

# HOMEGRID



POWERED BY LITHION



## Stack'd Series Reference Manual

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# 1. Safety Precautions

It is very important and necessary to read the user manual carefully before installing or using the battery. Failure to do so, or to follow any of the instructions or warnings in this document, can result in electrical shock, serious injury, or death, or can damage battery, potentially rendering it inoperable.



Observe these instructions and keep them located near the Li-ion Battery for future reference.



For more information about this product, please visit the official website: <http://www.homegridenergy.com>



Work on a Li-ion Battery should be carried out by qualified personnel only.

## 1.1. General warnings



While working on the Li-ion Battery wear protective eyeglasses and clothing.



Any uncovered battery material such as electrolyte or powder on the skin or in the eyes must be flushed with plenty of clean water immediately. Then seek medical assistance. Spillages on clothing should be rinsed out with water.



Explosion and fire hazard. Terminals of the Li-ion Battery are always alive; therefore, do not place items or tools on the Li-ion Battery. Avoid short circuits, too deep discharges, and too high charge currents. Use insulated tools. Do not wear any metallic items such as watches, bracelets, etc. In case of fire; you must use a type D, foam or CO2 fire extinguisher.



Do not open or dismantle the battery. Electrolyte is very corrosive. In normal working conditions contact with the electrolyte is impossible. If the battery casing is damaged do not touch the exposed electrolyte or powder because it is corrosive.



Li-ion batteries are heavy. If involved in an accident they can become a projectile! Ensure adequate and secure mounting and always use suitable handling equipment for transportation.



Handle with care because a Li-ion battery is sensitive to mechanical shock.



Do not expose cable outside, all the battery terminals must be disconnected



Do not place in a children or pet touchable area.



Do not use cleaning solvents to clean the battery.



Do not expose the battery to flammable or harsh chemicals or vapors.



Do not paint any part of the battery; including internal or external parts



Do not drop, deform, impact, cut or spear the battery with a sharp object.



Do not wet the battery and avoid of direct sunlight.



Do not use a damaged battery.



Please contact the supplier within 24 hours if there is something abnormal.



It is prohibited to insert any foreign object into any part of battery.



Any warranty claims are excluded for direct or indirect damage due to items above.

## 1.2. Charge and discharge warnings



If the battery is stored for long period of time, it is required to be charged every six months, and the SOC should be no less than 90%.



Battery needs to be recharged within 12 hours, after fully discharged.



Do not connect battery with PV solar wiring directly.



Use only with a HOMEGRID approved BMS.



If charged after the Lithium Battery was discharged below the “Discharge cut-off voltage”, or when the Lithium Battery is damaged or overcharged, the Lithium Battery can release a harmful mixture of gasses such as phosphate.



The temperature range over which the battery can be charged is 0°C to 45°C. Charging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.



The temperature range over which the battery can be discharged is -10°C to 55°C. Discharging the battery at temperatures outside this range may cause severe damage to the battery or reduce battery life expectancy.

### 1.3. Transportation warnings



The battery must be transported in its original or equivalent package and in an upright position. If the battery is in its package, use soft slings to avoid damage.



Do not stand below a battery when it is hoisted.



Never lift the battery at the terminals or the BMS communication cables, only lift the battery at the handles.

#### **NOTE:**

- Batteries are tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC.10/11/Rev.5).
- For transport, the batteries belong to the category UN3480, Class 9, Packaging Group II and have to be transported according to this regulation. This means that for land and sea transport (ADR, RID & IMDG) they have to be packed according to packaging instruction P903 and for air transport (IATA) according to packaging instruction P965. The original packaging complies with these instructions.

### 1.4. Disposal of lithium batteries



Batteries marked with the recycling symbol must be processed via a recognized recycling agency. By agreement, they may be returned to the manufacturer.



Batteries must not be mixed with domestic or industrial waste.



Do not throw a battery into fire.

### 1.5. Before Connecting

- ◆ After unpacking, please check product and packing list first, if product is damaged or parts are missing, please contact the local retailer or manufacturer;
- ◆ Before installation, be sure to cut off the grid power at the inverter and make sure the battery is in the **OFF** mode;
- ◆ Wiring must be correct, do not mistake the positive and negative cables, and ensure no short circuit with any external device or object;
- ◆ It is prohibited to connect the battery and AC power directly;
- ◆ The embedded BMS in the battery is designed for 48VDC, please **DO NOT** connect the battery in series;
- ◆ Battery system must be well grounded and the resistance must be less than 1ohm;
- ◆ Make sure the grounding connection is set correctly before operation.

- ◆ Ensure the electrical parameters of the battery system are compatible to all related equipment;
- ◆ Keep the battery away from water and fire.

### **1.6. In Using**

- ◆ If the battery system needs to be moved or repaired, the power must be cut off at the inverter system and the battery must be completely shutdown;
- ◆ It is prohibited to connect the battery with any different type of battery.
- ◆ It is prohibited to connect the batteries with faulty or incompatible inverters;
- ◆ It is prohibited to disassemble the battery (QC tab removed or damaged);
- ◆ In case of fire, only dry powder fire extinguisher can be used, liquid fire extinguishers are prohibited;
- ◆ Please do not open, repair or disassemble the battery except trained technicians from HOMEGRID or authorized by HOMEGRID. We do not undertake any consequences or related responsibility which, because of violation of safety operation, or violation of design, production and equipment safety standards.

## 2. Introduction

The Stack'd Series lithium iron phosphate battery is an energy storage product developed and produced by HOMEGRID, it can be used to support reliable power for various types of equipment and systems. The Stack'd Series is especially suitable for applications of high power, limited installation space, and restricted load-bearing and long cycle life.

The Stack'd Series has a built-in BMS battery management system, which can manage and monitor cell's information including voltage, current and temperature. What's more, the BMS can help extend the cycle life by balancing cells during charging and discharging.

Multiple battery stacks are allowed to be connected in parallel to expand capacity and power to meet the requirements of longer power supporting duration and higher power consumption.

### 2.1. Lithium iron phosphate battery

The lithium iron phosphate battery (LiFePO<sub>4</sub> or LFP) is the safest of the mainstream lithium battery types. A single LFP cell has a nominal voltage of 3.2V. A 51.2V LFP battery consists of 16 cells connected in series.

LFP is the chemistry of choice for very demanding applications. Some of its features are:

- ◆ Rugged - It can operate in deficit mode during long periods of time.
- ◆ High round trip efficiency.
- ◆ High energy density - More capacity with less weight and volume.
- ◆ High charge and discharge currents - Fast charges and discharges are possible.
- ◆ Flexible charge voltages.

The lithium iron phosphate battery is therefore the chemistry of choice for a range of very demanding applications.

### 2.2. Stack'd Series Features

- ◆ The whole stack and each module is non-toxic, pollution-free and environment-friendly;
- ◆ Cathode material is made from LiFePO<sub>4</sub> with safety performance and long cycle life;
- ◆ Battery management system (BMS) has protection functions including over-discharge, over-charge, and over-current and high/low temperature;
- ◆ The system can automatically manage charge and discharge state and balance current and voltage of each cell;
- ◆ Flexible configuration, multiple battery modules can be stacked for expanding output and Capacity.
- ◆ Adopted self-cooling mode efficiently reduces any system noise;
- ◆ The module has less self-discharge, up to 6 months without charging on a shelf, no memory effect, with excellent performance of shallow charge and discharge;
- ◆ Working temperature range is from -10 to 55°C (14F-131F) , (Charging 0~45°C (32-113F); discharging -10~55°C (14F-131F) )with excellent discharge performance and cycle life;
- ◆ Small volume, light weight, plug-in embedded design modules, are easy to install and maintain;

## 2.3. Specifications



Figure 2.1. Overall system diagram

| No. | Items                         | Parameters  |        |        |        |        |        |        |     |
|-----|-------------------------------|---|--------|--------|--------|--------|--------|--------|-----|
| 1   | Model                         | SS*-LFP***00-2A01   |        |        |        |        |        |        |     |
| 2   | Main Controller Module        | SS-MC100-200M2  |        |        |        |        |        |        |     |
| 3   | Battery Module Type           | SS-FS48100-16OSJ1   |        |        |        |        |        |        |     |
| 4   | Battery Module Chemistry      | LiFePO4   |        |        |        |        |        |        |     |
| 5   | Battery Module QTY*           | 2   | 3      | 4      | 5      | 6      | 7      | 8      |     |
| 6   | Nominal Capacity(Ah)          | 200   | 300    | 400    | 500    | 600    | 700    | 800    |     |
| 7   | Nominal Energy(kWh)***        | 9.60  | 14.4   | 19.2   | 24.0   | 28.8   | 33.6   | 38.4   |     |
| 8   | Voltage                       | Nominal(V)  | 48.0   |        |        |        |        |        |     |
|     |                               | Recommend Charging(V)   | 52.5   |        |        |        |        |        |     |
|     |                               | Max. Charging(V)  | 53.5   |        |        |        |        |        |     |
|     |                               | Discharge Cut-off(V)  | 44.0   |        |        |        |        |        |     |
| 9   | Current                       | Max. Charging(A)  | 125    | 200    | 300    | 300    | 300    | 300    | 300 |
|     |                               | Max. Discharging(A)   | 125    | 200    | 300    | 300    | 300    | 300    | 300 |
|     |                               | Peak for 10s(A)   | 175    | 250    | 350    | 350    | 350    | 350    | 350 |
| 10  | Weight (Approx.)              | 230lbs  | 325lbs | 420lbs | 515lbs | 610lbs | 705lbs | 800lbs |     |
| 11  | Dimensions (H*W=29"*D=15.75") | 24.2"   | 29.4   | 35.2"  | 41"    | 46.8"  | 52.6"  | 58.4"  |     |
| 12  | Communication                 | RS485, CAN  |        |        |        |        |        |        |     |
| 13  | Cycle Life                    | 4000 times@80%DOD   |        |        |        |        |        |        |     |
| 14  | Designed Calendar Life        | ≥10 years   |        |        |        |        |        |        |     |
| 15  | Safety Function               | Over-charge, Over-discharge, Over-current, Low/High-temperature, Low-voltage, Short-circuit Protections |        |        |        |        |        |        |     |
| 16  | Parallel Capability           | Maximum 10 Stacks (Recommended 6 Stacks)  |        |        |        |        |        |        |     |

## 2.4. Equipment Interface Instruction



Figure 2.2.Main controller module positive

| No. | Instructions   | NO. | Instructions |
|-----|----------------|-----|--------------|
| 1   | Display screen | 2   | Power switch |
| 3   | Status code    |     |              |

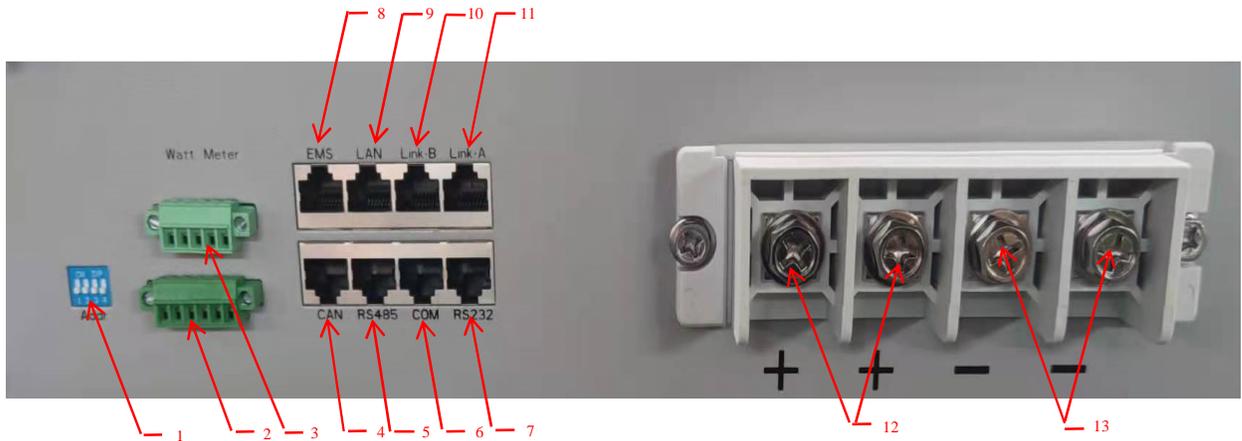


Figure 2.3. Interface definition of main controller module

| No. | Instructions                          | No. | Instructions                            |
|-----|---------------------------------------|-----|---|
| 1   | Address Dial Switch                   | 8   | Reserve                                 |
| 2   | Inverter CAN /RS485communication port | 9   | Reserve                                 |
| 3   | Reserve                               | 10  | Parallel communication port B           |
| 4   | Inverter CAN communication port       | 11  | Parallel communication port A           |
| 5   | Inverter RS485communication port      | 12  | Charge and discharge positive electrode |
| 6   | CAN upgrade communication port        | 13  | Charge and discharge negative electrode |
| 7   | RS232 communication interface         | 14  |   |

### Power switch

Power switch: turn on/off the input and output of the whole system.

### Display screen

Display screen: the interface can observe the operation status information SOC, SOH, charging and discharging power, alarm fault indication, charging and discharging status display and system status indication of the whole system.

### Status code

Status code: When the system status code is displayed as protection information, only the value will be displayed. When the system status code is displayed as fault information, err and fault value will be displayed. The definition of the alarm is shown in the table below:

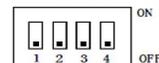
| numerical value | Alarm indication                  | numerical value | Alarm indication                |
|-----------------|-----------------------------------|-----------------|---------------------------------|
| 000             | No breakdown                      | 009             | Low discharge temperature       |
| 001             | Over voltage protection           | 011             | High ambient temperature        |
| 002             | Low voltage protection            | 012             | Excessive differential pressure |
| 003             | Charging over current protection  | 013             | Discharge circuit failure       |
| 004             | Discharge over current protection | 014             | Charging circuit fault          |
| 005             | Short circuit protection          | 015             | Cell failure                    |
| 006             | Charging high temperature         | 016             | NTC failure                     |
| 007             | High discharge temperature        | 017             | Voltage acquisition fault       |
| 008             | Low charging temperature          |                 |                                 |

### **NOTE:**

- When the system is charged, the display streamline gathers in the middle, and when it is discharged, the display streamline disperses to both sides

### Master address dial switch

Dial switch: 4-digit dial switch, address "0" and "1", as shown in the figure. After setting, you need to restart the system and activate it.

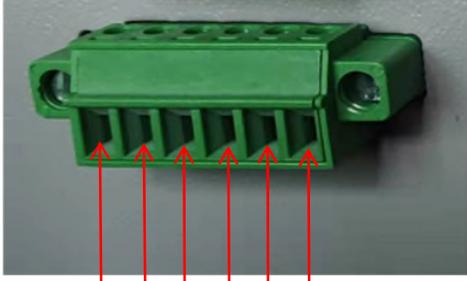


When the system stacks are in parallel, the communication between each stack is required. Both master and slave stacks need a hardware address configuration, and the hardware address can be set through the dial switch on the main board. The definition of the switch is shown in the table below.

| Address Coding | Dial Code Switch Position |     |     |     | Definition  |
|----------------|---------------------------|-----|-----|-----|---|
|                | #1                        | #2  | #3  | #4  |   |
| 1              | ON                        | OFF | OFF | OFF | The host stack can monitor the operation of other stack systems by setting the main switch position |
| 2              | OFF                       | ON  | OFF | OFF | Set to the slave stack 2  |
| 3              | ON                        | ON  | OFF | OFF | Set to the slave stack 3  |
| 4              | OFF                       | OFF | ON  | OFF | Set to the slave stack 4  |
| 5              | OFF                       | ON  | ON  | OFF | Set to the slave stack 5  |
| 6              | ON                        | OFF | ON  | OFF | Set to the slave stack 6  |
| 7              | ON                        | ON  | ON  | OFF | Set to the slave stack 7  |
| 8              | OFF                       | OFF | OFF | ON  | Set to the slave stack 8  |
| 9              | ON                        | OFF | OFF | ON  | Set to the slave stack 9  |
| 10             | OFF                       | ON  | OFF | ON  | Set to the slave stack 10   |

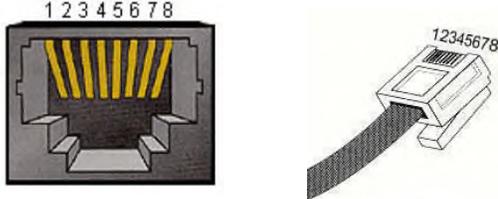
### Inverter CAN/RS485 communication port

Front panel CAN / RS485 communication port: Rear panel Can / RS485 communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

| Port definitions  | RJ45 Pin | Function   |
|---|----------|------------|
|  | 1        | RS485-B    |
|   | 2        | RS485-A    |
|   | 3        | RS485 -GND |
|   | 4        | CAN-L      |
|   | 5        | CAN-H      |
|   | 6        | CAN -GND   |

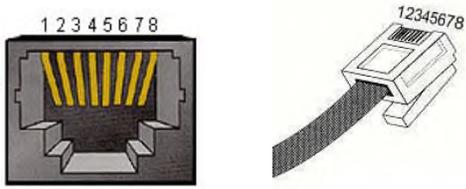
### RS232 communication port

RS232 communication port: (RJ11 port) comply with RS232 protocol (baud rate: 9600), for manufacturers or professional engineers debugging or service.

| Port definitions  | RJ11 Pin | Function       |
|---|----------|----------------|
|  | 1        | NC(NO connect) |
|   | 2        | NC(NO connect) |
|   | 3        | RS232-GND      |
|   | 4        | RS232-TX       |
|   | 5        | RS232-RX       |
|   | 6        | RS232-GND      |
|   | 7        | NC(NO connect) |
|   | 8        | NC(NO connect) |

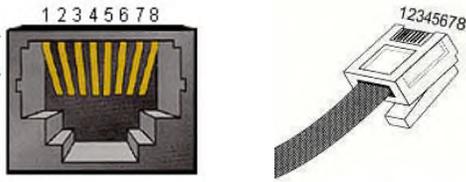
### COM communication port

COM communication port: Connect the monitoring host controller to query the data and monitor the running status of the system.

| Port definitions  | RJ45 Pin | Function  |
|---|----------|-----------|
|  | 1        | RS485-B   |
|   | 2        | RS485-A   |
|   | 3        | CAN -GND  |
|   | 4        | RS485-GND |
|   | 5        | RS485-GND |
|   | 6        | CAN -GND  |
|   | 7        | CAN-L     |
|   | 8        | CAN-H     |

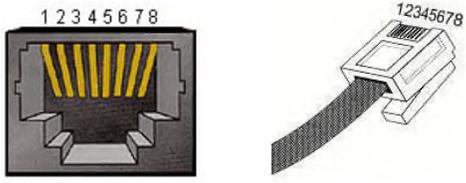
### Inverter RS485 communication port

Rear panel RS485 communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

| Port definitions  | RJ45 Pin | Function       |
|---|----------|----------------|
|  | 1        | RS485-B        |
|   | 2        | RS485-A        |
|   | 3        | RS485-GND      |
|   | 4        | NC(NO connect) |
|   | 5        | NC(NO connect) |
|   | 6        | RS485-GND      |
|   | 7        | RS485-B        |
|   | 8        | RS485-A        |

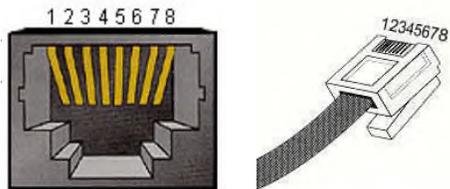
### Inverter CAN communication port

Rear panel CAN communication port: (RJ45 port) follows can protocol and RS485 protocol. For the output system information, the system master uses this interface to communicate with External inverter PC and other equipment.

| Port definitions  | RJ45 Pin | Function |
|---|----------|----------|
|  | 1        | CAN-H    |
|   | 2        | CAN-L    |
|   | 3        | CAN -GND |
|   | 4        | CAN-H    |
|   | 5        | CAN-L    |
|   | 6        | CAN -GND |
|   | 7        | CAN-H    |
|   | 8        | CAN-L    |

### Rear panel Link A / Link B communication port

Link A / B communication port: the definition of link a and B on the rear panel of the interface main controller module is the same. RS485 interface is used for parallel communication between the main controller modules, and up to 15 devices can be connected in parallel.

| Port definitions  | RJ45 Pin | Function       |
|---|----------|----------------|
|  | 1        | RS485-B        |
|   | 2        | RS485-A        |
|   | 3        | RS485-GND      |
|   | 4        | NC(NO connect) |
|   | 5        | NC(NO connect) |
|   | 6        | RS485-GND      |
|   | 7        | RS485-A        |

|  |   |         |
|--|---|---------|
|  | 8 | RS485-B |
|--|---|---------|



Figure 2.4. Battery module interface definition

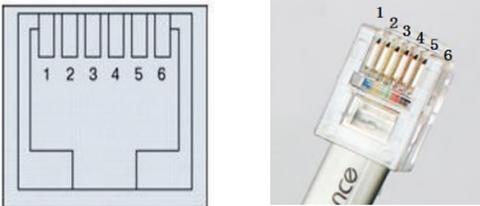
| No. | Instructions        | NO. | Instructions                  |
|-----|---------------------|-----|-------------------------------|
| 1   | Address Dial Switch | 2   | RS232 communication interface |
| 3   | Power switch        |     |                               |

### Power switch

Power switch: turn on / off the input and output of the whole battery module.

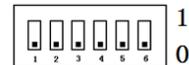
### RS232 communication port

RS232 communication port: (RJ11 port) comply with RS232 protocol (baud rate: 9600), for manufacturers or professional engineers debugging or service.

| Port definitions  | RJ11 Pin | Function  |
|---|----------|-----------|
|  | 1        | NC        |
|   | 2        | RS232-GND |
|   | 3        | RS232-TX  |
|   | 4        | RS232-RX  |
|   | 5        | RS232-GND |
|   | 6        | NC        |

### Address dial switch

ADD Switch: 6 ADD switches, “0” and “1”, refer to picture right. The settings will be active only after restart the battery.



When the battery communicates with the inverter, the address of the battery pack must be set to 1, and the address of the parallel slave should be greater than 1.

When the battery module is connected in parallel, cascading communication is required. Hardware address configuration is required for both the master module and the slave module, and the hardware address can be set by the dial switch on the board. The definition of the switch refers to the table below.

| Address Coding | Dial Code Switch Position |     |     |     |     |     | Definition  |
|----------------|---------------------------|-----|-----|-----|-----|-----|---|
|                | #1                        | #2  | #3  | #4  | #5  | #6  |   |
| 1              | ON                        | OFF | OFF | OFF | OFF | OFF | Set the master module, and the inverter communicates with the battery at that address |
| 2              | OFF                       | ON  | OFF | OFF | OFF | OFF | Set to the slave module 1   |
| 3              | ON                        | ON  | OFF | OFF | OFF | OFF | Set to the slave module 2   |
| 4              | OFF                       | OFF | ON  | OFF | OFF | OFF | Set to the slave module 3   |
| 5              | ON                        | OFF | ON  | OFF | OFF | OFF | Set to the slave module 4   |
| 6              | OFF                       | ON  | ON  | OFF | OFF | OFF | Set to the slave module 5   |
| 7              | ON                        | ON  | ON  | OFF | OFF | OFF | Set to the slave module 6   |
| 8              | OFF                       | OFF | OFF | ON  | OFF | OFF | Set to the slave module 7   |

### Battery anode and Battery cathode

Positive and negative connection: the battery modules are connected in parallel through the connecting terminals, and finally the main controller module is connected in parallel. The power cable adopts waterproof connector. When connecting the power plug, its corresponding interface must be aligned.



## 2.5. Sleep and Wake up

### 2.5.1 Sleep

- 1) The main controller module will turn off the main relay when the battery module has a charging and discharging MOS fault.
- 2) When the battery module has the output of under voltage protection battery shutdown, the main controller closes the main relay.

### 2.5.2 Wake up

When the system is in sleep mode, after completing the operation, the system will exit the low power mode and enter the normal operation mode:

- 1) Connect the charger, and the output voltage of the charger must be greater than 48V.
- 2) Connect the upper controller to observe whether the communication between the main controller and the battery is normal
- 3) Observe whether the upper controller has charging current.
- 4) After successful charging, the system will enter normal mode.

#### Note:

- when the DC bus has a voltage greater than 48VDC, the system main controller module is powered, and the main relay is closed to charge the battery module and establish communication. If the battery module cannot charge and establish communication, the main controller module will delay about 10s to disconnect the main relay.

## 2.6. Forced discharge mode

When the battery is in the sleep mode for under voltage protection and the minimum battery voltage is greater than 2.0V, turn off the power switch first, wait for 2S, and then turn on the power switch. The battery enters the forced discharge mode for 5 minutes. In the forced discharge mode, the battery powered main controller inverter works. If the inverter is connected to the commercial power to charge the system, the battery will exit the forced discharge mode and switch to the normal mode. If the on-load discharge current of the inverter exceeds 20A or there is no charging current within 5 minutes, the battery will enter the sleep mode again.

## 2.7. Automatic parallel

With the automatic parallel function; when the slave battery (address > 1) is powered on, the charge and discharge switch is in disconnect state. When the voltage difference between the slave battery and master battery is less than the condition of "the minimum voltage difference between the slave and the master", the master sends the command to the slave. After the slave receives the command from the master, the charge and discharge switch will be connected, and the slave is integrated into the master system to complete the parallel operation.

## 3. How to match communication with inverter

### 3.1. Supported brands

At present, the energy storage products of our company have completed matching tests with some series of inverters from the following brands, and we will continue matching tests with inverters of other companies. Please check our official website for the latest list of supporting brands. <http://www.homegridenergy.com>.



### 3.2. Inverter matching list

The list only lists the inverter manufacturers one of the same series products, in general, for inverter manufacturers in the same series of products, the communication protocols are the same. Our battery can communicate with the other products of same series inverter, if a series of products is encountered that cannot communicate, please contact us.

The following inverter matching list may not be up to date. The list may change according to the software version upgrade, and the reference manual may does not change immediately according to the software version upgrade. Therefore, if the user wants to get the latest inverter matching support, please browse the official website to check the relevant documents, <http://www.homegridenergy.com>.

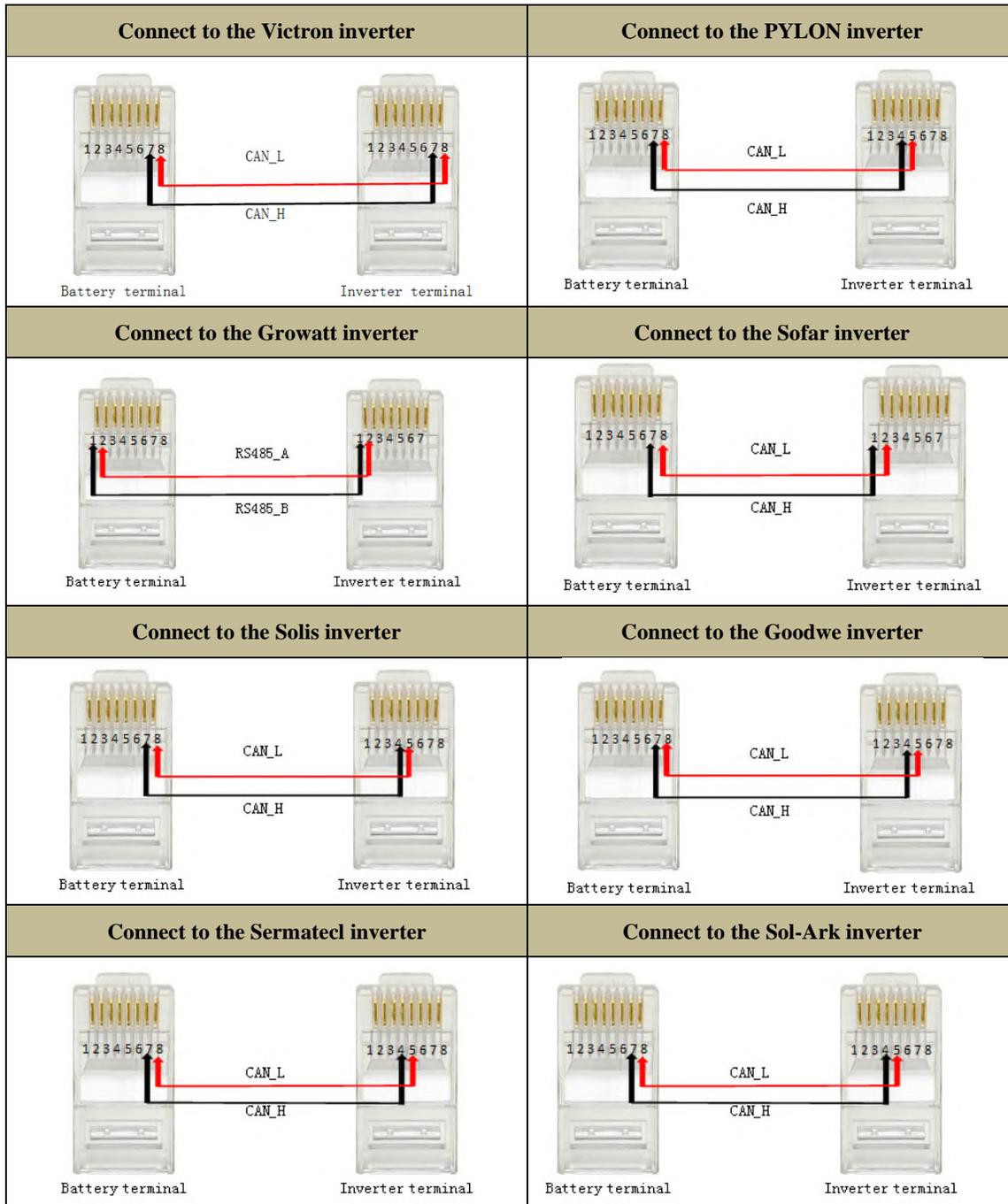
The inverter manufacturer may upgrade its software version, which may cause problems in the communication between our battery and the inverter. Therefore, before communicating with the inverter, please confirm whether the software version of the inverter is consistent with the list. If not, please contact us.

| Inverter  |                     |                  | Power Base Venus<br>Firmware version | Communication<br>mode |
|-----------|---------------------|------------------|--------------------------------------|-----------------------|
| Brand     | Type                | Protocol Version |                                      |                       |
| Growatt   | SPF 12KT HVM        | V1.22            | V439                                 | RS485                 |
| Studer    | Xtender-XTH-8000-48 | V1.0.3           |                                      | Xcom-CAN              |
| Sofar     | HYD5000-ES          | V6.0             |                                      | CAN                   |
| Solis     | RHI-5K-48ES         | V1.2             |                                      | CAN                   |
| Goodwe    | GW5048-EM           | V1.5             |                                      | CAN                   |
| Victron   | MultiPlus-II        | V6.0             |                                      | CAN                   |
| SMA       | S16.0H-12           | V2.0             |                                      | CAN                   |
| Sermatec  | SMT-5K-TL-UN        | V1.2             |                                      | CAN                   |
| Schneider | ConextTM Gateway    | V2.0             |                                      | RS485                 |
| PYLON     | SUNSYNK-5K-SG01LP1  | V1.2             |                                      | CAN                   |
| Sol-Ark   | Sol-Ark-12K-P       | V1.0             |                                      | CAN                   |
| Li_PLUS   | ZRStandard          | V1.2             |                                      | CAN                   |

### 3.3. Connection with inverter

This section will introduce how to connect the Stack'd Series products. Inverter manufacturers may upgrade their products, resulting in hardware communication interface changes. If communication is not possible in the application according to the following wiring method, please contact with us.

The CAN/RS485 communication port of the Stack'd Series is connected with the communication interface of inverter.



**NOTE:**

- The above CAN and RS485 communication connections are not connected the ground wire, in the application of relatively large interference, it is recommended to connect the ground wire, the ground wire connection method is a single-ended shielding line.

## 4.Safe handling of lithium batteries Guide

### 4.1. Schematic Diagram of Solution

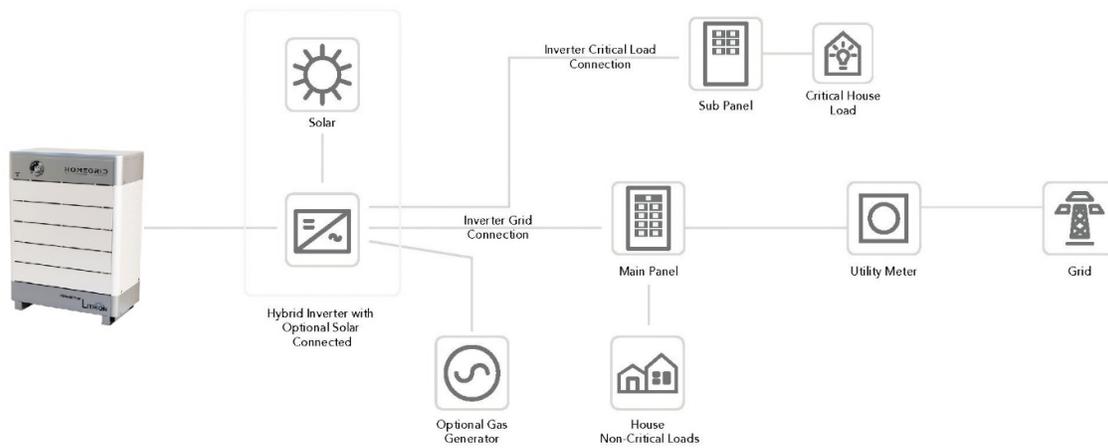


Figure 4.1. Schematic diagram of solution

### 4.2. Familiar with system

Be careful when unpacking the system. The whole system is heavy. Do not lift it with a pole. There are sliding wheels under the system to move. The weight of the battery can be found in the chapter "specifications".

Be familiar with batteries. The battery poles are located on the left side of the battery. The battery polarity is shown on the left side of the battery. The positive pole is represented by "+" and the negative pole by "-".



Figure 4.2. Side view of the whole system

### 4.3. Precautions before installation

Before installation, be sure to read the contents in Chapter 1 Safety Precautions, which is related to the operation Safety of installation personnel, please pay attention to these precautions.

### 4.4. Tools

The following tools are required to install the battery pack:



Wire cutter



Cable clamp



Screw Driver

#### **NOTE:**

● Use properly insulated tools to prevent accidental electric shock or short circuits. If insulated tools are not available, cover the entire exposed metal surfaces of the available tools, except their tips, with electrical tape.

### 4.5. Safety Gear

It is recommended to wear the following safety gear when dealing with the battery pack:



Insulated gloves



Safety goggles



Safety shoes

## 5. Installation

### 5.1. Package Items

Unpacking and check the Packing List:

#### 1) Connector

Each system will be equipped with a positive connector and a negative connector. The two connectors are not connected to the cable, and users can wire according to the actual application needs.



Positive connector



Negative connector

- 2) Each system will be equipped with a positive terminal and a negative terminal. The two connectors are not connected with cables so users can connect wires according to actual application needs. Where total charge and discharge current exceeds 250 amps, use the jumper connectors provided to connect each lug of the positive and each lug of the negative respectively.

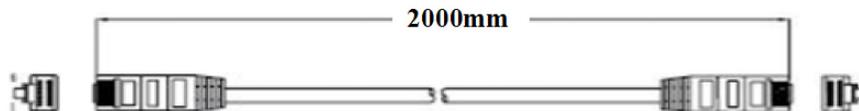


Positive connector



Negative connector

- 3) Communication connecting line between system and inverter



### 5.2. Installation Location

Make sure that the installation location meets the following conditions:

- ◆ The area is completely water proof.
- ◆ The floor is flat and level.
- ◆ There are no flammable or explosive materials.
- ◆ The ambient temperature is within the range from 0°C to 50°C.
- ◆ The temperature and humidity is maintained at a constant level.
- ◆ There is minimal dust and dirt in the area.
- ◆ The distance from heat source is more than 2 meters.
- ◆ The distance from air outlet of inverter is more than 0.5 meters.
- ◆ Do not install outside directly.
- ◆ Do not cover or wrap the battery case or cabinet.
- ◆ Do not place in a child or pet touchable area.
- ◆ The installation area shall avoid direct sunlight.

◆ There is no mandatory ventilation requirements for battery module, but please avoid installation in confined area. Aeration shall avoid high salinity, humidity, or temperature.



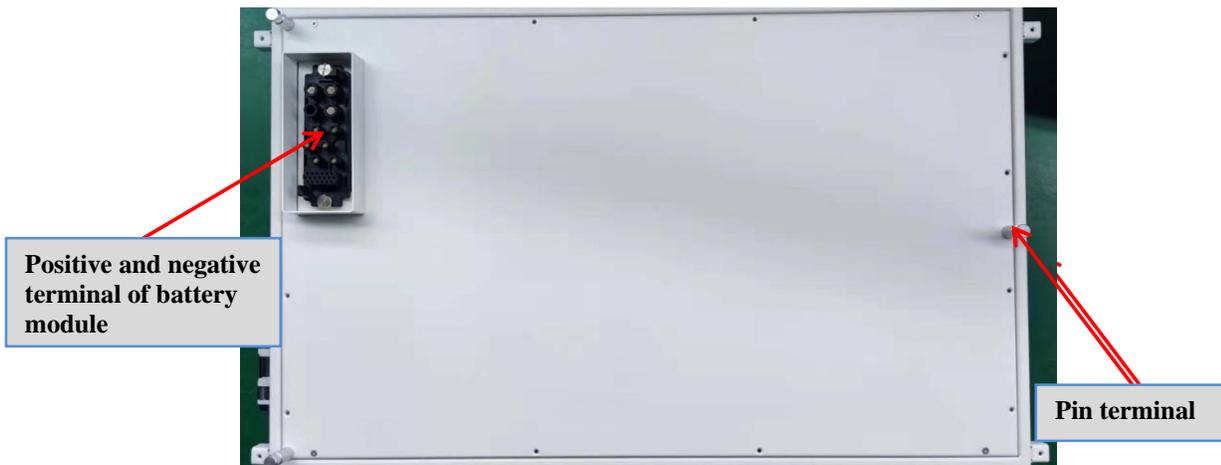
## CAUTION

If the ambient temperature is outside the operating range, the battery pack stops operating to protect, itself. The optimal temperature range for the battery pack to operate is 0°C to 45°C. Frequent exposure, to harsh temperatures may deteriorate the performance and life of the battery pack.

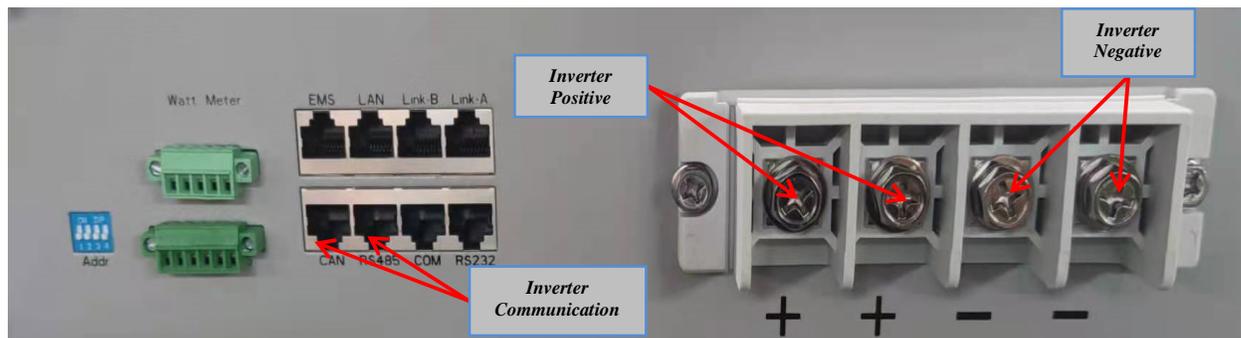
### 5.3. Parallel Installation

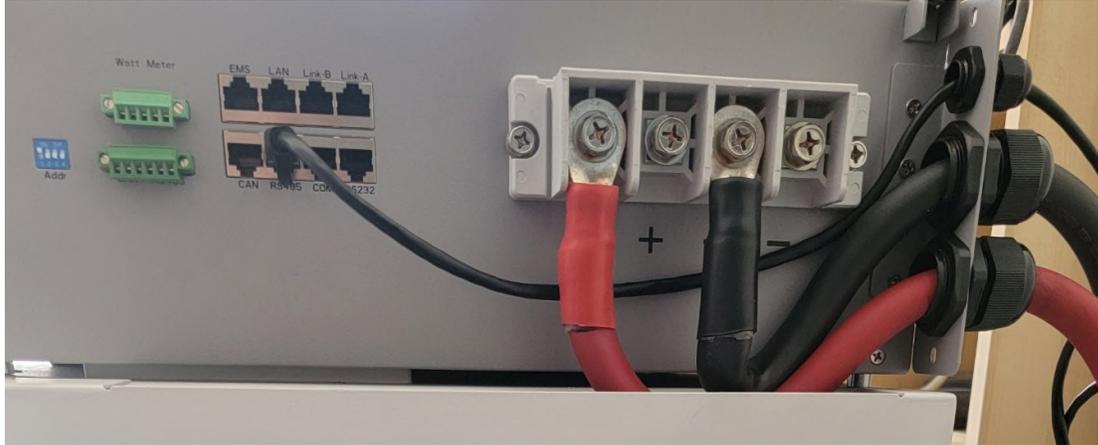
#### A. Stack the whole system

(1) Connect the battery module. The corresponding pin terminals are stacked one by one.

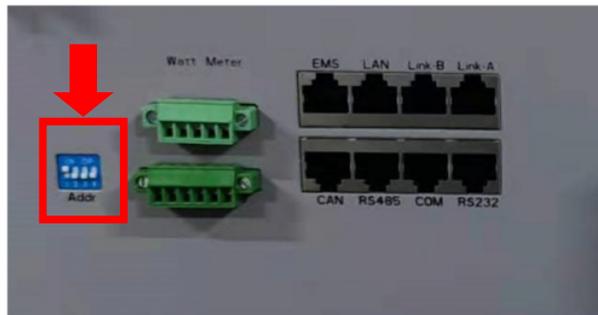


(2) Connect the main positive lug on the main controller to the positive connection of the inverter and connect the negative to the negative connection of the inverter. Connect the communication line and select the communication port CAN or RS485 according to the inverter protocol. Copper wire shall be sized according to the charge and discharge current of the inverter(s). Compression wire fittings can be replaced by the installer with conduit fittings if conduit is required by the local authority having jurisdiction.





(3) The master controller address should be set to "1" for communication between the master controller and the inverter. The master controller switch should be turned off before connecting with the inverter.



**NOTE:**

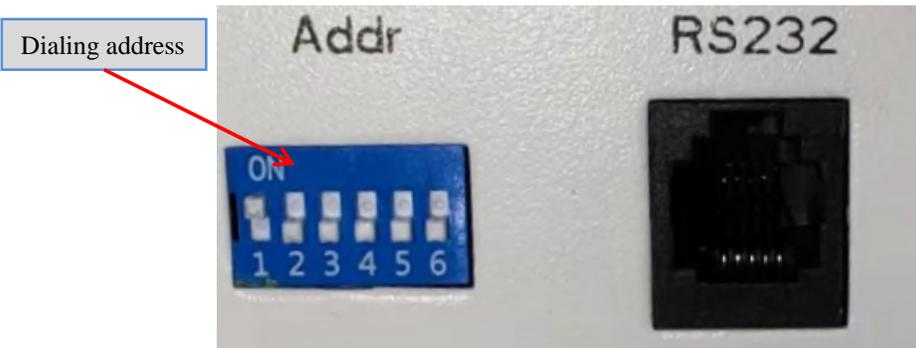
- Before starting the system, the operator should strictly check the connection terminal to ensure that the terminal is firmly connected, check whether the battery address is set correctly, and whether the inverter switches are in the off state. Do a good and thorough job in safety protection and turn on the inverter in the following order. When installing the system, remove the battery module bottom insulation skin.

B. Power on

Check all connection terminals and communication lines carefully.

Turn on the power and turn on all battery modules:

(1) Press the switch button on the front panel of lithium battery module "1"

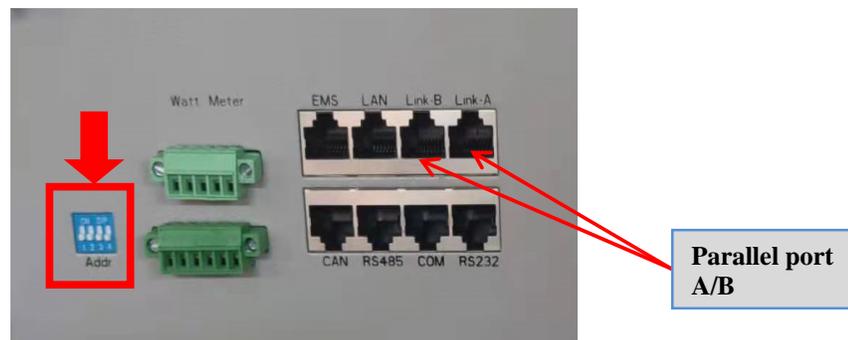


(2) After pressing the switch of the main controller box for about 6 seconds, the main controller box will pass the self-inspection, and then there will be a sound from the internal relay and

check the no fault alarm on the display screen. System startup complete.



(3) The master address of the slave is "2" and the parallel port is connected to the communication cable of the host parallel port. The upper controller can monitor the parallel port.



NOTE: After installation, do not forget to register online for full warranty:  
<http://www.homegridenergy.com>

**NOTE:**

- In order to avoid current pulse during start-up, predischage function should be added to the high voltage system. All connected batteries should be turned on first, and then the circuit breaker between the high voltage system and inverter should be turned on.
- Circuit breaker shall be installed between high voltage system and inverter to protect system safety.
- All installation and operation must comply with local electrical standards.

## 6. Troubleshooting Steps

### 6.1. Problem determination based on

- 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.

### 6.2. Preliminary determination steps

1) The system cannot be turned on, and the power indicator is not illuminated or flashing. If the external switch of the system is turned on, the running light flashes, and the external power supply voltage exceeds 48V, the system still cannot be turned on for operation, please contact the dealer or HomeGrid warranty support.

2) The system can be turned 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:

a) Temperature: Above 55C or under -10C , the system could not work.

Solution: to move system to the normal operating temperature range between 0C and 45C

b) Current: If current is greater than 400A, battery protection will turn on.

Solution: Check whether current is too large or not, if it is, change the settings on the inverter side.

c) High Voltage: If charging voltage above 57V, the battery protection will turn on.

Solution: Check whether voltage is too high or not, if it is, change the settings on the inverter charging side.

d) Low Voltage: When the battery discharges to 44V or less, battery protection will turn on.

Solution: Charge the battery for some time, the red light should then turn off

Excluding the four points above, if the fault still cannot be located, turn off battery and contact HomeGrid warranty support.

### 7.3. The battery cannot be charged or discharged

1) Cannot be charged:

Disconnect the power cables, measure voltage on power side, if the voltage is 53~54V, restart the battery, connect the power cable and try again, if this still does not work, turn off battery and contact distributor or HomeGrid warranty support.

2) Unable to discharge:

Disconnect the power cables and measure voltage on battery side, if it is under 44V, charge the battery; if voltage is above 48V and still cannot discharging, turn off battery and contact HomeGrid warranty support.

## 7.Storage,Transportation and Emergency Situations

### 7.1. Storage

Recharge and maintain the battery pack regularly every three months to ensure the battery is in the best condition.

### 7.2. Transportation

Battery packs need to be packed before they can be shipped, in original packaging, during transportation, severe impact, extrusion, direct sunlight and rain should be protected against and avoided.

### 7.3. Emergency Situations

#### (1). Leaking Batteries

If the battery pack leaks electrolyte, avoid contact with the leaking liquid or gas. If exposed to any leaking substance, immediately perform the actions described below. Inhalation: Evacuate the contaminated area and seek medical attention.

Contact with eyes: Rinse eyes with flowing water for 15 minutes and seek medical attention.

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

NO WATER! Only dry powder fire extinguisher can be used; if possible, move the battery pack to a safe area before it catches fire.

#### (3). Wet Batteries

If the battery pack is wet or submerged in water, do not allow any person access, and then contact HOMEGRID or an authorized dealer for technical support.

#### (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 HOMEGRID or an authorized dealer.

#### **NOTE:**

- Damaged batteries may leak electrolyte or produce flammable gas.
- In case a damaged battery needs recycling, it shall follow the local recycling regulation (ie. Regulation (EC) N° 1013/2006 among European Union) to process and using the best available techniques to achieve a relevant recycling efficiency.
- Any further questions, please contact HOMEGRID: [info@homegridenergy.com](mailto:info@homegridenergy.com)



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Official website: [www.homegridenergy.com](http://www.homegridenergy.com)