

SOLINTEG EBR-A SERIES HIGH VOLTAGE STORAGE SYSTEM

EBR-S26K, EBR-S53K
EBR-S32K, EBR-S59K
EBR-S37K, EBR-S64K
EBR-S42K, EBR-S69K
EBR-S48K, EBR-S75K



User Manual

ENGLISH VERSION







As an indispensable part of Solinteg EBR-A series storage system, this manual introduces the assembly, installation, electrical connection, communication connection, maintenance and troubleshooting of the products.

This document serves only as a guide, in which only the basic requirements are listed for use. All statements, information and recommendations in this document do not constitute any express or implied guarantee.

All operations, such as transportation, storage, installation, operation, use, and maintenance, should comply with applicable laws, regulations, standards, and normative requirements.

The products, services or features purchased are subject to the commercial contracts and terms of Solinteg Power Co., Ltd. All or part of the products, services or features described in this document may not be within the scope of purchase.

	ATTENTION: Do not use EBR-A storage system as direct power source for medical equipment.
	WARNING: The battery could explode and/or be severely damaged if dropped or crushed.
	ATTENTION: Appropriate mechanical lifting equipment must be used since the Battery Module weighs 49kg.
	ATTENTION: The battery may explode if exposed to open flames or other extreme sources of heat.
	CAUTION: The battery terminals must be disconnected before commencing any work on the battery.
	ATTENTION: Do not touch the B+ or B- terminals for accumulate parasite current. Always check the B+ and B- terminals with a voltmeter. Do not connect or charge the single module directly from the two terminals. The Battery Module CANNOT be connected in parallel directly.
	ATTENTION: Always wear individual protection devices, use insulated tools, and follow the safety plan of this manual.
	At end of life, these batteries must be disposed properly by a certified professional company.

All data subject to change without notice.

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Before installing Solinteg battery system, please contact your Solinteg representative for the latest manual and any additional support.

In the presence of any alarm/warns on both the battery and the inverter, the user must power off the whole system and disconnect the power connection.

The battery must be inspected immediately by an authorized Solinteg technician or send the battery to Solinteg for an accurate check.

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1 Safety Instruction

1.1 Environment Requirements

This product is designed for indoor operation. It must be installed in a location complying with following:

- Temperature: $-10^{\circ}\text{C} \sim +55^{\circ}\text{C}$ ($+15^{\circ}\text{C} \sim +30^{\circ}\text{C}$ optimal).
- Storage temperature: $-10^{\circ}\text{C} \sim +55^{\circ}\text{C}$ ($+20^{\circ}\text{C} \sim +25^{\circ}\text{C}$ optimal).
- Relative humidity: 5% ~ 95%RH.
- Ground shall be flat and level.
- With no direct-sun exposure, metal scurf, dust or corrosive gas.
- With suitable ventilation space.
- With no liquid, flammable or explosive material in the installation area.
- Out of reach of children or pets.
- Must equipped with fire-extinguisher system.
- It is recommended to use the battery at a controlled temperature and humidity space.

1.2 Safety Guidelines

- Only can be installed and operated by **authorized and qualified** personnel.
- Adequately **insulated tools** must be used at all times to ensure battery terminals are not short-circuited.

(as defined by ASTM F1505/IEC 60900:2012 “Standard Specification for Insulated and Insulating Hand Tools”).

- The safety guidelines included in this document may not include or consider all the regulations in your area of installation/operation. When installing and operating this product, the installer must review and consider applicable **Federal, State, and Local laws and regulations** in accordance with the industry standards of the product.
- **Stable and reliable grounding** shall be equipped properly for safety and normal operation.
- Please carefully check the products before installation. Please contact us immediately if any abnormal damage or deformation, especially stab, hit, trample or strike.
- **Protective equipment** must be used during installation, disassembly and operation, such as protective clothing, insulated shoes, goggles, safety helmets, insulated gloves, etc.
- Please **do not mix use** batteries from different manufacturers, different types and models, as well as old and new together.
- **Prohibited** to install, disassemble or operate any part of the whole system if any part is electrified.
- **Prohibited** to drill, cut, chop, puncture, deform, incinerate or any other destructive action, which may lead to damage of sealing, insulation.

- Carefully check and confirm the power connection, communication connection and configuration of whole system (including inverter, battery, PV, load, utility grid, etc.) in accordance with corresponding manual before operation.
- Do not dispose in fire, mix with other battery types, charge above specified rate, connect improperly, or short circuit, which may result in overheating, explosion or leakage of cell contents.
- Do not open or disassemble.
- Keep away from heat/sparks/open flames/hot surfaces.
- Ambient and storage method could impact the product life span, so please comply with the operation environment instruction to ensure that device could work in proper condition.
- The weight of an individual Solinteg Battery Module is 49 kg, please use the original packaging and follow all safety precautions if the Battery Module is to be relocated to another location, to avoid damage to the product and personal injury.
- The high voltage configuration should have a minimum number of 5 modules in order to reach at least 250 Vdc in series. The maximum number of modules composing an HV string must not exceed 15.

1.3 Personnel Requirements

Personnel capable of product installation, electrical and cable connection, commissioning, maintenance, troubleshooting, and replacement must meet the following requirements:

- Personnel must be trained in installation, commissioning of the electrical system and dealing with hazards.
- Personnel should read this manual thoroughly and understand the safety matters related to operation.
- Personnel should be familiar with the relevant local safety regulations of electrical systems.
- Do not wear metal objects such as rings, watches, and key chains and take proper safety precautions, such as wearing insulation gloves and electrician's shoes.
- Do not store un-insulated tools in pockets or tool belts while working in the vicinity of the battery to avoid short circuits and personal injuries.

1.4 Precautionary Statement and Response

▼ 1.4.1 Battery Leakage

Due to the corrosion of electrolyte, protective gloves /protective clothing/eye protection/face protection shall be used to avoid directly contact. If exposed to the leaking substance, following actions shall be taken:

People shall be evacuated and get medical attention immediately.

- If inhalation: Contaminated work clothing must not be allowed out of the workplace. And completely washed before reuse.
- If skin contact: Wash with plenty of water and get medical advice/attention immediately.
- If eye contact: Rinse cautiously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing. And then get medical advice/attention.
- If ingestion: Induce vomiting and get medical advice/attention immediately.

▼ 1.4.2 Fire

- Carbon dioxide, Novac1230, or FM-200 fire extinguishers shall be equipped near the equipment.
- Extinguish the fire before battery catching fire.
- If battery on fire, evacuate people immediately without any hesitation.

1.5 Hazard Statement




This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard. Additional information is given in the Safety Data Sheet.

Dispose of contents/container in accordance with local/regional/national/international regulations.

The materials contained in this product may only represent a hazard if the integrity of the cell or battery is compromised and/or physically, thermally, or electrically abused. Anticipated hazards under those conditions as below:

- Skin irritation
- Serious eye irritation
- Allergic skin reaction
- Damage to organs (bone, teeth) through prolonged or repeated exposure
- Toxic to aquatic life
- Harmful to aquatic life with long-lasting
- Warning Statements

Lithium Iron Phosphate (LiFePO4) Battery or Cell DANGER

	Warning hazard sign
	Health hazard
	It is very toxic to aquatic life

2 System Introduction

2.1 Overview

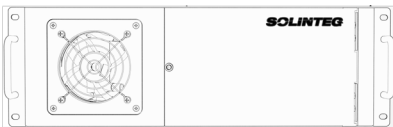
EBR-A series (LiFePO₄ system) is designed for high voltage application. The modularized design and the outstanding performance guarantee the safety, stability and reliability in various application scenarios such as frequency modulation, peak shaving, self-generation and self-consumption, demand management, off-grid power backup, etc.

Due to the startup voltage (250 VDC) of Controller, 6pcs Battery Modules is preferred for an adequate buffer of energy to prevent shutdown of the Controller due to inactivity of external power source, such as a long period of the inverter on standby, utility grid loss, malfunction of solar charger, etc. System with 5pcs Battery Modules also could be used in some special designed system, such as low DOD system.

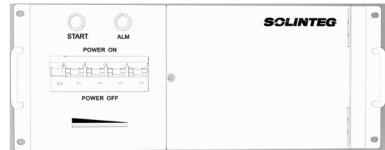
The Solinteg Battery Module is designed for commercial and industrial applications up to 752kWh. For multiple connection, loss factor (2% recommended) shall be taken into consideration during calculation of the target energy of the storage system.

Make sure to configure inverter with correct and suitable parameters before connecting to the battery. Solinteg Battery Module must be used with the Controller box.

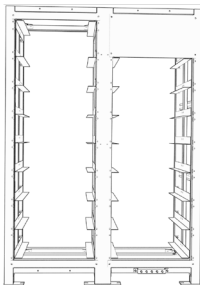
Battery Module: EBR-B5K3-A



Controller: EBR-C-A



Rack: EBR-R-A(S)/EBR-R-AT



Paraller Box: EBR-P-A



2.2 Battery Module

▼ 2.2.1 Module Parameters

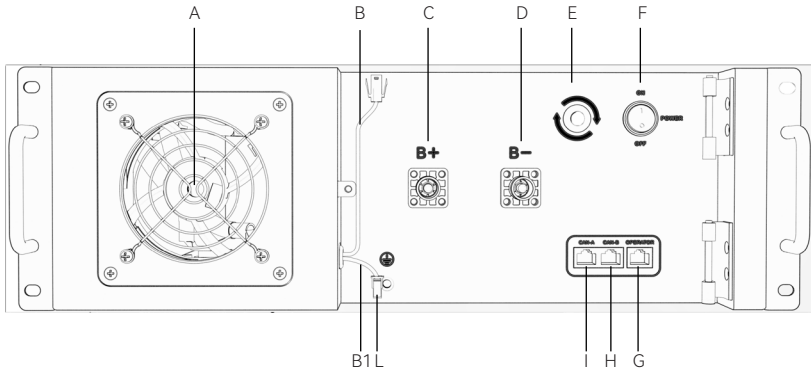
The Battery Module must be used only for High Voltage Serial connection in conjunction with the controller.

Specifications subject to change without notice.

Battery Module	EBR-B5K3-A
Nominal Energy (kWh)	5.37
Usable Energy (kWh)	4.83
Nominal Capacity (Ah)	105
Nominal Voltage (V)	51.2
Voltage Range (V)	46.5 - 58.4
Max. Charge/Discharge Current (A)	100/100
Weight (kg)	49
Dimension[D*W*H] (mm)	650 * 482 * 150
Protection Degree	IP21
Operation Temp. Range [°C]	0~55 (Charge)/-10~55 (Discharge)
Rec. Operation Temp. [°C]	15~30
Storage Temperature [°C]	-10~55
Rec. Storage Temperature [°C]	15~30
Relative Humidity	5%-95% (No condensation)
Altitude (m)	2000
Cell Type	LiFePO4
Module Connection	Quick Connector
Installation Method	Rack
Module Number	5~14 in series
Communication	CAN/RS232
Cooling	Ventilation with Intelligent Fan

▼ 2.2.2 Battery Module Interface

The terminal layout is shown in the following figure:



No.	Definition	Description
A	Fan	Battery Cooling
B	Fan Power-in	Input Power for Fan
B1	Fan Power-out	Output Power for Next Fan
C	B+	Positive Socket of Battery Module, 100A max.
D	B-	Negative Socket of Battery Module, 100A max.
E	Activation Button	For Activation of Battery Module
F	Power Switch	Power Circuit Control of Battery Module
G	Operator Port	RS232, for Debugging
H	CAN-B Port	For Communication Between Battery Modules, No Sequence Required.
I	CAN-A Port	
L	GND Hole	For Grounding Connection

▼ 2.2.3 Pin Definition of RJ45 Cable

No.	Color	CAN-A/B	Operator Port
1	Orange & White	CANH	RS232_TX
2	Orange	CANL	RS232_RX
3	Green & White	GND	RS232_GND
4	Blue	/	RS232_5V
5	Blue & White	/	/
6	Green	/	/
7	Brown & White	/	/
8	Brown	/	/

▼ 2.2.4 Accessory List

(Standard Kit 120A Single Module HV)

Battery Module would be packed together with corresponding standard accessories in a carton box. Battery Module and accessories should be checked according to following list during unpacking the Battery Module. Be sure to confirm the items, quantities in the carton and no damage.

ITEM	QTY	Picture	Specification
PE Cable	1		2. 5mm ² , yellow-green cable, 160mm from terminal hole to hole DJ431-6A OT terminal crimped at both ends. Grounding connection between up-down Battery Modules.
HV Series Cable	1		5mm ² , Red, 180mm 1 orange connector (UES0630LCNBA/non-waterproof/no key) 1 black connector (UES0630LCNAA/non-waterproof/no key) Battery Module B+ to adjacent Battery Module B-.
BAT Series Comm. Cable	1		8-core straight-through standard network cable 170mm including RJ45 plugs Battery Module CAN-A to adjacent Battery Module CAN-B.

2.3 Controller Overview

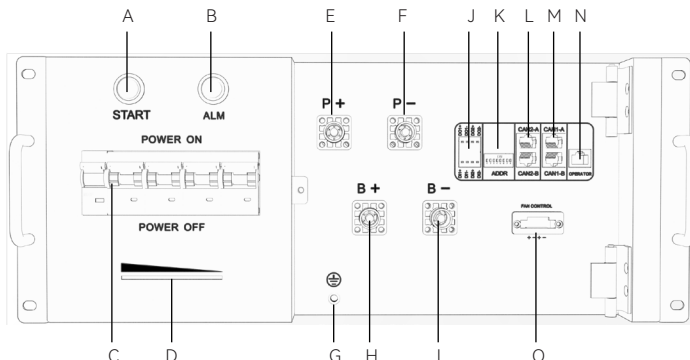
▼ 2.3.1 Controller Parameter

The Battery Module must be used only for High Voltage Series connection in conjunction with the controller.

Specifications subject to change without notice.

Controller	EBR-C-A
Operation Voltage [Vdc]	250 - 1000
Max. Charge/Discharge Current [A]	100/100
Communication	CAN/RS232
Power Source	Internal DC from Battery
Power Connection Type	Quick Connector
Weight [kg]	23
Dimension[D*W*H] (mm)	650 * 482 * 190
Protection Degree	IP21
Operation Temp. Range [°C]	-10~55
Rec. Operation Temp. [°C]	15~25
Storage Temperature [°C]	-10~55
Rec. Storage Temperature [°C]	15~30
Relative Humidity	5%~95% (No condensation)
Altitude [m]	2000

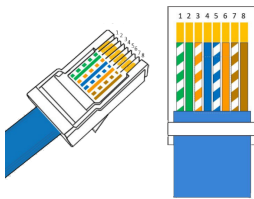
▼ 2.3.2 Controller Interface











No.	Definition	Description
A	Run Button	Activation of Controller
B	Alarm Indicator	Indication of Alarm
C	Breaker	Power Circuit Control of the Controller
D	Status Bar	Operation Status and Insulation Error
E	P+	Positive Socket for Inverter, 100A max.
F	P-	Negative Socket for Inverter, 100A max.
G	GND Hole	Grounding Connection
H	B+	Positive Socket for Battery Module
I	B-	Negative Socket for Battery Module
J	D/I D/O Port	Digital In and Out
K	ADDR	Distribution of Communication Address 1st to 4th is for address, 7th for terminal resistance and others reserved.
L	CAN-2 Port	Inverter Communication, no Sequence Required
M	CAN-1 Port	Parallel Communications of Clusters
N	Operator Port	RS232, for Debugging and WiFi Module
O	24V Port	Output of 24V, for Fan and other Need.






▼ 2.3.3 Pin Definition of RJ45 Cable

No.	Color	CAN2-A/B	CAN1-A/B	Operator Port
1	Orange & White	/	CANH	RS232_TX
2	Orange	/	CANL	RS232_RX
3	Green & White	/	/	RS232_GND
4	Blue	CANH	/	RS232_5V
5	Blue & White	CANL	/	/
6	Green	/	/	/
7	Brown & White	/	/	/
8	Brown	/	/	/



▼ 2.3.4 Accessories of Controller

ITEM	QTY	Picture	Specification
INV Comm. cable	1		8-core straight-through standard network cable 5000mm with RJ45 plugs Controller CAN-2 to BMS port of inverter.
B+ cable	1		25 mm ² , red, 180mm with plugs 2 orange plugs (UES0630LCNAA/non-waterproof/no key) Battery Module B+ to Controller B+.
P+ Cable	1		25 mm ² , red, 5000mm with plugs 1 orange plug (UES0630LCNAA/non-waterproof/no key) Controller P+ to Inverter BAT+.
P- Cable	1		25 mm ² , black, 5000mm with plugs 1 black plug (UES0630LCNBA/non-waterproof/no key) Controller P- to Inverter BAT-.
CON Comm. Cable	1		8-core straight-through standard network cable 300mm including RJ45 plugs Controller CAN-1 to Battery CAN-A.
EXT CON Comm. Cable	1		8-core straight-through standard network cable 900mm including RJ45 plugs Bottom Battery Module to top controller, if necessary.
Parallel Comm. Cable	1		2-core straight-through standard network cable 2200mm including RJ45 plugs Parallel comm. connection of multi-controllers.
B- cable	1		25 mm ² , black, 800mm with plugs 2 black plugs (UES0630LCNAA/non-waterproof/no key) Battery Module B- to Controller B-.

ITEM	QTY	Picture	Specification
EXT HV Cable	1		<p>25 mm², red, 800mm with plugs 1 orange connector (UES0630LCNBA/non-waterproof/no key) 1 black connector (UES0630LCNAA/non-waterproof/no key) Bottom Battery Module to top controller, if necessary.</p>
Fan Control Cable	1		<p>2*0.75mm², 2-core wire, Black soft rubber, One end: 4P green terminal, with HE1508 crimped cable The other end: 2 outputs (1pcs 5557 male rubber shell female terminal, 250mm. 1pcs 5557 male rubber shell female terminal, 1100mm) Fan control and power supply.</p>
CON PE Cable	1		<p>2.5mm², yellow-green, 170mm (hole to hole) 2pcs DJ431-6A OT Grounding connection between Controller and Battery Module.</p>
PE Cable	1		<p>2.5mm², yellow-green, 5000mm (hole to hole) 2pcs DJ431-6A OT Connection between controller and external grounding point.</p>
EXT PE Cable	1		<p>2.5mm², yellow-green, 600mm (hole to hole) 2pcs DJ431-6A OT Grounding connection between left-right Battery Modules.</p>

2.4 Rack Overview

▼ 2.4.1 Rack Parameter

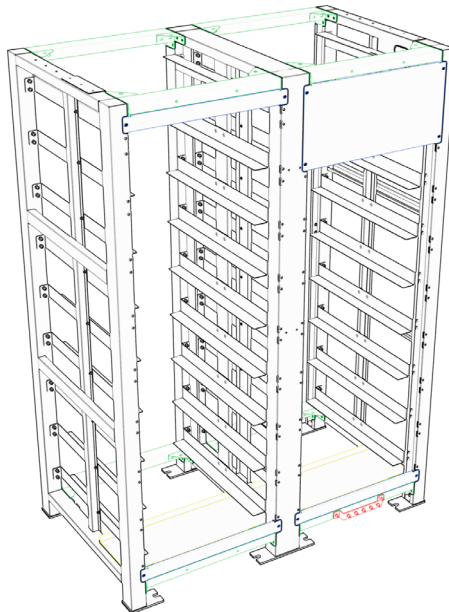
The rack must be well grounded before operation.

Specifications subject to change without notice:



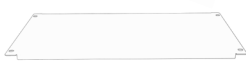
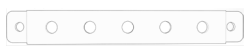



ITEM	EBR-R-A6	EBR-R-AT6	EBR-R-A8	EBR-R-AT8
Dimension [W*D*H] (mm)	1092*636*1206	554*636*1206	1092*636*1526	554*636*1526
Total Positions (Column * Layer)	2 * 6	1 * 6	2 * 8	1 * 8
Controller Position	2	1	2	1
Battery Module Position	12	6	16	8
Rack Material	SCGG			
Weight [kg]	81	46	108	60

- Dimension means the one after assembly.
- Controller position could be used to install batteries.

▼ 2.4.2 Rack Interface



▼ 2.4.3 Packing List

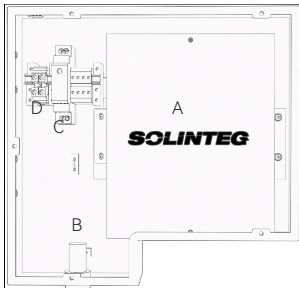
No	Name	Picture	EBR-R-AT6	EBR-R-A6	EBR-R-AT8	EBR-R-A8
1	Pillar		2	3	2	3
2	Beam		4	8	4	8
3	Tray		1	2	1	2
4	Crosspieces		2	3	2	3
5	Decorative Cover		0	1	0	1
6	PE Bar		1	1	1	1
7	M6X12 Screw		60	122	68	138
8	M6X15 Screw		7	7	7	7
9	M8X60 Expansion Screw		4	8	4	8

2.5 Paraller Box Overview

▼ 2.5.1 Paraller and Paraller Box Parameter

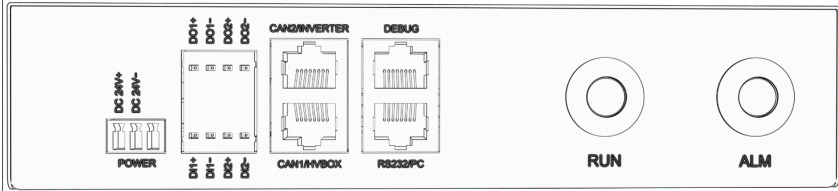
ITEM	EBR-P-A1 (Paraller)	EBR-P-A (Paraller Box)
Operation Voltage [V]	24VDC	230VAC
Power Source	External DC Source	Including AC/DC Source
Max. Clusters	8	8
Communication	CAN/RS232	CAN/RS232
Dimension [W*D*H mm]	230 * 190 * 40	325 * 323 * 83
Weight [kg]	1.2	6
Operating Temperature [°C]	-10~55	-10~55
Relative Humidity	5%-95% (No condensation)	5%-95% (No condensation)
Altitude [m]	2000	2000

▼ 2.5.2 Paraller Box Interface



No.	Name	Function
A	Paraller	Comm. Control of Multi-clusters
B	Power Button	Power Circuit Control of Paraller
C	Power Source	AC/DC Converter to Supply Paraller, 230V
D	Wiring Terminal	AC Cable Connection

▼ 2.5.3 Paraller Interface



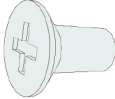
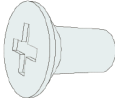


Name	Function	Name	Function
L+	24V+	DI1+	Digital input and output ports reserved.
L-	24V-	DI1-	
PE	GND	DI2+	
CAN1/CON.	CAN port to controller	DI2-	
CAN2/INVERTER	CAN port to inverter	DO1+	
RS232/PC	RS232 to PC	DO1-	
Debug	CAN-1 and CAN-2 debug port	DO2+	
ON/OFF	ON/OFF button with LED	DO2-	
ALARM	Alarm LED		

▼ 2.5.4 Pin Definition of RJ45 Cable

No.	Color	CAN 1/2	Debug	Operator Port
1	Orange & White	/	CANH	RS232_TX
2	Orange	/	CANL	RS232_RX
3	Green & White	/	/	RS232_GND
4	Blue	CANH	/	RS232_5V
5	Blue & White	CANL	/	/
6	Green	/	/	/
7	Brown & White	/	CANH	/
8	Brown	/	CANL	/

▼ 2.5.5 Accessories of Paraller Box

ITEM	QTY	Picture	Specification
Cross Rail	1		
4P Terminal	1		10AWG, 5000mm
M5X10 Screw	3		Fixation between Rack and cross rail
M4X10 Screw	4		Fixation between Paraller box and cross rail

2.6 System Configuration

▼ 2.6.1 Single Cluster

Cluster with 15pcs batteries, 1pcs controller and EBR-R-A8 rack is used to illustrate the configuration of single cluster. Configuration of cluster with other capacity and racks should be adjusted accordingly.

- Batteries only can be connected in series.
- Unless official authorization and confirmation, batteries in one cluster shall have the same characters, such as SOC, batch, storage time, etc.
- Minimum required Battery Module in one cluster is 5 and 6 is preferred for better performance of the cluster.
- Must equipped with fire-extinguisher system.
- DIP 7 of ADDR must be set as “ON” and others as “OFF” before turn-on the cluster.

▼ 2.6.2 Multi-Clusters

- If more than 1 cluster, Paraller shall be used for parallel connection of clusters.
- Power combiner shall be prepared by the customer.
- Quantities of Battery Module in each cluster must be the same.
- Mode of Battery Module involved in the same paralleled system must be the same, unless specified.
- Cable for parallel connection of each cluster must be the same (length, cross-section, materials, etc.).
- Address (1st to 4th bit) of each controller must be set accordingly.
- Resistance of the last controller must be set as “ON” and “OFF” for the rest clusters.

▼ 2.6.3 Capacity Expansion

- The storage system expansion only can be processed by personnel with authorization and qualification.
- The expansion of storage system cannot be applied privately, which may lead to uncontrollable and unpredictable effect on stability, reliability and lifespan of the storage system.
- Only Battery Module with the same model as those existing could be added to the existing cluster(s).
- Make sure capacity of each cluster in the storage system is the same after expansion.
- Make sure the existing storage system and new battery/batteries have been fully charged before expansion processed.
- Please note that SOH of cluster after expansion would follow the worst SOH condition battery to perform.


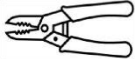






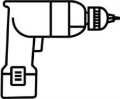
3 Installation




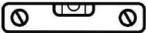




Cluster with 15pcs Battery Modules, 1pcs Controller and EBR-R-A8 rack is used to illustrate the installation process.

Due to the weight, all the device shall be lifted by lifting machine or manually handling according to local rules.


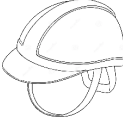




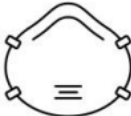
3.1 Tools and Gear

▼ 3.1.1 Necessary Tools

No.	Category	Name	Function	Picture
1	Cable processing	Electrician knife	Stripping of insulating layers	
2	Cable processing	Wire stripping pliers	Stripping of insulating layers	
3	Cable processing	Crimping pliers	Terminal crimping	
4	Installation tools	Percussion bit	Drilling	
5	Installation tools	Open-end spanner (full set)	Installation and removal of nuts	
6	Installation tools	Phillips screwdriver (PH2,PH3)	Installation and removal of screws	
7	Installation tools	Slotted screwdriver (SL2)	Installation and removal of screws	
8	Installation tools	Hex keys (full set)	Installation and removal of screws	
9	Installation tools	Electric torque screwdriver (with full set of Phillips bits, hexagon screw bits and slotted screw bits)	Installation and removal of screws	

No.	Category	Name	Function	Picture
10	Installation tools	Manual torque screwdriver (with full set of Phillips bits, hexagon screw bits and slotted screw bits)	Installation and removal of screws	
11	Installation tools	Torque adjustable wrench	Installation and removal of nuts	
12	Installation tools	wrench	Installation and removal of nuts	
13	Measuring devices	Spirit level	Establishing level-ness	
14	Measuring devices	Tape measure	Distance measurement	
15	Marking tools	Pencil	Marking	
16	Cable processing	Insulation Tape	Electrical insulation	
17	Installation Tool	Lifting Machine	Devices Lifting	

▼ 3.1.2 Personal Protection

			
Goggle: Eye Safety	Helmet: Head Protection	Earmuff: Hearing Protection	Insulation Gloves: Hand Protection
			
Safety Shoes: Foot Protection	Protective Suit: Body Protection	Mask: Breathing Protection	

3.2 Checking Before Installation

▼ 3.2.1 Basic Checking

- ① It's recommended to install the battery system indoor. Please ensure necessary protection applied for temperature and humidity control, no direct-sunlight.
- ② Please reserve enough ventilation space for heat dissipation.
- ③ Make sure no liquid, flammable or explosive material in the installation area.
- ④ Please make sure the battery system is out of reach by children.
- ⑤ Batteries installed in saline areas may be corroded and may cause fire. Do not install the battery system outdoors in saline areas. Saline areas are defined as areas within 500 meters of the coast or affected by sea breezes. The areas affected by sea breezes vary depending on meteorological conditions (such as typhoons, seasonal winds) or topography (dikes, hills).
- ⑥ The installation of the battery system must be fire-resistant in accordance with local regulations.
- ⑦ The installation location must be approved by the local government.
- ⑧ Ensure that the installation surface is strong enough to support the battery system, and the support screws meet the load bearing requirements of the battery system.
- ⑨ Please install upright, to facilitate the stability of the equipment.
- ⑩ Do not make the rack forward, horizontal, upside down, backward tilt and flip.

▼ 3.2.2 Safety Confirmation

- ① Carefully estimate the weight of the equipment to avoid damage due to the equipment beyond the range of individually liftable weights.
- ② Ensure that the equipment is balanced during handling to avoid drops.
- ③ Personnel must wear the protective items and use insulated tools (listed in Clause 3.1) during installation and operation.
- ④ Automatic fire fighting system shall be checked and confirmed for the continuous and stable operation during installation.
- ⑤ Check and confirm the grounding of installed space (basement of room and/or cabinet) is reliable and stable.
- ⑥ Check and confirm all the power source, including batteries, hybrid inverter, DC source, PV source and utility grid, has been disconnected and no residual current during installation of battery system.
- ⑦ Check and confirm the electrical (current, voltage, etc.) compatibility between the battery system and hybrid inverter and other power source before installation.

⑧ It's recommended to use lifting device to move and locate the devices of battery system. If without handle tool, the devices must be handled by no less than 3 personnel.

▼ 3.2.3 Unpacking and Inspection

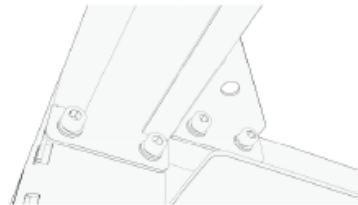
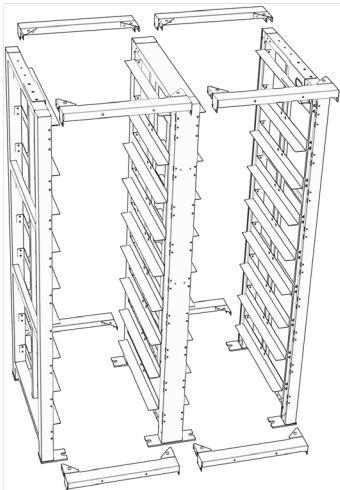
- ① Load and unload the packages according to local rules and regulations.
- ② Check and confirm the modes and quantities according to the shipping list before unpacking.
- ③ Carefully check the cartons before unpacking. Please contact us immediately if any abnormal damage or deformation, especially stab, hit, trample or strike.
- ④ Check and confirm the modes and quantities of items in the cartoon according to the packing list shown in **2.2.4, 2.3.4, 2.4.3 and 2.5.5.**

3.3 Mechanical Installation

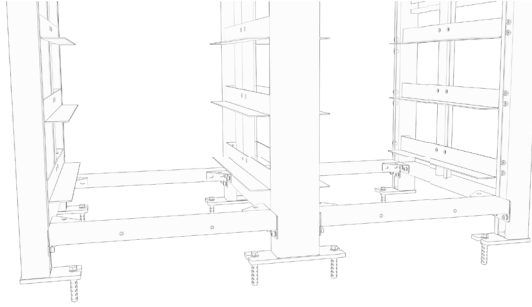
▼ 3.3.1 Rack Installation

Step 1:Unpack and check the models and quantities according to packing list in 2.4.3.

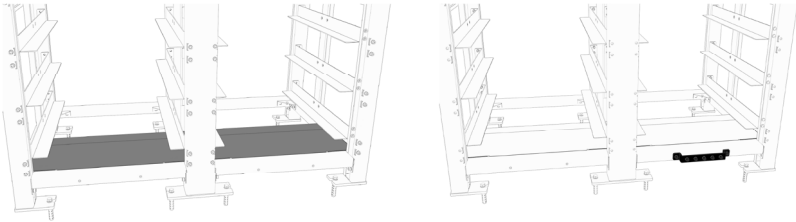
Step 2:Locate the pillars in determined space and then fix the beams onto the pillars with M6x12 screws respectively. (4pcs screws for each end of every beam).



Step 3: Use electric drill with bit (10mm) to drill holes for each foot at the bottom pillars accordingly. And then tighten the M8X60 expansion screw to fix the pillar onto ground. (1pc screw for each foot).

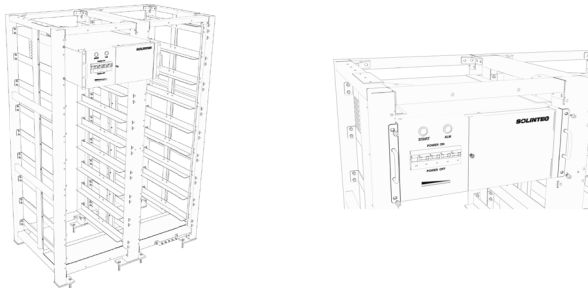


Step 4: Place the tray in the position shown, and using the M6X15 screws to install the PE bar on the bottom beam. (2pcs screws for fixation and 5pcs for grounding cable connection).

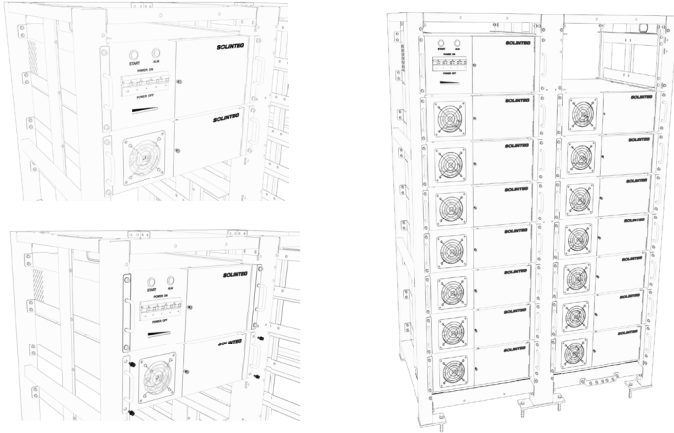


▼ 3.3.2 Battery and Controller Installation

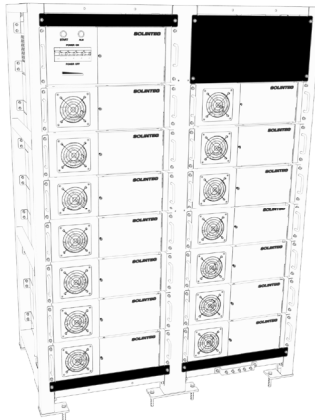
Step 1: Place the controller in the top layer (left or right of EBR-R-A6 and EBR-R-A8 based on actual need) of the rack horizontally. And then fix the controller to rack with M6X12 screws (4pcs).



Step 2:Place the batteries from the 2nd layer from the top in the same column of controller and then another column. Fix the batteries with M6X12 screws (4pcs for each battery).

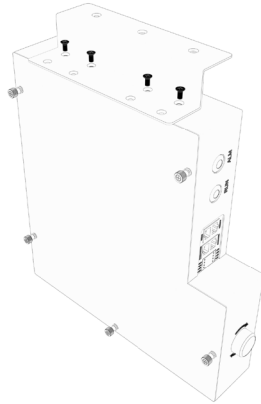


Step 3:Fix the Crosspieces (2pcs screws each) and Decorative Cover (4pcs screws) with M6X12 screws.

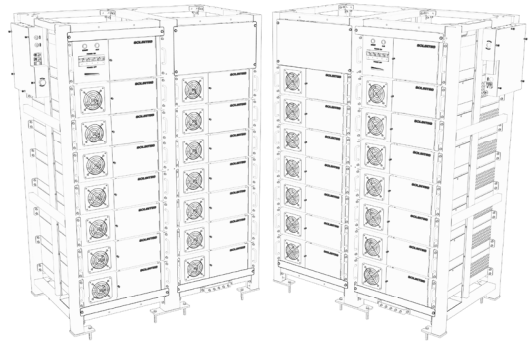
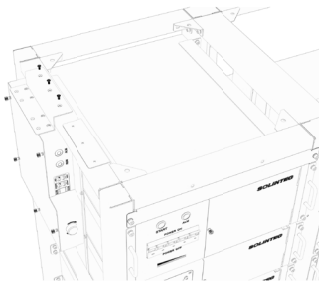


▼ 3.3.3 Paraller Box Installation

Step 1: Fix the Cross Rail onto the Paraller Box with M6X12 screws (4pcs).



Step 1: Install the Paraller Box onto the Rack with M6X12 screws (3pcs). The Paraller box could be installed either left side or right side of the Rack.



3.4 Wiring and Commissioning of Single-cluster

▼ 3.4.1 Notes before Handling

All drawings are for reference only, always refer to the physical product as the standard. If the manual does not match the physical product, stop all actions, remove all connections, store the batteries in a safe place and call your Solinteg technical representative for assistance.

NOTE:

5pcs is the minimum quantity of one battery system for low DOD application. And 6pcs Battery Modules would be preferred for normal battery system.

ATTENTION:

Make sure all the Battery Modules have the same SOC.

ATTENTION:

Screws, cables and connections must be installed with due diligence and the tightening torque must be 14Nm. Each terminal should be inspected, and its torque checked every three months.

ATTENTION:

To make sure the stability and reliability of grounding quality, check and confirm the grounding cables of the battery system periodically.

WARNING:

If some of the cable need to be replaced during installation, please make sure the cable section is suitable for operation current and corresponding terminal listed in Section for the 2.2.4, 2.3.4, 2.4.3 and 2.5.5.

WARNING:

The storage system must be restarted after changing ADDR.

CAUTION:

Power cable connections must be processed in strict accordance with the instructions in this manual and local rules. Incorrect power connections can damage the battery and cause injuries or serious danger and damages.

CAUTION:

Make sure that the Battery Modules and Controller are powered-off before power connection. (check the button LED and the switch under the front cover).

CAUTION:

Make sure that the ground connection is not shared with other potential distributing devices and the ground rod is not used for Neutral Line dispersion or Harmonics mitigation circuit.

CAUTION:

Arrange the cables according to the specific installation requirements, always paying attention to minimizing the length of the cables to avoid voltage drops. Alternate arrangements are strictly prohibited.

▼ 3.4.2 Wiring of Battery System

Step 1: Keep the breaker of Controller and power switch of all Battery Modules as OFF. DIP 7 of ADDR must be set as “ON” and others as “OFF”.



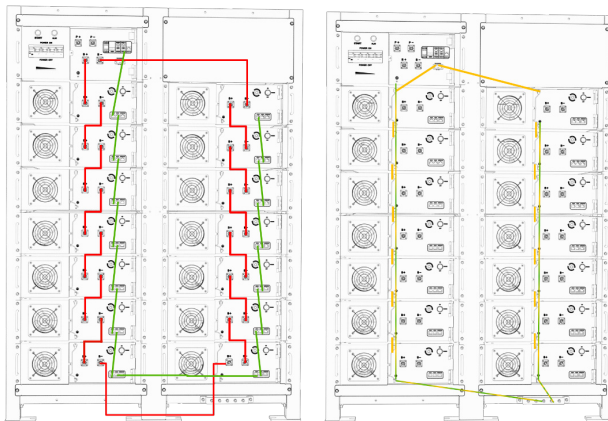
The Controller must be set up before turning it on.
The DIP addresses must follow the picture below to enable the CAN communication.



CONTROLLER ADDRESSING

The last module of the series must be terminated with the provided 120Ohm Terminator to end CAN line.

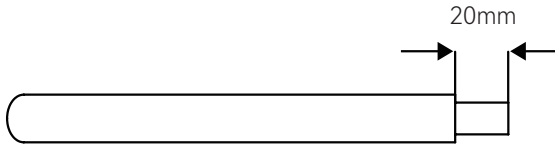
- Step 2:** Connect B+ terminal of Controller to B+ terminal of the 1st Battery Module. (B+ cable).
- Step 3:** Connect B- terminal of Battery Module to B+ terminal of next Battery Module. (HV Series Cable).
- Step 4:** Connect the B- terminal of the last Battery Module to B- terminal of the Controller. (B- Cable).
- Step 5:** Connect CAN-1B of Controller to CAN-A of the first Battery Module. (CON Comm. Cable).
- Step 6:** Proceed with CAN series connection between all the Battery Modules: from CAN-B of one module to CAN-A of the next one. (BAT Comm. Cable).
- Step 7:** Connect the GND terminals of modules and Controller to PE bar or external GND point (torque of 5 Nm). (CON PE Cable, PE Cable, EXT PE Cable and BAT PE Cable).
- Step 8:** Connect 24V Port of Controller to Fan Power-in socket of Battery Modules adjacent to Controller. (Fan Control Cable).
- Step 9:** Connect Fan Power-out of Battery Module to Fan Power-in of next Battery Module.



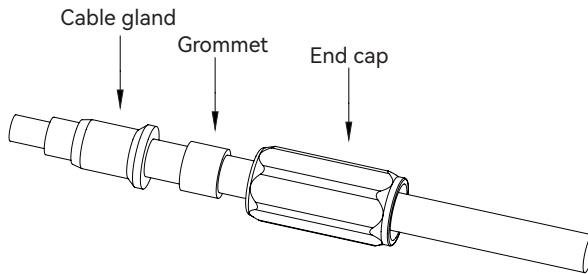
▼ 3.4.3 Wiring between Inverter and Battery system

Step 1: Connect P+ and P- terminals of Controller to battery input terminal of Solinteg inverter. Make sure there is suitable breaker between inverter and battery system. **(P+ Cable and P- Cable).**

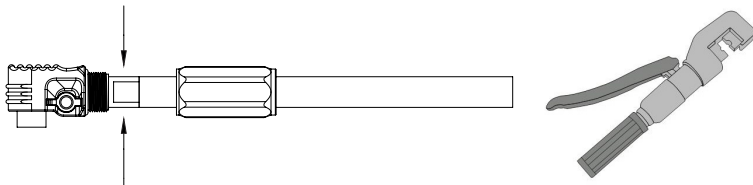
① Peel off the insulation sleeve of P+ and P- cable respectively.



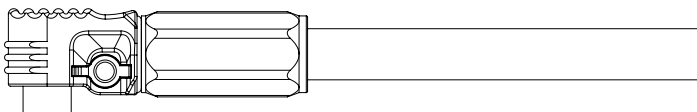
② Disassemble the connector (provided as the accessories of inverter) and then thread the cable into end cap, grommet and cable gland in turn.



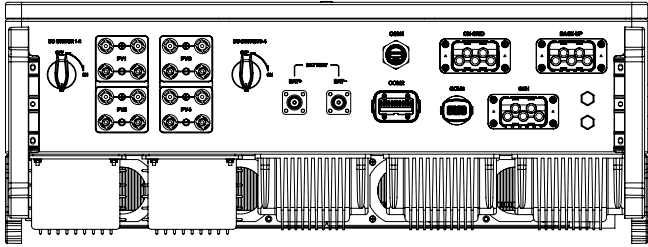
③ Insert the cable into the metal terminal and crimp with crimping plier (please check the crimping quality by pulling the cable after crimping).



④ Push the cable gland, grommet and end cap at the plug end into place, and tighten the end cover with the thread of connector.



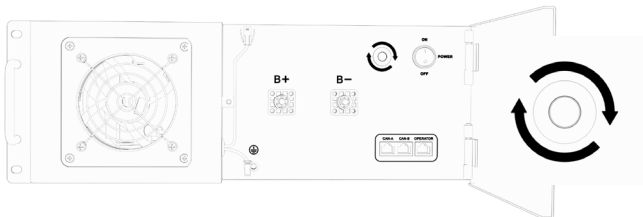
Step 2:Connect CAN-2A of Controller to BMS port (COM2) of inverter. (**BMS Comm. Cable, accessory of inverter**).



▼ 3.4.4 Commissioning of Single-cluster

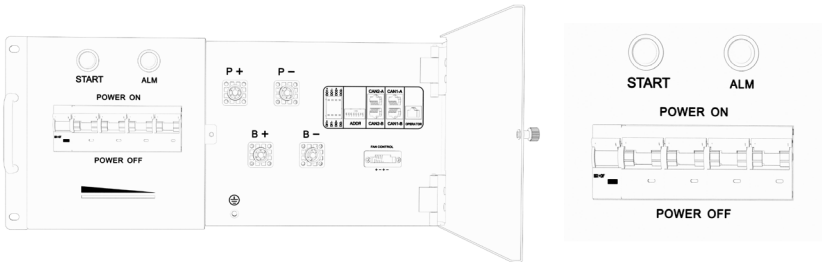
- Make sure the breaker between inverter and the battery system is OFF during start-up procedure. Or else, the self-checking will fail and the battery system would be STOP mode.
- If one or more modules do not turn on automatically, it is necessary to check all the COM CAN connections and restart the START-UP procedure.
- The communication between Controller and Inverter is correctly and stably connected during operation.
- If communication between the inverter and Controller loses more than 60 seconds, Controller will enable safety procedure by opening the internal power circuit (POWER CONTACTOR).
- Do not leave the powered battery system without communication with inverter, which may lead to imbalance of Battery Modules for self-discharging.

Step 1:Make sure the breaker between inverter and battery system as OFF. Turn on the power switch of all Battery Modules as ON (**DO NOT PRESS THE Activation Button**) .



Step 2: Turn on the Controller breaker and then press the Run Button of Controller and hold for 5 seconds to start the start-up automatic procedure.

- ① Controller Run Button light up and then on steady GREEN, while status bar flashes.
- ② Battery Modules wake up automatically one by one (Activation Button lit-up and on GREEN).
- ③ Once insulation test and self-checking finished successfully (about 120 seconds), the battery system closes the output circuit and Status Bar stops blinking.



Step 3: Close the breaker between inverter and battery system.

3.5 Wiring and Commissioning of Multi-clusters

Install each cluster independently according to Section 3.3 before wiring.

▼ 3.5.1 Notes before Handling

NOTE:

Parallel must be used for management of clusters in a battery system with multi-clusters (max. 8 clusters).

NOTE:

CAN communication between the various Controllers has to be in Daisy Chain, starting from the Controller address 00 and continuing in sequence until the last module.

ATTENTION:

Besides the Parallel for communication combination, power combiner box must be used for electrical combination of all the clusters, wherein relevant protection devices must be equipped according to system design, local rules, etc.

CAUTION:

Make sure all the Battery Modules have the same model and the same SOC.

CAUTION:

Make sure all the clusters have the same capacity (each cluster has the same quantities of Battery Modules).

CAUTION:

Make sure that the ground connection is not shared with other potential distributing devices and the ground rod is not used for Neutral Line dispersion or Harmonics mitigation circuit.

CAUTION:

Arrange the cables according to the specific installation requirements, always paying attention to minimizing the length of the cables to avoid voltage drops. Alternate arrangements are strictly prohibited.

CAUTION:

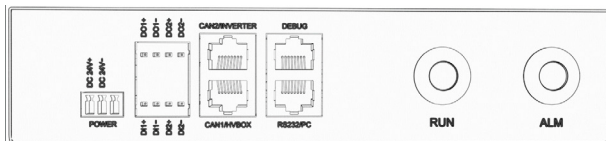
Power cables for connection from each Controller to Paraller must be the same (length, cross-section, materials, etc.).

CAUTION:

Make sure that the Battery Modules and Controllers are powered-off and all the breakers are set as OFF before power connection. (check the button LED and the switch under the front cover).

CAUTION:

A single module with a voltage lower than a few mV compared to the others could generate a performance reduction of the entire system.



▼ 3.5.2 Wiring of Multi-clusters

Step 1:Process the wiring of each cluster according to Section 3.4.2.

Clusters with the same number of modules. Each module of each cluster must have the same voltage. Each cluster must have the same total voltage.

Step 2:Set the DIP switches for each Controller in accordance with the table below, ensuring the DIP settings align with the sequence of the connected Controllers. DIP 7 of ADDR of the last Controller must be set as “ON” and others as “OFF” before turn-on the cluster.

Controller No.	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6	DIP7	DIP8
	Address bit. ON for 1 and OFF for 0				Reserved		Terminal Resistance	Reserved
0	OFF	OFF	OFF	OFF	/	/	ON for Enable OFF for Disable	/
1	ON	OFF	OFF	OFF	/	/		/
2	OFF	ON	OFF	OFF	/	/		/
3	ON	ON	OFF	OFF	/	/		/
4	OFF	OFF	ON	OFF	/	/		/
5	ON	OFF	ON	OFF	/	/		/
6	OFF	ON	ON	OFF	/	/		/
7	ON	ON	ON	OFF	/	/		/

▼ 3.5.3 Wiring between Clusters, Paraller and Inverter

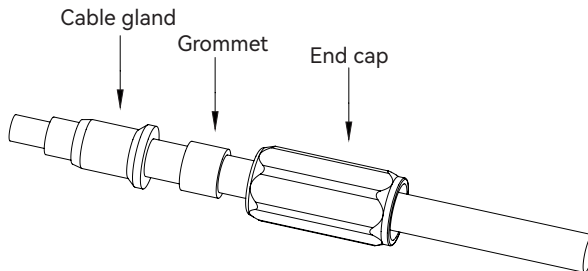
Step 1: Connect P+ and P- terminals of each Controller to input terminals of power combiner box respectively (P+ Cable and P- Cable), which shall be prepared by customer according to local rules. Make sure there is suitable DC breaker (1000VDC/100A) in the combiner box.

Step 2: Connect positive and negative terminals of power combiner box to battery input terminals of Solinteg inverter correctly and respectively. The cable shall be prepared by customer and the conductor core section shall be $25\text{mm}^2 \sim 35\text{mm}^2$.

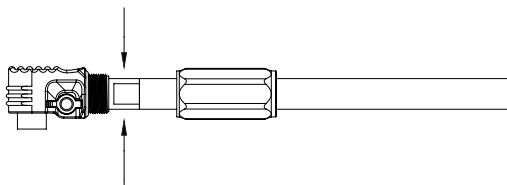
- ① Peel off the insulation sleeve of P+ and P- cable respectively.



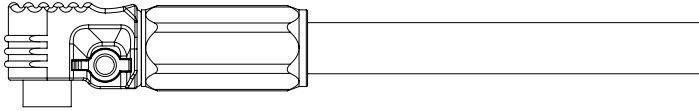
- ② Disassemble the connector (provided as the accessories of inverter) and then thread the cable into end cap, grommet and cable gland in turn.



- ③ Insert the cable into the metal terminal and crimp with crimping plier (please check the crimping quality by pulling the cable after crimping).



- ④ Push the cable gland, grommet and end cap at the plug end into place, and tighten the end cover with the thread of connector.

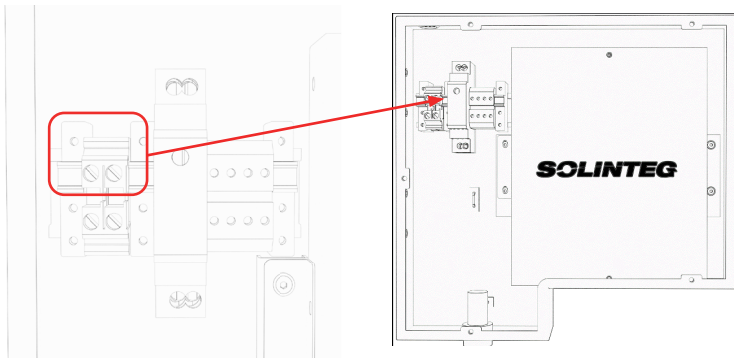


Step 3: Connect the input terminals to L line and N line of backup port of inverter.

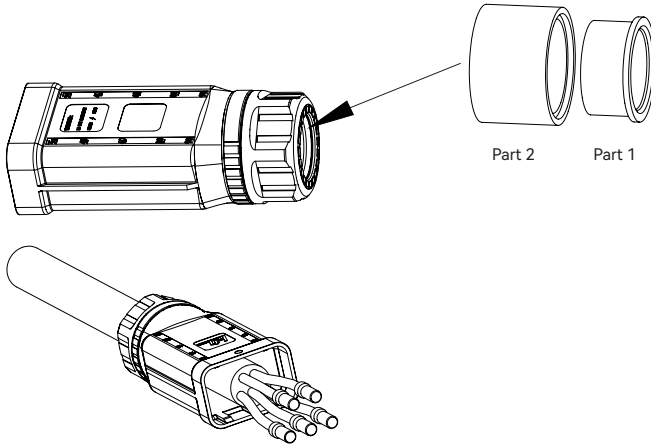
- ① Peel off the insulation sleeve of both end of L and N cables respectively.



- ② Thread the L and N cables into the AC hole, insert into the input port of the Paraller Box and tighten the screws respectively.

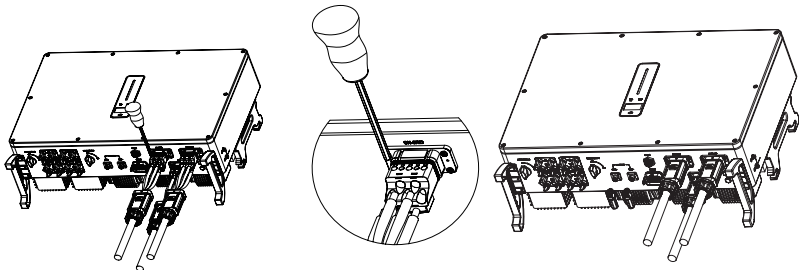


③ Insert another end of the cables into the metal terminal and crimp with crimping plier respectively (please check the crimping quality by pulling the cable after crimping).



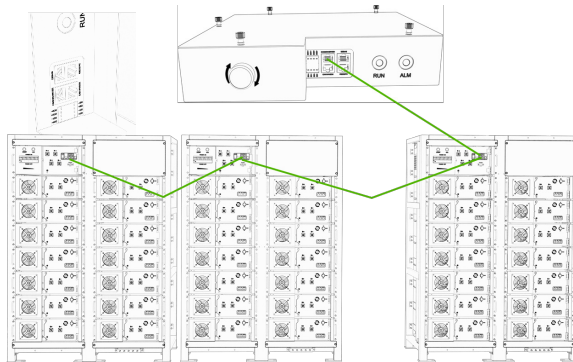
④ Insert L cable into anyone of L1/L2/L3 port and N cable into N port and tighten corresponding screw ($5 \pm 0.1N \cdot m$).

⑤ Insert the main body into the rubber core and hear the "click" sound, then tighten the nut with an open-ended wrench (torque $10.0 \pm 0.1N \cdot m$).

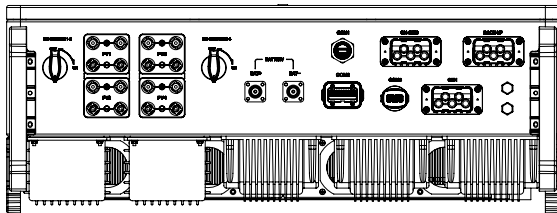


Step 4: Proceed with CAN series connection between all the Controllers: from CAN-2B of one Controller to CAN-2A of the next one. **(Parallel Comm. Cable).**

Step 5: Connect CAN-2A of Controller to CAN1/CON. of Paraller. **(Parallel Comm. Cable).**



Step 6: Connect the CAN2/INVERTER of Paraller to BMS port (COM2) of inverter. (**BMS Comm. Cable, accessory of inverter**).



Step 7: After wiring, check all the connections to make sure polarity is correct.

▼ 3.5.4 Commissioning of Multi-clusters

Step 1: Turn on the button of Paraller box.

Step 2: Activate the first Controller ID00 according to Section 3.4.4. Only when the first cluster is fully operational then it is possible to proceed with the start-up procedure of the second cluster.

Step 3: Wait for the complete start-up of last cluster and then start-up next cluster.

Step 4: After all the clusters finish the start-up procedure, Paraller will initiate the control procedure of each single cluster by activating the Controller contactors one by one.

Step 5: The start-up procedure foresees the deferred switching on of the various clusters with a delay of at least 5 seconds from each other.

If one or more modules of one cluster do not come online, Controller will send a WARNING message to Paraller and the entire system will enter into IDLE MODE. To clear this status, it is necessary to inspect the Battery Modules which causing the wake-up interruption, fix the error and repeat the entire Start-Up process from Step 1 (All Controllers must be turned OFF and ALL Battery Modules must be switched OFF before restarting the procedure).

3.6 Power-off and Removal

▼ 3.6.1 Power-off of Controller

Step 1: Stop the charging or discharging process of inverter.

Step 2: Set the DC breaker between inverter and Controller/Paraller as OFF.

Step 3: Turn off the Breaker of Controller manually.

▼ 3.6.2 Removal of Controller

Step 1: Wait for more than 60 seconds after power-off of Controller.

Step 2: Disconnect all the power and communication cables between inverter/Paraller and Controller.

Step 3: Disconnect all the power and communication cables between Controller and the 1st Battery Module.

Step 4: Disconnect the GROUND cable.

Step 5: Remove fixing screws that secure Controller to Rack.

Step 6: Remove Controller from its location.

3.7 Operation of Single Battery Module

▼ 3.7.1 Notes before Handling

NOTE:

During normal operation, the Activation Button of Battery Module has no function, which is bypassed by the control communications from the Controller.

NOTE:

If needs to upgrade or operate on the single Battery Module, it is possible to enable the Battery Module by pressing the Activation Button and monitor the battery via PC software through the RS232 Operator Port.

ATTENTION:

Read this entire manual thoroughly to understand the correct startup and shutdown procedures for each battery configuration.

ATTENTION:

Please always refer to the physical Battery Module in front of you, and if the module has a different configuration to this manual, stop all activity immediately and contact your Solinteg technical representative.

CAUTION:

The Activation Button and the Power Switch are not SAFETY BREAKER, the Battery Module is ALWAYS LIVE even if the Activation Button and the Power Switch are turned OFF.

CAUTION:

Make sure all the clusters have the same capacity (each cluster has the same quantities of Battery Modules).

CAUTION:

Make sure that the ground connection is not shared with other potential distributing devices and the ground rod is not used for Neutral Line dispersion or Harmonics mitigation circuit.

CAUTION:

Arrange the cables according to the specific installation requirements, always paying attention to minimizing the length of the cables to avoid voltage drops. Alternate arrangements are strictly prohibited.

CAUTION:

Power cables for connection from each Controller to Paraller must be the same (length, cross-section, materials, etc.).

CAUTION:

Make sure that the Battery Modules and Controllers are powered-off and all the breakers are set as OFF before power connection. (check the button LED and the switch under the front cover).

CAUTION:

A single module with a voltage lower than a few mV compared to the others could generate a performance reduction of the entire system.

▼ 3.7.2 START-UP

Step 1: Turn ON the Power Switch (1 = ON 0= OFF).

Step 2: Press the Activation Button and hold on for 2 seconds.

Step 3: The Activation Button will blink until the safety inspection completed, which means Battery Module has been turned on.

▼ 3.7.3 POWER-OFF

Step 1: Press the Activation Button and hold on for 5 seconds.

Step 2: Turn OFF the Power Switch (1 = ON 0= OFF).

▼ 3.7.4 Recharge of Single Battery Module

- This process must be supervised by solinteg and performed only with a solinteg rack.
- If a Module Recharge is necessary, it is compulsory to supervise the Battery during the entire process.
- Pc software must be used to monitor the single cell voltage.
- No cell must surpass the value of 3.65VDC.
- Maximum charger parameter for the single battery module are 10a 56VDC.

4 Transportation and Storage

- For long-term storage, the battery should be recharged once every 3 months, and the amount of electric charge shall exceed 80% of the rated capacity.
- Please charge the battery in 18 hours after it fully discharged or over-discharging protection mode is activated.
- If the batteries have not been used for more than 9 months, these batteries must be charged to at least SOC 50 % each time.
- For the first installation, the interval among manufacture dates of battery modules shall not exceed 3 months.
- If a battery is replaced or added for capacity expansion, each battery's SOC should be consistent. The max. SOC difference should be between $\pm 5\%$.
- If users want to increase their battery system capacity, please ensure that the SOC of the existing system capacity is about 40%. The manufacture date of the new battery shall not exceed 6 months; in case of exceeding 6 months, please charge the new battery to around 40%.

5 Contact Information

Should you have any question about this product, please contact us.

We need the following information to provide you the best assistance:

- Model of the device
- Serial number of the device
- Date of the device
- Fault code/name
- Brief description of the problem

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