

USER MANUAL

IONX'S INNOVATIVE ENERGY STORAGE SOLUTIONS





www.ion-x.co.za | info@ion-x.co.za



TABLE OF CONTENTS

SAFETY REQUIREMENT

Validity	1
Safety	2
Target Group	 3

BATTERY SYSTEM INSTALLATION

Installation Preparation	1.1
Battery Cluster Installation	1.2



Interface Introduction	2.1
Ground Wire Connection	2.2
Connect Communication	2.3

1.

2.

SAFETY REQUIREMENT

1. 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.

2. 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.

3. 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

ΝΑΜΕ ΡΗΟΤΟ		NAME	рното
Impact Drill		Torque Socket Wrench	
Torque Wrench	1-10-10	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	рното	NAME	рното
Safety Gloves		Safety Shoes	Æ
Protective Goggles		Dust Mask	

TABLE 1.3 MECHANICAL EQUIPMENT LIST

NAME	РНОТО	NAME	РНОТО
Electric Forklift		Load-bearing 3 T	Unit 1
Manual Forklift	- Ali	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 rackstable 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) M12 Bolt
- (2) Spring Washer
- (3) Flat Washer
- (4) Expansion Tube



- 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







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	СОМ	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

1B+CONNECT WITH BATTERY TOTAL+2B-CONNECT WITH BATTERY TOTAL-3SWITCH/LIGHTCONTROL THE INPUT AND OUTPUT OF THE BATTERY4STOPSTOP THE OPERATION OF THE THE BATTERY4STOPSTOP THE OPERATION OF THE HV BOX5BMU OUTIOIVCCONTROL THE INPUT AND OUTPUT OF THE BATTERY101VCCVCCONTROL102PARALLEL OUTPUTVCCVCCVCCVCCVCCVCCVCCONTROL11011-R11-R11-R11-RTHE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL	NO.	NAME	PORT	DESCRIPTION
2B-CONNECT WITH BATTERY TOTAL -3SWITCH/LIGHTCONTROL THE INPUT AND OUTPUT OF THE BATTERY4STOPSTOP THE OPERATION OF THE HATTERY4STOPSTOP THE OPERATION OF THE HATTERY4STOPSTOP THE OPERATION OF THE HATTERY5BMU OUT1010VCC0COND100PARALLEL OUTPUT0VCC0ORD100PARALLEL INTPUT1011020PARALLEL INTPUT102VCC0OND1111H11H11H11H11H11H11H11H11H1111H1111H1111H1110211PARALLEL INTOUT OF THE BATTERY11FAN POWER11FAN POWER12LAN13P-14D+14D+	1	B+		CONNECT WITH BATTERY TOTAL +
3SWITCH/LIGHTCONTROL THE INPUT AND OUTPUT OF THE BATTERY4STOPSTOP THE OPERATION OF THE HV BOX4STOPSTOP THE OPERATION OF THE HV BOX52H2L60PARALLEL OUTPUT72H2L6BMU IN2H72HPARALLEL OUTPUT72HPARALLEL INTPUT71HPARALLEL INTPUT101LPARALLEL INTPUT111H-RCOMMUNICATION PORT BETWEEN11L1H-RCOMMUNICATION PORT BETWEEN11L1H-RCOMMUNICATION PORT BETWEEN11L-R1L-RTHE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL (SCU)8DISCONNECTORCONTROL THE INPUT AND OUTPUT OF THE EXTERNAL POWER SUPPLY OF THE BATTERY9MM07-02NV-77/POWER SUPPLY FOR CABINET INDUCTOR LIGHTS10FAN POWERVFS*11FAN POWERVFS*12LANVFS*13P-TO BATTERY COMBINER CABINET BAT-14D+TO BATTERY COMBINER CABINET BAT-	2	B-		CONNECT WITH BATTERY TOTAL -
4 STOP STOP THE OPERATION OF THE HV BOX 5 BMU OUT 2H 2L 6 BMU OUT 101 PARALLEL OUTPUT VCC GND PARALLEL INTPUT 6 BMU IN 102 PARALLEL INTPUT 7 2L PARALLEL INTPUT 102 VCC OND 102 VCC OND 11L 11H 11L 11L-R 11L THE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL (SCU) 11B 11A-R THE MAIN CONTROL (SCU) 11B-R 11B-R THE MAIN CONTROL (SCU) 11B-R 11B-R THE MAIN CONTROL (SCU) 11B-R 11B-R THE MAIN CONTROL (SCU) 10 DISCONNECTOR V-4 9 MM07-02N V-4 10 DI7L V+4 10 DO7L V+4 10 DO7L V+4 10 DO7L V+4 10 DO7L V+4 11	3	SWITCH/LIGHT		CONTROL THE INPUT AND OUTPUT OF THE BATTERY
5 2H 2L 5 2H 2L 6 2L PARALLEL OUTPUT 6 2H 2L 7 2H 2L 6 2H 2L 7 2H 2L 7 2H 2L 8 102 PARALLEL INTPUT 102 1H 1L 11L-R 1H-R 1L 11L-R 1L-R 1H 11A 1H-R 1H 11B-R 1H 1H	4	STOP		STOP THE OPERATION OF THE HV BOX
5 BMU OUT 2L 01 001 PARALLEL OUTPUT 0 GND 6 BMU IN 102 PARALLEL INTPUT 6 BMU IN 102 PARALLEL INTPUT 7 0 VCC GND 10 VCC GND VCC 11 11 THE MAIN CONTROL UNIT (RCU) AND THE BATTERY THE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL USCU 11 10 VC VC 12 NM07-02N V- V- 14 VFS- POWER SUPPLY FOR CABINET INDUCTOR LIGHTS 13 P. USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL 13 P. TO BATTERY COMBINER CABINET BAT-			2H	
BMU OUT IOI PARALLEL OUTPUT GND GND GND A GND PARALLEL INTPUT BMU IN IO2 PARALLEL INTPUT IO2 PARALLEL INTPUT GND IO2 PARALLEL INTPUT IO2 GND IO2 GND IO2 PARALLEL INTPUT IO2 GND IO2 SCU GND IO2 IO3 IO1 IO2 SCU IO4 IO2 IO3 IO2 COMMUNICATION PORT BETWEEN IO3 IO3 IO3 IO3 IO4 IO4 IO4 IO4 IO4 IO5 IO5 IO5 IO3 IO5 IO5 IO4 IO5 IO5 IO5 IO5 IO6 <td></td> <td></td> <td>2L</td> <td></td>			2L	
VCCGNDGND42H2LBMU IN102VCCVCCVCCVCCGNDVCCGNDVCCGNDVCCGND1111-R11-R11-R11-R11-R11-R11-R11-R11-R11-R11-R11-R11-R11-R11111111FAN POWERV+11FAN POWERV+11FAN POWERV+11FAN POWERV+V+11FAN POWERV-1V+V+12LLANV- <td>5</td> <td>BMU OUT</td> <td>101</td> <td>PARALLEL OUTPUT</td>	5	BMU OUT	101	PARALLEL OUTPUT
Image: style s			VCC	
62H62L710271H1020001111-R120500NECTOR10V+1107L10V+11FAN POWER11FAN POWER11FAN POWER11CSP12LAN13P-14D+150011-E160+170-180-190-100-11FAN POWER120-13P-140-			GND	
82L102PARALLEL INTPUTVCCGNDGNDIL1111L11L11LR11LR11LR11LR11L11A11L11A11L11B11L11B11B11B11B-R11B-RCONTROL THE INPUT AND OUTPUT OF THE EXTERNAL POWER SUPPLY OF THE BATTERY8DISCONNECTOR9MM07-02N10V+0V/+11OO7L12LAN13P-14DAN15ONER SUPPLY FOR CABINET INDUCTOR LIGHTS16P-17TO BATTERY COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL			2H	
6BMU INIO2PARALLEL INTPUTVCCGNDGNDGNDIGNDII1111-121212131414151516171718191111111212131415151516171718191910111212131415151516171718191919101011121314151516171718191919191919191919			2L	
VCCGNDGNDIGND11 </td <td>6</td> <td>BMU IN</td> <td>102</td> <td>PARALLEL INTPUT</td>	6	BMU IN	102	PARALLEL INTPUT
Image: state in the state in			VCC	
11			GND	
11			1H	
1H-R 1L-RCOMMUNICATION PORT BETWEEN THE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL USUD)8DISCONNECTORCONTROL THE INPUT AND OUTPUT OF THE EXTERNAL POWER SUPPLY OF THE BATTERY9MM07-02NV-7JI7L7V+10D07L11DO7L12LANVFS-13P-TO BATTERY COMBINER CABINET BAT -14D+TO BATTERY COMBINER CABINET BAT -			1L	
7SCU1 L-R 1 A 1 B 1 B 1 B-RTHE MAIN CONTROL UNIT (RCU) AND THE MAIN CONTROL ONTON THE MAIN CONTROL ONTON THE MAIN CONTROL8DISCONNECTOR USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL10P-TO BATTERY COMBINER CABINET BAT -14D+TO BATTERY COMBINER CABINET BAT +			1 H-R	
Image: International optimization optimi	7	SCU	1 L-R	THE MAIN CONTROL LINIT (RCU) AND
Image: 18 Image: 18-7 Image: 18-7 Image: 18-7Image: 18-7 Image: 18-7<		500	1A	THE MAIN CONTROL (SCU)
IA-R1B-R000 <td rowspan="2"></td> <td></td> <td>1 B</td> <td></td>			1 B	
Image: state in the state in			1 A-R	
8DISCONNECTORCONTROL THE INPUT AND OUTPUT OF THE EXTERNAL POWER SUPPLY OF THE BATTERY9MM07-02NV-7771/10DI7L11DO7L11FAN POWER OUTLETVFS+12LANVFS+13P-TO BATTERY COMBINER CABINET BAT -14P-TO BATTERY COMBINER CABINET BAT -			1 B-R	
a DISCONNECTOR EXTERNAL POWER SUPPLY OF THE BATTERY B MM07-02N V- 9 MM07-02N V- 7 // // 10 DI7L // 0/ V+ POWER SUPPLY FOR CABINET INDUCTOR LIGHTS 10 D07L V+ 11 FAN POWER VFS+ 0UTLET VFS- POWER SUPPLY FOR BATTERY FAN 12 LAN USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL 13 P- TO BATTERY COMBINER CABINET BAT - 14 D+ TO BATTERY COMBINER CABINET BAT +	0			CONTROL THE INPUT AND OUTPUT OF THE
9 MM07-02N $V+$ 9 MM07-02N $V /$ $/$ $/$ 10 $J/$ $V+$ DI/DO $V+$ $V+$ DI/DO $V+$ $V+$ DI/DO $V+$ $V+$ DI/DO $V+$ $V+$ $DORL$ $V+$ $V+$ $DORL$ $V+$ $V+$ 11 $FAN POWER$ $VFS+$ $POWER SUPPLY FOR BATTERY FAN$ 11 $FAN POWER$ $VFS VFS 12$ LAN $VFS USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL 13 P TO BATTERY COMBINER CABINET BAT - 14 P+ TO BATTERY COMBINER CABINET BAT + $	0	DISCONNECTOR		EXTERNAL POWER SUPPLY OF THE BATTERY
9 MM07-02N V- 10 / 10 DI7L V+ V+ DO7L POWER SUPPLY FOR CABINET INDUCTOR LIGHTS DI/DO V+ DO8L V+ 11 FAN POWER OUTLET VFS- POWER SUPPLY FOR BATTERY FAN 12 LAN 13 P- 14 D+			V+	
Image: constraint of the second sec	9	MM07-02N	V-	
10DI7L11DO7LDO7LPOWER SUPPLY FOR CABINET INDUCTOR LIGHTSDO8LV+11FAN POWER OUTLET12LAN13P-14D+14D+			/	
10N+10DO7LDO7LPOWER SUPPLY FOR CABINET INDUCTOR LIGHTS10V+11FAN POWER OUTLETVFS+12LANVFS-13P-TO BATTERY COMBINER CABINET BAT -14D+TO BATTERY COMBINER CABINET BAT +			DI7L	
10DI/ DODO7LPOWER SUPPLY FOR CABINET INDUCTOR LIGHTS10V+LIGHTS11FAN POWER OUTLETVFS+POWER SUPPLY FOR BATTERY FAN12LANVFS-USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL13P-TO BATTERY COMBINER CABINET BAT -14D+TO BATTERY COMBINER CABINET BAT +			V+	
V+ LIGHTS D08L D08L V+ V+ 11 FAN POWER OUTLET VFS- POWER SUPPLY FOR BATTERY FAN 12 LAN 13 P- 14 D+	10	DI/ DO	DO7L	POWER SUPPLY FOR CABINET INDUCTOR
DOBL V+ II FAN POWER OUTLET VFS+ VFS- I2 LAN I3 P- I4 D+			V+	LIGHIS
V+ VFS+ POWER SUPPLY FOR BATTERY FAN 11 FAN POWER OUTLET VFS+ POWER SUPPLY FOR BATTERY FAN 12 LAN USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL 13 P- TO BATTERY COMBINER CABINET BAT - 14 D+ TO BATTERY COMBINER CABINET BAT +			DO8L	
II FAN POWER OUTLET VFS- POWER SUPPLY FOR BATTERY FAN 12 LAN USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL 13 P- TO BATTERY COMBINER CABINET BAT - 14 D+ TO BATTERY COMBINER CABINET BAT +			V+	
Image:	11	FAN POWER		POWER SUPPLY FOR BATTERY FAN
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 +		OUILEI	VF3-	
13 P- TO BATTERY COMBINER CABINET BAT - 14 D+ TO BATTERY COMBINED CABINET BAT +	12	LAN		USED FOR COMMUNICATION BETWEEN THE SCREEN AND MAIN CONTROL
14 D+ TO BATTERY COMBINED CABINET BAT +	13	P-		TO BATTERY COMBINER CABINET BAT -
	14	P+		TO BATTERY COMBINER CABINET BAT +

 $\mathbf{\mathbf{V}}$



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.



