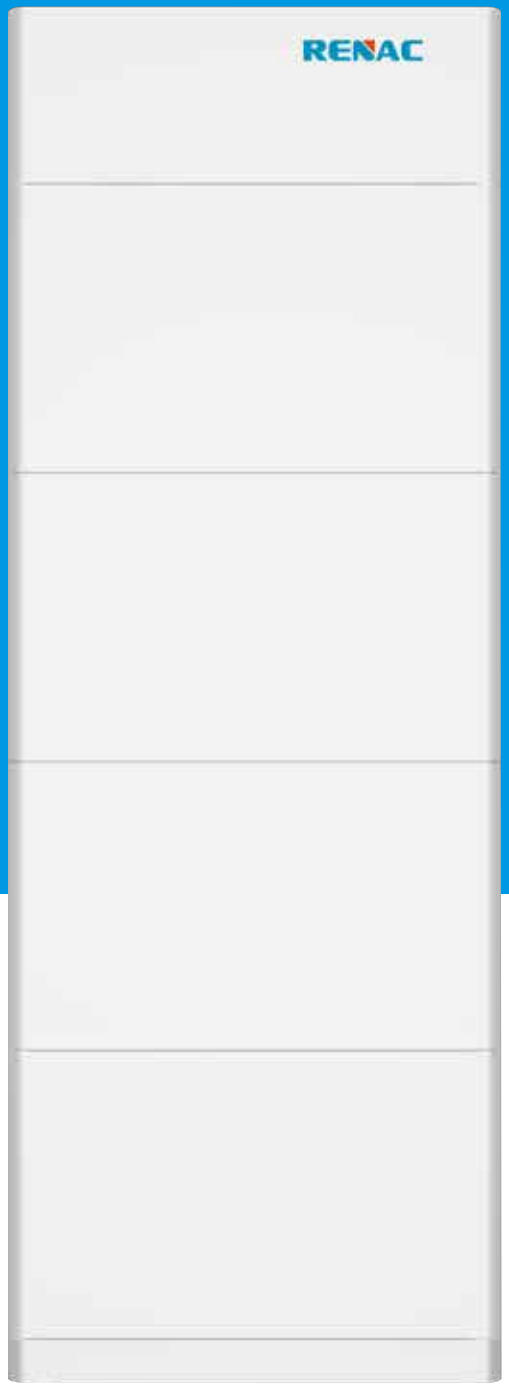
Turbo H1
Series



User Manual

TB-H1-3.74

TB-H1-7.48

TB-H1-11.23

TB-H1-14.97

TB-H1-18.7

RENAC

Content

Notice

This manual contains important safety instructions that must be followed during installation and maintenance of the equipment.

Save the manual!

This manual must be stored carefully and be available at all times.

Copyright Declaration

1. About This Manual

1.1 Applicability

Please read the product manual carefully before installation,operation or maintenance. This manua contains important safety instructions and installation instructions that must be followed during installation and maintenance of the eauipment.

TB-H1-3.74 TB-H1-7.48 TB-H1-11.23 TB-H1-14.97 TB-H1-18.7

1.2 Target group

The instructions in this document may only be performed by qualified persons who must have the following skills:

- Knowledge of how batteries work and are operated
- Knowledge of how an inverter works and is operated
- Knowledge of, and adherence to the locally applicable connection requirements, standards, and directives
- Knowledge of, and adherence to this document and the associated system documentation, including all safety instructions
- Training in dealing with the hazards associated with the installation and operation of electrical equipment and batteries
- Training in the installation and commissioning of electrical equipment

Failure to do so will make any manufacturer's warranty, guarantee or liability null, and void unless you can prove that the damage was not due to non-compliance.

1.3 Symbols used

The following types of safety instructions and oeneral information appear in this document as described below:

	**DANGER!** 'Danger' indicates a hazard with a high level of risk that, if not avoided, will result in death or serious injury.
	**WARNING!** 'Warning' indicates a hazard with a medium level of risk that, if not avoided, will result in death or serious injury.
	**CAUTION!** 'Caution' indicates a hazard with a low level of risk that, if not avoided, could result in minor or moderate injury.
NOTICE	**NOTICE!** 'Notice' indicates a situation that, if not avoided, could result in equipment or property damage.
	**NOTE!** 'Note' provides tips that are valuable for the optimal operation of your product.

1.4 Designation in the Document

The following types of safety instructions and general information appear in this document as described below:

Designation in this document	Designation in this document Complete designation
BMC	Battery Master Controller
RBS	Rechargeable Li-ion Battery Stack
SOC	State of Charge
DOD	Depth of Discharge

2. Safety

2.1 General Safety

The Turbo H1 Series batterv is for residential and works with a photovoltaic system. It is a high voltage Li-ion battery storage system, with the control module on itself. It could be operated in on-grid, off-grid and backup modes with compatible inverters. The battery system could be connected to the Internet through network cable for maintenance and firmware updating.Read all safety instructions carefully prior to any work and observe them at all times when working on or with Turbo H1 Series battery. Incorrect operation or work mav cause:

•Injury or death to the operator or a third party;

•Damage to the inverter or other properties.

2.2 Important safety instructions

⚠	**DANGER!** •Danger to life due to electric shock when live components or DC cables are touched. •The DC cables connected to an inverter may be live. Touching live DC cables results in death or serious injury due to electric shock. •Disconnect the battery system and inverter from voltage sources and make sure it cannot be reconnected before working on the device. •Do not touch non-insulated parts or cables. •Do not remove the terminal block with the connected DC conductors from the slot under load. •Wear suitable personal protective equipment for all work on the battery system. •Observe all safety information of the inverter.
⚠	**WARNING!** •Battery Module Leakage If the battery modules leak electrolytes, contact with the leaking liquidor gas should be avoided. The electrolyte is corrosive, and the contactmay cause skin irritation and chemical burns. If one is exposed to theleaked substance,do these actions: Inhalation: Evacuate the contaminated area, and seek medical help immediately. Eye contact: Rinse eyes with flowing water for 15 minutes and seekmedical help immediately. Skin contact: Wash the affected area thoroughly with soap and waterand seek medical help immediately. Ingestion: Induce vomiting and seek medical help immediately . •The battery modules and its components should be protected fromdamage when transporting and handling. Do not impact, pull, drag, or step on the battery modules. Do not insert unrelated objects into any part of the battery modules. Do not throw the battery module into a fire. Do not soak the battery modules in water or seawater. Do not expose to strong oxidizers. Do not short circuit the battery modules. The battery modules cannot be stored at high temperatures (more than 50°c) The battery modules cannot be stored directly under the sun. The battery modules cannot be stored in a high humidity environment. Do not use the battery modules if it is defective, or appears cracked,broken or otherwise damaged,or fails to operate. Do not attempt to open, disassemble, repair, tamper with, or modify the battery modules. The battery modules are not user-serviceable. Do not use cleaning solvents to clean the battery modules
⚠	**CAUTION!** Risk of injury due to weight of the battery module. •Injuries may result if the battery module is lifted incorrectly or droppedwhile being transported or installed. •Transport and lift the battery module carefully. Take the weight of thebattery module into account. •Wear suitable personal protective equipment for all work on thebattery system. •If the battery is not installed within one month after receiving thebattery, the battery must be charged till the SOC is more than 50% for maintains.
NOTICE	**NOTICE!** •Firefighting Measures The battery modules may catch fire when it is put into the fire. In case of a fire, please make sure that an ABC or carbon dioxide extinguisher isnearby.Water cannot be used to extinquish the fire. Full protective clothing and self-contained breathing apparatus are for the firefighters to extinquish the fire. •Damage to the battery system due to under voltages If the battery system doesn't start at all, please contact Renacafter-sales service within 48 hours. Otherwise, the battery could bepermanently damaged.
☞	**NOTE!** •Electrica installation and maintenance must be carried out by competent electricians according to local regulations.

2.3 Explanation of symbols

This section gives an explanation of all the symbols shown on the type label
Symbols on the Type Label

Symbol	Explanation
	TUV mark.
	Do not disconnect or disassemble by untrained personnel.
	Do not short circuit.
	Do not expose the battery to open flame, heat or sparks, as there is a risk of fire or explosion.
	Keep the battery modules away from children.
	Observe the documents Observe all documents supplied with the system.
	Warning! Metal parts of the batteries are always under voltage. Do not short-circuit the batteries! In case of a short-circuit, may flow very high currents and cause burns. By Touching conductive parts can cause cardiac arrhythmia and shock.
	Tha battery contains corrosive electrolytes.Please avoid contact with the leaked substance.
	WEEE designation Do not dispose of the system together with the household waste but in accordance with the disposal regulations for electronic waste applicable at the installation site.

3. Introduction

3.1 Product Overview

The Turbo H1 series battery can be integrated with high voltage hybrid inverter for PV energy storage system.

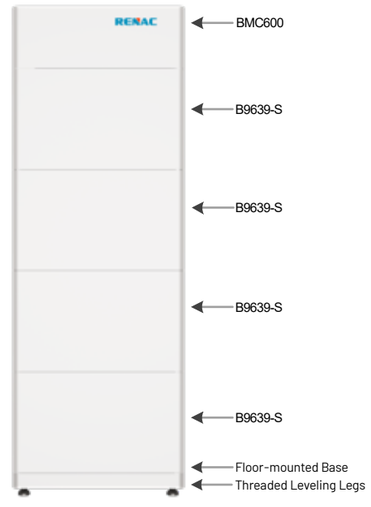
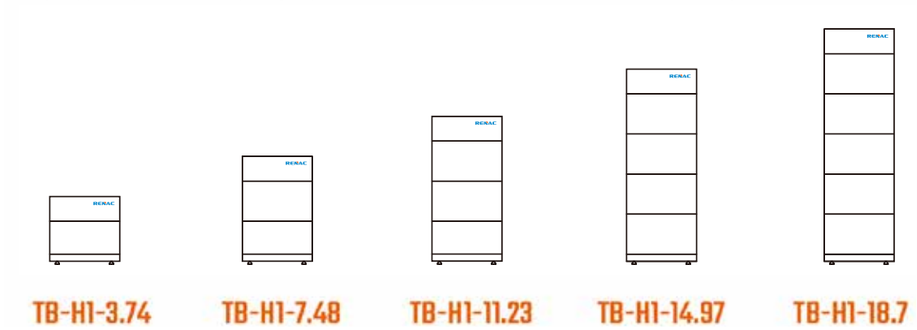


Figure 3-1 PV Energy Storage System (TB-H1-14.97 is used as example)

Note: The Turbo H1 series battery consists of a battery master controller and rechargeable battery stacks. BMC model name is BMC600.RBS model name is B9639-S.

Battery Capacity Description

The battery supports power and capacity expansion.One BMC supports a maximum of five RBS expansion modules.



3.2 Terminals

BMC view

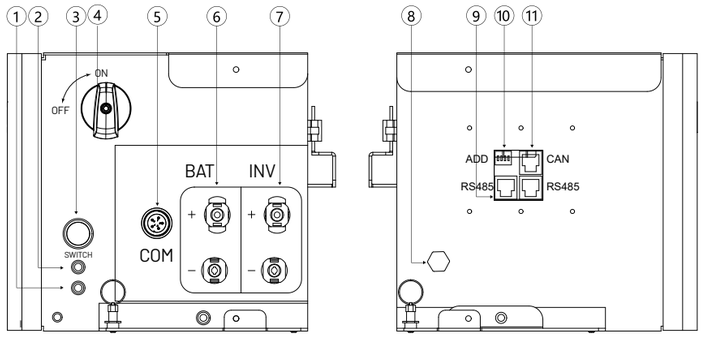
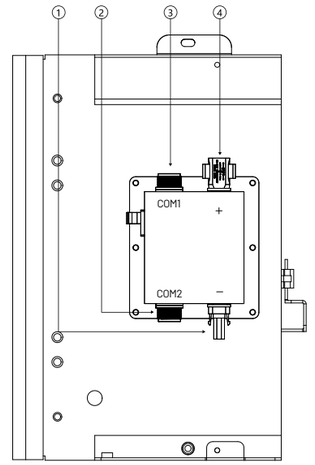


Figure 3-2 Terminals of BMC600

Object	Description
1	Alarm LED
2	Running LED
3	Start button
4	DC isolator
5	Communication port
6	Battery terminals connect with B9639-S(BAT+/BAT-)
7	Battery terminals connect with hybrid inverter(BAT+/BAT-)
8	Waterproof valve
9	RS485 port
10	Parallel communication Add
11	CAN port

RBS view



Object	Description
1	BAT- connector
2	CAN communication connector
3	CAN communication connector
4	BAT+ connector

4. Technical data

Model	TB-H1-3.74	TB-H1-7.48	TB-H1-11.23	TB-H1-14.97	TB-H1-18.7
Electrical Parameters					
Nominal Energy[1](kWh)	3.74	7.48	11.23	14.97	18.7
Usable Energy(90%DOD)(kWh)	3.36	6.73	10.1	13.47	16.83
Nominal Voltage(V)	96	192	288	384	480
Voltage range(V)	81~108	162~216	243~324	324~432	405~540
Rated DC power(kWh)	2.88	5.76	8.64	11.52	14.4
Maximum charge / discharge current(A)[2]	30/30				
Depth of Discharge	90%				
Cooling	Natural				
General					
Battery technology	LiFePO4				
Dimensions(H*W*D)(mm)	606*651*217	932*651*217	1258*651*217	1584*651*217	1910*651*217
Weight(kg)	49.5	86.8	124.1	161.4	198.7
	1	2	3	4	5

Model	TB-H1-3.74	TB-H1-7.48	TB-H1-11.23	TB-H1-14.97	TB-H1-18.7
General					
Enclosure	IP65 (Indoor)				
Type of installation	floor stand				
Operating temperature range(°c)[3]	-10~+50				
Communication	CAN/RS485				
Cycle Life(90%DOD)	>6000 cycles				
Warranty[3]	10 Years				
Operating Altitude(m)	<2000				
Certificates	UN38.3,EN/IEC62619,EC62040，EN 62477-1,1EC 62040-1EN 61000-6-1/-3				

[1]Nominal Energy: Test conditions: 100% DOD, 0.2C charge & discharge at + 25℃.

[2]The recommended charging and discharging current is 20/20A.

[3] Ambient temperature : Charging (0 ... +40℃), Discharging (-10 ... +50℃).

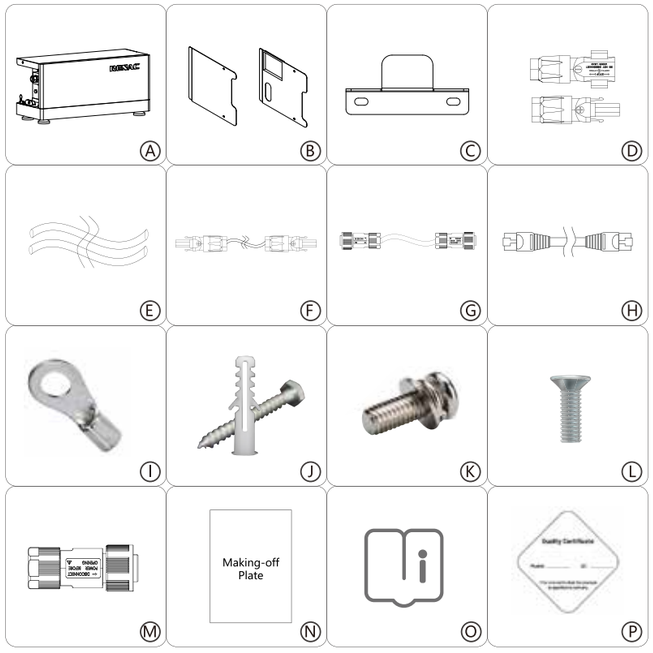
[4]Conditions apply. Refer to Renac Power Battery Warranty Policy.

5. Installation

5.1 Unpacking

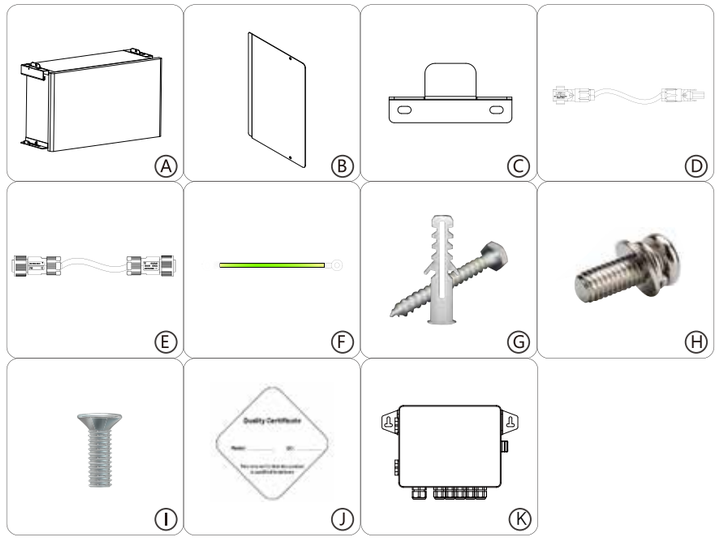
Check the delivery for completeness. Contact your dealer at once if anything is missing.

Battery Master Controller(BMC)



Object	Quantity	Description
A	1	Battery Master Controller (BMC600)with floor-mounted base
B	1	BMC protective cover
C	1	Bracket
D	4	Battery Connectors(1* positive, 3*negative)
E	3	DC input power cable(inverter to battery, 1.5m, B- to B-， 2m)
F	1	DC input power cable (B+ to B+)
G	1	Signal cable(BMC to RBS)
H	1	Signal cable(1.5m)
I	1	Ring terminal(for 10AWG cable)for grounding
J	2	Expansion tubes& Expansion screws
K	4	M5 screws
L	4	M4 screws
M	1	CAN communication terminator resistor
N	1	Making-off plate
O	1	User Manual
P	1	Quality Certificate

Rechargeable Battery Stack(RBS)



Object	Quantity	Description
A	1	Rechargleable Battery Stack(B9639-S)
B	2	RBS protective cover
C	1	Bracket
D	1	DC input power cable(B+ to B-)
E	1	Signal cable(RBS to RBS)
F	1	Ground cable
G	2	Expansion tubes& Expansion screws
H	5	M5 screws
I	4	M4 screws
J	1	Quality Certificate
K	1	Combiner Box(optional)

Open the package and pick the product, check that if there is any distortion or impaired during the transportation. Meanwhile, check that if the relating accessories and the materials are here, you can see the accessories list in the table.

The instruction manual is an integral part of the unit and should therefore be read and kept carefully.

It is recommended that the packaging should not be removed until the unit is located in the installation site.

5.2 Check for transport damage

Check if the Turb o H1 series battery has some visible external damage, such as cracks in the housing or display please contact with your dealer if you find any damage.

5.3 Installation precaution

Requirements for Installation Location

a)A solid support surface must be available(e.g., concrete or masonry).

b)The installation location must be inaccessible to children.

c)The installation location must be suitable for the weight and dimensions of the battery system.

d)The installation location must not be exposed to direct solar irradiation.

e)The installation location must not be close to the fire.

f)The altitude of the installation location should be less than 2000m.

g)The ambient temperature should be between -10°C and +55°C.

h)The ambient humidity should be between 5-95%.

5.4 Available space

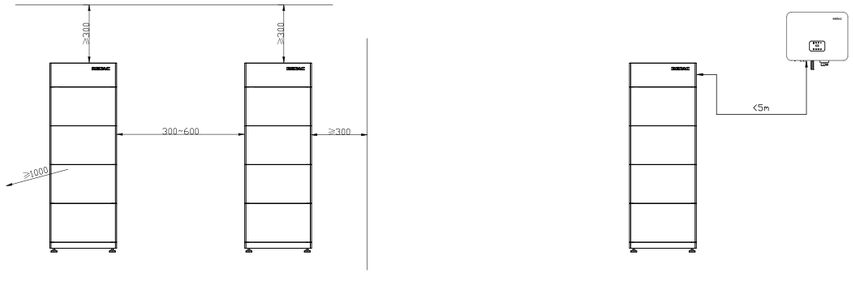


Figure 6-1 Battery space size

5.5 Preparation

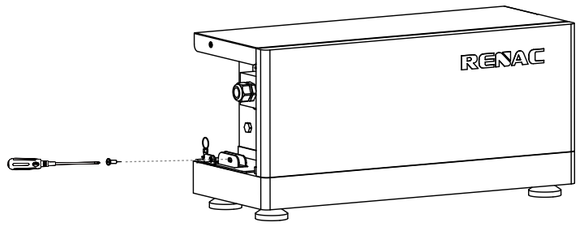
The following tools shall be prepared before installation

Installation Tools

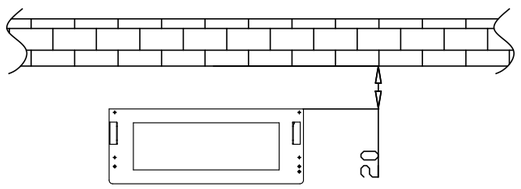
No.		Model	Function
1		Level	Make sure the bracket is properly installed
2		BOSCH HD18-2 Two Speed Hammer Drill	Drill holes on the wall
3		Hammer	Hanging the bracket
4		KIMO 20V 1/2 Corlless Brushless Impact Wrench Set	Hanging the bracket
5		Screwdriver	Wiring
6		RJ45 Crimping Tool	Crimping tool for RJ45 terminal
7		Crimping plier	Crimping Tool For Insulated Electrical Connectors

5.6 Installation steps

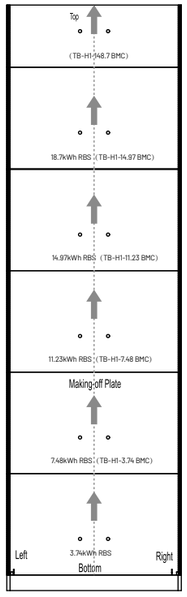
1.Take the BMC and base out of the package
2.Loose the two screws with screwdriver.



3.Take the BMC from the base.
4.Put the installed base and feet alona the wall, and keep the distance of 20 mm between the wall and the base.



5.Align the marking-off plate with the upper surface of the base.



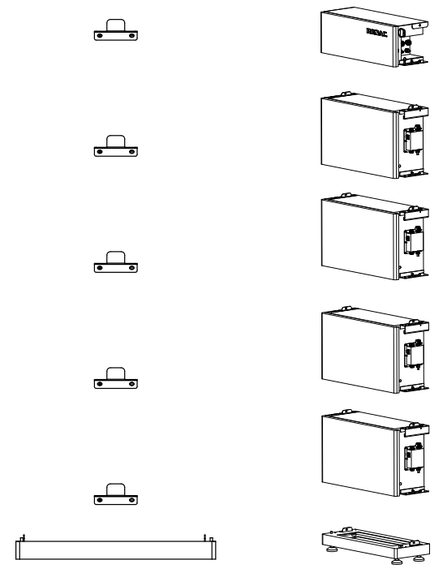
6.Dril holes with Φ10 driller carefully, make sure the holes are deep enough (at east 45mm)for install and tight the expansion tubes.

7.instal the expansion tubes in the holes, and tight them. nstal the wall bracket using the expansion screws in the screw package.

8.Take a battery module from the package out. Hang the RBS on the bracket, Pull the latches on the left and right sides and put one battery module on the base. Pay attention to the direction of the module.

9.Repeat the operations for other battery modules.

10.Put the BMC on top of the RBSs.

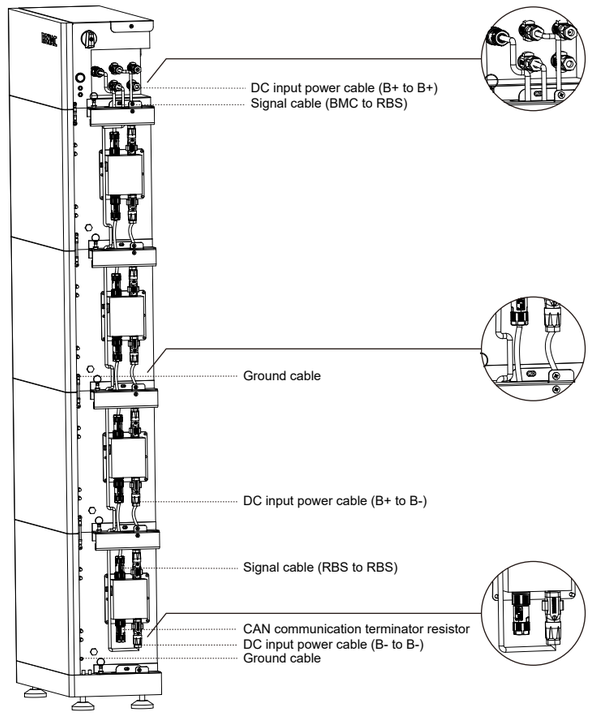


11.Secure the RBSs each other and BMC with RBS using M5 screws.

5.7 Electrical Wiring Connection

5.7.1 Internal Electrical Connection of the Battery

DC power cable(B-to B-)should be prepared by following battery power cable connection, and others cables you can find in the accessory package.



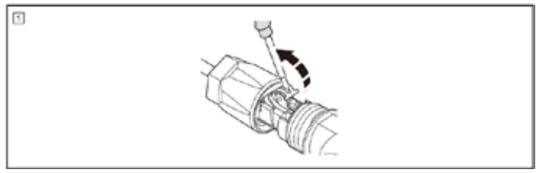
5.7.2 External Electrical Connection of the Battery

5.7.2.1 Battery Power Cable Connection

1.Prepare the tin-plated cables with a conductor cross section of 4 to 6 mm^2(AWG 10).

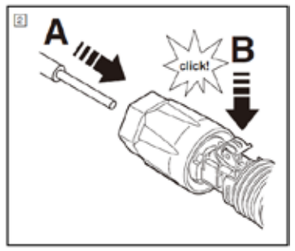
2.Strip 15mm off the conductor. Use a suitable stripping tool for this(e.g. "Knipex Solar 121211").

3.Open the spring using a screwdriver.



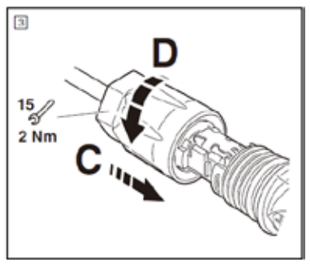
4.Carefully insert the stripped wire with twisted litz wires all the way in(2, A). The litz wire ends have to be visible in **the spring**.

5.Close the spring.Make sure that the spring is snapped in(2, B).



6.Push the insert into the sleeve (3, C)

7.Tighten the cable gland to 2 Nm(2, D). Use a suitable and calibrated torque wrench,size 15. Use an open-jaw wrench, size 16, to hold the connector in place.



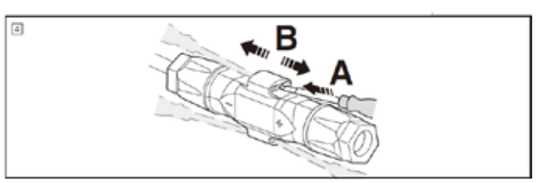
8.Fit the two connectors together until the connection audibly locks into place.

9. Check to make sure the connection is securely locked

10.Separating connectors

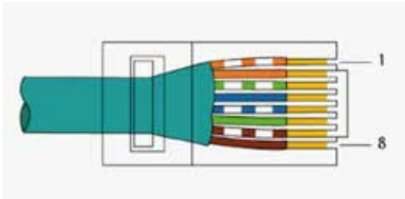
1).Insert the screwdriver into one of the four openings(4, A).

2). Leave the screwdriver in the opening. Pull the two connectors apart(4, B).



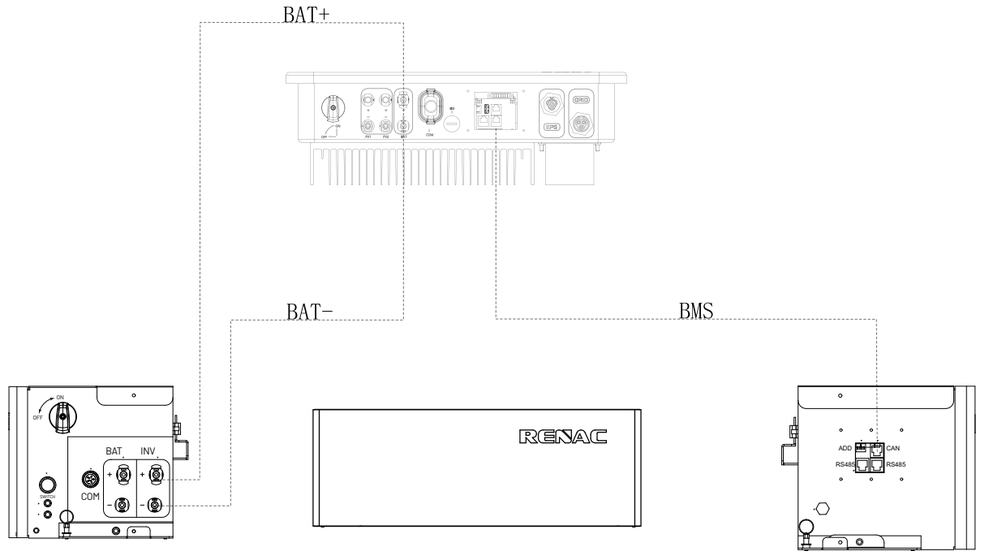
5.7.2.2 Battery Communication Connection

The communication interface between battery and inverter is CAN with a RJ45 connector, The Pins definition is as below



Pin	1	2	3	4	5	6	7	8
Function	NC	NC	NC	CANH	CANL	NC	NC	NC

Overview for all battery connections



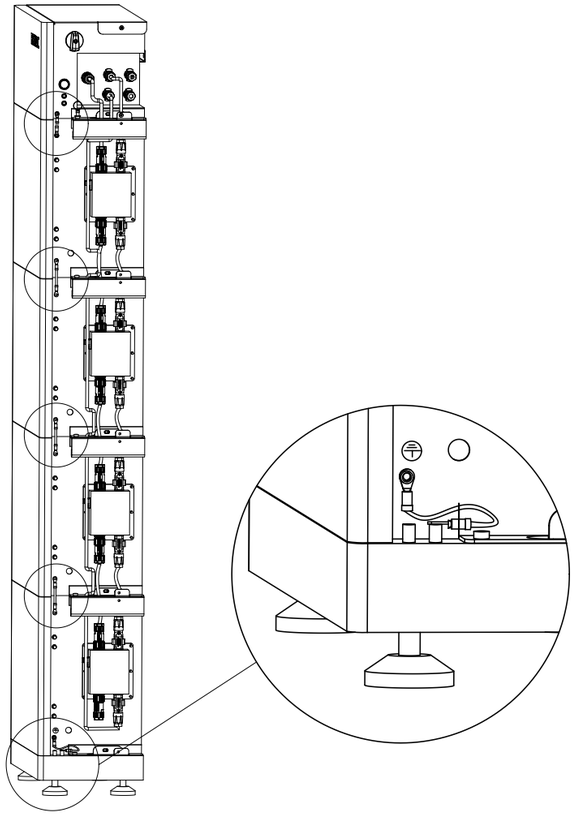
5.7.3 Earth Connection

The BMC and RBSs must be connected to a protective conductor, For this purpose, a line from the potential equalization rail to the floor mounted base must be installed expertly.

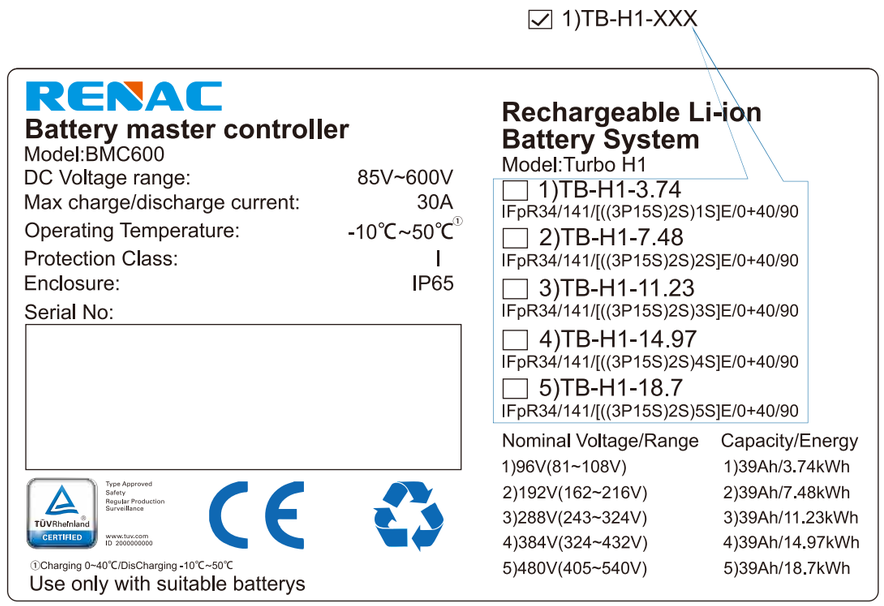
Cable size:10AWG

Connection step:

- Strip the earthling cable insulation.
- Insert the stripped cable into the ring terminal.
- Clamp the end of the ring terminal.
- Unscrew the screw of the earthling connector.
- Suit the ring terminal on the earthling connector .Suit the gasket on the earthling connector.
- Screw the screw of the earthling connector.

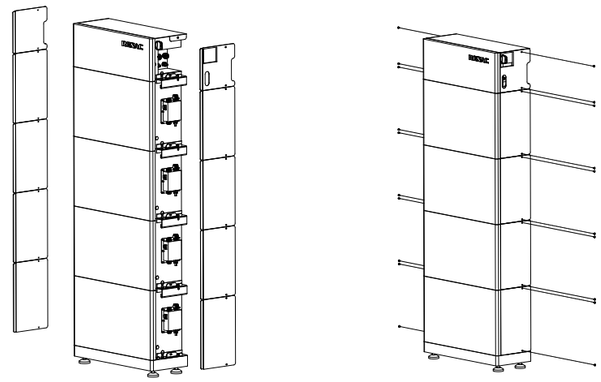


Mark the product type on the following lable



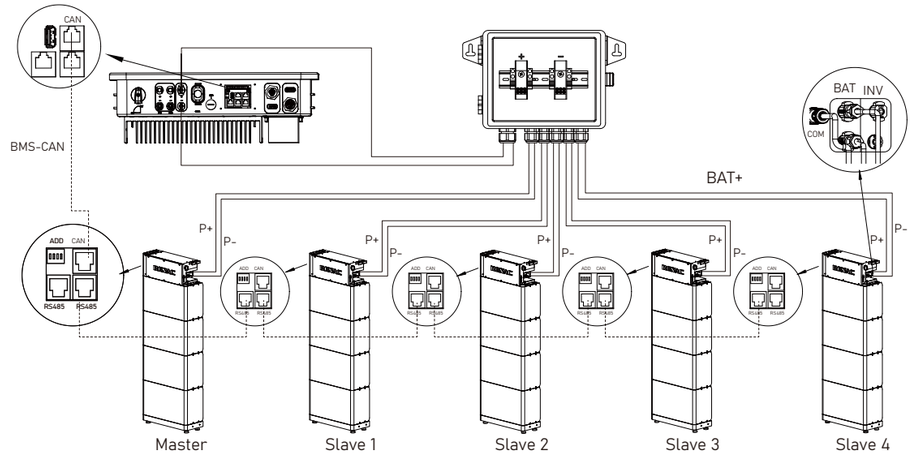
5.8 External protective cover installation

After electrical connections are complete, check all the wirina are correctly and securely connected,install the external protective cover, and secure it using M4 screws.



5.9 Overview for All Battery sets Connectionst

5.9.1 Cables Connection



Note:

- For the parallel connection of **2 battery sets and 3 battery sets**, please use the power cable in **accessory bag of battery package** to do the connection.
- For the parallel connection of **4 battery sets and 5 battery sets**, please use the power cable in **accessory bag of combiner box** to do the connection.
- **The length of power cables between battery sets and combiner box must be the same.**

5.9.2 Dip Switch Description

- ADD switch is a 4-bit dial switch to manually distribute the communication address of battery sets.1-3 bit means the communication address of battery sets, the status of 4th bit means if this BMC is the master or not. **For the master,the communication address is largest and the fourth digit must be ON status.**
- Please refer to the table below to set the ADD switch for parallel connection of different battery sets.

	Master	Slave 1	Slave 2	Slave 3	Slave 4
1 battery set					
2 battery sets					
3 battery sets					
4 battery sets					
5 battery sets					

6. Commissioning

6.1 Switch on the System for Single Battery Set

1. Switch on the air switch between the battery and inverter if there is any.
2. Switch on the DC breaker on BMC
3. When the running LED flashes, and the interval time between two flashes is 1 second, push the black start button on BMC.
4. If it is failed to switch on the battery system, check if all the electrical connection is correct.
5.If the electrical connection is correct, but the battery system is stil unable to switch on, contact our after-sale service within 48 hours.

6.2 Switch on the System for Multiple battery sets

Turn on DC breakers sets (on BMC) of all battery sets.
Turn on the DC switch of inverter or AC breaker, all battery sets will be powered on automatically.
Or push the start button on master BMC when the running LED flashes, all battery sets will be powered on.

If it is failed to switch on the battery system, please check if all the electrical connections are correct or not push the start button of master battery set.

6.3 LED state

The Power Battery has a status signal. About the permanently integrated LED in the housing, displayed are the following states:

LED state	Description
Green blinking (1 times per second)	BMC DC switch on
Green and red blinking (1 times per second)	Push black start button or hybrid inverter awake
Green	Battery system workable
Red	Battery system faults or warning

If faults, warning or events of the battery occur, these are reported on the display of the inverter or can be called up via the Renac SEC.

6.4 Startup and Shutdown

6.4.1 Startup

1. Switch on the DC isolator on BMC.
2. Push the start button.
3. Make sure that every green indicator on the system is on.

6.4.2 Shutdown

1. Push the start button.
2. Switch off the DC isolator on BMC.
3. Make sure that every green indicator on the system is off.

7 Decommissioning

7.1 Dismantling the battery

•Push the start button.
•Switch off the DC breaker on BMC.
•Disconnect battery wiring.
•Wait for 5 minutes for de-energizing.
•Disconnect communication and optional connection wiring.
•Remove the battery from the bracket.

7.2 Packaging

If possible, please pack the battery with the original packaging.
If it is no longer available, you can also use an equivalent carton that meets the following requirements.
•Suitable forloads more than 40kg.
•With handle.
•Can be fully closed.

7.3 Storage

The battery module should be stored clean, dry and ventilated indoors with a temperature range between 0°C ~+35°C avoid contact with corrosive substances, keep away from fire and heat sources and charaed every six months with no more than 0.5 C(C-rate is a measure of the rate at which a battery is discharged relative to its maximum capacity.) to the SOC of 40% after along time of storage.

7.4 Disposal

Disposal of the system must comply with the local applicable disposal regulations for electronic waste and used batteries.
•Do not dispose of the battery system with your household waste.
•Avoid exposing the batteries to high temperatures or direct sunlight.
•Avoid exposing the batteries to high humidity or corrosive atmospheres.
•For more information, please contact Renac.

8 Maintenance and Warranty

8.1 Maintenance

If the ambient temperature for storage is 0~35°C, recharge the batteries at least one time every 6 months.

8.2 Warranty

RENAC 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.
RENAC 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, ooding 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 qualifled 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

SMART ENERGY FOR BETTER LIFE

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