marvel® Tech

ML5K-HVR-01
User Manual

*The actual product may slightly differ from certain promotional videos or images; please refer to the actual product as the standard. Unless otherwise specified, all data on this page is derived from our laboratory testing and may vary due to environmental factors.
*Specifications are subject to change without prior notice.

Catalogue

1.Technical Specication

Battery Module model	No.Of High-Voltage BoX	Number of battery Modules	Battery System Capacity	Battery System Voltage	Operating Voltage Range
ML5K-HVR-01	1	6	30.72kWh	307.2V	273.6~355.2V
		7	35.84kWh	358.4V	319.2~414.4V
		8	40.96kWh	409.6V	364.8~473.6V
		9	46.08kWh	460.8V	410.4~532.8V
		10	51.2kWh	512V	456~592V
		11	56.32kWh	563.2V	501.6~651.2V
		12	61.44kWh	614.4V	547.2~710.4V
		13	66.56kWh	665.6V	592.8~769.6V
		14	71.68kWh	716.8V	638.4~828.8V
		15	76.8kWh	768.0V	684~888V
		16	81.92kWh	819.2V	729.6~947.2V
		17	87.04kWh	870.4V	775.2~1006.4V

Model	ML5K-HVR-01
Energy	5.12KWh
Operatingvoltage range	220~1000V
Dimension(L*W*H)	502*580*2173mm
Single Module Technical Specification	
Dimension (L*W*H)	High VoltageBox: 552*502*163mm, Battery Box:580*502*197mm
Nominal voltage	51.2V
Nominal capacity	100Ah
Energy	5.12KWh
Recommendedchargingcurrent	50A
Max continue charge current	100A
Max continuedischarge current	100A
Chargingtemperature	0-55℃
Discharge temperature	-20-60℃
Environment	Indoor
Altitude	3000m
Relative humidity	5%～95%
Cooling	Forced air cooling
Celltechnology	Lithium-iron phosphate (LiFePO4)
Protection rating	IP20
Life cycle	6000 times @80%DOD(25℃)
Communication	CAN/RS485
Extendedfunction	Thermal aerosol fire extinguishing device (standard)
Certificates	IEC 62619, IEC 61000, UL 1973, UL 9540A, UN38.3, MSDS

2. Safety Information

2.1 General Safety

Please read the user manual carefully and check all the safety instructions on the equipment and in this document.

The "DANGER"， "WARNING", and "NOTICE" statements in this document do not cover all the safety instructions. They are only supplements to the safety instructions.

For user safety and utilization efficiency of this manual, a list of symbols is designed to alert people from danger. You must understand and comply with the emphasized information to avoid personal injury and property damage. Relative safety symbols have been listed below.

Danger	DANGER indicates a hazardous situation which, if not avoided, will result in serious injury and/or fire.
Warning	WARNING indicates a hazardous situation which, if not avoided, will result in property loss and/or void the warranty.
NOTICE	NOTICE indicates normal situation which, if not avoided, will result in damage to the battery.

NOTICE

Follow local laws and regulations when installing, operating, or maintaining the equipment. The safety instructions in this document are only supplements to local laws and regulations.

2.2 Personal Safety

Personal Requirements

People who plan to install or maintain battery equipment must be trained, understood all necessary safety precautions, and are able to correctly perform all operations.

Only qualified professionals or trained people are allowed to install, operate, and maintain the equipment.

⚠ DANGER

- Keep the batteries away from children and pets.
- Do not touch the energized battery, the temperature of the battery enclosure may increase during operation.
- Do not touch the energized battery terminals.
- Do not stand on, lean on, or sit on the battery.

2.3 Electrical Safety

Symbols on Battery

There are some electrical symbols on battery relate to electrical safety. Please make sure you have fully understood them before installation.

	Electrical danger	Voltage exists when the battery is powered on. Only qualified engineers are allowed to operate.
	Earth connector	Earth connection.
	DC positive and negative connectors	Identify positive and negative connectors of DC power source.
	WEEE label	Batteries must not be disposed with general waste. It must be appropriately recycled in accordance with local regulations.
	Recycle	Batteries can be recycled, please refer to your local regulations regarding the correct disposal methods.

Electrical Safety

⚠ DANGER

- Before installation, ensure that the equipment is intact. Otherwise, electric shock or fire may occur.
- Do not connect or disconnect power cables when battery is power-on. Which may cause electric arcs and sparks, moreover fire or personal injury.
- Before connecting a power cable, check the positive or negative connectors are correct.
- Do not connect the battery with different batteries in parallel.
- Do not connect the battery with AC supply directly.
- Do not connect the battery with PV wiring directly.
- Do not connect the batteries in series.
- Do not connect the battery to faulty or unqualified inverter or charger.
- Do not create short circuits with the external connection.
- Make sure the grid is cut off and the battery is powered off before maintenance.
- Make sure the earth cable is connected correctly before operation.

⚠ WARNING

- Recharge the battery in every six months if not in use.
- Recharge the battery within 10 days after the battery is fully discharged(SOC=0%).
- Ensure the battery cable is installed correctly.
- When the battery is being installed or repaired, ensure the battery is powered off and and isolated. Using a multimeter check to ensure there is no voltage in the positive and negative terminals.

⚠ CAUTION

- Please use appropriately insulated tools for installation and maintenance.
- Please check the LED status indicator when the battery is powered on.
- Please ensure the communication cable is connected correctly between the battery and the inverter.
- Please check for inverter alarms and the SOC reading once communication is established between the inverter and the battery.

Environment Safety

⚠ WARNING

- Ensure the battery is installed in a dry and well-ventilated location.
- The installation position must be away from direct sunlight and rain.
- The installation position must be far away from potential sources of fire..
- The installation position must be far away from all sources of water.
- Do not install the equipment in locations that contain flammable gases and/or flammable liquids.
- The operation and service life of the battery depends on the operating temperature. Operate the battery at a temperature equal to or better than the ambient temperature. The recommended operating temperature range is from 0°C to 30°C.

2 . 4 Transportation Safety

⚠ WARNING

- The products have passed UN38.3 certification.
- The products have MSDS documents available.
- The products belong to class 9 dangerous goods.
- **Please protect the packing case from the following situations:**
  - Being dampened by rains, snows, or falling into water;
  - Falling down or mechanical impact;
  - Being upside-down or tilted.

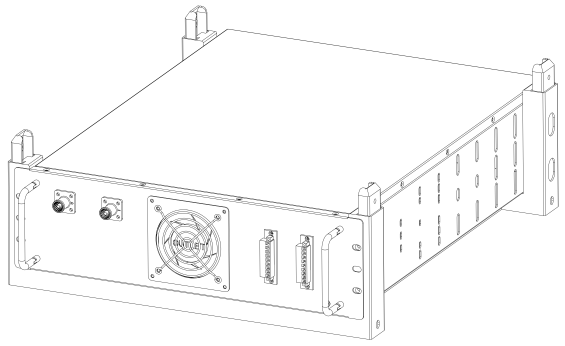
3. System Information

3.1 Product Introduction

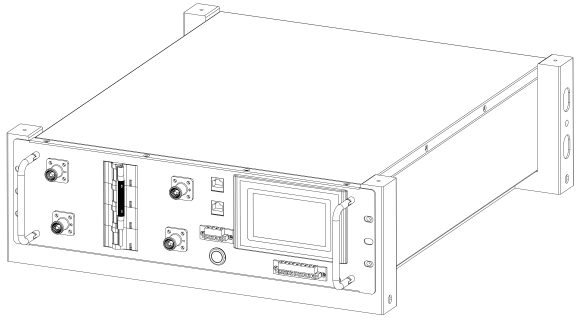
ML5K-HVR-01 is a high-voltage battery storage system based on lithium-iron phosphate technology.It is used to primarily store excess PV power that is generated by an inverter based on PV system.

3.2 Specification

3.2.1 Battery Module



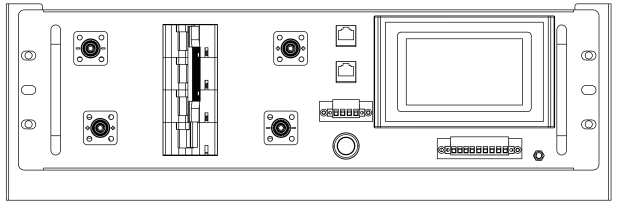
3.2.2 High-voltage box



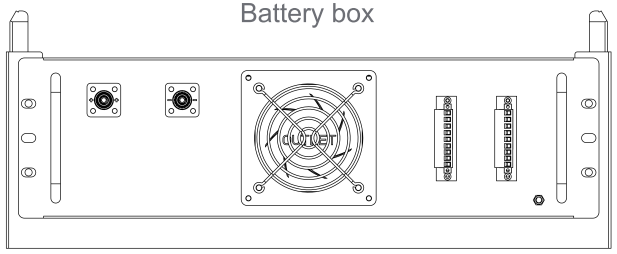
3.3 Port definitions

3.3.1 Connection Area

High voltage box



Battery box



3.3.2 Start

Power On Procedure:

Switch on the circuit breaker of the master battery.

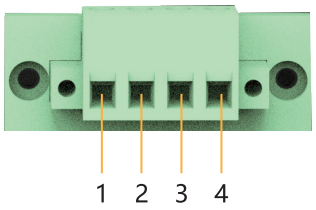
Press and hold the START button on the master battery for 5 seconds to complete the power-on process.

Power Off Procedure:

Press and hold the START button on the master battery for 5 seconds. The circuit breaker will automatically trip, completing the power-off process.

3.3.3 CAN RS485 Definition

Interfaces are defined as follows:



1	2	3	4	5	6	7	8	9
CAN_H	CAN_L	RS485_A	RS485_B	-	-	-	-	-

3.3.4 Link Power/Link in/Link out

Link Power/Link in/Link out are used for the communication between the battery packs. The battery pack close to the inverter is the master pack, others are the slave pack.

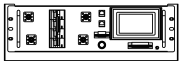
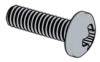
4. Installation

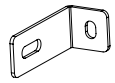
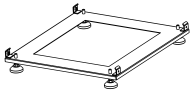
4.1 Tools

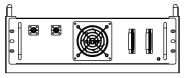
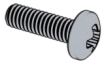
Tools			
Installation	Rubber mallet 	Star screwdriver 	Hammer drill (10 mm) 
	ESD gloves 	Safety goggles 	Anti-dust respirator 
	Safety shoes 	Level 	

4.2 Checking deliverables

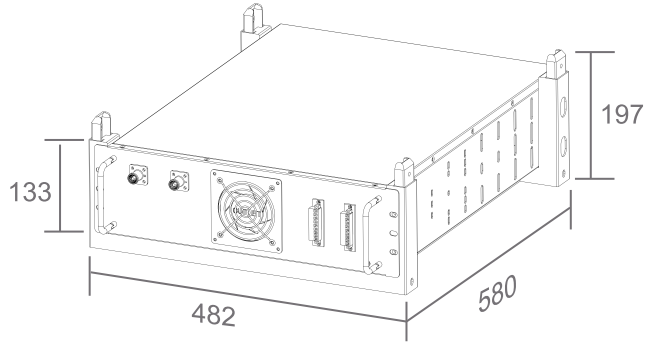
After unpacking the battery, check whether deliverables are intact and complete.

Packing list of HV Box				
No.	Part name/size	Quantity	Photo	Used for
1	High-voltage box	1		
2	Communication cable	1		Communication cable
3	Positive charging cable	1		Orange curved plug
4	Negative charging cable	1		Black curved plug
5	Positive charging cable	1		Orange curved plug
6	Negative charging cable	1		Black curved plug
7	Terminal resistance	1		Terminal resistance
8	Cabinet screws	4		Lock box body
9	Cross shaped hexagon head three combination screw	1		Grounding screw
10	Cross shaped hexagon head three combination screw	2		To fix the fixing plate
11	304 stainless steel Wall plug	2		To fix the wall hanging bracket

Packing list of HV Box				
No.	Part name/size	Quantity	Photo	Used for
12	yellow-green two-color grounding cable	1		Grounding cable
13	Resistance wire	1		Resistance wire
14	Communication plug	1		Communication plug
15	Super five categories RJ45 shielded crystal head	2		RJ45 Crystal head
16	L type plate	2		L shaped wall mount
17	The base	1		To put at the bottom of the battery

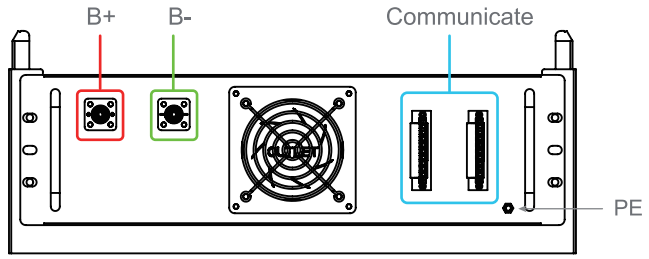
Packing list of Battery Box				
No.	Part name/size	Quanti ty	Photo	Used for
1	Battery box	1		
2	Positive charging cable	1		Power cable
3	Communication cable	1		Serial communication line
4	Cabinet screws	4		Lock box body
5	Cross shaped hexagon head three combination screw	1		Grounding screw
6	moisture-proof desiccant	2		Moisture proof
7	yellow-green two-color grounding cable	1		Grounding cable

4.3 Dimensions



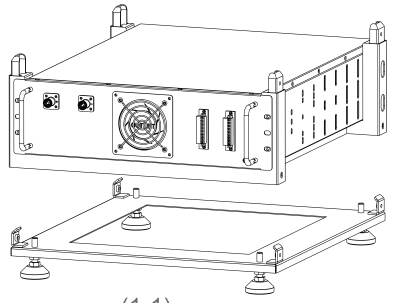
4.4 Installation Procedure

Connect the power cable and Connect the communication cable.

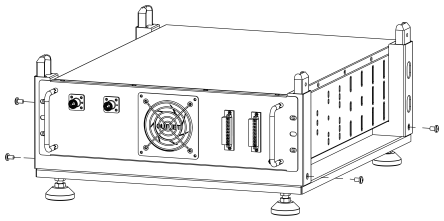


Step 1

Install the battery on the base as shown in the figure and secure the battery at the four corners using screws



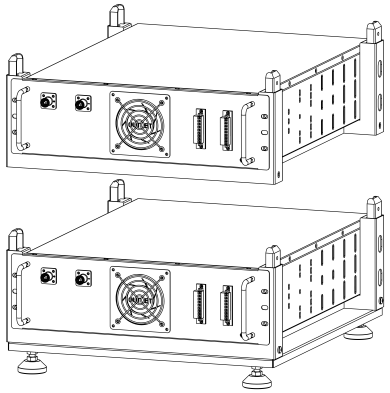
(1-1)



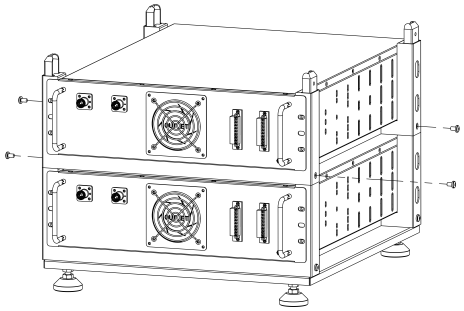
(1-2)

Step 2

Place the next battery module on top of the previous battery module, and ensure that the fastening screws are tightened.



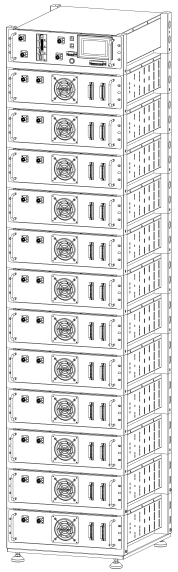
(2-1)



(2-2)

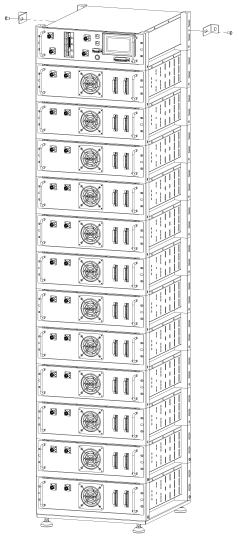
Step 3

Repeat the preceding steps to install other battery modules. After all battery modules are installed, install the high pressure cabinet on the top of the last battery box.

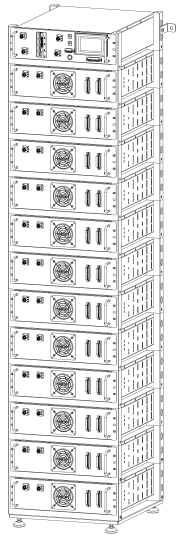


Step 4

Attached the L-shape wall hanging bracket onto the high voltage box as shown in the image.



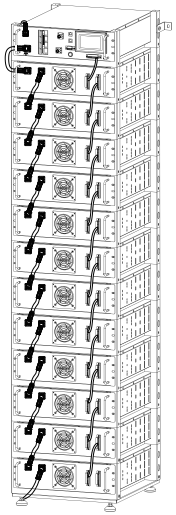
(4-1)



(4-2)

Step 5

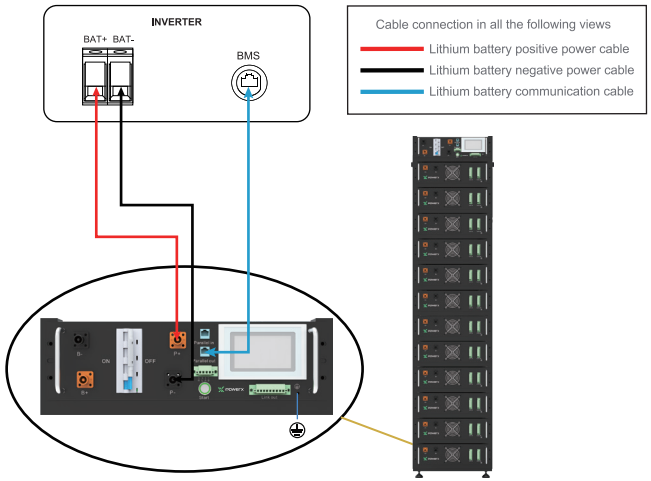
As shown in the diagram, connect the power cables and communication cables.



5 Electrical Connection

Notice

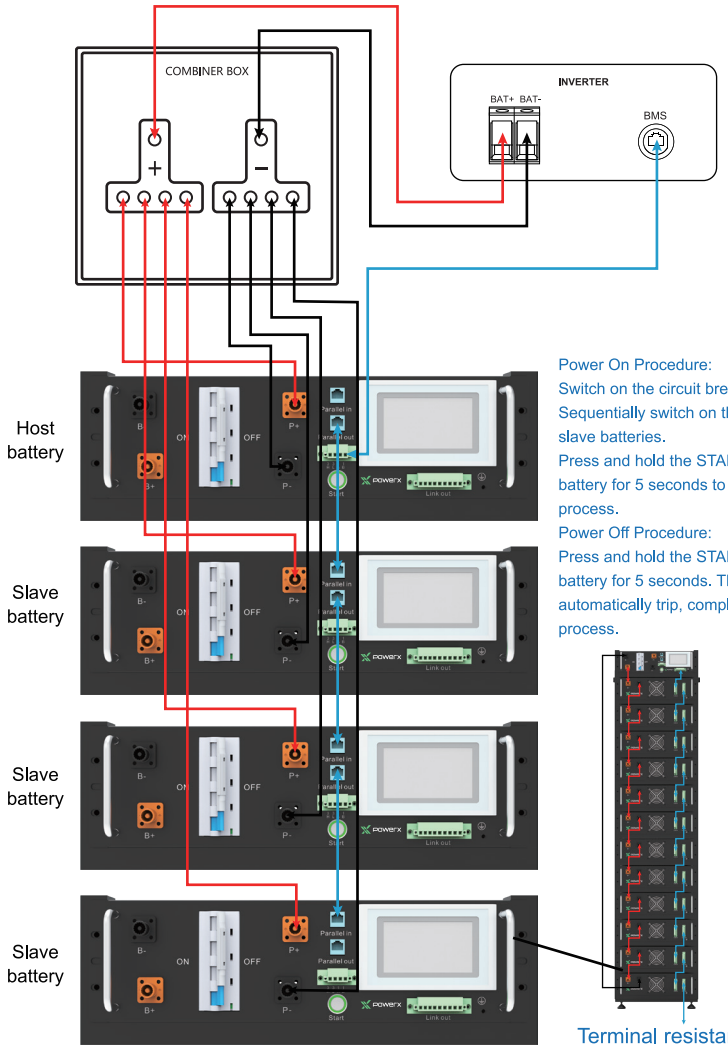
• Please refer to the figure below for the electrical connection of a single battery system.



Notice

• The same energy storage system supports battery systems parallel connection, with a maximum of 25 clusters in parallel connection. Ensure that the available power of each cluster is consistent.
• An additional combiner cabinet is required.
• Connect P+ and P- of all battery systems to the DC input bus of the combiner cabinet respectively
• Connect the CAN ports of all battery systems to the CAN1 port of the confluence control cabinet in series
• Only first battery and laster battery need short communication 120Ω
• Connect the CAN2 port of the combiner cabinet to the CAN port of the PCS, and connect the DC output bus of the combiner control cabinet to the DC input port of the PCS.
• The following takes the configuration of a 7-battery system as an example to introduce the electrical connections.

In order to ensure equal current flow, the length of the two positive and negative poles connecting lines must be the same.



Power On Procedure:
Switch on the circuit breaker of the master battery.
Sequentially switch on the circuit breakers of the slave batteries.
Press and hold the START button on the master battery for 5 seconds to complete the power-on process.
Power Off Procedure:
Press and hold the START button on the master battery for 5 seconds. The circuit breaker will automatically trip, completing the power-off process.

6. Commissioning Procedure

After all the cable (power and communication) connections are completed, please ensure the following:

- Ensure the DC switch on the inverter is OFF
- Ensure the AC switch that is connected to the grid and EPS output (if used) of the inverter is OFF
- Ensure the DC switch on the HV box is OFF

For commissioning we recommend the following steps:

- Turn the DC switch on the HV box ON
- Refer to section 3.3.2 Start for turning on the battery
- Wait until the HV box LED´s on
- Wait until the inverter LED´s on
- Turn on the DC switch on the inverter
- Set up the battery and the inverter on the App
- Turn on the AC switch that is connected to the grid and EPS output of the inverter

7. Maintenance

- Recharge Requirements During Normal Storage

Battery should be stored in an environment with temperature range between -10°C ~ +45°C and maintained regularly according to following table with 0.5C(25A) current till 100% SOC after long storage time.

Storage Environment Temperature	Relative Humidity of Storage Environment	Storage Time	SOC
Below - 10℃	/	Prohibit	/
-10~25℃	5%~70%	≤12 months	30%≤SOC≤60%
25~35℃	5%~70%	≤ 6 months	30%≤SOC≤60%
35~45℃	5%~70%	≤ 3 months	30%≤SOC≤60%
Above 45℃	/	Prohibit	/

- Recharge Requirements When Over Discharged

Over discharged (90%DOD) battery should be recharged according to following table, otherwise over discharged battery will be damaged.

Storage Environment Temperature	Storage Time	Note
-10~25℃	≤ 15 days	Battery Pack disconnected to inverter
25~35℃	≤7 days	
35~45℃	<12 hours	Battery Pack connected to inverter