.7A
Backup Rated Apparent Power	5000VA
Ingress Protection	IP65
Operating Temperature Range	-10 ~ +50°C
Protective Class	Class I
Inverter Topology	Non-Isolated
Overvoltage Category	AC III, DC II
MADE IN CHINA	
Manufacturer : Shenzhen SOFARSOLAR Co., Ltd. Address : 11/F., Gaixinqi Technology Building, No.67 Area, Xingdong Community, Xin'an Sub-district, Bao'an District, Shenzhen City, China VDE-AR-N4105, G99, AS/NZS 4777.2, CERTIFICATE NO.: EESS-220609-0	
	

Figure 2.5-1 Inverter label

## 3. Product Installation

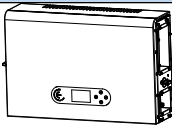

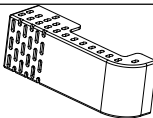
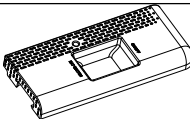
### 3.1. Checking Before Installation

#### Checking Outer Packing Materials

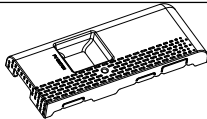
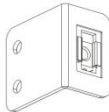
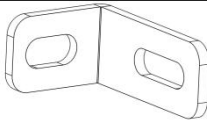
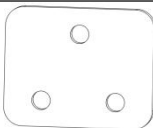
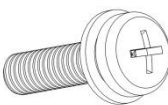
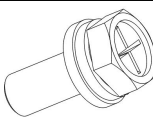
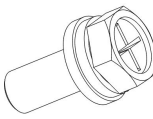

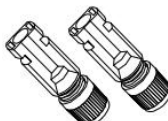
Before opening inverter package, check whether the outer package is damaged, such as holes and cracks, and check the inverter and battery model. If any damage is found or the inverter model does not match your requirements, please do not open the product package and contact your distributor as soon as possible.



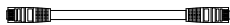




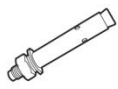
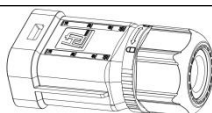
#### Inverter module packing list



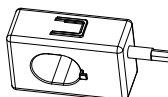
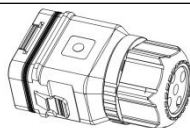



Before installation, carefully check whether the packaging and accessories are intact. Includes the following accessories: :

No	Pictures	Description	Quantity
1		Inverter	1pcs
2		Pedestal	1pcs
3		Pedestal cover	2pcs
4		Left side cover	1pcs






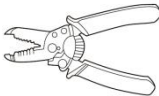

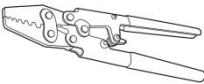
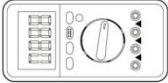
5		Right side cover	1pcs
6		Hanging rack	2pcs
7		Fixed support rack B	2pcs
8		Side connector	2pcs
9		SEM screw M4*10	6pcs
10		Hexagon screws M5*10	4pcs
11		Hexagon screws M6*14	4pcs
12		PV+ input terminal	2pcs
13		PV- input terminal	2pcs



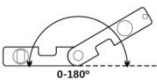



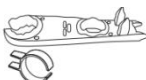

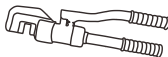
14		Metal terminals secured to PV+ input power cables	2pcs
15		Metal terminals secured to PV- input power cables	2pcs
16		Parallel connection cable	1pcs
17		Battery positive terminal + input terminal plastic case	1pcs
18		Battery negative terminal + input terminal plastic case	1pcs
19		Battery positive + input terminal metal core	1pcs
20		Battery negative - Input terminal metal core	1pcs
21		M6*60 Expansion bolt	3pcs
22		AC connector	1pcs

23		Load connector	1pcs
24		Single phase electronic rail mounting meter & current transformer (CT)	1pcs (optional)
25		Current transformer (CT)	1pcs
26		COM 24pin connector	1pcs
27		Manual	1pcs
28		The warranty card	1pcs
29		Quality Certificate	1pcs

## 3.2. Installation Tools

Before installation, prepare the following tools:

NO	Tool	Model	Function
1		Hammer drill Recommend Drill @ Φ8mm	Used to drill holes on the wall.
2		Screwdriver	Remove and install screws and wires
3		Cross screwdriver	Remove and install screws and wires
4		Wire stripper	Used to peel cable
5		M6 socket head wrench	Secure the backplane and inverter
6		Crimping Tool	Use to crimp cable on grid side, load side and CT extensive cable
7		Multimeter	Check whether the cable connection is correct, the positive and negative terminals of the battery are correct, and the grounding is reliable

8		Marker	Mark signs
9		Measuring tape	Measure distance
10		Level	Ensure the rear panel is properly installed
11		ESD gloves	Installer wear when installing product
12		Safety goggles	Installer wear when drill holes
13		Mask	Installer wear when drill holes
14		Removal Tool	Remove the output terminal of the battery module
15		sleeve	Install Fixed support rack
16		Crimping tools	Used to crimp OT connector

### 3.3. Installation environment

- ✧ Choose a dry, clean, neat and convenient location for installation.
- ✧ Machine ambient temperature:  $-10^{\circ}\text{C}\sim 50^{\circ}\text{C}$ ;
- ✧ Relative humidity: 5-95% (non-condensing);
- ✧ The product should be placed in a well-ventilated place;
- ✧ There are no inflammable and explosive objects near the installation position of the product;
- ✧ The product system inverter AC over-voltage level is three;
- ✧ The highest altitude of the installation environment is 4000m.

The installation position of the product should be chosen to avoid direct sunlight, snow position

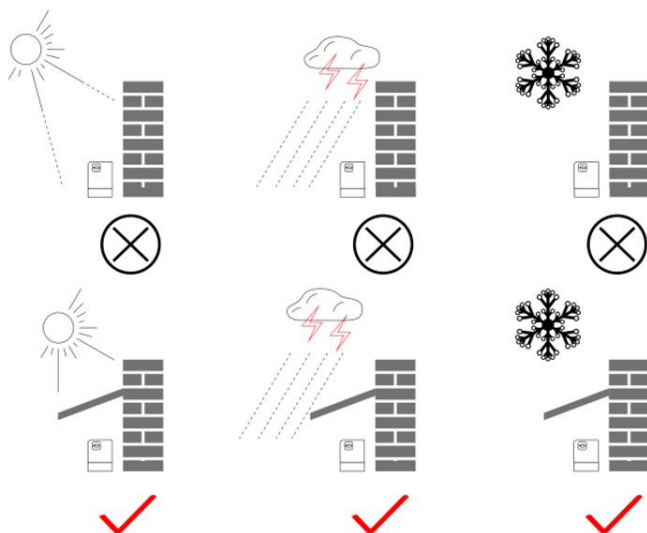


Figure 3.3-1 Installation Environment Diagram

### 3.4. Installation Space

To ensure sufficient space for installation and heat dissipation, reserve sufficient space

around the ESI series household energy storage system. The requirements are as follows:

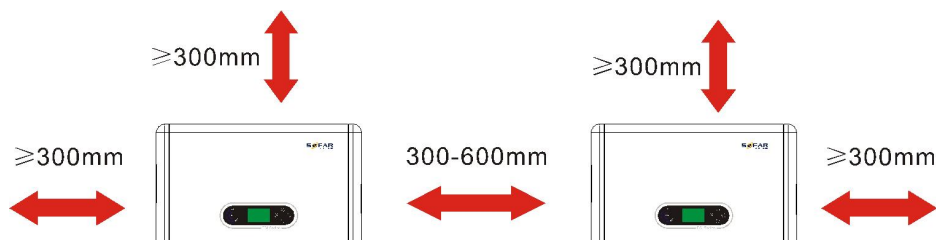


Figure 3.4-1 Installation space diagram

### 3.5. Product Installation

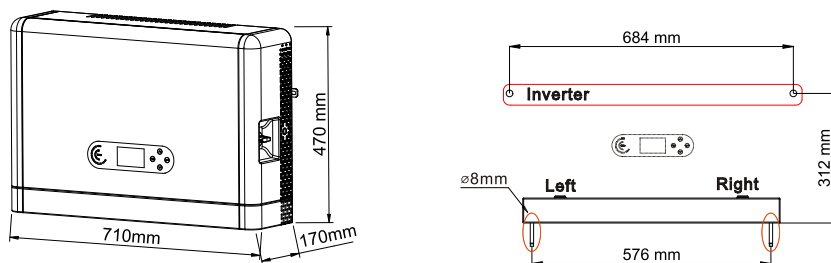


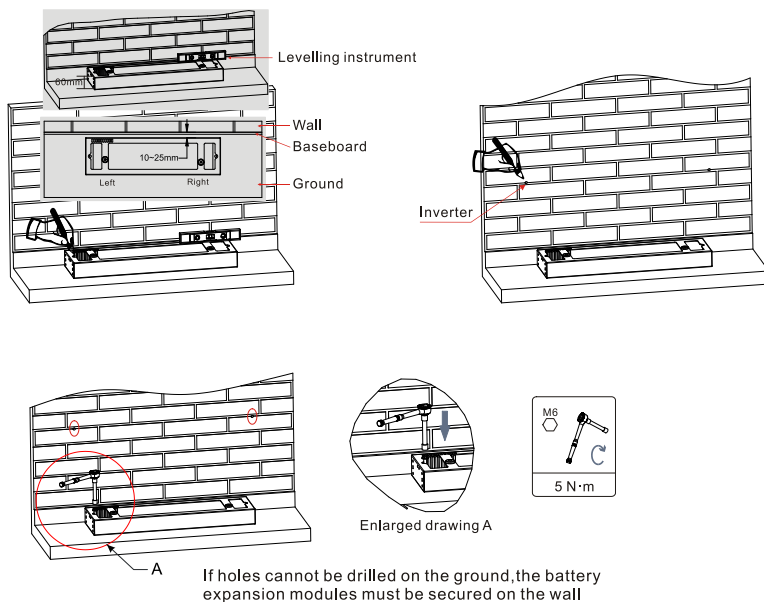
Figure 3.5-1 ESI series installation dimensions diagram

#### ● Pedestal installation

Procedure:

- 1) Place the pedestal against a wall and keep it 10 to 25mm away from the wall. Adjust the hole positions using a level, and mark the hole positions using a marker.
- 2) To install the pedestal, remove the pedestal, drill holes using a hammer drill ( $\varnothing 8\text{mm}$ , depth range 60-65 mm), and tighten expansion screws to ensure that the base is securely installed.

- 3) Use a marker to mark holes for securing the inverters based on the dimensions shown in Figure 3.5-1.



## ● Inverter installation

Procedure:

- 1) Align the inverter on the floor pedestal.
- 2) Install connectors on both sides and tighten the six screws using a cross screwdriver.



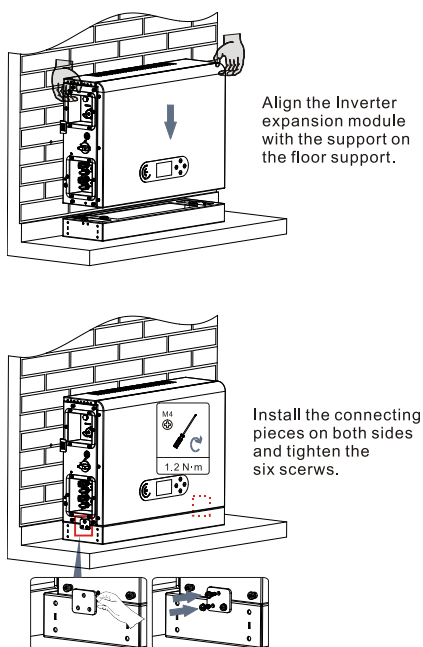


Figure 3.5-3 inverter installation diagram

### ● Support rack installation:

Procedure:

- 1) Drill holes with a hammer drill ( $\varnothing$  8mm, depth range 60-65 mm). Reposition and drill the holes, if the original one has a large deviation.
- 2) Connect and fix the rack with M6\*16 screws.

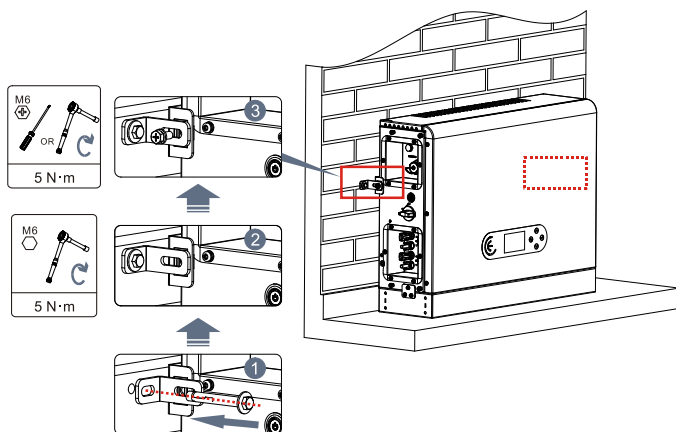




Figure 3.5-4 Schematic diagram of wall fixing installation

## 4. Electrical Connection

### 4.1. Attentions Before Connection

	<p>The voltage in the power conversion circuit of this product is very high. Fatal danger of electric shock or severe burns. All electrical connections of photovoltaic modules, inverters and battery systems must be carried out by qualified personnel.</p>
<p>Attention</p>	<p>Wear rubber gloves and protective clothing (protective glasses and boots) when operating high voltage/current systems such as inverters and battery systems.</p>
	<p>This product is mainly applied to photovoltaic energy storage systems for household use. If not used according to the instructions, the protection provided by the equipment may be damaged.</p>
<p>Attention</p>	

### 4.2. Preparation of Connection Cables

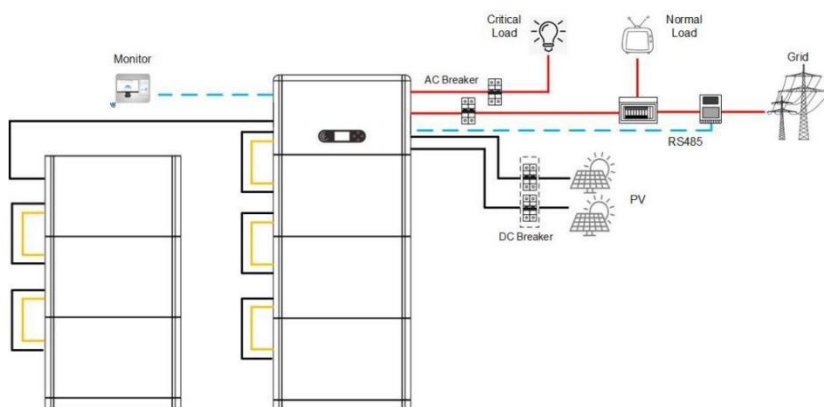


Figure 4.2-1 System connection diagram

Table 4.2-1 Cables prepared by customers

No	Cable	Recommended specifications
1	PV connection cable	UL10269 12AWG
2	AC Grid connection cable	UL10269 8AWG
3	EPS connection cable	UL10269 10AWG
4	Grounding cable	UL10269 8AWG

## 4.3. Electrical Connection for Internal System

### 4.3.1. Internal protection grounding cable connection

Connect the grounding cables of the battery module and inverter as shown in Figure 4.3.1-1.

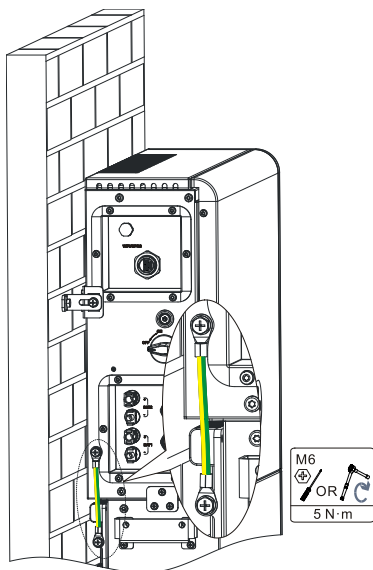


Figure 4.3.1-1 Internal grounding cable connection

### 4.3.2.Power cables connection

As shown in Figure 4.3.2-1, connect the power ports (BAT+,BAT-) of the inverter to the cascading positive and negative power cables (B+,B -) of the battery module.

#### Precautions during installation :

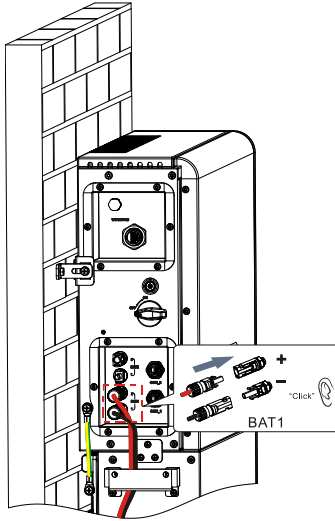


Figure 4.3.2-1 Connection of battery internal DC terminal

### 4.3.3.Internal communication cable connection

Connect the communication terminals of the inverter and battery module from top to bottom according to 4.3.3-1 in the following figure, and secure them with cable ties. In addition, install a matching resistor on the communication interface of the last battery module in the system.

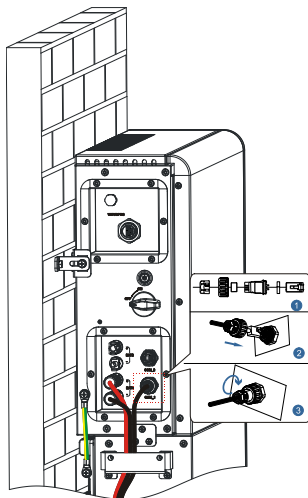


Figure 4.3.3-1 Internal signal cable connection

#### 4.3.4.Data collector connection

Connect the standard WIFI/4G stick in the inverter package according to 4.3.4-1 in the following figure.

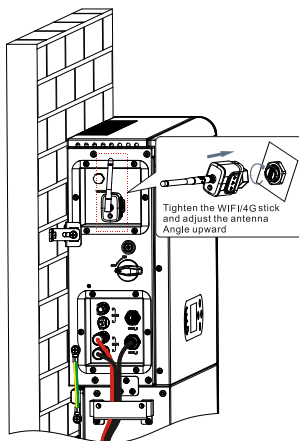


Figure 4.3.4-1 WIFI/4G connection

## 4.4. External Electrical Connection

### 4.4.1.External ground Connection of the PGND cable

#### Procedure 1 Crimp OT terminals

##### Precautions:

- When stripping the cable, do not scratch the core of the cable.
- The conductor crimping plate of an OT terminal is pressed to form a cavity that completely covers the conductor core and tightly binds the OT terminal.
- The crimping line can be covered with heat shrink tubing or insulation tape.

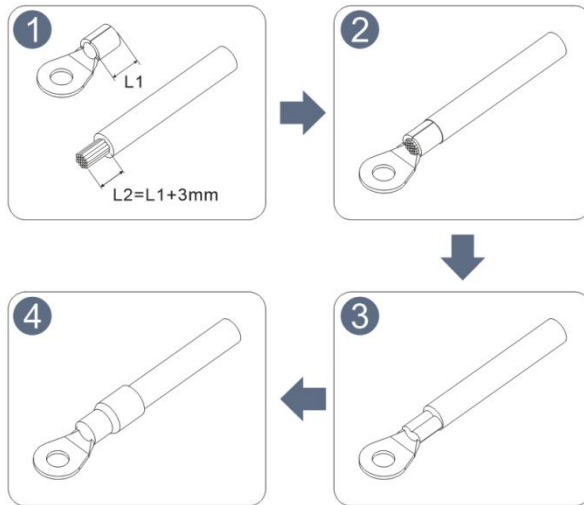


Figure 4.4.1-1 Diagram of Crimping OT terminals

Procedure 2 The OT terminal is crimped properly, and the ground cable is connected to the position shown in the following figure.

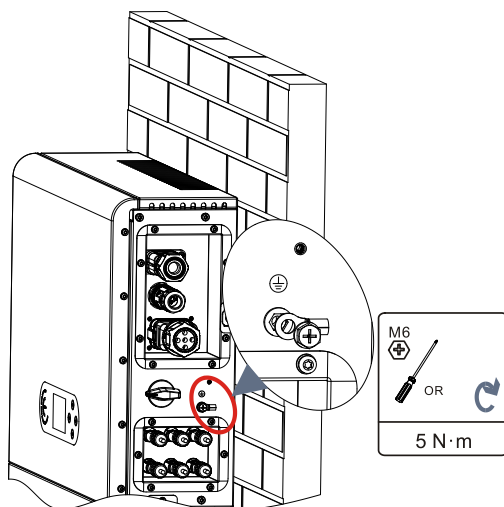


Figure 4.4.4-2 Connect the grounding wire

## 4.4.2.PV module connection

Recommended DC input cable specifications

CAS (mm <sup>2</sup> )		External cable diameter(mm <sup>2</sup> )
Range	Recommended value	
4.0~6.0	4.0	4.5~7.8

## Connection Procedure:

**Step 1:** Prepare PV positive and negative power cables;



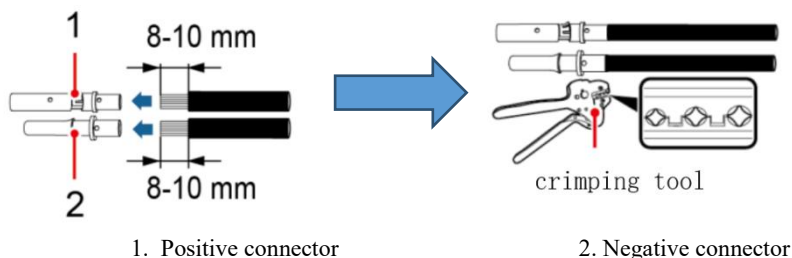


Figure 4.4.2-1 Prepare PV positive and negative power cable

**Step 2 :** Insert the crimped photovoltaic positive and negative power cable into the corresponding photovoltaic connector.

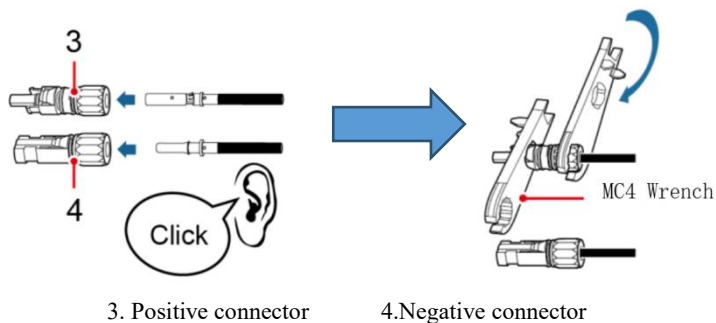


Figure 4.4.2-2 Prepare PV positive and negative connectors

**Step 3 :** Ensure that the DC voltage of each PV string is less than 600V and the polarity of PV cables are correct. Insert the positive and negative connectors into the corresponding PV region of the ESI series inverter until a click is heard. As the figure 4.4.2-3 showing.

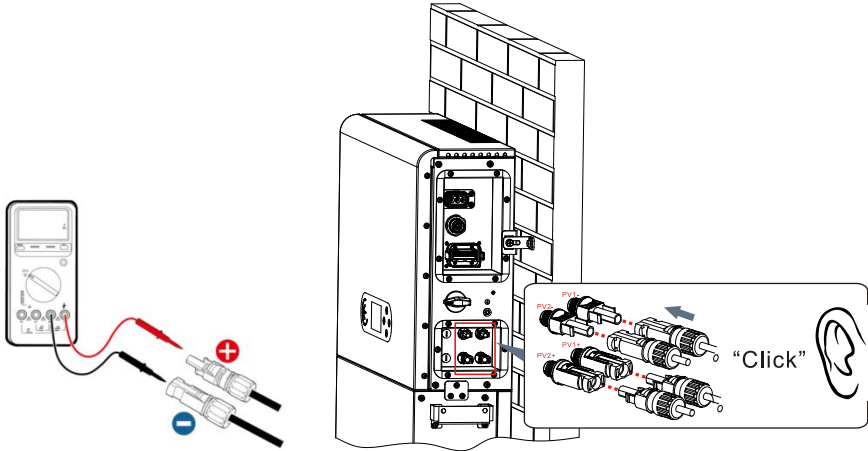


Figure 4.4.2-3 Connect PV connector


**Caution**

Ensure that the DC switch is turned off before removing the PV positive and negative connectors.

### Follow-up Step

Disconnect the PV connector using an MC4 wrench, as shown in Figure 4-6.

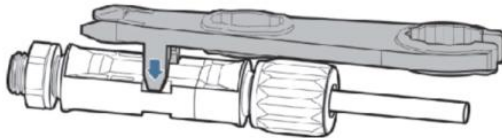


Figure 4.4.2-4 Disconnect PV connectors

## 4.4.3. Grid connection

### Install AC wiring terminals

Take out AC wiring terminals from the carton of the inverter, strip and install cables

according to the cable specifications listed in Table 4.2-1

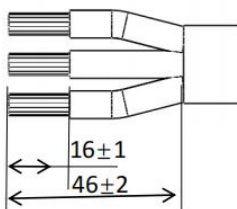
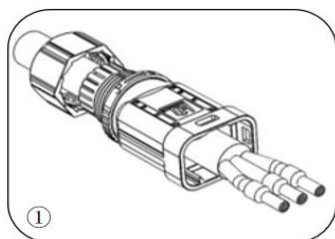
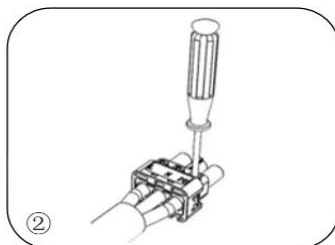


Figure 4.4.3-1 Wire stripping size

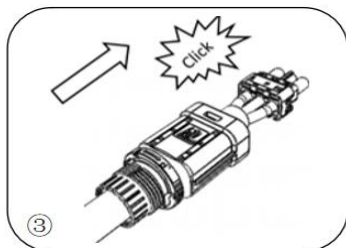
## Installation Step



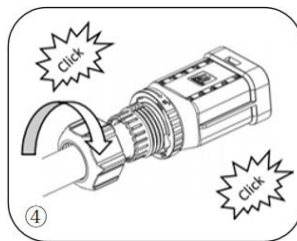
After riveting the peeling wire to the insulation terminal, thread it into the



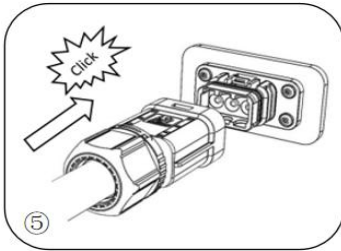
Insert the cable into the rubber core according to the wire sequence, make the insulation terminal flush with the surface of the rubber core, and press the screw torque  $2.0 \pm 0.1 \text{ n.m}$



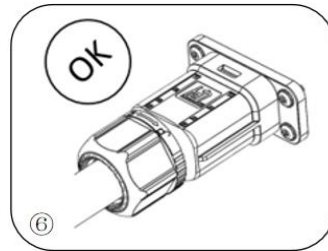
The body is inserted into the core and a click is heard



Tighten the nut with an open wrench and make a "click" sound



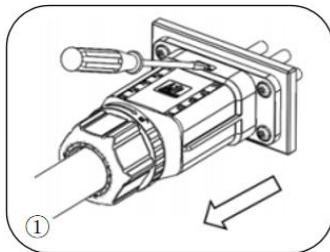
Insert the female end of the wire into the male end and hear a "click" sound



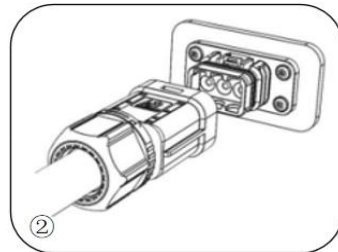
Installation complete

Figure 4.4.3-2 Installation Procedure Diagram

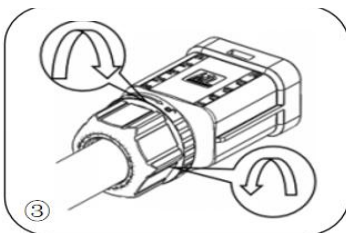
## Removal Step



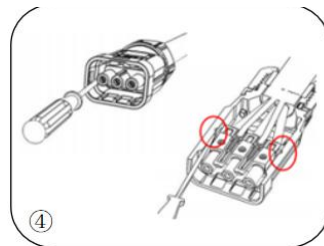
Use a screwdriver to point at the unlocking position, hold the cable driver, and pull it back to separate the male and female



The female connector is separated from the board connector



Hold the unlocking buckle with one hand and rotate it in the direction indicated, while rotate the nut in the opposite direction with the other hand



Remove the red circles on both sides using a screwdriver

Figure 4.4.3-3 Removal procedure

Connect the AC wiring terminals to the corresponding AC Grid ports, as shown in the following figure.

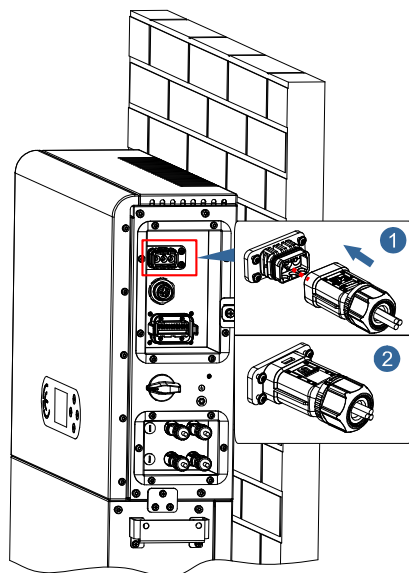


Figure 4.4.3-4 Grid connection

#### 4.4.4.EPS connection

According to the cable specifications given in Table 4.4.1, peel the cable according to the following figure 4.4.4-1. Then install the EPS connector according to 4.4.4-2. Finally, insert the installed EPS connector into the corresponding position of the inverter according to Figure 4.4.4-3.

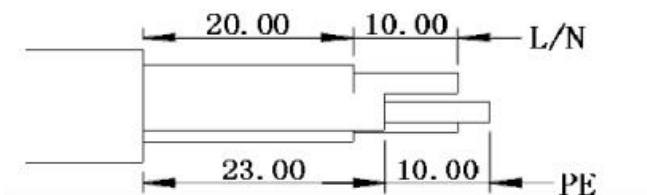
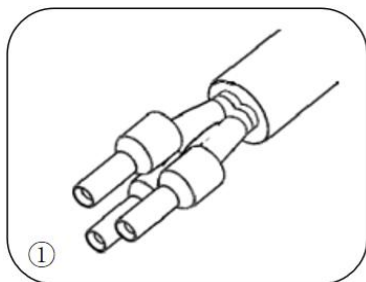
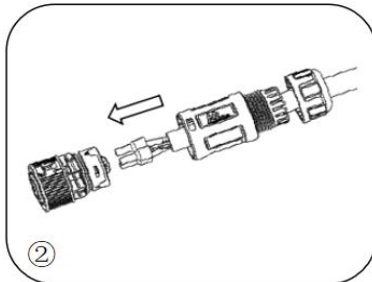


Figure 4.4.4-1 Stripping diagram

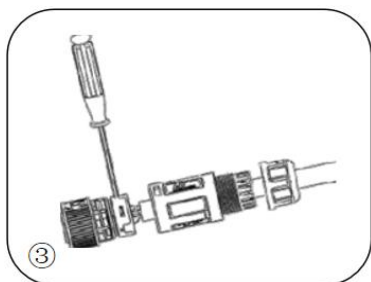
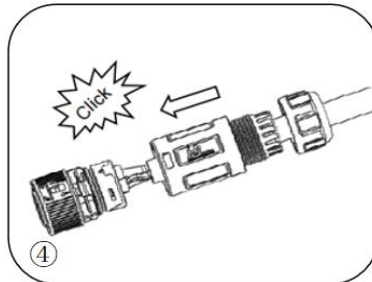
## Install procedure



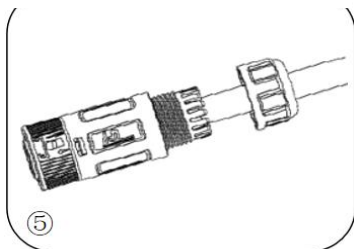
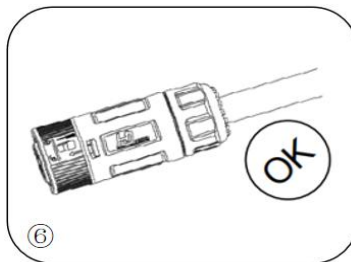
Crimp terminal



Insert the cable into the butt terminal


 Crimp the wire with an inner hexagon screwdriver with a screw torque of  $1.2 \pm 0.1\text{n.m}$ 


Insert the subject into the corresponding clasp and hear a "click"


 Screw locking nut into main body,  
torque  $2.5 \pm 0.5\text{n.m}$ 


Installation complete

Figure 4.4.4-2 EPS Connector installation

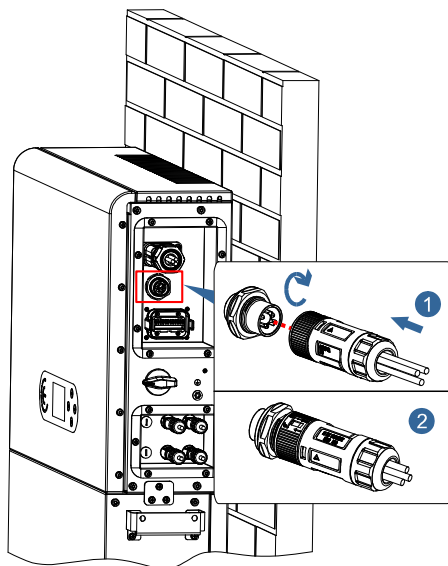


Figure 4.4.4-2 EPS connection

#### 4.4.5.COM-Multi function communication connection

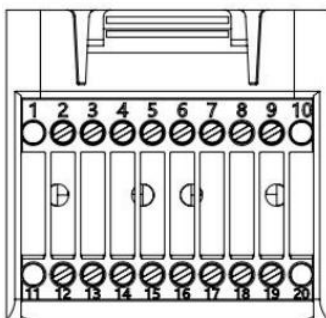


Figure 4.4.5-1 COM port diagram

Table 4.4.5-1 Port description

PIN	Definition	Function	Comment
-----	------------	----------	---------

1	N/A	N/A	
2	UC-A	RS485 differential signal -A	Inverter monitoring 485 signal
3	UC-B	RS485 differential signal -B	
4	EN+	RS485 differential signal +	Battery 485 signal
5	EN-	RS485 differential signal -	
6	MET-A	RS485 differential signal -A	Smart meter 485 signal
7	MET-B	RS485 differential signal -B	
8	CANH	CAN high data	Battery CAN communication signal
9	CANL	CAN low data	
12	GND	Logic interface signal	(DRMS) Logical interfaces ues for below standard Australia (AS4777) , Europe General (50549) , German (4105)
13	DRMS 1/5		
14	DRMS 4/8		
15	DRMS 2/6		
16	DRMS 0		
17	DRMS 3/7		
18	CT+	Current transformer output positive terminal	Current transformer communication signal
19	CT-	Current transformer output negative pole	
20	N/A	N/A	

Link Port



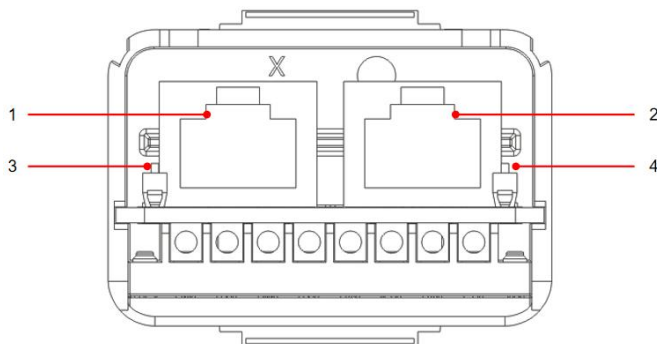


Figure 4.4.5-2 Link Port diagram

Table 4.4.5-2 Link Port description

Icon	Define	Function	Comment
1	Link Port 1	Parallel signal output	Parallel signal port (RJ45)
2	Link Port 0	Parallel signal input	
3	Link Port 1 dip switch	Match resistance on and off	The dial switch has 0 (dial up) and 1 (dial down). 1 means on and 0 means off
4	Link Port 0 dip switch		

The wire stripping is divided into 2 to 9 holes and 12 to 19 holes. The wire stripping size is defined according to the cable connection position

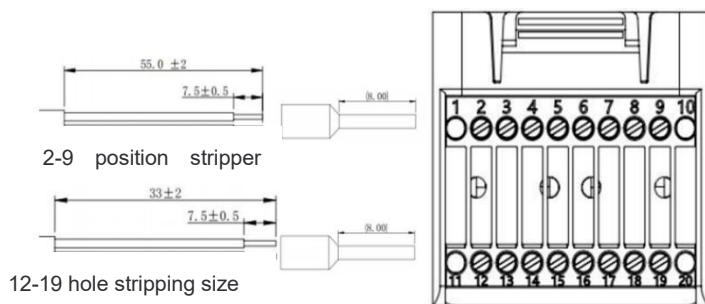


Figure 4.4.5-2 Schematic diagram of wire stripping size

## 1. RS485 (Wired monitoring or inverter cascade monitoring)

Refer to the figure shown below, connect the RS485+ and RS485- of the inverter to the TX+ and TX- of the RS485 → USB adapter, and connect the COM port of the adapter to the computer. (NOTE : The length of the RS485 communication cable should be less than 1000 m)

Connect pins as shown(2pin and 3pin)

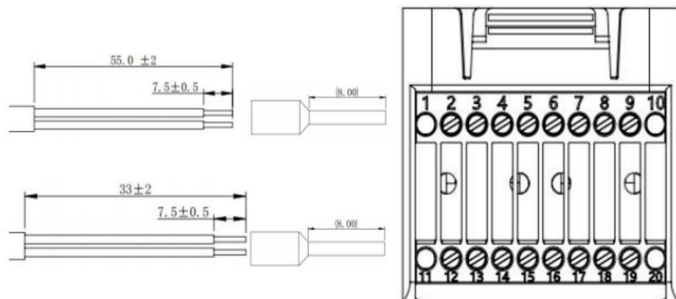


Figure 4.4.5-3 RS 485 wiring diagram

RS485 wires are connected in parallel between inverters, (NOTE : When multiple inverters are connected via RS485 wires, set communication address to differentiate the inverters , please refer to this manual<6.3.1System setting→8.Communication Addr>)

## 2. Logic interface

The logic interface pin definitions and circuit connections are as follows:

Logic interface pin are defined according to different standard requirements

- Logic interface for AS/NZS 4777.2:2020, also known as inverter demand response modes (DRMs).

The inverter will detect and initiate a response to all supported demand response commands within 2 s. The inverter will continue to respond while the mode remains asserted.

Table 4-6 Function description of the DRMs terminal

Pin NO.	Function
12	GND

13	DRMS 1/5
14	DRMS 4/8
15	DRMS 2/6
16	DRMS 0
17	DRMS 3/7

- b) Logic interface for EN50549-1:2019, is in order to cease active power output within five seconds following an instruction being received at the input interface.

The inverter can be connected to a RRCR (Radio Ripple Control Receiver) in order to dynamically limit the output power of all the inverters in the installation.

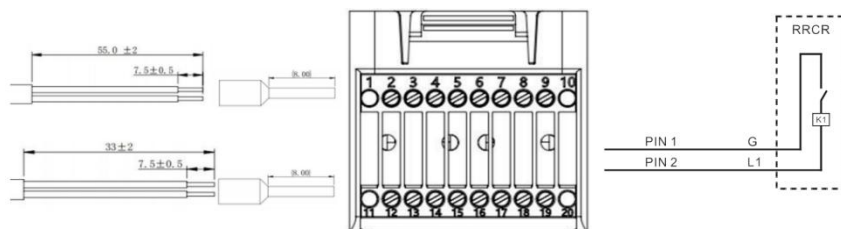


Figure 4.4.5-4 DRMs wiring diagram

Table 4-9 Function description of the terminal

COM Pin NO.	Pin name	Description	Connected to (RRCR)
PIN 13(PIN2)	L1	Relay contact 1 input	K1 - Relay 1 output
PIN 12(PIN1)	G	GND	K1 - Relay 1 output

Table 4-10 The inverter is preconfigured to the following RRCR power levels,close is 1, open is 0

L1	Active Power	Power drop rate	Cos(φ)
1	0%	<5 seconds	1
0	100%	/	1

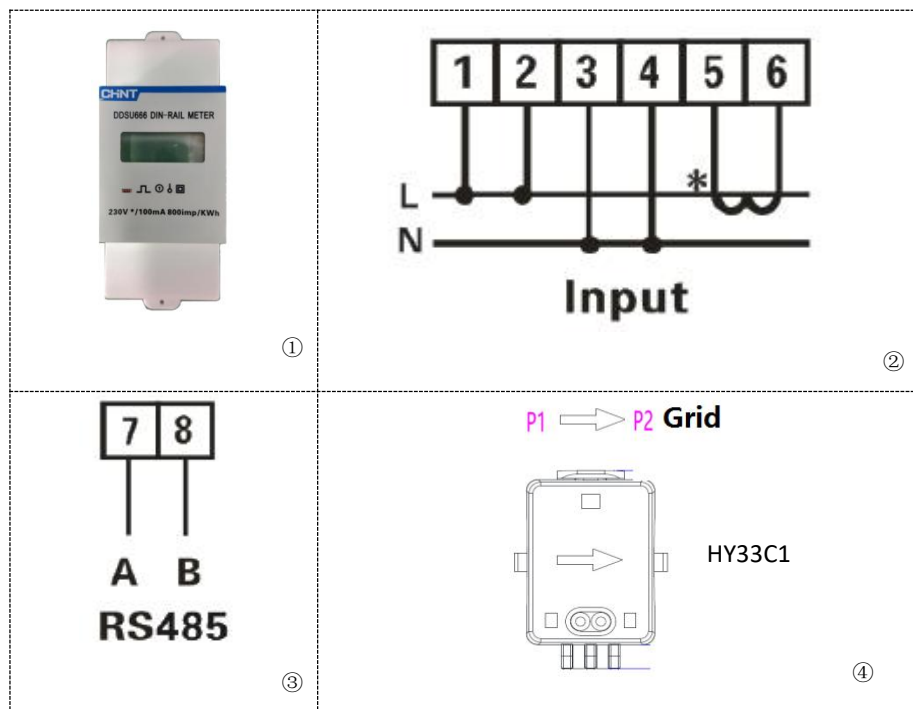
### 3.Meter/CT

PIN5 and PIN6 of COM are used for meter communication, the electricity meter is shown in the fig.①, PIN5 and PIN6 correspond to 7, 8 respectively on the electricity meter, as shown in fig.③.

The connection mode is shown in fig.②. The 1/2 and 3/4 on the electricity meter are connected to voltage signals L and N respectively. And the current needs to be connected through the current transformer, 5, 6 correspond to the current transformer.

NOTE:The direction of the current transformer is shown in fig.④.

Fig. Meter



If you need to use the CT alone, attach the CT to PIN18 and PIN19.

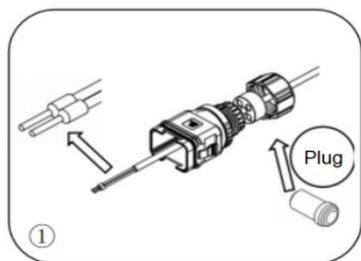
There are two ways to get grid current information :

Plan A:CT(default)

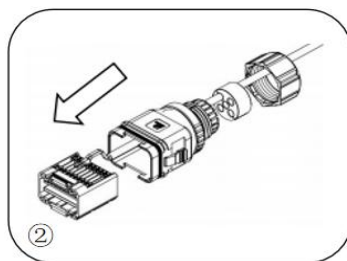
Plan B:Meter +CT

If you need to use the meter +CT scheme, please contact SOFARSOLAR staff to purchase the appropriate meter and CT.

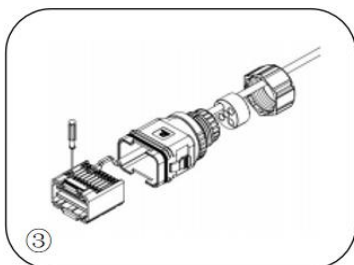
## COM Installation procedure for connecting cables



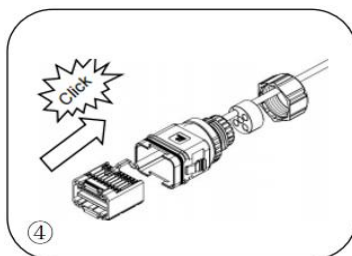
Remove the plug from the plug and thread the terminal in the order shown



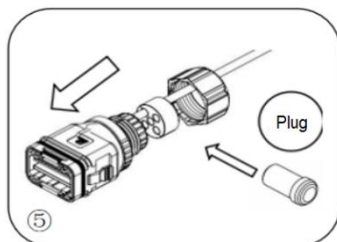
Insert the wire into the corresponding terminal



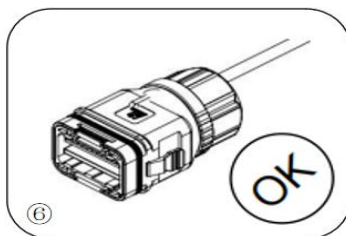
Crimp the wire with a flat-head screwdriver with a torque of  $1.2 \pm 0.1 \text{ n.m}$



Line core, rubber core area can not appear riding line phenomenon, rubber core into the main body with a "click" sound



Insert the plug into the body and plug the unwired hole



Screw the lock nut into the main body, torque  $2.5 \pm 0.1 \text{ mm}$ , complete installation

Figure 4.4.5-5 Procedure for connecting COM cables

Insert the stripped COM connector into the corresponding port of the inverter, as

shown in the following figure.

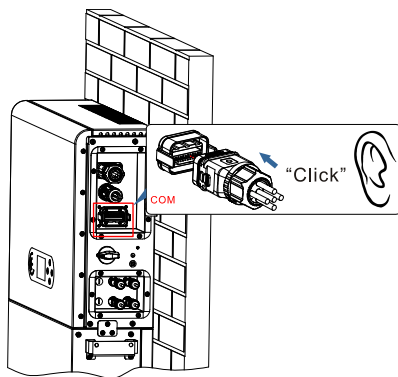


Figure 4.4.5-6 COM connection

#### 4.4.6.Smart Meter /CT

Refer to the COM interface description in table 4.1, the RS485A and RS485B of the electricity meter should be connected to pin6 and pin7 of the COM port of the inverter.



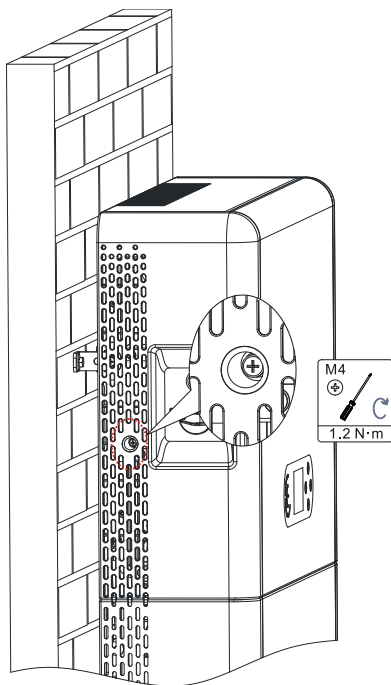


Figure 4.5-1 Install the cover

## 4.6. Parallel system

Refer to figure 4.6-1 below and connect the system in parallel according to the success of the master and slave (up to 6 units). The dip switch inside the COM 24PIN connector of the last system inverter should be moved to the position of 1.



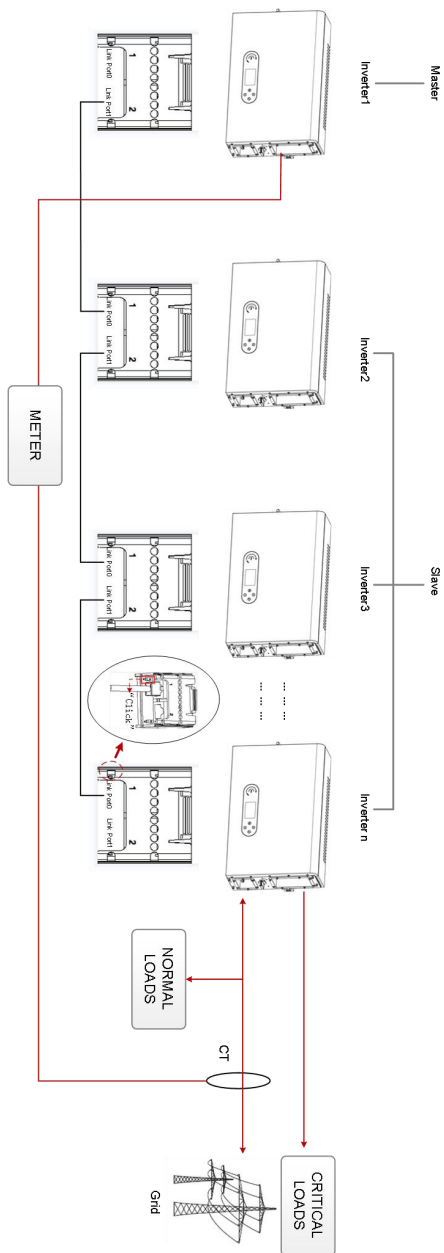


Figure 4.6-1 System parallel diagram

## 4.7. System Electrical Topology

SOFARSOLAR has already integrated RCMU (residual current monitoring unit) inside inverter, If an external RCD is required, a type-A RCD with rated residual current of 100mA or higher

ESI series household energy storage system is mainly composed of PV modules, BTS 5K battery modules, inverters, AC switches, load and distribution units, smart meters /CT, and power grid.

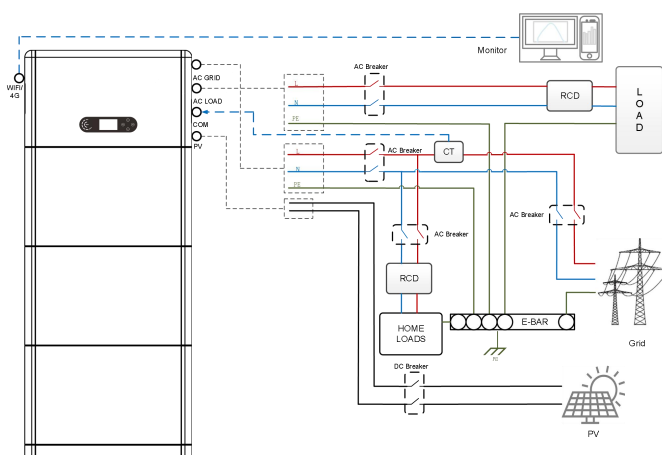


Figure 4.7-1 System Electrical Topology (General)

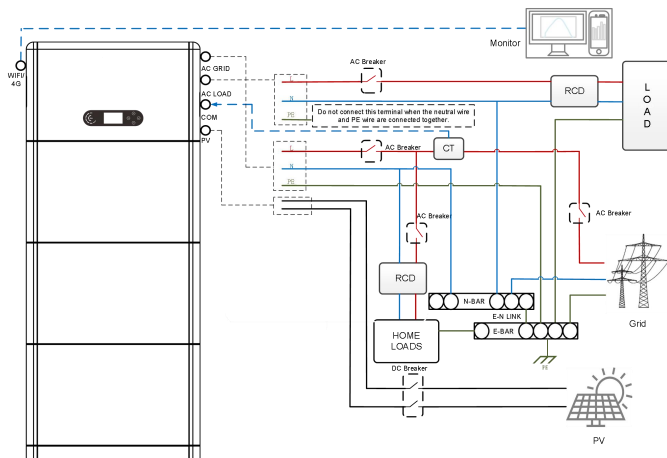


Figure 4.7-2 System Electrical Topology (Australian version)

## 5. Commissioning

### 5.1. Checking Before System Starting

Please double check the following items before running

1. The product should be completely fixed on the pedestal bracket, and the connection with the wall should be tight and firm.
2. The PV+/PV- line is firmly connected, the polarity is correct, and the voltage is in line with the accessible range.
3. BAT+/BAT cables are firmly connected, the polarity is correct, and the voltage meets the accessible range.
4. Grid/load cable connections are firm/correct.
5. The inverter power grid port is correctly connected to the power grid and the AC circuit breaker is disconnected.
6. The inverter load port is correctly connected to the emergency load, and the circuit breaker is disconnected.

### 5.2. Startup steps

Important: Please follow the steps below to turn on the inverter.

1. Make sure the inverter is off.
2. Switch the DC switch ON the PV side of the product to ON.
3. Switch the DC switch ON the battery side of the product to ON, and press the battery black start button to activate the battery.
4. Turn on the AC circuit breaker between the inverter power grid port and the power grid.
5. Turn on the AC circuit breaker between the inverter load port and the emergency load.

6. Press the system power button, and the inverter starts running. The system status indicator turns blue.

When the inverter is running, set the following parameters.

Table 6- 1 Setting parameter

Parameter	Comment
1.Menu language selection	Default English
2.Set and confirm system time	If the collector or mobile APP is connected to the monitoring system, the time has been calibrated to the local time
*3.Safety parameter import	<p>USB import: you need to find the safety parameters file (named by the corresponding safety country) on the website, download to the USB, import</p> <p>Bluetooth import: Connect the Bluetooth mode of the product through the SOFARSOLAR Cloud data App, and import the safety file</p>
4.Setting the input channel	The default order: BAT1, BAT2, PV1, PV2)
5. Setup is complete	

Table 6-2 List of regulated countries

Code		Country	Code		Country
000	000	Germany VDE4105	018	000	EU EN50438
	001	Germany BDEW		001	EU EN50549
	002	Germany VDE0126	019	000	IEC EN61727
001	000	Italia CEI-021 Internal	020	000	Korea
	001	Italia CEI-016 Italia	021	000	Sweden
	002	Italia CEI-021 External	022	000	Europe General
	003	Italia CEI0-21 Areti	024	000	Cyprus
002	000	Australia-A	025	000	India
	008	Australia-B	026	000	Philippines
	009	Australia-C	027	000	New Zealand
003	000	Spain EPS-RD1699	028	000	Brazil
	002	Spain NTS		001	Brazil-LV
	004	Spain island		002	Brazil-230
004	000	Turkey		003	Brazil-254
005	000	Denmark	029	000	Slovakia VSD
	001	Denmark TR322		001	Slovakia SSE
006	000	Greece Continent		002	Slovakia ZSD
	001	Greece island	030	000	Czech
007	000	Netherland		001	Czech-MV
008	000	Belgium	033	000	Ukraine
009	000	UK G99	034	001	Norway-LV
	001	UK G98	035	000	Mexico LV
010	000	China-B	038	000	60Hz wide range
	001	China Taiwan	039	000	Ireland EN50549-1
	002	China TrinaHome	040	000	Thailand-PEA
	003	China HongKong		001	Thailand-MEA
	004	China SKYWORTH	044	000	South Africa
	005	China CSISolar	046	000	Dubai DEWG
	006	China CHINT		001	Dubai DEWG-MV

	009	China-A	107	000	Croatia
011	000	France	108	000	Lithuania
	001	FRArrete23	111	000	Columbia
	003	France VFR 2019		001	Columbia-LV
012	000	Poland	121	000	Saudi Arabia
	003	Poland-ABCD	122	000	Latvia
013	000	Austria Tor Erzeuger	123	000	Romania
015	000	Switzerland-A			
	001	Switzerland-B			



### Caution

It's very important to make sure that you have selected the correct country code according to requirements of local authority.

Please consult qualified electrical engineer or personnel from electrical safety authorities about this.

SHENZHEN SOFARSOLAR Co., Ltd. is not responsible for any consequences arising out of incorrect country code selection.

Tebal 6-3 Default values for other Settings

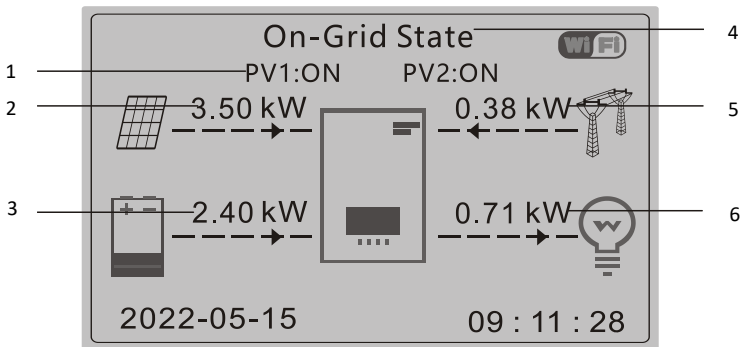
Item	Default status
Energy Storage Mode	Self-use Mode
EPS Mode	Disable
Feed-in Limitation	Disable
IV Curve Scan	Disable
Logic Interface	Disable

## 5.3. Turn off steps

Important: Please follow the steps below to turn off the inverter.

1. Close the AC circuit breaker between the inverter grid port and the grid to ensure that the machine is in standby mode;
2. Switch the DC switch on PV side of the product to OFF;
3. Press the battery switch button to turn off the battery output, switch the DC switch on the battery side of the product to OFF, and the blue indicator light of the system status goes out;
4. Close the AC circuit breaker between the inverter load port and the emergency load.


## 5.4. Menu





1 Circulates current PV and battery statue    2 PV Power    3 Battery Power

4 Display current inverter status    5 Grid Power    6 Loads Power

Figure 6-1 Main interface


In the main interface, press “” button to enter Grid/Battery/PV parameter page.

Main interface		Grid Output Information
		Grid(V).. .....**.*V
		AC Power .....**.*kW
		Frequency.....**.*Hz
		Battery Information





Batt.....****.*V
Batt Curr.....**.*A
Batt Power.....**.*kW
Batt Temp.....*°C
Batt SOC.....**%0
Batt Cycles.....*T
<b>PV Information</b>
PV1 Voltage .....****.*V
PV1 Current.....**.*A
PV1 Power.....**.*kW
PV2 Voltage .....****.*V
PV2 Current.....**.*A
PV2 Power.....**.*kW
Inverter Temp.....*°C

In the main interface, press“”button to enter main menu. The main menu has the following seven options.

Main Interface



1.System Settings
2.Advanced Settings
3.Energy Statistic
4.System Information
5.Event List
6.Software Update
7.Battery Real-time Information

## 5.4.1.System Setting

### 1. System Setting



1.Language Setting
2.System Time
3.Safety Param.
4.Energy Storage Mode
5.Input channel Configuration
6.EPS Mode
7.Communication Addr.

### 1. Language Settings

Used to set the menu display language.

#### 1.Language Settings



1. 中文	6. Deutsch
2.English	7. Čeština
3.Italiano	8.French
4.Portugues	9. Español
5. 日本語	

### 2. System Time

Set the system time for the inverter.

#### 2.Time



Time

2022-05-13 17:07:00

### 3. Safety Parameter.

#### 3. Safety Parama.



- |                            |
|----------------------------|
| 1.Select safety regulation |
| 2.Select USB File          |

Select safety regulation

Under this function, users can choose the safety package of different countries and regions, so as to comply with the local electricity standards.

## Select USB File

User can modify the Safety Parameter. of the machine through the USB flash disk, and the user needs to copy the parameter information that needs to be modified into the USB flash disk card in advance.

Note: To enable this feature, please contact the SOFARSOLAR technical support.

## 4. Energy Storage Mode

4. Energy Storage Mode



1. Self-use Mode



2. Time-of-use Mode

3. Timing Mode

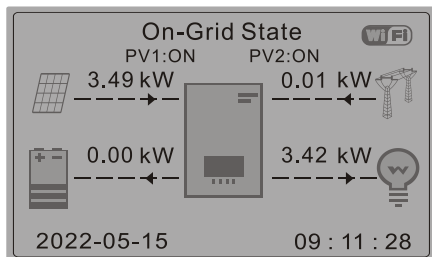
4. Passive Mode



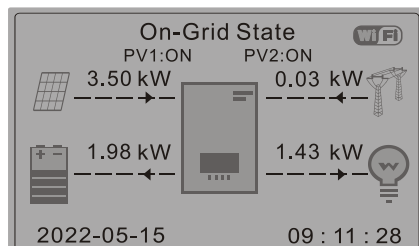
### 4.1 Self-use Mode

In Self-use mode, inverter will automatically charge & discharge the battery.

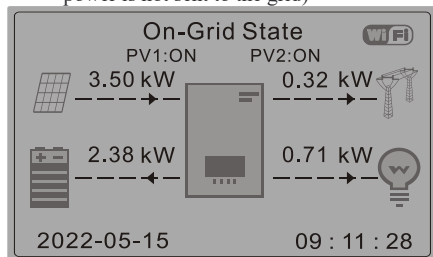
- 1) If PV power = load power (including emergency load and ordinary load), the inverter will not charge and discharge the battery.



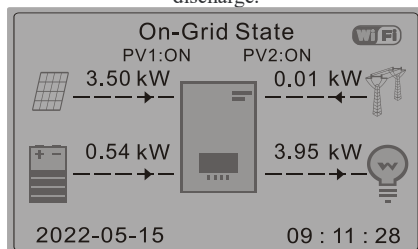
- 2) If PV generation > LOAD consumption, the surplus power will be stored in the battery.



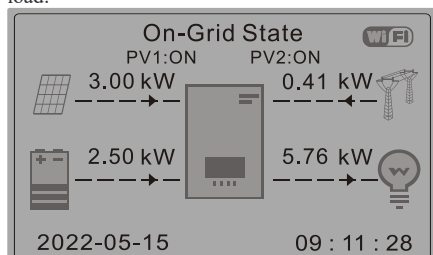
- 3) If the battery is fully charged or has reached its maximum charging power, the remaining power is sent to the grid (with Anti-countercurrent enabled, the remaining power is not sent to the grid)



- 4) If the PV power is less than the load power, the inverter will supply power to the load through battery discharge.



- 5) If the PV power plus battery power is still less than the load power, the inverter will purchase power from the grid to supply power to the load.



## 4.2 Time-of-use Mode

If electricity is more expensive in high demand time (peak rate) & electricity is much cheaper in low demand time (off-peak rate). You can select an off-peak period to charge your battery. Outside the off-peak charge period, inverter is working in Auto Mode.

If your family normally go to work/school on weekdays & stay at home on weekends, which means the home electricity consumption is much higher on weekends. Thus, you need to store some cheap electricity on weekdays only. This is possible using our Time-of-use mode.

In summer, if your PV system can produce more electricity than your home electricity consumption. Then you don't need to set an off-peak charge period to charge your battery in summer at all. You can select an effective date (normally winter) for Time-of-use mode in this case. Outside the effective date, inverter is working in Auto Mode.

You can set multiple Time-of-use rules to meet your more complex requirement. Right now we support 4 rules maximum (rule 0/1/2/3).

## 2. Time-of-use Mode



Time-of-use Mode			
Rules. 0: Disabled			
From	To	SOC	Charge
02h00m	- 04h00m	070%	01000W
Effective Date			
Dec. 22	-	Mar. 21	
Weekday select			
Mon. Tue. Wed. Thu. Fri. Sat. Sun.			

## 4.3 Timing Mode

Changing the value of a rule can set multiple timing rules.

## 3. Timing Mode



Timing Mode	
Rules. 0: Enabled/Disabled	
Charge Start	22 h 00 m
Charge End	05 h 00 m
Charge Power	02000 W
DisCharge Start	14 h 00m
DisCharge End	16 h 00m
DisCharge Power	02500 W

## 4.4 Passive Mode

### 4.Passive Mode



For more detailed information, please ask representative of SOFAR to get a copy of passive mode communication protocol.

## 5. Input channel Configuration

Input Channel Config	
Input Channel 1	Bat input 1/No use
Input Channel 2	Bat input 2/No use
Input Channel 3	PV input 1/No use
Input Channel 4	PV input 2/No use

Input Channel 1/2 indicates the battery input channel enable setting, Input Channel 1/2 indicates the PV input channel enable setting.

## 6. EPS Mode

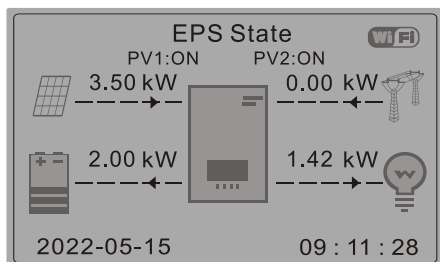
### 5.EPS Mode



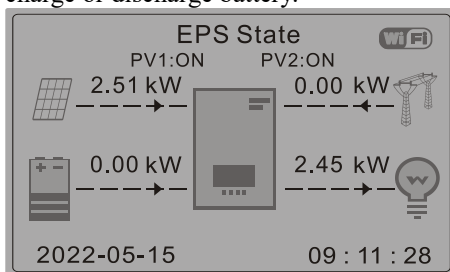
### 1.EPS Mode Control



- 1) If PV generation > LOAD consumption  
( $\Delta P > 100W$ ), inverter will charge battery



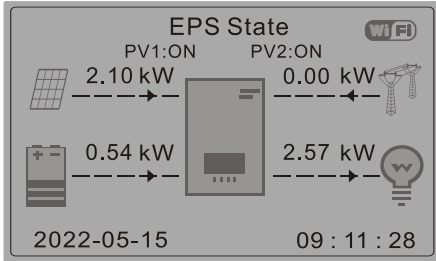
- 2) If PV generation = LOAD consumption ( $\Delta P < 100W$ ), inverter won't charge or discharge battery.



3) If PV generation < LOAD consumption

( $\Delta P > 100W$ ), inverter will discharge

battery.



## 7. Communication Addr

6.Communication  
Addr



1.Communication  
Addr



2.Baud Rate



## 5.4.2.Advanced Setting

2.Advanced setting



Password input 0001

1.Battery Parameter
2.Battery Active
3.Anti Reflux
4.IV Curve Scan
5.Logic interface
6.Factory Reset
7.Parallel Settings
8. Reset Bluetooth
9.CT Calibration

10.Set Electricity Meter

11.NeutralPointGrounding

## 1. Battery Parameter

1.Battery Parameter



Battery Number



Battery1



## Battery Quantity

Group 1 represents the number of cascading battery modules for the BAT1 port of the inverter.

Group 2 represents the number of battery modules connected to the BAT2 port of the inverter.

## Battery 1

2.Battery 1



1.Discharge Depth

2.Set Force Charge Time



3.Save

## Depth of Discharge

For example: if Discharge Depth = 50% & EPS Discharge Depth = 80%.

While grid is connected: Inverter won't discharge the battery when its SOC is less than 50%.

In case of blackout: Inverter will work in EPS mode (if EPS mode is enabled)

& keep discharging the battery till battery SOC is less than 20%.

3.Depth of Discharge



Discharge Depth

50%

EPS Discharge Depth

80%



EPS Safety Buffer 20%
--------------------------

## Set Force Charge Time

Force the battery to charge at a certain time to ensure that the battery is fully charged.

## Save

Save the Settings after the Settings are complete

## 2. Battery Active

Battery Active



1.Auto Active Control
-----------------------

2.Force Active
----------------





Use this function to forcibly activate the battery when the battery is low。

## 3. Feed-in limitation

Users can limit the maximum power sent from the system to the grid by enabling Anti Reflux control. Counter current power is the maximum power expected to be sent to the grid (e.g., 0KW means no energy is fed into the grid).

3.Feed-in Limitation



1.Feed-in Limitation		Enable/Disable
2.Hard Limit Control		Enable/Disable
3.Control Mode		Generation limit
		Export limit
4.Feed-in Power		***kW

## Feed-in Limitation

Determines whether the feature is enabled. Under normal conditions, it is possible to set the infeed limit enabled. Write limit power. According to the feed power limit

setting of the inverter, limit the MPPT and battery side power generation, so as to adjust the active power/apparent power from the inverter to the power grid to achieve the feed power limit function.

### **Hard limit control**

- 1) The machine must be connected to the meter and set the meter enable in the meter setting item. Otherwise, the machine will report a gauge error.
- 2) If the power transmitted by the machine to the grid is greater than the set reverse current power, the machine will fail and disconnect from the grid. Fault report: "Reverse current overload; ID 13"
- 3) When both the feed-in limit and the hard limit control are enabled, the machine will perform the hard limit control function.

Note: Soft limits shall be used to control the active or apparent power output levels to ensure that the power limits are not exceeded. Where Power limit is exceeded, Soft limit control function shall operate to reduce the the active or apparent power output of the inverter to less than Power limit. When the power limit is exceeded because the soft limit is out of control or not in use, the hard limit shall be used to provide protection.

### **Control Mode: Generation limit and Export limit**

Generation limit mode provide control to limit the apparent power level output from the inverter to the grid.

Export limit mode provide control to limit the active power level output from the inverter to the grid.

### **Feed-in Power**

Set the power limit of feeding

## **4. IV Curve Scan**

When a component of PV modules is blocked or abnormal, multiple power peaks occur, the maximum power peaks can be traced by enabling this function.

The user can enter the scan period to make the inverter scan immediately.

3.IV Curve Scan	1.Scan Control	Enable/Disable
	2.Scan Period	*** min
	3.Force Scan	

## 5. Logical Interface Control

Enables or disables a logical interface. This feature is only available under certain safety regulations.

Logical Interface Control	Enable
	Disable

## 6. Factory Reset

Factory Reset	1.Clear Energy Data
	2.Clear Events

Clear the total energy yield of the inverter.

1.Clear Generated Power	Cancel	Enter 0001
-------------------------	--------	------------

Clear the history events of the inverter.

2.Clear List	Cancel
--------------	--------

## 7. Parallel Setting

For the parallel system, please refer to <4.6 Parallel System > .

Parallel Setting	1.Parallel function control
	2.Parallel Primary-Replica

3.Set Parallel Address
------------------------

4.Save
--------

1. Parallel function control: Enable or disable the parallel function. This function must be enabled on both the master and slave machines.

2. Set master and slave: Set the master and slave. Select one inverter as the master and the others as slave machines.

3. Set parallel address: Set the parallel address for each inverter. In a parallel system, each inverter should have a parallel address that does not duplicate that of other machines. (Note: Parallel addresses are different from communications addresses used for monitoring.)

4. Save: Be sure to save after the Settings.

## 8. Bluetooth Reset

Bluetooth Reset
-----------------



Please Confirm !
---------------------



Succeed
---------

## 9. CT Calibration

Used to calibrate the orientation and phase of the CT. The battery should be charged or discharged when using this feature.

CT Calibration
-------------------



Start CT Calibration
----------------------

Succeed/ Failed
--------------------

Set CT Power Offset
---------------------

***W
------

If the calibration fails, check whether the battery is in charge or discharge state.

## 10. Set Electricity Meter

Set Electricity Meter
-----------------------



Enable/Disable
----------------

## 11. Neutral Point Grounding

## 12.

NeutralPointGrounding



Enable/Disable

### 5.4.3.Energy Statistic

3.Energy Statistic



Today

PV .....\*\*\*kWh

Load .....\*\*\*kWh

Export.....\*\*\*kWh

Import.....\*\*\*kWh

Charge.....\*\*\*kWh

Discharge.....\*\*\*kWh



Month

PV .....\*\*\*kWh

Load .....\*\*\*kWh

Export.....\*\*\*kWh

Import.....\*\*\*kWh

Charge.....\*\*\*kWh

Discharge.....\*\*\*kWh



Year

PV .....\*\*\*kWh

Load .....\*\*\*kWh

Export.....\*\*\*kWh

Import.....\*\*\*kWh

Charge.....\*\*\*kWh

Discharge.....\*\*\*kWh



Lifetime

PV .....	***kWh
Load .....	***kWh
Export.....	***kWh
Import.....	***kWh
Charge.....	***kWh
Discharge.....	***kWh

## 5.4.4.System Information

4..System Information



1.Inverter Info

2.Battery Info

3.Safety Info

4.Debug Info

5.PCU Info

1.Inverter Info



Inverter Info (1)

Product SN

Hardware Version

Power Level

Safety Firmware Version



Inverter Info (2)

Software Version

Country

Safety Lib Version



Inverter Info (3)



Input Channel 1
Input Channel 2
Input Channel 3
Input Channel 4
Inverter Info (4)
Energy Storage Mode
RS485 Address
Inverter Info (5)
Logic Interface
Power Factor
Inverter Info (6)
Feed-in Limitation
Insulation Resistance



## 2.Battery Info



Battery 1 Info (1)
Battery Type
Battery Capacity
Discharge Depth
EPS Safety Buffer
Battery 1 Info (2)
Max Charge (A)
Max Discharge (A)
Charge Start



Charge End

3.Safety parameters.



Safety param(1)

OVP 1

OVP 2

UVP 1

UVP 2



Safety param (2)

OFP 1

OFP 2

UFP 1

UFP 2



Safety param(3)

OVP 10mins

4.debug info.



debug info

Dsp1 version

State1

State2

State3

5.PCU info



PCU info (1)

PCU serial number

PCU hardware version

PCU software version





#### PCU info (2)

PCU serial number

PCU hardware version

PCU software version



#### PCU info (3)

PCU serial number

PCU hardware version

PCU software version

### 5.4.5.Event List

Once a fault occurs, the fault information is displayed on the event list page. The event list displays the current event records, including the event ID and occurrence time of each event. You can access the event list screen on the main screen to view detailed information about real-time events. Events are listed by occurrence time, and the latest events are listed first.

5.Event  
List

1.Current event  
2.History event


ID042 IsoFault

2.Historical  
Fault  
Information

1.ID001 2020-4-3 14:11:45  
2.ID005 2020-4-3 11:26:38

1.ID001 Grid OVP  
2.ID005 GFCI Fault

### 5.4.6.Software Update

You can upgrade the software using the USB flash drive to maximize the performance of the product and avoid abnormal operation caused by software bugs.

The upgrade file folder name is firmwareESI. These three upgrade file names are ESI\_ARM.bin, ESI\_DSPM.bin, ESI\_DSPS.bin.

**Step 1** Insert the USB drive into the computer.

**Step 2** SOFARSOLAR will send the upgraded firmware to the users who need to

upgrade. After receiving the file, decompress it and save it in a USB flash drive.

**Step 3** Insert the USB disk into the USB/Wifi interface of the machine.

**Step 4** Turn on DC switch.

**Step 5**

6.Software Update		Enter Password	<b>Enter 0715</b>
			Software Update(PCS)
			Software Update(BMS)
			Software Update(PCU)

**Step 6** If the following error occurs, upgrade again. If this situation persists for several times, contact technical support for help.

USB error	DSPM file error	DSPS file error
ARM file error	Upgrading DSPM fail	Upgrading DSPS fail
Upgrading ARM fail		

**Step 7** After the upgrading, turn off the DC switch, wait for the LCD screen to go off, then restore the WiFi connection, and then turn on the DC switch and AC switch again, and the inverter will enter the running state. You can view the current software version in System Info >> Software Version.

### 5.4.7.Monitoring description

The operation information (generated energy, alert, operation status) of the inverter can be transferred to PC or uploaded to the server via WiFi/4G. Users can choose to use web or APP for monitoring and viewing according to their needs. They need to register an account and bind the device with the WiFi/4G SN number. The SN number of the WiFi/4G shall be affixed to the package box and the WiFi/4G.

Web: <https://home.solarmanpv.com> (Recommended browser: Chrome58、Firefox49、IE9 andabove version) .

APP: Android: Go to Android Market and search “SolarMAN”.

IOS: Go to App Store and search "SolarMAN".

SolarMAN-3.0-Web User Manual , Please visit the  
<https://doc.solarmanpv.com/web/#/7>.



SOLARMAN  
Business Web-12:

Operation manual PDF file:

## 6. Trouble shooting and maintenance

### 6.1. Troubleshooting

- This section describes the potential errors for this product. Please read carefully for the following tips when doing the troubleshooting:
- View the warning or error information and error codes displayed on the display to record all error information
- If no error message is displayed on the LCD, perform the following steps to check whether the current installation status meets the operating requirements of the inverter:
  - Is inverter be installed in a clean, dry, ventilated environment?
  - Is the DC switch turn off?
  - Are the cable cross section area and length meet the requirement?
  - Are the input and output connection and wiring in good condition?
  - Are the configuration settings correctly for the particular installation?
  - Is the display panel properly connected to the communication cable and intact?
- To view the recorded fault information, perform the following steps: On the home screen, press "XXX" to enter the main menu. Select "Events" and press "XXXX" to enter.
- Ground fault alarm

The integrated inverters in this product comply with the ground fault alarm monitoring of IEC 62109-2 clause 13.9. If a grounding fault alarm occurs, the fault will be displayed on the LCD screen with red light on, and the fault can also be found in the fault history. For the machine equipped with WiFi/4G data collector, the alarm information can be seen on the corresponding monitoring website or received through the APP on the mobile phone.

➤ Event list

Table 6-1 Event list

ID No.	Name	Solution
ID001	The grid voltage is too high	If the alarm occurs occasionally, the possible cause is that the electric grid is abnormal occasionally. Inverter will automatically return to normal operating status when the electric grid's back to normal.
ID002	The grid voltage is too low	
ID003	The grid frequency is too high	
ID004	The grid frequency is too low	<p>If the alarm occurs frequently, check whether the grid voltage/frequency is within the acceptable range. If yes, please check the AC circuit breaker and AC wiring of the inverter.</p> <p>If the grid voltage/frequency is NOT within the acceptable range and AC wiring is correct, but the alarm occurs repeatedly, contact SOFARSOLAR technical support to change the grid over-voltage, under-voltage, over-frequency, under-frequency protection points after obtaining approval from the local electrical grid operator.</p>
ID005	Charge Leakage Fault	Internal faults of inverter, switch OFF inverter, wait for 5 minutes,
ID006	OVRT function is faulty	

ID007	LVRT function is faulty	<p>then switch ON inverter. Check whether the problem is solved.</p> <p>If not, please contact SOFARSOLAR technical support.</p>
ID008	Island protection error	
ID009	Transient overvoltage of grid voltage 1	
ID010	Transient overvoltage of grid voltage 2	
ID011	Power grid line voltage error	
ID012	Inverter voltage error	
ID017	Power grid current sampling error	
ID018	Wrong sampling of dc component of grid current	
ID019	Power grid voltage sampling error (DC)	
ID020	Power grid voltage sampling error (AC)	
ID021	Leakage current sampling error(DC)	
ID022	Leakage current sampling error(AC)	
ID023	DCV sampling error	
ID024	Input current sampling error	
ID025	DCI sampling error(AC)	
ID026	Branch current sampling	

ID029	Leakage current consistency error	
ID030	Grid voltage consistency error	
ID031	DCI consistency error	
ID033	SPI communication error (DC)	
ID034	SPI communication error (AC)	
ID035	Chip error (DC)	
ID036	Chip error (AC)	
ID037	Auxiliary power error	
ID038	Inverter soft startup fails	
ID041	Relay detection failure	
ID042	Low insulation impedance	Check the insulation resistance between the photovoltaic array and ground (ground), if there is a short circuit, the fault should be repaired in time. If not solved, please contact SOFARSOLAR technical support.
ID043	Ground fault	Check ac output PE wire for grounding.
ID044	Error setting input mode	Check the PV input mode (parallel/independent mode) setting of the inverter. If not, change the PV input mode

ID045	CT Fault	Check whether the CT connection is correct
ID046	Input reverse connection error	
ID047	Parallel Fault	
ID048	SN doesn't match Type	
ID049	Battery temperature protection	<p>Make sure the inverter is installed in a place free from direct sunlight.</p> <p>Make sure the inverter is installed in a cool/well-ventilated place.</p> <p>Ensure that the inverter is installed vertically and the ambient temperature is lower than the upper limit of the inverter temperature.</p>
ID050	Radiator 1 temperature protection	
ID051	Radiator 2 temperature protection	
ID052	Radiator 3 temperature protection	
ID053	Radiator 4 temperature protection	
ID054	Radiator 5 temperature protection	
ID055	Radiator 6 temperature protection	
ID057	Temperature 1 protection	
ID058	Temperature 2 protection	
ID059	Module 1 temperature protection	
ID060	Module 2 temperature protection	
ID061	Module 3 temperature	



	protection	
ID065	Unbalanced bus voltage RMS	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.  If not, please contact SOFARSOLAR technical support.
ID066	The transient value of bus voltage is unbalanced	
ID067	Bus undervoltage during grid connection	
ID068	Bus voltage low	
ID069	PV over-voltage	Check whether the PV series voltage (Voc) is higher than the maximum input voltage of the inverter. If yes, adjust the number of PV modules in series and reduce the PV string voltage to fit the input voltage range of the inverter. After correction, the inverter will automatically return to normal state.
ID070	Reserved	Check whether the battery overvoltage Settings are inconsistent with battery specifications
ID071	LLC BUS overvoltage protection	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.  If not, please contact SOFARSOLAR technical support.
ID072	Inverter bus voltage RMS software overvoltage	
ID073	Inverter bus voltage instantaneous value software	

	overvoltage	
ID081	Battery overcurrent protection by software	
ID082	Dci overcurrent protection	
ID083	Output instantaneous current protection	
ID084	BuckBoost software flow	
ID085	Output effective value current protection	
ID086	PV overcurrent software protection	
ID087	PV flows in uneven parallel	
ID088	Unbalanced output current	
ID097	LLC hardware overvoltage	
ID098	Inverter bus hardware overvoltage	
ID099	BuckBoosthardware overflows	
ID100	Reserved	
ID102	PV hardware overflows	
ID103	Ac output hardware overflows	
ID105	Meters communication fault	
ID110	Overload Protection 1	Check whether the inverter works in overload state.
ID111	Overload Protection 2	

ID112	Overload Protection 3	
ID113	Overtemperature derating	<p>Make sure the inverter is installed in a place free from direct sunlight.</p> <p>Make sure the inverter is installed in a cool/well-ventilated place.</p> <p>Ensure that the inverter is installed vertically and the ambient temperature is lower than the upper limit of the inverter temperature.</p>
ID114	Frequency derating	<p>Make sure the grid frequency and voltage are within acceptable range.</p>
ID115	Frequency loading	
ID116	Voltage derating	
ID117	Voltage loading	
ID124	Battery low voltage protection	<p>Check whether the battery voltage is too low or the battery discharge depth is too low.</p>
ID125	Battery low voltage shutdown	
ID129	Output hardware overcurrent permanent failure	<p>Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check</p>
ID130	Permanent Bus overvoltage	

	failure	whether the problem is solved.
ID131	Busovervoltage hardware permanent fault	If not, please contact SOFARSOLAR technical support.
ID132	PV unbalance current permanent fault	
ID133	Output transient overcurrent permanent failure	
ID134	Output current imbalance permanent fault	
ID135	Input mode setting error permanent failure	
ID137	Input overcurrent permanent fault	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.
ID138	Output hardware overcurrent permanent failure	If not, please contact SOFARSOLAR technical support.
ID139	Input hardware overcurrent permanent failure	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.
ID140	Relay permanent fault	
ID141	Bus Unbalanced permanent fault	If not, please contact SOFARSOLAR technical support.
ID142	DC SPD failure	
ID143	AC SPD failure	
ID145	USB fault	Check the USB port of the

		inverter
ID146	Wifi fault	Check the WIFI connection of the inverter
ID147	Bluetooth fault	Check the bluetooth connection of the inverter.
ID148	RTC clock failure	Internal faults of inverter, switch OFF inverter, wait for 5 minutes, then switch ON inverter. Check whether the problem is solved.  If not, please contact SOFARSOLAR technical support.
ID149	Communication board EEPROM error	
ID150	Communication board FLASH error	
ID152	The software version is inconsistent with the safety version	
ID153	SCI communication error (DC)	
ID154	SCI communication error (AC)	
ID155	SCI communication error (Fuse)	
ID156	Inconsistent software versions	Contact technical support to obtain the upgrade software.
ID157	Lithium battery 1 communication error	Make sure the battery you use is compatible with the inverter.  CAN communication is recommended. Check whether the communication cable or port
ID158	Lithium battery 2 communication error	
ID159	Lithium battery 3	

	communication error	between the battery and the inverter is faulty.
ID160	Lithium battery 4 communication error	
ID161	Force shutdown	The inverter is forced to shut down.
ID162	Remote shutdown	The inverter is shut down remotely.
ID163	Drms0 shutdown	The inverter is Drms0 shut duwn
ID165	Remote derating	The inverter is derating remotely
ID166	Logic interface derating	The inverter is Logic interface derating
ID167	Anti refluxderating	The inverter is Anti refluxderating
ID169	Fan 1 fault	Check whether fan 1 of the inverter works properly
ID170	Fan 2fault	Check whether fan 2 of the inverter works properly
ID171	Fan 3 fault	Check whether fan 3 of the inverter works properly
ID172	Fan 4 fault	Check whether fan 4 of the inverter works properly
ID173	Fan 5 fault	Check whether fan 5 of the inverter works properly
ID174	Fan 6 fault	Check whether fan 6 of the inverter works properly
ID175	Fan 7 Fault	Check whether fan 7 of the

		inverter works properly
ID176	Communication failure of electricity meter	
ID177	BMS over-voltage alarm	The lithium battery is faulty. Shut down the inverter and lithium battery. Wait for 5 minutes and start the inverter and lithium battery. Check whether the problem is rectified. If not, contact technical support.
ID178	BMS under-voltage alarm	
ID179	BMS high temperature alarm	
ID180	BMS low temperature alarm	
ID181	BMS over-current alarm	
ID182	BMS Short circuit alarms	
ID183	BMS Version inconsistency	
ID184	BMSCAN Version inconsistency	
ID185	BMS CAN Version is too low	
ID189	Communication failure of arc equipment	
ID401 ~ ID432	Acr fault	

## 6.2. Daily Maintenance

This product usually does not require maintenance or calibration, but ensure that the inverter and the heat sink of the battery module are not covered by dust or dirt.

➤ Clean the inverter :

Please clean the inverter with an air blower, a dry & soft cloth or a soft bristle brush. Do NOT clean the inverter with water, corrosive chemicals, detergent, etc.

➤ Clean radiator:

In order to ensure the normal function and long service life of the product, it is necessary to ensure that there is enough air flow space around the radiator at the rear of the product, and there is no material around the radiator that obstructs the air flow, such as dust or snow, must be removed. Clean the radiator with compressed air, a soft cloth, or a soft brush. Do not use water, corrosive chemicals, cleaning agents, or strong detergents to clean the heat sink.



## 7. Technical Parameters

Inverter Module							
Model	ESI 3K-S1	ESI 3.68K-S1	ESI 4K-S1	ESI 4.6K-S1	ESI 5K-S1	ESI 5K-S1-A	ESI 6K-S1
Rated battery voltage	400V						
Max. charge/discharge current	20A						
Max. PV input power	4500Wp	5400Wp	6000Wp	6900Wp	7500Wp	7500Wp	9000Wp
Max. input voltage	550V						
Rated input voltage	360V						
MPPT operating voltage range	85~520V						
Number of MPP trackers	2						
Max. input current per MPPT	16A/16A						
Rated grid voltage	L/N/PE, 220V/230V/ 240V,50Hz / 60Hz						
Grid voltage range	180Vac-276Vac (According to local standard)						
Rated AC power	3000W	3680W	4000W	4600W	5000W	5000W	6000W
Max. AC power output to utility grid	3300VA	3680VA	4400VA	4600VA	5500VA	5000VA	6600VA
Rated voltage,Frequency(Off-grid)	220V/230V, 50/60Hz						

Max. apparent power(Off-grid)	3000VA	3680VA	4000VA	4600VA	5000VA	5000VA	6000VA
Peak output power,Duration(Off-grid )	4500VA, 10S	5520VA, 10S	6000VA, 10S	6900VA, 10S	7500VA, 10S	7500VA, 10S	9000VA, 10S
Switch time	< 10ms						
Max efficiency of solar inverter	97.70%	97.70%	97.70%	97.80%	97.80%	97.80%	97.80%
European efficiency of solar inverter	97.00%	97.00%	97.00%	97.10%	97.10%	97.10%	97.10%
Topology	Transformerless						
Dimension(W*D*H)	708*170*410mm						
Weight	22.5kg						

## Certification

EMC	EN 61000-6-2, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-3-11, EN 61000-3-12
Safety standards	IEC 62109-1/2, IEC 62040-1, IEC 62116, IEC 61727, IEC 61683, IEC 60068(1,2,14,30),UN38.3,IEC62619,SAA
Grid standards	VDE-AR-N 4105, VDE V 0126-1-1, AS/NZS 4777, CEI 0-21, G98/G99, TR321,TR322, EN 50438/EN50549, UTE C15-712-1, NRS 097-2-1, UNE 206 007-1

1. Test condition: 0.2C charge/discharge, 25°C, 100%DOD
2. Refer to the temperature derating curve.
3. If the altitude is >2000m, derating operation is required, refer to the derating

curve.

4. Rated AC power 4600 for VDE-AR-N 4105, 5000 for Australia, 6000 for other country
5. Max. AC power output to utility grid 4600 for VDE-AR-N 4105, 5000 for Australia, 4048/5500/6600 for Italy, 3680/ 5000/6000 for other country.
6. 4600 for VDE-AR-N 4105, 5500 for Italy, 5000 for other country.
7. 4048 for Italy, 3680VA for other countries.
8. 21.7A for Australia.
9. Italy is 1.1 times overloaded

## 8. Manufacturer's Warranty and Liability Terms

### **SOFAR standard warranty document**

Warranty period and calculation method of SOFARSOLAR inverter products refer to the Quality Assurance Agreement of SOFARSOLAR ESI Series Household Energy Storage System.

### **Extended warranty period**

If the purchased inverter exceeds the warranty period stipulated in the Warranty Agreement of SOFARSOLAR ESI Series Household Energy Storage System, the customer can apply for the extended warranty period by providing the serial number of the product to the sales team of the company, and the Company has the right to reject the purchase application for the extended warranty period that does not meet the requirements.

If the original buyer wants to apply for the extended warranty service, please contact the sales team of SHENZHEN SOFARSOLAR Co., LTD to purchase the products that exceed the extended warranty period but have not passed the warranty period stipulated in the Warranty Agreement of SOFARSOLAR ESI Series Household Energy Storage System, the original buyer shall bear different extended premiums.

Upon purchase of the extended warranty service, our company will issue an extended warranty card to the customer to confirm the extended warranty period.

### **Invalid warranty clause**

Equipment failure caused by the following reasons is not covered by the warranty:

- 1) The "warranty card" has not been sent to the distributor or Shenzhen

SOFARSOLAR Co., LTD;

- 2) Without the consent of SHENZHEN SOFARSOLAR Co., LTD to change equipment or replace parts;
- 3) Use unqualified materials to support SHENZHEN SOFARSOLAR Co., LTD 's products, resulting in product failure;
- 4) Technicians who don't belong to SOFARSOLAR Co., LTD modify or attempt to repair and erase the product serial number or silk screen;
- 5) Incorrect installation, debugging and use methods;
- 6) Failure to comply with safety regulations (certification standards, etc.);
- 7) Damage caused by improper storage by dealers or end users;
- 8) Transportation damage (including scratches caused by internal packaging during transportation).Please claim directly from the transportation company or insurance company as soon as possible and obtain damage identification such as container/package unloading;
- 9) Failure to follow the product user manual, installation manual and maintenance guidelines;
- 10) Improper use or misuse of the device;
- 11) Poor ventilation of the device;
- 12) The product maintenance process does not follow relevant standards;
- 13) Failure or damage caused by natural disasters or other force (such as earthquake, lightning strike, fire, etc.)