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An Expert of Energy Storage Solutions.

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# Narada lithium storage

**With technology of LFP cells**

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**High voltage solution**

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# Narada lithium cell

## Brief introduction

### Narada NLC series of lithium-ion cell

Narada NLC series cell are made by LFP ( $\text{LiFePO}_4$ ) and NMC ( $\text{LiNiMnCoO}_2$ ) technologies, available in both pouch and prismatic forms with light weight, stable performance and high energy density



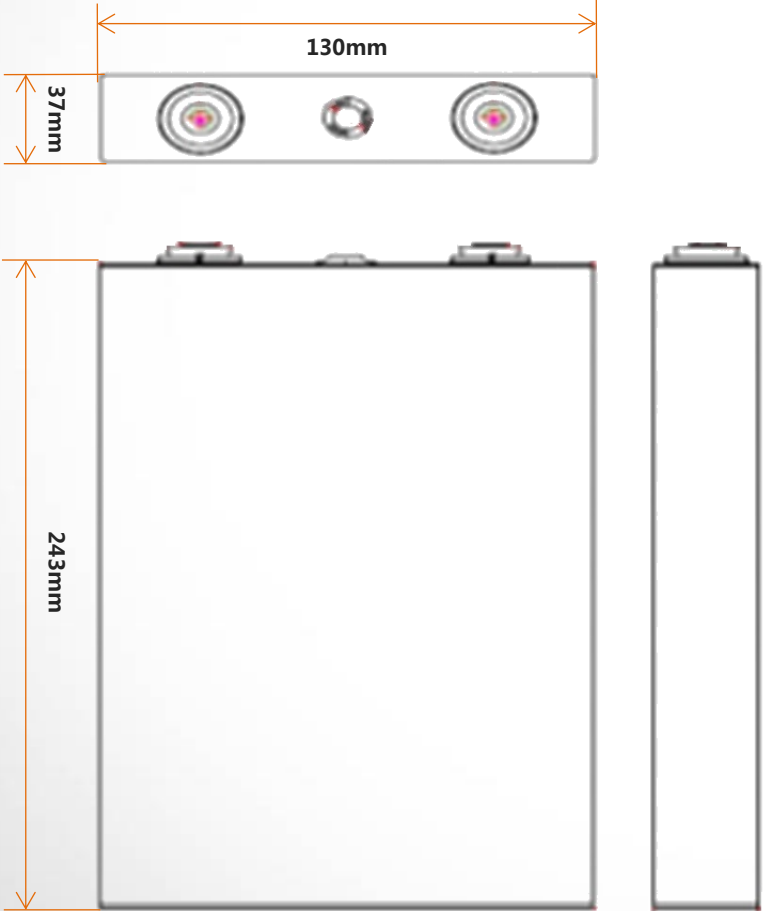
 Cell family of Narada NLC series

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# Narada lithium cell

## Dimension of prismatic cell



■ NLC36130255PF

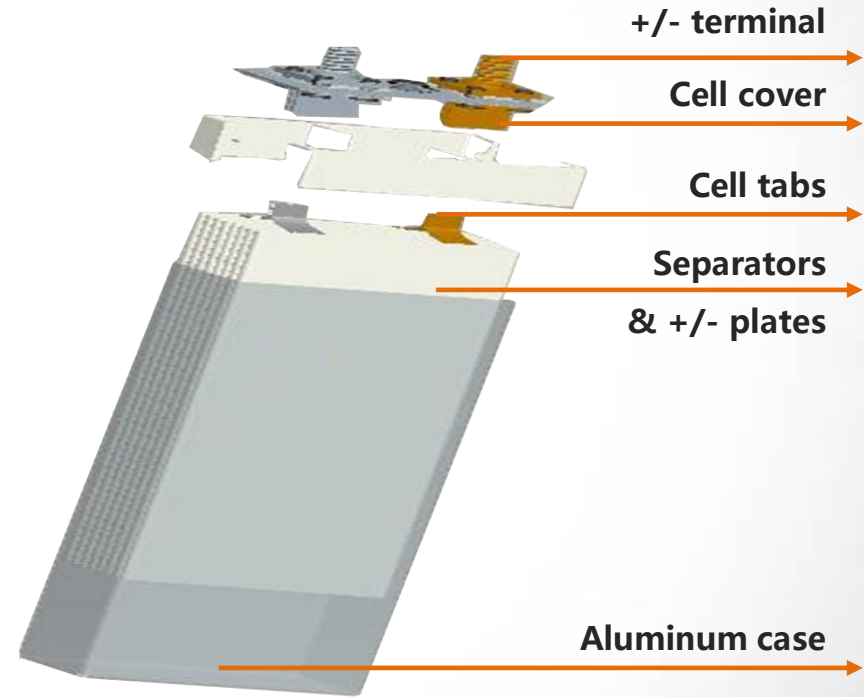
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# Narada lithium cell

## Specification of NLC cell

Model	NLC36130255PF
Rated voltage	3.2V
Rated capacity	80Ah
Discharge current	240A (Continuous)
Charge current	80A (Standard)
Discharge current	80A (Standard)
Charge current	160A (Maximum)
Charge voltage	3.65V (Limit)
Cut-off voltage	2.5V
Impedance	$\leq 1.0\text{m}\Omega$
Length of cell	130.0mm
Width of cell	37.0mm
Height of cell	243.0mm



Exploded view of NLC cell

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# NESP lithium module

## Dimension of module



NESP housing

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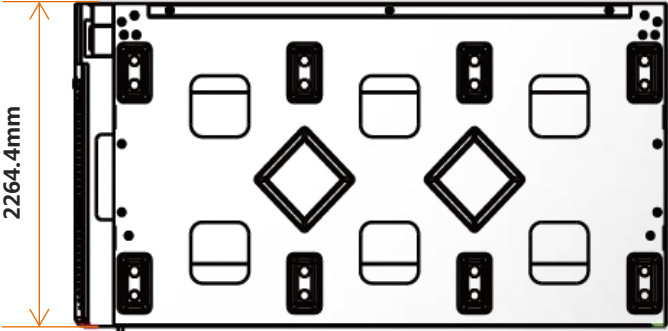
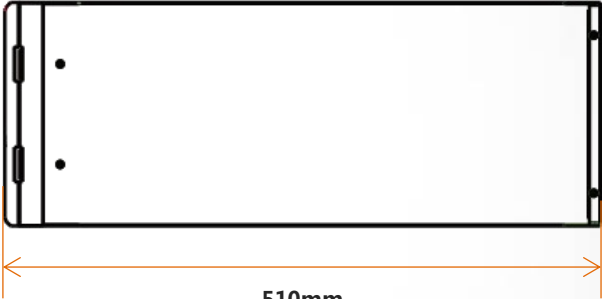
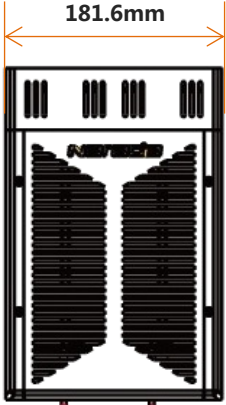


Narada NLC cell

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NESP module



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# NESP lithium module

## Specification of module

Model	19NESP160	38NESP80
Rated voltage	19.2V	38.4V
Rated capacity	160Ah	80Ah
Cell connection	6*2strings	12*1string
Dimension	510.0*181.6*264.4mm	
Weight	35kg	
Temperature range	Discharge: -20 to +60°C Charge: 0 to +60°C Storage: 0 to +40°C	
Recommended temperature	Discharge: +15 to +35°C Charge: +15 to +35°C Storage: +15 to +30°C	
Humidity	5% to 95%	



■ Modules connection in system

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# NESP storage system

## System introduction



Whole integrated storage system with both lithium modules and BMS, quite convenient in both maintenance and installation, extendable to large scale

- **Customized system with flexibility**
- **Wide range of voltage and capacity**
- **Modular design for easy installation**
- **Integrated with battery management**

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# NESP storage system

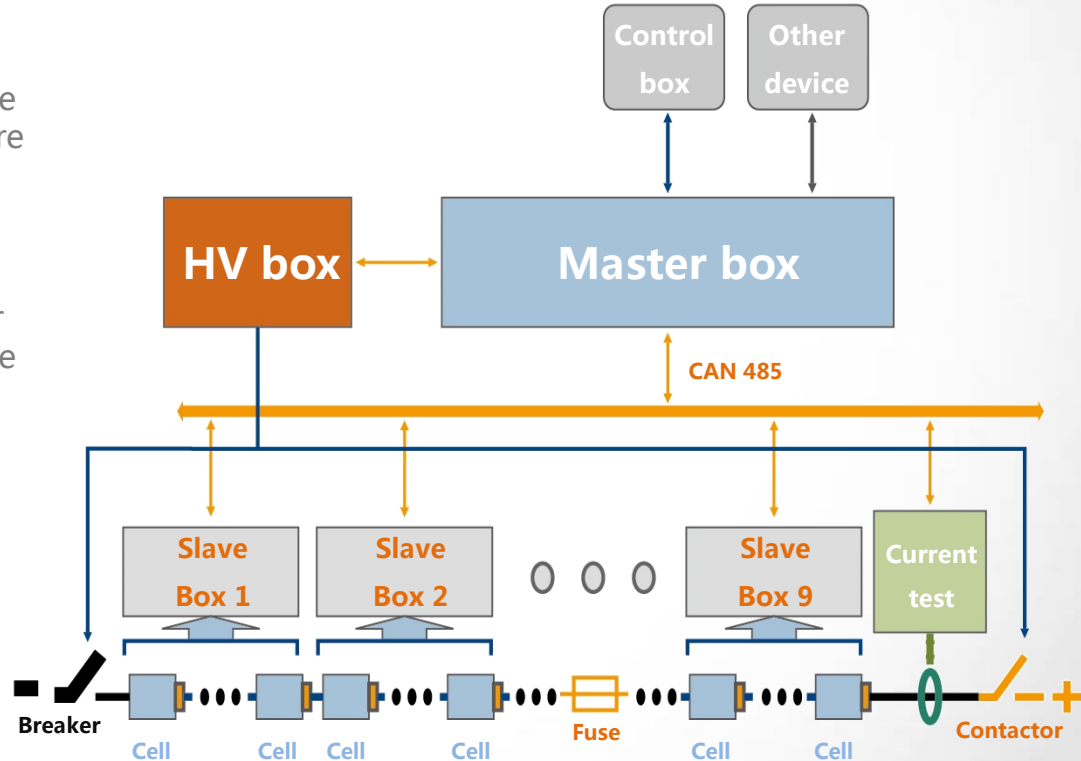
## Function and diagram of BMS

### Principal function

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

### Optional function

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



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# NESP storage system

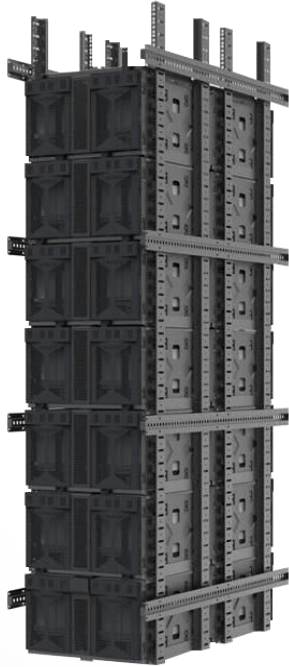
## System configuration



NESP



BMS



Racks



Cabinet



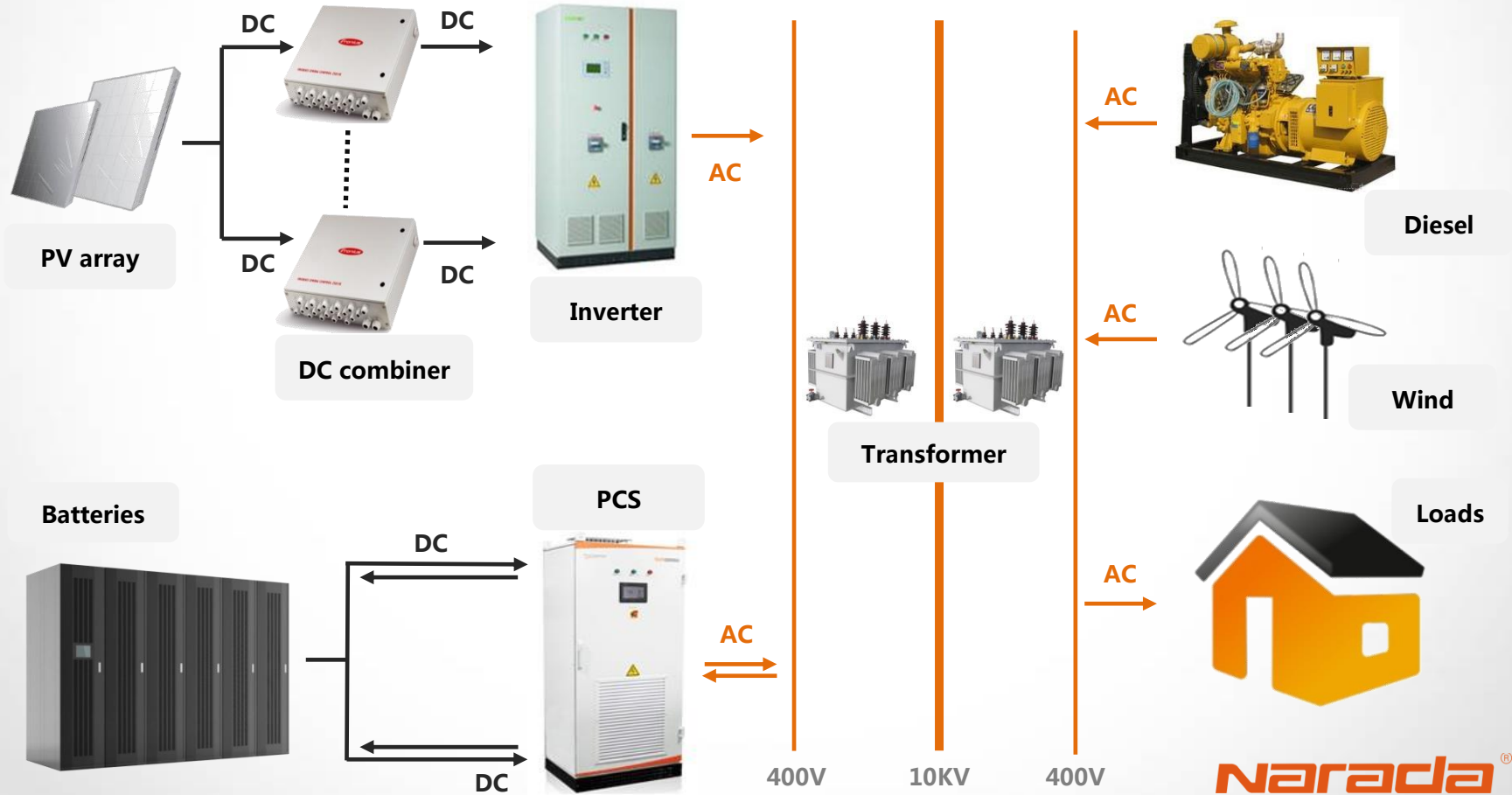
Storage system

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# NESP storage system

## Commercial system composition



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**Low voltage solution**

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# NPFC lithium module

## General introduction



### Narada 48NPFC series

Made of LiFePO<sub>4</sub> (lithium iron phosphate) cells with 48V integrated with smart BMS for remote monitoring as well as 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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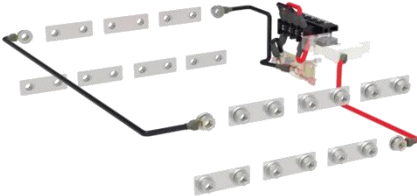
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# NPFC lithium module

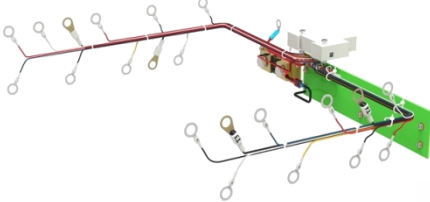
## System composition



■ Battery cell group



■ Connection system



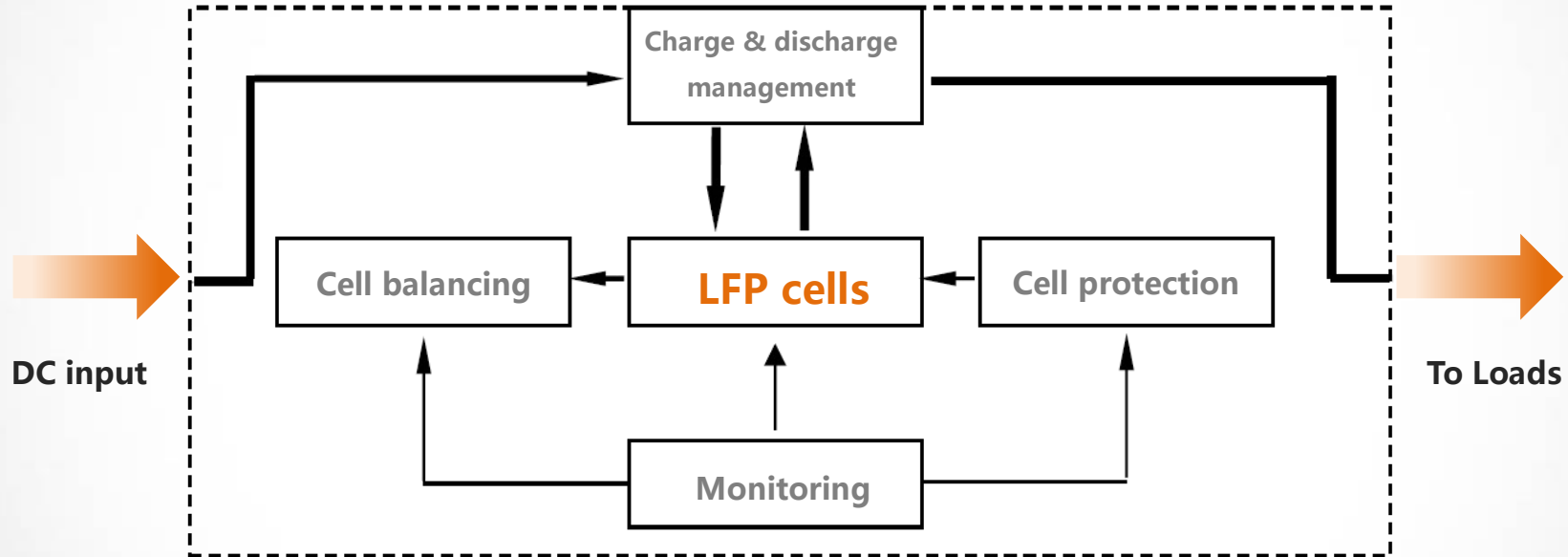
■ Protection system



■ BMS system

# 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

## Interface of front panel



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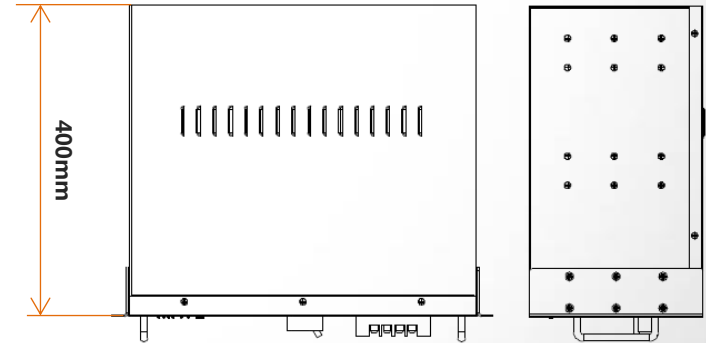
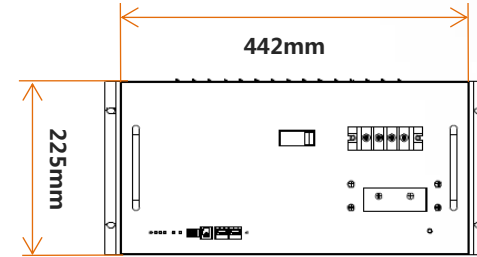
# NPFC lithium module

## Module 48NPFC80



■ 48NPFC80

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



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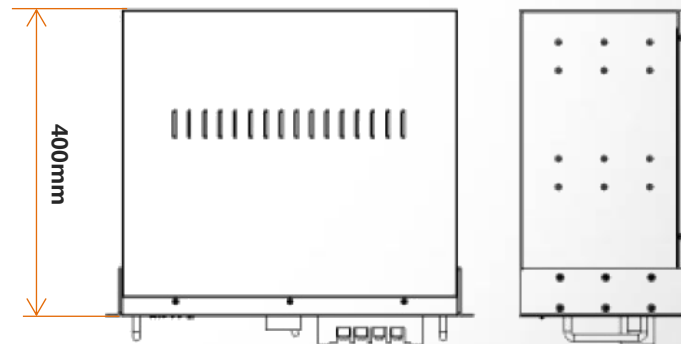
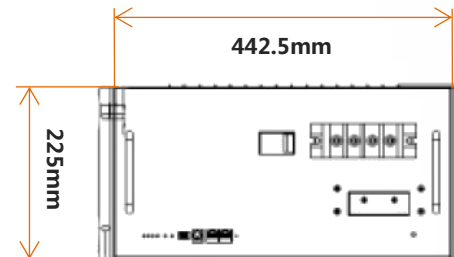
# NPFC lithium module

## Module 48NPFC100



### 48NPFC100

Specification	Value
Rated capacity (at 25 °C)	100Ah(C <sub>5</sub> )
Recommended charge current	20A
Max. charge/discharge current	100A
Charge voltage/End voltage	54±0.5V/40.5V
Weight	45kg



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# NPFC storage system

## Separated storage cabinet



A completed storage solution, consists of NPFC modules, monitoring platform, connection box, as well as EMS, ideally for general requirement



- **Automatic** operational mode
- **Smart App** for remote monitoring
- **Optimize** profit of PV system



- **Modular** design for flexible setup
- **Plug & Play** for easier installation
- **Compatible** with most of inverters



- **5 years** product warranty
- **7 years** performance warranty
- **15 years** expected service life

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# NPFC storage system

## Composition of cabinet

### ■ Solar inverter

Compatible with most type of both battery inverter and hybrid inverter

### ■ EMS & connection

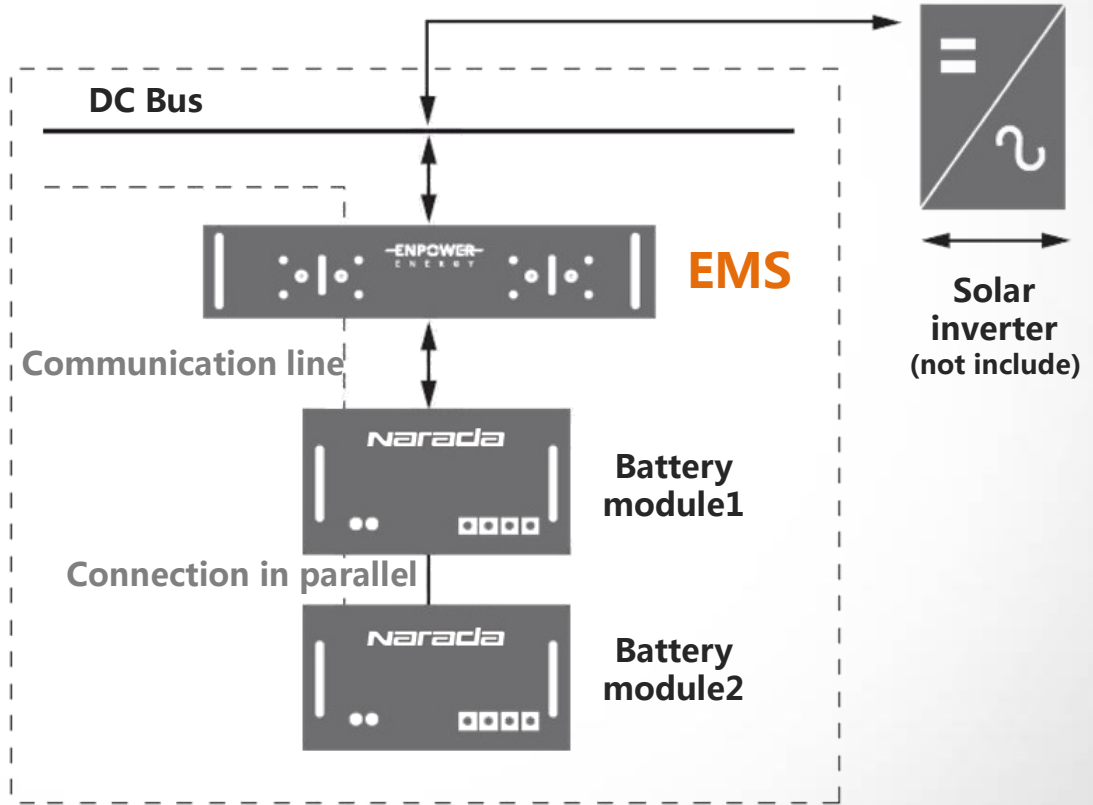
Real-time system regulation for energy balance and economics

### ■ Battery modules

Installed with two modules of 48NPFC80 lithium-ion batteries

### ■ Monitoring

Remote data monitoring for both laptop and mobile telecom devices



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# NPFC storage system

## Cabinet specification

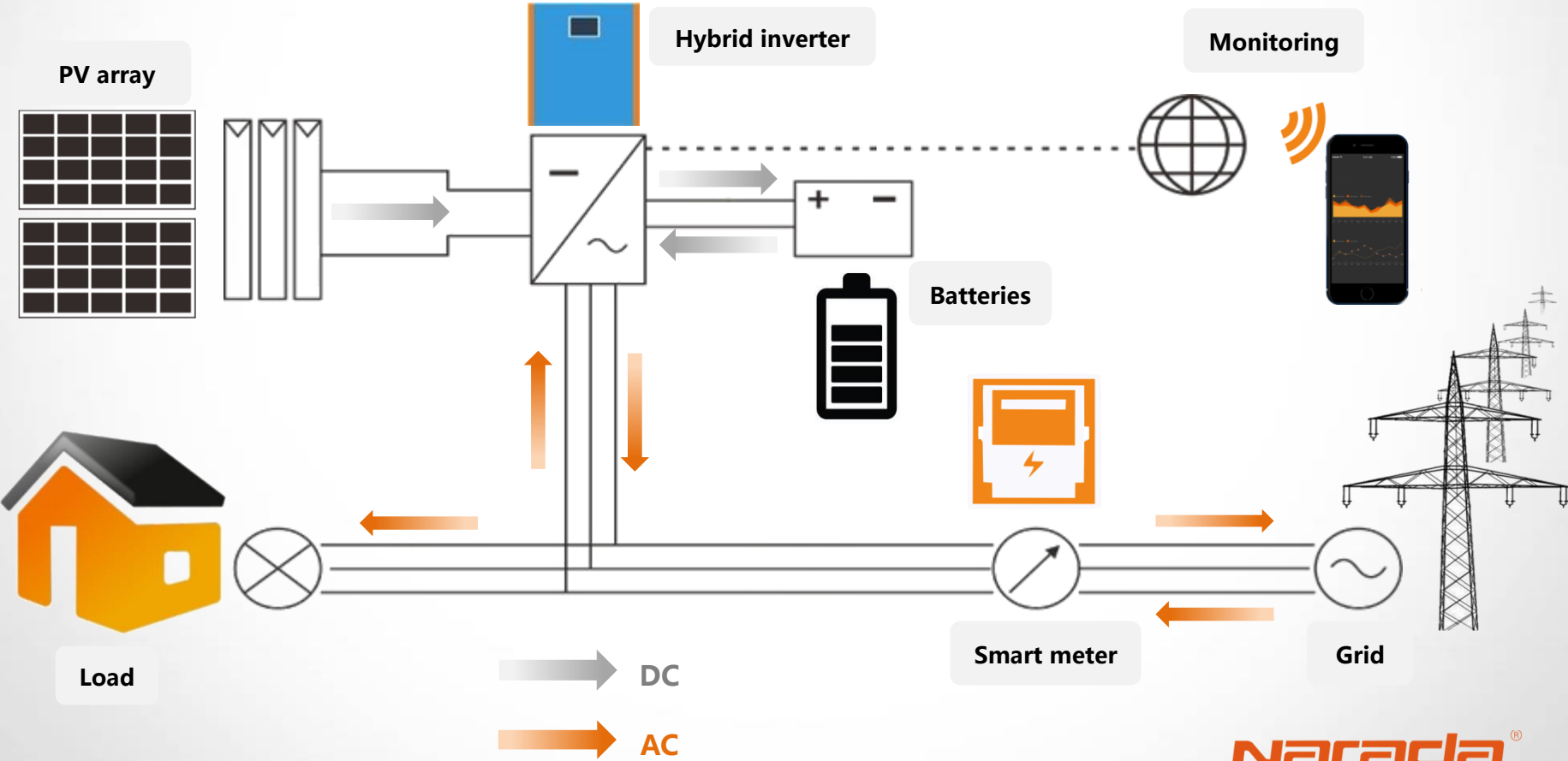
Parameters	Description	
<b>Input</b> (AC-Utility grid)	Rated input AC voltage	220-240V@1-Phase or 400V@3-Phase
	AC frequency	50 Hz/60 Hz
	Max. line current	60 A
<b>Input</b> (AC-PV interface)	Rated input AC voltage	220-240V@1-Phase or 400V@3-Phase
	AC frequency	50 Hz/60 Hz
	Max. line current	60 A
<b>Output</b> (AC-normal load)	Rated output AC voltage	220-240V@1-Phase or 400V@3-Phase
	AC frequency	50 Hz/60 Hz
	Max. line current	60 A
<b>Output</b> (AC-UPS load)	Rated output AC voltage	220V/230V/240V@1-Phase
	AC frequency	50 Hz/60 Hz
	Continuous power@25°C	3500 VA
	Power 30 min. / 5 sec. @25°C	4000 VA / 10.5 kVA
	Power factor	0.1~1

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# NPFC storage system

## Residential system composition



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# NPFC storage system

## Monitoring system



### ▶ Functions of monitoring

- Data generation, storage, consumption
- Warning & analysis for system failure
- Both real-time and historical records
- Flexible demonstration by any time
- Available for both IOS and Android

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# NPFC storage system

## Integrated storage cabinet



An integrated system, consists with Narada NPFC modules, inverter, monitoring platform, EMS and connection box, ideally for high-end requirement



- **Automatic** operational mode
- **One-stop** integrated solution
- **Smart** energy management



- **Modular** design for maintenance
- **Plug & Play** for easier installation
- **Available** for many other inverters



- **5 years** product warranty
- **7 years** performance warranty
- **15 years** expected service life

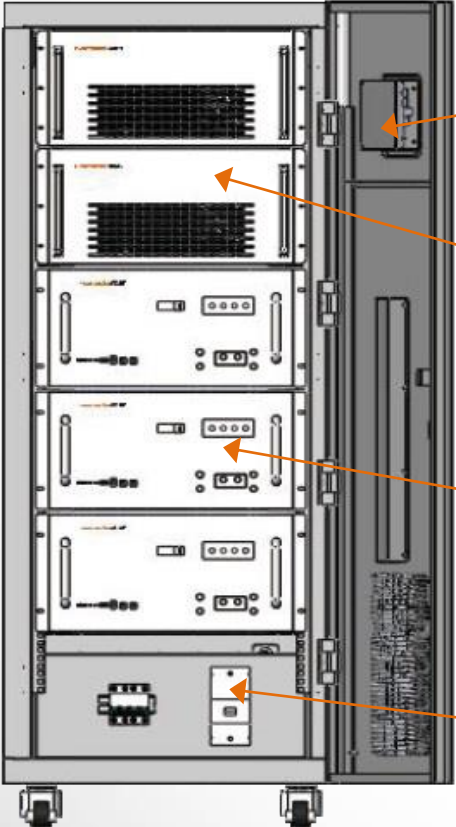
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# NPFC storage system

## Composition of cabinet

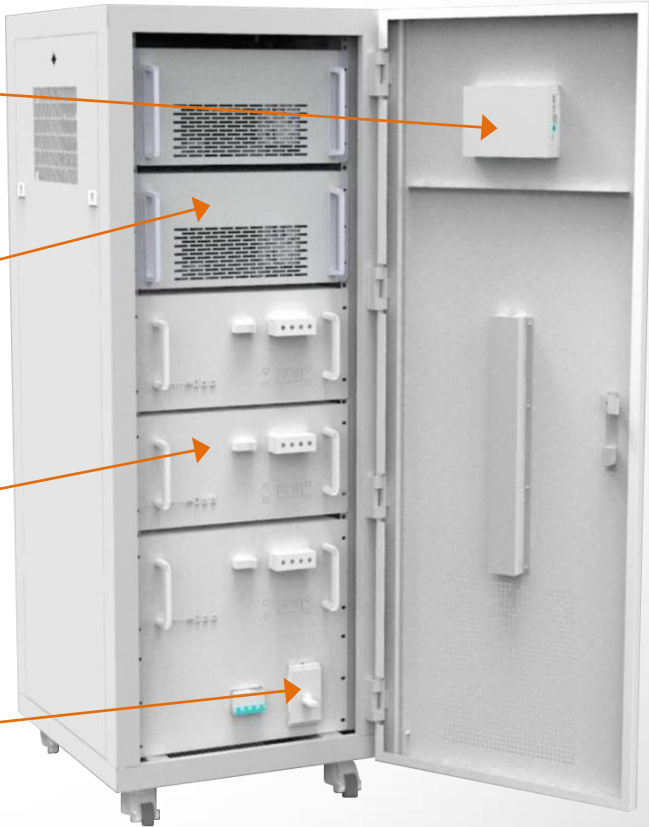


**EMS  
module**

**Inverter  
modules**

**Battery  
modules**

**System  
switch**



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# NPFC storage system

## Cabinet specification

Parameter	3KW/11.5KWh	6KW/11.5KWh
Dimensions (W*D*H)	600*700*1600mm	
System weight	<280 Kg	<300 Kg
Nominal/Available capacity	11.5KWh / 9.21KWh (@ 80% DOD)	
Operating voltage range	48V (@ [40,100])	
Maximum charging power	3.0KW	6.0KW
Maximum charging current	60A / 45A	120A / 90A
Charge/Discharge efficiency	93.5%	
Grid feed-in	3N ~ 400V	
Inverter certification	VDE-AR-N4105 / IEC62109 / VDE0126 / CE	
Battery configuration	3pcs of 48V80Ah modules in parallel	
Battery lifespan	>5000 times (@ 80% DOD)	
Battery certification	CE / UN 38.3	
Energy management system	9 inch touch screen with full color	
Communication access	RS485 / RS232 / USB / Ethernet / WiFi	

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# NPFC storage system

## Operational modes

### Under normal grid condition ■

#### Daytime:

Loads firstly get PV energy, whose rest will be stored in cabinet, and residue into grid

#### At night:

Loads firstly get energy from battery, then from grid if storage capacity is not enough

### Under abnormal grid condition ■

#### On-grid to off-grid:

System will automatically switch to off-grid mode for vital loads when grid is abnormal

#### Off-grid to on-grid:

System will switch back automatically from off-grid to on-grid mode when grid normal



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# NPFC storage system

Specialty of integrated cabinet



■ More options of appearance available

## ▶ System Highlights

- Compact and one-stop integration
- Smart management for more profit
- Auto-switch for on & off grid mode
- Long lifespan with >7years warranty
- Touchable screen for local monitoring

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# NPFC storage system

More cabinet reference



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# Narada®



**Projects of power storage**

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# Energy storage project for Grid India

Katwaria Sarai, New Delhi, India



## Project highlights

The first overseas project of energy storage, which consists of both Narada lead-carbon battery and lithium battery



- Storage capacity: **1MWh**
- Pb-C batteries: **500KWh**
- Li-ion batteries: **500KWh**
- Function: **Frequency modulation**
- Project date: **2016.08**

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# Energy storage project for Grid India

Katwaria Sarai, New Delhi, India



More references

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# Storage project for premier school

Peshawar, Pakistan

## Project Details

- Storage power: **30KWp**
- Storage capacity: **84KWh**
- Battery type: **NLC36130255PF**
- Battery quantity: **324pcs**
- Project date: **2016.11**



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# Storage project for premier school

Peshawar, Pakistan



More references

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# Storage project for grid distribution

Xuzhou city, Jiangsu, China

## ▶ Project Details

- Storage power: **300KWp**
- Storage capacity: **344KWh**
- Battery type: **NLC36130255PF**
- Battery quantity: **1344pcs**
- Project date: **2016.12**



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# Storage project for grid distribution

Xuzhou city, Jiangsu, China



More references

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# Residential solution of Narada HESS

Nantong city, Jiangsu, China



## ▶ Project Details

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

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# 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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Thanks!

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