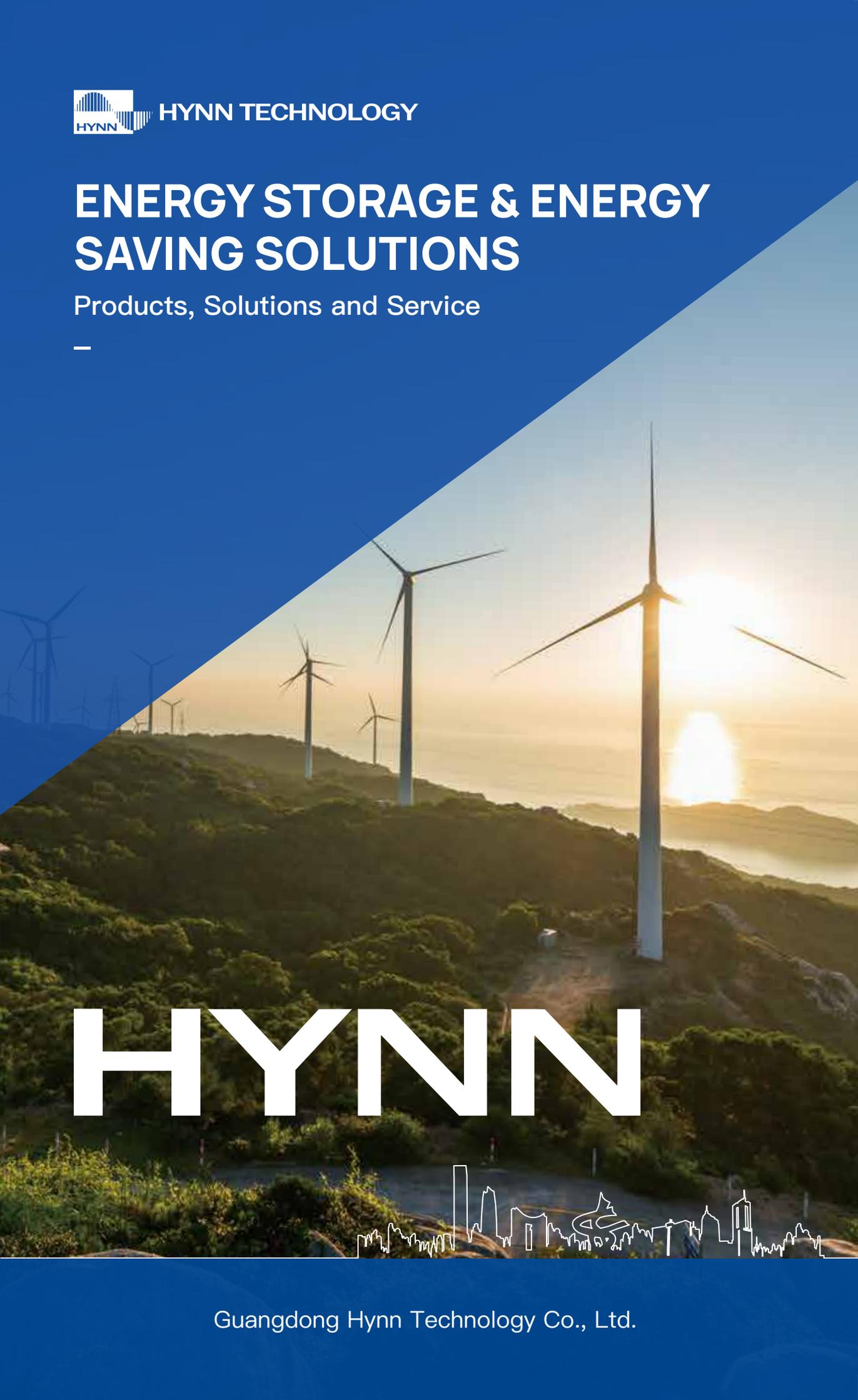




HYNN TECHNOLOGY

ENERGY STORAGE & ENERGY SAVING SOLUTIONS

Products, Solutions and Service



HYNN

Guangdong Hynn Technology Co., Ltd.



Pioneer with Innovative Solutions

Morgan Stanley

Invested by Morgan Stanley (China)
Private Equity Investment Management

PROVIDE INTEGRATED SMART ENERGY SOLUTIONS TO GLOBAL CUSTOMERS

Over 18 Years of Experience in Cell Manufacturing and Testing

 **100,000+m²**
Office and Factory Area

 **350+GWh**
Accumulated Delivery

 **2000+**
Global Staff

 **500+**
R&D Staff and
Technicians

 **9+**
Delivery to
Overseas Countries

 **7+**
Foreign
Subsidiaries

Established in 2006, HYNN TECHNOLOGY has been committed to providing intelligent production lines, full life cycle testing lines and comprehensive energy solutions for power/energy storage batteries, and has become one of the tier-one suppliers in global market.

The company has more than 2,000 employees, distributed in China, Germany, France, Sweden, Japan, South Korea, The United States, etc., has a R&D and technician team of more than 500 people.

Until now, HYNN has delivered cell production and testing lines to 9 countries and more than 42 domestic cities in China mainland, accumulated over 350 GWh.

Under the intense challenges of mass production lines, HYNN acquired rich tech and project experience, hence has grown into core supplier of the world's leading battery manufacturers, car makers, ESS integrators and etc.



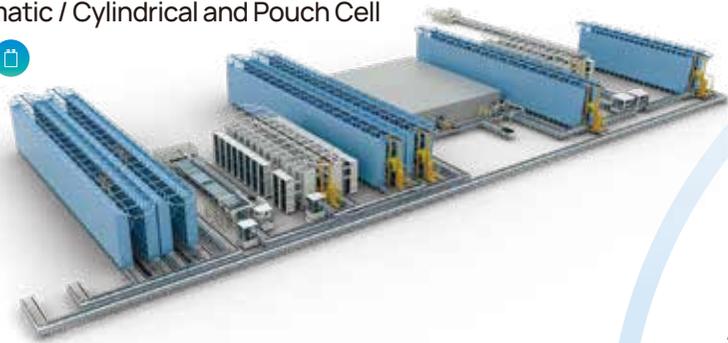
HYNN

Business Panorama

Renewable Energy Full Life-Cycle Applications

Cell Formation & Test

Turnkey Automated Cell Finishing Solutions for Prismatic / Cylindrical and Pouch Cell



Module PACK Test & Application



AC/DC, DC/DC



Energy Saving Testing Solutions



Charging / Swapping Station



Regular Testing

Energy Storage Products & Solutions

PCS



Containerized Inverter Step-up Transformer System



Renewable Power Station

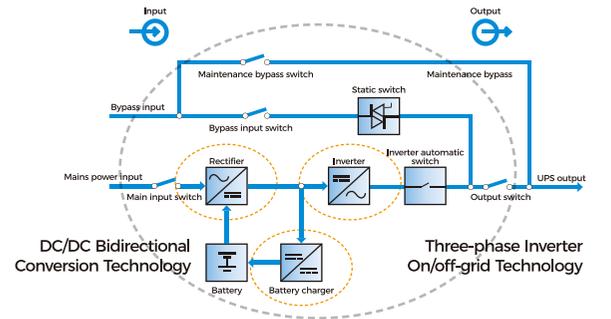


Micro-Grid

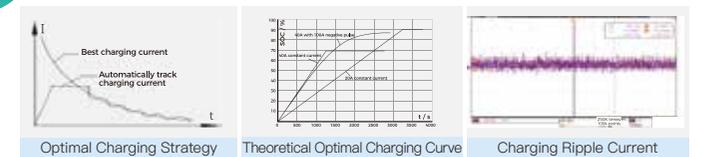
Application Scenarios

Core Advantages

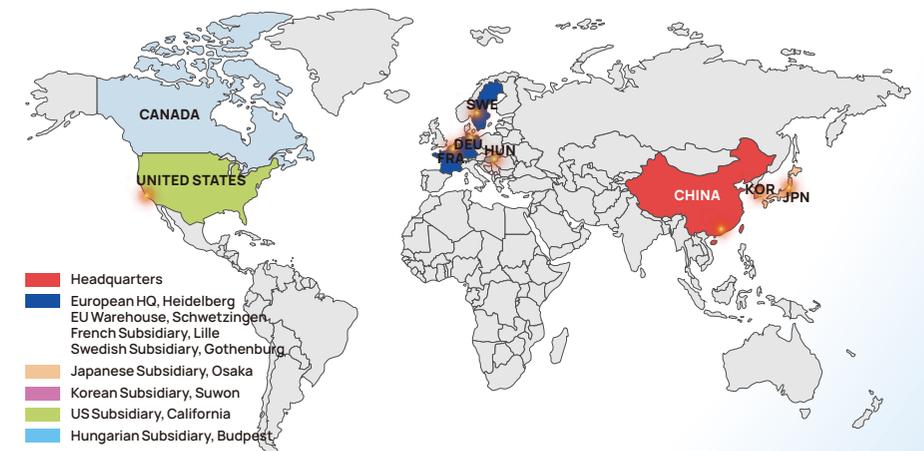
Comprehensive & Reliable Power Electronics Technology



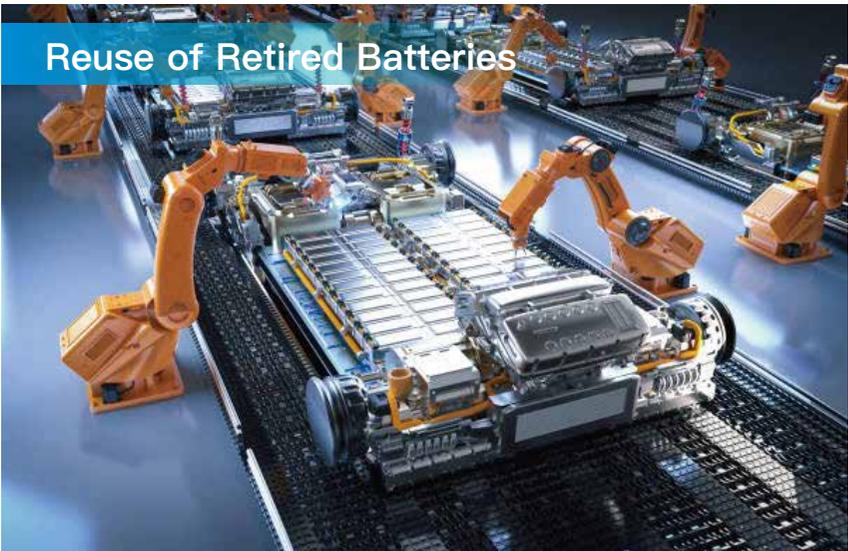
Cell-level Control Technology



Global Turnkey Delivery Experience



Application Scenarios



Customers



* Only part of the clients. Names not listed in order.

Project Reference



▶ Containerized testing system for BESS Battery manufacturer, multiple projects in China



▶ Energy-saving testing for PV station Energy group, Jiangsu, China

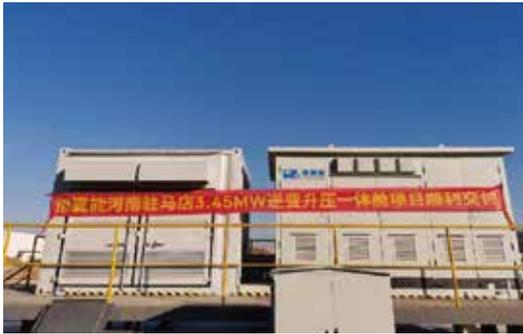
HYNN



▶ Containerized testing system for BESS
Energy group, France



▶ D-BUS energy saving solutions
Battery manufacturer, France



▶ Inverter + step-up boost system
Energy group, Henan, China



▶ Inverter + step-up boost system
Energy group, Inner Mongolia, China



▶ Inverter + step-up boost system
Energy group, Jiangsu, China



▶ Solar, Storage, Charging and Testing
Integrated Solution
Municipal investment Group, Guangdong,
China



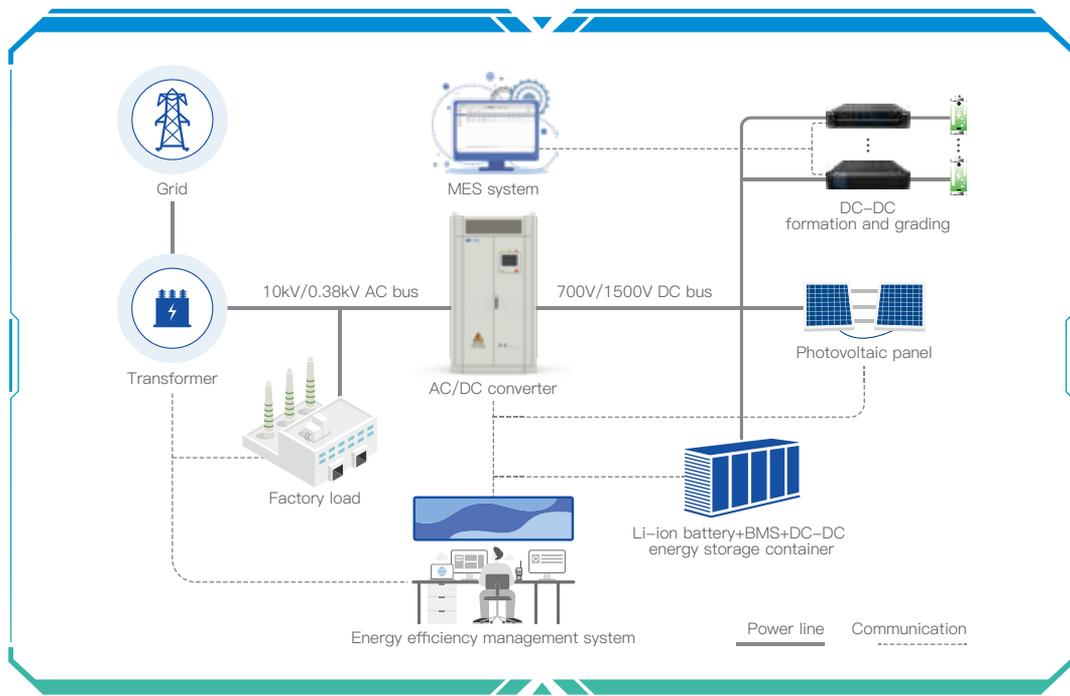
▶ AC/DC Hybrid micro-grid solutions
Energy group, Heilongjiang, China



▶ Fishing & PV complementary power sation
Municipal investment group, Guangdong,
China

Solution Highlights

Micro-grid Energy Saving Solution



Design Principle

AC/DC converters, energy storage containers, and DC/DC power modules connected through 700V/1500V DC bus coupling; the energy in the factory can be dispatched in real time by the EMS energy efficiency management system.

Solution Advantages



Multiple converters in parallel
AC DC hybrid integrated

20%

Energy Saving Effect

Compared to the traditional formation and grading scheme, the line loss is smaller, the internal energy circulation transmission level is fewer, the overall system efficiency is improved, and the energy-saving effect is improved by 20%.

10%

Overall Cost

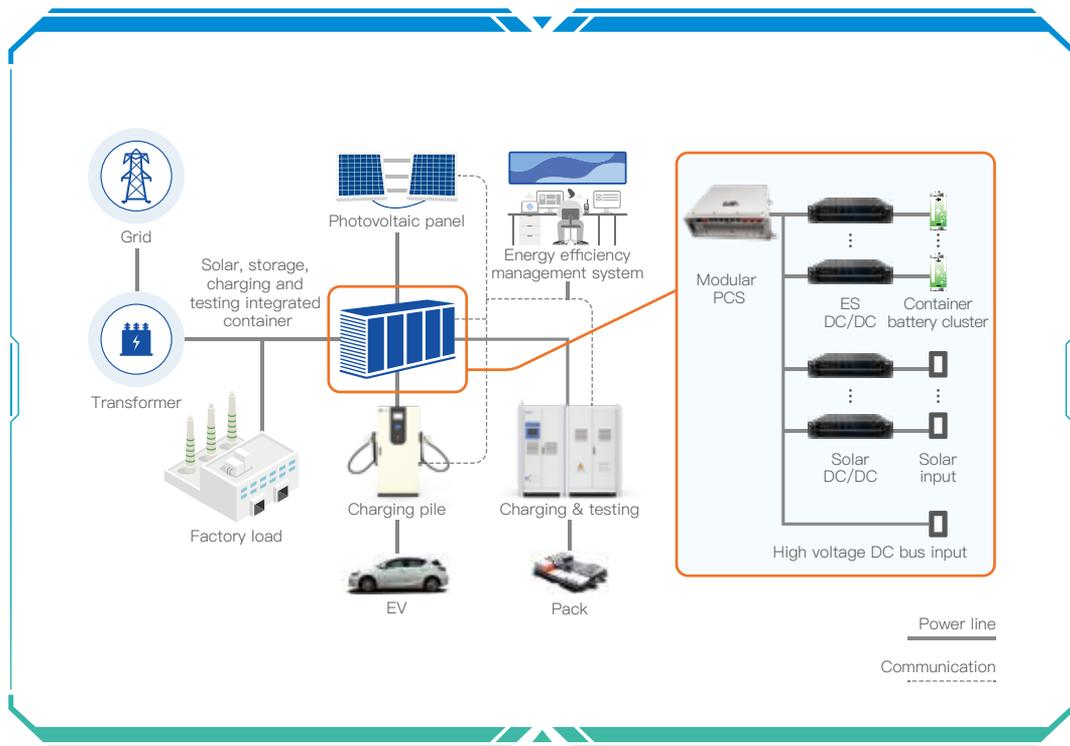
Compared to the traditional formation and grading scheme, AC/DC adopts a high-power all-in-one machine, which can save 10% of the overall cost.

15%

Stability Performance

Achieve ACDC non-isolated parallel control of multiple PCS. Through common-mode voltage suppression strategy, circulating current suppression tech and multi-machine parallel resonance suppression algorithm, the system efficiency is greatly increased.

Solar, Storage, Charging and Testing Integrated Solution



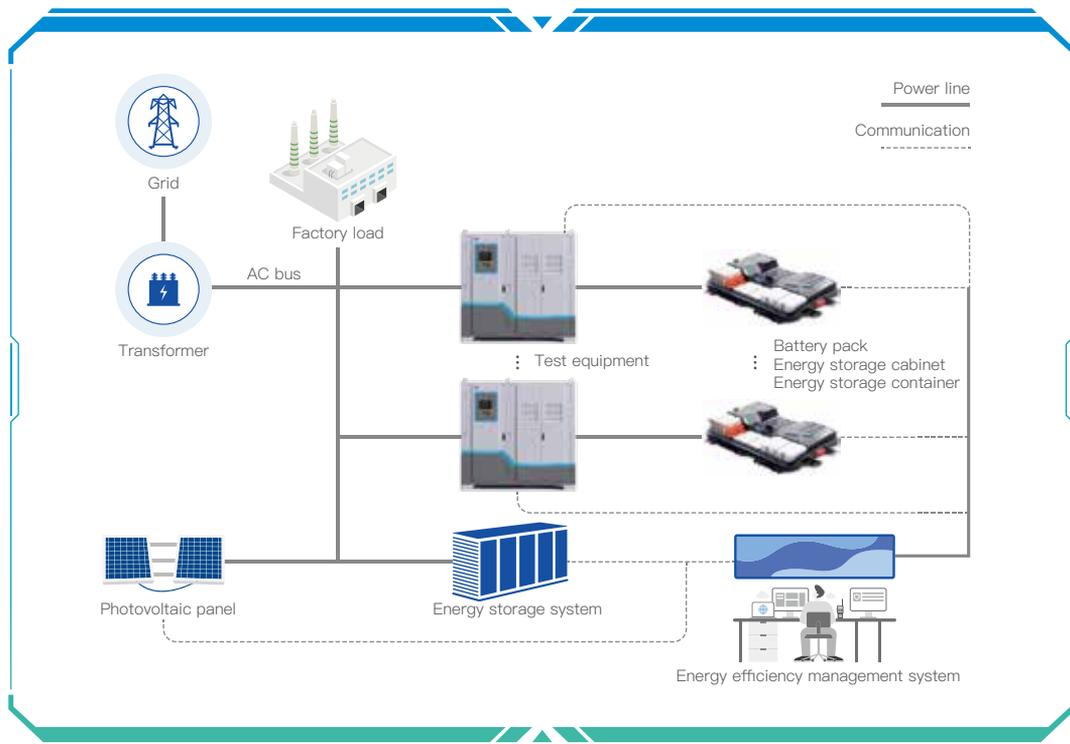
Design Principle

The system is composed of energy storage PCS, optical storage integrated container, charging station, detection equipment, and supporting intelligent energy efficiency management system. The system energy can be controlled by the energy efficiency management system for real-time optimal energy efficiency scheduling.

Solution Advantages

<div style="text-align: center;">  <p>Energy-saving Improvement</p> <p>Multi energy complementary, suppressing the impact of charging load changes, and improving energy efficiency by 10%.</p> </div>	<div style="text-align: center;">  <p>Overall Cost</p> <p>Flexible configuration, high system conversion efficiency, high-voltage DC bus scheme, overall cost reduction of 10%.</p> </div>	<div style="text-align: center;">  <p>Safety Improvement</p> <p>Multi channel signal acquisition, real-time monitoring, abnormal fluctuation warning, system safety performance increased by 15%.</p> </div>
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Power Battery Energy Saving Testing Solution



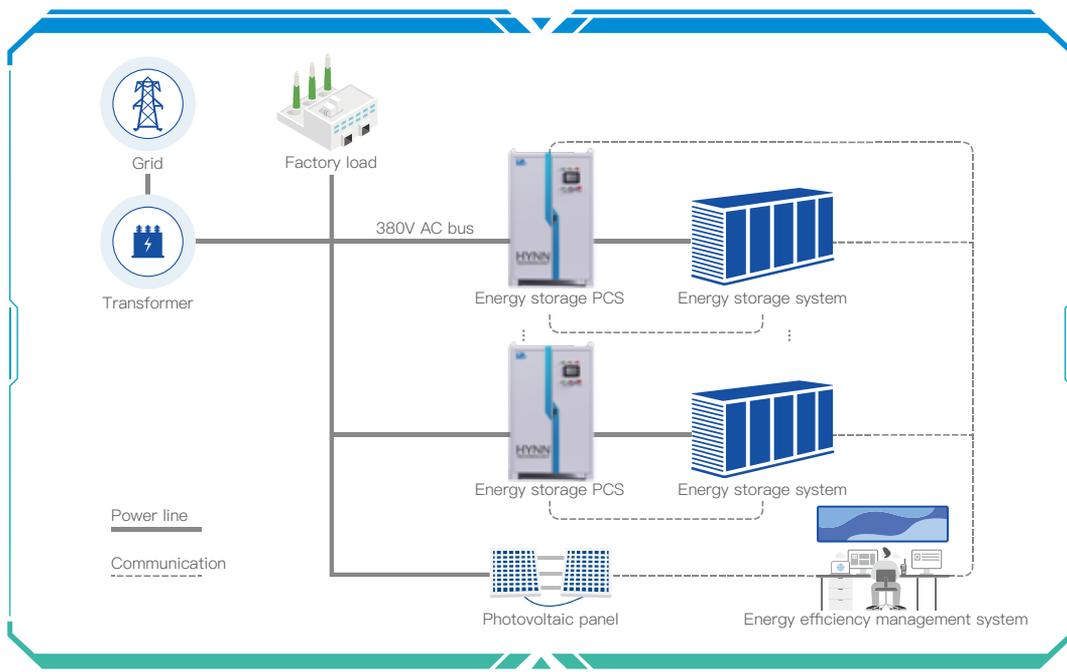
Design Principle

The system consists of power battery testing equipment, photovoltaic power generation system, energy storage container, electric vehicle pack, and supporting intelligent energy efficiency management system. The system energy can be controlled by the energy efficiency management system for real-time optimal energy efficiency scheduling.

Solution Advantages

<div style="text-align: center;">  <p>15%</p> <p>Energy-saving Improvement</p> <p>The system has been intelligently scheduled by the energy efficiency management system, achieving multiple complementary functions and increasing the intelligent energy-saving effect by 15%.</p> </div>	<div style="text-align: center;">  <p>50%</p> <p>Efficiency Improvement</p> <p>Based on partial charge and discharge data, predict the complete charge and discharge curve of the battery, shorten the testing process, and improve the testing efficiency by 50%.</p> </div>	<div style="text-align: center;">  <p>20%</p> <p>Safety Improvement</p> <p>Multi level software and hardware fuse protection, high security protection for data recording, and 20% improvement in security performance.</p> </div>
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Energy Storage System Solution



Design Principle

The system consists of energy storage PCS, photovoltaic power generation system, energy storage container, and supporting intelligent energy efficiency management system. Each power unit is electrically connected through 380V AC bus coupling. The system energy can be controlled by the energy efficiency management system for real-time optimal energy efficiency scheduling.

Solution Advantages

10%
Energy Saving

Power generation side

Centralized renewable energy grid connection generates smooth power generation output and reduces the demand for wind and solar waste.

After configuring energy storage in optical storage power stations, based on power output prediction and energy storage discharge scheduling, intermittent and fluctuating renewable energy generation output can be smoothly controlled to meet grid connection needs, thereby improving the utilization rate of renewable energy and increasing energy efficiency by 10%.

5%
Efficiency Improvement

Grid side

The instability of electrical energy generates demand for peak shaving, system frequency regulation, and other auxiliary operations.

In the power supply system, power load fluctuations and frequency changes will cause a decline in power generation efficiency. Through high-voltage energy storage, peak shaving and valley filling of power load and fast and flexible adjustment of frequency can be achieved, ensuring power quality and safe and stable operation of the system, and improving efficiency by 5%.

20%
Electricity Cost

User side

The peak valley arbitrage, self use backup, mobile portability and other demands of end users have led to various energy storage applications.

In the market where peak valley electricity prices are implemented, charging the energy storage system at low electricity prices and discharging the energy storage system at high electricity prices can achieve arbitrage of peak valley electricity prices and reduce electricity costs by 20%.

Featured Equipment

PCS **ON/OFF Grid**



Efficient

Three-level control, the maximum conversion efficiency reaches 99%.



Convenient

Modular/integrated design, easy operation and maintenance, supports parallel operation of multiple machines at AC sides.

Product Features



Applications

Equipped with VSG, VF, PQ, black start and other functions suitable for power generation side, grid side, user side and etc.



Grid Support

Comply with CE, GB/T34120, GB/T34133 standards.
Support high/low voltage and frequency ride-through.
Enhanced power grid adaptability.
Fast response.

* VSG: Virtual Synchronous Generator
VF: Voltage and Frequency
PQ: Active and Reactive Power Control

Equipment Parameters

PCS Series

**HYNN1500V
1250kW**

**HYNN1500V
1575kW**

**HYNN1500V
1725kW**



Precision of voltage regulation
±1%

Precision of current regulation
±1%

Grid frequency range
50Hz/45~55Hz, 60Hz/55~65Hz

Max AC output
1150/1449/1587A

Power factor
≥0.99 (Rated power)

Power factor adjustable range
-1~1

Max Power (AC)
1375/1732/1897kVA

Standby power consumption
<100W

Charge/discharge switch time
<0.1s (Rated power)

PCS Module

HYNN-PCS215-1500M



Rated AC power
215kW

AC overload capability
237kW

Allowed grid voltage
690(-15%~10%)V

Allow grid frequency
50/60(-5~5)Hz

Power factor
0.99/-1~1

DC voltage range
1000~1500VDC

DC Max current
237A

Max Efficiency
99%

Interface & Protocol
Modbus TCP/RTU

Containerized Inverter Step-up Transformer System ON/OFF Grid



Highly Integrated

Modular design improves space utilization
Pre-installed and pre-engineered to reduce on-site work
Easy to install and transport

Efficient Reliable



Smart operation management
Quick fault location
Inverter and transformer unit optimized to improve system efficiency
IP 54 protection level

Product Features



Energy Saving Cost Down

Inverter and transformer integrated to reduce system cost
Reserved interface for solar storage applications
Nighttime SVG function to reduce operation cost

Grid-tied



Equipped with LVRT and HVRT
Equipped with active and reactive four-quadrant adjustment function
Fast power response (<10ms)

Parameters

HYNN-1500V 3.45MW-IH

Max DC power
3450/5000/5160kW

DC input channels
2/4/24

Rated AC current
1588A*2/1150A*4/198A*24

Grid frequency range
50/60Hz

Transformer type
Dry/Oil

Max efficiency
99%

HYNN-1500V 5MW-IH

DC voltage range
1000~1500V

Precision of current & voltage regulation
±1%

Rated AC voltage
690V

Output current (THD)
<3% (Rated power)

Rated power
3500/5100kVA

Protection level
IP 54

HYNN-1500V 5MW-MH

Max DC current
1897A*2/1375A*4/236A*24

Max AC power
3795/5500kW

AC voltage range
586~759V

Power factor and adjustable range
≥0.99 / -1~1

Voltage transformation ratio
37/0.69kV

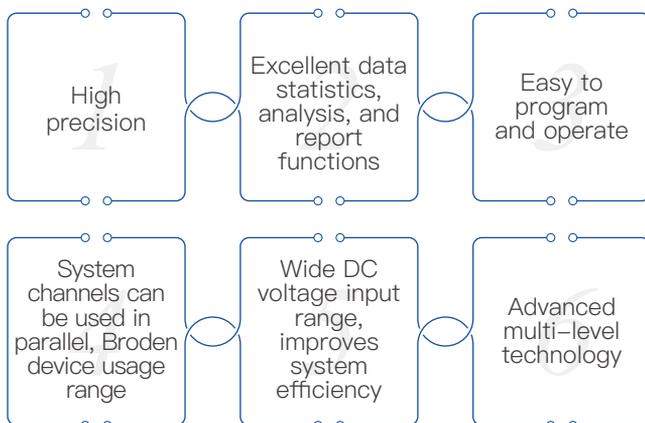
Allowable environment temperature
-35°C~+60°C

Regenerative Digital Battery Tester ON/OFF Grid

(with Energy Feedback Function)



Features



Parameters

HYNN-DEPT60V100A-8CH

HYNN-DEPT100V300A-2CH

AC input voltage range

380VAC ±10% Three-phase five-wire system

Input grid frequency range

50±2Hz

AC max power

≤55/≤66kVA

Charging power

48/60kW

Power factor

>0.99 (Rated power)

Charing efficiency

≥90%

Grid-tied current (THD)

≤5% (Rated power)

Output channels

2/8 Channels

Output DC voltage range

5~60V/10~100V

Out voltage control accuracy

± (0.5‰FS+0.5‰RD)

Output DC current range

≤100A/≤300A

Output current control accuracy

± (0.5‰FS+0.5‰RD)

Current rise/fall response

≤10ms (10%~90%)

Battery input voltage range

5~60V/10~100V

Battery max input current

≤100A/≤300A

Max output grid power

≤48/≤60kW

Feed efficiency

≥90%

Battery voltage display resolution

1mV

Battery current display resolution

1mA

Power accuracy

2‰

Data sampling cycle

10ms

Host computer data recording cycle

100ms

Communication interface

LAN / CAN2.0 / RS 485

Protection level

IP 20

Working temperature range

0~40°C, Altitude<1000 m

Maximum relative humidity

0~90% (No condensation)

Size (width * depth * height)

800*800*2200mm

High Power BESS/Battery PACK/Cluster Testing System ON/OFF Grid

► Applicable to 2500V high voltage complex environment



High-quality energy feedback, maximum efficiency $\geq 96\%$



High power factor value, > 0.99



Total harmonic content of grid-tied current $\leq 5\%$



I-type three-level technology, wide voltage range output, small ripple

Test Items

Short circuit, insulation, withstand voltage

Working condition simulation, capacity, cycle life

Pulse charge & discharge characteristics

ACIR, DCIR, BMS performance

Charge & Discharge Efficiency

Consistency test evaluation

Overcharge and over-discharge endurance

Product Features

Multi-level authorization

MES data access

BMS two-way communication, customize BMS values as control / protection parameters

Working condition simulation

System channels can be used in parallel

DSP full digital control

Anti-reverse connection, Data security protection

Parameters



RS485



CAN



Ethernet



Remote monitoring

**Low 0-200V
10-300kW**

**Normal 0-1000V
50-800kW**

**High 0-2500V
1000kW-6.3MW**

Current up/down reaction time **<5ms**

Charge/discharge switch time **<10ms**

Voltage accuracy **$\pm 0.05\%FS$**

Voltage resolution **0.1mV**

Current accuracy **$\pm 0.05\%FS$**

Current resolution **0.1mA**

6MW level BESS Pioneer in Industry Testing System Project

6.3MW energy storage container test system is customized and designed according to customer needs. All energy storage equipment and distributed systems uniformly interact with MES through the dispatching system to realize the integration of equipment and upstream and downstream systems.



Project Features



Control strategy for paralleling multiple devices to achieve flexible configuration



Complete multi-level protection mechanism to achieve reliable operation



Excellent software, hardware and system design, high precision and high reliability

Energy Efficiency Management System

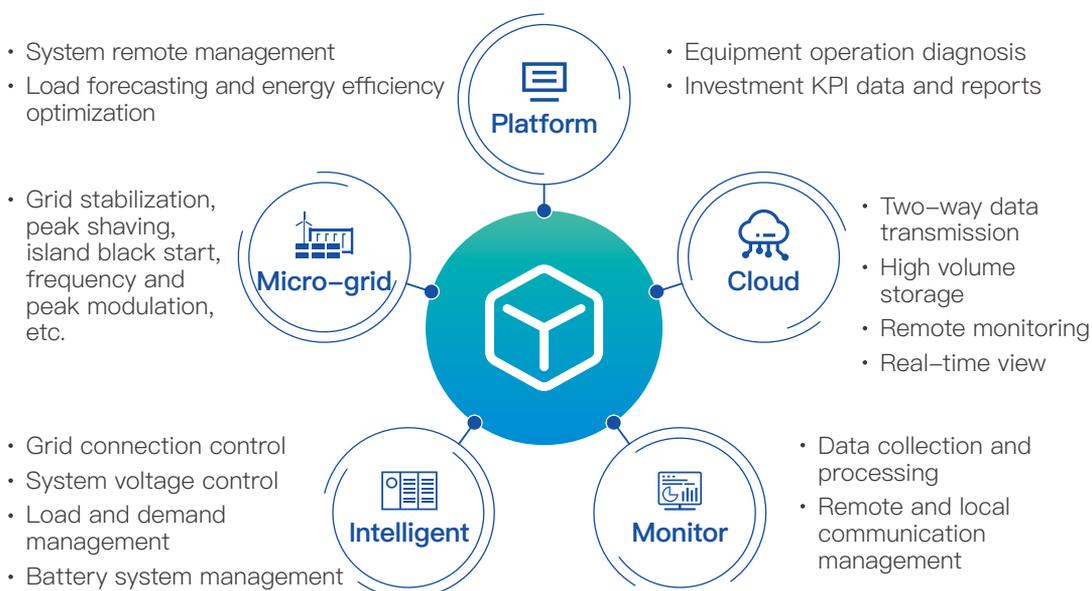
By predicting the power demand of the industrial park/station micro-grid, the charge and discharge ratio is adjusted to achieve optimal DC bus charge and discharge balance control, hence to realize real-time optimal energy management and reduce power consumption. Supports a variety of application scenarios, such as frequency and peak regulation, smooth output, black start after islanded system, peak shaving etc.



Advantages



Features



Innovating Energy Storage & Energy Saving Solutions
Products, Solutions and Service
Partner with your Cell Testing Expert



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With the aim of maximizing customers' value, we achieve the maximization of our enterprise value.

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