5.2 Installation location

Make sure that the installation location meets the following conditions:
1) The area is completely waterproof.
2) The floor is flat and level.
3) There are no flammable or explosive materials.
4) The ambient temperature is within the range from 0°C to 50°C.
5) The temperature and humidity are maintained at a constant level.
6) There is minimal dust and dirt in the area.
7) The distance from heat source is more than 2 meters.
8) The distance from air outlet of inverter is more than 0.5 meters.
9) The installation areas shall avoid of direct sunlight.
10) There is no mandatory ventilation requirements for battery module, but please avoid of installation in confined area. The aeration shall avoid of high salinity, humidity or temperature.
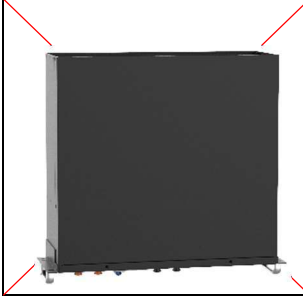
 Caution
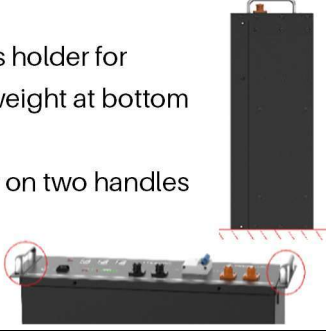
If the ambient temperature is out of the operating range, the battery stops operating to protect itself. The optimal temperature range for the battery pack to operate is 10°C to 40°C. Frequent exposure to harsh temperatures may deteriorate the performance and life of the battery.

5.3 Installation Direction

NOT allowed:

Upside down	Sidelong	Sidelong

Recommended:

		Note
A		Caution: Do not stack modules together directly.
B		Caution: Make sure there is holder for more than 40kg weight at bottom of each module. Installed only rely on two handles is NOT allowed.

5.4 Grounding

Grounding cables shall be 6AWG or higher yellow-green cables. After connection, the resistance from battery grounding point to Ground connection point of room or installed place shall smaller than 0.1Ω.

1) based on metal directly touch between the module's surface and rack's surface. If using painted rack, the corresponding place shall remove the painting.

2) install a grounding cable to the grounding point of the modules.

5.5 Put into cabinet or rack
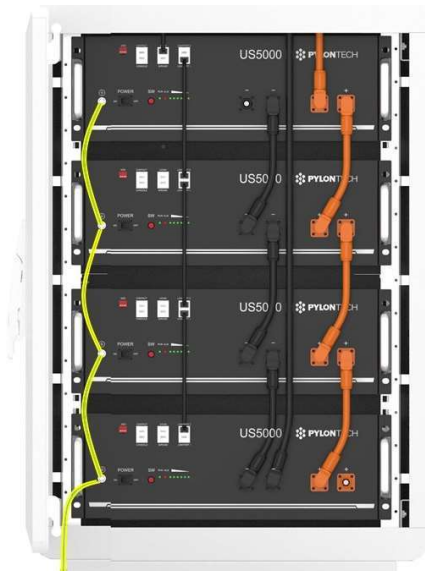
Put battery modules into cabinet and connect the cables:

1) Put the battery into the cabinet.
2) Drive the 4 pcs screws.
3) Connect the cables between battery modules.
4) Connect the cables to inverter.
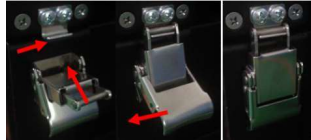
5.6 Put into bracket

1) Put the battery into 2 pcs of bracket.

2) Use 4 location holes, stack the batteries together. And connect the 4 locker together.

3) Maximum 3 in stack.

After installation, do not forget to register online for full warranty:

http://www.pylontech.com.cn/service/support

 Caution

1) follow local electric safety and installation policy, a suitable disconnection device between battery system and inverter could be required.
2) all the installation and operation must follow local electric standard.

5.7 Suitable disconnection device

It is recommended to have a disconnection device for protection between battery system and inverter:

1) The rated voltage shall ≥60V DC. Do **NOT** use AC breaker.
2) The rated current shall match with system design:
    shall consider:
    ● the maximum DC current on inverter side.
    ● the number of power cable: for instance, if only one pair of 4awg cable, the rated current of breaker shall be 125A or smaller.
3) If using breaker, the type shall be type C (recommended) or type D.
    The Icu required:
    the maximum short circuit current for calculation of each module is 2500A.
    for instance:

	Icu of breaker
1~4 modules	Must ≥10kA
5~8 modules	Must ≥20kA

5.8 Power on

Double check all the power cable and communication cable between batteries and between battery and inverter. Switch ON the disconnection device between battery and inverter if available.
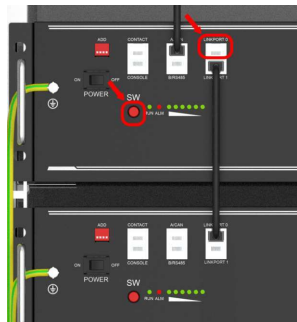
For US5000-B:
Switch ON all modules` breaker first.

For US5000 and US5000-B:
1) Switch on all the battery modules:
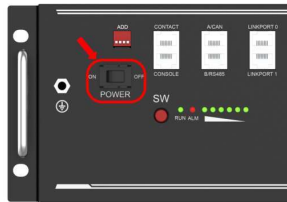
2) The one with **empty Link Port 0** is the **Master Battery** Module, others are slaves (1 master battery configure with maximum 15 slave batteries):

3) Press the **red SW button** of **master battery** to power on, all the battery LED light will be on one by one from the Master battery:

Note:

1) After the battery module powered on, the soft-start function takes **3sec** to active. After soft-starts battery ready to output high power.

2) During capacity expansion or replacement, when parallel different SOC/voltage of module together, it is recommended to maintain the system in idle for ≥15mins or till the SOC LEDs becomes similar (≤1dot difference) before normal operation.

5.9 Power off

1) Turn external power source off.
2) Press red SW switch of master battery. Then all batteries will off.
3) Switch Power switch OFF.
4) Switch Breaker OFF (for US5000-B).
5) Switch OFF the disconnection device between battery system and inverter, if available.

5.10   Multi-group mode

Connect power cable first:
1)   each pair of cable hold max 100A constant current. Connect enough pairs of cable based on calculation of system current.
2)   Suitable protection device between battery system and inverter is required.
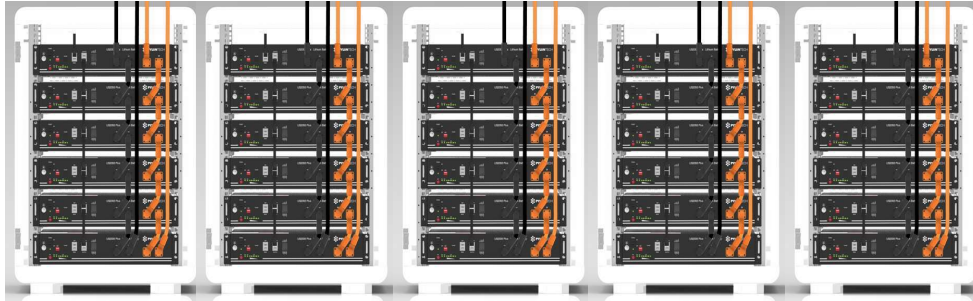
By RS485: DO NOT need LV-HUB.
1)   Make sure all dip switch of master batteries is R000.
       R: is the baud rate of RS485, all master batteries shall be the same.
2)   Connect communication cable follow the picture:

Multiple Battery Groups RS485 Communication Cable Connection

Max 6 groups
1) The A/CAN of 1st group/master battery connects to inverter or EMS(pin: 7A, 8B, DO NOT connect other pins)
2) The B connect to A of next group; the B/RS485 of last group master battery is empty.

Master battery Group 1.   Master battery Group 2   Master battery Group 3   Master battery Group N.max 6.
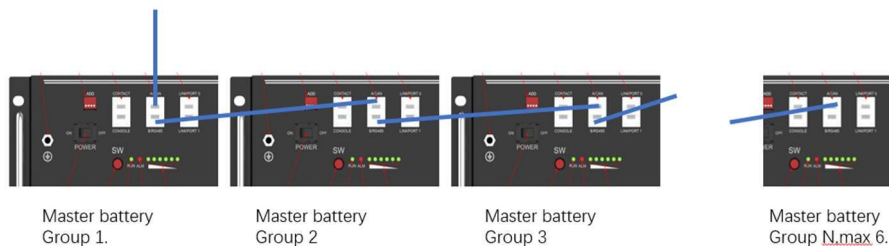
3)   Then turn ON the batteries. After all batteries running and buzzer of master battery in group1 rings 3 times. Means all groups are online.
       For inverter or EMS, The interruption of each RS485 command shall at least≥1s.

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By CAN:
1) connect power cable of LV-HUB.
2) Connect communication cable follow the picture.
   the cable from master battery to LV-HUB, is recommended to use: WI0SCAN30RJ1 or cable with pin 1~3 empty.

| Master battery | Master battery | Master battery | Master battery |
| Group 1. | Group 2 | Group 3 | Group N.max 6. |
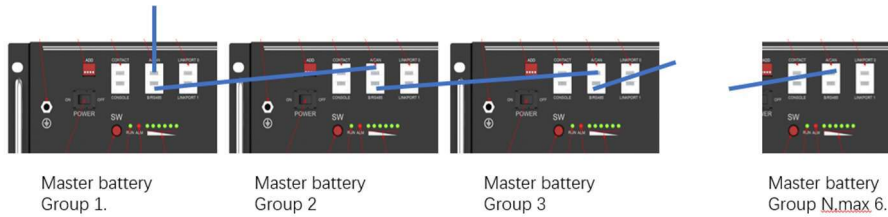
3) Make sure all dipswitch of master batteries is 0000, then turn ON batteries.
4) After all batteries running and buzzer of master battery in group1 rings 3 times. Means all groups are online.
5) Change the dip switch of **master battery in group1** to 0100. Then connect communication cable between LV-HUB and master battery in group 1.
6) Then turn ON LV-HUB.
   Detailed information please refer to manual of LV-HUB.

Multiple Battery Groups CAN Communication Cable Connection
Each Communication HUB connects maximum 6 battery piles.

1) The CAN IN connects to port 0
2) The A/CAN connects to port 1~7 freely
3) The B connect to A of next group; the B/RS485 of last group master battery is empty.

| Master Battery | Master Battery | Master Battery | Master Battery |
| Group 1 | Group 2 | Group 3 | Group N, max 6 |
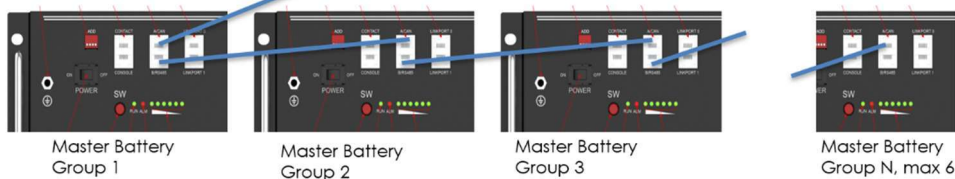
6. Trouble shooting

● Communication related problem

Unable to communicate with inverter on compatible list.

Possible conditions:
1) RS485: baud rate. Check the dip switch1, set to correct one, and restart. All master battery shall be the same.
2) CAN: terminal resistance. Check the dip switch2, set to 0 and retry.
3) CAN: pin. Try connects the CAN-H, L, GND only and do not connect other pins to inverter. Using the correct cable.

● Functional related problem
1) Whether the battery can be turned on or not
2) If battery is turned on, check the red light is off, flashing or lighting
3) If the red light is off, check whether the battery can be charged/discharged or not.

Possible conditions:
1) Battery cannot turn on, switch ON and press the red SW the lights are all no lighting or flashing.
a) Capacity too low, or module over discharged.
   solution: use a charge or inverter to provide 48-53.5V voltage. If battery can start, then keep charge the module and use monitor tools to check the battery log.
   If battery terminal voltage is ≤45Vdc, please use ≤0.05C to slowly charge the module to avoid affect to SOH. If battery terminal voltage is >45Vdc, it can use ≤0.5C to charge.
   If battery cannot start, turn off battery and repair.

2) The battery can turn on, but red light is lighting, and cannot charge or discharge. If the red light is lighting, that means system is abnormal, please check values as following
b) Temperature: Above 60°C or under -10°C, the battery could not work.

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Solution: to move battery to the normal operating temperature range between 0°C and 50°C.

c) Current: If current exceeds 90A, battery protection will turn on.
Solution: Check whether current is too large or not, if it is, change the settings on power supply side.

d) High Voltage: If charging voltage above 54V, battery protection will turn on.
Solution: Check whether voltage is too high or not, if it is, to change the settings on power supply side. And discharge the module.

e) Low Voltage: When the battery discharges to 44.5V or less, battery protection will turn on.
Solution: Charge the battery till the red light turns off.

f) Cell voltage high. The module voltage is lower than 54V, SOC LED does not all on. When discharge the module protection disappear.
Solution: keep charge the module by 53-54V or keep the system cycle. The BMS can balance the cell during cycling.

3) Unable to charge and discharge with red LED on. The temperature is 0~50 degree. Use charger to charge, not possible. Use load to discharge, not possible.

g) Under permanent protection. The single cell voltage has been higher than 4.2 or lower than 1.5 or temperature higher than 80 degree. Solution: Switch off the module and contact your local distributor for repair.

4) Unable to charge and discharge without red LED on. The temperature is 0~50 degree. Use charger to charge, not possible. Use load to discharge, not possible.

h) Fuse broken.
Solution: Switch off the module and contact your local distributor for repair.

5) Buzzer rings and **all LED flash**

i) High voltage protection.
Cell voltage higher than 4V or module voltage higher than 55.5V.
Solution: **Battery system requires properly established communication with inverter and correctly settings on inverter to run safely.** Check the setting of the inverter or charger, the charge voltage shall be 53.2~52.5Vdc;

Check the communication between battery system and inverter whether established or not; Check the ADD switch on battery module whether is set correctly or not;

Under this condition, the BMS remains functional without damage. Just leave the module switched OFF and wait for the battery voltage drop down naturally(15mins) then restart. If then no alarm comes out, this means the module is ready for work.

6) Buzzer rings and **ALM solid red**
j) Reverse connection of cables.
   Solution: Power off all battery and inverters. Disconnect breaker. Check the cable connection and disconnect all power cables. Check the power port damaged or not. Then try turn on the single module, without any cable connected. If no alarm, then it is reverse connection of cables. Switch off the module and contact your local distributor.
k) MOSFAIL.
   Solution: Power off all battery and inverters. Disconnect breaker. Check the cable connection and disconnect all power cables. Check the power port damaged or not. Check the setting of inverter or charger, check the communication between inverter and battery system.
   Try turn on the single module, without any cable connected. If still buzzer rings. Then switch off the module and contact your local distributor.

7) After switch On, the module turns on directly
l) BMS failure.
   Solution: Switch off the module and contact your local distributor.

Excluding the points above, if the faulty still cannot be located, turn off battery and contact your local distributor.

7. Emergency Situations

1) Leaking Batteries

   If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If one is exposed to the leaked substance, immediately perform the actions described below.

   a) Inhalation: Evacuate the contaminated area and seek medical attention.

   b) Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention as soon as possible.

   c) Contact with skin: Wash the affected area thoroughly with soap and water and seek medical attention.

   Ingestion: Induce vomiting and seek medical attention.

2) Fire

   If detect the battery cell is catching fire, firstly cut off the external power source. Then use vast of water for suppression. After fire suppressed, soaking battery within water and contact Pylontech or an authorized dealer. If detect the cabling or other components (not battery cell) is catching fire. Firstly, cut off the external power source. Then use dry powder fire or carbon dioxide extinguisher for suppression.

3) Wet Batteries

   If the battery pack is wet or submerged in water, do not let people access it, and then contact Pylontech or an authorized dealer for technical support. Cut off all power switch on inverter side.

4) Damaged Batteries

   Damaged batteries are dangerous and must be handled with the utmost care. They are not fit for use and may pose a danger to people or property. If the battery pack seems to be damaged, pack it in its original container, and then return it to Pylontech or an authorized dealer.

 Caution

Damaged batteries may leak electrolyte or produce flammable gas.

8. Remarks

Recycle and disposal.

In case a battery (normal condition or damaged) needs disposal or needs recycling, it shall follow the local recycling regulation (i.e. Regulation (EC) Nº 1013/2006 among European Union) to process, and using the best available techniques to achieve a relevant recycling efficiency.
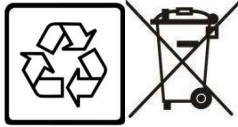
Storage, Maintenance and Expansion

1) It is required to charge the battery at least once every 6 months, for this charge maintenance make sure the SOC is charged to higher than 90%

2) Every year after installation. The connection of power connector, grounding point, power cable and screw are suggested to be checked. Make sure there is no loose, no broken, no corrosion at connection point. Check the installation environment such as dust, water, insect etc. make sure it is suitable for IP20 battery system.

3) A new battery module can be added onto an existing system at any time. Please make sure the new battery is acting as the master. The new module, due to a higher SOH may have a difference on SOC with existing system, but it will not affect the parallel connection system performance.

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