Parallel Operation Guide

Inverter/charger

EN

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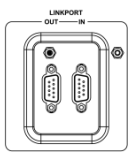
1 Applicable Models

The product models listed in the table below all support the parallel operation for multiple units in single phase or three phase. After correctly connecting the inverter/charges according to the wiring diagram of single phase parallel or three phase parallel, the phase can be arbitrarily switched to single phase or three phase (Phase A, B & C) through the LCD, achieving different output voltages.

Product Series	Product Models	Parallel Communication Ports & Accessories		
		Parallel Com. Ports	Parallel Com. Cables	CAN Bus Terminal Resistor
HP-AHP20SA	HP3522-AH1250P20SA HP3542-AH0650P20SA HP5542-AH1050P20SA	 DB9 terminal	 DB9 male-female 1.2m parallel communication cable /CAT.6-DB9(M)-DB9-120 cm	 DB9 parallel kits CAN-R120 (including one DB9-CAN-R120 and one DB9(M)-CAN-R120)
HP-AHP20A	HP2022-AH0750P20A HP2021-AH0730P20A HP2042-AH0450P20A HP2041-AH0430P20A HP3522-AH1250P20A HP3521-AH1230P20A HP3542-AH0650P20A HP3541-AH0630P20A HP5542-AH1050P20A HP6041-AH1130P20A			
UC-P20	UC3522-1250P20 UC3542-0650P20 UC5542-1050P20			
UCP-P20	UCP3522-1250P20 UCP3542-0650P20 UCP5542-1050P20			
KR-P20	KR3522-1250P20 KR3542-0650P20 KR5542-1050P20			

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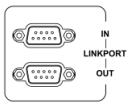
KRP-P20	KRP3522-1250P20 KRP3542-0650P20 KRP5542-1050P20			
KP-AHP20	KP3542-AH0650P20PS KP5542-AH1050P20PS KP5542-AH1050P20PD			
HP-AHP20BR	HP3522-AH1250P20BR HP3542-AH0650P20BR HP5542-AH1050P20BR			
HP-AHP30A	HP3522-AH1250P30A HP3542-AH0650P30A HP5542-AH1050P30A	 DB9 terminal		
HP-AHP65A	HP3522-AH1250P65A HP3542-AH0650P65A HP5542-AH1050P65A	 USB-A 3.0 port	 USB-A 3.0 (M) parallel communication cable 120cm/CAT.6-USB-A 3.0(M)-120cm	 CAN communication termination resistor/ USB-A 3.0(M)-CAN-R120

Note: The actual product model on sell shall prevail.

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2 Preparation

2.1 Wire and breaker size for parallel operation

- **Recommended battery wire and breaker size when connecting a single inverter/charger**

Product Model		Battery Wire Size	Circuit Breaker
HP-AHP30A	HP3542-AH0650P30A	20mm²/4AWG	2P—125A
	HP5542-AH1050P30A HP3522-AH1250P30A	35mm²/2AWG	2P—200A
HP-AHP65A	HP3542-AH0650P65A	20mm²/4AWG	2P—125A
	HP5542-AH1050P65A HP3522-AH1250P65A	35mm²/2AWG	2P—200A
HP-AHP20SA	HP3542-AH0650P20SA	20mm²/4AWG	2P—125A
	HP5542-AH1050P20SA HP3522-AH1250P20SA	35mm²/2AWG	2P—200A
HP-AHP20BR	HP3542-AH0650P20BR	20mm²/4AWG	2P—125A
	HP5542-AH1050P20BR HP3522-AH1250P20BR	35mm²/2AWG	2P—200A
HP-AHP20A	HP2042-AH0450P20A HP2041-AH0430P20A	13mm²/6AWG	2P—100A
	HP2022-AH0750P20A HP2021-AH0730P20A HP3542-AH0650P20A HP3541-AH0630P20A	20mm²/4AWG	2P—125A
	HP5542-AH1050P20A HP6041-AH1130P20A HP3522-AH1250P20A HP3521-AH1230P20A	35mm²/2AWG	2P—200A
UC-P20 UCP-P20	UC3522-1250P20 UC5542-1050P20 UCP3522-1250P20	35mm²/2AWG	2P—200A

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	UCP5542-1050P20		
	UC3542-0650P20 UCP3542-0650P20	20mm²/4AWG	2P—125A
KP-AHP20	KP3542-AH0650P20PS	20mm²/4AWG	2P—125A
	KP5542-AH1050P20PS KP5542-AH1050P20PD	35mm²/2AWG	2P—200A
KR-P20 KRP-P20	KR3522-1250P20 KR5542-1050P20 KRP3522-1250P20 KRP5542-1050P20	35mm²/2AWG	2P—200A
	KR3542-0650P20 KRP3542-0650P20	20mm²/4AWG	2P—125A

If the "BATT Input Mode" is selected as "Shared" (for the specific selection, please refer to section 3.2 Debug for single phase parallel or 4.2 Debug for three phase parallel), you need to connect all the battery cables of parallel inverter/chargers together. First, you need to use a connector or busbar as a connector to connect the battery cables together, and then connect to the battery terminals of each inverter/charger. The size of the cable used from the connector to the battery is X times the "Battery wire size" in the table above. X indicates the number of inverter/chargers connected in parallel. If the "BATT Input Mode" is selected as "Independent," you only need to connect each inverter/charger with the corresponding battery, and you cannot connect the cables of batteries or inverter/chargers together. In the same parallel system, there should not be devices with both "Shared" and "Independent" battery input modes.

- **Recommended PV, utility, and AC output wire and breaker size**

In parallel installation, the wire and breaker size for PV, utility and AC output are the same as in single installation; please refer to the user manual of the corresponding product model to select the appropriate wire and breaker size.

2.2 Precautions for parallel installation

Note: The following installation and wiring diagrams are illustrated using the HP-AHP20SA as an example. The parallel wiring for other product models is similar, please refer to the actual product you received.

- **Determine the installation location**

For proper air circulation to dissipate heat, the inverter/charger requires a clearance of approx. 30cm to the side and approx. 50cm above and below the unit. Be sure to install each unit in the same level.

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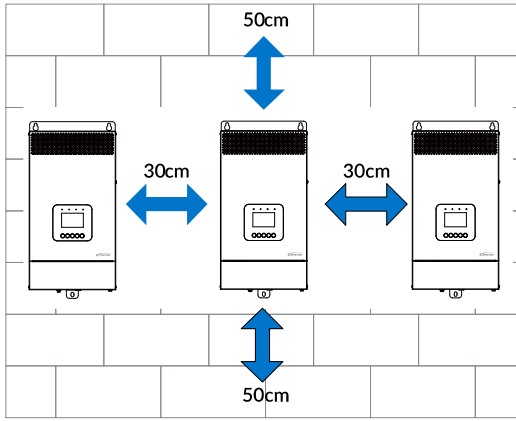
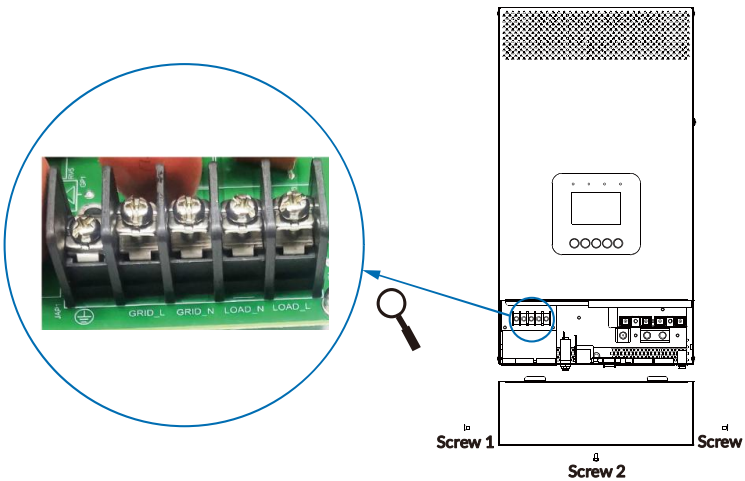


- **Wiring**

Before wiring, please remove the wire cover by unscrewing the three screws.



Note: The above figure illustration is based on the HP-AHP20SA series. For other product models, please refer to the actual product you received.

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DANGER

- When making electrical connections in a parallel system, ensure that all circuit breakers in the system are disconnected.
- Please wire correctly according to the silk print on the terminals, DO NOT connect it backwards!

NOTICE

- If the "BATT Input Mode" is selected as "Shared," all the inverter/chargers connected in parallel are connected to the same battery pack. Ensure that the cable length of each inverter/charger to the battery pack is the same.
- If the "BATT Input Mode" is selected as "Independent," each inverter/charger is connected to a battery pack separately. Ensure that the cable length of each inverter/charger to the battery pack is the same.
- Ensure that the Utility cable length and wire size of each parallel inverter/charger is the same, otherwise it will lead to too large input power difference between inverter/chargers, which will affect the normal operation and service life of the inverter/charger.
- Ensure that the load cable length and wire size of each parallel inverter/charger is the same, otherwise it will lead to too large output power difference between inverter/chargers, which will affect the normal operation and service life of the inverter/charger.

2.3 Parallel Discharging Mode

When the inverter/charger is used in parallel, it is recommended to set the "Discharging Mode" to "PV > BT > BP (namely, PV > Battery > Bypass)". It is recommended to keep the discharging mode at the factory default values without any changes. Otherwise, the parallel operation might be affected.

When set to different charging and discharging modes, the impacts on parallel operation are shown in the following table:

- **NO:** indicates the setting is not recommended. If the charging and discharging mode is set to "NO", it may cause asynchronization in certain logic switching during parallel operation.
- **YES:** indicates the setting is recommended. If the charging and discharging mode is set to "YES", the inverter/charger can normally work.
- **Invalid:** indicates the setting is invalid for the parallel system. The inverter/charger will work according to the default values.

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Discharging Mode / Charging Mode	PV > BP > BT	PV > BT > BP (Prior)	BP > PV > BT
Solar prior	NO	YES	YES
Only solar	NO	YES	YES
Solar plus Utility	Invalid	Invalid	Invalid
Utility prior	Invalid	Invalid	Invalid

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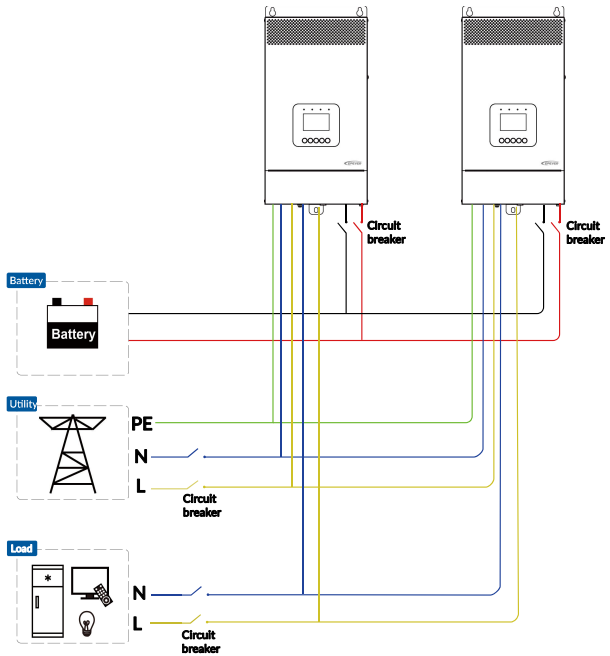
3 Parallel Operation in Single phase

3.1 Single phase parallel wiring diagram

3.1.1 Connect the battery, utility, load, and parallel communication cables

1) Two inverter/chargers in single phase parallel

- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

- **Connect the parallel communication cables**

Step 1: Connect the parallel communication ports on the side of each inverter/charger by the parallel communication cables.

Step 2: Connect the CAN bus terminal resistor (included accessory) to the parallel communication ports of the first and last inverter/charger.

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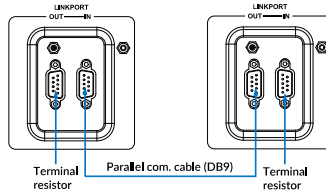
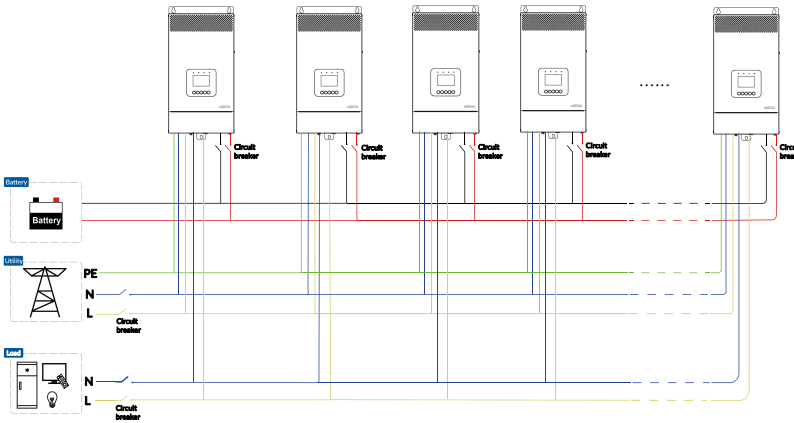


2) Three or more inverter/chargers in single phase parallel

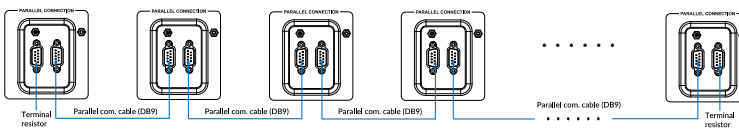
- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

Note: When the inverter/chargers are connected in parallel as shown in the above figure, it is recommended that for three or more inverter/chargers in parallel, connect an EPEVER "Parallel inductor" in series to the load output N wire of each inverter/charger, to improve unstable operation of the parallel system caused by unbalanced bypass output power and unbalanced charging power during parallel operation, and other issues. For the models of "Parallel inductor" corresponding to different inverter/chargers, please refer to the optional accessories.

- **Connect the parallel communication cables**



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3.1.2 Connect the PV

PV connection in the parallel system is the same as the connection for the single inverter/charger. For PV connection in the parallel system, please refer to the user manual of the corresponding product model, which includes the PV connection of single inverter/charger.

NOTICE

- Each inverter charger should be connected to PV modules separately, and it is prohibited to connect the same PV modules to two or more inverter chargers.
- In parallel installation, if the Utility and PV supply power together, a certain deviation (inequality) in the output power exists for each inverter/charger. The larger the difference between each inverter/charger's Utility charging current, the greater the deviation in output power. This is the internal loop of the inverter/charger, which will not affect the normal operation of the Utility bypass.

3.2 Debug for single phase parallel

Step 1: Double check the parallel wiring according to the following requirements before debugging:

- Ensure that the wires are connected correctly according to the wiring diagram, and do not reverse connect.
- Ensure that the strong and the weak current wiring is not crossed to prevent interference with the parallel communication line. That is, the parallel communication line does not cross with PV, battery input line and AC output line wiring, otherwise the parallel communication line may be interfered and an Err87 fault will alarms (synchronization signal reception failure).
- Ensure that the wiring of AC input and AC output are connected separately and uniformly connected to the combiner box or busbar. Otherwise, it will cause uneven loading of each inverter/charger in the bypass mode.
- Ensure that all circuit breakers for the battery, utility input, load side and PV are disconnected.

Step 2: Connect the circuit breakers on the battery side in sequence to turn on each inverter/charger, set the "BATT Input Mode" of each inverter/charger as "Shared" or "Independent" (decided by the actual connection), set the phase of each inverter/charger to "Single" through LCD, then restart the inverter/charger. See the example of "BATT Input Mode" and "Phase Set" on the slave unit for six inverter/chargers in single phase parallel below.

Note: The setting of "BATT Input Mode" must be consistent with the actual connection method of the battery pack.

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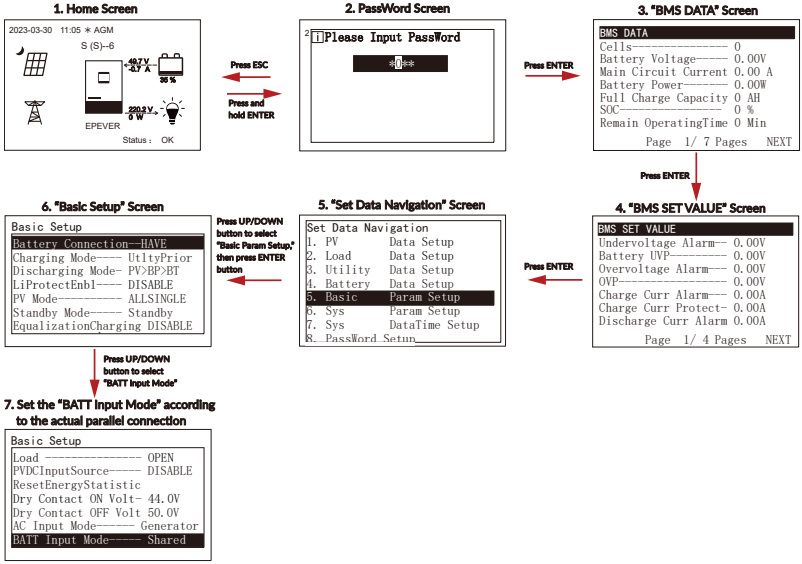
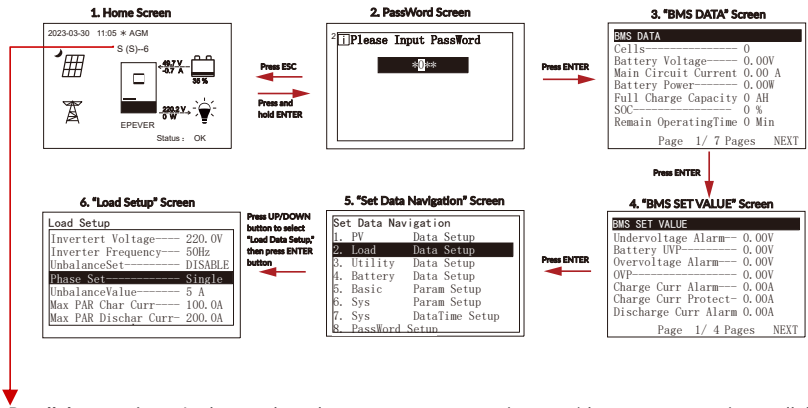
■ **Operation for "BATT Input Mode":**



■ **Operation for "Phase Set":**



Parallel status icon: It shows when there are two or more inverter/chargers connect in parallel successfully, and it will not display on the single inverter/charger.

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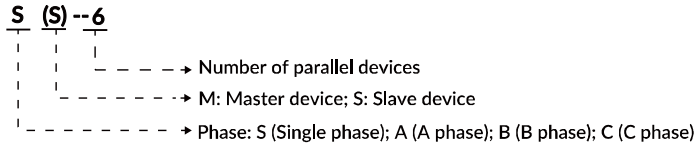
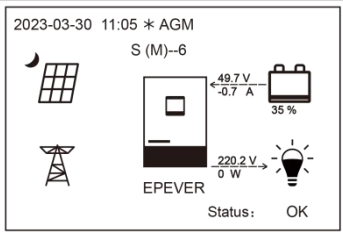
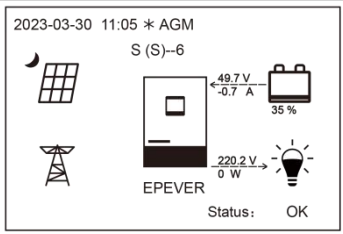


Note: The master and slave units are randomly defined.

After"BATT Input Mode" and "Phase Set" is modified, restart the inverter/charger for the setting to take effect. Follow the above flowchart to re-enter the "Basic Param Setup" and "Load Data Setup" page and check if the "BATT Input Mode" and "Phase Set" is correct. Or after powering on at least 2 parallel units, observe whether the phase setting on the screen of the set equipment is successful.

Note: Only after the phase settings of all parallel equipment are successful can the output circuit breaker can be connected.

Step 3: Turn on each inverter/charger, the parallel status icon will display. See the example of single phase parallel operation of 6 units as below. For other numbers of units in single phase parallel operation, only the "number of parallel" displays differently.

Parallel in single phase, Master unit: S (M)-6	Parallel in single phase, Slave unit: S (S)-6
	

NOTICE

- If the parallel status icon displayed on the LCD is consistent with the actual phase and startup quantity of the inverter/chargers, it indicates that the phase setting and parallel communication have been successful. If the number of parallel status icon displayed is less than the actual startup quantity, or an Err80 fault is reported, please check if there is a loose connection for the parallel communication cable and ensure two inverter/chargers are started up at least.
- If the inverter/charger displays Err82 fault (i.e., there is an unset phase in the system), please check if the phase setting is successful.

Step 4: Connect all AC breakers on the utility input, and the utility input of all inverter/chargers must be connected to the same utility. All inverter/chargers will automatically switch to utility bypass charging mode after being connected to the utility for 30 seconds (expect for

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"Solar" charging mode). If all inverter/chargers don't switch to utility bypass or utility doesn't charge after being connected to the utility for 30 seconds, please check if the GRID indicator is OFF (i.e., not connected to the utility) or the charging mode is incorrect. If the utility is not connected, or L (Live wire) and N (Neutral wire) are connected in reverse, the inverter/charger will display Err92 fault (parallel AC input source abnormal).

⚠ DANGER

When connecting the utility for bypass charging, if only the utility breaker of a certain inverter/charger is disconnect, be careful that the utility input terminals of this inverter/charger still have power.

Step 5: If there is no fault alarm, indicates the parallel system is completely installed.

Step 6: Please connect all circuit breakers on the load side, and the parallel system will start to provide power to the load.

Note: To avoid overload, ensure the entire system in running status before connecting the load circuit breakers.

NOTICE

First, connect the breaker of the battery to ensure the inverter/charger operates normally. And then connect the breakers of PV and utility. If you do not follow this operation sequence, you will be responsible for any damage to the inverter/charger.

⚠ WARNING

After the inverter/charger is powered on, the AC output is turned on by default. Before turning on the power switch of the inverter/charger, please confirm that the AC output is correctly connected to the load and there is no safety hazards present.

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4 Parallel Operation in Three Phase

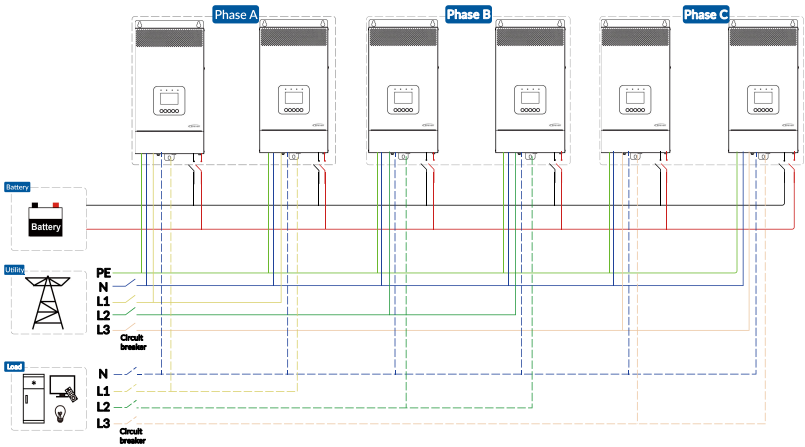
4.1 Three phase parallel wiring diagram

When paralleling in three phase(Phase A, Phase B and Phase C), the number of parallel units in each phase is arbitrarily specified by the user. The user can increase the number of parallel units in Phase A, Phase B, or Phase C according to actual needs to expand the capacity of a certain phase. For example, four inverter/chargers can be set for Phase A, one for Phase B and one for Phase C. The wiring method for increasing or decreasing the inverter/chargers in Phase A, B and C is similar.

4.1.1 Connect the battery, utility, load, and parallel communication cables

1) Two for Phase A, two for Phase B, and two for Phase C

- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

- **Connect the parallel communication cables**

Step 1: Connect the parallel communication ports on the side of each inverter/charger by the parallel communication cables.

Step 2: Connect the CAN bus terminal resistor (included accessory) to the parallel communication ports of the first and last inverter/charger.

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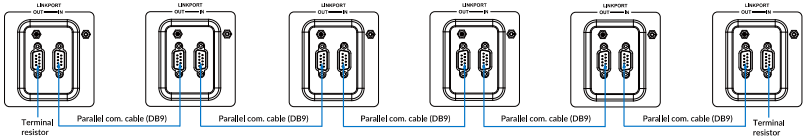
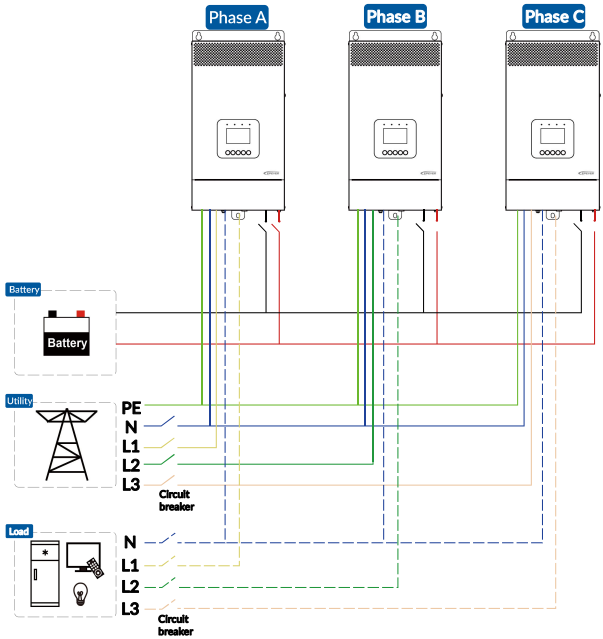


2) One for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

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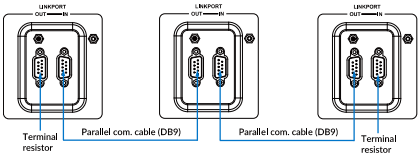
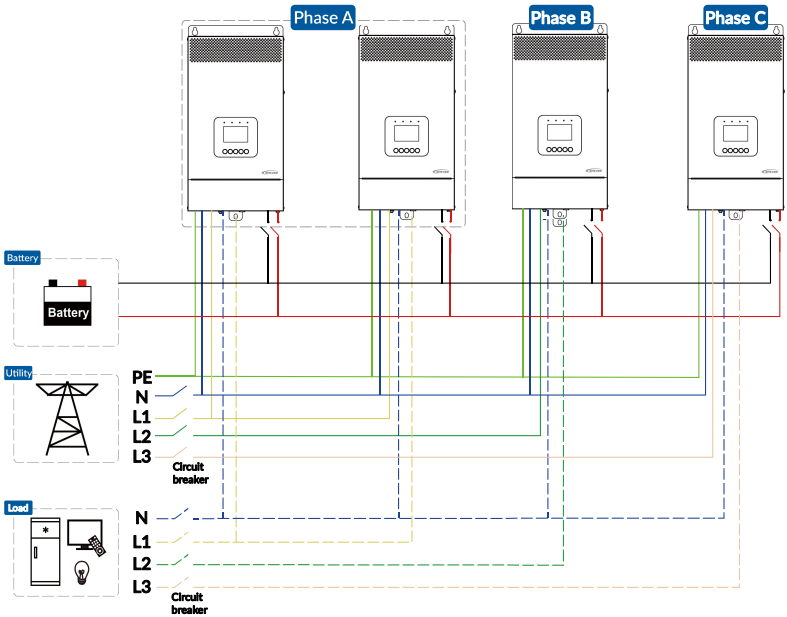
- **Connect the parallel communication cables**



3) Two for Phase A, one for Phase B, and one for Phase C

- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

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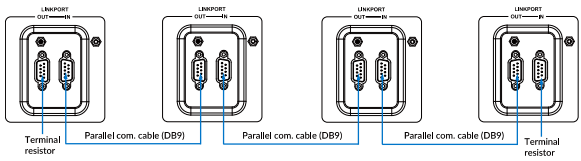
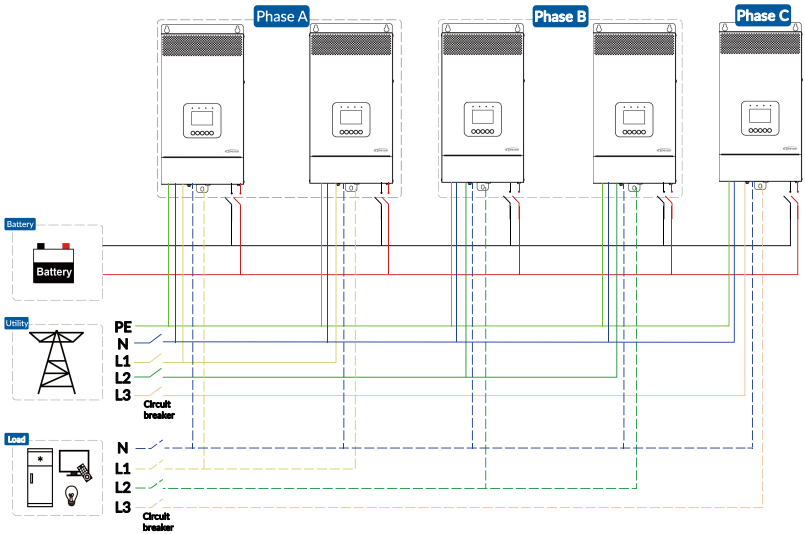
- **Connect the parallel communication cables**



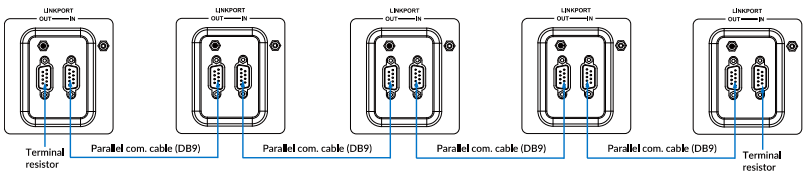
4) Two for Phase A, two for Phase B, and one for Phase C

- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

- **Connect the parallel communication cables**



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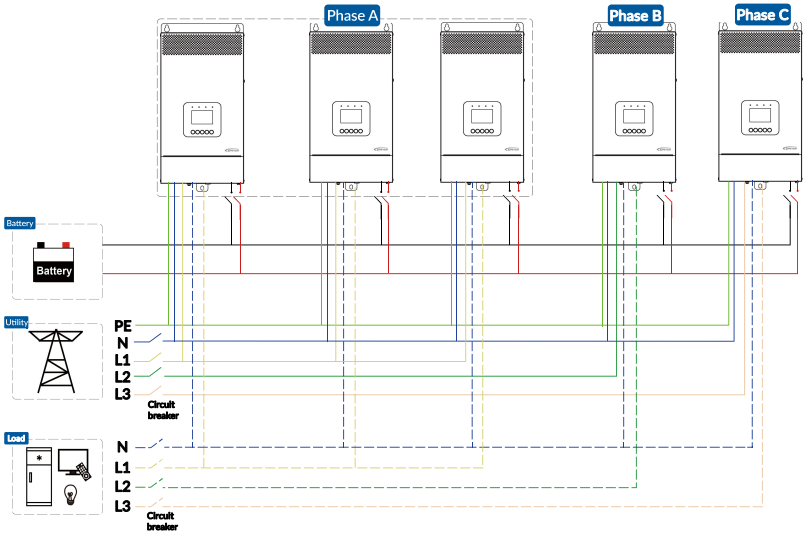
5) Three for Phase A, one for Phase B, and one for Phase C

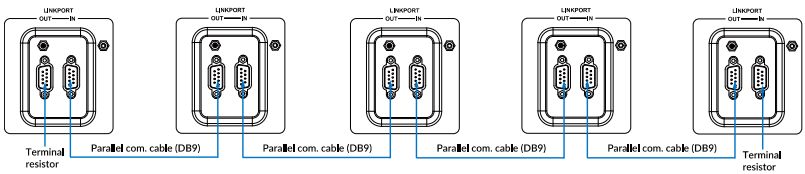
- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

Note: When the inverter/chargers are connected in parallel as shown in the above figure, it is recommended that for Phase A, connect an EPEVER "Parallel inductor" in series to the load output N wire of each inverter/charger, to improve unstable operation of the parallel system caused by unbalanced bypass output power and unbalanced charging power during parallel operation, and other issues. For the models of "Parallel inductor" corresponding to different inverter/chargers, please refer to the optional accessories.

- **Connect the parallel communication cables**



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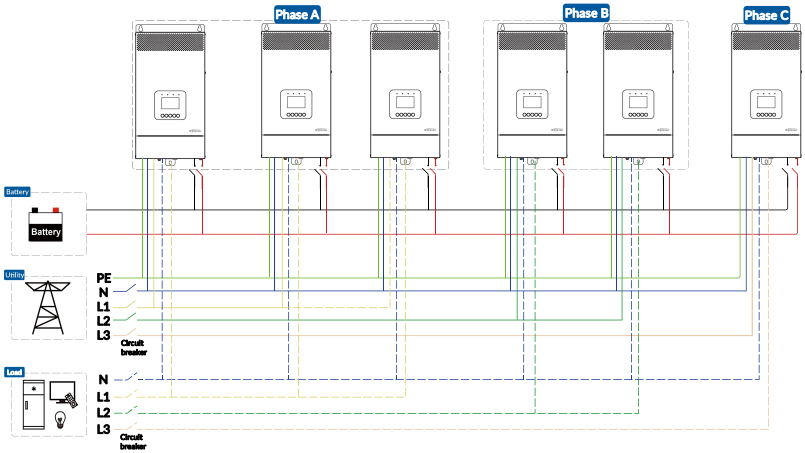
6) Three for Phase A, two for Phase B, and one for Phase C

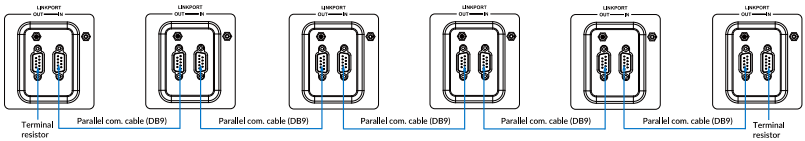
- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

Note: When the inverter/chargers are connected in parallel as shown in the above figure, it is recommended that for Phase A, connect an EPEVER "Parallel inductor" in series to the load output N wire of each inverter/charger, to improve unstable operation of the parallel system caused by unbalanced bypass output power and unbalanced charging power during parallel operation, and other issues. For the models of "Parallel inductor" corresponding to different inverter/chargers, please refer to the optional accessories.

- **Connect the parallel communication cables**



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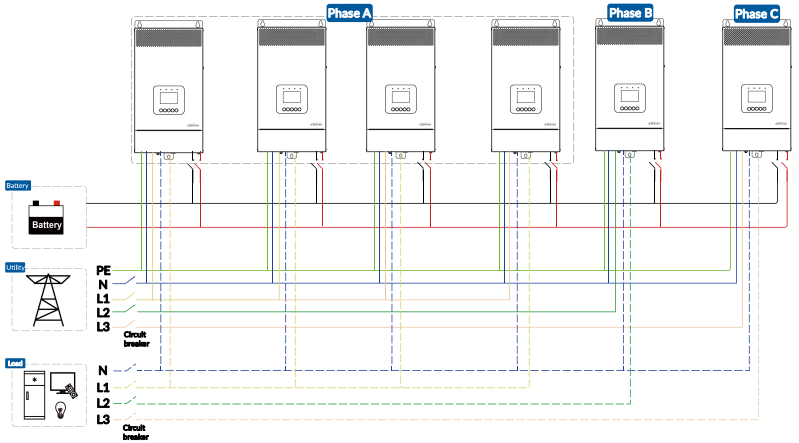
7) Four for Phase A, one for Phase B, and one for Phase C

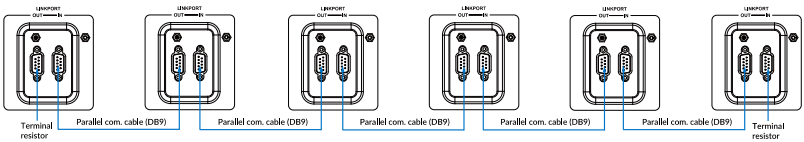
- **Connect the battery, utility and load**



Note: The figure above shows the connection method for the "BATT Input Mode > Shared" mode. The "BATT Input Mode > Independent" mode requires each inverter/charger to connect a battery pack separately.

Note: When the inverter/chargers are connected in parallel as shown in the above figure, it is recommended that for Phase A, connect an EPEVER "Parallel inductor" in series to the load output N wire of each inverter/charger, to improve unstable operation of the parallel system caused by unbalanced bypass output power and unbalanced charging power during parallel operation, and other issues. For the models of "Parallel inductor" corresponding to different inverter/chargers, please refer to the optional accessories.

- **Connect the parallel communication cables**



4.1.2 Connect the PV

PV connection in the parallel system is the same as the connection for the single inverter/charger. For PV connection in the parallel system, please refer to the user manual of the corresponding product model, which includes the PV connection of single inverter/charger.

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NOTICE

- Each inverter/charger should be connected to PV modules separately, and it is prohibited to connect the same PV modules to two or more inverter/chargers.
- In parallel installation, if the Utility and PV supply power together, a certain deviation (inequality) in the output power exists for each inverter/charger. The larger the difference between each inverter/charger's Utility charging current, the greater the deviation in output power. This is the internal loop of the inverter/charger, which will not affect the normal operation of the Utility bypass.

4.2 Debug for three phase parallel

Step 1: Double check the parallel wiring according to the following requirements before debugging:

- Ensure that the wires are connected correctly according to the wiring diagram, and do not reverse connect.
- Ensure that the strong and the weak current wiring is not crossed to prevent interference with the parallel communication line. That is, the parallel communication line does not cross with PV, battery input line and AC output line wiring, otherwise the parallel communication line may be interfered and an Err87 fault will alarms (synchronization signal reception failure).
- Ensure that the wiring of AC input and AC output are connected separately and uniformly connected to the combiner box or busbar. Otherwise, it will cause uneven loading of each inverter/charger in the bypass mode.
- Ensure that all circuit breakers for the battery, utility input, load side and PV are disconnected.

Step 2: Connect the circuit breakers on the battery side in sequence to turn on each inverter/charger, set the "BATT Input Mode" of each inverter/charger as "Shared" or "Independent" (decided by the actual connection), set the phase of each inverter/charger to "Phase A/B/C" through LCD, then restart the inverter/charger. See the example of screen display on the slave unit for two inverter/chargers below.

Note: The setting of "BATT Input Mode" must be consistent with the actual connection method of the battery pack.

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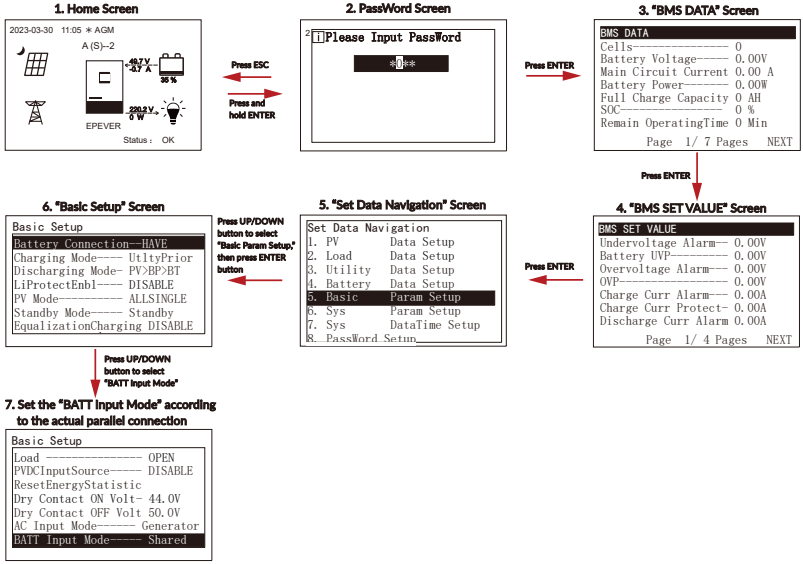
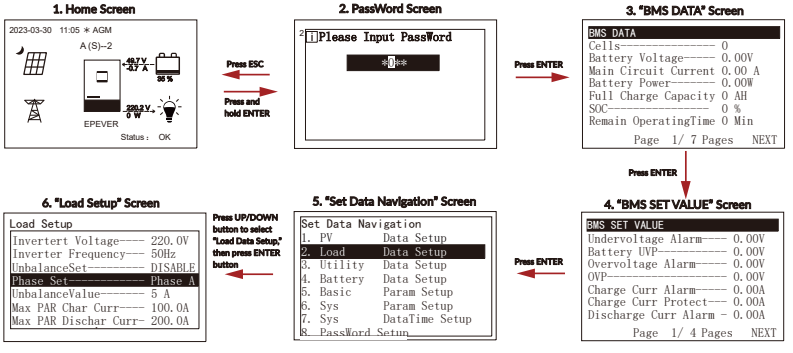
■ **Operation for "BATT Input Mode":**



■ **Operation for "Phase Set":**

◆ **Parallel parameters setting for Phase A**

After three phase wiring is completed, the "Phase Set" of each inverter/charger in Phase A needs to be changed to "Phase A". See the example of screen display on the slave unit for two inverter/chargers in Phase A below.



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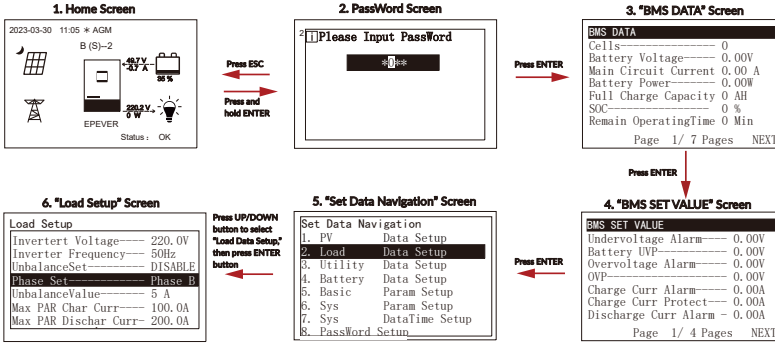
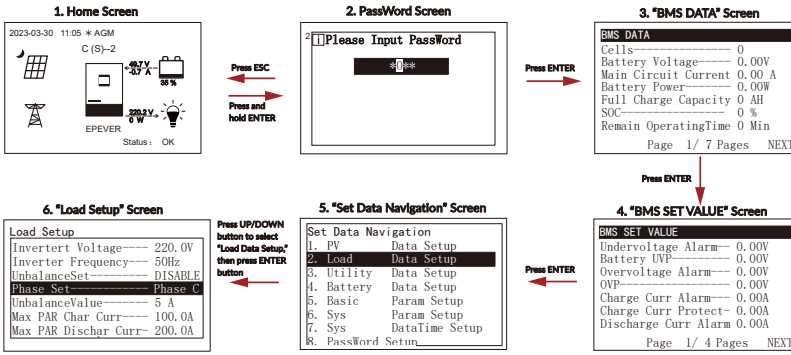
◆ **Parallel parameters setting for Phase B**

After three phase wiring is completed, the "Phase Set" of each inverter/charger in Phase B needs to be changed to "Phase B". See the example of screen display on the slave unit for two inverter/chargers in Phase B below.



◆ **Parallel parameters setting for Phase C**

After three phase wiring is completed, the "Phase Set" of each inverter/charger in Phase C needs to be changed to "Phase C". See the example of screen display on the slave unit for two inverter/chargers in Phase C below.



After "BATT Input Mode" and "Phase Set" is modified, restart the inverter/charger for the setting to take effect. Follow the above flowchart to re-enter the "Basic Param Setup" and "Load Data Setup" page and check if the "BATT Input Mode" and "Phase Set" is correct. Or after powering on at least 2 parallel units, observe whether the phase setting on the screen of the set equipment is successful.

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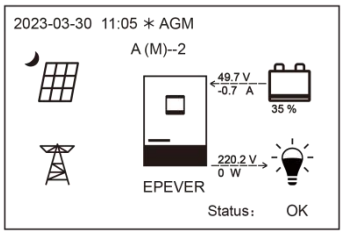
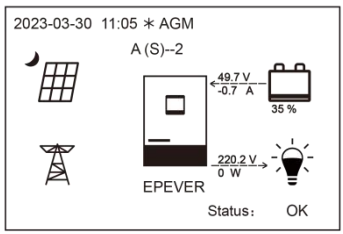
Note: Only after the phase settings of all parallel equipment are successful can the output circuit breaker can be connected.

Step 3: Turn on each inverter/charger, the parallel status icon will display. See the example of three phase parallel operation of 6 units as below (2 units each in Phase A, B and C). For other numbers of units in three phase parallel operation, only the "number of parallel" displays differently.

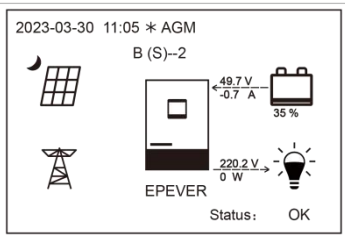
Master unit in Phase A: A (M)-2



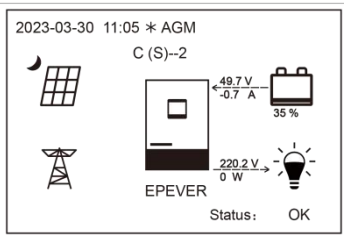
Slave unit in Phase A: A (S)-2



Slave unit in Phase B: B (S)-2



Slave unit in Phase C: C (S)-2



- When parallel operation in three phase, Master unit(M) only displays on the screen of one of the inverter/chargers in Phase A. The inverter/chargers in Phase B or C will not display Master(M), but only display Slave(S).
- If the LCD doesn't display parallel status icon after startup, please check if the parallel wiring of each inverter/charger is correct, if there is any loose connection, and make sure at least 2 units are turned on and online, only then parallel status icon will be displayed.
- After the inverter/chargers are turned on, the load circuit breaker can only be connected after ensuring the phases are set correctly through the home screen or parameters "Phase Set".
- When the inverter/chargers are installed in three phase, and connect the utility input to Phase A, B and C, make sure the phase connection is the same as the setting in "Phase Set". Or when "Phase Set" of the inverter/charger is set as "Phase A/B/C", the utility

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input can be connected according to the line sequence of A/B/C, B/C/A and C/A/B.

- If the parallel status icon displayed on the LCD is consistent with the actual phase and startup quantity of the inverter/chargers, it indicates that the phase setting and parallel communication have been successful.
- If the number of parallel status icon displayed is less than the actual startup quantity, or an Err80 fault is reported, please check if there is a loose connection for the parallel communication cable and ensure two inverter/chargers are started up at least.
- If the inverter/charger displays Err82 fault (i.e., there is an unset phase in the system), please check if the phase setting is successful.

Step 4: Connect all AC breakers on the utility input side of all inverter/chargers, and the utility input of all inverter/chargers must be connected to the same three-phase utility. And the input three-phase utility should match the phase setting of the inverter/chargers, so that the inverter/chargers can work normally. All inverter/chargers will automatically switch to utility bypass charging mode after being connected to the utility for 30 seconds (expect for "**Solar**" charging mode). If all inverter/chargers don't switch to utility bypass or utility doesn't charge after being connected to the utility for 30 seconds, please check if the GRID indicator is OFF (i.e., not connected to the utility) or the charging mode is incorrect. If the utility is not connected, or Phase A/B/C are connected in reverse, or N(Neutral wire) are connected in reverse, the inverter/charger will report an Err92 fault (parallel AC input source abnormal), then just adjust the correct wiring sequence. When "Phase Set" of the inverter/charger is set as "Phase A/B/C", the utility input can be connected according to the line sequence of A/B/C, B/C/A and C/A/B.

⚠ DANGER

When connecting the utility for bypass charging, if only the utility breaker of a certain inverter/charger is disconnect, be careful that the utility input terminals of this inverter/charger still have power.

Step 5: If there is no fault alarm, indicates the three phase parallel system is completely installed.

Step 6: Please connect all circuit breakers on the load side, and the parallel system will start to provide power to the load.

Note: To avoid overload, ensure the entire system in running status before connecting the load circuit breakers.

NOTICE

First, connect the breaker of the battery to ensure the inverter/charger operates normally. And then connect the breakers of PV and utility. If you do not follow this operation sequence, you will be responsible for any damage to the inverter/charger.

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⚠ WARNING

After the inverter/charger is powered on, the AC output is turned on by default. Before turning on the power switch of the inverter/charger, please confirm that the AC output is correctly connected to the load and there is no safety hazards present.

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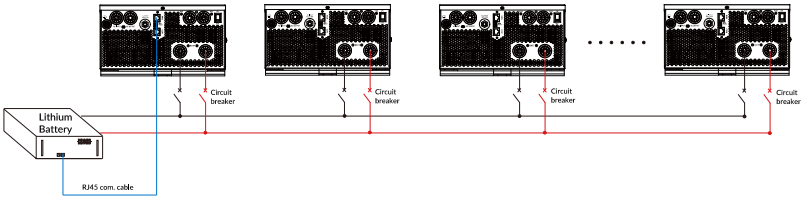
5 BMS Connection

5.1 BMS wiring diagram for parallel

- **Set the "BATT Input Mode" as "Shared"**

In either single phase application or three phase application, if the "BATT Input Mode" is selected as "Shared," the lithium battery can be connected to any inverter/charger through BMS communication cable(RJ45 cable). However, all parallel devices must be connected to the same lithium battery pack. Wiring diagram is as below:



- **Set the "BATT Input Mode" as "Independent"**

If the "BATT Input Mode" is selected as "Independent," connect each lithium battery to the corresponding inverter/charger through the BMS communication cable(RJ45 cable). The lithium battery, BMS communication cable, and inverter/charger must be corresponding.

Note: The "BATT Input Mode > Shared" mode and the "BATT Input Mode > Independent" mode cannot be used at the same time in the same parallel system.

5.2 BMS parameter setting for parallel

- **Set battery type**

When charging and discharging the battery by BMS, it is necessary to select the correct battery type through the LCD according to the actual battery used. Operation steps are as follows:

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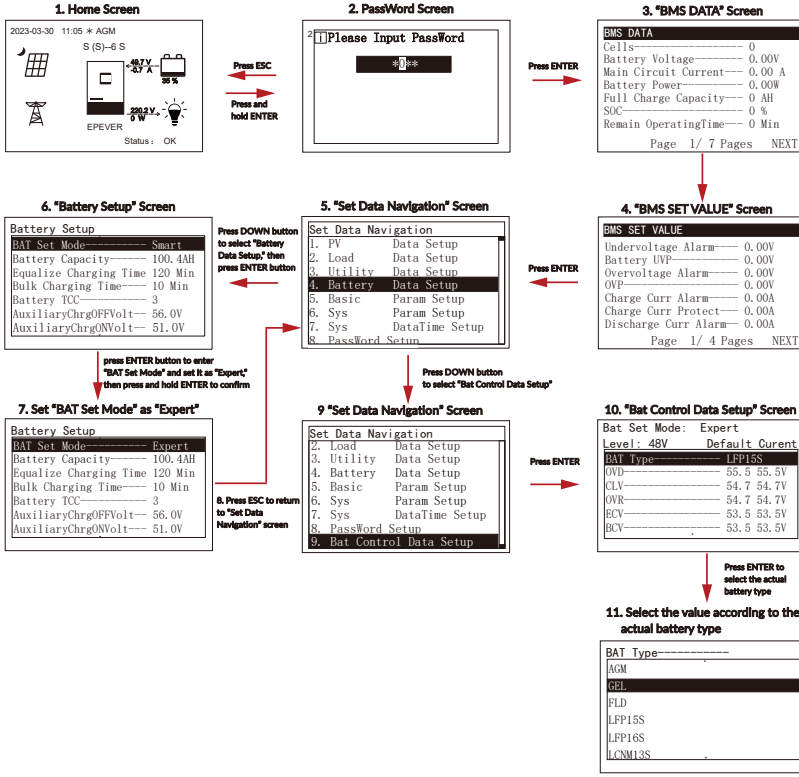

- **Set parameters of "Charge Control Mode, BMS Valid/Invalid, BMS voltage control enable, BMS current control select"**

Connect the battery and the inverter/charger successfully. If the "BATT Input Mode" is selected as "Shared," carry out BMS parameters setting on the LCD of the inverter/charger that connected with the battery. To set "ChargeControlMode" as "SOC," set "BMS Valid/Invalid" as "VALID," set "BMSVltCntrlEnable" as "ENABLE," and set "BMSCurent Select" according to the actual battery type (refer to "Battery work modes" in the user manual for single inverter/charger). The BMS parameters of other inverter/charger need to be kept in the factory default state to avoid affecting the normal operation. If the "BATT Input Mode" is selected as "Independent," the BMS parameters of each inverter/charger need to be set separately. Operation is shown as below:

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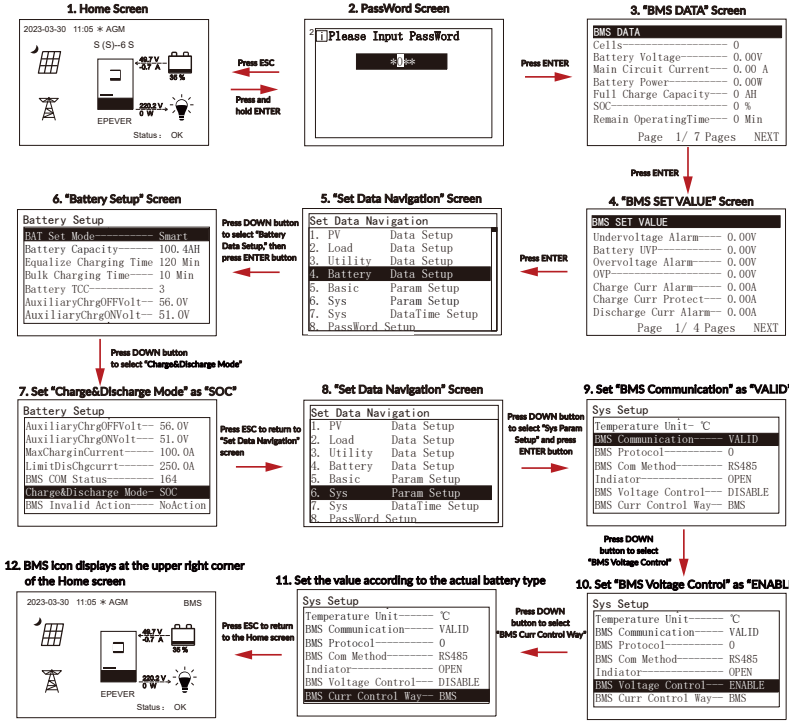

During the parallel operation process, for inverter/chargers that are not connected to the BMS communication cable, the "BMS Valid/Invalid" needs to be set to "INVALID." Otherwise, the inverter/chargers will display Err74 fault (BMS communication error).

- **Set BMS protocol**

Step 1: Based on the manufacturer information of the lithium battery connected to the inverter/charger, determine the lithium battery conversion communication protocol number PRO (Go to EPEVER website and download the **"BMS Communication Protocols & Fixed ID"** file to obtain the corresponding PRO numbers for different lithium battery manufacturers).

Step 2: According to the above operation flowchart 1 to 9, enter the "Sys Param Setup" page and set the "BMS Protocol" to the value consist with the PRO number.

Step 3: After setting the BMS parameters, return to the home screen, where the word "BMS" is displayed in the upper right corner, indicating the BMS connection is successful.

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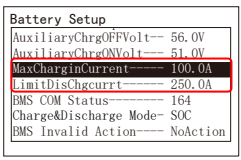
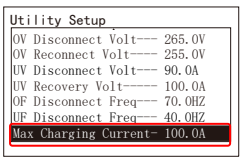
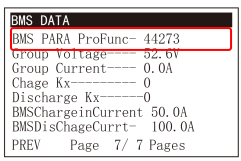
5.3 BMS control logic for charging and discharging

In either single phase application or three phase application, after the BMS is correctly connected and BMS parameters are set correctly, the system will follow the following logic to control the charging and discharging of lithium battery.

- **Description of relevant parameters**

The BMS control logic for charging and discharging involves the following parameters. Please first enter the corresponding interface to view the values of each parameter.

Parameter	Interface	Description
MaxChargingCurrent LimitDisChgCurrt		Enter the "4. Battery Setup" screen, click the "UP/DOWN" button to view the parameter. This parameter value supports modification, and the setting range refers to the user manual of the corresponding product model, and the introduction to "parameter list."
Max Charging Current		Enter the "3. Utility Setup" screen, click the "UP/DOWN" button to view the parameter. This parameter value supports modification, and the setting range refers to the user manual of the corresponding product model, and the introduction to "parameter list."
BMS PARA ProFunc		Enter the "BMS DATA" screen, click the "UP/DOWN" button to view the parameter. This parameter value is read from BMS automatically. When connecting to a single battery pack, it shows 0. When multiple battery packs are connected in parallel, it shows 44273.

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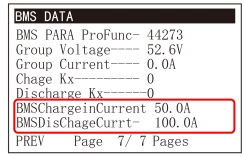
BMSCharginCurrent BMSDisChageCurrt		Enter the “BMS DATA” screen, click the "UP/DOWN" button to view the parameter. No matter a single battery pack is used or multiple battery packs in parallel are used, the “Charge current Limit” of each parallel unit = “BMSCharginCurrent” divides number of parallel units online. And the “Discharge current Limit” of each parallel unit = “BMSDisChageCurrt” divides number of parallel units online.

- **Control Logic for battery pack**

Scenario		Control Logic
Charging	PV and utility are available Only PV is available	Charge the battery according to the smaller value of “BMSCharginCurrent” divides number of parallel units online, and “MaxCharginCurrent”
	Only utility is available	Charge the battery according to the smallest value of “BMSCharginCurrent” divides number of parallel units online, “MaxCharginCurrent,” and “MaxCharge Current”
Discharging	---	Once the actual battery discharge current exceeds the “BMSDisChageCurrt” divides number of parallel units online, or “LimitDisChgCurrt,” the inverter/charger immediately turns off the output, LCD will display battery over-current error (Err37) . And then, the inverter/charger will restart after 30 seconds protection. Then the inverter/charger continues to perform the above operations repeatedly.

If the parameters read from the BMS include the BMSCharginCurrent and BMSDisChageCurrt (viewed through the "BMS DATA" screen), set the MaxCharginCurrent, LimitDisChgCurrt (set through the "Battery Data Setup" screen), and the MaxCharge Current (set through the "Utility Data Setup" screen) according to the above "Control Logic for battery pack", to avoid damage to the battery caused by unsuitable battery charging and discharging current when communication fails.

If the parameters read from the BMS do not include the BMSCharginCurrent and

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BMSDisChageCurrt (viewed through the "BMS DATA" screen), set related parameters according to the “Battery work modes” in the user manual for single inverter/charger.

5.4 Parameters Sync Update Item

- **Set the "BATT Input Mode" as "Shared"**

If the "BATT Input Mode" is selected as "Shared," the parameters (listed in the following table) of all slave inverter/chargers will be automatically synchronized to the host units after normal communication. The following parameters will be automatically updated after normal operation on the LCD of any inverter/charger.

Note: The parameter definitions and setting ranges that can be synchronized are explained in the corresponding product manual.

LCD Interface	When the following parameters are set on any inverter/charger, it will be automatically synchronized to all the other inverter/chargers.	
Home Screen	Battery Voltage (Lithium battery with BMS communication) Battery Current (Lithium battery with BMS communication) SOC (Lithium battery with BMS communication)	
Load Data Setup	Inverter Voltage UnbalanceSet UnbalanceValue	Inverter Frequency (**Note:** After setting this parameter, it will only take effect after restarting all the equipment.)
Utility Data Setup	OV Disconnect Volt OV Reconnect Volt UV Disconnect Volt UV Recovery Volt	OF Disconnect Freq UF Disconnect Freq Max Charging Current
Battery Data Setup	Battery Capacity Equalize Charge Time Bulk Charging Time Battery TCC AuxiliaryChrgOFFVolt AuxiliaryChrgONVolt MaxCharginCurrent LimitDisChgCurrt	Low Battery Alarm Discharging Recovery Discharge Protection AuxiliaryChargingON AuxiliaryChargingOFF LimitChgTemp LimitDisChgTem OTP

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	FullChargeProtection Full Charge Recovery	OTP Recovery Charge&Discharge Mode
Bat Control Data Setup	Battery Type OV Disconnect Volt Charging Limit Volt OV Recovery Volt Equalization Volt Bulk Charging Volt Float Charging Volt	 Bulk Recovery Volt LV Recovery Volt UV AlarmRecoveryVolt UV Alarm Voltage LV Disconnect Volt
Basic Param Setup	Charging Mode, Discharging Mode, Lithium Battery Protection, PV Mode, Standby Mode, Equalize Charge, Load, Battery Connection Method; LowConsumption (AC) and LowConsumption Detection Time (The two options are only applicable to the UC-P20/UCP-P20/KR-P20/KRP-P20 series)	

- **Set the "BATT Input Mode" as "Independent"**

If the "BATT Input Mode" is selected as "Independent," the parameters (listed in the following table) of all slave inverter/chargers will be automatically synchronized to the host units after normal communication. The following parameters will be automatically updated after normal operation on the LCD of any inverter/charger.

Note: Some of the battery-related settings parameters will not be synchronized. The parameter definitions and setting ranges that can be synchronized are explained in the corresponding product manual.

LCD interface	**When the following parameters are set on any inverter/charger, it will be automatically synchronized to all the other inverter/chargers.**	
Load Data Setup	UnbalanceSet UnbalanceValue Inverter Voltage Inverter Frequency (**Note:** After setting the parameter, it will only take effect after restarting all the inverter/chargers.)	
Utility Data Setup	OV Disconnect Volt OV Reconnect Volt UV Disconnect Volt	OF Disconnect Freq UF Disconnect Freq

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	UV Recovery Volt	
Basic Param Setup	Charging Mode, Discharging Mode, PV Mode, Battery Connection Method; LowConsumption (AC) and LowConsumption Detection Time (The two options are only applicable to the UC-P20/UCP-P20/KR-P20/KRP-P20 series)	

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6 Parallel Troubleshooting

After the inverter/charger is powered on, the meter displays the boot screen all the time (unable to enter the home screen) and the red "RUN" indicator flashes. It means the communication with the inverter/charger is error. When the above fault occurs, check whether the communication cable is disconnected. If not, don't hesitate to contact our after-sales engineer.

Error code[1]	Fault/Status	Indicator	Buzzer[2]	Solution
Err80	CAN communication failure	--	Intermittent beeps	Check if the parallel communication connection wire and terminal resistance are loose, and ensure that the parallel communication connection wires between each inverter/charger are securely connected.
Err82	Phase abnormal	--		Please check according to the following to ensure the uniformity of the phase settings of the inverter/chargers in the parallel system: 1. Is there an inverter/charger with Phase Set as "Phase A/B/C" in single phase parallel system. 2. Is there an inverter/charger with Phase Set as "Single" in three phase parallel system. 3. Only Phase A or B or C, or Phase A and B, or Phase B and C, or Phase A and C are set in three phase parallel system. 4. During the operation of three phase parallel system, one phase is suddenly missing.
Err83	Current unbalance in three phase	--		After setting the "UnbalanceSet" to "ENABLE" in three phase parallel system, the difference in output current between any two phases exceeds the set value of "UnbalanceValue." It is necessary

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				to ensure that the difference in output current between any two phases does not exceed the set value of “UnbalanceValue,” or to increase the value of “UnbalanceValue,” or to turn off unbalance protection (i.e., set the “UnbalanceSet” to “DISABLE”).
Err84	Load relay adhesion	--		The contact of AC output relay adheres, and the inverter/chargers need to be restarted.
Err86	CAN ID abnormal	--		Please contact technical support.
Err87	Fail to receive sync signal	--	Intermittent beeps	Check if the parallel connection cable is loose, and ensure that the parallel cables between all inverter/chargers are securely connected. Or only phase B/C, phase B, or phase C is enabled in the three-phase system, and ensure that phase A, phase B, and C are online at the same time.
Err92	AC input abnormal	GRID red solid ON		In parallel system, there are situations where the inverter/charger is not connected to the utility, or utility is not connected correctly, adjust the wire connection in correct sequence. 1. In single phase system, utility is not connected to the input terminals L(Live Line), and N(Neutral Line) in reverse. 2. In three phase system, utility input A, B and C line sequence is incorrect. When the inverter/charger’s “Phase Set” is set as “Phase A/B/C”, the utility input can be connected according to the line sequence of A/B/C,

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				B/C/A and C/A/B.
Err93	Inconsistent product models	--		Check if there are equipment with inconsistent product models in the system, and ensure the consistency of all equipment in the system.
Err94	Number of parallel exceeds the limit	--		Check if the number of parallel units in single phase or three phase system exceeds 12 units.
Err95	Current sharing abnormal	--		Check if the outputs of parallel units in the system are correctly connected together. Ensure that the output breakers of the parallel units are all connected.

(1) The fault/status code is displayed in the "Status" column at the bottom right corner of the LCD. When multiple faults occur simultaneously, the LCD only displays the fault code with the smallest value.

(2) Set the "BuzzerAlert" as "ON", the buzzer will sound when a fault occurs. After the fault is eliminated, the buzzer will automatically mute. If the "BuzzerAlert" is set as "OFF", even if a fault occurs, the buzzer will not sound.

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HUIZHOU EPEVER TECHNOLOGY CO., LTD.

+86 - 752-3889706

info@epever.com

www.epever.com