

Hightech Power Lithium-ion Battery User Manual

50Ah



EN

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1 Note on this Manual

1.1 Scope of Validity

This manual is an integral part of HV Solar Storage. It describes the assembly, installation, commissioning, maintenance and failure of the product. Please read it carefully before operating.

HV Solar Storage

General Pack(Master)

Booster Pack(Slave)


NOTE: There are 4 models for Solar Storage system, including BMS and battery packs.


Please refer to section 3.3.1 HV SOLAR STORAGE Configuration List on page 11 for more information.


1.2 Target Group


This manual is for qualified electricians. The tasks described in this manual may only be performed by qualified electricians.

1.3 Symbols Used

	DANGER! "DANGER" indicates a hazardous situation which, if not avoided, will result in serious injury or death.
--	---

	WARNING! "WARNING" indicates a hazardous situation which, if not avoided, could result in serious injury or death.
---	--

	CAUTION! "CAUTION" indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
---	---

	NOTE! "NOTE" provides tips that are valuable for the optimal operation of your product.
---	---

2 Safety

2.1 Safety Instructions

For safety reasons, installers are responsible for familiarizing themselves with the contents of this manual and all warnings before performing installation.

2.1.1 General Safety Precautions

WARNING!

Please don't crush or impact the battery, and always dispose it according to the safety regulation.

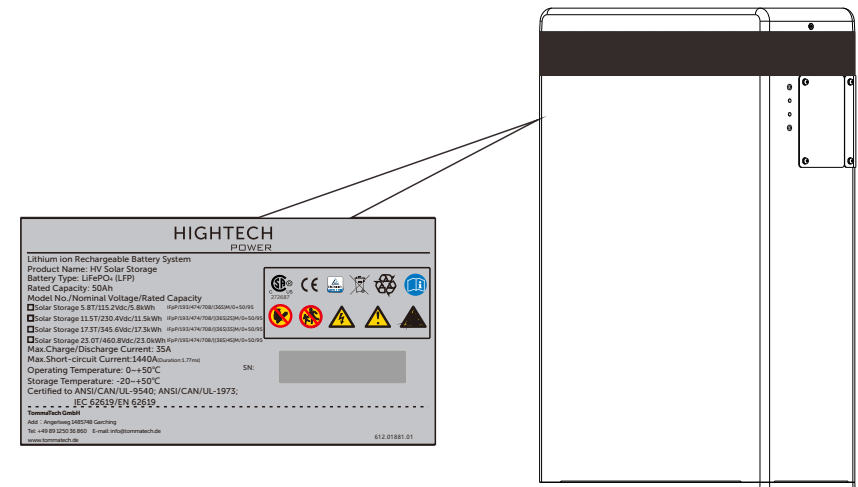
Observe the following precautions:

- Risks of explosion
- Do not subject the battery to strong impacts.
- Do not crush or puncture the battery.
- Do not dispose of the battery in a fire.
- Risks of fire
- Do not expose the battery to temperatures in excess of 50°C.
- Do not place the battery near a heat source, such as a fireplace.
- Do not expose the battery to direct sunlight.
- Do not allow the battery connectors to touch conductive objects such as wires.
- Risks of electric shock
- Do not disassemble the battery.
- Do not touch the battery with wet hands.
- Do not expose the battery to moisture or liquids.
- Keep the battery away from children and animals.
- Risks of damage to the battery
- Do not allow the battery to get in contact with liquids.
- Do not subject the battery to high pressures.
- Do not place any objects on top of the battery.

HV Solar Storage can only be used in the household energy field. It is not allowed to be used in other industries, such as the medical equipment industry and automotive application industry.










2.1.2 Explanation of Symbols

This section gives an explanation of all the symbols shown on HV Solar Storage system and on the warning label.



CAUTION!

If the battery is not installed within one month after receiving the battery, the battery must be charged till the SOC is more than 50% for maintains.

Symbol	Explanation
	TUV mark for IEC62619
	The battery system should be disposed of at a proper facility for environmentally safe recycling.
	The battery system should not be disposed together with the household waste. Disposal information can be found in the enclosed documentation.
	Wear protective glasses
	Observe enclosed documentation.
	Keep the battery system away from open flames or ignition sources.
	Keep the battery system away from children.
	Danger of high voltages. Danger to life due to high voltages in the battery system!
	Danger. Risk of electric shock!
	The battery pack may explode.

2.2 Response to Emergency Situations

2.2.1 Leaking Batteries

If the battery leaks electrolyte which is corrosive, avoid contact with the leaking liquid or gas. Direct contact may lead to skin irritation or chemical burns. If one is exposed to the leaked substance, do these actions:

Accidental inhalation of harmful substances: Evacuate people from the contaminated area, and seek medical attention immediately.

Eye contact: Rinse eyes with flowing water for 15 minutes, and seek medical attention immediately.

Dermal contact: Wash the affected area thoroughly with soap and water, and seek medical attention immediately.

Ingestion: Induce vomiting, and seek medical attention immediately.

2.2.2 Fire

In case of a fire, make sure an ABC or carbon dioxide extinguisher is nearby.



WARNING!

The battery pack may catch fire when heated above 150°C.

If a fire breaks out at where the battery is installed, do these actions:

1. Extinguish the fire before the battery catches fire;
2. If the battery has caught fire, do not try to extinguish the fire. Evacuate people immediately.

WARNING!

If the battery catches fire, it will produce noxious and poisonous gases. Do not approach.

2.2.3 Wet Batteries and Damaged Batteries

If the battery is wet or submerged in water, do not try to access it.

If the battery seems to be damaged, they are not fit for use and may pose a danger to people or property.

Please pack the battery in its original container, and then return it to TommaTech GmbH or your distributor.

CAUTION!

Damaged batteries may leak electrolyte or produce flammable gas. If you suspect such damage, immediately contact TommaTech GmbH for advice and support.

2.3 Qualified installer

⚠ WARNING!

All operations of relating to electrical connection and installation must be carried out by qualified person .

A skilled worker is defined as a trained and qualified electrician or installer who has all of the following skills and experience:

- Knowledge of the functional principles and operation of on-grid systems
- Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods
- Knowledge of the installation of electrical devices
- Knowledge of and adherence to this manual and all safety precautions and best practices

3 Product Introduction

3.1 Product Overview

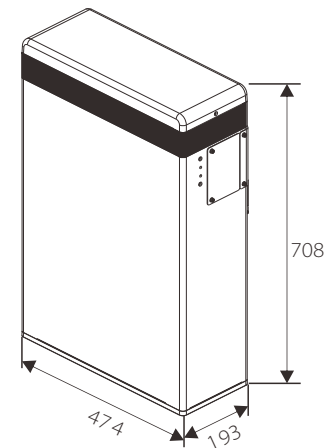
3.1.1 Demension and Weight

A battery management system (BMS) is an electronic system that manages a rechargeable battery.

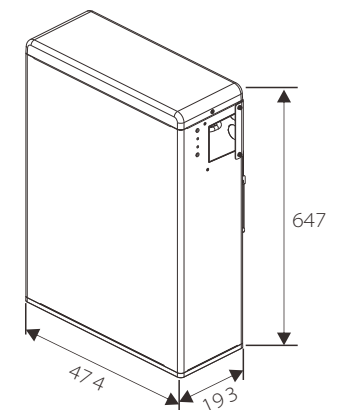
Battery is a type of electrical battery which can be charged, discharged into a load.

A battery system includes a BMS and battery pack(s).

	General Pack(Master)	Booster Pack(Slave)
Length	474mm	474mm
Width	193mm	193mm
Height	708mm	647mm
Weight	72.2kg	68.5kg



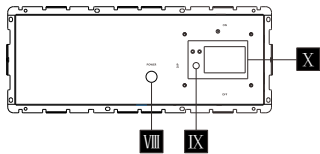
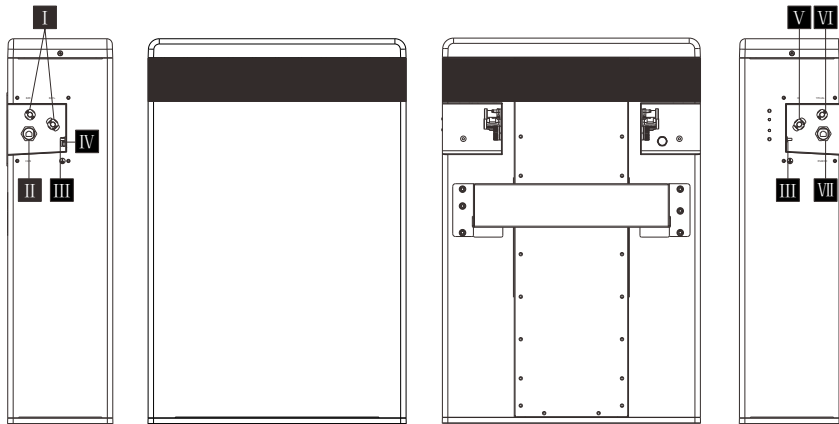
General Pack(Master)



Booster Pack(Slave)

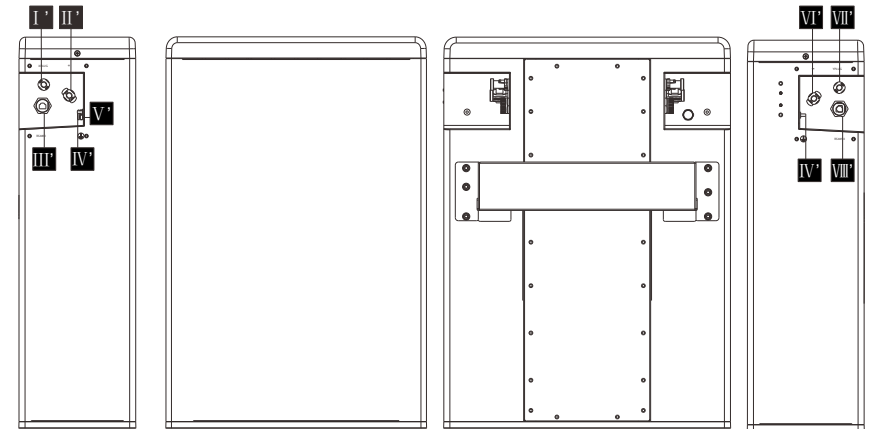
3.1.2 Appearance

• Section view of General Pack



Object	Mark	Description
I	BAT+/BAT-	Charge/Discharge Connectors
II	CAN	CAN Connector
III	GND	GND
IV	/	Air Valve
V	-	Power Connector to + of next battery pack, or to YPLUG of the same pack
VI	YPLUG	Power Connector' to XPLUG of next battery pack, or to "-" of the same pack
VII	RS485 II	RS485 Connector to RS485 I of next battery pack
VIII	POWER	Power Button
IX	DIP	DIP Switch
X	ON/OFF	Circuit Breaker

• Section view of Booster Pack



Object	Mark	Description
I'	XPLUG	Power Connector' to YPLUG of upper battery pack
II'	+	Power Connector to "-" of upper battery pack
III'	RS485 I	RS485 Connector to RS485 II of upper battery pack
IV'	GND	GND
V'	/	Air valve
VI'	-	Power Connector to + of next battery pack, or to YPLUG of the same pack
VII'	YPLUG	Power Connector' to XPLUG of next battery pack, or to "-" of the same pack
VIII'	RS485 II	Rs485 Connector to RS485 I of next battery pack

3.2 Basic Features

3.2.1 Features

HV Solar Storage is one of the advanced energy storage systems on the market today, incorporating state-of-the-art technology, high reliability, and convenient control features shown as below:

- 90% DOD
- 99% faradic charge efficiency
- 95% battery roundtrip efficiency
- Cycle life > 6000 times
- Secondary protection by hardware
- Ip55 protection level
- Safety & reliability
- Small footprint
- Floor or wall mounting

3.2.2 Certifications

HV Solar Storage system safety	CE, FCC, RCM, TUV (IEC 62619)
Battery cell safety	UL 1642
UN number	UN 3480
Hazardous materials classification	Class 9
UN transportation testing requirements	UN 38.3
International protection marking	IP 55

3.3 Specifications

3.3.1 Solar Storage Configuration List

No.	Model	Battery Pack	Energy(kWh)	Voltage (V)
1	Solar Storage 5.8T	General Pack*1	5.8	100-131
2	Solar Storage 11.5T	General Pack*1+Booster Pack*1	11.5	200-262
3	Solar Storage 17.3T	General Pack*1+Booster Pack*2	17.3	300-393
4	Solar Storage 23.0T	General Pack*1+Booster Pack*3	23.0	400-524

3.3.2 Performance

	General Pack	Booster Pack
Dimension(mm)	474* 193*708	474*193*647
Weight(kg)	72.2	68.5
Nominal Voltage(Vdc)	115.2	115.2
Operating Voltage(Vdc):	100-131	100-131
Nominal Capacity(Ah):	50	50
Max. charge/discharge Current(A) :	35	35
Recommend Charge/Discharge Current (A):	25	25
Standard Power(kW)	2.5	2.5
Maximum Power(kW)	3.5	3.5
Altitude(m)	≤ 2000	
Faradic Charge Efficiency(25°C/77°F)	99%	
Battery Roundtrip Efficiency(C/3, 25°C/77°F)	95%	
Expected Lifetime(25°C/77°F)	5 years	
Cycle life(90% DOD, 25°C/77°F)	6000 cycles	
Available Operating Temperature	0-50°C	
Optimal Operating Temperature	15-35°C	
Storage Temperature	-20-50°C (3 months)	
	0-40°C (1 year)	
Ingress Protection	Ip55	

4 Installation

4.1 Installation Prerequisites

Make sure that the installation location meets the following conditions:

- The building is designed with resistance to earthquakes
- The location is far away from the sea, to avoid sea water and humid air
- The floor is flat and level
- There are no flammable or explosive materials nearby
- The ambience is shady and cool, keep away from heat and avoid direct sunlight.
- The temperature and humidity stays at a constant level.
- There is minimal dust and dirt in the area.
- There is no corrosive gases present, including ammonia and acid vapor.
- The ambient temperature is within the range from 0°C to 50°C, and the optimal ambient temperature is between 15°C and 35°C.

NOTE!

The Triple Power battery is rated at IP55 and thus can be installed outdoors as well as indoors. However, if installed outdoors, do not expose the battery directly to sunlight and moisture.

NOTE!

If the ambient temperature is beyond the operating range, the battery will stop operating to protect itself. The optimal temperature range for the battery to operate is from 15°C to 35°C. Frequent exposure to harsh temperatures may deteriorate the performance and lifetime of the battery.

4.2 Safety Gear

Installation and maintenance personnel must operate according to applicable federal, state and local regulations as well as the industry standard.

The product installation personnel shall wear safety gears, etc. in order to avoid short circuit and personal injury.



Insulated Gloves



Safety Goggles



Safety Shoes

4.3 Tools

These tools are required to install HV Solar Storage.



Torque Screwdriver



Phillips Screwdriver



Hexagon Wrench



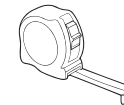
Phillips Screwdriver



Slotted Screwdriver



Torque Wrench



Tape Measure



Driller



Pencil or Marker

4.4 Installation

4.4.1 Check for Transport Damage

Make sure the battery is intact during transportation. If there are any visible damages, such as cracks, please contact your dealer immediately.

4.4.2 Unpacking

Unpack the battery package by removing the packing tape. Ensure the battery modules and relevant items are complete. See the package items on section 4.4.3 and check the packing list carefully. If any items are missing, immediately contact TommaTech GmbH or your distributor

CAUTION!

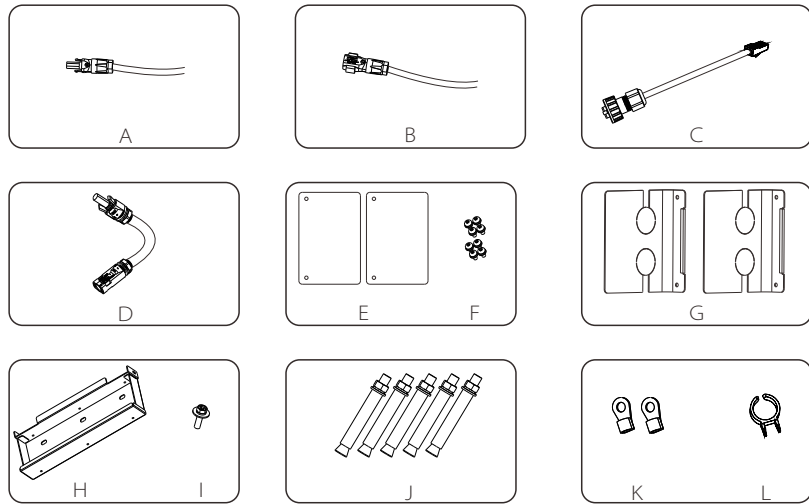
According to regional regulations, several people may be required for moving the equipment.

WARNING!

Please strictly follow the installation steps. TommaTech GmbH will not be responsible for any hurting or loss caused by incorrect assembling and operation.

4.4.3 Accessories

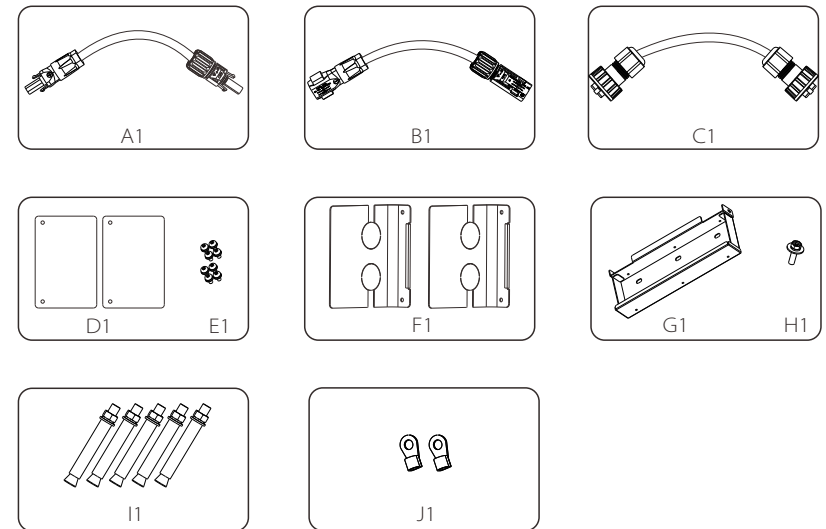
General Pack:



The table below lists the number of each component.

Object	Description	Quantity
A	Power cable between inverter and General Pack (+) (2m)	1
B	Power cable between inverter and General Pack (-) (2m)	1
C	CAN communication cable (2m)	1
D	Series-connected plug	1
E	Cover plate1	2
F	M4 screw	8
G	Cover plate2	2
H	Wall bracket	1
I	M5 screw	1
J	Expansion bolt	5
K	Ring terminal (for grounding)	2
L	Power cable disassembling tool	1

Booster Pack:



The table below lists the number of each component.

Object	Description	Quantity
A1	Power cable between battery packs (650mm)	1
B1	Power cable between battery packs (650mm)	1
C1	RS485 communication cable (650mm)	1
D1	Cover plate1	2
E1	M4 screw	8
F1	Cover plate2	2
G1	Wall bracket	1
H1	M5 screw	1
I1	Expansion bolt	5
J1	Ring terminal (for grounding)	2

4.4.4 Battery Installation Steps

It is recommended that the space between battery packs is more than 300mm.

Steps (for General Pack or Booster Pack):

Make sure the wall is strong enough to withstand the weight of battery.

Step 1: Fix the wall bracket (H or G1) on the wall

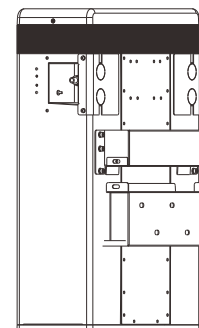
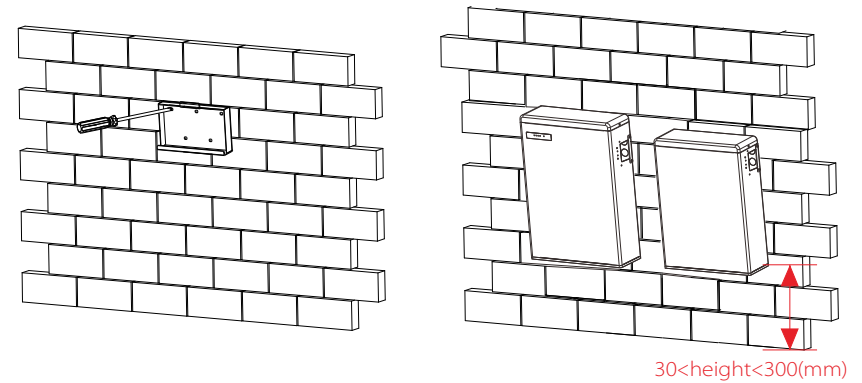
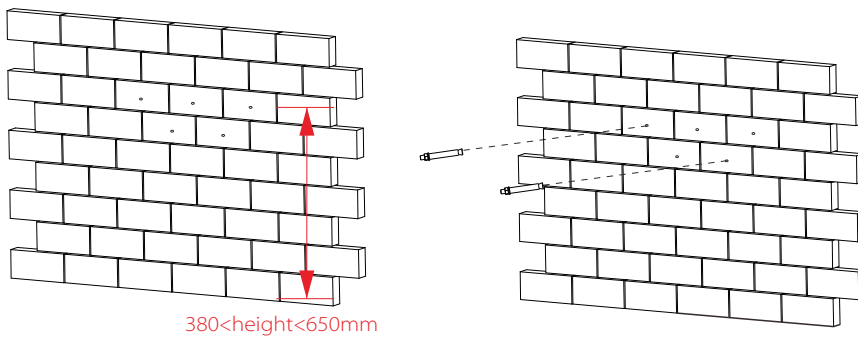
- Use the wall bracket as a template to mark the position of the 5 holes
- Drill holes with $\phi 10$ driller, make sure the holes are deep enough (at least 50mm) for installing and tightening the expansion bolts (J or I1)
- Install the expansion bolts in the wall, and tighten the screws on the bracket by using the screw driller.

Step 2: Match the battery with the wall bracket

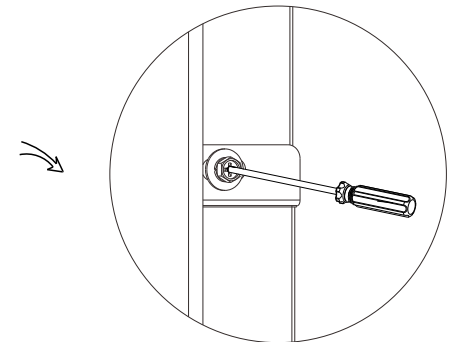
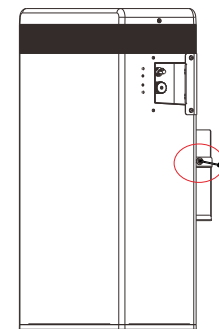
- Lift the battery to the wall bracket
- Hang the battery over the wall bracket, move the battery close to the wall and match it on the wall bracket

Step 3: Lock the joint between hanging board and wall bracket with M5 combinationscrew (I or H1).

Note: Keep the distance from installation point to the floor less than 650mm.



Side view of hanging the battery on the wall bracket.

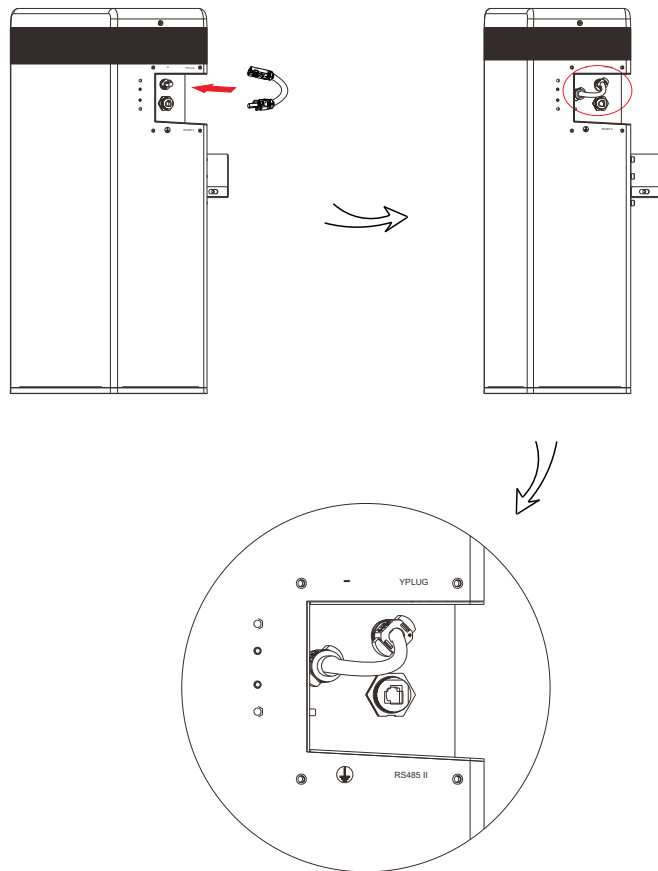


4.5 Cable Connection

4.5.1 Connecting Power Cables between Battery Packs

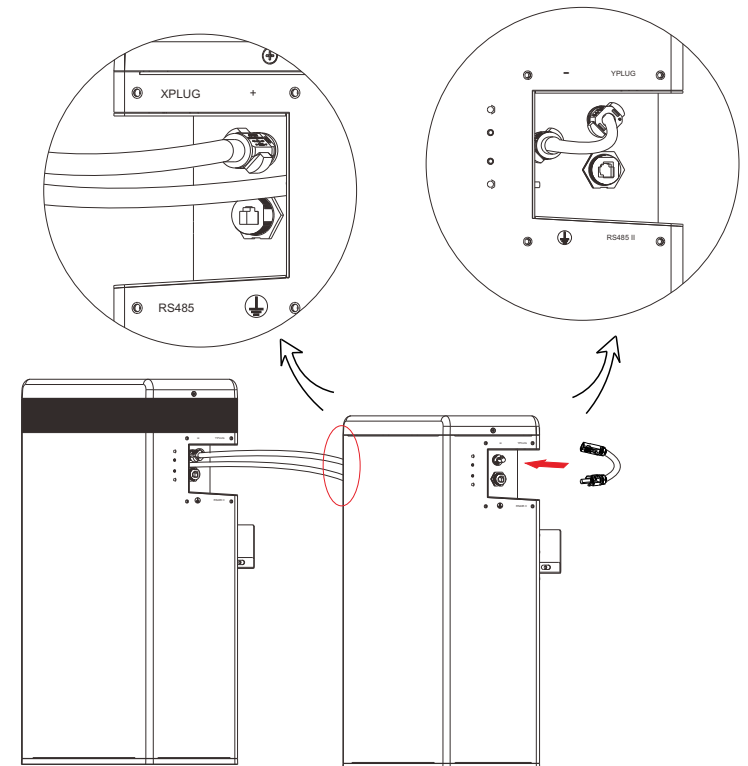
For General Pack:

1. The only step of connecting power cable for General Pack is connecting the series-connected cable to "-" and "YPLUG" on the right side. The series-connected cable is used to make a complete circuit.



For General Pack + 1~3 Booster Packs:

1. Connect "-" (V for General Pack or VI' for Booster Pack) on the right side to "+" (II') on the left side of the next battery pack.
2. Connect "YPLUG" (VI for General Pack or VII' for Booster Pack) on the right side to "XPLUG" (I) on the left side of the next battery pack.
3. The rest battery packs are connected in the same way.
4. Insert the series-connected cable at "-" and "YPLUG" on the right side of last battery pack to make a complete circuit.



4.5.2 Connecting Power Cables to Inverter

This step is going to connect power cables between inverter and HV Solar Storage. The default length of power cables are 2 meters, so customers can appropriately cut the cable according to the actual installation environment. As a result, each power cable has one terminal block when leaving the factory, and customers need to connect the other end of terminal block by themselves.

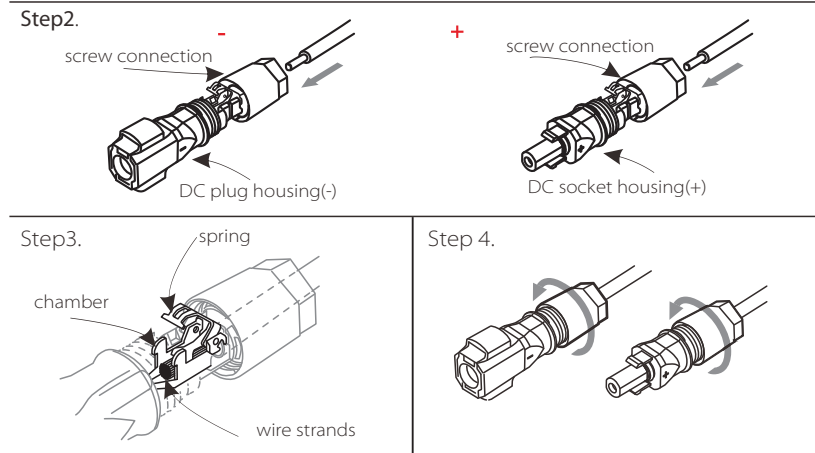
➤ Cable Connection Steps:

Step1. Strip the cable to 15mm.

Step2. Insert the stripped cable up to the stop (negative cable for DC plug(-) and positive cable for DC socket(+)) are live). Hold the housing on the screw connection.

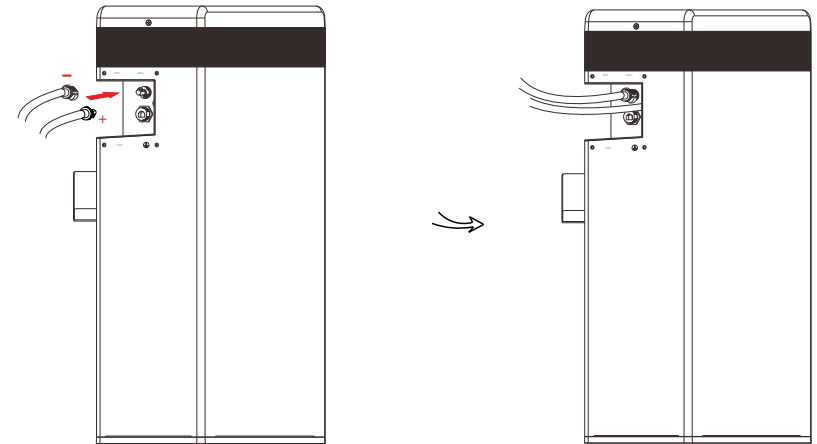
Step3. Press down the spring clamp until it clicks audibly into place (You should be able to see the fine wire strands in the chamber)

Step4. Tighten the screw connection(tightening torque:2.0±0.2Nm)

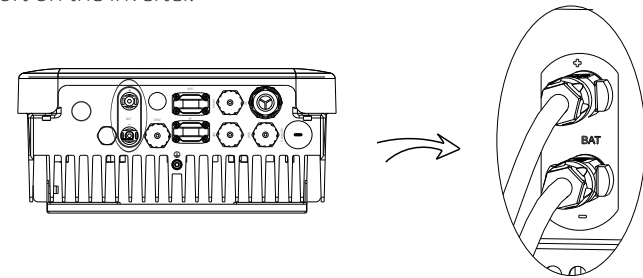


➤ Connecting Charging Cables between Inverter and HV Solar Storage:

1. Connect the the positive cable (+) (A) and negative cable (-) (B) to the BAT+ and BAT- respectively as shown in the following figure.



2. Keep the inverter off. Connect the other end of power cables (+,-) to the BAT (+,-) port on the inverter.

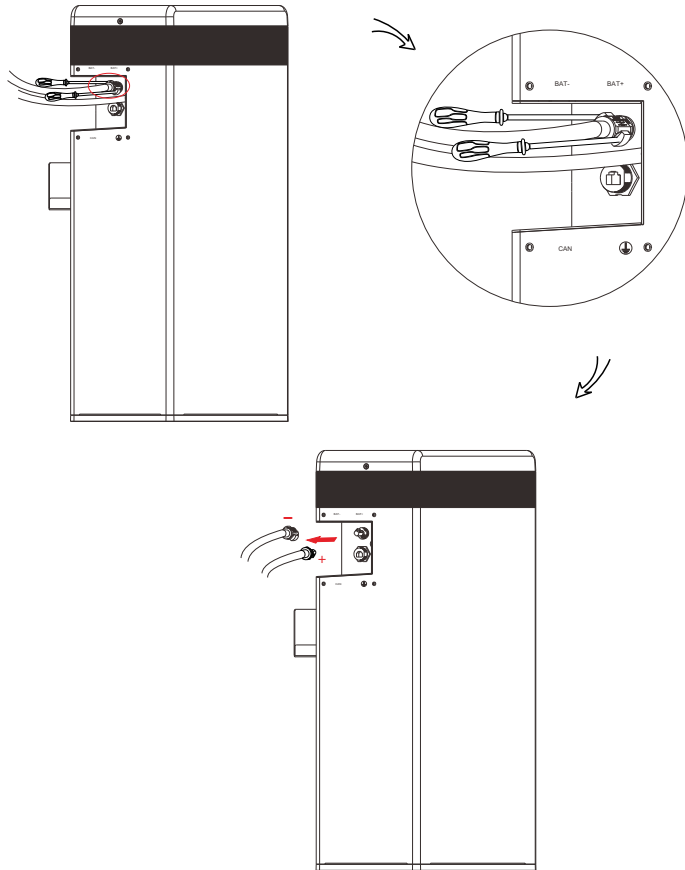


👉 NOTE!

1. When connecting the cable to inverter, fit the two connectors together until the connection audibly locks into place.
2. Check to make sure the connection is securely locked.
3. Don't shake both ends of the cable at the joint once the connection is locked.

➤ Disassembling Power cable (on BAT+, BAT-, "+", XPLUG port)

Disassemble the power cable by plugging the slot type screwdriver or the Power cable disassemble tool(L) to the terminal groove of the power cable. Please see the illustration as shown below:

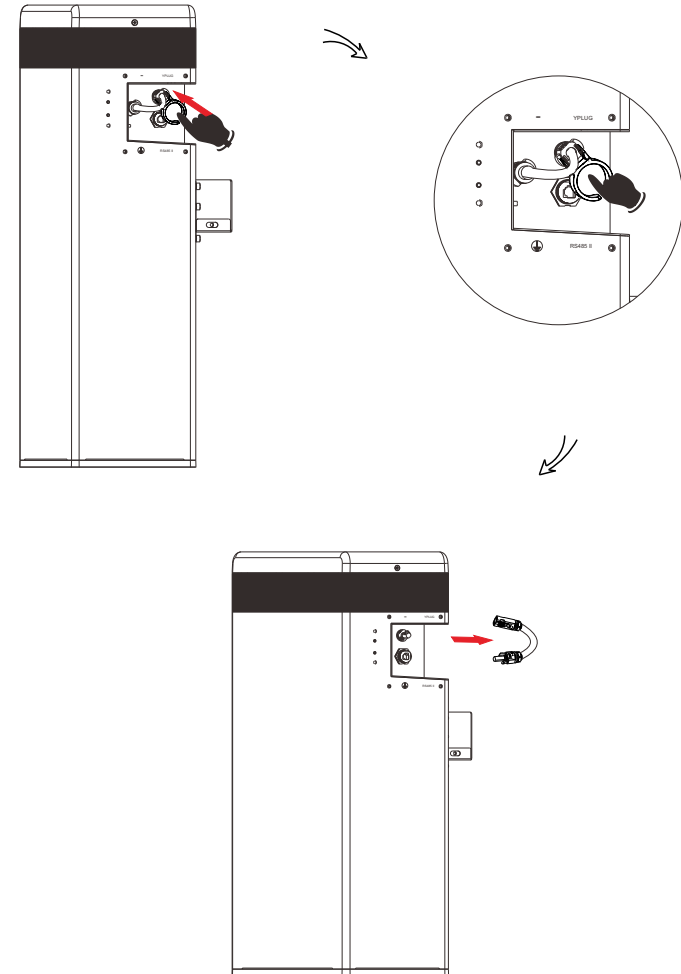


⚠ CAUTION!

DO NOT disassemble power cables when HV Solar Storage is not turned off, otherwise there would be an arc discharge that could cause serious injury!

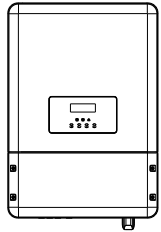
➤ Disassembling Power Cable (on "-", YPLUG port)

Disassemble the power line by plugging the Power cable disassemble tool(L) to the terminal groove of charging cable. Please see the illustration as shown below:

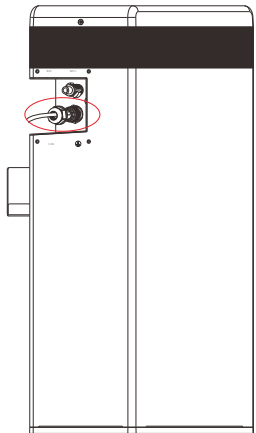


4.5.3 Connecting CAN Communication Cable

It is required for the BMS to communicate with the inverter for proper operation.

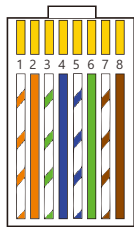
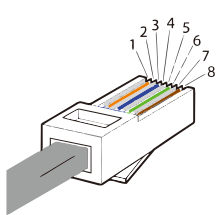


1. Insert one end of the CAN communication cable (C) directly to the BMS port of the inverter.



2. Insert the other end of the CAN communication cable to the CAN connector (II) on the first battery pack which is marked in red. Assemble the cable gland and tighten the cable cap.

The wiring order of the communication cable is as follow:



- 1) Orange stripes on white
- 2) Orange
- 3) Green stripes on white
- 4) Blue
- 5) Blue stripes on white
- 6) Green
- 7) Brown stripes on white
- 8) Brown

Sequence	1	2	3	4	5	6	7	8
CAN	/	GND	/	CAN_H	CAN_L	/	A1	B1

4.5.4 Connecting RS485 Communication Cable

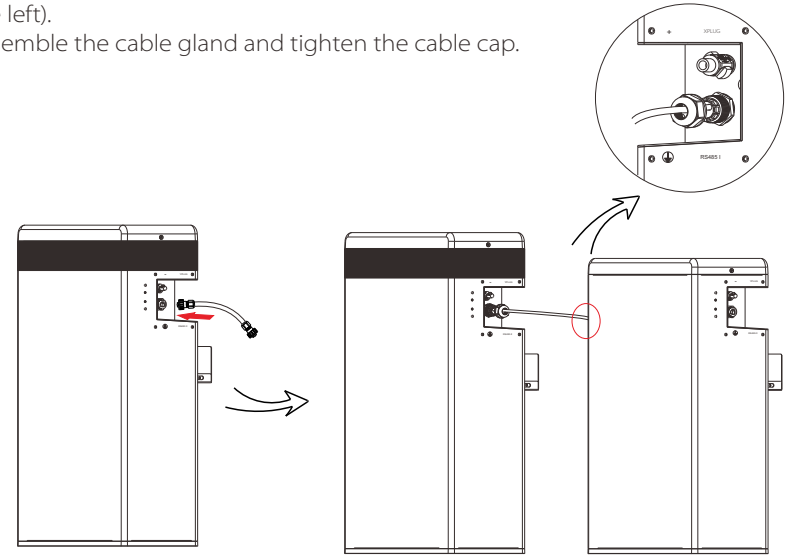
For General Pack:

There's no need to use RS485 communication cable.

For General Pack + 1~3 Booster Packs:

Connect RS485 II (VII for General Pack or VIII for Booster Pack) of the first battery pack (as shown on the right) to RS485 I on the next battery pack (as shown on the left).

Assemble the cable gland and tighten the cable cap.

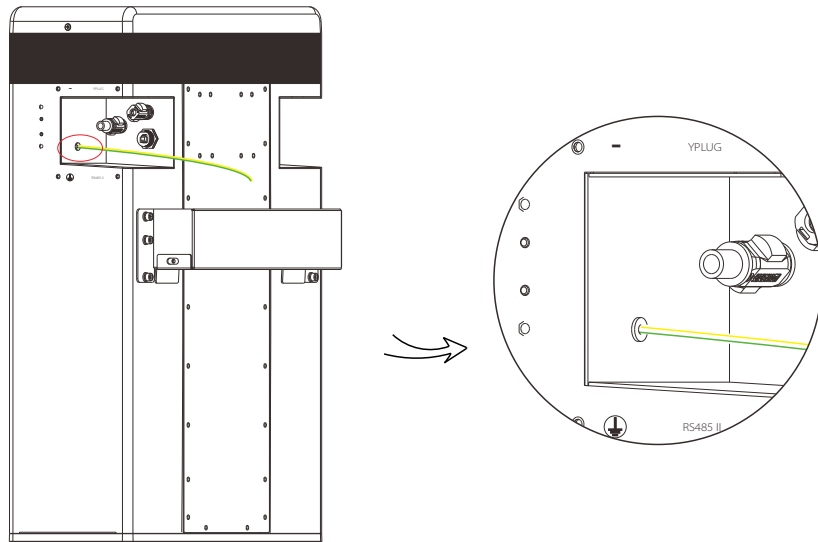
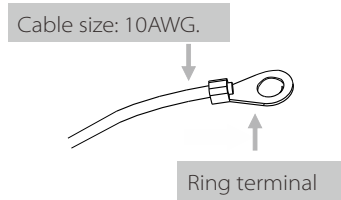


The wiring order of the communication cable is as follow:

Sequence	1	2	3	4	5	6	7	8
RS485I	VCC_485	GND_485	B2	N-	P+	A2	VCC_485_2	GND_485
RS485II	VCC_485	GND_485	B2	N-	P+	A2	VCC_485_2	GND_485

4.5.5 Connecting Ground Wire

The terminal point for GND connection is on the side of grooves as shown below:



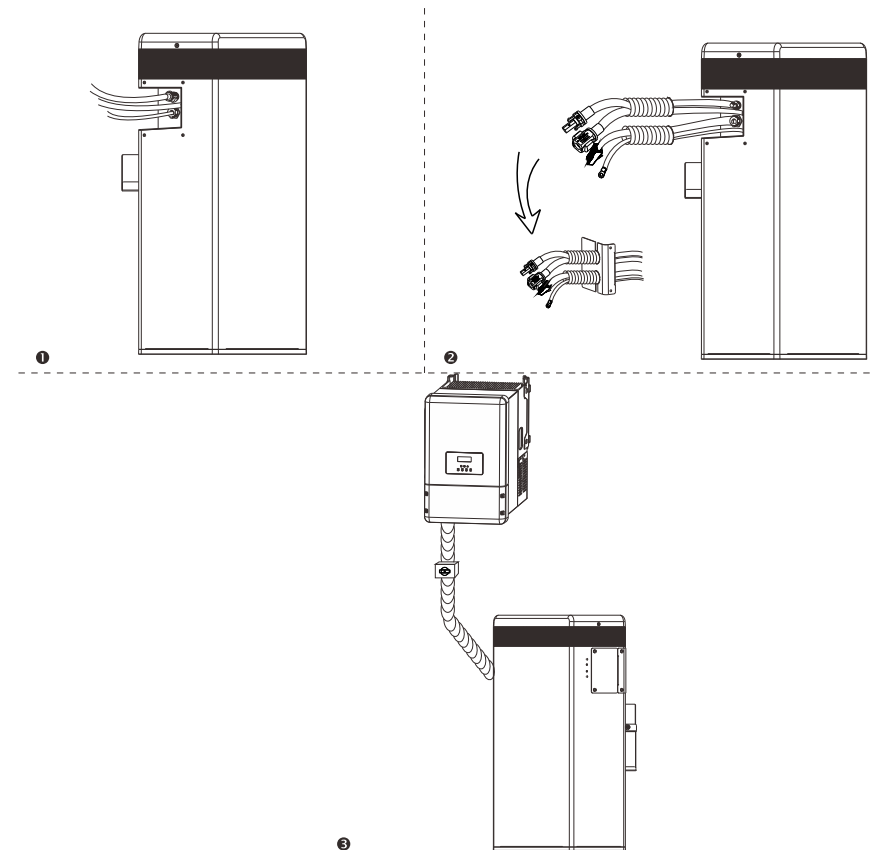
CAUTION!
GND connection is mandatory!

4.5.6 Overall Installation

It is recommended to protect the cables with corrugated pipe.

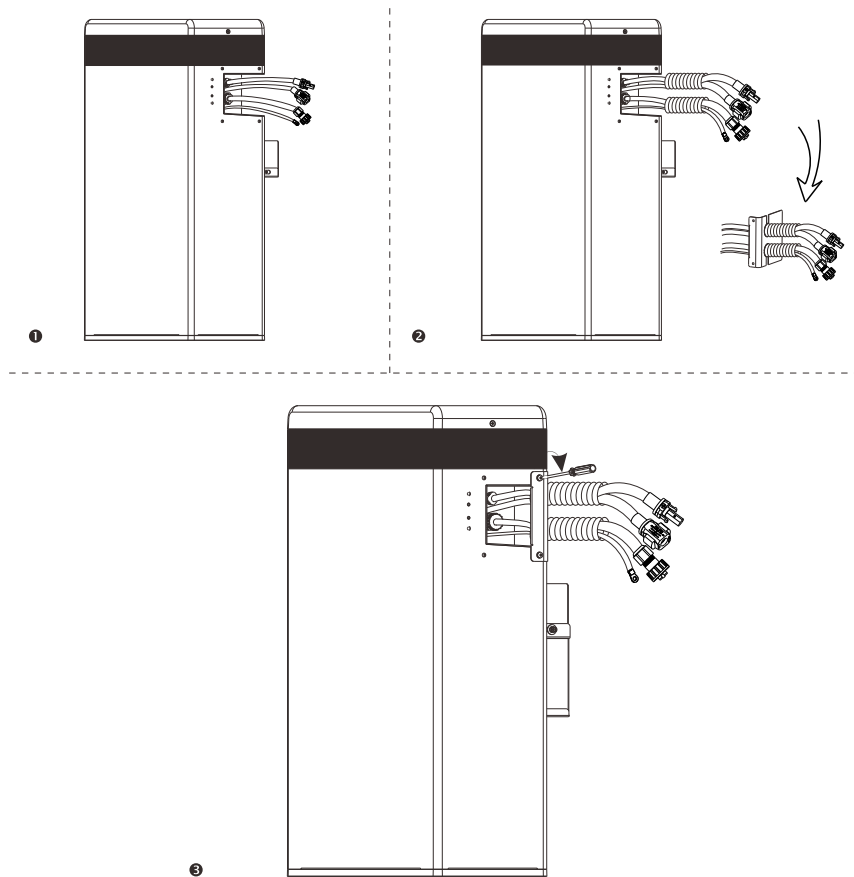
For General Pack:

1. Connect all the cables on the left side of General Pack.
2. Run the cables through the corrugated pipe.
3. Do remember to insert the series-connected cable at "-" and "YPLUG" on the right side of the last battery pack to complete the internal circuit.
4. Set the cables into the groove of metal plates and screw them back to the battery pack on both sides.



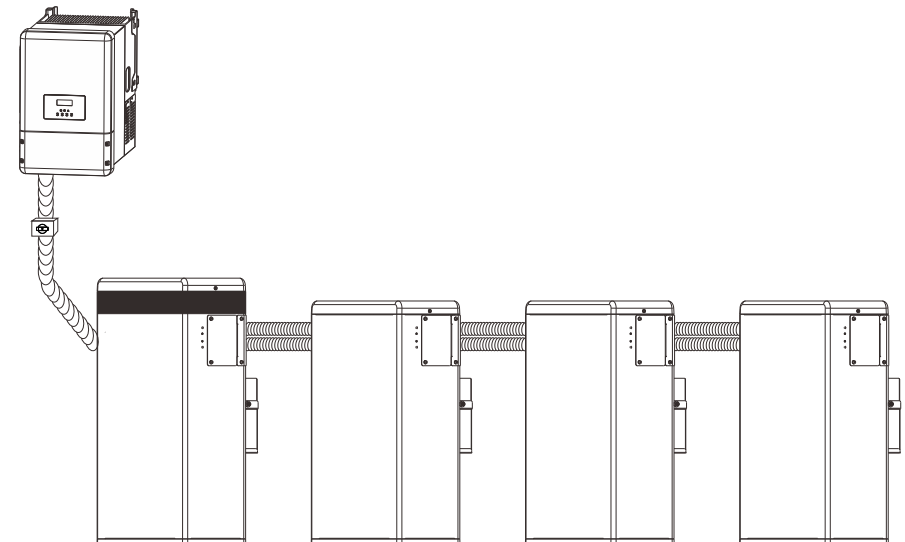
For General Pack + 1~3 Booster Packs:

1. Connect the cables at one end of the General Pack/Booster Pack.
2. Run the cables through the corrugated pipe.
3. Set the cables into the groove of metal plates and screw them back to the battery packs on both sides.
4. Do remember to insert the series-connected cable at "-" and "YPLUG" on the right side of the last battery pack to complete the internal circuit.



4.6 Overview of Installation

The following diagram is a completed HV Solar Storage installation with General Pack + three Booster Packs.



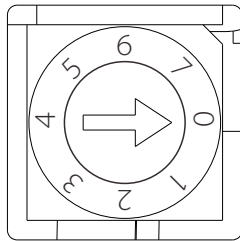
⚠ CAUTION!

One HV Solar Storage is allowed to install one General Pack with three Booster Packs at most. Connecting more than three Booster Packs to HV Solar Storage will blow the fuse, and the batteries will be damaged. Please keep in mind and follow this instruction.

5 Commissioning

5.1 Configuring Battery System

The DIP switch is used to configure the number of battery packs which are communicating to inverter. The detailed configuration information is shown as follows:



Configuration activated by inverters

- 0- Matching General Pack (default)
- 1- Matching General Pack + 1*Booster Pack
- 2- Matching General Pack + 2*Booster Pack
- 3- Matching General Pack + 3*Booster Pack

➤ Black-start configuration

The black-start function is only used in the off-grid environment when there is no other power supply.

Note: if the battery is started in black-start mode, although there is no BMS communication, the port still has high voltage and there is a risk of electric shock!

After the black-start mode is started, if the BMS communication couldn't be built within 3 minutes, the black-start fails.

- 4- Matching General Pack
- 5- Matching General Pack + 1*Booster Pack
- 6- Matching General Pack + 2*Booster Pack
- 7- Matching General Pack + 3*Booster Pack

5.2 Commissioning

👉 NOTE!

When powering on the BMS, the system will start self-testing. If the buzzer bips, it means DIP configuration fault or communication failure occurs. If the buzzer bips, please check if the number of battery packs is corresponding to the DIP configuration, and also check if the RS485 communication cables are correctly connected. After checking above two situations, press the POWER button to power on, and press the POWER button again 10s later. In addition: The buzzer will only alarm on the corresponding fault during the power-on self-test. When the self-test is completed, it won't bip again even if the same fault occurs.

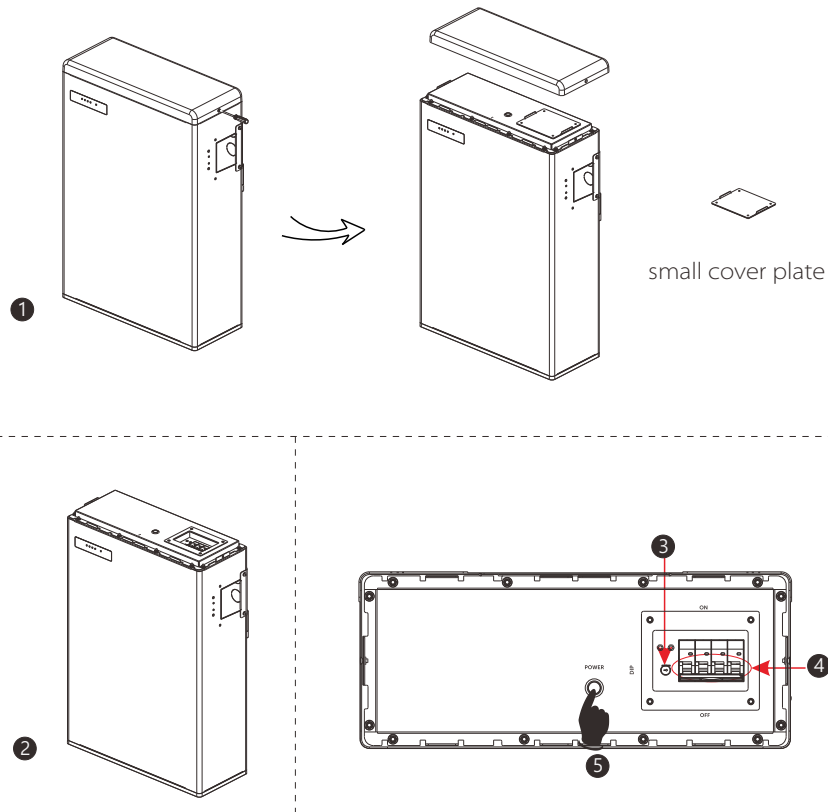
👉 NOTE!

Frequently pressing the POWER button may cause system error. Please make sure at least 10 seconds is left before you pressing the POWER button the second time.

Commissioning Steps

If all the battery packs are installed, follow these steps to put it in operation.

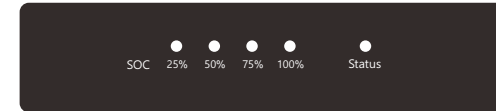
1. Remove the upper cover board of General Pack;
2. Remove the small cover plate;
3. Rotate the DIP to corresponding number with small tool according to the number of battery pack(s) that has(have) been installed;
4. Switch the circuit breaker to ON position;
5. Press the POWER button to turn on HV Solar Storage;
6. Put the small cover plate back;
7. Reinstall the upper cover board to General Pack;
8. Power on the inverter.



5.3 Status Indicators

The LED indicators on the front panel of the battery pack are showing the operating status.

5.3.1 BMS

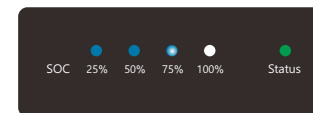


The following table shows the status of BMS.

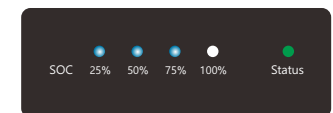
No.	Status of BMS	Mode
1	Light off	Power off
2	The Green LED is light on for 1s, and light off for 4s	Inverter sends Idle command
3	The Orange LED is light on for 1s, and light off for 4s	BMS Protection
4	The Red LED keeps lighting on for 10min, then flickers with light on for 1s, and light off for 4s	Fault
5	The Green LED is light on for 0.3s, and light off for 0.3s	Upgrade for BMS
6	The Green LED keeps light on	Active

The capacity indicators show the SOC:

- When the battery pack is neither charging nor discharging, the indicator lights are off.
- When the battery pack is charging, part of the Blue LED is flashing with the frequency of light on for 0.5s, light off for 0.5s, and part of the Blue LED keeps light on. Take SOC 60% for instance, in charging state:
 1. The first two Blue LED indicators keeps on
 2. The third Blue LED indicator flashes once every 1s
- When the battery pack is discharging, the Blue LED is flashing with the frequency of light on for 1s, and light off for 4s. Take SOC 60% for instance, in discharging state:
 1. The first three blue LED indicators flash once every 5 seconds



Charging



Discharging

5.3.2 Battery Pack



S1 and S2 represent independent status indicators. The status of S1 and S2 have the same meaning for battery pack in the following table.

Note: Only when both S1 and S2 are flashing once every 5s in Green LED, it means the battery system is active.

No.	Status of battery pack	Mode
1	Light off	Power off/Sleep
2	The Green LED is light on for 1s, and light off for 4s	Active
3	The Orange LED is light on for 1s, and light off for 4s	Protection
4	The Red LED keeps lighting on for 10min, then flickers with light on for 1s, and light off for 4s	Fault
5	The Green LED is light on for 0.3s, and light off for 0.3s	Upgrade for BMS

NOTE!

After powering off the BMS, the LED lights of S1 and S2 will keep flashing in 20 minutes.

5.4 Shutting Down HV Solar Storage

To shut down the system, follow the steps below:

1. Turn off the breaker between inverter and battery pack;
2. Open the upper cover board;
3. Power off the BMS;
4. Turn off the system by moving the circuit breaker switch to the OFF position;
5. Make sure that every indicator on the T-BAT system is off;
6. Disconnect the cables.

6 Troubleshooting

6.1 Troubleshooting

Check the indicators on the front to determine the state of HV Solar Storage. A warning state is triggered by a condition, for example, when voltage or temperature is beyond the designed limitations. HV Solar Storage's BMS periodically reports its operating state to the inverter.

When HV Solar Storage falls outside prescribed limits, it enters a warning state. When a warning is reported, the inverter immediately stops operation.

Use the monitoring software on the inverter to identify the cause of the warning. The possible warning messages are as follows:

Warning Messages	Description	Troubleshooting
BMS_External_Err	The communication between BMS and inverter is interrupted	Check if the communication cable between BMS and inverter is correctly and well connected.
BMS_Internal_Err	1. DIP switch at the wrong position; 2. The communication between battery packs is interrupted	1. Move the DIP switch to the correct position; 2. Check if the communication cable between battery packs is correctly and well connected.
BMS_OverVoltage	Battery over voltage	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_LowerVoltage	Battery under voltage	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_ChargeOCP	Battery charge over current protection	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_DischargeOCP	Battery discharge over current protection	Contact your distributor or TommaTech GmbH directly for servicing.

Warning Messages	Description	Troubleshooting
BMS_TemHigh	Battery over temperature	Wait till the temperature of cells go back to the normal state.
BMS_TemLow	Battery under temperature	Wait till the temperature of cells go back to the normal state.
BMS_CellImblance	The capacities of cells are different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_Hardware_Protect	Battery hardware under protection	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_Insulation_Fault	Battery insulation fault	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_VoltSensor_Fault	Battery voltage sensor fault	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_TempSensor_Fault	Battery temperature sensor fault	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_CurrSensor_Fault	Battery current sensor fault	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_Relay_Fault	Battery relay fault	<ol style="list-style-type: none"> 1. Make sure the power cable is correctly and well connected to the power connector (XPLUG) of the BMS; 2. If the first step still does not work, contact your distributor or TommaTech GmbH directly for servicing.
BMS_SelfChk_Fault	BMS selfcheck fault	Contact your distributor or TommaTech GmbH directly for servicing.

Warning Messages	Description	Troubleshooting
BMS_CellTempDiff_Fault	The temperature between cells are different	Stop charging or discharging for a while.
BMS_CapMismatch_Fault	The capacity of battery packs are different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_SlaveSwVer_Mismatch_Fault	The software between slavers are different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_SlaveSw&HwMismatch_Fault	The hardware is different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_Manu_Mismatch_Fault	The cell manufacture is different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_MasterSw&SlaveSwMismatch_Fault	The software between Master and Slaver are different	Contact your distributor or TommaTech GmbH directly for servicing.
BMS_ChgReqNoAck_Fault	No action for charging request	Check the information from inverter.

7 Decommissioning

7.1 Dismantling the Battery

Shutting down HV Solar Storage

Disconnect the cables between BMS and inverter

Disconnect the short-circuit plug on the last battery module

Disconnect the cables.

7.2 Packing

Please pack the BMS and battery modules with the original packaging.

If it is no longer available, you can also use an equivalent carton that meets the following requirements:

- Suitable for loads more than 70kg
- With handle
- Can be fully closed

8 Maintenance and Warranty

8.1 Maintenance

If the ambient temperature for storage is -20~50°C, recharge the batteries at least one time every 3 months.

If the ambient temperature for storage is -20~20°C, recharge the batteries at least one time every 6 months.

8.2 Warranty

TommaTech GmbH protects this product under warranty when it is installed and used as listed in this manual. Violation of installation procedure or use of the product in any way not described in this manual will immediately void all warranties on the product.

TommaTech GmbH does not provide warranty coverage or assume any liability for direct or indirect damages or defects that result from the following causes:

- Force majeure (flooding, lightning strike, overvoltage, fire, thunderstorm, flooding etc.)
- Improper or noncompliant use
- Improper installation, commissioning, start up or operation (contrary to the guidance detailed in the installation manual supplied with each product)
- Inadequate ventilation and circulation resulting in minimized cooling and natural air flow
- Installation in a corrosive environment
- Damage during transportation
- Unauthorized repair attempts
- Failure to adequately maintain the equipment. An on-site inspection by a qualified technician is possible following 60 months of continuous use. Warranty claims made beyond 60 months from date of commissioning may be declined if it cannot be demonstrated that the equipment has been adequately maintained
- External influence including unusual physical or electrical stress (power failure surges, inrush current, etc.)
- Use of an incompatible inverter or devices