



# X3-EPS Parallel Box & Parallel System

## Installation Guide



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# 1 Important Instructions

 Warning!

- All electrical installations must be carried out in accordance with the local electrical standards.
- All operations described in this manual only can be performed by qualified electricians.
- Authorized service personnel must disconnect all power from X3-EPS parallel box before attempting any maintenance or cleaning or working with X3-EPS parallel box.






 Warning!

- The hybrid on&off grid parallel system is extremely complex, and any small misoperation may cause the system running failed and it is hard to find the misoperation, so any operations are prohibited before reading this guide carefully.

 Warning!

- A large amount of cables will be to connected in the parallel system,so make sure all cables are in good condition and that cables are not undersized. Do not use any damaged or substandard cables in the system.

## ➤ Symbols on the Type Label

	Danger of high voltage. Danger to life due to high voltage of control box!
	Danger . Risk of electric shock!
	Observe enclosed documentation.
	The control box can not be disposed of together with the household waste.
	Do not work on this control box until it is isolated from battery and mains suppliers.

# 2 Introduction

SOLAX X3-Hybrid series inverter provides the parallel connection which could make ten inverter maximum connected in one system to deliver larger output power. In order to delivering power to some important large loads steadily both in on-grid and off-grid status, the hybrid system should connect a large changeover device to achieve parallel functions in any conditions.

Now SOLAX launch a changeover device, called "X3-EPS parallel Box", which could achieve change over function between on-grid condition and off-grid condition. Besides it has an internal junction box which could connect ten EPS output cables of inverters.

### X3-EPS parallel box models:

X3-EPS-BOX-P5-I	X3-EPS-BOX-P5-E
X3-EPS-BOX-P10-I	X3-EPS-BOX-P10-E

P5 & P10 mean maximum admissible inverter quantity.

X3-EPS-BOX-P5-I and X3-EPS-BOX-P5-E allows that 5 X3-Hybrid inverters mostly could be connected in the system.

X3-EPS-BOX-P10-I and X3-EPS-BOX-P10-E allows that 10 X3-Hybrid inverters mostly could be connected in the system.

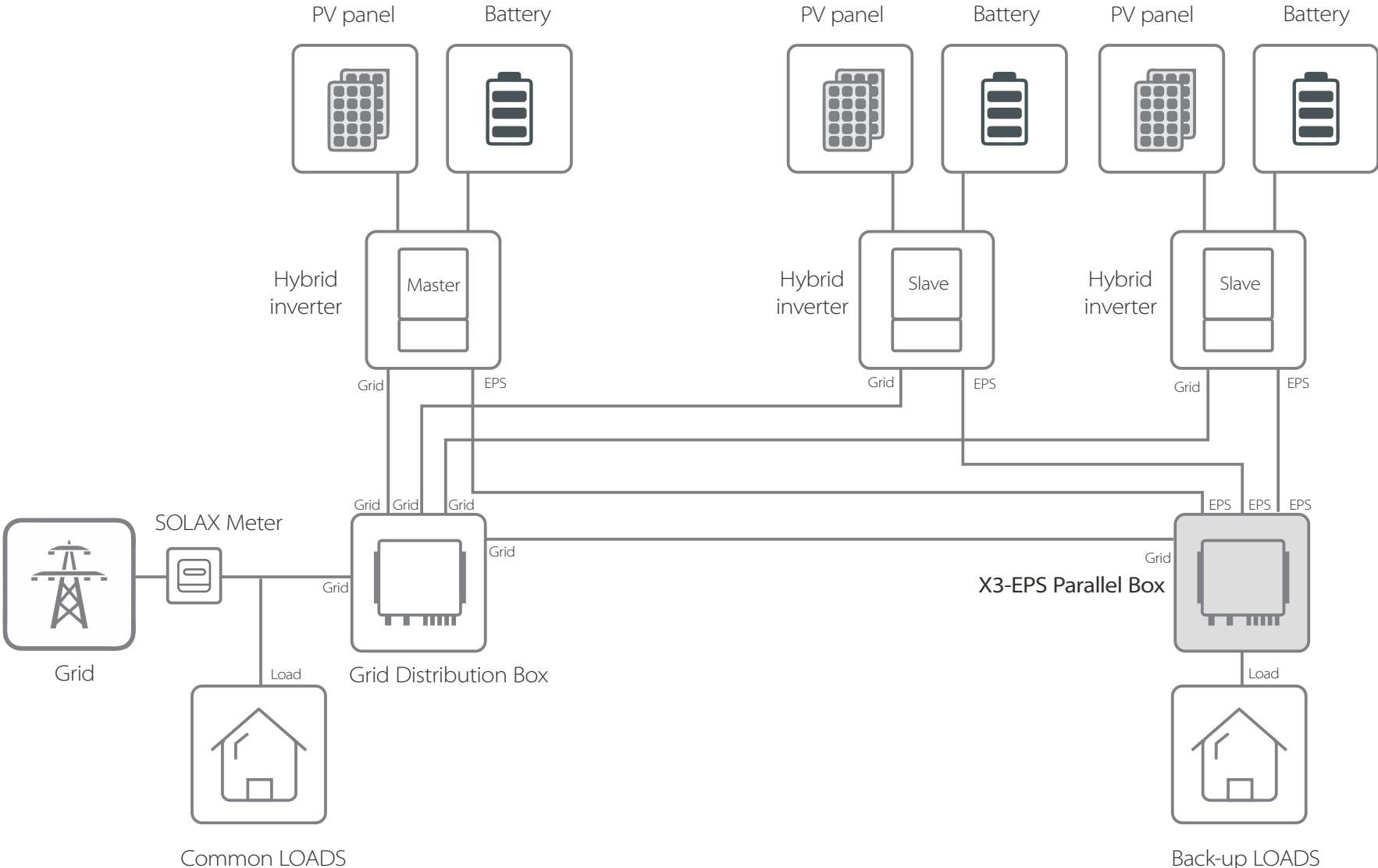
I & E mean different areas of application.

X3-EPS-BOX-P5-I and X3-EPS-BOX-P10-I ( **I version for short below**) 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 for Australia and New Zealand.)

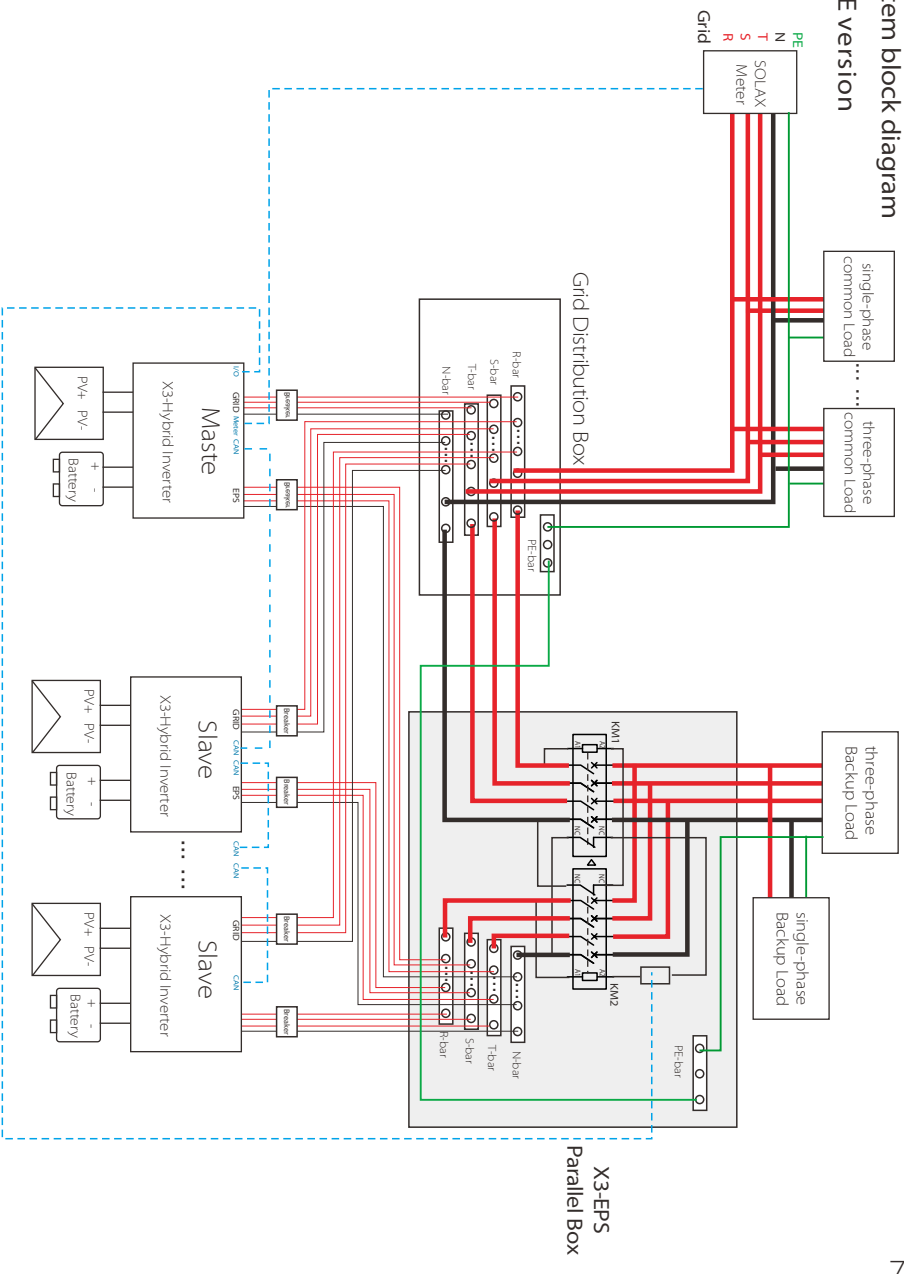
X3-EPS-BOX-P5-E and X3-EPS-BOX-P10-E ( **E version for short below**) applies to the wiring rules that requires live lines and Neutral line of alternative supply must be disconnected after the grid is off. ( applies to most countries.)

# 3 System Diagram

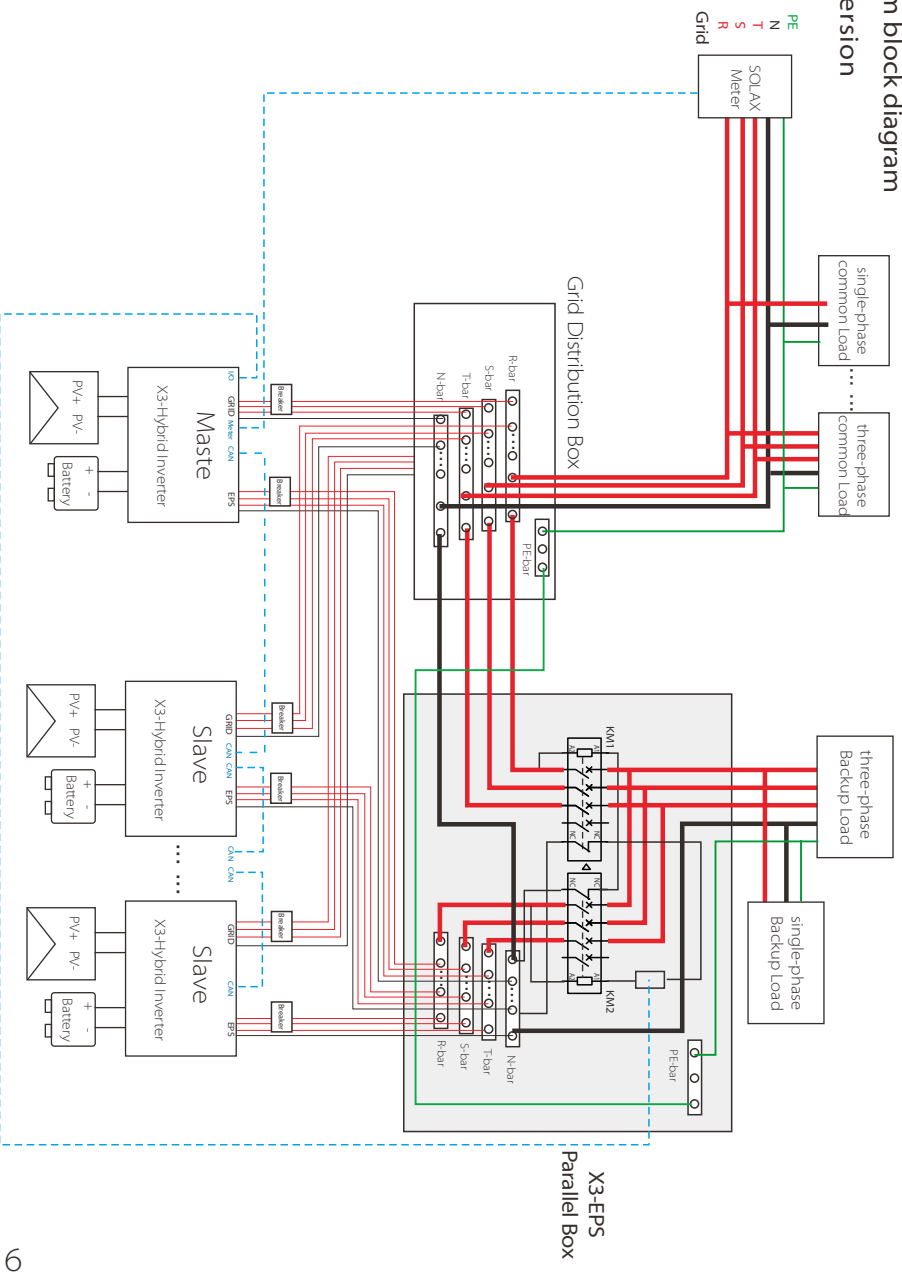
➤ System schematic diagram



➤ System block diagram for E version



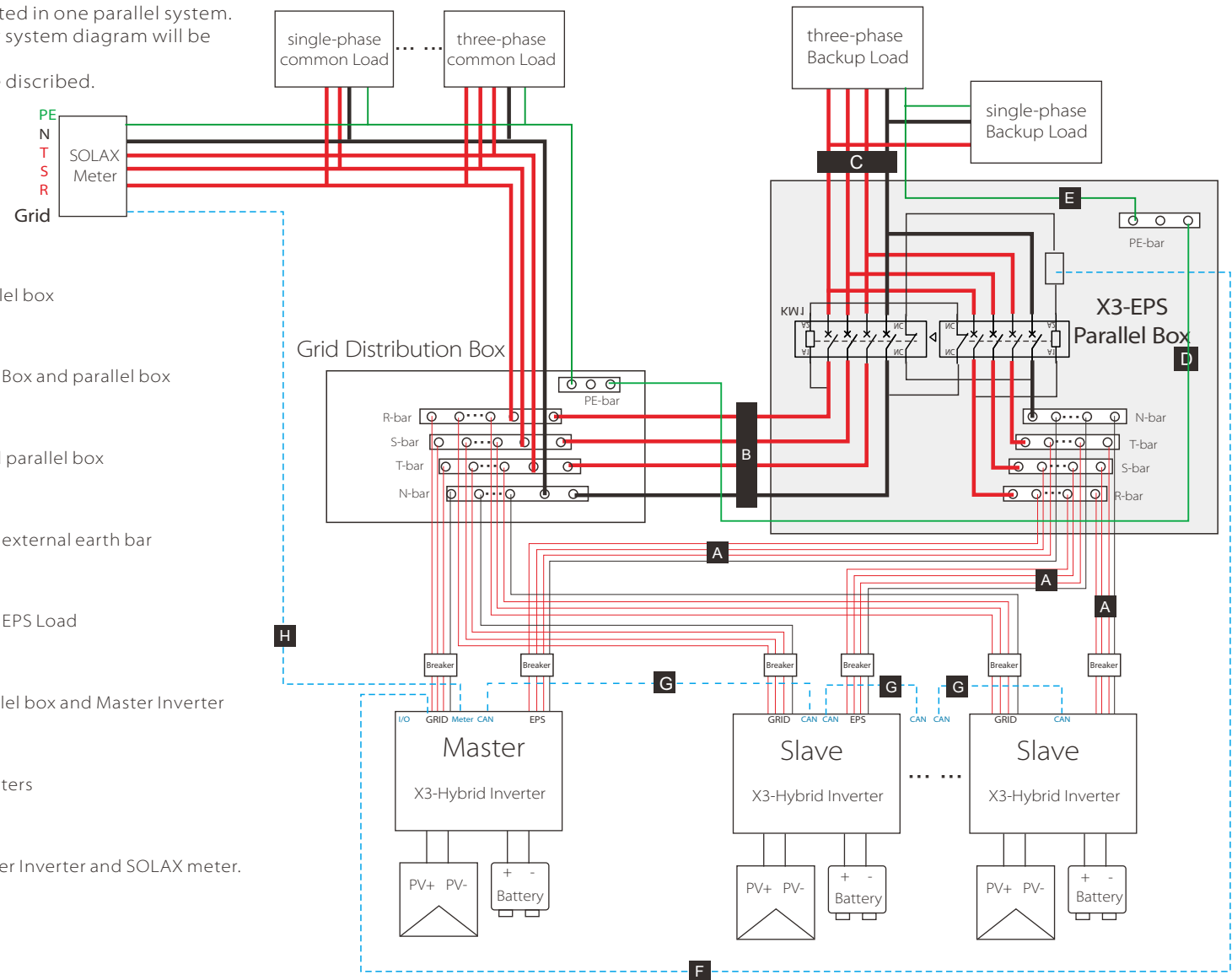
➤ System block diagram for I version



## 4 ALL Cable Connection Overview

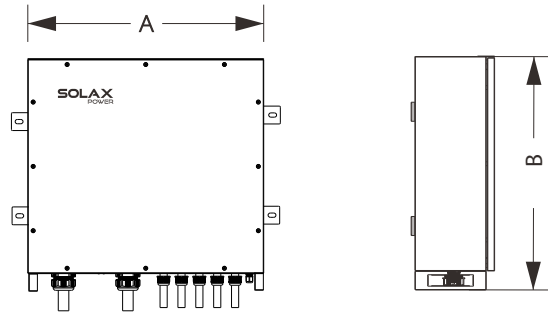
A large number of cables need to be connected in one parallel system. Only cables marked with majuscule in below system diagram will be introduced in this manual. For other cables connection, here will not be described.

- A** EPS connection between Inverter and parallel box (refer to Section 7.1, page 14)
- B** Grid connection between Grid Distribution Box and parallel box (refer to Section 7.2, page 16)
- C** EPS Load connection between EPS load and parallel box (refer to Section 7.3, page 18)
- D** Earth connection between parallel box and external earth bar (refer to Section 7.2, page 16)
- E** Earth connection between parallel box and EPS Load (refer to Section 7.3, page 18)
- F** Communication connection between parallel box and Master Inverter (refer to Section 7.4, page 21)
- G** Communication connection between Inverters (refer to Section 7.4, page 19)
- H** Communication connection between Master Inverter and SOLAX meter. (refer to Section 8.2, page 23)



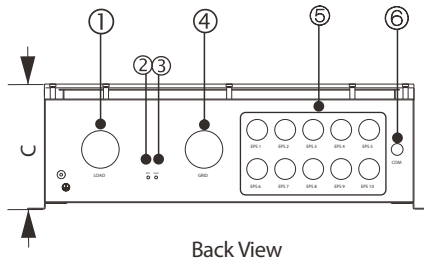
## 5 X3-EPS Parallel Box Information

### 5.1 Dimension & Terminals



X3-EPS-BOX-P5-I  
X3-EPS-BOX-P5-E  
X3-EPS-BOX-P10-I  
X3-EPS-BOX-P10-E

Object	For P5 Versions	For P10 Versions
A	630mm	660mm
B	613mm	650mm
C	220mm	230mm

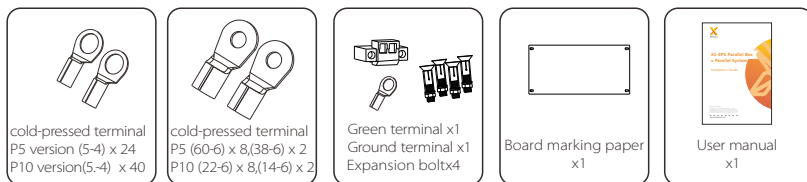


Back View

Object	Description
1	Load terminal connected with load
2	LED (EPS proper functioning)
3	LED (grid proper functioning)
4	Grid input
5	EPS input
6	Communication interface

### 5.2 Packing List

Check the delivery for completeness. Contact your dealer at once if anything is missing.



## 6 Mounting of X3-EPS Parallel Box

### ➤ Dimensions for mounting

On the packing list there is a board marking paper made of cardboard to indicate where the X3-EPS Parallel Box should be mounted on the wall.



### ➤ Installation tools



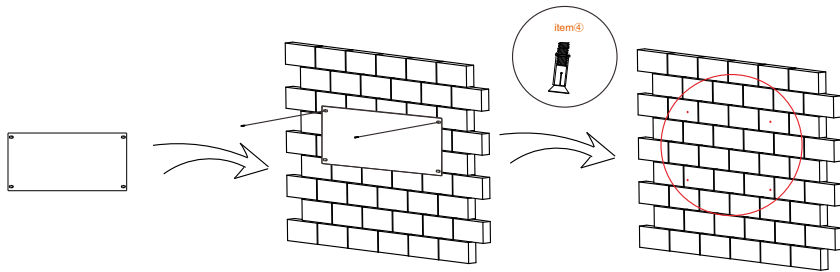
Step 1: Attach the corresponding expansion screw in the fitting to the wall.

- In the attachment package, there is a marking board marking paper with four holes on it, which is the same as the distance of the machine to install four screws. You can use the marking board marking paper to find the installation position of the machine.
- After selecting the location of the installation machine, paste the marking board marking paper on the wall to depict the location of the four screws, and then knock the corresponding four expansion screws in the marking board marking paper paste hole.

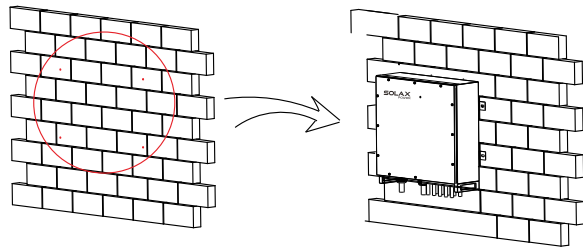
Step 2: Place the machine on the wall to match the expansion screw position and lock the nuts on the four screws. (Torque: 8.0 N·m)

Step 3: Match the X3-EPS Parallel Box with wall bracket.

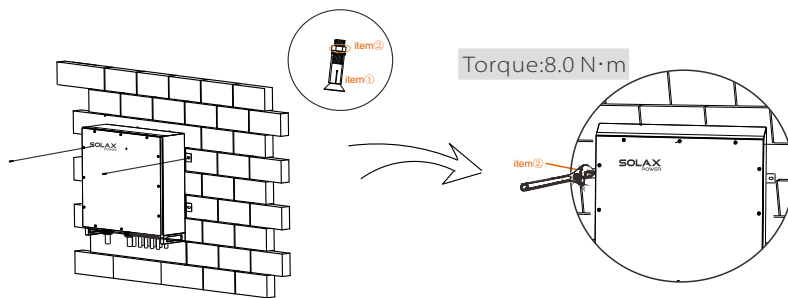
➤ Mounting steps



step1



step2



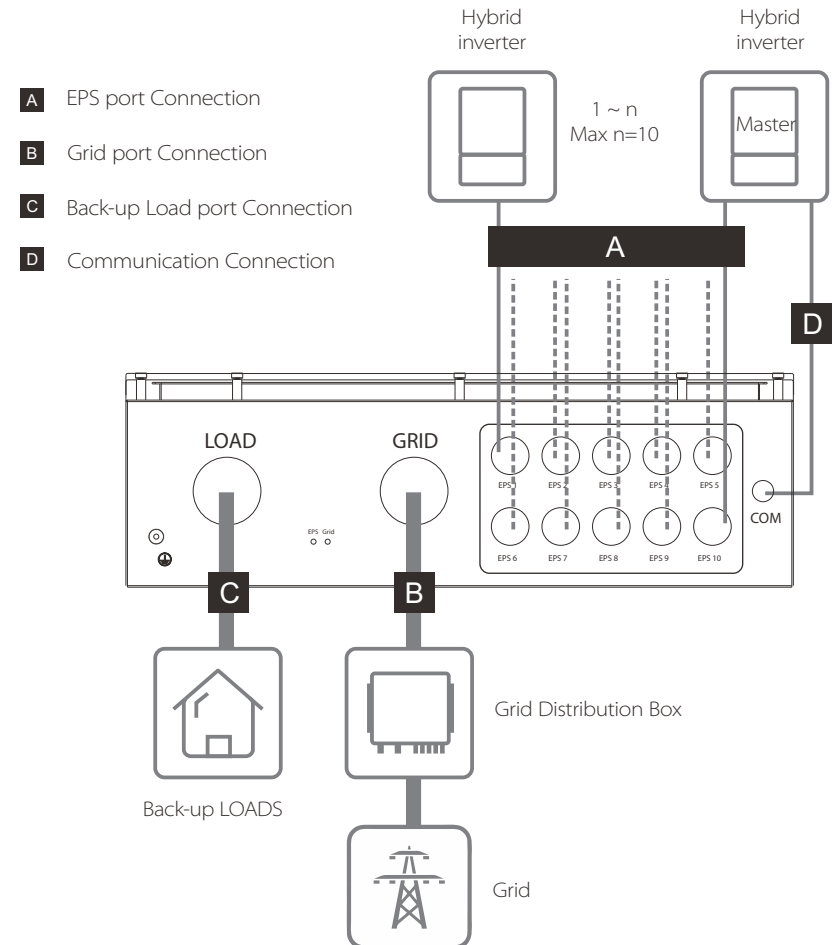
step2

## 7 Connection of X3-EPS parallel box



**Important Warning!**

• The hybrid on&off grid parallel system is extremely complex and a large amount of cables need to be connected, therefore it is strongly required that **every cable must be connected according to correct line sequence (R-R, S-S, T-T, N-N)**, otherwise any small misoperation may cause the system running failed.





## 7.1 EPS ports connection

EPS port Connection is between parallel box and hybrid inverters.

- EPS port Connection of I version and E version are the same.

### ➤ EPS port connection of parallel box side

#### Step 1. Make EPS wire.

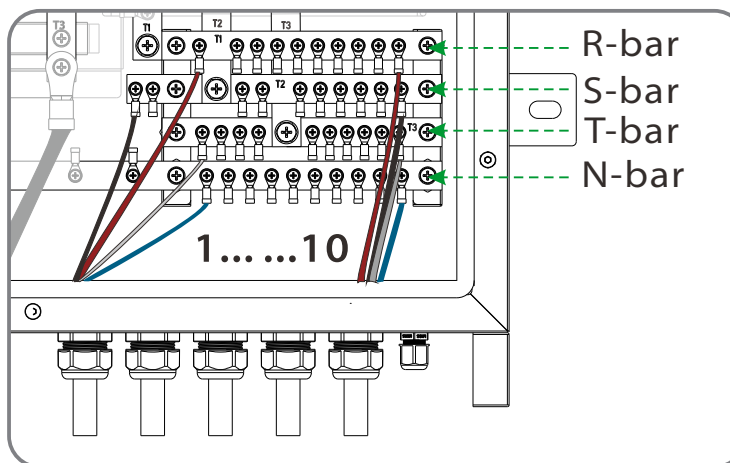
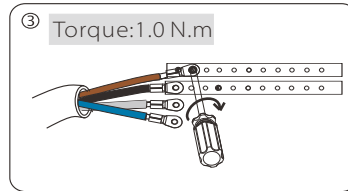
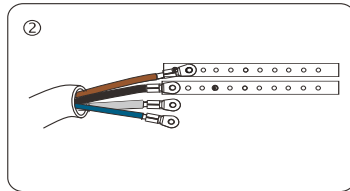
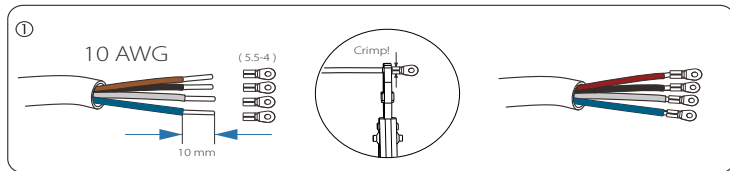
Select the right wire (cable size: see figure below).

Remove 10mm insulation from wire ends.

Insert the stripping terminal.

Press the terminal head with the blank holder.

**Step 2.** Screw through cable port and corresponding EPS ports (R-bar, S-bar, T-bar, N-bar, N-ba) and tighten. (Torque: 1.0 N·m)



### ➤ EPS port connection of inverter side

#### Step 1. Make EPS wires.

Choose the appropriate wire (cable size: refer to picture below).

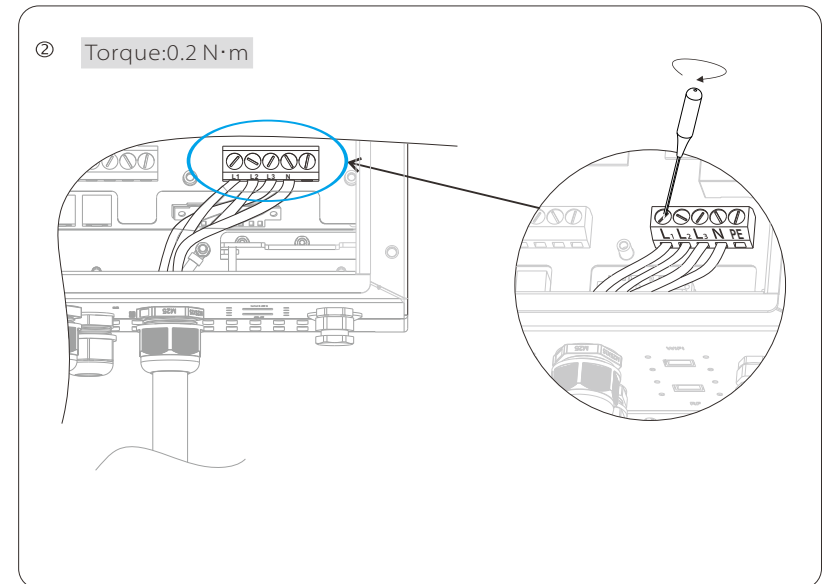
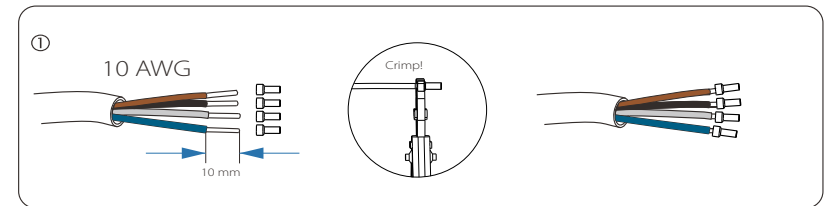
Reserve about 60mm of conductor material sectional area.

Remove 12mm of insulation from the end of wire.

Insert stripped wires into AC terminal.

Compress the AC terminal head by using a crimping pliers and screw down screw cap tightly.

**Step 2.** Insert EPS cable into EPS port through screw cap and then tighten the screw cap. Insert L1, L2, L3 wire and N wire into corresponding ports of EPS terminal and screw them tightly. (Torque: 0.2 N·m)



## 7.2 Grid ports connection

Grid port Connection is between parallel box and Grid distribution box.

- I version and E all need to connect 5 cables (R, S, T, N, G).
- R/S/T/G cables connection are the same, but N /P bar of I version and N/P bar of E are different.

### ➤ Grid port connection of parallel box side

**Step 1.**Make Grid wire.

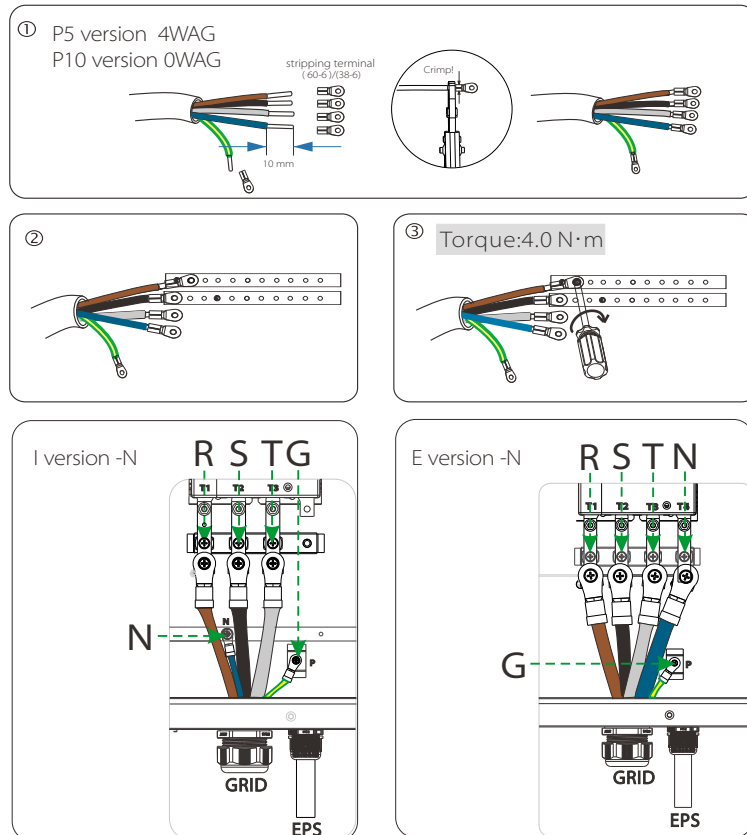
Select the right wire (cable size: see figure below).

Remove 10mm insulation from wire ends.

Insert the stripping terminal.

Press the terminal head with the blank holder.

**Step 2.**Screw through cable port and corresponding EPS ports (R-bar, S-bar, T-bar, N-bar, G-bar) and tighten.(Torque:4.0 N·m)



### ➤ Grid port connection of Grid distribution box side

Grid port connection of grid distribution box side should be analyzed and operated depending on field wiring condition.

Here will not be described into details.

## 7.3 Back-up Load ports connection

Load port Connection is between parallel box and Back-up Load.

- I version and E all need to connect 4 cables (R, S, T, N).
- R/S/T cables connection are the same, but N bar of I version and N bar of E are different.

### ➤ Selecting appropriate Back-up loads

Before the system installation, user must project some important load as the back-up loads which need to be worked when there is an outage.

When selecting back-up loads, the requirement shown as below must be satisfied:

- 1: Algebraic apparent power of back-up loads **must be less than** Algebraic apparent power of hybrid system \* **0.9**.
- 2: Algebraic RCD apparent power of RCD back-up loads **must be less than** Algebraic apparent power of hybrid system \* **0.6**.

For example:

If 1 \* X3-Hybrid-6.0-D-E inverter and 2 \* X3-Hybrid-10.0-D-E inverters are installed in one system, the algebraic apparent power of hybrid system =  $1 * 6KW + 2 * 10KW = 26KW$   
the algebraic apparent power of back-up loads must be less than  $26kw * 0.9 = 23.4KW$ .

If the back-up load is belongs to RCD nonlinear load, the algebraic RCD apparent power of the loads must be less than  $26KW * 0.6 = 15.6KW$ .

➤ Load port connection of parallel box side

**Step 1.** Make Load wire.

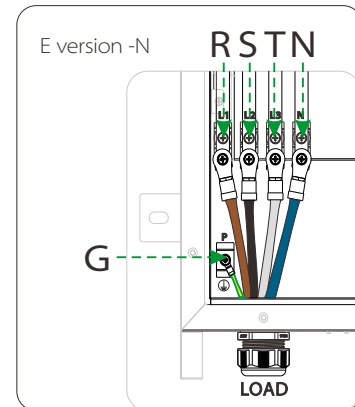
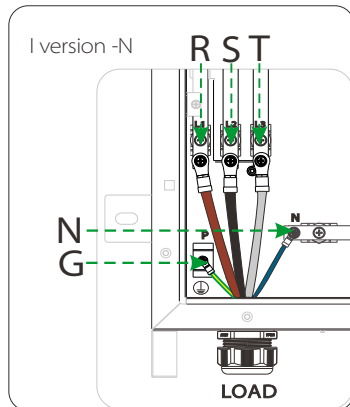
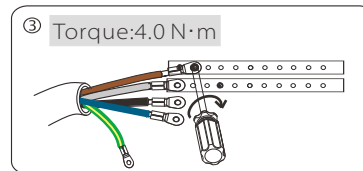
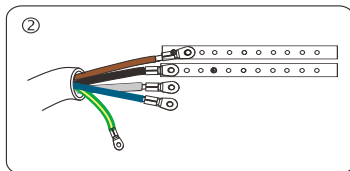
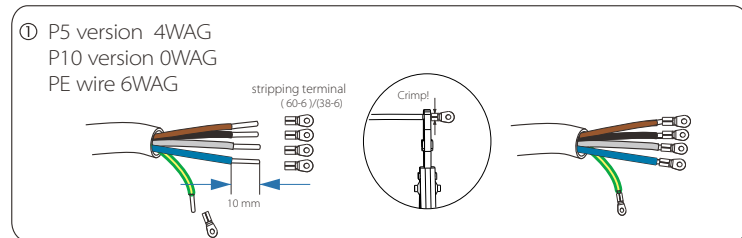
Select the right wire (cable size: see figure below).

Remove 10mm insulation from wire ends.

Insert the stripping terminal.

Press the terminal head with the blank holder.

**Step 2.** Screw through cable port and corresponding EPS ports (R-bar, S-bar, T-bar, N-bar, G-bar) and tighten. (Torque: 4.0 N·m)



➤ Grid port connection of Loads side

Grid port connection of loads side should be analyzed and operated depending on specific loads.

Here will not be described into details.

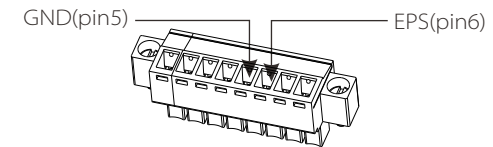
## 7.4 Communication connection

The communication connection is between parallel box and hybrid Master Inverter. In parallel system, one inverter will be set the "Master inverter" which will control every other inverter's energy management and dispatch control.

*Note: For how to set a Master inverter, please refer to page 4.*

➤ Communication connection of Master inverter side.

Communication interface with the main inverter for EPS and GND, two wires.



1	2	3	4	5	6	7	8
485A	485B	Shutdown	+3.3V	GND	EPS	GEN_A	GEN_B

➤ Master inverter communication connection steps:

The steps of X3-EPS parallel box communication line connection of the main inverter are as follows:

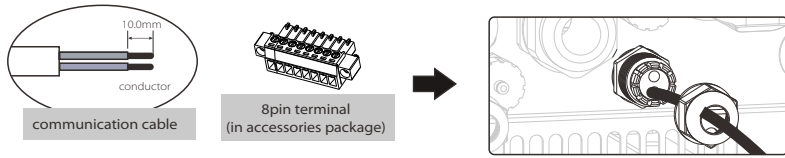
**Step1.** Prepare a connector and two communication wires.

**Step2.** Unscrew the nut of EPS connector and insert two communication wires through it.

**Step3.** Strip the insulation from the communication wires, then insert one side of wires into pin1 and pin2 holes of the 8 pin positive terminal which can be found in accessories package. And then screw them tightly.

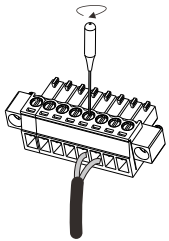
**Step4.** Insert the positive terminal into the corresponding negative terminal block inside of the inverter. And then screw it tightly.

Step1

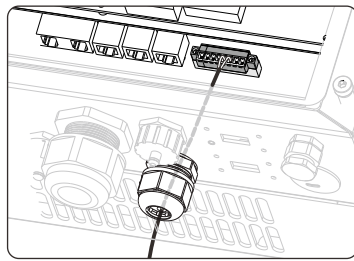


Step2

Torque:0.2±0.1N·m

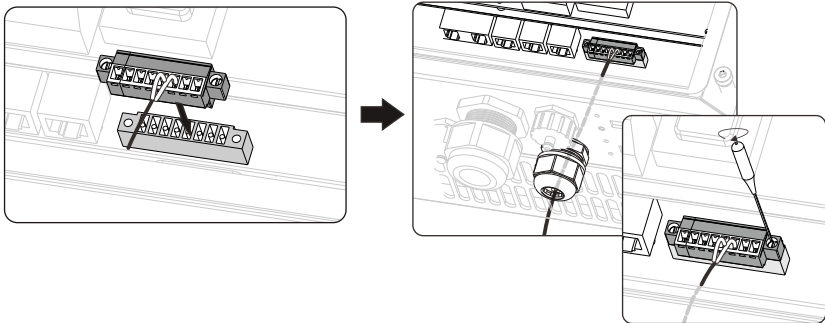


Step3



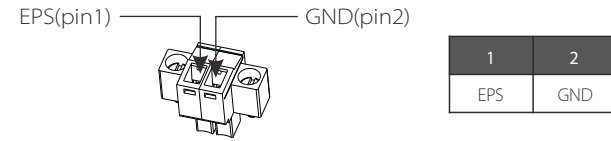
Step4

Torque:0.4±0.1N·m



➤ Communication connection of Parallel box side.

Communication interface with the X3-EP3 Parallel Box for EPS and GND, two wires.



Step 1. Made communication lines .

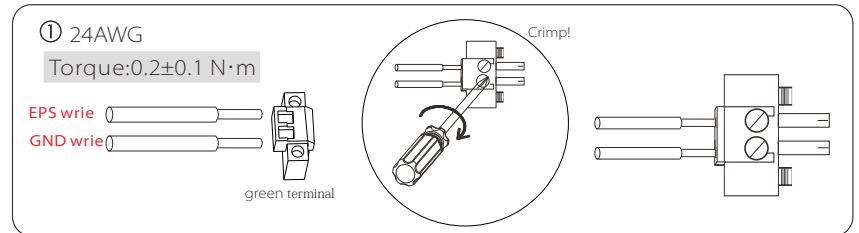
Select the correct wire (cable size: see figure below).  
Remove 10mm insulation from wire ends.

Plug in the communication terminal.

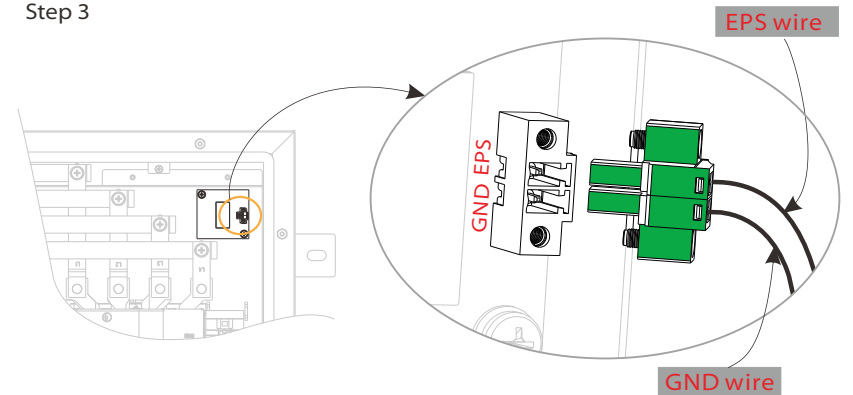
Step 2. Place the corresponding EPS/GND line on the two feet of the green terminal. Use a screwdriver to lock the wire. (Torque:0.2±0.1 N·m)

Step 3. Fasten through the communication terminal and the corresponding CAN port. (Torque:0.4±0.1 N·m)

Step 1、Step 2



Step 3



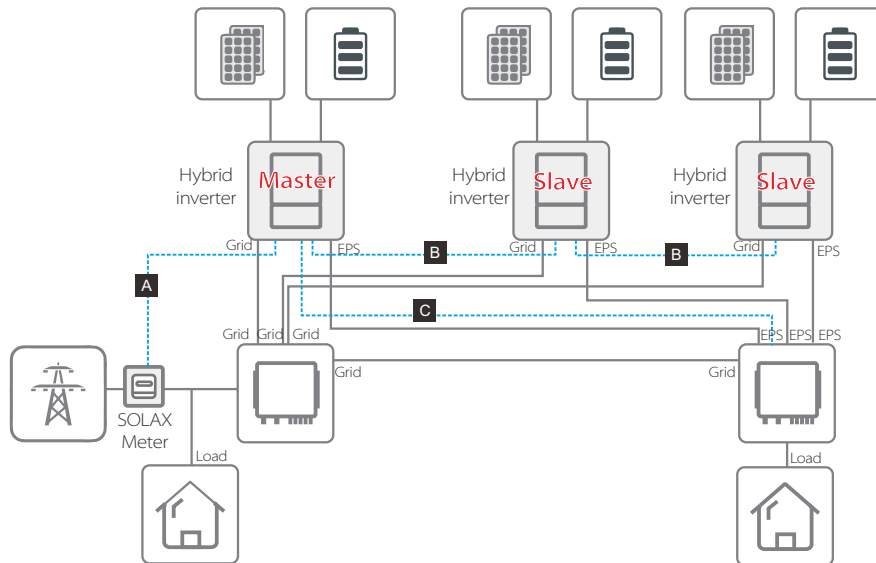
## 8 Connection of Parallel System

### 8.1 Master Inverter and Slaver Inverter

In parallel system, one inverter will be set as the “Master inverter” which will control every other inverter’s energy management and dispatch control. Only one meter needs to be connected in this system and communicate with the “Master inverter”, and all other slaver inverter communicate with “Master inverter” by CAN communication-parallel connection.

### 8.2 All communication connection of parallel system

- A** Communication connection between Master Inverter and SOLAX meter
- B** Communication connection between Inverters
- C** Communication connection between Master Inverter and parallel box (refer to page 19)



### ➤ A B Connection Steps



Note: Use standard CAT7 network cables for CAN-CAN connection and CAT5 cable for CAN-Meter connection.

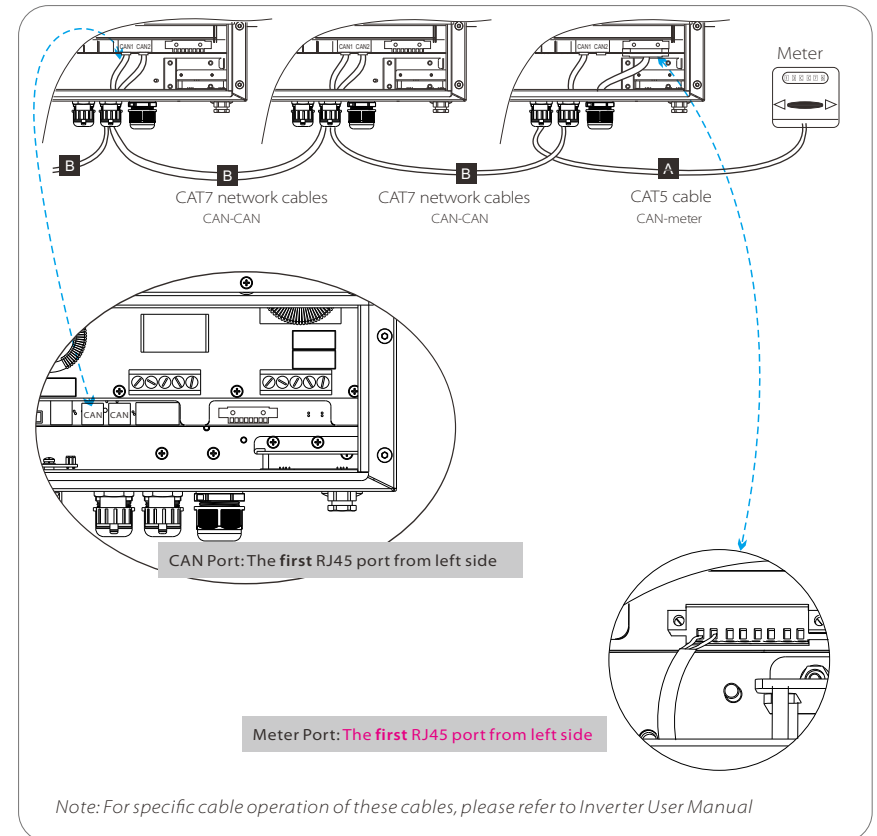
CAN-CAN connection:

- Insert one side of CAT7 cable into the first inverter’s **CAN port** and the other side into the next inverter’s **CAN port**.

RS485-Meter connection:

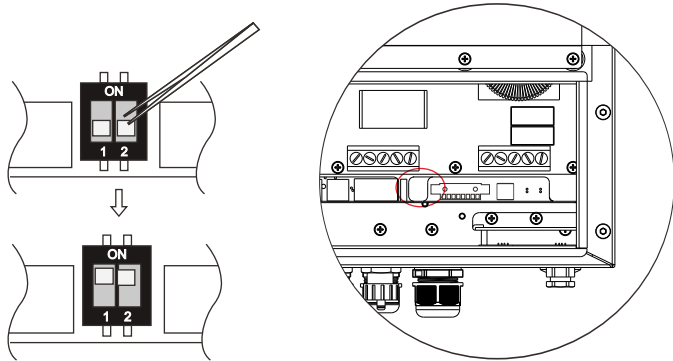
- Insert one side of CAT5 cable into the **RS485 port of meter**, and the other side into the **COM 1 port of the first inverter** or the **CAN 2 port of the last inverter**.

**Please note the inverter connected with meter will be the Master Inverter and this Master inverter must be connected with battery.**



➤ Set the DIP switch of Master Inverter. (No need to set slaver's DIP switch)

- Remove the top-down cover from master inveter, and find the DIP switch between CAN2 port and LAN port on the control board.
- - Push the white DIP switch of the main inverter and the last inverter connected from bottom to "ON" position with appropriate tweezers.



## 9 LCD display

### 9.1 Work Modes in parallel system

There are three work modes in parallel system, and your acknowledge of different inverter's work modes will help you understand parallel system better, therefore please read it carefully before operating.

Free mode	Only if no one inverter is set as a "Master", all inverters are in free mode in the system.
Master mode	When one inverter is set as a "Master", this inverter enters master mode. Master mode can be changed to free mode or slaver mode by LCD setting.
Slaver mode	Once one inverter is set as a "Master", all other inverters will enter slaver mode automatically. Slaver mode can not be changed from other modes by LCD setting.

### 9.2 "Master Inverter" setting in LCD display



Note: Before operation, please ensure that all the inverters' software version must be the same, otherwise this function can not be use.

Find the inverter connected with the SOLAX meter ,then enter setting page of the inverter LCD display, then click parallel setting, and choose "Master".

Note: Once this inverter is set as a "Master", all other inverters will enter "slaver mode" automatically.

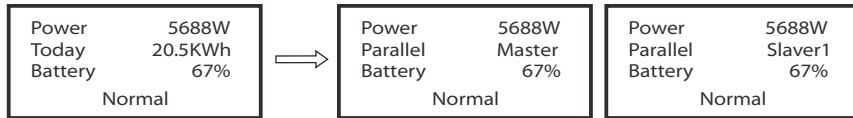
Setting
Battery
Parallel Setting
Reset

Parallel Setting
Status                      Free
>setting                      Master

### 9.3 LCD display Information

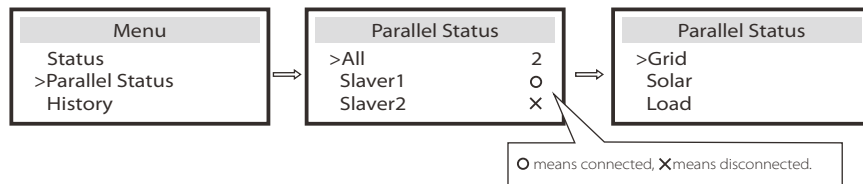
**Main display:**

Once inverter enters parallel system, the “today yield” will be replaced by “Inveter Class”, and parallel relevant fault has a higher priority than other faults and will be showed firstly on main display.



**Status display:**

User can obtain all the status data from master inverter. System power and individual slaver inverter power can be obtain in status display of master inverter.



### 10 Logout

If one inverter wants to exit from this parallel system, please do the steps as below:

- step1: Disconnect all the network cables on the CAN port.
- step2: Enter setting page and click parallel setting, and choose “Free”.

**Note:**

- If a slaver inverter is set to “Free” mode but not disconnect the network cable, this inverter will return to “Slaver”mode automatically.
- If a slaver inverter is disconnected with other inverter but not be set to “Free” mode, this inverter will stop working and maintain “waiting” status.