User Manual

Home Energy Storage System

Soluna S12 EU

Oct.2020| Revision A.1

About this manual

This manual describes how to install the Soluna S12 EU. Reading this manual before you attempt to install the product, and following the instructions throughout the installation process. If you are uncertain about any of the requirements, recommendations, or safety procedures described in this manual, contact Soluna immediately for advising and clarification. The information included in this manual is accurate at the time of publication. however, with regards to the product design and technical specification updates, our company reserves the right to make changes at any time without prior notice. e. In addition, the illustrations in this manual are meant to help explain system configuration concepts and installation instructions. The illustrated items may different from the actual items at the installation location.

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1 Safety precautions

Energy storage integrated machines are designed and tested strictly in accordance with relevant international safety standards. As an electrical and electronic device, all relevant safety regulations must be strictly complied during installation, operation, and maintenance. Incorrect use or misuse may result in:

- Injury to the life and personal safety of the operator or other people.
- Damage to the machine or other property belongs to the operator or other people.
- This chapter mainly various warning symbols in operation manual and provides safety instructions for the installation, operation, maintenance and use of energy storage integrated machines.

Statement

Our company will not responsible for any consequence caused by any of the following events.

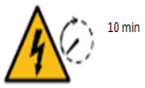
- Damage caused by transportation.
- The storage conditions do not meet the requirements specified in the manual, resulting in damage.
- Incorrect storage, installation, and use.
- Unqualified personnel install and operate the machine.
- Failure to comply with the operation instructions and safety precautions in this manual.
- Operate in extreme environments which are not covered in this manual.
- Exceed the operation range of parameters that specified in the technical specification.
- Unauthorized disassembly, modification, or modification of the software code.
- Device damage caused by abnormal natural environment (force majeure, such as lightning strikes, earthquakes, fires, storms, etc.)
- Warranty expiration without extension of the warranty service.
- Installation or use in environment which are not specified in related international standards

1.1 Warning signs

Warning signs are used to warn you about the conditions that may cause severe injury or damage to the device. They instruct you to exercise caution to prevent danger. The following table describes the warning signs used in this manual.

Sign	Name	Description
	Danger	Serious physical injury or even death may occur if related requirements are not followed
	Warning	Physical injury or damage to the devices may occur if related requirements are not followed.
	Electrostatic discharge	Damage may occur if related requirements are not followed
	Hot sides	Sides of the device may become hot. Do not touch.
Note	Note	Steps to take for ensuring the proper running of the device.

1.2 Safety guide

	• After receiving this product, first confirm the product package is intact. If any question, contact the logistic company or local distributor immediately. • The installation and operation of the machine must be carried out by professional technicians who have received professional trainings, and thoroughly familiar with all the contents in this manual and the safety requirements of the electrical system. • Do not carry out connection/disconnection, unpacking inspection and unit replacement operations on the machine when power source is applied. Before wiring and inspection, users must confirm the breakers on DC and AC side of inverter are disconnected and wait for at least 10 minutes
	• Ensure there is no strong electromagnetic interference caused by other electronic or electrical devices around the installation site. • Do not refit the machine unless authorized. • All the electrical installation must conform to local and national electrical standards. • Ground with proper technics before operation
	• Do not open the surface cover of the machine unless authorized. The electronic components inside the machine are electrostatic sensitive. Do take proper anti-electrostatic measures during authorized operation.
	• Do not touch the housing of the machine or the radiator to avoid scald as they may become hot during operation
	• The machine needs to be reliably grounded.
	• Ensure that DC and AC side circuit breakers have been disconnected and wait at least 10 minutes before wiring and checking.
Note: Technical personnel who can perform installation, wiring, commissioning, maintenance, troubleshooting and replacement of the energy storage inverters must meet the following requirements:	
• Operators need professional training. • Operators must read this manual completely, and master the related safety precautions. • Operators need to be familiar with the relevant safety regulations for electrical systems. • Operators need to be fully familiar with the composition and operating principle of the entire energy storage system, and related standards of the countries/regions in which the project is located. • Operators must wear personal protective equipment.	

1.2.1 Transportation and installation

	• Keep the package and unit complete, dry and clean during storage and transportation. • This machine is heavy. Please remove and install it with at least Two people. • To ensure the normal and safe operation of the energy storage integrated machine and avoid personal injury, please select proper handling and installation tools, and take mechanical protection measures to protect personal safety, such as wearing smashing shoes, coverall and so on. • Only qualified electricians are allowed to install the machine. • Do not put and install the machine on or close to flammable or explosive materials. • Do not install the machine in a place where children and other people can easily touch it. • To avoid a risk of electric shock, please remove rings, bracelets, and other metal jewelry on your hands before installation and electrical connection. • The solar cell modules exposed to the sunlight may generate dangerous voltage. Users must cover the cell modules with fully light shading materials before electrical connection. • The input voltage of the machine should not exceed the maximum input voltage, otherwise damage may occur. • The machine is not suitable for the positive or negative grounding systems of solar cell modules. • Ensure the proper grounding of the inverter. • Ensure reliable installation and electrical connection.

1.2.2 Grid-tied operation

Note	• Only qualified electricians are allowed to operate the machine under the permission of local power departments. • All electrical connections must meet the electrical standards of the countries/regions in which the project is located. • Ensure reliable installation and electrical connection before operation. • Do not open the cover of the machine when the machine is working or any circuit is connecting to the machine.

1.2.3 Maintenance and replacement

	• Only qualified electricians are allowed to perform the maintenance, inspection, and component replacement of the machine. • Please contact the distributor or manufacturer for maintenance. • In order to avoid irrelevant personnel from entering the maintenance area during maintenance, temporary warning signs must be placed to warn non-professionals to enter or use fence for isolation. • Before carrying out any maintenance operations, all input power to the machine must be disconnected first, and wait for at least 10 minutes until the internal parts of the machine are fully discharged. • Please follow the electrostatic protection norms, and take correct protective measures because there are mostly electrostatic sensitive circuits and devices in the machine. • Do not use parts and components not provided by our company during maintenance. • Restart the machine after eliminating the faults and problems which may affect the safety and performance of the machine. • Do not get close to or touch any charged metal conductor parts of the grid or running system, otherwise electric shock or fire may occur. Please do not ignore the warning icons and instructions with “electric shock”.

1.2.4 What to do after scrapping

	• Do not dispose of the machine together with household waste. The user has the responsibility and obligation to send it to the designated organization for recycling and disposal.

2 Product Introduction

Soluna S12 EU Home Energy Storage System can connect with solar power generation system, which ensure the users can use environmentally-friendly energy 24 hours at any time. ESS store the energy generated by PV, and uses it whenever needed, not only reduce the purchase of electricity from the grid, but also improves the household energy self-consumption and saves the electricity cost. Soluna integrated energy storage solve solution, help users with achieving maximize the self-use of green energy.

2.1 Features

- intelligent power management
- Simple user controls, power data history analysis, and programming
- Capacitive touch screen interface
- Secure battery access door
- height-adjustable threaded appliance-grade feet for stability and level appearance

2.2 Application

- Self use
- Peak Shaving
- Emergency power

2.3 Outline Dimensions

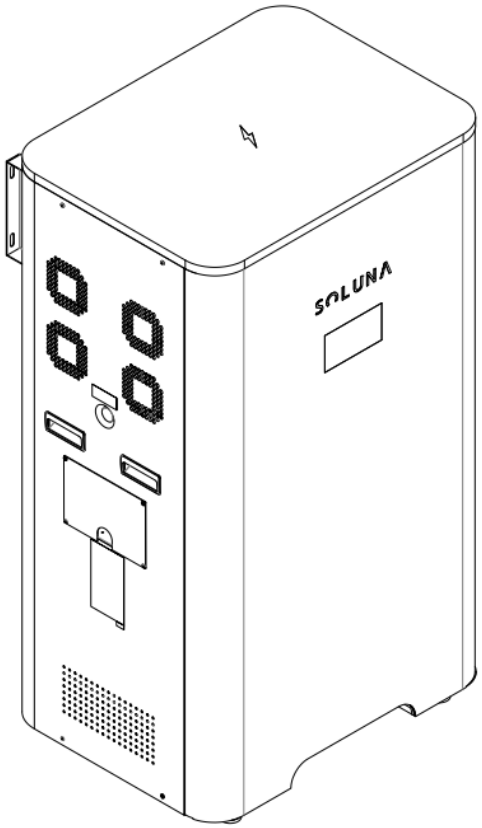


Figure 2.1 outline dimension

Width	750	mm
Depth	565	mm
Height	1335	mm
Weight	240	kg

2.4 Functional description

2.4.1 Basic principle of Soluna S12 EU

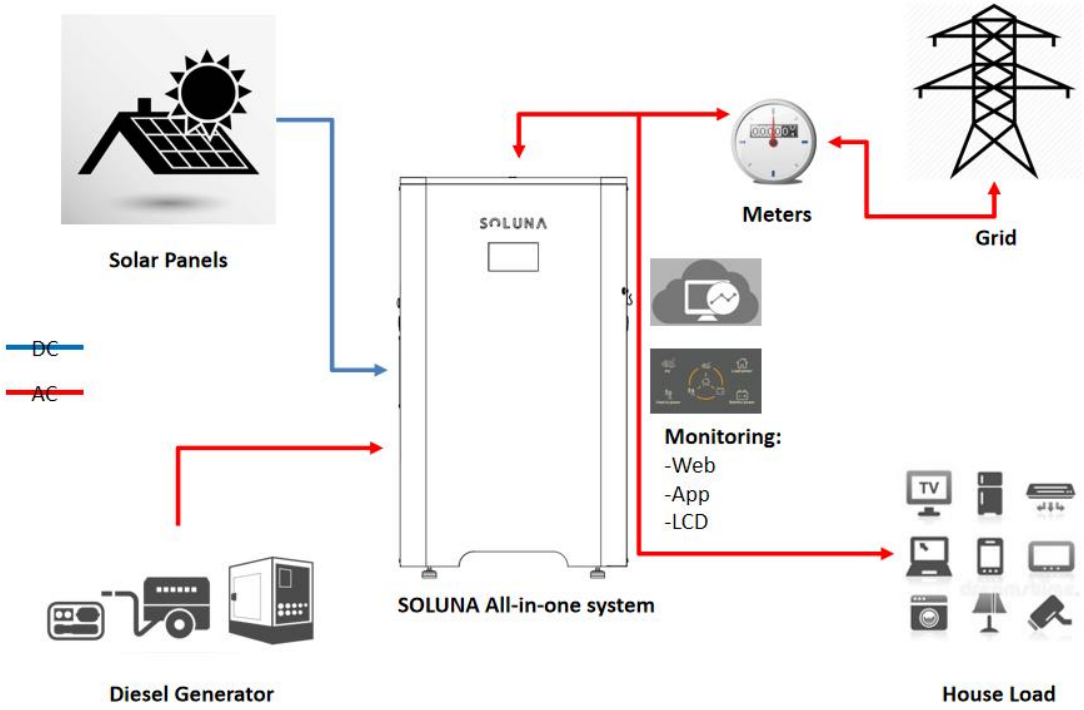


Figure2.2 basic principle of Soluna S12 EU

2.4.2 Working mode

Soluna S12 EU has the following working modes for your home energy storage system.

Mode 1: In daytime, PV power will charge the battery in priority, if battery is full, PV power is used to power the loads, then excess power sell to the grid.

Mode 2 : At night time, Battery power the loads, if battery is not sufficient, grid will supplement.

Mode 3 : If grid malfunction or in no grid region, PV and battery can power the loads together.

Mode 4 : When the battery is low and PV power is unavailable. Grid can charge the battery and at the same time, Grid will power the loads.

Mode 5 : Generator can charge the battery bank.

Mode 6 : If Time Of Use function is enabled, will ensure battery remaining power and grid sell power is adjustable.

Mode 7: UPS Function can ensure important loads still powered in case grid suddenly fail down.

2.5 Technical data

2.5.1 Technical data of System

	Specifications table		
Model	**Soluna S12 EU-A80**	**Soluna S12 EU-A50**	**Soluna S12 EU-A36**
PV input			
Max. recommended DC power（W）	8000	6500	4680
Max. DC voltage （V）	500	500	500
Start-up Voltage （V）	150	150	150
Nominal DC operating voltage（V）	360	360	360
MPPT voltage range （V）	125-425	125-425	125-425
Vdc range @ full power (Vdc)	250-425	250-425	300-425
Max. input current （A）	18/18	11/11	11/11
Max. short current （A）	22/22	16/16	16
Number of MPPT trackers	2	2	2
Strings per MPPT tracker	1/1	1/1	1/1
AC Input & AC Output			
Normal Voltage (VAC)	230,Single phase(L/N/PE)		
Frequency (Hz)	50/60		
Max. AC output current (A)	38.3	25	18
Max. AC input current (A)	38.3	25	18
Max. continuous Power (kW)	8	5	3.6
Power factor range	-0.8～+0.8		
Off-Grid AC Output			

Normal Voltage (VAC)	230,Single phase(L/N/PE)		
Frequency (Hz)	50/60		
Max. AC output current (A)	38.3	25	18
Max. continuous Power (kW)	8	5	3.6
Peak Power	1.5 times of Max. continuous Power (10S)		
Power factor range	-0.8～+0.8		
Battery data			
Battery type	Lithium(LFP)		
Module number	3	3	3
Nominal Storage capacity (kWh)	11.52	11.52	11.52
Usable Storage Capacity (kWh)	9.22	9.22	9.22
Battery capacity (Ah)	225	225	225
Normal voltage (V)	51.2	51.2	51.2
Voltage range (V)	42-58	42-58	42-58
Max. charge current (A)	150	100	60
Max. discharge current (A)	150	100	60
DOD	80%		
Cycle life	6000		
Regular parameters			
Protective class	Class I		
Overvoltage category	OVC II(PV) , OVCIII(AC main Grid)		
Dimension (mm)	W*D*H=750*565*1335		
Weight (kg)	240		
Display	7" graphic LCD		
Communication	WIFI,CAN		
Operating temperature range (°C)	-10～+40 (＞45℃ derating)		
Storage stability range (°C)	-20～+60		
Relative humidity	0~95%		
Altitude (m)	<2000		
Cooling methods	Forced airflow		
Ingress protection	IP20		
Condition	Indoor conditioned		
Certificates	IEC62109 AS/NZS 60950.1 EN61000-6-1:2007 EN61000-6-3:2007/+A1 CE-LVD EN 62477-1: 2012+ALL: 2014		
Warranty			
Please refer to SOLUNA WARRANTY CONDITIONS			

2.5.2 Technical data of battery module

Physical Characteristics

Width	205 mm
Depth	678 mm
Height	436 mm
Weight	60 kg

Electrical Characteristics

Battery type	LFP
Total Energy Capacity	3.84 kWh
Usable Energy Capacity	3.07 kWh
Battery Capacity (Nominal)	75 Ah
Nominal Voltage	51.2 V
Usable Voltage Range	48~57.6 V
Charge Current (Recommended)	37.5A
Discharge Current (Recommended)	37.5A
Max. Continuous Charge Current	50A
Max. Continuous Discharge Current	50A
DOD	80%
Internal resistance	⩽60 mΩ
Cycle life @ 25℃ (under standard charge and discharge conditions，charge 0.2C,discharge 0.2C)	⩾6000
DC Disconnect	Contactor Fuse

Warranty

Please refer to SOLUNA WARRANTY CONDITIONS

BMS

Power consumption	<3W (work), <100mW (sleep)
Monitoring parameters	System Voltage System Current Cell Voltage Cell temperature
Communication	CAN
Protection	Over voltage Under Voltage Over current Over temperature Under temperature

System Configuration

Module parallel	1~4 Parallel

Operating Conditions

Installation Location	Indoor
Operating Temperature	-10~45 ℃
Operating Temperature (Recommended)	15~30 ℃
Storage Temperature	-20~60 ℃
Humidity	5%~95%
Altitude	Max. 2,000 m
Cooling Strategy	Natural Convection

Reliability & Certification

Certificates	Cell：UL1642
	Battery Module：IEC62619 / UL1973
Transportation	UN38.3
Ingress Rating	IP20

2.6 Appearance

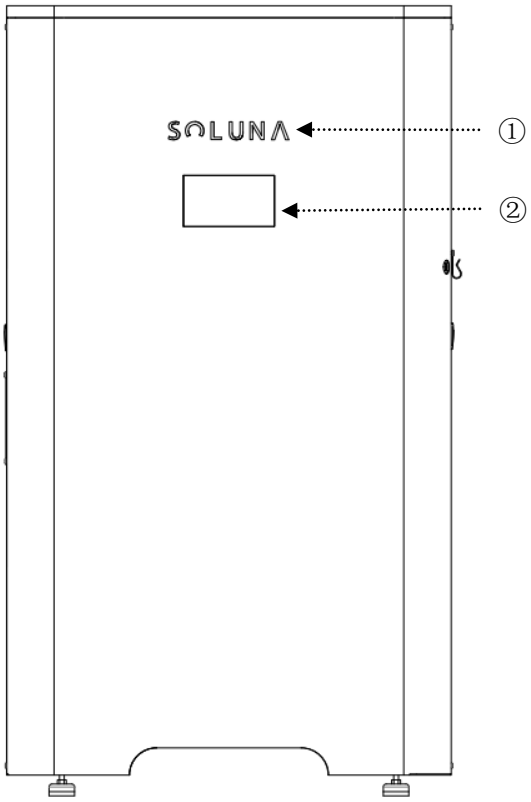


Figure 2.3 Appearance

Number	Name	Remark
①	Soluna brand	
②	LCD panel	

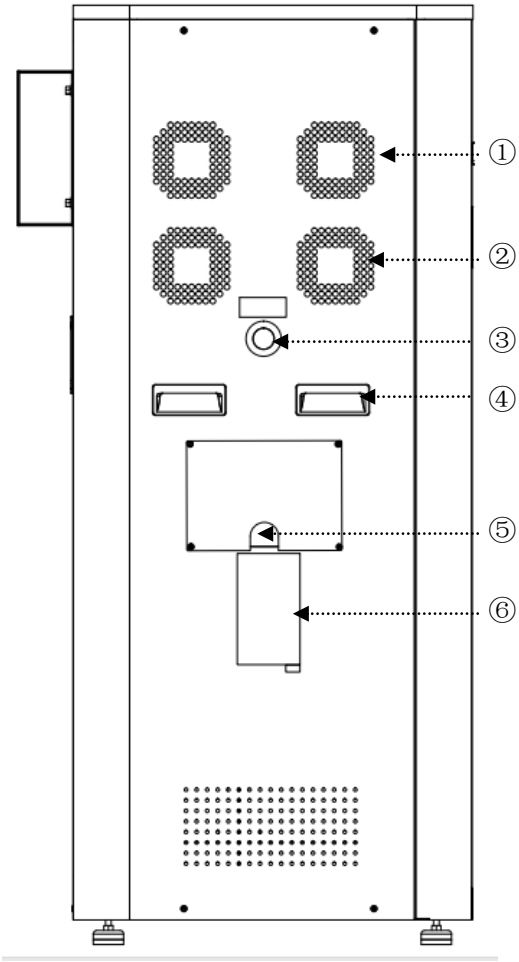


Figure 2.4 Appearance

Number	Name	Remark
①	FAN outlet	
②	FAN outlet	
③	Emergency Stop	
④	Handle	
⑤	Entry port	
⑥	Label	

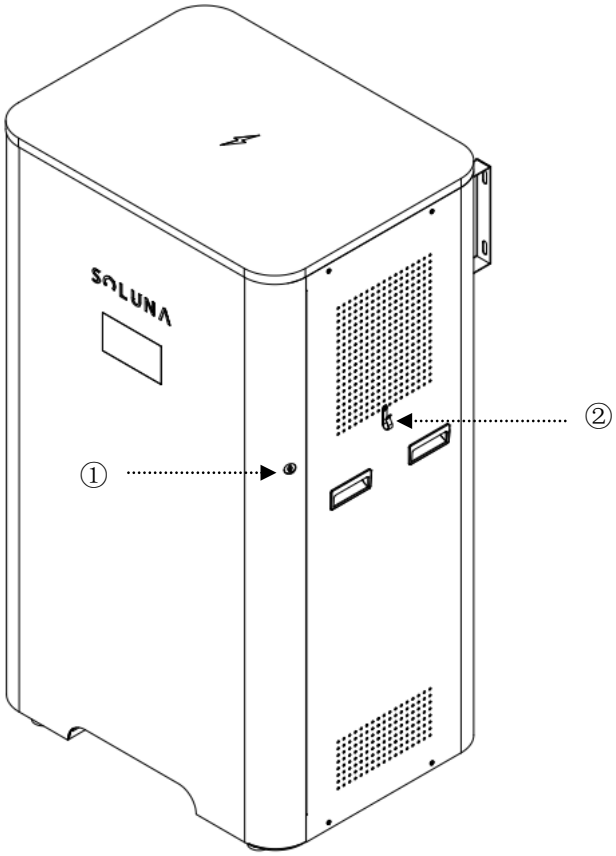
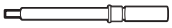


Figure 2.5 Appearance

Number	Name	Remark
①	Door lock of system	
②	Door key	

3 Installation

3.1 Installation tools

Item	Photo	Remark
1		Marking pen
2		Impact drill(φ12 mm)
3		Steel tape
4		Torque wrench (Opening size:13mm)
5		Phillips-screwdriver (M6,M8)
6		Straight screwdriver
7		Multimeter
8		Safety gloves
9		Safety goggles
10		Dust mask
11		Safety shoes

3.2 Installation spacing

In order to ensure good ventilation of the energy storage integrated machine, please reserve enough installation spacing around the machine during installation.

Position	Min spacing	Remark
Side spacing	100cm	There needs to be a clearance of 100cm on either side of Soluna system
Back spacing	10cm	It needs to be installed against the wall

Note: For detailed requirements about the narrowest maintenance channel, escape route, etc., refer to the applicable standards of the country/ region where the project is located.

3.3 Wire specifications

In order to standardize the specification of ac and dc connectors or terminals of compatible inverters, the following requirements are required for connecting ac and dc wires of corresponding types of inverters

Model	GRID & Load side	PV Load
Soluna S12EU-A36	It is recommended to use 4 mm^2 of wire	It is recommended to use 4 mm^2 of wire
Soluna S12EU-A50	It is recommended to use 6mm^2 of wire	It is recommended to use 6 mm^2 of wire
Soluna S12EU-A80	It is recommended to use 10mm^2 of wire	It is recommended to use 6 mm^2 of wire

3.4 Installation step

3.4.1 Unpacking confirmation

Before unpacking, check carefully whether the product information in the order is consistent with that on the nameplate of the package box, and whether the product package is intact. If there is any question, please contact the supplier timely.
Store the idled machine in its original package, and take anti-moisture and anti-dust measures. after taking the machine out of the box, check the following items:

Item	Name	Qty (pcs)	Remark
1	System case	1	
2	Battery module	2	
3	key	1	
4	PV connector	2	
5	PV connector removal tool	1	
6	Screws-M6*12	14	

7	Screws-M5*8	1	
8	Screws-M4*6	6	
9	Wrench 3#	1	
10	Expansion bolts-M8*100	4	
11	Module mounting bracket	2	
12	Wall mounting bracket	2	
13	CAN1 communication line	1	
14	CAN2 communication lie	1	
15	User manual	1	
16	RJ45 terminal	2	
17	Current sensor	1	

3.4.2 Basic installation requirement

The energy storage integrated machine cabinet is IP20 and suitable for installation in dry, dust-free environments. According to EMC standards, the energy storage integrated machine cabinet is designed to meet the installation requirements in a home environment. Select the installation site according to the following requirements:

- The installation site should be well ventilated, free from rain and direct sunlight;
- The installation floor should be dry and flat. It is strictly forbidden to have water on the ground; ensure that the ground level is not shaken and can fully carry the weight of the energy storage integrated machine cabinet.
- The temperature in the installation environment should range from -10 °C to 40 °C; the relative temperature should range from 4 to 100 %.
- Reserve enough installation spacing between the front, rear, left and right, top and wall of the energy storage integrated machine cabinet to ensure good ventilation, heat dissipation, installation and maintenance, and safe escape.
- There are no combustible gas and flammable materials nearby.
- The installation environment should be clean.

3.4.3 Installation procedures

The mechanical installation steps are as follows:

Step1 :user can find 3units of battery module and 1unit of the case of soluna after opening the packing box

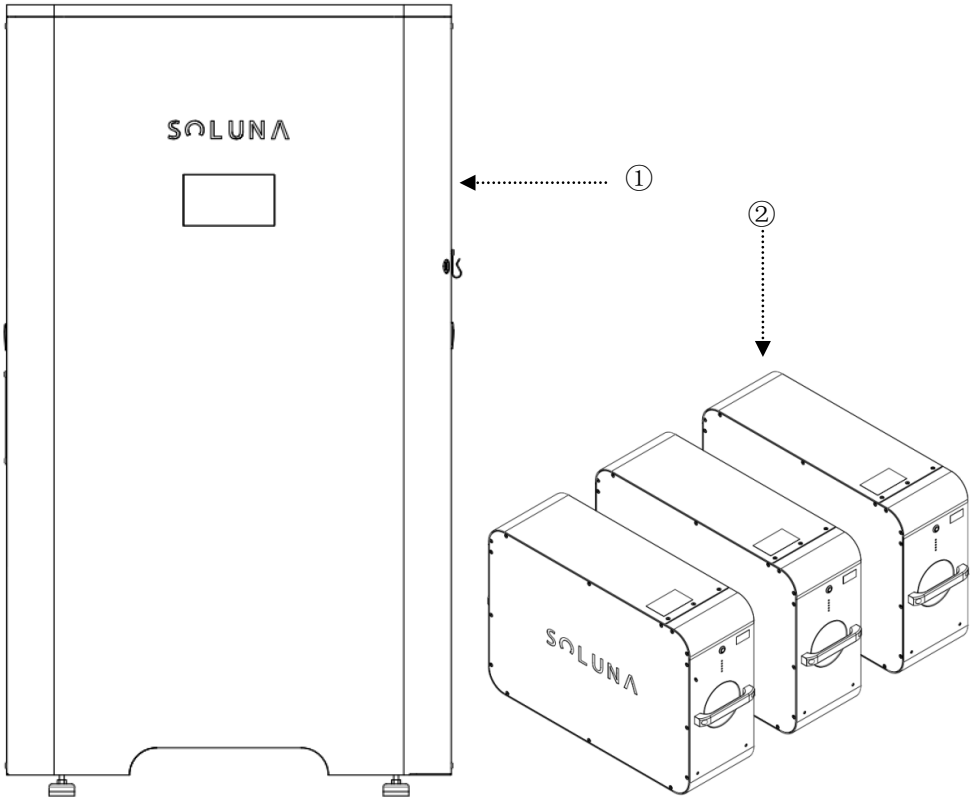


Figure 3.1 Soluna system case & Battery units

Number	Name	Remark
①	System case	
②	Battery module	

Step2: The system is installed against the wall

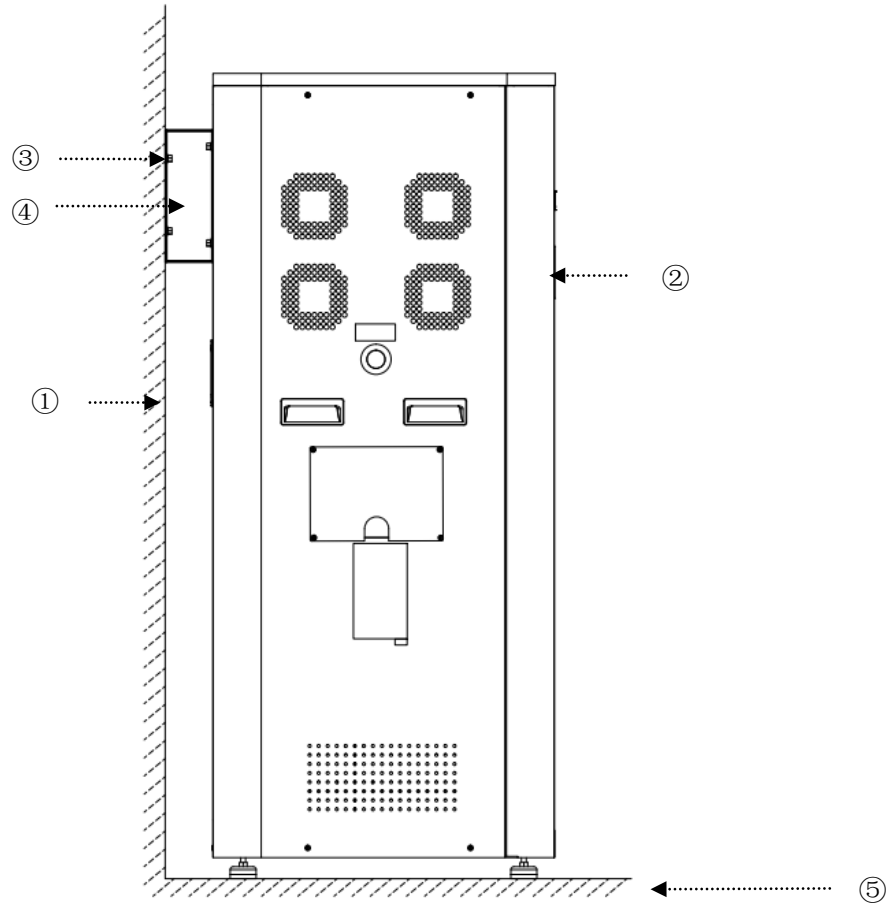


Figure 3.2 Installation place

Number	Name	Remark
①	Wall	
②	Soluna System	
③	Expansion Screw	
④	Fixed Bracket	
⑤	Ground	

Step3: Open the door of soluna system, and open the case of battery module & System case.

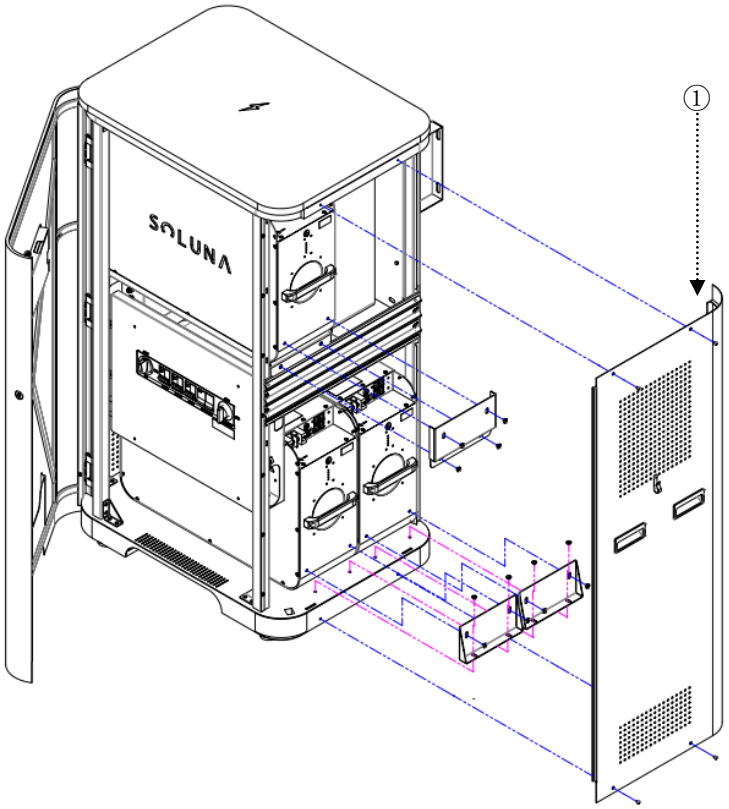


Figure 3.3 System case

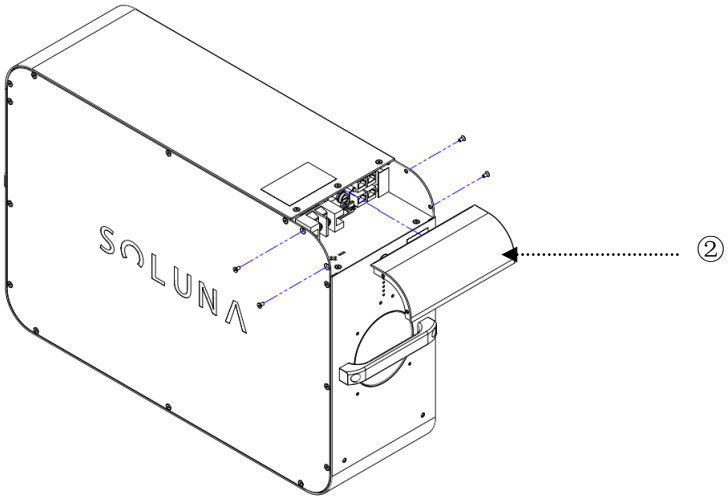


Figure 3.4 Battery unit

Number	Name	Remark
①	System case	
②	Case of Battery module	

Step4: Push the battery module into the system, and lock the battery cable and plug in the CAN communication & Remote line.

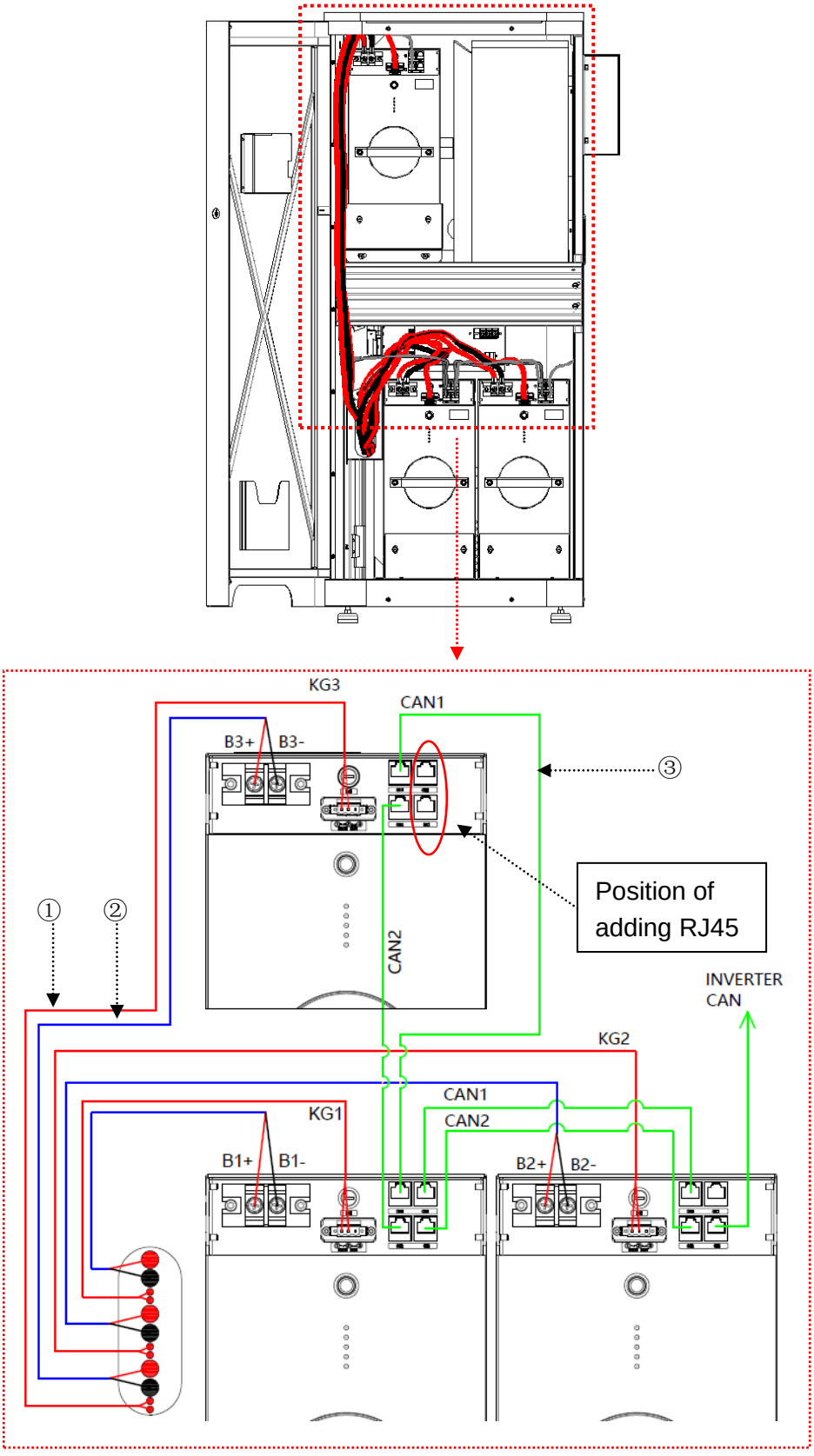


Figure 3.5 Connection for battery cable &CAN communication & Remote line

Remark: Need add RJ45 terminal on CAN1 & CAN2 BUS communication wire
In order to prevent the communication interference.
Please find the above picture for the position of adding RJ45 terminal.
User can find the RJ45 terminal in the accessories.
Please find the following picture for RJ45 terminal for details

Figure 3.6 RJ45 terminal

Number	Name	Remark
①	Remote wire	
②	Battery cable	
③	CAN communication line	

Remark: Connecting wire for communication line

1) All CAN1 lines are parallel for the internal communication of battery units
2) All CAN2 lines are parallel for the external communication .
(between battery unit and hybrid inverter),then,CAN2 is connected to inverter.

Step 5: Fixed battery module and Close the door of Soluna system.

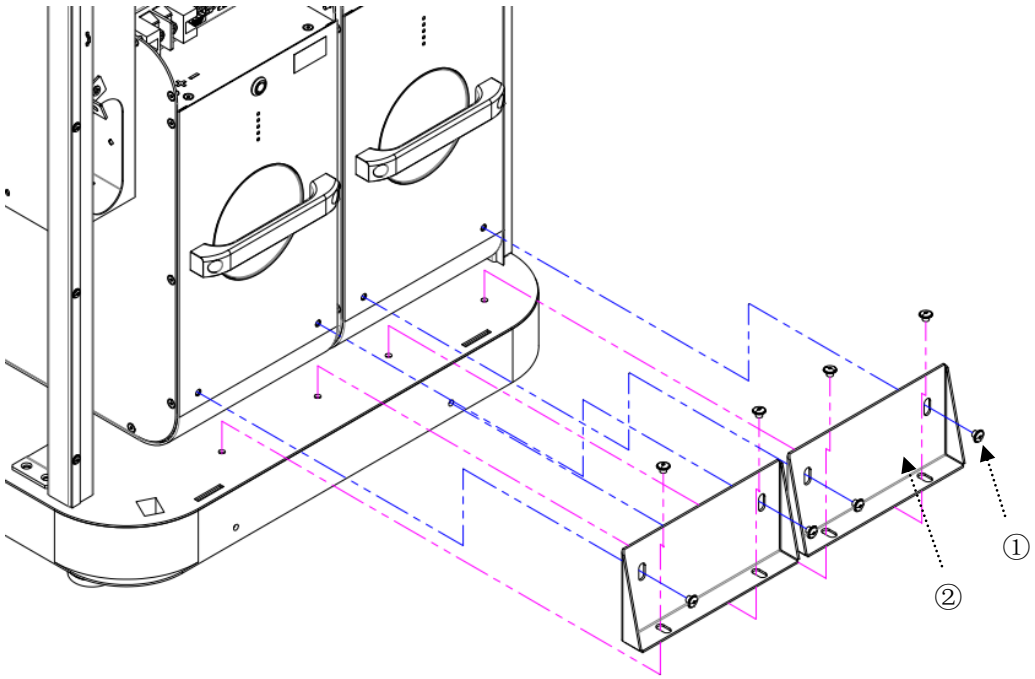
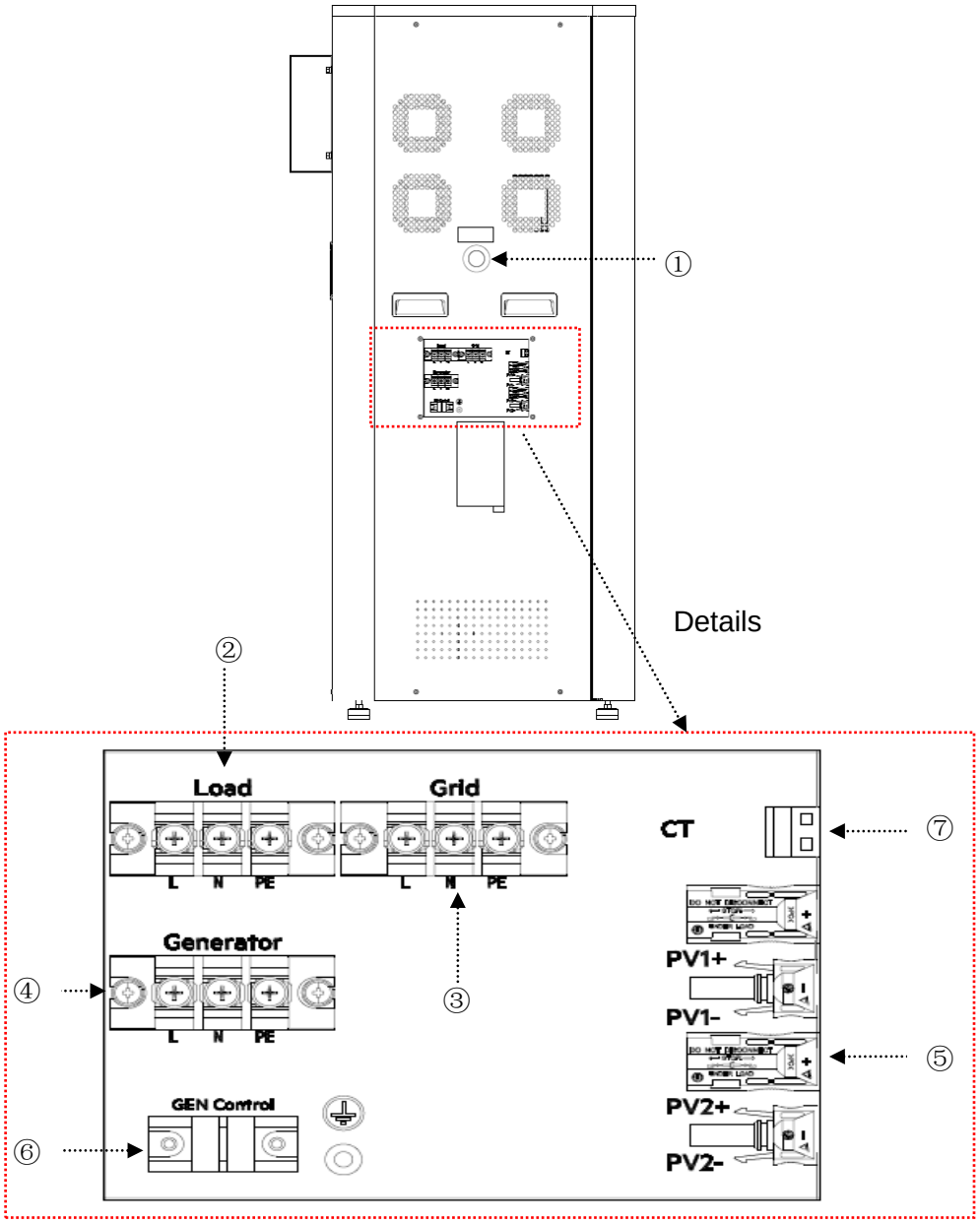


Figure 3.7 Fixed battery module

Number	Name	Remark
①	M6*12 Combination screw	
②	Fixed bracket	

Step6: external circuit connection (PV\Grid\Load)

Figure3.8 external circuit connection



Number	Name	Remark
①	Emergency Stop	
②	Load connector	Back-up load connector
③	Grid connector	
④	GEN connector	
⑤	PV connector	
⑥	GEN control port	
⑦	CT connector	

PV connection

	Only qualified PV strings under the local electrical safety laws and regulations and comply with the technical parameters of this manual are allowed to connect to the Soluna series energy storage integrated machines. the PV string connected to the energy storage integrated machine must adopt the DC connector configured especially for the energy storage integrated machine, do not use other connection devices without authorization from our company, otherwise damage to the device, unstable operation or fire may occur, and our company will not undertake quality assurance or assume any direct or joint liability thereof.

Note:

It is recommended to use 4mm^2 of wire for PV connecting wire.

PV terminal crimping------Terminal crimping torque 3.6–4.6 N•m .

- Ensure that the maximum open circuit voltage of each PV string is not higher than the maximum input voltage of the energy storage integrated machine under any circumstances.
- It is forbidden to connect the PE wire (ground wire) to the positive and negative poles of the PV strings, otherwise it will cause damage to the energy storage integrated machine.
- Ensure that the PV string polarity matches the PV connector, otherwise the energy storage integrated machine will be damaged.
- The insulation resistance of the PV panel to the ground should be greater than the safety regulation, otherwise there will be electrical hazards.
- Ensure the wires of the cable correspond to the connector terminals, and tighten the screws. the crimping torque of the screws is 1.5–2.5 N•m.
- Use a multimeter to measure the voltage of the DC input string, verify the polarity of the DC input cable, and ensure that the voltage of each string is within the allowable range of the machine.

Grid & Load connection

	Only qualified AC transmission cables under the local electrical safety laws and regulations and comply with the technical parameters of this manual are allowed to connect to the Soluna series energy storage integrated machines

Recommended wire specifications for safe system operation are as shown in the following table.

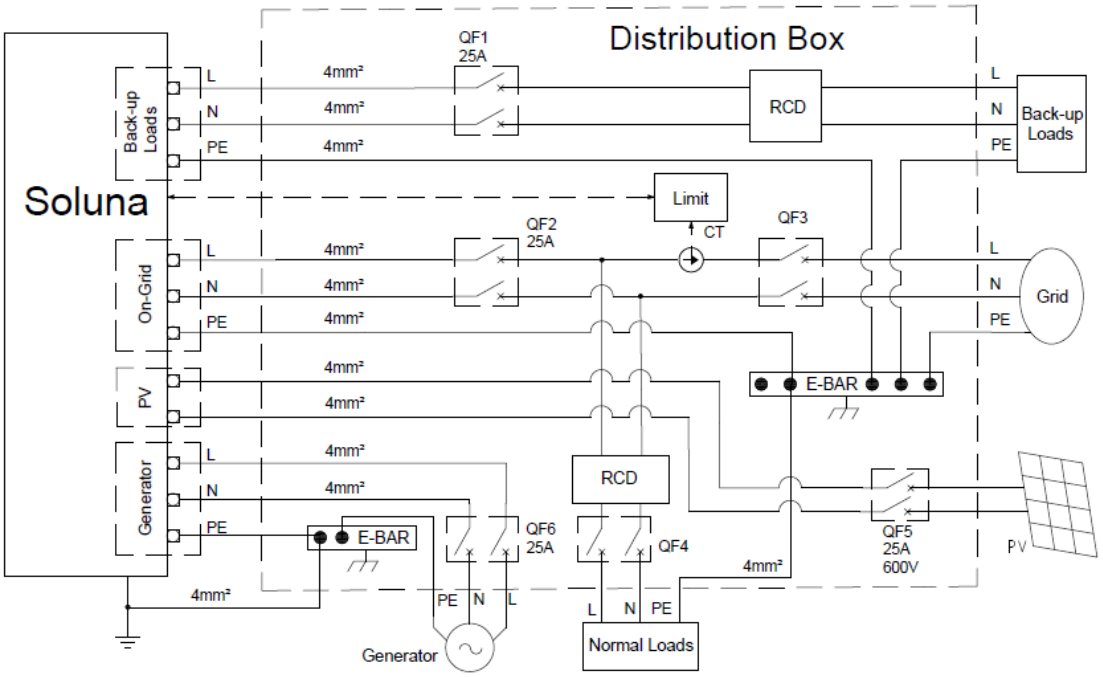
Model	GRID side	Load side
Soluna S12EU-A36	It is recommended to use 4 mm^2 of wire	It is recommended to use 4 mm^2 of wire
Soluna S12EU-A50	It is recommended to use 6mm^2 of wire	It is recommended to use 6 mm^2 of wire
Soluna S12EU-A80	It is recommended to use 10mm^2 of wire	It is recommended to use 10mm^2 of wire

Terminal crimping of wires L, N, and PE of the mains and load cables
Terminal crimping torque 3.6–4.6 N•m
Note:

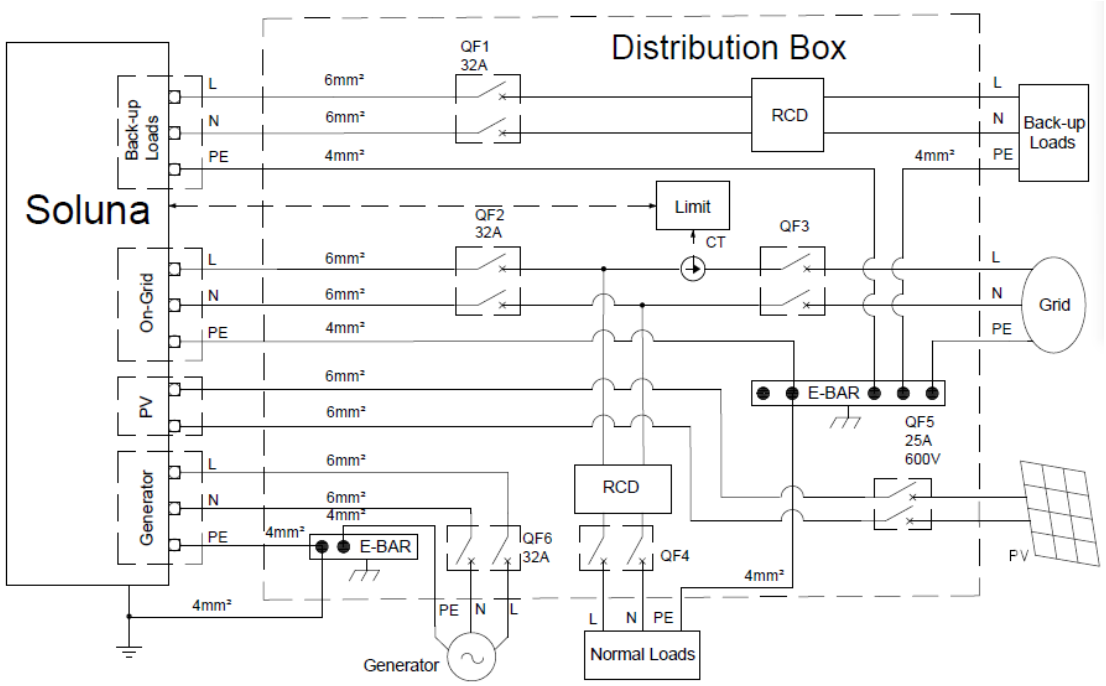
- Before connecting the AC power grid cable to the energy storage integrated machine, the lightning protection and short circuit protection measures must be taken in accordance with the local electrical safety regulations. The PE cable (grounding cable) of the machine must be reliably grounded.
- Connect the three wires L, N, and PE of the single-phase public power grid to the corresponding AC terminals, fasten them, and tighten the screws. The crimping torque is 1.5–2.5 N•m.
- Connect the three wires L, N, and PE of the load to the corresponding load terminals, fasten them, and tighten the screws. The crimping torque is 1.5–2.5 N•m.

Step7 : Electrical connection

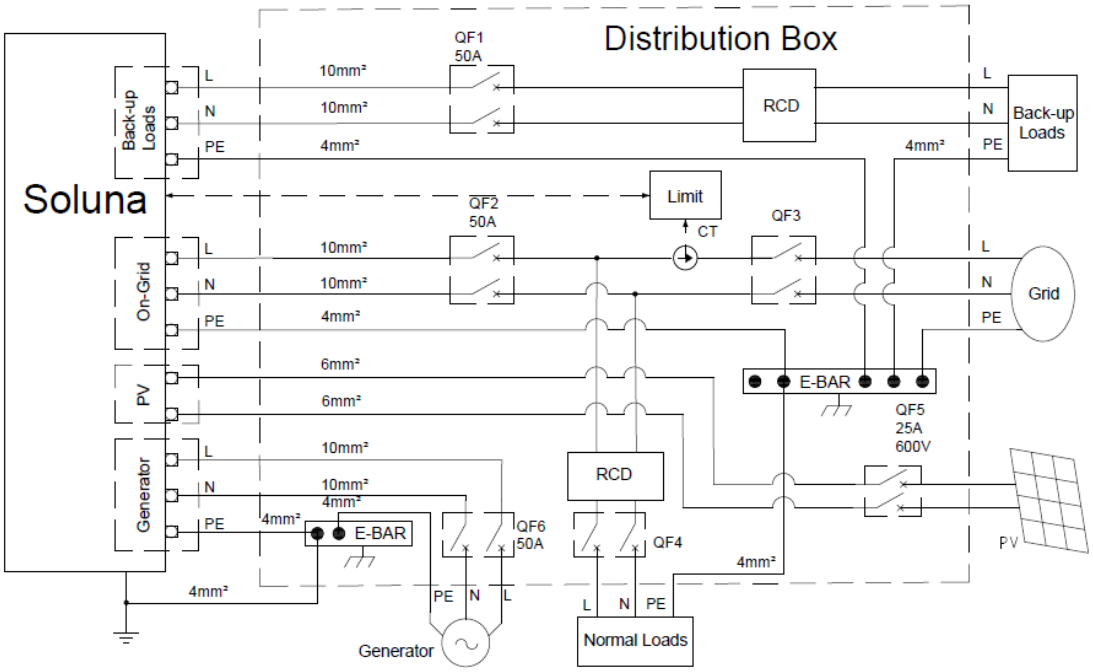
1） Soluna S12EU-A36



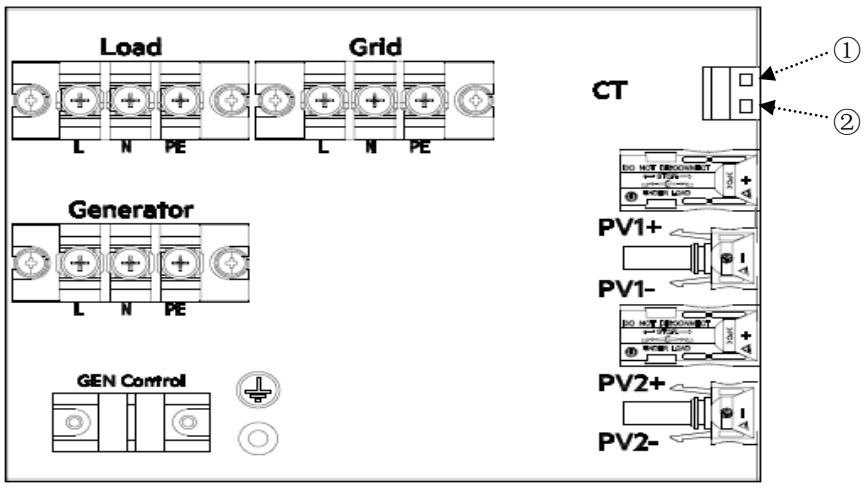
2）Soluna S12EU-A50



3）Soluna S12EU-A80



4）CT connection



Number	Name	Remark
①	CT connector	Connect to black wire of CT
②	CT connector	Connect to white wire of CT
②	CT	

4 How to operate Soluna

4.1Turn on or turn off Soluna S12 EU system

Turn on: Open the door, and turn on all the switch of Load/Grid/Battery/Remote.
Turn off: Open the door, and turn off all the switch of Load/Grid/Battery/Remote.
Please find the following pictures for the position of switch.

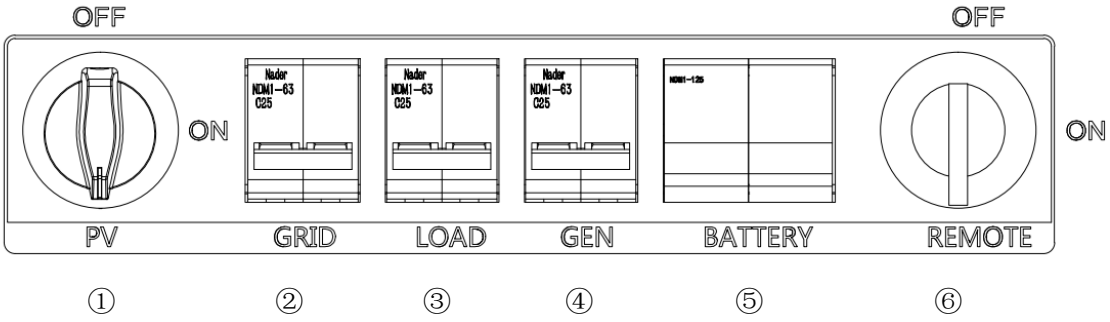


Figure 4.1 Turn on\Turn off system

Number	Name	Remark
①	PV Switch	
②	Grid breaker	
③	Load breaker	Back-up load breaker
④	GEN breaker	
⑤	Battery breaker	
⑥	Remote switch	

4.2 How to operate LCD screen (user screen)

Users can only check Soluna system operating information and perform simple charge and discharge settings on the user screen, please find the following information for details.

4.2.1 Position of LCD

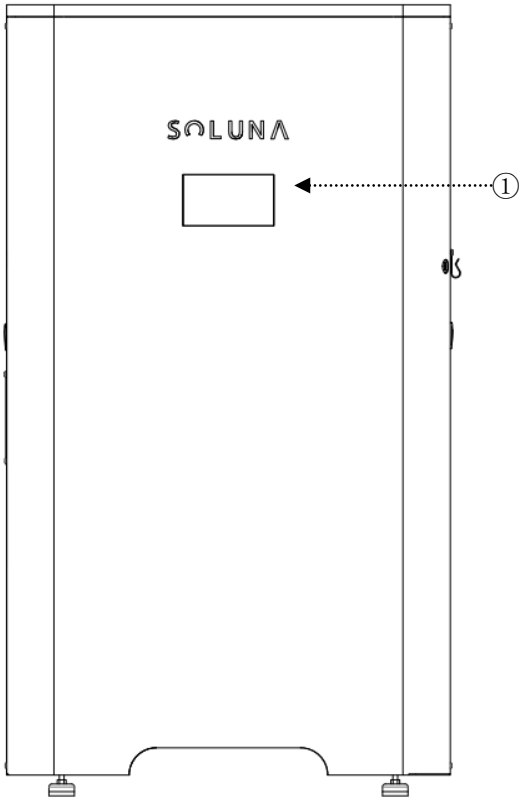


Figure 4.2 LCD

Number	Name	Remark
①	LCD panel	

Note:

The LCD is touch screen, user can touch the screen to see the information of system.

4.2.2 How to check the information of LCD screen

LCD screen including 5 icons.
（Status、Settings、Data、Production information、Battery Capacity）
Click each icon will see the relevant information.

Please find the following picture for the interface of LCD screen.

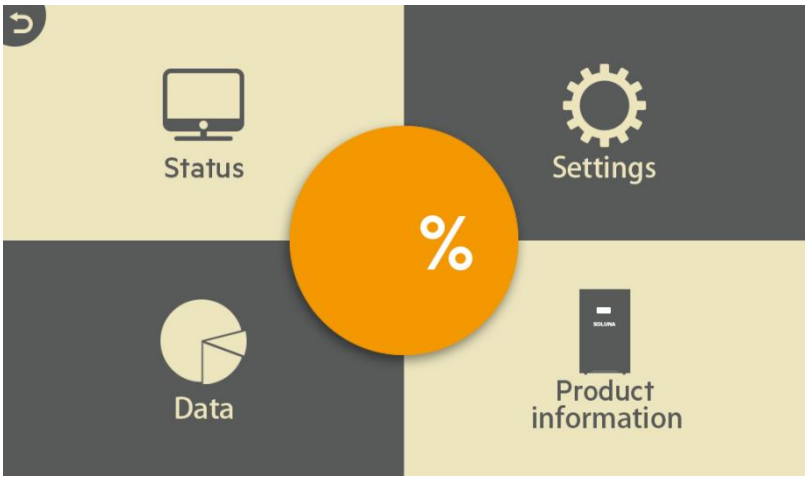


Figure 4.3 LCD Screen

4.2.3 How to check the information of “Status” icon

User can find the following interface after clicking the icon of Status

Figure 4.4 information of status icon

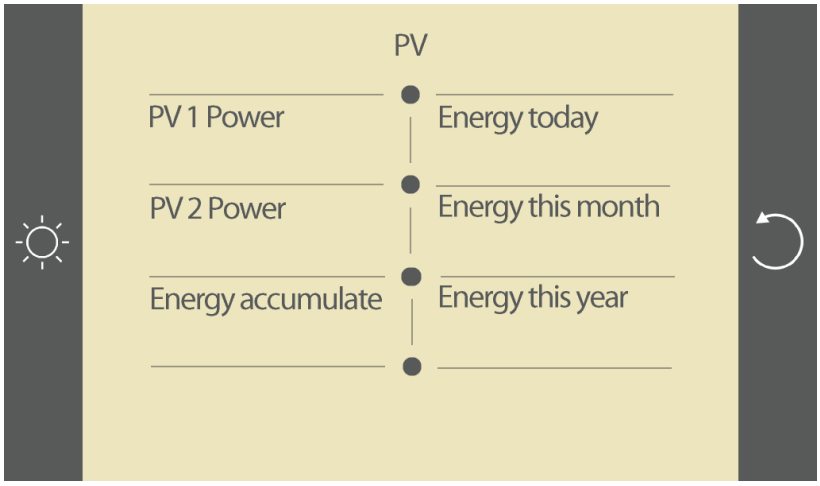


Figure 4.5 PV information

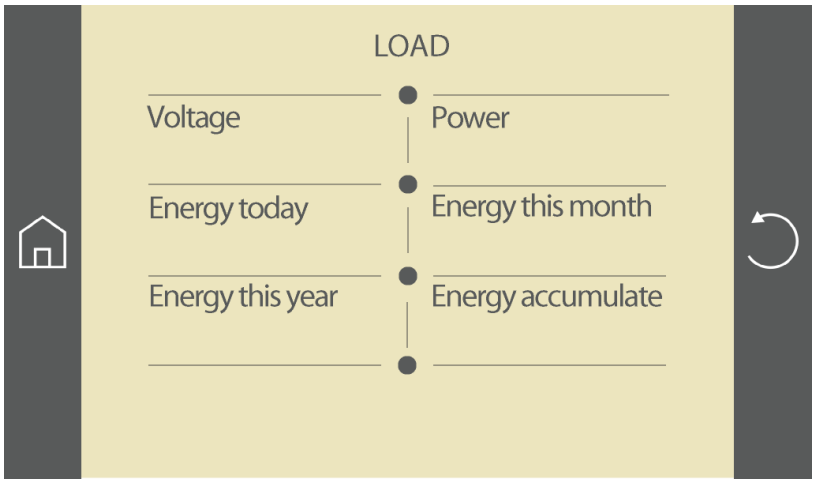


Figure 4.6 Load information

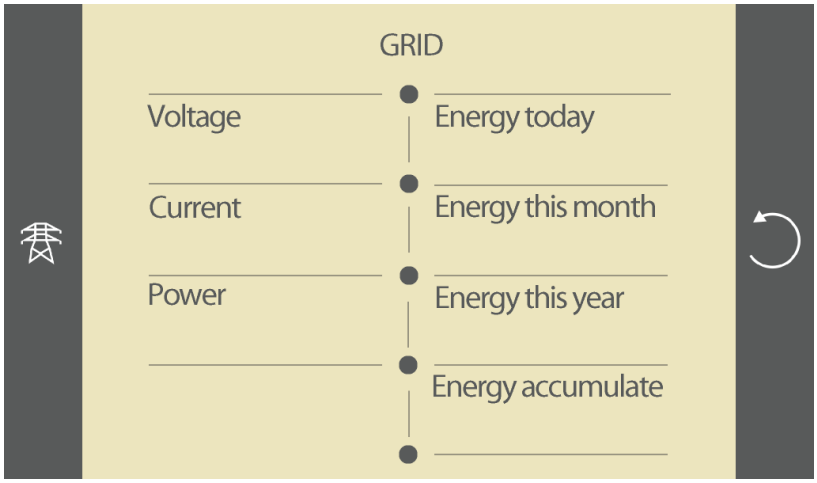


Figure 4.7 Grid information

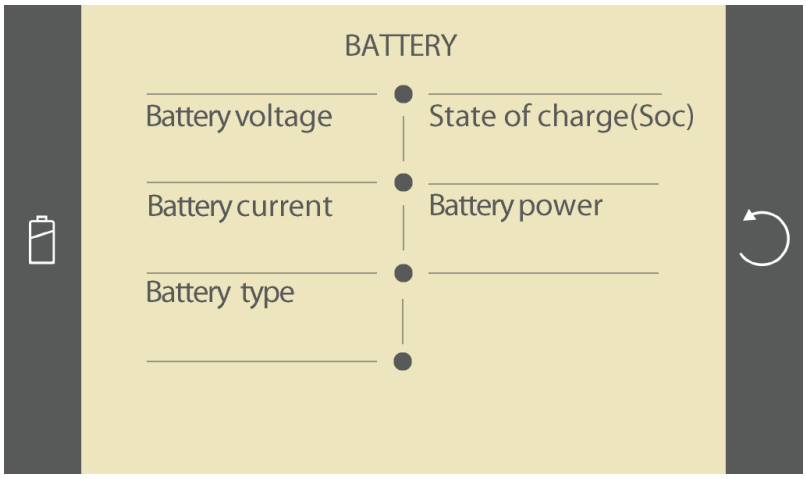


Figure 4.8 Battery information

4.2.4 How to Setting parameters of Soluna system

User find the following interface after clicking the icon of “Setting” .

Figure 4.9 Setting icon information

User can find the following interface after clicking the icon of Power sources.

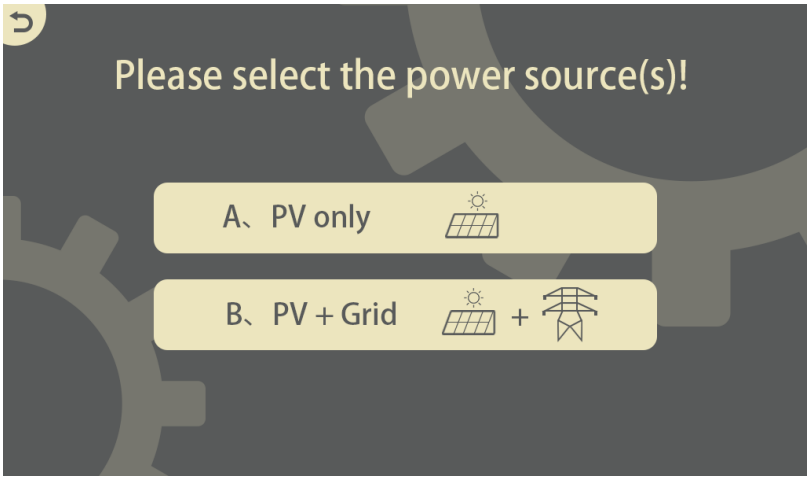


Figure 4.10 Power source

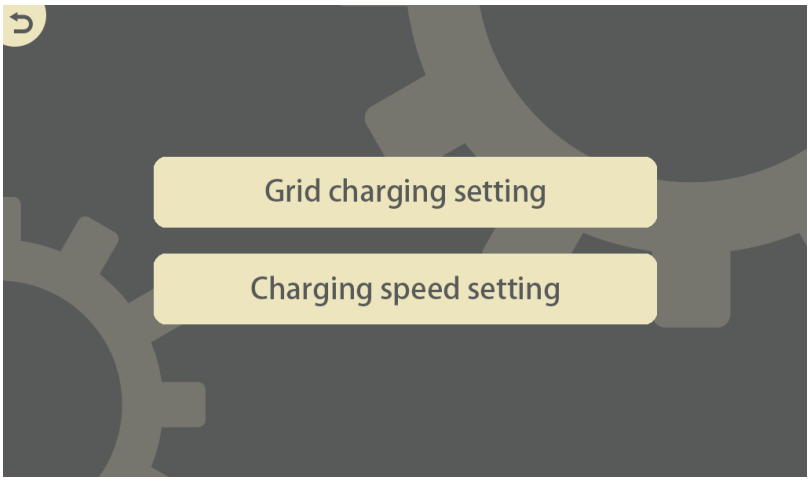


Figure 4.11 Charging setting (1)

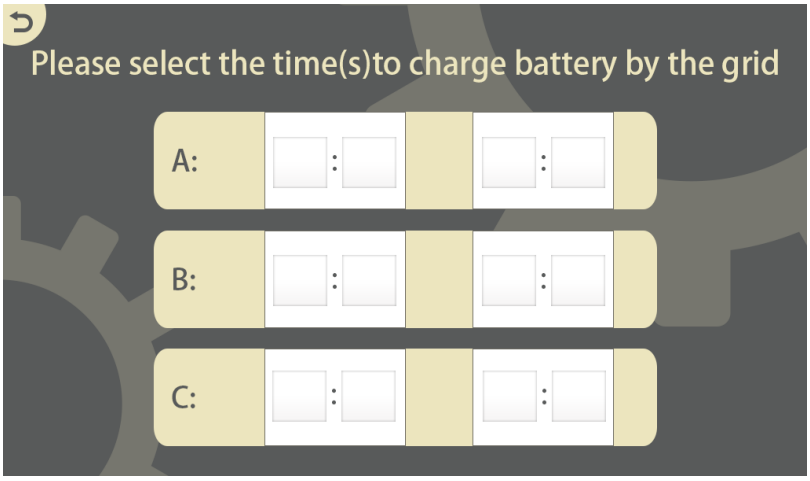


Figure 4.12 Charging setting (2)

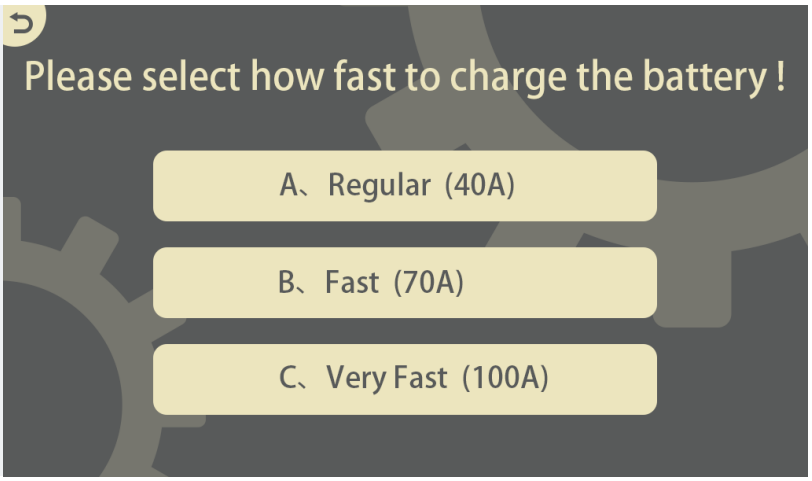
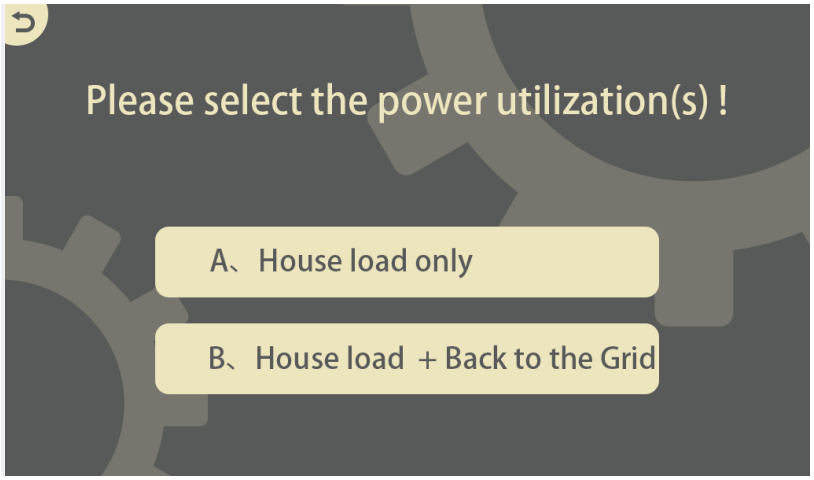


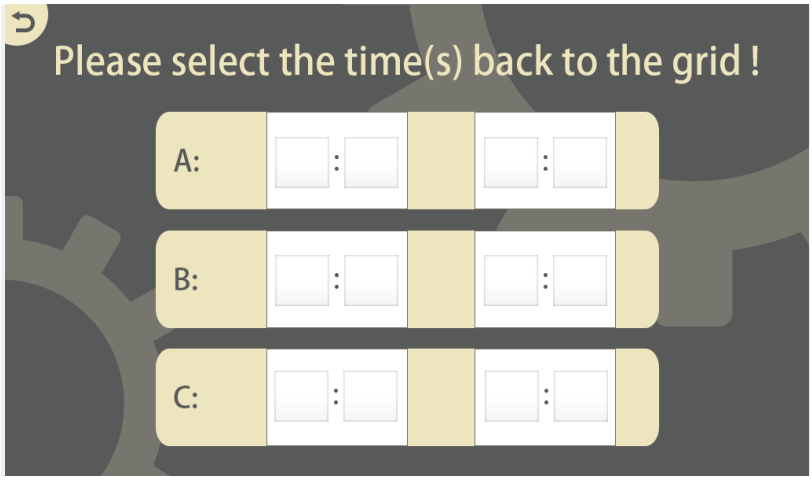
Figure 4.13 Charging setting (3)

The initial default charging speed is Regular (40A), Unless there are special circumstances. it is not recommended to use Very Fast to charge the battery. Low current charging is beneficial to prolong the battery life.

User can find the following interface after clicking the icon of power utilizations.

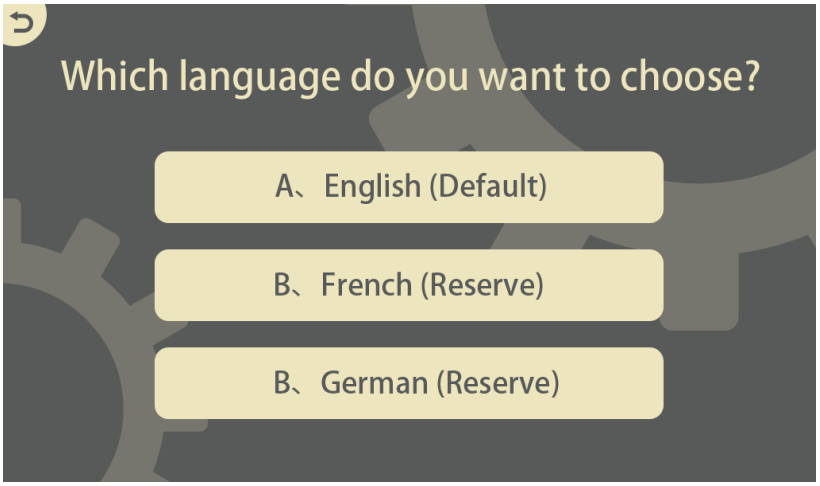


If user does not want the battery's energy to be fed back to the grid, tick "House load only".



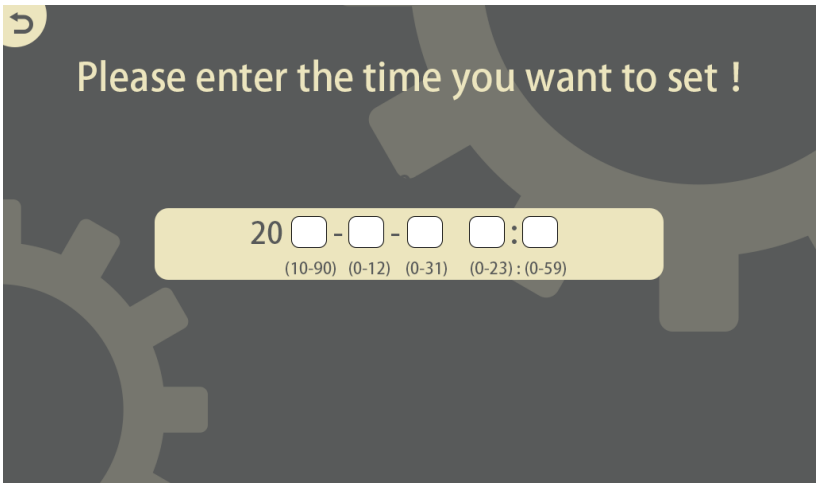
Users can set the battery discharge time period according to their need.

User can find the following interface after clicking the icon of Languages.



Remark: There are 3 kinds of language option in the Soluna system.
But ,So far, only English is default, French and German are reserve.

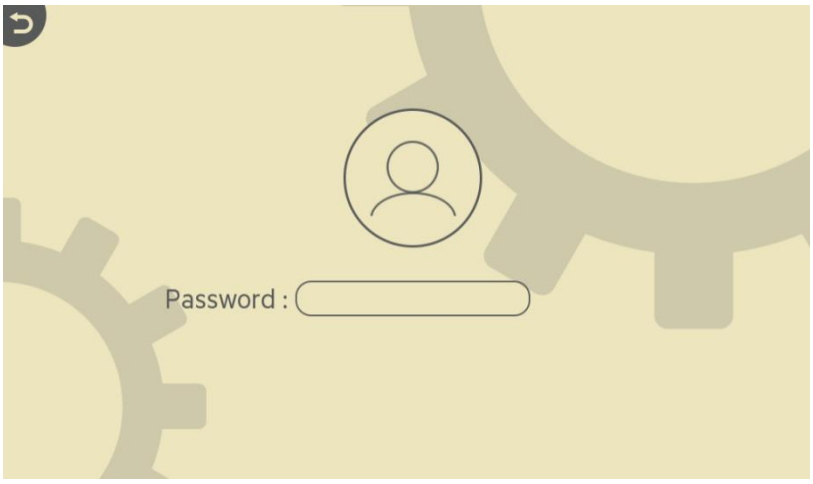
User can find the following interface after clicking the icon of timing.



The initial defaults time is China time, the user must change it to local time after finishing installing the system because the charging and discharging time setting on the user's screen is directly related to the local time.

User can find the following interface after clicking the icon of Reset & advanced Setting. User need to enter password if the user wants to restore the parameters of Soluna system.
(Remark: Soluna will provide the password if user needs it，

The advanced settings are only opened to installers, and it is not recommended that end users enter into the advanced settings to set the parameters.

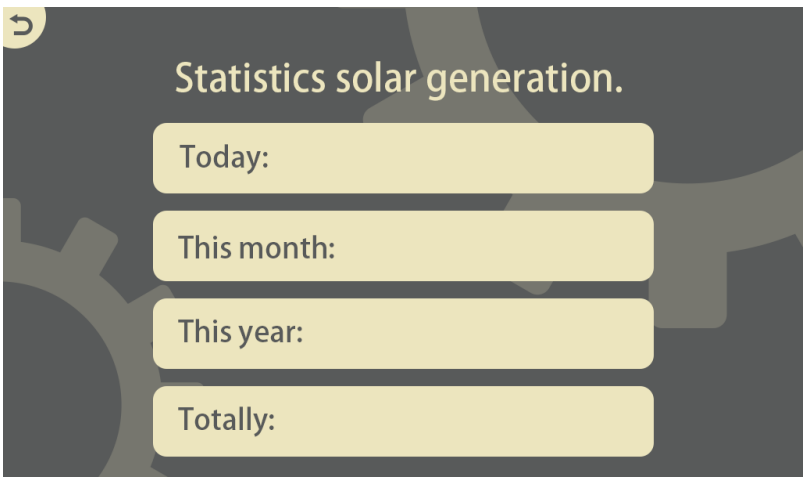


User needs to confirm again it after setting the parameters of Soluna system.

4.2.5 How to check the information of “Data” icon.

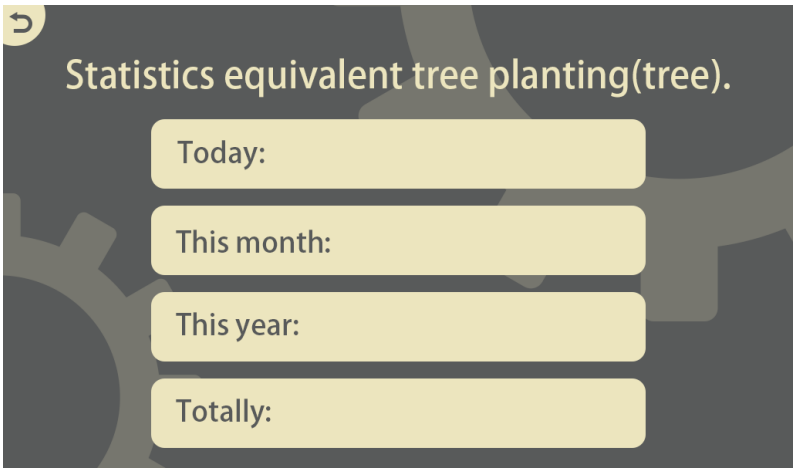
User can find the following interface after clicking the icon of Data.

a. User can find the following interface after clicking the icon of Solar generation.

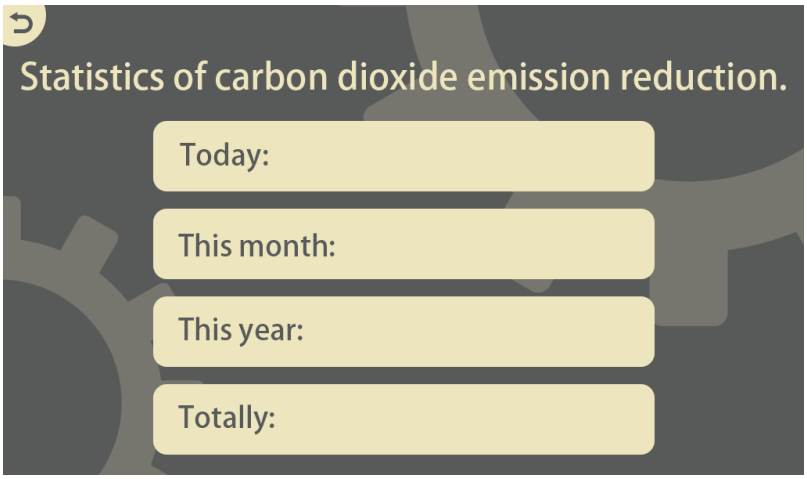


b. User can find the following interface after clicking the icon of “back to grid”.

C. User can find the following interface after clicking the icon of “Equivalent tree Planting”.

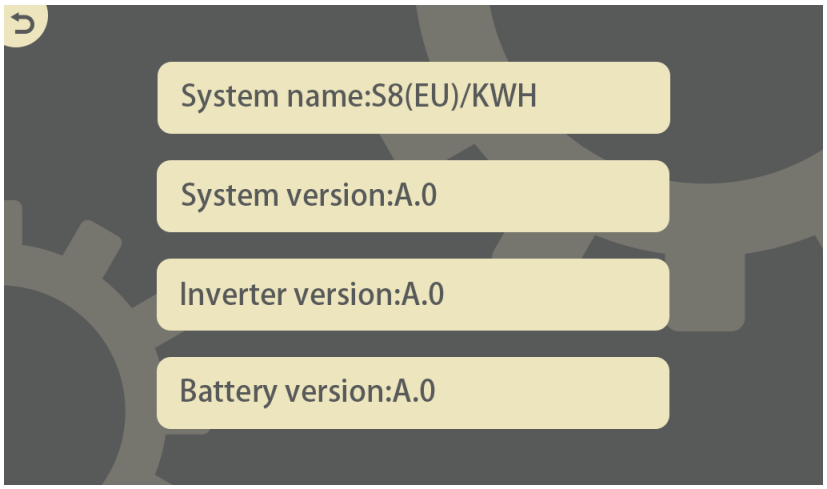


d. User can find the following interface after clicking the icon of “save the earth”.



4.2.6 How to check the production information of Soluna system

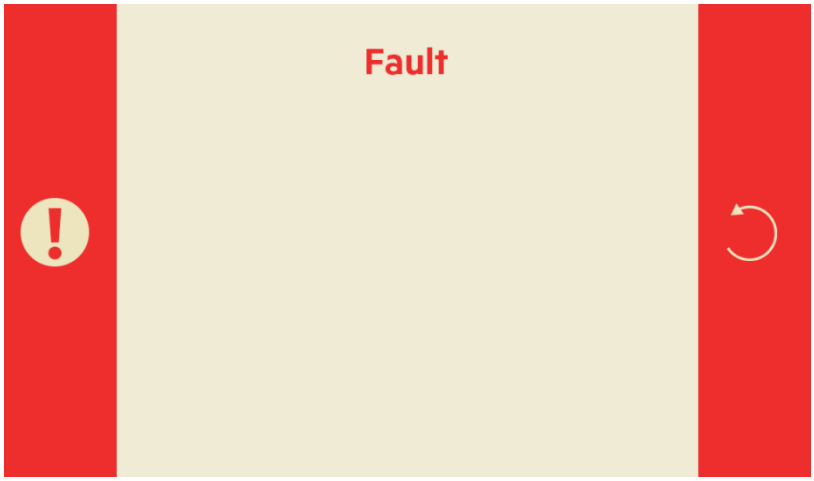
User can find the fault information after click the icon of “production information”.



4.2.7 How to Check the fault information

User can find the fault information after click the fault icon

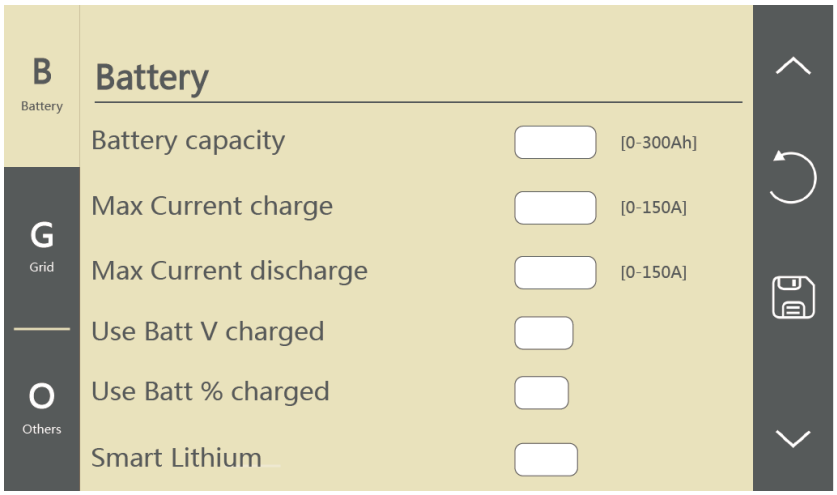
Remark: User will find an icon blinking in the upper right corner of the LCD panel if there is any fault during Soluna system operation.



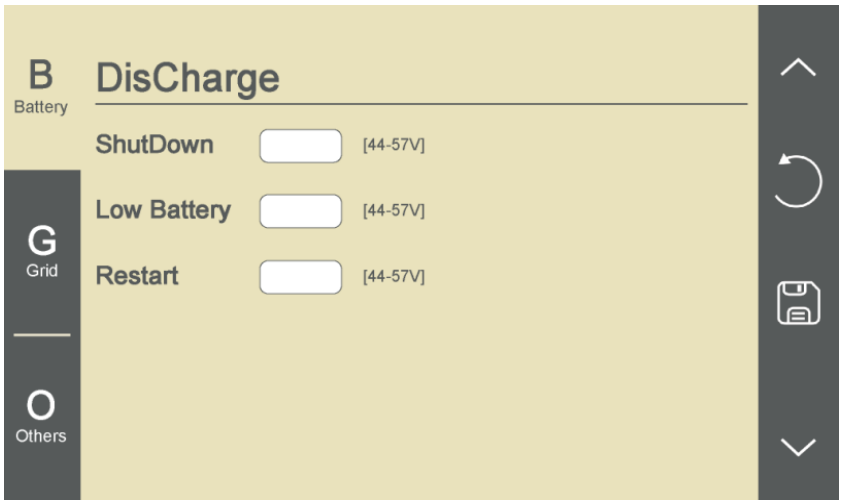
5.How to operate the LCD （only for installer）

The advanced setting is only opened to installers, and installers can set them according to user's requirements.

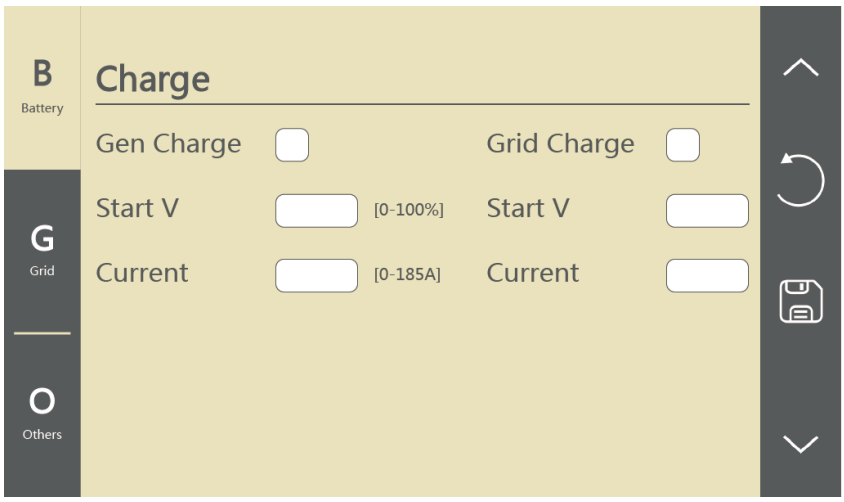
5.1 battery parameter setting



The installer can set the Max charging and discharging current values according to actual needs. Meanwhile, "Use Battery V charged" & "Smart Lithium" should be ticked.



1) Shut down----- Soluna system will shutdown if the battery voltage below this value.
2) Low Battery------Soluna system will alarm if the battery voltage below this value .
3) Restart------Restart level after Soluna System shutdown.



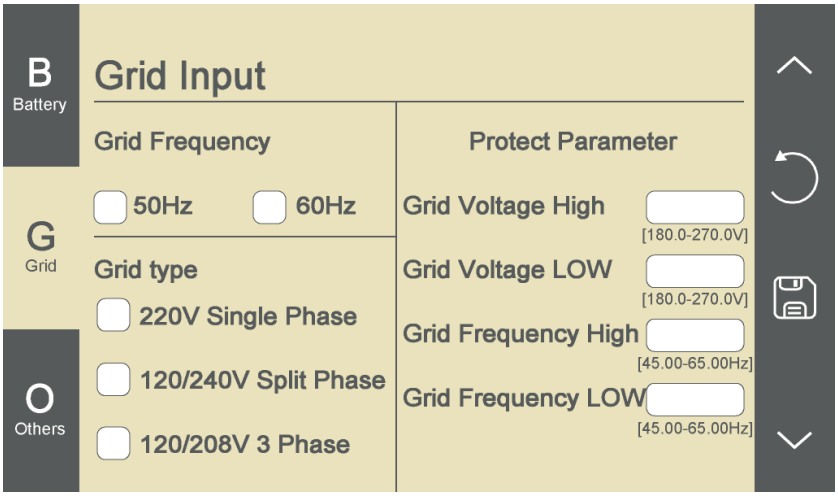
Gen charge" start V"------ Gen will start when the battery voltage is less than the "start V" in the condition of off-grid mode

GEN charge "current" ------ Current value that GEN charges the battery after started

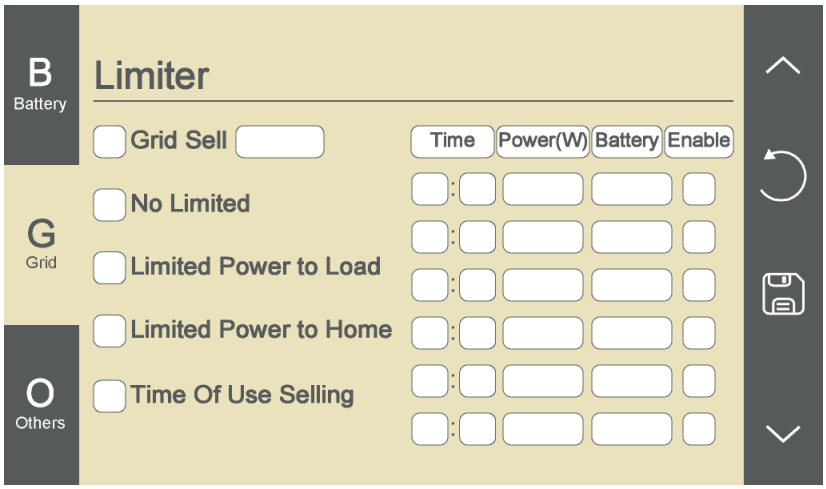
Grid charge "start V" ------ Grid will start when the battery voltage is less than the "start V" in the condition of off-grid mode

Grid charge "current" ------ Current value that Grid charges the battery after started.

5.2 Grid parameters setting



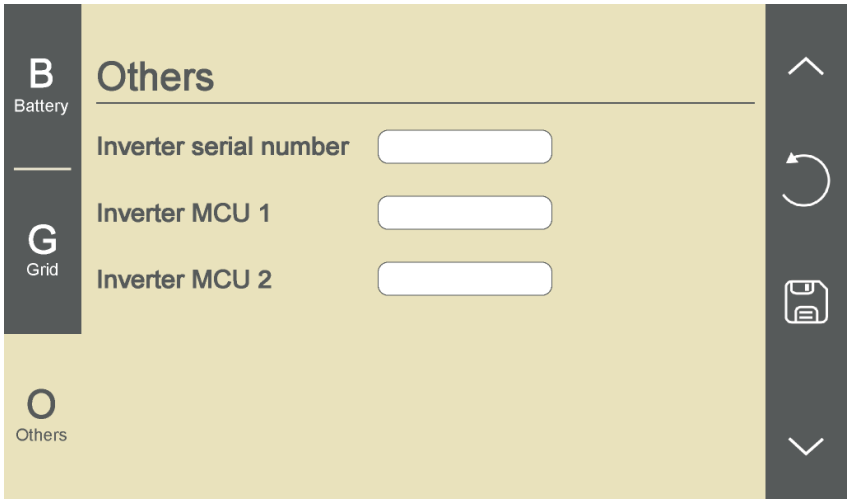
Select the correct Grid frequency accordingly, Otherwise Soluna system will not Work.

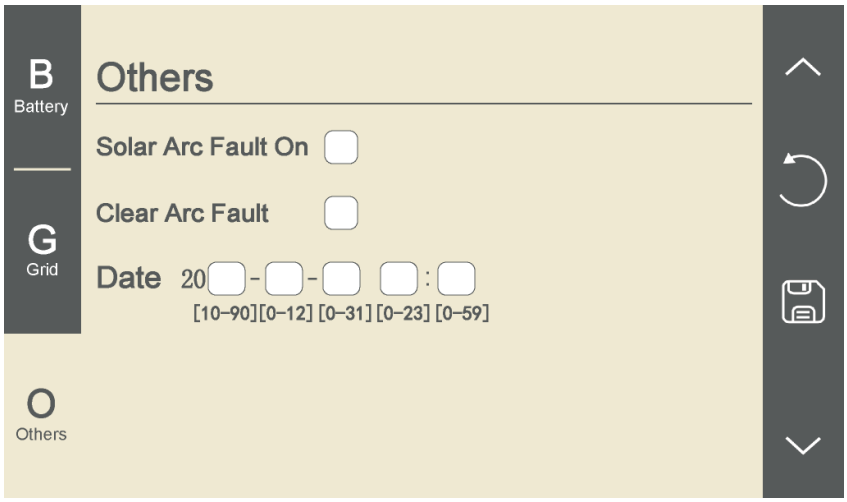


Charging and discharging time of Soluna system.
Six periods can be set, from 0:00-24:00.
Under “House load Only”, Do not tick” Grid Sell”
Under ”House load+Back to Grid”, Tick ”Grid Sell”.
Grid sell----The energy generated by PV supply house loads and battery in priority, excess energy would feed back to Grid.
Limited Power to load------Tick it means output power depends on actual loads
Limited power to home-----Tick it means output power depends on CT position.

5.3 Others

Installer can find the Version information of Inverter hardware & Software.

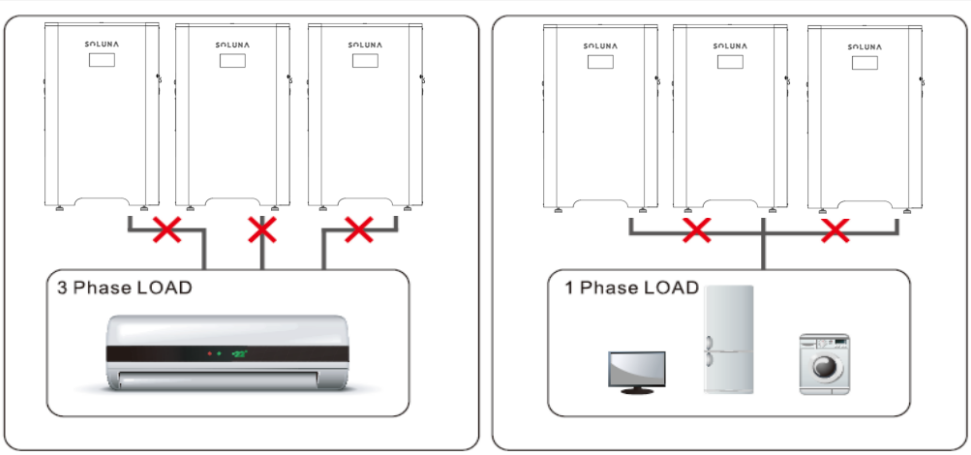




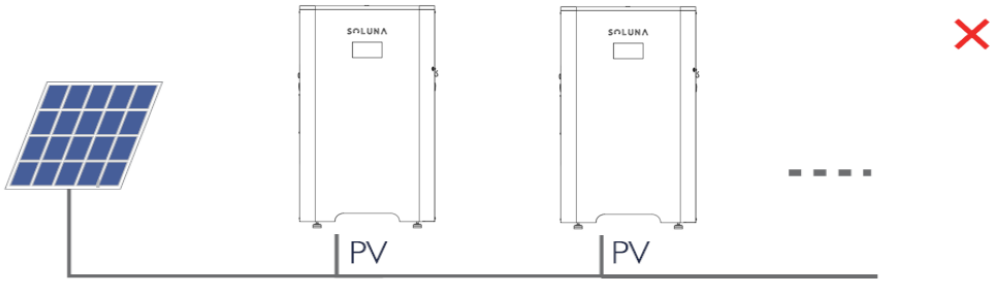
Solar Arc Fault on------ this is only for US market

6.Caution

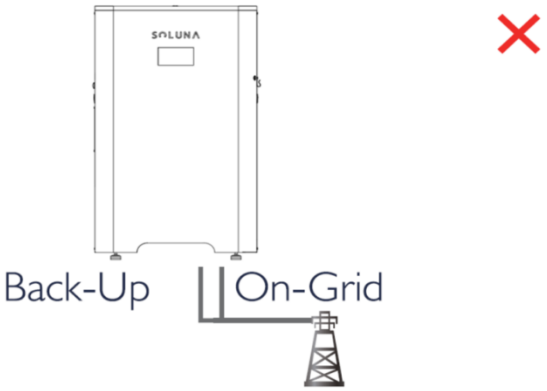
1）The Soluna system does not support parallel (three-and single-phase) operation on the AC-Backup, Parallel operation of the unit will void the warranty.



2) Single PV string Can’t be connected to 2 or more Soluna systems.



3) Back-up side can’t be connected to Grid.



4）Soluna system must be grounded. Otherwise, there might be possible to hazard personal safety, besides, it is probably to affect LCD’s display.

5) Water pump is not recommended to connect with Soluna S12EU.

6) Air conditioners is not recommended to connect with Soluna S12EU-A36

7) Air conditioners of 1.5P above are not recommended to connect with Soluna S12EU-A50
8) Air conditioners of 2P above are not recommended to connect with Soluna S12EU-A80

7 Troubleshoot

7.1 Below are the descriptions of fault codes when system works abnormally. Find the table-1 for details.

.

If any of the fault messages listed in Table-1 appear on Soluna screen and the fault has not been removed after restarting, Please contact installer or Soluna.

Table-1		
Fault code	Fault information	Remark
F01	Dc input polarity reverse fault	
F02	Dc insulation impedance permanent fault	
F03	Dc leakage current fault	
F04	Ground fault GFID (battery end grounding)	
F05	Read the memory error	
F06	Write the memory error	
F07	GFDI Blown Fuse	
F08	GFDI Grounding contact failure	
F09	IGBT damage by excessive drop voltage	
F10	Auxiliary switch power supply failure	
F11	Ac main contactor errors	
F12	Ac auxiliary contactor errors	
F13	Grid voltage surge	
F14	DC firmware over current malfunction	
F15	AC firmware over current malfunction	
F16	GFCI(RCD) Ac leakage current fault	
F17	Three phase current, over-current fault	
F18	AC over current fault of hardware	
F19	All hardware failure synthesis	
F20	DC over current fault of the hardware	
F21	Dc leakage flow fault	
F22	Crash stop (if there is a stop button)	
F23	Ac leakage current is transient over current	
F24	Dc insulation impedance failure	
F25	Dc reverse irrigation failure	
F26	The dc bus is unbalanced	

F27	Dc end insulation error	
F28	Inverter 1 dc high fault	
F29	Ac load switch failure	
F30	Ac main contactor failure	
F31	Ac secondary contactor failure	
F32	Inverter 2 dc high fault	
F33	AC Current over current	
F34	AC Overload	
F35	AC Grid Unavailable fault	
F36	AC grid phase error	
F37	Ac three-phase voltage imbalance failure	
F38	Ac three phase current unbalanced failure	
F39	AC Over current failure	
F40	DC Over current failure	
F41	AC Line W,U over voltage	
F42	AC Line W,U low voltage	
F43	AC Line W,V over voltage	
F44	AC Line W,V low voltage	
F45	AC Line U,V over voltage	
F46	AC Line U,V low voltage	
F47	AC Over frequency	
F48	AC Low frequency	
F49	Phase U grid current dc current high	
F50	Phase V grid current dc current high	
F51	Phase W grid current dc current high	
F52	AC inductor A, Phase current dc current high	
F53	AC inductor B, Phase current dc current high	
F54	AC inductor C, Phase current dc current high	
F55	dc bus voltage is too high	
F56	dc bus voltage is too Low	
F57	AC reverse irrigation	
F58	AC grid U over current	
F59	AC grid V over current	
F60	AC grid W over current	
F61	Reactor A phase current high	
F62	Reactor B phase current high	
F63	Reactor C phase current high	
F64	IGBT Heat sink High temperature	

7.2 The followings are common methods of troubleshooting.

If problem haven't been solved, Please contact Soluna.

Table-2

Error code	Description	Solutions
F13	Working mode change	Inverter work mode changed 1） wait for a minute and check. 2） Seek help from us, if can't go back to normal state.
F18	AC over current fault of hardware	AC side over current fault 1） Please check whether the backup load power and common load power are within the range; 2） Restart and check whether it is in normal; 3） Seek help from us, if cannot go back to normal state.
F20	DC over current fault of the hardware	DC side over current fault 1) Check PV module connect and battery connect; 2) Turn off the DC switch and AC switch and then wait one minute, then turn on the DC/AC switch again; 3) Seek help from us, if cannot go back to normal state.
F23	AC leakage current is transient over current	Leakage current fault 1) Check the cable of PV module and inverter; 2) Restart inverter; 3) Seek help from us, if cannot go back to normal state.
F24	DC insulation impedance failure	PV isolation resistance is too low. 1) Check the connection of PV panels and inverter is firmly and correctly; Check whether the PE cable of inverter is connected to ground; 2) Seek help from us, if cannot go back to normal state.
F26	The DC busbar is unbalanced	1) Please wait for a while and check whether it is normal; 2) If still same, and turn off the DC switch and AC switch and wait for one minute and then turn on the DC/AC switch; 3) Seek help from us, if cannot go back to normal state.
F35	No AC grid	No Utility 1) Please confirm grid is lost or not; Check the grid connection is good or not;

		2) Check the switch between inverter and grid is on or not; 3) Seek help from us, if cannot go back to normal state.
F42	AC line low voltage	Grid voltage fault 1) Check the AC voltage is in the range of standard voltage in specification; 2) Check whether grid AC cables are firmly and correctly connected; 3) Seek help from us, if cannot go back to normal state.
F47	AC over frequency	Grid frequency out of range 1) Check the frequency is in the range of specification or not; 2) Check whether AC cables are firmly and correctly connected; 3) Seek help from us, if cannot go back to normal state.
F48	AC lower frequency	Grid frequency out of range 1) Check the frequency is in the range of specification or not; 2) Check whether AC cables are firmly and correctly connected; 3) Seek help from us, if cannot go back to normal state.
F56	DC busbar voltage is too low	Battery voltage low 1) Check whether battery voltage is too low; 2) If the battery voltage is too low, using PV or grid to charge the battery; 3) Seek help from us, if cannot go back to normal state.
F63	ARC fault	1) ARC fault detection is only for US market; 2) Check PV module cable connection and clear the fault; 3) Seek help from us, if cannot go back to normal state.
F64	Heat sink high temperature failure	Heat sink temperature is too high 1) Check whether the work environment temperature is too high; 2) Turn off the inverter for 10mins and restart; 3) Seek help from us, if cannot go back to normal state

8.How to use the generator & AC couple function

Soluna system have the function of diesel generator & AC couple.
If the user who want use the diesel generator & AC function, please contact to us, following the engineers' instruction to operate.

9.Contact us

If any questions for Soluna system, please contact us.

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