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ABCs of Inverters

About Inverters

An electronic device known as a power inverter or inverter converts direct current (DC) to alternating current (AC). It converts alternating current (AC) to direct current (DC) during mains present while by passing the AC mains and charging the battery (DC).

Classification of Inverters

Inverters can be classified based on two types:

A. Based on Input DC power source: 12V/24V/48V

12V/24V/48V Inverters are rated in VA and Volt. The capacity of an inverter is measured in VA and the volt rating determines the number of batteries required to connect with the Inverter. The battery which is used in the inverter application is of 12 Volt. Hence, a 12 Volt UPS would require 1 battery and 48 Volt UPS would require 4 (12*4) batteries.

1. **12 V DC:** For smaller consumer and Home energy inverters e.g: LG700E, LG900, LG1100, LG1450i, LG1550i, LGS900i, LGS1000i, LGS1100i & LGS1600.

2. **24, 36, and 48V DC:** For home and commercial purposes. e.g: LGS1700, LG1950i, LG2300, LGS2500, LGS3000, LGS4000, LG3500, LG5000, LGS5000 & LGS6000.

B.Based on Output waveform: Sinewave/Squarewave

1. **Pure Sine Wave:** Inverters provide a clean power supply like grid power which ensures the safety of appliances and also reduces the noise level from appliances like fans, lights, and television, etc. Livguard sine wave inverters also support sensitive appliances like computers and laptops.

2. **Square Wave:** Square wave inverters are basic inverters. In the absence of mains, they provide power.

VA Rating

Volt Ampere is the full form of VA. "V" is the voltage and "A" is the current that is transferred by the inverters to the appliances.

Other Features

Regulated(UPS) and Unregulated(ECO) mode

In regulated (UPS) Mode, the Switch should be kept in this mode when the computer is to run as this will ensure regulated voltage input of 180V to 260V which is suitable for sensitive appliances like computers.

Unregulated (ECO) Mode allows the flexibility to charge the UPS at low voltage.

Thermal Circuit Breaker/MCB Protection:

It is used for protecting inverters in case of very high load connected in mains mode.

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Choosing
The Right Inverter

Suppose a household needs the following appliances to run on an inverter:

Appliances	Power Rating (in watts)	No. of App	Total Power Required (in watts)
Ceiling Fan	80	3	240
Tube Light	18	3	54
LED TV	65	2	130
Laptop	45	3	135
Wifi Router	20	1	20
	Total Power Requirement		**579**

How to convert VA from Watt?

The measuring unit of the inverter is VA which is the Voltage Ampere. Usually, to find out VA from wattage, we divide the wattage of the sum of appliances by 0.7 (power factor of UPS). i.e. 579 watts means 827 VA.

Let's understand the following example:

"VA Rating of Inverter = Power Requirement / Power Factor
579/0.7 = 827 VA"

Inverter with 900 VA would be suitable.

*Note: The power factor depends on the type of appliances used and it generally varies from 0.7 to 0.8. In the above calculation, it is taken as 0.7. For Heavy Loads just as AC, Washing machines, water pumps, etc, need to choose heavy-duty inverters.

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ABCs of Batteries

About Battery

Inverter Batteries supply stored chemical energy
to the inverter/UPS in form of electrical energy & vice versa.

Battery Types (Based on Container)

1. Tall Tubular

2. Short Tubular

3.Short Tubular Jumbo

4. Short Tall Tubular

Battery Capacity

Inverter Batteries supply stored chemical energy
to the inverter/UPS in form of electrical energy & vice versa.

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Choosing
The Right Battery

Choose the right battery according to the required backup:

Let's assume that you need a battery for 2 hours backup for the running appliances of 827VA, 579Watt (previous example of choosing the right inverter).

Battery Capacity = Power requirement(VA)
* Backup Hours(Hrs)/Battery Voltage(Volts)

Battery Capacity = (827*2)/12 = 139Ah

150Ah battery will work as per the taken loads.

*Note: Battery performance degrades according to the usage, therefore you are recommended to buy a 5-10% higher capacity battery.

Double Battery Selection Single Battery and Double Battery:

Assume that you need 4 hrs backup for the same running load.

Battery Capacity required = (827*4) / 12 = 275 Ah

For this backup you will need **2 batteries of 150Ah to provide 300 Ah** as Batteries available between 90-260Ah, and 24V (12*2) output comes with 2 Batteries, hence choose the right inverter which supports 24V input.

Battery Warranty

Warranty of the battery is expressed as:

'Replacement Warranty' + 'Pro-rata Warranty'

Replacement Warranty: Customer gets a free replacement during this period

Pro-rata Warranty: Customer gets a discount on the new battery purchased.

Example:

36 + 24*, 36 Month will be Replacement Period & 24 Months will be ProRata Warranty

Please refer to the Chart for Discount % in ProRata Warranty.

Discount %

Pro Rata Warranty

Model	Ah	Flat	Pro-rata	Total warranty	1-6 Months	7-12 Months	13-18 Months	19-24 Months	25-30 Months
IT 9048ST	90	24	24	24 + 24	45%	40%	35%	25%	
IT 1048ST	100	24	24	24 + 24					
IT 1172STT	110	42	30	42 + 30					25%
IT 481200ST	120	24	24	24 + 24					
IT 481400ST	135	24	24	24 + 24					
IT 481500ST	150	24	24	24 + 24					
IT 2060TT	200	36	24	36 + 24					
IT 1548STJ	150	24	24	24 + 24					
IT 1560STJ	150	36	24	36 + 24					
IT 1548STT	150	24	24	24 + 24					
IT 1560STT	150	36	24	36 + 24					
IT 1560TT	150	36	24	36 + 24					
IT 1672TT	160	42	30	42 + 30					25%
IT 1848STJ	180	24	24	24 + 24					
IT 1860TT	180	36	24	36 + 24					
IT 2048TT	200	24	24	24 + 24					
IT 2360TT	230	36	24	36 + 24					
IT 1572TT	150	42	30	42 + 30					25%
IT 1578TT	150	48	30	48 + 30					
IT 1584TT	150	60	24	60 + 24					
IT 1872TT	180	48	24	48 + 24					
IT 2072TT	200	48	24	48 + 24					
IT 2272TT	220	48	24	48 + 24					
IT 2672TT	260	42	30	42 + 30					25%
IT 1636STJ	160	18	18	18 + 18	40%	35%	25%		
IT 1536TT	150	18	18	18 + 18					
IT 1548TT	150	30	18	30 + 18					
IT 1648TT	160	27	21	27 + 21				25%	
IT 1642TT	160	24	18	24 + 18					