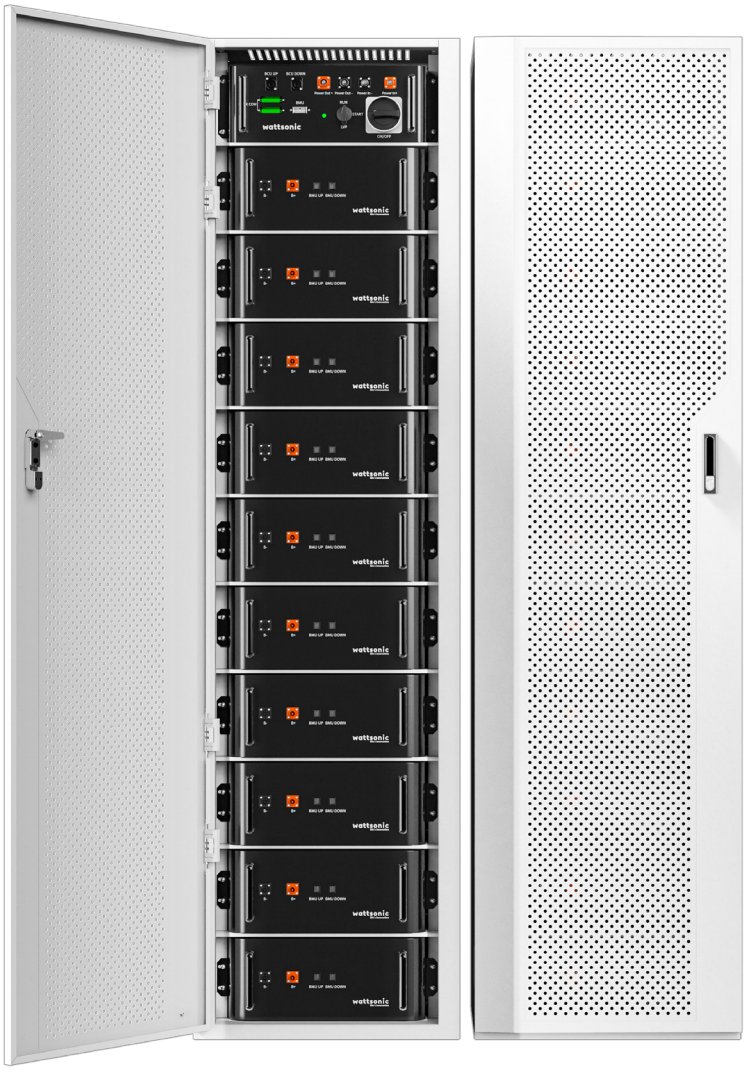
wattsonic
life's innovation

Commercial High Voltage LiFePO4 Rack Mounted Battery Modules with BMS

USER MANUAL



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1. Overview



To secure the full 10-years battery product warranty, be sure to install the Wattsonic Commercial Cabinet by qualified installers.

Warning: Read this entire document before installing or using Wattsonic Commercial Cabinet. 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 Wattsonic Commercial Cabinet, potentially rendering it inoperable.

PRODUCT SPECIFICATIONS

All specifications and descriptions contained in this document are verified to be accurate at the time of printing. However, because continuous improvement is a goal at Wattsonic, we reserve the right to make product modifications at any time.

The images provided in this document are for demonstration purposes only. Depending on product version and market region, details may appear slightly different.

ERRORS OR OMISSIONS

To communicate any inaccuracies or omissions in this manual, please send an email to: service@wattsonic.com



ELECTRONIC DEVICE: DO NOT THROW AWAY

Proper disposal of batteries is required. Refer to your local codes for disposal requirements.

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All other trademarks contained in this document are the property of their respective owners and their use herein does not imply sponsorship or endorsement of their products or services. The unauthorized use of any trademark displayed in this document or on the product is strictly prohibited.

2. Safety Information

2.1 Symbol Used

SAVE THESE IMPORTANT SAFETY INSTRUCTIONS. Wattsonic Commercial Cabinet installation and repair instructions assume knowledge of high voltage electricity and should only be performed by Wattsonic Certified Installers. Wattsonic assumes no liability for injury or property damage due to repairs attempted by unqualified individuals or a failure to properly follow these instructions. These warnings and cautions must be followed when using Wattsonic Commercial Cabinet.

Symbols in this document

This manual uses the following symbols to highlight important information:

Danger	DANGER used to warn of urgent dangerous situations, if not avoided, it could result in death or serious personal injury.
Warning	WARNING indicates a hazardous situation which, if not avoided, could result in injury or death.
Caution	CAUTION indicates a hazardous situation which, if not avoided, could result in damage to the equipment.
Attention	ATTENTION used to transmit the safety warning information about equipment or environment, if not avoided, it may cause equipment damage, data loss, equipment performance degradation or other unpredictable results. “Attention” does not involve personal injury.
Note	NOTE indicates an important step or tip that leads to best results, but is not safety or damage related.

Symbols on the Packing box

	Handle with care.
	This side up.
	Keep dry.
6	Stacked layers.

Symbols on the nameplate

	The product cannot be disposed of with household waste.
	Please read the instructions carefully before installation.
	Do not touch any internal parts of the product until 5 min after being disconnected from the mains and PV input.
CE	CE mark, the product complies with the requirements of the applicable CE guidelines.
TUV	TUV certification.
	Danger. Risk of electric shock!
	The surface is hot during operation and no touch is allowed.
	Electric shock hazard, it is strictly forbidden to use the person to disassemble the product casing.

2.2 Important Safty Instructions

CAUTION

- Please make sure there are no flammable materials near the cabinet or module when installing the Wattsonic Commercial Cabinet, and keep a fire extinguisher in an accessible place.
- Do not pile things on modules or cabinets.
- Avoid installing in locations where there is a risk of flooding.
- The product should be installed and keep be level.
- The installation position should be stable enough to support a certain amount of weight and vibration.
- The appropriate battery storage and operation temperature is 25±5°C .
- The humidity range of battery operation and storage is 40 to 80%.
- Please adjust the cabinet room to a proper temperature for a better battery performance and life span.
- Please adjust the cabinet room to a proper humidity, otherwise it may cause battery failure or fire.
- Do not install the cabinet if the temperature is beyond the -20-60°C range or the humidity is above 80%
- Do not install product with damaged or uninsulated tools.
- Please ensure the earth ground wire connection is stable to prevent possible electric shock.
- The installation must be carried out only by Wattsonic Certified Installers, who have been trained in dealing with high voltage electricity.
- The battery may be in danger of high voltage or short circuit. Please follow the instructions when conducting installation and other operations:

    Remove rings, watches or other metal and conducting electricity objects;

    Wear insulated gloves before operation;

    Use tools with insulating isolation;

    Do not put tools or metal parts on top of the modules and cabinets.

- Do not use cleaning solvents to clean the product, or expose the product to flammable or harsh chemicals or vapors.
- Do not use fluids, parts, or accessories other than those specified in this manual, including use of non-genuine Wattsonic parts or accessories, or parts or accessories not purchased directly from Wattsonic or a Wattsonic-certified party.

WARNING

- Read this entire document before installing or using Wattsonic Commercial Cabinet. 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 the product, potentially rendering it inoperable.
- Do not short the positive and negative terminals of Module or Sub-Master BMS.
- Do not modify, short circuit, disassembly the modules.
- Do not attempt to open, disassemble, repair, tamper with, or modify Wattsonic battery module. Wattsonic battery module is not user serviceable. LFP Cells in Wattsonic Battery are not replaceable. Contact the Wattsonic Authorized Reseller who sold the battery for any repairs.
- Do not throw the battery or shock it.
- Do not modify the cables, including power cables, communication cables, etc.
- Prohibit battery wiring in any other way than specified in the manual.
- Incorrect wiring connection may cause product damage and danger.
- Do not touch any metal terminals and mental objects linked with mental terminals of the module.
- Do not use or install the product if it is defective, appears cracked, broken, or otherwise damaged, or fails to operate.
- There is a high possibility of electric shock or serious burns due to the high voltage.
- This product has potential danger such as death or serious injury by fire, high voltages or explosion if the precautions are not read or fully understood.
- Electrical installations must be done under in accordance with the local and national electrical safety standards.
- Rubber gloves and protective clothing (goggles and boots) should be worn when working on high voltage/high current systems such as battery systems.
- Danger of electric shock. Do not remove the cover. There are no internal parts that can be serviced by users. Contact a qualified authorized technician for service.

3. Installation

3.1 Installtion Tool

CAUTION

All tools used for installing the battery should be insulated or free of exposed metal parts.
If not, at least the handle knob must be insulated.

(1) Torque Wrench

It is used for fastening the cable terminal and product.



(2) Electric Driver

It is used to fasten the enclosure of a product.



(3) Digital multimeter

It is used for checking product voltage and insulation.



3.2 Product List

Picture	Item	Content	Size(mm)
	Cabinet	Cabinet Frame	W:625.25 D:489.97 H:2352
	Battery Module	Battery Module	W:465 D:180 H:356
	Sub-Master BMS Module	Sub-Master BMS Module	W:465 D:194 H:403.5
---	Accessory	Accessory	---

3.3 Product Overview

3.3.1 Battery Rack

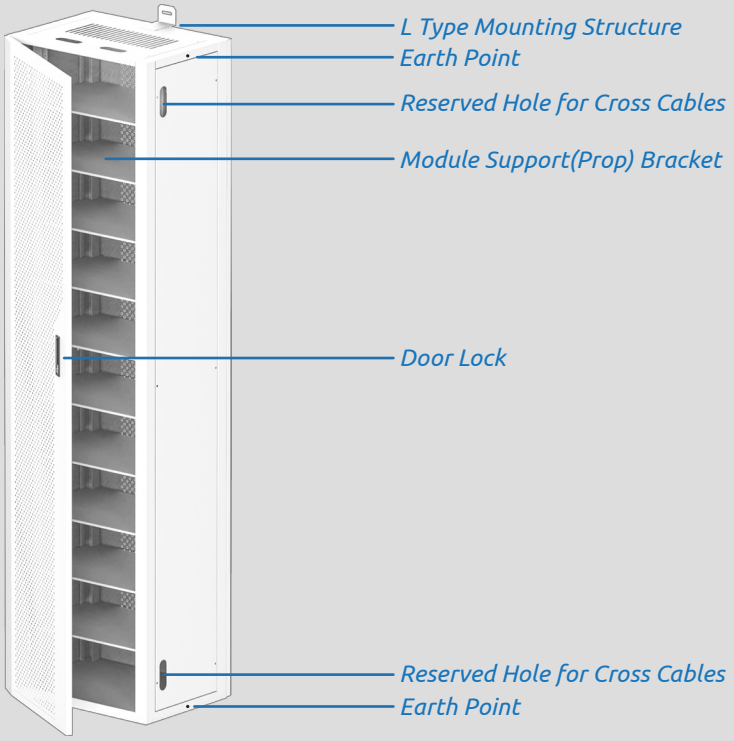
Cabinet frame is the enclosure to mount and secure the battery and Sub-Master BMS module.

Fix the Cabinet frame with bolts and nuts on the wall through the L type mounting structure.

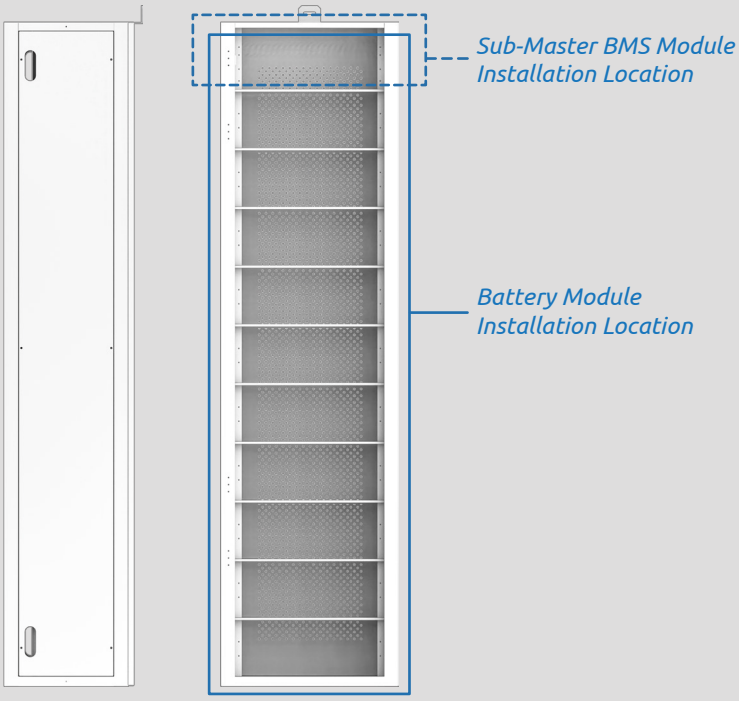
Size: W:625.25

D:489.97

H:2352(mm)



Battery Rack(Axis view)



Battery Rack (Side view) *Battery Rack (Front view)*

3.3.2 Sub-Master BMS Module

The battery management unit of the rack has a built-in Rack BMS and battery protection Unit.

Mounted in the uppermost position of the cabinet.

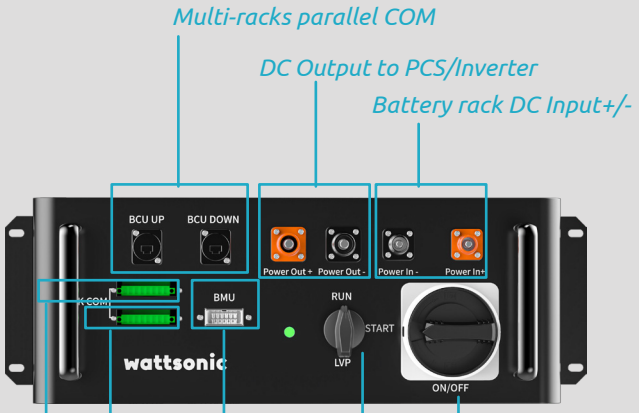
Size: W:465

D:356

H:180(mm)



Sub-Master BMS (Axis view)



Sub-Master BMS (Front view)

8	7	6	5	4	3	2	1	P1
HMI485B	HMI485A	BCANH	BCANL	DCCANH	DCCANL	PWR-	PWR+	

8/7 RS-485 Com. Ports for external Control(Smart1 EMS)
6/5 Bus CAN for Multi-racks internal CAN COM.
4/3 Debug CAN for single rack CAN COM.
2/1 24Vdc output to external device

3.3.3 Battery Module

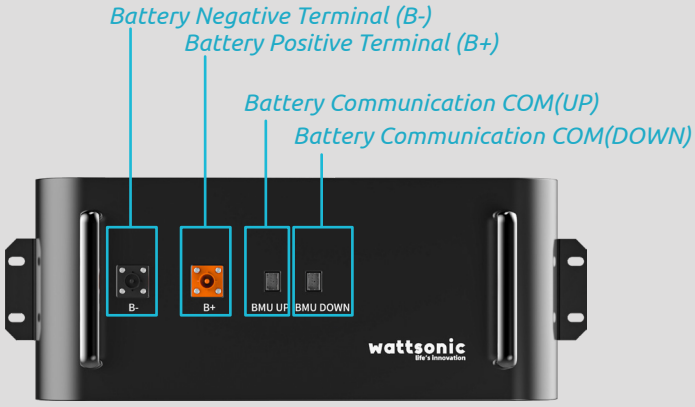
A battery module consisting of battery cells and a slave control.

Install it into the battery rack sequentially as instructed.

Size: W:465
D:403.5
H:194(mm)



Battery Module (Axis view)



Battery Module (Front View)

3.3.4 Accessory

(1) Communication cable A

Use to connect Sub-Master BMS module communication with battery module.



(2) Communication cable B

Use to connect communication between battery modules.



(3) Power Cable A

Power lines between battery modules.

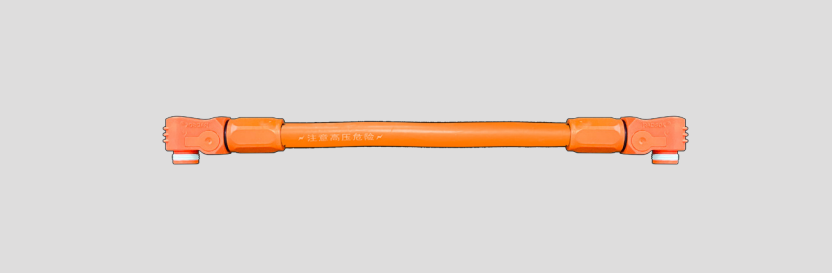
Used to connect the positive and negative end power between battery modules.



(4) Power Cable B

The total positive power line of the battery modules.

The power line used to connect the positive pole between battery modules and Sub-Master BMS.



(5) Power Cable C

The total negative power line of the battery modules.

The power line used to connect the negative pole between battery modules and Sub-Master BMS.



(6) L type mounting structure

Used to connect the wall and the cabinet to make the cabinet stable.



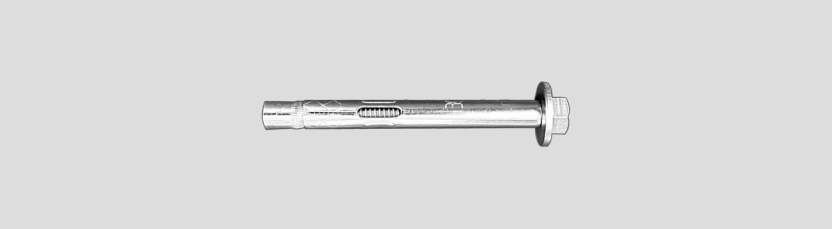
(7) COM Resistor

Used to set up the termination resistance of a module.



(8) M6*60 Expansion Bolt

Used for fixing the L type mounting structure and the wall.



(9) M5 Triad Screw

Used for fixing the L type mounting structure and the cabinet.

Used for fixing the module and the cabinet.



(10) Break the Paint Gasket

Used to destroy the insulation paint between the module and the cabinet, so that the cabinet is grounded.



3.4 Pre-installation Check

3.4.1 Battery Module Voltage Measurement

Before proceeding with the installation, pre-check the battery to make sure it is safe.

Use a digital multimeter to measure the voltage between the positive terminal (+) and the negative terminal (-) of the battery module.

The standard voltage shall be between 30V and 43.8V.

> Test Point:
>
> Positive Terminal, Negative Terminal

> Test Procedure:
>
> Set the multimeter to the DC voltage, connect the red meter to the positive terminal and the black meter to the negative terminal.



3.4.2 Battery Module
Insulation Resistance Measurement

CAUTION **Do not measure resistance the way you measure voltage.**

With a digital multimeter, measure on the positive (+) or the negative (-) terminal in the module and the module case part.

The standard value should be100 MΩ or more.

Test Point:

Positive Terminal, Screw beside the Negative Terminal

Test Procedure:

Set the multimeter to the resistance measurement position, connect the red meter to the positive terminal and the black meter to the screw beside the negative terminal.



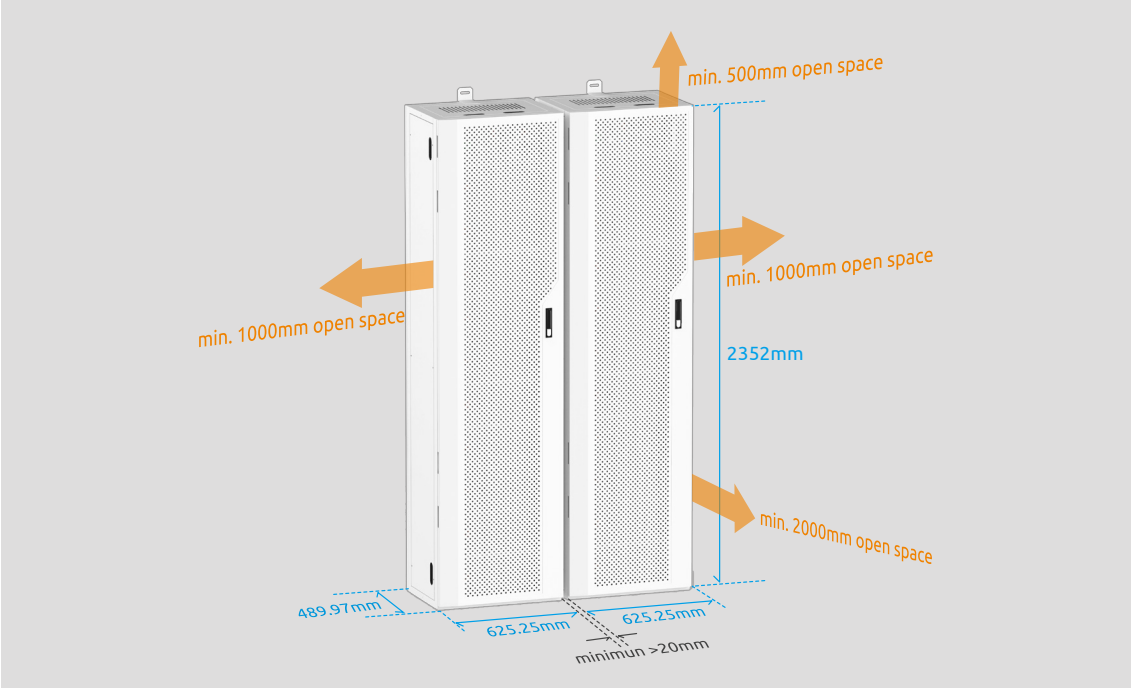
3.4.3 Environmental Checks

CAUTION **Product installation in an inappropriate environment can result in installation problems or product problems.**

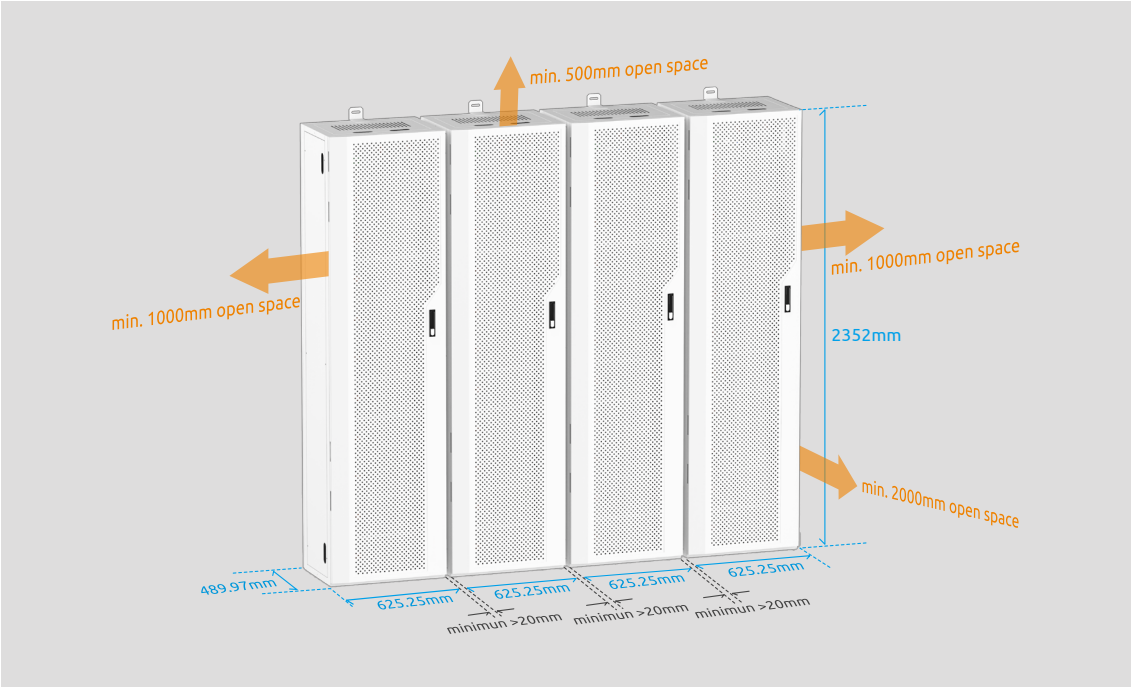
- The wall on which the cabinet is mounted must be strong and can withstand the weight of the cabinet for a long time.
- The cabinet needs to be installed in a well-ventilated environment.
- Do not expose the cabinet directly to strong sunlight to prevent the power derating due to excessive temperature.
- The cabinet should be installed in a place with shelter to prevent direct exposure to sunlight and rain.
- To avoid risk the cabinet must be installed out of reaching of children.
- 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 to 50.
- 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 whole system is more than 0.5 meters.
- Do not cover or wrap the battery case or cabinet.
- Do not place at a children or pet touchable area.
- The installation area shall avoid of direct sunlight.
- Due to ventilation or airtight requirements, please follow the installation distance requirements (top/left/right/front) on the next page.
- The aeration shall avoid of high salinity, humidity or temperature.

3.4.4 Selection of Installation Location

80.6kWh Single Rack Installation



160kWh(80.6kWh*2) 2 Racks Installation



3.5 Installation Procedure

3.5.1 Single Rack (Two Cabinet)

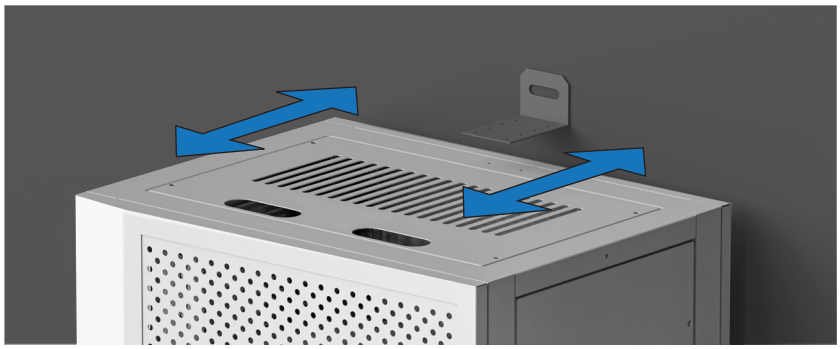
3.5.1(1) Rack Installation and Fixing

Refer to the construction drawing to install the cabinet.

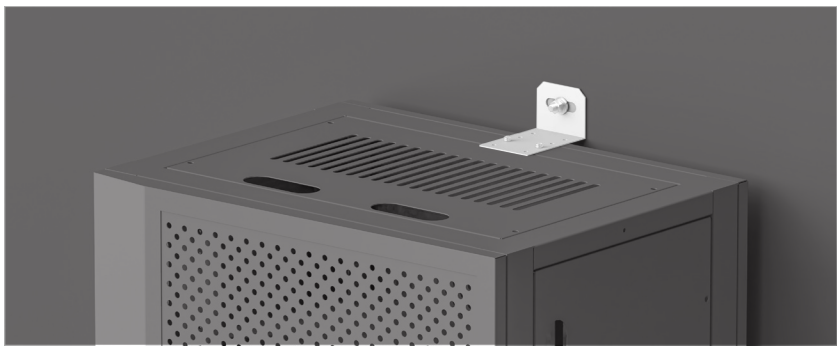
Step1. Place the cabinet on a level stable floor.



Step2. The cabinet can be adjusted as needed from the back wall, and matched with the equidistant holes of the L type mounting structure, and fixed.



Step3. Fix the L type mounting structure and cabinet with one M5*60 expansion bolt on the wall side and two M5 triad screw on the cabinet side.



3.5.1(2) Ground Terminal Connection

Ground Terminal Connection

After the cabinet is fixed, then connect one of the earth point of cabinet (side top or bottom) to the PE distribution box.

And each cabinet should be connected with a grounding wire.



Battery Rack(Axis view)

3.5.1(3) Mounting and Securing Product

CAUTION

For safety reasons, please use at least 3-4 people during installation.
Dn not mount the module upside down.
Check the module before installation to ensure safety.

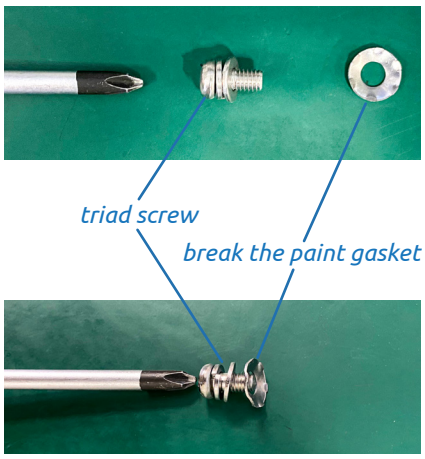
Step1. Open the door of the cabinet, and put battery module to cabinet carefully.

Installation starts from the bottom to up, install the lowest module first.



Step2. After the module is put into the cabinet, fix it to the cabinet with 4 M5 triad screw on both sides. And put a break the paint gasket between each triad screw and module as the figure shown below to enhance electrical conductivity of the whole cabint.







Step3. Install the battery module from bottom to top, and install the Sub-Master BMS in the top of the cabinet, use screws and break the paint gasket to secure the Sub-Master BMS to the cabinet.



Step4. Install all the battery modules and Sub-Master BMS module to the cabinet as the instruction figure below, and secure them to the cabinet.



3.5.1(4) Communication Cables Connection

CAUTION

Connect communication cables as below figure and avoid connecting to other communication ports.
If you change the communication port arbitrarily, the product may be broken.
Use only the provided communication cable.
If the product is used arbitrarily, the product may not operate properly.

Step1. Communication Cable A

Open the terminal protection cap and use communicaiton cable A to connect Sub-Master BMS module communication with battery module as the red line shown in the figure. And pay attention to the difference between the terminals of the cable.

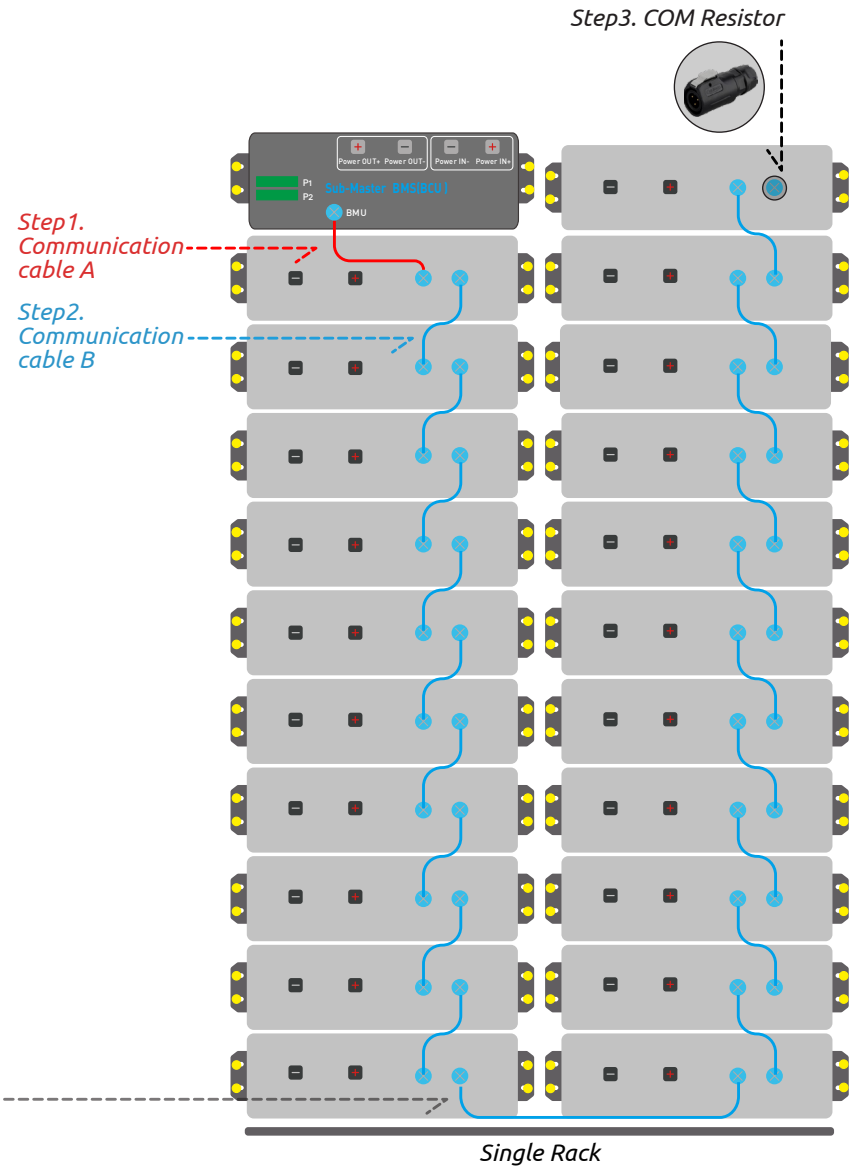
Step2. Communication Cable B

Open the terminal protection cap and use communication cable B to connect communication between battery modules as the blue line shown in the figure.

Step3. COM Resistor

Plug into the COM resistor from standard accessories to the open COM port of the last battery as the black circle shown in the figure.

The cross cable can be passed throuth the reserved hole on the both sides of the cabinet for a better cable management.



3.5.1(5) Power Cables Connection

WARNING

1. Make sure the main switch on the Sub-Master BMS is "OFF" before cables connection.

2. At least two people should work on cables connection to ensure accurate and safe operation.

3. Please make sure to wear insulating gloves before installation.

4. Use insulating tools to connect cables.

5. Be careful of external short circuit during connection. Carelessness may cause danger.

Step1. Power Cable A

> *Power lines between battery modules.*

Start connection from the very first battery module under the Sub-Master BMS. Open the terminal protection cap and use power cable A to connect the positive(B+) and negative end power(B-) between battery modules as the black line in the figure shows in order.

Step2. Power Cable B

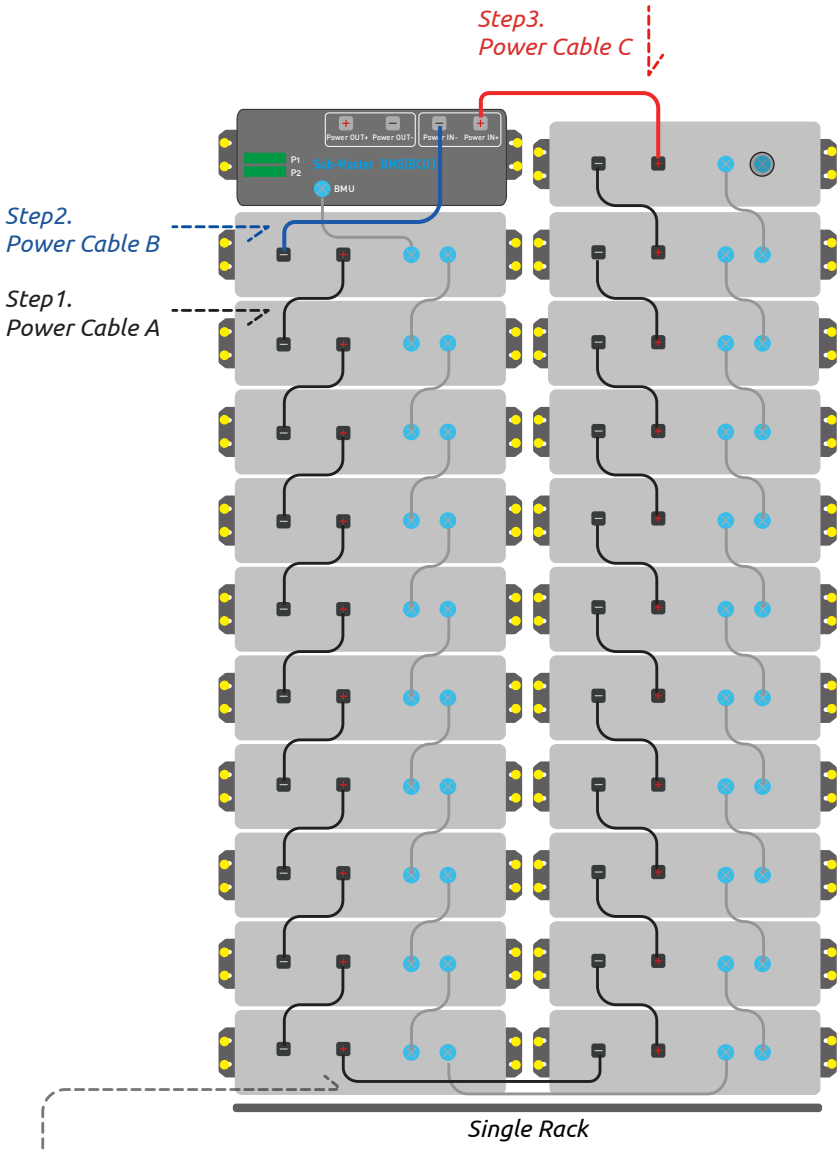
> *The total positive power line of the battery modules.*

Connect the "B+"terminal on the last battery module to the "Power IN+" terminal on the Sub-Master BMS with power cable B as the red line shown in the figure.

Step3. Power Cable C

> *The total negative power line of the battery modules.*

Connect the "B-"terminal on the battery module which is under Sub-Master BMS to the "Power IN-" terminal on the Sub-Master BMS with power cable C as the blue line shown in the figure.



The cross cable can be passed throuth the reserved hole on the both sides of the cabinet for a better cable management.

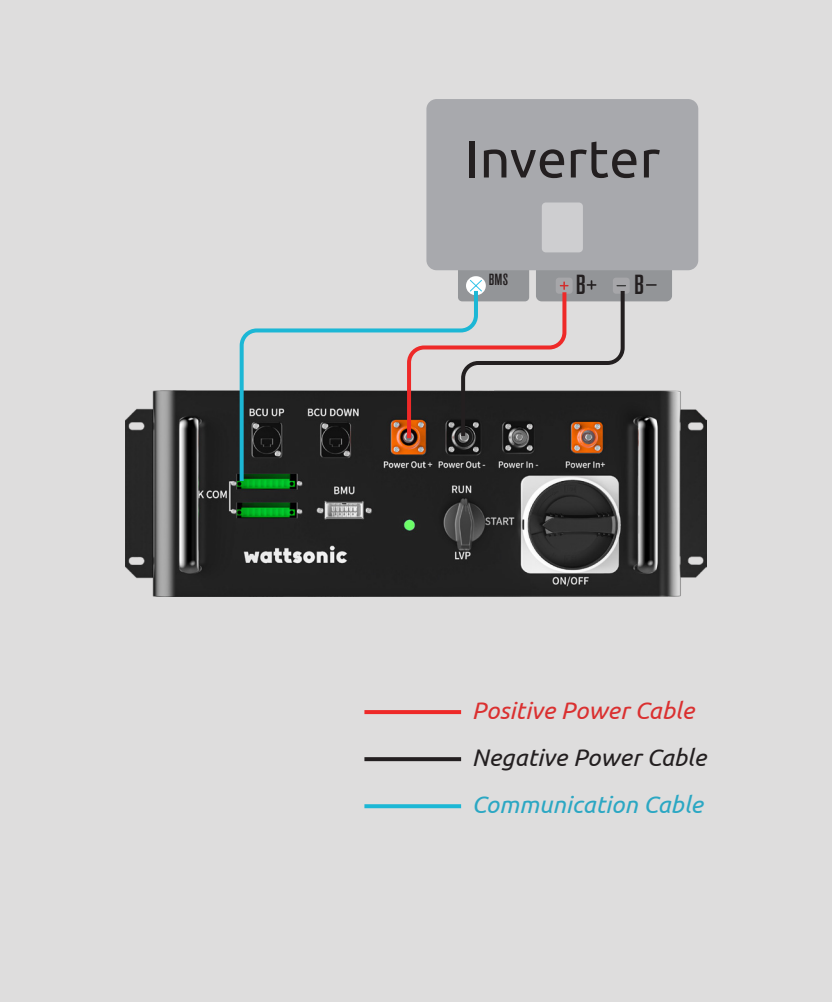
3.5.1(6) Connection between BMS and PCS

Connect the Power OUT+ and Power OUT- of Sub-Master BMS to B+ and B- of inverter.

To ensure the safe use of the equipment, please connect the circuit breaker between the PC and the Sub-Master BMS.

Make sure there is no power supply before connecting, and use a cable that meets the requirements.

Please refer to the figure to connect.



3.5.2 Single Cabinet

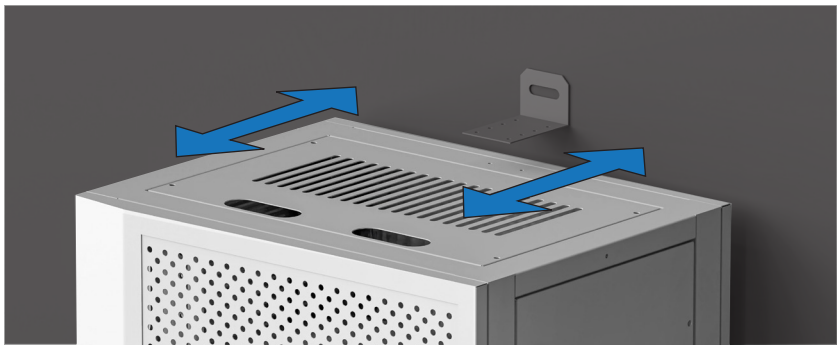
3.5.2(1) Rack Installation and Fixing

Refer to the construction drawing to install the cabinet.

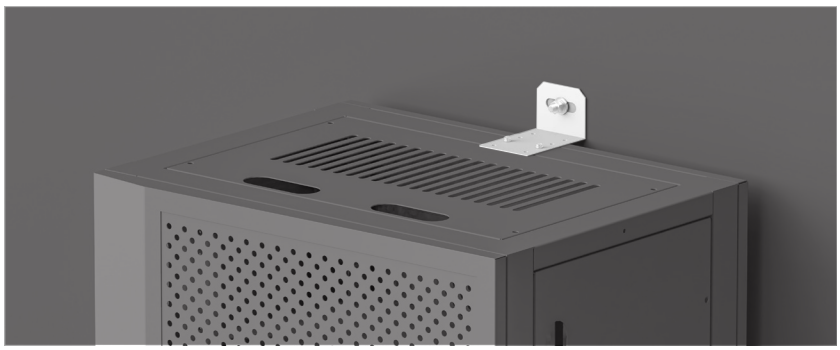
Step1. Place the cabinet on a level stable floor.



Step2. The cabinet can be adjusted as needed from the back wall, and matched with the equidistant holes of the L type mounting structure, and fixed.



Step3. Fix the L type mounting structure and cabinet with one M5*60 expansion bolt on the wall side and two M5 triad screw on the cabinet side.



3.5.2(2) Pre-installed cables connection

Ground Terminal Connection

After the cabinet is fixed, then connect one of the earth point of cabinet (side top or bottom) to the PE distribution box.



Battery Rack(Axis view)

(FOR ONLY SINGLE CABINET MODEL)
Battery Positive cable Installation

> **NOTE**
>
> **Only models with a single cabinet require pre-installation of the total positive power cable. Other models do not require this step.**

Refer to the construction drawing to install the cable.

Please install the **power line C**(total positive power line) in the slot on the side of the cabinet in advance because it is difficult after mounting the module.



Battery Rack(Axis view) *Battery Rack (Front view)*

3.5.2(3) Mounting and Securing Product

CAUTION

For safety reasons, please use at least 3-4 people during installation.
Dn not mount the module upside down.
Check the module before installation to ensure safety.

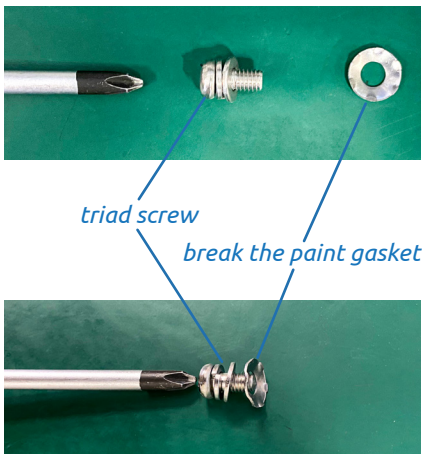
Step1. Open the door of the cabinet, and put battery module to cabinet carefully.

Installation starts from the bottom to up, install the lowest module first.



Step2. After the module is put into the cabinet, fix it to the cabinet with 4 M5 triad screw on both sides. And put a break the paint gasket between each triad screw and module as the figure shown below to enhance electrical conductivity of the whole cabint.



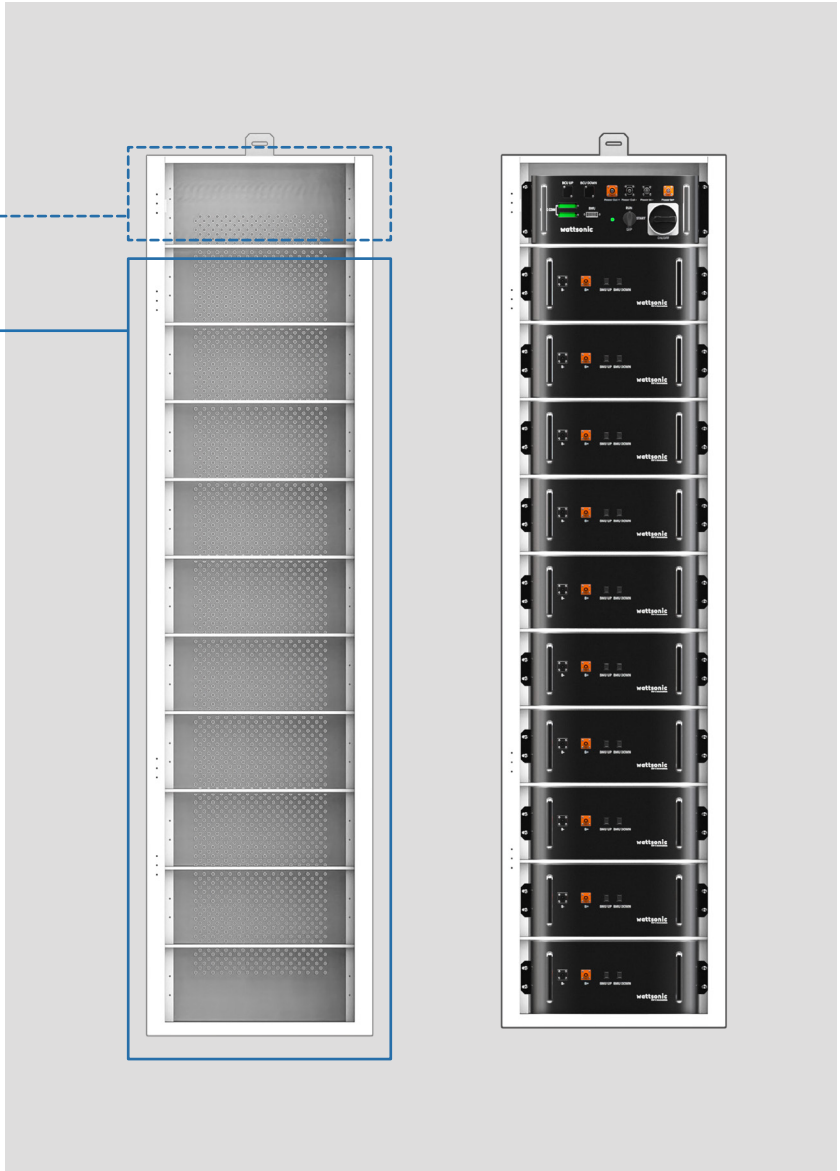




Step3. Install the battery module from bottom to top, and install the Sub-Master BMS in the top of the cabinet, use screws and break the paint gasket to secure the Sub-Master BMS to the cabinet.



Step4. Install all the battery modules and Sub-Master BMS module to the cabinet as the instruction figure below, and secure them to the cabinet.



3.5.2(4) Communication Cables Connection

CAUTION

Connect communication cables as below figure and avoid connecting to other communication ports.
If you change the communication port arbitrarily, the product may be broken.
Use only the provided communication cable.
If the product is used arbitrarily, the product may not operate properly.

Step1. Communication Cable A

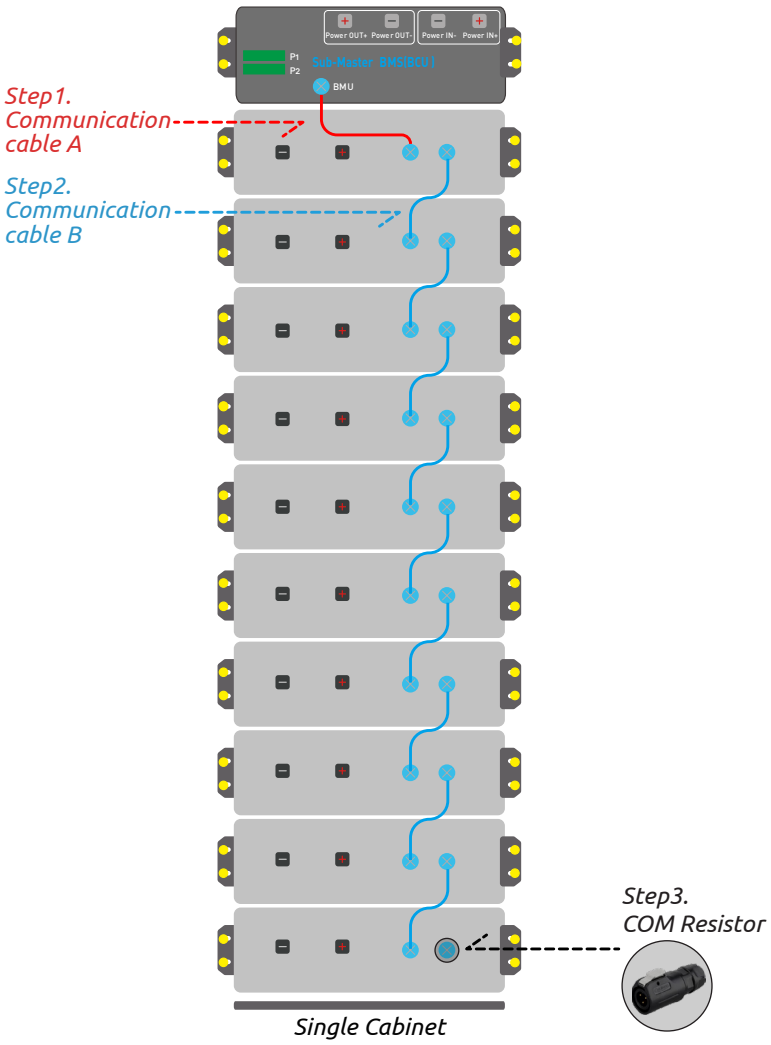
Open the terminal protection cap and use communicaiton cable A to connect Sub-Master BMS module communication with battery module as the red line shown in the figure. And pay attention to the difference between the terminals of the cable.

Step2. Communication Cable B

Open the terminal protection cap and use communication cable B to connect communication between battery modules as the blue line shown in the figure.

Step3. COM Resistor

Plug into the COM resistor from standard accessories to the open COM port of the last battery as the black circle shown in the figure.



3.5.2(5) Power Cables Connection

WARNING

1. Make sure the main switch on the Sub-Master BMS is "OFF" before cables connection.

2. At least two people should work on cables connection to ensure accurate and safe operation.

3. Please make sure to wear insulating gloves before installation.

4. Use insulating tools to connect cables.

5. Be careful of external short circuit during connection. Carelessness may cause danger.

Step1. Power Cable A

> *Power lines between battery modules.*

Start connection from the very first battery module under the Sub-Master BMS. Open the terminal protection cap and use power cable A to connect the positive(B+) and negative end power(B-) between battery modules as the black line in the figure shows in order.

Step2. Power Cable B

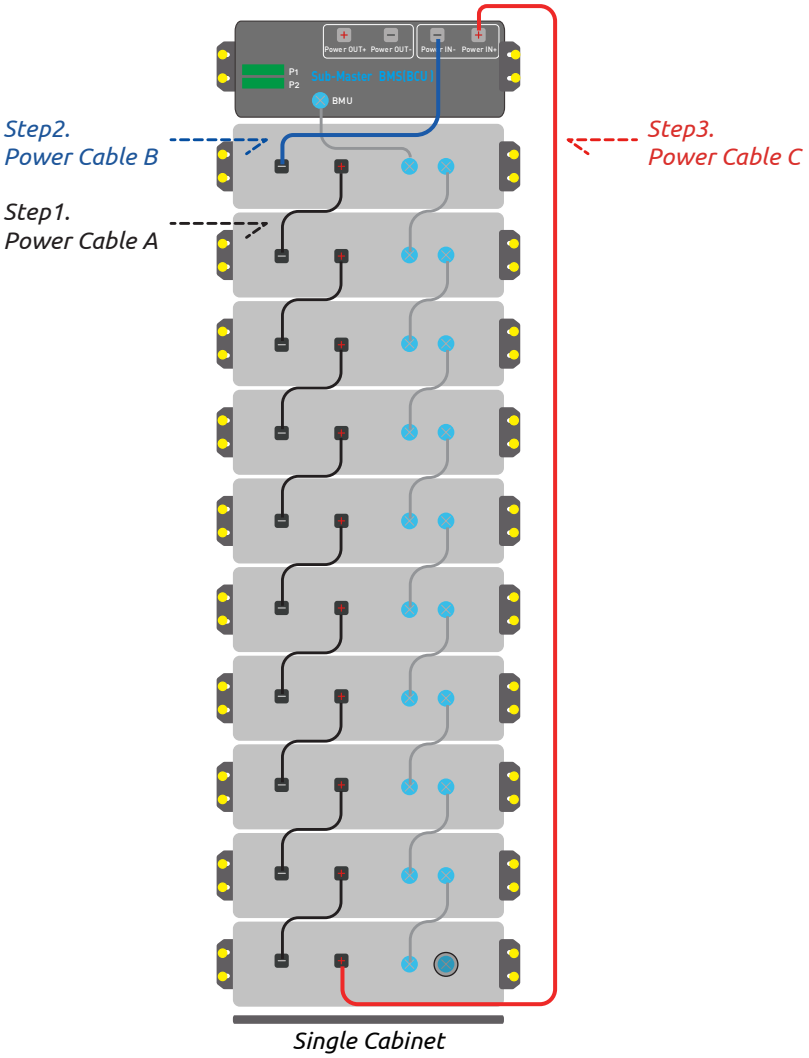
> *The total positive power line of the battery modules.*

Connect the "B+"terminal on the last battery module to the "Power IN+" terminal on the Sub-Master BMS with power cable B as the red line shown in the figure.

Step3. Power Cable C

> *The total negative power line of the battery modules.*

Connect the "B-"terminal on the battery module which is under Sub-Master BMS to the "Power IN-" terminal on the Sub-Master BMS with power cable C as the blue line shown in the figure.



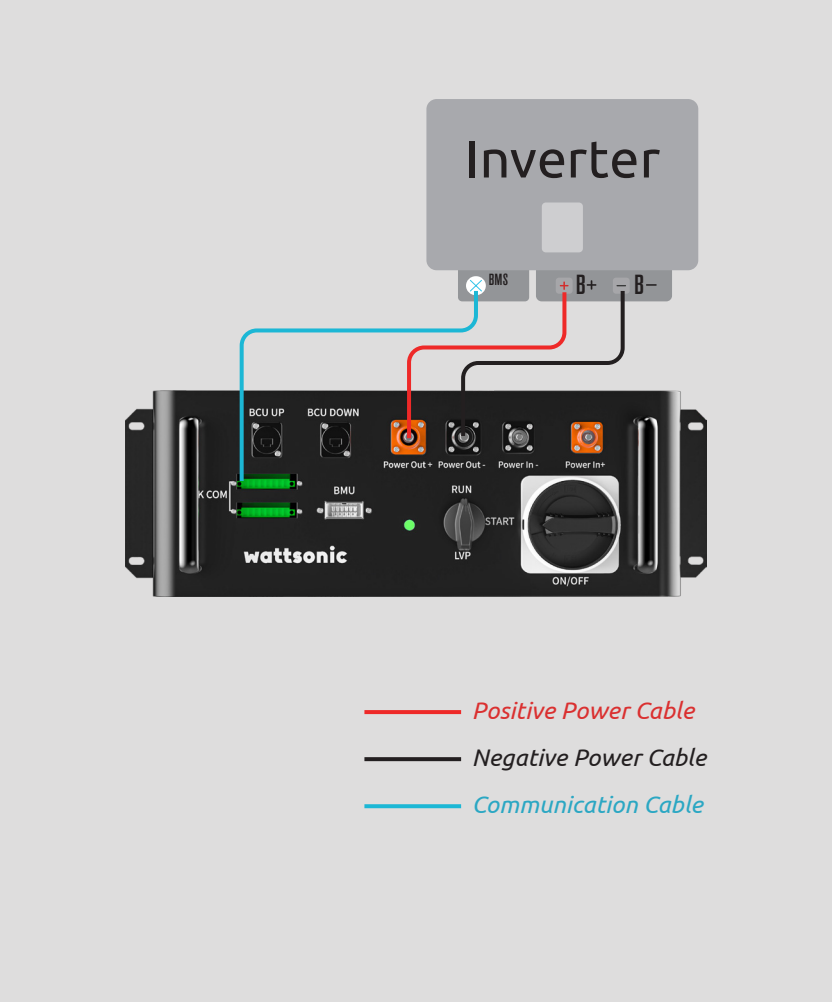
3.5.2(6) Connection between BMS and PCS

Connect the Power OUT+ and Power OUT- of Sub-Master BMS to B+ and B- of inverter.

To ensure the safe use of the equipment, please connect the circuit breaker between the PC and the Sub-Master BMS.

Make sure there is no power supply before connecting, and use a cable that meets the requirements.

Please refer to the figure to connect.



4. Product Specification

4.1 System Configuration



Single Rack Datasheet	
Nominal Voltage	806Vdc
Nominal Capacity	100Ah/80.6kWh
Operation Voltage	630V~919V
Recommended DOD	90%
Maximum Charge/Discharge Current	100A
Operation Temperature	0~50
Storage Temperature	-20~60
Cabinet Size [W*H*D]	1270.5*2352*490mm
Cabinet Weight	950kg
Cabinet IP Rate	IP 21
Cycles	10,000 cycles
User Interface	PC based monitor
External Com/Control	RS-485 ModBus



Single Cabinet Datasheet	
Nominal Voltage	384Vdc
Nominal Capacity	100Ah/38.4kWh
Operation Voltage	300V~438V
Recommended DOD	90%
Maximum Charge/Discharge Current	100A
Operation Temperature	0~50
Storage Temperature	-20~60
Cabinet Size [W*H*D]	625.25*2352*490mm
Cabinet Weight	475kg
Cabinet IP Rate	IP 21
Cycles	10,000 cycles
User Interface	PC based monitor
External Com/Control	RS-485 ModBus

4.2 Module Specification



Sub-Master BMS	
Operation Voltage [Vdc]	200~1000
Max. Charge/Discharge Current [A]	100
Recommend Charge/Discharge Current [A]	100
Functions	Pre-charge, Over-Less Voltage/ /Over-Less Temperature Protection, Cells Balancing/SOC-SOH calculationetc.
Communication Protocol/Connector Type	CAN/RS485 ModBus, TCP/IP/ RJ45
Power Connection Type	Amphenol MC4
User Interface	LCD Display(Optional, need to be confirmed upon order)
Dimension [W*H*D mm]	465*180*356
Weight	10kg
Operating Temperature [℃]	-20~55
Ingress Protection	IP21
Installation Method	Rack Mounted
Warranty	10 years



Battery Module	
Nominal Voltage/Capacity per Module	38.4V/3.84KWH
Expand Capability	Up to 21 Modules series at 806V/80.6KWH
DOD Recommended	90%
Max. Charge/Discharge Current [A]	100A Continual
Recommend Charge/Discharge Current [A]	100A Continual
Communication Protocol/Connector Type	CAN/ RJ45
Power Connection Type	Amphenol Original with lock
Dimension [W*H*D mm]	465*194*403.5 per module
Weight	34kg
Charge Temperature Range [℃]	0~45
Discharge Temperature Range [℃]	-20~55
Ingress Protection	IP21
Installation Method	Rack Mounted
Cables Connection Method	Connection at front
Warranty	10 years or 10,000 cycles @90% DOD

5. Start and Stop Procedures

5.1 Start-up Procedures

CAUTION

Please refer to the procedure to start the system.
Wrong operation may cause system start-up failure or danger.

Step1. Please make sure both COM and power cables are connected correctly including grounding cable.

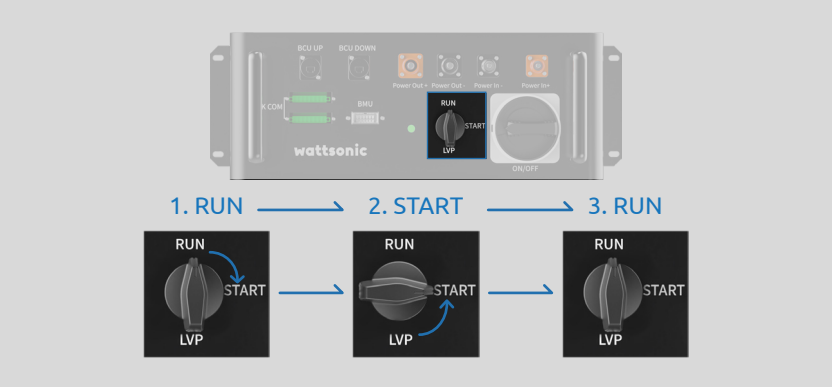
Step2. Please turn on MAIN Switch on Sub-Master BMS box(BCU).



CAUTION

Please always keep LVP at RUN position after starting up, or the batteries has high risk of going to flat, LVP is the hardware level protecting of the batteries from over-discharge.

Step3. Please turn LVP from RUN to START, then switch back to RUN.



Step4. Waiting the LED indicator flashing green to solid green.

LED Status	
Green	ON
Red	FAULT

Step5. Start Up success.

5.2 Stop Procedures

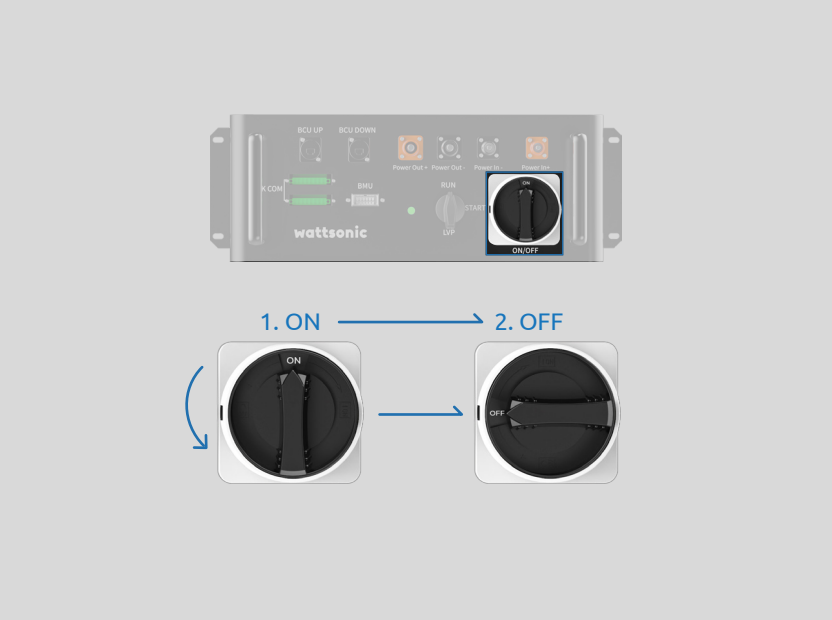
CAUTION

Observe the suggested maneuver procedure.
Failure to follow the maneuver procedure may result in DC relay failure
or Fuse Fail due to inrush current.

Check if there is equipment connected to the cabinet, if there is disconnect it first prevent damage caused by power cuts.

Check if there is equipment in charge and discharge operation, if there is, stop the process first.

And then turn off the main switch from “ON“ to “OFF“ to stop the system.



6. Maintenance

Danger: Risk of product damage or personal injury due to incorrect service!

Caution: Verify that there is no voltage or current before pulling any connector.

Caution: Keep non-related persons away!

Caution: A temporary warning sign or barrier must be posted to keep non-related persons away while performing electrical connection and service work.

Attention: For any maintenance need, please contact us. Otherwise, Wattsonic shall not be held liable for any damage caused.

Note: Servicing of the device in accordance with the manual should never be undertaken in the absence of proper tools, test equipment or the latest revision of the manual which has been clearly and thoroughly understood.

Items	Methods	Period
System clean	Use a soft dry cloth to clean the product. If the surface is dirty, use a soft cloth lightly moistened with water. Do not clean the battery terminals when wet. Do not use volatile liquid when cleaning the product. When cleaning the cabinet room, shut down all systems before cleaning.	Six months to a year (it depends on the dust contents in air.)

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