



PCS-9567A

Power Conversion System

Based on comprehensive experience and solutions, NR Electric's Power Conversion System (PCS), with various battery technologies, is flexible to provide a wide range of functionalities required by the smart grid, micro grid and renewable energy.

The advanced converter/inverter technology and diversified operational modes in NR's PCS make conversion between DC and AC more efficient with less harmonic distortion, higher reliability, availability and flexibility for power system operation.

Functions

As the interface between the grid and energy storage unit, PCS is applied to the site requiring dynamic energy storage, which can store electric power when the grid power is in surplus and supply the stored power to the grid when the grid power is in short. Furthermore, it can also be used for frequency regulation to improve system stability or as the main power source of micro-grid system.

Power Conversion System

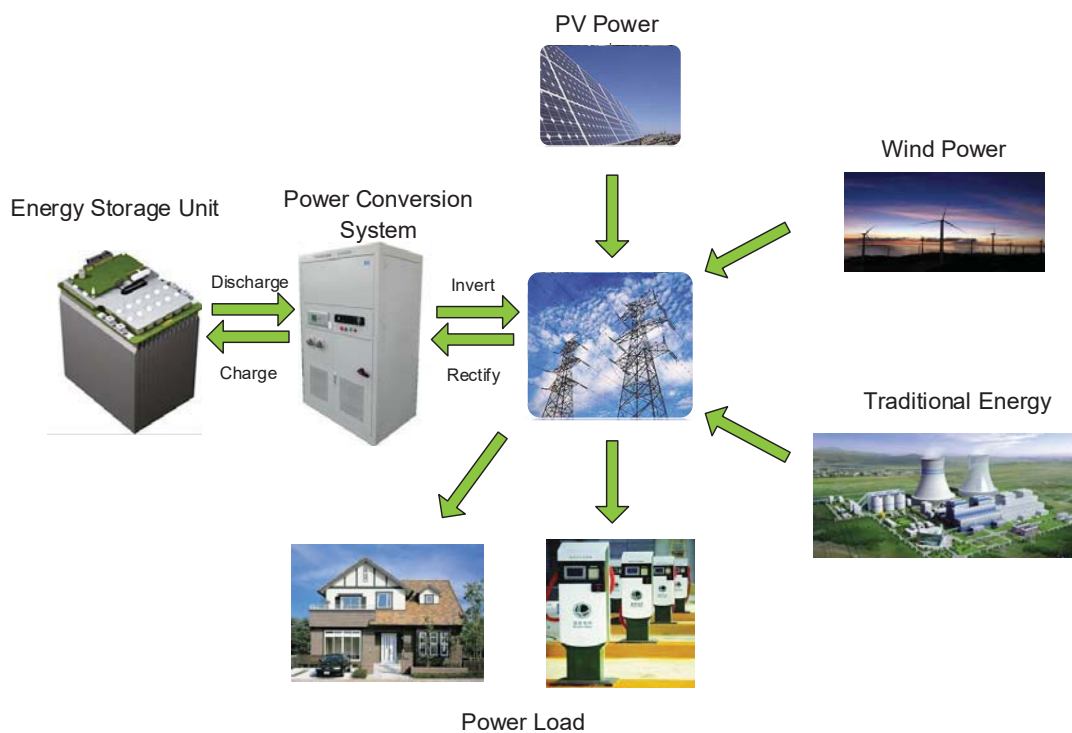


Figure 1 Bidirectional Power Conversion System Application

- Accurate and flexible charging & discharging control modes
PCS can realize real-time communication with the Battery Management System (BMS) and accurately monitor the current operation information of batteries. It can control the charging & discharging status of converter and switch conveniently charging & discharging modes among “constant current”, “constant voltage” and “constant power”. NR’s PCS can support multiple types of energy storage elements.
- Free switchover between grid-connected operation mode and isolated grid operation mode
PCS can not only realize bidirectional energy exchange in the grid-connected operation mode, but also can be the main power source in isolated grid operation mode, allowing free switchover between the two modes.
- Soft grid-connected control and electric energy quality control
On the base of the online monitored grid voltage information, the control system can accurately control the output voltage of converter in real-time and can eliminate static and dynamic errors to realize non-impact grid connection. In addition, the control system has online harmonic monitoring function and independent harmonic analysis software module, realizing optimized control of power conversion and ensuring electric energy quality.
- Respond to MEMS commands for peak load shifting
By the MEMS (Micro-grid Energy Management System), it can store electric energy at power consumption valley and release electric energy at power consumption peak, realizing peak load shifting.
- Grid frequency and grid reactive power control
In grid-connected operation, PCS can not only realize primary and secondary grid frequency regulation coordinating with AGC (Automatic Generation Control), but also realize grid

static reactive power control coordinating with AVC (Automatic Voltage Control).

- Complete self-check and protection functions
The scope of self-check covers the control system, I/O units, converter power module and so on. Self-check can ensure detecting internal system fault within 1ms, and provide the corresponding operation, such as blocking trigger pulse or tripping. Complete protection functions are provided to ensure the normal operation of PCS.
- Transient fault recording functions
The system can record continuously fault signals for a whole fault period including pre-fault to after-fault. The recorded data file is stored in the sharing directory of the operator workstation, and can be used in fault analysis or accident tracking.

Features

- Based on the high performance and high stability hardware platform, with friendly MMI.
- Complete charging and discharging restriction functions, ensuring no overvoltage or over temperature will occur and keep the batteries safe during charging and discharging.
- Complete and reliable protection functions, ensuring reliable and safe operation.
- Respond to MEMS command, and initiatively participate in grid peak regulation, alleviate pressure on the grid.
- A number of communication interfaces are provided such as CAN, RS485 and Ethernet, compatible with various communication modes.

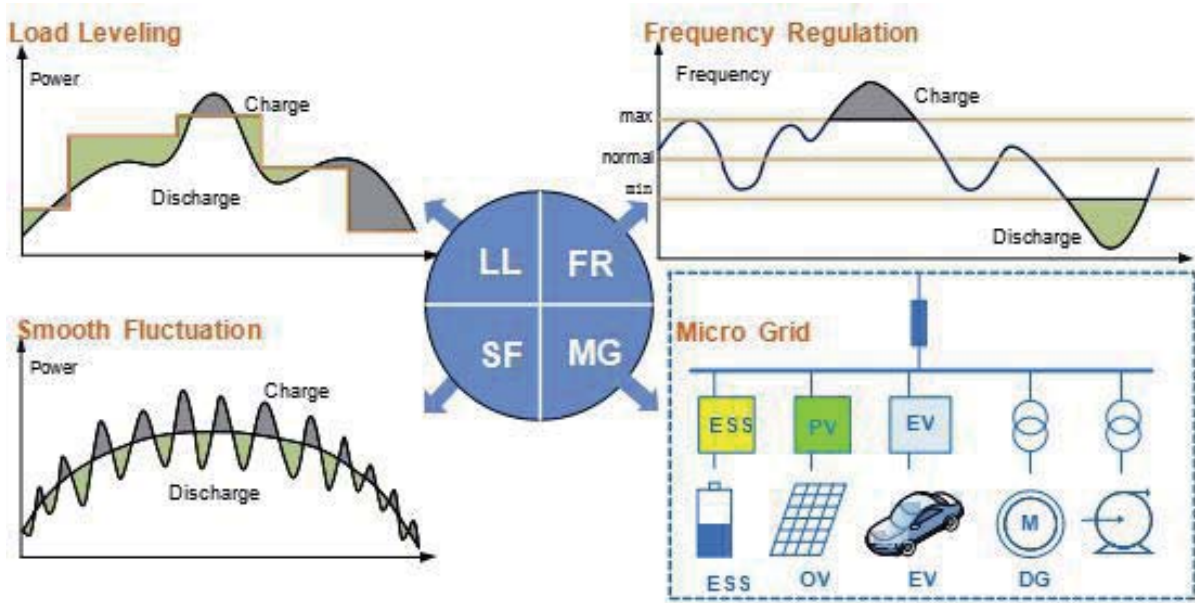


Figure 2 Power Conversion System Functions

Technical Data

Without isolation transformer type:

| Type | PCS-9567A-150kW | | PCS-9567A-250kW | | PCS-9567A-500kW | |
|--|--|---------|---------------------|---------|---------------------|---------|
| DC Side | | | | | | |
| Maximum continuous operating power (kW) | 165 | | 275 | | 550 | |
| Range of operating voltage (V) | 500~850 | | | | | |
| Maximum operating current (A) | 330 | | 550 | | 1,100 | |
| DC voltage ripple | < 1% | | | | | |
| DC current ripple | < 3% | | | | | |
| AC Side | | | | | | |
| Rated power (kW) | 150 | | 250 | | 500 | |
| Maximum continuous operating power (kVA) | 165 | | 275 | | 550 | |
| Nominal (phase to phase) operating voltage (V) | 315 | 380 | 315 | 380 | 315 | 380 |
| Operating voltage range (V) | 280~350 | 340~420 | 280~350 | 340~420 | 280~350 | 340~420 |
| Maximum continuous operating current (A) | 302 | 251 | 504 | 418 | 1,008 | 836 |
| Normal frequency (Hz) | 50 / 60 | | | | | |
| Operating frequency range (Hz) | 45~55 / 55~65 | | | | | |
| Total harmonic distortion rate | < 3% (up to 40th at rated power) | | | | | |
| Rated power factor | > 0.99 | | | | | |
| Power factor range | -0.9~+0.9 | | | | | |
| Maximum efficiency | 98.5% | | 98.5% | | 98.7% | |
| Grid configuration(s) allowed for product connection | Three-phase three-wire system | | | | | |
| System Parameters | | | | | | |
| Weight (kg) | 800 | | 1,000 | | 1,400 | |
| Dimensions (W x H x D) (mm) | 800 x 1,900 x 700 | | 1,000 x 2,100 x 700 | | 1,400 x 2,100 x 700 | |
| Cooling method | Forced air cooling | | | | | |
| Maximum altitude allowed (mm) | 6,000 (> 3,000 derating) | | | | | |
| Isolation method | None- transformer | | | | | |
| Operating temperature range (°C) | -25~50 | | | | | |
| Environment humidity | 0~95 %, no condensation | | | | | |
| Protection level | IP20 | | | | | |
| Display | LCD | | | | | |
| Communication method | CAN / RS485 / RJ45 / fiber | | | | | |
| Protocol | CAN / Modbus / IEC60870-103 / IEC61850 | | | | | |

With isolation transformer type:

| Type | PCS-9567AT-150kW | | PCS-9567AT-250kW | |
|---|------------------|--|------------------|--|
| DC Side | | | | |
| Maximum continuous operating power (kW) | 165 | | 275 | |
| Range of operating voltage (V) | 500~850 | | | |
| Maximum operating current (A) | 330 | | 550 | |
| DC voltage ripple | < 1% | | | |
| DC current ripple | < 3% | | | |

| Type | PCS-9567A-150kW | PCS-9567A-250kW | PCS-9567A-500kW |
|--|--|-----------------|---------------------|
| AC Side | | | |
| Rated power (kW) | 150 | | 250 |
| Maximum continuous operating power (kVA) | 165 | | 275 |
| Nominal (phase to phase) operating voltage (V) | 400 | | |
| Operating voltage range (V) | 360~440 | | |
| Maximum continuous operating current (A) | 239 | | 397 |
| Normal frequency (Hz) | 50 / 60 | | |
| Operating frequency range (Hz) | 45~55 / 55~65 | | |
| Total harmonic distortion rate | < 3% (up to 40th at rated power) | | |
| Rated power factor | > 0.99 | | |
| Power factor range | -0.9~+0.9 | | |
| Maximum efficiency | 97.5% | | |
| Grid configuration(s) allowed for product connection | Three-phase four-wire system | | |
| System Parameters | | | |
| Weight (kg) | 1,200 | | 1,500 |
| Dimensions (W x H x D) (mm) | 1,200 x 2,160 x 700 | | 1,400 x 2,160 x 700 |
| Cooling method | Forced air cooling | | |
| Maximum altitude allowed (m) | 6,000 (> 3,000 derating) | | |
| Isolation method | Transformer isolation | | |
| Operating temperature range (°C) | -25~50 | | |
| Environment humidity | 0~95 %, no condensation | | |
| Protection level | IP20 | | |
| Display | LCD display | | |
| Communication method | CAN / RS485 / RJ45 / fiber | | |
| Protocol | CAN / Modbus / IEC60870-103 / IEC61850 | | |