PCS Energy storage inverter

Overview

The LNBI series energy storage converter is a high-power factor, high-precision programmable IGBT-based switching power supply equipment applied to smart grids and smart microgrids.

Designed for three-phase energy storage systems, the energy storage converter is 50/60Hz grid adaptive, employing DC-AC bidirectional conversion and four-quadrant SVPWM/SPWM technology. It features bidirectional energy flow, a power factor of over 0.99, low grid harmonic pollution, and high power quality.

The energy storage converter's output power factor is adjustable (-0.8 leading ~ 1.0 ~ +0.8 lagging), meeting different grid requirements. A touchscreen serves as the human-machine interface, integrating display and control. Operating data, status information, and fault information are displayed in real-time, with a historical fault information query function (capable of storing 200,000 entries). Optional AC and DC energy meters provide accurate AC and DC energy statistics (0.2 accuracy class).

The energy storage converter is compatible with various energy storage technologies, including lead-acid batteries, lithium batteries, flow batteries, hydrogen fuel cells, and supercapacitors. Multiple communication interfaces are available, including RS485, TCP/IP, and CAN, using the standard Modbus communication protocol for remote monitoring. Optional WIFI and GPRS communication modules allow users to download a mobile or PC smart terminal APP for 24/7 real-time monitoring of equipment operation data and alarm information from anywhere.

The energy storage converter specifically designed for flow batteries includes a 0V pre-charging function, with selectable DCDC pre-charging and resistor pre-charging modes. The DCDC pre-charging method allows for selection of the pre-charging power (≤ PCS main unit power) according to requirements, and is compatible with appropriate battery voltage ranges. The constant current value during the pre-charging phase is adjustable, and it features comprehensive over/under voltage, overcurrent, and overtemperature protection functions. The resistor pre-charging method also allows for selection of the pre-charging power (≤ PCS main unit power), with the pre-charging current generated by the voltage difference. The pre-charging resistor selection should be matched to the internal resistance of the flow battery.

Typical applications include peak shaving and valley filling, photovoltaic energy storage and direct current integration, industrial and commercial energy storage, and peak-valley arbitrage.

Technical Features

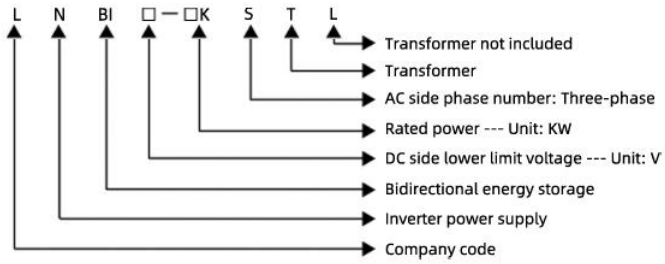
1. Four-quadrant operation, bidirectional energy flow, 50/60Hz grid adaptive.

2. Adjustable output power factor (-0.8 leading to 1.0 to +0.8 lagging), customizable reactive power compensation.

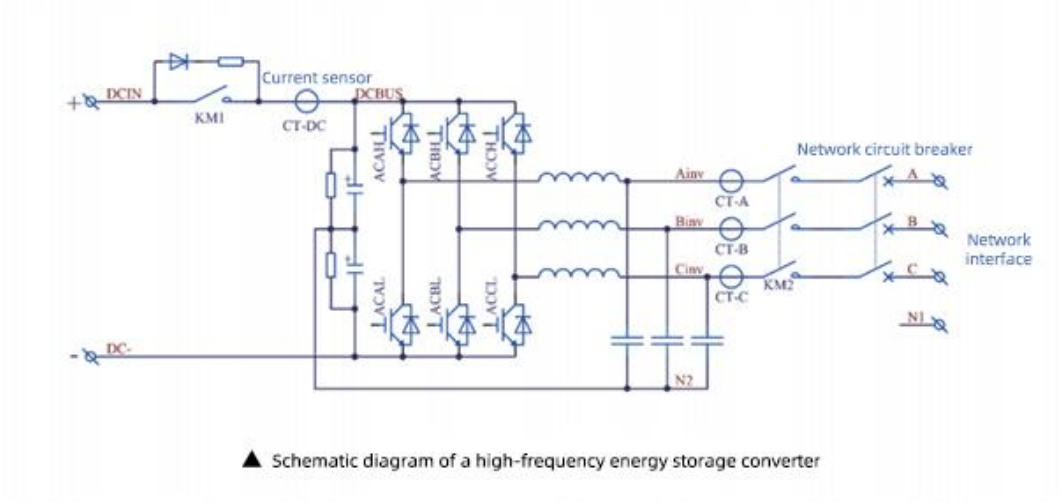
3. DC reverse connection protection, over/under voltage protection, overcurrent protection, overheating protection, etc.

4. Color touch screen, Chinese and English language switching, integrated display and control, clear display of operating data.

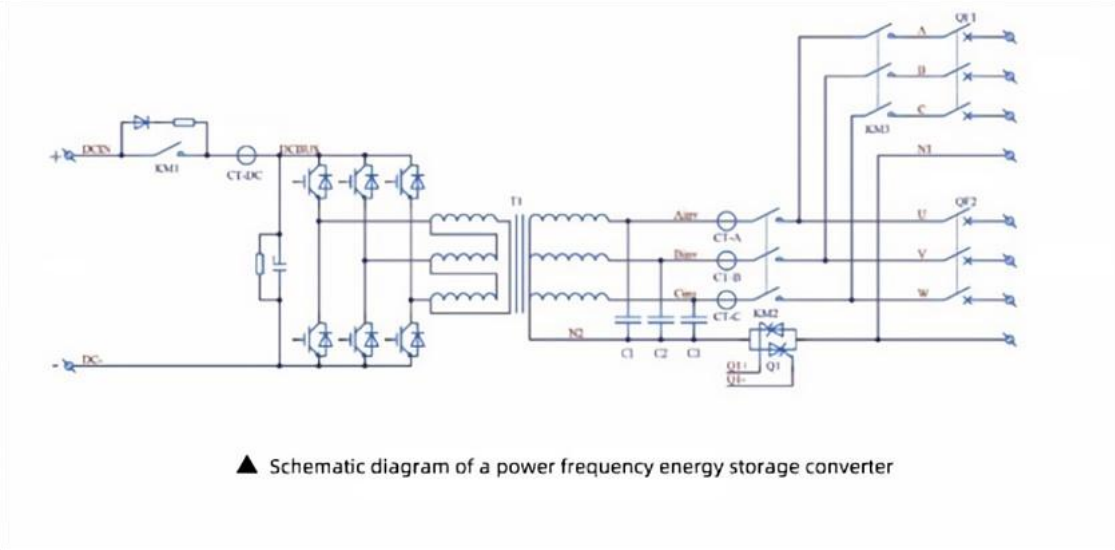
Model and meaning



Electrical schematic diagram

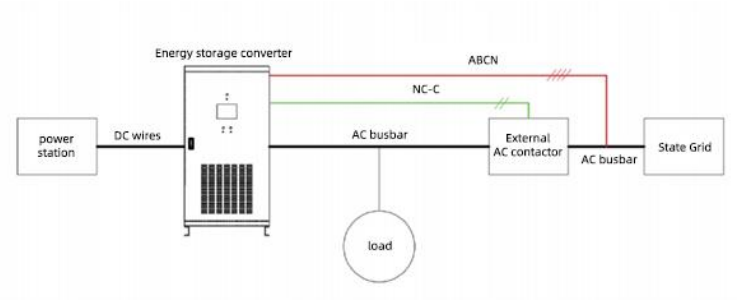


▲ Schematic diagram of a high-frequency energy storage converter



▲ Schematic diagram of a power frequency energy storage converter

System topology diagram of PCS AC side single-channel output (external AC contactor)

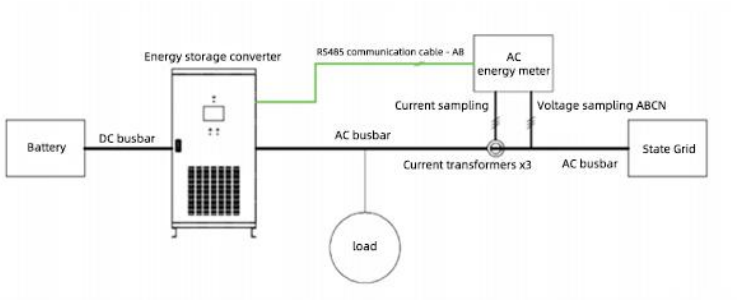


After a power outage in the grid, if the PCS needs to operate in grid-forming mode, a solution with one AC output port and an external AC contactor is required. The external AC contactor is an optional component. The energy storage converter will reserve dry contact terminals for external control of the AC contactor and terminals for AC voltage signal sampling. Users need to provide their own wiring (1mm²). The operating logic is as follows:

● When the grid power fails, the PCS (which needs to switch to UPS mode) automatically and seamlessly switches to off-grid mode, supplying power to the load after grid formation.

● After the grid power is restored, the PCS synchronizes with the grid using the sampled AC voltage signal, controls the external AC contactor to close, and automatically switches to grid-connected mode.

PCS Anti-backflow System Topology Diagram



When grid connection and power export are not permitted, and the energy storage inverter's output power can only be used by the load, an anti-backflow function can be optionally configured. This function can be switched on or off via the local touchscreen. The external AC energy meter is an optional component. The energy storage inverter will reserve an RS485 communication interface for the AC energy meter; the user needs to provide their own wiring (1mm²*2 - two-core shielded cable). The operating logic is as follows:

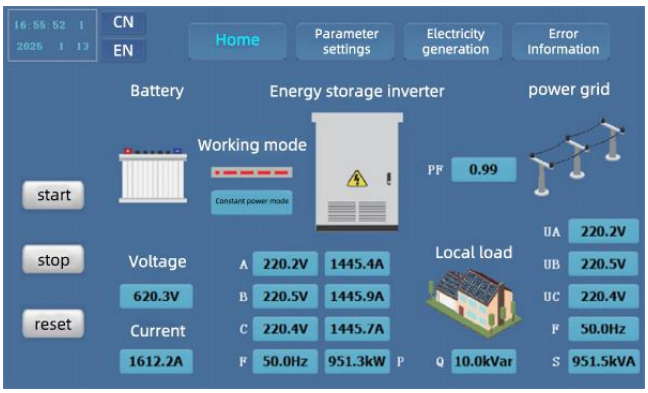
● The output power of the energy storage inverter can be adjusted in real time according to the load size. The PCS output power is directly consumed by the local load and will not be uploaded to the power grid.

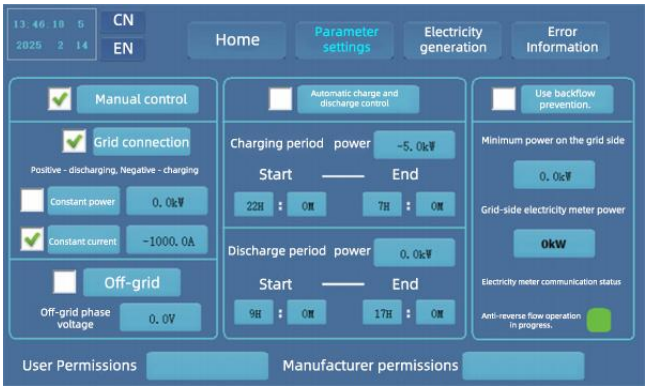
● For models with only one AC output port that require grid connection, the anti-backflow AC energy meter needs to be externally installed before the load, and the RS485 communication needs to be connected to the PCS.

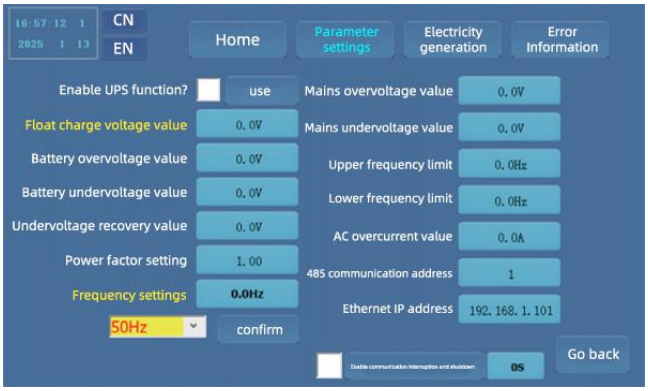
● For PCS units with both load and grid connection ports, if the load is only connected to the load port, the anti-backflow energy meter can be built into the PCS.

Operating Interface

Color touchscreen, integrated display and control, supports switching between Chinese and English.







Technical parameters and selection criteria

High-frequency equipment parameters					
Rated equipment power	50KW	100KW	200KW	500KW	1000KW
Maximum equipment power	55KW	110KW	220KW	550KW	1100KW
DC side parameters					
DC voltage range	600-900VDC				
Voltage/current regulation accuracy	±1%FS				
DC current ripple	＜3%Irms				
DC side parameters					
AC wiring method	3-phase 3-wire / 3-phase 4-wire (Please specify when ordering)				
Rated grid voltage	220/380VAC(Other voltages available upon request; please contact technical support for details)				
Power grid voltage range	±15%				

Rated grid frequency	50/60Hz
Power grid frequency range	10%
Total current distortion rate	THD < 3% (standard power grid)
Power factor	-0.8 leading ~ 1.0 ~ +0.8 lagging, adjustable
Independent inverter mode	
Output voltage	220/380VAC
Output voltage regulation accuracy	±1%
Output voltage distortion	<3% (resistive load)
Output frequency	50/60Hz
Output frequency stability	±1%
Three-phase load unbalance	100%
System Parameters	
Operating modes	Manual mode, Automatic mode, EMS mode
Charging and discharging modes	Constant current → Constant voltage, Constant power → Constant voltage
Pre-charging mode	Resistor pre-charging
Maximum conversion efficiency	98%
Noise	＜65dB
Protection level	IP20 (customizable to IP54)
Permissible ambient temperature	-15℃ to 50℃ (Other temperatures can be customized)
Permissible relative temperature	0-95% (no condensation)
Permitted altitude	≤6000m; for altitudes exceeding 2000 meters, derating is required (1% derating for every 100 meters increase in altitude).
Cooling method	Intelligent air cooling
Emergency shutdown	There is an emergency stop button.
Display	Touchscreen
Insulation monitoring	Insulation tester
Temperature monitoring	Temperature monitoring instrument
Communication interface	RS48 , Ethemet , WIFI , GPRS , CAN
Communication protocol	Modbus RTU/ Modbus TCP
This indicates optional features. The above technical parameters are standard parameters and are for reference only; they can be customized according to the user's actual needs.	

Power frequency equipment parameters					
Rated equipment power	50KW	100KW	200KW	500KW	1000KW
Maximum equipment power	55KW	110KW	220KW	550KW	1100KW
DC side parameters					
DC voltage range	350-750VDC	350-750VDC	350-750VDC	400-850VDC	500-850VDC
Recommended rated voltage	384/420/480	420/480	480	600	600

Voltage/current regulation accuracy	±1%FS
DC current ripple	＜3%Irms
DC side parameters	
AC wiring method	3-phase 3-wire / 3-phase 3-wire (Please specify when ordering)
Rated grid voltage	220/380/630VAC (Other voltages are available upon request)
Power grid voltage range	±15%
Rated grid frequency	50/60Hz
Power grid frequency range	±10%
Total current distortion rate	THD < 3% (standard power grid)
Power factor	-0.8 leading ~ 1.0 ~ +0.8 lagging, adjustable
Independent inverter mode	
Output voltage	220380/630VAC (other voltages can be customized) +1%
Output voltage distortion	<3% (resistive load)
Output frequency	50/60Hz±1%
Three-phase load unbalance	100%
System Parameters	
Operating modes	Manual mode, Automatic mode, EMS mode
Charging and discharging modes	Constant current → Constant voltage, Constant power → Constant voltage
Pre-charging mode	Resistor pre-charging, DC-DC pre-charging
Maximum conversion efficiency	96% (including transformers)
Noise	＜65dB
Protection level	IP20 (customizable to IP54)
Permissible ambient temperature	-15℃ to 50℃ (Other temperatures can be customized)
Permissible relative temperature	0-95% (no condensation)
Permitted altitude	≤6000m; for altitudes exceeding 2000 meters, derating is required (1% derating for every 100 meters increase in altitude).
Cooling method	Intelligent air cooling
Emergency shutdown	There is an emergency stop button.
Display	Touchscreen
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Communication protocol	Modbus RTU/ Modbus TCP
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Optional features

Input Dry Contacts: Start/Stop dry contact, BMS fault dry contact, Charge/Discharge direction dry contact, Reset control dry contact, etc.

Output Dry Contacts: Running status dry contact, Fault status dry contact, Power-on status dry contact, Charging status dry contact, Discharging status dry contact, etc.

Dry Contact Definitions:

a) Start/Stop Dry Contact: Input type, dry contact closed, equipment runs; dry contact open, equipment stops.

b) BMS Fault Dry Contact: Input type, dry contact closed, equipment is allowed to run; dry contact open, equipment stops and alarms.

c) Charge/Discharge Direction Dry Contact: Input type, dry contact closed, equipment operates in charging mode; dry contact open, equipment operates in discharging mode.

d) Reset Control Dry Contact: Input type, dry contact changes from open to closed (rising edge signal), equipment performs fault reset, dry contact remains closed for at least 1 second.

e) Running Status Dry Contact: Output type, dry contact activates when the equipment is running or stopped, 1NO+1NC

f) Fault Status Dry Contact: Output type, dry contact activates when the equipment malfunctions, 1NO+1NC

g) Power-on Status Dry Contact: Output type, dry contact activates when the equipment is powered on and the screen is lit, 1NO+1NC

h) Charging Status Dry Contact: Output type, dry contact activates when the equipment is charging the battery from the power grid, 1NO+1NC

i) Discharging Status Dry Contact: Output type, dry contact activates when the equipment is discharging from the battery to the power grid, 1NO+1NC

Note: For the selection of the number of dry contacts and definitions of other functional dry contacts, please consult our company's technical department.

Standard dimensions and net weight

● W --- Width, L --- Depth, H --- Height

Due to continuous equipment upgrades and adjustments, the dimensions and weight are for reference only; the actual product shall prevail.

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