

Home Energy Storage System
Ultra Series

POWER MATRIX

Support by
Kowint Energy
Technical Support Department



User Manual



KOWINT ENERGY (SHENZHEN) CO., LTD

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CONTENTS

1.	Safety.....	3
1.1.	Safety Instructions	3
1.2.	Response to Emergency Situations.....	4
1.3.	Qualified Installer	5
2.	Product Introduction	6
2.1.	Product Overview	6
2.2.	Product Architecture	6
2.3.	Benefits.....	10
2.4.	Specification	11
3.	Installation	12
3.1.	Installation Prerequisites	12
3.2.	Safety Prepare	12
3.3.	Required Tools	13
3.4.	Packaging Inspection	13
3.5.	Open Box	13
3.6.	Packing List	14
3.7.	Battery Installs Steps.....	16
3.8.	Cable Connection	20
4.	Commissioning	23
4.1.	Commissioning Steps.....	23
4.2.	WIFI Configuration.....	23
5.	Appendix.....	27
5.1.	DEBUG Interface	27
5.2.	LINK-IN & LINK-OUT Interface.....	27
5.3.	Product Application	28
5.4.	Space Requirement & Office Layout	28

1. Safety

1.1. Safety Instructions

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

1.1.1. General Safety Precautions



WARNING!

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

Observe the following precautions:

- Risks of explosion
Do not subject the battery to strong impacts. Do not crush or puncture the battery.
Do not dispose of the battery in a fire.
- Risks of fire
Do not expose the battery to temperatures in excess of 55°C. Do not place the battery near a heat source, such as a fireplace. Do not expose the battery to direct sunlight.
Do not allow the battery connectors to touch conductive objects such as wires.
- Risks of electric shock
Do not disassemble the battery.
Do not touch the battery with wet hands.
Do not expose the battery to moisture or liquids. Keep the battery away from children and animals.
- Risks of damage to the battery
Do not allow the battery to get in contact with liquids. Do not subject the battery to high pressures.
Do not place any objects on top of the battery.



CAUTION!

If the battery is not installed within three month since the battery arrived, the battery should be perform the maintenance charge operation, the target is keep the SOC not less than 50% .

1.2. Response to Emergency Situations

1.2.1. Leaking Batteries

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

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

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

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

Ingestion: Induce vomiting and seek medical attention immediately.

1.2.2. Fire

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



WARNING!

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

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

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



WARNING!

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

1.2.3. Wet Batteries and Damaged Batteries

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

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

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



CAUTION!

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

1.3. Qualified Installer



WARNING!

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

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

Knowledge of the functional principles and operation of on-grid systems

Knowledge of the dangers and risks associated with installing and using electrical devices and acceptable mitigation methods.

Knowledge of the installation of electrical devices

Knowledge of and adherence to this manual and all safety precautions and best practices

2. Product Introduction

2.1. Product Overview

The Power Matrix series product is a 204.8V – 512V ranges lithium iron phosphate battery storage system independently developed by Kowint Energy (ShenZhen)Co.,Ltd. For example, the regular 4 modules rated voltage of the system is 409.6V, and the maximum Output power can reach to 20.48kWh.

Product Dimension (e.g. 4 modules): W x H x D= 678mm x 1400mm (20.48kWh) x 268mm

2.2. Product Architecture

2.2.1. Product Overview

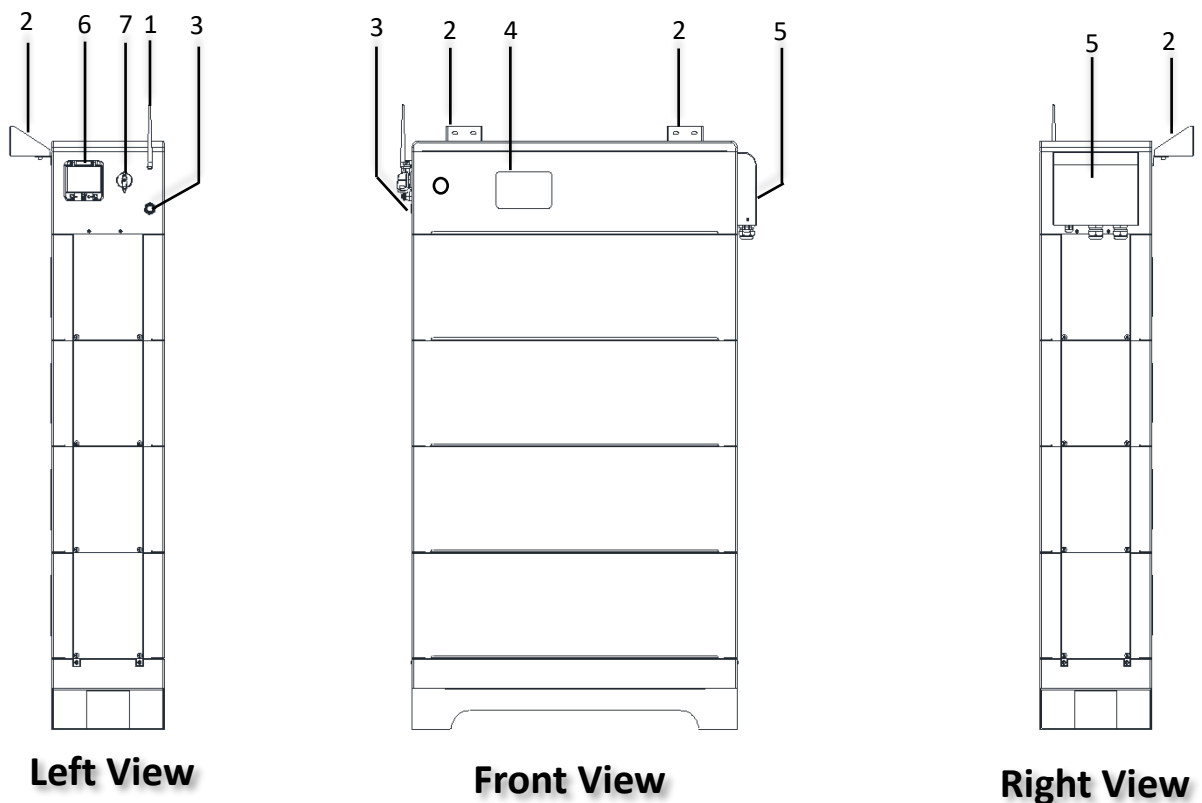


Table 1: Architecture introduce

No.	Items	Instructions
1	WiFi Interface	WiFi Antenna Interface
2	Bracket	Wall mount Bracket*2

2. Product Introduction

3	Power Button	Power Button
4	Display Screen	The system monitors display screen
5	Interface cover	Interface panel cover
6	Air Switch	The first switch to turn ON for product protection
7	Active Switch	Main controller circuit active switch (trigger after Air Switch activation)

2.2.2. Module design

The Power Matrix Battery Energy Storage System modularity was defined in order to realize the best compromise between the following constraints:

- Flexible growth from 10.24kWh to 25.6kWh.
- High reliability and ease of maintenance.
- Maximize the power output.

The Power Matrix is based on the following Modules:

Battery Base Module (BBM) is responsible for the base function of the Power Matrix.

Battery Module (BM) storage the energy.

Main Control Module (MCM) integrated the BMS and communication function, is responsible for the battery system management and communication with an inverter.

2.2.3. Battery Base Module

The Battery Base Module is an empty module, it's designed for the system's base.

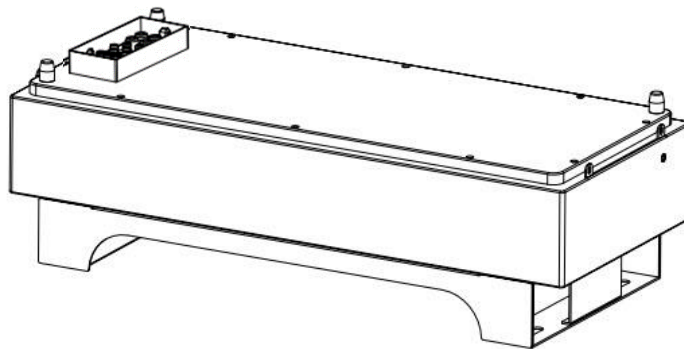


Table 2: Battery Base Module Parameters

No.	Items	Parameters
1	Model	Power Matrix-Base
2	Weight (Approx.)	12.5kg
3	Dimensions (W*D*H)	775*268*202±2mm

2.2.4. Battery Module

The Battery Module is composed of 102.4V Battery pack and BMS, each Battery Module can support 5.12kWh energy.

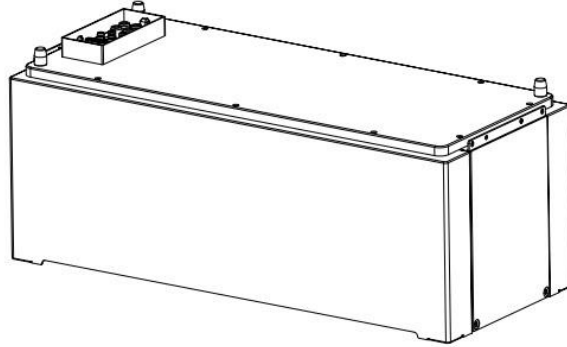


Table 3: Battery Module Parameters

No.	Items	Parameters
1	Model	Power Matrix-ST
2	Cell Configuration	32S1P
3	Nominal Capacity	50Ah
4	Nominal Energy	5120Wh
5	Weight (Approx.)	60kg
6	Dimensions (W*D*H)	775*269.5*286±2mm

2.2.5. Main Control Module

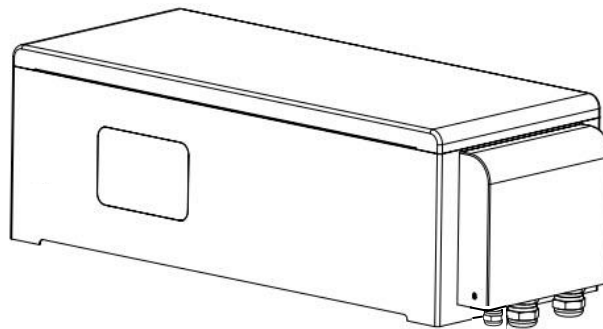


Table 4: Main Control Module Parameters

No.	Items	Parameters
1	Model	PM400-Power Matrix
2	Operation Voltage Range	172.8V~233.6V (2 modules) 259.2V~350.4V (3 modules) 345.6V~467.2V (4 modules) 432V~584V (5 modules)
3	Maximum Operation Current	48A
4	Communication	CAN, RS485, WIFI

2. Product Introduction

5	Weight (Approx.)	19kg
6	Dimensions (W*D*H)	820*268*222±2mm

2.2.6. Interface panel description

The Interface panel at the right side of the MCM (Main Control Module).

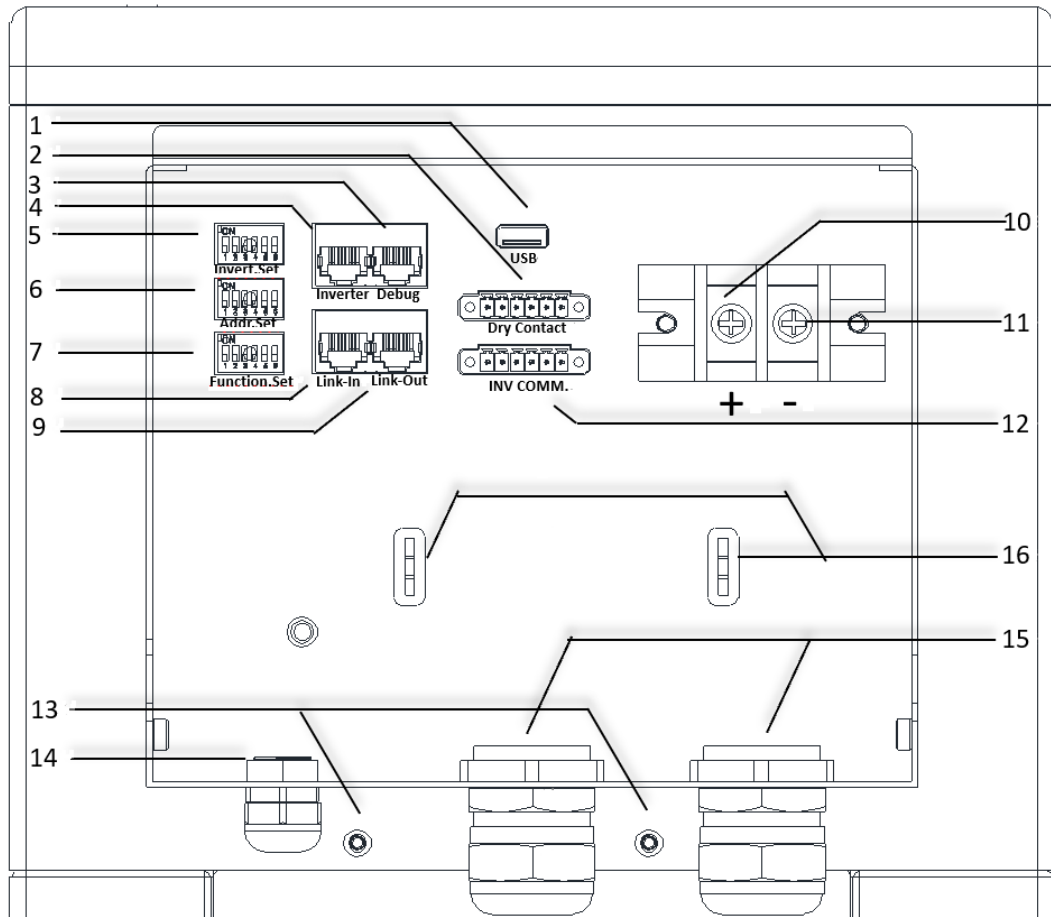


Table 5: Interface panel introduce.

No.	Items	Instructions
1	USB	USB connection Port
2	Dry Contact	Uncommitted digital signal pin on electronic circuit or integrated circuit board
3	Debug	CAN communication connection
4	INV COMM	Inverter CAN communication port
5	Invert. Set	Inverter communication match select switch
6	Addr Set	Address Dial Switch
7	Function Set	The Battery role setting switch
8	Link-In	Temporary Reserved
9	Link-Out	Temporary Reserved

2. Product Introduction

10	+	Power anode
11	-	Power cathode
12	INV COMM	Inverter CAN communication port
13	GND	Ground wire connection port
14	COMM. Gland	Gland for communication cable collection
15	PW. Gland	Gland for power cable collection
16	Hook	Use zip-tie to bound cables and hook

2.3. Benefits

- Extreme safety---lithium iron phosphate battery, long life.
- High performance---a single system supports nearly 25kW load (maximum 5 battery modules).
- Data Visualization---large screen display, the running status is clear at a glance.
- Easy installation---stacked design, the system automatically recognizes the module.
- Excellent scalability--- 2~5 modules in a single system can be flexibly configured.
- High operability--- one-key switch, easily monitor.
- High maintainability--- support cloud monitoring and cloud upgrade (optional).
- Strong adaptability---outdoor design, suitable for installation in outdoor environment.
- High compatibility---matching test with mainstream energy storage system high-voltage inverter.

2.4. Specification

Table 6: product parameters

No.	Items	Parameters				
1	Model	Power Matrix Series				
2	Main Control Module	PM400-Power Matrix				
3	Battery Module Type	Power Matrix-ST				
4	Battery Module Chemistry	LiFePO4				
5	Battery Module QTY	2	3	4	5	
6	Nominal Power (kW)	9.83	14.57	19.66	24.58	
7	Nominal Energy(kWh)	10.24	15.36	20.48	25.6	
8	Current	Max. Charging(A)	48			
		Max. Discharging(A)	48			
		Peak for 10s(A)	75			
9	Voltage	Nominal(V)	204.8	307.2	409.6	512
		Recommend Charging(V)	227.2	340.8	454.4	568
		Max. Charging(V)	233.6	350.4	467.2	584
		Discharge Cut-off(V)	172.8	259.2	345.6	432
10	Weight (Approx. kg)	151.5	211.5	271.5	331.5	
11	Dimensions (W*H*D) mm	820*996*26 9.5	820*1282* 269.5	820*1568* 269.5	820*1854* 269.5	
12	Communication	CAN, RS485, WIFI				
13	Cycle Life	≥6000 times @25℃				
14	Designed Calendar Life	10 years				
15	Safety Function	Over-charge, Over-discharge, Over-current, Low/High-temperature, Low-voltage, Short-circuit Protections				
16	Charging Temperature Range(℃)	0~50				
17	Discharging Temperature Range(℃)	-20~50				
18	Best Operating Temperature Range(℃)	15~35				
19	Storage Temperature Range(℃)	-20~55				
20	Best Storage Temperature Range(℃)	0~35				
21	Humidity(@RM)	10% -90% (non-condensing)				
22	Altitude(m)	0~2000				

3. Installation

3.1. Installation Prerequisites

Make sure that the installation location meets the following conditions:

The building is designed to withstand earthquakes.

The location is far away from the sea, to avoid saline water and humid air.

The floor is flat and level.

There are no flammable or explosive materials nearby.

The ambient environment is shady and cool, and away from heat as well as direct sunlight.

The temperature and humidity stay at a constant level.

There is minimal dust and dirt in the area.

There is no corrosive gases present, including ammonia and acid vapor.

The ambient temperature is within the range from 0°C to 55°C, and the optimal ambient temperature is between 15°C and 35°C.



NOTE !

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



NOTE !

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

3.2. Safety Prepare

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

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



Safety goggles

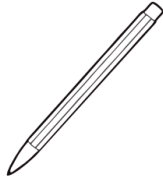


Insulated gloves

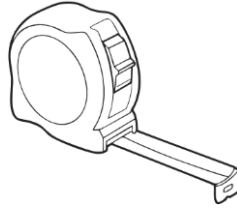


Safety shoes

3.3. Required Tools



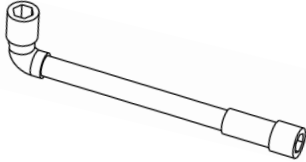
Pencil or Mark



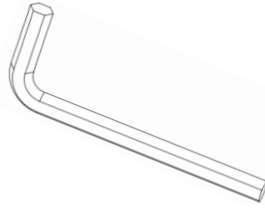
Tape measure



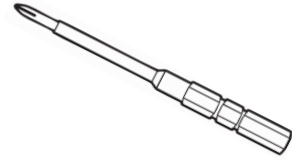
driller



Socket nut wrenches



Hex wrenches



Phillips screwdrivers

3.4. Packaging Inspection

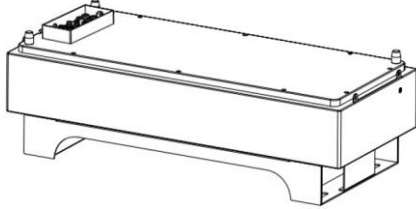
Check the battery packages to find the visible damages, any visible damages, such as cracks, please contact your dealer immediately.

3.5. Open Box

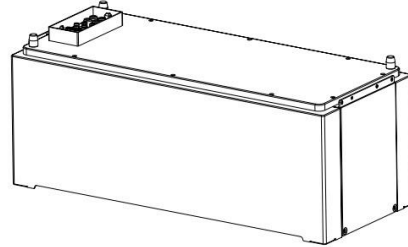
Open the battery package by cutting the packing tape, please check if the battery package and all relevant items are intact.

Check the package items on section 3.6, check the packing list carefully, if there's any item missing, please contact your distributor directly.

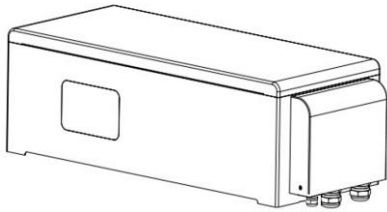
3.6. Packing List



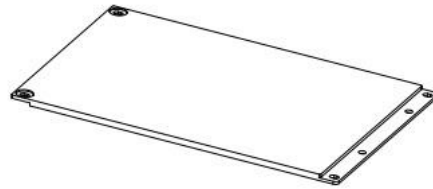
Base Module*1



Battery Module*N ($N \leq 5$)



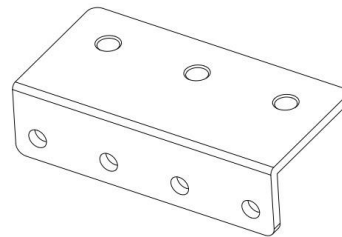
Main Control Module*1



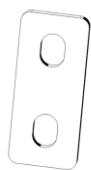
Connection Board*2N($N \leq 5$)



Wall Mounting kit*2



MCM Mounting kit *2

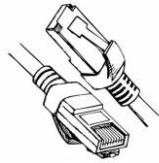


Module Connector*4



WIFI Antenna *1

4. Commissioning



RJ45 Cable (T568A/T568B)1m*2



Communication Switch Box*1



Power Cable 6AWG 1.5m*2



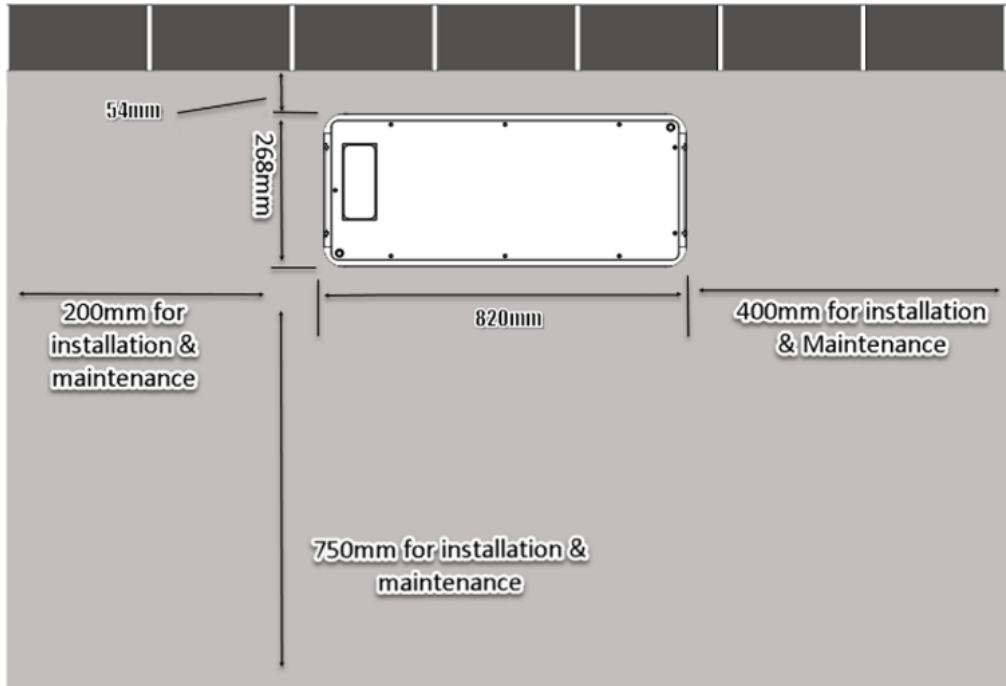
User Manual*1

3.7. Battery Installs Steps

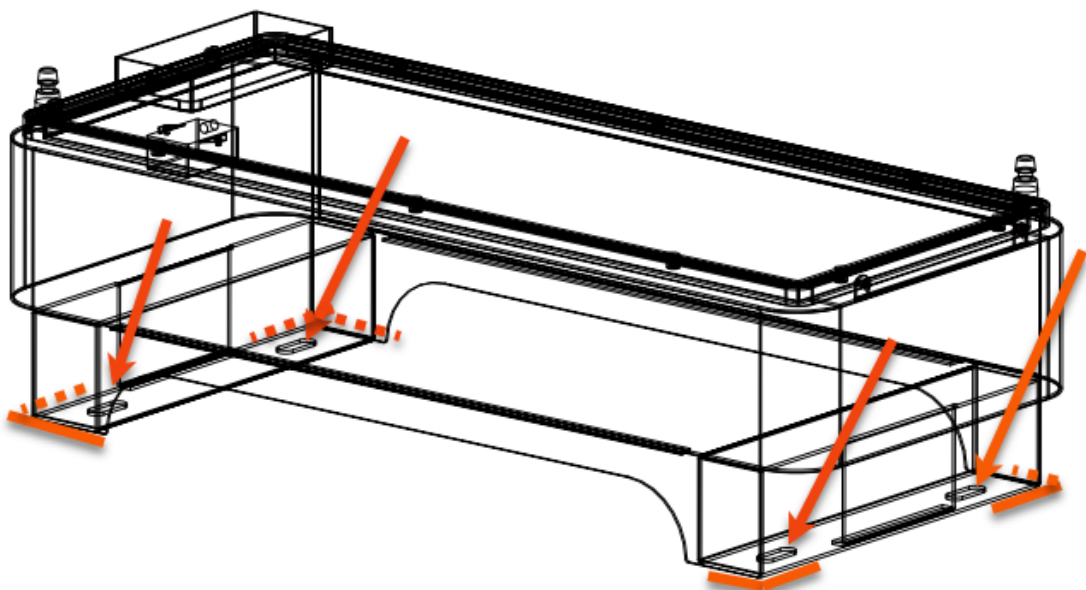
The battery physical installation is the **floor mounting**.

Step 1: Install the Battery on the floor.

- Put the **Battery Base Module (BBM)** to the install location refer to the following diagram.

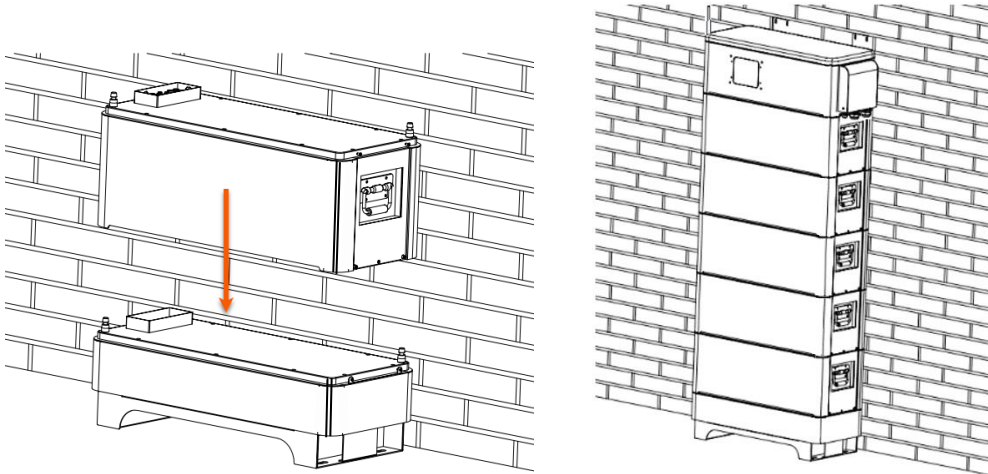


- Use the BBM (Battery Base Module) as a template to mark the edge of the BBM and 4-hole positions of the BBM on the floor as the diagram.

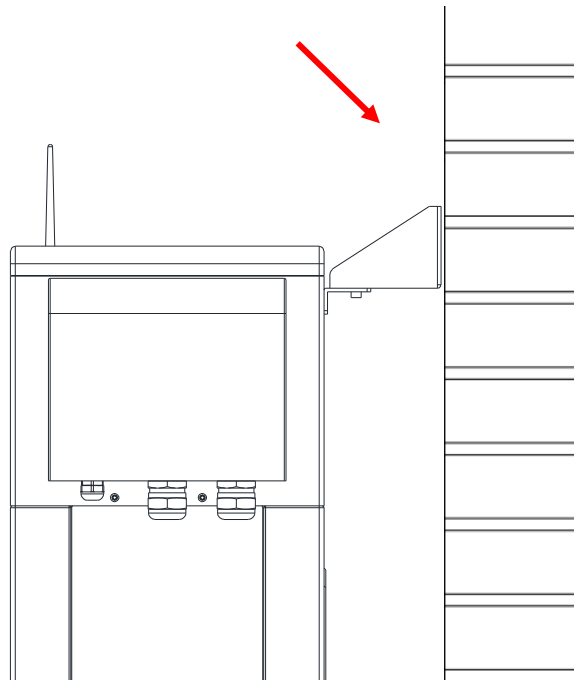


4. Commissioning

- Remove the BBM, and Drill holes with $\phi 12$ driller, make sure the holes are deep enough (at least 60mm for installing and tightening the expansion bolts).
- Install the expansion bolts into the floor, then put back the BBM as the marked edge, and tighten the screws.
- Install the BM (Battery Module) onto the BBM one by one and the MCM (Main Control Module) as the diagram.
-

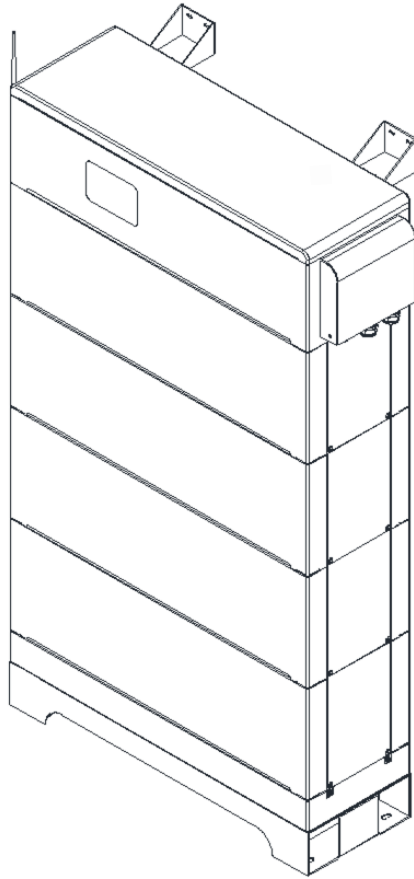


- Adjust the hanging board as it's appropriate location as the following diagram.
- Use the current hanging boards as the templates to mark the hole position, then remove the MCM and use the paper or cloth to cover the BM, and drill holes with $\phi 6$ driller, make sure the holes are deep enough (at least 60mm for installing and tightening the expansion bolts).



4. Commissioning

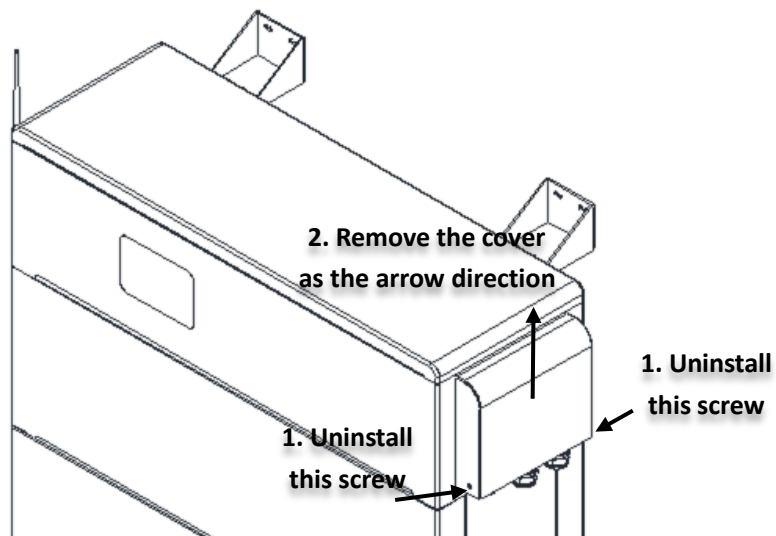
- install the expansion bolts into the wall, reinstall the MCM back to its position and tighten the screw to fix the Power Matrix with the wall.
- Install the connection board between the BBM and the BM and install all the connection board one by one as following diagram.



Step 2: Uninstall the interface cover

After the Step 1 finished, the Power Matrix battery was installed at its location, uninstall the interface panel cover before start next step

4. Commissioning



Step 3: Power Matrix Dial Switch setting

Set the Dial switch according to the role of the battery pack (The Dial switch is on the interface panel which at the bottom of the battery pack) first.

A. Set the Function Set refer to the Function SET reference table.

The Function Dial Switch used for Hardware communication impedance matches. FUN SET refer to the picture below. The setting will be active only after restart the battery.

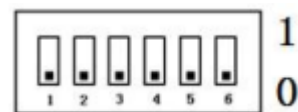
Table 7: Function SET reference table

The Role of the Device	#1	#2	#3	#4	#5	#6
Single Mode	0	0	0	0	0	0

B. Set the Addr SET switch refer to the ADDR SET Reference table.

The Address Dial Switch used for Hardware address configure.

ADD Switch: 6 ADD switches, "0" and "1", refer to picture right.



The settings will be active only after restart the battery. When the battery communicates with the inverter, the address of the battery pack must be set to 1.





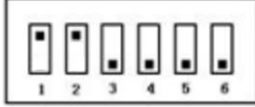

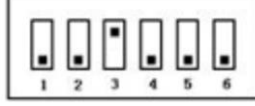

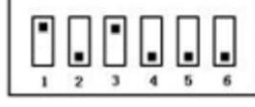

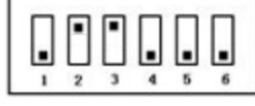

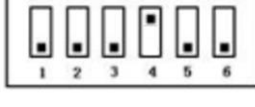

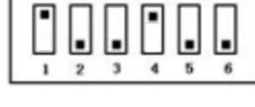

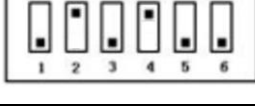

Table 8: Addr SET Dial Switch reference table.

Address Coding	Dial Code Switch Position						Definition
	#1	#2	#3	#4	#5	#6	
1	1	0	0	0	0	0	Set the master battery, and the inverter communicates with the battery at that address

C. Set the INV.set switch refer to the INV.set Reference table.

4. Commissioning

Table 9: INV.set Dial Switch reference table

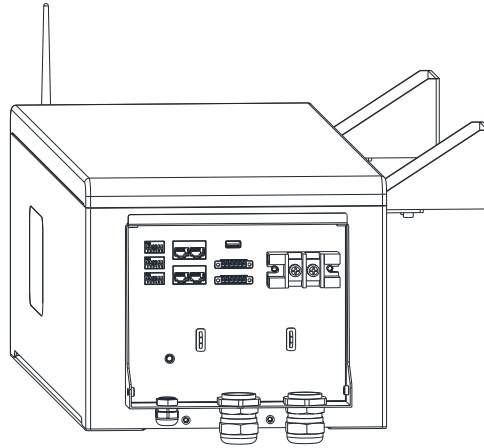
Brand	Type	ID	INV. set Position	Communication Switch Box Position	Comm Mode
KOYOE	High Voltage	1	 1 0		CAN
ThinkPower	High Voltage	2	 1 0		CAN
INVT	High Voltage	3	 1 0		CAN
SerMatec	High Voltage	4	 1 0		CAN
Sol-ark	High Voltage	5	 1 0		CAN
Goodwe	High Voltage	6	 1 0		CAN
Solis	High Voltage	8	 1 0		CAN
Deye	High Voltage	9	 1 0		CAN
ATESS	High Voltage	10	 1 0		CAN

3.8. Cable Connection

3.8.1. Communication Cable Connection

- There are three holes on the MCB for the cable go through

4. Commissioning



- Connect the communication cable from the **Invert.COM** port to the Inverter's Communication port.

3.8.1.1. Invert Port---Communication with Inverter (RS485 & CAN) Interface

Device supply Inverter communication connection: RS485 & CAN Interface. CAN/RS485 communication port: (RJ45 port) follow CAN protocol and RS485 protocol, for output batteries information, the battery uses this interface to communicate with external inverters, PCS, and other devices.

Port Definition		PIN number	PIN Definition
		1	RS485_B
		2	RS485_A
		3	RS485-GND
		4	CAN-GND
		5	CAN-GND
		6	RS485-GND
		7	CAN_H
		8	CAN_L

3.8.1.2. LINK-IN & LINK-OUT---Communication Port (Function Reserved)

3.8.2. Communication Switch Box Connection

Dial Switch Definition		Area Number	Area Definition
		1	INV COM
		2	BAT COM
		3	CAN DIP switch
		4	RS485 DIP switch

- The communication DIP switch is applied for both CAN and RS485 communication protocol of

4. Commissioning

various inverter band. Each DIP switch has three level. Before any start-up, set CAN & RS485 DIP switch to NC, the middle of CAN high & low and RS485 A & B. If any update or conflict description of inverter PIN order and Kowint battery's, please contact Kowint FAE for further help.

3.8.3. Power Connection

Before connecting the power cable, make sure the inverter and all of the batteries in Power OFF status.

Step 1: Connect the power cables to the Inverter or the batteries

The default length of power cables are 2 meters, if the actual installation environment needs longer power cable, the customer can use the power connectors in the packing list to made the longer power cables.

Step 2: Connect the power cable between the batteries.

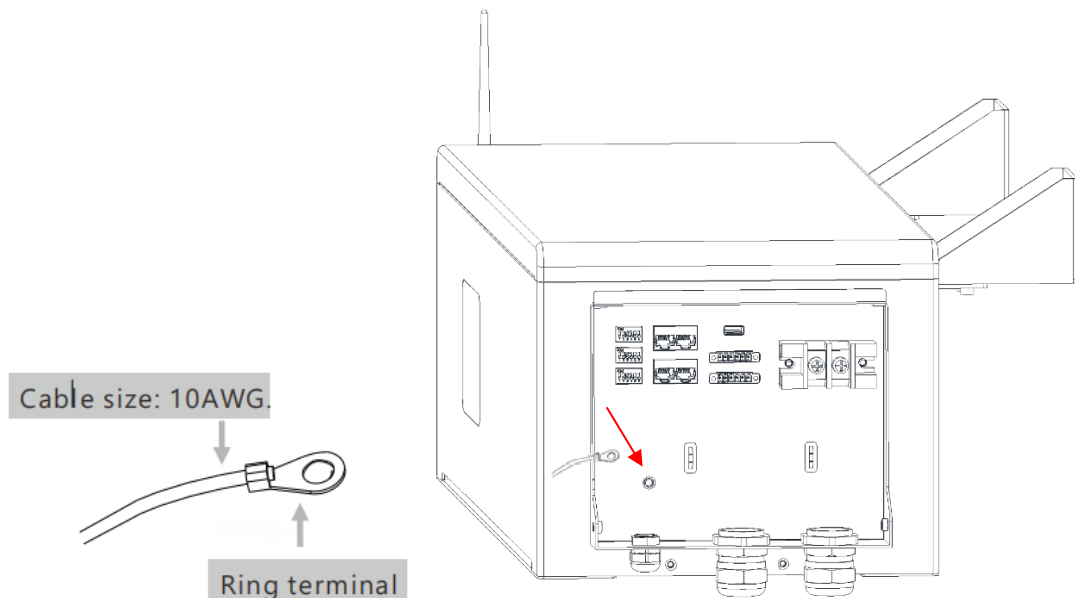
connect the Positive cable & Negative cables to the inverter's Positive Pole & Negative Pole.

3.8.4. Ground Wire connection

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

Cable size: 10AWG.

Connect the ground wire to the Ground terminal on the Base module right side, and tight the Nut with the Socket Nut wrenches. Connect the other side to the grounding.

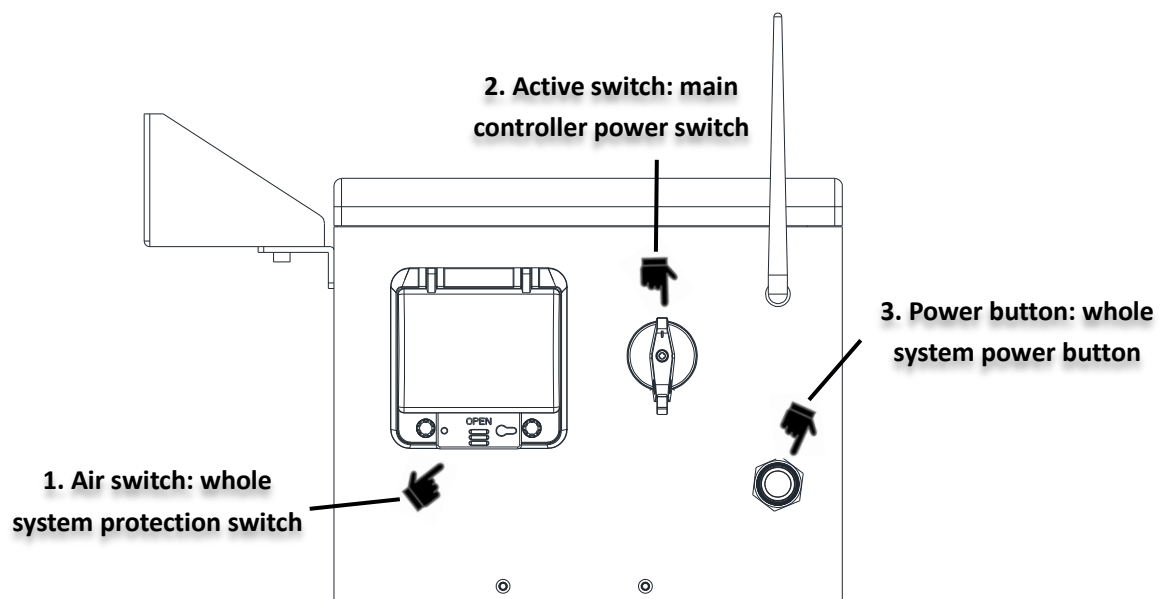


4. Commissioning

4.1. Commissioning Steps

After all the battery packs are installed, follow these steps to put it into operation.

- Verify the batteries communication cable connection is correct.
- Verify the batteries power connection on the left side is correct.
- Verify the batteries dial switch setting is correct.
- Verify the inverter Power button status is OFF.
- Start the Air Switch on the Main Controller Module to activate product short-circuit protection, surge current protection, over-low voltage protection etc..
- Power ON the Active switch (clockwise rotate) to supply power for main controller system.
- Press the Power button on the main controller module to supply power for all batteries.
- Check the battery screen to confirm the batteries working normal.
- Press the Power button on the master battery to turn on all of the batteries.
- Power OFF Active switch (counterclockwise rotate) following by the initial launch steps above.
- Power ON inverter and other high voltage systems.



4.2. WIFI Configuration

Antenna connection port is recommended to fasten tight before WIFI configuration, since the antenna is critical for a communication receive in and send out quality. For details, please refer to the figure below.

4. Commissioning

Step 1: Download the Kowint APP on phone

Search the keyword “Kowint” from AppStore on iPhone or Google Play on Android phone, download APP and finish installation. Once the APP installation is successful, user can see the “Kowint” APP logo shown on the right. If users fail to upgrade the latest APP version or to install the APP on phone, please contact Kowint technical support for advice.



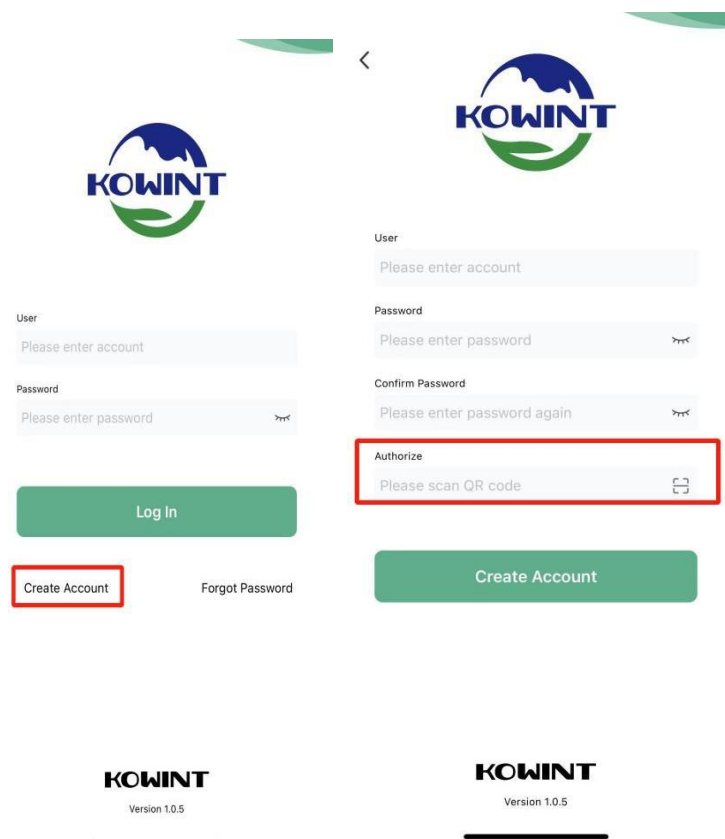
Step 2: Create APP user account

Click Create Account button and type in account and password, then scan the QR code provided by the installer, finally click the Create Account button shown in the picture on the right and type in the account and password you just created to log in.

Step 3: Create AP for APP parameter settings

Prepare a new or existed WIFI from a hotspot, router or other telecommunication equipment that generates a specialized wireless network functioned as an AP (internet access is not mandatory).

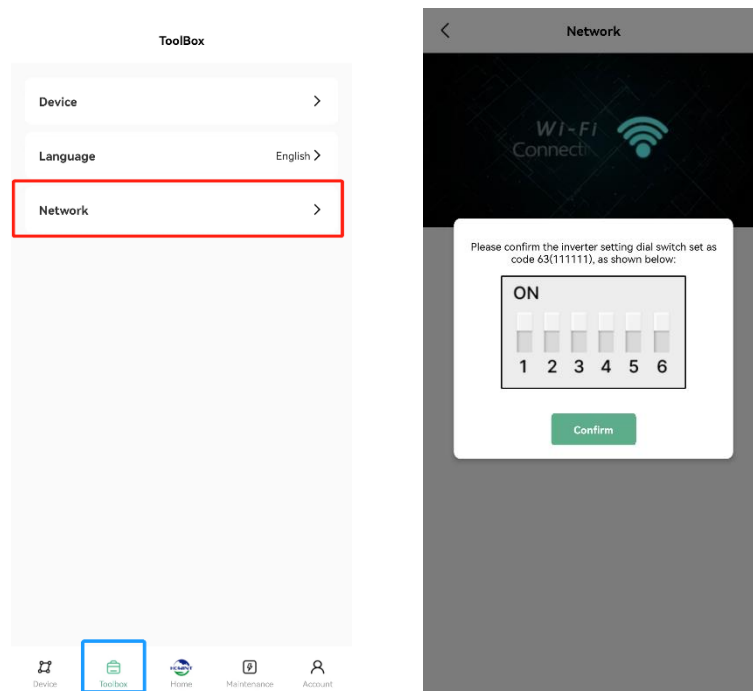
P



Step 4: Inverter Set dial code setting before AP connection

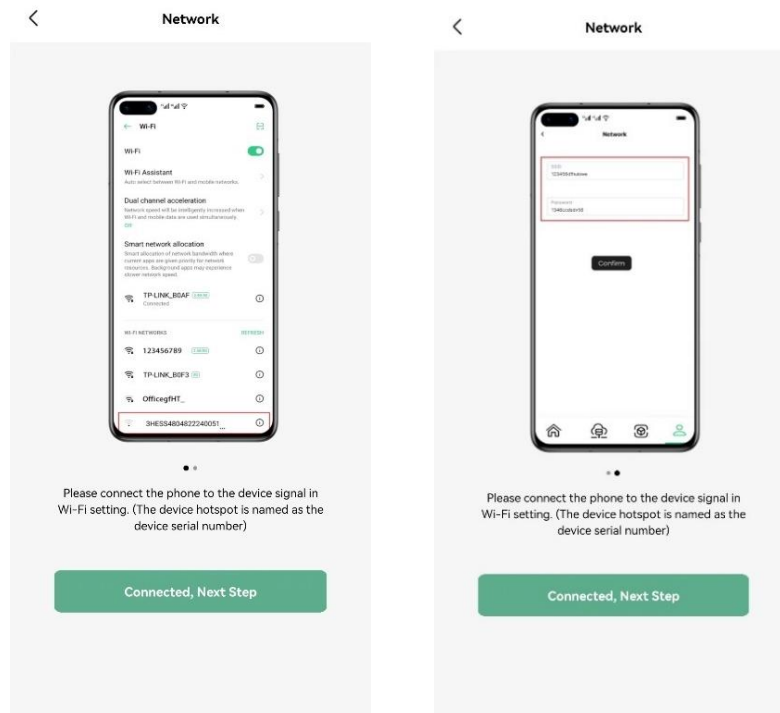
Click the phone APP Toolbox – Network on screen, and confirm to connect while the inverter setting dial switch set as code 63 (Invert. Set dial 111111) as the figure shown below. Also, users need to turn on GPS location information in order to use a nearby WIFI list.

4. Commissioning



Step 5: Pairs WIFI SSID & Password from battery product

Find the battery SSID that includes the battery SN code shows on the product information label. Normally, the default password is 12345678. If users have troubles to connect the product WIFI, please contact Kowint FAE for further help.



4. Commissioning

Step 6: Send Private WIFI SSID & Password to battery product on APP

Type the private Wi-Fi name in SSID and type in the password of user's private Wi-Fi, after this step, click confirm. If it returns to the main interface after clicked confirm, it will indicate that Wi-Fi get configured successfully (send once only). Please be aware that WIFI SSID and password setting is not recommended to use special signal @, #, \$ etc.

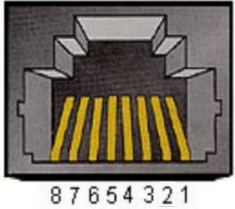
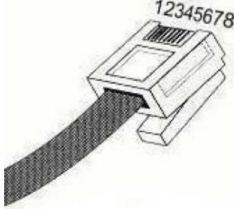
Step 7: Check the current situation of added devices

Select the device in the HOME interface to view the corresponding current data of the device.

5. Appendix

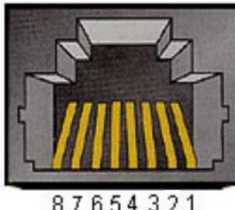
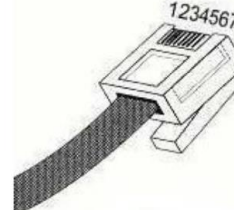
5.1. DEBUG Interface

The COM communication port: (RJ45 port) combined with CAN protocol, for manufacturers or professional engineers debugging or service.

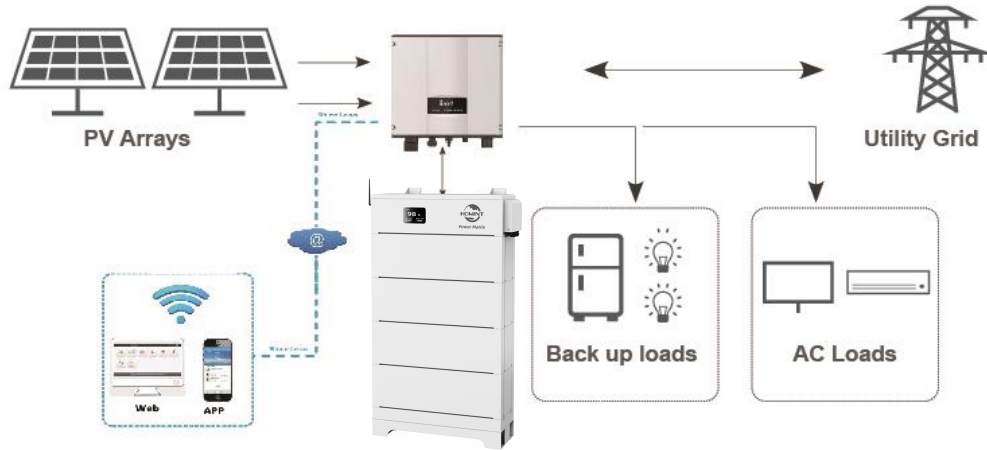
Port Definition	PIN number	PIN Definition
 	1	CAN_L
	2	CAN_H
	3	CAN-GND
	4	CAN-GND(LCD)
	5	CAN-GND(LCD)
	6	CAN-GND
	7	CAN_H(LCD)
	8	CAN_L(LCD)

5.2. LINK-IN & LINK-OUT Interface

The Console interface comply with RS485 and CAN protocol for manufactures or professional engineers debugging or service. Functions and ports are temporary reserved at present.

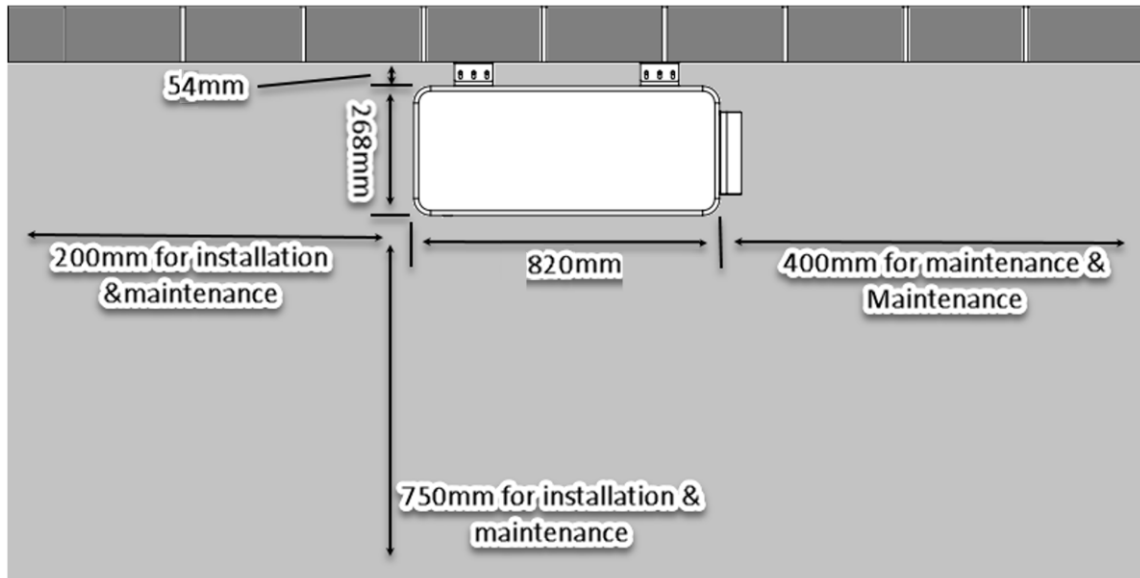
Port Definition	PIN number	PIN Definition
 	1	RS485-B
	2	RS485-A
	3	RS485-GND
	4	CAN-GND
	5	CAN-GND
	6	RS485-GND
	7	CAN_H
	8	CAN_L

5.3. Product Application



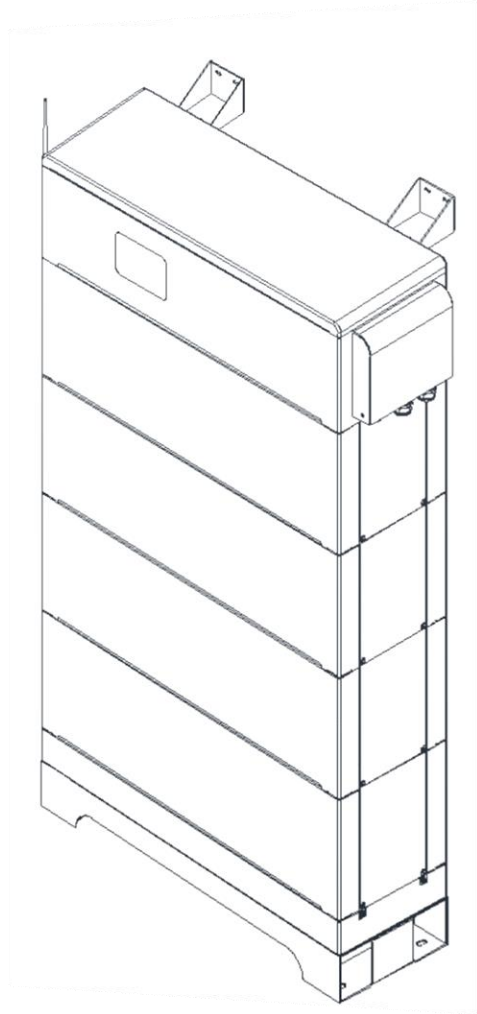
5.4. Space Requirement & Office Layout

The Power Matrix series product is floor mounted installed; it requires the following minimum site footprint:





Your Green Energy Manufacturer



KOWINT ENERGY (SHENZHEN) CO. , LTD

Version: A03
27 June 2023

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