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September, 2019

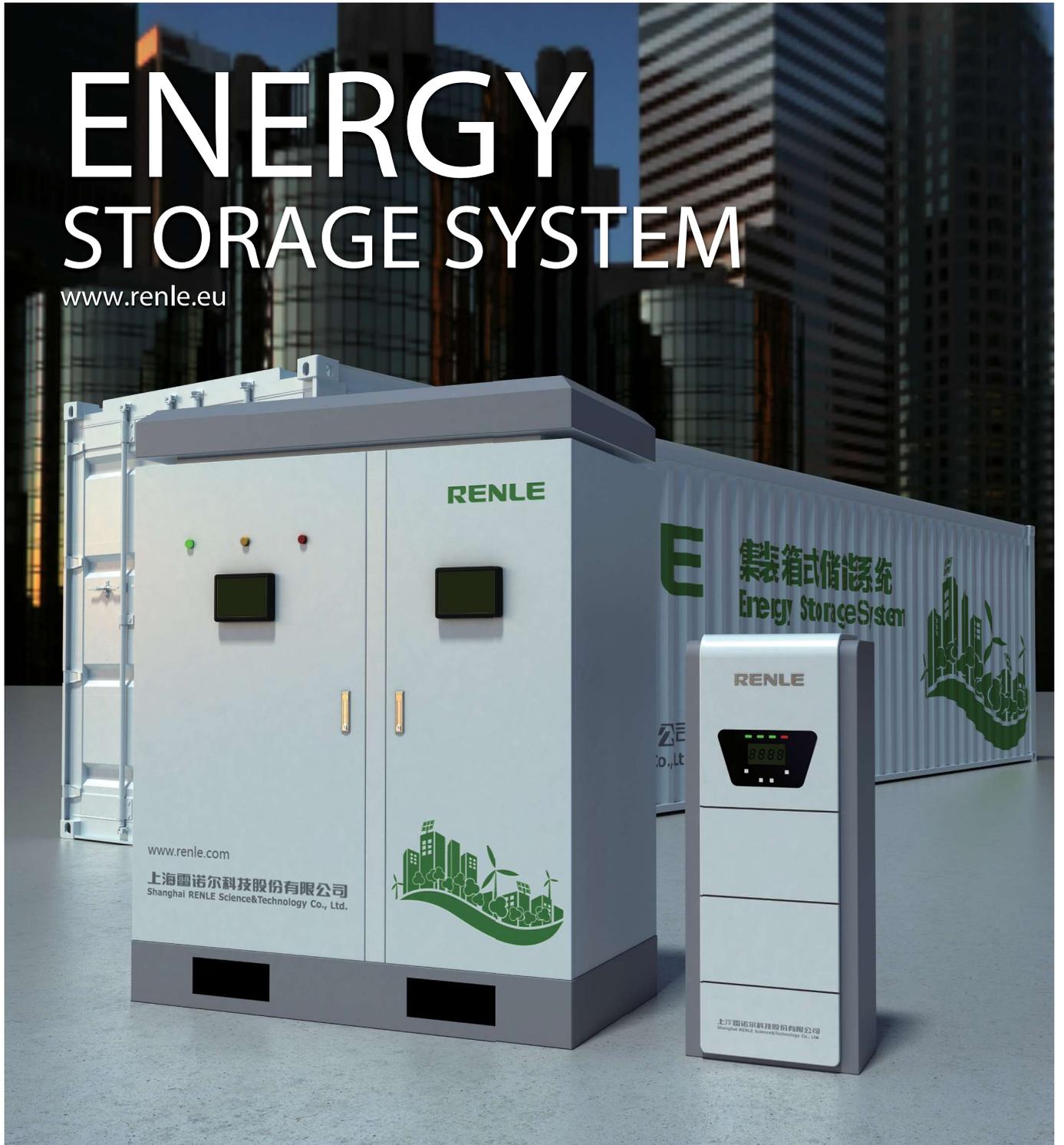


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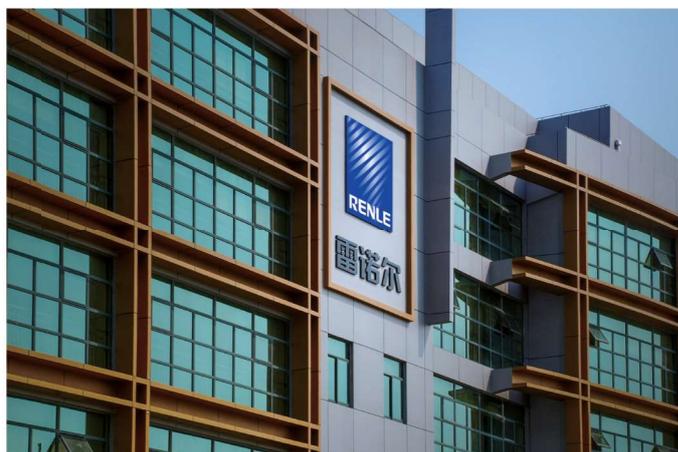
ENERGY STORAGE SYSTEM

www.renle.eu



Professional manufacturer of Smart Grid • New Energy • Electric Drive

RENLE Science & Technology Co., Ltd.



Shanghai RENLE Science & Technology Co., Ltd is a designer and product provider of energy saving system for intelligent electric industry, as well as an integrator of solutions for control system. Renle's products include LV motor soft starter, LV frequency inverter (VFD or AC drive), intelligent electric equipment, new energy electric equipment and complete sets of LV/HV power transmission and distribution equipment etc. The products are widely used in different kinds of industries and fields, such as electric power industry, metallurgical industry, petroleum and petrochemical industries, mines, chemical industry, construction industry, construction material industry, municipal engineering, military industry, light industry, textile, printing and dyeing, papermaking and pharmaceutical industries etc.

Renle's products are well exported to many countries and areas in the world.

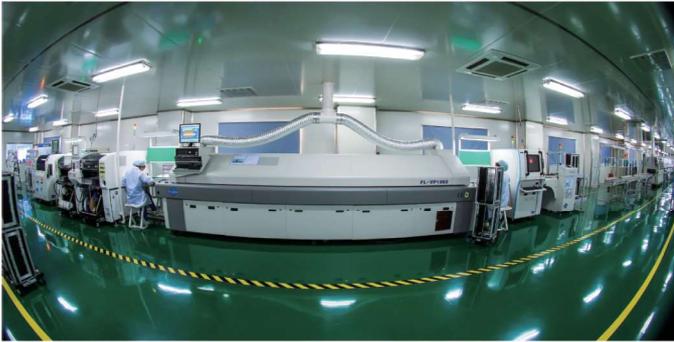
Renle's products have been used as parts of complete national key projects, such as Expo 2010 Shanghai China, 2008 Beijing Olympic Games, Yangshan Deepwater Port Project of Shanghai International Shipping Center, Shanghai Pudong Airport, Shanghai Hongqiao Airport, the Three Gorges Project, Gansu Satellite Launching Center, South-to-North Water Diversion Project, West-to-East Natural Gas Transmission Project, China National Petroleum Corp. , SINOPEC, Double Coin Type Group Ltd., and Shandong Linglong Tire Co., Ltd. etc. The products receive unanimous appraisal from the customers for excellent quality and perfect after-sales service.





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In China, RENLE is a pioneer who has firstly passed the certification of ISO9001 Quality Management System, ISO 14001 Environment System, OHSAS 18001 Occupational Health and Safety Management System, CE, TUV, GOST and national CCC etc. RENLE has been continuously introducing internationally advanced production and test equipment, and has established laboratories and provided R&D experiment base to domestic universities and colleges. Approved by National Human Resources and Social Security Bureau, RENLE has established a post-doctoral workstation. This shows that RENLE cooperates with universities for setting up platforms for teaching and study. This raises the independent innovation ability and R&D ability of the enterprise.

For many years Renle has been striving for and devoted to production modernization, administration collectivization, production specialization and technical leading. Renle has achieved

many honors: Key High-tech Enterprise of National Torch Program, High and New Tech Enterprise, National Enterprise of Credit, State-level Key New product, Shanghai Innovative Enterprises, Shanghai Enterprise Certifying Technology Center, Shanghai Renowned Brand, Shanghai Famous Brand Product, Shanghai Key New Product, Shanghai Renowned and High Quality Product, Post-doctoral workstation and Smart Grid R&D centers.

Renle will continually develop energy saving, high efficient, precise and humanized products, as well as help customers realize economic transformation and industrial upgrading with unique industrial control technology, advanced and applicable innovation products and profoundly integrated solution. In addition, Renle will speed up its pace of internationalization, satisfy the customers with quality and try to become a world renowned professional supplier of smart electric equipment!



RENLE'S ENERGY STORAGE SYSTEM SOLUTION

MAKES ENERGY CONSUMPTION MORE ECONOMIC, SMARTER AND SAFER

RENLE's energy storage system is R&D for applications such as power grid side, power generation side, user's side and microgrid energy storage. RENLE, depending on its production capability as an ODM factory and battery technology, and upstream materials, developed lithium iron phosphate battery core with longer life and lower cost. RENLE can supply integrated solutions and products for applications from battery packs, battery clusters to container energy storage system and large-medium-small optical storage systems. The product adopts modularization design, third degree BMS protection, high efficiency PCS/optical storage all-in-one machine and smart EMS management. Products can be flexibly configured. Application scope includes power grid, industry and commerce, data center, backup power, domestic energy storage and low-speed electric vehicle etc.



Core Superiorities Of Energy Storage System



Container type energy storage product

- Modularization of product design
- Integration of system structure
- Diversification of system expansion and upgrade



Energy storage solution

- Frequency modulation and peak shaving of energy storage
- Smart microgrid
- Backup power supply system
- Domestic energy storage system



Perfect project delivery management

- Customized energy storage battery with optimal features/controllable cost
- A team with practical experience of development for many years



Operation maintenance

- Rapid response
- Real time big data
- Remote control



Application of energy storage system



Power generation side

- Smooth and intermittent energy
- Peak shaving and frequency modulation
- Raise of new energy absorption



Power grid side

- Auxiliary service
- Delay of capacity increase



User's side

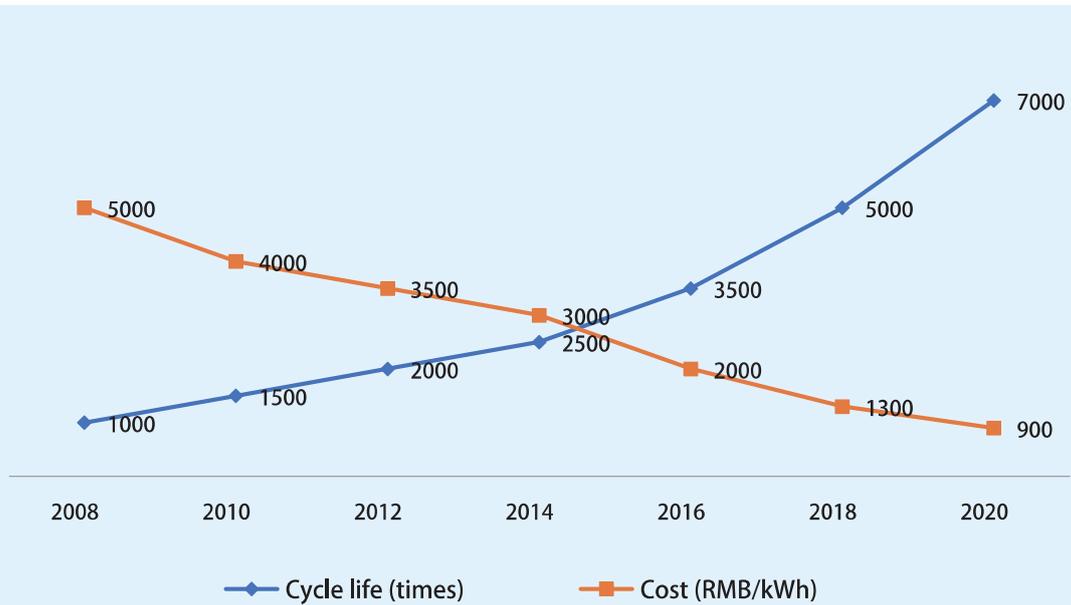
- Peak shaving and valley filling
- Restraint of load and required amount
- Increase of power supply reliability and energy quality



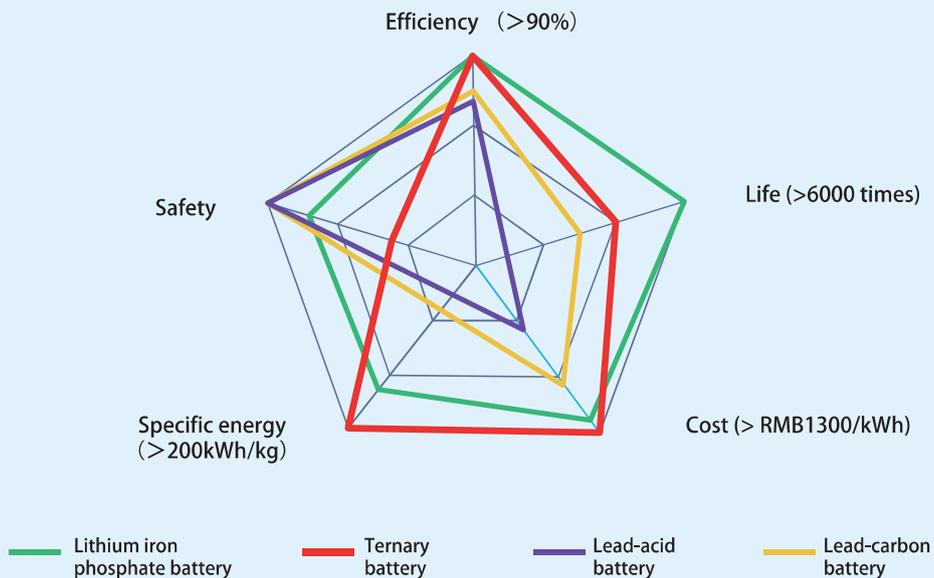
Island, off-grid energy storage

- Microgrid
- Energy storage of areas in shortage of electricity

Development tendency of lithium iron phosphate battery



Tendency of cycle life-cost of lithium iron phosphate battery



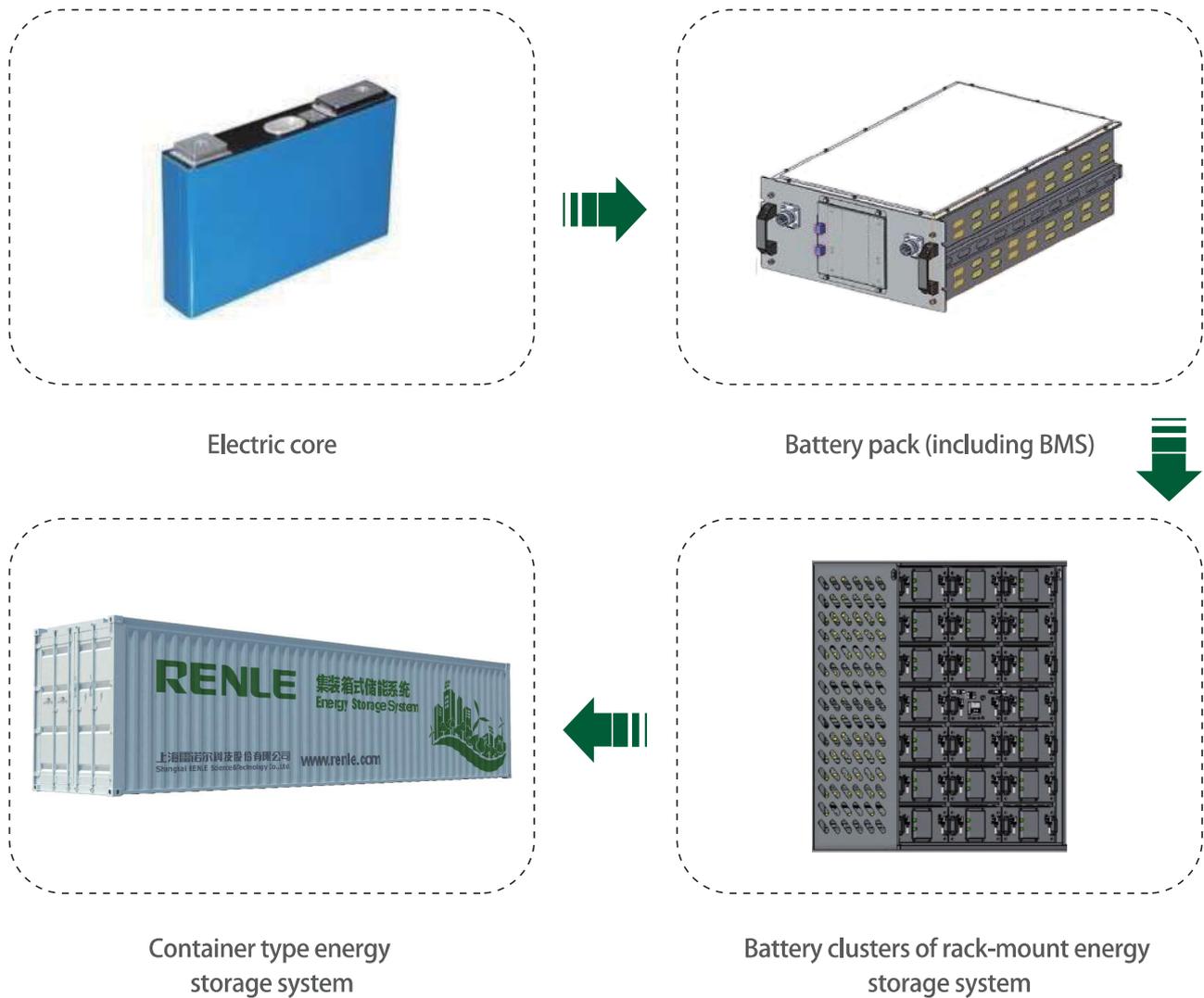
Radar map of lithium iron phosphate battery and other main streams

Compared with batteries of other systems, RENLE's lithium iron phosphate battery fully considers aspects such as safety, life and cost and has more superiorities.

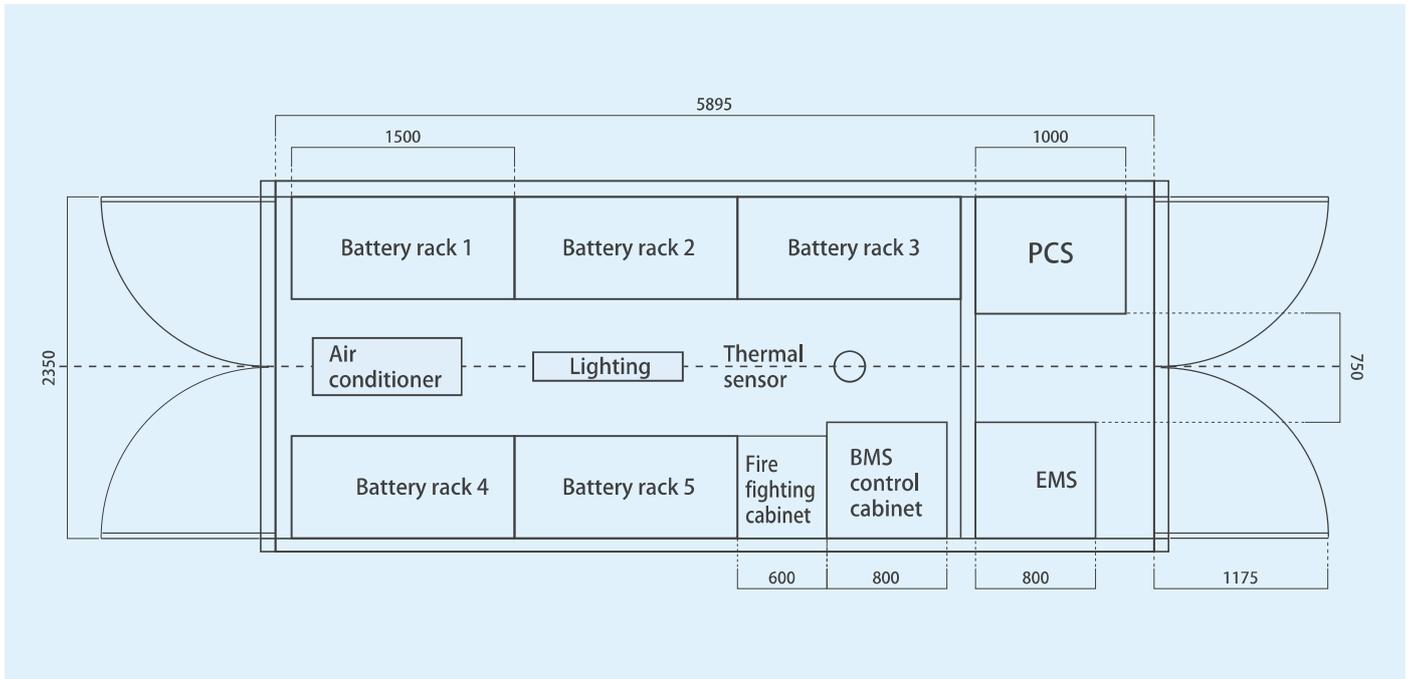
Features of energy storage system

- Modularization structure allows flexible combination of degree systems of different voltage within 1000V/different capacity and convenient maintenance;
- Design of third degree battery management system provides highest reliability;
- Customized lithium iron phosphate battery offers high safety and long cycle life. Service life can be longer than 10 years;
- Small volume and light weight makes transportation easy. Rack-mount and container type structure offers flexible arrangement and allows rapid application at different sites;
- RENLE' s battery passed certifications such as TUV, CE, UN38.3 and GB/T36276-2018 etc.

Structure of large container type energy storage system

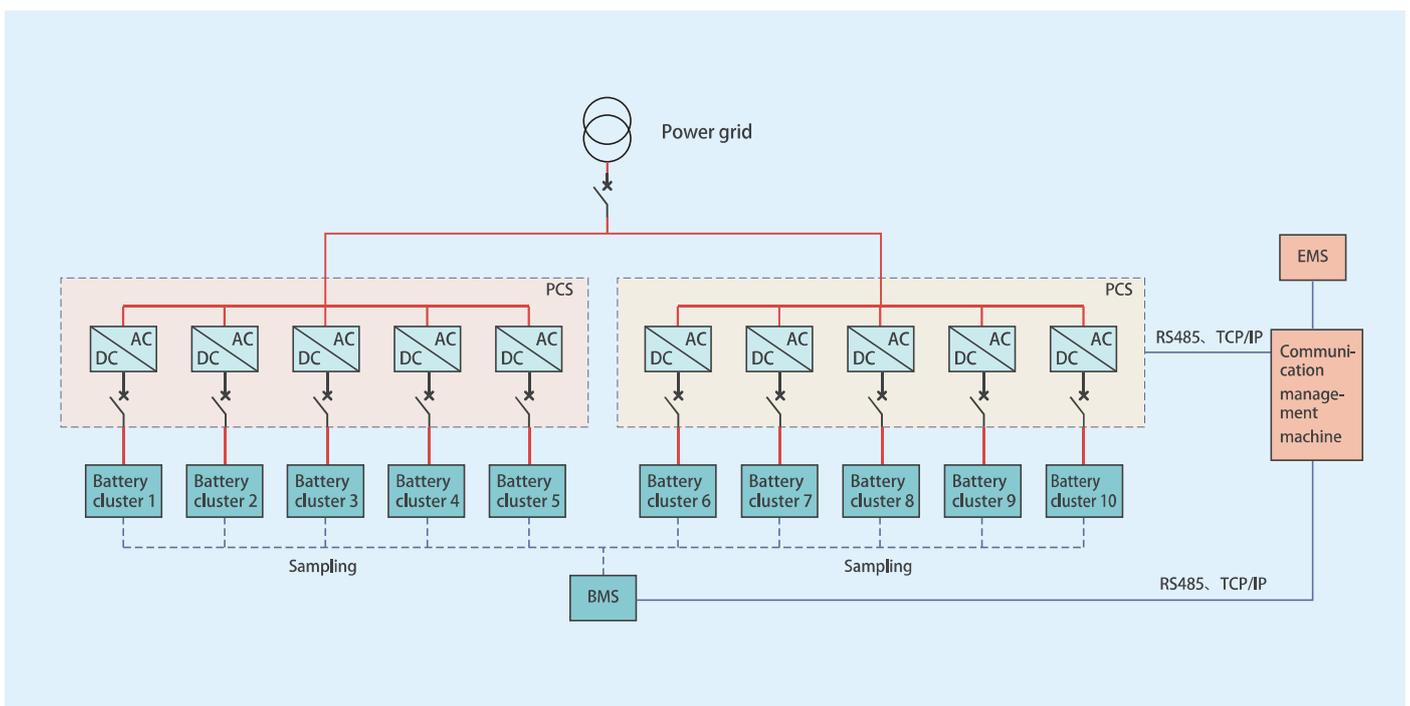


Arrangement diagram of container type energy storage system



Container type energy storage system includes lighting, fire protection, environment control, electric distribution, security and monitoring etc. Container type energy storage system of different sizes can be customized according the requirement of customers with different inner arrangement.

Topological diagram of energy storage system



Battery pack



LFPS-48 series pack



11.904kWh standard pack

Electric parameters					
Model	LFPS-4850	LFPS-48100	LFPS-48155	76.8V155Ah	38.4V310Ah
Battery type	Lithium iron phosphate				
Rated capacity	50Ah	100Ah	155Ah	155Ah	310Ah
Quantity of electricity	2.56kWh	5.12kWh	7.936kWh	11.904kWh	11.904kWh
Nominal voltage	51.2V	51.2V	51.2V	76.8V	38.4V
Limited charging voltage	58.4 ± 0.3V	58.4 ± 0.3V	58.4 ± 0.3V	87.6 ± 0.3V	43.8 ± 0.3V
Floating charging voltage	55.2 ± 0.3V	55.2 ± 0.3V	55.2 ± 0.3V	82.8 ± 0.3V	41.4 ± 0.3V
Max. charging current	50A	100A	155A	155A	310A
Standard charging current	25A	50A	77.5A	77.5A	155A
Max. discharging current	25A	50A	77.5A	77.5A	155A
Standard discharging current	75A	150A	232.5A	232.5A	465A
Max. discharging current	100A	200A	310A	310A	620A
Pulse discharging current	43.2V	43.2V	43.2V	64.8V	32.4V
Discharging end voltage	40.0V	40.0V	40.0V	60V	30V
Discharging cut-off voltage	≤3%	≤3%	≤3%	≤3%	≤3%
Structure & environment					
Standard dimensions (W x D x H)	482 ± 3mm	482 ± 3mm	483 ± 3mm	420 ± 3mm	420 ± 3mm
	470 ± 3mm	470 ± 3mm	467 ± 3mm	651 ± 3mm	651 ± 3mm
	200 ± 2mm	200 ± 2mm	222 ± 2mm	210 ± 2mm	210 ± 2mm
Weight	30 ± 2Kg	56 ± 2Kg	63 ± 2Kg	90Kg	90Kg
Charging temperature	0 ~ 45°C				
Discharging temperature	-20 ~ 55°C				
Normal operation temperature	5°C ~ 45°C				
Storage condition	5 ~ 35°C				
SOC	30%	30%	30%	30%	30%

Small sized optical storage system (0.3kW~2kW)

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Model	RNES-P-OR3N2	RNES-P-OR3N2	RNES-P-OR5N1	RNES-P-OR5N2	RNES-P-1R0	RNES-P-1R0	RNES-P-1R0
Continuous output power	300W		500W		1000W	1500W	2000W
Peak power	600W		1000W		2000W	3000W	4000W
Battery type	Lithium battery						
Battery capacity	300Wh 24V 13AH	500Wh 24V 26AH	500Wh 24V 26AH	800Wh 24V 33AH	1000Wh 24V 43AH	1500Wh 24V 66AH	2000Wh 48V 40AH
External charging	DC25.2V4A				DC25.2V 7A	DC25.2V 10A	DC58.8V 7A
Charging time	3 ~ 4H	6 ~ 7H	6 ~ 7H	7 ~ 8H	6 ~ 7H	6 ~ 7H	6 ~ 7H
Solar charging	PWM (optional)						MPPT
PV controller charging specification	24V6A		24V10A			48V10A	
PV charging voltage range	36 ~ 55V						65 ~ 150V
AC output voltage	220V/110V						
Output frequency	50/60Hz						
Output wave form	Pure sinusoidal wave						
DC output	5V2A/12V10A/24V10A						
Operation environmental temperature	-15℃ ~ 50℃						
Operation environmental humidity	RH45% ~ 85% , without condensation						
Protection method	Overcharging protection, overdischarging protection, overload protection, high temperature protection, short circuit protection						
Content of display	DC voltage, DC current, remaining battery capacity, active power, remaining usage time						
Cooling method	Air cooling (when inside temperature >65℃)						
Others	LED lamp (1W)						
Product size	270 × 310 × 170mm ²		360 × 280 × 195mm ²		370 × 290 × 178mm ²	370 × 290 × 178mm ²	370 × 290 × 178mm ²
Product weight	4.5kg	5.5kg	6kg	7.5kg	7.8kg	10.2kg	12.8kg

Small sized optical storage system (3kW)



Model	RNES-P-2R56	RNES-P-5R12	RNES-P-7R68	RNES-P-10R24
Battery type	Lithium iron phosphate			
	51.2V 50Ah			
Battery pack	1 pack	2 pack	3 pack	4 pack
	2.56kWh	5.12kWh	7.68kWh	10.24kWh
Rated power	3kW			
Rated voltage	51.2V			
Electric core capacity	3.2V50Ah			
Electric core connection method in pack	1P16S			
Pack connection method in battery cluster	1P1S	2P1S	3P1S	4P1S
Grid connection voltage	AC220V ± 15%			
Grid connection frequency	50/60Hz			
Cycle life	≥5000 cycles, or 5 years			
Operation mode	On-off grid			
Grid type	Single phase			
Communication interface and type	CAN、Modbus TCP、Modbus RTU			
Max. efficiency	92%			
Dimensions(W x D x H)	600mm × 600mm × 1400mm			
Operation temperature	0~55℃			
Storage temperature	-10~45℃			
Humidity range	15%~90%			
Altitude	≤2000m			
Protection degree	IP21			
Cooling method	Forced air cooling, temperature control			
Weight	≤80kg	≤110kg	≤140kg	≤170kg

Small sized optical storage system (5kW)

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Model	RNES-P-2R56	RNES-P-5R12	RNES-P-7R68	RNES-P-10R24
Battery type	Lithium iron phosphate			
Battery pack	1 pack 2.56kWh	2 pack 5.12kWh	3 pack 7.68kWh	4 pack 10.24kWh
Rated power	5kW			
Rated voltage	51.2V			
Electric core capacity	3.2V50Ah			
Electric core connection method in pack	1P16S			
Pack connection method in battery cluster	1P1S	2P1S	3P1S	4P1S
Grid connection voltage	AC220V ± 15%			
Grid connection frequency	50/60Hz			
Cycle life	≥5000 cycles, or 5 years			
Operation mode	On-off grid			
Grid type	Single phase			
Communication interface and type	CAN、Modbus TCP、Modbus RTU			
Max. efficiency	92%			
Dimensions(W x D x H)	600mm × 600mm × 1200mm			
Operation temperature	0~55℃			
Storage temperature	-10~45℃			
Humidity range	15%~90%			
Altitude	≤2000m			
Protection degree	IP21			
Cooling method	Forced air cooling, temperature control			
Weight	≤80kg	≤110kg	≤140kg	≤170kg

Small sized optical storage system (8kW)



Model	RNE5-P-15R36	RNE5-P-19R2	RNE5-P-23R04	RNE5-P-26R88	RNE5-P-30R72
Battery type	Lithium iron phosphate				
Battery pack	4 packs	5 packs	6 packs	7 packs	8 packs
Rated power	8kW				
Rated voltage	307.2V	384V	460.8V	537.6V	614.4V
Electric core capacity	3.2V50Ah				
Electric core connection method in pack	1P24S				
Pack connection method in battery cluster	1P4S	1P5S	1P6S	1P7S	1P8S
Grid connection voltage	AC380V ± 15%				
Grid connection frequency	50/60Hz				
Cycle life	≥5000 cycles, or 5 years				
Operation mode	On-off grid				
Grid type	3 phases, 3 lines				
Communication interface and type	Wifi、RS485、GPRS				
Max. efficiency	93.67%				
Dimensions (W x D x H)	700mm × 700mm × 1500mm				
Operation temperature	0~55℃				
Storage temperature	-10~45℃				
Humidity range	15%~90%				
Altitude	≤2000m				
Protection degree	IP21				
Cooling method	Forced air cooling, temperature control				
Weight	≤250kg	≤300kg	≤350kg	≤400kg	≤450kg

Small sized optical storage system (10kW)

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Model	RNES-P-47R616	RNES-P-59R52	RNES-P-71R424	RNES-P-83R328	RNES-P-83R328
Battery type	Lithium iron phosphate				
Battery pack	76.8V 155Ah				
	4 packs	5 packs	6 packs	7 packs	8 packs
	47.62kWh	59.52kWh	71.42kWh	83.33kWh	95.23kWh
Rated power	8kW				
Rated voltage	307.2V	384V	460.8V	537.6V	614.4V
Electric core capacity	3.2V155Ah				
Electric core connection method in pack	1P24S				
Pack connection method in battery cluster	1P4S	1P5S	1P6S	1P7S	1P8S
Grid connection voltage	AC380V ± 15%				
Grid connection frequency	50/60Hz				
Cycle life	≥5000 cycles, or 5 years				
Operation mode	On-off grid				
Grid type	3 phases, 3 lines				
Communication interface and type	Wifi、RS485、GPRS				
Max. efficiency	93.67%				
Dimensions (W x D x H)	600mm × 700mm × 1500mm				
Operation temperature	0~55℃				
Storage temperature	-10~45℃				
Humidity range	15%~90%				
Altitude	≤2000m				
Protection degree	IP21				
Cooling method	Forced air cooling, temperature control				
Weight	≤250kg	≤300kg	≤350kg	≤400kg	≤450kg

Medium sized optical storage system (30kW/71.424kWh)



System parameter

Model	RNES-P-71R424
Output power/system energy	30kW/71.42kWh
Battery type	Lithium iron phosphate
Protection degree	IP21
Guarantee	3 years for product, 10 years for performance

Inverter parameter

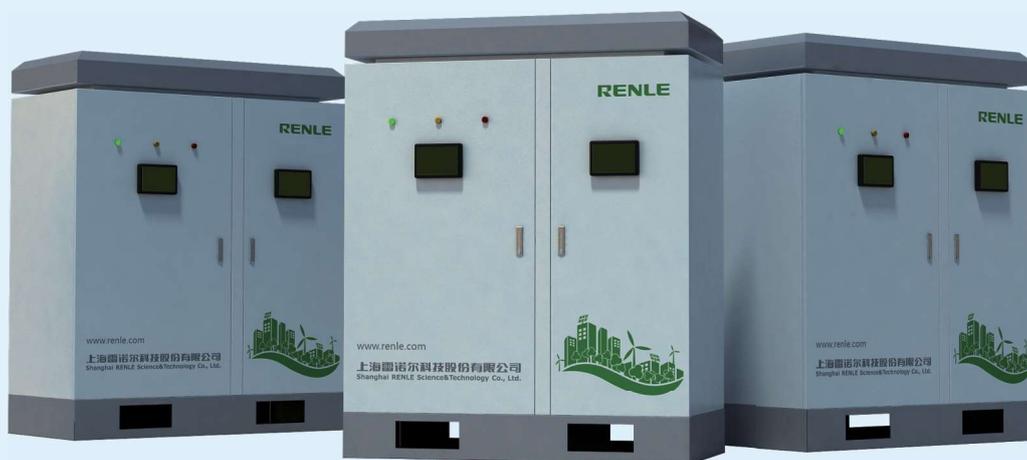
Max. PV current	180A	Rated output frequency	50/60Hz
Max. PV voltage	1000V	Operation temperature	-25~55℃
Rated AC current	43A	Dimensions (W x D x H)	950 × 750 × 1860
Max. charging/discharging power	30kW	Power factor	0.8 advance ~ 0.8 lag
Number of phase	3P+N+PE	Weight	440kg
Rated output voltage	400V	Communication interface	RS485、CAN
Grid voltage range	360V~440V	Communication protocol	CAN、ModBus

Technical parameter of battery & BMS

Electric core model	3.2V155Ah
Battery capacity	71.42kWh
Weight	400kg
Dimensions (W x D x H)	600 × 750 × 2000
Cycle number	≥5000 cycles, or 5 years
Electric core connection method in pack	1P24S
Pack connection method in battery cluster	1P6S

Medium sized optical storage system (30kW/130.944kWh)

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System parameter

Model	RNES-P-130R944
Output power/system energy	30kW/130.94kWh
Battery type	Lithium iron phosphate
Protection degree	IP21
Guarantee	3 years for product, 10 years for performance

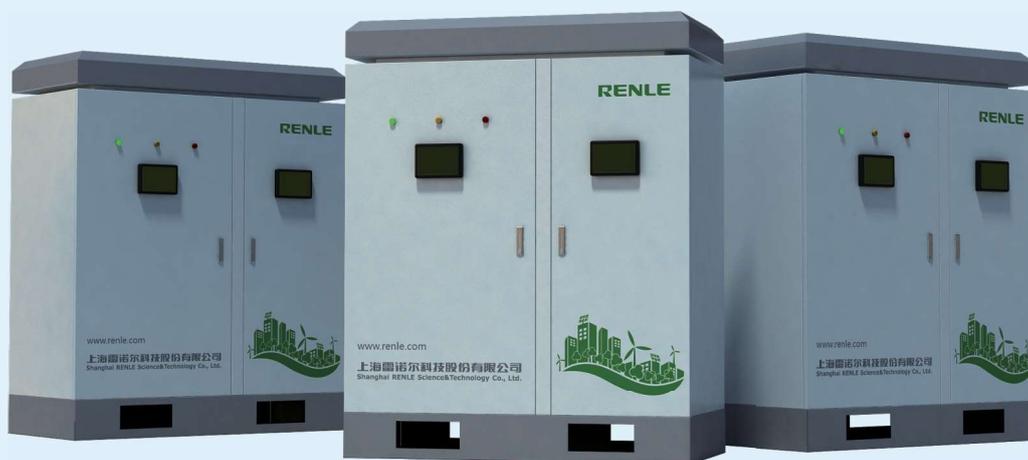
Inverter parameter

Max. PV current	180A	Rated output frequency	50/60Hz
Max. PV voltage	1000V	Operation temperature	-25~55°C
Rated AC current	43A	Dimensions (W x D x H)	950 × 750 × 1860
Max. charging/discharging power	30kW	Power factor	0.8 advance ~ 0.8 lag
Number of phase	3P+N+PE	Weight	440kg
Rated output voltage	400V	Communication interface	RS485、CAN
Grid voltage range	360V~440V	Communication protocol	CAN、ModBus

Technical parameter of battery & BMS

Electric core model	3.2V155Ah
Battery capacity	130.94kWh
Weigh	560kg
Dimensions (W x D x H)	900 × 750 × 2000
Cycle number	≥5000 cycles, or 5 years
Electric core connection method in pack	2P12S
Pack connection method in battery cluster	1P11S

Medium sized optical storage system (30kW/142.848kWh)



System parameter

Model	RNES-P-142R848
Output power/system energy	50kW/142.85kWh
Battery type	Lithium iron phosphate
Protection degree	IP21/IP65 (container)
Guarantee	3 years for product, 10 years for performance

Inverter parameter

Max. PV open circuit voltage	DC1000V	Recommended PV power	50kWp
PV voltage range	DC480V~DC800V	Rated output frequency	50/60Hz
Battery voltage range	DC352V~DC600V	Frequency range	45~55/55~65Hz
Max. charging/discharging power	50kW	Operation temperature	-25~55℃
Max. charging/discharging current	142A	Dimensions (W x D x H)	950 × 750 × 1860
Rated AC current	72A	Weight	440kg
Number of phase	3P+N+E	Communication interface	RS485、CAN
Rated AC voltage	AC400V	Communication protocol	ModBus RTU 、CAN
AC voltage range	AC360V~AC440V	On-off grid switching time	Automatic, ≤10ms

Technical parameter of battery & BMS

Electric core model	3.2V155Ah
Battery capacity	142.85kWh
Weigh	≤2000kg
Dimensions (W x D x H)	1000 × 750 × 1860
Cycle number	≥5000 cycles, or 5 years
Electric core connection method in pack	2P12S
Pack connection method in battery cluster	1P12S

Medium sized optical storage system (60kW/226.176kWh)

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System parameter

Model	RNES-P-226R176
Output power/system energy	60kW/226.18kWh
Battery type	Lithium iron phosphate
Protection degree	IP21/IP65 (container)
Guarantee	3 years for product, 10 years for performance

Inverter parameter

Max. PV open circuit voltage	180A	Off-grid output voltage range	± 15%
PV voltage range	DC200~900V	Rated output frequency	50/60Hz
Battery voltage range	1/2	Backup battery	UPS (STS needed)
Max. charging/discharging power	3-section charging	Operation temperature	-20~55°C
Max. charging/discharging current	91A	Dimensions (W x D x H)	600 × 800 × 2000
AC rated current	60kW	Weight	265kg
Number of phase	3P+N+E	Communication interface	RS485、CAN、LAN、REPO
Rated AC current	AC380V/400V/415V	Communication protocol	CAN、ModBus TCP、ModBus RTU
AC voltage range	± 15%		

Technical parameter of battery & BMS

Electric core model	3.2V155Ah
Battery capacity	226.18kWh
Weigh	2600kg
Dimensions (W x D x H)	1900 × 750 × 2000
Cycle number	≥ 5000 cycles, or 5 years
Electric core connection method in pack	2P12S
Pack connection method in battery cluster	1P19S

Medium sized optical storage system (100kW/214.272kWh)



System parameter

Model	RNES-P-214R272
Output power/system energy	100kW/214.27kWh
Battery type	Lithium iron phosphate
Protection degree	IP54
Cooling method	Battery cabinet, air conditioner electric cabinet, smart air cooling

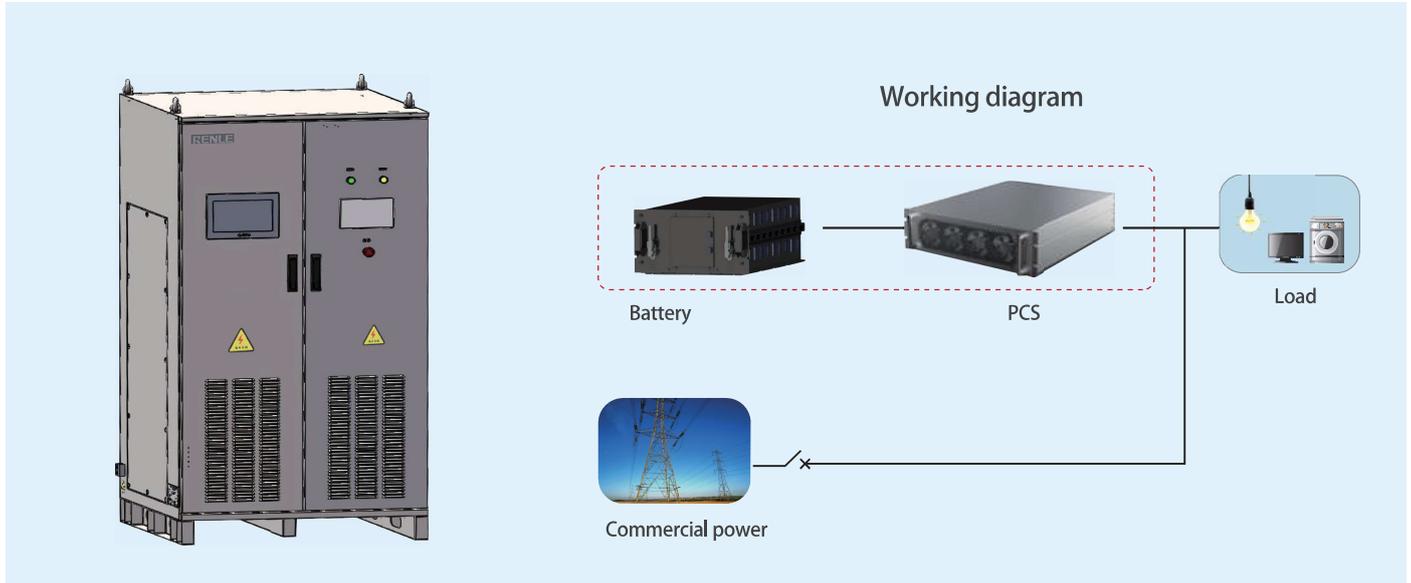
Inverter parameter

Max. DC current	228A
Voltage range	DC500~900V
Max. AC current	159A
Max. charging/discharging power	100kW
Number of phase	3 phases, 5 lines
Rated output voltage	AC400V
Grid voltage range	340~460VAC (range can be set)
Off-grid output voltage accuracy	1%
Rated output frequency	50/60Hz
On-off grid switching time	Normal condition <200ms (under special conditions SCR are required for zero switching)
Operating temperature	-25~55°C
Dimensions (W x D x H)	800 × 800 × 1800
Communication interface	RS485, CAN, Ethernet, GPRS
Communication protocol	CAN、ModBus TCP、ModBus RTU
Weight	730kg

Technical parameter of battery & BMS

Electric core model	3.2V155Ah
Battery capacity	214.27kWh
Weight	1200kg
Dimensions (W x D x H)	2200 × 1200 × 2200
Cycle number	≥5000 cycles, or 5 years
Electric core connection method in pack	2P12S
Pack connection method in battery cluster	1P18S

Energy storage system



System parameter

Model	RNES-C-119R04	RNES-C-226R176
Output power/system energy	35kW/119.04kWh	70kW/226.18kWh
Battery type	Lithium iron phosphate	
Protection degree	IP21/IP65 (container)	
Guarantee	3 years for product, 10 years for performance	

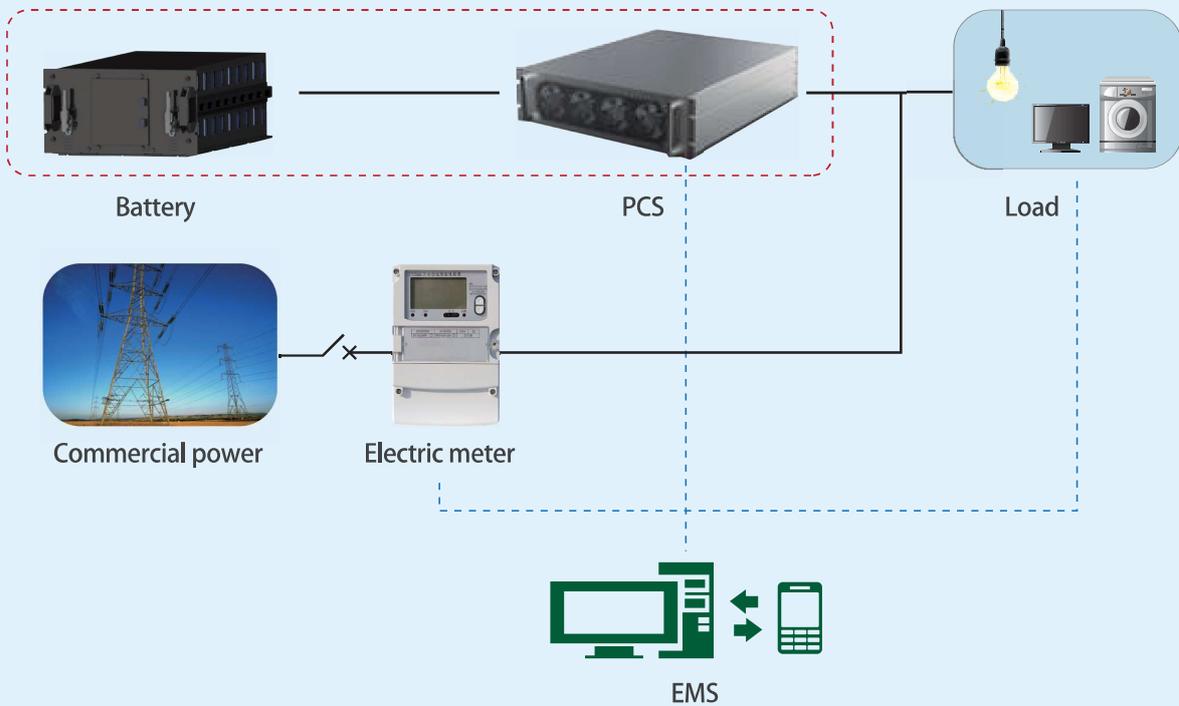
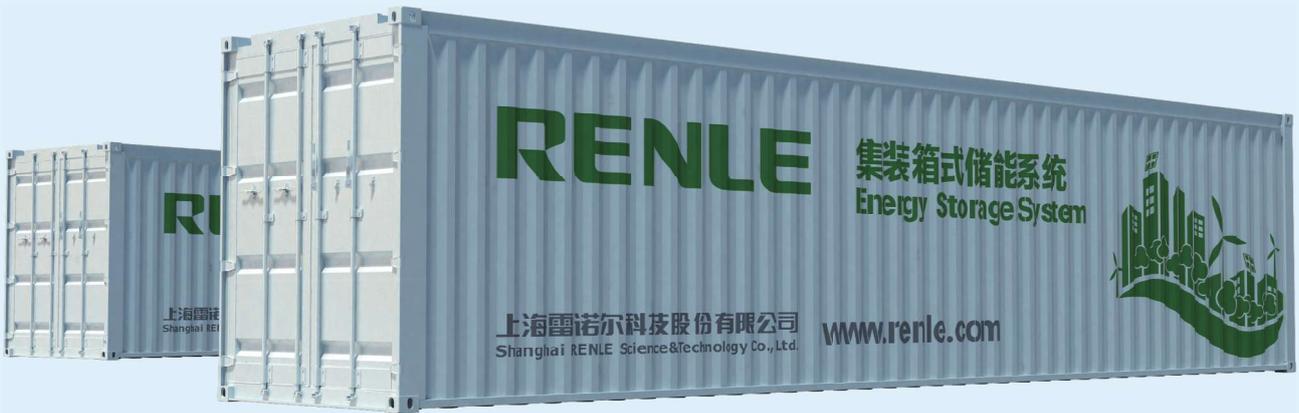
Inverter parameter

Max. DC current	55A	110A	Off-grid output voltage range	AC380V ± 15%
Voltage range	DC600~900V		Rated output frequency	50/60Hz
DC channel number	1	1/2	Backup battery	UPS (STS needed)
Charging management	3-section charging		Operation temperature	-25~55°C
Max. AC current	53A	106A	Dimensions(W x D x H)	435 × 135 × 600
Max. charging/discharging power	35kW	70kW	Weight	35kg 36kg
Number of phase	3 phases, 3 lines		Communication interface	RS485、CAN、LAN、REPO
Rated output voltage	AC380V		Communication protocol	CAN / ModBus TCP / ModBus RTU
Grid voltage range	AC380V ± 15%			

Technical parameter of battery & BMS

Electric core model	3.2V155Ah	
Battery capacity	119.04kWh	226.18kWh
Weight	1200kg	2600kg
Dimensions (W x D x H)	1500 × 750 × 1500	1900 × 750 × 2000
Cycle number	≥ 5000 cycles, or 5 years	
Electric core connection method in pack	1P24S	2P12S
Pack connection method in battery cluster	1P10S	1P19S

Container type energy storage system



Working diagram

System parameter		
Model	RNES-C-20	RNES-C-40
Output power/system energy	350kW/1.1904MWh	350kW/1.1904MWh
Battery type	Lithium iron phosphate	
Protection degree	IP65	
Cooling method	Battery room, air conditioner electric room, smart air cooling	
Inverter parameter		
Max. DC current	550A	1870A
Voltage range	DC600~900V	
DC channel number	5	13
Charging management	3-section charging	
Max. AC current	530A	1378A
Max. charging/discharging power	350kW	910kW
Number of phase	3 phases, 5 lines	
Rated output voltage	AC380V/AC400V	
Grid voltage range	± 15%	
Off-grid output voltage range	± 15%	
Rated output frequency	50/60Hz	
Backup battery	UPS (STS needed)	
Operation temperature	-25~55℃	
Dimensions(W x D x H)	1000 × 800 × 2000	1200 × 800 × 2000
Communication interface	RS485、CAN、LAN、REPO	
Communication protocol	CAN、ModBus TCP、ModBus RTU	
Weight	800kg	1600kg
Technical parameter of battery & BMS		
Electric core model	3.2V155Ah	1.1904MWh
Battery capacity	1.1904MWh	14t
Weight	14t	6000 × 2352 × 2385
Dimensions (W x D x H)	6000 × 2352 × 2385	
Cycle number	≥5000 cycles, or 5 years	
Electric core connection method in pack	2P12S	
Pack connection method in battery cluster	1P20S	

Note: Number of battery packs can be adjusted according to the requirement of project. The system can be customized according to the requirements of the customer.