Klacci®
life unlocked.

Energy Storage System


Klacci®
life unlocked.
Energy Storage System

Contents

Introduction

Creating a Reliable and Sustainable Energy Environment with Renewable Energy and Storage Systems

Since its establishment in 1965, Klacci Technology Co., Ltd.(a subsidiary of I-TEK Enterprise) has been known for supplying intelligent access control systems. Guided by the mission to "make everyone's life safer and their property more secure,"Klacci is committed to providing innovative, secure, and convenient solutions.Beyond its expertise in intelligent access control systems, Klacci integrates NFC, Bluetooth, and RFID technologies to create efficient mobile access and biometric solutions tailored for high-end residential and commercial office needs. Its smart building solutions combine automated door controls with contactless technology, offering a healthy and convenient lifestyle in the post-pandemic era.

Klacci embeds environmental sustainability into its core values. Through advanced energy-saving technologies, the company introduces secure energy storage systems to meet high-energy demands. These systems provide multiple benefits, including peak shaving, backup power supply, and carbon emission reduction. They enable customers to flexibly manage electricity usage, precisely control energy costs, optimize energy efficiency, and reduce environmental impact.

With stringent quality management and over 100 patents, Klacci's products have earned ANSI and UL certifications and are marketed globally, deployed across diverse sectors such as government institutions, schools, and hospitals. Driven by continuous technological innovation, Klacci integrates safety and energy-saving features into smart buildings, creating a safer and more sustainable living environment, delivering profound value to customers and society.

We prioritize an environmentally friendly, stable, and easily maintainable safe usage environment, protecting the planet while providing reliable and efficient energy support.

Klacci

System Advantages

Safety

- **Electric Shock Protection** — The battery adopts a safe voltage level (51.2V SELV), completely eliminating the risk of electric shock to personnel.
- **Fire Safety Reliability**
  - » **Low Ohm Thermal Risk** — "Large-section pure copper busbar and optimized connection design ensure ultra-low contact resistance and excellent heat dissipation, suppressing hotspot formation.
  - » **Controllable DC Side Risk** — The high-voltage side after boosting adopts a low-current design, with positive and negative poles physically isolated in wiring, enhancing insulation protection.
  - » **Thermal Runaway Isolation** — Module-level independent rapid shutdown mechanism, precisely isolating faulty units, effectively curbing thermal spread, and ensuring overall system safety.

Value

- **Ultra High System Availability** — In a parallel architecture, when one or multiple battery modules fail or undergo maintenance, the system continues to supply power, maximizing uptime.
- **Longer Battery Life** — A parallel configuration distributes current and voltage stress, eliminating the transient high current and voltage surges experienced by the end modules in a series system.

  Optimized management based on electrochemical characteristics slows down battery aging rate and reduces capacity degradation.
- **Intelligent control system** — Each 51.2V module employs independent precise voltage regulation, completely eliminating the need for complex passive or active battery balancing circuits and algorithms required in traditional series systems.
- **Simpler Grid Integration** — The modules are boosted by the controller and connected in parallel to the PCS DC bus, eliminating the strict phase and frequency synchronization requirements needed for AC paralleling on the PCS output side, thereby simplifying system integration and expansion.

Intelligent Maintenance

- **High-Reliability Network** — Achieve real-time collection of massive module-level data
- **Cloud Big Data Platform** — Conduct in-depth analysis to accurately assess battery State of Health (SOH) and predict lifespan.
- **Preventive Maintenance** — Maximize system service life and reduce long-term operational costs.
- **Reliable & Cost-Effective** — Strictly adhering to the IEC 61508 functional safety standard principles, the design meets data center availability requirements with a Tier IV - Fault Tolerant architecture. The system ensures high reliability and overall cost-effectiveness through the architectural design itself, featuring parallel redundancy and simplified control.

The system has been certified and a patent application has been filed

- **UL 9540A** Energy storage system thermal runaway propagation assessment test
- **UL 1973** Standard for Batteries
- **IEC 62619** Safety testing for industrial applications of secondary lithium-ion battery packs
- **CE-EMC** Electromagnetic compatibility testing
- **UN 38.3** Testing the safety of lithium batteries in air trar

CE c UL us
MH 67668

Klacci®

System Application

Renewable Energy Integration for Improved Energy Efficiency

Energy storage improves efficiency by storing surplus energy for later use, reducing waste, cutting costs, and lowering reliance on traditional energy sources.

Uninterruptible Power Supply (UPS)

Designed according to Tier IV data center specifications, it provides real-time backup power and voltage stability through battery storage and fast-switching mechanisms, ensuring critical loads operate normally during power anomalies. The energy storage system stores energy in normal mode and rapidly discharges during power outages, protecting equipment from the impact of power interruptions.

Peak Shaving, Frequency Regulation

Supports power peak shaving (reducing peak loads) and frequency regulation services (stabilizing grid frequency), lowering electricity costs while enhancing grid stability.

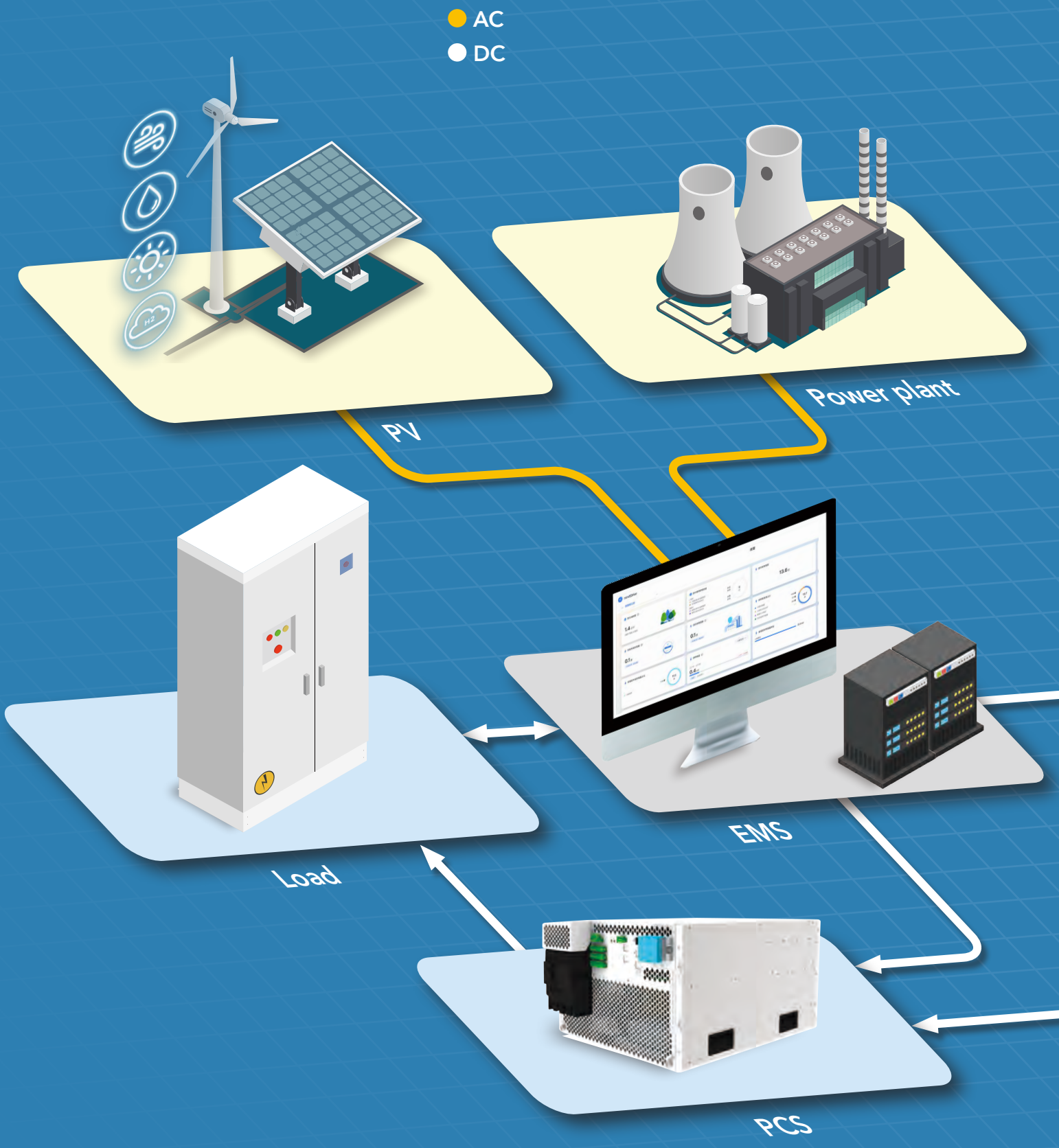
Peak Shaving and Valley Filling

Energy demand fluctuates throughout the day, with peaks during the day and valleys at night. Energy storage technology can store excess energy during low-demand periods to meet high-demand periods, thereby stabilizing energy supply and avoiding energy waste or shortages caused by supply-demand imbalances.

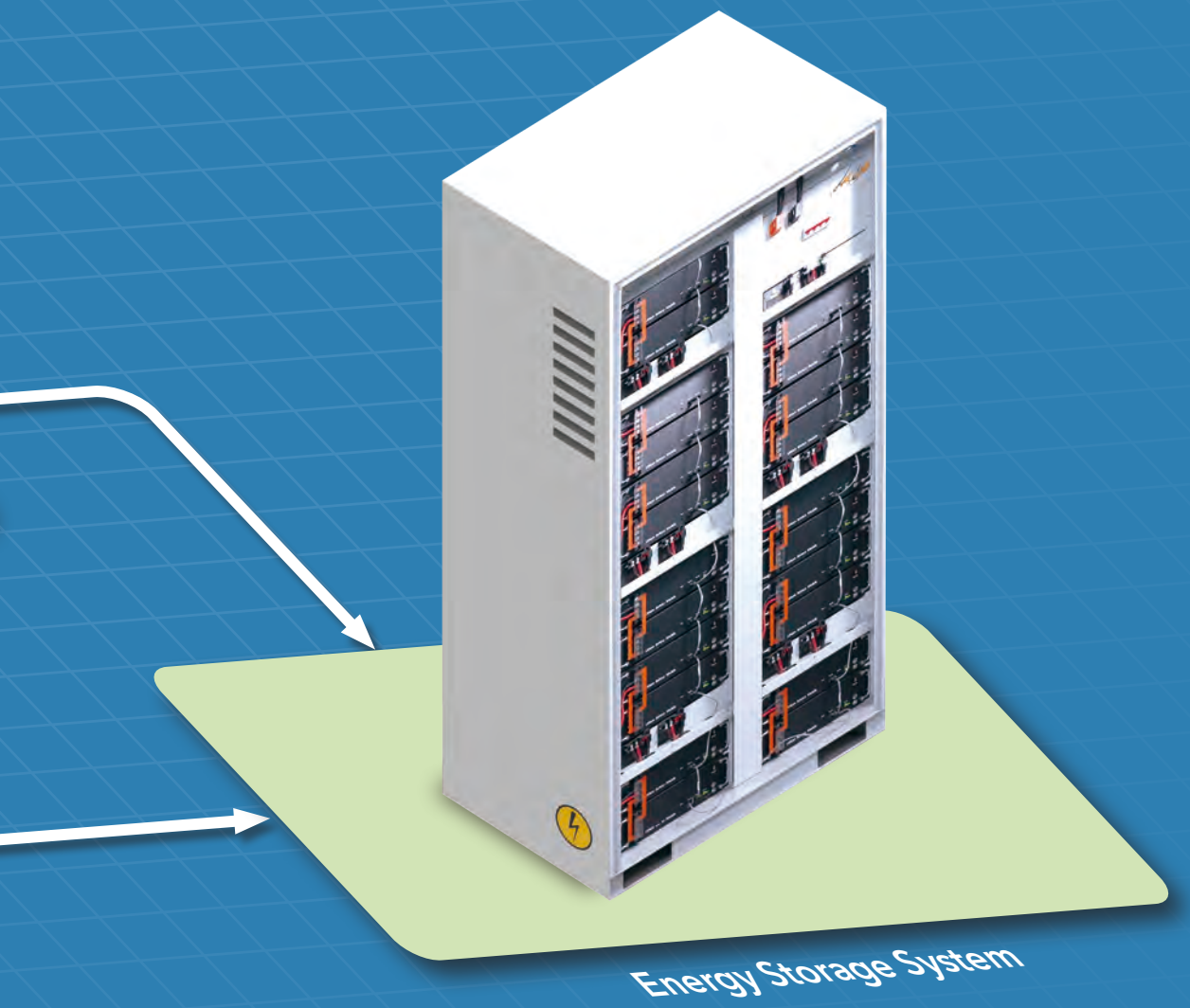
Power Trading Participation and Grid Stability Enhancement

Energy storage enhances grid stability by quickly adjusting to demand fluctuations, ensuring reliable operation and reducing power interruptions.

System Configuration



The system architecture converts electricity generated from solar energy through a Power Conditioning System (PCS), enabling storage in battery modules or direct supply to loads. The Energy Management System (EMS) oversees real-time monitoring, data analysis, and equipment scheduling. Through automated management, it effectively enhances the utilization rate of renewable energy, while reducing energy consumption and mitigating the issue of high power generation costs.



System Feature Evaluation

Feature Comparison	Klacci Low-Voltage Battery Parallel Connection System	Other manufacturers High-Voltage Battery Series Connection System
Operating temperature	Low	High(Endpoint)
BMS Battery Module Control System	Low(On / Off)Automatic Balancing	High(Overcharge Monitoring/ Overdischarge)
Cooling System	Working Temperature: 40 ± 5°C (Natural Cooling with Exhaust Fan)	High Temperature Above 80°C (Needs forced air / liquid / immersion cooling)
Charging and Discharging(SOC)	90%	80%
Battery Remaining Capacity after 5 Years	>90%	<80%
Auxiliary System Energy Consumption	Low	High
Safety	Ensures safety for both personnel and products	Risks include high-temperature and high-voltage runaway, as well as electric shock hazards to personnel
Risk of Electric Shock to Personnel	No Risk of Electric Shock(Low Voltage) Arc voltage below 60V Gasification occurs below 900V	High risk of electric shock(Requires high-voltage insulation) Arc voltage above 900V Vaporization above 1100V
Fire Risk Safety	Extremely Safe	Danger
Initial Setup Cost	High	Low
Operation and Maintenance Cost	Low(Easy to replace) Can be handled anytime by a general electrician	High(Difficult to replace) Needs upkeep from skilled electrical technicians
Reliability Rate	99.99% availability with no downtime Supports hot-swappable maintenance Longer battery life	Cabinet shutdown with 3 charge-discharge cycles Requires at least 2 days for battery equalization Requires at least 15 days of annual downtime
Placement / Installation area	Indoor/outdoor use allowed	Limited to outdoor, enclosed spaces
Required Space(Area Efficiency)	20' container(1.1M)	20' container(2.4M)

Klacci's energy storage is not just a backup, but an active defense and value enhancement, the system features

- High Safety: No fire, no explosion, no overheating
- Intelligent Adjustment: Store electricity at low prices, discharge at high prices
- Structural Stability: Reduces battery temperature and remains reliable under long-term loads
- Highly durable: Long lifespan and low maintenance
- Easy to operate: No dedicated personnel required; easy to manage

Klacci Low-voltage Parallel

No air conditioning required – natural heat dissipation design saves energy. Ideal for applications with high safety requirements.

No air conditioning, fan cooling

Other manufacturers High-voltage Connection

Additional cooling, such as air conditioning or liquid cooling, is needed to ensure system stability.

Liquid Cooling System

Outdoor energy storage cabinet cooling system with air conditioning

Specifications

Power Plant / Industrial Type

PCS

125kW

Specifications

Battery Cabinet Performance Parameters	
Number of Routes	1
DC Voltage Range	600 - 1000Vdc
Maximum DC Current	198A
Rated DC Power	125kW
Stabilizing Accuracy	≤±2%
Stabilization Accuracy	≤±5%
Pressure Limiting Characteristics	Eligible
Current Limiting Characteristics	Eligible
AC Output (Grid)	
Rated Output Power	125kW
Overload Capacity	1.1x Long Term
Rated Voltage	AC400V
Rated Output Current	180A
AC Access Method	Three-Phase Four-Wire
Isolation	Non-Isolated
Grid Voltage Range	400V (-15% - +15%)
Grid Frequency Range	50Hz / 60Hz±2.5Hz
Total Harmonic Distortion Rate	≤3% (Fully Loaded)
Power Factor	0.99 / -1 - 1
Current DC Component	≤0.5%
Charge/Discharge Conversion Time	<100ms
Size (W×H×D)	800 × 1800 × 800mm
AC Output (Load)	
AC Off-Grid Voltage	400Vac
AC Voltage Range	400Vac±3%
AC Off-Grid Frequency	50Hz / 60Hz
Offline Output THDU	≤3% (Linear load)
Unbalanced Load Capability	1
Offline Multi-Computer Parallel Connection	Nonsupport
DC Side Parallel Connection	Nonsupport
General Specifications	
Dimensions (W×H×D)	520 × 240 × 680mm
Weight	70 kg
Cooling Method	Compulsory Air-Cooled
Maximum Working Altitude	3000m
Operating Temperature Range	-20°C - 60°C
Allowable Relative Humidity	≤95%
Protocol	BMS-CAN | EMS -Network Port / RS485
Maximum Conversion Efficiency	≥99%
Newsletter	≤75dB
Multi-Module Networking	DC Side Separate - AC Side Parallel Connection
Waterproof Rating	IP21 Indoor Container

Battery Cabinet

110kWh 208kWh

Specifications (110kWh)

Performance Parameters	
Voltage Output Range	500 - 850Vdc (Constant Voltage Adjustable)
Max. Discharge Power	100kW
Max. Output Current	150A
Max. Charging Power	100kW
Total Energy	220kWh
Battery Module Specification	51.2V 100Ah
Battery Module Number	22
General Specifications	
Dimensions (W×H×D)	800 × 1900 × 1200mm
Weight	1600 kg
Cooling Method	Natural Cooling
Operating temperature	Charging: 0°C - 56°C Discharging: -20°C - 56°C
Waterproof Rating	IP21 Indoor Container / IP65 Outdoor Container
Protocol	CAN / RS485
Cycle Life	≥6000 times

Specifications (208kWh)

Performance Parameters	
Voltage Output Range	600 - 850Vdc (Constant Voltage Adjustable)
Max. Discharge Power	104kW
Max. Output Current	140A
Max. Charging Power	104kW
Total Energy	208kWh
Battery Module Specification	51.2V 100Ah
Battery Module Number	13
General Specifications	
Dimensions (W×H×D)	1000 × 1950 × 1250mm
Weight	1750 kg
Cooling Method	Forced Air Cooling
Operating temperature	Charging: 0°C - 56°C Discharging: -20°C - 56°C
Waterproof Rating	IP21 Indoor Container
Protocol	CAN / RS485
Cycle Life	≥6000 times

Light Duty / Commercial Type

PCS

6.5kW Hybrid Inverter

- Supports Parallel Connection
- Can connect up to 6 units in parallel

(Exceeding the quantity may cause delays in RS485 communication function.)

Model: ECO-HV-5548

Specifications

Performance Parameters	
Phase	Single-phase Input / Single-phase Output
Rated Output Power	6500W
Rated Output Power	6000W
Max. Charging Power	6000W
Parallel Capability	Able to Connect 6 Units in Parallel
Photovoltaic Input (DC)	
Rated DC Voltage / Maximum DC Voltage	360Vdc / 500Vdc
Starting Voltage / Initial Supply Voltage	60V / 90Vdc
Maximum Power Voltage Range	60Vdc - 450Vdc
Maximum Input Current	1/20A
Maximum Conversion Efficiency (DC/AC)	>99%
Grid Input (AC)	
Nominal Voltage (AC)	220 / 230 / 240VAC
Output Voltage Range	170 - 264 VAC / 90 - 264 VAC
Rated Output Current	24A
Power Factor	>0.99
Total Harmonic Distortion (THD)	<3%
Conversion Efficiency	
Maximum Conversion Efficiency (DC/AC)	93% (Battery DC/AC) 97% (PV DC/AC)
Off-grid and Hybrid Operation	
AC Startup Voltage / Automatic Restart Voltage	170 / 180VAC
Frequency Range	45 - 65Hz
Acceptable Input Voltage Range	170 - 264 VAC / 90 - 264 VAC
Maximum AC Input Current	30A
Battery Output	
Nominal Output Voltage	220 / 230 / 240VAC
Rated Output Power	5500W
Pulse Power	8250W
Switch Time	<10ms
Output Waveform	Pure sine wave
Total Harmonic Distortion (THD)	<3%
Efficiency (DC/AC)	92%
Batteries and Charging	
Rated DC Voltage	48Vdc
Maximum Solar Charging Current	100A
Maximum AC Charging Current	80A
Max. Charging Current	100A
General Specifications	
Dimensions (W×H×D)	260 × 450 × 102mm
Weight	8.5 kg
Protocol	RS485 / Wi-Fi / GPRS / Lithium Battery
Relative Humidity	0 - 90%
Operating temperature	-10°C - 50°C

Batteries

5kWh Battery Module (3U)

Model: YNJB16S100ND-L

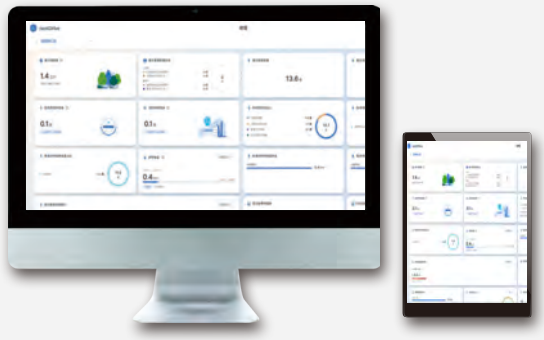
Specifications

Battery Module Performance Parameters	
Rated Voltage	51.2Vdc
Output Voltage Range	44.8-57.6Vdc
Nominal Capacity	100Ah
Rated Energy	5.12kWh
Rated Discharge Current	50A
Max. Discharge Current	100A
Rated Charge Current	50A
Max. Charging Current	100A
Max. Discharge Power	5.12kW
Max. Charging Power	4kW
Performance	≥95% DOD
Voltage Sampling Quantity	16S
Battery Balancing	Active Balancing 3A
Dimensions (W×H×D)	484 × 133 × 470mm
Weight	40±1 kg
Operating temperature	Charging: 0°C - 45°C Discharging: -20°C - 55°C
Storage Temperature	0 - 25°C / 12 months
Waterproof Rating	IP52
Protocol	CAN / RS485
Cycle Life	≥6000 times
Additional Features (optional)	
Heating Function	Activates when charging temperature is below 0'C (Automatically managed by BMS))
Certification / Compliance	
Certification / Compliance	IEC62619 / CE / UN38.3

Klacci®

EMS System Management

EMS Energy Management System



Cloud System Architecture

The system offers two selectable power supply operation modes

- Energy Storage AI Automatic Regulation
- Hybrid Inverter Smart Control Mode

NextDrive Cloud

(Supplier by aws)

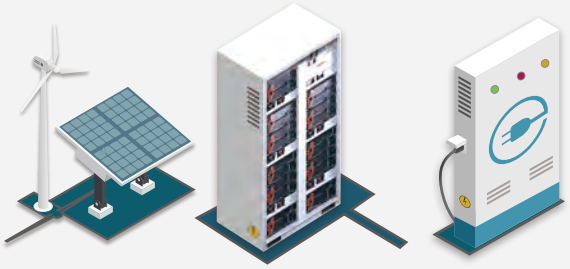
NextDrive

Smart Energy Gateway

Measurement

Meter Table

Energy Storage Management

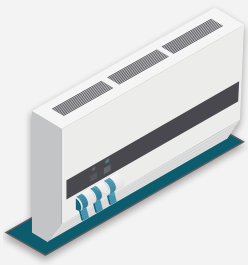


PV

Energy Storage System

Charger

Monitoring



Key Equipment

This EMS (Energy Management System) is centered around the NextDrive Smart Energy Gateway, which connects all on-site electricity consumption, power generation, and energy storage equipment. Through the NextDrive Cloud platform, data is uploaded to the cloud for centralized management.

The web-based EMS interface allows administrators to monitor and manage energy systems in real time.

Power usage

Users gain clear insight into their electricity usage, including consumption levels, billing estimates, and demand trends.

Green Energy

Through the integration of solar and energy storage systems, users gain insights into carbon savings and energy efficiency outcomes.

AI Intelligence

The system is equipped with AI-driven automatic regulation capabilities to optimize energy dispatching based on predictive analytics.

Equipment Monitoring

Instant notifications are sent to managers upon equipment faults to facilitate swift handling.

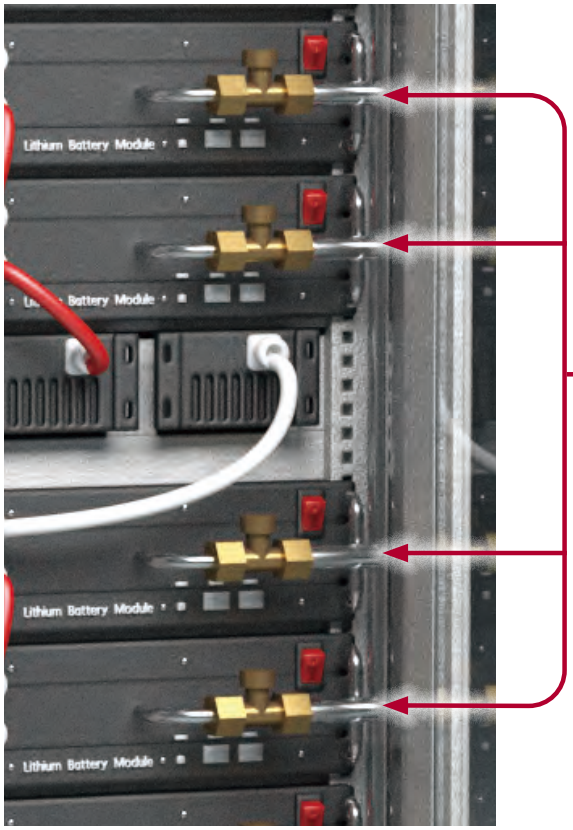
Optional Fire Suppression System

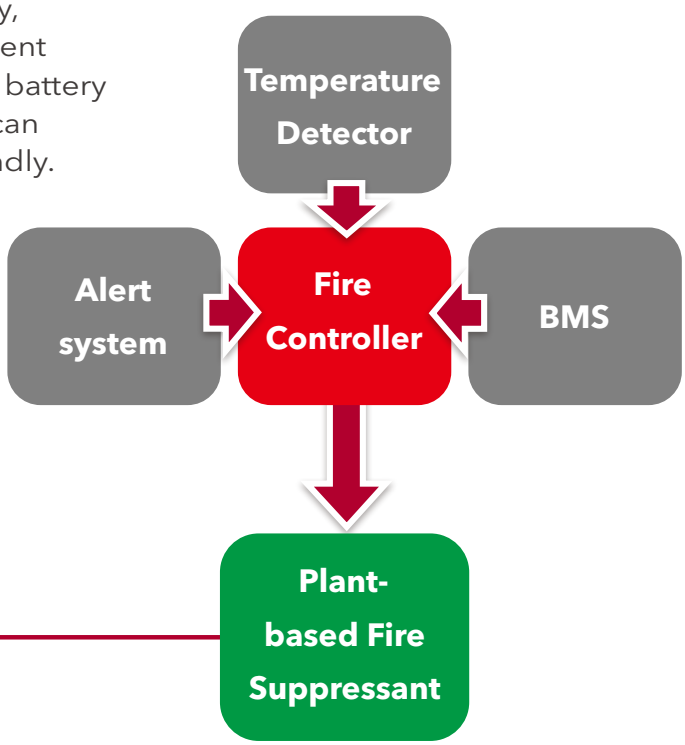
This energy storage system combines the electrochemical characteristics of the battery with a self-developed intelligent power controller to effectively solve the voltage matching issue between low-voltage batteries and high-voltage PCS, while simplifying the control system and enhancing safety and performance. Utilizing EDC (Efficient Data Collection and Distributed Control System) technology, combined with thermocouple modules and DIDO control modules, the system can precisely monitor temperature variations within the energy storage cabinet batteries and detect anomalies in real time to ensure safety.

EDC Automatic Fire Extinguishing Function

- The system can be optionally equipped with an automatic fire suppression system. When an abnormal condition is detected, it will automatically activate alarms, cut off power, or release extinguishing agents targeting the thermal runaway cells, extinguishing the fire immediately. This effectively prevents fire escalation and ensures safety.

- This system uses an environmentally friendly, plant-based, non-toxic fire extinguishing agent that can extinguish Class A fires and lithium battery fires. The agent is biodegradable in soil or can be recycled, making it environmentally friendly.





Green, safe, and non-toxic agent

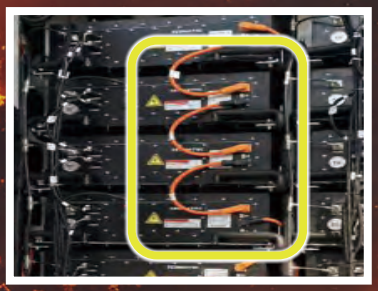
- The agent has passed toxicity tests.
- The agent decomposes in soil.
- Assist in fire escape and survival.
- The agent is recyclable and environmentally friendly.
- Fire Department Certified Agent

Thermal Runaway Cause Analysis of Competing Systems

The Other Manufacturers' Systems waterproof design limited the fire suppressant to the outer casing, failing to extinguish burning lithium cells inside. Gas agents cannot put out Class A fires, leading to uncontrolled fire spread.

Thermal Runaway Risk

If lithium batteries fail to detect and control temperature in time, thermal runaway can occur, rapidly generating high temperatures and flammable gases, which may lead to battery module fires or even explosions.

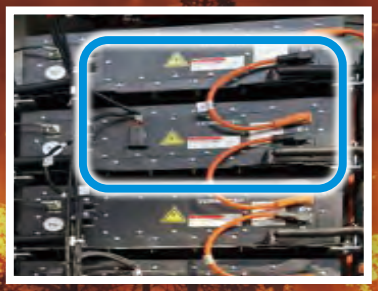


Installation Defects

Improper wiring, damaged protective layers, or lack of fire and waterproof planning during installation can lead to short circuits, leakage, and increased fire and equipment damage risks.

BMS Failure Risks

The BMS monitors battery voltage, temperature, and status in real time. Failure can cause overcharge and thermal runaway risks.



Safety Mechanism Deficiency

Relying solely on the BMS for safety protection means that if the BMS fails, the entire system lacks a final line of defense.

Klacci®
life unlocked.

www.klacci.com

Headquarters and Operation Office

I-TEK Metal Manufacturing Co., Ltd.

18 Gungye 3rd Road, Annan, Tainan 70955, Taiwan.

T 886 6 3840722

F 886 6 3840715

E sd.klacci@gmail.com
sd@klacci.com
sd@iteklock.com.tw

Global Office

KLACCI Inc.

California, USA

Nevada, USA

T +1 (720) 675-5677

E sd@klacci.com
sd.klacci@gmail.com

Contact

Alex

T 886 6 3840722 #161

E sd@iteklock.com.tw

Michelle

T 886 988105081

E michelle.itek@gmail.com

+886-988-105-081