



Battery Energy Storage Product Catalog



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1 Company profile

Headquarters & R&D Center
(Nanjing, 58,000m²)



IEDs Factory
(Nanjing, 220,000m²)



HVDC & FACTS & Converter
Factory
(Changzhou, 270,000m²)



Intelligent Mechanical Technology
Industrial Park
(Changzhou, 50,000m²)



NR Electric (NR), as a power stability expert, is dedicated to provide smart, reliable and environmental friendly solutions for power generations, power grid and industries. The products and solutions covers protection, automation & control, HVDC & FACTS, renewable & microgrid and engineering consulting & services.

Relying on the know-how capability of power system protection & control technology, NR is one of the foremost companies in the renewable energy industry with the most complete product line, the most advanced technology and the highest market share. NR develops and manufactures key electrical equipment for battery energy storage, such as power conversion system, battery module, battery management systems, energy management systems, and energy storage protection & control devices. NR also has the ability for energy storage system integration. In addition, NR has strong professional system analysis as well as engineering design capabilities. Based on the diversified application needs of energy storage, NR can provide global users with first-class energy storage solutions.

NR always adheres to quality first policy. Quality control runs through every step from R&D and design to product manufacturing. Strict testing systems and testing methods ensure that the entire production process is under good quality control. NR's products have always been known in the industry for their low repair rate. NR has passed ISO9001 quality management system, ISO14001 environmental management system, ISO45001 occupational health and safety management system, ISO20000 information technology service management system, ISO27001 information security management system and ANSI ESD S20.20 and IEC61340 anti-static management system certification. NR's energy storage product series have passed certification of internationally renowned institutions such as UL, TUV and CE. NR's R&D process management has reached the international advanced level, and it has passed the CMMI Level 5 formal assessment.

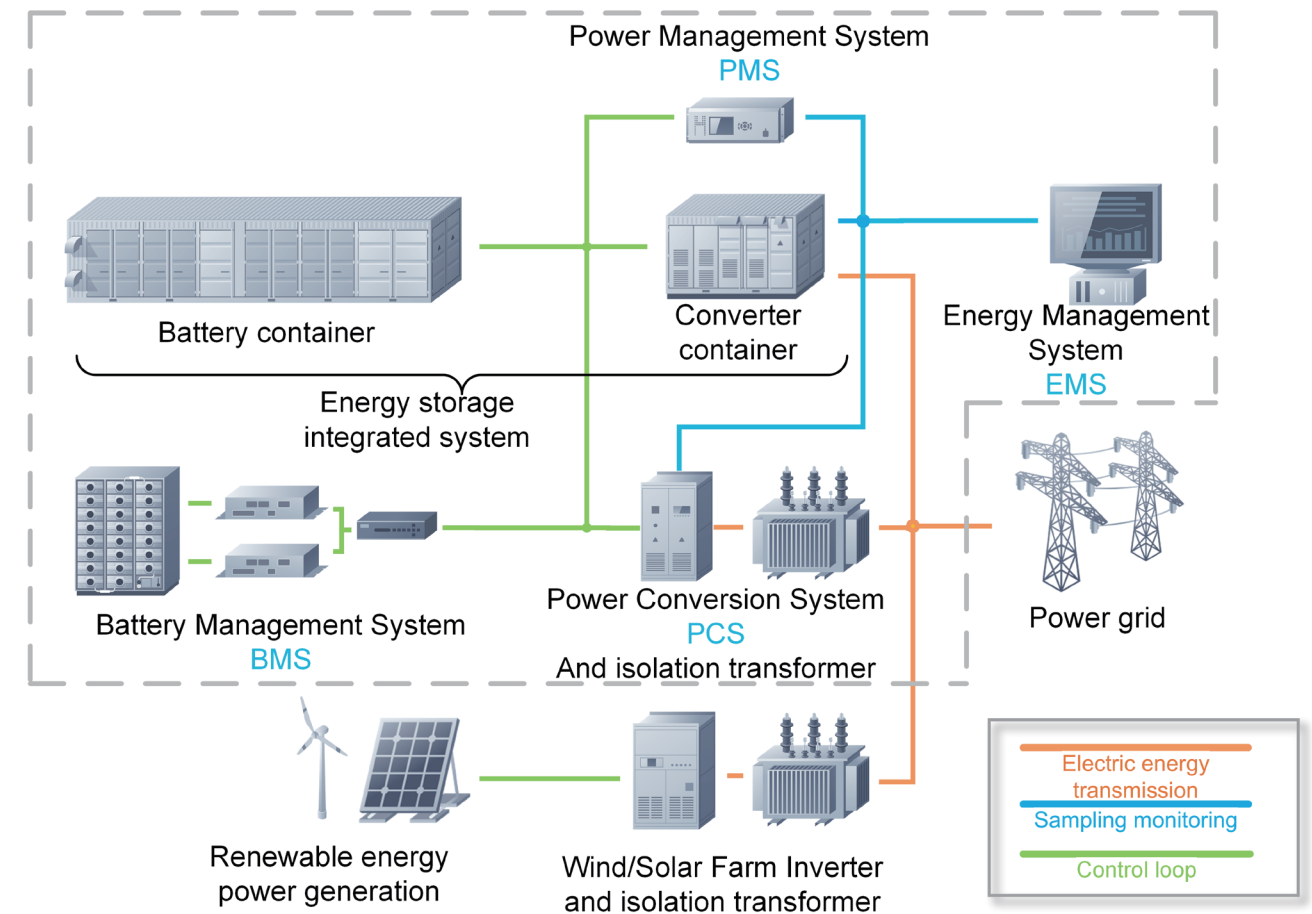
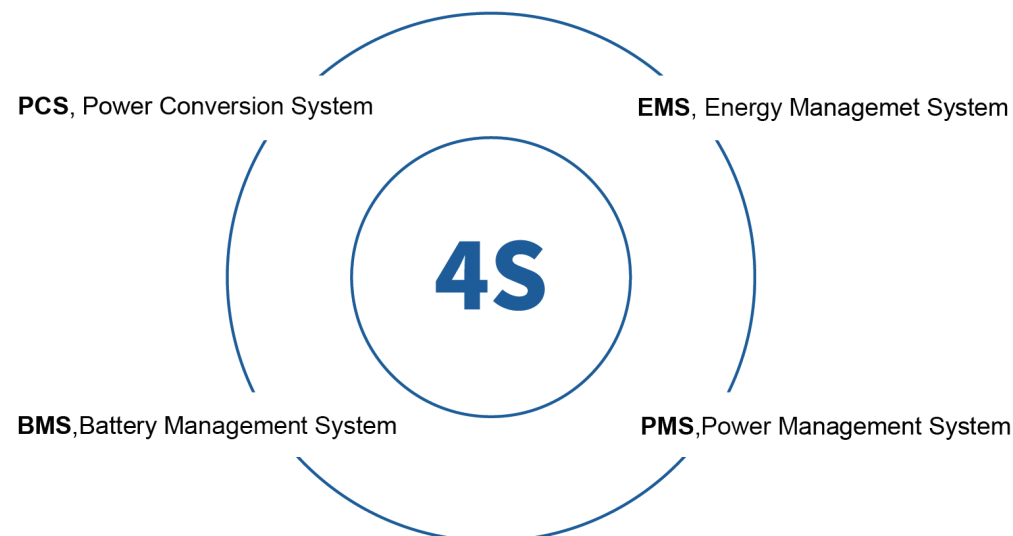


2 Product series

As the professional energy storage system solution provider and equipment supplier, NR has completed more than 500 battery energy storage projects, and the total installed capacity worldwide has exceeded 1.5GW.







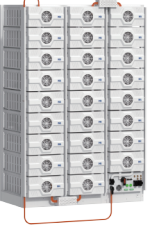







NR's integrated battery energy storage solution can play a key role in various applications, including power generation, renewable energy, load side and microgrid, helping to build a new advanced power system. The "4S" battery energy storage products provided by NR include: PCS (Power Conversion System), BMS (Battery Management System), EMS (Energy Management System) and PMS (Power Management System). Among them, PCS realizes the bidirectional power flow between battery and power grid; BMS realizes effective management and control of the battery; EMS monitors and controls the entire energy storage system to realize the steady-state function to ensure the safe and reliable operation of the system; PMS realizes high-speed transient control and according to different application scenarios, formulates corresponding control strategies to reasonably control the coordinated operation of multiple PCS.

NR's battery energy storage products can integrate various types of batteries (lithium battery, sodium sulfur, liquid flow, lead carbon, etc.), it has been vast applied in renewable power farms, bulk capacity power storage plant, distributed energy storage, auxiliary AGC frequency regulation, urban flexible distribution network, emergency power supply, micro-grid and other scenarios.



Product list

Note: only typical products are listed

<h2>Integration energy storage system</h2>	 <p>PCS-8811CB Centralized energy storage system</p>	 <p>PCS-8812PB Liquid cooled energy storage cabinet</p>	 <p>PCS-8813CPB High voltage directly connected energy storage system</p>	 <p>PCS-8813CPB High voltage directly connected energy storage system</p>
<h2>Power Conversion System</h2>	 <p>PCS-9567TU 1500V series outdoor Power Conversion System</p>	 <p>PCS-9567A Power Conversion System</p>	 <p>PCS-9567AT Power Conversion System (built-in isolation transformer)</p>	 <p>PCS-9567D DC Power Conversion System</p>
<h2>Energy storage battery</h2>	 <p>NBM-L46.5 Liquid-cooled battery modules</p>	 <p>NBM-F14.3 Air cooled battery module</p>	 <p>NBR-L372 Air cooled cluster</p>	
<h2>Battery management system</h2>	 <p>PCS-9695A-MD Battery stack management unit</p>	 <p>PCS-9695A-S Battery cluster management unit</p>	 <p>PCS-9695A-UP Battery module management unit</p>	
<h2>Energy management system & Power management system</h2>	 <p>PCS-9700-ESS Energy management system</p>	 <p>PCS-9567CP Power management system</p>		
<h2>Other auxiliary products</h2>	 <p>PCS-9567SS Intelligent Static Switch</p>	 <p>PCS-9617MG Microgrid Controller</p>	 <p>PCS-9726L Renewable power integration device</p>	

3 Integration energy storage system



PCS-88** (Energy storage system)			****/**** (Rated Capacity)	**** (AC side connection voltage)
PCS-8811	CB	Centralized energy storage container	PCS container 0~6MW Battery container 0~6MWh	6~35kV
PCS-8812	PB	Liquid cooled energy storage cabinet	186KW/372KWh	0.4~35kV
PCS-8813	CPB	High voltage directly connected energy storage container	Single unit 0~25MW 0~50MWh	6~35kV

PCS-8811CB

Centralized energy storage system



Safe and reliable

- Original active safety strategy, composite battery protection criterion
- Multiple no-dead zone protection design, PCS and BMS millisecond-level fast protection
- Support module-level fire protection and various fire-fighting media, multi-dimensional fire perception and control system, fast and reliable linkage

High efficiency and low losses

- Adaptive control of battery container air conditioning, system cycle efficiency increased by 1.5%
- PCS three-level topology, maximum efficiency 99%

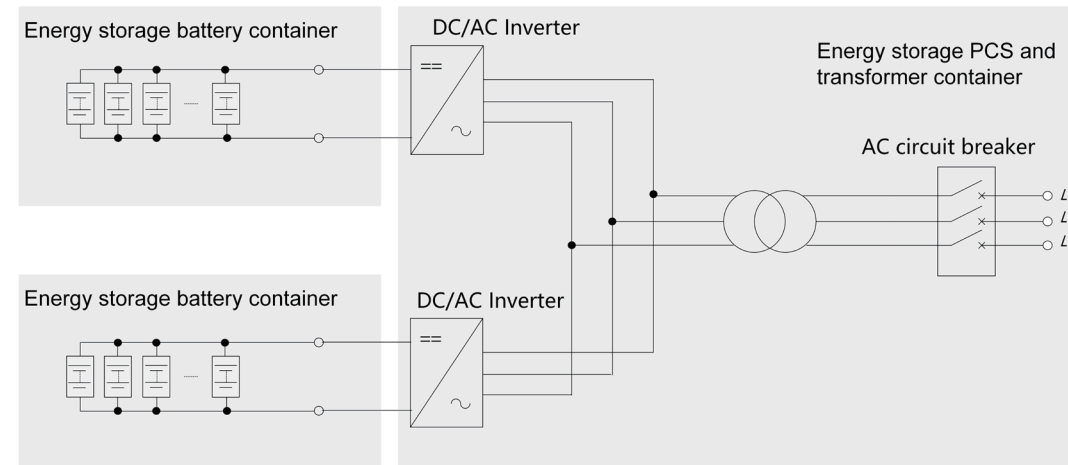
Power grid friendly

- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- PCS/BMS all support IEC 61850 protocol and fast communication interface, with millisecond response
- Support fault recording to facilitate fault analysis and location

High Integration

- Integrated PCS, transformers, lithium batteries, communication cabinets, and other core equipment, delivered as a whole
- Battery container supports back-to-back or walk-in arrangements, with customizable unit power and capacity

Schematic diagram



Technical specifications

Type designation	PCS-8811CB-2500/5018	PCS-8811CB-3450/6881
Battery Data		
Battery capacity (kWh)	5018	6881
Cell Type	3.2V/280Ah	
System output voltage range (V)	1100~1460	1056~1401.6
Battery configuration	400S14P	384S20P
BMS communication Interface	RJ45	
BMS Communication protocols	Modbus-TCP, IEC 61850	
AC Side Data		
Rated power (kW)	2500	3450
Max output power (kVA)	2750	3795
Grid connection voltage range (kV)	6~35	
Nominal grid frequency (Hz)	50 / 60	
Allowable grid frequency (Hz)	45~55 / 55~65	
Max. THD of current	< 3%	
Charge and discharge conversion time	< 30ms	
Power factor at nominal power	> 0.99	
Adjustable power factor	-1~1	
AC connection	Three-phase three-wire	
Isolation method	transformer	
General data		
Weight of PCS and transformer container	16T	17.5T
Dimensions (W × H × D) (mm)	7400×3000×3000	7600×3000×3000
Weight of battery container	58T	2×(45T)
Dimensions (W × H × D) (mm)	13176×2800×3100	2×(10500×2800×3100)
Cooling of PCS	Temperature controlled forced air cooling	
Cooling of battery container	Industrial air conditioner	
Max. working altitude (m)	5000 (> 3000 derating)	
Noise	≤ 75dB(1m)	
Operating temperature range (°C)	-30~50	
Relative humidity	0~95%	
Degree of protection	IP54	
communication Interface	RJ45 / Fiber	
Communication protocol	IEC 61850	

PCS-8812PB

Liquid cooled energy storage cabinet



Safe and reliable

- Single cluster controlled, no parallel connection at DC side, small short-circuit current
- The energy storage cabinet is independent to realize electrical and fire safety isolation
- The temperature difference of the battery cell is less than 3℃, which improves the safety and cycle life
- Optional module level fire fighting system

Grid friendly

- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- Support IEC61850 protocol and fast communication interface, with millisecond response
- Support fault recording to facilitate fault analysis and location

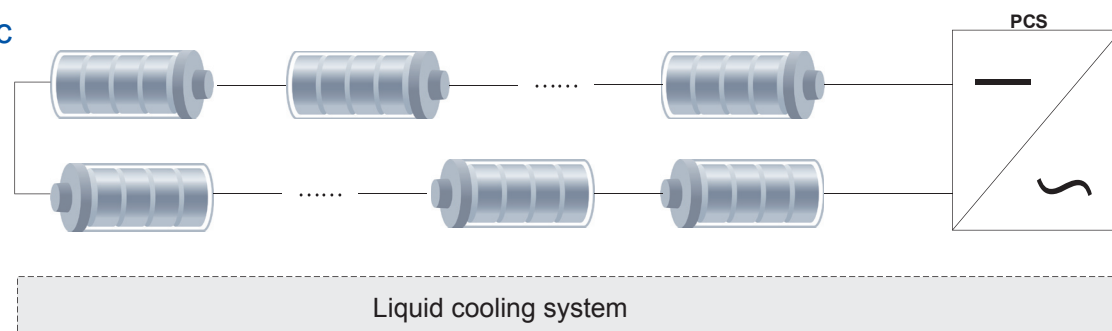
High efficiency and low losses

- Efficient heat dissipation by liquid cooling, and system cycle efficiency improved by > 1%
- PCS three-level topology, maximum efficiency 99.1%

High integration

- Battery and PCS all liquid cooling, high protection level up to IP 66
- Highly integrated cabinet directly outputs AC, and supports parallel connection of multiple cabinets at AC side
- Modular and easy to expand, power and energy density increased by > 30%

Schematic diagram



Technical specifications

Type designation	PCS-8812PB-186/372	
Battery data		
Rated capacity (kWh)	372	
Rated voltage (V)	1331.2	
Voltage range (V)	1164.8~1497.6	
Maximum current (A)	176	
AC side data		
Rated power (kW)	186	
Maximum power (kVA)	205	
Rated AC current (A)	156	268
Maximum AC current (A)	171	295
Rated voltage (V)	690	400
Voltage range (V)	587-759	360-440
Grid frequency (Hz)	50 / 60	
Frequency range (Hz)	45~55 / 55~65	
Maximum THD of current	< 3%	
Charging and discharging switch time	<20ms	
Power factor at nominal power	> 0.99	
Adjustable power factor	-1~1	
AC connection	Three phase three wire	
System data		
Weight (kg)	4500	
Dimensions (W×H×D) (mm)	1500×2480×1300	
System efficiency	88%	
Cycle life	>5000 times (DOD 90%, EOL 80%)	
Voltage of auxiliary power	400V, 3+N (optional self-powered)	
Auxiliary power (kW)	5	
Cooling	Internal circulation liquid cooling	
Maximum working altitude (m)	4000 (> 3000 derating)	
Internal isolation method	transformerless	
Noise	≤75dB(1m)	
Operating temperature range (℃)	-30~50	
Relative humidity	0~100%	
Degree of protection	whole machine IP56, key equipment IP66	
HMI	Bluetooth	
Communication interface	RJ45 / optical fiber port	
Communication protocol	IEC 61850	

PCS-8813CPB

High voltage directly connected energy storage system



High efficiency and low losses

- Cascaded multi-level topology, low IGBT switching losses
- PCS efficiency > 98%
- Maximum system efficiency > 90%

Grid friendly

- Directly integrated into the high-voltage grid, better transient grid support
- Integrated with synchronous condenser function, simultaneous support frequency and voltage
- Fast response, less than 5ms
- Single unit with large capacity, avoid parallel connection of multiple small PCSs, superior transient coordination performance

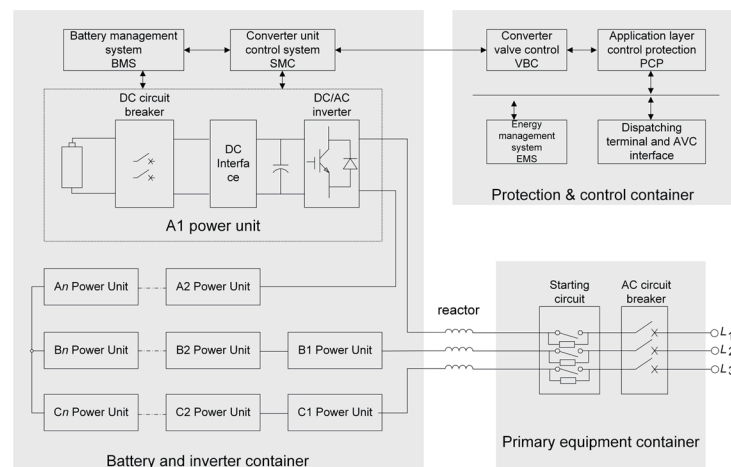
Safe and reliable

- Multi-level SOC balancing control, high uniformity
- No parallel connection of battery clusters, no circulating current, small short-circuit current
- >10% redundancy design, fast isolation of single module fault
- High uniformity of liquid-cooled battery (temperature difference < 3°C)

High integration

- Integrated with EMS, PCS, BMS
- Support industry and electrical standard communication interfaces
- Integration arrangement of battery/BMS/PCS and filter
- Standard storage container for primary AC output, separate cooling and fire protection system

Schematic diagram



Technical specifications

Type designation	PCS-8813CPB
Electrical parameter	
Rated grid voltage (kV)	6~35
Operation voltage (@UN)	-15% ~ +15%
Rated grid frequency (Hz)	50 / 60
Operation frequency (@fN)	±6%
Rated power (MW)	0~25
Installation capacity (MWh)	0~50
Topology	Cascaded multi-level topology, each phase is composed of N units of H-bridge modules, distributed battery connects to DC side of each H-bridge module. Y or Δ connection
Redundancy	Redundancy≥10%, the storage system stops only when all redundant modules fail
Over load capability	1.1pu long-term operation / 1.2pu no less than 60s / 3pu no less than 10s
Adjustable power factor	-1.0~1.0, four-quadrant operation
Control accuracy of output current	<1%
Control accuracy of output voltage	<1%
Control accuracy of output power	<1%
Maximum THD of current(THD)	<3%
Response time (ms)	< 5
Charging and discharging switch time (ms)	≤20
Time for island detection (ms)	< 5
Mode switch	on grid/off grid switch; Black start
PCS efficiency	> 98%
System max efficiency	> 90%
Protection functions	
System level: AC overvoltage/under voltage protection	yes
System level: AC over frequency/ under frequency protection	yes
System level: over current protection	yes
System level: three phases unbalance protection	yes
Module level: IGBT short circuit protection	yes
Module level: power module protection	yes
Module level: over temperature protection	yes
Module level: DC over voltage/under voltage protection	yes
Module level: reverse connection of battery positive and negative terminal protection	yes
Module level: battery cluster fault protection	yes
Module level: communication optical fiber fault protection	yes
System parameter	
Arrangement	Container
Cooling method	liquid cooled, air-cooled+ air condition in container
Maximum working altitude (m)	4000 (> 3000 derating)
Operating temperature range (°C)	-30~50
Relative humidity	0~95%, no condensation
Noise	≤75dB (1m distance)
Degree of protection	IP54
Communication interface	CAN / RS-485 / RJ45 / optical fiber
Communication protocol	CAN / Modbus / IEC 61850 / IEC 60870-5-103 etc



4 Power Conversion System

PCS-9567 (converter)		**** (rated power kW)
TU	1500V Outdoor cabinet	1000~1750
TH	DC/AC, high voltage	1000~1500
A	DC/AC, low voltage	50~630
AT	DC/AC, with isolation transformer	50~250
D	DC/DC, converter	150~250

PCS-9567TU-1000/1250/1375/1575/1750

1500V series outdoor Power Conversion System



High efficiency and low losses

- Air-cooled heat dissipation, low system losses
- PCS three-level topology, maximum efficiency 99%

Safe and reliable

- Separate primary and secondary compartment, high security
- IP 65, High degree of protection
- Separate circulating heat dissipation design, high efficiency and reliability

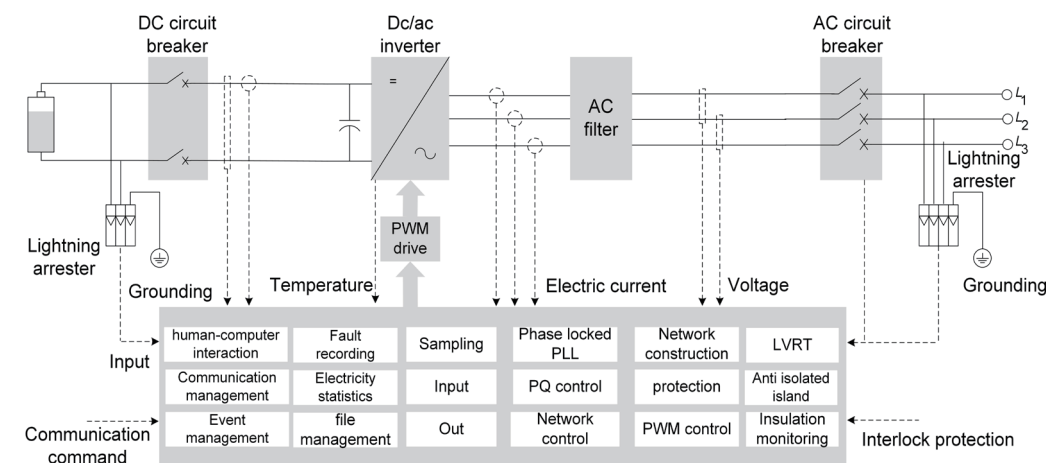
Grid friendly

- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- Support IEC61850 protocol and fast communication interface, with millisecond response
- Support fault recording to facilitate fault analysis and location

High integration

- Modular design, convenience for operation and maintenance
- Unit building block function, support parallel connection of multiple cabinets on the AC side
- Power and energy density increased by > 50%

Schematic diagram



Technical specifications

The product series covers 1000kW~1750kW, some typical model specifications are as follows:

Type designation	PCS-9567TU-1000	PCS-9567TU-1250	PCS-9567TU-1375	PCS-9567TU-1575	PCS-9567TU-1750
DC side					
DC voltage range (V)	600~1500	780~1500	850~1500	970~1500	1050~1500
Maximum DC input current (A)	1833	1833	1833	1833	1833
DC voltage ripple	< 1%				
DC current ripple	< 3%				
AC side					
Nominal output power (kW)	1000	1250	1375	1575	1750
Maximum AC power (kVA)	1100	1375	1513	1650	1900
Nominal operating voltage (V)	400	500	550	630	690
Operating voltage range (V)	360~440	450~550	500~600	567~690	630~760
Maximum AC output current (A)	1588				
Nominal operating frequency (Hz)	50 / 60				
Operating frequency range (Hz)	45~55 / 55~65				
Maximum THD of current	< 3%				
Nominal power factor	> 0.99				
Adjustable power factor	0.9 (leading) ~ 0.9 (lagging)				
AC connection	Three phase three wire				
System					
Weight (kg)	1600				
Dimension (W×H×D) (mm)	1200×2350×1400				
Cooling method	Forced air cooled				
Maximum working altitude (m)	6000 (> 3000 derating)				
Isolation method	Transformer less				
Operating temperature range (C)	-35~60 (>50 derating)				
Relative humidity	0~95%, no condensation				
Degree of protection	IP65				
Communication interface	CAN / RS-485 / RJ45 / optical fiber port				
Communication protocol	CAN / Modbus / IEC 61850 / IEC 60870-5-103 etc				

PCS-9567A-150/250/500/630

Power Conversion System



High efficiency and low losses

- 2-level/3-level topology, maximum efficiency up to 99%
- Low loss fans, intelligent temperature control
- Low loss reactor, reduce operation loss

Safe and reliable

- UAPC platform, mature hardware and software
- Redundant AC/DC power supply
- Comprehensive protection functions
- Support fault recording to facilitate fault analysis and location
- High speed carrier wave synchronization, support multi-PCS parallel connection

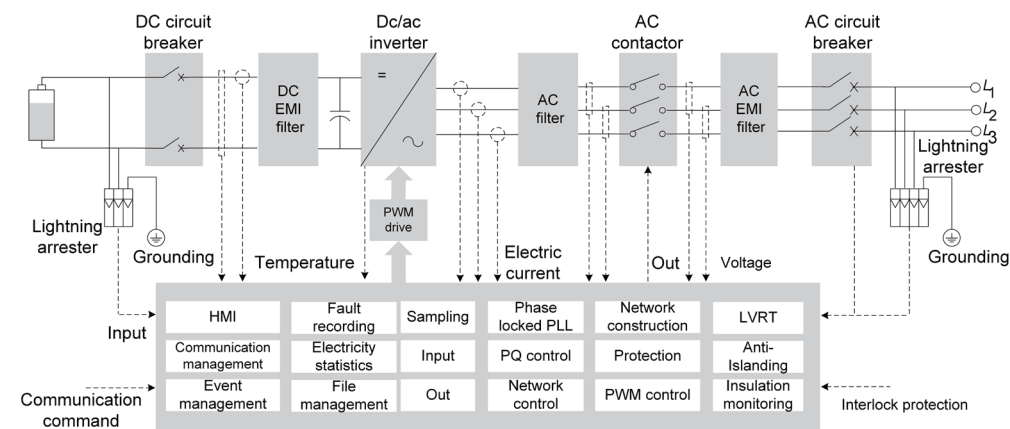
Flexible applications

- Applicable for lithium/ Lead carbon/NaS/redox flow batteries
- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- On grid/off grid switch

Grid friendly

- Low harmonic, harmonic current as low as 1.5%
- Dynamic reactive power support, enhance grid stability
- Anti-Island mode detection
- Low/Zero Voltage Ride Through (LVRT) function

Schematic diagram



Product specifications

The product series covers 150kW~630KW, some typical model specifications are as follows

Type designation	PCS-9567A-150	PCS-9567A-250	PCS-9567A-500	PCS-9567A-630
DC side				
Maximum DC power (kW)	165	275	550	693
DC voltage range (V)	500~850	600~850	500~850	600~850
Maximum DC input current (A)	330	550	1100	1155
DC voltage ripple	< 1%			
DC current ripple	< 3%			
AC side				
Nominal output power (kW)	150	250	500	630
Maximum AC power (kVA)	165	275	550	693
Nominal operating voltage (V)	315	380	315	380
Operating voltage range (V)	280~350	340~420	280~350	340~420
Maximum AC output current (A)	302	251	1008	1050
Nominal operating frequency (Hz)	50 / 60			
Operating frequency range (Hz)	45~55 / 55~65			
Maximum THD of current	< 3%			
Nominal power factor	> 0.99			
Adjustable power factor	0.9 (leading) ~ 0.9 (lagging)			
AC connection	Three phase three wire			
System				
Weight (kg)	650	700	800	800
Dimensions (W×H×D) (mm)	800 × 1960 × 700	1000 × 2160 × 700	1100 × 2160 × 700	1100 × 2160 × 700
Cooling method	Forced air cooled			
Maximum working altitude (m)	6000 (> 4000 derating)			
Isolation method	Transformer less			
Operating temperature range (°C)	-25~50			
Relative humidity	0~95%, no condensation			
Degree of protection	IP20			
HMI	LCD			
Communication interface	CAN / RS-485 / RJ45 / optical fiber port			
Communication protocol	CAN / Modbus / IEC 61850 / IEC 60870-5-103 etc			

PCS-9567TH-1000/1250/1375/1500

Power Conversion System



High efficiency and low losses

- Three-level topology, maximum efficiency 99%
- Low loss fans, intelligent temperature control
- Low loss reactor, reduce operation loss

Flexible applications

- Applicable for lithium/ Lead carbon/NaS/redox flow batteries
- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- On grid/off grid switch

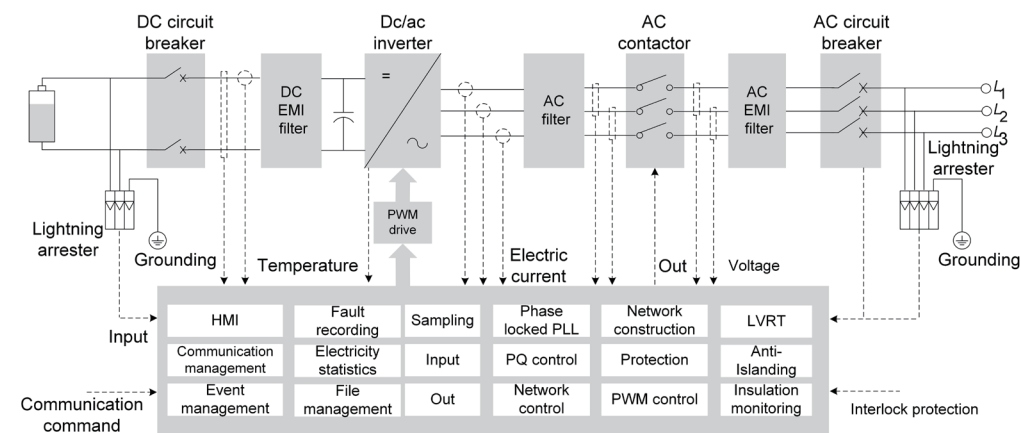
Safe and reliable

- UAPC platform, mature hardware and software
- Redundant AC/DC power supply
- Comprehensive protection functions
- Support fault recording to facilitate fault analysis and location
- High speed carrier wave synchronization, support multi-PCS parallel connection

Grid friendly

- Low harmonic, harmonic current as low as 1.5%
- Dynamic reactive power support, enhance grid stability
- Anti-Island mode detection
- Low/Zero Voltage Ride Through (LVRT) function

Schematic diagram



Product specifications

The product series covers 1000kW~1500KW, some typical model specification are as follows:

Type designation	PCS-9567TH-1000	PCS-9567TH-1250	PCS-9567TH-1375	PCS-9567TH-1500
DC side				
Maximum DC power (kW)	1100	1375	1513	1650
DC voltage range (V)	850~1500	990~1500	1050~1500	1050~1500
Maximum DC input current (A)	1294	1389	1441	1571
DC voltage ripple	< 1%			
DC current ripple	< 3%			
AC side				
Nominal output power (kW)	1000	1250	1375	1500
Maximum AC power (kVA)	1100	1375	1513	1650
Nominal operating voltage (V)	540	660	690	
Operating voltage range (V)	486~594	594~726	630~760	
Maximum AC output current (A)	1176	1203	1267	1382
Nominal operating frequency (Hz)	50 / 60			
Operating frequency range (Hz)	45~55 / 55~65			
Maximum THD of current	< 3%			
Nominal power factor	> 0.99			
Adjustable power factor	0.9 (leading) ~ 0.9 (lagging)			
AC connection	Three phase three wire			
System				
Weight (kg)	1600			
Dimensions (W×H×D) (mm)	1600×2160×700			
Cooling method	Forced air cooled			
Maximum working altitude (m)	6000 (> 4000 derating)			
Isolation method	Transformer less			
Operating temperature range (°C)	-25~50			
Relative humidity	0~95%, no condensation			
Degree of protection	IP20			
HMI	LCD			
Communication interface	CAN / RS-485 / RJ45 / optical fiber port			
Communication protocol	CAN / Modbus / IEC 60870-103 / IEC 61850 etc			

PCS-9567AT-50/150/250

Power Conversion System (built-in isolation transformer)



High efficiency and low losses

- Maximum efficiency up to 98% (including transformer)
- Low loss fans, intelligent temperature control
- Low loss reactor to reduce system operation power losses

Flexible applications

- Transformer isolation, can be connected to any system, without affecting precision load operation
- Connected to different voltage levels to adapt to different battery voltages and grid voltages
- Compatible with lithium battery, lead carbon battery, sodium sulfur battery, liquid flow battery and other types of batteries
- Various control modes such as PQ and grid-forming, suitable for different application scenarios
- Support on and off grid operation to realize uninterrupted power supply

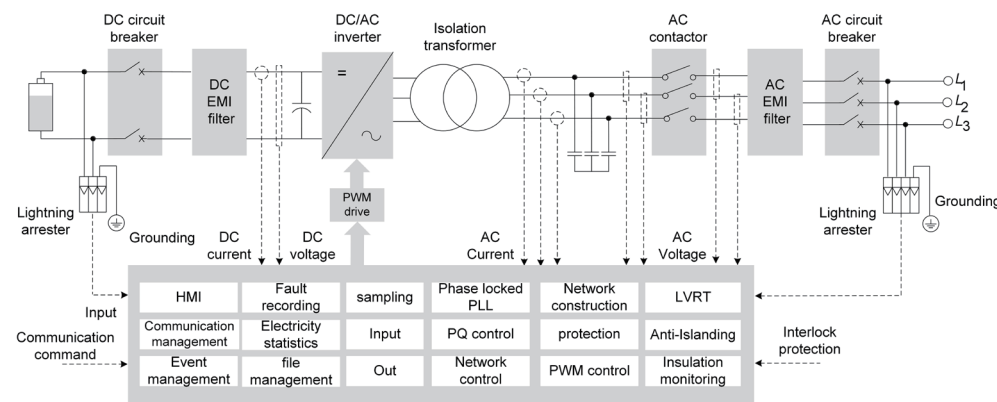
Safe and reliable

- UAPC platform, mature hardware and software
- Redundant AC/DC power supply
- Comprehensive protection functions
- Support fault recording to facilitate fault analysis and location

Grid friendly

- Built-in isolation transformer, smaller footprint
- Low harmonic, harmonic current as low as 1.5%
- Dynamic reactive power support, enhance grid stability
- Anti-Island mode detection
- Low/Zero Voltage Ride Through (LVRT) function

Schematic diagram



Product Specifications

The product series covers 50kW~250KW, some typical model specification are as follows:

Type designation	PCS-9567AT-50	PCS-9567AT-150	PCS-9567AT-250
DC side			
Maximum DC power (kW)	55	165	275
DC voltage range (V)	500~850		
Maximum DC input current (A)	110	330	550
DC voltage ripple	< 1%		
DC current ripple	< 3%		
AC side			
Nominal output power (kW)	50	150	250
Maximum AC power (kVA)	55	165	275
Nominal operating voltage (V)	400		
Operating voltage range (V)	360~440		
Maximum AC output current (A)	80	239	397
Nominal operating frequency (Hz)	50 / 60		
Operating frequency range (Hz)	45~55 / 55~65		
Maximum THD of current	< 3%		
Nominal power factor	> 0.99		
Adjustable power factor	0.9 (leading) ~ 0.9 (lagging)		
AC connection	Three phase four wire		
System			
Weight (kg)	650	700	750
Dimensions (W×H×D) (mm)	800×2060×700	1000×2160×800	1100×2160×850
Cooling	Forced air cooled		
Maximum working altitude (m)	6000 (> 4000 derating)		
Isolation mode	Transformer isolation		
Operating temperature range (°C)	-25~50		
Relative humidity	0~95%, no condensation		
Degree of protection	IP20		
HMI	LCD		
Communication interface	CAN / RS-485 / RJ45 / Optical fiber		
Communication protocol	CAN / Modbus / IEC 61850 / IEC 60870-5-103 etc		

PCS-9567D-150/250

DC Power Conversion System



High efficiency and low losses

- Integrated design to reduce equipment size
- High power density, maximum efficiency of 98.7%
- Low loss fans, intelligent temperature control
- Low loss reactor to reduce system operation power losses

Grid friendly

- Low ripple current, ripple current as low as 2%
- Friendly and universal design, can be directly connected to the DC distribution network

Flexible applications

- Flexible control of charge and discharge of energy storage battery
- Support the connection of lithium battery, lead carbon, sodium sulfur, liquid flow batteries and the communication of BMS
- Support constant voltage, constant current, constant power and other operation modes
- High-speed optical fiber communication interface
- Flexibly compatible with DC / AC converter to form a two-stage energy storage converter system

Safe and reliable

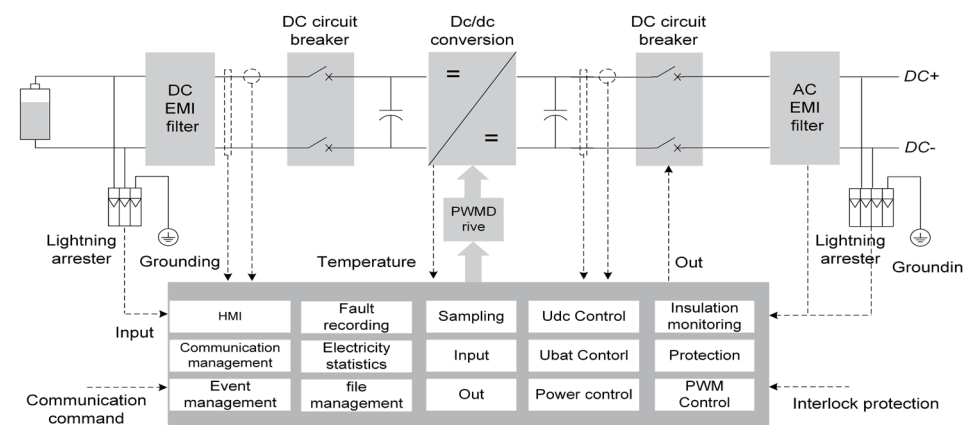
- UAPC platform, mature hardware and software
- Redundant AC/DC power supply
- Comprehensive protection functions
- Support fault recording to facilitate fault analysis and location

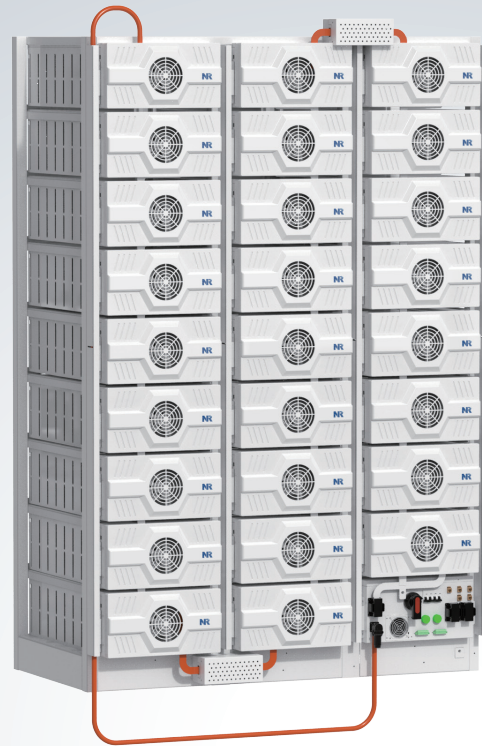
Technical specifications

The product series covers 150kW~250KW, some typical model specifications are as follows :

Type designation	PCS-9567D-150	PCS-9567D-250
DC low voltage side		
Maximum DC power (kW)	165	275
Voltage operating range (V)	320~600	
Maximum current (A)	520	860
DC High voltage side		
Rated power (kW)	150	250
Rated voltage (V)	720	
Voltage operating range (V)	500 ~ 850	
Maximum current (A)	330	550
Maximum efficiency	98.5%	98.7%
System		
Weight (kg)	1200	1250
Dimensions (W×H×D) (mm)	1000×2060×700	1100×2060×700
Cooling	Forced air cooling	
Maximum working altitude (m)	6000 (> 4000 derating)	
Operating temperature range (°C)	-25~50	
Relative humidity	0~95%, non-condensing	
Degree of protection	IP20	
HMI	LCD	
Communication interface	CAN / RS-485 / RJ45 / optical fiber	
Communication protocol	CAN / Modbus / IEC 61850 / IEC 60870-5-103 etc	

Schematic diagram





5 Energy storage battery

NBX (storage battery)		X (cooling method)		*** (Unit Rated Energy kWh)
NBM	battery module	F	Air cooled	
NBR	battery cluster	L	Liquid cooled	

NBM-F14.3/NBR-F372

Air cooled battery module and battery cluster

Product features

- More secure with multiple alarm protection
- PCS high-speed communication, 20ms level fast protection & control
- Air duct design with high heat dissipation efficiency, cell temperature difference less than 3 °C
- Adaptive algorithm of maximum available capacity of cell, with better SOC accuracy
- Comprehensive balancing strategy to control battery consistency throughout the life cycle
- Redundant communication network design, higher communication reliability
- Support value report and fault recording, and stronger fault analysis ability



Air-cooled battery module NBM-F14.3



Model	NBM-F14.3
Charge/discharge rate	0.5C
Cell type	Prismatic LFP with aluminum shell
Cell capacity	280Ah
Combination method	1P16S
Rated Capacity	280Ah
Rated Power	14.3kWh
Rated charge and discharge power	7.2kW
Nominal voltage	51.2 V
Operating voltage range	40V~58.4V
Dimensions (W×H×D)	455×223×770mm
Weight	106kg
Power density	135.2Wh/kg

Air-cooled battery cluster NBR-F372



Model	NBR-F372
Arrangement Type	3 vertical columns
Cell type	Prismatic LFP with aluminum shell
Cell capacity	280Ah
Combination method	1P416S
key components	26 PACK, 1 high voltage box
Rated Capacity	280Ah
Rated Power	372.7kWh
Rated charge and discharge power	186.4kW
Nominal voltage	1331.2V
Operating voltage range	1050V~1500V
Dimensions (W×H×D)	1500×2250×800mm
Weight	3200kg
Power density	112.9Wh/kg

NBM-L46.5

Liquid-cooled battery modules and battery clusters

Features

- 1/3 area saving per unit and energy consumption reduction by 1/4
- Full coverage of application scenarios, easy transportation and maintenance
- More secure with multiple alarm protection
- High-speed communication to achieve 20ms level fast protection & control
- Efficient thermal management, cell temperature difference < 3 °C , improve cell life
- Comprehensive balancing strategy to control battery consistency throughout the life cycle
- Redundant communication network design, higher communication reliability



Liquid Cooled Battery Module NBM-L46.5



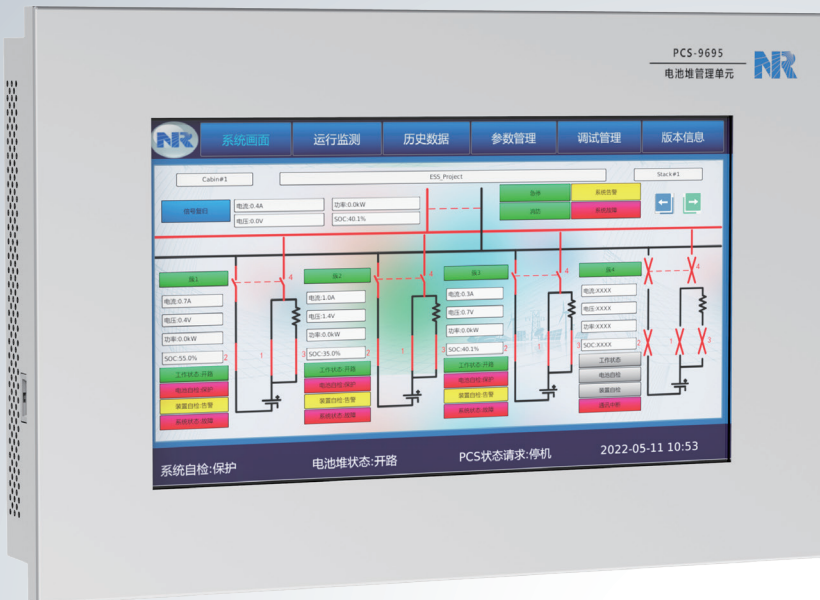
Model	NBM-L46.5
Charge/discharge rate	0.5C
Cell type	Prismatic LFP with aluminum shell
Cell capacity	280Ah
Combination method	1P52S
Rated Capacity	280Ah
Rated power	46.6kWh
Rated charge and discharge power	23.3kW
Nominal voltage	166.4V
Operating voltage range	145.6V~187.2V
Dimensions (W×H×D)	808×242×1172mm
Weight	360kg
Power density	129.4Wh/kg

Liquid cooled battery cluster integrated in the PCS-8812PB cabinet



Cell type	Prismatic LFP with aluminum shell
Cell capacity	280Ah
Combination method	1P416S
Rated Capacity	280Ah
Rated power	372.7kWh
Rated charge and discharge power	186.4kW
Nominal voltage	1331.2V
Operating voltage range	1164.8V~1497.6V
Communication protocol	IEC 61850
Degree of protection	IP66
Weight (battery only)	3480kg
Energy Density (battery only)	107.1Wh/kg

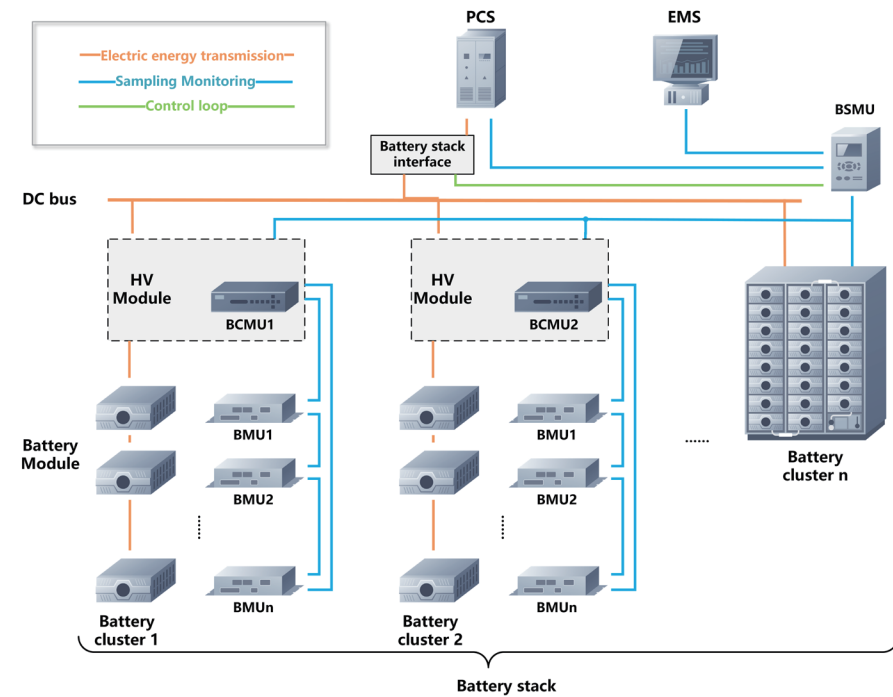
6 Battery management system



PCS-9695A (Battery management system)	XX (management level)	
UP		battery module, BMU
S		battery cluster, BCMU
MD		battery stack, BSMU

Battery Management System Architecture

The battery management system adopts a layered and distributed topology to manage batteries. Real-time monitoring of battery cells, battery modules, battery clusters and battery stacks can be carried out according to the characteristics of each level, to achieve effective management of monitoring, protection & control, and ensure the safe and stable operation of the battery system.



Multiple security protection

- Three-level alarm strategy, four-level protection mechanism
- Cell, module, battery cluster, battery stack, four-level protection
- Battery overcharge, over discharge, overcurrent, high temperature, low temperature, pressure difference, temperature difference protection
- Fire linkage, emergency stop, system-level protection coordination
- High-speed point-to-point communication with PCS to achieve 20ms level fast protection & control

Real-time condition monitoring

- High-precision real-time synchronous measurement of battery voltage, temperature and current
- Online identification of battery parameters, automatic SOC calibration
- Battery health online diagnosis, abnormal status warning
- High-voltage insulation measurement, circuit status monitoring

Complete control management

- Pre-charge control to ensure safe battery power-on
- Comprehensive balancing strategy to control battery state consistency
- Supports value report and fault recording, convenient for troubleshooting and fault analysis
- Periodic storage of battery status parameters, support data recording for the last 90 days

Flexible and reliable networking

- Hierarchical distributed architecture, suitable for various scale lithium battery energy storage scenarios
- Address self-adaptation, battery module management unit, plug and play
- High-speed ring network communication between the battery module and the battery cluster management unit
- TCP dual-network communication between the battery cluster and the battery stack management unit
- Dual network communication between Battery cluster and battery stack management unit with EMS

PCS-9695A-MD

Battery stack management unit



PCS-9695A-S

Battery cluster management unit



PCS-9695A-UP

Battery module management unit

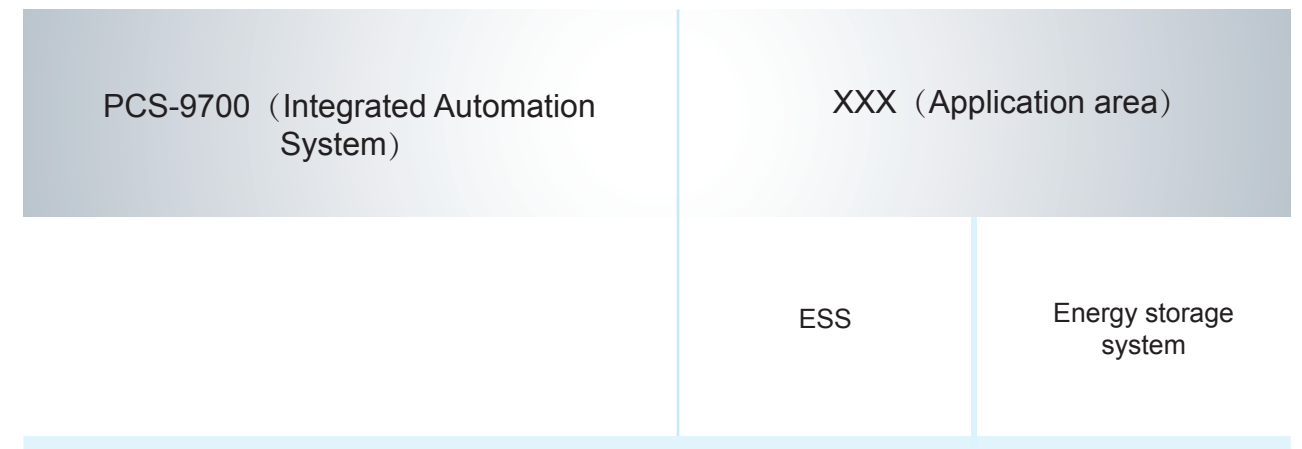


Product main parameters

Measurement object	Range	Accuracy	Refresh cycle
Cell voltage	-0.3~5.0V	±3mV	≤100ms
Cell temperature	-40~125 C	±1 C	≤100ms
Cluster voltage	0~1500V	0.2%FS	≤100ms
Cluster Current	By system	0.2%FS	≤100ms
SOC	0~100%	5%	≤1s
Insulation resistance	50kΩ~10MΩ	±20%	
	≤50kΩ	±10 kΩ	

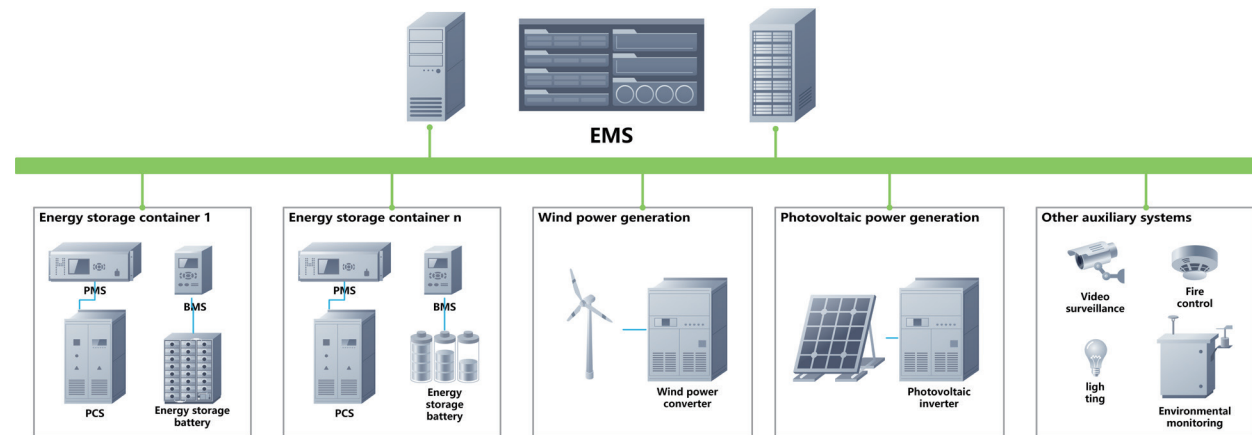


7 Energy management system



Energy Management System Architecture

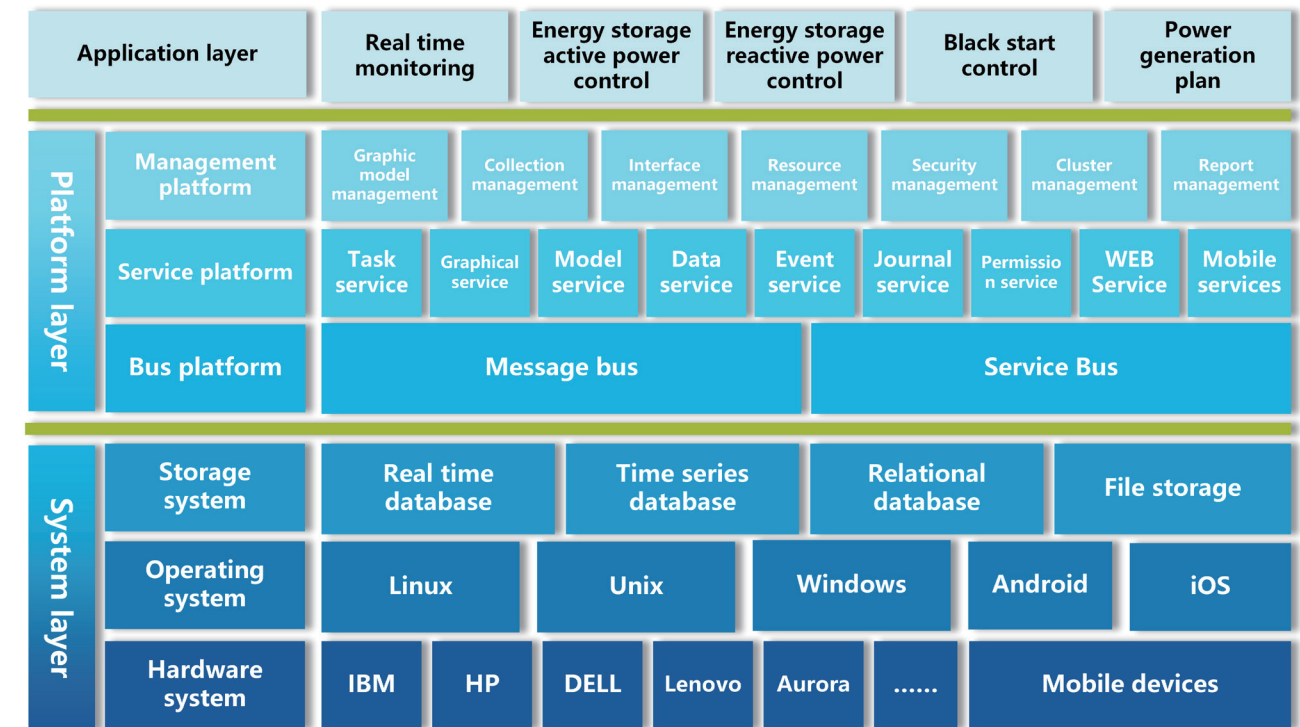
The application layer of the energy storage energy management system realizes special functions such as active power control, reactive power control, black start control, peak regulation and frequency regulation through the interaction with the PCS, which can meet the functional requirements of the different application of energy storage projects.



Features

- Power grid dispatch system-level security and reliability
- Ms-level control response to meet the requirements of frequency regulation, peak regulation and voltage regulation
- Relying on the PC server platform to achieve a million-point data processing capability, to meet the needs of energy storage battery mass information management
- Support information security release function, monitor the operation status of energy storage on the remote WEB terminal
- Support mobile publishing and mobile APP functions, master the operation information of the energy storage system anytime anywhere

The energy storage energy management system is designed and developed for the characteristics of energy storage application scenarios such as large amount of monitoring data and diverse operation modes. Based on the integrated platform, the integrated collection, storage, monitoring and control of the energy storage system are realized. It has the characteristics of reliability, simplicity, ease use and economy.



HMI function

It supports the graphical and comprehensive display of key information of energy storage system, such as measurement and report information, operation mode, protection action information, SOC, operation plan, etc. in the form of dashboards, curves, and tables.



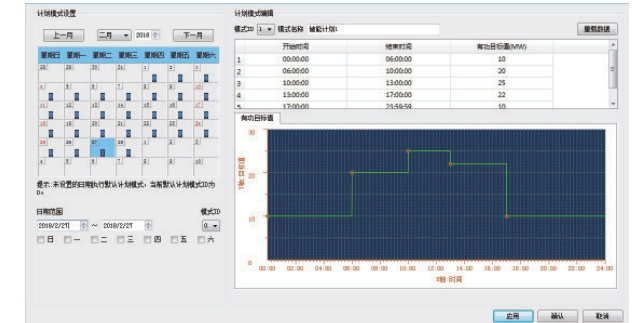
Mobile APP function

The overall operation of the energy storage system and the operation of each energy storage unit can be monitored conveniently and quickly.



Power generation plan management function

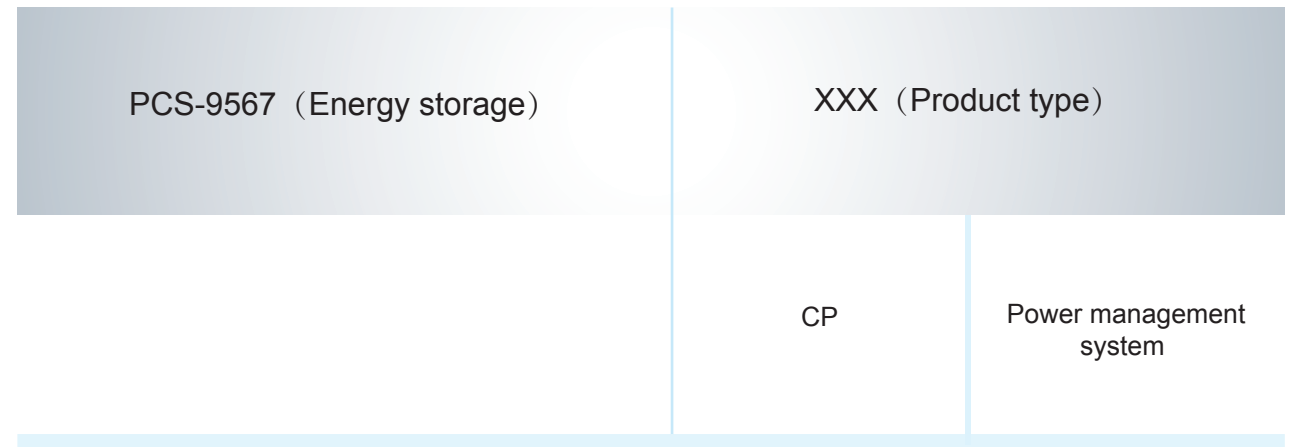
It provides a complete and visual technical means for peak shaving and valley filling to realize the economical utilization of energy storage.



Product Features

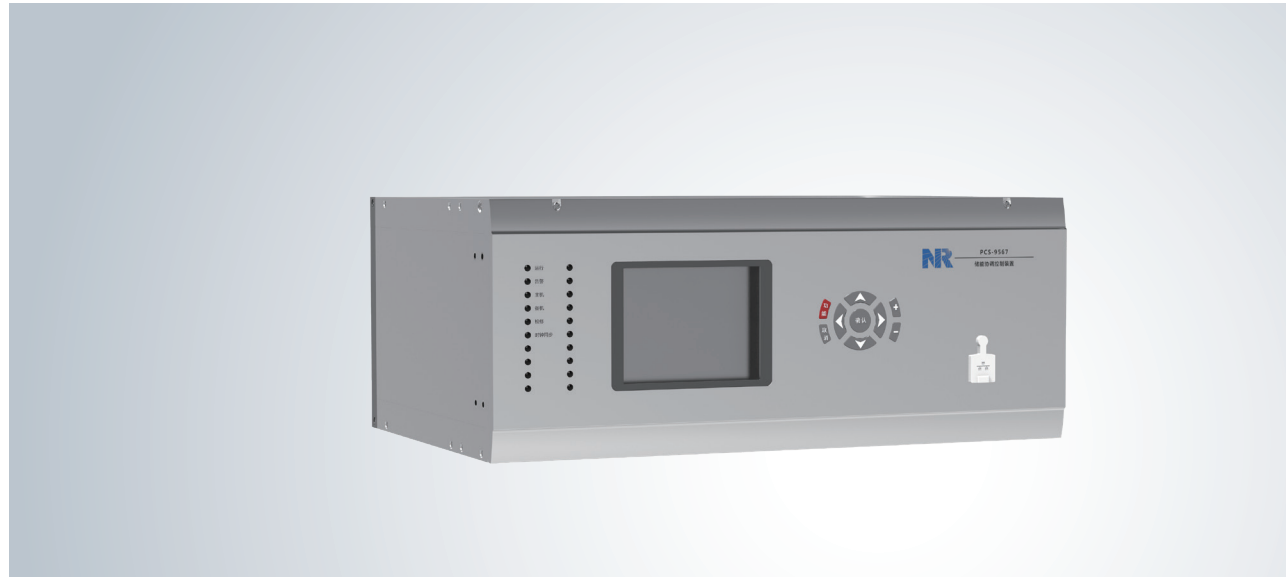
Data collection	Receive real-time information from PCS and BMS
Real-time display	Support dynamic curve/histogram/pie chart and other data display methods, support custom graphical interface
Control operation	Support remote control function of PCS, support sequence control, support operation record
Alarm handling	Support alarm stratification, grading classification processing, with accident push screen function, support historical condition retrieval
Event log	Support sequence of events (SOE) recording of various signals, with a resolution of $\leq 2\text{ms}$
Statistical Analysis	Statistical analysis of current, voltage, frequency, power and temperature, etc., supports statistical functions such as maximum value/minimum value/cumulative value/pass rate, etc.
Report function	Support daily report, monthly report and annual report function for various measurements, support automatic printing
Redundancy management	When one of the hosts in the system has a hardware and software failure, it can automatically switch to other hosts without losing data during switching
Program management	Receive, store and manage scheduling plan curves, support curve display, and support manual input of plan values
authority management	Support hierarchical and role-based authorization management system

8 Power management system



PCS-9567CP

Power management system



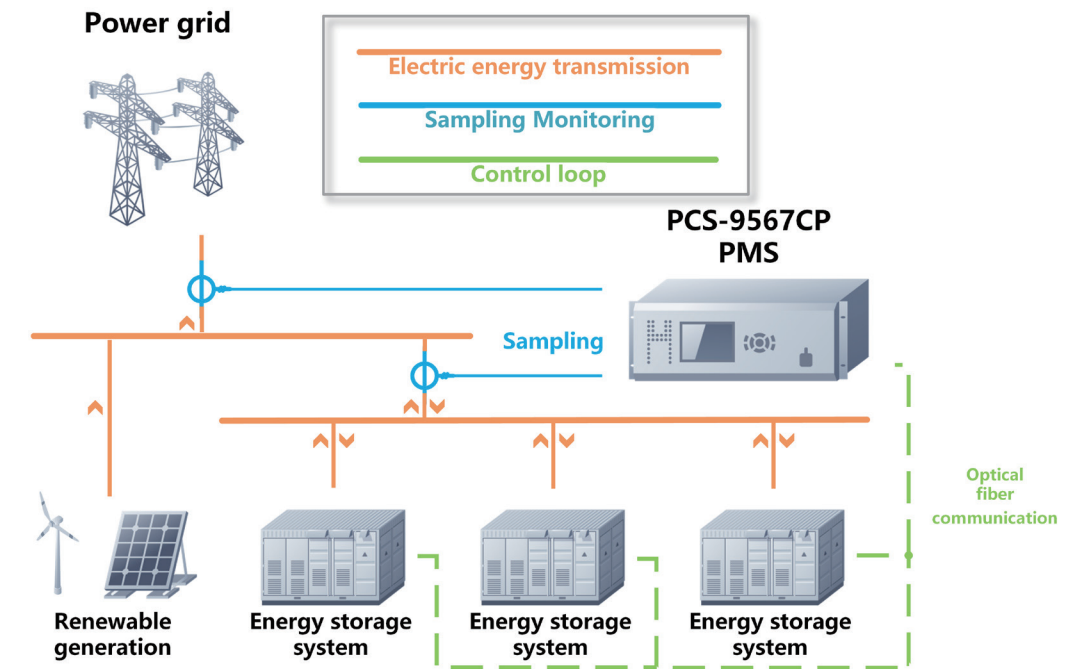
Functions

- Auxiliary AGC, AVC control
- Dynamic frequency regulation , voltage regulation control
- Inertia support and damping control
- Load peak shaving and valley filling control
- Renewable energy power smooth control
- Tie Line Power Control
- Off-grid black start control
- Off-grid frequency, voltage stability control
- Off-grid detection and on-grid switching control
- Multi-PCS Parallel Power Coordinated Control
- Multi-battery unit SOC equalization control

Features

- Based on NR UAPC embedded hardware platform, the control algorithm has a fast execution cycle, many hardware interfaces, and a wide range of application scenarios.
- Support IEC 61850 MMS substation monitoring protocol to meet the standardized access requirements of energy storage power stations
- With multiple independent optical fiber interfaces, it supports to form a GOOSE control network with PCS, and the communication delay is less than 2ms, which meets the needs of fast power control
- Support redundant configuration to improve system reliability
- Support layered distributed networking architecture, through the two-layer network architecture configuration of master coordination control and slave coordination control, it can meet the group control and group adjustment requirements of GW-level large-capacity energy storage power stations

Schematic diagram



Product Features

Power supply	88-264Vdc, 88-264Vac (AC, DC adaptive)
Data collection and output	
AC current input	1A/5A
AC voltage input	50~120V
DC analog input	4-20mA, 0-5V
Digital input	dry contact
Digital output	dry contact
Communication	
Communicate with SCADA/EMS systems	Media: Ethernet, RS-485 serial port
	Protocol: IEC 60870-5-103, IEC 61850 communication protocol
Communicate with remote control	Media: Ethernet, RS-485 serial port
	Protocol: IEC 60870-5-103, IEC 61850 communication protocol
Communication with PCS	Media: Ethernet, Fiber
	Protocol: GOOSE communication protocol
	Networking method: a single unit supports up to 100 PCS Hierarchical cascading networking is used for more than 100 units
Dual- interconnection communication	Media: Ethernet, Fiber
	Protocol: GOOSE communication protocol
Time synchronization	IRIG-B code time synchronization, network packet time synchronization



9 Other auxiliary products

PCS-9567 (energy storage product series)	XX (Product type)	**** (Rated power KW)
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SS	Intelligent Static Switch	500 or 1000
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PCS-9617 (Micro-grid product series)	XX (Product type)
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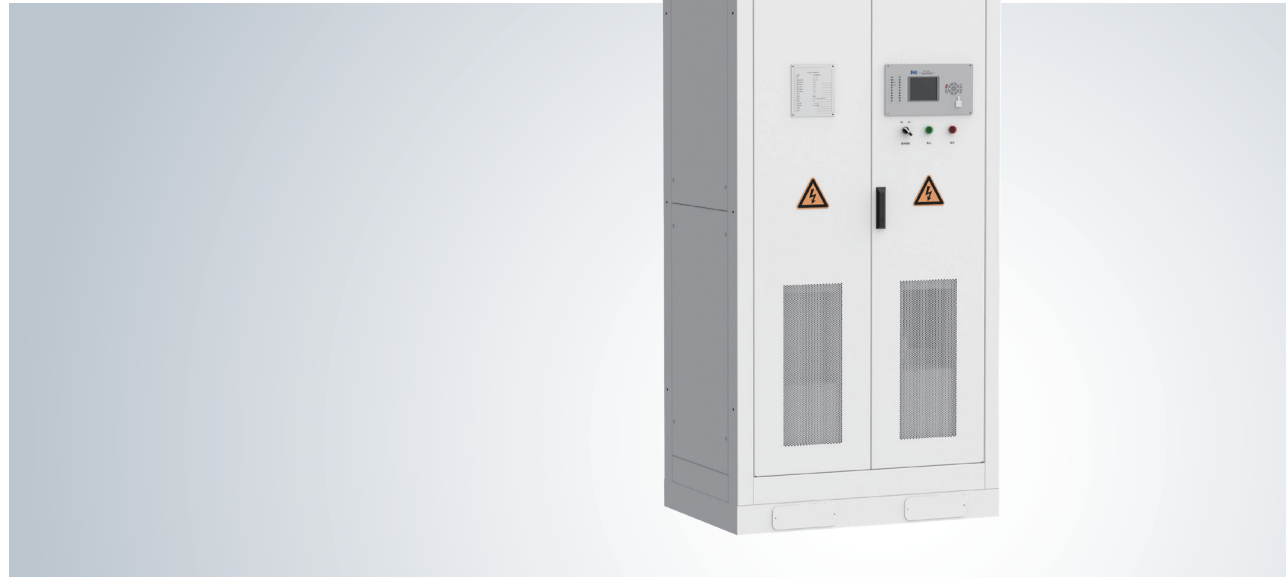
MG	Microgrid Controller
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PCS-9726 (Renewable power generation control and protection product series)	XX (Product type)	X (Application area)
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L	Intelligent integrated device	A Double branch transformer with communication management function
		B Double branch transformer without communication management function
		C Double winding transformer with communication management function
		D Double winding transformer without communication management function

PCS-9567SS

Intelligent Static Switch



Flexible applications

- Commercial and industrial energy storage system
- Small on-off grid micro grid system
- Data center and other emergency power supply system
- Other high reliability power supply systems

High efficiency and low losses

- Quick separation of energy storage system and grid (<10ms)
- Low-power intelligent temperature control system with an efficiency of 99.5%
- Automatic on/off grid switching to reduce operation and maintenance costs
- Integrated micro-grid control function reduces additional investment

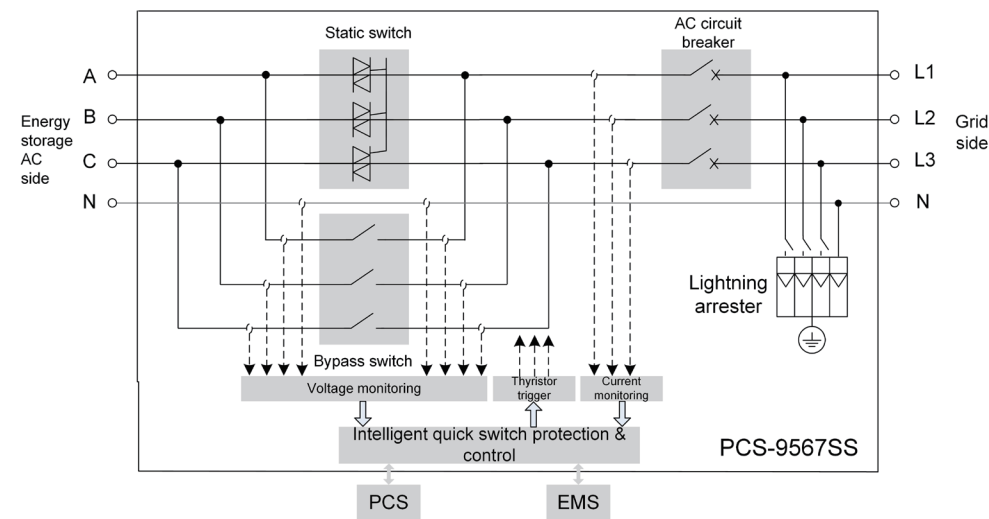
Safe and reliable

- Redundant loop design with bypass function
- Comprehensive and reliable protection
- Integrated fault recording function

Grid friendly

- Support multi-PCS synchronization on/off-grid switching, convenient for system expansion

Schematic diagram



Product features

Type designation	PCS-9567SS-500	PCS-9567SS-1000
Function		
On and off grid switching time (ms)	<10	
Protective function	Over temperature, over current, over voltage, lightning protection, etc.	
AC side		
Rated power (kW)	500	1000
Maximum AC power (kW)	550	1100
Maximum AC current (A)	800	1600
Rated grid voltage (V)	400	
Allowable grid voltage (V)	340~440	
Rated grid frequency (Hz)	50 / 60	239
Allowable grid frequency (Hz)	45~55 / 55~65	
System		
Weight (kg)	530	650
Dimensions (W×H×D) (mm)	900×2160×700	1000×2160×700
AC connection	Three-phase four-wire system	
Cooling method	forced air cooling	
Maximum allowable altitude (m)	6000 (> 4000 derating)	
Allowable ambient temperature (°C)	-25~50	
Allowable relative humidity	0~95%, no condensation	
Protection class	IP20	
HMI	LCD	
Communication Interface	CAN / RS-485 / RJ45 / Optical	
Communication protocol	CAN / Modbus / IEC 60870-103 / IEC 61850 etc.	

PCS-9617MG

Microgrid Controller



The main function

- Grid-connected operation control (tie line power, energy storage management)
- Island operation control (frequency and voltage emergency control, photovoltaic power limit)
- Transient process control: micro-grid operation mode switching, synchronous grid connection

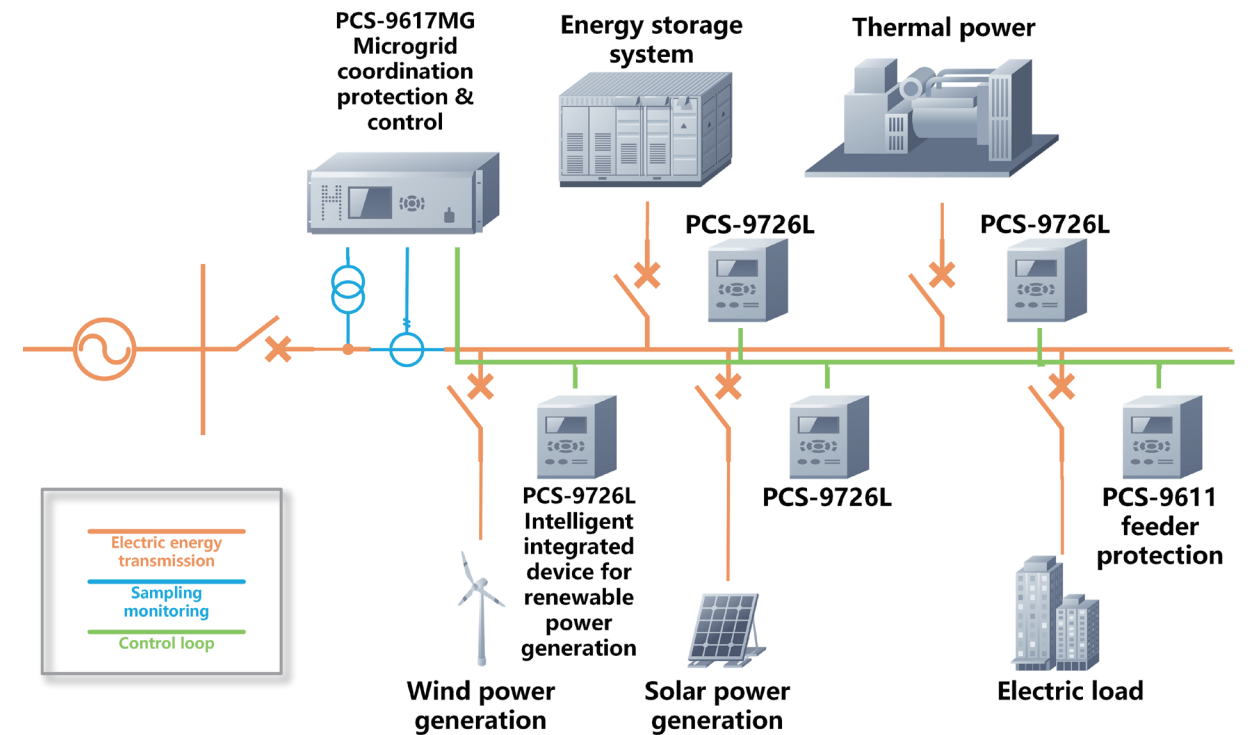
Grid friendly

- Support multi-PCS synchronization on/off-grid switching, convenient for system expansion
- Flexible control logic and easy programmable logic development
- Supports rich communication interfaces and communication protocols, fast communication with PCS

Safe and reliable

- Comprehensive and reliable protection
- Integrated fault recording function

Schematic diagram



Product features

Power supply	88-264Vdc, 88-264Vac (AC, DC adaptive)
Data collection and output	
AC current input	1A/5A @50Hz
AC voltage input	50~120V @50Hz
Digital input	dry contact
Digital output	dry contact
Communication	
Communicate with supervisory SCADA/EMS systems	Media: Ethernet, optical fiber, RS-485 serial port
	Protocol: IEC 60870-5-103, IEC 61850, Modbus
Networking method	star, ring
Time synchronization	Second pulse, IRIG-B, network message

PCS-9726L

Renewable power integration device



Flexible application

- Various new energy power generation scenarios: photovoltaic, wind power, etc.

Safe and reliable

- Comprehensive and reliable protection
- Independent protection module and no dependence on communication network
- Integrated fault recording function

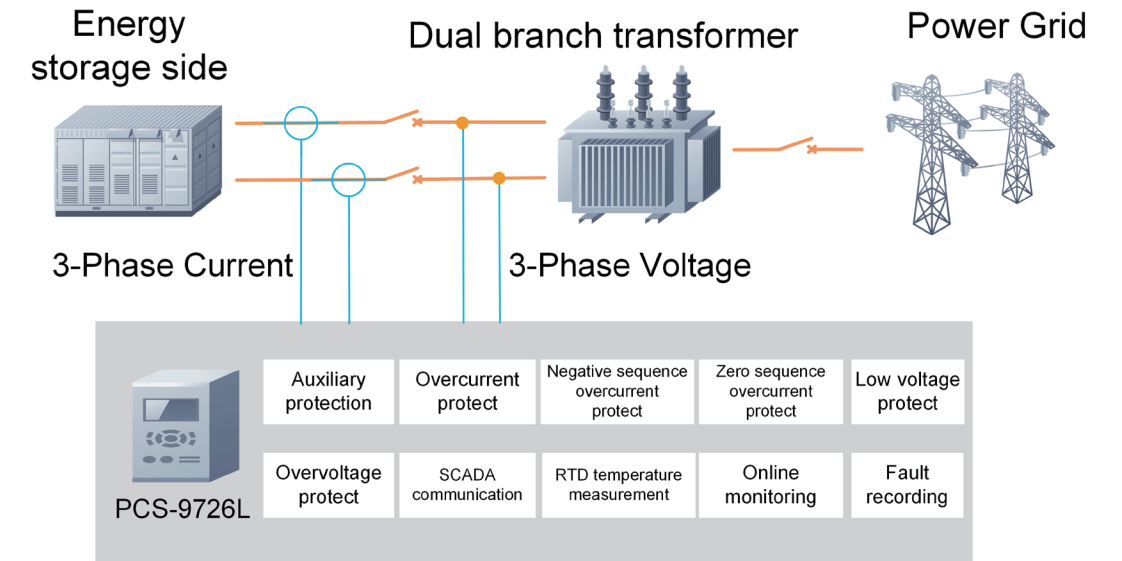
Comprehensive features

- Protection, control, measurement, communication management, ring network communication

Grid friendly

- Modular software design, flexible configuration
- Various communication methods
- Friendly and easy-to-use auxiliary configuration software, convenient for debugging and maintenance

Schematic diagram



Product features

Power supply	88-264Vdc, 88-264Vac (AC, DC adaptive)
Data collection and output	
AC current input	1A/5A
AC voltage input	3.8~540V
Digital input	dry contact
Digital output	dry contact
Communication	
Communicate with supervisory SCADA/EMS systems	Media: Ethernet, optical fiber, RS-485 serial port
	Protocol: IEC 60870-5-103, IEC 61850, Modbus
Networking method	star, ring
Time synchronization	IRIG-B, network message

10 Application cases





100MW/400MWh Vanadium-redox-flow-battery Energy Storage (PCS+PMS+EMS Integrated Supply) Dalian, Liaoning

Peak shaving, frequency regulation, black start



22MW/20.5MWh Hengqin Gas Power Plant Hybrid Battery Energy Storage Project Zhuhai, Guangdong

Auxiliary AGC frequency regulation, black start, auxiliary service





10MW/10MWh Huaneng Xutuan Wind Farm Lithium Battery Energy Storage Project (EPC)
Mengcheng, Anhui Province

Reduce wind curtailment, track forecast curve, smoothen fluctuation, grid auxiliary services



101MW/202MWh Huadian Tengzhou Power Plant Peak Shaving Energy Storage Project
(PCS+PMS+EMS integrated supply) Tengzhou, Shandong

Peak shaving, frequency regulation, voltage regulation



30MW/30MWh Huaneng Xiaojian Wind Farm Lithium Battery Energy Storage Project (EPC)
Mengcheng, Anhui Province

Reduce wind curtailment, track forecast curve, smoothen fluctuations, grid auxiliary services



10MW/5MWh Zhangye Power Plant Energy Storage Frequency Regulation Project Zhangye, Gansu

Power Plant Auxiliary Frequency Regulation



12MW/48MWh Baililian Lithium Battery Energy Storage Project Jiaozuo, Henan

Peak shaving and valley filling \ auxiliary services



300kW/340kWh Low-voltage flexible distribution network lithium battery energy storage + DC distribution network converter project Xuzhou, Jiangsu

Flexible DC distribution network control, auxiliary frequency regulation and voltage regulation



12MW/48MWh Jinling Station Lead-acid Battery Energy Storage Project Huzhou, Zhejiang

Frequency regulation, voltage regulation, peak shaving and valley filling, auxiliary services



2MW/4MWh User side lithium battery energy storage project, Conghua, Guangdong

Auxiliary services, peak shaving and valley filling



2MW/2.17MWh EWJR lithium battery energy storage project , Switzerland
 Power grid peak shaving, frequency regulation and voltage regulation



3MW/2MWh PEA Micro-grid Energy Storage Project , Thailand
 Micro-grid coordination control, auxiliary frequency regulation and voltage regulation



1MW/0.5MWh India Power Grid first energy storage system, India
 Peak shaving and valley filling, auxiliary frequency regulation



100kW/100kWh Thailand's first Micro-grid energy storage project, Thailand
 Micro-grid coordination control, auxiliary frequency regulation and voltage regulation



1.2MW/7.2MWh NGK Shikoku Island ITO sodium-sulfur battery energy storage project, Japan
Peak shaving and valley filling, auxiliary frequency and voltage regulation



1MW/2MWh Ibaraki user-side Vanadium Redox Flow Battery energy storage project, Japan
Peak shaving and valley filling, off-grid main power supply



600kW/3.6MWh TOTO factory user-side sodium-sulfur battery energy storage project, Japan
Auxiliary Services, Power Tracking

18MW/54MWh Hokkaido HEPCO Energy Storage Project, Japan
Peak shaving and valley filling, auxiliary frequency regulation



NR ELECTRIC CO.,LTD.
69 Suyuan Avenue, Nanjing 211102, China
Tel:+86 25 87178888 Fax:+86 25 87178999
Email:NRservices@nrec.com, NRsales@nrec.com
www.nrec.com/en
www.nrec.com/ru