ATLANT INDUSTRIES

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COMPANY PRODUCTS

Key products: energy storage systems, energy monitoring platforms

Puwei New Energy aims to build mid to high-end energy storage systems and world-class energy monitoring platforms

OEM Exports	Energy storage assemblies and parts	Energy storage systems	Monitoring platforms
US company Powin Stack750 series modular energy storage units	Power packs/ racks/ containers	Air/liquid cooled containers	Energy Management System (EMS) in the field of storage of energy
	Automatic Power Control System (SAUM)	Integrated air/liquid cooled cabinets	Digital platform for plant energy monitoring
	Inverter and transformer monoblocks		Microgrid monitoring platform for multi-energy microgrids

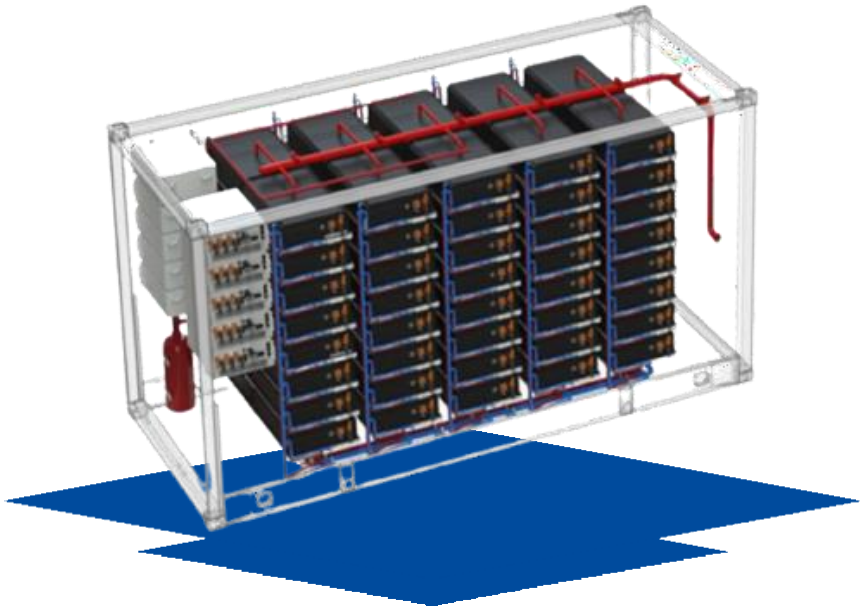
With energy storage as the core and a monitoring platform as the carrier, they are indispensable for digital chemical plants as well as for the tasks of organizing the energy supply for industrial and commercial purposes

1. OEM Export | (Powin Modular Outdoor Energy Storage, 750 kWh, USA)

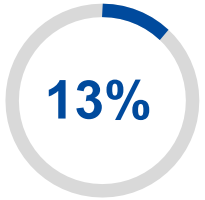
- Through technical co-operation and technology transfer, Powin has gained extensive technical and operational experience with Powin's energy storage facilities
- The Company has become an OEM for Powin's electricity storage devices and has now been awarded a formal three year OEM contract for approximately 20GWh from Powin (Centipede, 750kWh - currently the largest single site electricity storage device in the world)

Stack750 Technical Indicators	
Galvanic cells	LFP
Specifications for galvanic cells	3.2 V, 280 Ah
Power pack compounding system	1P30S
Power pack capacity	26.88 kWh
Rated DC voltage	1344V
Charge and discharge rates	≤ 0.5 sec
Battery charge	752.64 kWh
Cooling method	air/liquid cooling

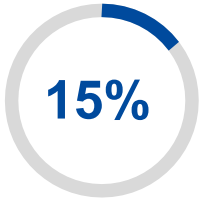
2. Energy storage assemblies and parts | Air or liquid cooled storage tanks



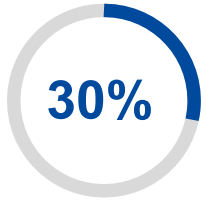
- Liquid cooled energy storage systems are able to precisely regulate the temperature of each individual battery cell by means of convective heat transfer and the dissipation of heat by the coolant
- **Consisting of power batteries (modules, racks), battery rack class controllers, air/liquid cooling systems, safety systems and intelligent control systems, they offer three main benefits: they are safer, more efficient and more cost-effective**



System service life increased by 13%



Electricity cost decreased by 15%



Time savings in operation and maintenance by 30% or more

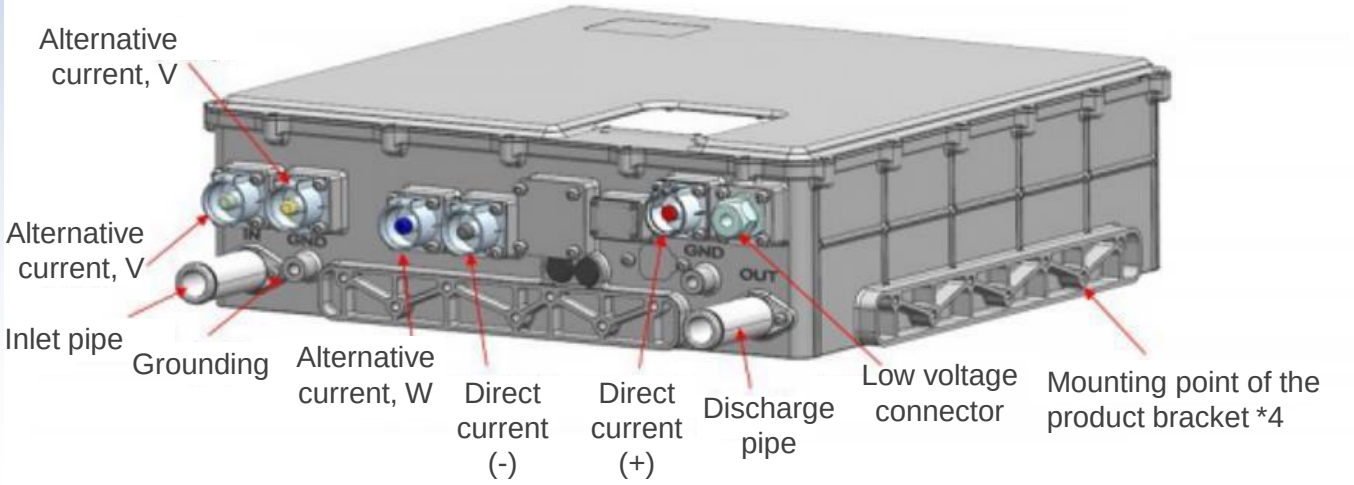
Space saving by 40% or more

Energy density increased by 100%

Name	Specifications	Notes
Rated power	1,72032 MW	
Nominal energy	3,44064 MWh	
Maximum discharge depth of the galvanic cell (DOD)	0 - 100%	Recommended value 90%
DC voltage range	1075.2 V ~ 1382.4 V	
DC side energy cycle efficiency	≥ 93.5%	0.5 sec
Galvanic cell cyclic life	6000 cycles	0.5 sec, 25℃, 90% DOD, 80% EOL
Galvanic cell self-discharge current	< 3% monthly	All equipment is switched off and the system is not running
Operating temperature range	-20℃ ~ +55℃	
Indoor ambient temperature control range	25±5℃	
Dimensions	6176*2866*2896	Container dimensions
Weight	About 35 t	Full load
IP Rating	IP54	

PW-LC Series

SAUM, 150 kW, with liquid cooling modules



- Autonomous control system that is not only a power module but also a separate SAUM
- Capacity: one module 150 kW
- Cooling method: liquid cooled version
- Electrical voltage: voltage up to 1500VDC
- Dimensions: 475*429*130 (L*W*H)
- Liquid cooled one-piece housing

2. Energy storage assemblies and parts | Inverter and transformer monoblocks

PW-TPCS100 Series Inverter and Transformer Monoblock

- This system, which integrates functions such as current conversion, voltage conversion and electrical isolation, can convert unstable electrical energy into stable AC electrical energy and raise the voltage to the required level

Efficient conversion

- Three-level topology, maximum efficiency 99%
- Intelligent air cooling, 45 degree ambient temperature without power reduction
- Wide DC operating voltage range, 1500 V, full load capability

Power supply support

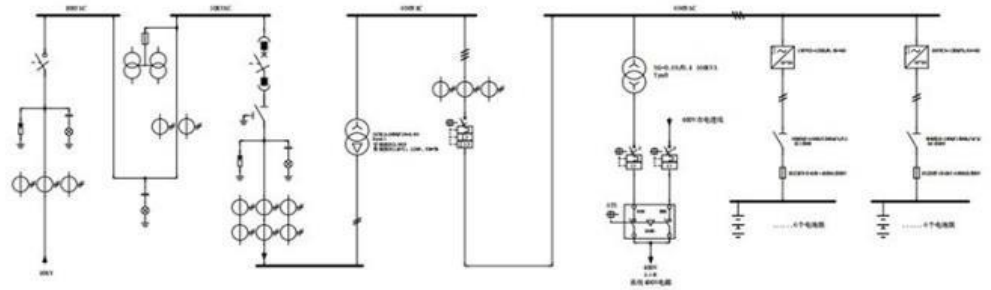
- Features primary frequency modulation and fast source, network and load dispatching functions

Robust and reliable

- High protection class (IP65, C5 option)
- Communication with BMS and EMS to support multi-level system protection

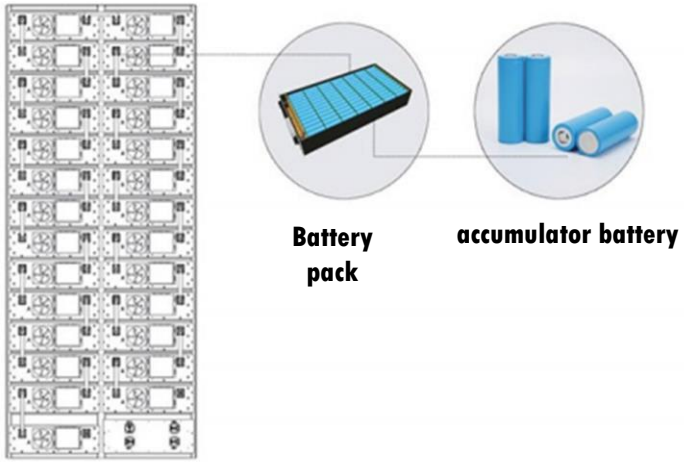
Flexible application

- Four-quadrant operation mode with battery charge and discharge control function
- SAUM has VSG, VF, PQ and other modes of operation



10 kV high voltage switchgear | 10/0.69 transformer | 0.69 kV low voltage switchgear | 400 V system power supply | SAUM, electrical cabinet

3. Energy storage system | Air-cooled or liquid-cooled container energy storage system



Battery pack

accumulator battery

- Lithium-iron-phosphate batteries are used, and the internal resistance, voltage and capacity of each battery cell are very stable. Three-phase 100% unbalanced load, high shock load

Low internal resistance | **High magnification** | **High security** | **Long service life** | **Great price** | **Flexible operation**

The number of cycles can reach more than 6000, the service life is more than 10 years, and the cost of comprehensive operation is relatively low

System integration design of galvanic cells	
Galvanic cell	38121-3.2 V, 15 Ah
Battery	38121-14S24P, copper construction
Battery case	14.8 V 360 Ah, integrated Battery Management Unit (BMU), 0.5 s/2P-fold magnification
Battery rack	Standard battery racks in 14 levels, 2 rows, consisting of 27 battery compartments connected in series (integrated BCMU), 1029 V/360 Ah
Containers	36ft high container cabinet, 12 battery compartments and 2 combi DC cabinets

3. Energy storage system | Integrated cabinet for industrial and commercial energy storage

PW-Stack 215/360

High integration

High compactness

High stability

High reliability

Active safety

PW-Stack215 Technical Indicators	
Galvanic cells	LFP
Specifications for galvanic cells	3.2 V, 280 Ah
Power pack compounding system	1P48S
Power pack capacity	43.008 kWh
Rated DC voltage	768 V
Charge and discharge rates	≤ 0.5 sec
Battery charge	215 kWh
Cooling method	air/liquid cooling

Stack360 Technical Indicators	
Galvanic cells	LFP
Specifications for galvanic cells	3.2 V, 280 Ah
Power pack compounding system	1P30S
Power pack capacity	26.88 kWh
Rated DC voltage	1344V
Charge and discharge rates	≤ 0.5 sec
Battery charge	376.32 kWh
Cooling method	air/liquid cooling

Energy storage system | Multi-stage monoblock for utility-scale energy storage

PW-Module45 PW-Module30 PW-Module15

Proprietary multi-stage monoblock for utility-scale energy storage

PW-Module15/30/45

Technical indicators of public utilities	
Galvanic cells	LFP
Specifications for galvanic cells	3.2 V, 120 Ah
Rated AC voltage	220 V (single phase)
Charge and discharge rates	≤ 0.5 sec
Rated power	5 kW
Battery charge	15 kWh/ 30 kWh/ 45 kWh (available)
Cooling method	Free cooling/air cooling

Energy storage system | Mobile electric motor cars

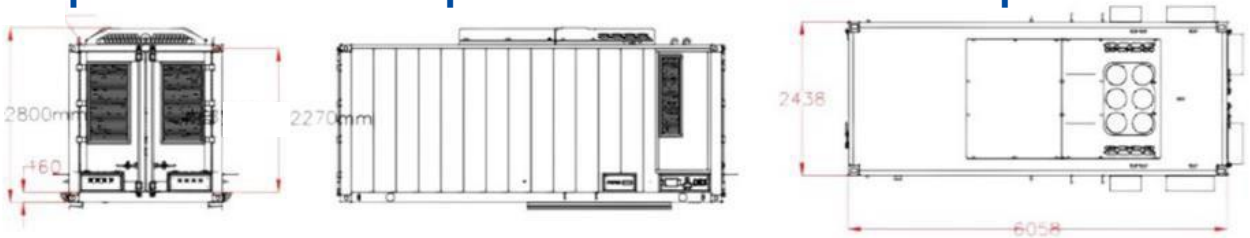
30-foot mobile electrical cabinets

20-foot mobile electrical cabinets

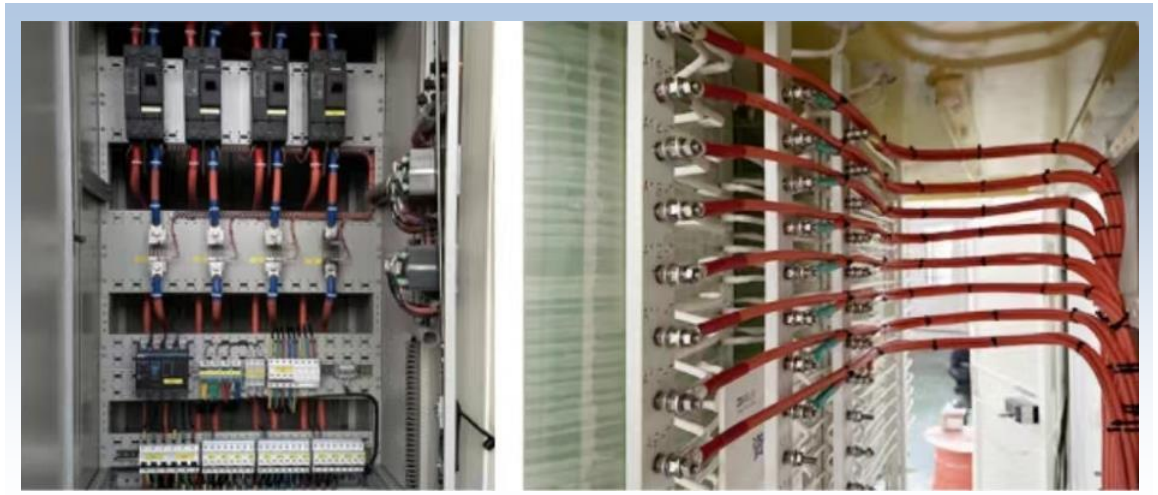
- The batteries have a rated capacity of 1.725MWh, are equipped with two 320 kW Dual Gun chargers and support four DC ground units for simultaneous on-board battery charging
- In use: A 20-foot container (≤ 6058 × 2600 × 2896 mm) containing 8 battery packs (including BMS), an electrical cabinet, a 630 kW SAUM, two 320 kW Dual Gun charging stations and auxiliary systems such as air conditioning, fire suppression and lighting

Purpose: temporary power supply system, emergency power supply system

Industrial parks | **Rail transport** | **Airports** | **Sea ports**



3. Energy storage system |
Ultra high voltage direct charging station



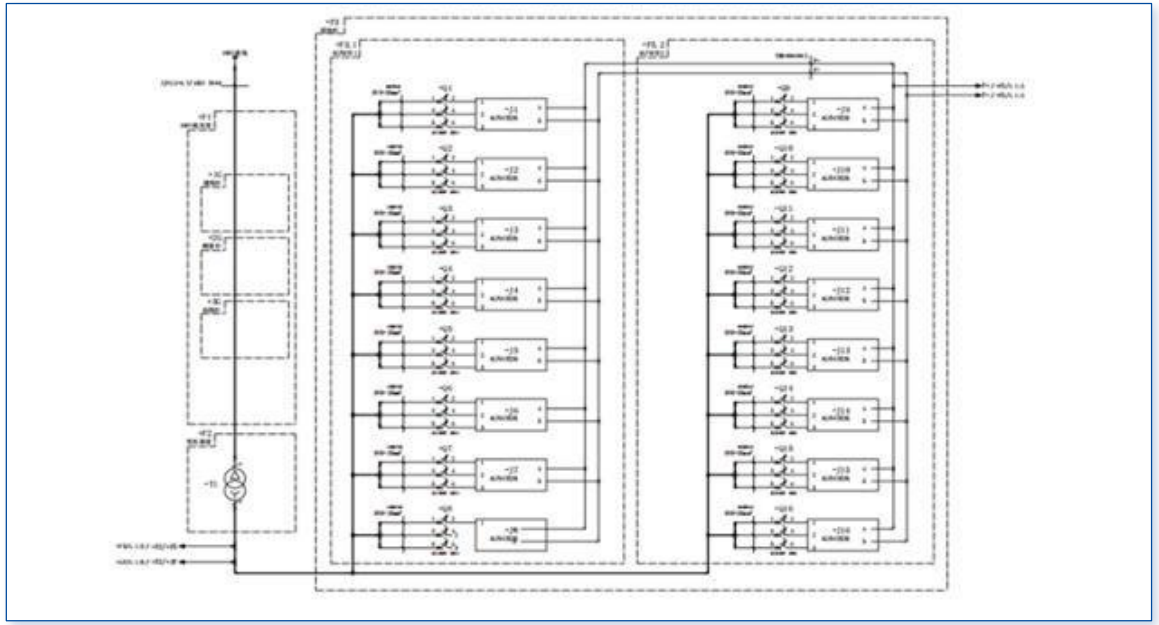
- The Ultra high voltage direct charging station is a highly integrated modular high performance (200 - 750 V / 500 A) charging station for new DC power microgrids
- High performance | Fast charging | High grid adaptability

Long-distance charging and recharging station

Motorway maintenance area

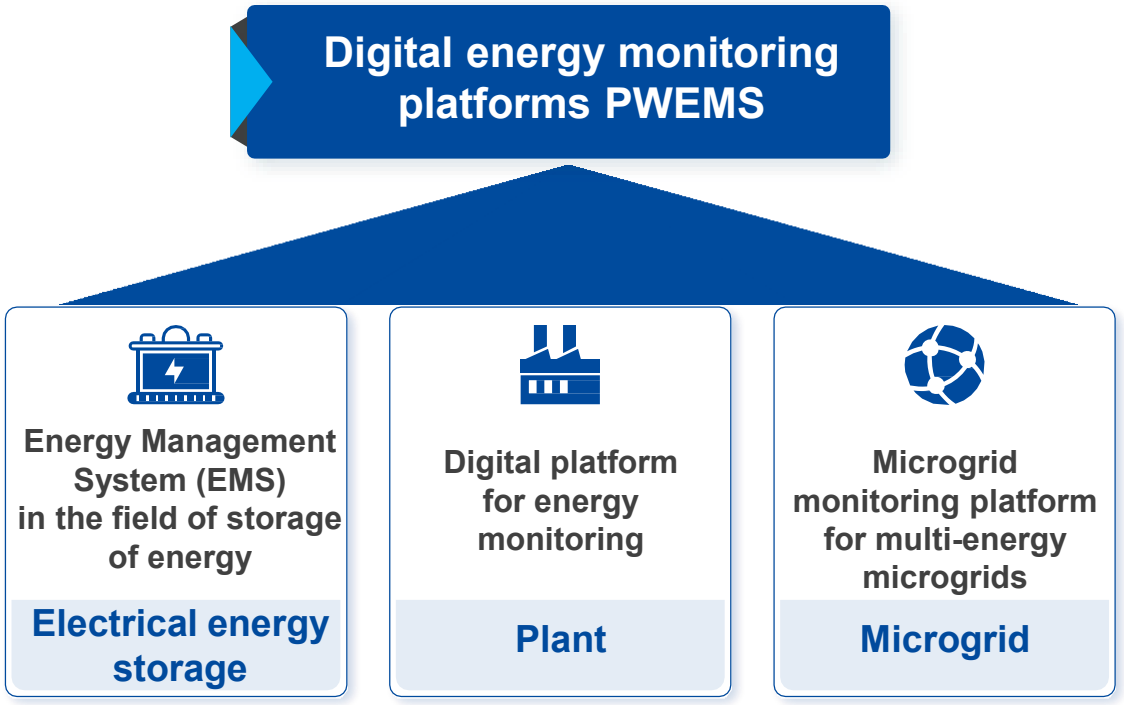
Heavy trucks, dump trucks

Logistic parks



Digital energy monitoring platforms

- PWEMS is a proprietary digital energy monitoring platform software developed and owned by Pewei New Energy
- Digital energy monitoring is a system that uses information and intelligent technology in its planning, design, construction and overall operation, organically coordinating and optimizing the distribution, conversion, storage, consumption, etc. of various energy sources, and making full use of renewable energy in new types of regional energy supply systems



4. Monitoring platform |
Energy Management System (EMS) in the field of storage of energy

Three applications

Peak load reduction and load drop smoothing

In large shopping centers, office buildings, industrial parks, charging and battery stations, etc., the energy storage system charges during periods of lower electricity prices and supplies energy during peak electricity prices to reduce peak loads and ultimately reduce electricity costs

Expansion of the power distribution system

When the power load increases and the initial power distribution capacity is insufficient, when the user needs to increase the power load and the initial power distribution capacity is insufficient, the expansion effect can be achieved by adding an energy storage system

Emergency power supply

In the case of a power supply with different load levels or in the case of a fire (e.g. financial institutions, brokerage houses, shopping centres, plants, etc.), the energy storage system operates autonomously in the event of a grid failure and non-essential loads can be selectively disconnected to ensure reliable power supply to essential loads. When the grid is available, the energy storage system works in parallel with the grid to reduce peaks and compensate for sags

Technical features

Visualization	Rich graphical and dynamic display of energy flows
Intellectualization	Support for multiple operational strategies and the ability to dynamically adjust strategies according to electricity prices to achieve peak load reduction and smoothing of load drops
Integration	Universal monitoring and intelligent control of every charge and discharge session
Real-time video monitoring	Comprehensive real-time monitoring of the operating status of each device

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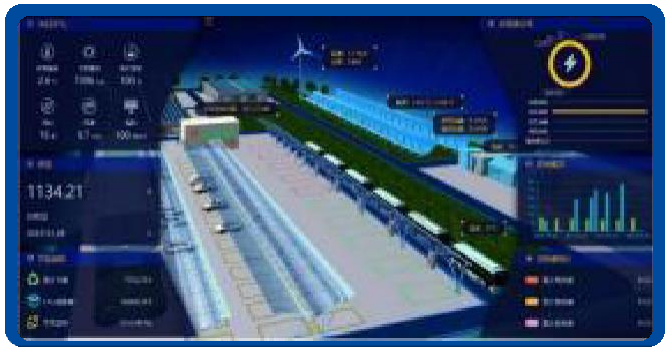
WE PURSUE EXCELLENCE IN EVERYTHING WE DO

4. Monitoring platform |
Energy Management System (EMS) in the field of storage of energy

Function list

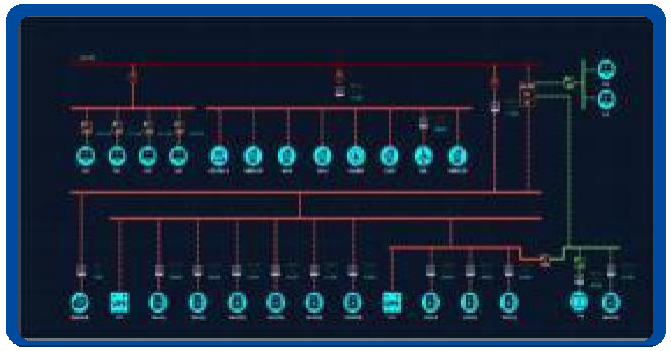
System home page and primary system schematic	Video control of equipment	Statistics and data analysis	Operational strategy	Defense strategy
Charge and discharge control	Emergency notification management	Data recording	User management	

System home page



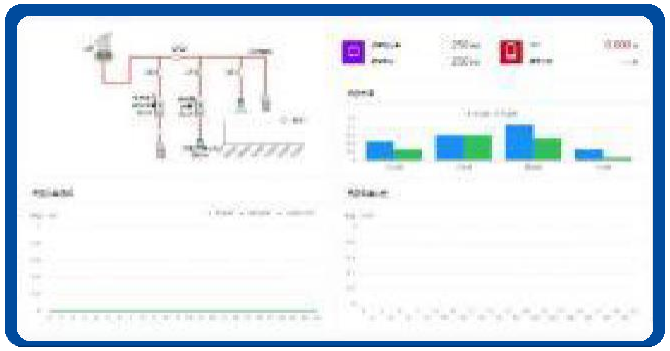
The system home page is a customizable system interface that displays a 3D rendering of the area in which the system is located, as well as the distribution of each element, operating status, energy saving and emission reduction data, system size and other parameter data

Primary system schematic



Real-time display of key information such as total charge/discharge capacity, daily charge/discharge capacity, current, voltage and meter power of each assembly

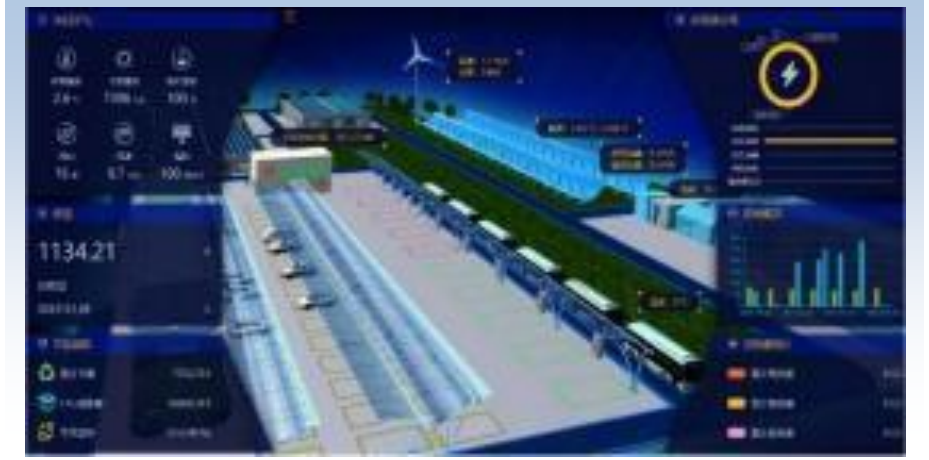
Video monitoring of energy storage



Battery information mainly shows charge and discharge capacity, current, SOC, etc. of all Automated Power Management (APM) systems and battery packs in the station

4. Monitoring platform |
Energy Management System (EMS) in the field of storage of energy

Energy management system in the field of electricity storage - Program modules



S.No	Project Name	Description
1	Video monitoring	Video monitoring of equipment, display of trend curves, etc.
2	Database	Real-time storage, statistical queries
3	Energy storage management software platform	Logical control of the energy storage system, collection of fault information and alarm management, etc., and support for system troubleshooting and maintenance.
4	Dispatching algorithm for automatic gain control (AGC)	Balanced dispatch / SOC response to grid AGC instructions
5	Primary frequency modulation function module	Primary frequency modulation function of the electrical energy storage device
6	Dynamic reactive function module	Dispatching function of dynamic reactive power of electrical energy storage device
7	Source grid load power dispatching module	Dispatching function of source network load response
8	Module of the combined algorithm of the primary frequency modulation of the thermal power unit of the electric energy storage device	Energy storage modules for integrated frequency control of thermal power units
9	Module of combined algorithm of frequency modulation of energy storage thermal power units	Thermal units with energy storage jointly perform AGC frequency modulation
10	Integrated platform for the organization of energy supply	Integrated energy supply (energy service)

4. Monitoring platform |
Energy Management System (EMS) in the field of storage of energy

Energy management system for energy storage - Energy management system (EMS) performance index (including coordinated control)

Intelligent real-time video monitoring of energy storage System operation status

Intelligent battery life assessment

Intelligent diagnostic energy storage system. Cause of equipment failure

Intelligent generation of energy storage equipment. Running an operability report

S.No	Name	Index	Notes
1	System architecture	Dual machine redundancy	2 controllers are designed with mutual redundancy
2	Response time to AGC system command	≤ 3 sec	
3	Response time to the capacity of the local energy storage module	≤ 1 sec	The 1S requirement can be configured in the usual way
4	Response time to primary frequency modulation	≤ 400 msec	Requires rapid coordinated management and support of a rapid data collection system
5	Response time for dynamic reactive power	≤ 100 msec	Requires rapid coordinated management and support of a rapid data collection system
6	- Data acquisition scan cycle	≤ 1 sec	
7	Real-time screen refresh time	≤ 1 sec	
8	Control command execution time	≤ 1 sec	
9	Data storage cycle	≤ 1 sec	
10	Full system boot time	< 3 min	All SAUMs and batteries successfully deactivated
11	The system supports the storage of statistical data	≥ 1 year	
12	Annual system availability	≥ 99.9%	
13	Average time between failures of the whole system	≥ 20 000 h	MTF calculated from the performance of the plant equipment
14	On-line configuration of system parameters	Can be set up online	Algorithm parameters and associated control parameters
15	Software version update	Can be updated online	
16	Maintenance console	is maintained	Design should be in line with real needs

4. Monitoring platform |
Energy Management System (EMS) in the field of storage of energy

Application for energy storage with the power generation owner

Energy storage and gas-fired units respond in a coordinated manner to grid AGC dispatch, response time is <1000 msec

Use of energy storage technology to enable gas propulsion systems to start from a standstill

The whole station responds to the load output command of the source network, response time < 400 msec

Energy storage facility interacts with primary frequency modulation unit

Application for energy storage with the grid operator

Response to grid AGC/ AVC dispatch, response time is <1000 msec

The whole station responds automatically to the primary frequency modulation and the response time is < 400 msec

Automatic dynamic reactive power and voltage regulation of four grid connected points throughout the station, response time is < 30 msec

The whole station responds to the load output command of the original grid load, full power output within 1000 ms

Application for energy storage with utilities

The roof of the plant floor is covered with solar panels to generate electricity from sunlight

Solar energy is mainly used for electricity generation and consumption

Solar power generation combined with energy storage for integrated applications using peak and minimum price differentials, etc.

Comprehensive benefit optimization is realised and revenue is increased

3 - 5 years can pay back the investment in the project

4. Monitoring platform |
Digital energy monitoring platform in plant

Energy video monitoring, for measurable overview energy monitoring; for overview video monitoring of energy flows in a region

Energy analysis, collection of energy consumption statistics, analysis of energy consumption, carbon dioxide emissions, etc., providing an effective basis for energy saving and emission reduction decisions

Organizing power supply, implementing statistical analysis, intelligent optimization, energy dispatching, power forecasting, etc. can reduce energy costs and improve asset performance

Energy metering, providing universal trading services for various energy sources such as cooling and heating, as well as providing metering and billing, transaction monitoring, settlement, estimation, etc

Power system operation and maintenance, equipment accounting, monitoring, fault diagnosis, intelligent inspection, intelligent work order, report output, etc

1 Digital plant

Coordinating the development and use of conventional, wind, solar, geothermal, biomass and other forms of energy in accordance with local circumstances, and optimising the location of power, gas, heating, cooling and water infrastructure

2 Comprehensive support

This includes planning and designing energy, investing in infrastructure, operating and maintaining multiple energy sources, investment and financing, and other value-added services:

- The integrated energy platform can be deployed in the cloud or locally, creating a coordinated three-tier system: cloud service platform + local video monitoring centre + local control substation
- It can be used for video monitoring of various complex energy systems in plants, industrial parks, urban areas, etc
- Platform for operation, maintenance and service
- Custom development can be undertaken for complex power systems in a wide range of industries.

4. Monitoring platform |
Digital energy monitoring platform in plant

1

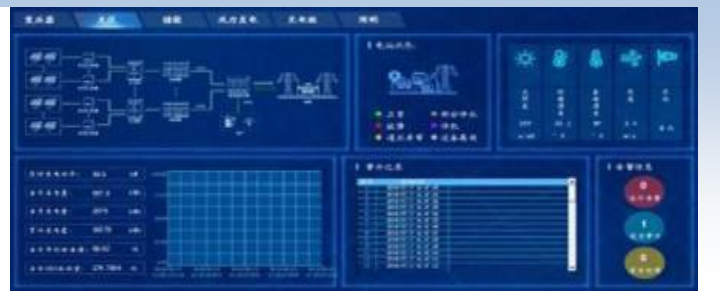
Energy Video monitoring

2

Energy analysis

3

Organization of electricity supply



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Operation and maintenance of power systems

5

Accounting in the electricity industry

4. Monitoring platform |
Energy Management System (EMS) in microgrids

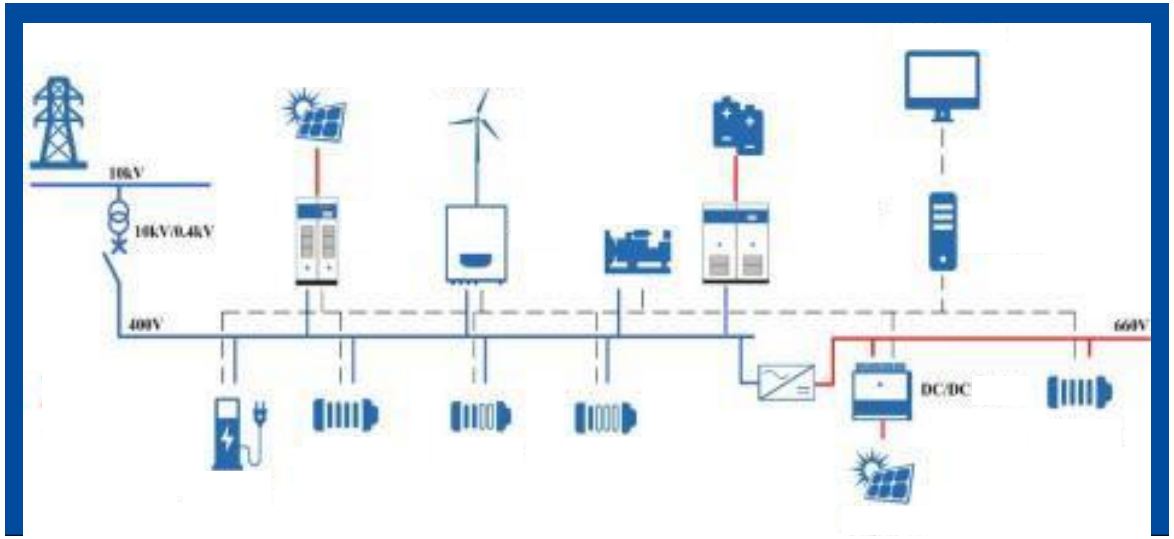
Solution for multi-energy microgrids

A microgrid is a power generation and distribution system capable of self-monitoring, protection and control according to pre-defined objectives. It can be connected to an external grid to form an interconnected grid, or it can operate in isolation to form a stand-alone grid.

The new energy microgrid system performs video monitoring and overall control of the operating status of charging and discharging equipment and energy storage systems, monitors and controls the power load of charging equipment and smart energy equipment in industrial parks according to peak and low power prices and energy consumption conditions; enhances the disaster resilience of the internal power system of industrial parks in the face of sudden disasters, helps to provide continuous power to critical loads in the event of grid failure, and ensures efficient, clean and reliable power supply to industrial parks, while at the same time optimising the energy consumption strategy of industrial parks by reducing the difference between peaks and troughs to provide economic benefits to them.

Key technologies

- Switching on and controlling distributed energy resources.
- Easy disconnection from the grid
- Energy storage management.
- Information and communication.
- Local protection and video monitoring.
- Energy management.
- Intelligent dispatching
- Intelligent energy consumption
- Analysis and forecasting



PRODUCT PERFORMANCE

Product performance

Energy Storage + Intelligence + CNC AIG550 high-speed intelligent five-axis machining centre

- An autonomous energy storage system can provide emergency power and at the same time arbitrage the difference in peak electricity prices to reduce electricity costs
- The machine is equipped with a special intelligent networked machine control system capable of networked large data management, trajectory processing of small linear segments in three-dimensional space and intelligent online detection

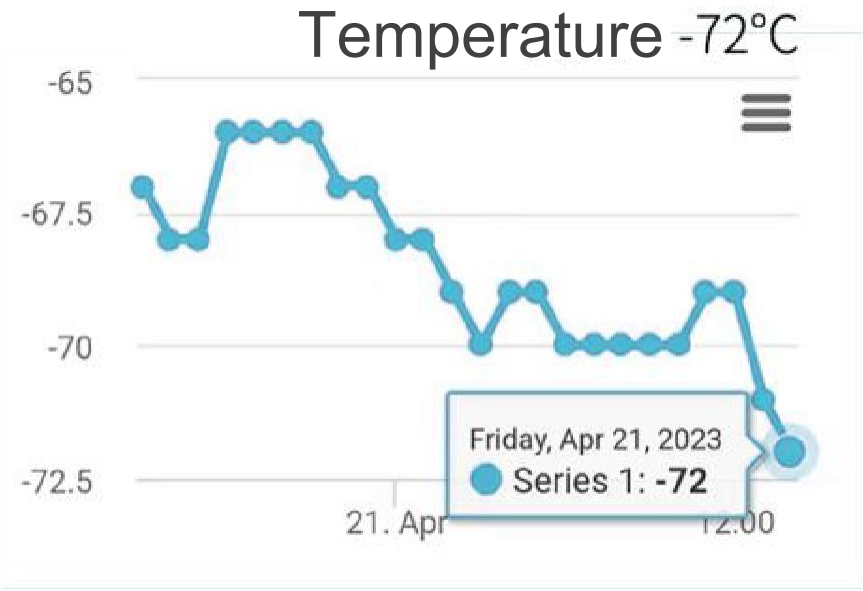
Specifications	
Working stroke in X/Y/Z axes	550/400/350 mm
Angle of rotation in the A/C axes	±110°/360°
Drive axleHSK E40	30000 rpm
Maximum swivel diameter of the worktable	φ200 mm
Drive mode of the worktable	DDM transmission (with circular grid)
Magazine capacity	24T
Three-axis X/Y/Z positioning accuracy	8 μm
Positioning accuracy in the A/C axes	±4″
Three-axis X/Y/Z repositioning accuracy	5 μm
Repositioning accuracy in the A/C axes	±2″
Machine weight	4700 kg
CNC system	TRUMPF system

Product performance | Supplier of energy storage cabinets for Antarctic Research stations

The Automatic Power System Platform for Antarctic Research has fully independent intellectual property rights and integrates power, data, storage and communications into a platform to support polar scientific research

Kunzhan Station

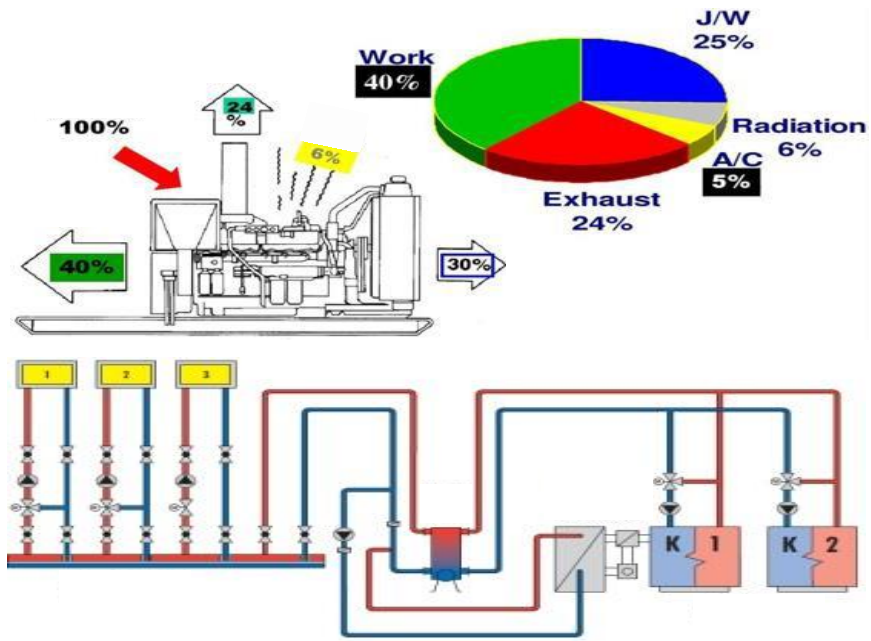
Negative 72 degrees Celsius
4500 meters above sea level



Product performance |
Chongqing Fortune Centre distributed power system

Development and demonstration application of a distributed integrated power supply system

In combination with the energy consumption characteristics of buildings, the research and development of technologies for the efficient use of waste heat, such as exhaust gas and hot water, as well as technologies for the combined control of micro gas combustion engines, photo-voltaic systems and energy storage, will provide intelligent management of hierarchical source load classification and improve the overall energy efficiency of energy systems at the whole-building level



Efficient power and load distribution system
A major research and development project on artificial intelligence and the Internet of Things in Chongqing, 2018

Distributed power supply system for the Chongqing Fortune Centre (business premises, offices)



Installed power of the system is 244 kW, including:

- Natural gas-fired cogeneration plant, set 1
- Peak heat balancing boiler system, set 1
- Solar power generation system, set 2
- Electrical system cooling, set 1

Product Performance | Integrated Energy Monitoring System for Xidian Group's Xi'an Plant in Xi'an Province

XD Group Power System's comprehensive energy service solution

The project was commissioned in 2020

The project includes

Three applications

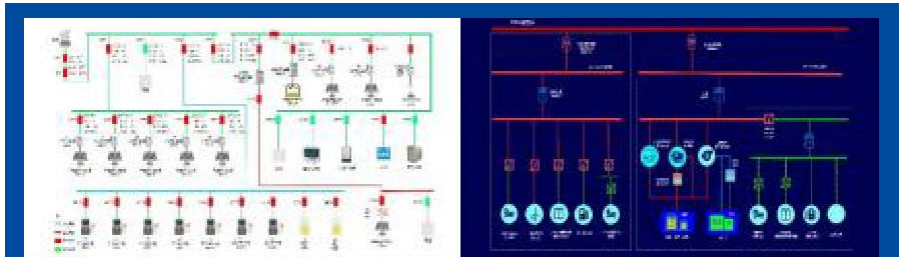
- Plant areas
- Industrial parks
- Urban areas

Five main application subsystems are formed

- Energy video monitoring
- Organization of electricity supply
- Operation and maintenance of power systems
- Energy trading
- Energy supply (energy service)

Comprehensive solutions for energy supply (energy service) are formed

Based on this platform, a comprehensive on-site energy demonstration project has been established, using the original site and building as the implementation site, with clean and low-carbon energy supply, green and efficient energy consumption, and intelligent and coordinated energy monitoring. The aim is to integrate different forms of energy and create a comprehensive energy, high efficiency and energy saving micro-grid demonstration base with multiple energy sources



Product performance | Shengli Oilfield - A new microgrid for recharging optical storage devices

Charging column

1 MWh

Energy storage systems

100 kW/ 200 kWh + 400 kW/ 800 kWh

Solar power generation system

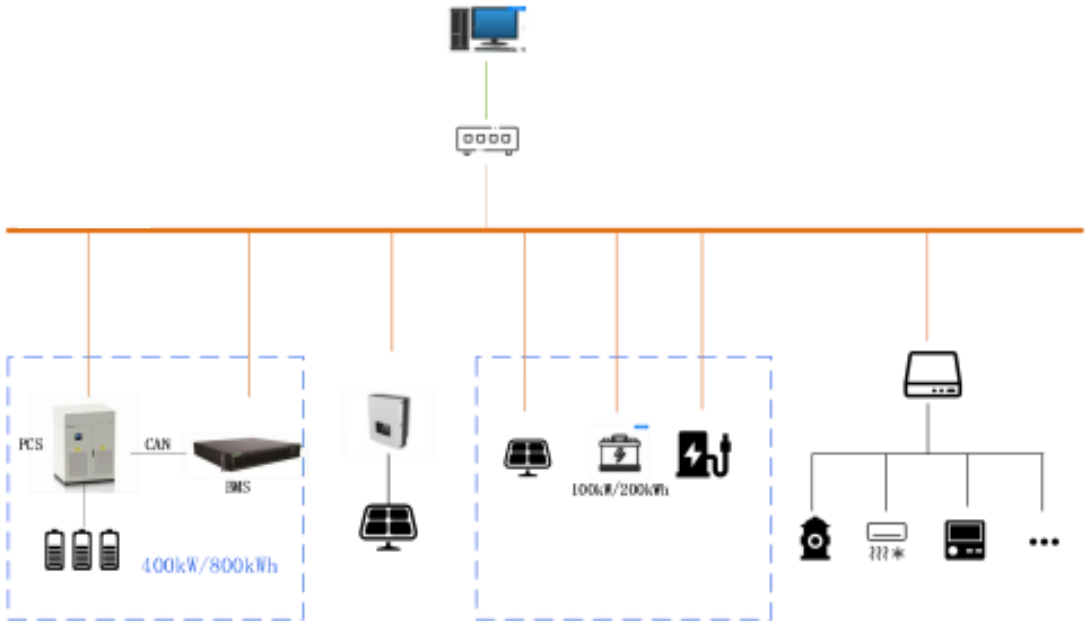
900 kW (consisting of 1,656 solar modules of 550 W each and 9 inverters for series-connected solar panels of 110 kW each)

Charging column

4 sets of 60 kW DC dual guns, 8 sets of 7 kW AC dual guns

Operation mode

When sunlight is available, the solar power system generates electricity to power charging stations and consumers in industrial parks. The excess is prioritised for battery charging. When the batteries are fully charged, the power is supplied to the station's consumers. Electricity from the grid is used as an additional energy source. During off-peak hours at night, electricity from the grid charges the batteries and powers the battery charger. The power plant can efficiently use solar energy and battery power. The energy storage system has operating modes such as grid-connected and off-grid operation, standby power mode, off-grid operation, peak-load reduction and load-decrease smoothing



The communication topology of the energy management system (EMS) is divided into two levels: the upper level is the overall centralised video monitoring system, and the lower level is the equipment: a 500 kW storage inverter, battery management system (BMS), environmental monitoring equipment, fire protection system, air conditioning or access control system, etc., all connected to a video monitoring system.

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