

Parallel Kit Installation Guide For Galleon(pro) 3-3

V. 4.0

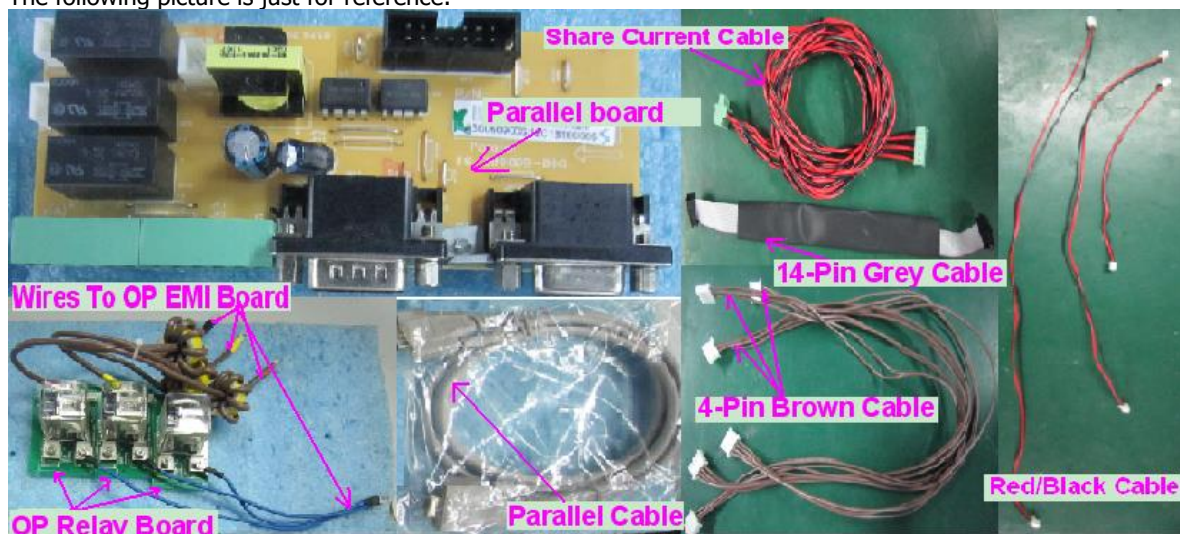
1. Package Inside

In parallel kit, you will find the following items in the package:

- 1 PCS of parallel board
- 1 PCS of parallel cable
- 3 PCS OP relay board
- 1 PCS of share current cable
- 3 PCS of 2-pin red/black cables, 3 PCS of 4-pin brown cables and 1 PCS of 14-pin grey cable
- 3 PCS of brown wires (each with a yellow & white core) and 1 PCS of blue wire
- Long screw and short screw for assembly
- CNTL board and COMMU board (optional)

Note: The specs of relay board, wire, and cable are different for 10K, 10k (L), 20K, 20K (L) 30K, 30K(L) model. Please DO NOT mix them.

The following picture is just for reference:



2. Installation

Warning: (For standard model)

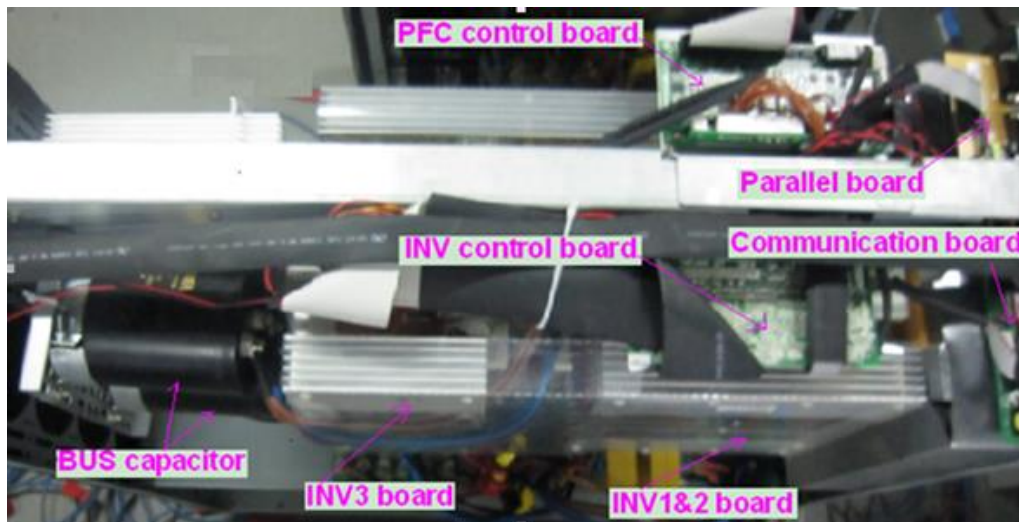
- Make sure the UPS is not turned on before installation. The UPS should not be turned on during installation.
- Cut off all the power supply to the unit before installation.

Warning: (For long-run model)

- Make sure a DC breaker or other protection device between UPS and external battery pack is installed. If not, please install it carefully. Switch off the battery breaker before installation.
- Cut off all the power supply to the unit before installation.

2.1 Uncover the UPS

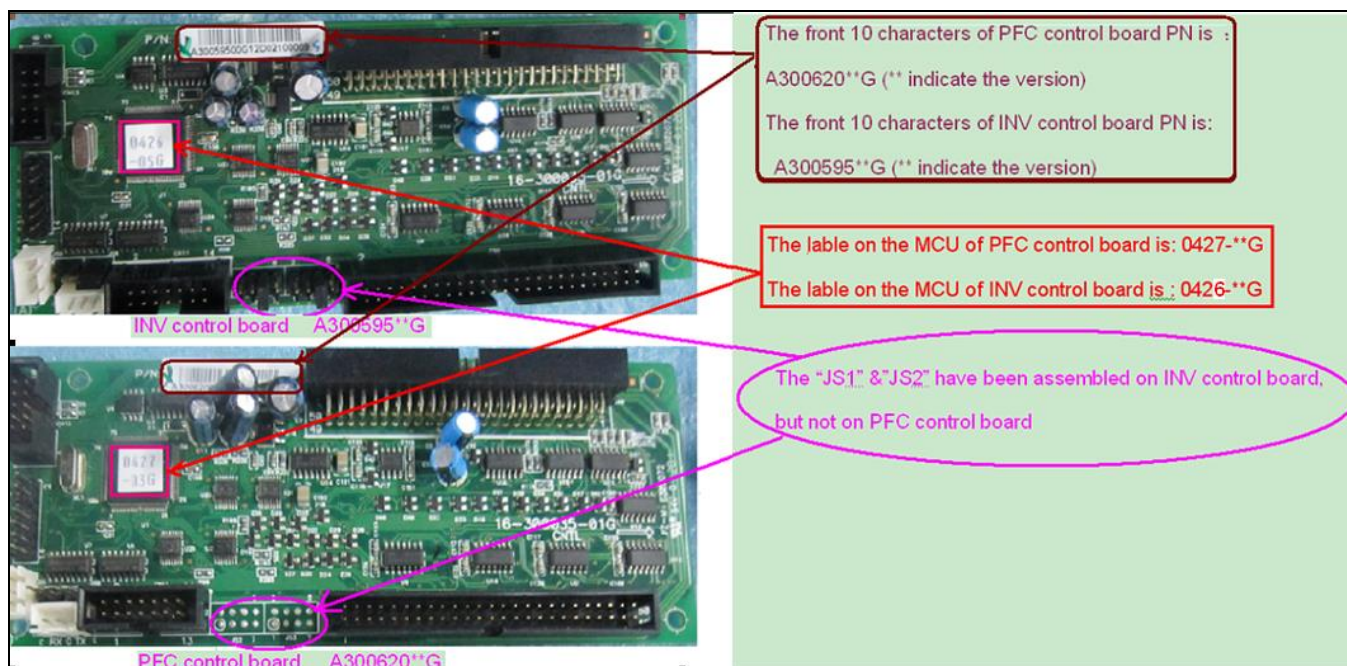
Uncover the UPS that intend to be paralleled by demounting all screws, and the following picture is used to show the PCBA boards location in the UPS:



2.2 Replace the CNTL board and COMMUNICATION board

Please ignore this step, if the the units you have bought were suitable for parallel function already.

For Gallon 3-3 UPS (10K, 15K, 20K, 30K), there are 2 control boards, one for PFC control , and the other for INV control, the following picture showing the different between these two boards, the part number (The beginning 10 number of the series number) and firmware label (Label on the MCU) in the picture just for reference, different version UPS may have different control board, the part number and firmware label may different with the picture showing:



Make sure the UPSs that you want to parallel have the same part number, if different please sent the par number to us for verifying.

In case you need to replace the control board, please following steps below:

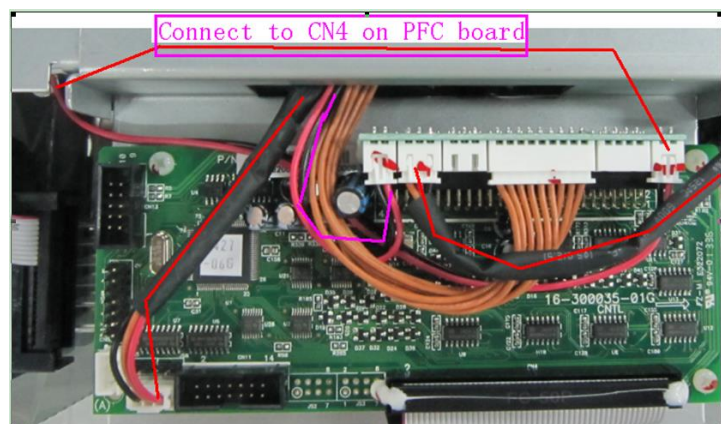
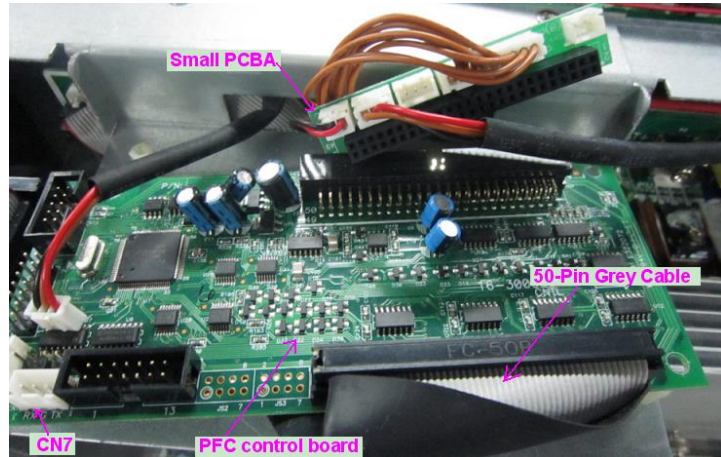
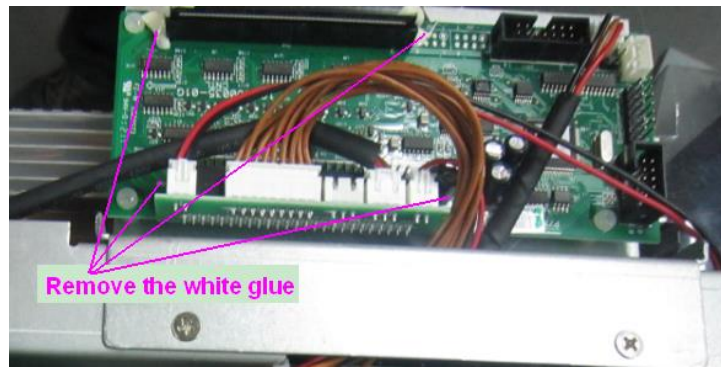
Step 1: Replace PFC control board:

Remove the white glue.

Disconnect the 3-pin cable from CN7 of the PFC control board, demount the small PCBA board.

Demount the 3 white screws, disconnect the 50-pin cable.

Replace the PFC control board with a new one. It is better assemble the small PCBA first, then assemble the new PFC control board by install the 3 screws, and then connect the 3-pin cables and 50-pin cables.

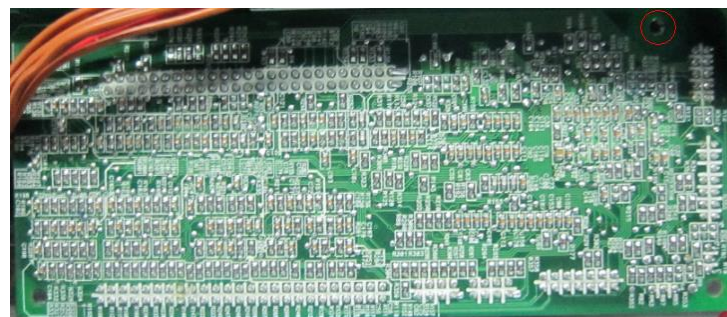
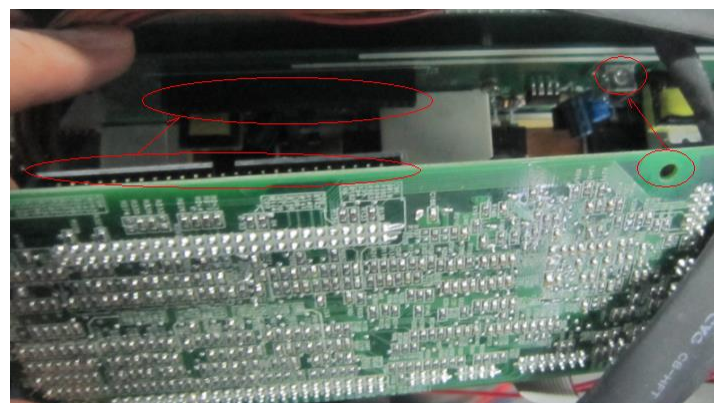
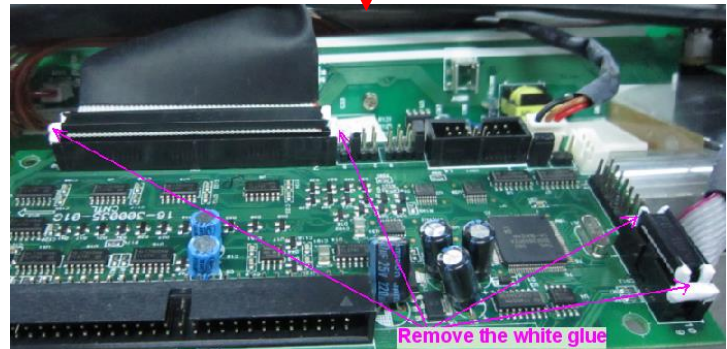
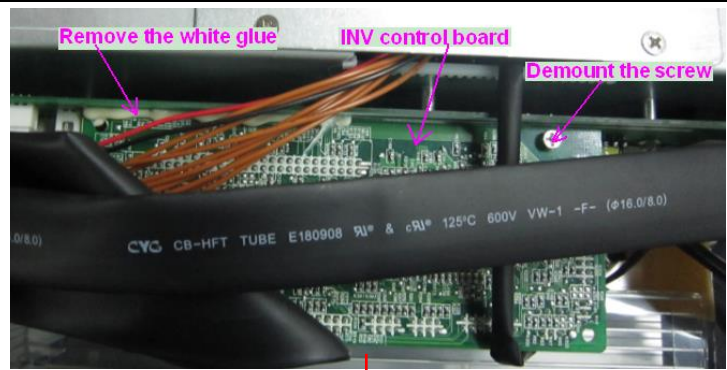


Step 2: Replace the INV control board:

Remove the white glue, demount the screw. Then pull the INV control board.

Flipping over the INV control board, you can see the glue on the connectors, remove the glue, then disconnect all the cables.

Replace the INV control board with a new one, assemble the new board back to the INV1&2 board.

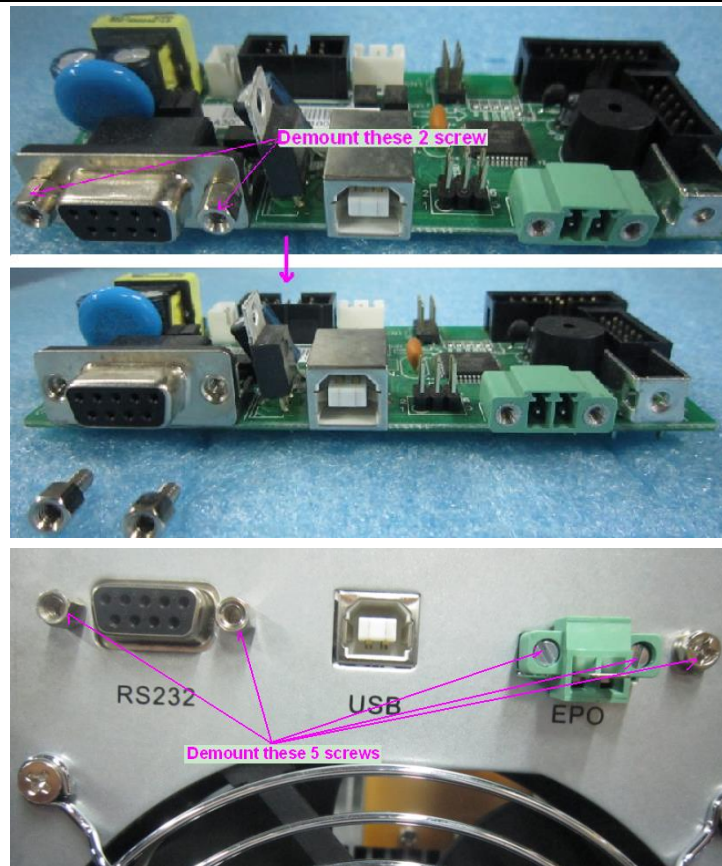


Step 3: Replace the communication board:

Take a new communication board, demount the 2 screws of the DB-15 port.

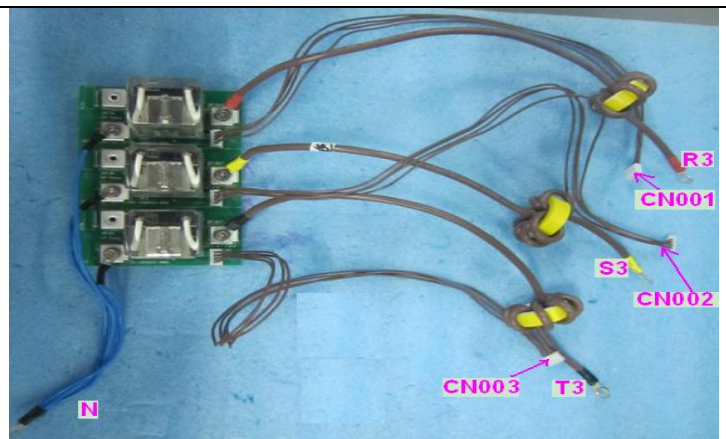
Disconnect the cables on the communication board, and demount the screws that used to fasten the communication board to the rear panel.

Replace the board with a new one, connect the cables, install the screws.

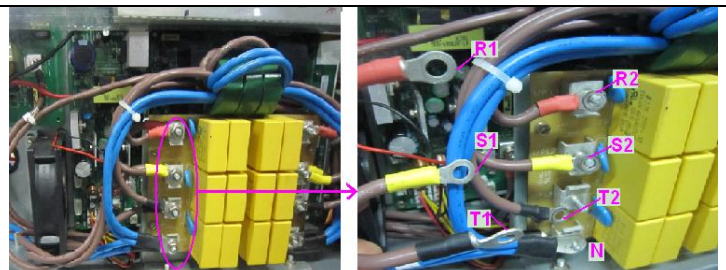


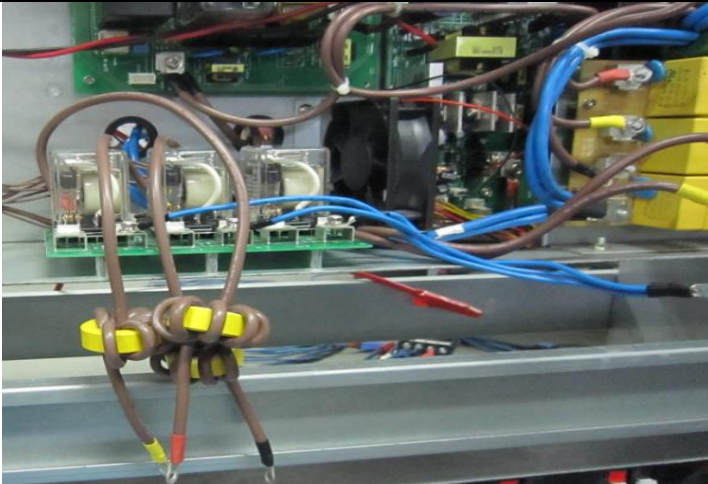
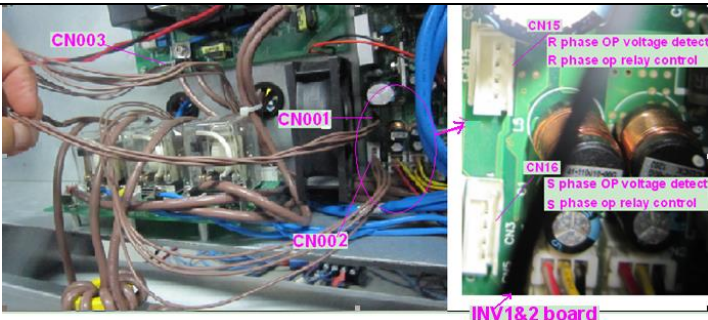
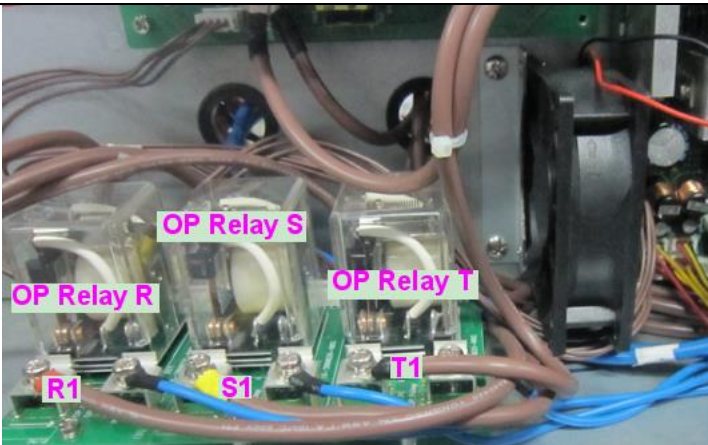
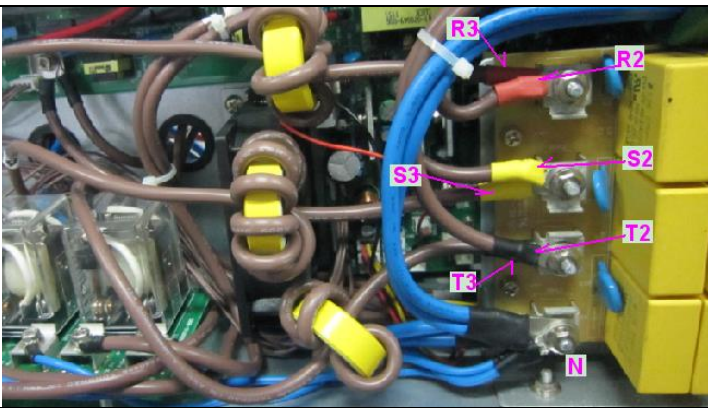
2.3 Parallel kit installation

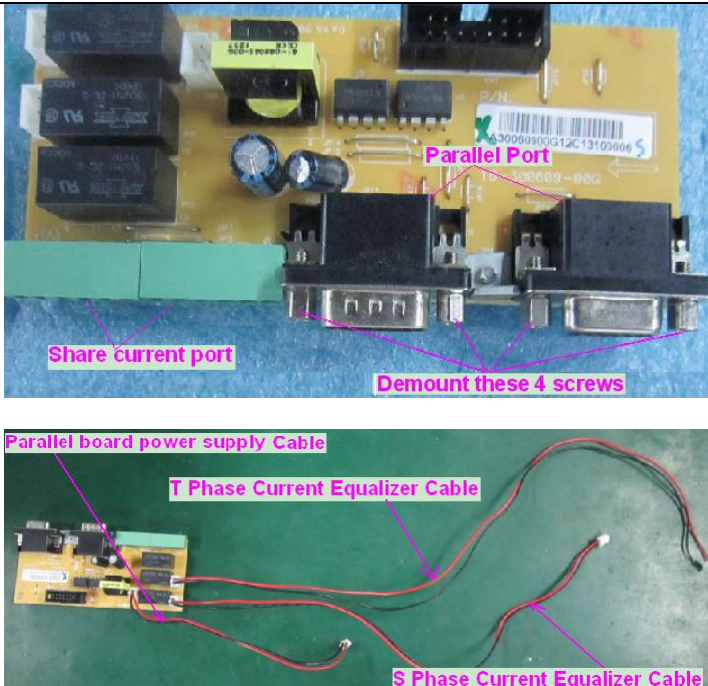
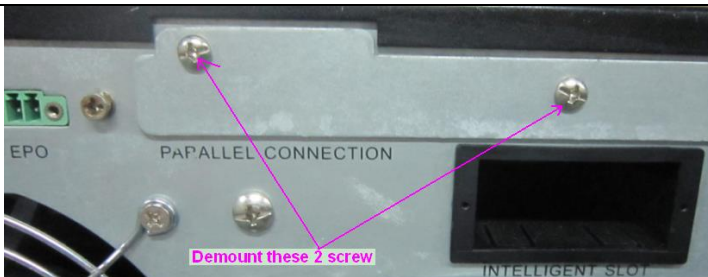
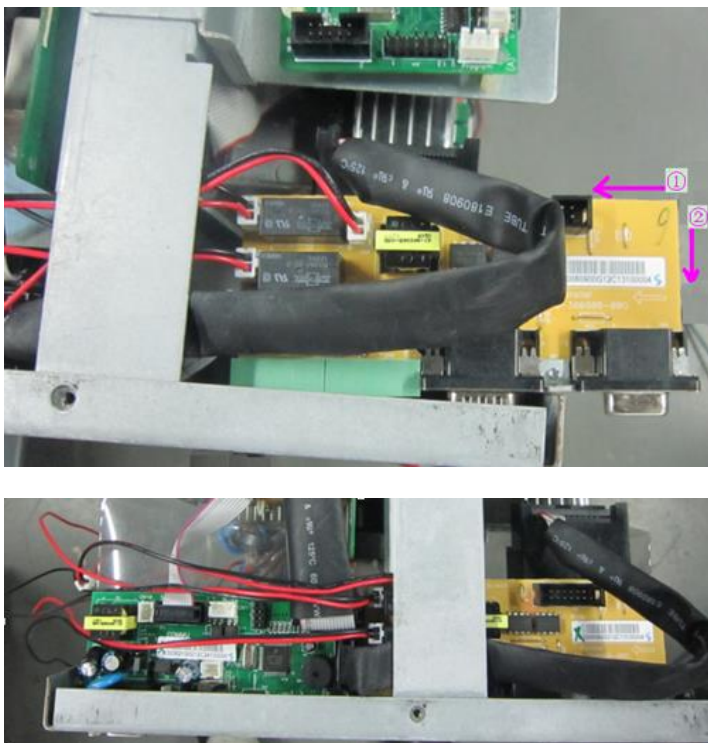
Step 1: Assemble the wires to the OP relay board.


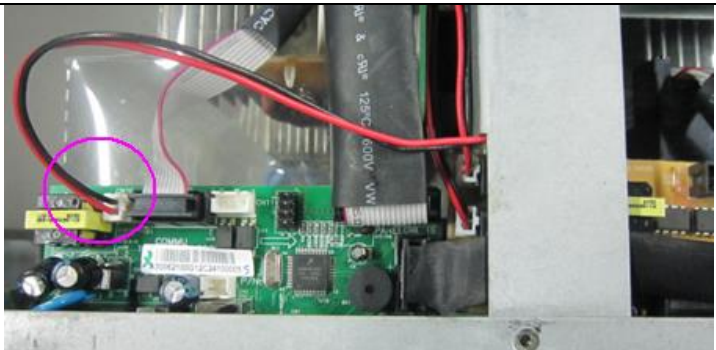
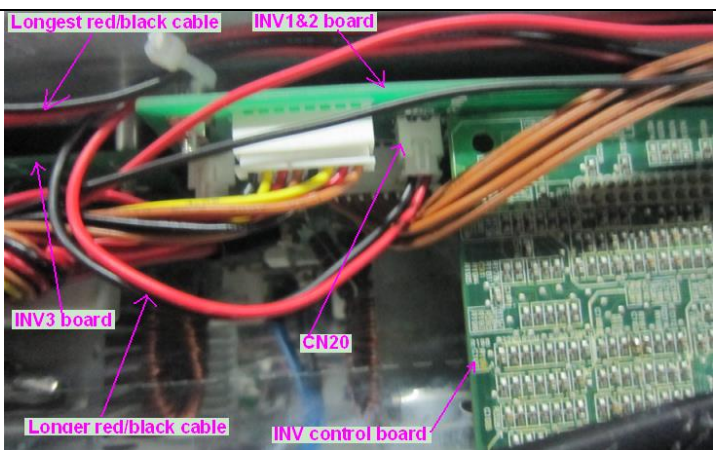
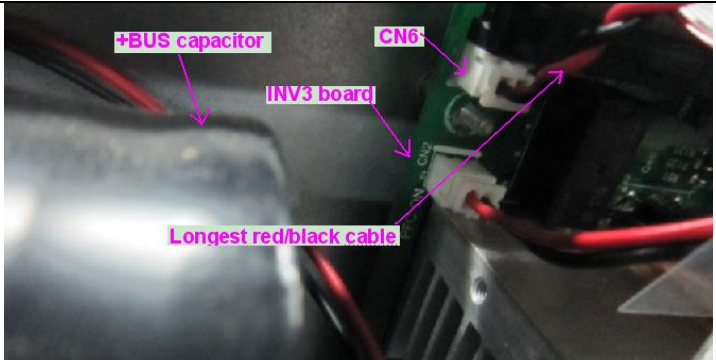


Step 2: Demount the 3 wires from the O/P EMI board.



<p>Step 3: Assemble the OP relay boards to the location left of the OP EMI board.</p>	
<p>Step 4: Connect the OP relay control and OP voltage detect cables (4-pin brown cable): Connect CN001 to CN15 of INV1&2 board. Connect CN002 to CN16 of INV1&2 board. Connect CN003 to CN15 of INV3 board.</p>	
<p>Step 5: Connect the wires that demounted from the OP EMI board by "step2":</p> <p>Connect R1 to P1 of OP relay board R</p> <p>Connect S1 to P1 of OP relay board S</p> <p>Connect T1 to P1 of OP relay board T</p>	
<p>Step 6: Connect the wires that with yellow & white core to the OP EMI board:</p>	

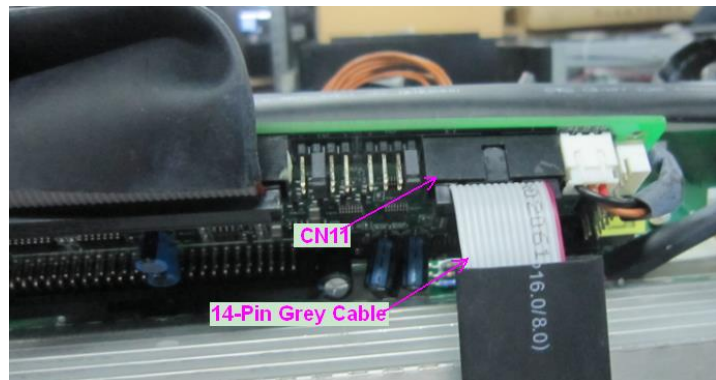
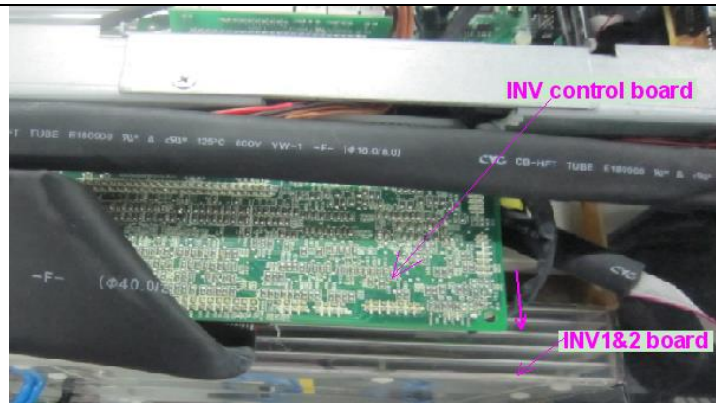
<p>Step 7: Take a new parallel board, demount the 4 screws from the parallel port (DB15 Connectors)</p> <p>Connect the "Parallel board power supply cable" to CN9 of parallel board.</p> <p>Connect the "S phase current equalizer cable" to CN10 of parallel board.</p> <p>Connect the "T phase current equalizer cable" to CN11 of parallel board.</p>	
<p>Step 8: Remove covers for parallel board port by demounting 2 screws.</p>	
<p>Step 9: Assemble the parallel board into the UPS: Reference the left pictures please.</p>	

	
<p>Step 10: Connect the "Parallel board power supply cable" (Short red/black cable) to CN10 of communication board.</p>	
<p>Step 11: Connect the "S phase current equalizer cable" (the longer red/black cable) to "CN20" of INV 1&2 board.</p>	
<p>Step 12: Connect the "T phase current equalizer cable" (the longest red/black cable) to "CN 6" of INV 3 board.</p>	

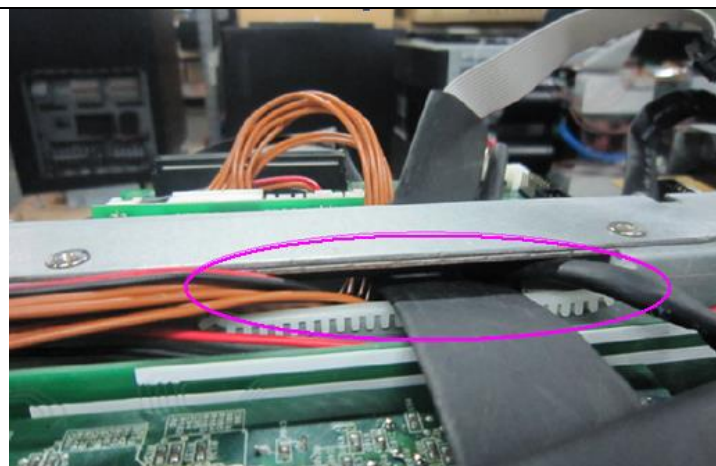
Step 13: Connect the 14-pin grey cable to CN11 of INV control board:

Please reference to **Step2 of part 2.2** to demount the INV control board from the INV1&2 board.

Connect the 14-pin grey cable to CN11 of INV control board.



Step 14: Assemble the INV control board back to INV1&2 board, and then make the 14-PIN grey cable through the middle iron board.

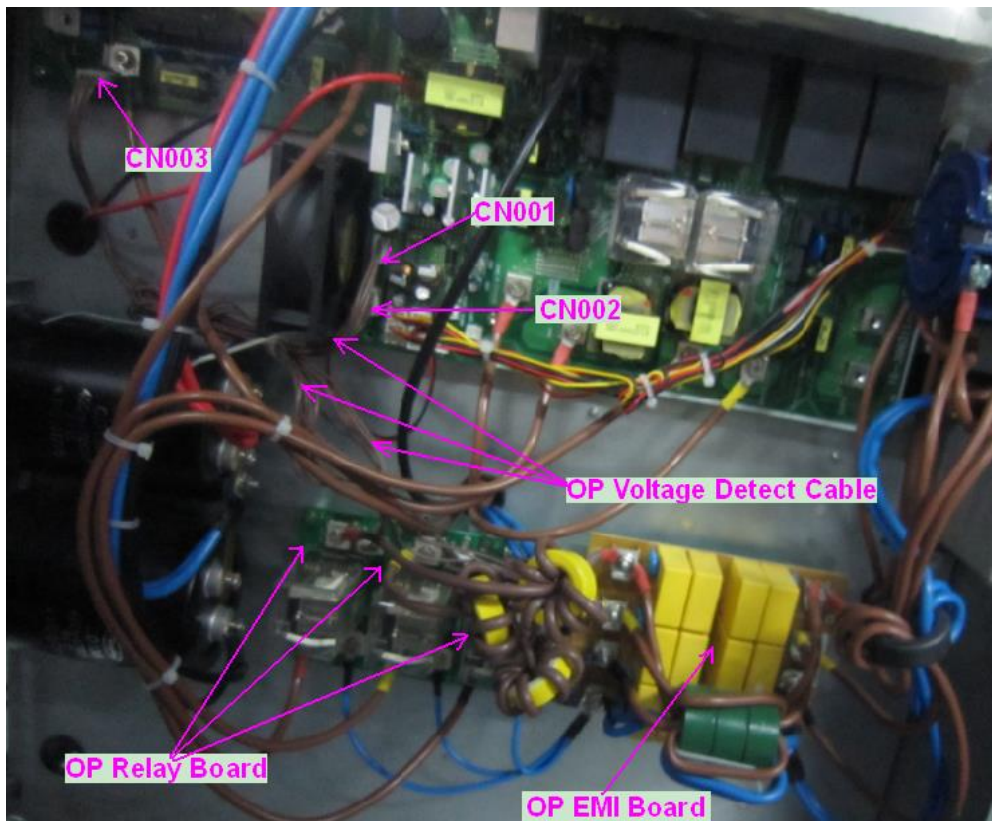


Step 15: Connect the 14-pin grey cable to CN1 of parallel board.



At last, assemble all the cover back to the unit. Now the UPS is ready for parallel operation function.

Above is suitable for GALLON 3-3 10k, 15k, 20K,30K standard modle, for long backup modle, the difference is the OP relay boards assembling, the following picture is for reference when assembling OP relay boards to the long backup unit:



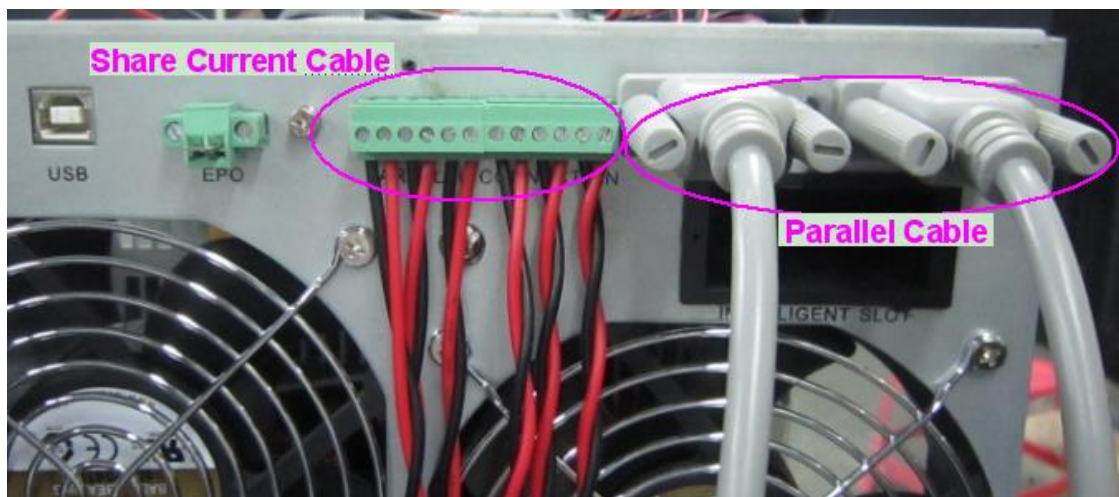
The Location Of OP Relay Board For Long Backup Unit

3. Wiring Connection for Parallel Operation

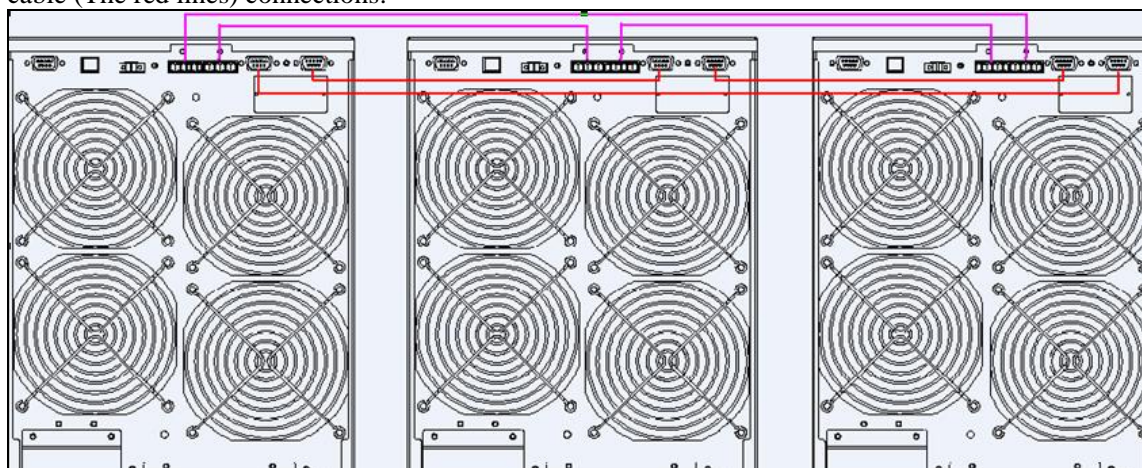
Please follow the below steps to connect cables and wires for Gallon 3-3 parallel models.

Step 1: Parallel cable and share current cable connection:

It is better to connect the "Share current cable" first, then connect the "parallel cable". It's all dummy-proof design which can prevent customers from mis-connection. However, any stress to cables will cause bad contact or broken inner wires. Please be aware of that.



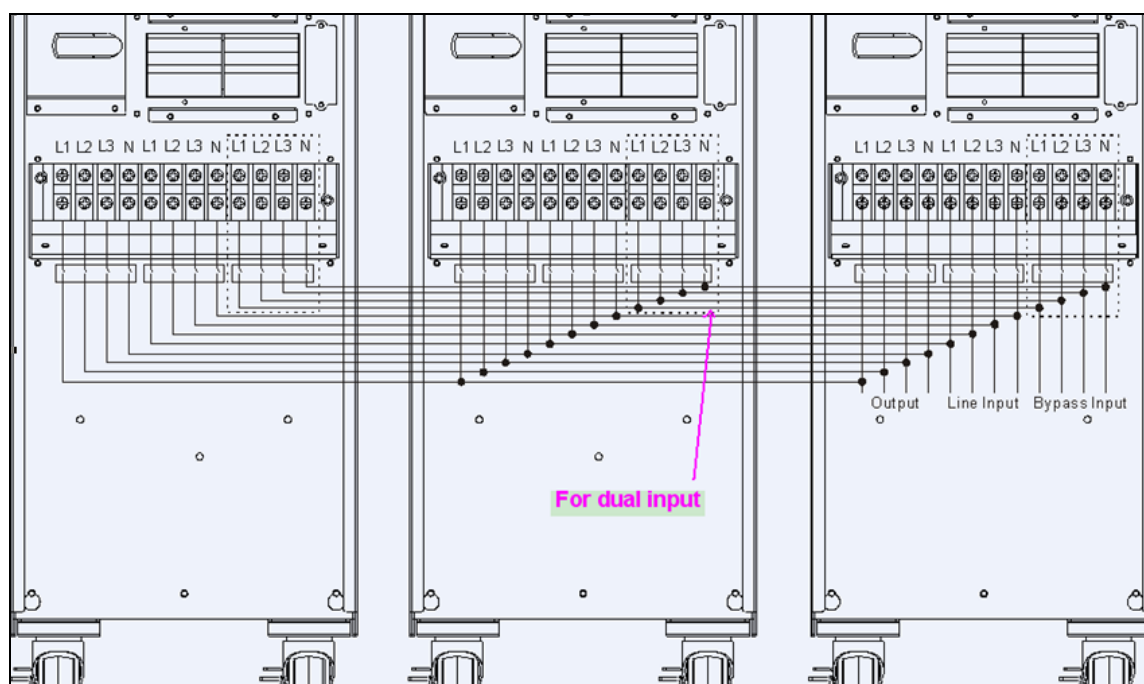
The following graph showing the share current cable connection (The pink lines) and the parallel cable (The red lines) connections:



Step 2: Input and output wires connection:

Please connect the input and output according to the following graph :

- 1) Connect the input wires of each UPS to a breaker.
- 2) Connect all input breakers to a major breaker. The major breaker will directly connect to the mains.
- 3) Connect the output wires of each UPS to an output breaker.
- 4) Connect all output breakers to a major output breaker. Then this major output breaker will directly connect to the loads.

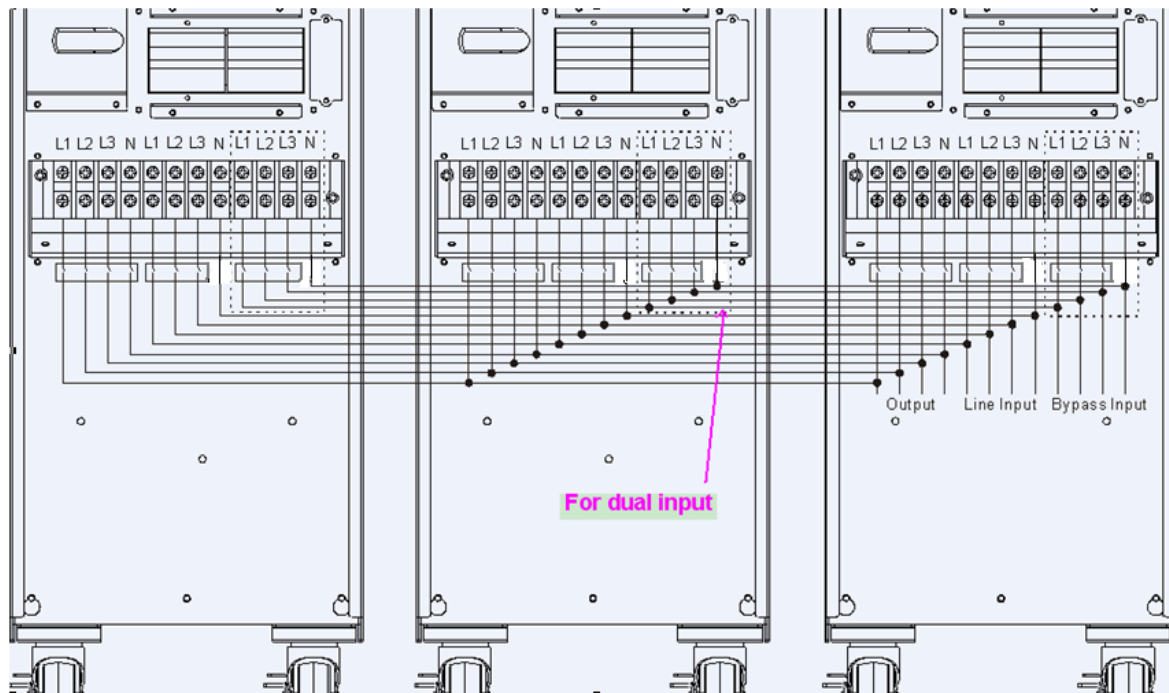


Step 3: If the UPS is connected to external battery pack, it's required to install battery breaker (DC type) for each UPS. **Each UPS should be connected to an independent battery pack.**

We strongly suggest to install a breaker (AC type, D curve) for input/output in each unit. Please refer to UPS user manual for the selection of diameter and color of the wires.

NOTE1: Each UPS should be connected to an independent battery pack. Otherwise, it will cause system permanent failure.

NOTE2: For UPSs with isolation output transformers, the neutral of the input must be connected together after the input distribution switch. You can connect the input N terminal of each UPS together directly.



4. Parallel Operation

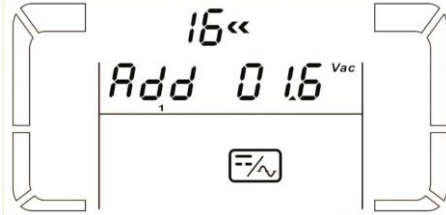
- 1) Make sure that the parallel board and OP relay board have been installed correctly.
- 2) Make sure that each UPS has the same configuration, including the following parameters:
 - a) output voltage,
 - b) output frequency,
 - c) bypass voltage range,
 - d) bypass frequency range,
 - e) converter enable or disable,
 - f) bypass enable or disable,
 - g) bypass open or forbidden,
 - h) frequency auto detect enable or disable,
 - i) inverter short clear enable or disable
- 3) Turn on the UPS into the line mode or battery mode respectively, and measure the output voltage by multimeter. Make sure the difference of the each phase output voltages among the UPSs is less than 1.5V(typical 1V). If not, you can adjust the inverter voltage of each UPS via LCD as below:

Inverter A voltage adjustment

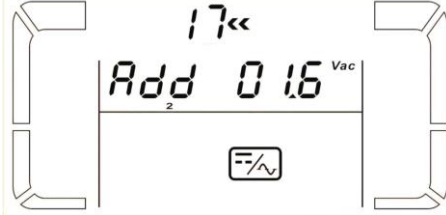
Interface	Setting
	<p>Parameter 2: you may choose Add or Sub to adjust inverter A voltage</p> <p>Parameter 3: the voltage range is from 0V to 9.9V, the default value is 0V.</p>

Inverter B voltage adjustment

Interface	Setting
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	<p>Parameter 2: you may choose Add or Sub to adjust inverter B voltage*</p> <p>Parameter 3: the voltage range is from 0V to 9.9V, the default value is 0V.</p> <p>*The number 1 under the <i>Add</i> or <i>Sub</i> represent the inverter B</p>
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Inverter C voltage adjustment


Interface	Setting
	<p>Parameter 2: you may choose Add or Sub to adjust inverter C voltage*</p> <p>Parameter 3: the voltage range is from 0V to 9.9V, the default value is 0V.</p> <p>*The number 2 under the <i>Add</i> or <i>Sub</i> represent the inverter C</p>

After adjusting the inverter voltage, check whether the output voltage detecting is ok or not. Entering the pictures as below via LCD, the LCD will display the output voltage detected. If the difference between the display value and the voltage measured by mutimeter is more than 1V, adjusting it to make sure the difference is no more than 1V. Then shut down the UPS to save this setting into EEPROM.

Output A voltage calibration

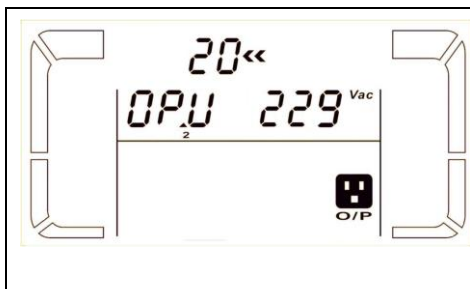
Interface	Setting
	<p>Parameter 2: it always shows OP.V as output voltage.</p> <p>Parameter 3: it shows the internal measurement value of the output A voltage, and you can calibrate it by pressing Up or Down according to the measurement from an external voltage meter. The calibration result will be effective by pressing Enter. The calibration range is limited within +/-9V. This function is normally used for parallel operation.</p>

Output B voltage calibration

Interface	Setting
	<p>Parameter 2: it always shows OP.V as output voltage*.</p> <p>Parameter 3: it shows the internal measurement value of the output B voltage, and you can calibrate it by pressing Up or Down according to the measurement from an external voltage meter. The calibration result will be effective by pressing Enter. The calibration range is limited within +/-9V. This function is normally used for parallel operation.</p> <p>*The number 1 under the <i>OPV</i> represent the output S</p>

Output C voltage calibration

Interface	Setting
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Parameter 2: it always shows **OP.V** as output voltage.

Parameter 3: it shows the internal measurement value of the output C voltage, and you can calibrate it by pressing **Up** or **Down** according to the measurement from an external voltage meter. The calibration result will be effective by pressing **Enter**. The calibration range is limited within $\pm 9V$. This function is normally used for parallel operation.

*The number 2 under the **OPU** represent the output C

- 4) Connect the UPSs referring to the Section 3.
- 5) Turn on the parallel system with utility power supply (in AC mode)
 - a) Supply the parallel system with utility power.
 - b) Set each UPS's breaker of the battery pack at "ON" position (only for long-run model).

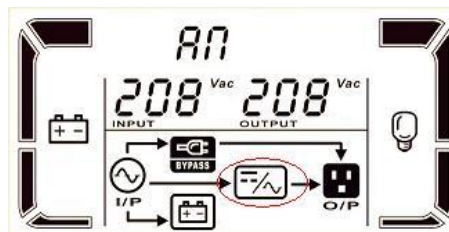
NOTE: the parallel UPSs can not use one battery pack. Each UPS should have its own battery pack.

Then set each UPS's input breaker and output breaker at "ON" position. At this time the fan is running and the UPS enter to power on mode for initialization, several seconds later, UPSs operates in Bypass mode. After a while when UPSs' output relays have closed, the parallel system supplies power to the loads via the bypass.

- c) Check the LCD whether displays the parallel information as showed in the below picture. If parallel UPS systems are successfully set up, it will show "**PAR**" and assigned number as below picture. The master UPS will be default assigned as "**001**" and slave UPSs will be assigned as either "**002**" or "**003**". If not see this picture, you can not go to next step and please check if the parallel cables have been connected well.



- d) Press and hold the "ON" button for 0.5s to turn on the UPS one by one, the buzzer will beep once and the LCD will display the parallel process as showed in the below picture, the sign in the red circle will twinkle until the UPSs entering to AC mode synchronously, the parallel system start to supply power to the load.



- 6) Turn on the parallel system without utility power supply (in Battery mode)
 - a) Check if the parallel cables connected well please follow the below steps:
 - I) Turn on the battery breaker of each UPS (only for long-run model).

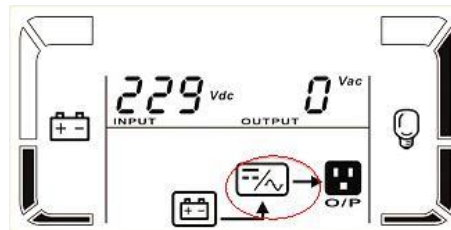
NOTE: 1.Do not turn on the output breaker of each UPS!

2.The parallel UPSs can not use one battery pack. Each UPS should have its own battery pack!

- II) Press the "ON" button of one UPS to set up the power supply, UPS will enter to power on mode.

After initialization UPS will enter to No Output mode, then Press and hold the "ON" button for 0.5s to turn on the UPS, and the buzzer will beep once. A few seconds later, the UPS will be turned on and enter to Battery mode.

III) Then do the same procedure to the other UPS according II), the LCD will display the parallel process as showed in the below picture, the sign in the red circle will twinkle until the UPSs entering to the battery mode:



IV) Check the LCD whether displays the parallel information as showed in the below picture. If parallel UPS systems are successfully set up, it will show "PAR" and assigned number as below picture. The master UPS will be default assigned as "001" and slave UPSs will be assigned as either "002" or "003". If not see this picture, you can not go to next step and please check if the parallel cables have been connected well.



V) Press "OFF" button for 0.5s of each UPS one by one to turn off all UPSs in parallel system.

- b) Turn on the battery breaker (only for long-run model) and output breaker of each UPS.
- c) Press the "ON" button of one UPS to set up the power supply, UPS will enter to power on mode. After initialization UPS will enter to No Output mode, then Press and hold the "ON" button for 0.5s to turn on the UPS, and the buzzer will beep once.
- d) A few seconds later, the UPS will be turned on and enter to Battery mode.
- e) Then do the same procedure to the other UPS according c), the LCD will display the parallel process as showed in the below picture, the sign in the red circle will twinkle until the UPSs entering to the battery mode:



f) Then the parallel system has been installed and starts to supply power to the load.

7) Turn off the parallel system

Press and hold the "OFF" button for 0.5s to turn off the UPS one by one, the buzzer will beep once. After a while, the UPSs will enter to bypass mode or no output mode synchronously.

8) Add one new unit into the parallel system

- a) You can not add one new unit into the parallel system when whole system is running. You must cut off the load and shutdown the system.
- b) Make sure all of the UPSs are the parallel models, and follow the connection refer to section 3.

- c) Install the new parallel system refers to the previous section.
- 9) Remove one unit from the parallel system

There are two methods to remove one unit from the parallel system:

First method:

- a) Press the "OFF" key twice and each time should be lasted for more than 0.5s, then the UPS will enter into bypass mode or no output mode without output.
- b) Turn off the output breaker of this unit, and then turn off the input breaker of this unit.
- c) After it shutdown, you can move the parallel cable and share current cable. And then remove the unit out of the parallel system.

Second method:

- a) If the bypass is abnormal, you can not remove the UPS without interruption. You must cut off the load and shut down the system first.
- b) Make sure the bypass setting is enabled in each UPS and then turn off the running system. All UPS will transfer to bypass mode.
- c) Remove all the maintenance bypass covers and set the maintenance switches from "UPS" to "BPS".
- d) Turn off all the input breakers and battery breakers in parallel system.
- e) Turn off the output breaker and move the parallel cable and share current cable of the UPS which you want, then remove it out of the parallel system.
- f) Turn on the input breaker of the remaining UPS and the system will transfer to Bypass mode. Set the maintenance switches from "BPS" to "UPS and put the maintenance bypass covers back.
- g) Turn on the remaining UPS according to 5).

Version	Date	Modification
1.0	20120810	New create
1.1	20140805	Some words correction
2.0	20140902	For UPS with isolation output transformer, need to join the neutral at the input terminal of each UPS together. Because the input breaker of the UPS never cut OFF the neutral.
3.0	20150324	Add 30K to the SOP and some small issue corrected.
4.0	20160130	Modify the control boards necessary for parallel description