
Narada[®]

An Expert of Energy Storage Solutions.

Narada Lithium-ion battery

For telecom, storage, motive power and IDC

By **Daisy Chen**

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Lithium-ion module

NPFC lithium module

General introduction



Narada 48NPFC series

Made of LiFePO₄ (lithium iron phosphate) batteries, integrated with smart management system for remote monitoring and maintenance, suitable for many applications of energy storage

- **No active cooling units required**
- **Compact, space saving for cabinet**
- **Easier site planning and installation**
- **More safety and operational reliability**
- **High efficiency and longer service life**

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NPFC lithium module

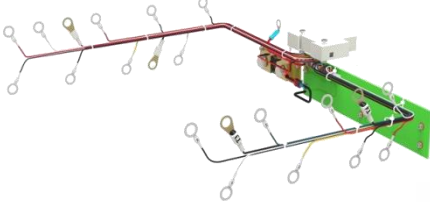
System composition



■ Battery cell group



■ Connection system



■ Protection system



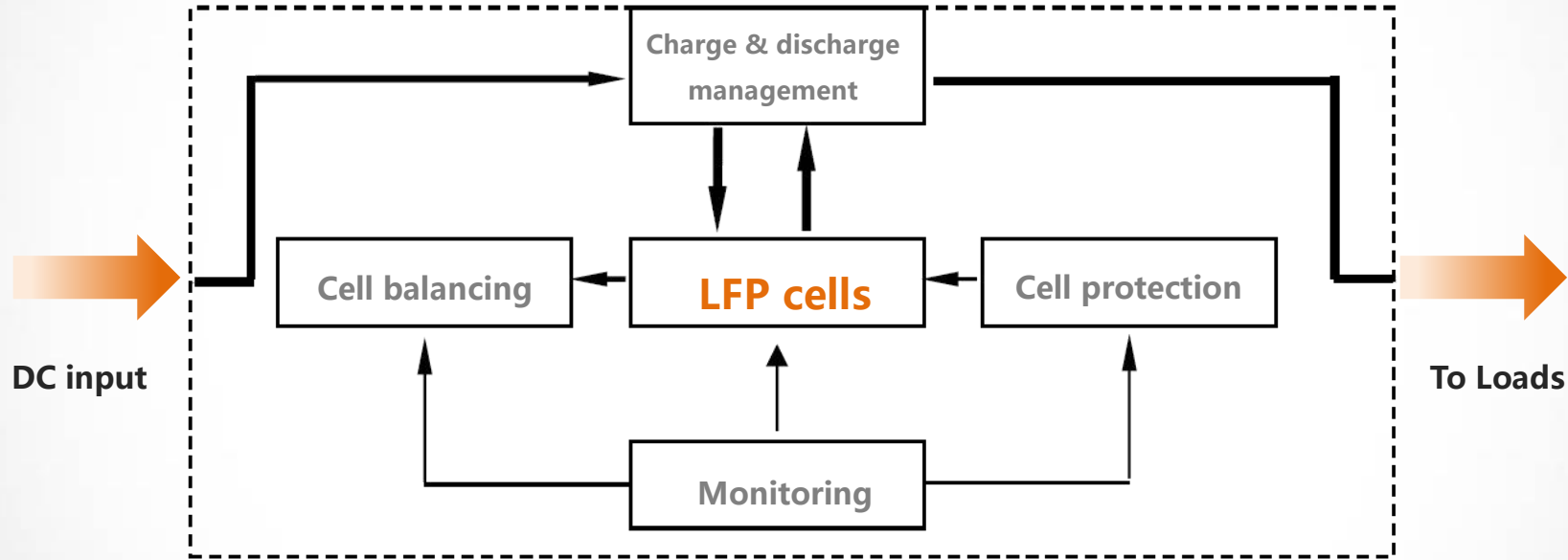
■ BMS system

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NPFC lithium module

Schematic diagram



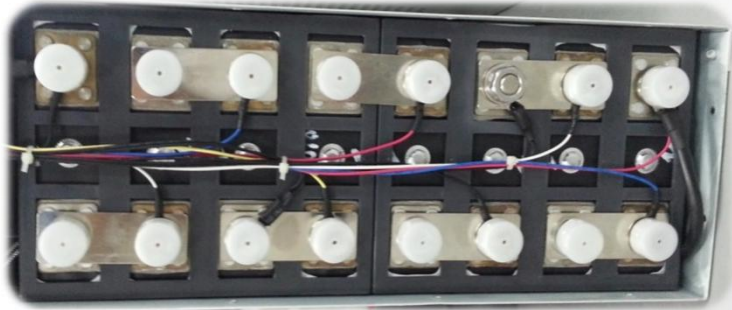
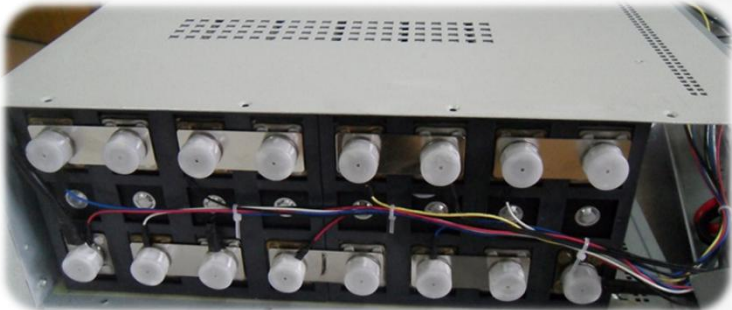
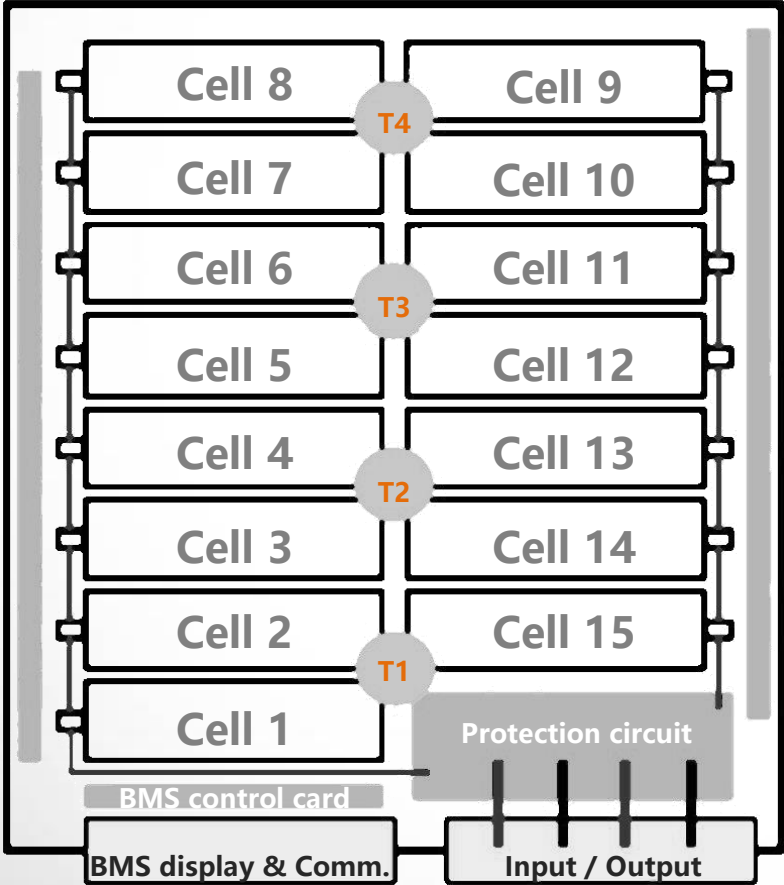
- **LFP cell:** Chemical power source, for energy storage and power supply
- **Monitoring:** Optional component according to requirement from clients
- **Ch. & disch. management:** Current limit for charge & discharge circuit
- **Cell protection:** Against short-circuit, over-charge, over-current...etc.
- **Cell balancing:** System equalization to those unbalanced LFP cell

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NPFC lithium module

Inside layout

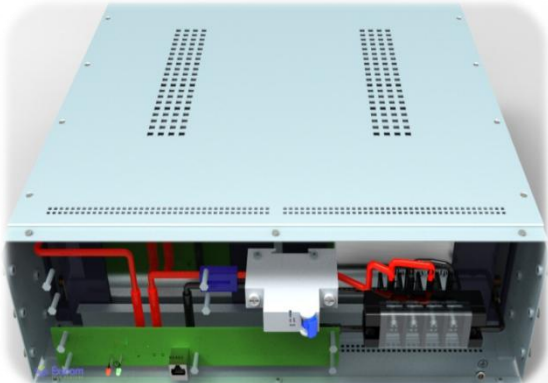
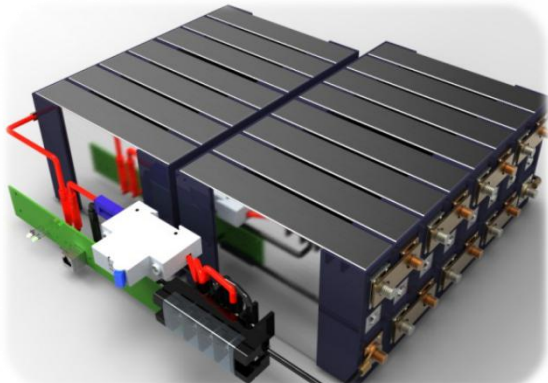
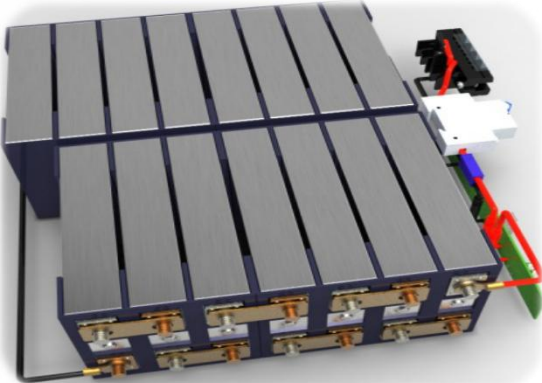


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NPFC lithium module

Inside layout



More details inside

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NPFC lithium module

Interface of front panel



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Housing of the module



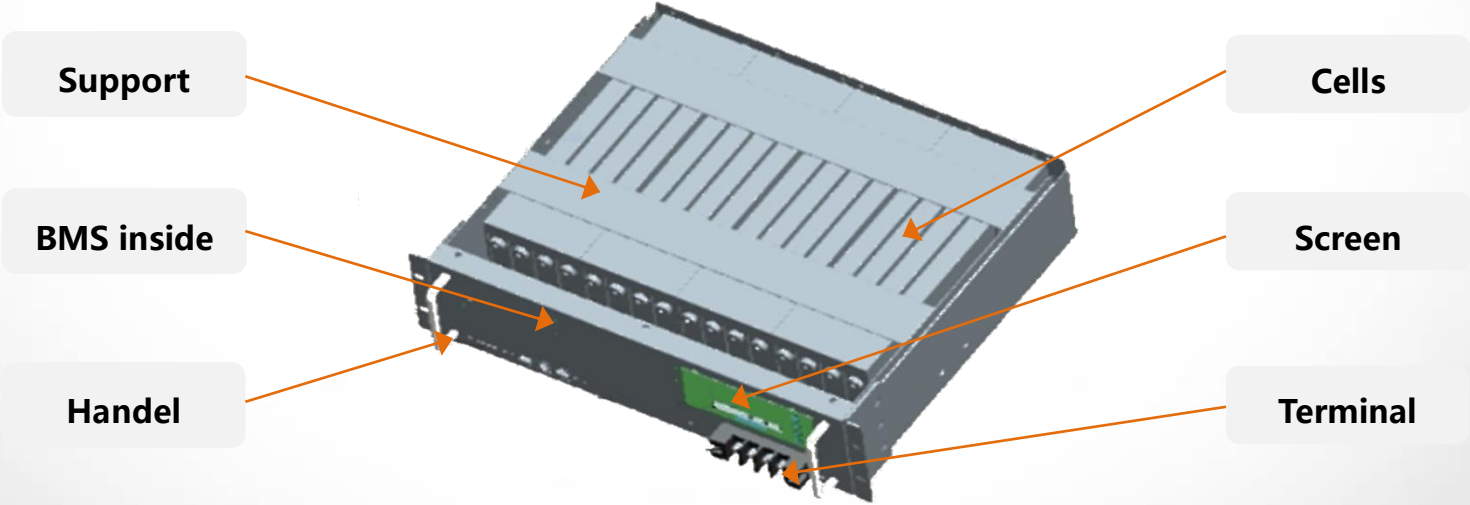
■ Up and bottom cover



■ Side panel



■ Front panel

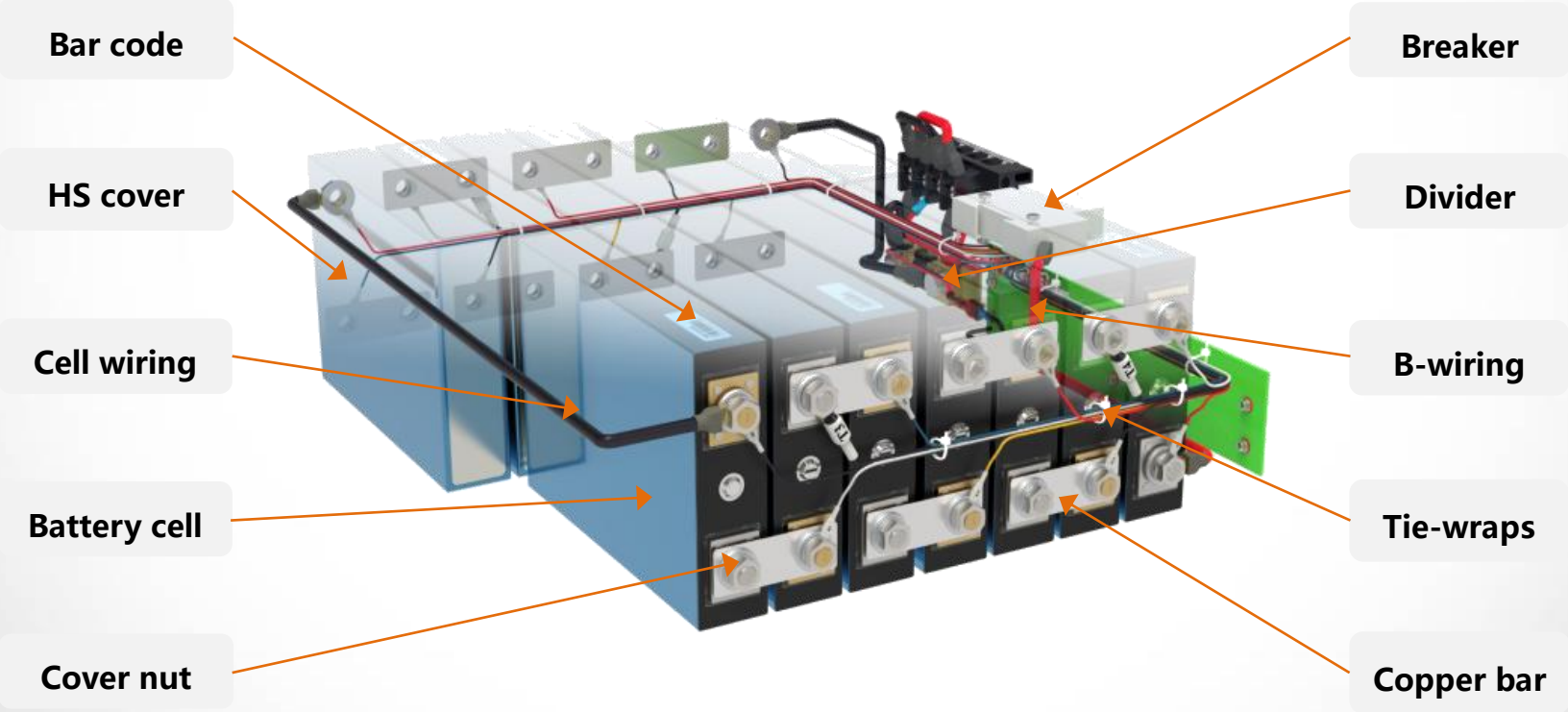


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NPFC lithium module

Inside connection system

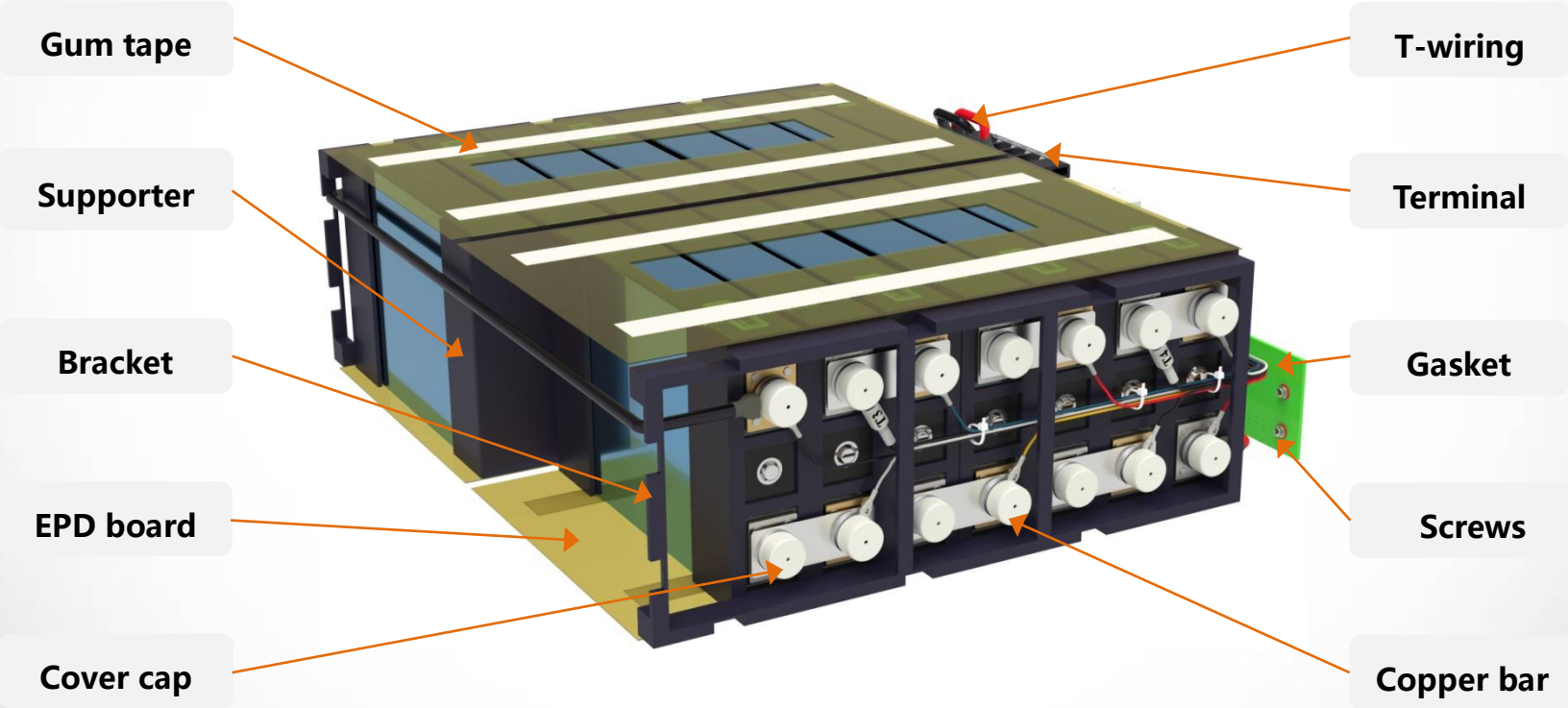


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NPFC lithium module

Inside protection system

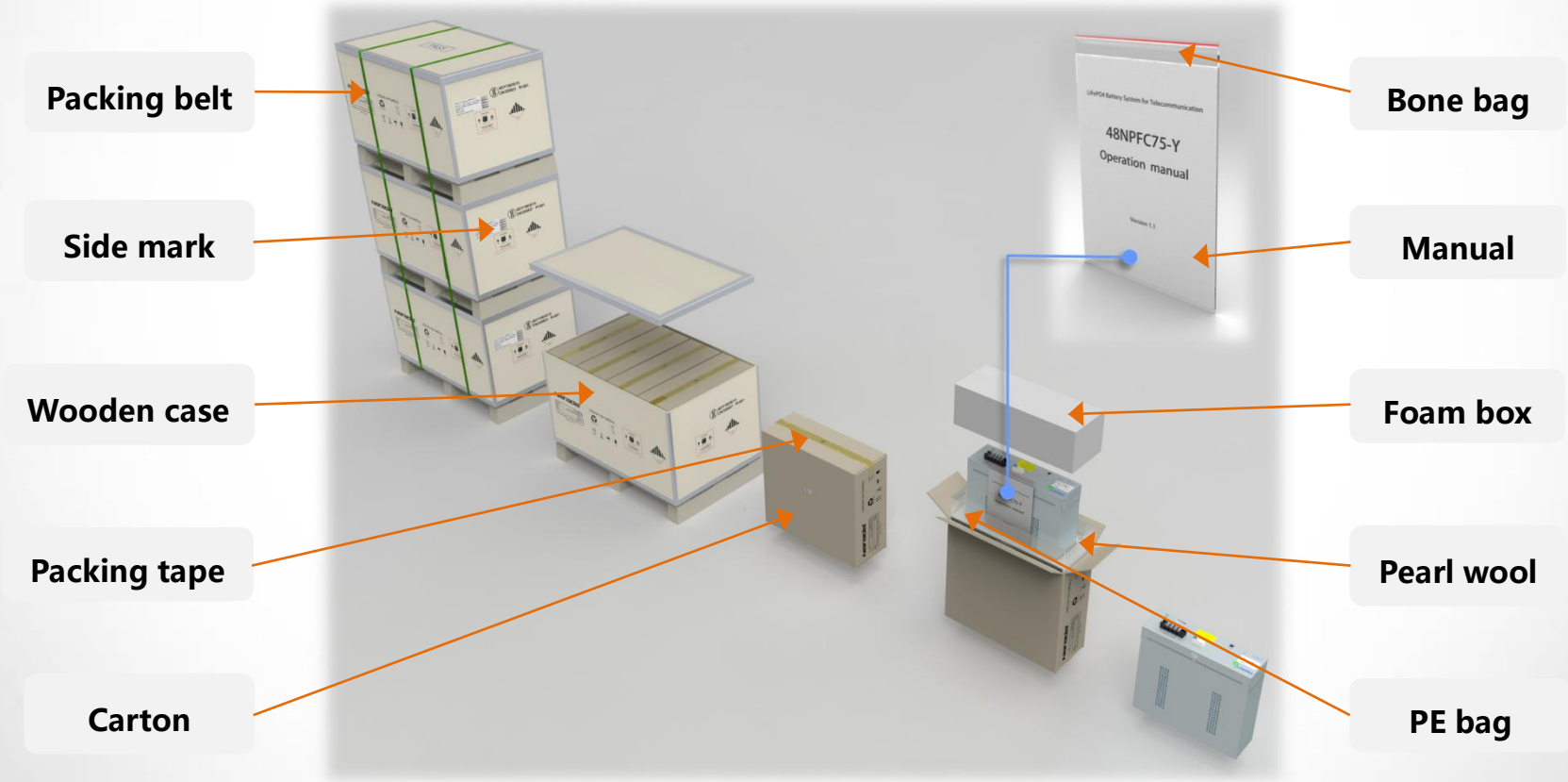


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NPFC lithium module

Packaging system



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NPFC lithium module

Narada module family



Model	Spec.	Dimension
48NPFC10	48V10Ah	442*245*44mm(1U)
48NPFC20	48V20Ah	442*245*88mm(2U)
48NPFC30	48V30Ah	442*245*132.5mm(3U)

Model	Spec.	Dimension
48NPFC50	48V50Ah	442*390*132.5mm(3U)
48NPFC70	48V70Ah	442*400*132.5mm(3U)
48NPFC80	48V80Ah	442*400*225mm(5U)

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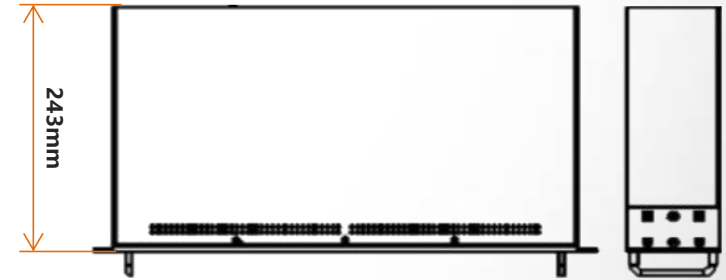
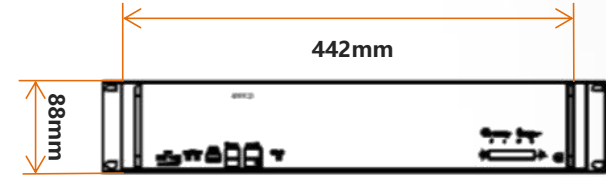
NPFC lithium module

Module 48NPFC20



■ 48NPFC20

Specification	Value
Rated capacity (at 25 °C)	20Ah(C ₅)
Recommended charge current	4A
Max. charge/discharge current	20A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	13.4kg



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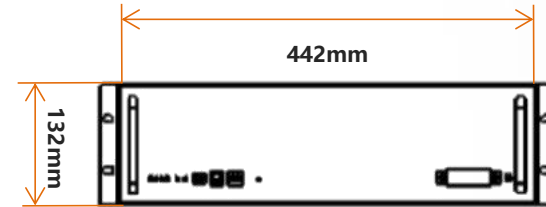
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NPFC lithium module

Module 48NPFC30



■ 48NPFC30



Specification	Value
Rated capacity (at 25 °C)	30Ah(C ₅)
Recommended charge current	6A
Max. charge/discharge current	30A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	18.4kg

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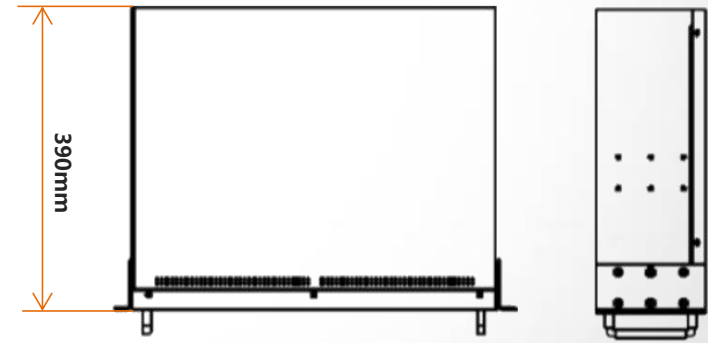
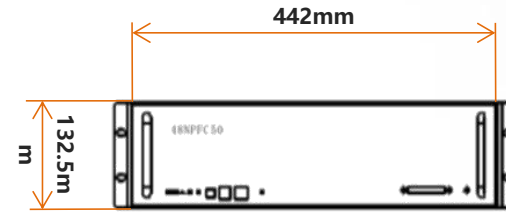
NPFC lithium module

Module 48NPFC50



■ 48NPFC50

Specification	Value
Rated capacity (at 25 °C)	50Ah(C ₅)
Recommended charge current	10A
Max. charge/discharge current	50A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	32kg



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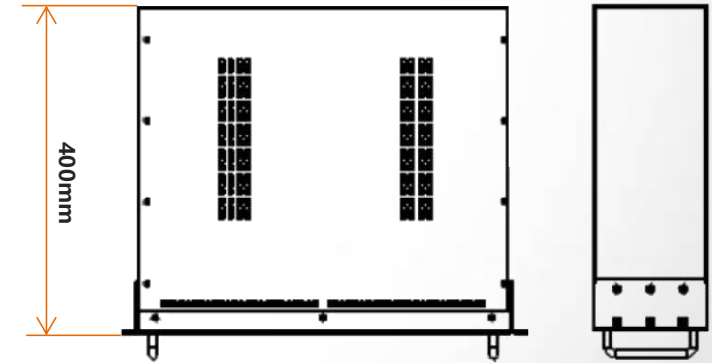
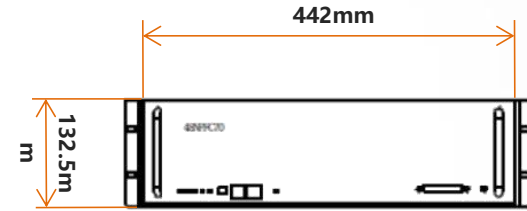
NPFC lithium module

Module 48NPFC70



■ 48NPFC70

Specification	Value
Rated capacity (at 25 °C)	70Ah(C ₅)
Recommended charge current	14A
Max. charge/discharge current	40A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	40.5kg



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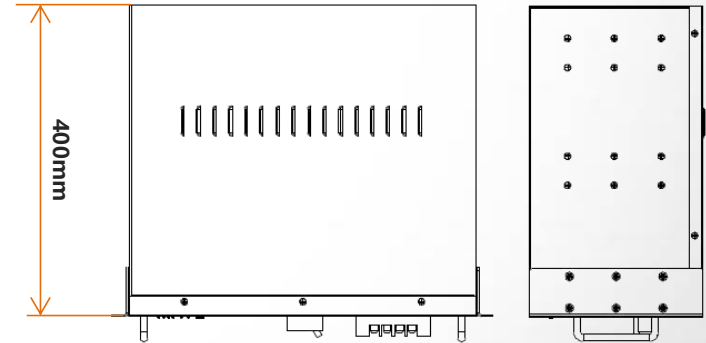
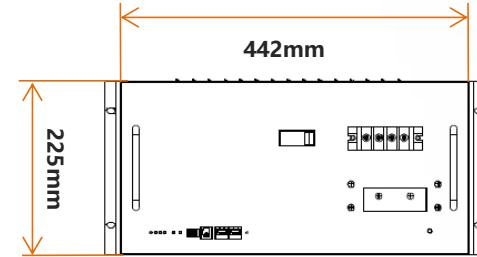
NPFC lithium module

Module 48NPFC80



■ 48NPFC80

Specification	Value
Rated capacity (at 25 °C)	80Ah(C ₅)
Recommended charge current	16A
Max. charge/discharge current	80A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	44kg



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NPFC lithium module



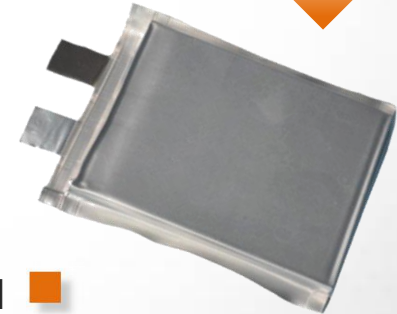
> 48NPFC50,60,70,80

■ Plasmatic cell

Module with cell types



> 48NPFC10,20,30



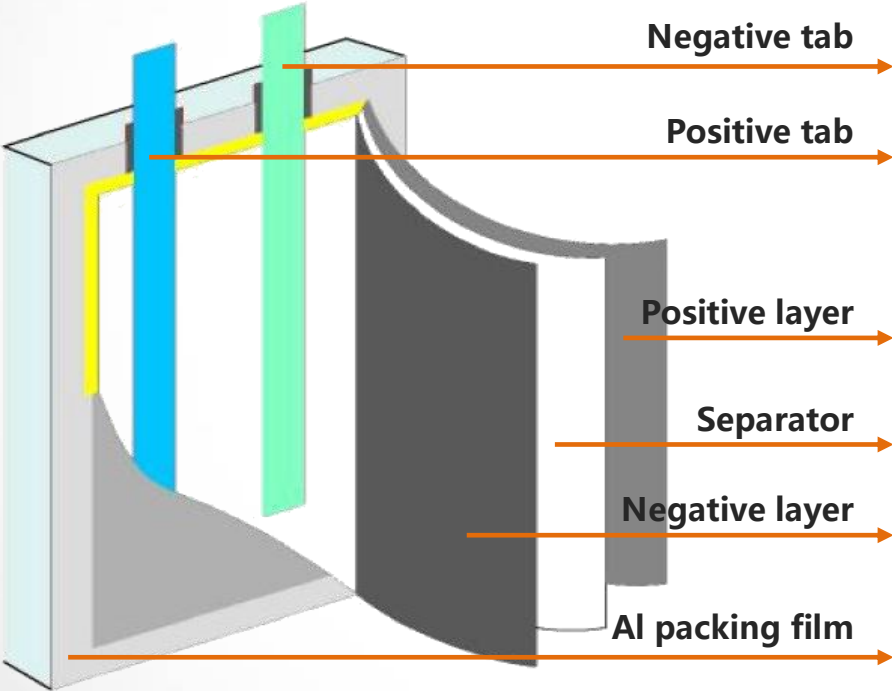
Pouch cell ■

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NPFC lithium module

Pouch type of LFP cell



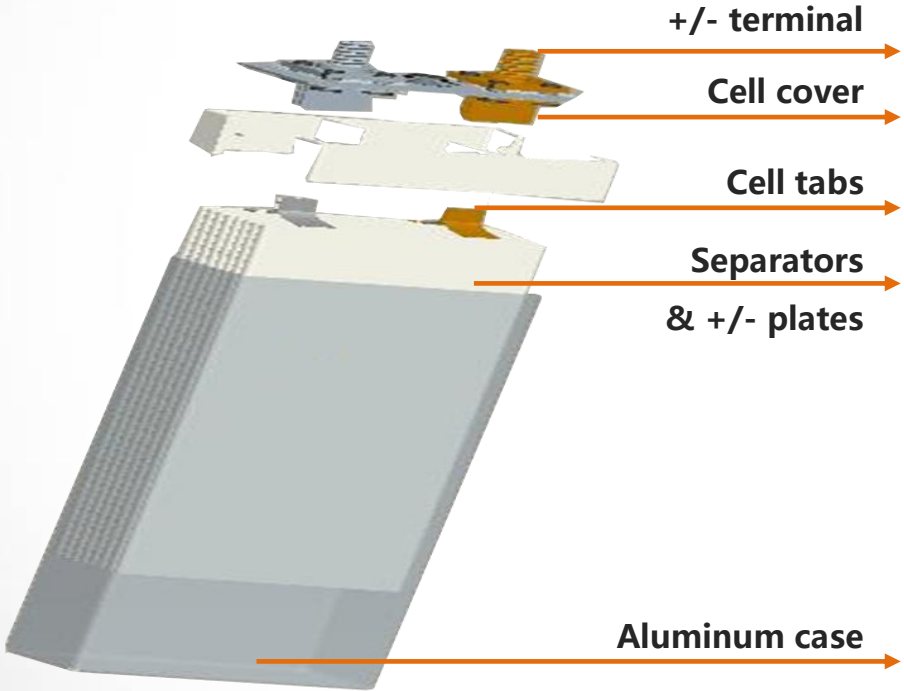
■ Components



■ Cell pouch

NPFC lithium module

Plasmatic type of LFP cell



■ Components



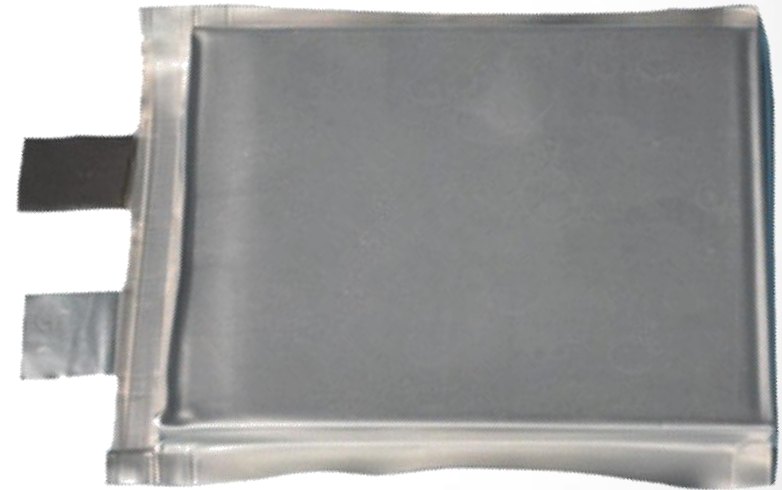
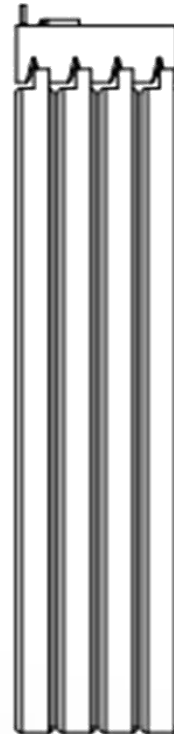
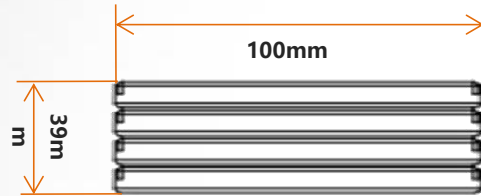
■ Cell housing

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NPFC lithium module

Pouch cell dimension



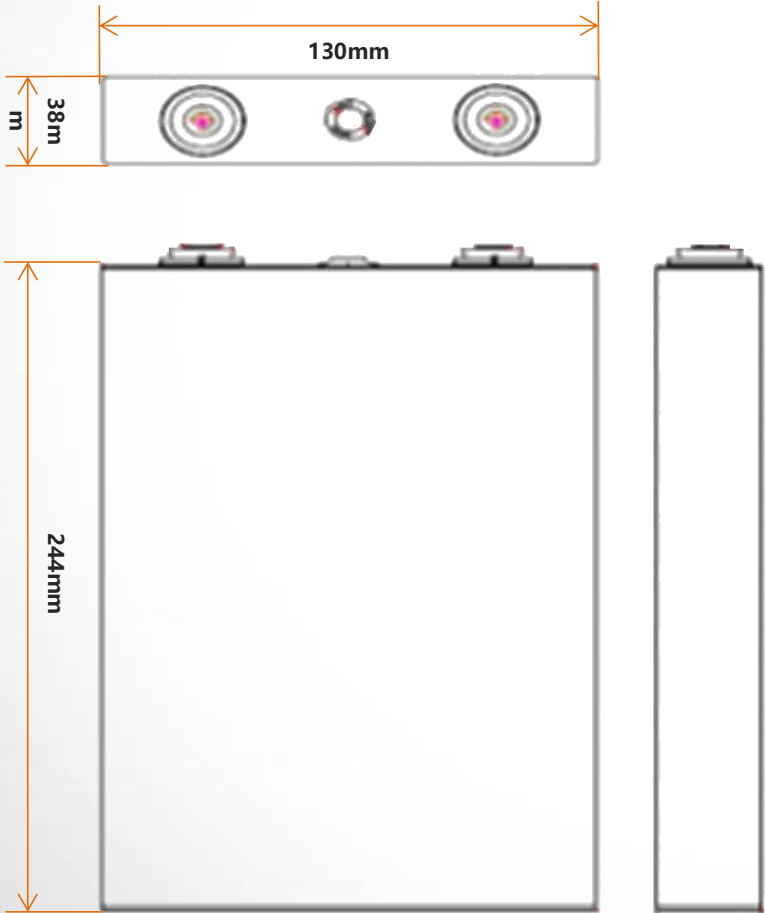
■ NL 90100175PF

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NPFC lithium module

Plasmatic cell dimension







■ NLC36130255PF

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LFP cell specification

Models	8065135MR	3470175PF	29135230PF	36130255PF
Dimension	8*65*135mm	35*70*175mm	30*135*223mm	38*130*244mm
Weight	150g	800g	1800g	2250g
Nominal capacity	7Ah	20Ah	60Ah	80Ah
Nominal voltage	3.7V	3.2V	3.2V	3.2V
Limit of charge voltage	4.2V	3.65V	3.65V	3.65V
Cut-off voltage	2.75V	2.0V	2.5V	2.0V
Maximum charge current	7A	20A	60A	80A
Maximum discharge current	10.5A	300mA	120A	160A
Max. transient disch. current	28A	500mA	180A	240A
Appearance				

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NPFC lithium module

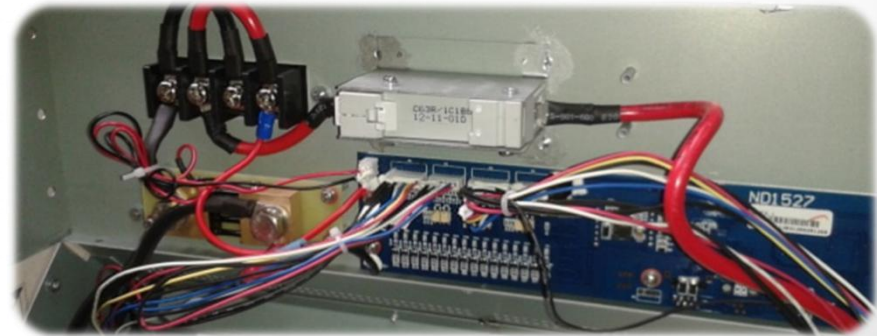
BMS introduction

Principal function

- **Data acquisition:**
 - Cell voltage and temperature
 - Cumulative charge/ discharge power
 - Current & capacity of battery module
- **System protection:**
 - Over or under temperature & voltage
 - Short circuit or communication failure
 - Over current of charging or discharging
- **Cell balancing**
- **SOC & communication**

Optional function

- LCD display interface
- EEROM for data storage
- Current limit setup: 2A~25A

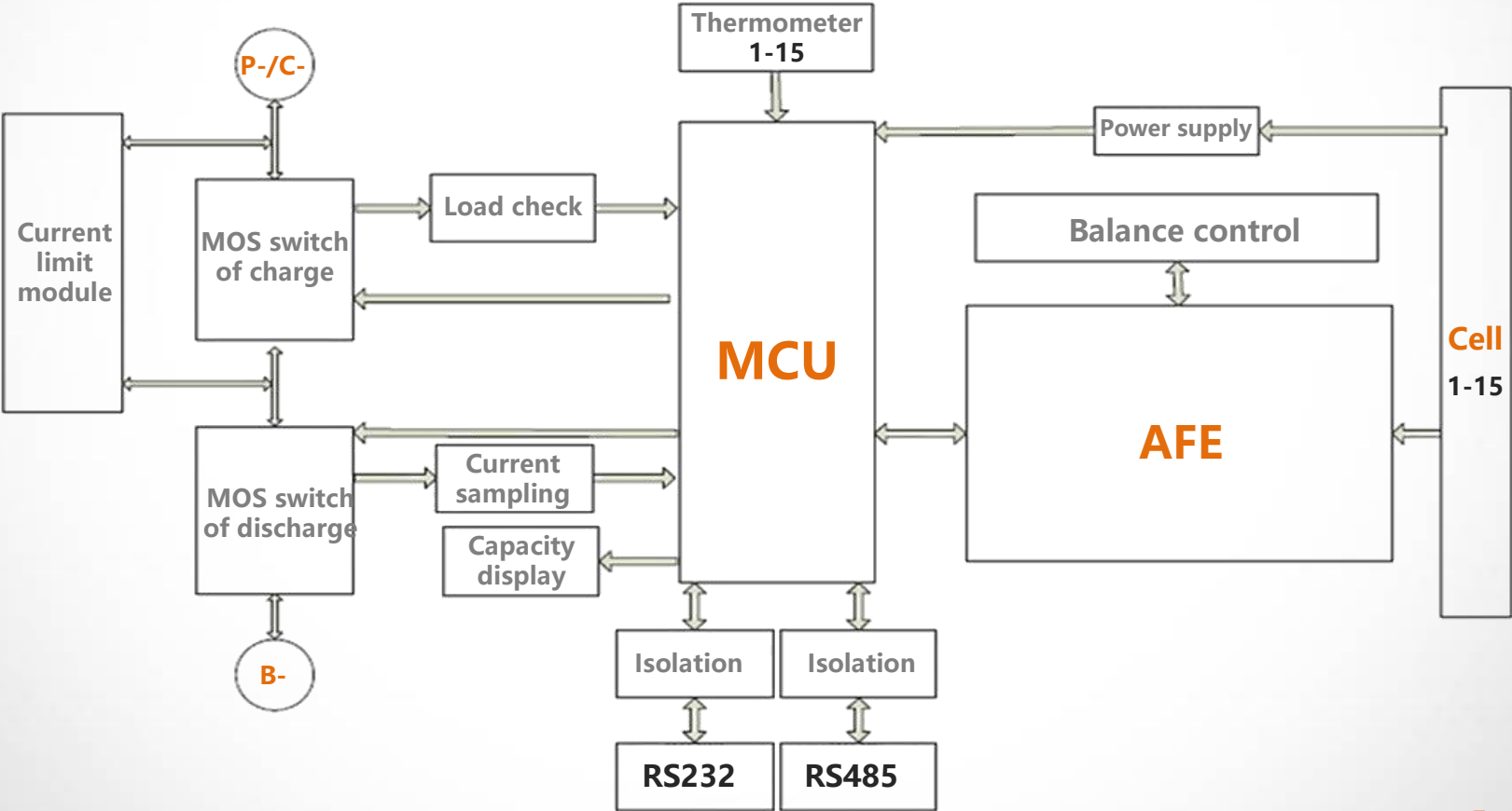


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NPFC lithium module

BMS working principle



NPFC lithium module

BMS monitoring platform

The screenshot displays the BMS monitoring platform interface for an NPFC lithium module. The interface is divided into several sections:

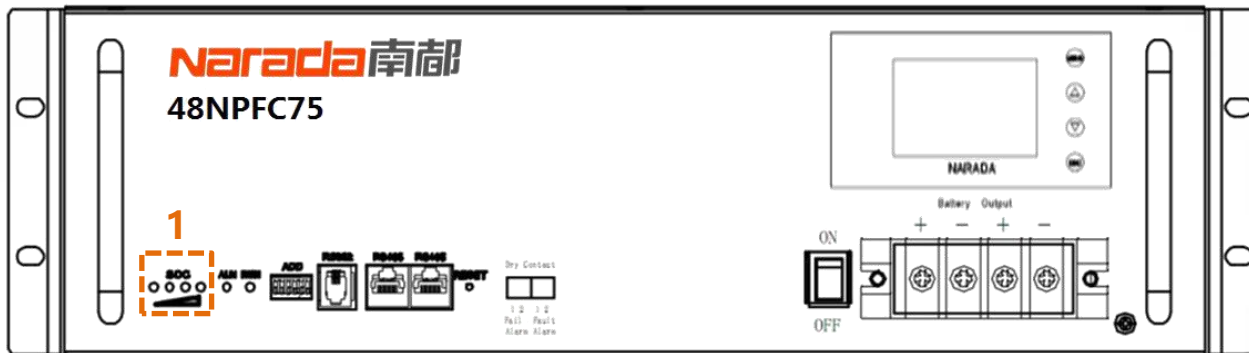
- Navigation:** Tabs for OVERALL, INFO, PARAM, CONFIG, and STORAGE. The current user is 'test@normal' and the date is '2015-02-05'.
- Table 1 (Left):** A table with columns 'Balance', 'Value', and 'Unit'. It lists 15 cells. Cell 9 has a value of 3.182 (highlighted in purple), and cell 15 has a value of 3.180 (highlighted in red).
- Table 2 (Middle):** A table with columns 'Caption', 'Value', and 'Unit'. It lists various parameters such as V_SUM (47.77 V), V_AVG (3.185 V), V_MAX (3.199 V), V_MIN (3.156 V), V_DIFF (0.043 V), Loop_count (2 #), Capacity_Full (73.00 AH), Capacity_Surplus (49.51 AH), Remain_Chg_Time (- H), Remain_Disch_Time (1.11 H), CELL_TEMP1-4 (37.00 °C), PCB_TEMP (38.00 °C), ENV_TEMP (38.00 °C), and Current (-44.47 A).
- Protect Status:** A list of protection status indicators, all currently disabled (grey circles): No_Voltage_Protect, No_Current_Protect, No_Temp_Protect, and No_ShortCurrent_Revers.
- Alarm Status:** A list of alarm status indicators, all currently disabled (grey circles): No_Voltage_Alarm, No_Current_Alarm, No_Temp_Alarm, and No_Other_Alarm.
- Normal Status:** A section showing a green progress bar for SOC at 67.82% and SOH at 100.00%. It also indicates 'CommunicationOK' and 'Discharging' with green circles.
- Bottom Controls:** Radio buttons for Pack_Count (232) and DIP_Addr (485). A dropdown menu for Pack_Count is set to 1, and a dropdown menu for DIP_Addr is set to 2. A small table shows bit patterns: 0 1 0 0 and 1 2 3 4.
- Footer:** Status messages: 'Communication OK addr = 2' and 'BMS : EM-CS6F-NDS41-08V05-01-150425'.

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NPFC lithium module

Interface of front panel



NO.	Name	Function	Remark
1	SOC	Capacity indicator	Shown by 4 green lights, each 25% capacity

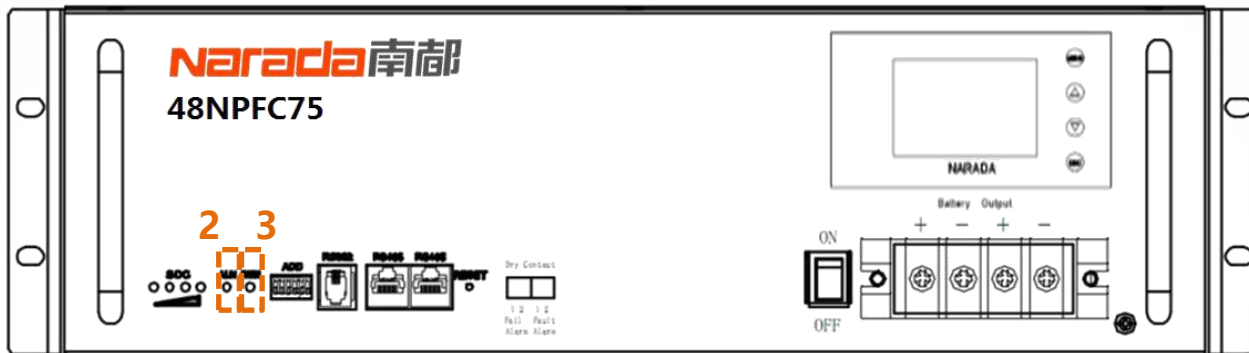
Capacity	LED Status			
	LED1 ●	LED2 ●	LED3 ●	LED4 ●
0-25%	ON	OFF	OFF	OFF
25%-50%	ON	ON	OFF	OFF
50%-75%	ON	ON	ON	OFF
75%-100%	ON	ON	ON	ON

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NPFC lithium module

Interface of front panel



NO.	Name	Function	Remark
2	ALM	Alarm indicator	Shown by a red light when error occurs
3	RUN	Operation indicator	Shown by a green light for operation status

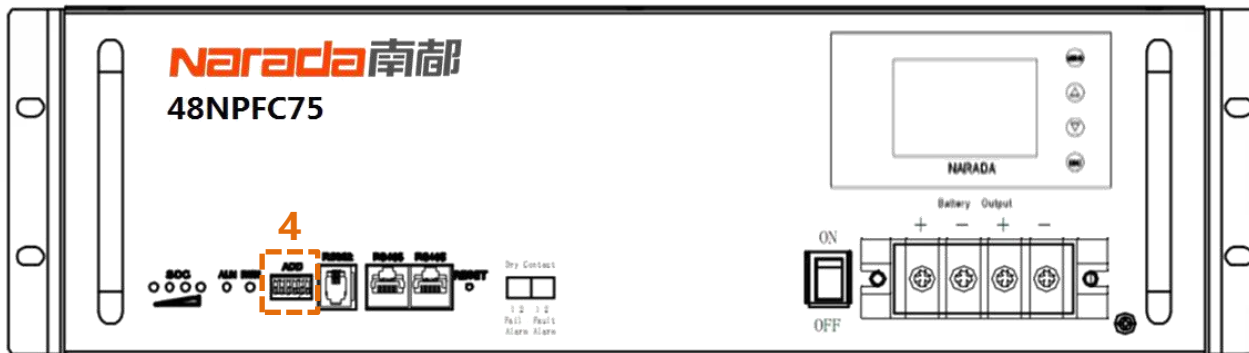
Battery Status	RUN ●	ALM ●	Remark
Idle	0.25S ON/3.75S OFF	OFF	In normal status
Charge	0.5S ON/0.5S OFF	OFF	In normal status
Discharge	Constant ON	OFF	In normal status
Charge/discharge/Idle	Depends on battery	ON blinks	No ALM flash when over/under charge
Charge/discharge/Idle	OFF	Constant ON	Hardware of BMS fail

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NPFC lithium module

Interface of front panel



NO.	Name	Function	Remark
4	ADD	Communication address	Maximum 16pcs cells connected in parallel

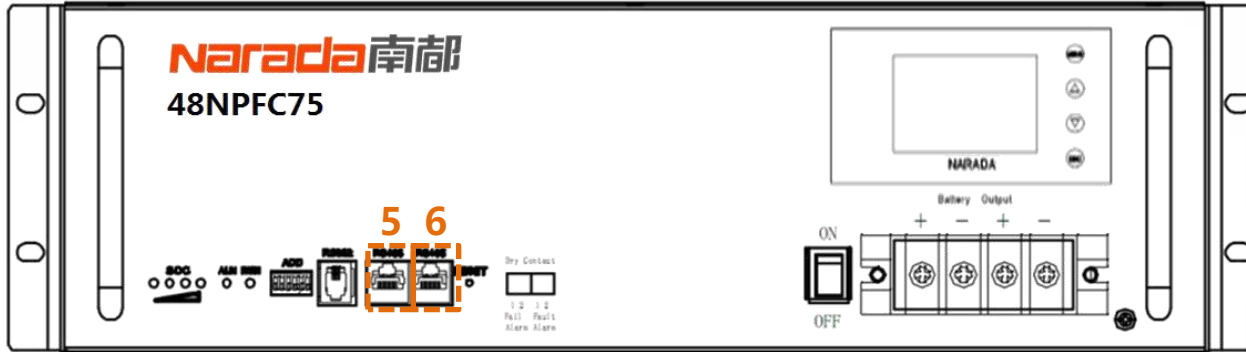
PACK 1 0000 ADD ON DIP 1 2 3 4	PACK 2 0001 ADD ON DIP 1 2 3 4	PACK 3 0010 ADD ON DIP 1 2 3 4	PACK 4 0011 ADD ON DIP 1 2 3 4	PACK 5 0100 ADD ON DIP 1 2 3 4	PACK 6 0101 ADD ON DIP 1 2 3 4	PACK 7 0110 ADD ON DIP 1 2 3 4	PACK 8 0111 ADD ON DIP 1 2 3 4
PACK 9 1000 ADD ON DIP 1 2 3 4	PACK 10 1001 ADD ON DIP 1 2 3 4	PACK 11 1010 ADD ON DIP 1 2 3 4	PACK 12 1011 ADD ON DIP 1 2 3 4	PACK 13 1100 ADD ON DIP 1 2 3 4	PACK 14 1101 ADD ON DIP 1 2 3 4	PACK 15 1110 ADD ON DIP 1 2 3 4	PACK 16 1111 ADD ON DIP 1 2 3 4

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Interface of front panel



NO.	Name	Function	Remark
5	RS232	Up-link port	Data load for single module & BMS upgrade
6	RS485	Cascading port	Data load for multiple modules in parallel

RJ11 pins	Definition
1	GND
2	Pack receives
3	Pack deliveries
4	Void

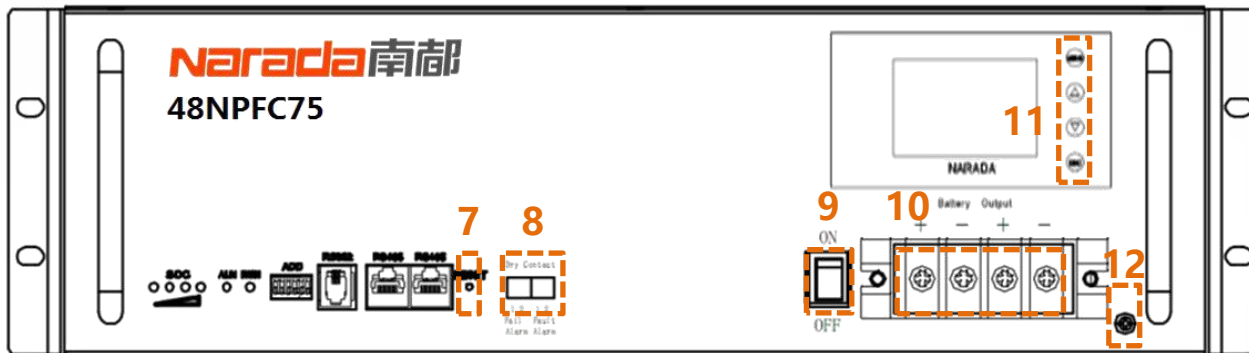
RJ45 pins	Definition
1	GND
2	RS485_A
3	RS485_B
4,5,6,7,8	Void

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Interface of front panel



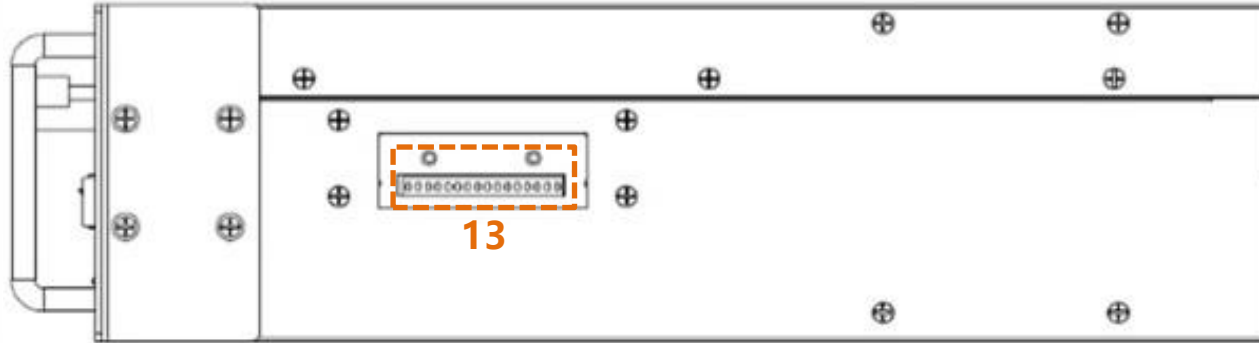
NO.	Name	Function	Remark
7	Reset	Button for reset	Reset for stability when error occurs to battery
8	Contact	Indicators of dry contact	System alarm for failure of BMS and cell: short circuit, over current or temperature...etc.
9	Switch	On/Off switch	Press Off into sleep mode, without any output
10	Output	Output terminals	Two equal sets of DC power output

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Interface of front panel



NO.	Name	Function	Remark
11	LCD	Optional display	Info shown for the status of cells and module
12	GND	Ground screw	Grounding connection by cable above 16AWG via the hole on backside of cabinet for safety
13	BMI	The interface for battery maintenance	To measure voltage and resistance for each cell, with maximum 2A for cell charging

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Projects of telecom

Telecom base of China mobile

Chongqing city, China



- System: **48V/200Ah**
- Ambient: **Outdoor**
- Battery type: **48NPFC50**
- Battery quantity: **4pcs**
- Project date: **2011.07**



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Telecom base of China mobile

Chongqing city, China



■ More references

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The project of FTTC(Fiber To The Curb)

Nantong city, China



- System: **48V/10Ah**
- Ambient: **Outdoor**
- Battery type: **48NPFC10**
- Battery quantity: **1pcs**
- Project date: **2012.05**

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The project of FTTC(Fiber To The Curb)

Nantong city, China



More references

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Telecom base of Reliance group

Mumbai, India



- System: **48V/300Ah**
- Ambient: **Outdoor**
- Battery type: **48NPFC75**
- Battery quantity: **4pcs**
- Project date: **2015.08**

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Telecom base of Reliance group

Ahmedabad, India



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Projects of power storage

Residential solution of Narada HESS

Gu An city, Hebei, China



▶ Project Details

- PV generation: **10KWp**
- Storage capacity: **57.6KWh**
- Battery type: **48NPFC75**
- Battery quantity: **8pcs**
- Project date: **2015.07**

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Residential solution of Narada HESS

Gu An city, Hebei, China



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Residential solution of Narada HESS

Nantong city, Germany



▶ Project Details

- PV generation: **5KWp**
- Storage capacity: **7.2KWh**
- Battery type: **48NPFC75**
- Battery quantity: **2pcs**
- Project date: **2014.10**

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Wind-PV and storage integration

Shenzhen city, Guangdong province, China



Project highlights

The integration of 50KW wind and 100KW PV system, and the total storage is 2.9MWh from 3 sorts of batteries



SOUTHERN POWER GRID

- PV generation: **100KWp**
- PbC batteries: **900KWh**
- Gel batteries: **900KWh**
- LFP batteries: **1100KWh**
- Project date: **2015.11**

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Wind-PV and storage integration

Shenzhen city, Guangdong province, China



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Narada hybrid storage

Lin'an city, Zhejiang province, China



Project highlights

The original hybrid storage system with both VRLA and LFP batteries, controlled by integrated heat management

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- PV generation: **57KWp**
- Storage capacity: **2MWh**
- VRLA capacity: **1.5MWh**
- LFP capacity: **400KWh**
- Project date: **2011.07**

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Narada hybride storage

Lin'an city, Zhejiang province, China



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Projects of motive power

Hybrid bus, van and coach

NAVECO Ltd.



IVECO

- Rated voltage: **336V**
- Rated capacity: **20.2KWh**
- Cell type: **LFP battery**
- Cell spec.: **Pouch, 60Ah**
- Cell quantity: **105*1string**

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Hybrid bus, van and coach

NAVECO Ltd.



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Electric car, sedan and vehicles

Zotye International Auto Trading Co., Ltd.



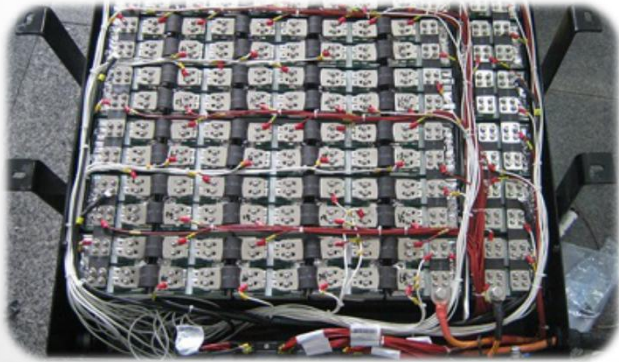
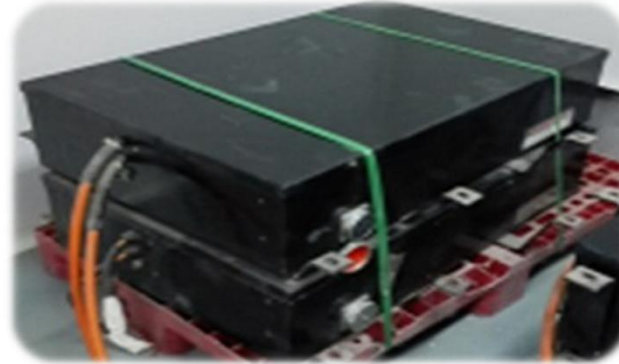
- Rated voltage: **340V**
- Rated capacity: **36KWh**
- Cell type: **LFP battery**
- Cell spec.: **Pouch, 10Ah**
- Cell quantity: **100*8strings**

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Electric car, sedan and vehicles

Zotye International Auto Trading Co., Ltd.



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Standard module for electric taxi

State Grid Zhejiang Electric Power Company



STATE GRID

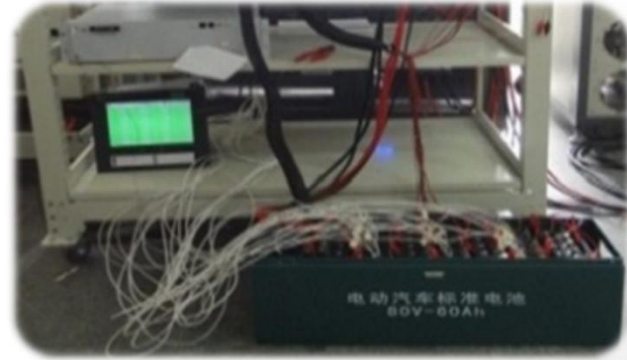
- Specification: **80V-60Ah**
- Capacity: **4.8KWh**
- Charge condition: **0.5C**
- Discharge condition: **1C**
- Recycles: **500times**

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Stored Energy Solutions for a Demanding World!

Standard module for electric taxi

State Grid Zhejiang Electric Power Company



More references

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Project of IDC center

IDC headquarter of Alibaba

Hangzhou city, China



- System: **240V/320Ah**
- Ambient: **Indoor**
- Cell type: **36130255PF**
- Discharge condition: **2C**
- Project date: **2013.05**

Narada®

Stored Energy Solutions for a Demanding World!

IDC headquarter of Alibaba

Hangzhou city, China



More references

Narada[®]

Stored Energy Solutions for a Demanding World!

IDC headquarter of China mobile

Harbin city, China



- System: **48V/800Ah**
- Ambient: **Indoor**
- Battery type: **48NPFC75**
- Battery quantity: **14pcs**
- Project date: **2013.08**

Narada[®]

Stored Energy Solutions for a Demanding World!

IDC headquarter of China mobile

Harbin city, China



More references

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Thanks!
