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**CHAKRA 2.5-H**  
**PRODUCT DESCRIPTION**

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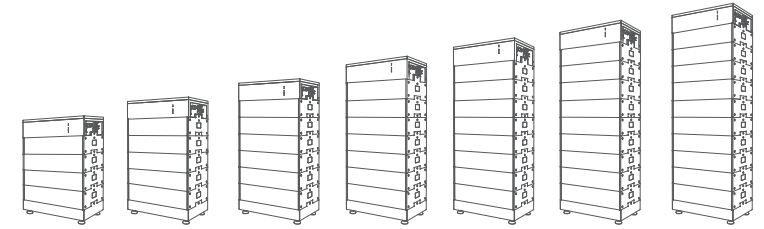
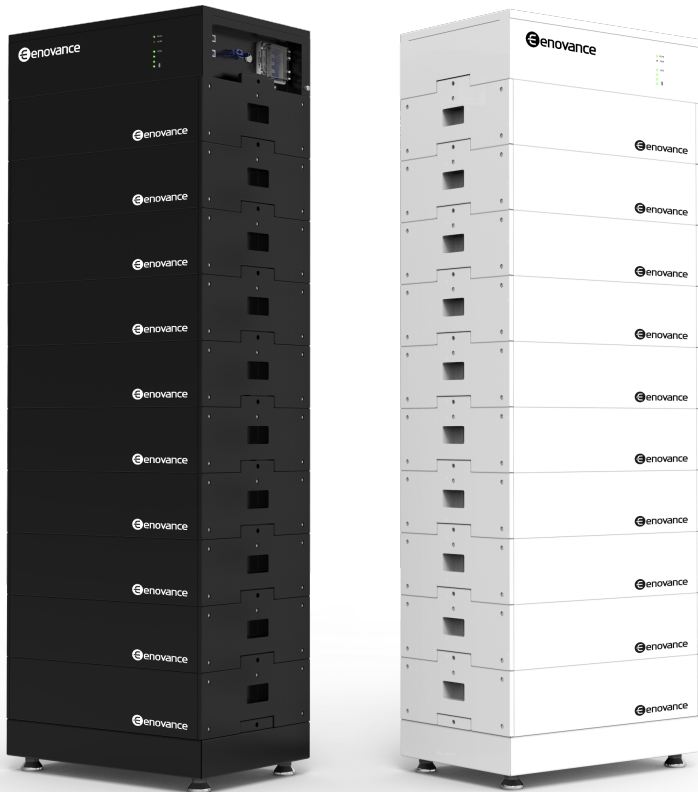
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## TECHNICAL DATA

### NOTE

Operating current derating according to cell voltage and battery temperature.



Model	CHAKRA 2.5 – H4	CHAKRA 2.5 – H5	CHAKRA 2.5 – H6	CHAKRA 2.5 – H7	CHAKRA 2.5 – H8	CHAKRA 2.5 – H9	CHAKRA 2.5 – H10
<b>Performance</b>							
Battery Module No.	4	5	6	7	8	9	10
Nominal Voltage	204.8V	256V	307.2V	358.4V	409.6V	460.8V	512V
Nominal Capacity	50 Ah						
Nominal Energy	10.0 kWh	12.5 kWh	15.0 kWh	17.5 kWh	20.0 kWh	22.5 kWh	25.0 kWh
Charge Voltage	222.72~224.64 V	278.4~280.8 V	334.08~336.96 V	389.76~393.12 V	445.44~449.28 V	501.12~505.44 V	556.8~561.6 V
Discharge Voltage	182.4~224.64 V	228~280.8 V	273.6~336.96 V	319.2~393.12 V	364.8~449.28 V	410.4~505.44 V	456~561.6 V
Nominal Charge / Discharge Current	25 A (0.5C)						
Max Charge / Discharge Current	50 A (1C)						
Nominal Charge / Discharge Power	5000 W	6250 W	7500 W	8750 W	10000 W	11250 W	12500 W
Max Charge / Discharge Power	10000 W	12500 W	15000 W	17500 W	20000 W	22500 W	25000 W
<b>Communication</b>							
Display	SOC status indicator, LED indicator						
Communication	RS232、RS485、CAN						
<b>General Specification</b>							
Dimension( W×D×H mm )	560×359×815mm	560×359×950mm	560×359×1085mm	560×359×1220mm	560×359×1355mm	560×359×1490mm	560×359×1625mm
Weight (Kg)	160 kg	190 kg	220 kg	250 kg	280 kg	310 kg	340 kg
Installation	Floor stand						
Working Temperature	-20 C ~ 60 C						
Storage Temperature	≤25 C,12 months; ≤35 C,6 months; ≤45 C,3 months						
Operating / Storage / humidity	≤ 95%RH						
Max Operating Altitude	≤2000m						
IP Rating	IP20						
Cell Technology	LiFePO4, Lithium Iron Phosphate						
Cooling	Natural convection						
Cycle life	6000 Cycles @ 80% DOD / 25 C / 0.5C, 60% EOL						
Scalability	Max 10 modules per stack, 4 stacks in parallel						
<b>Standard Compliance</b>							
Certification	UN38.3、IEC62619、IEC62040-1(more available upon request)						
<b>Ordering and Deliverable Part</b>							
Product ordering part	CHAKRA 2.5 H battery module CHAKRA 2.5 H base and control box						

## PRODUCT OVERVIEW

### 2.1 Brief Introduction



PRODUCT OVERVIEW

CHAKRA 2.5-H is a high-voltage lithium battery consisting of 4-10 pcs battery modules (51.2V / 50AH) and one BCU (Battery Control Unit) in series with an operating voltage range between 180V—700V. It is designed for commercial / industrial energy storage applications and works together with a high battery voltage hybrid inverter. **CHAKRA 2.5-H is not suitable for supporting life-sustaining medical devices.**

CHAKRA 2.5-H has built-in BMS (Battery Management System, include master BMS in BCU and slave BMS in battery modules), which can manage and monitor cells information including voltage, current and temperature. Besides that, BMS can balance cells charging to extend cycle life. BMS has protection functions including over-discharge, over-charge, over-current and high/low temperature; the system can automatically manage charge state, discharge state and balance state.

CHAKRA 2.5-H have internal soft-start circuit, so CHAKRA 2.5-H can support inverter without soft-start function.

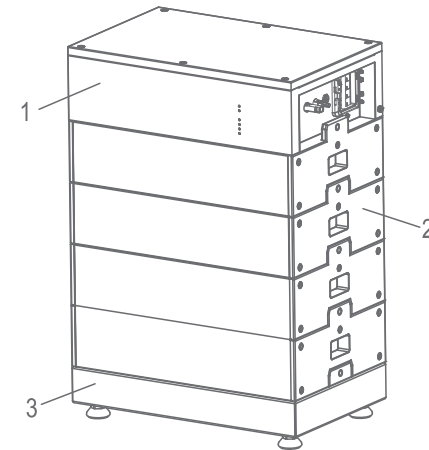
Multiple CHAKRA 2.5-H can be connected in parallel to expand capacity and power. 4 CHAKRA 2.5-H can be connected in parallel at most, for example, connect 4 x CHAKRA 2.5-H10 in parallel to get a 100kWh battery system.

CHAKRA 2.5-H supports independent charging. When multiple CHAKRA 2.5-H are connected in parallel, after one CHAKRA 2.5-H is fully charged, inverter can keep charging other CHAKRA 2.5-H until all CHAKRA 2.5-H are fully charged.

CHAKRA 2.5-H support black start function while working with compatible inverters.

### 2.2 Battery System Overview

CHAKRA 2.5-H consist of base, battery modules connected in series and BCU (Battery Control Unit).

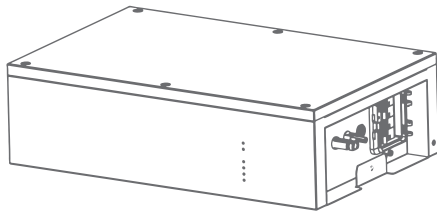


NO.	Definition
1	BCU (Battery Control Unit)
2	Battery Module
3	Base



## 2.3 BCU

BCU include master BMS, Breaker, DC fuse, Soft-start circuit, Charge circuit, Discharge circuit, parallel independent charge control circuit and 12V DC/DC power supply module. Master BMS controls charge voltage/current and discharge voltage/current according to the cell voltage and temperature provided by slave BMS in battery modules. Master BMS communicate with PCS through CAN communication.



Parameters	Specification
Nominal Voltage	180V—750V
Nominal Current	25A
Maximum Current	30A
Working Temperature	-20°C~60°C
Environmental humidity	≤95%RH
Protection Class	IP20
Cooling	Natural
Weight(kg)	11 kg
Dimension(W*H*D)	560*360*143 mm
Communication	CAN / RS232
Certificates	IEC62619、IEC62040-1、 SAA etc.

## 2.3.2 LED Indicator Definition



Note:

flash 1 - 0.25s light / 3.75s off

flash 2 - 0.5s light / 0.5s off

flash 3 - 0.5s light / 1.5s off

LED Indicators Instructions

Status	L5		L4	L3	L2	L1	Descriptions	
Shut down	OFF	OFF	OFF	OFF	OFF	OFF	All OFF	
Standby	Flash 1	OFF	According to the battery level				Indicates Standby	
Charging	Normal	Light	OFF	According to the battery level				The highest capacity indicator LED flashes(Flash 2), others lighting
	Full Charged	Light	OFF	Light	Light	Light	Light	Turn to standby status when charger off
	Protection	OFF	Light	OFF	OFF	OFF	OFF	Stop charging
Discharge	Normal	Flash 3	OFF					
	UVP	OFF	OFF	OFF	OFF	OFF	OFF	Stop charging
	Protection	OFF	Light	OFF	OFF	OFF	OFF	Stop discharge
Fault	OFF	Light	OFF	OFF	OFF	OFF	OFF	Stop charging and Discharge

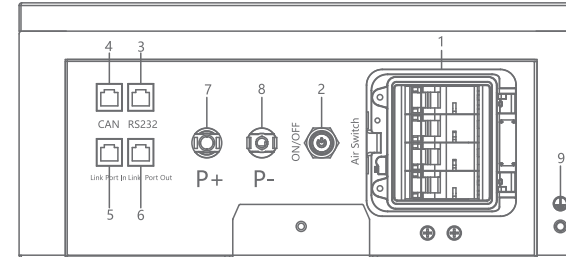
### Charging Battery Level Indicators Instructions

Status		Charging				
Battery Level Indicator		L5	L4	L3	L2	L1
Battery Level (%)	0 ~ 25%	Light	OFF	OFF	OFF	Flash 2
	26 ~ 50%		OFF	OFF	Flash 2	Light
	51 ~ 75%		OFF	Flash 2	Light	Light
	75 ~ 100%		Flash 2	Light	Light	Light
	Full Charged		Light	Light	Light	Light

### Discharging Battery Level Indicators Instructions

Status		Discharge				
Battery Level Indicator		L5	L4	L3	L2	L1
Battery Level (%)	0 ~ 25%	Flash 3	OFF	OFF	OFF	Light
	26 ~ 50%		OFF	OFF	Light	Light
	51 ~ 75%		OFF	Light	Light	Light
	75 ~ 100%		Light	Light	Light	Light

### 2.3.3 Port Definition



No.	Items	No.	Items
1	Power Switch	6	BCU Link Port Out
2	ON/OFF Button	7	P+
3	RS232 Port	8	P-
4	CAN Port	9	GND
5	BCU Link Port In		

#### 2.3.3.1 Power Switch

Main MCB: Switch ON /OFF CHAKRA 2.5-H.

#### 2.3.3.2 ON/OFF Button

After switch ON the Power Switch, long press ON/OFF Button to switch ON/OFF CHAKRA 2.5-H.

#### 2.3.3.3 BCU Link Port / CAN Port

BCU Link Port In / Link Port Out / CAN port communication follow CAN protocol, for communication between batteries and PCS.

#### 2.3.3.4 RS232 Port

RS232 Communication Terminal (RJ45 port) follow RS232 protocol, for manufacturer or professional engineer to debug or service.

PIN	Definition
Pin 1、 PIN 8	GND
Pin 2、 PIN 7	RS232_TX
Pin 3、 PIN 6	RS232_RX

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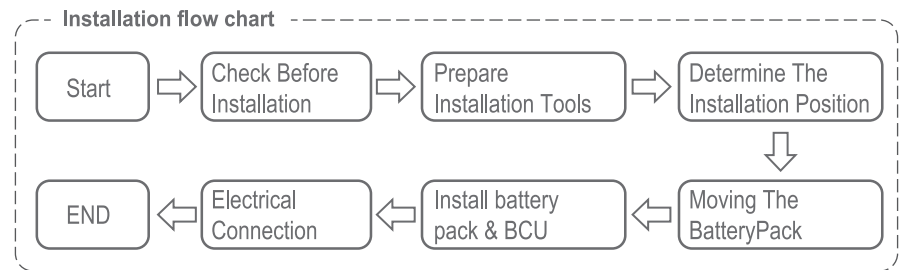
## INSTALLATION GUIDE

### 2.4 Battery Module

Battery module include 51.2V/50AH battery unit and slave BMS. The slave BMS collects the cell voltage and temperature of the battery unit in real time and send these message to the master BMS through internal communication.

Slave BMS integrate cell balance circuit, which can balance cell capacity according to the control instructions of Master BMS.

Parameters	Specification
Battery Type	LiFePO4, Lithium Iron Phosphate
Nominal Voltage	51.2V
Nominal Capacity	50Ah
Nominal Energy (100%DOD)	2.5 KWh
Usable Energy (90%DOD)	2.25 KWh
DOD	< 90%
Nominal Charging Current	25A
Maximum Charging Current	30A
Nominal Discharge Current	25A
Maximum Discharge Current	30A
Working Temperature	-20 ℃ ~60 ℃
Environmental humidity	≤95%RH
Protection Class	IP20
Cooling	Natural
Weight(kg)	30 kg
Dimension(W*H*D)	560*360*135 mm
Certificates	IEC62619、UN38.3、IEC62040-1、SAA etc.
Cycle Life	6000 cycles @ 80% DOD / 25 ℃ / 0.5C 60% EOL



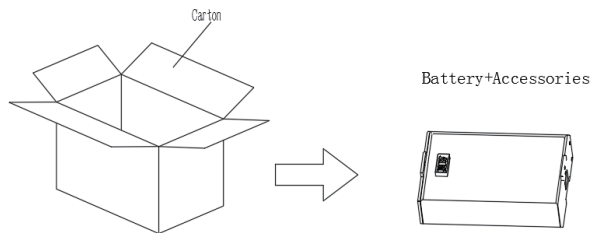
### 3.1 Checking Before Installation

#### 3.1.1 Checking Outer Packing Materials

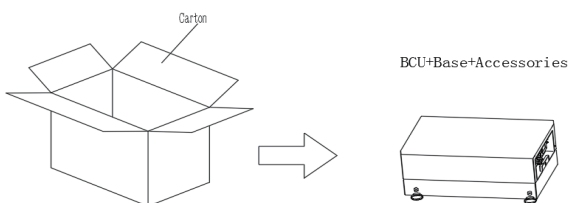
Packing materials and components may be damaged during transportation. Therefore, check the outer packing materials before installing the battery. Checking the surface of packing material for any damage, such as holes and cracks. If any damage is found, do not unpack the battery and contact the dealer as soon as possible. Remove the packing materials within 24 hours before installing the battery.

#### 3.1.2 Checking Deliverables

After unpacking the battery, check whether deliverables are intact and complete. If any damage is found or any component is missed, contact the dealer. The below table show the components that should be delivered.















Battery			
NO.	Pictures	Quantity	Description
1		1PCS	Battery
3		2PCS	M5*10
4		1PCS	Test report
5		1PCS	Certificate



BCU + Base			
NO.	Pictures	Quantity	Description
1		1PCS	BCU
2		1PCS	Base
3		1PCS	Matching resistor
4		1PCS	Metal in BAT+ connector
5		1PCS	Metal in BAT- connector
6		1PCS	BAT+ connector
7		1PCS	BAT- connector
8		4PCS	support leg
9		1PCS	Mounting Bracket
10		1PCS	backboard
11		3PCS	M5*12
12		4PCS	M6*60 Expansion bolts
13		1PCS	Manual
14		1PCS	Test report
15		1PCS	Certificate

### 3.2 Tools

Tools			
Installation	Knife 	Hammer drill (10mm) 	Socket wrench (10mm) 
	Rubber mallet 	Cross Screwdriver 	Marker 
	Inclinometer 	Measuring tape 	
Protection	ESD gloves 	Safety goggles 	Anti-dust respirator 
	Safety shoes 		

### 3.3 Installation requirements

#### 3.3.1 Installation environment requirements

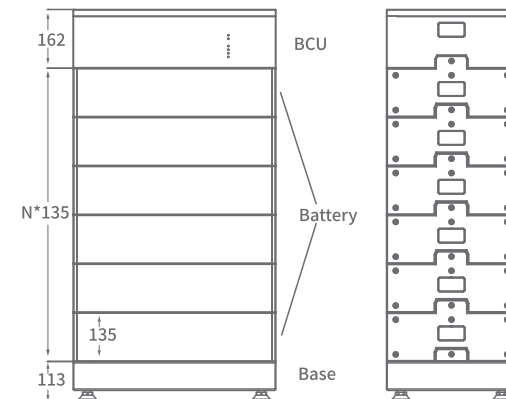
- Install the battery in the indoor environment.
- Place battery in secure location away from children and animals.
- Do not place the battery near any heat sources and avoid sparks.
- Do not expose the battery to moisture or liquids.
- Do not expose the battery to direct sunlight.

#### 3.3.2 Installation carrier requirements

- Only mount battery on fire resistant building. Do not install batteries on flammable buildings.
- Battery is quite heavy, make sure the wall/ground can meet the load bearing requirements.

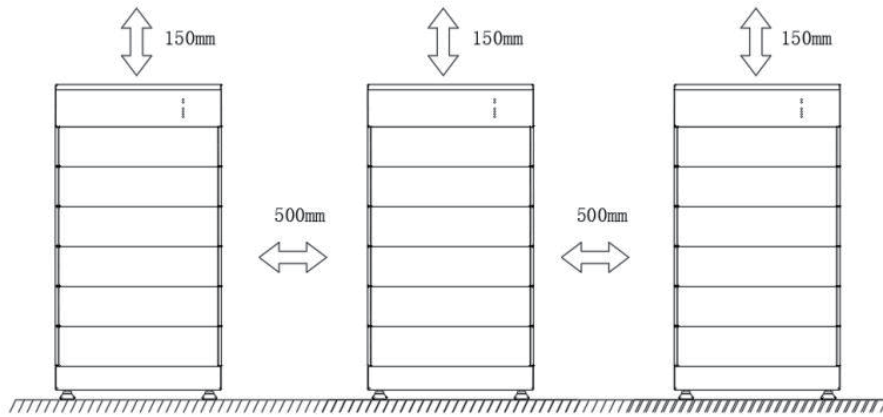
### 3.4 Installation Instructions

#### 3.4.1 Dimensions



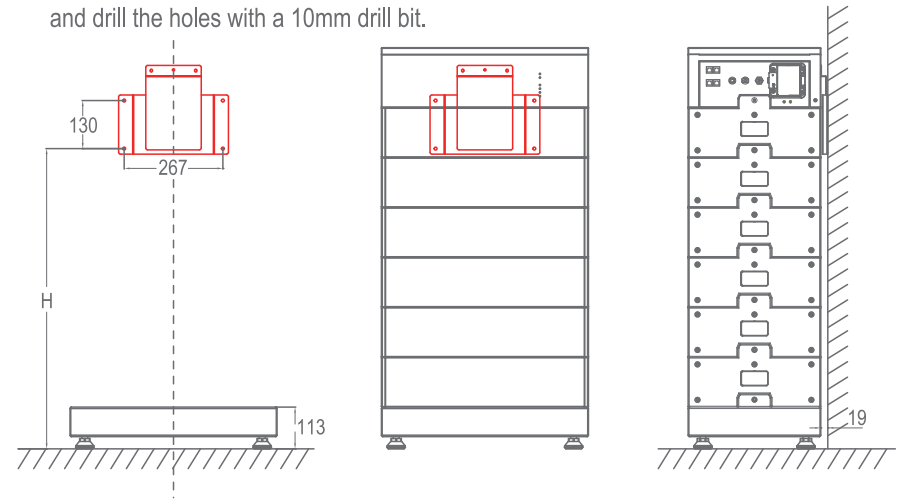
Battery(N)	H(mm)	Weight(Kg)
4	815	164
5	950	194
6	1085	224
7	1220	254
8	1355	284
9	1490	314
10	1625	344

Minimum mounting interval:



### STEP 3

If battery module is more than 5 (include 5), mounting bracket shall be installed. Position the holes according to the number of modules (5-10PCS) and drill the holes with a 10mm drill bit.

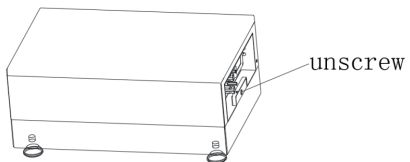


Battery	5	6	7	8	9	10
H(mm)	678	813	948	1083	1218	1353

### 3.4.2 Installation Step

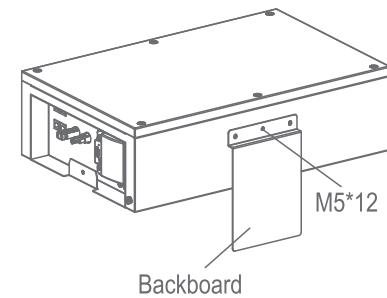
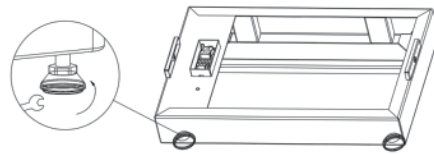
#### STEP 1

Unscrew and separate BCU and base.



#### STEP 2

Adjust the level of the base with a Level Ruler.



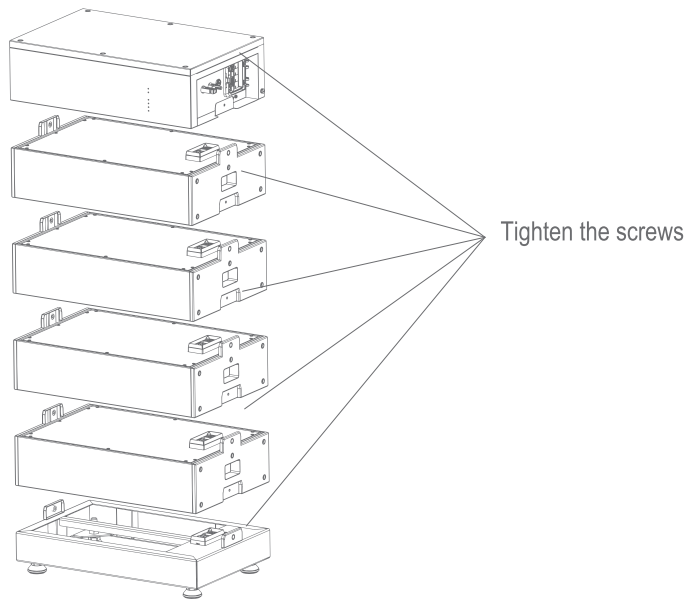


#### STEP 4

Install the b-atteries.

Tighten the screws to lock the battery module before installing next battery module.

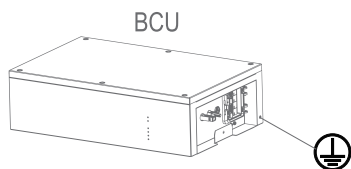
Please install the battery modules one by one.



#### STEP 5

Ground connection.

Connect PE line from BCU to ground.



#### STEP 6

Electrical connections.

##### 1、 Prepare power cable

You are advised to use the EV power cable with size 6mm<sup>2</sup> or 9AWG (1500V, 25A) and length min.1500mm.

<p>1 8-10 mm 2 8-10 mm</p>	<p>crimping tool</p>	<p>3 4 Click</p>
<p>1 2</p> <p>1: Positive metal contact 2: Negative metal contact</p>	<p>2</p>	<p>3 4</p> <p>3: Positive connector 4: Negative connector</p>
<p>MC4 Wrench</p>		
<p>4</p>	<p>5</p>	<p>6</p> <p>Connect to BCU</p>
		<p>7</p> <p>Disconnect connectors</p>

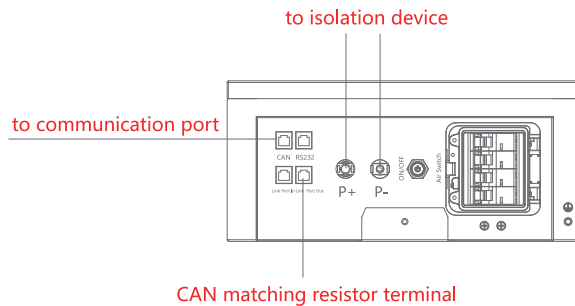
## 2. Prepare CAN communication cable

Refer to the following BCU CAN communication cable definition, according to the different inverter communication port definition, make corresponding communication terminal on site.

BCU CAN communication cable definition:

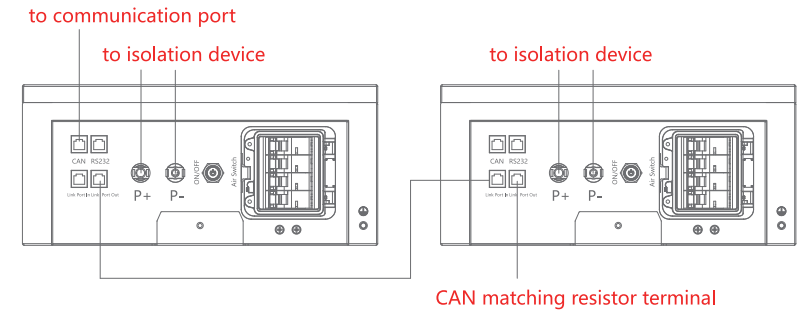
PIN	Definition
Pin 4	CAN_H
Pin 5	CAN_L

## 3. Single CHAKRA 2.5-H electrical connection



- Ⓐ Connect Power cable  
Connect P+|P- power cable from BCU to isolation device.  
Note: Reverse connection prohibited!
- Ⓑ Connect CAN communication cable  
Connect CAN cable from BCU CAN port to PCS communication port.
- Ⓒ Connect CAN matching resistor terminal  
Connect CAN matching resistor terminal to BCU Link Out.

## 4. Multiple CHAKRA 2.5-H in parallel electrical connection



**NOTE: BCU1 is BCU of 1st CHAKRA 2.5-H; BCU2 is BCU of 2nd CHAKRA 2.5-H, and so on.**

- Ⓐ Connect Power cable  
Connect P+|P- power cable from BCU to isolation device.  
Note: Reverse connection prohibited!
- Ⓑ Connect CAN communication cable  
Connect CAN cable from BCU1 CAN port to PCS communication port.
- Ⓒ Connect parallel communication cable  
Connect parallel communication cable from BCU1 Link Out to BCU2 Link In.
- Ⓓ Connect CAN matching resistor terminal  
Connect CAN matching resistor terminal to BCU2 Link Out.

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## STEP 7

Switch ON/OFF CHAKRA 2.5-H

Note: Before Switch ON Power Switch, double check all power cables and communication cables are properly connected.

### 1、Single CHAKRA 2.5-H

A、 Switch ON BCU power switch;

B、 Switch ON/OFF CHAKRA 2.5-H.

1、 Switch ON CHAKRA 2.5-H: Press ON/OFF button more than 3s, LED will light from L5 to L1, and then enters to automatic coding while all LED lights(L5 lights as purple). After finished automatic coding, L1 to L4 shows the normal capacity, and L5 shows the running status

2、 Switch OFF CHAKRA 2.5-H: Press ON/OFF button more than 3s, LED will light from L1 to L5, then CHAKRA 2.5-H will switch OFF, then Switch OFF the Power Switch.

### 2、 Multiple CHAKRA 2.5-H in Parallel

A、 Switch ON power switch of BCU1 and BCU2;

B、 Switch ON/OFF the battery system.

1、 Press ON/OFF button of BCU1 more than 3s, LED will light from L5 to L1, and then enters to automatic coding(assign BCU address and battery pack address) while all LED lights(L5 lights as purple). After finished automatic coding, L1 to L4 shows the normal capacity, and L5 shows the running status.

2、 Switch OFF the battery system: Press ON/OFF button of BCU1 more than 3s, LED will light from L1 to L5, then the battery system will switch OFF, and then switch OFF the Power Switch.

NOTE:

1、 After switching OFF battery system with ON/OFF button (Power Switch still ON), the battery system can be activated by charging the battery.

2、 The battery need to be fully charged for SOC calibration when it's switched ON for the first time.

## MAINTENANCE

### 4.1 Battery storage

Batteries should be stored in an environment with a temperature range between -10 °C ~ +45 °C , and maintained regularly according to the following table with 0.5C (25A) current until 40% SOC after a long time of storage.

Recharge conditions when in storage			
Storage Environment Temperature	Relative Humidity of Storage Environment	Storage Time	SOC
Below -10 °C	/	prohibit	/
-10~25 °C	5%~70%	≤12 months	30%≤SOC≤60%
25~35 °C	5%~70%	≤6 months	30%≤SOC≤60%
35~45 °C	5%~70%	≤3 months	30%≤SOC≤60%
Above 45 °C	/	prohibit	/

### 4.2 Recharge Requirements When Over Discharged

Please recharge the over discharged batteries (90%DOD) in a timeframe according to the following table, otherwise the over discharged battery modules will be damaged.

Recharge conditions when battery is over discharged		
Storage Environment Temperature	Storage Time	Note
-10~25 °C	≤15 days	Battery Pack disconnected from PCS
25~45 °C	≤7 days	

### 4.3 Replacement or expand capacity

#### Important:

Installation and maintenance of CHAKRA 2.5-H can only be performed by professional electricians.

#### Attention:

High Voltage Battery Storage! Improper handling can cause danger and damage.

This section describes how to remove or add battery modules to an existing CHAKRA 2.5-H system. Please keep in mind limits of number of modules (4-10).

SOC of new module and old module from existing battery system should be similar before connection.

#### 4.3.1 Remove modules

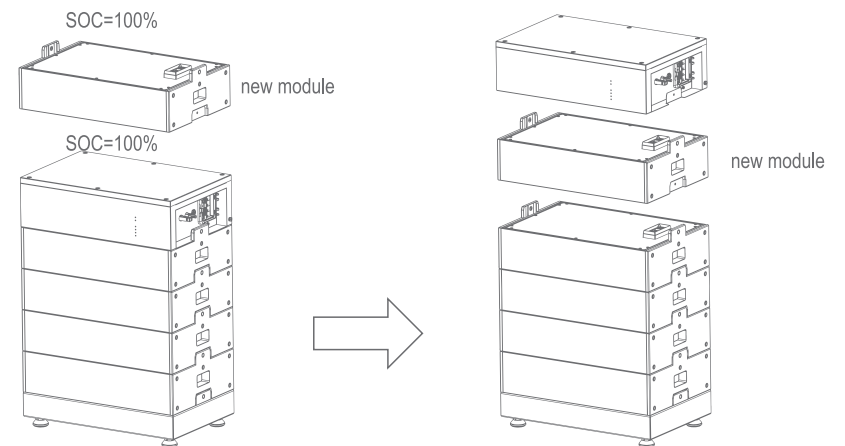
- 1、 Before replacement or expand capacity, please switch off the whole system, include PCS and Battery system
- 2、 Disconnect PCS from power grid, switch off the battery power supply and disconnect the connection between battery and inverter.
- 3、 Remove modules refer to section 3.4.2.

#### 4.3.2 Replace or extend modules

Battery modules can be replaced or extended when needed.

SOC of existing system and module to be added should be similar before connection.

- 1、 Charge the new module to 100% SOC with a charger (charge voltage is 56.16Vdc / 25A, cut off when current is less than 2.5A), and charge the existing system to 100% SOC.



- 2、 Refer to Section 4.3.1 to remove CHAKRA-BCU or remove modules that need to be replaced.
- 3、 Add the new module on top of other battery modules.
- 4、 Install battery system refer to section 3.4.2.
- 5、 The battery system is ready to work. The SOC values of the modules will equalize themselves over several cycles.