

HOW TO BUY AN INVERTER ?... BUYER'S GUIDE



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An One Looker for Inverter Buyers.

INTRODUCTION

The technology has achieved greater heights and reached well within the range of common man, even though the buyer will be confused in most of the occasions when he is planned to buy an electrical or electronic equipment.

Now a days Inverters play a vital role in home electrics. Inverters are meant to serve for longer period of time may be up to 5 years, 10 years or more...

Most of the buyers get confused in taking the decision to procure an inverter for their home or office.

This book is based on the information and experience gained from the production and distribution areas of Inverters and UPS since 1995.

This publication solves the common man's doubts and confusions that may likely to arise when installing an inverter at home. Technical terms are possibly avoided throughout the work of this book.

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1.

WHAT IS AN INVERTER...?



An inverter is an electronic equipment, converts DC voltage stored in a battery into 230 Volt AC during power failure. Available in different capacities rated as 600 VA, 850 VA, 1 KVA, 2 KVA etc. With an inverter almost all electrical or electronic appliances can be operated smoothly like conventional AC supply.

Sine Wave and Square wave models are available. Square wave models are comparatively cheap. Inductive loads like fan, motors etc will produce little noise on back up. Sine wave models provide AC with the same quality as that of grid supply by Govt. sources. Friendly with motorized loads. Efficiency is also high.

Recommendation: Sine wave inverters

2.

HOW DOES AN INVERTER WORK...?



A lead acid battery is charged with the conventional AC supply when the power is present. An in-built charger is incorporated inside the inverter. When the mains power fails, an electronic control circuit and a transformer get activated and generates 230 Volt/50 Hz AC. This AC is used to operate the recommended appliances connected to it.

By principle inverter and UPS are similar, The UPS is mostly used to operate computer systems because, its changeover speed from conventional AC to inverter mode is far high to prevent reset than that of a conventional inverter used to operate common electrical appliances.

3. **WHAT TYPE OF ELECTRICAL APPLIANCES CAN BE WORKED WITH AN INVERTER...?**



Light Duty Mixer Grinder

Inverters are designed to work on different load levels. When used, the load level should not exceed the maximum of 70% or 80% of the total rated capacity of the inverter.

Ex: A 600 VA inverter shall only be operated to a load level of 450 Watt to 500 Watt maximum.

To determine the capacity of the inverter you are planning to buy, the first step is to calculate the power of the electrical appliances going to be connected with the inverter in **Watt**.

Two schemes are given below to meet the requirement of an average customer:

Scheme-1

Tube lights	40 Watt	4 Nos:
Fan	70 Watt	3 Nos:
Television	32" (LED)	1 No:

To meet this requirement **600 VA** inverter can be opted.

Scheme-2

Tube lights	40 Watt	7 Nos:
Fan	70 Watt	5 Nos:
Television	32" (LED)	1 No:

To meet this requirement **800 VA** inverter is suitable.

Electrical appliances not recommended to use with the inverter....



Electric iron, Refrigerator ,Power Tools,Motors & Pump set, Heater, Air conditioner, Hair dryer,Washing Machine, Grinder, Ovens etc. are not advised to work on inverters. An 850 VA above rated inverter can run a small mixer grinder (Mixi) with no other loads.

4. TABLE TO CALCULATE THE POWER (WATT) OF HOME ELECTRICAL GADGETS...

ELECTRICAL APPLIANCE	POWER IN WATT
1. Tube light-ordinary magnetic ballast type	40 to 60 Watt
2. Tube light-With electronic choke	30 to 35 Watt
3. Ceiling fan	70 to 90 Watt
4. Ordinary filament lamps	Printed over the bulb
5. Common CFLs	5 to 18 Watt
6. Television (old CRT type)	150 to 350 Watt
7. LCD or TFT type	50 to 200 Watt
8. Light duty mixer grinder or mixi	750 Watt
9. Electric iron	1000 Watt or above
10. Vacuum cleaner	700 Watt or above
11. Computer	350 Watt
12. Refrigerator (165 Litre)	300 to 450 Watt
13. Audio-Video equipment	150 to 1500 Watt
14. Coffee Heater	1000 Watt or above
15. Hair drier	1000 Watt or above
16. Steaming Equipment	1000 Watt or above

5. HOW MUCH TIME DOES THE INVERTER WORK DURING POWER FAILURE...?



The back-up time of the appliances connected to the inverter is determined by the capacity of the battery used . Batteries are rated as 12 Volt/40 Ah (Ampere hour), 12 Volt/60 Ah, 12 Volt/80 Ah, 12 Volt/100 Ah, 12 Volt/120 Ah etc.

The listed schemes (Scheme 1 and 2), full load will continuously work for 1 hour to 1 ½ hours with a 12 Volt /100 Ah battery.

No: of appliances to be connected with the inverter is decided by the rating (capacity) of the inverter, Higher capacity battery or addition of extra Nos: of the batteries will not help.

The back-up time can be considerably increased by using the inverter only for low energy consuming loads like LED tubes, LED lamps and CFLs instead of common tube lights.

Ex: One 40 Watt tube light can be replaced with a 16 Watt CFL .

2 or 3 fans only will run continuously for more than 8 hours .

Just note, the batteries are not generators. It fails to work when it is discharged. **Once the battery is fully discharged, it will take about 6 to 10 hours to get it fully charged.** During this charging period, if another power failure occurs the battery can not provide an extended back-up. Reduce the load to minimum or turn-off the inverter during this situation.

Normally the inverters rated above 1500 VA, 2 or more Nos: of batteries to be connected in series.

An inverter designed to work on 12 Volt will never work on 24 Volt or higher ratings. Similarly 24 Volt units never work on 12 Volt or below.

6.

HOW TO BUY A BATTERY...?



The most important consideration to be taken when an inverter is planned. Battery is the most expensive part in an inverter installation.

Batteries are classified in to 3 categories for inverter/UPS use :

- a. Tubular
- b. Non-Tubular
- c. Sealed maintenance Free (SMF)

Inverters can be worked with any one of these .**But it is strongly recommend to use only Tubular batteries with inverter or UPS.** If periodic maintenance is difficult SMF category can be opted.

7. WHY TUBULAR BATTERY IS RECOMMENDED...?



Plates of a tubular battery

Lead acid batteries used in inverters and automobiles are made with lead plates immersed in dilute sulphuric acid .

Automotive battery is meant for starting a vehicle. An automotive battery develops huge quantity of current, only for a very short period of time. By this reason, the plates of an automotive battery are thin and flat, especially positive plates. Such a heavy current rush is not required in an inverter operation. Battery used along with an inverter should supply a steady current for an extended period of time. The plates in the tubular batteries,(especially the positive plates) are very thick and will last for several years. A good tubular battery will serve you for about 3 to 5 years or more . The efficiency will be lowered after 2 years after it's installation. Tubular batteries normally carry a warranty for 36 to 60 months.

Non-Tubular batteries are mostly modified automotive batteries with altered flat terminals.

The life is less than that of a tubular battery. Warranty also will not cover more than 18/24 months normally.

After finalizing the decision to buy a tubular battery, next step is to select the brand and model of the battery. A good inverter provider can help you in this matter. Tall tower type batteries are considered to be the best in longer life and performance. For some batteries the warranty will be denied, if the inverter or UPS is not the brands listed by the battery manufacturer. Clarify this when you place the order.

Battery should be purchased only from the dealers with reliable service history, credibility and reputation. Make total clarification about the terms and conditions of warranty before paying the money. Total replacement, service only, buy back against new battery etc. are the common areas to be clarified. For many batteries the warranty status can be inspected through internet. QR Code verification is also possible

Battery connected to the inverter is charged with an in-built automatic charging system incorporated inside the unit.

8. SEPARATE WIRING IS REQUIRED FOR INVERTER INSTALLATIONS ...?



A newly built home probably equipped with a separate wiring for the appliances to be connected to the inverter. Total separate wiring for the entire home or office is not required. By making nominal changes in the distribution box is enough to install an inverter. This process is not expensive anyway.

9. HOW MANY TYPES OF INVERTERS ARE THERE ?...

Mainly there are two types: Sine wave and Square wave. Square wave inverters are comparatively cheaper. The motorized loads like fan etc. produce a humming sound when runs on square wave inverters but this will not cause any harm to the appliances. Televisions are work well with square wave inverters. Sine wave inverters give the output with almost the same properties of conventional AC supply. Fan, motorized loads etc. will work smoothly and it's efficiency is also high. Except a hike in the price Sine wave inverters are better in performance.

Inverters manufacturing in other states are also flooded in the market. Many of them are cheaper in price. Cost of an inverter can be lowered considerably by compromising the quality of transformers, relays and many parts.

Inverters are meant to work for years with low energy losses and better efficiency. A temporary saving may ultimately leads to heavy losses in power and unbearable repairing charges.

It is important to note that the service facility should be assured locally through the dealer or by direct manufacturer. Enquire about the credibility of the provider before you place the order.

After installing the unit ,it is your right to assure the rated capacity of the inverter by conducting a test with maximum load on back-up mode. You can demand this to the provider.

10.

HOW TO MAINTAIN THE BATTERY ?...



Fluid top-up



Sulphate deposit in terminals

The most important part in the maintenance part of an inverter installation is the care of battery .Each cell of the battery should be topped-up with de-ionized or distilled water periodically. Water level should not be allowed to fall below the recommended level. Do not spill the water from the cells, this will lead the loss of specific gravity which in turn results in low back up time. Water level should be checked at least once in 4 months.

If there is a sudden loss or decrease in the water level or the battery starts to boil or presents excessive bubbling, immediately contact service. The battery may be faulty or the charger may be defective. Periodically clean the terminals of battery and check the health of lugs connected at the wires. Extreme care should be taken while cleaning the terminals because the chemicals if come in contact with eyes or skin can cause severe burns or even the loss of eye sight.. After cleaning, apply a thin layer of white petroleum jelly over the terminals(only if required).

Important: If there is no power failure or power cut for quite a long time, turn off your mains switch and make the inverter to work for 30 minutes at least once in a week. This will increase the life of battery. Discharging is equally important for a battery to enhance it's extended life and overall performance.

11. WHAT ARE THE COMMON COMPLAINTS OF AN INVERTER?...

1. **Melting/burning** of input AC fuse: Happens when the inverter exceeds the load higher than the maximum rated capacity. Mains indicator will not work in this state even if the conventional AC is present. Reduce the load and replace the fuse cartridge with the same rating. **Turn-off the mains switch and inverter on-off switch before doing this.**

2. Burning of DC fuse: DC fuse blows when an excessive load current flows through it. Mostly, the DC fuse is kept inside the inverter. You have to contact service to replace it.

3. Over load trip: When the connected load exceeds the maximum capacity of the inverter, it gives an audio-visual indication and stops the back up temporarily. Most of the inverters have an automatic restart for 3 to 5 times. During this period you can turn off the excess load. If you fail to do so, the inverter enters in to a permanent cut-off or trip state. Trip or cut indicator will also turn-on now.

All appliances connected to inverter fails to get power either from the conventional AC supply or from the inverter. During this condition switch-off the unwanted load and turn-off the inverter-on switch, wait for 5 seconds and turn it on again. The unit resets and starts to function normally. Some times heavy lightning can also make the unit in to trip state. Battery- low condition can also leads to trip the unit.

4. Low battery: If the battery is almost fully discharged, the inverter never gives it's rated back-up time again before it gets fully charged. It will take about 6 to 12 hours to charge the battery near to fully charged state. Minimize the usage of inverter at this time.

5. Detachment of connecting eyelets or lugs of wires from the battery to the inverter: Replace it through your service.

6. Effluence of smoke and unusual smell: Burnt FETs or transformer. Contact service personal.

Checking the inverters by opening the lid is potentially dangerous, It can cause severe electric shock or even death. Contact your dealer or the manufacturer only, to service it.

7. Shortened back up time: Check the battery. If it is too old replace it with a new tubular battery.

12. IS IT POSSIBLE TO CONVERT A DOMESTIC INVERTER INTO A SOLAR POWERED INVERTER ?...

Yes, ordinary domestic inverters can be converted to solar charged inverters by incorporating solar panels with sufficient capacity and solar charge controllers. The process is expensive.



The information provided in this publication is helpful for a non-technical common man to buy and maintain the inverter and its battery .

Publishers:

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- i. Inverters,UPS,Stabilizers,Surge Protection systems,DC and AC power supplies,Servo stabilizers,Transformers,and Solar energy systems
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