

Item	50kW/60kWh	250kW/250kWh(20#container)	500kW/500kWh(40#container)
Product ID			
Energy Storage Capacity	60kWh	250kWh	500kWh
Nominal Discharge Power	50kW	250kW	500kW
Applications	Smooth output/Peak shaving & load leveling/Optimize electricity system/compensate for renewable energy generating		
Components	Battery Cabinet, Battery Management system, Power Conversion System, Other Auxiliaries	Battery Cabinet, Battery Management system, Power Conversion System, Other Auxiliaries	Battery Cabinet, Battery Management system, Power Conversion System, Other Auxiliaries
Warranty	Battery	2 years (more than 80% capacity remain)	
	PCS	2 years	
	Note	Could be extended according to customer's requirement	
Output Voltage	380V/480V	380V/480V	380V/480V
System Efficiency	>90%	>90%	>90%
Permissible Grid Voltage	340V-440V/420V-530V	340V-440V/420V-530V	340V-440V/420V-530V
Nominal Grid Frequency	50Hz/60Hz	50Hz/60Hz	50Hz/60Hz
Frequency Range	49Hz 51Hz/59.3Hz-60.5Hz	49Hz 51Hz/59.3Hz-60.5Hz	49Hz 51Hz/59.3Hz-60.5Hz
Connection Method	3 phase 4 line	3 phase 4 line	3 phase 4 line
THD	<5%(Nominal Power)	<5%(Nominal Power)	<5%(Nominal Power)
Permissible Relative Humidity	5%~95%(No-condensing)	5%~95%(No-condensing)	5%~95%(No-condensing)
Permissible altitude	≤2000m	≤2000m	≤2000m
Exterior Communication Interface	Ethernet	Ethernet	Ethernet
Noise	75 dB(Measured at 1 meter)	75 dB(Measured at 1 meter)	75 dB(Measured at 1 meter)
Response Time	<100ms	<100ms	<100ms
Enclosure Type	Indoor/outdoor	Indoor/outdoor	Indoor/outdoor

Based on the advanced Fe battery technology , intelligent battery management system, reliable power conversion system, BYD could provide integrated containerized solution according to clients' demand. The integration of the cabinets into a containerized enclosure ensures a particularly easy application. It is easy to transport the containers and they can be positioned flexibly. Based on the above configuration, BYD ESS can be scaled to virtually any multi-kW/MW power and energy capacity.

BYD ESS Reference Cases

BYD is committed to provide clients with integrated solutions and best services. The eco-friendly, sustainable, and safe BYD ESS has been widely recognized by clients. Reference cases of large-scale energy storage system include China State Grid 6MW/ 36MWh project, China Southern Grid 12MWh project, and Chevron 2MW/4MWh project etc.



6MW/36MWh For State Grid Project

World biggest chemical energy storage station

Capacity: 6MW(9MW)/ 36MWh  
Voltage: 0.4kV (AC 50Hz)  
Battery Type: FV200 (3.2V/200AH)  
Time: December, 2011  
Location: Zhangbei, China



2MW/4MWh Container Type ESS For Chevron

First MW scale overseas ESS container

Capacity: 2MW/4MWh  
Voltage: 0.5kV ( AC 60Hz )  
Battery Type: FV200 ( 3.2V/200AH )  
Time: March, 2012  
Location: San Francisco, USA

About BYD

Established in 1995, BYD is a top high-tech enterprise in China specializing in IT, automobile, and new energy. BYD is the largest supplier of rechargeable batteries in the globe, and has the largest market share for Nickel-cadmium batteries, handset Li-ion batteries, cell-phone chargers and keypads worldwide. It also has the second largest market share for cell-phone shells in the globe. BYD Auto becomes the most innovative independent national auto brand and leads the field of electric vehicles with unique technologies. In the field of new energy, BYD has developed green products such as solar farm, battery energy storage station, electric vehicle, and LED, etc. It will continue to lead the new energy revolution in the world!

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BYD Energy Storage System

Efficient, stable and safe storage solutions for renewable energy.

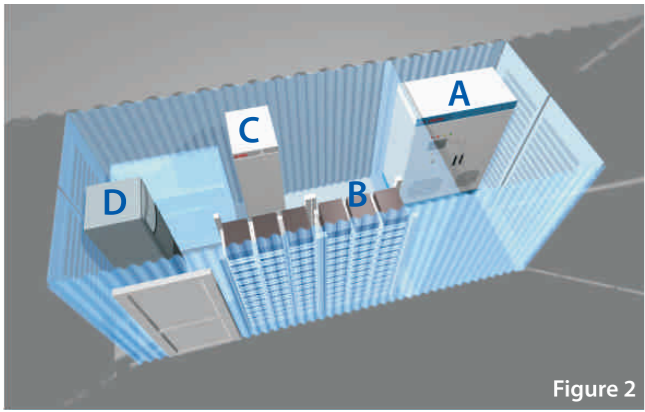
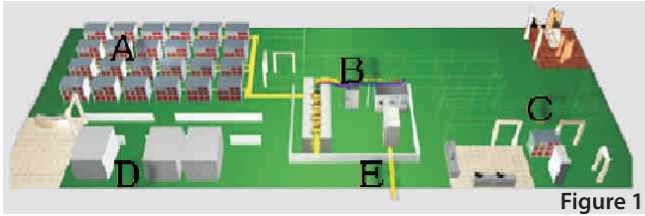
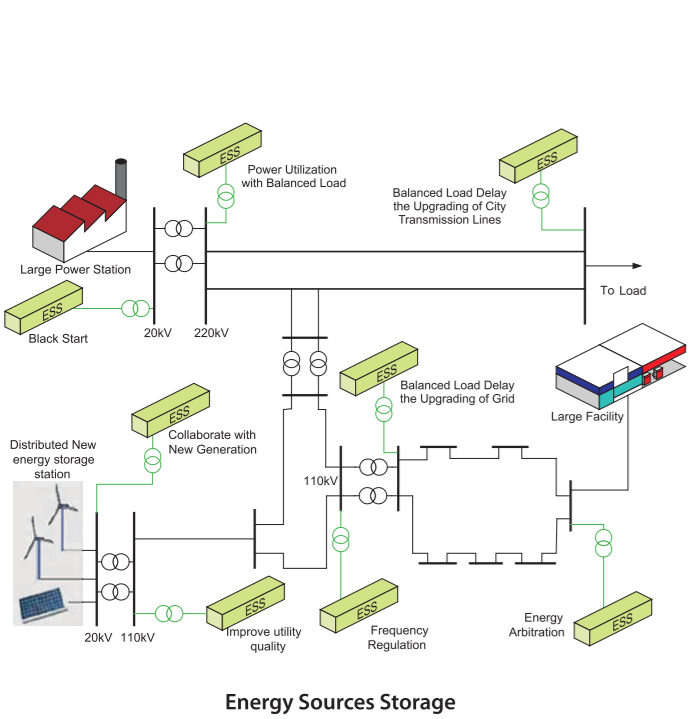


BYD Green Dreams



Relying on the advanced Fe battery technology, BYD can provide large-scale energy storage, distributed energy storage and micro-grid, which forms a complete set and series of energy storage system solutions. For example, the Indoor solution (figure 1) / outdoor solution (figure 2) with on-grid and off-grid function, which can achieve peak shaving & load leveling, smooth the wind/solar output and regulate the frequency etc.

BYD ESS technology offers a modular, flexible design and can be easily tailored to meet a diverse set of customer needs. Up to now, BYD has a lot of successful cases of battery storage solutions from KW sized to MW sized system at home and abroad.

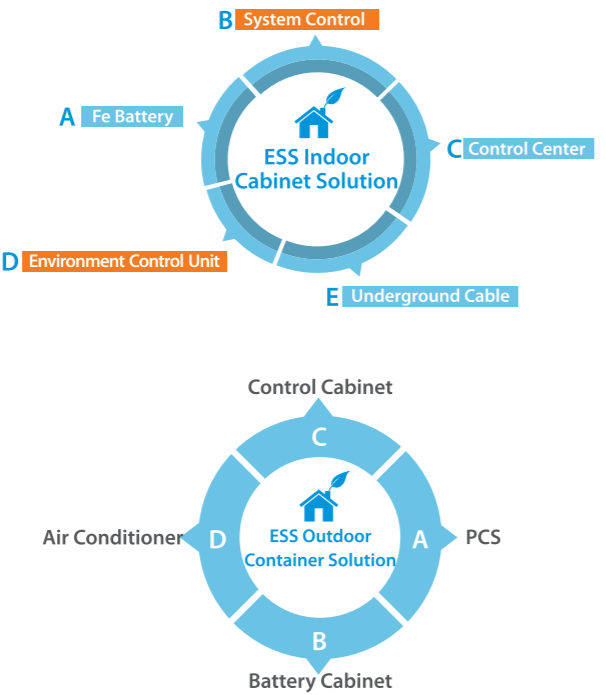


ESS Application Fields

- Wind power plant
- Photovoltaic power station
- Large-sized load center (factory, commercial center etc)
- Emergency power supply occasion
- Areas of limited situations of environment and field (airport, isolated island etc)
- "Black start" of grid
- Grid frequency modulation

Features of BYD ESS

- Peaking shaving & load leveling
- Make compensation for PV/wind generating, and smoothen the power output
- Minimize wire loss, increase the lifespan of wires and electric apparatus
- Act according to requirement of urban grid alteration, ensure safety of the grid
- Optimize the overall arrangement of system, stabilize output of the grid, and ameliorate the energy quality
- Use for urgency transient active power response and/or voltage supporting

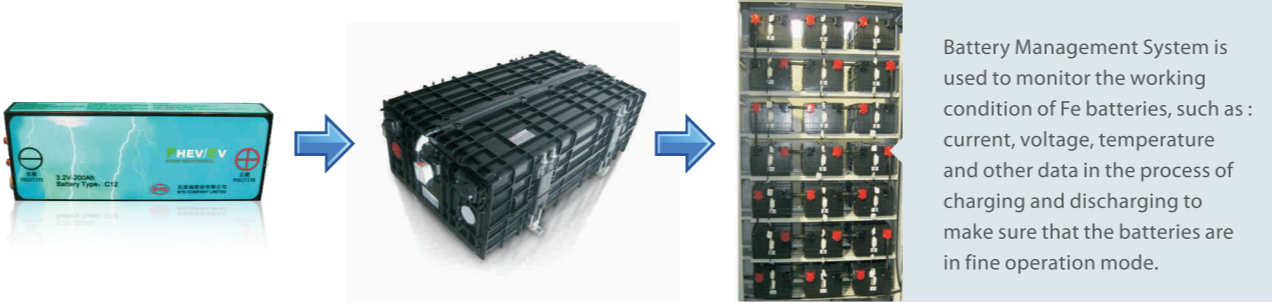
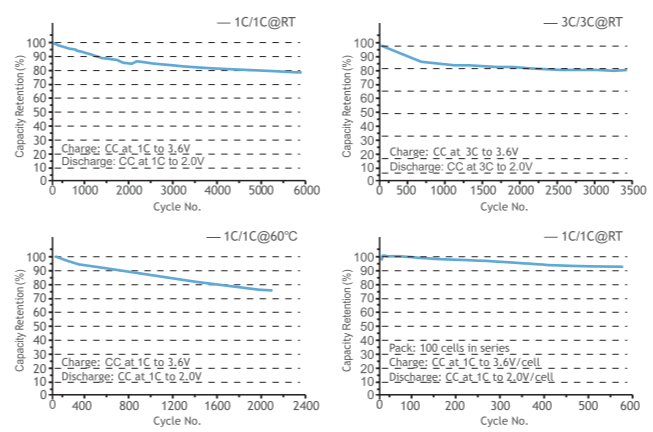


Fe Battery and Battery Management System of ESS

The high efficiency of BYD energy storage system is ensured by the advanced Fe battery technology and the intelligent Battery Management System. BYD self-developed Fe battery is environmental friendly and has excellent safety performance. Special designed for the BYD battery, the unique technology of BYD BMS can give smart control and protection to the system.

Long service life  
High power and high efficiency out put  
Low cost and Full Automatic Manufacture Process  
High Safety

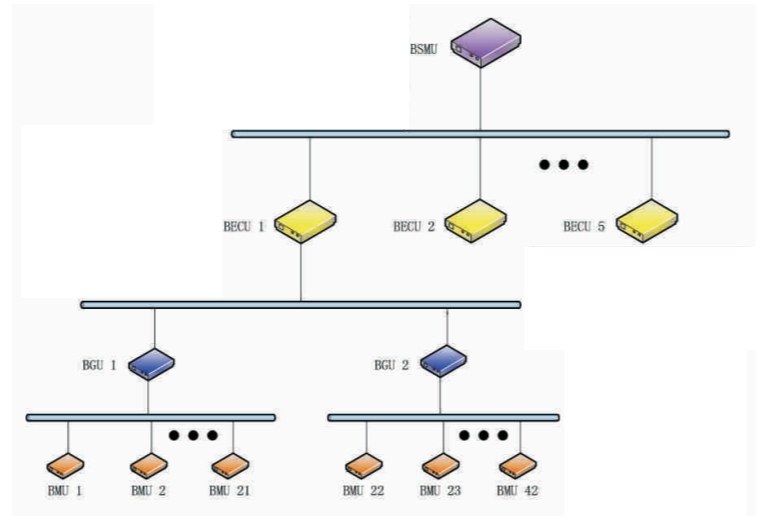
BYD Lithium-ion Iron-Phosphate (Fe) Battery Module Life Cycle Tests



Battery Management System is used to monitor the working condition of Fe batteries, such as : current, voltage, temperature and other data in the process of charging and discharging to make sure that the batteries are in fine operation mode.

Features of BMS

- Battery status monitoring
- Events record and storage function
- Operation control
- Insulation detection
- Dynamic balancing management
- Protection alarms
- Communication



BMS: Battery Management System  
BMU: Battery Management Unit  
BECU: Battery Electrical Controlling Unit  
BGU: Battery Gateway Unit  
BSMU: Battery Stack Management Unit

PCS & Control System

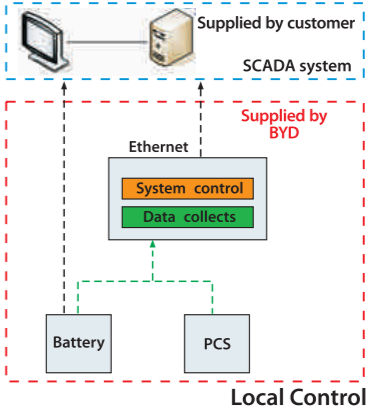
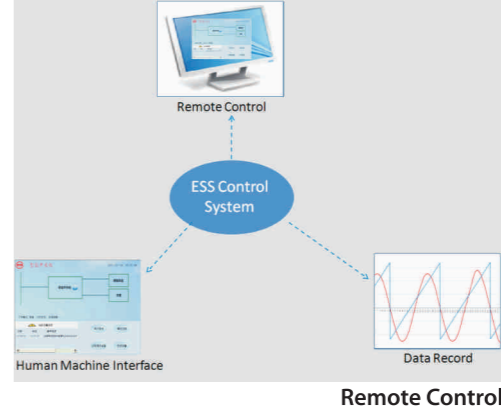


Types of BYD PCS

Based on BYD advanced high-power technology, BYD has self- developed a series of energy-storage system applied PCS units size including: 50kW, 100kW, 200kW, 250kW, 500kW, etc.

Features of BYD PCS

- Bidirectional Energy transducer  
The PCS unit can work on the active inverting mode, transforming energy to network and realizing transformer from DC to AC, and also on the active rectifier mode, transforming AC to DC, charging battery from the grid.
- Active and reactive power control function  
The PCS adjusts the angle of voltage and current output, implementing the proper operation
- Protection and Fault Diagnosis  
The PCS has hardware fault protection and software fault protection, and the protection is perfect.



Control System

- Energy Storage Control System Function:
- Controlling PCS and battery stacks to work together
  - Providing local monitoring and control operation interface
  - Providing remote monitoring and control operation interface
  - Recording and storing important operation parameters as accidents and failure data

New Energy Testing Center



BYD New Energy Testing Center is set up in September 2009, aimed to provide technology testing service and product certification platform.

In Dec 2010, the testing center was certified by VDE Institute as a registered manufacturer's laboratory.

In Dec 2010, the testing center was qualified by UL to participate in its Witness Test Data Program.

Till now, The following type of inverter/converter are certificated:  
UL : 5kw , 250kw  
TUV: 3kw/4kw , 500kw  
VDE: 3kw/4kw