

## Overview

The LNS series off-grid inverter is a power conversion device that converts input DC power into sinusoidal AC power for local load use.

The off-grid inverter utilizes SPWM/SVPWM technology, controlling the switching sequence of IGBT modules to chop high-voltage DC into a pulse sequence with gradually changing pulse width, forming a sinusoidal waveform. After filtering out high-frequency harmonics through a filtering circuit, the voltage pulse sequence is converted into smooth sinusoidal AC power, achieving power quality comparable to grid power and suitable for all types of loads.

Off-grid inverters can be classified by their output type: Single-phase off-grid inverters: output is single-phase AC power. Three-phase off-grid inverters: output is three-phase AC power. Customized split-phase off-grid inverters are also available: output is two-phase AC power [L1-L2-N], with L1-N and L2-N phases reversed. Phase-shifted inverters: output is three-phase four-wire [for example, with a line voltage of AC380V, L1-N=190V, L2-N=329V, L3-N=190V].

The off-grid inverter can select one AC source (mains power, generator, etc.) as a bypass, supplying power to the load through a switching device. The switching priority can be set. When using a generator as a bypass, a dry contact for generator start control can be optionally configured to start the generator via the dry contact before the DC input undervoltage occurs. The standard switching time is 40-200ms, and a fast switching model (<10ms) is available depending on load requirements.

The off-grid inverter has an input pre-charging function and a built-in buffer circuit to prevent large current surges from damaging the battery during initial power-on. It can operate normally in a wide temperature range, humidity range, and at high altitudes. Higher protection levels (IP54) can be customized for harsh geographical and climatic conditions.

Application scenarios: including backup power supply in remote mountainous areas and areas without electricity.

## Technical Features

- High Efficiency Conversion: Utilizing SPWM/SVPWM sine pulse width modulation technology, the maximum conversion efficiency can reach 96% under different loads and operating conditions;
- High Safety: Supports up to 400% overcurrent capability. Features multiple protection functions including input reverse connection protection, input over/undervoltage protection, output overload/overcurrent protection, three-phase voltage imbalance protection, drive protection, and over-temperature protection;
- Display and Settings: Uses a color LCD touch screen to display various operating parameters and allows for setting relevant parameters; Output Isolation: Industrial frequency transformer output, output harmonics <3%, voltage accuracy  $\pm 1\%$ , frequency accuracy  $\pm 0.1\%$ ;
- Wide Input Voltage Range: Customizable 40-1500V DC input voltage;
- Three-Phase Split Design: Each phase's hardware circuit is independently designed, ensuring no interference between phases and providing better heat dissipation.



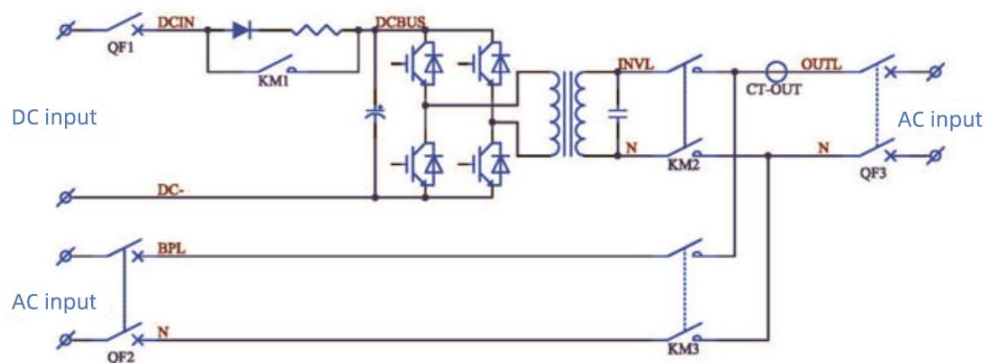
## Model and meaning

L N □□ - □ - □ K

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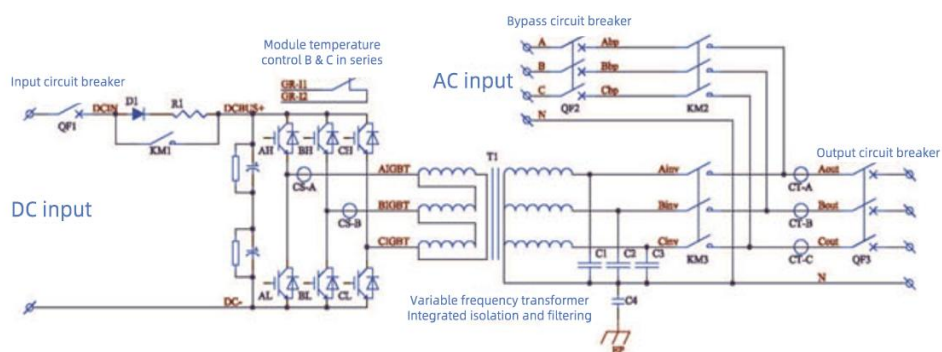
| Number | Number name | Meaning                                                                                                          | Remark |
|--------|-------------|------------------------------------------------------------------------------------------------------------------|--------|
| 1      | L           | Company Code                                                                                                     |        |
| 2      | N           | Inverter power supply                                                                                            |        |
| 3      | □           | S: Off-grid photovoltaic system<br>Automatic control: Pure inverter<br>/ Mains power priority                    |        |
| 4      | □           | DC input rated voltage                                                                                           |        |
| 5      | □           | AC output phase:<br>D: Single-phase output<br>L: Split-phase output<br>S: Three-phase output<br>P: Biased output |        |
| 6      | □           | Rated power                                                                                                      |        |
| 7      | K           | Unit: KVA                                                                                                        |        |

## Electrical Schematic Diagram



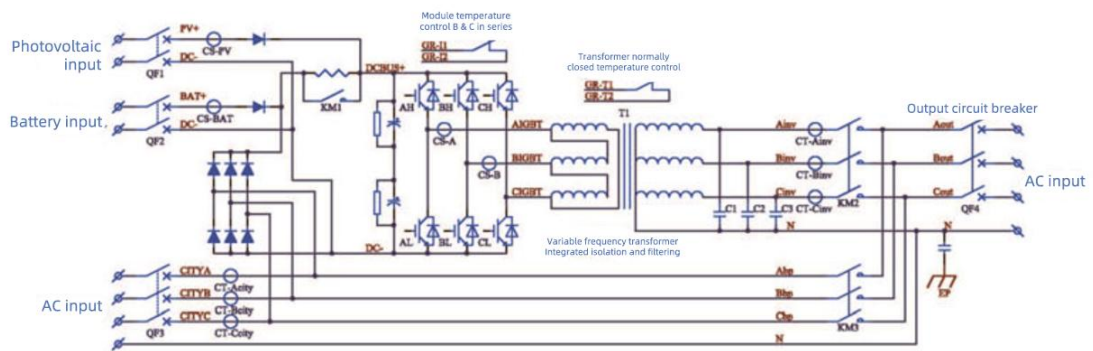
▲ Single-phase off-grid inverter schematic diagram

The bypass function is optional; the unit can be manufactured as a pure inverter model without the bypass feature.



▲ Schematic diagram of a three-phase integrated off-grid inverter

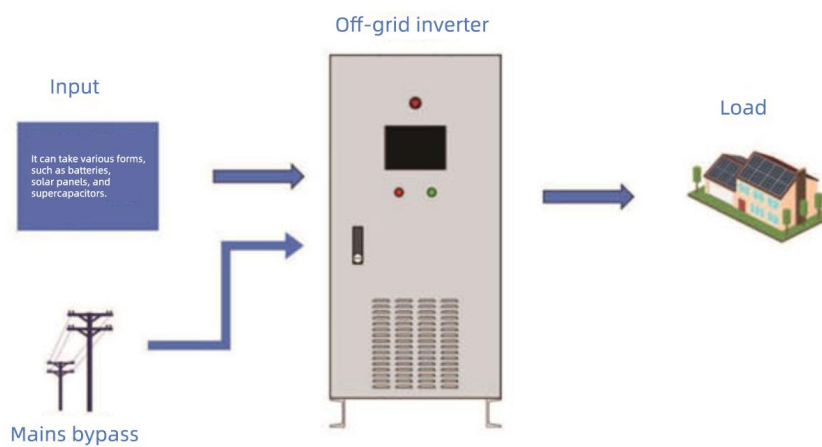
The bypass function is optional; the unit can be used as a pure inverter without the bypass. A three-phase split design is also available.



▲ Schematic diagram of a new type of three-phase off-grid inverter

The bypass function is optional; the unit can be manufactured as a pure inverter without the bypass. A single-phase design is also available.

## Off-grid inverter system working topology diagram



When the inverter operates in inverter-priority mode, it normally supplies power to the load through its inverter output. If the DC input is abnormal or the inverter operating conditions are not met, the system can automatically switch to bypass power supply mode to meet the load's power requirements. When the inverter operating conditions are met again, the inverter automatically switches back to inverter operation mode.

When the inverter operates in bypass-priority mode, if the bypass is disconnected, the inverter automatically switches to inverter output [the inverter section can select cold standby or hot standby logic depending on the load requirements]. When the bypass is restored, the inverter automatically switches back to bypass operation mode.

| Single-phase inverter power supply parameters |                                |                                                                                                                                                |      |    |       |       |       |       |       |
|-----------------------------------------------|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-------|-------|-------|-------|-------|
| Model                                         |                                | LNS*—D—*K                                                                                                                                      |      |    |       |       |       |       |       |
| Power (KVA)                                   |                                | 5                                                                                                                                              | 10   | 20 | 30    | 50    | 100   | 150   | 200   |
| DC Input                                      | Input voltage range            | 40-850V<br>The DC voltage range can be selected according to the power requirements; other voltages are available upon request.<br>(850-1500V) |      |    |       |       |       |       |       |
|                                               |                                |                                                                                                                                                |      |    |       |       |       |       |       |
| Bypass input                                  | Allowable Input V Range        | 220Vac±15%, other voltages available upon request                                                                                              |      |    |       |       |       |       |       |
|                                               | Input frequency range          | 50/60Hz±5Hz, other frequencies available upon request                                                                                          |      |    |       |       |       |       |       |
|                                               | Bypass transfer time           | ≥200ms, customizable to <10ms                                                                                                                  |      |    |       |       |       |       |       |
| Communication Output                          | Rated Output V                 | 220VAC other voltages available upon request                                                                                                   |      |    |       |       |       |       |       |
|                                               | Rated Output Freq              | 50/60Hz, other frequencies available upon request                                                                                              |      |    |       |       |       |       |       |
|                                               | Output V Accuracy              | ±1%                                                                                                                                            |      |    |       |       |       |       |       |
|                                               | Output Freq Accuracy           | ±0.1%                                                                                                                                          |      |    |       |       |       |       |       |
|                                               | Rated Current (A)              | 22.8                                                                                                                                           | 45.5 | 91 | 136.4 | 227.3 | 454.6 | 681.9 | 909.1 |
|                                               |                                | The rated current is calculated at an output voltage of AC 220V.                                                                               |      |    |       |       |       |       |       |
|                                               | THD (Waveform Distortion Rate) | <3% (linear load)                                                                                                                              |      |    |       |       |       |       |       |
|                                               | Dynamic Response Time          | 2ms (load 0-100%)                                                                                                                              |      |    |       |       |       |       |       |
|                                               | Overload Capacity              | 110% for 10 minutes, 200% for 3 seconds, customizable up to 400% for 1 second                                                                  |      |    |       |       |       |       |       |
|                                               | CF (Crest Factor)              | 3:1                                                                                                                                            |      |    |       |       |       |       |       |
|                                               | Max Inverter Efficiency        | 96%                                                                                                                                            |      |    |       |       |       |       |       |
| WorkingEnviro                                 | Insulation Strength            | 1500VAC,1 minute                                                                                                                               |      |    |       |       |       |       |       |

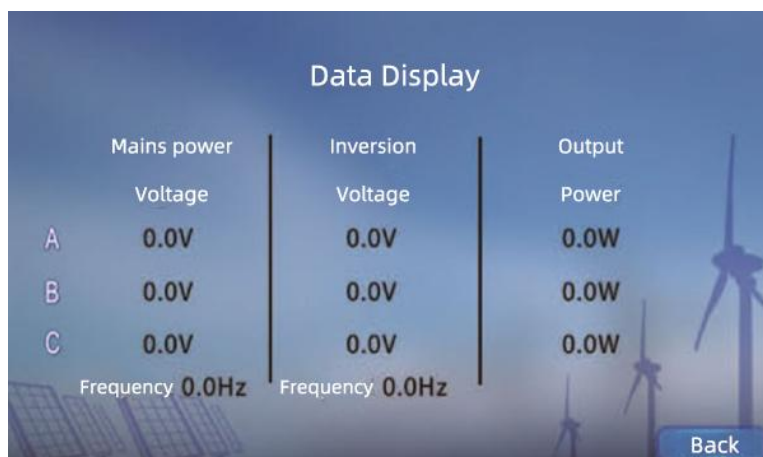
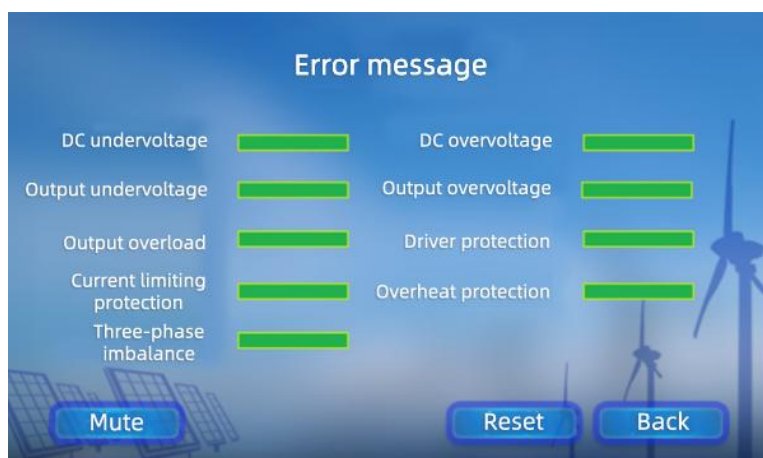
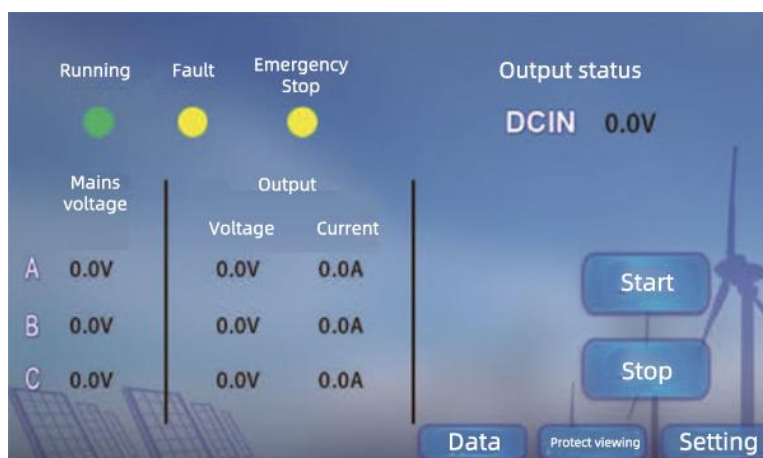
|                      |                                                                                                                                                                                                                                                               |                                                                                                     |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| nment                | (In/Out)                                                                                                                                                                                                                                                      |                                                                                                     |
|                      | Noise (at 1meter)                                                                                                                                                                                                                                             | ≤65dB(1 meter away)                                                                                 |
|                      | Operating Ambient Temp                                                                                                                                                                                                                                        | -10℃ to -50℃ Other temperatures can be customized                                                   |
|                      | Humidity                                                                                                                                                                                                                                                      | 0-90%, non-condensing                                                                               |
|                      | Operating altitude (m)                                                                                                                                                                                                                                        | ≤6000m, derating required above 2000 meters (1% derating for every 100 meters increase in altitude) |
| Indicator lights     | Bypass, Inversion (or Operation, Fault)                                                                                                                                                                                                                       |                                                                                                     |
| Display method       | Touchscreen/LED digital display                                                                                                                                                                                                                               |                                                                                                     |
| Protection functions | It features multiple protection functions, including input reverse connection protection, input over/undervoltage protection, output overload/overcurrent protection, three-phase voltage imbalance protection, drive protection, and overheating protection. |                                                                                                     |
| Emergency shutdown   | Equipped with an emergency stop button.                                                                                                                                                                                                                       |                                                                                                     |
| Protection level     |                                                                                                                                                                                                                                                               | IP20 (customizable to IP54)                                                                         |

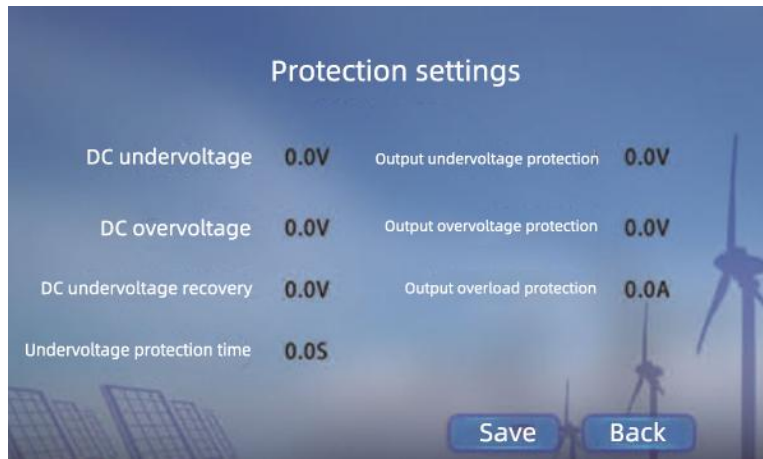
| Three-phase inverter power supply parameters |                                         |                                                                                                                                                |      |    |     |       |     |      |      |
|----------------------------------------------|-----------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------|------|----|-----|-------|-----|------|------|
| Model                                        |                                         | LNS*—S—*K                                                                                                                                      |      |    |     |       |     |      |      |
| Power (KVA)                                  |                                         | 10                                                                                                                                             | 30   | 50 | 100 | 200   | 500 | 800  | 1000 |
| DC Input                                     | Input voltage range                     | 40-850V<br>The DC voltage range can be selected according to the power requirements; other voltages are available upon request.<br>(850-1500V) |      |    |     |       |     |      |      |
|                                              |                                         |                                                                                                                                                |      |    |     |       |     |      |      |
| Bypass input                                 | Allowable Input V Range                 | 380VAC±15%, other voltages available upon request                                                                                              |      |    |     |       |     |      |      |
|                                              | Input frequency range                   | 50/60Hz±5Hz, other frequencies available upon request                                                                                          |      |    |     |       |     |      |      |
|                                              | Bypass transfer time                    | ≥200ms, customizable to <10ms                                                                                                                  |      |    |     |       |     |      |      |
| Communication Output                         | Rated V & Freq                          | 380VAC 50/60Hz Other voltages/frequencies are available upon request.                                                                          |      |    |     |       |     |      |      |
|                                              | Output V Accuracy                       | ±1%                                                                                                                                            |      |    |     |       |     |      |      |
|                                              | Output Freq Accuracy                    | ±0.1%                                                                                                                                          |      |    |     |       |     |      |      |
|                                              | Rated Current (A)                       | 15.2                                                                                                                                           | 45.6 | 76 | 152 | 303.9 | 760 | 1216 | 1520 |
|                                              |                                         | The rated current is calculated based on an output voltage of AC380V.                                                                          |      |    |     |       |     |      |      |
|                                              | THD (Waveform Distortion Rate)          | <3% (linear load)                                                                                                                              |      |    |     |       |     |      |      |
|                                              | Dynamic Response Time                   | 2ms (load 0-100%)                                                                                                                              |      |    |     |       |     |      |      |
|                                              | Overload Capacity                       | 110% for 10 minutes, 200% for 3 seconds, customizable up to 400% for 1 second                                                                  |      |    |     |       |     |      |      |
|                                              | CF (Crest Factor)                       | 3:1                                                                                                                                            |      |    |     |       |     |      |      |
|                                              | Max Inverter Efficiency                 | 100%                                                                                                                                           |      |    |     |       |     |      |      |
| Working Environment                          | Insulation Strength (In/Out)            | 1500VAC,1 minute                                                                                                                               |      |    |     |       |     |      |      |
|                                              | Noise (at 1meter)                       | ≤65dB(1 meter away)                                                                                                                            |      |    |     |       |     |      |      |
|                                              | Operating Ambient Temp                  | -10℃ to -50℃ Other temperatures can be customized                                                                                              |      |    |     |       |     |      |      |
|                                              | Humidity                                | 0-90%, non-condensing                                                                                                                          |      |    |     |       |     |      |      |
|                                              | Operating altitude (m)                  | ≤6000m, derating required above 2000 meters (1% derating for every 100 meters increase in altitude)                                            |      |    |     |       |     |      |      |
| Indicator lights                             | Bypass, Inversion (or Operation, Fault) |                                                                                                                                                |      |    |     |       |     |      |      |
| Display method                               | Touchscreen/LED digital display         |                                                                                                                                                |      |    |     |       |     |      |      |

|                      |                                                                                                                                                                                                                                                               |  |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
| Protection functions | It features multiple protection functions, including input reverse connection protection, input over/undervoltage protection, output overload/overcurrent protection, three-phase voltage imbalance protection, drive protection, and overheating protection. |  |
| Emergency shutdown   | Equipped with an emergency stop button.                                                                                                                                                                                                                       |  |
| Protection level     | IP20 (customizable to IP54)                                                                                                                                                                                                                                   |  |

## Operating Interface

Color touch screen, integrated display and control, supports Chinese and English language switching.





## Optional Features:

Input Dry Contacts: Start/Stop control dry contact, Reset control dry contact, etc.

Output Dry Contacts: Running status dry contact, Fault status dry contact, Power-on status dry contact, Generator start/stop dry contact, etc.

Dry Contact Definitions:

(1) Start/Stop Control Dry Contact: Input type, equipment runs when the dry contact is closed; equipment stops when the dry contact is open.

(2) Reset Control Dry Contact: Input type, when the dry contact changes from open to closed (rising edge of the signal), the equipment performs a fault reset; the closed state of the dry contact should be no less than 1 second.

(3) Running Status Dry Contact: Output type, the dry contact operates when the equipment is running and stopped, 1NO+1NC.

(4) Fault Status Dry Contact: Output type, the dry contact operates when the equipment malfunctions, 1NO+1NC.

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

(6) Generator Start/Stop Dry Contact: Output type, the dry contact operates to control the generator start/stop before the battery voltage discharges to the undervoltage level and after the battery is charged to the float charge voltage. The start/stop action voltage is configurable, 1NO+1NC.

Note: For the number of dry contacts selected and definitions of other functional dry contacts, please contact technical support for details.

**Guangzhou IDEALPLUSING information technology co., LTD**

Tel: +86-20-89282095    E-mail: [info@idealplusing.com](mailto:info@idealplusing.com)    Mobile/Whatsapp: +86-18928830209

Website: [www.idealplusing.com](http://www.idealplusing.com)    [www.idealpowersupply.com](http://www.idealpowersupply.com)

[www.jmhvpower.com](http://www.jmhvpower.com)    [www.ybyps.com](http://www.ybyps.com)    [www.azyps.com](http://www.azyps.com)

ADD: NO.85 Gaopu Road, Tianhe, Guangzhou, Guangdong Province, China. 510520.