Firefly Pro Residential Battery System (HV)

Product Manual (EN&AU)

Firefly Pro H3/H4/H5/H6/H7/H8

V1.3

This manual does not replace and is not intended to replace any local, state, provincial, federal or national laws and regulations applicable to battery system installation, electrical safety and use. Tecloman shall not be liable for compliance or failure to comply with such laws or codes in the installation of battery systems.

The content of this manual will be updated from time to time in case of product upgrade and iteration, without prior notice by Tecloman. Unless otherwise agreed, this manual is intended as a guide for use only, and all statements, information and recommendations in this manual do not constitute a warranty of any kind, express or implied.

Chengdu Tecloman Energy Storage CO., LTD

Address: 900 Guijin Road, Xindu District, Chengdu, Sichuan, China

Website: www.tecloman.com

Prologue

Overview

This manual mainly introduces the product information, function application, installation and debugging, system maintenance and technical parameters of Firefly Pro H3~H8.

Applicable personnel

This manual is mainly applicable to:

- Marketing engineer
- Technical support engineer
- Post sales engineer
- Electrical engineer/Technical practitioner

Symbol Definition

The following symbols appear in this manual with the following meanings.

Symbol	Meaning
	A hazard with a high risk of death or serious injury if not avoided.
	A hazard with an intermediate risk of death or serious injury if not avoided.
	A hazard with a low level of risk that will cause minor or moderate injury if not avoided.
	It is used to transmit safety warning information of equipment or environment. If not avoided, it may lead to equipment damage, data loss, equipment performance degradation or other unpredictable results; No personal injury involved.
	A supplement to the important information in the main text. It is not a safety warning message and does not involve personal, equipment and environmental injury information.

Update Record

The update record accumulates brief description of each file update, and tries to choose the latest version of the file as a guide.

V1.0 2022-12-10

First release

V1.1 2025-06-18

Add the requirements for CEC column names.

Definitions

Term	Meaning
Tecloman	Chengdu Tecloman Energy Storage CO., LTD
Firefly Pro	Firefly Pro Residential Battery System (HV)
BMS	Battery Management System
BCU	BMS Control Unit
BM	Battery Module
Base	Base
BMU	Battery sampling module
BCMS	Battery control module
SOC	Battery State Of Charge
SOH	Battery State Of Health
DOD	Depth Of Discharge
Hybrid inverter	Including PV, battery, grid, load interface
Battery inverter	Including battery, grid, load interface
PV inverter	Including PV, grid, interface

Content

1 Safety Precautions

1.1 General security

Statement

When installing, operating and maintaining this battery system, please read this manual first and follow all safety precautions indicated on the product and in the manual.

The contents of "Danger", "Warning", "Caution", and "Notice" in this manual do not represent all the safety precautions to be followed. They are only supplements to all the safety precautions. Tecloman disclaims any liability arising from any breach of general safe operation requirements or any breach of product safety standards for design, manufacture and use.

The product must be used in an environment that complies with the design specifications. Otherwise, equipment faults may occur, and the resulting product function abnormalities, component damage, personal safety accidents, and property losses are not covered by the product quality guarantee.

Comply with local laws, regulations, and regulations when installing, operating, and maintaining the product. The safety instructions in the manual are only supplementary.

This battery system is not intended to provide life-sustaining medical equipment. Ensure that the battery power failure does not cause personal injury.

Tecloman shall not be liable for any of the following occurrences:

- Do not operate under the conditions of use described in this manual;
- Installation and use environment beyond the relevant

international and national standards;

- Disassemble, change the product or modify the software code without authorization;
- Do not follow the operation instructions and safety warnings in the manual;
- Product damage caused by force majeure (such as earthquake, fire, storm, etc.);
- Transportation damage during the customer's own transportation;
- Damage caused by storage conditions that do not meet product documentation requirements.

General Requirements

Do not operate with power on during installation

- Do not perform outdoor operations (including but not limited to handling products, operating products and cables, plugging and unplugging signal interfaces connected to the outdoors, working at heights, outdoor installation, etc.) in severe weather such as thunderstorms, snowstorms, and strong winds;
- After the installation of the product, remove the discarded items in the product area;
- In case of fire, evacuate the scene quickly and call the fire alarm number. Under no circumstances, re-entering the burning building is prohibited;
- It is strictly forbidden to artificially alter, damage or block the logo and nameplate on the equipment;
- When installing the product, please use tools to tighten screws;

- Fully familiar with the composition and working principle of the PV energy storage system on the installation site, and the relevant standards of the country/region where the project is located;
- Paint scratches in the process of product transportation and installation must be repaired in time, and it is strictly forbidden to expose the scratched part to the outdoor environment for a long time.
- Under no circumstances, do not change the structure of the product, installation sequence, etc., without Tecloman permission;
- Move the modules by the clasps or handles. Do not affect the external connecting parts of each module.

Personal Safety

- Proper personal protective equipment should be worn during product operation. If a fault is found that may cause personal injury or product damage, the operation should be terminated immediately, the person in charge should be reported, and effective protective measures should be taken;
- Before using the tool, please master the correct use of the tool to avoid injury and damage to the product;
- To ensure personal safety and normal use, reliable grounding should be carried out before use;
- When the battery fails, the temperature may exceed the burn threshold of the touchable surface, and contact should be avoided.
- Do not open or damage the battery, the release of electrolytes is harmful to the skin and eyes, should avoid contact;
- Do not place irrelevant items on the top of the product or

insert the product in any position;

- Do not place flammable materials around the product.
- Batteries are strictly prohibited from being placed in the fire to avoid explosion and endanger personal safety;
- Do not put the battery module in water or other liquids;
- Do not short-circuit the battery module inside the battery module, because short-circuit will cause combustion.
- Batteries may cause danger of electric shock and large short-circuit current. When using the battery, the following precautions should be paid attention to:
  a) Remove metal wearables such as watches and rings;
  b) Use tools with insulated handles.
  c) Wear rubber gloves and insulated boots;
  d) Do not place tools or metal parts on the product;
  e) Please disconnect the PV inverter or charging and discharging power before connecting or disconnecting the product;
  f) Do not touch the inner conductors of the upper and lower connectors of the battery module with the metal body;
  g) Determine if the battery is accidentally grounded. If it happens, please remove the battery from the ground; touching any part of the grounded battery may result in electric shock. If these groundings are removed during installation and maintenance, the likelihood of such shocks can be reduced;
- Do not use water or detergent to clean the electrical parts inside and outside the cabinet;
- Do not stand, lean or sit on the product;
- Do not destroy the components of the product.

1.2 Personnel requirements

- Personnel responsible for the installation and maintenance of the product must first undergo strict training to understand safety precautions and master the correct operation method;
- Only qualified professionals or trained personnel are allowed to install, operate and maintain the product;
- Only qualified professionals are allowed to remove safety facilities and overhaul the product;
- Personnel who operate this product, including operators, trained personnel and professionals should have special operation qualifications required by the local country, such as electrical operation, high voltage electrician, special equipment operation qualification, etc.;
- Replacement of product components (including software) must be done by a professional or authorized person.

Notes

- Professionals: people who have experience in training or operating battery products and can understand the potential sources and magnitude of hazards in the process of installation, operation and maintenance of products;
- Trained personnel: the personnel who has received the corresponding technical training and has the necessary experience, can realize the risk that may be brought to him when performing an operation, and can take measures to minimize the risk to himself or other personnel;
- Operator: Operator who may come into contact with the product except trained personnel and professionals.

1.3 Electrical safety

Grounding Requirement

- For products that need to be grounded, protective ground wire must be installed first when installing; When disassembling the product, the protective ground wire must be removed finally;
- Do not damage the grounding conductor or the grounding hole of the product shell;
- Do not operate the product when the grounding conductor is not installed;
- This product shall be permanently connected to the protected area. Before operating the product, check the electrical connection of the product to ensure that the equipment has been reliably grounded.

General Requirements

Before electrical connection, ensure that the product is not damaged; otherwise, electric shock or fire may occur.

- Before the electrical connection, if it may encounter the energized area, it must disconnect the corresponding breaking device on the upper level of the product;
- Before electrical connection, ensure that the product is not damaged; otherwise, electric shock or fire may occur.
- Before connecting a power cable, ensure that the label on the power cable is correct.
- If the product has multiple inputs, disconnect all inputs and

perform operations on the device only after they are completely powered off.

Wiring Requirement

- The insulation layer may be aged or damaged if cables are used in a high temperature environment. Keep at least 30mm away from the heater or heat source area.
- Cables of the same type should be bundled together. Cables of different types should be routed at least 30mm apart. Do not intertwine or cross cables.
- Cables must be securely connected, properly insulated, and of appropriate specifications.

1.4 Installation environment requirements

The operation and service life of the battery system depend on the operating temperature. Install the battery system at a temperature equal to or better than the ambient temperature.

- The product should be installed in a dry and well-ventilated environment to ensure good heat dissipation;
- Avoid direct sunlight or rain, the surrounding environment is clean, there is no large amount of infrared radiation, organic solvents and corrosive gases;
- Installation position away from ignition sources, maintain a distance of 300mm from the heat source;
- Install in areas inaccessible to children;
- Installation location away from water sources such as taps, sewer pipes, sprinklers and other places to avoid water

infiltration;

- The product needs to be installed on a strong, flat support surface;
- Do not place inflammable and explosive materials around the product;
- Do not place the device in an environment with inflammable or explosive gas or smoke, and do not perform any operations in such environment.
- This product can be installed indoors or outdoors, indoor installation is suitable for non-residential space, outdoor installation is recommended to choose a sheltered location or build a sunshade.

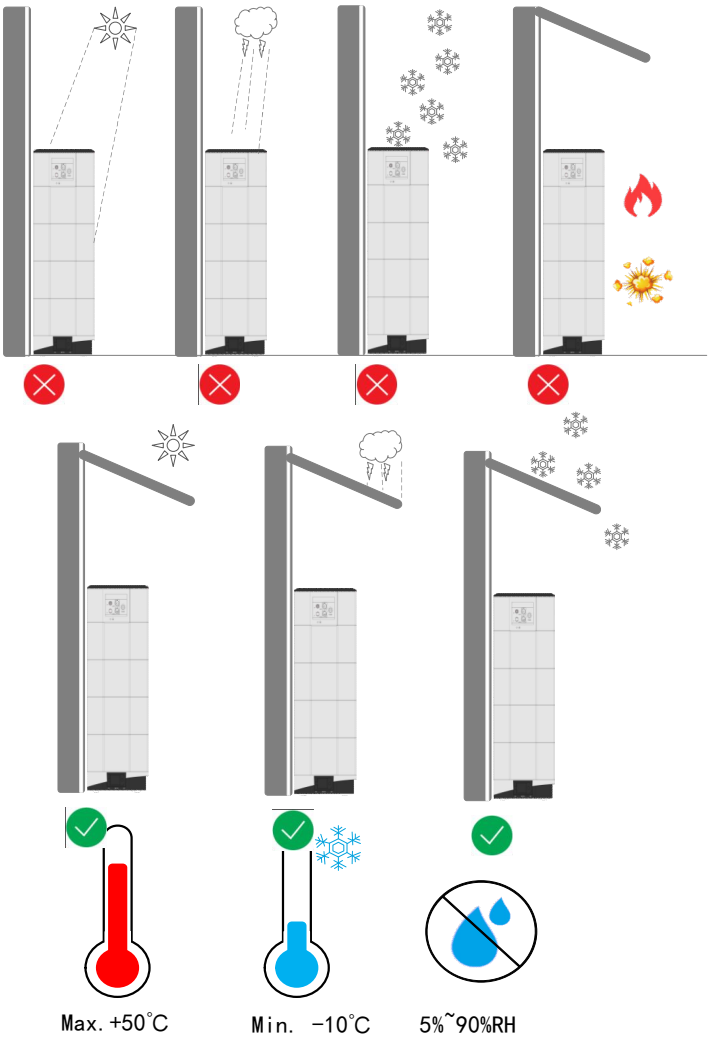


Figure 1-1 Installation environment diagram

1.5 Transportation requirements

By UN38.3 (UN38.3: Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria)and SN/T 0370.2-2009 "Inspection Procedures for

Packaging of Dangerous Goods for Export Part 2 Performance Inspection" certification (This product belongs to Class 9 dangerous goods).

The battery modules in the product (BCU and base do not require this certification) can be sent directly to the site, when meeting the requirements of vehicle, ship, etc. The shipping cases must have a dangerous package certificate and be securely packed. The outside of the cases should conform to international standards and be marked "Handle with care" and "Keep dry". Subject to external environment (such as temperature, transportation, storage, etc.), the product specifications are subject to the delivery date.

Avoid in transportation:

- Rain or snow directly drench or cover products or fall into water;
- Fall or mechanical impact;
- Inverted or tilted.

1.6 Machinery safety

Handling Safety

- When moving battery modules or other modules, prepare to bear heavy loads to avoid being crushed or sprained.
- Wear protective gloves when handling components of the product by hand to avoid injury; the battery module needs two people to carry.

Drilling Safety

Consider the following safety precautions when drilling holes on walls and ground:

- Wear safety goggles and protective gloves when drilling holes.

- During the drilling process, the product should be shielded to prevent debris from falling into the product. After drilling, the debris should be cleaned in time.

1.7 Debugging

When powering on the product for the first time, professionals must set parameters correctly. Incorrect Settings may cause the product to fail to run correctly or match with the inverter, affecting the normal operation of the device.

1.8 Maintenance and replacement

When the product is running, a high voltage may generate electric shocks, resulting in death, serious personal injury, or property damage. Therefore, before performing any maintenance work, power off the product and strictly follow the safety precautions listed in this manual and other related manuals.

- Please maintain the product under the condition that you are familiar with and understand the contents of this manual and have appropriate tools and testing devices;
- Before performing maintenance, power off the product and wait for the appropriate time according to the delay discharge label. Ensure that the product is powered off before performing any operation on the device.
- During the maintenance process, please try to avoid irrelevant personnel entering the maintenance site. Temporary warning signs or fences must be erected for isolation;
- If the product fails, please contact your dealer in time to deal with it;

- Power on the product only after the fault is rectified; otherwise, the fault may be extended or the product may be damaged.
- Do not open the cover plate without authorization, otherwise there will be a risk of electric shock, and the resulting failure is not covered by the warranty.
- Operation and maintenance personnel and professional and technical personnel shall be fully trained in safe use and product maintenance, and shall operate with adequate preventive measures and personal protective equipment;
- When moving or rewiring is required, the power input must be cut off. Wait 5 minutes for the internal energy discharge of the machine to be completed, and use a multimeter to confirm that there is no dangerous voltage in the parts of the output power interface and the parts in the machine to be repaired, and then start the maintenance.
- Maintenance of battery modules should be performed or supervised by personnel familiar with batteries and their required precautions;
- When replacing the battery module, please replace the battery module of the same model and report to Tecloman;
- Check immediately after the maintenance operation to ensure that no tools or other parts are missing in the product;
- If you do not use the product for a long time, you need to store batteries and recharge them according to this manual.

2 Product Description

2.1 Product introduction

Firefly Pro residential battery system is a high voltage storage battery developed by Tecloman specifically for home applications. The product is mainly composed of high safety, long life, environmental protection and pollution-free lithium iron phosphate cell and efficient suitable for the characteristics of lithium iron phosphate battery management unit, and according to the standard modular design, can be free to combine battery power according to the household load; It can match the inverter type used by mainstream manufacturers.

Function

Firefly Pro residential battery system consists of 3~8 battery modules, a BCU and a Base. The BCU is connected to the battery power and communication interface of the external inverter, and can store and release electric energy according to the requirements of the inverter management system. The output power port of this product is high voltage direct current.

- Battery charging: the PV or grid electric energy is stored in the battery after being changed by the inverter;
- Battery discharge: The electric energy stored in the battery is output to the load or fed into the grid after being changed by the inverter.

Model

Firefly Pro system model: Firefly Pro-HX (X can be 3, 4, 5, 6, 7, 8);

-- HX indicates that the system consists of X battery modules superimposed, and the corresponding power and voltage parameters are as follows:

Table 2-1Model Power and voltage parameters correspond table

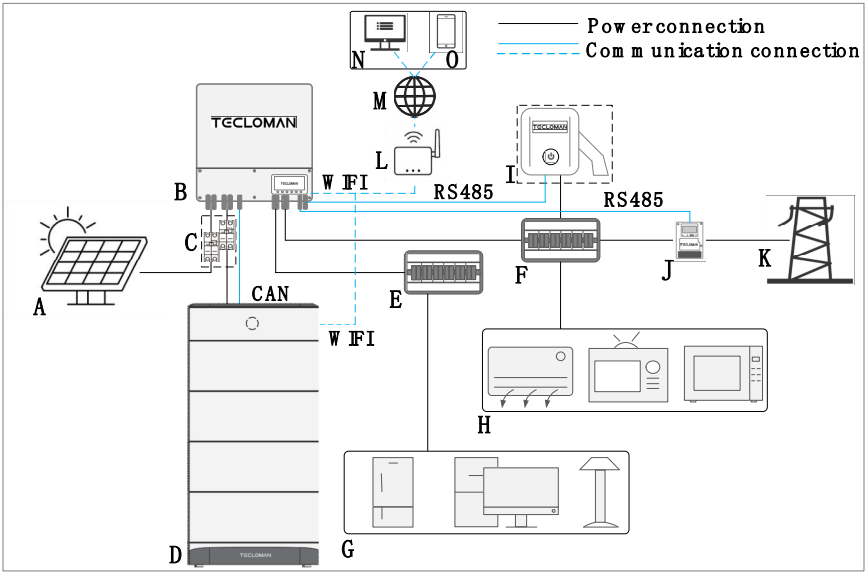
Model	Rated capacity	Nominal voltage	Remarks
H3	7.5kWh	153.6Vdc	
H4	10.0kWh	204.8Vdc	
H5	12.5kWh	256.0Vdc	
H6	15.0kWh	307.2Vdc	
H7	17.5kWh	358.4Vdc	
H8	20.0kWh	409.6Vdc	

Battery module in Firefly Pro: BH-2.5; Indicates that each module is 2.5kWh rated power, suitable for series high voltage use;

The BMS control unit and Base in Firefly Pro are referred to as BCU and Base.

Application Topology (common)

Firefly Pro residential battery system needs to be used with Hybrid inverter, PV string, power distribution unit, etc. It is often used for PV energy storage on-grid and off-grid systems in homes or small industrial and commercial buildings.



A: PV string	B: Hybrid inverter	C: DC switch
D: Firefly Pro	E: Essential load distribution board	F: General load distribution board
G: Essential load	H: General load	I: EV charger
J: Meter	K: Grid	L: Router
M: Internet	N: Tecloman cloud platform	O: Firefly App

Figure 2-1 Application topology (common)

Notes

- EV charger is optional and can be selected according to user's requirements. In this scenario, the communication function between EV charger and Hybrid inverter is only available for customized Hybrid inverter. For details, please consult Tecloman.
- Firefly Pro connects to the Internet via WIFI and wired;
- If the Hybrid inverter used for matching is Tecloman brand,

it can access Tecloman cloud platform; if it is a third-party manufacturer, it cannot access Tecloman cloud platform.

2.2 Appearance description

Battery System

Firefly Pro residential battery system overall appearance

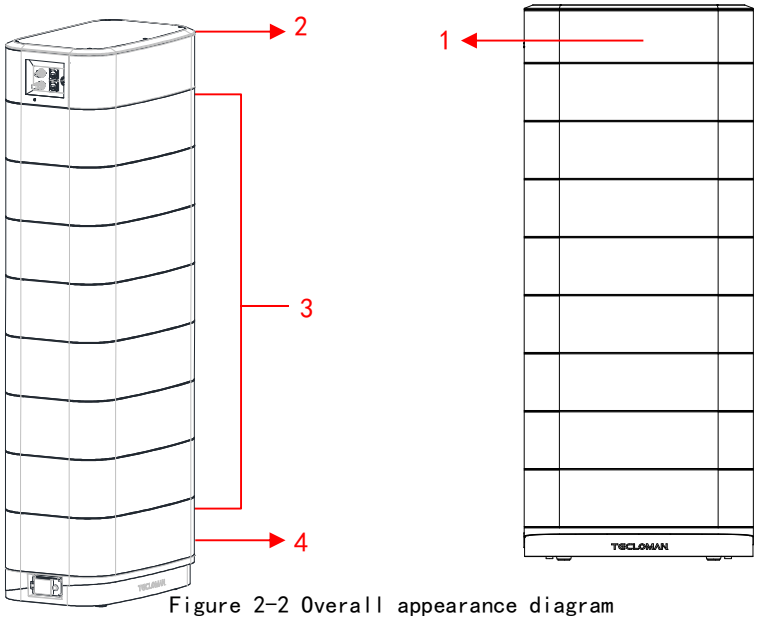


Figure 2-2 Overall appearance diagram

1: LED indicator ring (light transmission design and light by awakening, not awakened, the lamp ring does not appear) ;

2: BCU;

3: Battery module (Stacking layers range from 3 to 8) ;

4: Base;

BCU

BCU appearance and interface description.

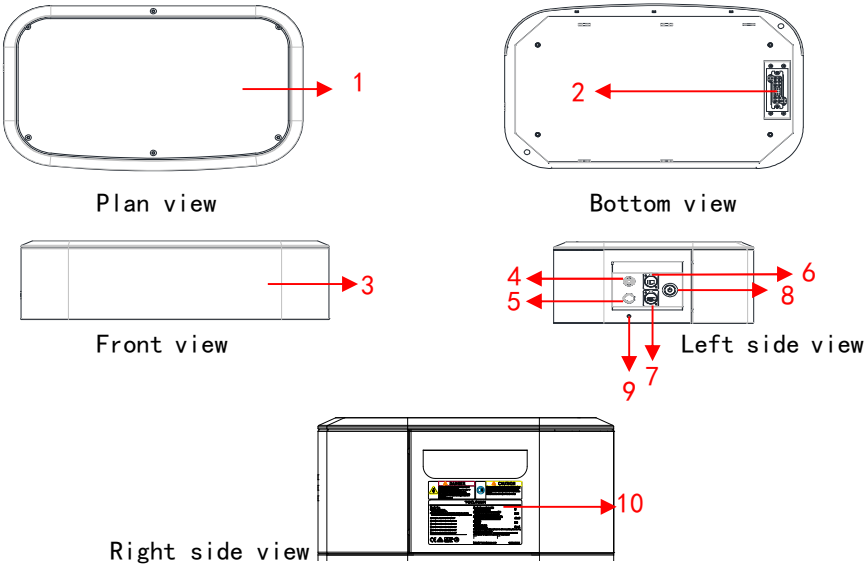


Figure 2-3 BCU appearance diagram

1: Top cover;

2: Internal downward plug interface for battery module;

3: Front cover (transparent parts, installed before delivery, do not need to be installed on site);

4: External positive power interface (identification: P+);

5: External negative power interface (identification: P-);

6: External communication interface 1 (identification: COM1);

7: External communication interface 2 (identification: COM2);

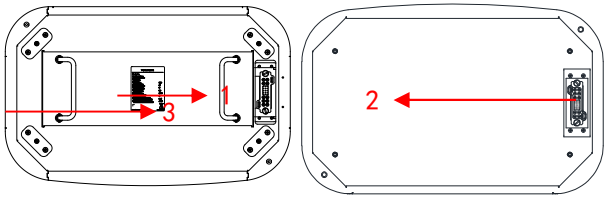
8: POWER button (identification: POWER);

9: Ground point (identification: ⏚);

10: Battery system nameplate and warning label.

Battery Module

Battery module appearance and interface description.



Plan view Bottom view

Figure 2-4 Battery module appearance diagram

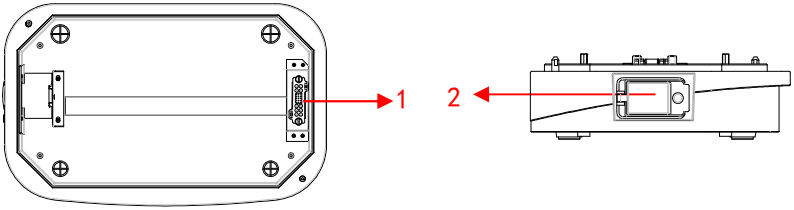
1: Internal upward connected to the BCU or upper battery module plug interface;

2: Internal downward connected to the base or the lower battery module plug interface;

3: Battery module nameplate.

Base

Base appearance and interface description.



Plan view Left side view

Figure 2-5 Base appearance diagram

1: Internal upward connected to the battery module plug interface;

2: DC SWITCH (identification: SWITCH);

2.3 Label description

Symbols on the System

Table 2-2 Symbols on the System

Number	Sign	Description
1	P+	Connect the battery side positive power cable port to the inverter

2	P-	Connect the battery side negative power cable port to the inverter
3	COM1	Communication cable port with inverter battery side & debugging port
4	COM2	Wired network interface
5	POWER	Power button, Power on/off & AP mode trigger
6	SWITCH	Battery DC switch, disconnect the product battery main circuit
7		Ground point
8		WEEE directive Do not dispose of the product with household waste. Dispose of the system according to the e-waste disposal regulations applicable at the installation site
7		CE mark The product complies with the requirements for the application of EU directives
9		TUV certification body logo
10		RCM(mark of compliance), brief guide to approval of electrical equipment in Australia

11	 Operation identification ● High voltage exists after the battery is powered on. All battery operations must be performed by qualified electrical technicians ● Ground the device before powering it on
12	 Check instruction manual identifier ● Remind the operator to check the product manual accompanying the battery system

Nameplate

Battery system nameplate (on BCU)

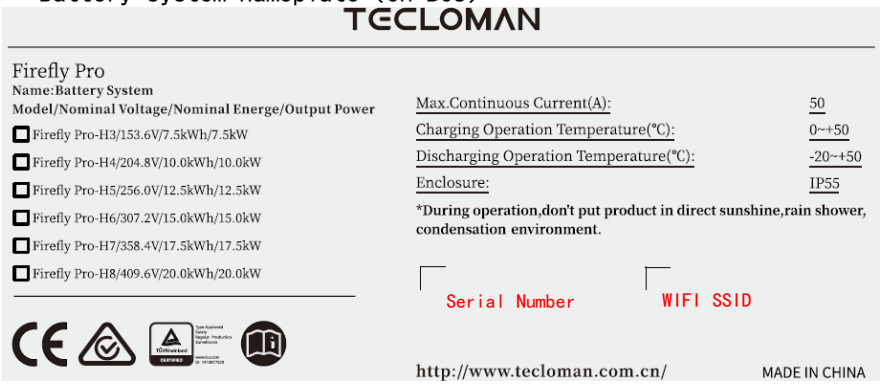


Figure 2-6 Battery system nameplate diagram

Battery module nameplate

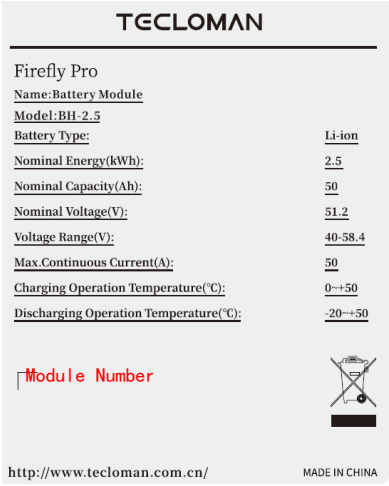


Figure 2-7 Battery module nameplate diagram

2.4 Product features

Multiple applications

- Support on-grid, off-grid scenarios;
- Support PV self-use, time-of-use electricity price, emergency backup power, virtual power plant and other working modes;
- Support indoor and outdoor installation.

Intelligent operation

- Equipped with intelligent BMS, real-time management system operation according to battery status, high-precision SOC, SOH calculation, battery module address adaptive, multi-layer battery module without address setting;
- Real-time communication with inverter, cooperative operation, compatible with multi-brand inverter. See "Tecloman _Firefly Pro residential battery system _ List of matching inverters" for details.

Safety, environmental protection, long life

- Use lithium iron phosphate cell, green environmental protection and pollution-free; The whole machine conforms to ROHS;
- Battery cycles > 6000@90%DOD/25℃/0.5C, 10 years warranty.

Convenient installation

- External power interface, communication interface are standard universal connectors;
- Product modular composition, using integrated blind plug connector, no cable installation;
- Single module weight < 35kg, two people can install;
- Common tools can be used to install, single battery system installation time < 15min.

Flexible extension

- The battery system supports power expansion and battery capacity expansion.

Maintenance friendly

- One button switch, support black-start;
- LED indicator ring status indicator, while mobile phone APP can be used to realize oncable monitoring;
- Use cloud data management system to realize the management and analysis of battery system anytime and anywhere;
- Supports oncable upgrade and fault diagnosis.

2.5 Operating state

Firefly Pro works in five states: Off, Precheck, Standby, Running, and Fault.

Table 2-3 Operating state definition table

Number	State	Description
1	Off	The battery system is powered off. The main circuit is disconnected.
2	Precheck	The battery system is powered on and the main loop is disconnected. Wait for the BMS to check the startup instruction, insulation, precharge, battery status, etc
3	Standby	The battery system starts normally, and the main loop is closed for charging and discharging.
4	Running	The communication with the inverter is normal. The main loop is closed to match the charging and discharging action of the inverter, and the charging and discharging limit is sent to the inverter according to the battery status.
5	Fault	A fault event is reported when the battery system is powered on and the main loop is disconnected. (Note: If the battery is seriously undervoltage, the battery system will power off to avoid battery damage due to continuous power depletion)

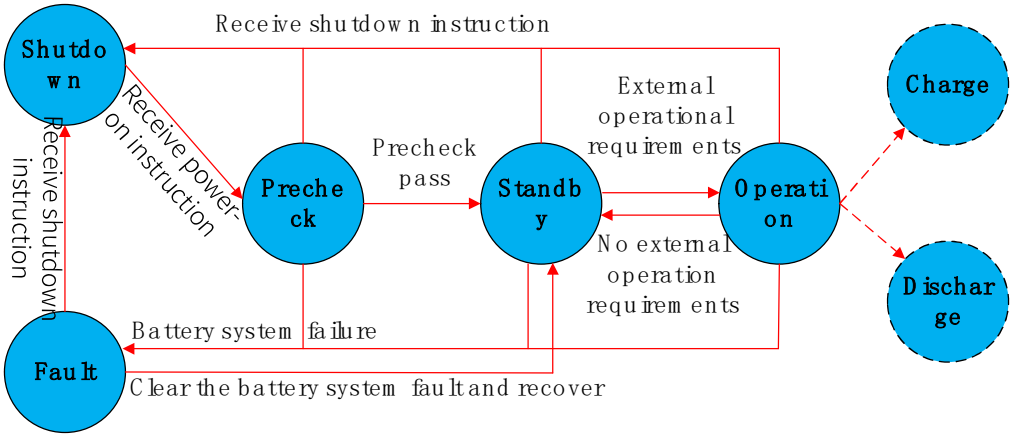


Figure 2-8 Product state logic diagram

3 Application Scenarios

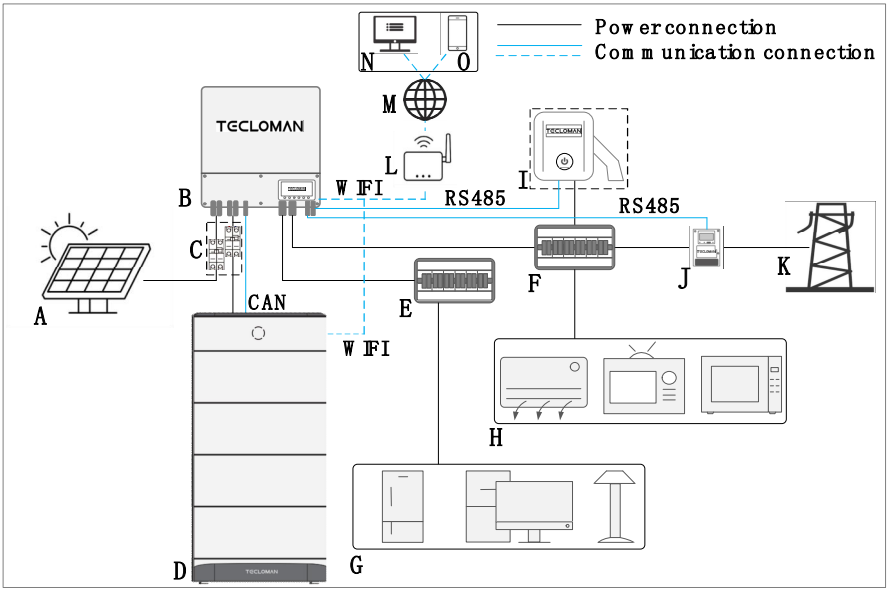
The Firefly Pro residential battery system is suitable for on-grid and off-grid PV energy storage systems in homes or small industrial and commercial buildings. Energy storage systems can be divided into two types according to different grid connections.

- On-grid system
- Off-grid system

3.1 On-grid system

Hybrid PV and energy storage on-grid system

Firefly Pro works with Hybrid inverter;



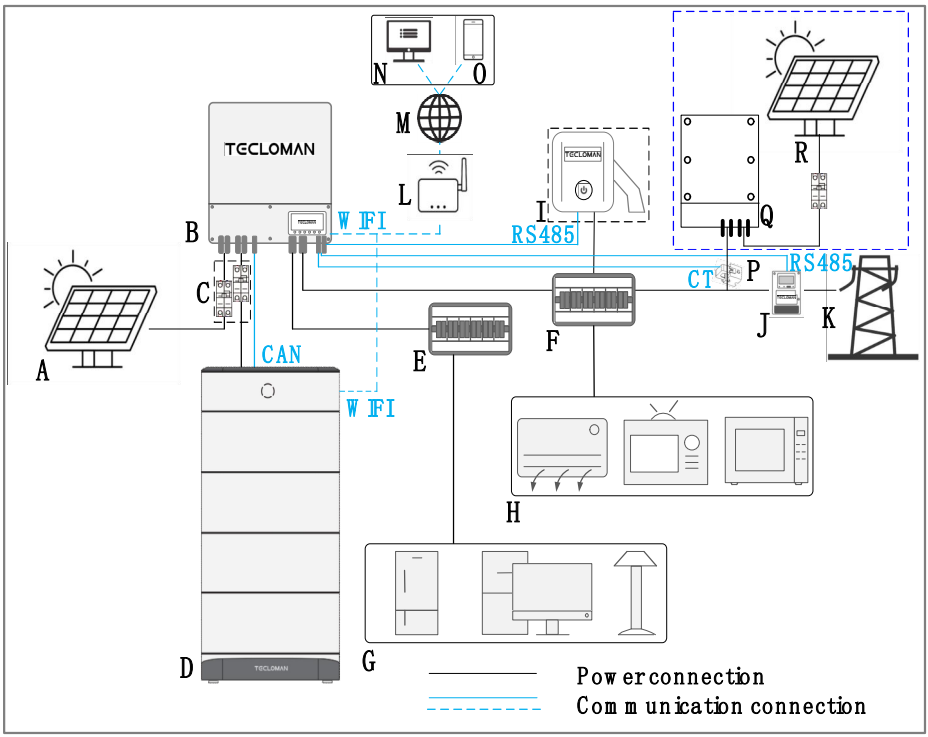
A: PV string	B: Hybrid inverter	C: DC switch
D: Firefly Pro	E: Essential load distribution board	F: General load distribution board
G: Essential load	H: General load	I: EV charger
J: Meter	K: Grid	L: Router
M: Internet	N: Tecloman cloud platform	O: Firefly App

Figure 3-1 Hybrid PV and energy storage on-grid system topology

Hybrid inverter is a new generation of inverters. It integrates power modules (MPPT, DC/DC, and DC/AC) commonly used in PV systems, which facilitates coordination among modules and simplifies installation and connection of terminals. This Hybrid PV + energy storage on-grid system is suitable for the first installation of PV energy storage scenarios.

Reformed PV and energy storage on-grid system

The Firefly Pro can be used in conjunction with the Hybrid inverter and PV inverter.



A: PV string
B: Hybrid inverter
C: DC switch
D: Firefly Pro
E: Essential load distribution board
F: General load distribution board

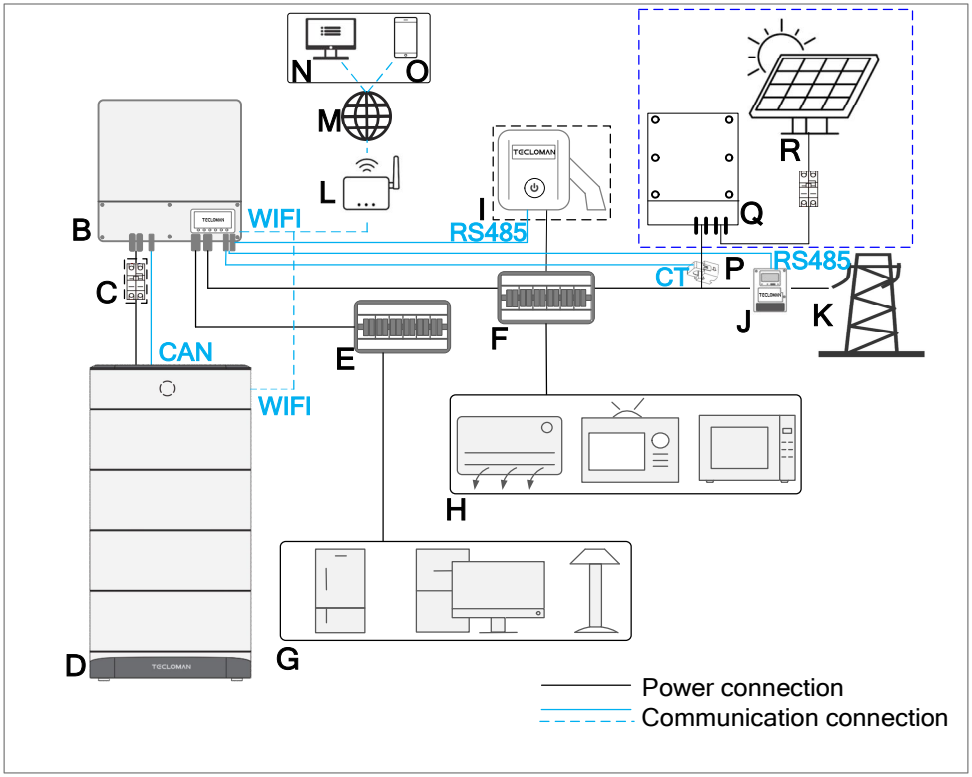
G: Essential load	H: General load	I: EV charger
J: Meter	K: Grid	L: Router
M: Internet	N: Tecloman cloud platform	O: Firefly App
P:CT(PV inverter generation current acquisition)	Q: PV inverter	R: PV string installed

Installed PV on-grid system

Figure 3-2 Reformed PV and energy storage on-grid system1 topology

The newly installed hybrid inverter is matched and connected with the installed PV inverter to meet the collaborative management of the power generation of the retrofitted PV and the installed PV; The modified PV and energy storage on-grid system is suitable for the scenario of increasing PV and energy storage after a small amount of PV has been installed.

Firefly Pro is used in conjunction with battery inverter and PV inverter.



A: PV string
B: Hybrid inverter
C: DC switch
D: Firefly Pro
E: Essential load distribution board
F: General load distribution board
G: Essential load
H: General load
I: EV charger
J: Meter
K: Grid
L: Router
M: Internet
N: Tecloman cloud platform
O: Firefly App
P:CT(PV inverter generation current acquisition)
Q: PV inverter
R: PV string installed

Installed PV on-grid system

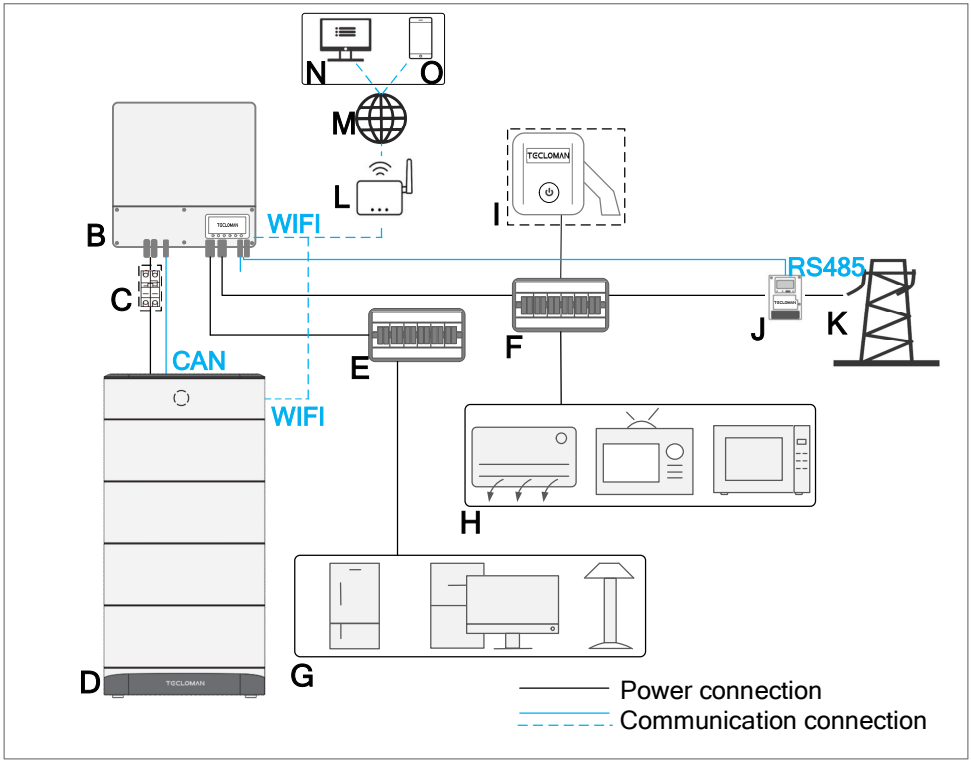
Figure 3-3 Retrofit PV and energy storage on-grid system 2 topology

The newly installed battery inverter matches and connects with the

installed PV inverter to meet the collaborative management of the new energy storage system and installed PV power generation. This reformed PV + energy storage on-grid system is suitable for scenarios where energy storage is increased after sufficient PV is installed.

Single energy storage on-grid system

Firefly Pro battery works with battery inverter;



	B: Hybrid inverter	C: DC switch
D: Firefly Pro	E: Essential load distribution board	F: General load distribution board
G: Essential load	H: General load	I: EV charger
J: Meter	K: Grid	L: Router
M: Internet	N: Tecloman cloud platform	O: Firefly App

Figure 3-4 Single energy storage on-grid system topology

This single energy storage on-grid system is suitable for scenarios where only energy storage is used as backup power.

Working mode of on-grid system description

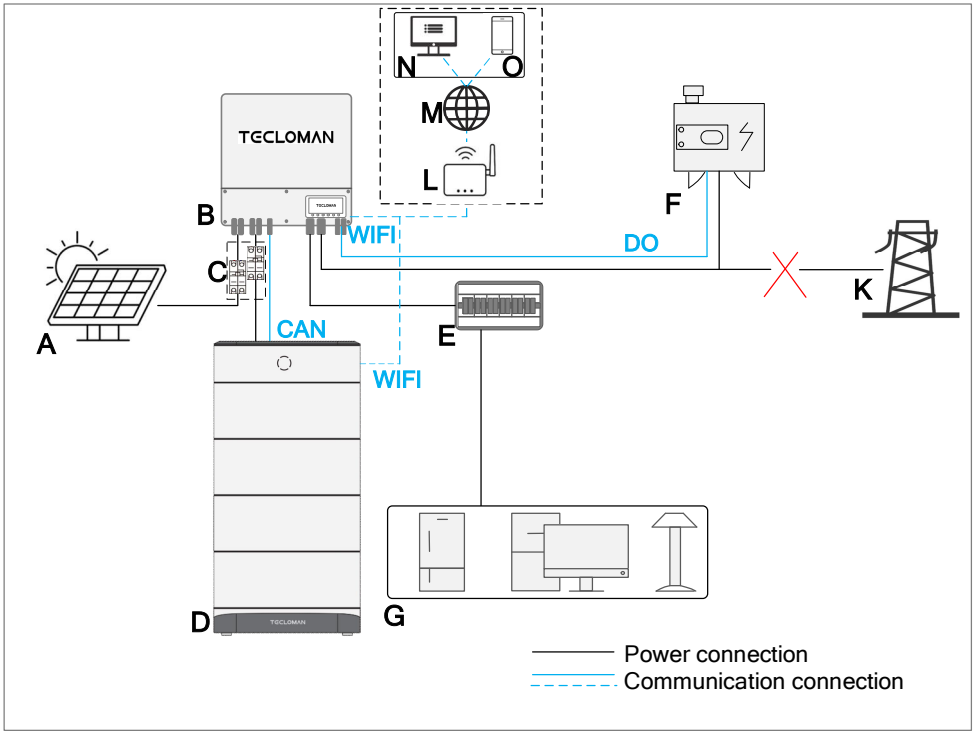
The on-grid optical storage system mainly has three working modes: self-generated self-use, time-of-use electricity price and emergency power backup.

All working modes are set in a Hybrid inverter or battery inverter. There is no need to set the Firefly Pro. The factory Settings can meet the above working modes of the optical storage system.

3.2 Off-grid system

Hybrid PV and energy storage off-grid system

The Firefly Pro battery can be used in conjunction with a Hybrid inverter or off-grid PV inverter.



A: PV string	B: Hybrid inverter	C: DC switch
D: Firefly Pro	E: Essential load distribution board	F: General load distribution board
G: Essential load	H: General load	I: EV charger
J: Meter	K: Grid	L: Router
M: Internet	N: Tecloman cloud platform	O: Firefly App

Figure 3-5 Hybrid PV and energy storage off-grid system topology

The Hybrid PV and energy storage off-grid system is applicable to the scenario of no grid or power failure.

4 System Installation

4.1 Pre-installation inspection

Outer packing inspection

Before opening the outer package of this product, check the outer package for visible damage, such as holes, cracks or other signs of possible internal damage, and check the product model number and product and module serial number. If there is any abnormal packaging or product model discrepancy, serial number missing, do not open, and contact your dealer as soon as possible.

Attachment check

After unpacking the stored product, please check whether the accessories are complete and complete and there is no obvious external damage. If anything is missing or damaged, contact your dealer.

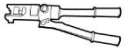
Notes

For details about the items and quantities of accessories delivered with the package, see the "Packing List" on the packing box.

4.2 Installation tools

Table 4-1 Installation tools list

Kind	Tools			
Installation	 Tape measure	 Gradienter	 Sleeve	 Screwdriver

	 Rubber hammer	 Wire cutters	 Network port crimping pliers	 Cord-press terminal crimping pliers
	 Hydraulic pliers	 Multimeter	 Pen	 Drill
Individual protection	 Insulating gloves	 Dust mask	 Goggle	 Safety shoe

4.3 Installation site

Basic requirements

- Do not install in areas where flammable and explosive materials are stored.
- This product installation is subject to corrosion in salt-affected region, may cause a fire, please do not in salt-affected outdoor installation. Salt-affected areas are those within 500m of the coast or affected by sea breezes. The area affected by sea breeze varies according to meteorological conditions (e.g. typhoon, seasonal winds) or topography with dykes, hills);
- Do not install in a position accessible to children;

Installation method

This product is installed on the ground, and the installation ground requirements are as follows:

- Should be smooth, no pits, sloping slope, water, etc.;
- It should be hard ground, with certain bearing capacity, bearing capacity > 300kg;

Installation space

When installing the product, reserve a certain space to ensure sufficient space for installation.

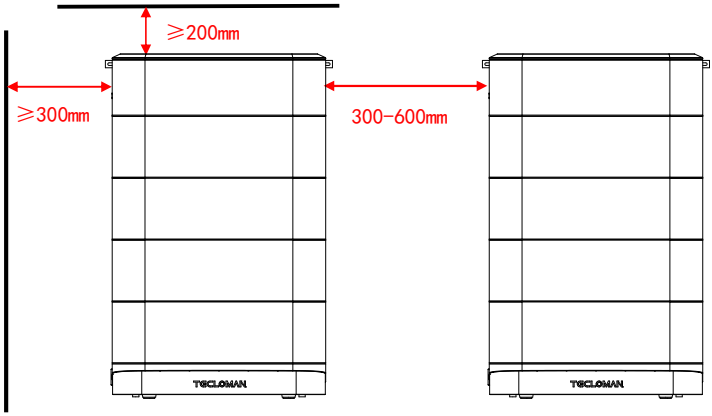


Figure 4-1 Installation reserved space diagram

4.4 Product installation

Installation notice

Before installation, estimate whether the installation space size meets the product size and reserved space size. The product size is as follows:

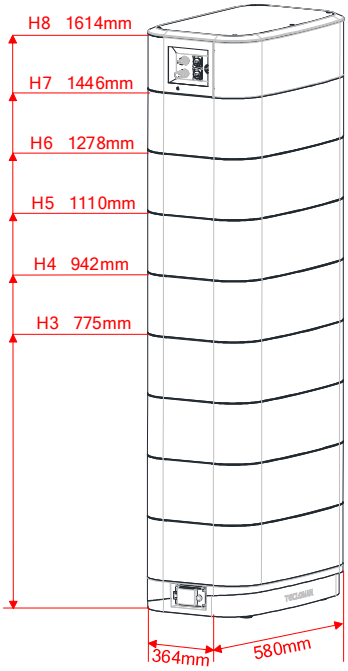


Figure 4-2 Product dimension diagram

Installation Steps

Step 1 Open the BCU + Base packing carton, take out the BCU + Base, and separate the BCU and Base; (There is no fixing between the BCU and the Base, it can be taken out directly from the top).

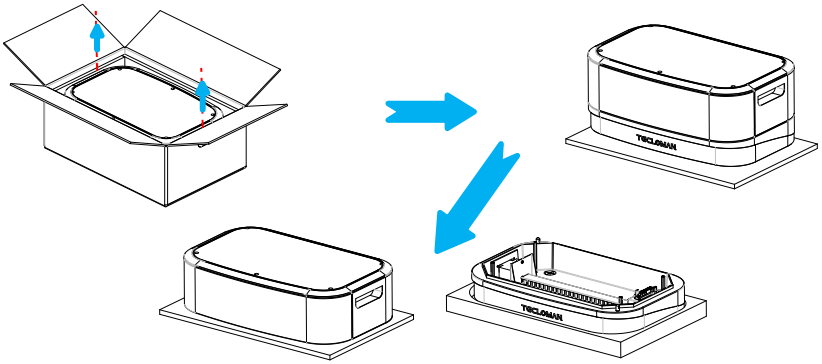


Figure 4-3 BCU and Base unpacking diagram

Step 2 Place the Base on the horizontal ground, the rear edge of the base is 15mm～30mm away from the wall surface, and confirm that the DC switch on the left side of the base is OFF;

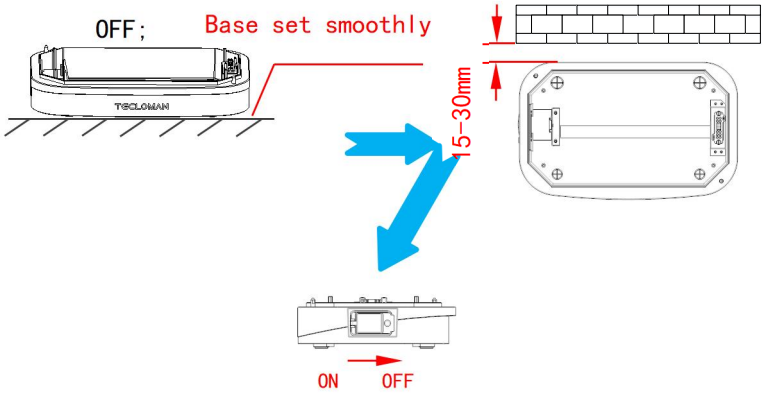


Figure 4-4 Base placement diagram

Step 3 Open the battery module packing carton, take out the battery module and put it on the base, pay attention to the orientation of the module, and ensure that the battery module and the base are inserted on the same side;

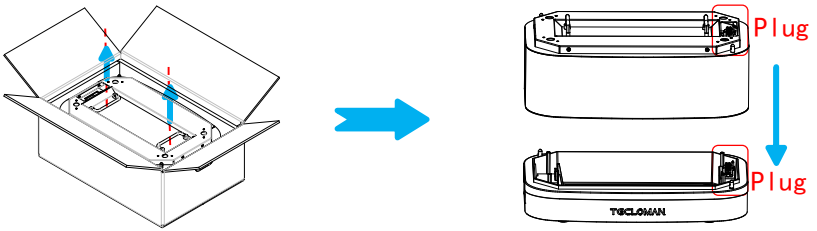


Figure 4-5 Battery module unpacking and placement diagram

Step 4 To secure the battery module and base, keep the screwdriver vertically downward, tighten the bolts clockwise, and rotate the handles on both sides toward the center to lay them flat.

Take out the pad and screw in the battery module accessories, and fix them on the four corners of the battery module upper cover with a screwdriver;

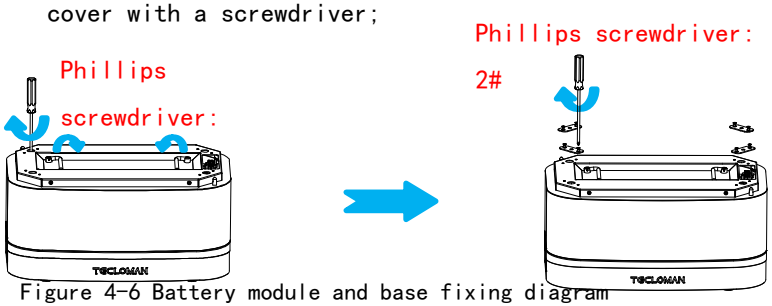


Figure 4-6 Battery module and base fixing diagram

Step 5 Repeat steps 3 and 4 for other battery modules to place them on the first battery module from bottom to top and secure them.

Warning

For each battery module, secure it to the lower module and install the four corner gaskets and screws before installing the next battery module.

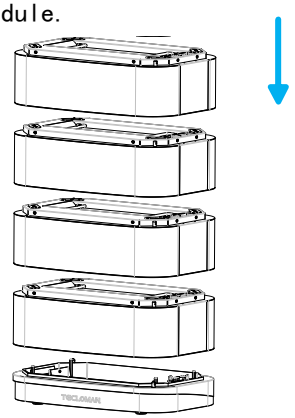


Figure 4-7 Schematic diagram of placement and fixing of multiple battery modules

Step 6 Take off the BCU top cover (BCU top cover is not fixed, directly from the top can be taken out);

Take out the wall drawing part 1*2pcs and screws (Phillips-M4*8) *4pcs in the attachment of the BCU and install the wall drawing part at the back of the BCU;

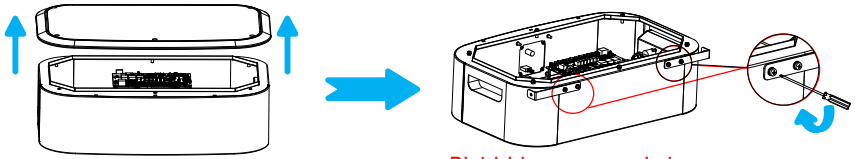


Figure 4-8 BCU cover removal and installation of wall structure 1 Schematic diagram

Step 7 Place the BCU with the top cover removed and the back draw wall structure 1 installed on the installed battery module.

Pay attention to the orientation of the module to ensure that the blind insert of the BCU and battery module are on the same side;

Secure the BCU and battery module. Keep the screwdriver vertically downward and tighten the bolts clockwise.

Cover the top of the BCU, and lock the top with screws (Phillips-M4*8) *6pcs;

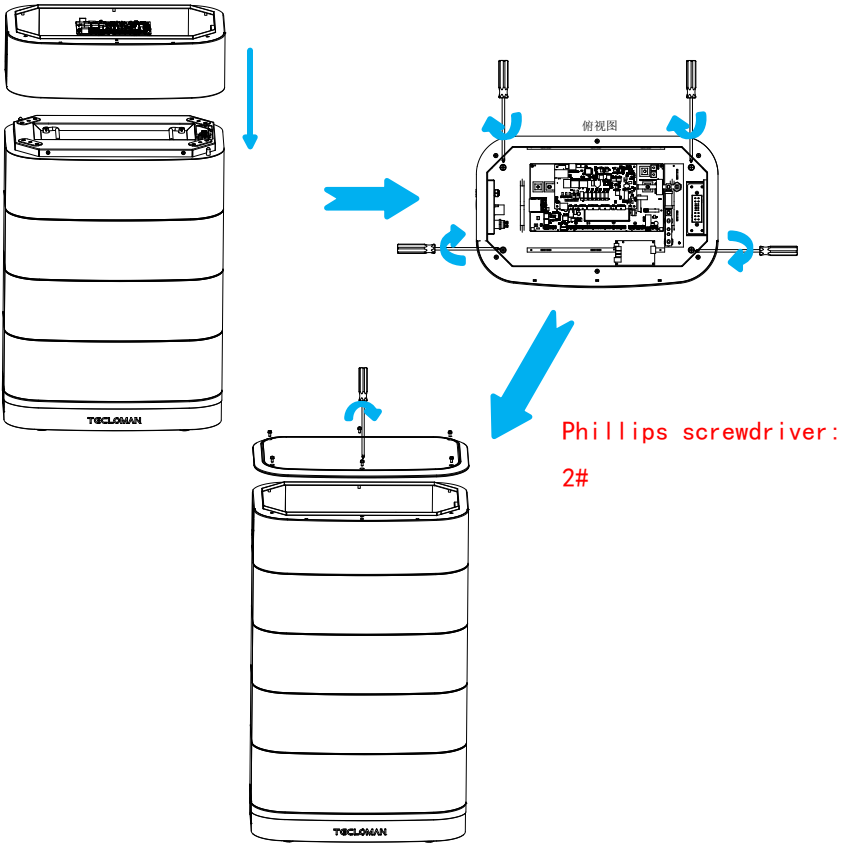


Figure 4-9 BCU placement and fixing and capping with battery module schematic diagram

Step 8 Preinstall the wall retaining structure 2*2pcs on the wall retaining structure 1 already installed in the BCU with screws (M5*15)*2pcs, and install the left and right sides;

Adjust structural 2 to ensure contact with the wall, and use a pen to make the hole position fixed between structural 2 and the wall;

Drill holes in the recorded holes (φ10) with an electric drill;

Install expansion screws (M16*75)*2pcs and secure them.

Warning

The BCU must be fixed on the wall to prevent the battery system from tipping over and causing damage

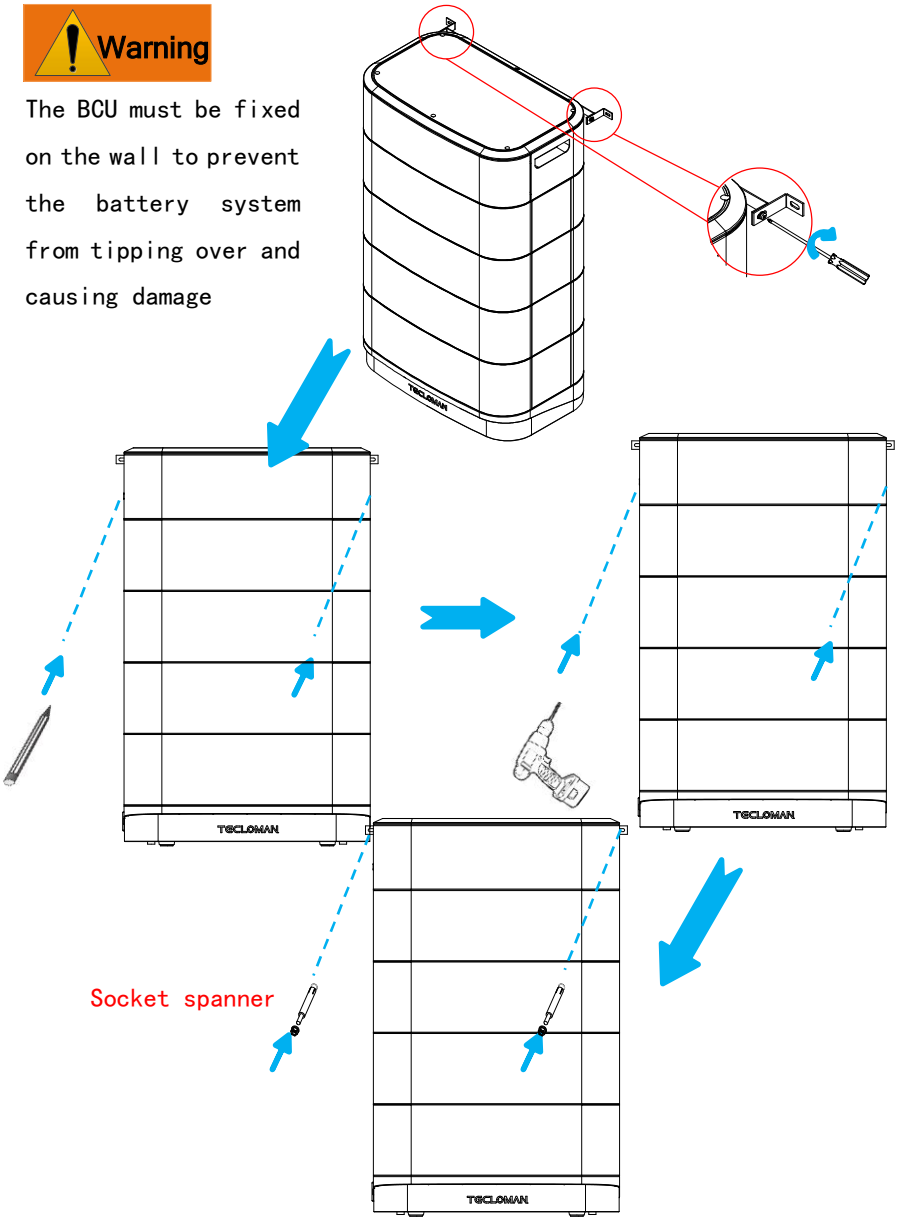


Figure 4-10 BMS control box wall fastening schematic diagram

5 Electrical Connection

Announcements

Before electrical connection, ensure that the SWITCH of the Base and all external switches connected to the battery system are in the OFF state. Otherwise, the high voltage of the battery system may cause shock hazard.

- Product damage caused by incorrect wiring is not within the scope of product warranty;
- The operation related to electrical connection must be carried out by professional electrical technicians;
- When making electrical connections, the operator must wear personal protective equipment.

Notes

The cable colors in the electrical connection diagrams in this section are for reference only. The cables must comply with the local cable standards (yellow and green cables can be used only for grounding protection).

5.1 Single battery system connection

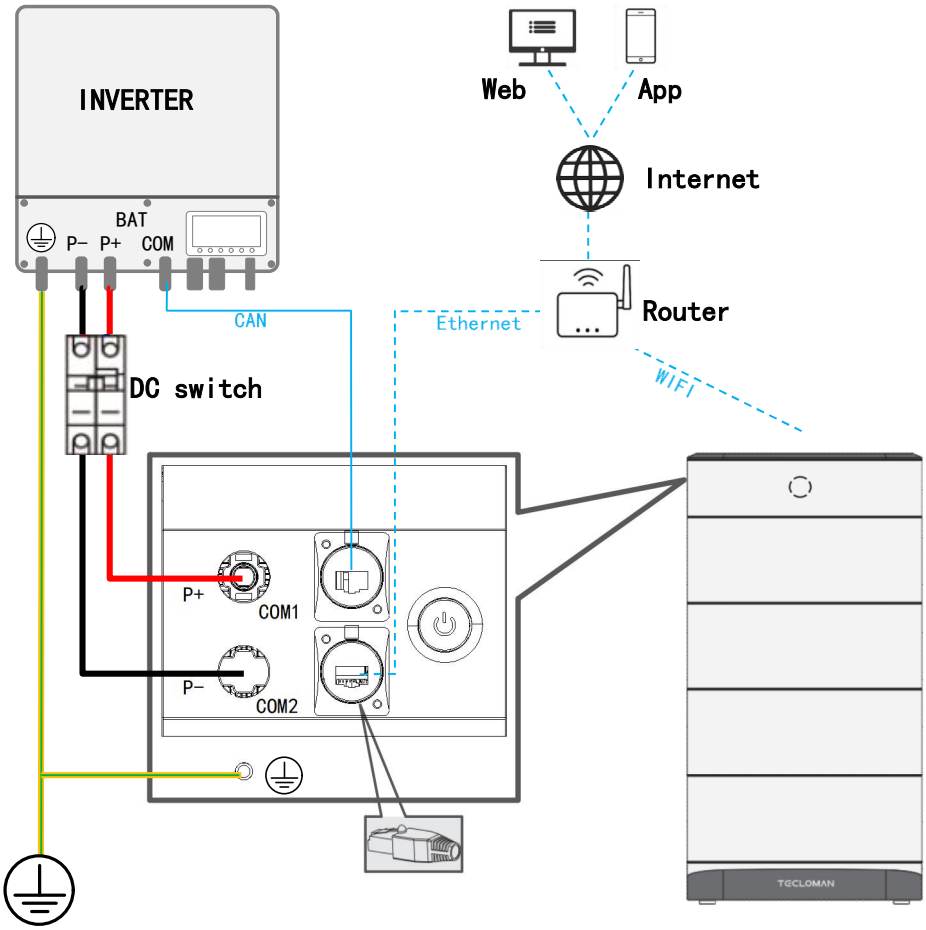


Figure 5-1 Single battery system connection diagram

5.2 Parallel connection of multiple battery systems (optional)

When used in parallel, note the following:

- A maximum of three battery systems can be connected in parallel,

  and each parallel battery system must have the same number of battery module layers, that is, the same specification and

model.

- The parallel battery system should be as much as possible to ensure that the battery system produced in the same batch;
- In parallel connection, the SOC of each battery system should be the same as far as possible (difference < 5%). If the difference is too large, the parallel strategy will be automatically implemented when the parallel machine starts for the first time, and the corresponding power and electricity after the parallel machine cannot be timely output. For details, consult Tecloman;
- Parallel boxes need to consult Tecloman to purchase separately.

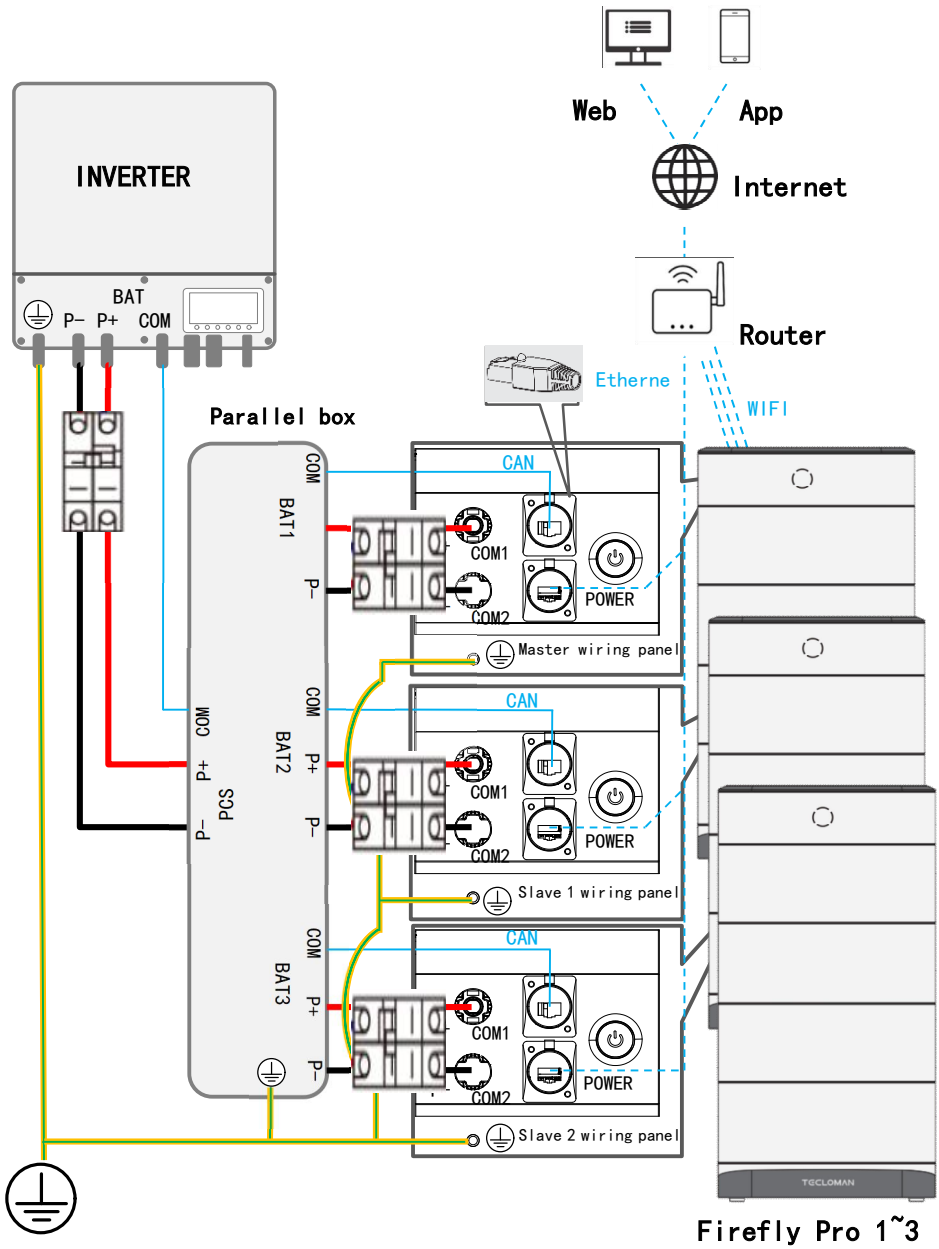


Figure 5-2 Parallel multiple battery system diagram

5.3 Connecting cable preparation

Table 5-1 System connection cables preparation table

No.	Cable		Type	Specifications (recommended)	Source
Single battery system					
1	Power cable (Battery-DC switch)		Universal energy storage cable	8AWG/black&red	Product delivery
2	Power cable (DC switch-inverter)		Universal energy storage cable	8AWG/black&red	Customer owned
3	Communication cable (Battery – inverter)	The definition and form of the interfaces on both ends are the same	Universal shielded 8-core network cable	——	Product delivery
		The definition or form of the interface on both ends are different	Make shielded 8-core network cables onsite	——	Customer owned
4	Communication cable, when choosing a wired network connection (Battery-router)		Universal shielded 8-core network cable	——	Customer owned
5	Ground cable		Yellow green ground cable	10mm²	Customer owned
Parallel battery system					
1	Power cable (Battery-parallel box)		Universal energy storage cable	8AWG/black&red	Product delivery
2	Power cable (Parallel box-DC switch) (Inverter-DC switch)		Universal energy storage cable	8AWG~1AWG According to inverter power	Customer owned
3	DC Connector		——	Accessories of paralell box	Product delivery
4	Communication cable (Battery-parallel box)		Universal shielded 8-core network cable	——	Product delivery

5	Communication cable (Parallel box-inverter)	Universal shielded 8-core network cable	——	Customer owned
6	Ground cable	Yellow-green ground cable	10mm²	Customer owned

5.4 DC switch preparation (Recommended)

Table 5-2 The battery system and the inverter connecting recommended table

Number	Specification	Quantity	Source
Single battery system			
1	Working voltage≥500Vdc; Working current 63A; 2P	1PCS	Customer owned
Parallel battery system			
1	Working voltage ≥ 500Vdc ; Working current 63A 2P; (N is the number of parallel machines)	1+N PCS	Customer owned
Note: In the Oceania region, DC switch must be configured.			

5.5 Mounting power cable

Single battery system

Take out the power cable of the battery system, insert one end of the crimped quick-plug connector into the installed power cable interface of the battery system (P+, P-), and the other end of the cable crimp the corresponding cable terminal and connect it to the DC switch according to the on-site DC switch (on/off between the inverter and the battery). Connect the other side of the DC switch to the battery port of the inverter using a cable of the same specifications.

Notice

- After the end of the quick-plug connector is inserted into the

positive and negative connectors of the product, pull back the DC input wire does not fall off, indicating that it is stuck in place;

- The other end of the power cable is reserved bare wire, which shall be crimped according to the on-site connection;
- For details about the battery power port of the inverter, see the inverter manual.

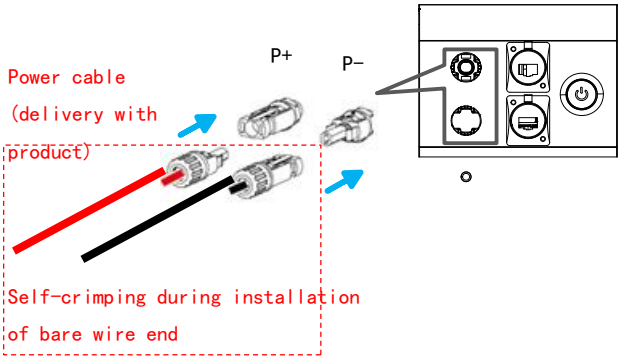


Figure 5-3 Single battery system power cable connection diagram

Multiple battery system parallel

Take out the power cable of each battery system, insert one end of the crimped quick-plug connector into the installed power cable interface of the battery system (P+, P-), and crimp the other end of the cable into the accessory terminal provided by the parallel box and connect it to the power interface of the battery side of the parallel box. The connection between the power interface of the inverter side and the battery interface of the inverter is determined according to the actual situation and the cable type and terminal crimping and connection.

Notice

The power connection between the parallel box and the inverter should

consider the maximum running current of the parallel system to ensure that the self-provided cable is suitable.

5.6 Communication cable installation

Single battery system

Take out the communication cable delivered with the battery system and insert one end into the installed battery system power communication port (COM1) and the other end into the inverter battery communication port.

Notice

- Both ends of the communication cable are standard RJ45 plugs with the same pin definition.
- If the battery communication port on the inverter is not the standard RJ45 network port and pin definition are different from those on the battery side, change the inverter communication cable based on the inverter definition onsite.

Multiple battery system parallel

Take out the communication cables of each battery system, insert one end into the installed battery system power communication interface (COM1), and the other end into the parallel box battery communication interface; The parallel box inverter communication port is connected to the inverter battery communication port.

Notice

- The parallel box battery communication port and inverter communication port are standard RJ45 network ports with the same pin definition as the battery system communication port.
- If the battery communication port on the inverter is not the standard RJ45 network port and pin definition are different

from those on the battery side, change the inverter communication cable based on the inverter definition onsite.

5.7 Ground installation

Announcements

Danger

Ensure that the ground cable is securely connected. If it is not connected or loose, electric shock may occur.

Notes

After installing the ground cable, you are advised to apply silicone gel or paint to the ground terminal for protection.

Crimp one end of the yellow-green ground cable to the OT terminal of the accessory, and use an accessory screw to lock the ground cable with OT terminal to the ground point of the BCU of the battery system, and connect the other end to the external ground point based on site conditions.

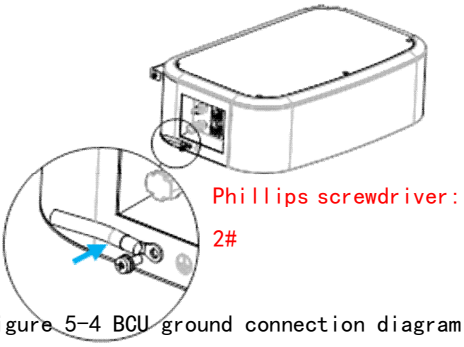


Figure 5-4 BCU ground connection diagram

6 System Debugging

6.1 Power-on precheck

Table 6-1 Battery system checklist before power-on

Number	Inspection item	Acceptance standard
1	Battery system installed in place	Install correctly and firmly
2	The installation environment meets requirements	The installation space is reasonable, the environment is clean and tidy, and there is no construction residue
3	Cable connection in place	Power cable and communication cable are connected correctly and firmly
3	Reliable grounding	The ground cable is connected correctly and firmly
4	Disconnect switch	The base "SWITCH" and all switches connected to the energy storage are in the "OFF" state
5	Connect cables properly	The cable layout is reasonable and meets customer requirements

6.2 System power-on

Notice

First turn on the DC switch between the inverter and the battery system power connection, and then power on the battery system; for details about how to power on an inverter, see the corresponding quick guide.

Turn the "SWITCH" of the base to ON, long press the POWER button until its button indicator is steady on, and release it. After the battery system is powered on for the first time, the LED light ring on the front of the BCU will light up.

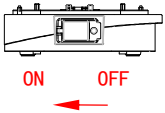


Figure 6-1 Base switch closure diagram

Lamp indication

Table 6-2 Battery system light display instruction table

Number	Classification		State		Definition
1	Power button indicator light		Normally on		System power-on
2			Normally off		System off
3			Button flashing		The system is in AP network distribution mode
3	LED lamp ring	SOC indication (static)		4 segments white glow	75%＜SOC≤100%
4				3 segments white glow	50%＜SOC≤75%
5				2 segments white glow	25%＜SOC≤50%
6				1 segment white glow	10%≤SOC≤25%
7				1 segment orange glow	SOC＜10%
8		Running indication (Dynamic)	On the basis of the SOC value corresponding to the constant light ring, the unlit light ring is turned		Charge

			on successively in the counterclockwise direction until the four segments are fully lit and then extinguished, and then the process is repeated	
9			On the basis of the SOC value corresponding to the constant light ring, the lighted light ring is turned off in a clockwise direction until all four segments are turned off, and then the process is repeated	Discharge
10			Light ring stroboscopic, 0.5s frequency	Fault

Notice

LED light ring has hibernation energy-saving design, it will automatically turn off after 30 seconds of steady light; After hibernation, it can be triggered again by radar. The triggering mode is that objects move within 20cm directly in front of the BCU.

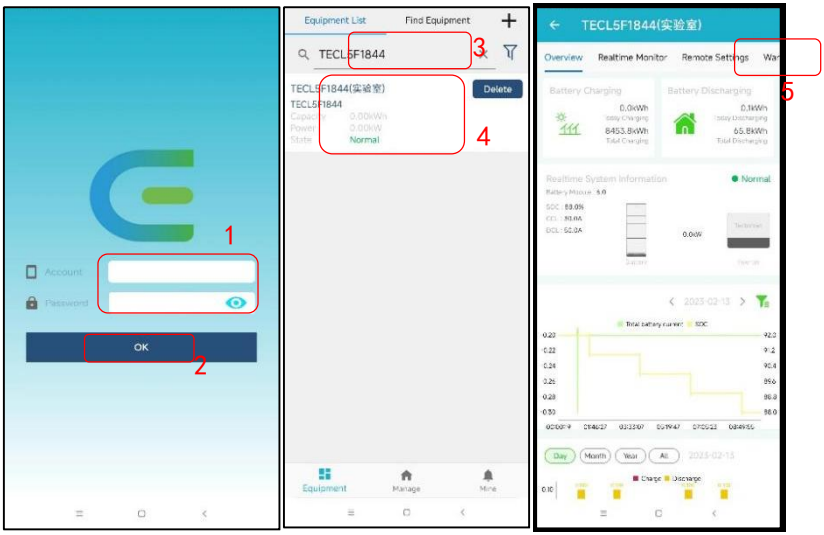
6.3 Battery system commissioning

Download and install the Firefly App first

Download and install the latest version of the Firefly App by referring to the Firefly App Quick Guide. You can register an account and perform operations such as network configuration, commissioning, monitoring, and upgrading of the battery system. You can obtain the Firefly App Quick Guide by scanning the QR code.

Set the number of battery module layers

This battery system BMS factory default management of battery modules number is 4 layers; If the number of modules installed onsite is not 4 layers, you need to set the number of battery modules through the App. The detailed setting procedure is as follows:



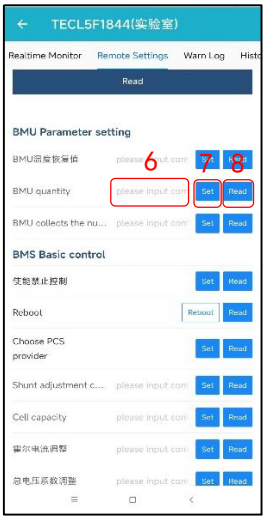


Figure 6-3 Battery modules layers settings procedure

1. Open Firefly App, enter account & password;
2. Click "OK" to log in the App;
3. Enter the installed product WIFI SSID to be set and click search;
4. Click the corresponding product to enter the product main monitoring interface;
5. Click "Remote Settings" to enter the product parameter setting interface;
6. Enter the number of battery module installation layers in the blank area behind "BMU quantity", for example, 5, 6, 7, 8, etc.
7. Click the "Set" button, and click again to ensure that the filling is successful;
8. Click "Read" to check whether the value displayed in the blank is the set value. If yes, the setting is successful.

Set the inverter brand

The factory default matching inverter brand of the BMS of this battery system is Tecloman self-branded inverter; If a third-party brand inverter is installed on site, you need to set the brand of the inverter through the App.

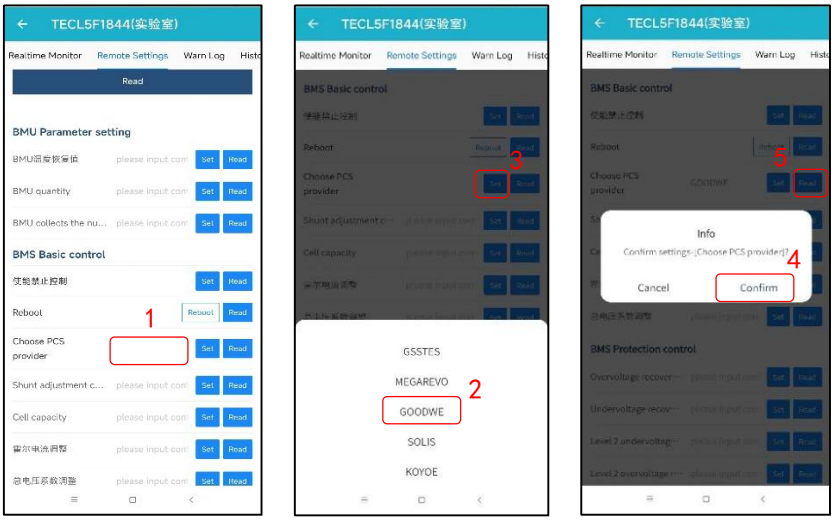


Figure 6-4 Setting the inverter brand for the battery system schematic diagram

Inverter brand setting item is also in the product parameter setting interface, enter the steps refer to the above;

1. Click "Choose PCS provider";
2. In the inverter brand list that is displayed, select the inverter brand to be installed, for example, GOODWE.
3. Click "Set" behind this parameter item;
4. Click "Confirm" in the pop-up window;
5. Click "Read" to check whether the inverter brand displayed in the blank is the set brand. If yes, the set is successful.

7 System Maintenance

7.1 System power-off

Announcements

When the energy storage system is running, only turning off the DC switch of the energy storage cannot completely power off the system. Therefore, the energy storage cannot be maintained.

Power-off procedure

Step 1 Long press the POWER button of the battery system until its button indicator is off to shut down the battery system;

Step 2 Disconnect the DC switch between the inverter and battery;

Step 3 Set the SWITCH of the Base to OFF.

7.2 Routine maintenance

To ensure the long-term running of the energy storage system, you are advised to perform routine maintenance according to this section.

Power off the system during system cleaning, electrical connection, and grounding reliability maintenance.

Table 7-1 Maintenance checklist

Examination content	Examination method	Maintenance period
System cleaning	Check the system interface regularly for blockage and dust blockage	Once every six months to once a

		year
System running state	Observe whether the appearance of the system is damaged or deformed; Listen to the system in the process of operation whether there is abnormal sound; Check whether battery parameters are correctly set when the system is running	Once every 3 months
Electrical connection	Check whether the cable connection is loose. Check whether the cable is damaged, especially whether the skin where the cable is in contact with the metal surface is cut. Check whether the waterproof cover of the unused COM port is in the correct state	3 months after each commissioning, and once every six months to a year thereafter
Reliable grounding	Check whether the ground cable is grounded reliably.	3 months after each commissioning, and once every six months to a year thereafter

7.3 Fault alarm handling

Fault alarm severities are defined as follows:

- Failure: The battery system fails, causing the battery system to stop or power off;
- Alarm: The rated operation of the battery system is affected by external conditions or does not respond to the operation of the inverter.

Fault alarm events can be viewed in real time through the App.

Table 7-2 Fault alarm definition table

Event name	Level	Cause	Handling suggestion
Battery	Fault	No protective charging action	Check the inverter

severely under voltage		for a long time after battery undervoltage;	and battery communication and power connection; Check whether the inverter is normal; Check whether the power grid or PV is without power for a long time;
Battery sampling disconnected	Fault	Internal sampling harness or BMS acquisition module is damaged;	Replace corresponding battery module;
Acquisition module connection disconnected	Fault	The number of BMUs is incorrectly set; Internal communication wiring harness or BMS acquisition module is damaged;	Check the number of BMU Settings using the App. Replace corresponding battery module;
The voltage difference between battery modules is too large	Fault	The voltage difference between battery modules is greater than 3V;	Check and measure the voltage between modules; When configuring batteries, the voltage difference of each battery should be less than 0.5V;
Battery overcurrent	Fault	The battery current exceeds the set value or current limit;	1. Check the parameters of the BCU; 2. Whether the communication

			between the BMS and the inverter is normal, and whether the corresponding setting of the BMS and the inverter is correct;
SOC jump variation	Fault	1. Calibration problems occur when SOC is installed for the first time; 2. The SOC calibration problem occurs after the BMS box or battery is replaced; 3. The battery is faulty;	1. After the initial installation, the SOC can be calibrated only after a complete charge and discharge of the battery system; 2. After replacing the BCU or battery, complete charge and discharge of the battery system, and then calibrate the SOC; 3. If after a complete charge and discharge, the battery will reach 100% as soon as it is charged and 10% as soon as it is discharged, there is a problem with a battery module and it needs to be replaced;

The battery fails to communicate with the inverter	Fault	1. The battery system is not started; 2. The inverter brand on the BCU is incorrectly set or the battery type on the inverter is incorrect; 3. The communication cable is incorrect;	1. Check whether the BCU is powered on properly; 2. Check the Settings on the BCU and inverter by App; 3. Check the communication cables;

7.4 Battery storage and recharge

Battery storage requirements

1. When storing batteries, place them according to the label on the packing case. Do not place them upside down or on the side.
2. When stacking battery packing cases, comply with the stacking requirements on the outer packaging.
3. Handle the batteries with care. Do not damage the batteries.
4. Storage environment requirements:

- Ambient temperature: -10℃～55℃, Recommended storage temperature: 20℃～30℃;
- Relative humidity: 5%RH～80%RH;
- Dry, ventilated, clean;
- Avoid contact with corrosive organic solvents, gases and other substances;
- Avoid direct sunlight;
- The distance from the heat source should not be less than two meters.

5. The battery must be disconnected from external storage.
6. Battery storage statistics should be collected monthly. For batteries whose storage time is close to 15 months (-10℃ ~ 25℃),

9 months (25℃ ~ 35℃) or 6 months (35℃ ~ 55℃), supplementary electricity should be arranged in time.

7. When shipping stored batteries, the principle of first in first out should be followed;
8. After the battery production test is completed, at least 50% SOC should be replenished before storage.

Expired storage criteria

In principle, it is not recommended to store batteries for a long period of time. Dispose the stored batteries as follows.

Table 7-3 Battery recharge period description table

Storage temperature requirement	Actual storage temperature	Recharge period	Remark
-10℃~55℃	≤-10℃	Not allowed	Recharge period: No need to handle, use as soon as possible Supplementary power time: The total storage time of supplementary power processing should not exceed the maintenance period
	-10℃~25℃	15 months	
	25℃~35℃	9 months	
	35℃~55℃	6 months	
	＞55℃	Not allowed	

1. Battery deformation, damage, leakage, directly scrapped, regardless of storage time.
2. The storage time is calculated from the last charge time marked on the supplementary charge label on the battery package. After the battery is properly charged, the latest charge time and next charge time are updated on the supplementary label (next charge time = latest charge time + supplementary charge period).
3. The maximum allowable period and times of storing supplementary

power is 3 years or 3 times. For example, once every 8 months, the maximum allowable time is 3 times. Recharge once every 12 months, maximum allowed 3 times; It is recommended that the battery be discarded if the maximum allowed period and times are exceeded.

4. Long-term storage of lithium battery will cause capacity loss. After storage at the recommended storage temperature for 12 months, the irreversible capacity loss of lithium battery is generally 3% to 10%. If you perform a discharge test according to the specifications, the battery may fail the test if its capacity is less than 100% of the rated capacity after storage.

Check the battery before recharge

1. Before replenishing batteries, the batteries need to be inspected for appearance. Only qualified batteries can be replenished for the next step. Unqualified batteries can be scrapped.
2. If the battery does not appear as listed below, it is judged to be qualified for appearance inspection.
   - Battery deformation
   - Battery case damaged
   - Battery leakage

Battery recharge operation

Because the battery module cannot be charged and discharged independently, it is necessary to combine the BCU and the base together to charge and discharge normally. Therefore, the battery charging system needs to be assembled first, and then the charging and discharging equipment can be connected to recharge the battery.

1. Assembly of battery system refer to Chapter 4"System installation";

2. After the battery system is assembled, refer to Chapter 5 "Electrical Connection" for Electrical connection.

3. Battery system storage and power supply Description For details, see the Lithium Battery Storage and Power Supply Guide.

7.5 Battery system disposal

The disposal of the battery system must comply with local regulations on waste e-waste and used batteries.

- Do not dispose of the waste battery system with your household waste;
- Avoid exposing waste batteries to high temperature or direct sunlight;
- Avoid exposing waste batteries to high humidity or corrosive environment;
- For more information, please contact Tecloman.

7.6 Battery Maintenance Statement

All batteries are strictly prohibited from being disassembled and repaired privately. All maintenance work must be carried out by TECLOMAN after-sales personnel or technicians designated by TECLOMAN.

8 Technical Data

Table 8-1 Battery system parameters

Item	Parameter					
System model	Firefly Pro-H3	Firefly Pro-H4	Firefly Pro-H5	Firefly Pro-H6	Firefly Pro-H7	Firefly Pro-H8
Battery system	BH-2.5 (51.2V/2.5KWh/30kg/ LiFePO4)					
	3pcs	4pcs	5pcs	6pcs	7pcs	8pcs
Rated capacity	7.5kWh	10.0kWh	12.5kWh	15.0kWh	17.5kWh	20.0kWh
Available electricity[1]	7.5kWh	10.0kWh	12.5kWh	15.0kWh	17.5kWh	20.0kWh
DOD	Maximum 100%, recommended 90%; adjustable					
Maximum working voltage	172.8Vdc	230.4Vdc	288.0Vdc	345.6Vdc	403.2Vdc	460.8Vdc
Nominal voltage (operating voltage range)	153.6Vdc 134.4~172.8Vdc	204.8Vdc 179.2~230.4Vdc	256.0Vdc 224.0~288Vdc	307.2Vdc 268.8~345.6Vdc	358.4Vdc 313.6~403.2Vdc	409.6Vdc 358.4~460.8Vdc
Nominal charge and discharge current	25A					
Maximum continuous charge and discharge current	50A					
Maximum charging and discharging power	7.68kW	10.24kW	12.8kW	15.36kW	17.92kW	20.48kW
Charge and discharge mode	CC/CV/CP					
External communication	CAN/RS485/Enernet/WIFI					
Self-consuming	≈14W	≈14W	≈15W	≈15W	≈16W	≈16W
Short-circuit current						
Operating ambient temperature[2]	Charge: 0~50℃; Discharge: -20~50℃					
Storage ambient	-10~55℃					

temperature						
Ambient humidity	5%~90%RH, without condensation					
Heat-dissipating method	Natural heat dissipation					
Protection level	IP 55 indoor & outdoor (Ground installation, no rain, no snow, no direct sunlight)					
Dimensions (W*D*H±2mm)	580×364 ×775mm	580×364 ×942mm	580×364 ×1110mm	580×364 ×1278 mm	580×364 ×1446 mm	580×364 ×1614mm
Weight (±0.2kg)	110kg	143kg	175kg	207kg	239kg	271kg
Certification & Standard	CB/RCM/CE/ UN38.3/ RoHS & IEC62619/IEC62477/UL1973					
Warranty[3]	10 Years					

1. Test conditions: ambient temperature 25±5℃, relative humidity 60±25%RH, atmospheric pressure 86kPa~106kPa, 100%DOD, 0.2C charging and discharging mode CC-CV/CC; The actual available power of the system is affected by the system connection and the efficiency of the inverter.
2. Under extreme ambient temperature, module charging and discharging will derate. The corresponding relationship between charging and discharging current value and temperature range is shown in the following table.

	Battery temperature range	Maximum continuous operating current (A)
Charge	T＜0	0
	0≤T＜5	0.1C/5
	5≤T＜10	0.2C/10
	10≤T＜15	0.4C/20
	15≤T＜20	0.6C/30
	20≤T＜35	1C/50
	35≤T＜40	0.8C/40
	40≤T≤45	0.5C/25
	45≤T≤50	0.3C/15
	50≤T＜54	0.2C/10
	T≥54	0
Discharge	-20＜T	0

	-20≤T<-10	0.2C/10
	-10≤T<-5	0.3C/15
	-5≤T<0	0.4C/20
	0≤T<5	0.5C/25
	5≤T<10	0.6C/30
	10≤T<15	0.8C/40
	15≤T<35	1C/50
	40≤T≤45	0.8C/40
	45≤T<50	0.5C/25
	50≤T<54	0.3C/15
	T≥54	0.2C/10

3. For details about the battery warranty, see Firefly Pro battery system warranty manual.

9 FAQs