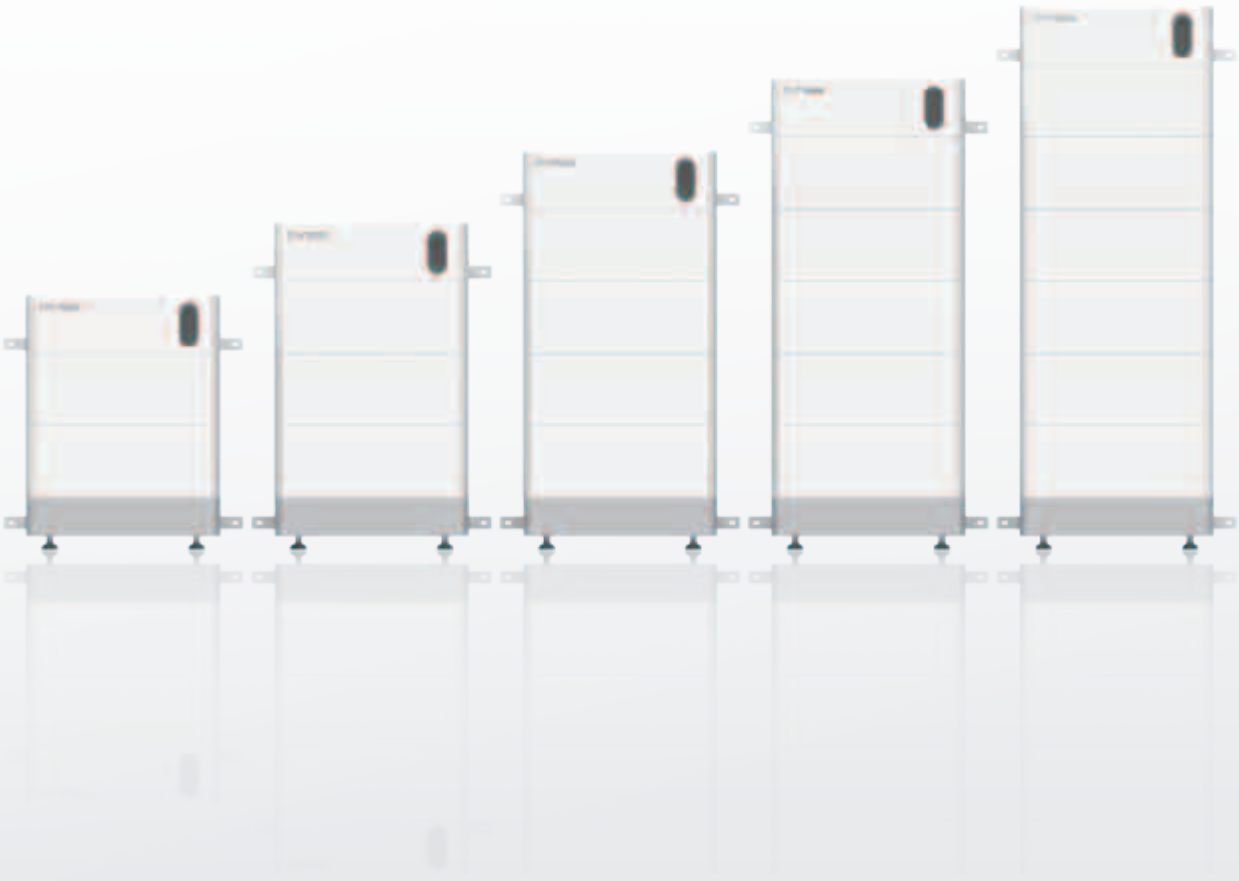


Tower Pro

USER MANUAL

Battery System

Tower Pro T-TP7/TP11/TP15/TP19/TP23

192-576V/40Ah

File version-20240712-V2-EN Information might be subject to change without notice during product improving.

Contents

Statement of Law

This product complies with the design requirements of environmental protection and personal safety. The storage, use and disposal of the products shall be carried out in accordance with the product manual, relevant contract or relevant laws and regulations.
You can check the related information on the website of Dyness Digital Energy Technology Co., LTD.when the product or technology is updated.
Web URL: http://www.dyness.com/
Please note that the product can be modified without prior notification.

Revision History

Revision No.	Revision Date	Revision Reason
V0	2022.10.23	First Published.
V1	2024.11.05	Add heating function.

Safe handling of lithium batteries guide

DANGER

Before installation or operation you must read the "Tower Pro ESS User Menu" carefully.
The batteries will produce high- voltage DC power and might cause lethal voltage and electric shock.
Only qualified persons are allowed to wire the batteries.

WARNING

This product is a high-voltage DC system, and should be operated by authorized persons only.
Risk of battery system damage or personal injury.
DO NOT disconnect while the system is running!
Keep all power sources off and verify that they are de-energized.
Battery damage may result in electrolyte leakage. If the electrolyte is leaked, do not touch the leaked electrolyte or volatile gas, and contact the after-sales service team for help immediately.
If leaked material was touched accidentally, please follow the steps below:

- Inhalation of leaked material: Evacuate from the contaminated area and seek medical assistance immediately.
- Eye contact: Flush with clean water for at least 15 minutes and seek medical assistance immediately.
- Skin contact: Wash the contact area thoroughly with soap and clean water and seek medical assistance immediately.
- Ingestion: Induce vomiting and seek immediate medical assistance.
- Do not move the battery system if it is connected with an external expansion module.

If you need to replace or add a battery, please contact the after-sales service center.

CAUTION

Risk of battery system failure or life cycle reduction.

Before Connecting

Please check the product and packing list after unpacking. If the product is damaged or parts are missing, please contact the local dealer.

Before installation, make sure that the grid is disconnected and the battery is switched off.

Do not invert the positive and negative cables and ensure there is no short circuit to the external device.

It is prohibited to connect the battery to AC power directly.

The battery system must be properly grounded and the resistance must be less than 1Ω.

Ensure that the electrical parameters of the battery system are compatible with the respective equipment.

Keep the battery away from water and fire.

During Use

If the battery system needs to be moved or repaired, the power must be disconnected and the battery must be switched off.

It is prohibited to connect different types of batteries.

It is prohibited to connect the battery to incompatible or faulty inverters.

It is prohibited to disassemble the battery (to avoid the warranty sticker being removed or damaged).

In case of fire, only a dry powder fire extinguisher must be used, foam extinguishers are prohibited.

Please do not open, repair or disassemble batteries; this is reserved for Dyness staff or authorized personnel. We do not take any responsibility caused by violation of safety operation or equipment safety standards.

Maintenance

Please read the user manual carefully.

If batteries are stored for a long time, it is required to charge them every 10 months, and the SOC should be no less than 50%.

Batteries need to be recharged within 12 hours, after being fully discharged.

Do not expose cables outside.

All battery terminals must be disconnected for maintenance.

Please contact the supplier within 24 hours if there is something abnormal.

Warranty claims are excluded for direct or indirect damage due to items above.

1 Introduction

Brief Introduction

Tower Pro is a high-voltage battery storage system based on lithium iron phosphate batteries, and it is one of the new energy storage products developed and produced by Dyness. It can be used to support reliable power for various types of equipment and systems. Tower Pro is especially suitable for application scenes of high power, limited installation space, restricted load-bearing and long cycle life.

Product Properties

- The entire module is non-toxic, non-polluting and environmentally friendly.
- Anode material is made from LiFePO4 with safety performance and long cycle life.
- The Battery Management System (BMS) comes with protective functions including over-discharge, over-charge, over-current and high/low temperature.
- The system can automatically manage the charge and discharge state and balance the current and voltage of each cell.
- Flexible configuration, multiple battery modules can be connected in series for expanding voltage and capacity.
- Adopted self-cooling mode rapidly reduces the entire system's noise.
- The module has less self-consumption, up to 10 months without charging; no memory effect, excellent performance of shallow charge and discharge.
- Working temperature range is from 0 to +55°C/-20 to +55°C(with heating function), with excellent discharge performance and cycle life.
- Small size and lightweight, standard module is easy to install and maintain.

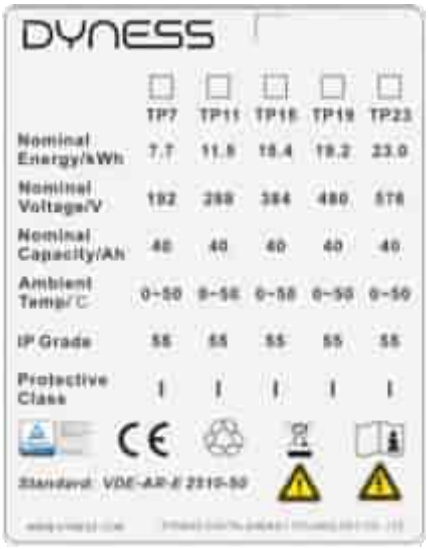


Figure 1-1 Battery energy storage system nameplate label

Figure 1-2 Labels with heating function

(Only systems with heating function will be labeled with this label)

Figure 1-3 WiFi QR code label

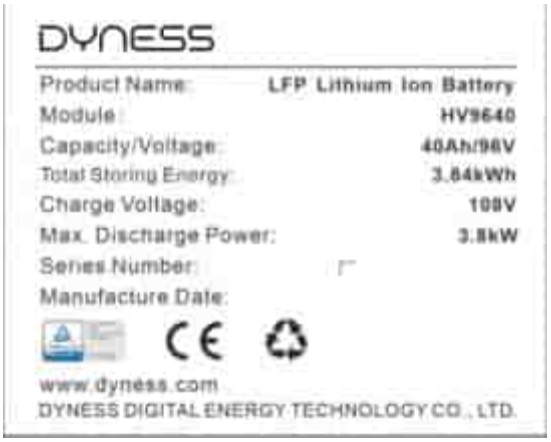


Figure 1-4 Battery module l

Product identity definition

	The battery voltage is higher than the safe voltage, and direct contact results in an electric shock hazard.
	Be careful with your actions and be aware of the dangers.
	Read the user manual before use.
	Do not dispose of the scrapped batteries with household waste; they must be recycled by professional personnel or institutes.
	After the useful life of the battery, it can continue to be used after being recycled by a professional recycling organization.
	This battery meets European directive requirements.
	This battery passed the TUV certification test.

2 Product specifications

System Performance Parameter

Table 2-1 Parameters of the Tower Pro system

Parameter	TP23	TP19	TP15	TP11	TP7
Module type	LFP	LFP	LFP	LFP	LFP
Total energy stored [kWh]	23.04	19.2	15.36	11.52	7.68
Usable capacity [kWh]	21.888	18.24	14.592	10.944	7.296
Recommend depth of discharge	95%	95%	95%	95%	95%
Max depth of discharge	100%	100%	100%	100%	100%
Module configuration	6 series	5 series	4 series	3 series	2 series
Voltage range [V/DC]	504 ~ 648	420 - 540	336 - 432	252 - 324	168 - 216
Battery system voltage (V/DC)	576	480	384	288	192
Battery system capacity (Ah)	40	40	40	40	40
Battery system charge voltage (V/DC)	648	540	432	324	216
Battery system charge current [A] (standard)	8	8	8	8	8
Battery system charge current [A] (normal)	20	20	20	20	20
Battery system charge current [A] (max)	40	40	40	40	40
Battery system discharge minimum voltage (V/DC)	504	420	336	252	168
Battery system discharge current [A] (standard)	8	8	8	8	8
Battery system discharge current [A] (normal)	20	20	20	20	20
Battery system discharge current [A] (max)	40	40	40	40	40
Battery system max charge & discharge current [A] (when used in communication with the inverter)	40	40	40	40	40
Discharge temperature range [°C]	-10~55° C/-20~55° C (with heating function)				
Charge temperature range [°C]	0~55° C/-20~55° C (with heating function)				
Max discharge power [kW]	23.04	19.2	15.36	11.52	7.68
Max charge & discharge power [kW] (when used in communication with the inverter)	23.04	19.2	15.36	11.52	7.68

Parameter	TP23	TP19	TP15	TP11	TP7
Short circuit current [kA]	1.5	1.5	1.5	1.5	1.5
Enclosure Protection (IP)	IP55	IP55	IP55	IP55	IP55
Dimensions [mm]	1672*587*310	1451*587*310	1230*587*310	1009*587*310	788*587*310
Weight [kg]	241.5	206	170.5	135	99.5
Battery module name	HV9640	HV9640	HV9640	HV9640	HV9640
Number of battery modules (pcs)	6	5	4	3	2

Figure 2-1 Tower Pro TP11

Battery Module

Figure 2-2 Battery module

Table 2-2 Product parameters

Module name	HV9640
Cell technology	Li-ion (LFP)
Battery module capacity (kWh)	3,84
Battery module voltage (V/DC)	96
Battery module capacity (Ah)	40

Module name	HV9640
Number of battery module cells (pcs)	30
Battery cell capacity (Wh)	128
Battery cell voltage (V/DC)	3.2
Battery cell capacity (Ah)	40
Number of battery module cells in series (pcs)	30
Battery module charge voltage (V/DC)	109.5
Battery module charge current (standard) [A]	20
Battery module charge current (normal) [A]	40
Battery module charge current (max) [A]	40
Battery module discharge minimum voltage (V/DC)	84
Battery system discharge current (standard) [A]	20
Battery module discharge current (normal) [A]	40
Battery module discharge current (max) [A]	40
Dimensions (W*D*H, mm)	587*310*241
Communication mode	CAN/RS485
Pollution degree (PD)	II
Ambient temperature (°C)	0 to +50
IP protection class	IP55
Weight (kg)	34.5

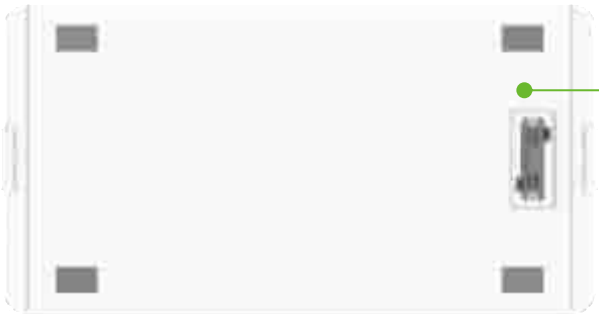


Figure 2-3 HV9640 top connector

Figure 2-4 HV9640 bottom connector

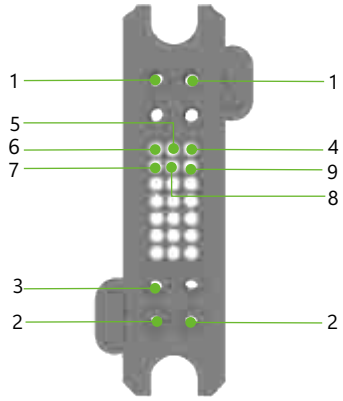


Figure 2- 5 Composite connector - male

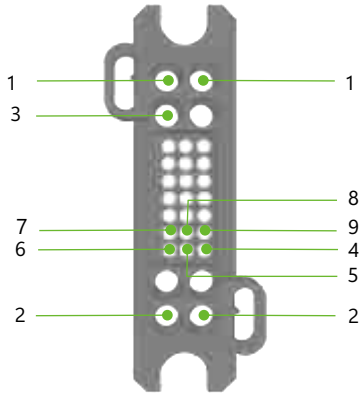


Figure 2-6 Composite connector - female

Table 2-3 Connector definition

Item	Name	Definition
1	Composite connector - male	Battery module output and communication interface
2	Composite connector - female	Battery module output and communication interface

Table 2-4 Port definition

No.	Composite connector - male	Composite connector - female
1	Positive output	Negative output
2	Negative output	Module negative
3	GND	GND
4	IP2	IP1
5	IM2	IM2
6	IP1	IP2
7	IM1	IM1

No.	Composite connector - male	Composite connector - female
8	HEAT-	HEAT+
9	HEAT-	HEAT+

Battery controller

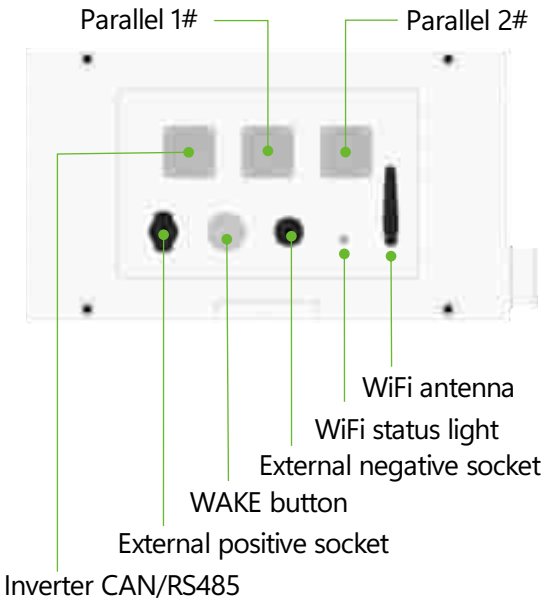


Figure 2-7 BDU right connector

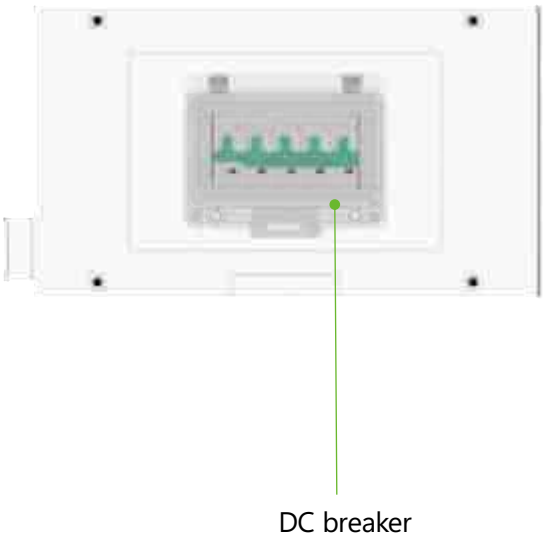


Figure 2-8 BDU left connector

Figure 2-9 BDU bottom connector

Table 2-5 Connector definition

Item	Name	Definition
1	Parallel 1#	Parallel communication connection of multi cluster systems
2	Parallel 2#	Parallel communication connection of multi cluster systems
3	Inverter CAN/RS485	RJ45 communication port between battery system and inverter

Item	Name	Definition
4	External positive socket	Connect battery system to inverter positive terminal
5	WAKE button	Press and hold this button for 5s to start the battery system
6	External negative socket	Connect battery system to inverter negative terminal
7	WiFi status light	Display current WiFi status
8	WiFi antenna	Receiving and sending WiFi signals
9	DC breaker	The master switch of the battery system, you must switch it on before switching on the Power On and Power WAKE switches; short circuit protection.

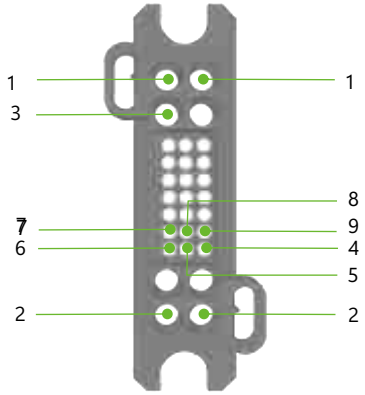


Figure 2-10 Power On switch

Table 2-6 Port definition

No.	Definition
1	Negative output
2	Positive output
3	GND
4	IP1
5	IM2
6	IP2
7	IM1
8	HEAT-
9	HEAT+

Figure 2-11 BDU front view

Table 2-7 LED status indicators

Battery status	SOC (%)	RUN	BAT STATE	COM	FAULT	SOC			
						LED1	LED2	LED3	LED4
Shutdown	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Standby	75<SOC≤100	●	OFF	●	OFF	●	●	●	●
	50<SOC≤75	●	OFF	●	OFF	●	●	●	OFF
	25<SOC≤50	●	OFF	●	OFF	●	●	OFF	OFF
	0<SOC≤25	●	OFF	●	OFF	●	OFF	OFF	OFF
	SOC=0	●	OFF	●	OFF	OFF	OFF	OFF	OFF
Charging	SOC=100	●	OFF	●	OFF	●	●	●	●
	75<SOC<100	●	●	●	OFF	●	●	●	Flashing
	50<SOC≤75	●	●	●	OFF	●	●	Flashing	OFF
	25<SOC≤50	●	●	●	OFF	●	Flashing	OFF	OFF
	0≤SOC≤25	●	●	●	OFF	Flashing	OFF	OFF	OFF
Discharging	75<SOC≤100	●	Flashing	●	OFF	●	●	●	●
	50<SOC≤75	●	Flashing	●	OFF	●	●	●	OFF
	25<SOC≤50	●	Flashing	●	OFF	●	●	OFF	OFF
	10≤SOC≤25	●	Flashing	●	OFF	●	OFF	OFF	OFF
	0<SOC<10	●	OFF	●	OFF	●	OFF	OFF	OFF
	SOC=0	●	OFF	●	OFF	OFF	OFF	OFF	OFF

- If the FAULT indicator is always on, it indicates that the battery has a fault alarm.
- If the COM indicator is always on, it indicates that the communication between inverter and battery is normal.
- If the RUN indicator is always on, it indicates that the system is operating normally.
- If the BAT STATE indicator is always on, it indicates that the battery is charging.
  Flashing indicates that the battery is discharging.
- The SOC indicator is indicating the current SOC status of the battery.
  Flashing indicates that the battery is charging.

DANGER

Ensure ON/OFF switch is turned on before waking up the battery. Otherwise it will affect the auto test process and cause danger.

DO NOT switch off the ON/OFF switch during normal operation, only in emergencies. Otherwise it will cause the battery current to surge.

CAUTION

If the DC breaker trips because of over-current or short circuit, you must wait for 30 minutes to switch it on again, otherwise it may cause damage to the breaker.

Figure 2-12 "Inverter CAN/RS485" port pins

Table 2-8 Definition of "Inverter CAN/RS485" port pins

PIN	Color	Definition
PIN1	Orange/White	485_B
PIN2	Orange	485_A
PIN3	Green/White	Reserved
PIN4	Blue	CANH
PIN5	Blue/White	CANL
PIN6	Green	NC
PIN7	Brown/White	NC
PIN8	Brown	NC

3 Installation and Configuration

Environmental Requirements

DANGER

Cleanliness

The battery system has high voltage connectors. The environmental conditions will affect the isolation of the system.

Before installation and switch-on, dust and swarf must be removed to keep the system clean.

The environment must be dust-proof to a certain extent.

Dust and humidity must be regularly checked during continuous operation of the system.

Fire Protection System

The room must be equipped with a fire protection system or fire extinguishers (Recommended: foam extinguisher). The fire protection system needs to be regularly checked to ensure its normal condition. Please refer to your local fire protection equipment for use and maintenance requirements.

Grounding System

Make sure that the grounding point for the battery system is stable and reliable before installation. If the battery system is installed in an independent equipment cabin (e.g. container), ensure that the grounding of the cabin is stable and reliable.

The resistance of the grounding system must be ≤100mΩ.

CAUTION

Temperature

Tower Pro system working temperature range: -20°C to +55°C; Optimum temperature: 18°C to 30°C; Exceeding the working temperature range will cause over-temperature/under-temperature alarms or protection of the battery system which may lead to the reduction of cycle lives.

Heating System(Optional)

It is essential to equip a heating system to keep the battery system in a relevant temperature range. If the environment is lower than 2°C, the system with heating function will automatically turn on the heating mode. At this time, the heating can be powered by the inverter or the battery itself. The condition for the battery to stop power supply is SOC<20%. When the lowest temperature of the battery is above 5 ℃, the heating mode will be exited.

Installation location precautions

DANGER

Please note that the battery should be installed with a minimum safe clearance from the surrounding equipment or battery. Please refer to the minimum clearance diagram below.

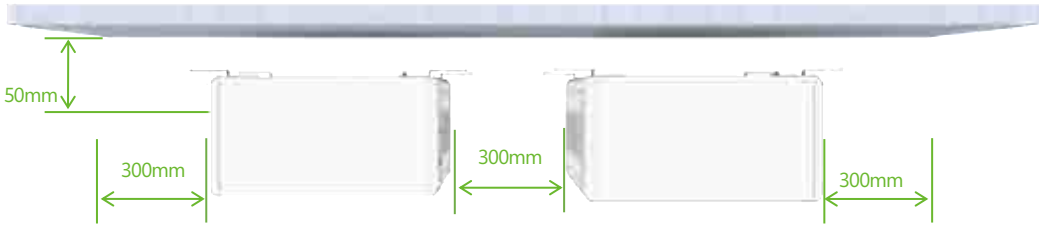


Figure 3-1 Minimum clearance

Installation location precautions

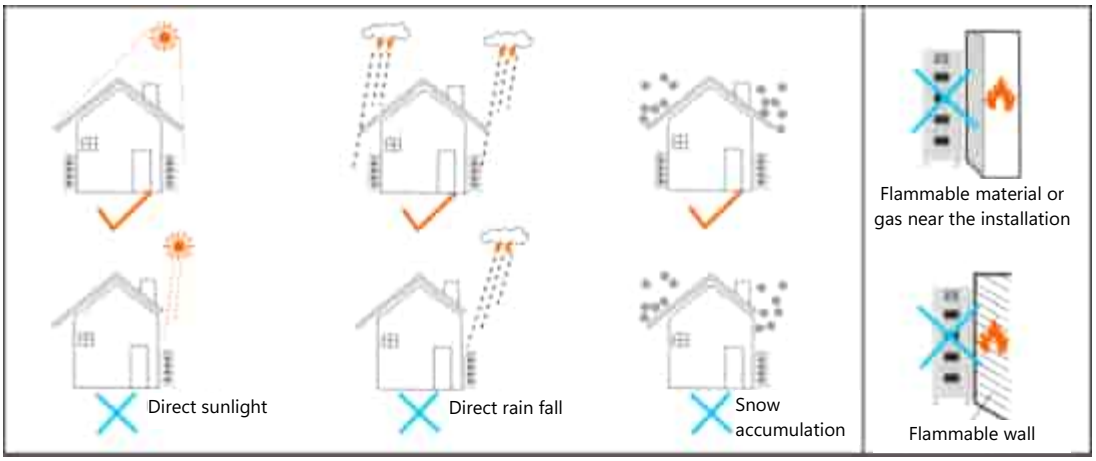


Figure 3-2 Installation location precautions

Tools

The following tools are required to install the battery pack:

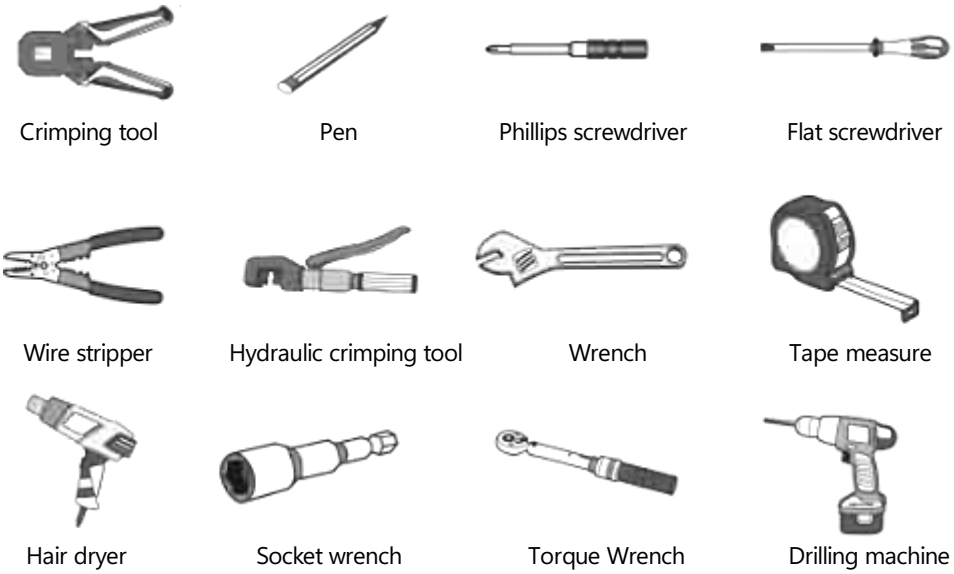


Figure 3-3 Installation tools

Safety Gear

We recommend wearing the following safety gear when working with batteries:

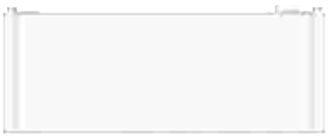
Figure 3-4 Safety gear

Unpacking inspection

- When the equipment arrives at the installation site, unloading should be performed according to rules and regulations, to prevent from being exposed to direct sunlight. The battery should not be installed in direct sunlight. Please refer to Section 3.3
- Before unpacking, the total number of packages shall be indicated according to the shipping list attached to each package, and all packages shall be checked for good condition.
- Handle with care and protect the surface coating of the goods.
- Upon opening the package, the installation personnel should read the technical documentation, verify the list according to configuration table and packing list and ensure that the goods are complete and intact. If the internal packing is damaged, goods should be examined and recorded in detail.

Table 3-1 Packing List

	Item	Specifications	Quantity	Image
A	BDU	587*310*180mm	1	
	Communication cable to inverter	Standard, b/L2000mm/RJ45 plug at both sides	1	
	Power cable-positive	Positive cable 6mm^2, red, 2m	1	
	Power cable-negative	Negative cable 6mm^2, black, 2m	1	
	Photovoltaic connector-F	To positive battery pole	1	
	Photovoltaic connector-M	To negative battery pole	1	
	RJ45 Waterproof connector	Communication connector to BDU	2	
	OT Terminal	OT4-6	2	
	screw	Cylindrical Head Inner Hexagonal three combination screw M5*14	2	
	screw	Cross Recessed outer hexagon three combination screw M6*14	8	
	CAN resistor	RJ45-CAN-120, Pin7&8	1	
	Expansion Bolt	Expansion Screw	4	
	Fixing bracket	To secure with the wall	4	

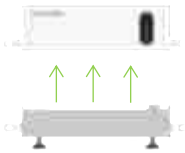
	Item	Specifications	Quantity	Image
	Base	587*310*186mm	1	
	User Manual	User Manual	1	
	Warranty card	/	1	
	Letter to customer	/	1	
	Packing list	/	1	
B	Battery	HV9640 96V/40Ah	1	
	screw	Cylindrical Head Inner Hexagonal three combination screw M5*14	2	
	Packing list	/	1	

Equipment installation

Installation Preparation

1. Make sure that the environment meets all technical requirements.
2. Prepare equipment and tools for installation.
3. Confirm that the DC breaker is in the OFF position.

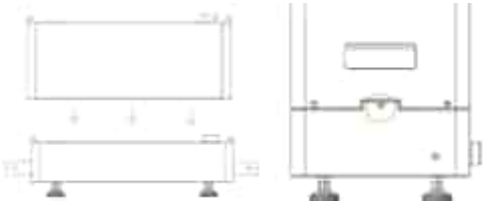
Mechanical Installation



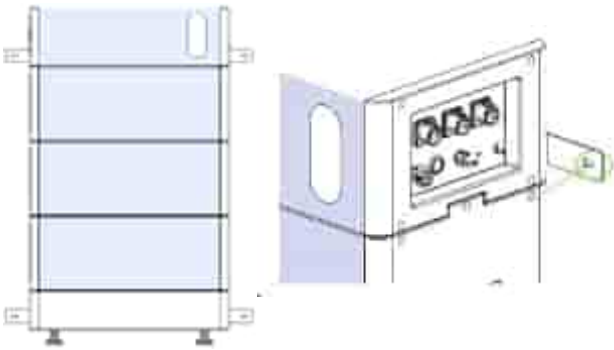
1. Separate the BDU from the battery base

2. Install the hanging ears on the base and BDU with M6 bolts.

3. Determine base placement. (The feet can be adjusted.)
4. Press the marked position with the electric drill and trepanning 2 holes on each side with diameter of 10mm on the wall. The hole depth shall be greater than 70mm.
5. Fix the expansion bolt M6 into the bottom of the hole on the wall. Use the M6 bolt to fix the hanging ear to the wall and control the torque at 6NM.



6. Place battery module on the battery base.
7. Fix each module with 2 screws.



8. Place BDU on battery module.
9. Press the marked position with the electric drill and trepanning 2 holes on each side with diameter of 10mm on the wall. The hole depth shall be greater than 70mm.
10. Fix the expansion bolt M6 into the bottom of the hole on the wall. Use the M6 bolt to fix the hanging ear to the wall and control the torque at 6NM.

DANGER

The battery system is a high-voltage DC system. Ensure that installation area of Tower Pro is stable and reliable.

Please confirm that the battery system is switched off before connecting. Electric shock and damage to the inverter may be caused if the battery is connected directly without being switched off.

Otherwise, the system cannot work properly. The voltage of the battery is too high, please pay attention to self-protection during measurement.

WARNING

A single battery module weighs 34.5kg. It is necessary to install battery modules with helpers if no lifting equipment is available, even more so if the battery modules are installed higher up.

Double-check all the power and communication cables. Make sure that the voltage of the inverter is at the same level as the battery system.

- Switch on the inverter, and make sure that all power equipment is working normally.
- Start the battery system. See Table 3-2 Battery system self-test step 2.

Table 3-2 Battery system self-test

Step 1 Electrical installation
After the HV9640 module is stacked, it must be fixed with two screws on the left and right. The modules are fixed and connected with screws. There is a special docking point at the bottom of the battery base, as shown in the figure below: 

Step 2 Battery system self-test

1. Switch the DC breaker of the BDU on.

2. Press and hold the WAKE button for approx 5s, battery power on.

3. Check the system output voltage.

- Use a multimeter to measure the output voltage on the positive and negative ports of the BDU.
- The output voltage should conform to the voltage range in Table “P7 Table 2-1 Parameter of the Tower Pro system”.

4. Press and hold the WAKE button for approx 5s, battery shutdown.

5. Switch the BDU DC BREAKER to OFF position.

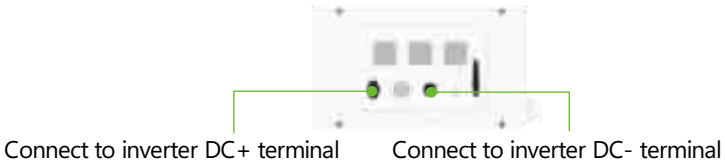
Table 3-3 WAKE button status indicators

● If the red light remains on, it indicates a battery failure.
● If the green light flashing, it indicates that the battery status is normal and the communication connection with the inverter has failed.
● If the green light remains on, it indicates that the battery and inverter are connected properly and the battery can be used normally.

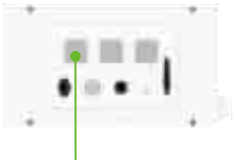
Step 3 Connecting inverter

1. Connect the external power cable to the inverter

(If the 2m power cable is not long enough, please find another power cable of the same specification, but the length is not to exceed 3m.)



2. Connect the Inverter CAN/RS485 communication cable to the inverter RJ45 CAN/RS485 port.



Connect to the inverter RJ45 CAN/RS485 communication port

Step 4 Connecting the Wi-Fi

1. Connection Preparation

Download the Dyness Smart ESS App to get full functionality of your battery from the App Store (iOS devices) or Google Play(Android devices) .

IOS device

Android device

Step 4 Connecting the Wi-Fi

Register after the APP is installed, click "Register", enter the registration page.
Follow the prompts to complete the registration process

- Fill in your E-email

Please follow the prompts to enter your email account correctly and send and fill in the security code;

- Improve account information

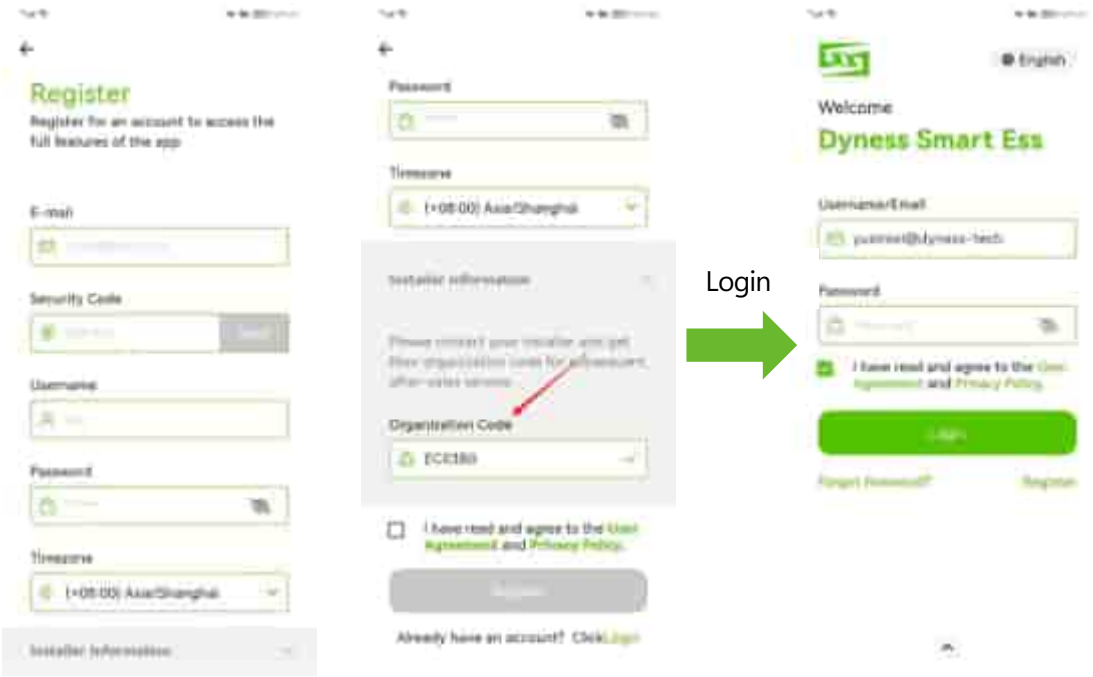
If this account is the first time to register the APP client, you need to improve the account information; Please enter Username and Password, select Timezone;

- Improve Installer information

The default Organization code is EC03B0. Please contact your installer for changes.
Please check the box in the Agreement column to indicate that you have agreed to the User Agreement and Privacy Policy;

- Registration is successful

Click "Register" button, jump back to the login interface, enter the account password to login



2. Steps Of Connection
APP :

- Create Plants

Please login account and click ' Create Plant'.

Step 4 Connecting the Wi-Fi

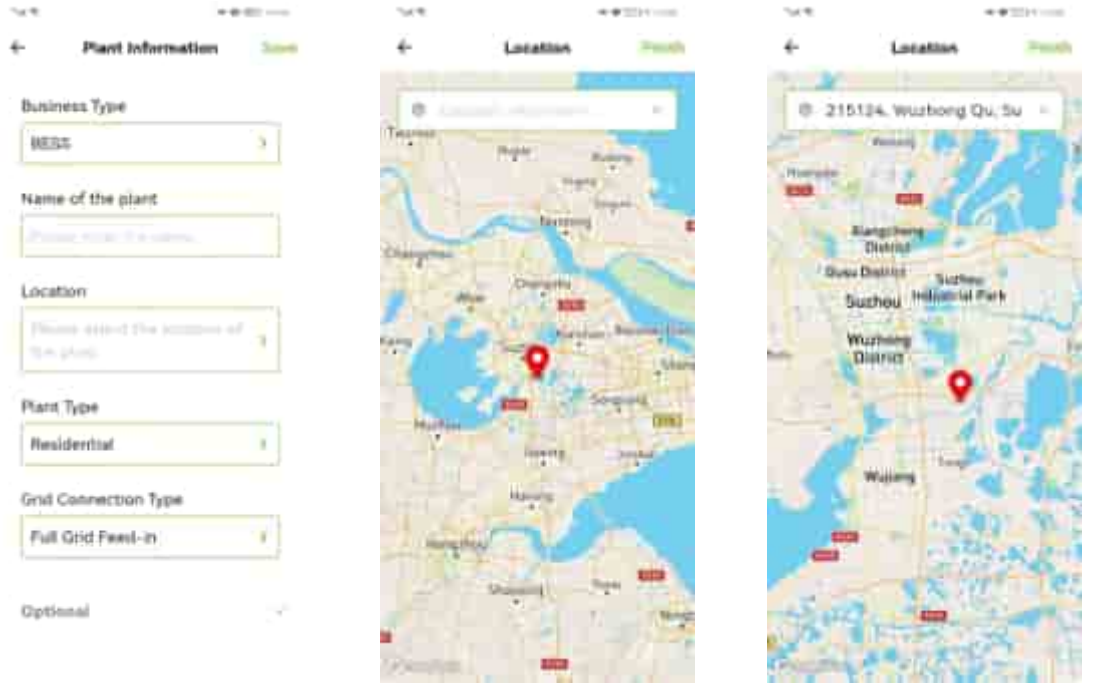
- Supplement new plant information

Please complete the Plant information according to the prompts. The more complete the information is, the better it will be for you to manage the power station.

Improve basic information

Please follow the prompts to improve the basic information of the power station: Business Type, Name of the plant, Location, Plant Type. When completing the basic information on the Plant Information page, if you do not create it near the power station, you can click the "Location" column to find the power station location, and the system will automatically match the rest of the information for you.When creating a power station, The Business Type is usually " BESS",the APP client will automatically locate your current location
(Please first set the allowed access location of Dyness Smart Ess app to always and turn on precise location). If you create a power station nearby, you do not need to change the relevant information.(Tip: Zooming in on the map will show the current location of the WiFi Stick, click the red mark on the map to confirm the location, and then click " Finish" .)

Step 4 Connecting the Wi-Fi



System information

Please improve the system information of the Plant according to the actual situation of the user's new plant: Plant Type, Grid Connection Type, etc.

Tip: The APP user terminal will display the layout of the plant according to the Grid connection type, and analyze the power station data according to the installed capacity.We suggest selecting Battery cluster as the type of Plant.

Optional information

Improve the remaining information according to the actual situation of the user. The more complete the input information, the better the management of the plant; The optional information can be left blank.

- Creation completed

After all the above steps are completed, click "Save" in the upper right corner to complete the creation of the Plant.

Step 4 Connecting the Wi-Fi

- Add a logger

Click the "Confirm" button in the Tips, scan the QR code of the device to add, or enter the serial number to add, after the correct input of the serial number, the collector will be displayed as successfully added.

Tip: Click “Confirm” to jump directly to the distribution network interface, see “ WiFi distribution network “ below.

Step 4 Connecting the Wi-Fi

WiFi Distribution Network

- WIFI distribution network, use Dyness smart ESS app to scan the QR code in the Wi-Fi Logger label.

Click on the icon in the upper right corner of the plant, select "Config Network", click on the serial number of the distribution network logger, click “Start Configuration”.

- Click the "Start Configuration" button to configure the network, and wait for the configuration to succeed.

Step 4 Connecting the Wi-Fi

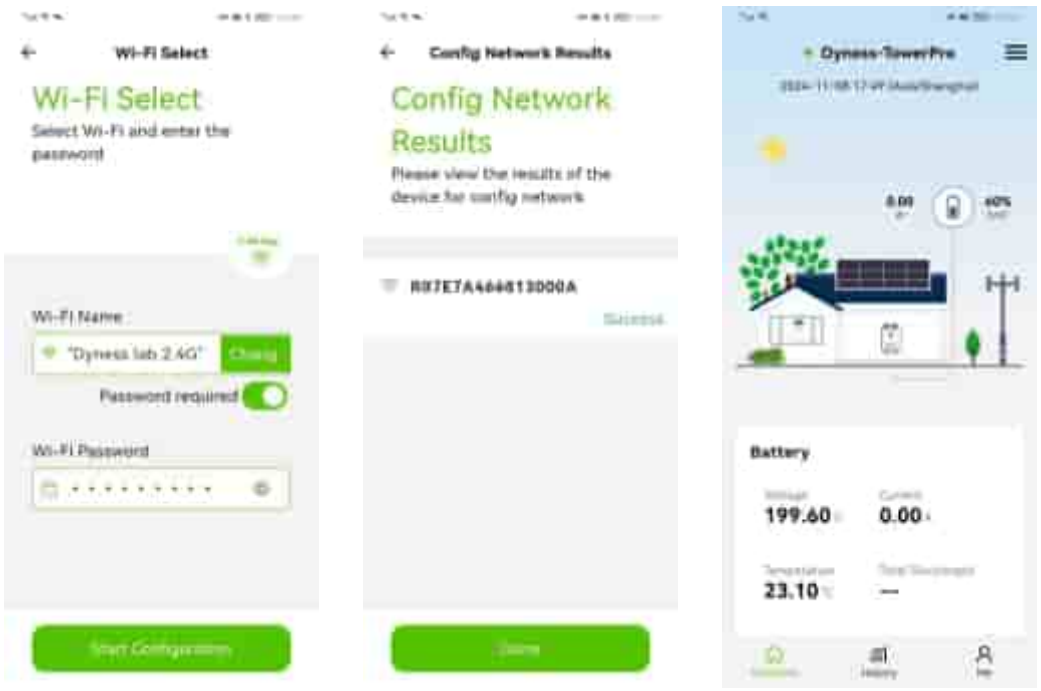
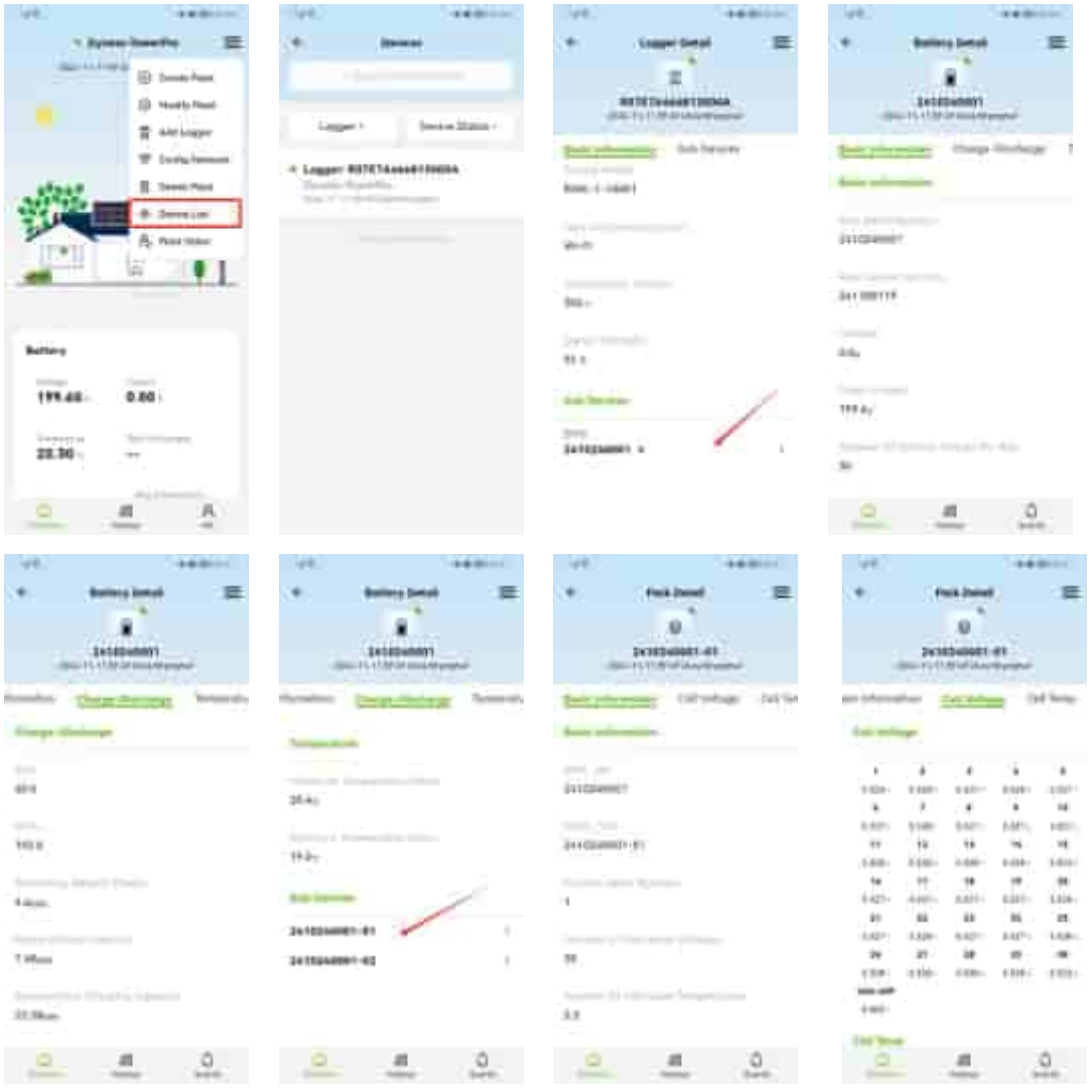


Table 3-4 WiFi status indicators

● If the yellow light flashing, it indicates that the distribution network has failed or not been distributed.
● If the yellow light remains on, it indicates successful network distribution and communication is currently being connected.
● If the green light remains on, it indicates successful network distribution and normal communication between BMS and WiFi.

Step 5 View battery information

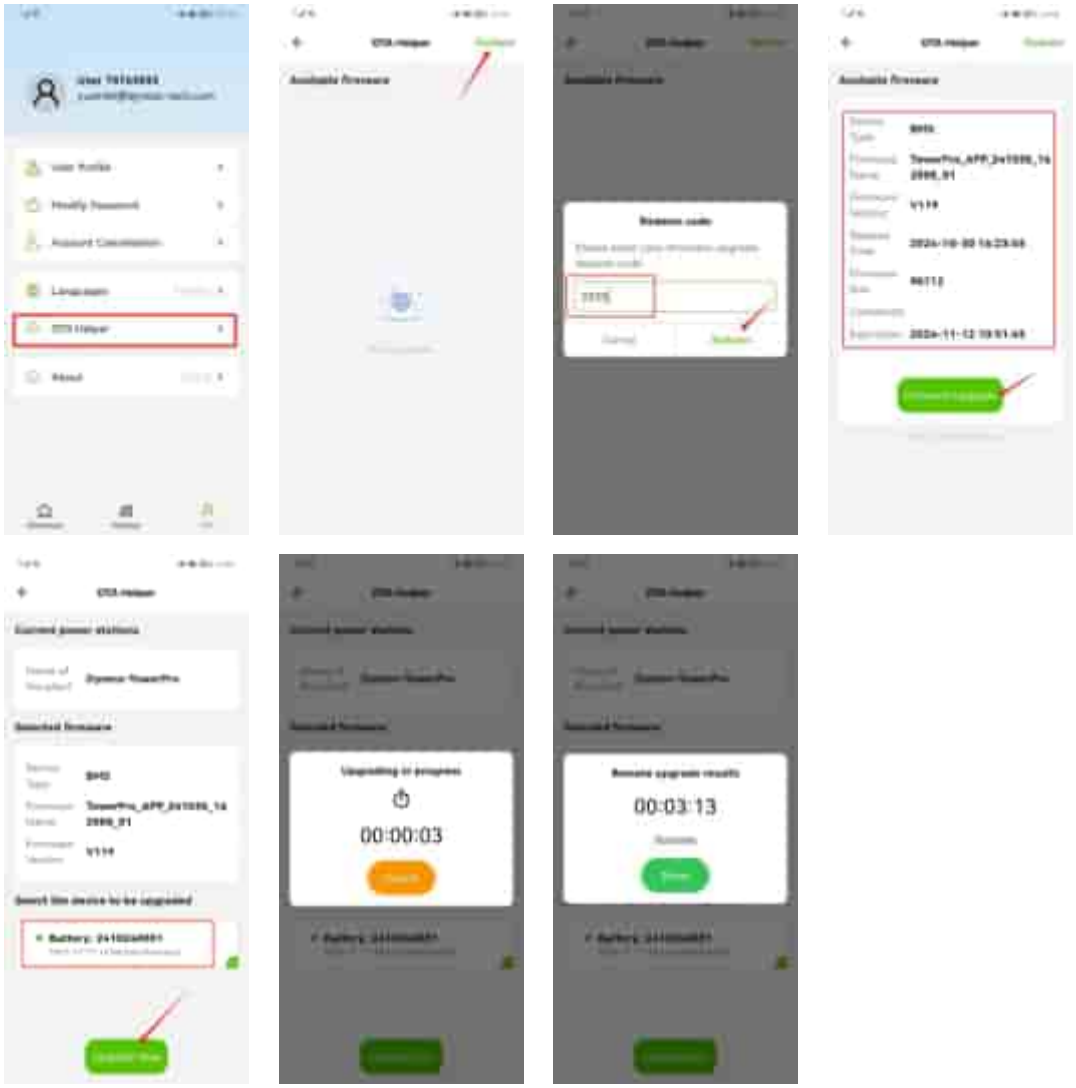
After successful network configuration， wait for 5~10 minutes, Click “Device List”,Click on the Logger as below,then you can see “Basic Information” and “Sub Devices” ,click “BMS” that you can see more detailed information about the battery, such as all cell voltage, temperature, and other data.



Step 6 OTA Helper in the app in the app

When users need to remotely upgrade BMS programs using OTA functionality, they can consult with the Installer to obtain “Redeem code”; The entire upgrade process takes 1-10 minutes. During this period, please do not close the app or turn off / restart the battery.

The detailed steps are as follows:



After the app prompts that the upgrade is successful, you can manually return to the main interface of the plant.

Step 7 Parallel system

Important:

The parallel connection of the Tower Pro series and all other related work are only allowed by professional and qualified electricians.
The total voltage difference between clusters is less than 20V; SOC of each cluster should be 100% and time interval between newly added cluster and existing cluster should be less than 6 months.
Maximum 12 tower pro clusters are allowed to be connected in parallel.

1. Parallel wiring

The general configuration diagram of the Tower Pro in parallel connection is as under.
Take three clusters for example:

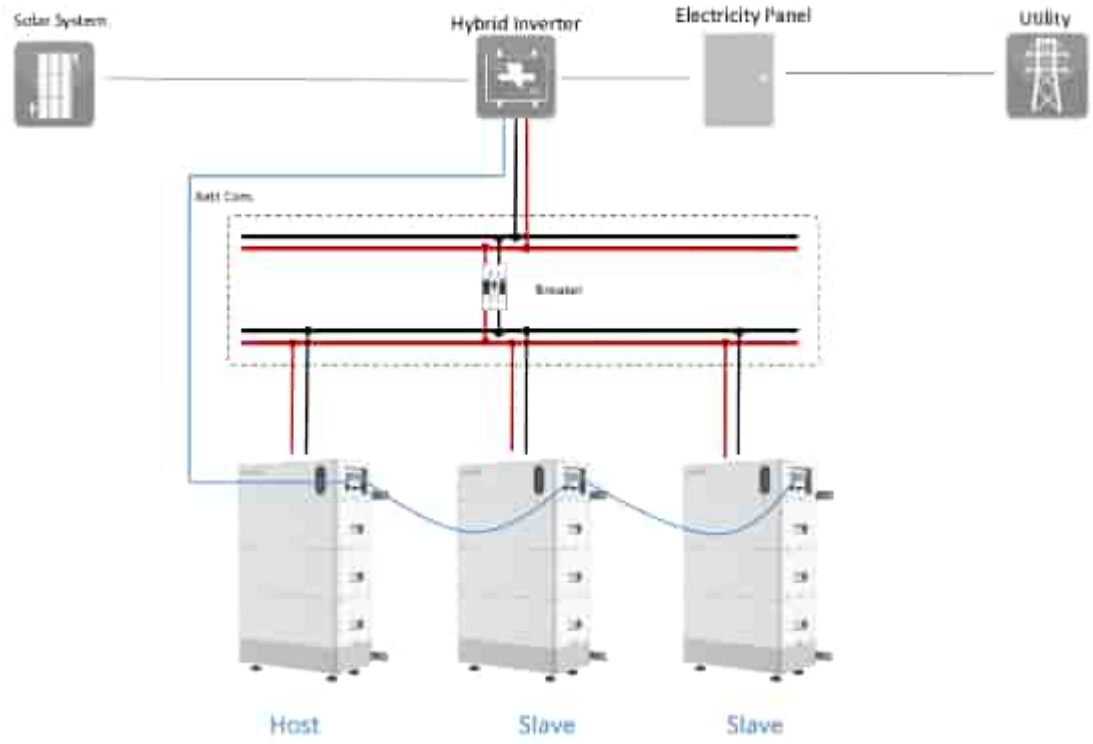
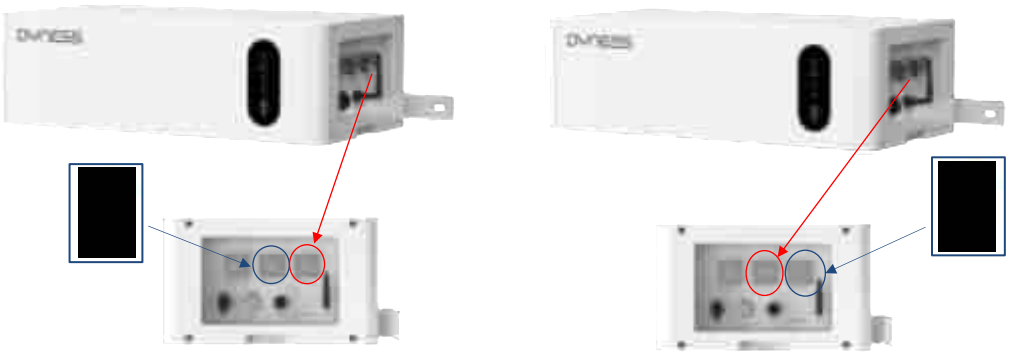


Figure 5-5 The general configuration diagram of the Tower pro

Communication network cable connection between Tower pro and Tower pro: standard network cable

For multi cluster parallel systems, the communication line connection between clusters is Host's Parallel 2 to the second cluster's(Slave) Parallel 1 and so on.Then connect a 120 Ω CAN resistor to the port of the host parallel 1 and the last slave parallel 2. Ensure the stability of CAN communication.

Step 7 Parallel system



Communication network cable connection between inverter and Tower Pro(Host):

CAN/RS485 of the BDU of Tower pro to the communication port of the inverter.

Attention

- The Tower Pro in parallel must be of the same model and same capacity.
- During capacity expansion, make sure SOC of each module is 100%.
- Power on sequence of multiple clusters: Start the Slave first, then start the Host last

4 Maintenance

Troubleshooting:

DANGER

The battery system is a high-voltage DC system. Ensure that the installation area of the Tower Pro is stable and reliable.

Please confirm that the battery system is switched off before connecting. Electric shock and damage to the inverter may be caused if the battery is connected to the inverter directly without being powered off.

Otherwise, the system cannot operate properly. The voltage of the battery is too high, please pay attention to self-protection during measurement.

No.	Problem	Possible Reason	Solution
1	Pressing the "WAKE" button does not turn on the device, and the light remains off.	The BDU DC breaker is not switched on.	Switch the BDU DC breaker on.
		The battery voltage is severely low (<80V) or damaged.	Contact the battery manufacturer for further inspection.
2	Pressing the "WAKE" button turn on the device, the light will turn on, but the display status of the light is red.	Improper placement of batteries and BDU during installation, resulting in misalignment of blind insertion pins.	Check the blind insertion pin and reset the misplaced blind insertion pin.
		Battery system protection.	Charge the battery to leave protection mode，or contact the battery manufacturer for further inspection.
3	The battery has no voltage output.	Battery changes into over-discharged protection.	Charge the battery to leave protection mode.
		Communication failure with inverter.	Check if the connection of the communication cable and PIN definition are correct.
		Inverter has an error.	Check for inverter errors and restore the inverter.
4	Battery shutdown	BDU DC circuit breaker open circuit.	Switch the BDU DC breaker on.
		Battery changes into	Charge the battery to leave

		over-discharged protection.	protection mode.
		Battery is in sleep mode.	Press and hold the WAKE button for approx. 15s.
5	SOC jump during battery charging and discharging process.	The battery system has not undergone full charge calibration for a long time.	Perform a full charge calibration once.
		Inconsistent SOC of battery module.	The system performs 10 ~ 30 full charge balancing cycles (depending on the SOC difference of the module, the number of full charge balancing will vary)； or fully charge each battery module separately with BDU and DC power supply.
		Differences in battery cell consistency or damage.	Contact the battery manufacturer for further inspection.

Replacement of Main Components

Replacing the Battery Controller (BDU)

WARNING

Turn off the entire battery system. Ensure that the negative and positive terminals are de-energized.

1. Press and hold the WAKE button for approx 5s, battery shutdown.

2. Switch the BDU DC BREAKER to OFF position.

- Disconnect the connecting cable.
- Remove the two screws on the BDU and remove the BDU from the system.

Figure 4-1 BDU right connector

- Exchange BDU. Then fix it with two screws.
- After replacing the new BDU, the battery self-test needs to be performed again (Refer to P19 Table 3-2 Battery system self-test)

Battery Maintenance

DANGER

Battery maintenance should only be carried out by professional and authorized persons.
Turn off the battery system first carrying out maintenance.

Voltage check:

[Periodical maintenance] Check the voltage of the battery system with the monitoring software. Check whether the system voltage is normal. For example: Check whether the single cell voltage is out of range.

Voltage check:

[Periodical maintenance] Check the SOC of the battery system with the monitoring software. Check whether the SOC of the batteries is normal.

Cable check:

[Periodical maintenance] Visually inspect all cables of the battery system. Check whether the cables are broken, aging or loose.

Balancing:

[Periodical maintenance] The battery system will become unbalanced if it has not been charged fully for a long time. Solution: Perform balancing maintenance (fully charge) every 10 month. Generally this maintenance progress needs to be completed when external devices such as the monitoring software and battery and inverter have proper communication.

Output relay check:

[Periodical maintenance] Under low load (low current), check the output relay OFF and ON condition; listen if the relay clicks, which means that it switches off and on normally.

5 Storage

For long-term storage (more than 3 months), the battery cells should be stored within the temperature range of 5 to 45°C, relative humidity <65% and non-corrosive gases.
The battery module should be stored within the temperature range of 5 to 45°C, dry, clean and well ventilated environment. The battery should be charged to 50 - 55% SOC before storage.
We recommend activating the battery system (discharge and charge) every 10 months, Corresponding to the battery system that has been installed and used normally, it is necessary to regularly fully charge the battery to calibrate the SOC. It is recommended to fully charge and calibrate at least once every 2 weeks.

CAUTION

The lifespan of the battery will be greatly reduced if you do not follow above instructions to store the battery for a long term.

6 Shipment

The battery module is pre-charged to 50% SOC or according to customer requirements before shipment. The remaining capacity of battery cells is determined by the storage time and condition after shipment.
The battery modules meet UN38.3 certificate standard.
In particular, special rules for the carriage of goods on the road and the current dangerous goods law, specifically ADR (European Convention on the International Carriage of Dangerous Goods by Road), as amended, must be observed.

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