BYD Energy Storage System
Efficient, Stable and Safe Storage Solutions for Renewable Energy.
BYD Energy Storage Solutions

Relying on the advanced Fe battery technology, BYD can provide large-scale energy storage systems, distributed energy storage systems and micro-grid systems. Based on these systems, BYD can provide a complete power solution realizing power output smoothing, peak shaving, frequency regulation, transient active power responding and transient voltage supporting, to keep the power system running safely, stably and reliably. These solutions can be used for frequency regulation, voltage compensation, frequency regulation and power quality management in the power system.

BYD mainly provide indoor/outdoor two kinds of solutions for on grid using, off grid using and hybrid using. Benefiting from the flexible and modular design, BYD ESS can be fit for various needs. From 2009 to 2013, BYD have finished a lot of successful cases from KW sized to MW sized system on china mainland or abroad.

ESS Application Fields

- New-energy generation
  Effectively smoothen the power output to decrease the impact to grid
  Generate according to the plan and correct forecast errors
- Reduce the peak and fill the valley
- Grid frequency modulation with AVC and AGC functions
- Electricity of transmission and distribution
- Smart grid
- Micro-grid
- Special type needs
  Military base, smelter, chemical plant, paper mill, airport, wharf and others

Energy Sources Storage

Battery

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 environment al 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.

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

- Long service life
- High power and high efficiency output
- Low cost and full automatic manufacture process
- High safety
Features of BMS

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

BMU : Battery Management Unit  
BECU : Battery Electric Controller Unit  
BSMU : Battery System Management Unit

Features of PCS

- Wide-range of DC input voltage
- 10% additional power for continuous operation at ambient temperature up to 40°C
- Short conversion time of full power from charge to discharge
- Indoor or outdoor installation
- Low voltage ride through
- Reactive power adjustable, max. reactive power up to 500kVar
- Active power derating
- Film capacitor design

Fire Protection system

- Automatic fire detecting
- Manual/automatic fire alarming
- Control room and local fire alarm device
- Fault alarm for fire detecting and alarming system
- The accumulator is placed in fire alarming controller. When the main power is off, the accumulator will supply the power to the automatic fire alarming system
- The monitoring function for the open circuit and short circuit in detecting circuit
- The monitoring function for the open circuit and short circuit in alarming circuit

Air Condition System

- Power-off memory And Reboot
- Remote fault identification and alarm, and report the fault through RS48S
- Use the fuzzy intelligence control for remote communication
- Have the cooling, heating, constant temperature and dehumidifying mode
- Heating control
- Temperature control
- Operation without failure continuous more than 2500hours, Long life, good working performance in harsh environment
Monitoring 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

Specification

<table>
<thead>
<tr>
<th>PCS Power</th>
<th>Battery Capacity</th>
<th>Size</th>
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<tbody>
<tr>
<td>1</td>
<td>250kW</td>
<td>1MWh</td>
</tr>
<tr>
<td>2</td>
<td>500kW</td>
<td>1MWh</td>
</tr>
<tr>
<td>3</td>
<td>1MW</td>
<td>1MWh</td>
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<tr>
<td>4</td>
<td>1.8MW</td>
<td>800kWh</td>
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</table>

New Energy Testing Center

BYD New Energy Testing Center was founded on 1st Dec. 2009, it mainly focus on testing and certification for New Energy products.
BYD New Energy Testing Center had been authorized by UL, VDE, TUV and CSA. We can test and certificate the products by the testing center.
BYD Project Reference

Canada 4MW/2MWh Containerized ESS

System Parameter
System Capacity: 4MW/2MWh
Project Location: Ontario Canada
Completion Time: April, 2014
Owner: RES Canada

Function
Demonstration Project
Peak Shaving
Peak and Frequency Regulation
Power Storage

Italy 1MWh Containerized ESS

System Parameter
System Capacity: 1MWh
Project Location: Italy
Completion Time: April, 2014
Owner: Terna

Function
Frequency Regulation

USA 4MW/2MWh Containerized ESS

System Parameter
System Capacity: 4MW/2MWh
Project Location: Ohio USA
Completion Time: February, 2014
Owner: RES America

Function
Frequency Regulation

USA 200kW/500kWh Containerized ESS

System Parameter
System Capacity: 200kW/500kWh
Project Location: Louisiana, USA
Completion Time: August, 2012
Owner: Duke, USA

Function
New Energy Testing
Solar Output Smoothing
Voltage / Frequency Regulation

USA 2MW/4MWh Containerized ESS

System Parameter
System Capacity: 2MW/4MWh
Project Location: San Francisco, USA
Completion Time: September, 2011
Owner: Chevron USA

Function
Used in Micro-grid System
Solar Output Smoothing
Power Loads

Chevron 250kW/500kWh Containerized ESS

System Parameter
System Capacity: 250kW/500kWh
Project Location: Doha Qatar
Completion Time: November, 2012
Owner: Chevron USA

Function
Solar Power Testing
Energy Storage
Solar Output Smoothing
Working On / Off Grid

BYD 200kW/800kWh Containerized ESS

System Parameter
System Capacity: 200kW/800kWh
Project Location: Shenzhen, China
Completion Time: June, 2009
Owner: BYD

Function
Peak Shaving
Power Loads

USA 2MW/4MWh Containerized ESS

System Parameter
System Capacity: 2MW/4MWh
Project Location: Tibet, China
Completion Time: December, 2013
Owner: Longyuan Tibet New Energy Company

Function
Solar and Wind Output Smoothing
Peak Shaving
System Frequency
State Grid 9MW/36MWh ESS

System Parameter
System Capacity: 9MW/36MWh
Project Location: Zhangbei, China
Completion Time: December, 2011
Owner: State Grid

Function
Solar and Wind Output Smoothing
Peak Shaving
System Frequency

China Southern Power Grid 3MW/12MWh ESS

System Parameter
System Capacity: 3MW/12MWh
Project Location: Shenzhen, China
Completion Time: August, 2011
Owner: China Southern Power Grid

Function
Demonstration Project
Peak Shaving
Peak and Frequency Regulation
Power Storage

BYD 20MW/40MWh ESS

System Parameter
System Capacity: 20MW/40MWh
Project Location: Shenzhen, China
Completion Time: June, 2014
Owner: BYD

Function
System Frequency
Micro-Grid

Trial Project of Energy Storage System with High Capacity Batteries of Nuclear Power Station

System Parameter
System Capacity: 2.5MW/3.5MWh
Project Location: Shenzhen, China
Owner: CGNPC

Function
Emergency Power Supply of Nuclear Station
Multimachine Parallel Function

State Grid 1MW/1MWh ESS

System Parameter
System Capacity: 1MW/1MWh
Project Location: Zhangbei, China
Completion Time: November, 2010
Owner: State Grid

Function
Wind Output Smoothing

ZhongDian Puri 100kW/400kWh ESS

System Parameter
System Capacity: 100kW/400kWh
Project Location: Zhangbei, China
Completion Time: November, 2011
Owner: ZhongDian Puri

Function
Dual Mode Automatic Seamless Switch of Grid-tied and Off-grid

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 MiniES2.0

Introduction
BYD MiniES2.0, the new generation energy storage system, is designed and developed for residential customers. System adopts high-performance lithium iron phosphate battery, which combines functional integration and modular design. The capacity can be smoothly expanded, at the meantime the installation is faster and more convenient. Basically, the system can support photovoltaic charging, load matching, remote dispatch and emergency backup (off-grid), etc. The overall system is fully upgraded based on the first generation of MiniES products, to meet the diverse needs of customers around the world.

Features
- **All-in-one Design**: The battery, PCS, BMS and other technologies are highly integrated, and there is no external cable connection between the structures to effectively protect user security and reduce installation cost.
- **Modular Design**: Flexible capacity solution, 7kWh-15kWh optional capacity for global users to choose. The capacity can be smoothly expanded upwards to meet the needs of families in different periods.
- **Hybrid Version Optional**.
- **Wireless Controllable**: Support wireless control, support VPP application, etc.
- **Convenient Installation**: The weight of single module is less than 30kg, which can be installed by one man independently, the installation cost drops more than 50%.
- **Battery Ten-year Warranty**: During the warranty period, the battery capacity remains more than 60%.

AC System Topology

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Overseas Market: +86 755 89888888 ext. 57386  E-mail: eprisupport@byd.com
Website: www.bydenergy.com
## BYD MiniES2.0

<table>
<thead>
<tr>
<th>PIC</th>
<th>MiniES-7.0</th>
<th>MiniES-9.6</th>
<th>MiniES-12</th>
<th>MiniES-14.4</th>
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<tbody>
<tr>
<td><strong>On-Grid</strong></td>
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<tr>
<td>Nominal Power (230, 50Hz)</td>
<td>3kW</td>
<td>4kW</td>
<td>5kW</td>
<td>5kW</td>
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<td>Maximum Power (25°C)</td>
<td>3.3kW</td>
<td>4.4kW</td>
<td>5.5kW</td>
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<td>Nominal Current</td>
<td>13A</td>
<td>17.3A</td>
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<td>Nominal Voltage/Range</td>
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<td>Nominal Frequency/Range</td>
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<td>Phase</td>
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<td><strong>Battery</strong></td>
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<tr>
<td>Capacity</td>
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<td>9.6kWh</td>
<td>12kWh</td>
<td>14.4kWh</td>
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<td>Battery Voltage/Range</td>
<td>96VDC/(84~108)</td>
<td>128VDC/(112~144)</td>
<td>160VDC/(140~180)</td>
<td>192VDC/(168~216)</td>
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<tr>
<td>DOD</td>
<td>85%</td>
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<td>Round trip efficiency (TBD)</td>
<td>&gt; 90%</td>
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<td><strong>Other</strong></td>
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<td>Protection rating (TBD)</td>
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<td>Noise (TBD)</td>
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<td>Weight</td>
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<td>152kg</td>
<td>180kg</td>
<td>208kg</td>
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<td>1280<em>726</em>275</td>
<td>1440<em>726</em>275</td>
<td>1600<em>726</em>275</td>
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<td>Work Temp.</td>
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<td>Storage Temp.</td>
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<td>Communication Port</td>
<td>LAN/WLAN/ RS485</td>
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<tr>
<td>Interaction</td>
<td>Button</td>
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