



UNLEASHING SUSTAINABLE POWER

USER MANUAL

IONX'S INNOVATIVE ENERGY STORAGE SOLUTIONS



Hv-215kwh

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SAFETY REQUIREMENT

I. VALIDITY

This document is used for quick start-up of the 215Kwh HV Battery: HV-215kwh. The information in this user manual is subject to change due to product updates or other reasons. We reserve the right to explain the details of the change.

II. SAFETY

The HV-BATT battery is a high voltage DC system, and it must be operated by authorized person. Read all safety instructions carefully before operating any work and observe them at all times when working on the system.

INCORRECT OPERATION OR WORK MAY CAUSE:

- Injury or death to the operator or a third party
- Damage to the system hardware and other properties.

NOTE BEFORE INSTALLATION:

1. Check the battery to see if it has an intact appearance, complete contents, and the correct model.
2. Use Insulating tools and wear personal protective equipment (PPE) when operating the equipment.
3. Follow the installation, operation and configuration instructions.
4. The manufacturer shall not be held liable for equipment damage or personal injury if you do not follow the instructions.

NOTE IN INSTALLATION AND MAINTENANCE:

1. The DC cables connected to the system may be live. Touching non-insulation live DC cables' parts may result in death or serious injury due to electric shock.
2. Disconnect the battery from a voltage source and make sure it cannot be reconnected before checking.
3. Do not remove any power cable on load (in charging or discharging status).
4. Wear suitable personal protective equipment for all work on the system.

CHECK BEFORE POWER ON:

1. The equipment is installed in a clean and flat place that is well-ventilated and easy to operate.
2. Ensure that the PE cable, the battery power copper bar, the inverter power cable, the communication cable, and the AC cable are connected correctly and securely.
3. Cable ties are intact, routed properly and evenly.

III. TARGET GROUP

Instructions in this document can only be performed by qualified persons who must have the following knowledge and skills:

- Knowledge of basic electrical systems and safety requirements.
- Knowledge of lithium batteries work and PCS.
- Knowledge of following local connection requirements and safety regulations.
- Knowledge and skills in the installation and commissioning of Solar or battery energy storage system.

MUST WEAR INSULATING PROTECTION PRODUCTS!



1. BATTERY SYSTEM INSTALLATION STEPS

1.1. INSTALLATION PREPARATION

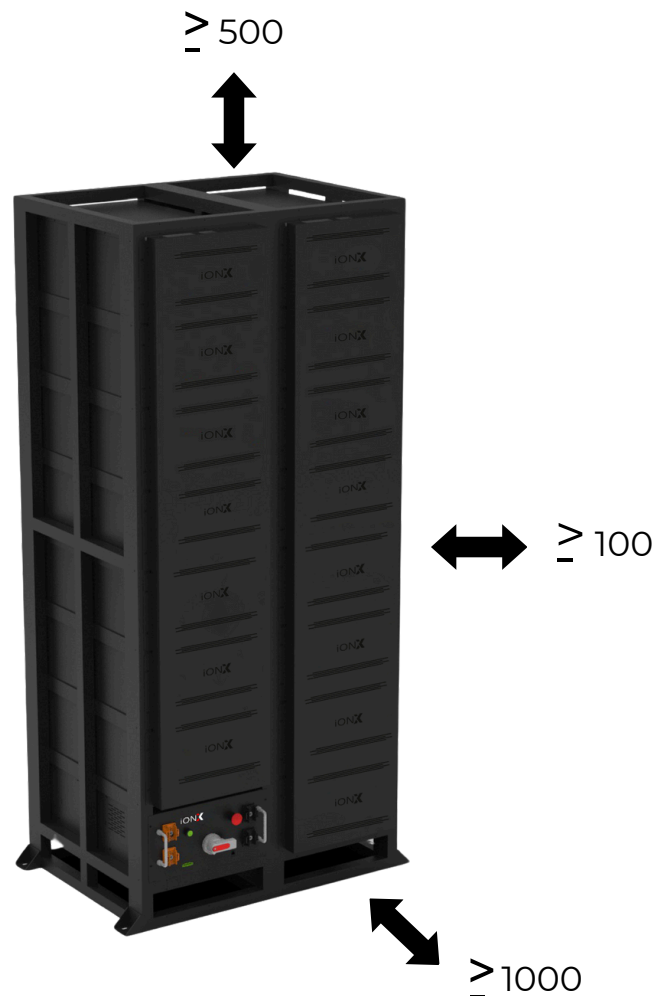
SITE PLANNING & INSTALLATION ENVIROMENT

- Do not install the battery clusters in a high, low-temperature, or wet place that exceeds the specifications.
- Keep the battery clusters away from water sources, heat sources, and flammable and explosive materials.
- Avoid installing battery clusters in environments with direct sunlight, dust, volatile gases, corrosive substances, and excessive salts. It is not allowed to install the battery clusters in a working environment with metallic conductive dust.

SPACE RESERVATION

- Reserve certain operation and ventilation space around the rack.
- Reserve at least 2000mm of operation and ventilation space in front.
- Reserve at least 500mm of operation space at the top.
- Reserve at least 100mm of ventilation space on the back.

SCHEMATIC DIAGRAM OF RESERVED SPACE:



TOOL METER PREPARATION:

NOTE: Use insulation tools to separate signal lines from strong current or high voltage lines to avoid electric shock.

TABLE 1.1 INSTALLATION TOOL LIST













| NAME | PHOTO | NAME | PHOTO |
|--------------------|---|----------------------|---|
| Impact Drill |  | Torque Socket Wrench |  |
| Torque Wrench |  | Diagonal Plier |  |
| Crimping Plier |  | Wire Stripper |  |
| Torque Screwdriver |  | Multimeter |  |
| Cable Tie |  | Insulation Tape |  |
| Herringbone Ladder |  | Rubber Hammer |  |

TABLE 1.2 PERSONAL PROTECTIVE EQUIPMENT LIST







| NAME | PHOTO | NAME | PHOTO |
|--------------------|---|--------------|---|
| Safety Gloves |  | Safety Shoes |  |
| Protective Goggles |  | Dust Mask |  |

TABLE 1.3 MECHANICAL EQUIPMENT LIST

| NAME | PHOTO | NAME | PHOTO |
|-------------------|---|------------------|--------|
| Electric Forklift |  | Load-bearing 3 T | Unit 1 |
| Manual Forklift |  | Load-Bearing 2 T | Unit 1 |

HANDLING AND UNPACKING INSPECTION

NOTE: To avoid turnover, fix the racked box to the forklift with a rope before moving. Move the rack carefully, as any impact or drop may cause damage to the rack. Once the box is placed, carefully remove the packaging to avoid scratching the rack. Keep the rack stable during the disassembly and assembly. If the rack installation environment is poor and long-term storage is required after unpacking, please take dust-proof measures. Ship the battery modules separately.

OPERATING STEPS

1. Use a forklift to transport the rack, battery box, and related accessories to the specified location.
2. Check whether the appearance and packaging of the rack, battery box, and related accessories are intact.
3. Remove the outer packaging.
4. Check whether the rack, battery box, and related accessories are intact.
5. After confirming the rack is intact, move it to the specified location.

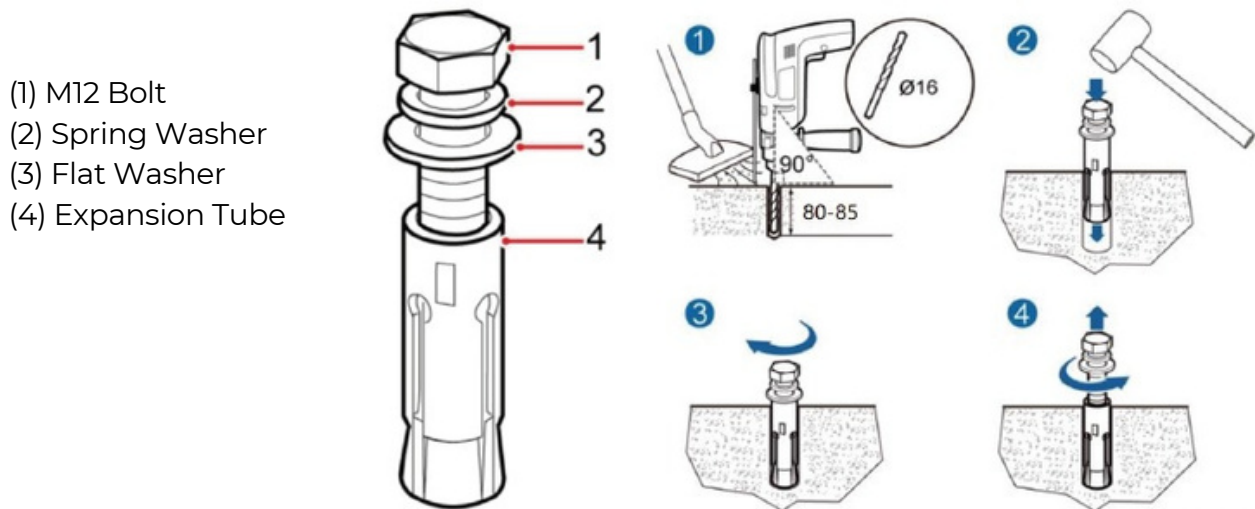
1.2. BATTERY CLUSTER INSTALLATION

RACK INSTALLATION

OPERATING STEPS

Step 1: Determine the rack installation position, and mark the mounting holes on the installation ground according to the drawing:

Step 2: Use an impact drill to drill holes in the mounting holes of the expansion bolts and then install four M12 expansion bolts into the mounting holes.



1. Punch holes in the concrete floor with an impact drill to a depth between 80mm & 85mm.
2. Tighten the expansion bolt slightly and place it vertically into the hole. Hit the expansion bolt with a rubber hammer until the expansion tube is all in the hole.
3. Pre-tighten the expansion bolts.
4. Unscrew the bolts and remove the spring washers and flat washers.

Step 3: Move the rack to the mounting location.

Step 4: Thread four M12 x 120 expansion bolts through the rack base holes, insert them into the expansion bolt mounting holes in the ground, and tighten the expansion bolts.

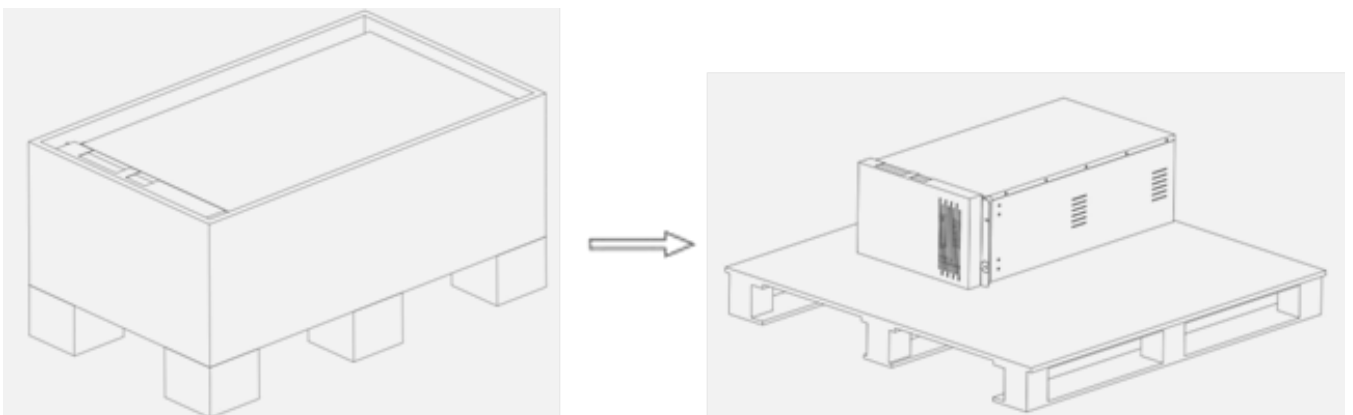
BATTERY MODULE INSTALLATION

Install the battery module and the main control box.

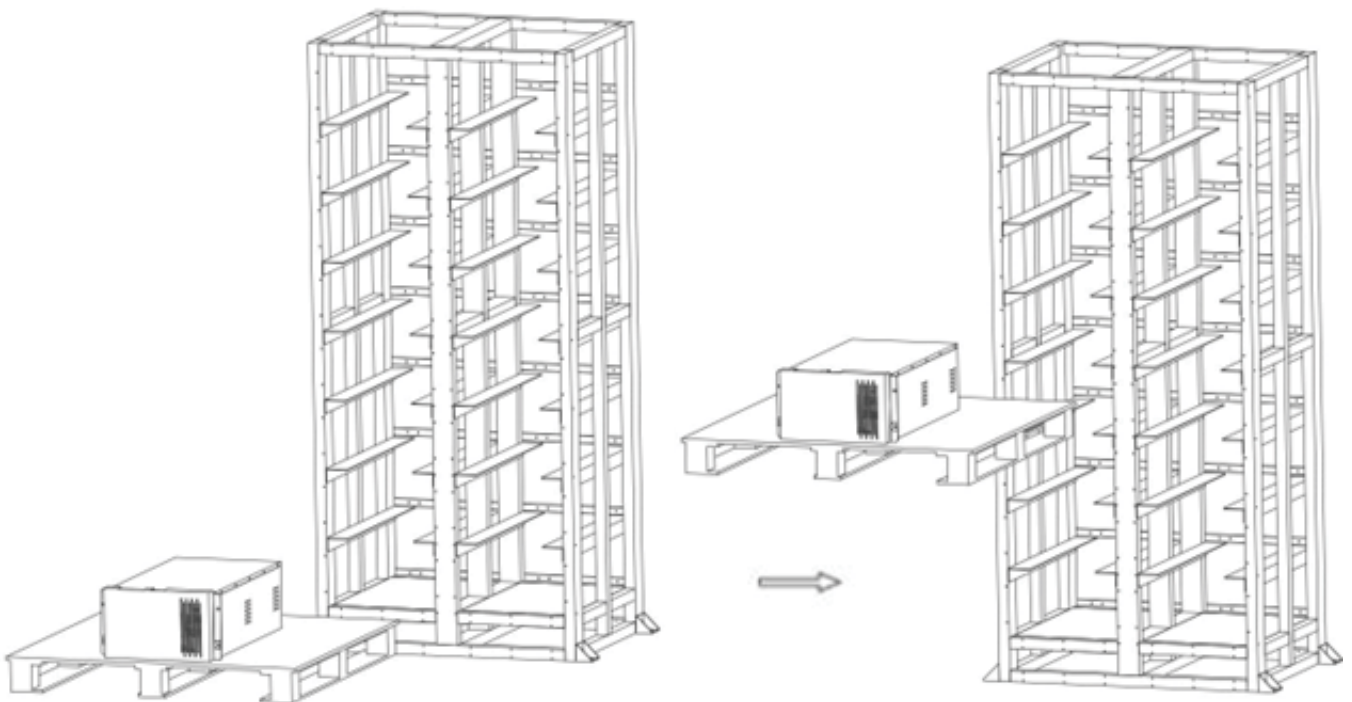
NOTE: Before installing the battery, please read the battery-related safety precautions carefully. Wear insulating gloves and use insulating tools during installation. Please place the battery correctly to avoid vibration and shock. When installing the battery module, place it from bottom to top and left to right to prevent the center of gravity from tipping over. The battery box is heavy and needs to be transported and lifted with a lifting platform with protection around it; if conditions are limited, 4 people are required to move it at the same time. The installation method of the main control box is the same as the battery box.

OPERATING STEPS

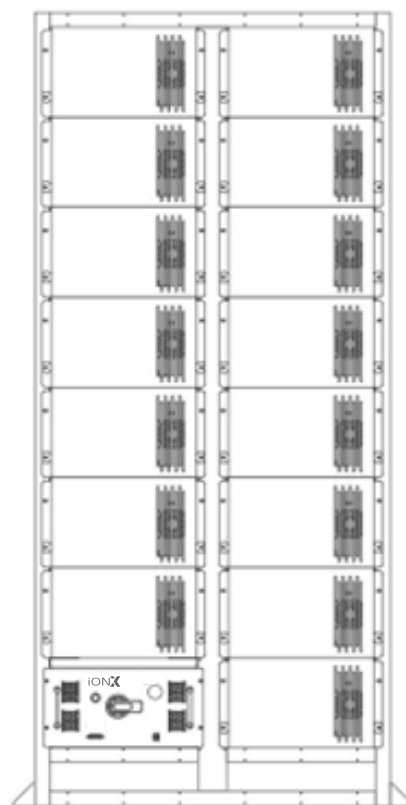
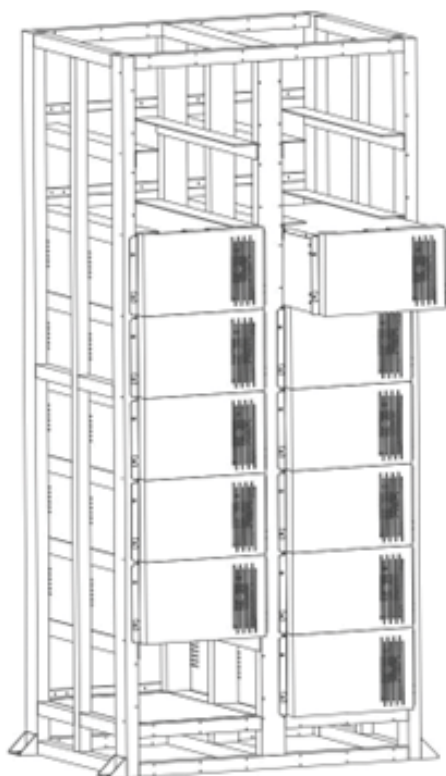
Step 1: Remove the wooden box and move the battery box to a flat pallet.



Step 2: Use an electric forklift to move the battery box to the front of the rack and raise the battery box to the corresponding height.



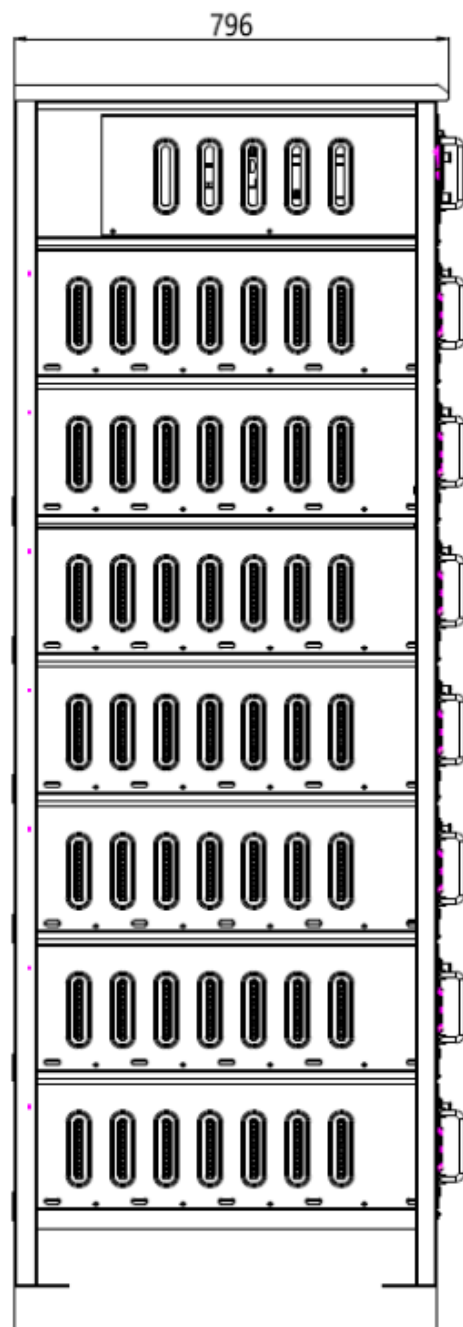
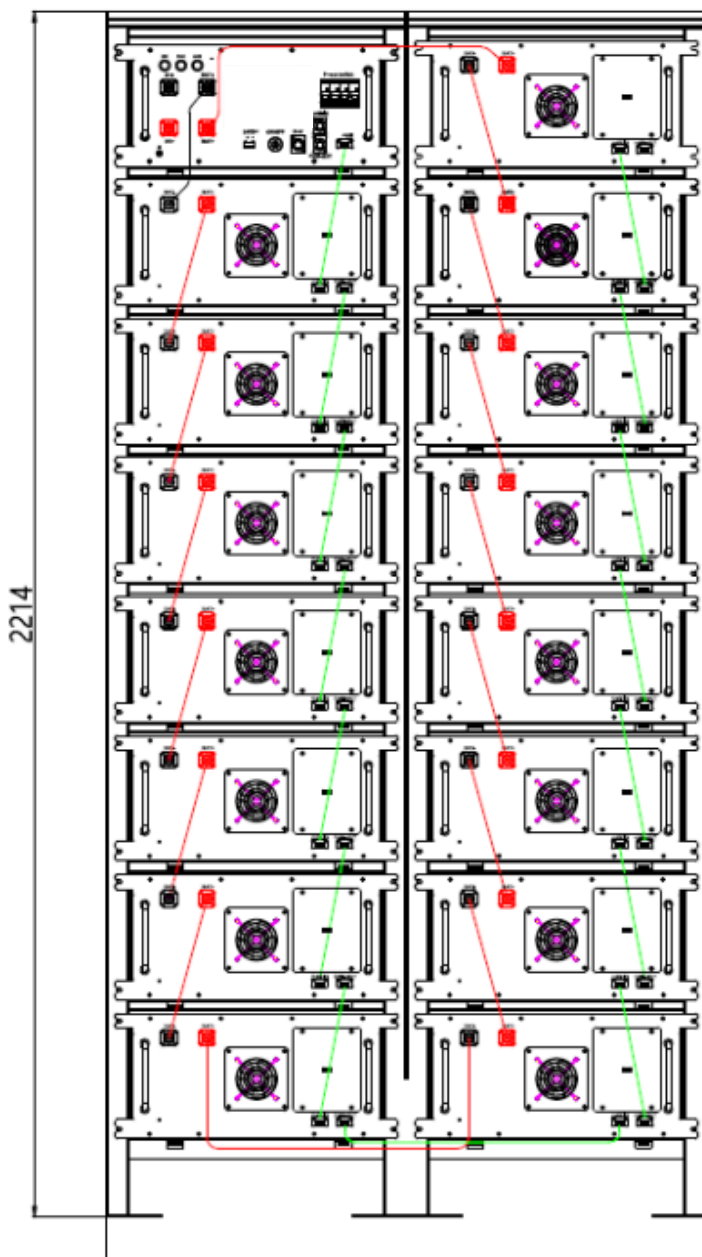
Step 3: Push the battery box inside the rack.



Step 4: Fix the battery box and the rack with lock screws

M6*15 Assembling Bolt

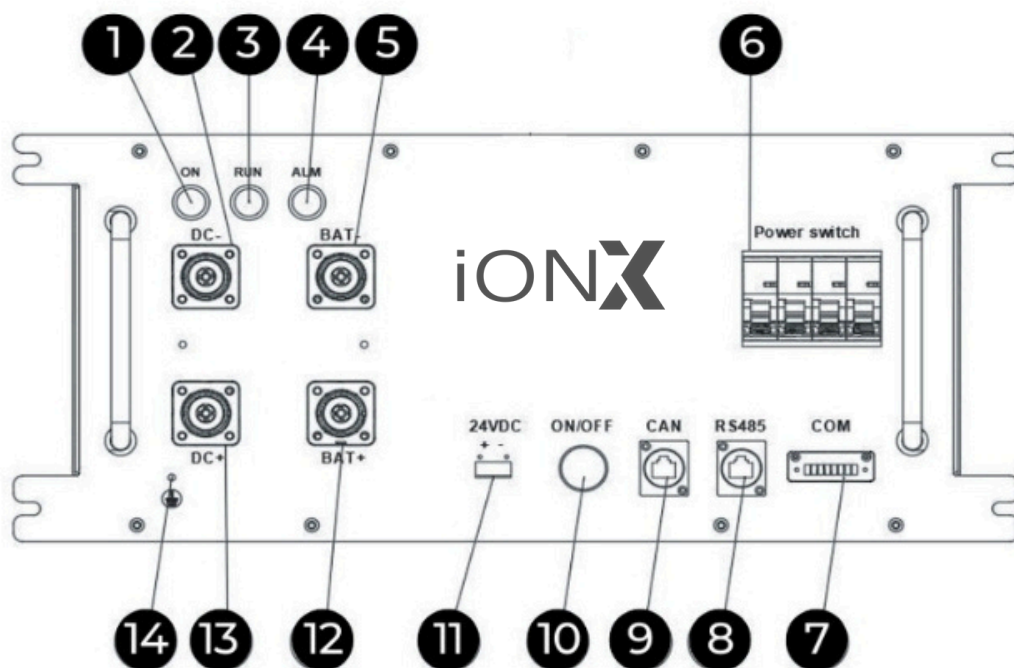




2.CABLE CONNECTION

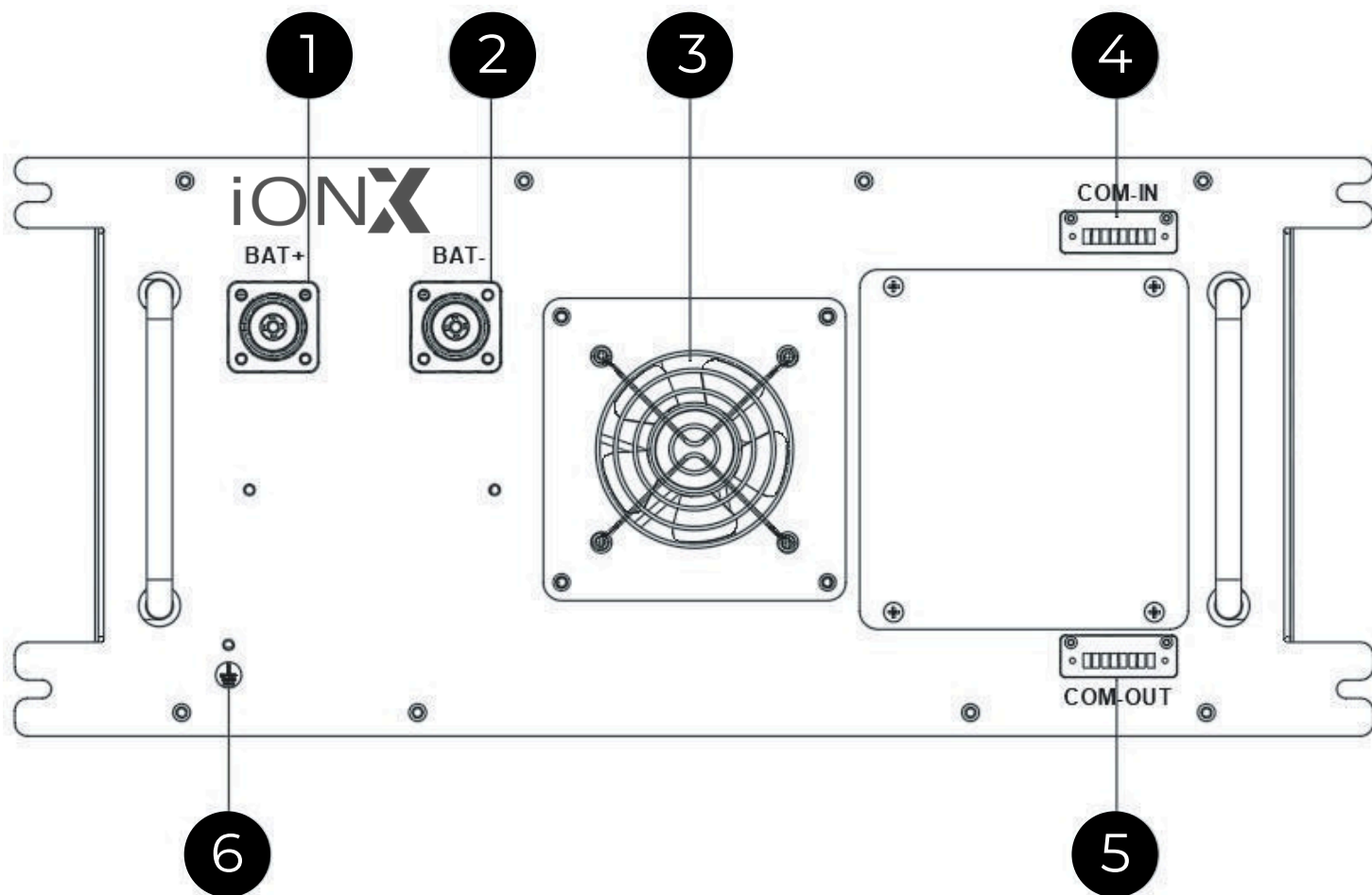
2.1. INTERFACE INTRODUCTION

MAIN CONTROL BOX AND PORT FUNCTION INTRODUCTION



| NO. | NAME | DESCRIPTION |
|-----|--------------|-----------------------------------|
| 1 | ON | POWER ON |
| 2 | DC- | SYSTEM OUTPUT |
| 3 | RUN | OPERATION INDICATOR |
| 4 | ALM | ALARM INDICATOR |
| 5 | BAT- | BATTERY NEGATIVE INPUT |
| 6 | POWER SWITCH | THE BMS POWER SUPPLY SWITCH |
| 7 | COM | COMMUNICATION WITH BATTERY MODULE |
| 8 | RS485 | BATTERY NEGATIVE INPUT |
| 9 | CAN | COMMUNICATION WITH INVERTERS |
| 10 | ON/OFF | START SWITCH |
| 11 | 24VDC | 24VDC POWER |
| 12 | BAT+ | BATTERY POSITIVE INPUT |
| 13 | DC+ | SYSTEM OUTPUT |
| 14 | GROUND POINT | |

BATTERY MODULE



| NO. | NAME | DESCRIPTION |
|-----|--------------|---|
| 1 | BAT+ | BATTERY MODULE POSITIVE POLE (ORANGE) |
| 2 | BAT- | BATTERY MODULE NEGATIVE POLE (BLACK) |
| 3 | FAN | |
| 4 | COM-IN | CONNECTION POSITION OF BATTERY MODULE COMMUNICATION |
| 5 | COM-OUT | CONNECTION POSITION OF BATTERY MODULE COMMUNICATION |
| 6 | GROUND POINT | |

MAIN CONTROL BOX PORT DESCRIPTION

| NO. | NAME | PORT | DESCRIPTION |
|-----|---------------------|-------|---|
| 1 | B+ | | CONNECT WITH BATTERY TOTAL + |
| 2 | B- | | CONNECT WITH BATTERY TOTAL - |
| 3 | SWITCH/LIGHT | | CONTROL THE INPUT AND OUTPUT OF THE BATTERY |
| 4 | STOP | | STOP THE OPERATION OF THE HV BOX |
| 5 | BMU OUT | 2H | PARALLEL OUTPUT |
| | | 2L | |
| | | I01 | |
| | | VCC | |
| | | GND | |
| 6 | BMU IN | 2H | PARALLEL INPUT |
| | | 2L | |
| | | I02 | |
| | | VCC | |
| | | GND | |
| 7 | SCU | 1 H | COMMUNICATION PORT BETWEEN THE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL (SCU) |
| | | 1 L | |
| | | 1 H-R | |
| | | 1 L-R | |
| | | 1 A | |
| | | 1 B | |
| | | 1 A-R | |
| | | 1 B-R | |
| 8 | DISCONNECTOR | | CONTROL THE INPUT AND OUTPUT OF THE EXTERNAL POWER SUPPLY OF THE BATTERY |
| 9 | MM07-02N | V+ | |
| | | V- | |
| | | / | |
| 10 | DI/ DO | DI7L | POWER SUPPLY FOR CABINET INDUCTOR LIGHTS |
| | | V+ | |
| | | DO7L | |
| | | V+ | |
| | | DO8L | |
| | | V+ | |
| 11 | FAN POWER OUTLET | VFS+ | POWER SUPPLY FOR BATTERY FAN |
| | | VFS- | |
| 12 | LAN | | USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL |
| 13 | P- | | TO BATTERY COMBINER CABINET BAT - |
| 14 | P+ | | TO BATTERY COMBINER CABINET BAT + |

CABLE WIRING PREREQUISITES

1. The system is not powered on.
2. Turn the disconnecting switch of the main control box to“OFF”.
3. The main control box “Switch / Light” DC circuit breaker is in the OFF state.
4. The combiner cabinet is in the OFF state.
5. PCS battery circuit breaker (Battery input) is in the OFF state.
6. PCS grid circuit breaker (AC input) is in the OFF state.
7. PCS maintenance switch (BYPASS) is in the OFF state.
8. PCS load circuit breaker (AC output) is in the OFF state.
9. PCS photovoltaic circuit breaker (PV input) is in the OFF state.
10. Wear insulating gloves and insulating shoes

CABLE CONNECTION STEPS

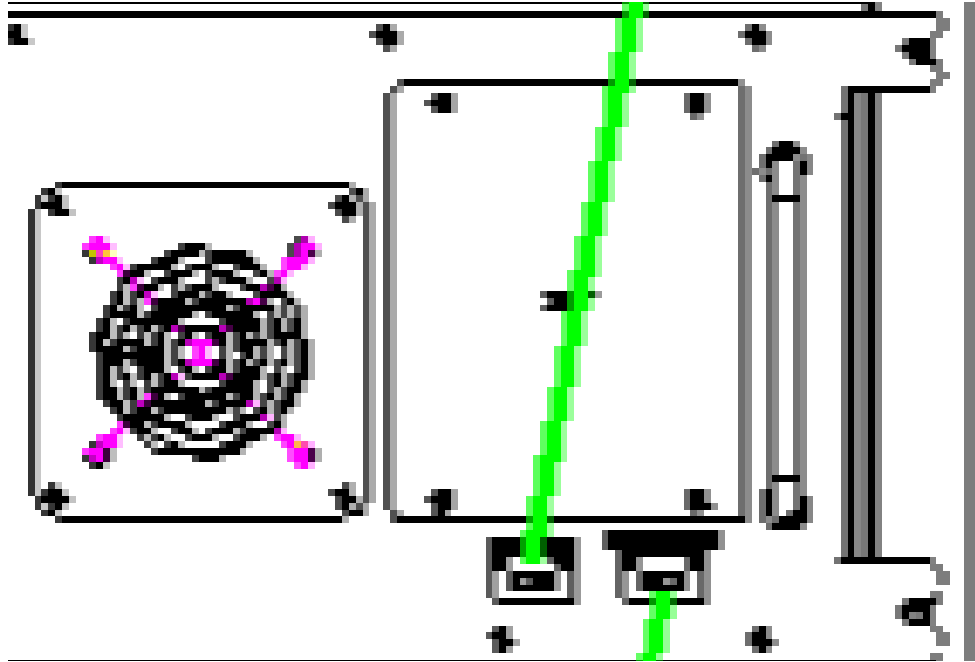
- 1.Connect the ground wire. (For details please see 2.2 ground wire and connection)
- 2.Connect the battery system communication cable, and connect the battery system and PCS communication cable. (For details please see 2.3)
- 3.Connect the battery system power cable, and connect the battery system demand PCS power cable. (For details please see 2.4)

2.2 GROUND WIRE CONNECTION



2.3 CONNECT COMMUNICATION CABLE

Connect the ground wire of the battery rack system.

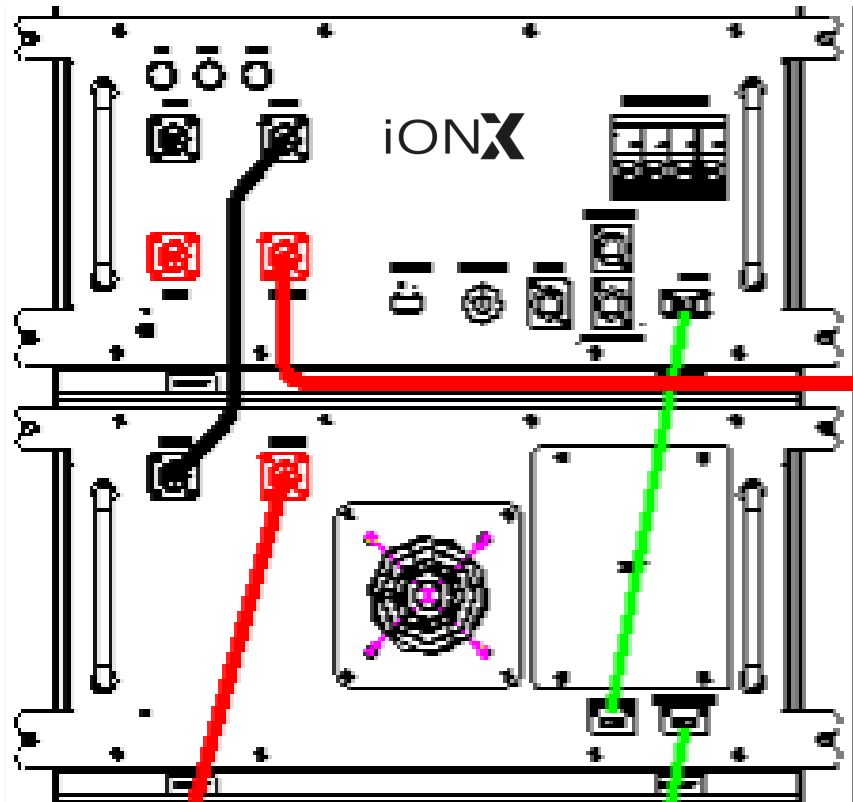


BMU PORT DESCRIPTION

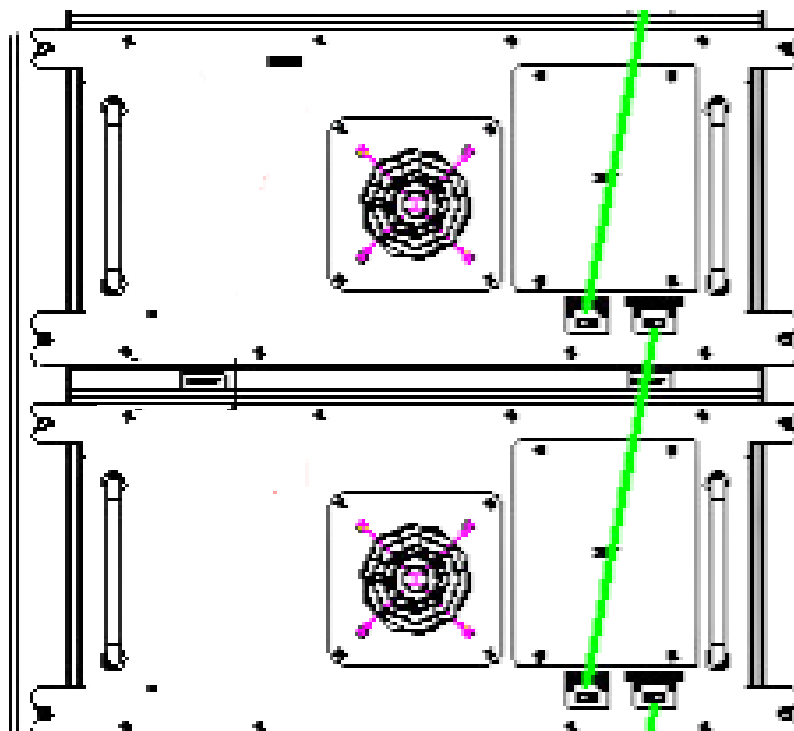
| NO. | DESCRIPTION |
|-----|--|
| 1 | VOLTAGE AND TEMPERATURE COLLECTION PORT, CONNECTED TO THE BATTERY TO COLLECT VOLTAGE AND TEMPERATURE |
| 2 | DO/DI INTERFACE, STANDBY |
| 3 | BMU IN, MODULE POWER SUPPLY (MAIN CONTROL MODULE OUTPUT), IN CONJUNCTION WITH THE MAIN CONTROL MODULE, ACHIEVES AUTOMATIC ADDRESS CODING FOR ALL SLAVE CONTROL MODULES, CAN (NON ISOLATED), AND COMMUNICATION WITH THE MAIN CONTROL MODULE. |
| 4 | BMU OUT, MODULE POWER SUPPLY (MAIN CONTROL MODULE OUTPUT), IN CONJUNCTION WITH THE MAIN CONTROL MODULE, ACHIEVES AUTOMATIC ADDRESS CODING FOR ALL SLAVE CONTROL MODULES, CAN (NON ISOLATED), AND COMMUNICATION WITH THE MAIN CONTROL MODULE. |

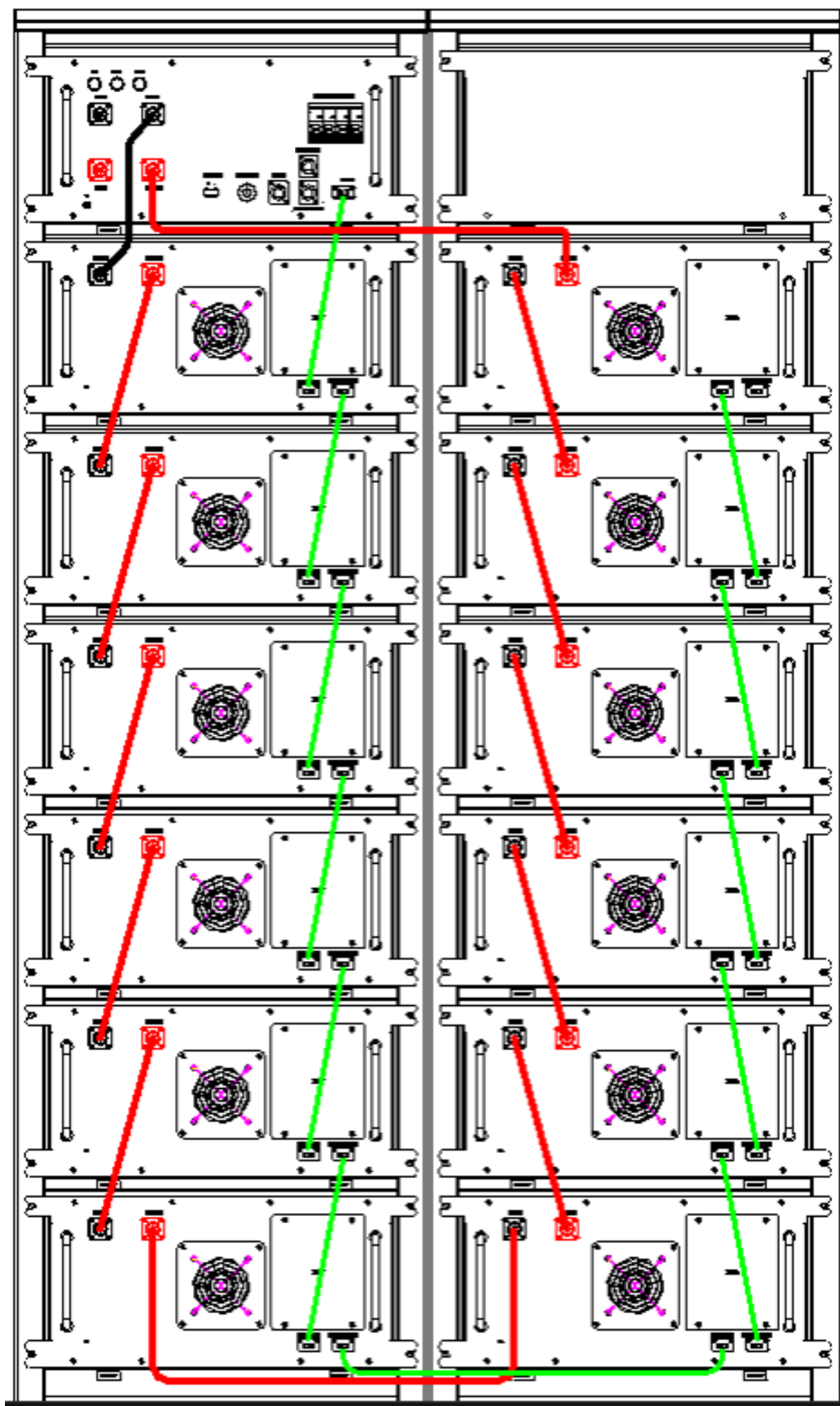
COMMUNICATION CABLE CONNECTION STEPS:

1. Connect the BMU in the main control box to the BMU C interface of the first battery.



2. Connect the D port of the first battery to the C port of the second battery. Subsequent connections follow this pattern.





3. MONITORING

3.1 3 LEVEL BATTERY MANAGEMENT SYSTEM BREAKDOWN

3.1 3 LEVEL BATTERY MANAGEMENT SYSTEM BREAKDOWN

The protection and monitoring functions of the battery system are realized through a BMS with a three-level management architecture:

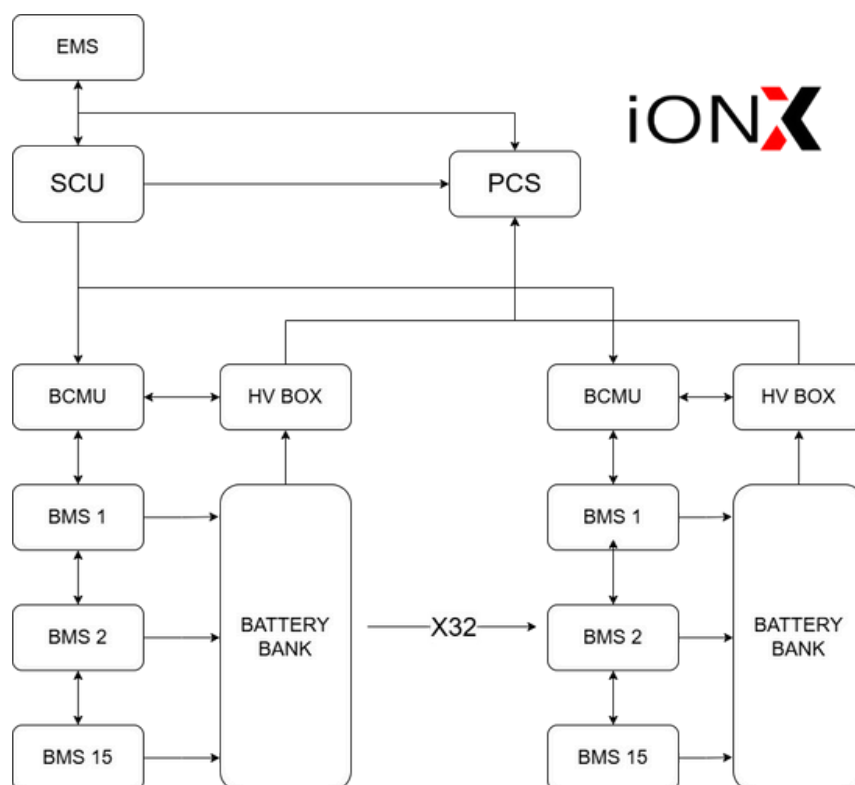
1. **BMU** (Battery Management Unit),
2. **BCMU** (Battery Cluster Management Unit), and
3. **SCU** (System Control Unit).

The main functions of the BMS at each level are as follows:

BMU (slave control, built into the battery pack): Monitor the voltage and temperature of individual cells, transmit these real-time data to the upper-level BCMU via CAN protocol and control the voltage equalization of individual cells.

BCMU (master control, built in the HV control box): Monitor the total voltage and total current of the entire battery cluster, transmit these real-time data to the upper level SCU via CAN protocol, calculate the SOE, SOH and insulation resistance of the battery cluster, control the relay switch to protect battery cluster based on real-time battery status, alarm and protection information.

SCU (central control, integrated in the electrical room): Collect the information from the lower-level BCMU, calculate and evaluate the SOE, maximum charge/discharge power, and SOH of the battery stack with multiple parallel-connected battery clusters, enable interlinked control with the automatic fire suppression system, A/C system and UPS via RS485, communicate with the PCS via CAN and with the EMS via Ethernet or RS485, receive dispatching commands from the higher-level management system to coordinate operation with the PCS.



3.2 2 LEVEL BATTERY MANAGEMENT SYSTEM BREAKDOWN

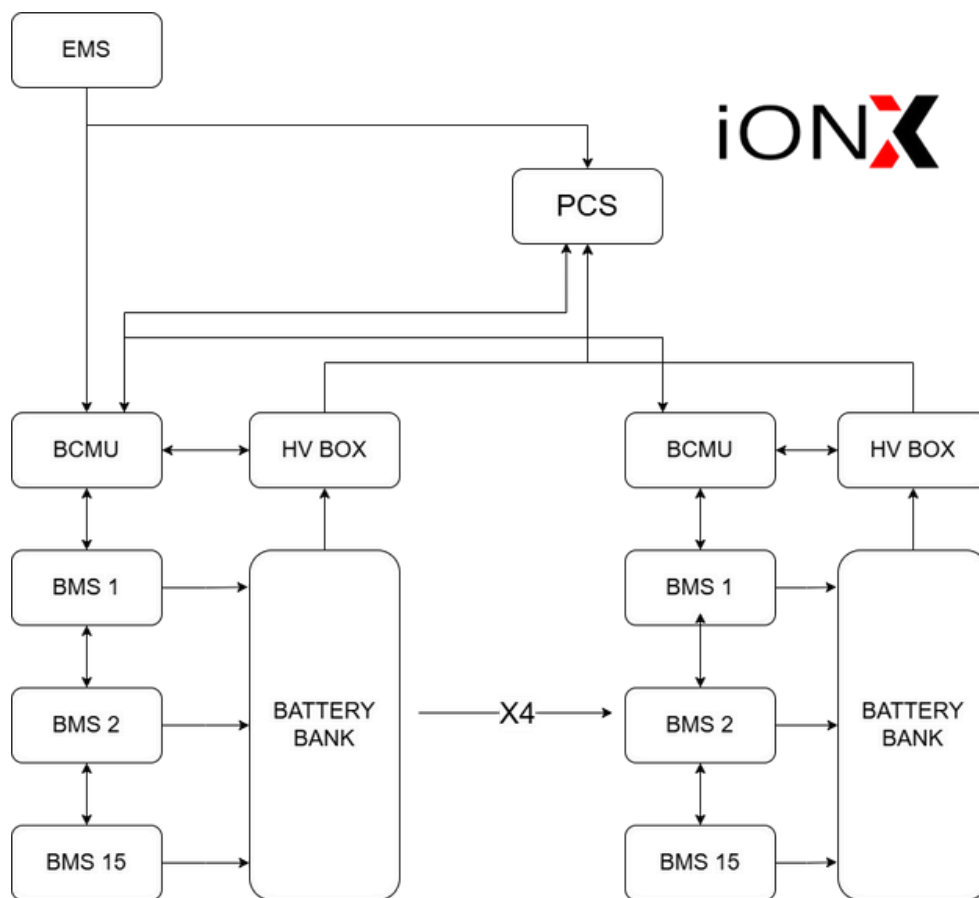
The protection and monitoring functions of the battery system are realized through a BMS with a two-level management architecture:

1. BMU (Battery Management Unit),
2. BCMU (Battery Cluster Management Unit)

The main functions of the BMS at each level are as follows:

BMU (slave control, built into the battery pack): Monitor the voltage and temperature of individual cells, transmit these real-time data to the upper-level BCMU via CAN protocol and control the voltage equalization of individual cells.

BCMU (master control, built in the HV control box): Monitor the total voltage and total current of the entire battery cluster, transmit these real-time data to the upper level SCU via CAN protocol, calculate the SOE, SOH and insulation resistance of the battery cluster, control the relay switch to protect battery cluster based on real-time battery status, alarm and protection information. Has the functionality to connect to EMS via RS485, has built in Bluetooth and GSM for local and online monitoring.



Certificate



AUTHORISED DISTRIBUTION CERTIFICATE

This is to certify that:

AFRICO SOLAR IMPORTERS & WHOLESALERS

*is an Authorised Distributor of **IONX** for **HV BATTERIES & EQUIPMENT**
through the Sub Sahara region from 27 March 2025.*



IONX (PTY) LTD