

ANPL

ANPL

# ENERGY STORAGE SYSTEM SOLUTION

POWERING THE GREEN FUTURE

ANRI POWER LIMITED

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ANRI POWER LIMITED

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POWERING THE GREEN FUTURE.



Patent Certification



# 01. About Us

## About ANPL

ANRI POWER Co., Ltd. (ANPL) specializes in the research and development, production, integration and application of lithium battery energy storage systems. ANPL provides comprehensive storage products, including batteries, BMS, EMS, TMS, and PCS, and also supports various system solutions for commercial & industrial, residential, and UPS backup energy. Through independent R&D of energy storage software and hardware, ANPL dedicated to push the boundaries of energy storage products to a higher level of reliability,

Our headquarter in Shanghai, China, as well as offices in Singapore and Germany, enable us to deliver innovative and comprehensive energy storage solutions to clients worldwide.

**10<sup>+</sup> years**  
of industrial equipment manufacturing DNA

**10<sup>+</sup> years**  
of R&D team experience in ESS industry

**36%**  
of R&D personnel

**36,000<sup>+</sup> m<sup>2</sup>**  
of the company land area

# About KALE

Founded in 2010, Kale Environmental Technology Co., Ltd ( stock symbol: Kale group; stock code: 301070 ) is one of the leading company in the HVLS fan industry. KALE have been specializing in manufacture of advanced HVLS FANS for 12+ years. Through constant innovation, Kale Fans has taken a leading position in the global market and served 10,000+ customers including 100+ Fortune Global 500 in worldwide.

Kale Group is committed to provide overall intelligent solution for green industry including HVLS fans, energy storage solution and smart power control system. Kale Group leverages its advantages in technology innovation as well as localized operation and maintenance, which facilitates the rapid development of ANPL.



Shanghai, China  
headquarter



Zhejiang, China  
production base



Mexico production base



Indian production base

# Global Business

17+  
O&M outlets

80+  
countries and regions  
covered by business footprint

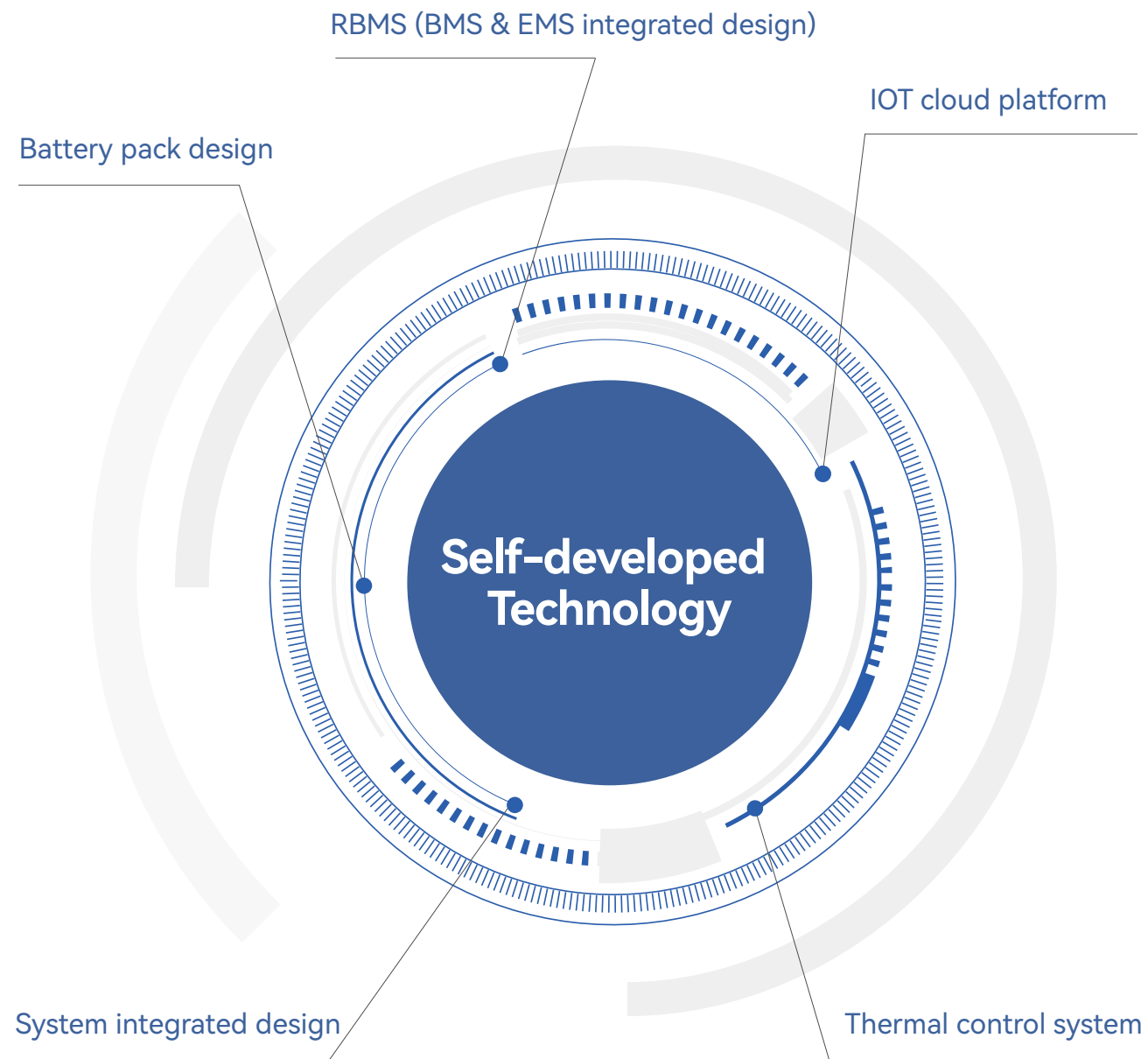
10000+  
clients worldwide





## R&D Strength

ANPL's R&D team is formed by experts with 10+ years of ESS experience who account for 30% of the personal. Through independent R&D and cooperation with industry-leading suppliers, ANPL has mastered the All-in-one design concept of 「BMS, EMS, TMS, and PCS」 full system integration.



## Manufacture Capability

The Shanghai headquarter has mature and advanced ESS production base. The comprehensive ESS production lines can operate the whole process from battery cell to system integration, including assembly, testing, delivery and so on. ANPL meets various quality system certification standards including ISO9001. ANPL dedicate to provide products with reliable quality and excellent manufacture to clients.



⚡ Energy Storage System:



Commercial & Industrial  
Energy Storage System 100kW/200kWh



UPS Backup  
Energy Battery



Residential Modular  
Energy Storage



Base Station  
Battery Pack

02.  
INNOVATIVE  
PRODUCTS

⚡ Intellectual Management System:



RBMS (BMS & EMS)



ANPL-CLOUD



# Commercial & Industrial Energy Storage System 100kW/200kWh

## HULK 200

### Product Introduction

"ALL in one" design, with high-performance batteries, BMS, high-performance and high protection level PCS, high protection level PACK and high-voltage module, EMS, etc. integrated into a single standardized outdoor cabinet to form an integrated, efficient, and flexible energy storage unit.



### Product Advantages

#### Safe and Reliable

- CATL battery cell
- IP67 pack, IP66 PCS and IP54 cabinet
- Pack level short-circuit protection
- Innovative air-cooling design
- 4 level of fire protection

#### Flexible Configuration

- Standardized interface for flexible access
- Plug and play modular design
- Expandable to MWh
- Integrated transportation
- On-grid / off-grid optional

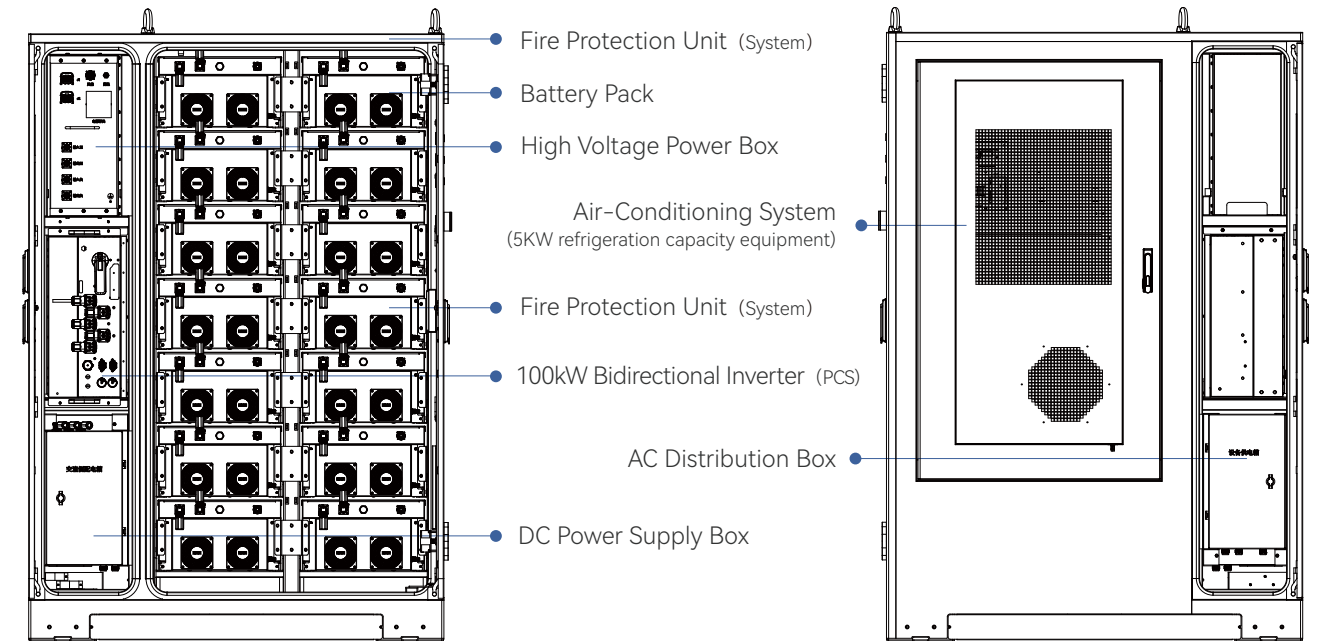
#### Intelligent Control

- 2A of BMS active balancing rate
- Optimized operation strategy by EMS
- OTA maintenance and monitoring
- Unmanned operation

#### Economical and Efficient

- Efficient thermal management design
- High-performance batteries and PCS
- Replaceable pack for easy O&M
- Longer battery life cycle

## Internal Construction



Off Grid Island



Commercial Buildings



Industrial Parks



Solar Storage Charging Integration System

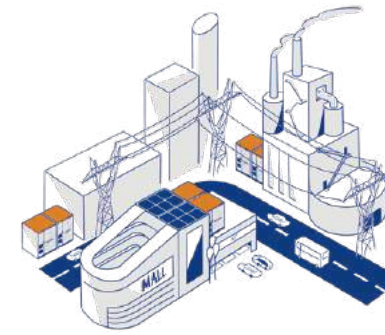


Distribution Grid Expansion



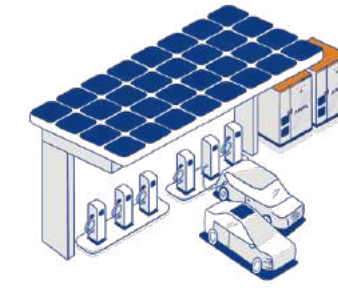
Product Type	ANPLHULK100200
<b>DC Parameters</b>	
Battery Type	Lithium-ion battery (CATL)
Battery Rated Capacity	3.2V / 280Ah
Battery System Configuration	1P224S
Battery Rated Capacity	200kWh
Rated Voltage	716.8V
Voltage Range	627.2V ~ 806.4V
Max Charge / Discharge Capacity	180kWh (DOD90%)
Life Cycle	6000 (EOL>80%, 25°C)
<b>AC Parameters</b>	
Grid Voltage Range	AC400V (-15%~+10%)
Grid Frequency Range	50Hz / 60Hz (±2.5Hz)
AC Mode	3-Phase 3-Wire (3P3W)
Isolation Mode	No isolation connected to the grid
Rated Charge / Discharge Power	100kW / AC
Operating Mode	On-grid / off-grid (optional isolation transformer)
<b>System Parameter</b>	
Rated Charging and Discharging Rate	0.5P
System Efficiency	≥88%
Wiring Method	Bottom in and bottom out
Anti-Corrosion Grade	C3
Operating Temperature Range	-20°C ~ +55°C
Relative Humidity Range	0 ~ 95% RH, no condensation
Cooling Method	Air cooling
IP Protection Rating	IP54 (battery room) ; IP67 (system)
Noise	≤70dB (1m)
Operating Altitude	2000m (>2000m derating)
Weight	≤2500kg
Dimension (W*D*H)	1550*1350*2250mm (1550*1600*2250mm, including AC)
Communication Protocols	ModBusTCP / RS485 / CAN
<b>Standard</b>	IEC62619 / IEC63056 / IEC61000 / IEC62477 / UN38.3 / EN50549 / VDE4105

## ⚡ Application Scenarios



### Industrial & Commercial ESS

- Peak-valley arbitrage
- Guarantee premium and stable electricity
- Increase the consumption of the renewables
- Assist with load management
- Increase the capacity of transformers
- Intellectual demand management



### PV Storage & EV Charging Station

- Increase PV generation for self-use
- Support dynamic transformer expansion
- Reduces dependence on the grid
- Save electricity bill



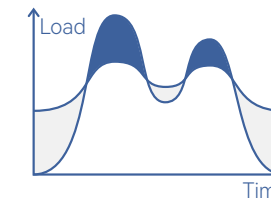
### Microgrid

- Affordable energy for remote area
- Flexible and reliable power supply
- Integration of distributed green energy
- Local climate resilience

## ⚡ Application Value

### Peak-Valley Arbitrage

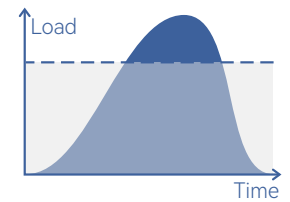
- Discharge
- Charge



Charges the ESS during the valley period at night / noon and discharge during the peak hours of electricity consumption to gain profit from electricity price differences.

### Dynamic Transformer Expansion

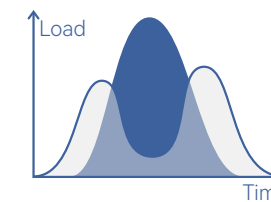
- Transformer capacity
- Short-term power consumption
- Capacity expanded by ESS



When the original transformer capacity is insufficient, the capacity can be dynamically expanded by energy storage and reduce the transformer cost.

### Consumption of Renewable Energy

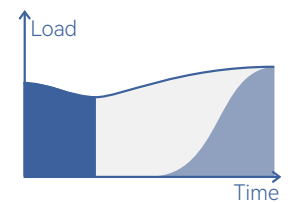
- Solar energy produced
- Use of solar on time
- Use of stored energy



The peak hour of power consumption and generation is different. ESS minimize waste and pollution by leveraging the power of the sun 24 hours a day.

### Combo With Diesel Power Generation

- Grid supply
- ESS supply
- Diesel power supply



ESS can serve as backup power when the grid is disconnected. It supplement the time required for diesel power generation to start.

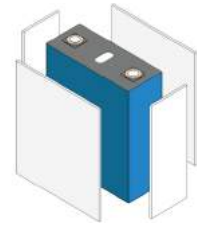


## 4 levels of Fire Protection

### Cell Safety

All-round thermal insulation pad

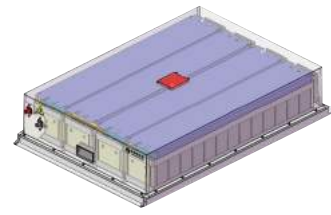
The thermal insulation effect is 3~5 times that of traditional materials.



### Pack Safety

Stand-alone fire protection module

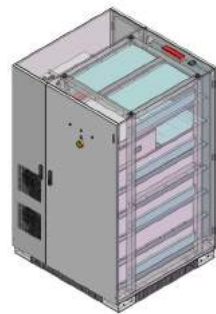
Each battery pack is equipped with battery-specific fire extinguishing agent and thermal detection devices.



### System Safety

System-level stand-alone fire protection module

The interior of the battery cabinet is designed with fire detection and extinguishing devices.



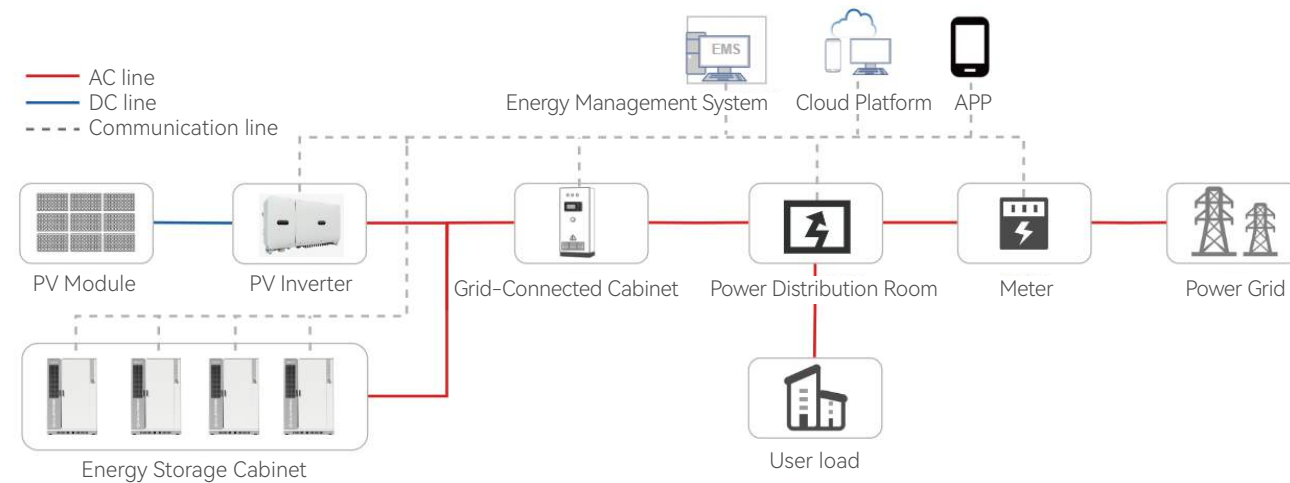
### Cloud Monitoring

Real-time data for each cell

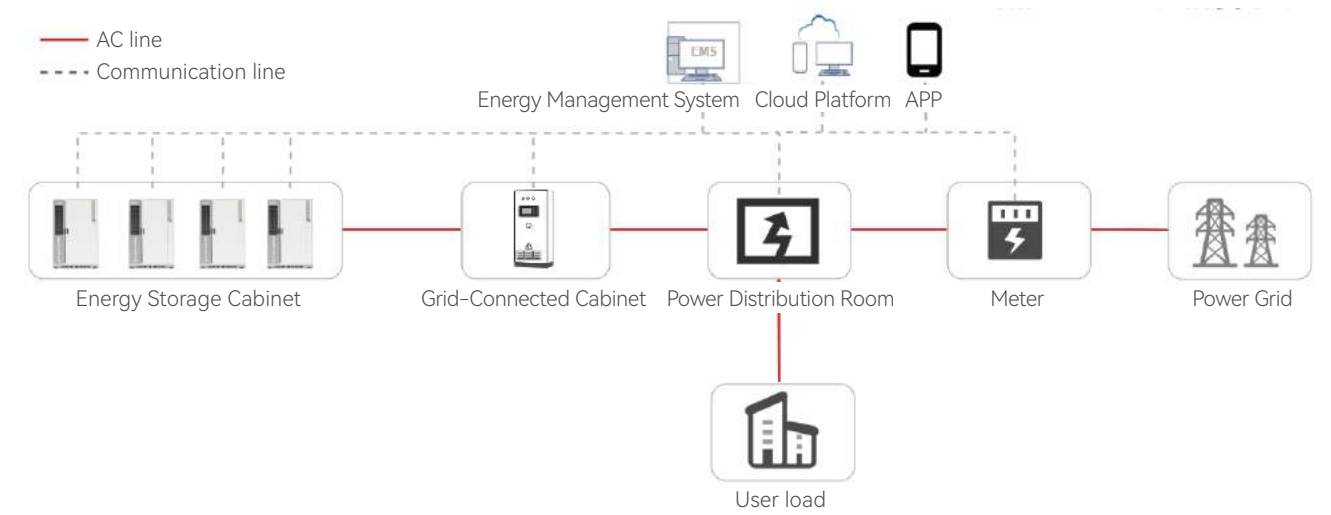
Remote monitoring and predictive diagnosis of SOH



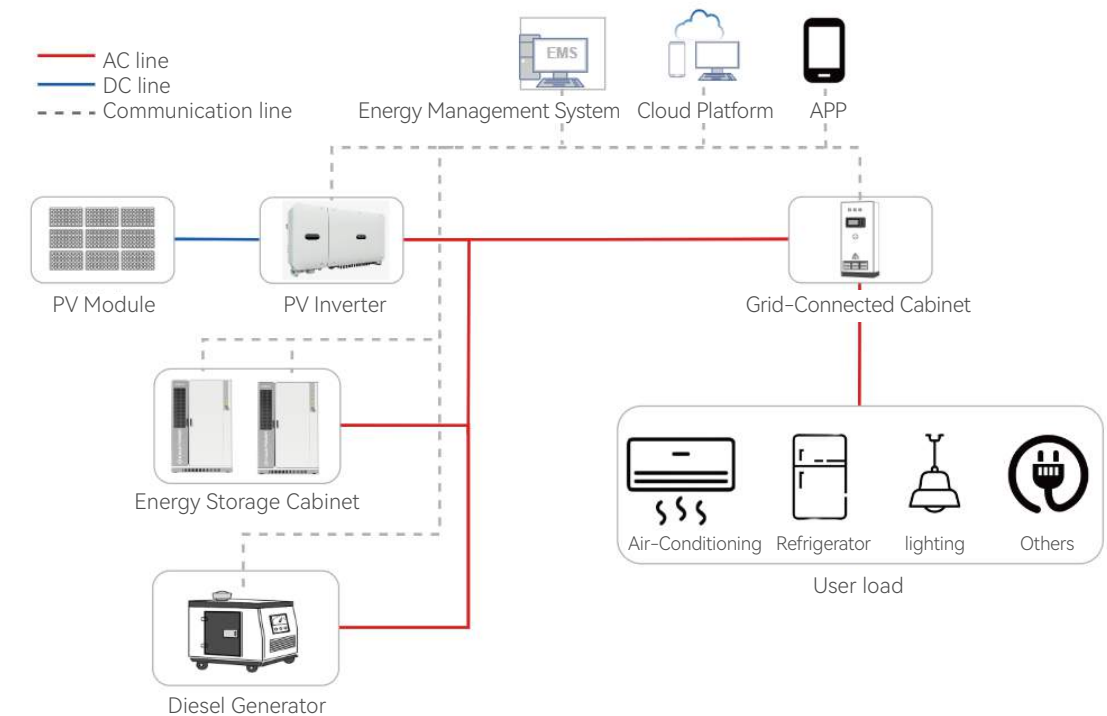
## Electrical Topology Diagram



Topology Map of solar, energy storage AC coupling system



Topology Map of energy storage low voltage AC coupling system



Topology Map of solar, energy storage and diesel power generation microgrid system

# UPS Backup Energy Battery

## SKYLINE P / S

### Original Technology High Security

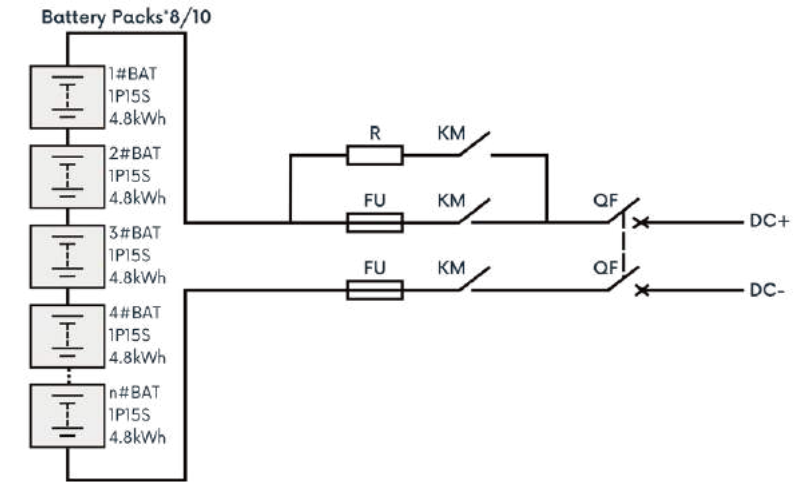
- Discharge ratio up to  $\geq 5C$
- BMS proactive balancing rate up to 2A
- Real-time monitor on cell temperature and voltage
- Proactive BMS management and warning
- Preventing short circuit breakers

### High Reliability Super Flexibility

- Individual rack replaceable
- Minimized discharging temperature rise of 20°C
- Compatible with wide voltage range of 320V ~ 691V
- Flexible configuration of 38.4kWh ~ 48kWh for individual rack
- Available for bulk or whole rack transportation



## Electrical Topology Diagram



Technical Parameters		ANPLSK		
Item	Cell	Pack	Rack (8/10 Packs)	
Configuration	/	1P15S	1P120S	1P150S
Dimensions [mm]	130*36*230 [W*D*H]	485*490*172 [W*D*H]	800*600*2000 [W*D*H]	
Weight [kg]	2.3	50	600	700
Rated Voltage [V]	3.2	48	384	480
Voltage Range [V]	2.5 ~ 3.6	37.5 ~ 54	300 ~ 432	375 ~ 540
Rated Capacity [Ah]	100	100	100	
Rated Energy [kWh]	0.32	4.8	38.4	48
Standard	IEC62619 / IEC63056: 2000 / IEC61000-6-2&-6-4 / IEC624777-1			





# Residential Modular Energy Storage

## STARK SERIES

### Intelligence

- Auto manage charge/discharge strategy
- Remote control from APP

### Profitability

- Proactive optimized strategy
- Save electricity bill from peak-valley price difference

### Flexibility

- Modular design support capacity expansion
- Plug and play

### Reliability

- Auto-switch between on/off grid
- 24 hours backup energy

### Security

- IP65 for outdoor use
- Advanced LFP battery

### Efficiency

- 90% Dod
- High voltage operation



Technical Parameters		ANPLSTARK	
<b>Electrical Character</b>			
Battery Type		LiFePO4	
Number of Battery Pack	HT5000-1	HT5000-2	HT5000-3
Rated Capacity [kWh]	4.8	9.6	14.4
Battery Type [Ah]		50Ah	
Rated Voltage [V]	96	192	288
Charging Cut-off Voltage [V]	108	216	324
Discharging Cut-Off Voltage [V]	84	168	252
Suggested Charge / Discharge Current [A]		25	
Max Charge/Discharge Current [A]		50	
<b>General Parameters</b>			
Battery Weight (HT5000*1) [kg]		60	
Battery Dimension (HT5000*1) [mm]		600*250*430	
High Voltage Controller weight [kg]		15.2	
High Voltage Controller Dimension (HT5000*1) [mm]		600*250*282	
Charging Temperature Range [°C]		0 ~ 55	
Discharging Temperature Range [°C]		-20 ~ 55	
Communication		CAN / RS485	
Life Cycle		>6000 <sup>[1]</sup>	
Protection Class		IP65	
Cooling Method		Self-Cooling	
Altitude [m]		≤4000	
Expandable Range		Maximum Concatenation of 3 Sets	
Adaptable PCS		YELON, GOODWE, GROWATT, DEYE, SMA, VICTRON...	
Standard		CE / UN38.3 / IEC62619	

[1] Test conditions: 0.2C, 25°C, 80% DOD

[2] Customized color available for battery shell.



# Base Station Battery Pack

-  Long Live Cycle
-  High Security
-  High Ratio of Discharge



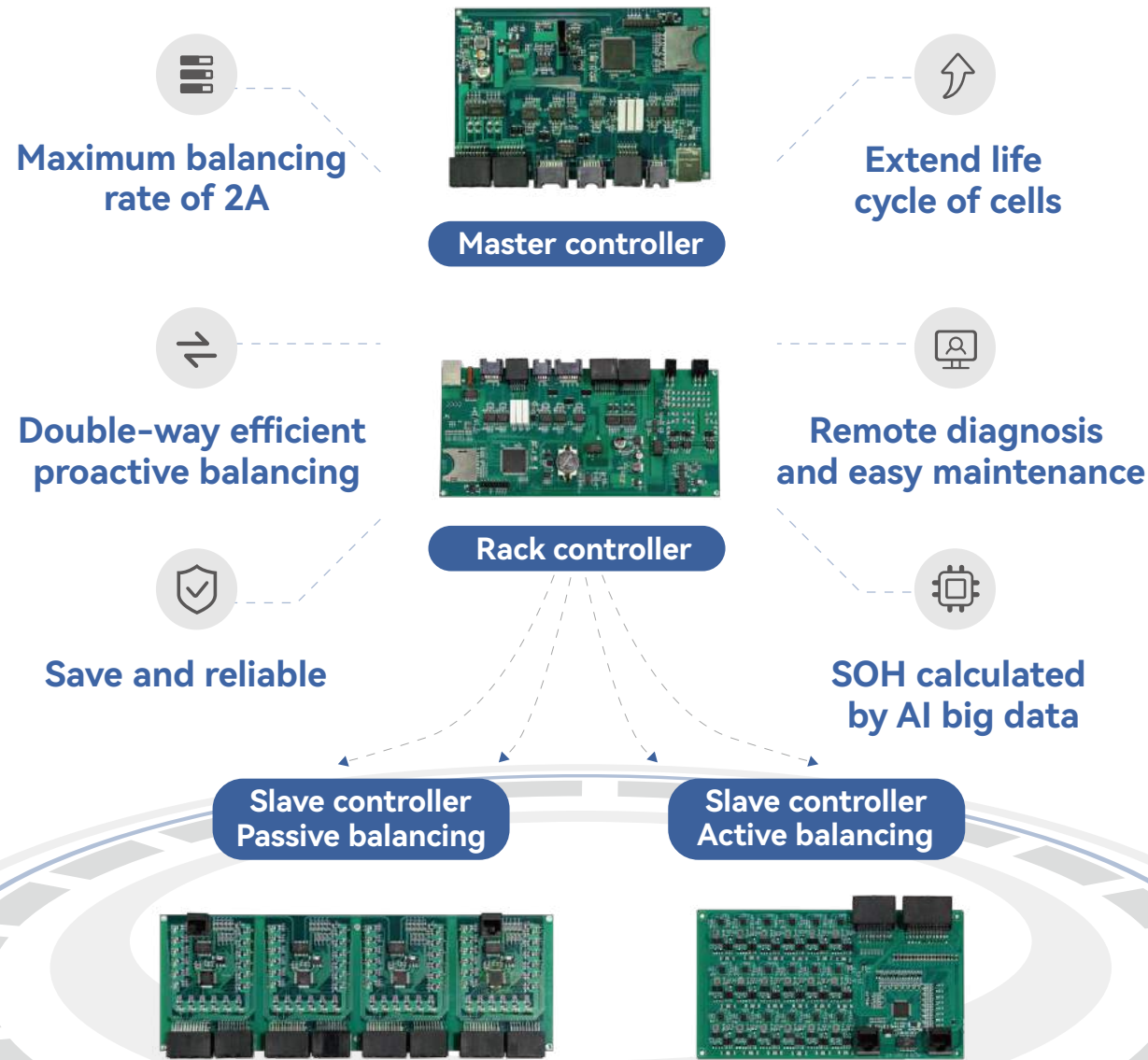
## Technical Parameters

Item	Cell	Module
Configuration	/	1P15S
Material	LFP	LFP
Rated Voltage [V]	3.2	48
Rated Capacity [Ah]		15
Rated Energy [kWh]	0.048	0.72
Max Constant Charge / Discharge Rate	Max Constant Charge: 1C / Max Constant Discharge: 2C	
Dimensions [mm]	38*121 [D*L]	228*504*154 [W*L*H]
Weight [kg]	0.34	12

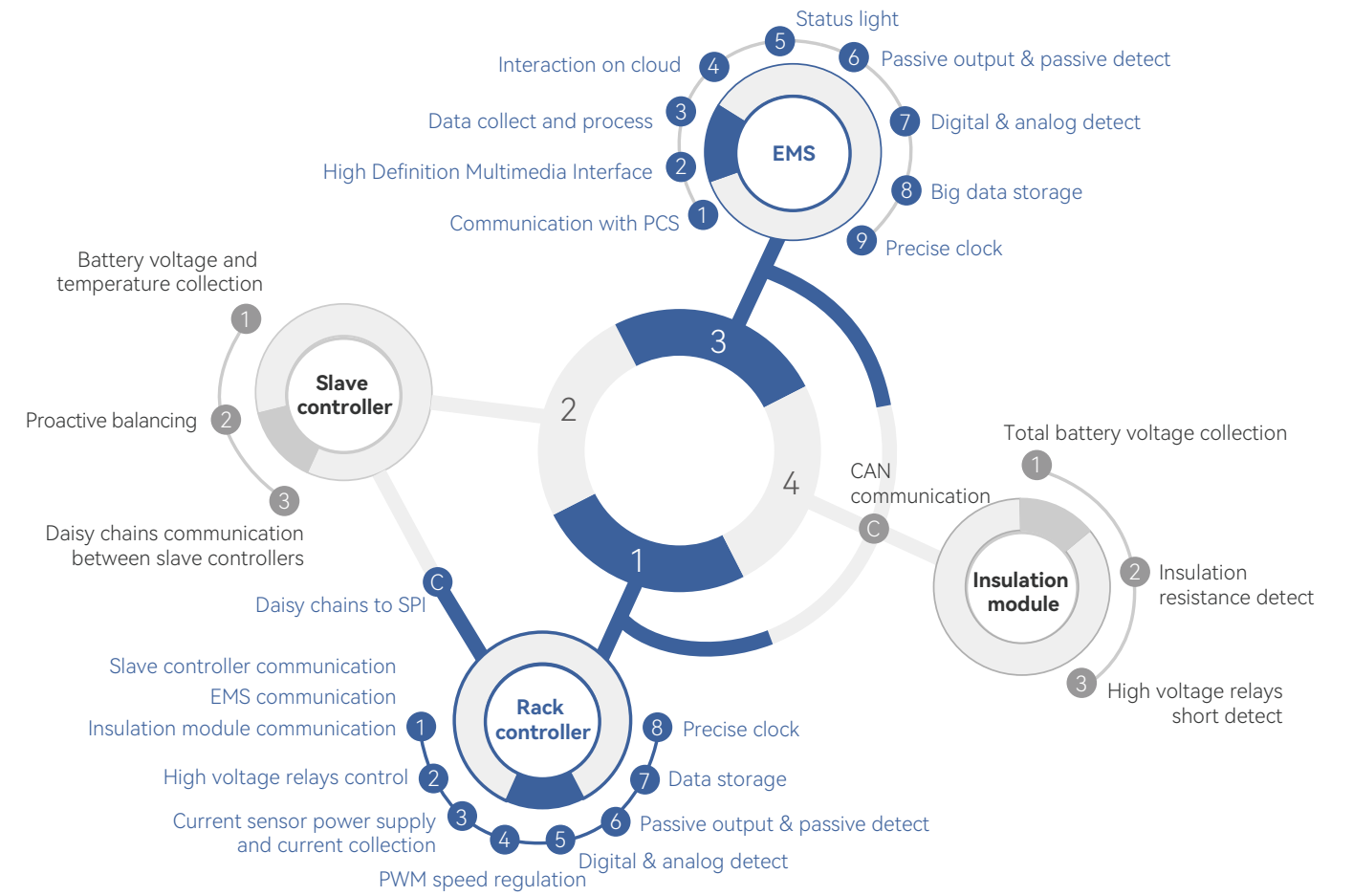
## Electical Character

Volatage Range [V]	2.5 ~ 3.6	37.5 ~ 54
Charge Volatage [V]	3.6	54
Charge Mode	CC-CV	
Max Charge Current [A]	15	
Max Disharge Current [A]	30	
Cycle Life	2000 @80%SOH	

# Intellectual Management System



# System Configuration



## Slave controller

Item	Mini	Rated	Max	Unit	
Working Condition	Temperature	-40	25	85	°C
	Relative humidity	5	55	95	%
	Altitude	0	--	4000	m
Single Cell Voltage	Voltage range	0	3.3	5	V
	Sampling accuracy	≤±0.2% FS, maximum error≤±5 mV			
Insulation and Withstand Voltage	Insulation resistance	When total battery voltage≥400V, relative error≤20%. When total battery voltage<400V, relative error≤30%. When insulation resistance≤50 kΩ, max error≤10 kΩ. When insulation resistance≥1 MΩ, negative error≤20%, positive errors≤200%.			
	Rated working voltage	0	1000	1500	V
	Withstand voltage	DC&AC ≥3820V&2700V			V
Temperature Sampling	Temperature range	-40	25	125	°C
	Quantity of sampling points	1	7	9	
	Sampling accuracy	Resolution≤1 °C, measurement error≤±1 °C, less than ±2 °C in the range of -40 °C ~ -20 °C & +65 °C ~ +125 °C			
Proactive Balancing	Current	0	2	2	A

## Rack Controller

Item		Mini	Rated	Max	Unit
Auxiliary	Voltage	12	24	36	V
power Supply	Cuttent	0	100	500	mA
Working	Temperature	-40	25	85	°C
Condition	Relative Humidity	5	55	95	%
	Altitude	0	--	4000	m
Total Voltage Sampling	Voltage Range	0	1000	1500	V
	Sampling Accuracy	≤±1%FS (<1000V) , ≤±0.5%FS (≥1000V)			
Shunt Current Sampling	Cuttent Range	-200	0	200	A
	Sampling Accuracy	±0.5%			V
Hall Current Sampling	Sensor Supply Aoltage	-200	0	200	A
		±0.5%			
Insulation and Withstand Voltage	Insulationresistance	When total battery voltage≥400V, relative error≤20%. When total battery voltage<400V, relative error≤30%. When insulation resistance≤50 kΩ, max error≤10 kΩ. When insulation resistance≥1 MΩ, negative error≤20%, positive error≤200%.			
	Rated Working Voltage				
	Withstand Voltage	0	1000	1500	V
	Voltage Range	DC&AC ≥3820V&2700V			V
	Temperature	0	24	36	V
Analog Input	sampling Accuracy	Resolution≤1 °C, measurement error≤±1 °C, less than ±2 °C in the range of -40 °C ~ -20 °C & +65 °C ~ +125 °C			
Digital Input/Output	Quantity	2			
High-Side Switching	Quantity	8			
Output					
SOC	Calculation Error	±5%			
Insulation CAN	Baud rate	250			
Communication					
Insulation 485 communication	Baud Rate	115200			
Ethernet Interface	Quantity	1			

## Master Controller

Item		Mini	Rated	Max	Unit
Low-Voltage	Voltage	12	24	36	V
Power Supply	Current	0	100	500	mA
Working	Temperature	-40	25	85	°C
Condition	Relative Humidity	5	55	95	%
	Altitude	0	--	4000	m
Isulation CAN	Quantity	2			
	Speed	250			
Isulation 485	Quantity	6			
	Speed	115200			
Ethernet Interface	Quantity	1			
Switch	Quantity	8			
	Drive	High Side			
GPIO	Quantity	2			
Dry Contact	Quantity	3			
	Voltage	24			
	Current	5			
Screen	Dimensions	7			

## HDMI

CPU Motherboard	T5L2 chip, DGUSII system
Touch Screen	Capacitive touch screen
Memory	32MBytes NOR Flash
Memory Devices	NOR Flash, External SD card can be connected
Interface	SD card interface, extended Flash interface, user interface (power supply and serial communication)
Configuration	TT5L2 chip, LCD interface, capacitive touch screen interface, user interface, Flash, extended Flash interface, speaker, RTC, SD card interface, PGT05 interface
Installation Method	Open hole installation, waterproofing need to be payed attention to
Power Supply	Rated power< 5W, working voltage 7~36V, working current 150~300mA Suggested power supply: 12V 1A DC regulated power supply
Dimensions	210.0*150.0*26.9 [W*H*T] [mm]
Front Panel	7.0in, 1024*600 resolution, 16.7Mcolour
Panel Viewport	IPS screen, wide viewing angle
Chassis Profile	Black housing with three-proof process
Cabinet Opening	Hole length 197.2mm, height 137.2mm, depth> 21mm, chassis panel thickness < 3.5mm



# 03. PROJECT APPLICATION

## Project Application (Selected)

### Commercial & Industrial ESS Projects

