

Application Note: X1 Hybrid Three-Phase System AC Grid Port Parallel Function for AU

1. Overview

Currently, Anker SOLIX X1 three-phase systems rate power range from “5 to 12kW”. Parallel systems can expand the overall output of the system and amplify the system power and backup capacity to meet customers' needs for higher power and larger storage capacity scenarios. This extends the power coverage and usage scenarios of the system and improves the overall competitiveness of the product. The product realizes the parallel function of AC Grid port for 6 power modules of three-phase products in the same type, and each power module can connect to 6 battery packs. Maximum 72kW, 180kWh system.

2. Anker SOLIX Technology

2.1 List of features supported/not supported by the parallel system

Items	Parallel X1-H12K-T	Remark
Heat Pump	☑	Hardware connected to the master Power Module
Third party PV inverter	☑	
Dynamic Export Limit	☑	For AU SA and VIC
Soft Grid Feeding Limit	☑	For AU
Hard Grid Feeding Limit	☑	For AU
Switch Off-Grid Sensitivity	☑	
Fast Stop	☑	
DRED	☑	For AU, hardware connected to the Master Power Module
RCR	☑	For Germany, hardware connected to the Master Power Module
Three Phase Unbalance Output	☑	
AC Backup port in parallel	Under development	

2.2 Recommended parallel configuration for Anker SOLIX X1 Three-phase systems

- (1) The following recommended configuration is for reference only, the actual configuration can be based on customer scenarios demand and business strategy specific analysis.
- (2) The principle of the lower limit of the number of battery configurations explains: the continuous discharge power of each battery is 3kW, recommended by the battery discharge can provide power module rated power.

- (3) Less battery configuration can also work in parallel, however, when the utility power outage / PV power generation is insufficient, each battery discharge power is 3kW, maybe it can't hold full loads of power.
Eg. "X1-H12K-T + 2*X1-B5-H" without PV, the Off-Grid Rated Output Power is 6kW AC Backup port, not 12kW.
- (4) If any of the power modules are not configured with batteries, the site will not be able to complete the commissioning. Therefore, each power module should be configured with at least 1 battery.

2.3 System input/output power¤t introduction

Parallel X1-H12K-T	Single Module	2 Parallel	3 Parallel	4 Parallel	5 Parallel	6 Parallel	Remark
AC Output (On-Grid)							"AC Grid port" to "Normal loads + Export to Grid"
Total Rated Output Power	12 kW	24 kW	36 kW	48 kW	60 kW	72 kW	
Total Rated Output Current (230V)	17.4 A	34.8 A	52.2 A	69.6 A	87 A	104.4 A	Calculation based on 230V
Total Max.Output Apparent Power	13.2 kVA	26.4 kVA	39.6 kVA	52.8 kVA	66 kVA	79.2 kVA	
Total Max. Output Current (230V)	20 A	40 A	60 A	80 A	100 A	120 A	Calculation based on 230V
AC Output (Off-Grid)*							"AC Backup port" to "Critical loads"
Total Rated Output Power	12 kW	12 kW *2	12 kW *3	12 kW *4	12 kW *5	12 kW *6	
Total Rated Output Current (230V)	17.4A	17.4A *2	17.4A *3	17.4A *4	17.4A *5	17.4A *6	Calculation based on 230V
Total Max.Output Apparent Power	12.6 kVA	12.6 kVA *2	12.6 kVA *3	12.6 kVA *4	12.6 kVA *5	12.6 kVA *6	
Total Max. Output Current (230V)	17.4A	17.4A *2	17.4A *3	17.4A *4	17.4A *5	17.4A *6	Calculation based on 230V
AC Input							"Grid" to "AC Grid port",
Total Max.Input Apparent Power	20 kVA	40 kVA	60 kVA	80 kVA	100 kVA	120 kVA	
Total Max.Input Current	30.3 A	60.6 A	90.9 A	121.2 A	151.5 A	181.8 A	Calculation based on port capability

*The current version of Backup port can not be parallelized, and the output capacity of each X1 Backup port is the same as a single unit.

Main breaker size and Power sensor size:

- (1) The main circuit breaker size of the utility power supply of the customer's home need to be matched with the total power of “Backup Loads + Batteries' Charging power”, and this information should be taken into consideration when configuring the parallel project.
Recommended configuration reference line **"Total Max.Input Current"**.
- (2) Power sensor size needs to refer to the **main circuit breaker size**. We have DTSSU666 100A and 250A power sensors that can be configured.

2.4 Each X1 power cable size, breaker size, RCD size recommendation (consistent with single X1)

Port	Items	Specification
AC Grid port	Power Cable	5-Conductor AC Power Cable, 8-17 mm in Outer Diameter <ul style="list-style-type: none">· L1 Conductor: 6 mm², Minimum 400 V Rating, Copper· L2 Conductor: 6 mm², Minimum 400 V Rating, Copper· L3 Conductor: 6 mm², Minimum 400 V Rating, Copper· N Conductor: 6 mm², Minimum 400 V Rating, Copper· PE Conductor: 6 mm², Minimum 400 V Rating, Copper
	Breaker	AC Breaker <ul style="list-style-type: none">· Minimum Rated Voltage: 400 VAC· Rated Current: Recommend 32 A (Depends on loads and battery configuration)
Backup port	Power Cable	5-Conductor AC Power Cable, 8-17 mm in Outer Diameter <ul style="list-style-type: none">· L1 Conductor: 6 mm², Minimum 400 V Rating, Copper· L2 Conductor: 6 mm², Minimum 400 V Rating, Copper· L3 Conductor: 6 mm², Minimum 400 V Rating, Copper· N Conductor: 6 mm², Minimum 400 V Rating, Copper· PE Conductor: 6 mm², Minimum 400 V Rating, Copper
	Breaker	AC Breaker <ul style="list-style-type: none">· Minimum Rated Voltage: 400 VAC· Rated Current: Recommend 32 A (Depends on loads and battery configuration)

2.5 Version information

Anker SOLIX X1 Three-Phase Energy Storage System supports AC Grid port parallel function. Anker SOLIX X1 Single-Phase Energy Storage System does not yet support parallel function, with plans to support three parallel units in the future.

The version information is as follows:

Model type:	X1-H5K-T, X1-H8K-T, X1-H10K-T, X1-H12K-T
Product firmware version	above V1.0.9.9
Installer app version	above V1.12.0
User app version	above V3.7.0
O&M system version	above V1.14.0

3. X1 Hybrid Three-phase System Parallel Scenario

X1-H12K-T's 6-parallel units as an example.

3.1 Installation

(1) The installation method is the same as that of the single X1, floor-mounted and wall-mounted. And the recommended installation spacing between each column is 300-600mm.

Figure: Installation space for floor-mounted modules.

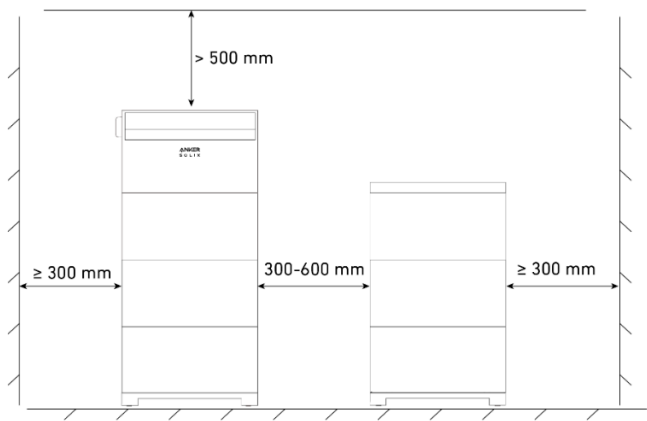
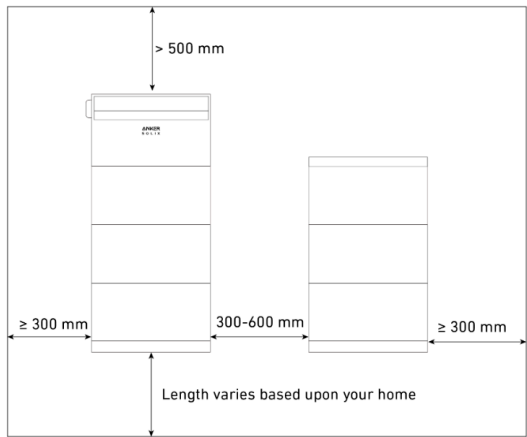
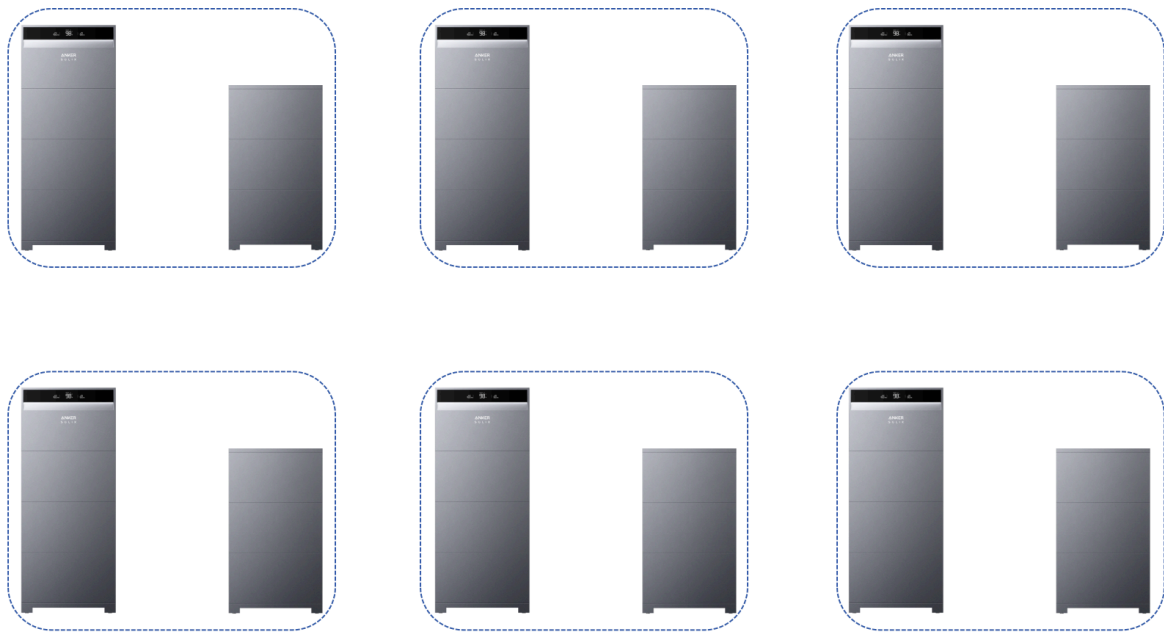


Figure: Installation space for wall-mounted modules.



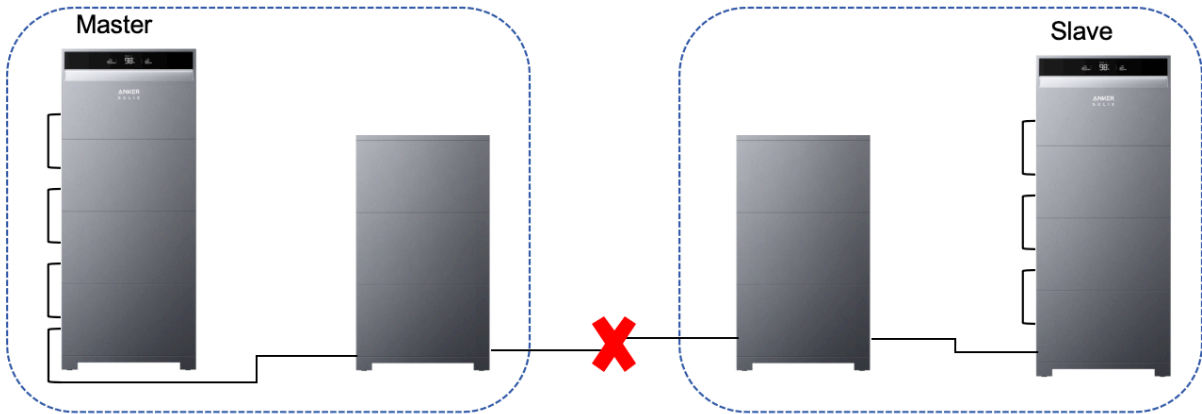
(2) It is recommended that the number of battery configurations under different Power modules be consistent to improve the balanced operation of the system, although our system has an equalization strategy for battery SOC.



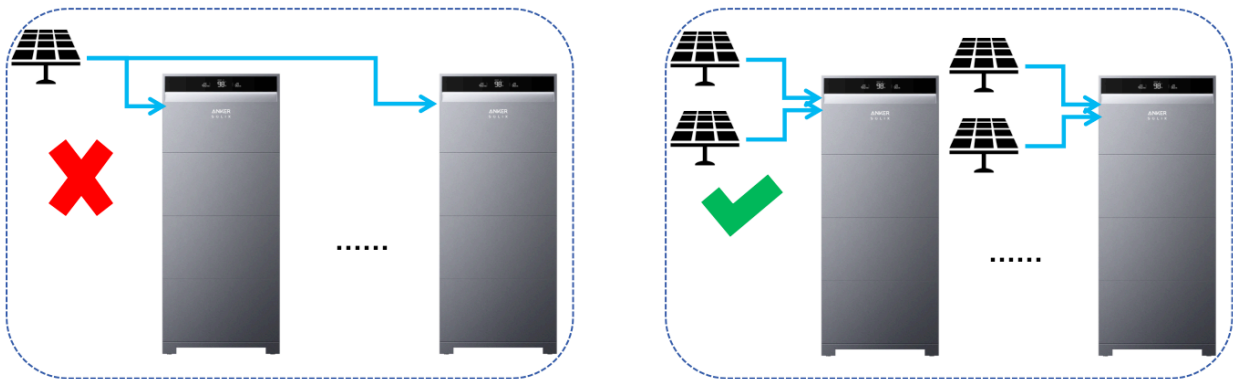
3.2 Power cable connection

(1) Battery power cable and signal cable connection are the same as single unit. There is no need to connect signal cable for the battery packs between the power modules.

Battery power cable and signal cable

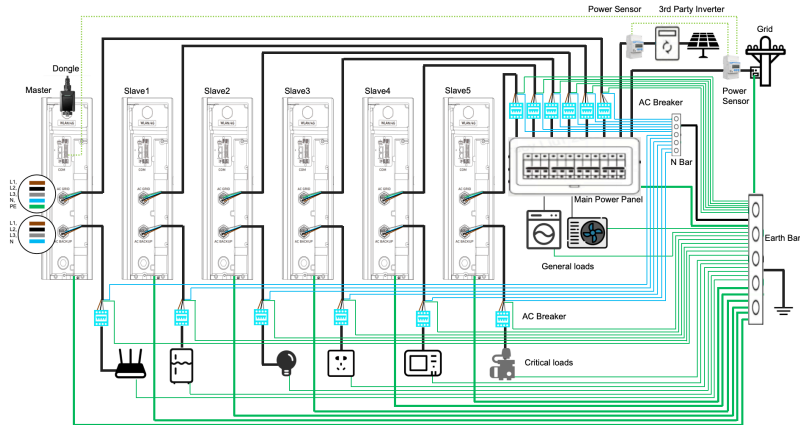


(2) PV needs to be connected independently, the same group of PV can not be connected to power module1 and power module2 at the same time. The connection details refer to the single unit.



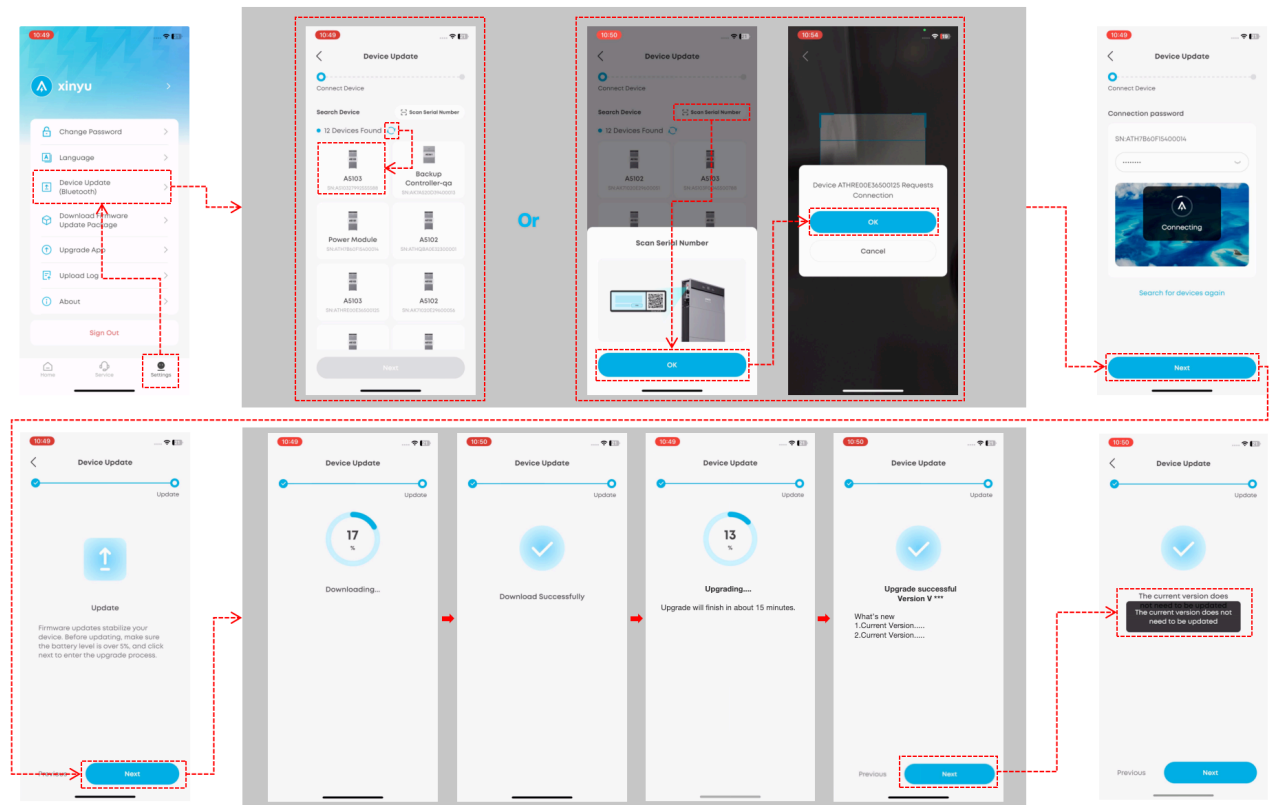
(3) Only the Master power module connects to Dongle and Power Sensor, the slaves do not. The backup loads should be connected to the backup ports of different power modules independently and evenly distributed, so that the system can be balanced and stable operation.

AU Three-phase Parallel Power Cable Connection--(Backup ports are separate)

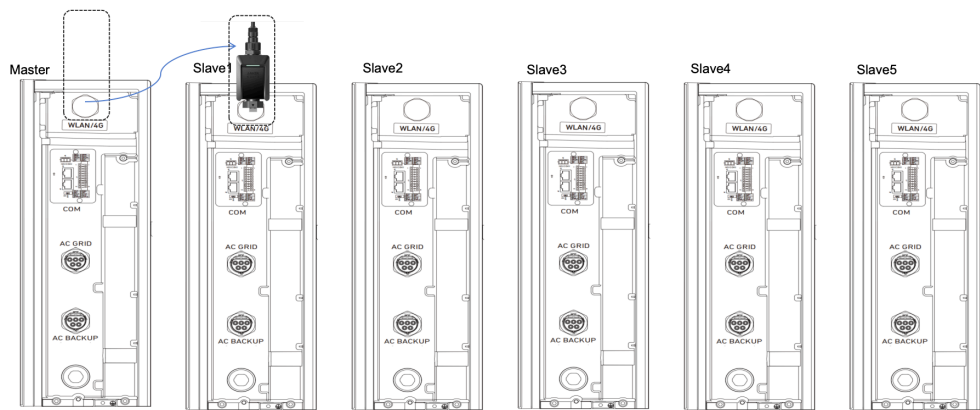


3.3 Device individually upgraded to the latest version

- (1) After the equipment installation is completed, power up the Master power module and batteries, make sure the dongle is plugged in, and do not connect the parallel signal cable between power modules first.
- (2) Use the installer APP according to the following steps: Connect devices (Bluetooth refresh auto-discovery or scan SN) -> Click "OK" -> Enter the connection password of the device -> After connecting successfully, Click "Next" -> The APP detection will automatically download package and upgrade -> Waiting for the successful result of the upgrade.



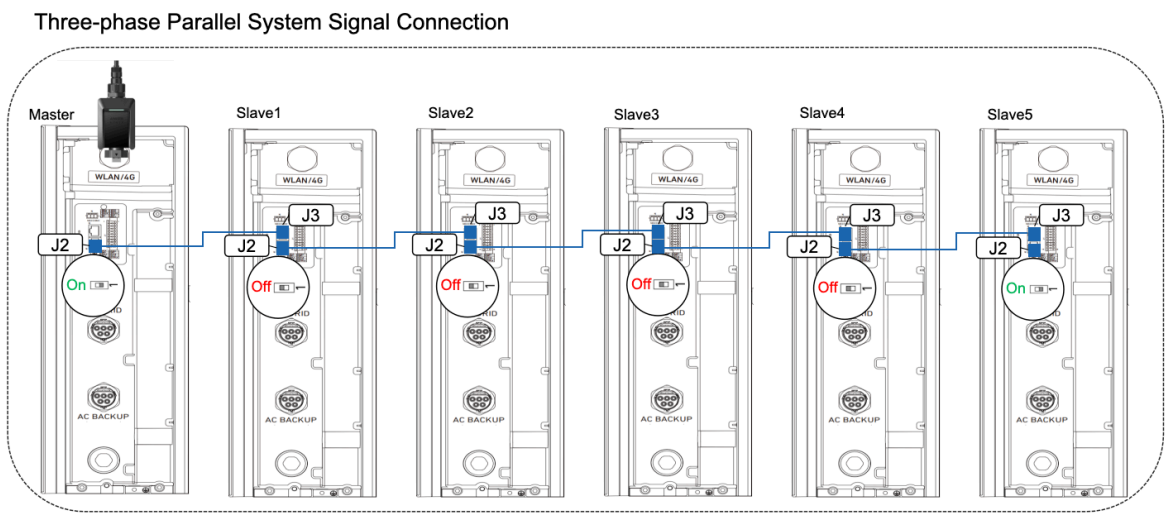
- (3) After the upgrade of the Master power module is completed, remove the Dongle from the Master power module and insert it into the slave power module 1, power up slave power module 1, and repeat the above upgrade process to complete the upgrade of slave power module 1.



- (4) Follow the same steps to complete the upgrade of other slave power modules one by one. When finished, plug the dongle back into the Master power module.
- Note: Battery SOC below 5% cannot start the upgrade, you need to complete the replenishment of power to 5% or more.

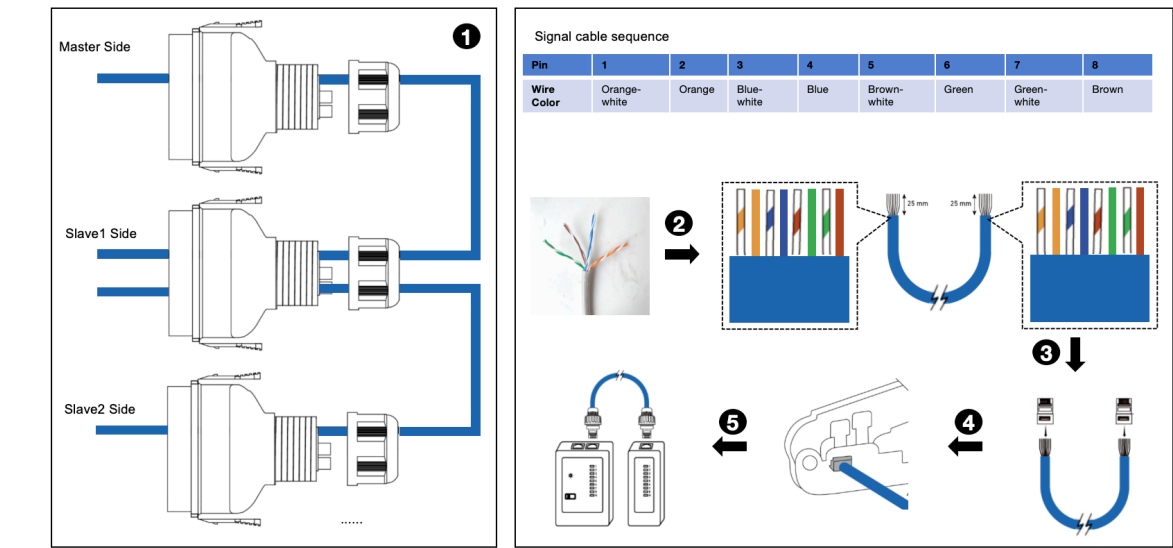
3.4 Parallel signal cable connection

- (1) After all the power modules are upgraded to the latest version (above V1.0.9.X), connect the power modules via signal cable sequence network cable as shown below. The network cable is not a standard configuration, the power module installation package is configured with two RJ45 connectors. The installer needs to do the network cable and make sure it is reliable.
- (2) The CAN bus 120 ohm resistor needs to be dialed in by the switches, with the first and last power modules set to "On" and the middle power module set to "1" (means "off")..



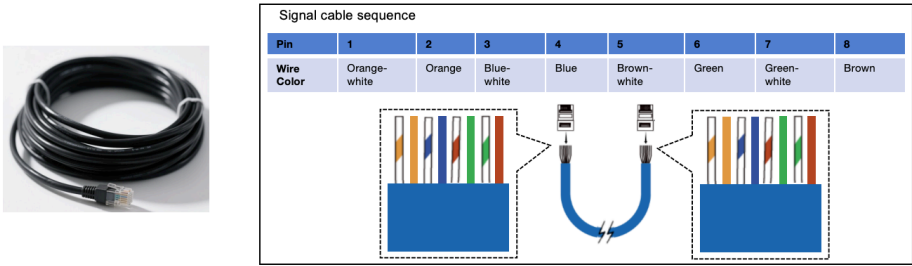
Parallel System Signal Cable Connection (On site crimp and make the signal cable)

1. Route the network cable through the locking cap and wiring compartment cover.
2. Strip the insulation layers from both ends of the signal cable (5-6mm in diameter).
3. Insert the wires into the RJ45 connectors (included) in the following table signal cable sequence. From Left to Right (Clip Faces Away):
4. Crimp the RJ45 connectors using the RJ45 crimping tool.
5. Use a cable tester to verify proper wiring and continuity.

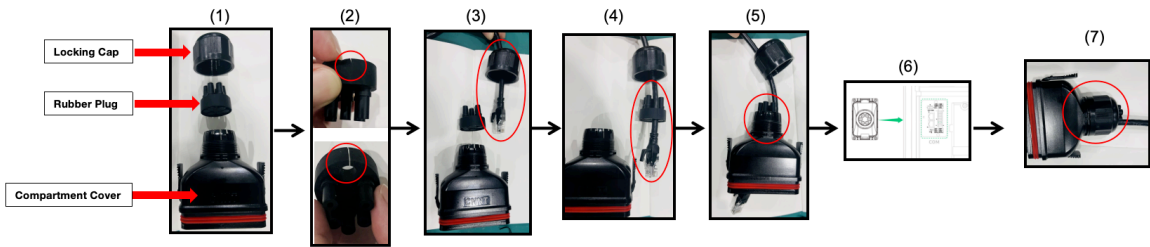


Parallel System Signal Cable Connection (Use the optional signal cable provided by anker)

1.The optional signal cable provided by anker has been crimped at the factory according to the required wire sequence, the wire sequence is as follows, **not a EIA/TIA568B standard** ordinary network cable.



2. Steps to connect: (1)Uninstall the "compartment cover", and detach the "rubber plug" and "locking cap" -> (2)Tear the wire holes of the rubber plug -> (3)Pass the signal cable through the "locking cap" -> (4)Pass the signal cable through the "rubber plug"-> (5)Pass the signal cable through the "compartment cover" and **must fully insert the rubber plug back into the compartment cover** -> (6)Connect the cable to the port and install the compartment cover -> (8)Tighten the locking cap to make sure there is no water leakage



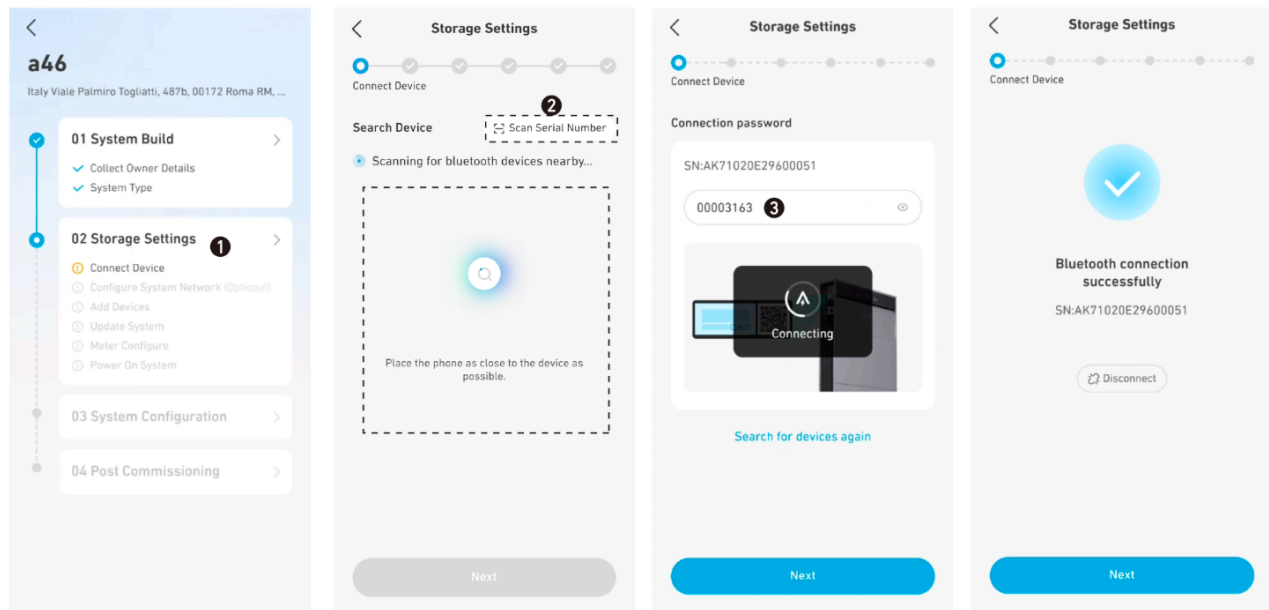
Notes:

- (1) Please make sure the signal cable sequence follows the requirement.
- (2) The total length of all signal cables combined is recommended to be no more than 30m.

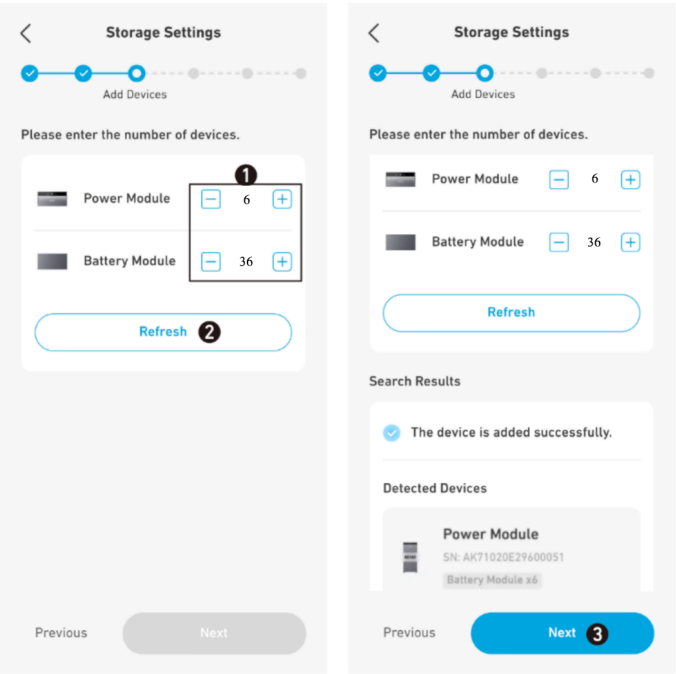
3.5 System commissioning process

New system commissioning: the same steps as single unit commissioning.

Note 1: the scanning Master power module recognizes the system.

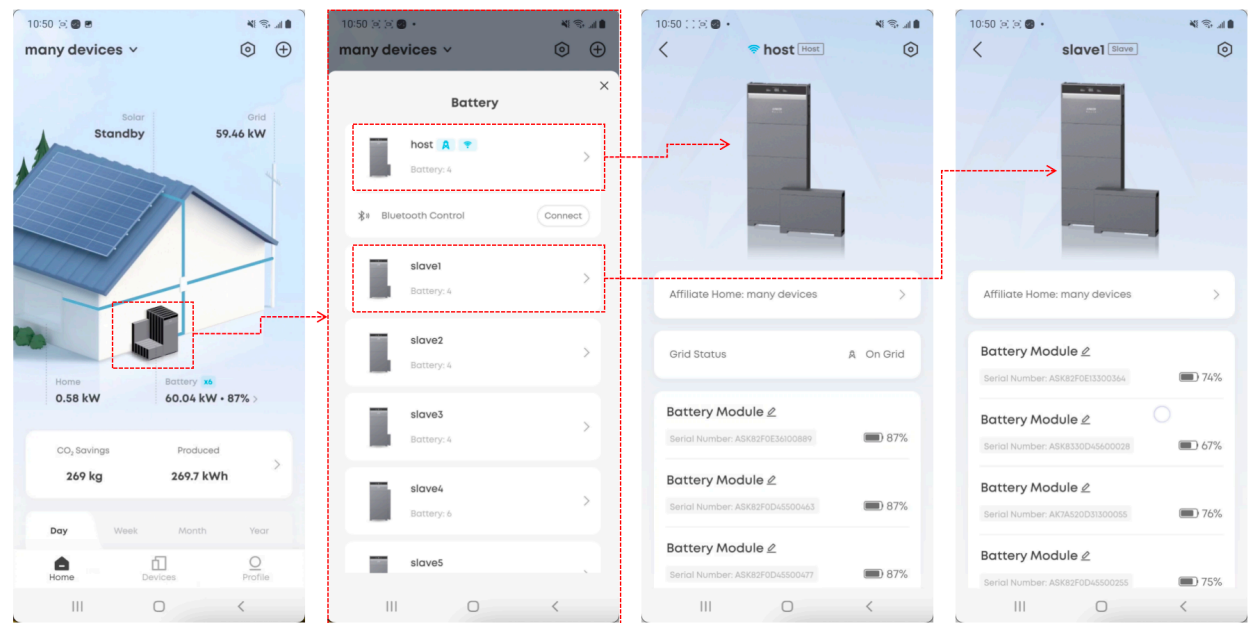


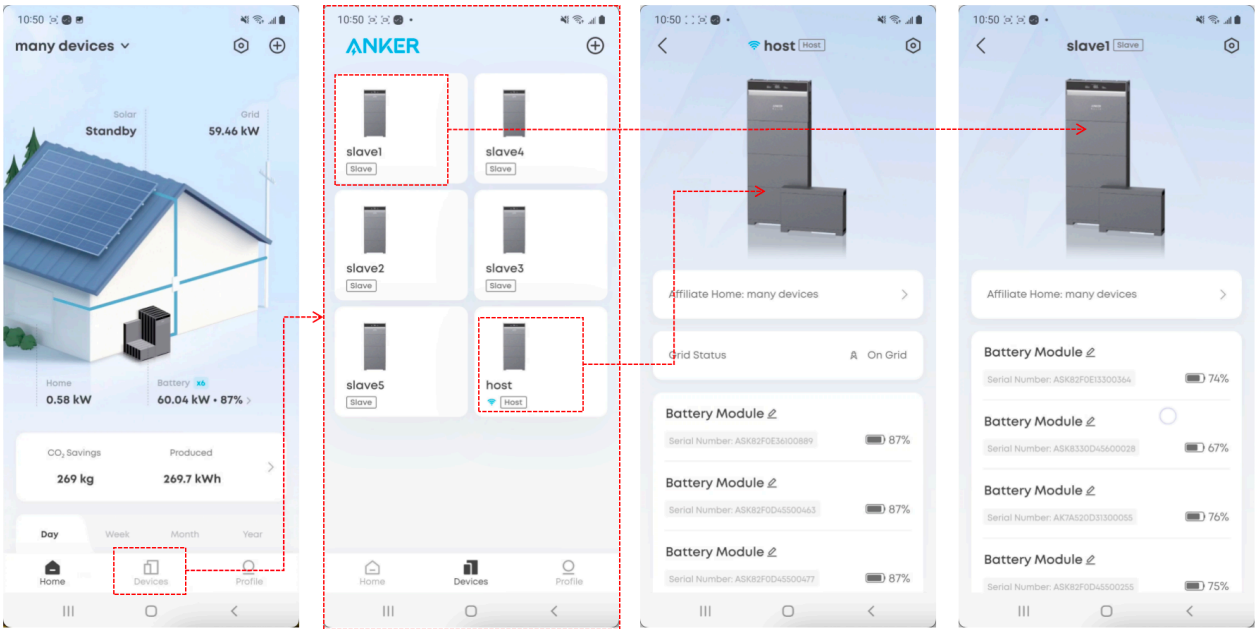
Note 2: when adding device you need to fill in accurately according to the actual number of configurations.



3.6 Viewing parallel system information in the user APP

The system information display of the user APP is consistent with that of the single unit, and you can view the real-time quantity, and the details of each device as follows:
The home page presents the solar, grid, home loads, battery charging/discharging and other information of the whole system, and you can view the details of each device by clicking Site or Device.

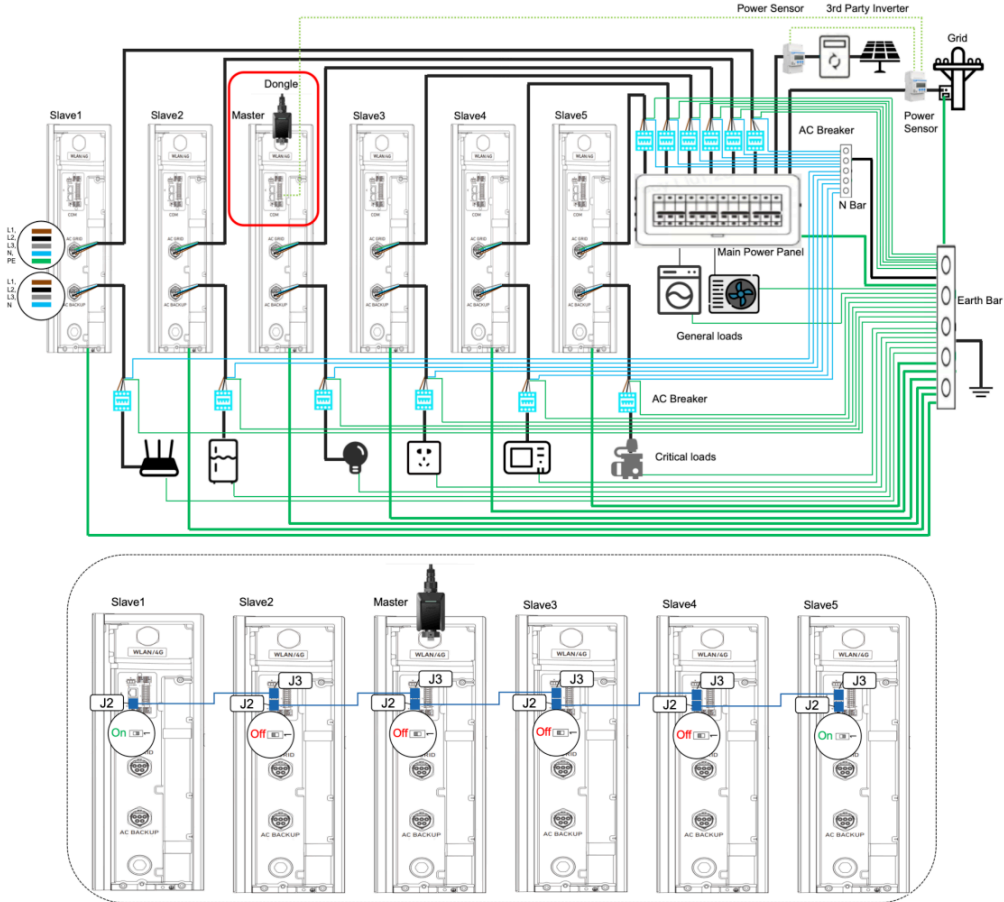




4. Notice

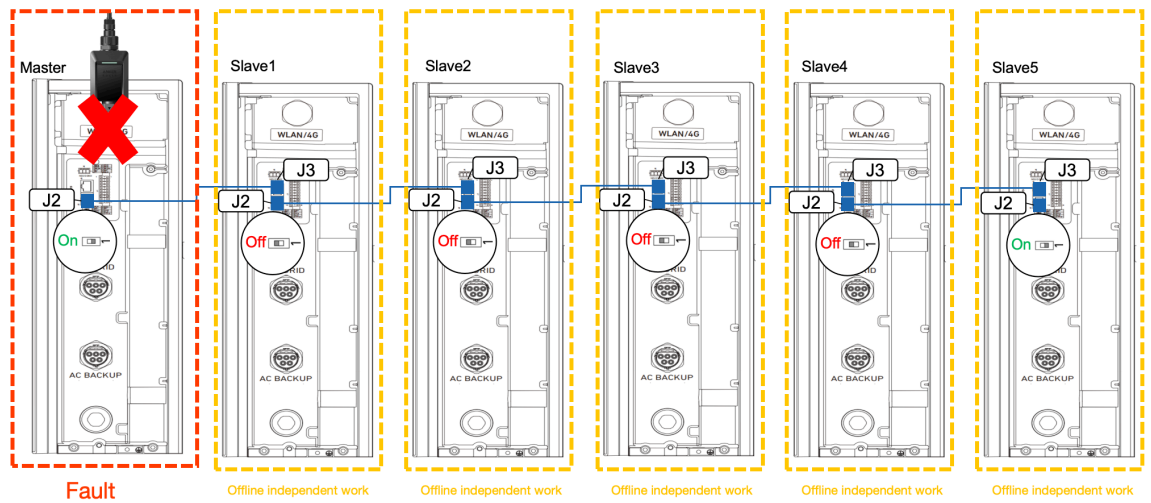
- (1) Grid/3rd party PV monitoring only requires the Master power module to connect to the Power Sensor, the slaves do not need to connect to the Power Sensor. The Master power module can also be in the middle of the parallel, not necessarily first or last.

AU Three-phase Parallel Power Cable Connection--(Backup ports are separate)

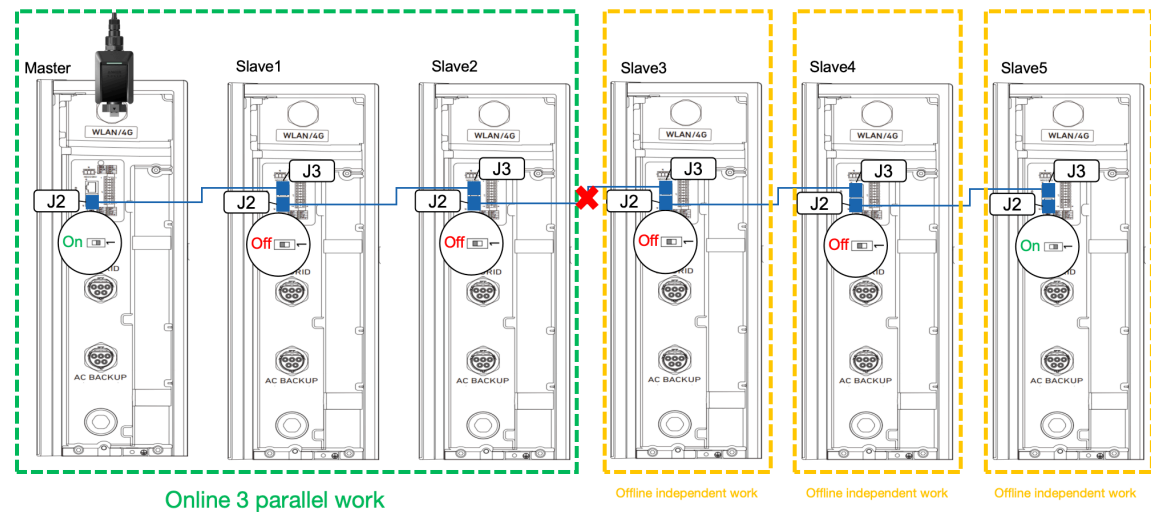


(2) Grif the master fails, the slave will not parallel work. But if the slave fails, the master can work normally and the master will synchronize the slave failure status to the cloud platform/app.

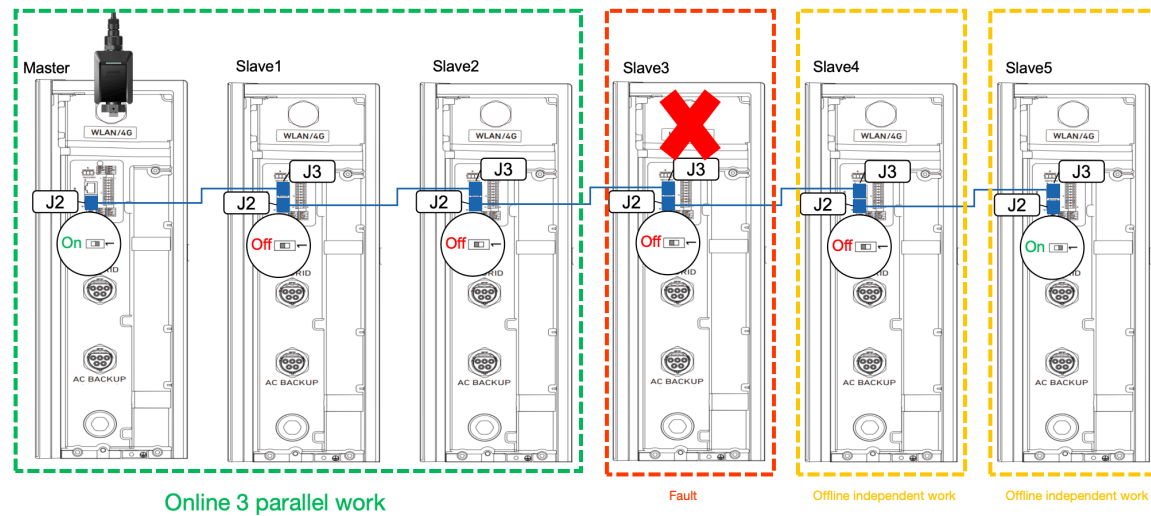
Host power module fault



When parallel signal cable disconnect



Slave power module failure affects communications



Slave power module failure not affects communications

