



SOLAX BOX | User Manual |



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1 Notes on this Manual

1.1 Scope of Validity

This manual is an integral part of SOLAX BOX. It describes the assembly, installation, commissioning, maintenance and failure of the product. Please read it carefully before operating.

1.2 Other applicable Documents

During installation, please find all assembly and installation instructions for components and other parts of the system. These instructions also apply to the equipment, related components and other parts for the system.

1.3 Target Group

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

1.4 Symbols Used

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



Danger !

"Danger" indicates a hazardous situation which, if not avoided, will result in death or serious injury.



Warning !

"Warning" indicates a hazardous situation which, if not avoided, could result in death or serious injury.



Caution !

"Caution" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



Note !

"Note" provides tips that are valuable for the optimal operation of your product.

2 Safety

2.1 Important Safety Instructions



Danger!

Danger to life due to high voltages in the inverter!

- All work must be carried out by qualified electrician.
- The appliance is not to be used by children or persons with reduced physical sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction.
- Children should be supervised to ensure that they do not play with the appliance.



Caution!

Danger of burn injuries due to hot enclosure parts!

- During operation, the upper lid of the enclosure and the enclosure body may become hot.
- Only touch the lower enclosure lid during operation.



Caution!

Possible damage to health as a result of the effects of radiation!

- Do not stay closer than 20 cm to inverter for any length of time.



Note!

Grounding the PV generator.

- Comply with the local requirements for grounding the PV modules and the PV generator. Solax recommends connecting the generator frame and other electrically conductive surfaces in a manner which ensures continuous conduction and ground these in order to have optimal protection of system and persons.



Warning!

- Ensure input DC voltage \leq Max. DC voltage. Over voltage may cause permanent damage to inverter or other losses, which will not be included in warranty!



Warning!

- Authorized service personnel must disconnect both AC and DC power from SOLAX BOX before attempting any maintenance or cleaning or working on any circuits connected to the SOLAX BOX.

- Prior to the application, please read this section carefully to ensure correct and safe application. Please keep the user manual properly.
- Use only attachments recommended or sold by Solax. Otherwise may result in a risk of fire, electric shock, or injury to person.
- Make sure that existing wiring is in good condition and that wire is not undersized.
- Do not operate SOLAX BOX with damaged or substandard wiring.
- Do not disassemble any parts of SOLAX BOX which are not mentioned in installation guide. It contains no user-serviceable parts. See Warranty for instructions on obtaining service. Attempting to service SOLAX BOX yourself may result in a risk of electric shock or fire and will void your warranty.
- Keep away from flammable, explosive materials to avoid fire disaster.
- The installation place should be away from humid or corrosive substance.
- Authorized service personnel must use insulated tools when installing or working with this equipment.
- PV modules shall have an IEC 61730 class A rating.

2.2 Battery Safety Instructions

Battery service lifetime will be shortened as ambient temperature rises. Replace batteries periodically to guarantee normal inverter performance.

Only personal with proper expertise can carry out the maintenance of accumulator batteries.

Replacement of accumulator batteries requires a match of same type and model with equal quantity.

As accumulator batteries may contain potential electric shock and short-circuit current danger, to avoid accidents that might be thus resulted, the following warnings should be observed during battery replacement:

- 1: Do not wear watches, rings or similar metallic items.
- 2: Use insulated tools.
- 3: Put on rubber shoes and gloves.
- 4: Do not place metallic tools and similar metallic parts on the batteries.
- 5: Switch off load connected to the batteries before dismantling battery connection terminals.

Do not expose accumulator battery to fire in order to avoid possible explosion that might endanger physical safety.

Non-professionals are not allowed to open or destroy accumulator batteries for electrolytes in batteries contain strong acid and other dangerous substances which cause damages to both human skins and eyes. Should electrolytes come into any contact with human body unintentionally, rinse with clean water and seek medical advice.

Do not cause battery positive and negative polarity short circuit.

2.3 PE Connection and Leakage Current

- The end-use application shall monitor the protective conductor by residual current operated protective device (RCD) with rated fault current $I_{fn} \leq 240\text{mA}$ which automatically disconnects the device in case of a fault.
- DC differential currents are created (caused by insulation resistance and through capacities of the PV generator). In order to prevent unwanted triggering during operation, the rated residual current of the RCD has to be min 240mA.

The device is intended to connect to a PV generator with a capacitance limit of approx 700nF.



WARNING !

High leakage current!
Earth connection essential before connecting supply.

- Incorrect grounding can cause physical injury, death or equipment malfunction and increase electromagnetic.
- Make sure that grounding conductor is adequately sized as required by safety regulations.
- Do not connect the ground terminals of the unit in series in case of a multiple installation. This product can cause current with a d.c component, Where a residual current operated protective (RCD) or monitoring (RCM) device is used for protection in case of direct or indirect contact, only an RCD or RCM of type B is allowed on the supply side of this product.
- Never touch either the positive or negative pole of PV or battery connecting device. Strictly prohibit touching both of them at the same time.
- The unit contains capacitors that remain charged to a potentially lethal voltage after the MAINS , battery and PV supply has been disconnected.
- Hazardous voltage will present for up to 5 minutes after disconnection from power supply.
- CAUTION-RISK of electric shock from energy stored in capacitor, never operate on the solar inverter couplers, MAINS cables, Battery cables, PV cables or the PV generator when power is applied. After switching off the PV , battery and Mains, always wait for 5minutes to let the intermediate circuit capacitors discharge before you unplug DC ,battery inplug and MAINS couplers.
- When access to internal circuit of solar inverter, it is very important to wait 45 minutes before operating the power circuit or demounting the electrolyte capacitors inside the device. Do not open the device before hand since the capacitors require long time to discharge sufficiently!
- Measure the voltage between terminals UDC+ and UDC- with a multi-meter (impedance at least 1Mohm) to ensure that the device is discharged before beginning work (35VDC) inside the device.

2.4 EC Directives

This chapter follows the requirements of the European low voltage directives, which contains the safety instructions and conditions of acceptability for the endues system, which you must follow when installing, operating and servicing the unit. If ignored, physical injury or death may follow, or damage may occur to the unit. Read this instructions before you work on the unit. If you are unable to understand the dangers, warnings, cautions or instructions, contact the manufacture if an authorized service dealer before installing.

Operating and servicing the unit.

The Grid connected inverter meets the requirement stipulated in Low Voltage Directive (LVD) 2006/95/EC and Electromagnetic Compatibility (EMC) Directive 2004/108/EC. The unit is test based on:

EN 50178:1997	EN 62109-1:2010	EN 62109-2:2011
VDE 0126-1-1:2006	VDE 4105:2011	

In case if installation in PV system, startup of the unit (i.e. start of designated operation) is prohibited until it is determined that the full system meets the requirements stipulated in EC Directive (2006/95/EC, 2004/108/EC, etc.)

The grid connected inverter leave the factory completely connecting device and ready for connection to the mains and PV supply ,the unit shall be installed in accordance with national wiring regulations. Compliance with safety regulations depends upon installing and configuring system correctly, including using the specified wirings. The system must be installed only by professional assemblers who are familiar with requirements for safety and EMC. The assembly is responsible for ensuring that the end system complies with all the relevant laws in the country where it is to be used.

The individual subassembly of the system shall be interconnected by means of the wiring methods outlined in national/international such as the national electric code (NFPA) No.70 or VDE regulation 0107.

3 Introduction

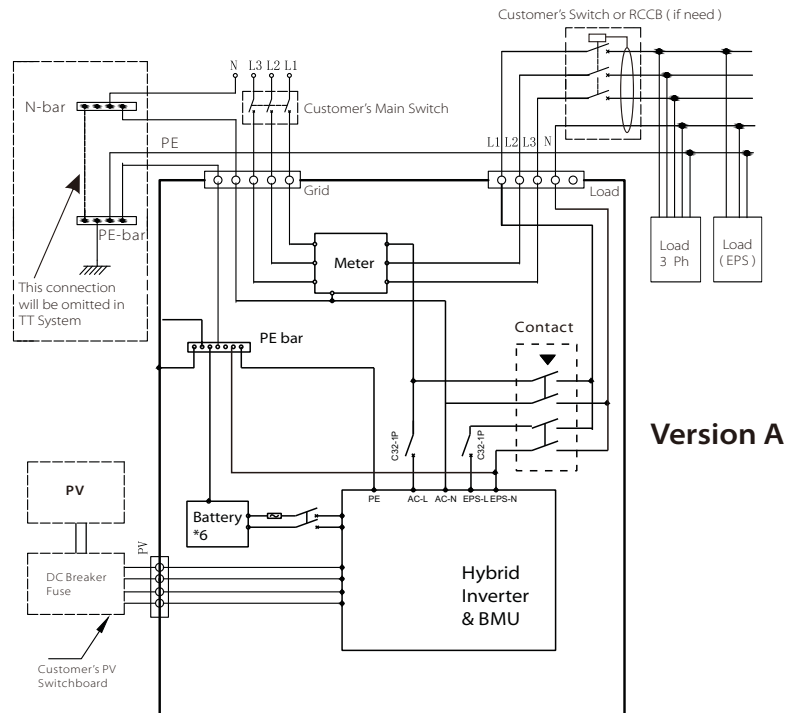
3.1 Appropriate Usage

SOLAX BOX is a high integrative product that contains of inverter, charger, battery and other electric appliances. Energy produced by PV generator can be used to optimize self consumption, store in the batteries for future use or feedin to public grid. Work mode depends on PV energy and user's preference. It can provide power for emergency use during the grid lost by using the erengy from battery and PV generator. Simple operations can achieve multiple functions and work modes by LCD touch screen.

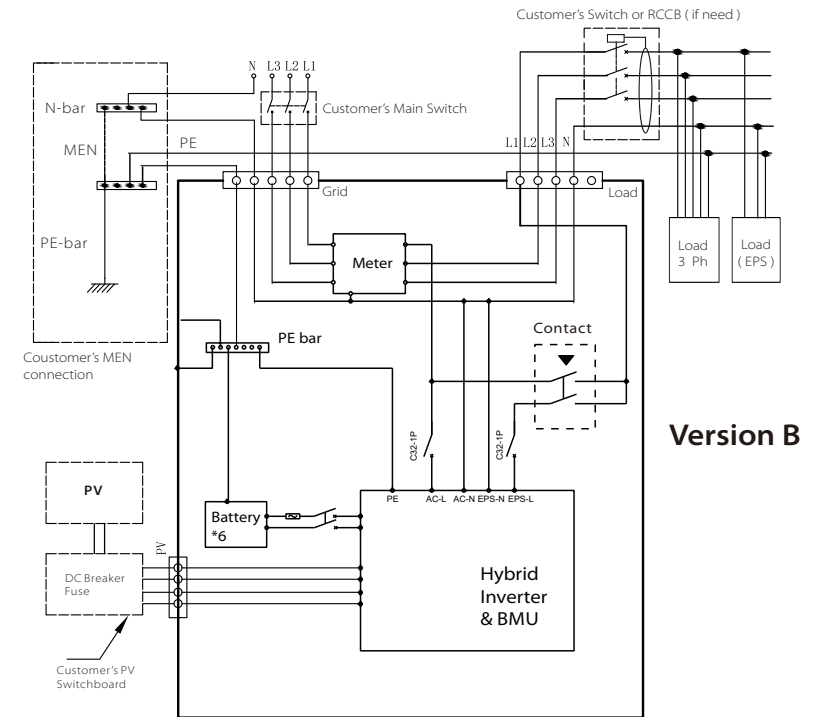
3.2 System Diagram

SOLAX BOX is designed for both single phase and three phase house electricity. Solax provides two versions of SOLAX BOX for customer to choose based on the local rules.

Version A applies to the wiring rules which requires Neutral line of alternative supply can be isolated or switched (applies to most countries) .



Version B applies to the wiring rules which requires Neutral line of alternative supply must not be isolated or switched (applies to wiring rules AS/NZS_3000:2012 of Australia and New Zealand).



Note!

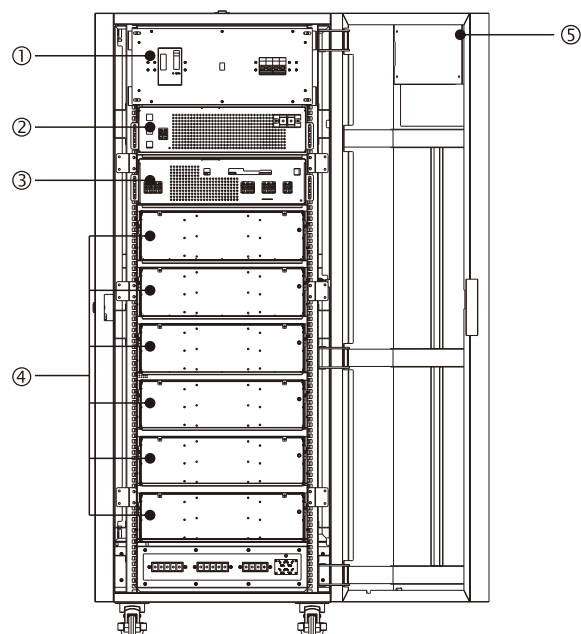


All figures or chematic diagrams in this section are using **three phase** as example. For single phase user, please ignore the L2 & L3 during the installation.

Otherwise, please check with the operator of the mains grid whether there are special regulations for grid connection.

3.3 Configuration

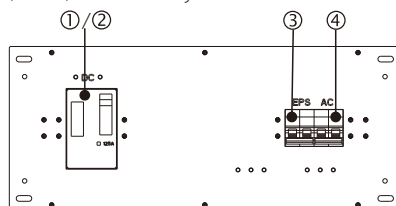
Model			
1	Control Box	x	1
2	Charger	x	1
3	Inverter	x	1
4	Batteries	x	1-6
5	LCD touch screen	x	1



3.4 Summary of Components

3.4.1 Control Box

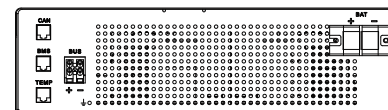
Control BOX is integrated with AC breaker, EPS breaker, battery breaker ,fuse ,meter and junction bar.



Object	Description
1	Battery breaker (63A for Control Box 50)
2	Battery breaker (125A for Control Box 100)
3	EPS breaker (32A)
4	AC breaker (32A)

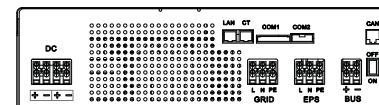
3.4.2 Charger

Charger is the external battery management unit to control energy charge or discharge from battery.



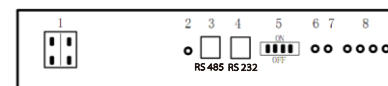
3.4.3 Inverter

Inverter can convert the DC current from PV generator into AC current and feed in to the public grid or store into the battery.



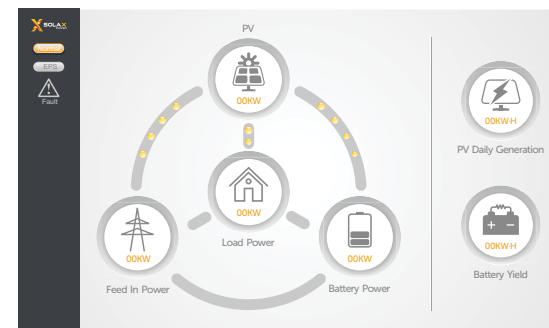
3.4.4 Battery system

SOLAX BOX can support to install 6 regular lithium batteries maximumly.



3.4.5 LCD touch screen

All work modes and parameters can be set on the LCD touch screen, and it will display real-time data to show current status.



4 Technical Data

4.1 Electrical Data

Model	Inverter+BMU			
	3K+2.5K	3.7K+2.5K	5K+2.5K	5K+5K
PV input				
Max. recommended DC power [W]	3300	4000	5000	5000
Max. DC voltage[V]	550	550	550	550
Norminal DC operating voltage[V]	360	360	360	360
MPPT voltage range [V]	125-530	125-530	125-530	125-530
Max. input current [A]	12	12/12	12/12	12/12
Max. short circuit current [A]	15	15/15	15/15	15/15
No. of MPP trackers	1	2	2	2
Strings per MPP tracker	1	1	1	1
Standby AC input / AC output				
Input voltage	230/400V;50HZ/60HZ3Phase(3N,PE)			
Grid configuration	TN-C,TN-S,TT			
Rated operating Current(single phase) [A]	63			
Rated opreating current(3 phase) [A]	40			
EPS Output (with battery)				
EPS rated power [VA]	2000			4000
EPS rated voltage [V], Frequency [Hz]	230VAC 50/60HZ			
EPS rated current [A]	8.7			17.3
EPS peak power[VA]	1.5xrated power, 10s			
Total harmonic distortion (THD)	<3%			
Swtich time [S]	<5			
Inverter Output				
Nominal AC power [W]	3000	3680	4600	4600
Nominal AC voltage; range [V]	230VAC 50/60HZ; 180~270VAC; 1Ph			
Nominal AC current [A]	13	16	20	20
Max. AC current [A]	14.4	16	22.1	22.1
Total harmonic distortion (THD)	<3%	<3%	<3%	<3%
Power factor (rated power)	1	1	1	1
Displacement power factor	0.90 leading..0.90 lagging			
Efficiency				
MPPT efficiency	0.999			
Inverter efficiency	0.976			
Charge/discharger efficiency	0.94			

4.2 Mechanical Data

Model	Inverter+BMU			
	3K+2.5K	3.7K+2.5K	5K+2.5K	5K+5K
Battery data				
Normal voltage [V]	48			
Storage capacity	Up to 15KWH(adjustable)			
Battery type	Lithium			
DOD	80%			
Cycle life	4000			
HMI Interface				
LCD	7" touch LCD			
Communication	Ethernet/Dry contact(Optional)/WIFI			
Dimensions				
L*W*H [mm]	1626*678*655			
Net weight [Kg]	180			
Environment Limits				
Degree of protection	IP 20 (for indoor use)			
EMC	IEC61000-6-2,IEC62109-6-3, IEC61000-3-2/-3-12,IEC61000-3-3/-3-11			
Safety	IEC62109-1,IEC62109-2,IEC62040-1			
Topology	Transformerless			
Others				
Operating temperature range [°C] (Inverter)	-10~+50 (derating at 40)			
Operating temperature range [°C](Battery)	-10~+50			
Storage stability range [°C]	-20~+60			
Altitude [m]	<2000			
Cooling concept	Forced airflow			
Noise emission (typical) [dB]	<40			

5 Installation

5.1 Check for Transport Damage

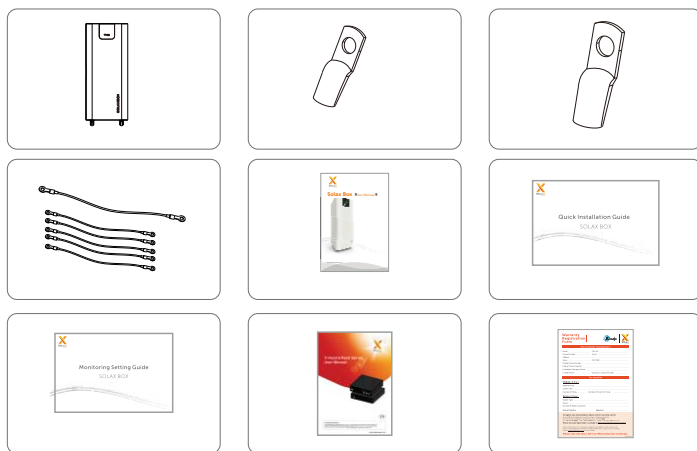
SOLAX BOX and battery system have respective packagings, and please check if they have some visible external damage, such as cracks in the housing or display, please contact with your dealer if you find any damage.

5.2 Unpacking

5.2.1 Check Packing List

Open the package and pick the product, check that if there is any distortion or impaired during transportation. Meanwhile, check that if relating accessories and the materials are here, you can see the accessories list in the table.

The instruction manual is an integral part of the unit and should therefore be read and kept carefully. It is recommended that the packaging should not be removed until the unit is located in the installation site.



Object	Quantity	Description
A	1	SOLAX BOX
B	6	Cold-pressed terminals (5-6)
C	11	Cold-pressed terminals (14-6)
D	6	Earth wires
E	1	User manual
F	1	Quick installation guide
G	1	Monitoring setting guide
H	1	Rack user manual
I	1	Warranty card

5.2.2 Disassemble packing

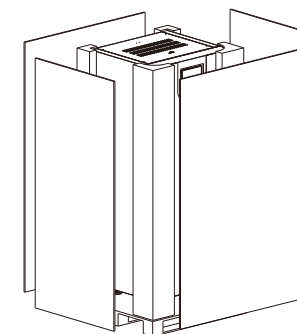
This section has been printed on the outer packing.

Unpacking steps

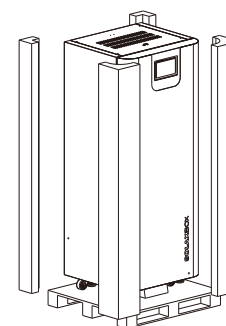
1. Disassemble the top cover: cut off the packing tape by scissors and remove the top cover.
2. Disassemble the side panels: adjust the plug tongue by pliers and remove the side panels.
3. Remove the foam and plastic bag around the SOLAX BOX.
4. Remove the SOLAX BOX to the suitable location by forklift.



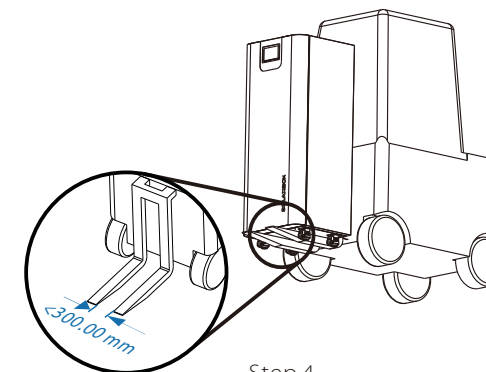
Step 1



Step 2



Step 3



Step 4

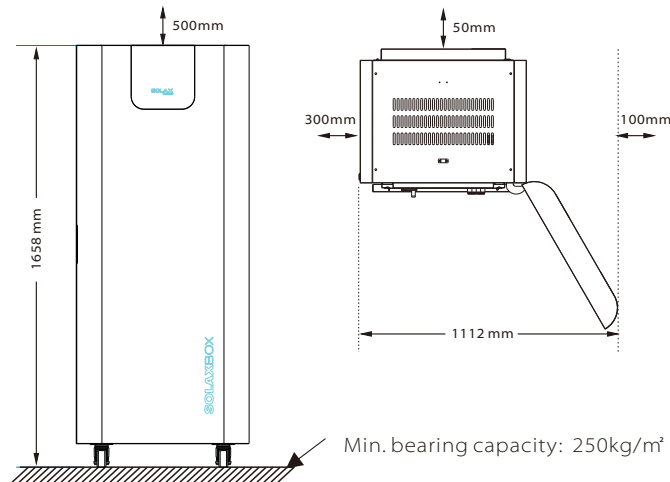
5.3 Installation Location

SOLAX BOX is designed for indoor installation (IP 20)

Make sure the installation location applies to the following conditions:

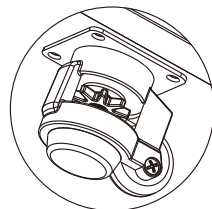
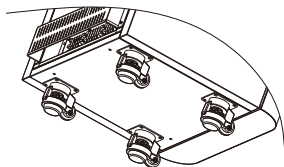
- No direct sunlight; no cool air directly; no highly flammable materials around; Unobstructed air circulation; not accessible for children.
- Humidity should be less than 95%; Moisture trapped within the location may cause corrosion and damage to the electric components.
- The ambient air temperature should be less than 40°C; That is to maintain a safe internal component temperature, the inverter reduce power if the ambient air temperature exceeds 40°C.
- SOLAX BOX is heavy, ensure the load-bearing capacity is strong enough to hold the weight.

Available Space Size



Caution!

Risk of tipping due to high centre of gravity, particularly with the door open. Anchor the universal wheels securely to the floor immediately after installation.



5.4 Installation Steps

5.4.1 Battery System Installation

- Step1: Open the door from back of SOLAX BOX with dedicated key. Put batteries into SOLAX BOX on the right position.(Fig. 5.4.1-1)
- Step2: Lock battery on both sides of bridge and screw it tightly.(Fig. 5.4.1-2)
- Step3: Insert battery connectors (tied on the left bridge) into BAT ports of the battery.(Fig. 5.4.1-3)
- Step4: Insert communication cable into RS232 port of the battery.(Fig. 5.4.1-3)
- Step5: Open the front door, to connect the PE wires of batteries one by one. And connect the last one to ground terminal, which is on the bottom of the cabinet.(Fig. 5.4.1-4)

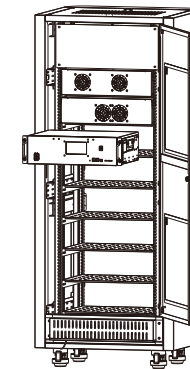


Fig. 5.4.1-1

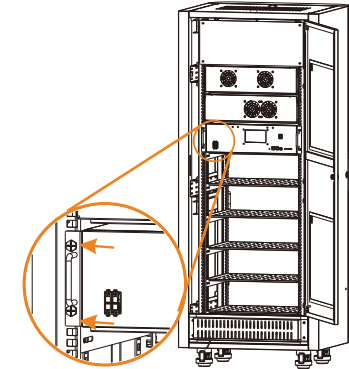


Fig. 5.4.1-2

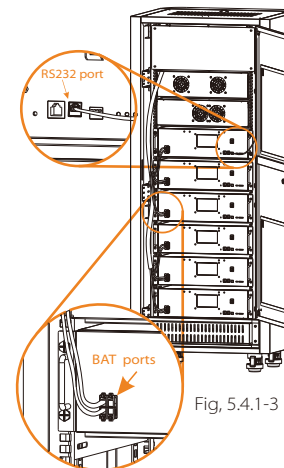


Fig. 5.4.1-3

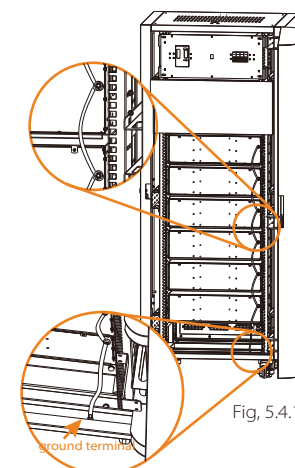


Fig. 5.4.1-4

5.4.2 PV strings Connection

SOLAX BOX can be connected in series into 2-strings PV modules for 3.7KW and 5KW, and 1-string PV modules for 3KW. Select PV modules with excellent function and reliable quality. Open-circuit voltage of module arrays connected in series should be <Max. DC input voltage; operating voltage should be conformed to MPPT voltage range.

Max.DC Voltage Limitation

Model	3K+2.5K	3.7K+2.5K	5K+2.5K	5K+5K
Max. DC Voltage (V)	550			
MPPT Voltage Range(V)	125-530			

Warning!



PV module voltage is very high which belongs to dangerous voltage range, please comply with electric safety rules when connecting. When the photovoltaic array is exposed to light, it supplies a D.C voltage to the PCE. When there is something wrong with the modules arrays. Modules can be connected with inverter only after eliminating these problems.

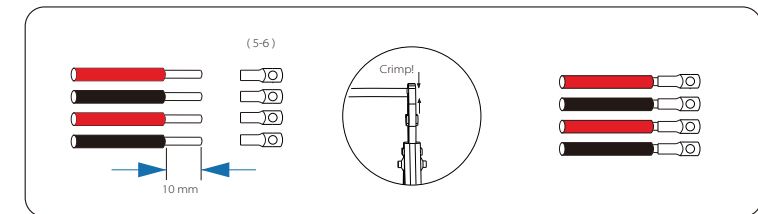
Note!



The following requirements of PV modules need to be applied for each input area;
 - Same type - Same quantity - Identical alignment - Identical tilt
 Please do not make PV positive or negative ground!
 we suggest the inverter install near PV module, in order to save cable and reduce DC loss. (No longer than 30m)

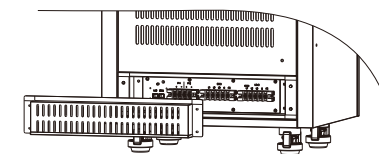
Connection Steps:

1. Check PV module.
 - 1.1 Use multimeter to measure module array voltage.
 - 1.2 Check the PV+ and PV- from the PV string combiner box correctly.
2. Make wires.
 - 2.1 Choose the 12 AWG wire to connect with the cold-pressed terminal.
 - 2.2 Trip 10mm of insulation from the Wire end.
 - 2.3 Insert the insulation into cold-pressed terminals and use crimping plier to clamp it.

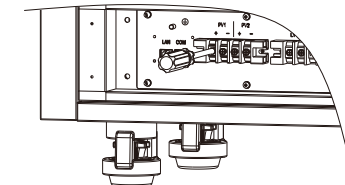


3. Connect PV wires.

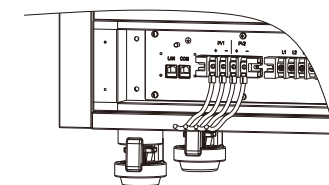
- 3.1 Remove the screws and take off the cover plate. (Fig. 5.4.2 - 1)
- 3.2 Remove the screws on terminal block.(Fig. 5.4.2 - 2)
- 3.3 Fit the wires into the terminal block accordingly.(Fig. 5.4.2 - 3)
- 3.4 Tighten the screws.(Fig. 5.4.2 - 4)



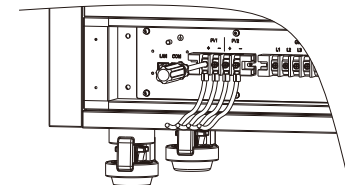
Fig, 5.4.2 - 1



Fig, 5.4.2 - 2



Fig, 5.4.2 - 3



Fig, 5.4.2 - 4

5.4.3 Grid Connection



WARNING!

Must comply with the connection requirement of your distribution grid.

SOLAX BOX is designed both for single phase and three phase use. The rated voltage of every phase is typical 230V, according to different countries. Other technical requests should comply with the requirements of local public grid.

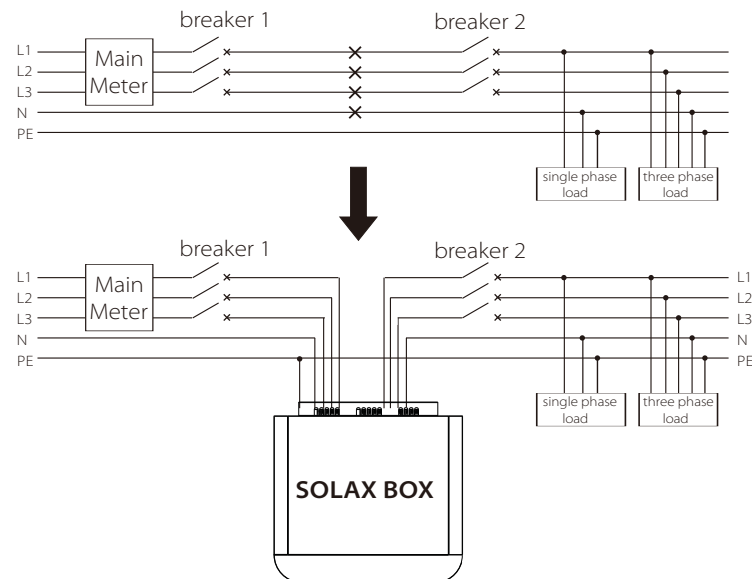
Wiring Diagram

SOLAX BOX need to be installed on Grid side, and two residual current circuits are necessary to be installed on the both sides of SOLAX BOX due to the installation requirements. SOLAX BOX supports standard grid configurations such as TN-C, TN-S and TT. For PE wiring, please comply with local grid configurations.



Note!

All figures or chematic diagrams in this section are using **three phase** as example. For single phase user, please ignore the L2 & L3 during the installation. Otherwise, please check with the operator of the mains grid whether there are special regulations for grid connection.



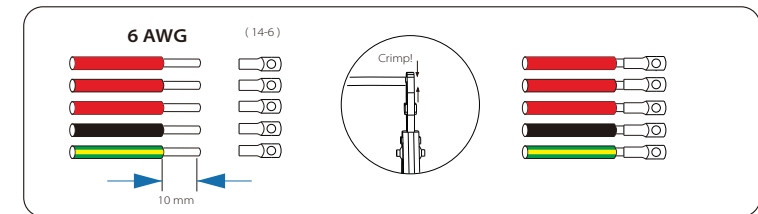
Requirements of cable design and breaker

The cable cross-section must be selected in accordance with applicable standards to suit the connected load, installation type etc. Moreover, the terminal area and size of the cable fitting must be noted.

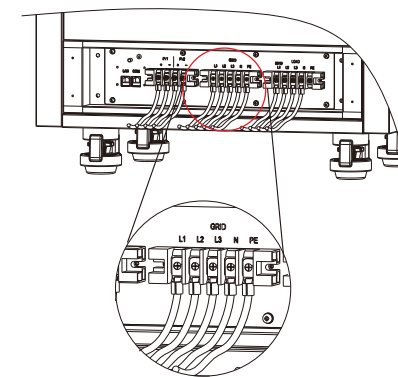
Model	3K+2.5K	3.7K+2.5K	5K+2.5K	5K+5K
Cable (Cu)	16mm ²			
Mirco-Breaker	63A			

Grid Port Connection Steps:

1. Make wires.
 - 2.1 Choose the 6 AWG wire to connect the cold-pressed terminal.
 - 2.2 Trip 10mm of insulation from the Wire end.
 - 2.3 Insert the insulation into cold-pressed rerminals and use crimping plier to clamp it.



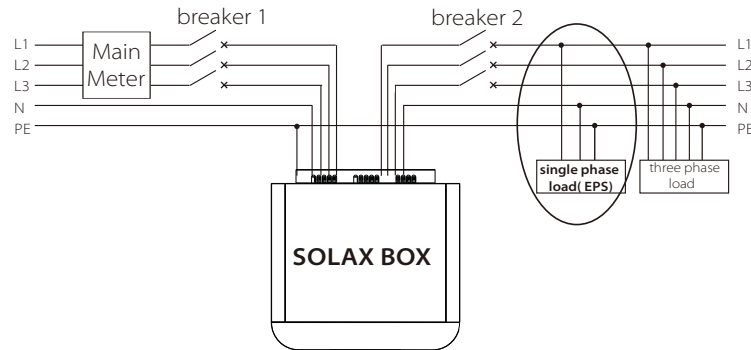
2. Connect gird wires.
 - 2.1 Remove the screws on terminal block.
 - 2.3 Fit the wires into the terminal block accordingly. (L2 & L3 only apply to three phase property.)(Fig. 5.4.3 - 1)
 - 2.4 Tighten the screws.



(Fig. 5.4.3 - 1)

5.4.3 Load Connection

SOLAX BOX has EPS function, it can provide power for emergency use during the grid lost by using the energy from battery and PV generator. Please note that the EPS function only applies to the appliances on L1.



Below table shows some conventional and reasonable loads for you reference.

Type	Power		Common equipment	Example		
	Start	Rated		Equipment	Start	Rated
Resistive load	X 1	X 1	Incandescent lamp TV	Incandescent lamp 100W	100VA (W)	100VA (W)
Capacitive load	X 2	X 1.5	Fluorescent lamp	Fluorescent lamp 40W	80VA (W)	60VA (W)
Inductive load	X 3~5	X 2	Fan Fridge	Fridge 150W	450-750VA (W)	300VA (W)

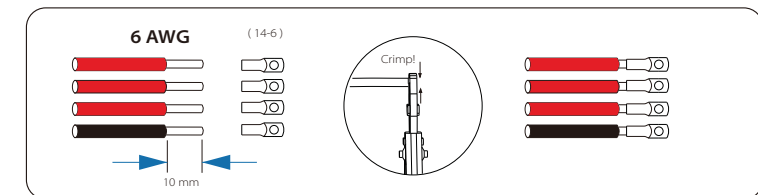


WARNING !

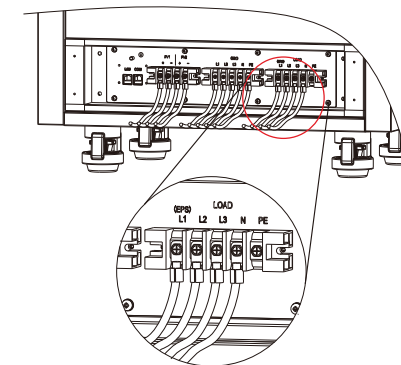
- EPS function only applies to single phase loads. (L1)
- Make sure the loads attached is within the EPS's output rating. Otherwise, the inverter will shutdown after an "over load" warning .
- When "over load" warning triggered, please adjust the load power to make sure it is within the range of the EPS output rating, and turn the SOLAX BOX on again.
- For the nonlinear load ,please pay attention to the inrush power make sure it is within the range of the EPS output.

Load Port Connection Steps:

1. Make wires.
 - 2.1 Choose the 6 AWG wire to connect the cold-pressed terminal.
 - 2.2 Trip 10mm of insulation from the Wire end.
 - 2.3 Insert the insulation into cold-pressed terminals and use crimping plier to clamp it.



2. Connect gird wires.
 - 2.1 Remove the screws on terminal block.
 - 2.2 Fit the wires into the terminal block accordingly. (L2 & L3 only apply to three phase property; PE does not need to be connected.)(Fig, 5.4.4 - 1)
 - 2.3 Tighten the screws.



(Fig, 5.4.4 - 1)

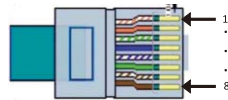
5.5 Communication Interface

SOLAX BOX provides several communication interfaces including LAN, Wifi , Com and USB for human-computer interaction. Operating information like output voltage, current, frequency, fault information, etc., can be delivered to PC or other monitoring equipments via these interfaces.

5.5.1 LAN

LAN communication is the standard communication interface. It can transmits the data between the router and SOLAX BOX via the local network.

The pin definition of the connector is as below.



Pin	1	2	3	4	5	6	7	8
Function	TX+	TX-	RX+	n/c	n/c	RX-	n/c	n/c

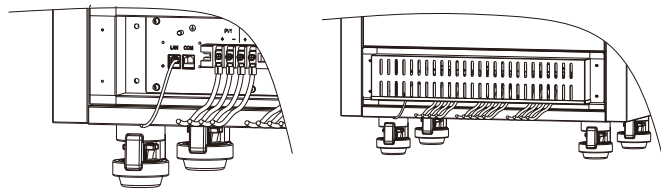
Grid Port Connection Step:

1. Make Network cable.

1. Prepare two RJ45 connectors and a communication cable.
2. Trip the insulation from the communication cable.
3. Insert the communication cable into the RJ45 connector following the PIN definition rule.
4. Crimp the RJ45 connector with the crimping plier.
5. Repeat the above steps to fix the other head of the communication cable.

2. Connect Network cable.

- 2.1 Insert one side of the cable into the LAN port on the SOLAX BOX, and the other side of the cable into the router or computer.



3. Install the cover plate.

5.5.2 Wifi

Wifi communication is a standard interface, it allows user to read the real time data by connecting inverter wifi with smartphone. It also applies with local network to allow user to check the details from online monitoring website via smartphone or PC.

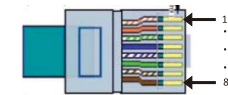
• Connection steps :

1. Connect the wifi with the router. (as described in the quick installation guide)
2. Set the station account on the solax-portal web.(as described in the quick installation guide)

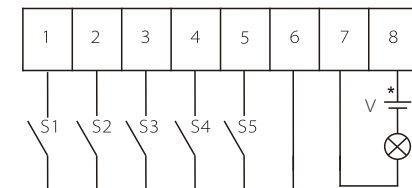
5.5.3 Com

Com port is provided to give several remote monitors and a remote alarm with the optional accessory. The remote monitor function provides an indication on the inverter's working status. The ISO remote alarm function provides a contact signal to alert earth fault of inverter.

The pin definition of the connector is as below.



Pin	1	2	3	4	5	6	7	8
Definition	Remote control for power switch off		Remote control for reactive power regulation			ISO Remote Alarm		



Note!

PIN7 and PIN8 are used for ISO fault remote monitoring by Installing an external alarm, and external connection between PIN9 and PIN10 must be within the range of 300V 2A.

*can also use AC power to supply alarm function.

• Connection steps

1. Choose at least 1mm² wire. Trip the insulation from the wire ends.
2. Insert the tripped wire into the holes of the terminal block.
3. Remove the screws on the terminal block.

5.5.4 USB for updating

SOLAX BOX provides an USB interface for updating the software version of inverter, manager, charger and LCD.

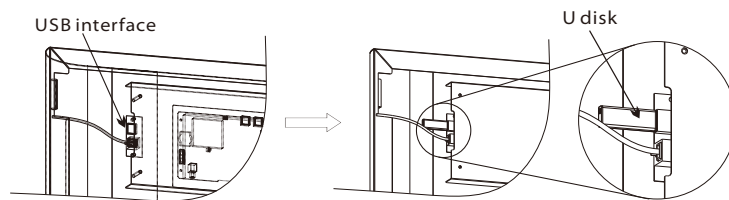


WARNING!

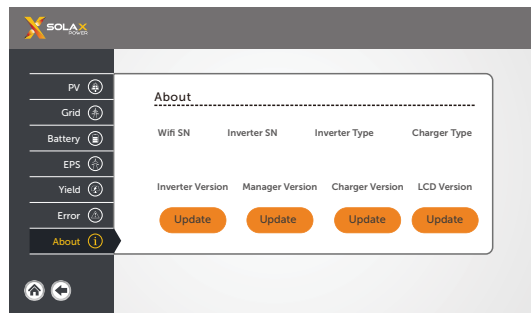
Ensure the inverter is steadily powered on before updating, otherwise any outages during updating will lead to fatal error. Device must connect PV panels (PV voltage must more than 150V) and grid through whole steps of upgrading, and please do the operation on a sunny day to prevent inverter from losing power. Keep the battery on and power the inverter when upgrading charger firmware.

• Connection steps

1. Download the firmware provided by SolaX into a thumb drive.
2. Open the front door and switch to "OFF Mode" (a rocker switch on Control Box).
3. Insert the thumb drive into USB interface on backside of front doo.



4. Enter LCD interface → Main interface → "About" to choose the corresponding firmware and then click "update".



5. Please maintain SOLAX BOX working status until the upgrade successfully complete. (it will show "successful" on LCD)

5.6 SOLAX BOX Power on/off Procedure

5.6.1 Start SOLAX BOX after checking all below steps:

- Make sure all wirings are completed.
- Make sure the cover plate has been installed correctly.
- Make sure the battery is connected correctly.
- Turn on the AC, EPS and DC breaker on the control box.
- Turn on battery.
- Turn on the "on/off" Button on the control box.

5.6.2 Start SOLAX BOX

- Inverter will start automatically when the PV panels generate enough energy or the battery is charged.
- There will be a boot animation shown on LCD display when the device is powered on.
- LCD display should will show the Home interface. On the top left corner there is the status of SOLAX BOX.
- Enter the setting interface.
- Set the system time as page 32.
- PV connection mode as page 33.
- Set the work mode as page 36.
- Set charger as page 36.
- Set the EPS as page 36.
- Set WIFI as page 33.

5.6.3 Shutdown SOLAX BOX

- Turn off the "on/off" Button on the control box.
- Turn off battery.
- Turn off the AC, EPS and DC breaker on the control box.

6 Operation

6.1 Touchscreen

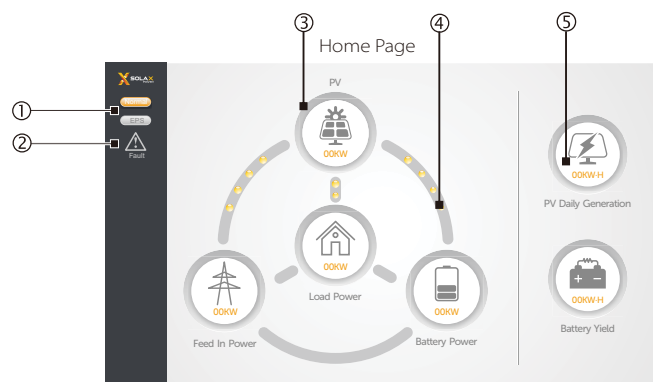
SOLAX BOX is fitted with a 7-inch high resolution colour touchscreen which can be controlled precisely.



6.2 Operation Interface

6.2.1 Home Page

There will have 1minute boot animation after switching on SOLAX BOX. PV panel, Grid, load and battery current status will display on the Home page. The flowing direction of the small yellow balls indicate the power flow.



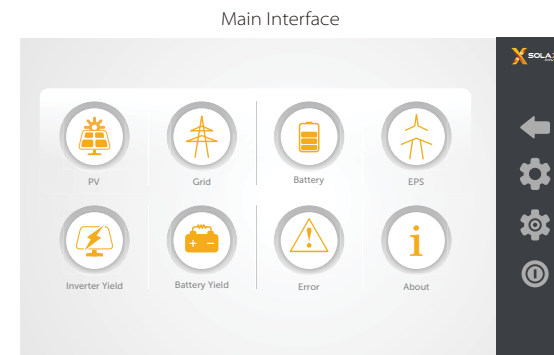
Model

- | | |
|---|---|
| 1 | Status (Normal mode or EPS mode) |
| 2 | Fault alert (touch it to enter fault page) |
| 3 | Real-time power of PV panel, load, grid and battery) |
| 4 | Specific flowing direction of energy |
| 5 | Daily generated energy from PV panel and yield of battery |

Note: Press any position on the display to enter Main Interface.

6.2.2 Main Interface

The main interface will lead user to access parameter page and setting page for more.



PV	Display of the current PV condition of the system. Input voltage, current and power situation of each PV input.	
Grid	Display of the current grid condition of the system. Output voltage, current, power and the local consumed power.	
Battery	Display of charger and battery condition of the system. Battery voltage, charge or discharge current, power, capacity and temperature. Energy generated from battery by today, this month and total.	
EPS	Display of the EPS parameters of EPS mode. Voltage, current, power and frequency.	
Inverter Yield	Display of energy generated by today, this month and total.	
PV	Display of the current PV condition of the system. Input voltage, current and power situation of each PV input.	
Error	Error logs contain error information happened.	
About	Display of main information of the inverter. Series numbers and software version. update the software of inverter, manager, charger and LCD.	

Back arrow: jump back to home page.



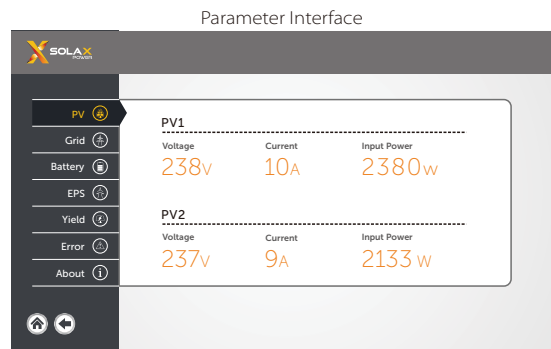
Setting symbol: enter basic setting page.



Setting symbol: enter advanced setting page.

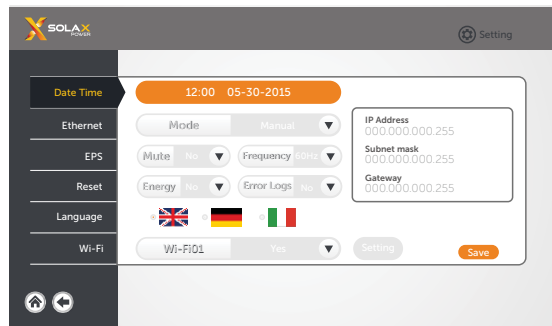


Reset button.



6.2.3 Basic Setting Interface

Basic setting interface is designed for enduser to do simple settings such as date-time, ethernet, language etc.



Date Time
Set date time

12:00 05-30-2015

Ethernet

Mode: Manual (dropdown)
Auto

Ethernet is a communication port for firmware updating and monitoring.
Set "Auto" to obtain IP address automatically.
Set "Manual" to obtain IP address manually.

IP Address: 000.000.000.255
Subnet mask: 000.000.000.255
Gateway: 000.000.000.255

EPS

System will enter EPS mode when grid is lost.

"Mute" means to set the warning of system.

- "No" means there will be a buzzing and it is default value.

- "Yes" means to shut down the warning function.

"Frequency" can be set 50Hz or 60Hz based on correlative loads.

Mute: No (dropdown)
Yes

Frequency: 60Hz (dropdown)
50Hz

Reset

Reset all energy of inverter and charger.

Reset all error logs.

Energy: No (dropdown)
Yes

Error Logs: No (dropdown)
Yes

Language

There languages: English, Deutsch, Italiano.



Wi-Fi

Step1: Choose "Yes".

Step2: Click "Setting". Choose an house-AP with stronger strength, and type in password.

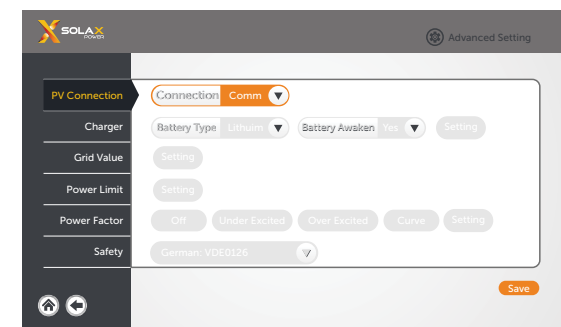
Wi-Fi01 (dropdown) Yes (dropdown)
Setting



Click "Save" after setting complete!

6.2.4 Advanced Setting Interface

Advanced setting interface is used for setting such as PV value, Grid value etc. For advanced setting requires, please directly contact with your distributor or Solax.



PV Connection

Two modes for PV input.

"Comm", means single MPP tracking, 2 MPPT working together.

"Multi" means multi-MPP tracking, 2 MPPT working independently.

Connection: Comm (dropdown)
Multi

Battery

SOLAX BOX is compatible with lead acid and lithium batteries. Click "Setting" to set parameters as below.

Battery Type Lithium Lead-acid

Battery Awaken Yes No

• Min Capacity

The minimum capacity of battery under grid tied working mode.

Note: Only for lithium battery and its BMS is compatible with inverter's protocol, this parameter need to be set.

• Charge Cut Volatge

When the battery voltage reaches this value, BMU will stop charging the battery.

• Discharge Cut Volatge

For lead acid battery, it will switch to float charging mode after exiting constant voltage charging mode. The value can be set for 50-58V.

• Charge Absorp Voltage

For lead acid battery, when charging begins, it will enter constant voltage charging mode in order to accelerate charging speed. The value can be set for 50-58V.

• Charge Float Voltage

When inverter is working in online mode, battery voltage reached this value, BMU will stop discharging the battery.

• Charge Max Current

The charge current can be set for 0-100A, The charge power can also be set.

• Discharge Max Current

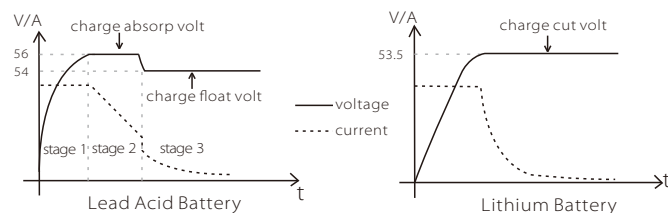
The discharge current can be set for 0-100A. The charger power can also be set.

• Battery Awaken

When the battery voltage drops too low to work, choose this option "Yes" to make battery charging from PV or grid forcibly only if the BUS voltage ranges 300V above.

Three-stage charging

Based on the different energy platforms between lithium battery and lead acid battery, lead acid battery need to be set into 3 charging status to increase its charging efficiency. In stage 1, it will be charged with constant current till the voltage rises to charge absorb volt to enter stage 2. In stage 2, it can be charged efficiently with constant voltage till charge current is more than 1A or the charging time on this stage reached for 2 hours. Then it will enter stage 3 for floating charging.



Grid

Usually enduser do not need to set the grid parameters. All default value have been set before leaving factory according to safety rules. If need to reset, any changes should according to the requirement of local grid.

All parameters are shown below.

Parameter	Comment
Normally	
Vac upper	Voltage high protect
Vac lower	Voltage low protect
Vac upper slow	Voltage high slow protect
Vac lower slow	Voltage low slow protect
Fac upper	Frequency high protect
Fac lower	Frequency low protect
Fac upper slow	Frequency high slow protect
Fac lower slow	Frequency low slow protect
Vac 10m avg	10 min voltage high protect
Apply to Italy(CEI0-21) only.	
Tuvp_Fast	Overvoltage protect fast time
Tovp_Fast	Undervoltage protect fast time
Tufp_Fast	Overfrequency protect fast time
Tofp_Fast	Underfrequency protect fast time
Tuvp_Slow	Overvoltage protect slow time
Tovp_Slow	Undervoltage protect slow time
Tufp_Slow	Overfrequency protect slow time
Tofp_Slow	Underfrequency protect slow time
FreDrpDlyTime	Frequency droop delay time
Apply to EN50438_NL / EN50438_DK / CE8001.	
FreqSetPoint	Frequency set point
FreqDropRate	Frequency droop rate

Power Limit

Set output power limitataion of inverter. The value can bet set for 0.00-1.00.

Power Factor (For specific country if required by the local grid.)

There are 4 modes for selecting: Off , Under-Excited, Over-Excited, Curve.
All parameters are shown below.

Mode	Comment
Off	–
Under-Excited	PF value
Over-Excited	PF value
Curve	Upper limit
	Lower limit
	Power Upper
	Power Lower
	PFLockInPoint (CEI 0-21 only)
Q(u)	PFLockOutPoint (CEI 0-21 only)
	QuVupRate (EN50438_NL / EN50438_DK / E8001 only)
	QuVlowRate (EN50438_NL / EN50438_DK / E8001 only)

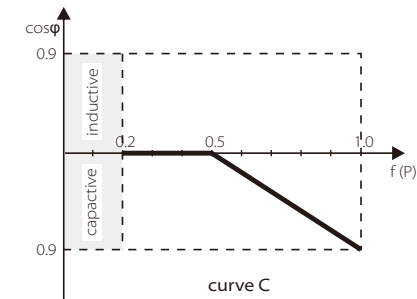
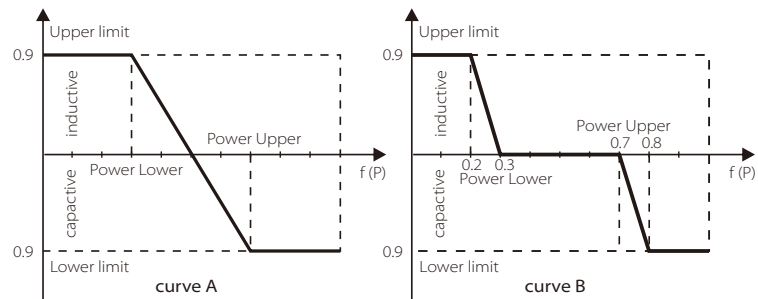
Off
Under-Excited
Over-Excited
Curve
Setting

Reactive power control, Reactive standard curve $\cos \varphi = f(P)$

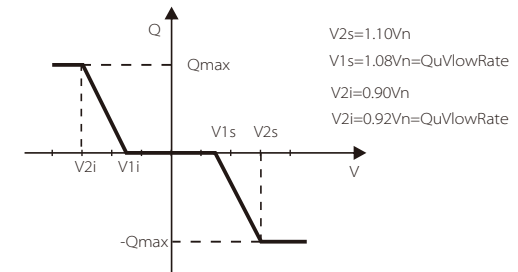
For ARN 4015, curve $\cos \varphi = f(P)$ should refer to curve A. default values of setting are as shown in curve A.

For E 8001, curve $\cos \varphi = f(P)$ should refer to curve B default values of setting are as shown in curve B.

For CEI 0-21, default value of PFLockInPoint is 1.05, when $V_{ac} > 1.05V_n$, and $P_{ac} > 0.2 P_n$, curve $\cos \varphi = f(P)$ should refer to curve C. Default value of PFLockOutPoint is 0.98, when $V_{ac} < 0.98 V_n$, $\cos \varphi = f(P)$ will exit curve C.



Reactive power control, Reactive standard curve $Q = f(V)$



Safety

Set up safety standard according to regions and local rules.
There are 19 standards for choice.

Off

Item	Standard	Country
1	VDE 0126	German
2	ARN 4015	German
3	AS 4777	Australia
4	G83/2	UK
5	G59/3	UK
6	C10_11	Belgium
7	OVE/ONORME 8001	Austria
8	EN 50438_NL	Netherlands
9	EN 50438_DK	Danmark
10	CEB	UK
11	CEI 0-21	Italy
12	NRS097_2_1	South Africa
13	VDE0126_Greece	Greece
14	UTE_C15_712_Fr	France
15	IEC61727_In	India
16	VFR_2014_Fr	France
17	C15-712-is-60	France
18	C15-712-is-50	France
19	VDE 0126-Gr-is	Greece

Work Mode

There are 2 work modes for choice: Self Use & Force Time Use.

Self Use:

- The priority for PV generated power will be: local load > battery > public grid.

Force Time Use:

- Battery will be charged or discharged in setting time.
- It can be set whether allows to charge from grid.

Force Time Use

Self Use
Force Time Use
Remote Control

Charger period 1 Charge from Grid ☒ Enable

Charger Time	Start	9 : 00	→	End	11 : 00
Disharger Time	Start	12 : 00	→	End	17 : 00

Charger period 2 Charge from Grid ☒ Enable

Charger Time	Start		→	End	
Disharger Time	Start		→	End	

Export Control

With this function, inverter can control energy exported to the grid.

Factory value:

- It is default value and can not be changed .

User value:

- It can only be set by installer.
- It must be less than factory value.

EPS System

Set battery backup discharge voltage.

Note:

- Battery backup discharge voltage must be lower than discharge cut voltage.
- Battery backup discharge voltage is the min voltage of the battery.
- User can adjust discharge cut voltage and battery backup voltage or increase Min capacity to adjust the capacity for EPS usage in case you have power cut frequently.
- For example: In online mode, discharge cut voltage is 47V. In EPS mode, battery backup voltage is 46V.

Password

Set new password here.

7 Maintenance

SOLAX BOX needs to be checked every 12 months.(once per year)

Clean the housing with a dry cloth and make sure there is no airflow obstruction.

Inspect the device and the cables for visible external damage and note the operating status display. In case of damage, please notify your installer. Repairs should only be carried out by authorised electricians.



WARNING!

Clean the airflow holes inside the housing, and cut off the power from the inverter by decommissioning or by using a bypass switch. **Lethal voltages** are still present in the terminals and cables in the device even after switching off and disconnection of the battery system. So after shutdown, wait at least **30 minutes** before working on the device.

Internal cleaning is only to be carried out by certified persons. Contact your installer/dealer if you find any defects. Do not perform any repair work by yourself.

• Battery

The battery needs to be maintained every month /quarter/ year/ according to different types and requirement of the battery. Only use the dry cloth to clean the outside of the battery system after cutting off the power from the batteries.

If the capacity of the battery decreased to lower than 80% of the rated capacity, the battery should be replaced.



NOTE !

The chapter is only for reference. The exact maintenance needs to be carry out according to the guide provided by the battery manufacture.

8 Troubleshooting

This section contains information and procedures for solving possible problems with SOLAX BOX, and provides you with trouble shooting tips to identify and solve most problems that could occur with SOLAX BOX.

This section will help you to narrow down the source of problems. Please read the following troubleshooting steps.

- Check the warning or fault messages on the System Control Panel or Fault codes on the inverter information panel. If a message is displayed, record it before doing anything further.
- Attempt the solution indicated in below table.

Faults	Diagnosis and solution
Communication Error	Communication fault. • Check the connection of Ethernet Cable or reset device. • Or seek help from us, if can not go back to normal state.
Overload error	• Switch off the excess loads to make sure the load power is within EPS's output rating. Then click the "X" icon in Error display to clear this error. • Or seek help from us, if can not go back to normal state.
SPI Fault	SPI communication fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
CAN1 Fault	CAN communication fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
PV Config Fault	PV Connection Setting Fault • Resetting the PV connection • Or seek help from us, if can not go back to normal state.
Inv EEPROM Fault	Inverter EEPROM fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
Relay Fault	Relay Fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
Sample Fault	The detection circuit Fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
RCD Fault	Residual Current Device Fault • Check the impedance of DC input and AC output. • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
Fan1 Fault	Fan Device Fault • Disconnect PV+ , PV- and battery, reconnect them.
Fan2 Fault	• Check if the fan is stopped by dust or other foreign. • Or seek help from us, if can not go back to normal state.

Faults	Diagnosis and solution
AC HCT Fault	AC Current Sensor Fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
OverLoad Fault	Over Load in EPS Mode. • Turn off high power device , press "ESC" to restart the inverter. • Or seek help from us, if can not go back to normal state.
EPS OCP Fault	Over Current in EPS Mode. • Make sure the load power is within the EPS power range. • Check if any nonlinear load is connect on the EPS. Remove this load to check if can recover. • Or seek help from us, if can not go back to normal state.
DCI Device Fault	DCI Device Fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
EPS Relay Fault	EPS Relay Fault • Disconnect PV+ , PV- , grid and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
TZ Protect Fault	Over current Fault. • Wait for a while to check if go back to normal status. • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.
Grid Lost Fault	Grid is Lost. • System will reconnect if the utility is back to normal. • Or seek help from us.
Grid Volt Fault	Grid Voltage Out of Range • System will reconnect if the utility is back to normal. • Or seek help from us.
Grid Freq Fault	Grid Voltage out of range • System will reconnect if the utility is back to normal. • Or seek help from us.
PLL Lost Fault	The Grid is Not Good. • System will reconnect if the utility is back to normal. • Or seek help from us.
Bus Volt Fault	Bus Voltage out of Normal Range. • Disconnect PV+ , PV- and battery, reconnect them. • Check if the PV input is within the range of the inverter. • Or seek help from us, if can not go back to normal state.
AC5M Volt Fault	The grid's voltage is out of range for the last 5 Minutes. • The system will back to normal if the grid is back • Or seek for help from us.
Inv OCP Fault	Inverter over current protection fault • Wait for a while to check if back to normal. • Or seek for help from us.
SCI Fault	SCI communication fault • Disconnect PV+ , PV- and battery, reconnect them. • Or seek help from us, if can not go back to normal state.

Faults	Diagnosis and solution
PV Volt Fault	PV Voltage Fault • Check the output of the PV voltage. • Or seek for help from us.
AC10M Volt Fault	The grid's Voltage is out of range for the last 10 minutes. • The system will back to normal if the grid is back • Or seek for help from us.
Isolation Fault	Isolation Fault • Check the connection of the inverter. • Or seek for help from us.
Temp Over Fault	Temperature over the limitation • Check if the fan is running normally. • Check if the envirement temperature is over limitation.\
Fan1 Speed Fault	Fan speed out of the normal range. • Check if the fan is stopped by dust or other foreign.
Fan2 Speed Fault	• Or seek help from us, if can not go back to normal state.
C1 Can Fault	The battery group's can communication fault. • Reconnect the charger communication cable. • Or seek help from us.
C1 Temp High	The battery charger is over temperature. • Check if the air ducting of the charger is blocked. • Improve the working environment or reduce the charging or discharging current. • Or, Seek help from us.
C1 FAN Fault	The fan of the charger is broken. • Check if the fan is working normally. • Check if anything blocking the fan • Or, Seek help from us.
C1 TZ Fault	The protection of the charger fault. • Wait for a while to check if back to normal. • Or, Seek help from us.
C1 EEPROM Fault	The charger's EEPROM fault. • Wait for a while to check if back to normal. • Or, Seek help from us.
C1 HCT1 Fault	The charger's current detection fault. • Reconnect the charger.
C1 HCT2 Fault	• Or, Seek help from us.
C1 Bus OVP	The Bus voltage of the charger over limit. • Wait for a while to check if back to normal. • Or, Seek help from us.
C1 Temp Low	The charger is under temperature • Improve the working environment of the charger. • Or, Seek help from us.

Faults	Diagnosis and solution
C1 Boost OVP	The Boost voltage of the charger over limit. • Wait for a while to check if back to normal. • Or. Seek for help from us.
C1 Bat OVP	The battery voltage is over limit. • Wait for a while to check if back to normal. • Or, Seek for help from us.
C1 Charger OCP	The charger is over current protected. • Wait for a while to check if back to normal. • Or, Seek help from us.
C1 Boost OCP	The boost current of the charger is over limit. • Wait for a while to check if back to normal. • Or, Seek help from us.
CT Fault	The CT or the meter is not connected well. • Check the connection of the CT or the meter. • Or, Seek help from us.
RC Fault	DCI over current protection Fault. • Wait for a while to check if back to normal. • Or seek for help from us.
DCI OCP Fault	DCI over current protection Fault. • Wait for a while to check if back to normal. • Or seek for help from us.
Other device Fault	Other device fault. • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
SW OCP Fault	Over current fault detected by software. • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
Dm9000 Fault	Network DSP fault. • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
RTC Fault	RTC Fault • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
Mgr EEPROM Fault	Manager EEPROM Fault. • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.

Faults	Diagnosis and solution
Mgr CAN Fault	Manager CAN Fault <ul style="list-style-type: none"> • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
C1 SPI Fault	Charge can communication fault. <ul style="list-style-type: none"> • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
C1 TZ Fault	Charge over current detected by hardware. <ul style="list-style-type: none"> • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.
C1 FAN Fault	Charge FAN fault. <ul style="list-style-type: none"> • Check if the fan is blocked . • Or seek for help from us if can not back to normal.
C1 sample Fault	Charge sample fault. <ul style="list-style-type: none"> • Turn off the PV, battery and grid , reconnect them. • Or seek for help from us if can not back to normal.

If the LCD touchscreen is not displaying a Fault light, check the following list to make sure that the present state of the installation allows proper operation of the unit.

- Is SOLAX BOX located in a clean, dry, and adequately ventilated place?
- Have the DC input breakers been switched on?
- Are the cables adequately sized and short enough?
- Are the input and output connections and wiring in good condition?
- Are the configuration settings have been done correctly?
- Are the display panel and the communications cable properly connected and undamaged?

Contact SolaX Customer Service for further assistance. Please be prepared to describe details of your system installation and faulty details. And please also provide the model and serial number of the unit.

9 Decommissioning

9.1 Dismantling the Inverter

- Disconnect SOLAX BOX from DC input and AC output.
- Disconnect battery wiring.
- Wait for 15 minutes for de-energizing.
- Disconnect communication and optional connection wiring.
- Loosen the universal wheels to remove the device.

9.2 Packaging

Please pack the device with the original packaging.

If it is no longer available, please use an equivalent caron that meets the following requirements.

- Suitable for loads more than 200 kg.
- Can be transported conveniently.
- Can be fully closed.

9.3 Storage

Store the SOLAX BOX in dry environment where ambient temperatures are always between -20 °C - +60 °C.

9.4 Disposal

When the device or other related components need to be disposed. Have it carried out according to local waste handling regulations. Please make sure to deliver wasted SOLAX BOX and packing materials to certain site, where can have assistance from relevant department to dispose and recycle.