

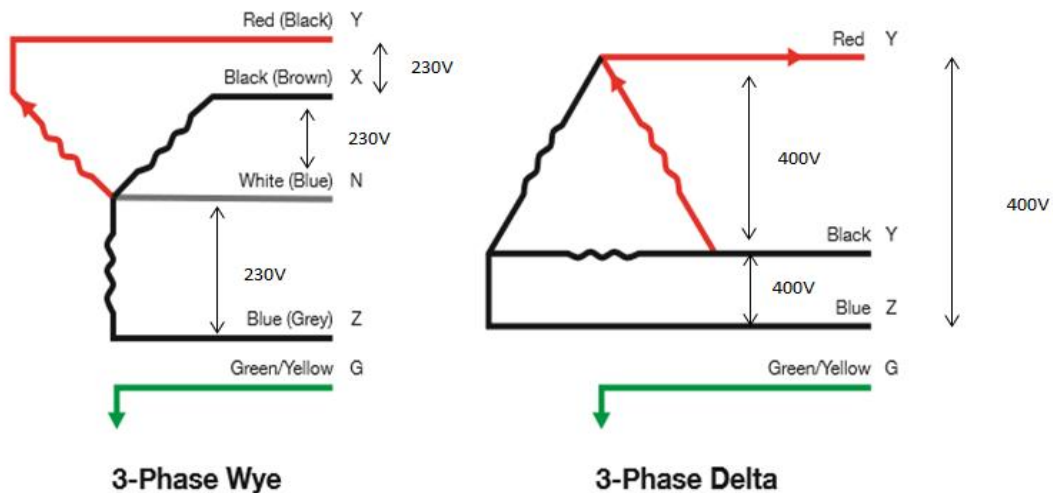
Application Note No. 004

Inverter Compatibility with Different Grid Types

Version History

- Version 01 (2020-06-20)
Initial Release

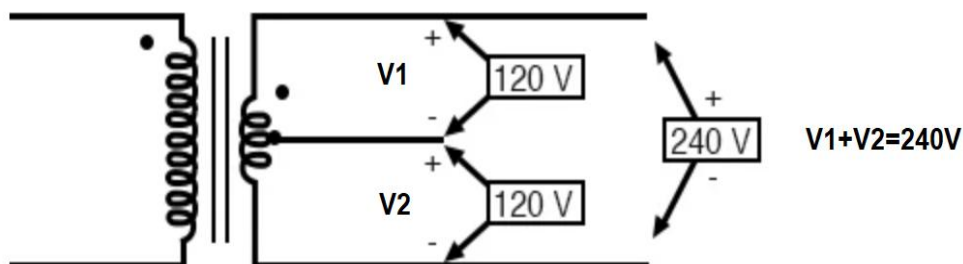
Most countries in the world use a supply of standard 230 V (phase voltage) and 400V (line voltage) with neutral cables at 50Hz or 60Hz. Or there might be a Delta grid pattern for power transportation and industrial use for special machines. As a corresponding result, most of the solar inverters for house use or commercial rooftops are designed on such a basis.



However, there are exceptions, this document will introduce how common Grid-tied inverters are used on this special Grid.

1. Split-phase supply

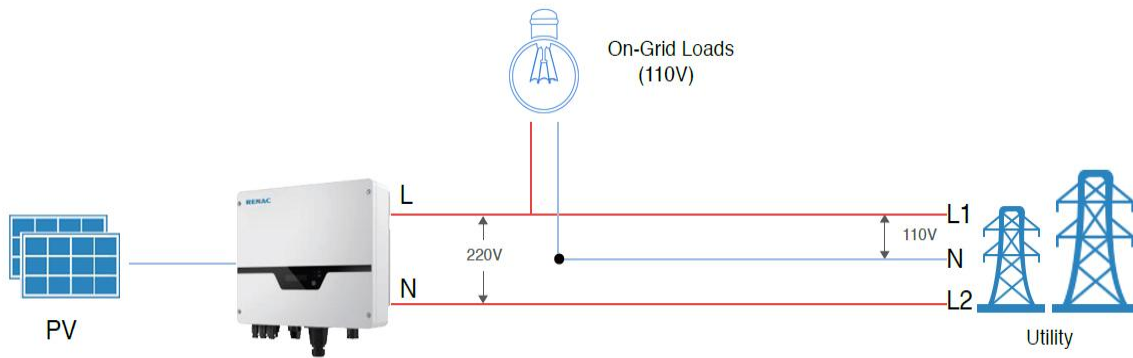
Like the United States and Canada, they use a grid voltage of 120 volts \pm 6%. Some areas in Japan, Taiwan, North America, Central America, and northern South America use voltages between 100 V and 127 V for normal household power supply. For house use, the grid supply pattern, we call it split-phase power supply.



As the nominal output voltage of most Renac Power single-phase solar inverters is 230V with neutral wire, Inverter will not work if connected as usual.

By adding two phases of the power grid (phase voltages of 100V, 110V, 120V, or 170V, etc.) connecting to the inverter to fit the 220V / 230Vac voltage, the solar inverter can work normally.

The connection solution is shown below:

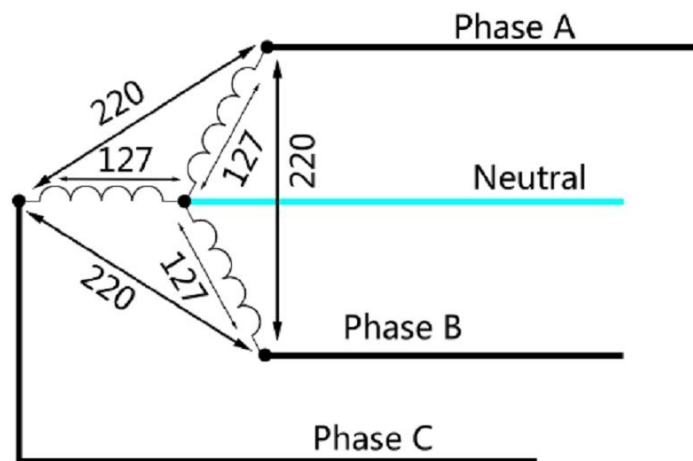


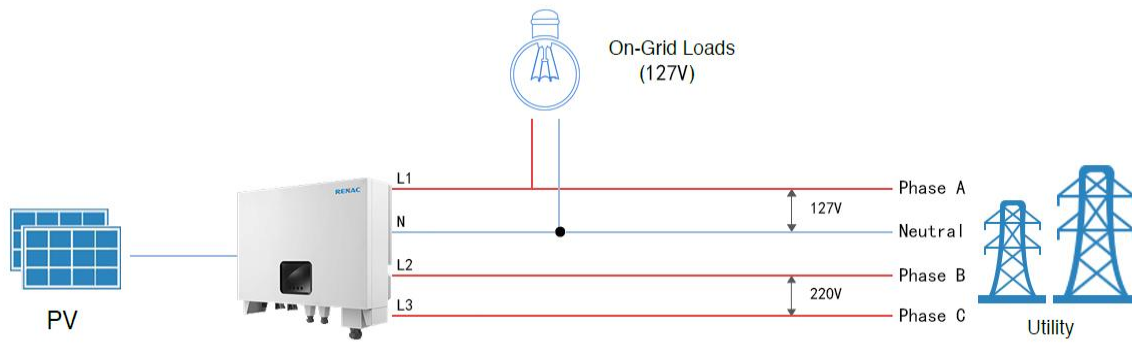
Note:

This solution is only suitable for single-phase grid-tied or hybrid inverters.

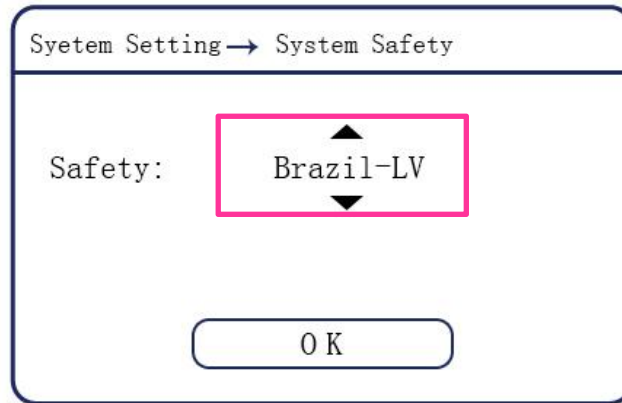
2. 230V three-phase Grid

In some regions of Brazil, there is no standard voltage. Most federative units use 220 V electricity (three-phase), but some other – mainly northeastern – states are on 380 V (three-phase). Even within some states themselves, there is not one single voltage. According to different uses, it can be a delta connection or a wye connection.





To fit such electricity system, Renac Power provides a solution by LV version Grid-tied 3-phase solar inverters NAC10-20K-LV series, which include NAC10K-LV, NAC12K-LV, NAC15K-LV, NAC15K-LV, which could use with both Star Grid or Delta Grid by commissioning on inverter display (just need to set inverter safety as “Brazil-LV”).



Below is the datasheet of the MicroLV series inverter.

Model	NAC10K-LV	NAC12K-LV	NAC15K-LV	NAC20K-LV
DC Input Data				
Max. Recommended PV Power	16900W	20800W	22100W	26000W
Max.DC Input Voltage	800V			
MPPT voltage Range	200-650V			
Start-up Voltage	250V			
No. of MPP Trackers	2			
No. of Input Strings per Tracker	2/2	3/3	3/3	3/3
Max. DC Input Current	20A/20A	30A/30A	30A/30A	30A/30A
DC Switch	Integrated			
AC Output Data				
Rated AC Power	11000@208Vac	14000@208Vac	15000@208Vac	17000@208Vac
	12000@220Vac	15000@220Vac	16000@220Vac	18000@220Vac
	13000@240Vac	16000@240Vac	17000@240Vac	20000@240Vac
Max.output power	13000VA	16000VA	17000VA	20000VA
Max. AC Current	32A	40A	43A	48A
Rated AC Voltage/Range	150-300V			
Grid frequency/ range	50Hz/60Hz ; ±5Hz			
Adjustable Power Factor[cos φ]	0.8leading~0.8lagging			
Output THDi(@Rated Output)	<3%			

3. Conclusion

Renac's MicroLV series three-phase inverter is designed with low voltage power input, specifically tailored to small commercial PV applications. Developed as an efficient response to South American market needs for low-voltage inverters above 10kW, it applies to the different grid voltage ranges in the region, which mainly covers 208V, 220V, and 240V. With the MicroLV series inverter, the system configuration can be simplified by avoiding the installation of an expensive transformer which adversely affects the system's conversion efficiency.