WE CREATE POWER

SUDHAN ENTERPRISES

Presenting to YOU...

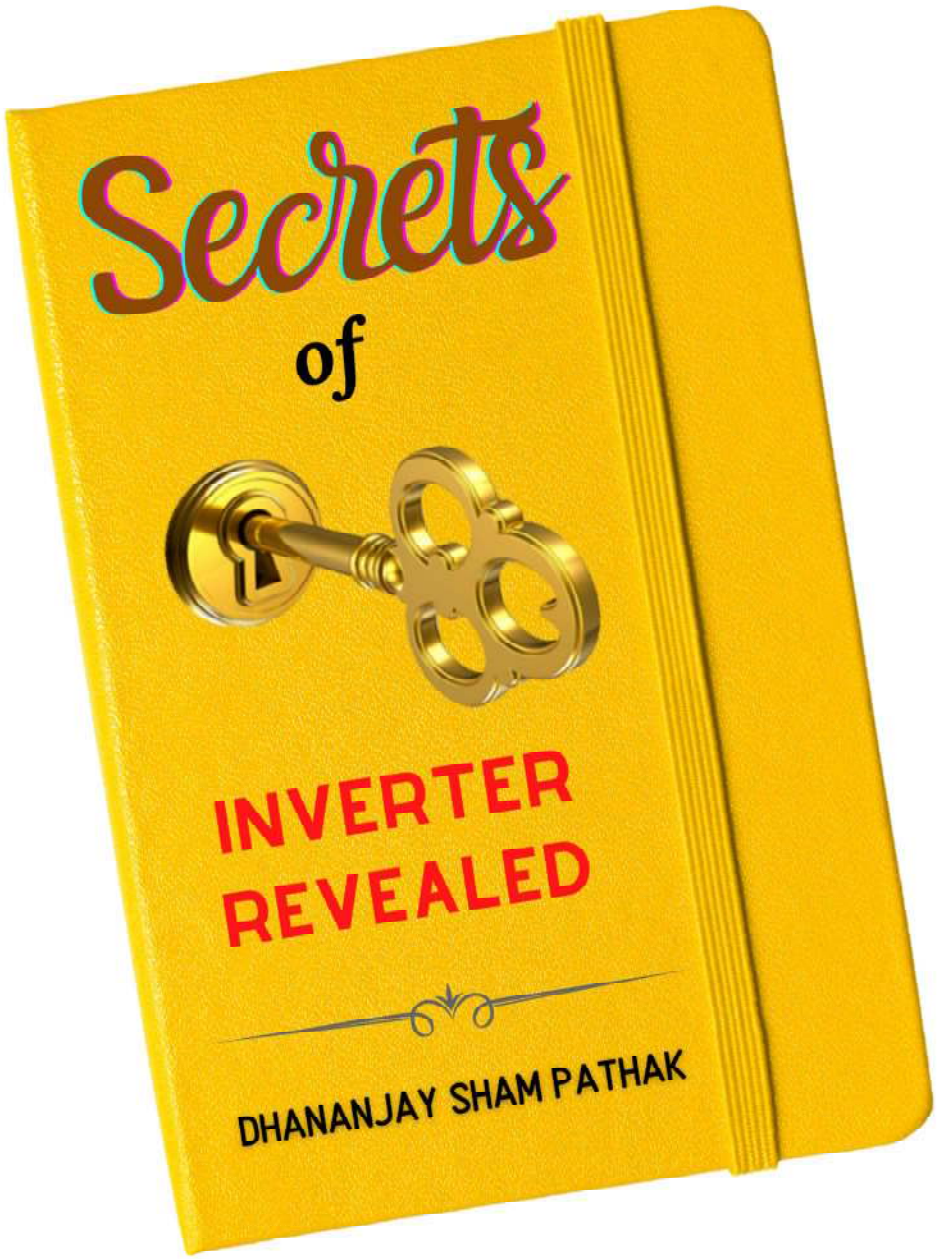


Table of Contents

Welcome to the Fourth Edition of this E-Book
The 4th Revised Edition is published in October' 2020.

Since in the last few years, there are lot of changes in Inverter Market. The prices decreased, competition is increased. More and more people are now aware of the Technology.

The old Pulse width Modulation Square-wave Technology is been replaced by superior Digital Sine-wave Technology.

However the basics do not change.

By rule of Thumb, people buy Inverter based on price, payment facilities, and features offered. However they miss on one very crucial point and that is After-Sales-Service.

It is the reliable After-Sales-Service which keeps your Inverter system alive. Without proper Service the entire System fails and becomes USELESS, hence make sure at least twice about this aspect, before purchasing.

I have written an exclusive Tips page "How to choose your Supplier". Be sure to read it.

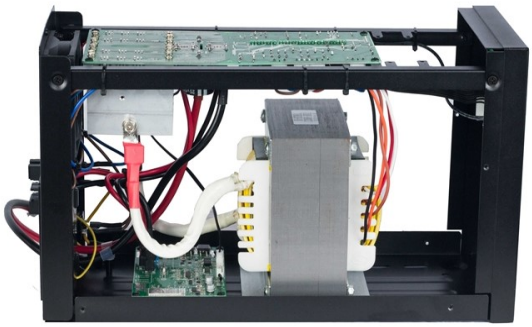
How to use the E-Book?

This E-Book is written considering a non-technical person in mind. Hence if you follow the topics as they are indexed and written, you will get more knowledge instead of jumping to different pages randomly.

Please see **Table of Contents** and then select Pages one by one.

Discover the Insiders View of Inverter

The General information



What is it, how it works in all Jargon free
and easy to understand language.

Take any Inverter and you will find the 3 basic parts

1. Charger Unit
2. Control Unit
3. Inverter Unit

How The Charger Circuit works

The Charger unit that is coupled with Electronic Circuit charges the Battery till it is fully charged. An electronic overcharge cutout thereafter stops further charging of Battery thus preventing damage to the Battery.

The example could be just as in case of any Water Tank. Once the water gets filled upto a specific mark, the BALL COCK stops water inflow.
This is a mechanical phenomenon. In inverter similar action is achieved electronically.

Automatic Changeover from MSEB to Inverter (during power failure) and from Inverter to MSEB (after power resumes)

TIP: ALWAYS CHOOSE AN INVERTER, WHICH HAS OVERCHARGING PROTECTORS, AS IT SAVES YOUR BATTERY & OFF COURSE YOUR HARD-EARNED MONEY.

HOW CONTROL CIRCUIT WORKS

A Control Circuit is responsible for all the activities of Charger and Inverter Circuits.
It is just like a mini computer that acts automatically through the set of desired commands.

It directs the Charger Circuit to charge the Battery when Regular Electricity is available. It starts Inverter Circuit upon power failure.

During Power failure when entire load in on Inverter and battery, the control Circuit constantly monitors the current consumption and load on inverter. If by any reason there is an excessive load on Inverter it immediately steps in to stop the inverter and thus protects inverter.

The Control Circuit should in short perform following works:

- Direct Charger to charge Battery during presence of Electricity & stop charging once Battery is fully charged.
- Monitor the input and output current.
- Direct Inverter to generate electricity upon Power Failure.
- Stop Inverter when Regular Electricity Resumes.
- Protect & Synchronize the Electronic & Electrical Circuit during crisis.

HOW INVERTER WORKS

Inverter's working is completely opposite to that of the Charger
The word “Invert” means to reverse. Basically Inverter takes DC Power from battery, converts it into A.C. Power and steps up the voltage from 12 Volts to 230 Volts. This is done by DC to AC conversion technology & step up transformer.

AUTOMATIC OPERATION AND CHANGEOVER

This Change Over from Mains Power to Inverter takes hardly 0.25 seconds.
So as soon as power fails, immediately power from Inverter, is given to the load without any smoke or noise. This automatic feature gives an edge over the contemporary generators that require a manual start.

In this process of Inverter operation, Inverter discharges the battery. It is advisable to stop the battery from further discharging, once the battery attains a desired low voltage, since further discharging would damage the battery.

This Low or Min Voltage is to be considered. Hence an ideal inverter should have a low Voltage Cut out or DRAIN Preventer to enhance life of battery.

TIP: ALWAYS CHOOSE INVERTER, WHICH HAS LOW VOLTAGE CUTOUT FEATURE TO SAFEGUARD BATTERY.

CHOOSE THE RIGHT FEATURES

(a) **Overload Protector**:
Accidentally or by mistake if there is more load than the required, then so as to protect inverter, the Power Inverter should be stopped at once. This is done by an Overload Protector.
In this case the overloaded Inverter is stopped for 3 seconds and it restarts automatically.
If it is overloaded again it pauses for 3 seconds. This helps user to switch off unnecessary or extra points. Once the load is within the range Inverter starts automatically and smoothly.

(b) **Fuse Protection**:
A fuse blows off if the current crosses the safe limit. This ensures that the inverter and the output load is protected during excessive current.

(c) **Output Short Circuit Protection**:
The output if short-circuited can cause serious harm. This technologically advanced feature prevents losses. However it is an optional feature.

(d) **Capacity to sustain 25% overload for certain time**.
Any good inverter should take load more than it's capacity for a minimum time.

What to look for in Inverter?

What to look for in an Inverter, in all Jargon free and easy to understand language. To come to this conclusion, we need to answer following Questions:-

- How many points we need to have, during Power Failure?
- Whether the capacity of Inverter is greater than the requirements or it is just at par?
- Whether the required backup time and the available backup time match each other or not?
- Which is the Technology offered by the Supplier? Digital Sinewave is desired one.
- Whether Inverter be economical initially but costly for maintenance afterwards?
- What would be the arrangements of After Sales Services?
- Without After Sales arrangement, such Product would be useless.
- What kind of Battery is made available with the Inverter?
- Is it , Low Maintenance Tubular that requires regular topping up or Dry battery?
- Whether the Battery is branded or assembled.

  Note: Although the branded and Tubular Batteries cost more initially they consume a lot less Electricity while charging as compared to the assembled Batteries. Branded Batteries can be charged faster than assembled ones and they last longer too, which means Good value for Your Money.
- Who will take care of the Battery and how?
- Which Supplier has the facility of producing and Supplying De-ionized water for Battery?
- Which Supplier can arrange smooth Battery servicing as promised?
- What are the backup arrangements?
- In case of Inverter failure whether the BYPASS wiring arrangement Is made or not?
- What are the Service arrangements for Inverter?
- Whether the Supplier has technical competence and his Service. Personnel are qualified to give proper Service whenever the need arise?
- Since how many years the Supplier is working in the field? How many Customers he has?
- What is the opinion of the existing Customers about the Supplier and Product?
- Whether the Customers are satisfied by the Product performance and about the Supplier?

How to choose an Inverter for your needs ?

Choosing an Inverter, in all Jargon free and easy to understand language.

Take the right decision to choose your Inverter

The first thing that needs to be decided is the LOAD. The load includes number of Fans, Lights and other Gadgets that are needed in case of emergency to work through an Inverter.
The following Chart is helpful for taking the decision:

Model	Load suggested	Battery Specs. & Qty.
650VA / 12V	3 Lights + 3 Fans	1 Battery of 12Volts
900VA / 12V	4 Lights + 4 Fans	1 Battery of 12Volts
1500VA / 24V	7 Lights + 7 Fans	2 Battery of 12Volts

Once the Power of Inverter is decided, the next step is to decide the Backup time.
Backup time is simply, number of hours lighting load works on an Inverter during Power Failure.

The Backup time in hours can be calculated using following formula:

Back Up Time = AH x 12V x N x P.F. x Efficiency of Battery (0.9) Divided by Load in (VA)

Where,

AH stands for Ampere hour capacity of battery
N stands for Number of 12 V batteries needed
P.F. stands for Power Factor of Machine
EFF stands for Efficiency of Battery
Load stands for Number of Lights and Fans

How to choose your Supplier

Following are probable Guidelines to choose a better Supplier:

- He should be better qualified and experienced in the said field.
- He should be prompt in giving Services.
- He should be professional in attitude.
- He should have necessary Sales and Service infrastructure.
- His area of operations should include your place.
- He should have a better communication facilities like Phone, Mobile, E-mail/Website, in case we need support from him.
- He/ his Staff should be honest, co-operative & willing to give After Sales Service if needed.
- He should have sufficient Staff to take care of Customer.

So keep looking for the best Supplier who gives You After Sales Service.

Doing a Cross Verification about your Supplier from their existing Customers

MASTER TIP :

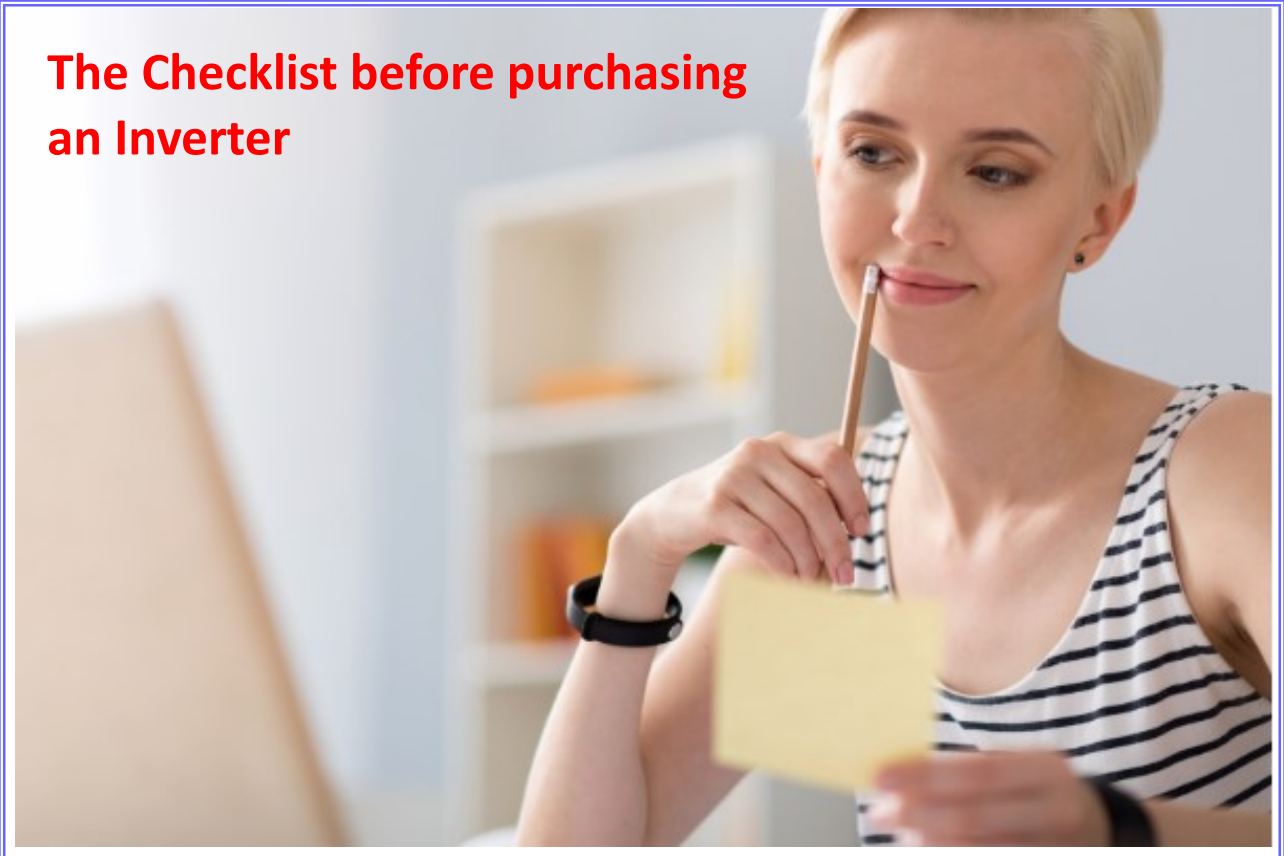
This is probably the most Important Step before purchasing almost any Gadget or Services. If you follow these Steps, You will always save Money, headaches plus time. And You will always remember me for the following Tips.

What to look for in a Supplier, in all Jargon free and easy to understand language.
Ask 2 to 3 existing Customers of your Suppliers following Questions to get required information:-

- Since how many years they are using the Products from the Supplier under consideration?
- Since installation, how was the Service received from the Supplier?
- Whether the claims made by the Supplier are true and really useful?
- Whether the Services of Supplier are professional, quick and in time as promised?
- How well the Serviceman is trained to solve your problems if they are any?
- What are the ways to register your Complaint?
- Overall what are good and bad points of Supplier as observed by the existing Customers?
- Is existing Customer happy with the Products/Services? If so, will they recommend it to others?
- Overall what is the perception of company from the existing customer?

Remember these are the sure fire ways to get the insider information without spending a dime for it. You can also SAVE your hard earned money by doing this simple survey trick.

The Checklist before purchasing an Inverter



Check List before purchasing Inverter, in all Jargon free and easy to understand language

The exact need of Electrical Points.

- To decide how many Tubelights and Fans are bare essential.
  This is the key in selection of Inverter and this step will decide Power Capacity of an Inverter.

The minimum and maximum back up time needed, upon the Power Failure.

- This will decide the Battery size, number and its ampere hour capacity.

The place to keep the Inverter and Battery.

The ideal place should have following essential things:

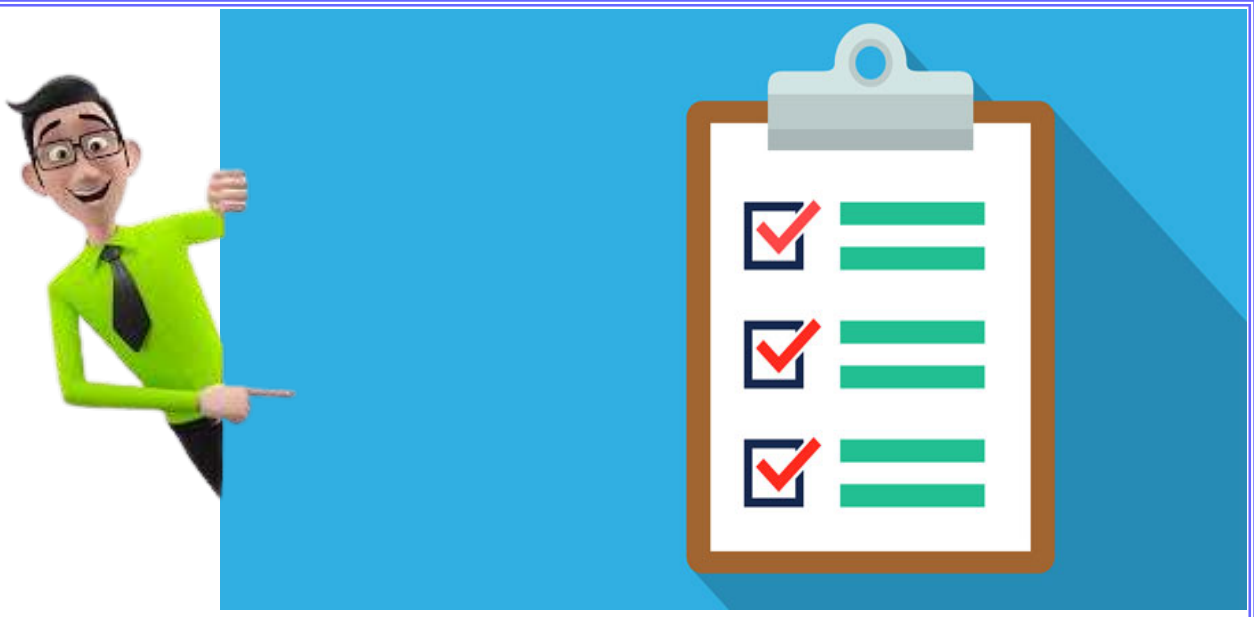
- The place should be well ventilated, preferably cross ventilated.
- It should be away from direct sunlight and direct heat source.
- It should be away from any source of water sprinkling or spillage.
- It should be away from children to avoid any accident.
- It should be easily accessible for a Battery / Inverter Serviceman who may come for maintenance purpose.
- It should be easier to place or shift Battery for any emergency need.

And finally the Wiring that has to done?

- Whether it is Casing-Capping, Concealed or Open type of Wiring that you prefer.

Mode: Choose whether you want an Auto Mode or Manual.

- In Auto Mode, the Inverter starts automatically however in this option you need to connect the desired Load.
- In Manual Mode, you have to start Changeover Switch to operate the Inverter points.

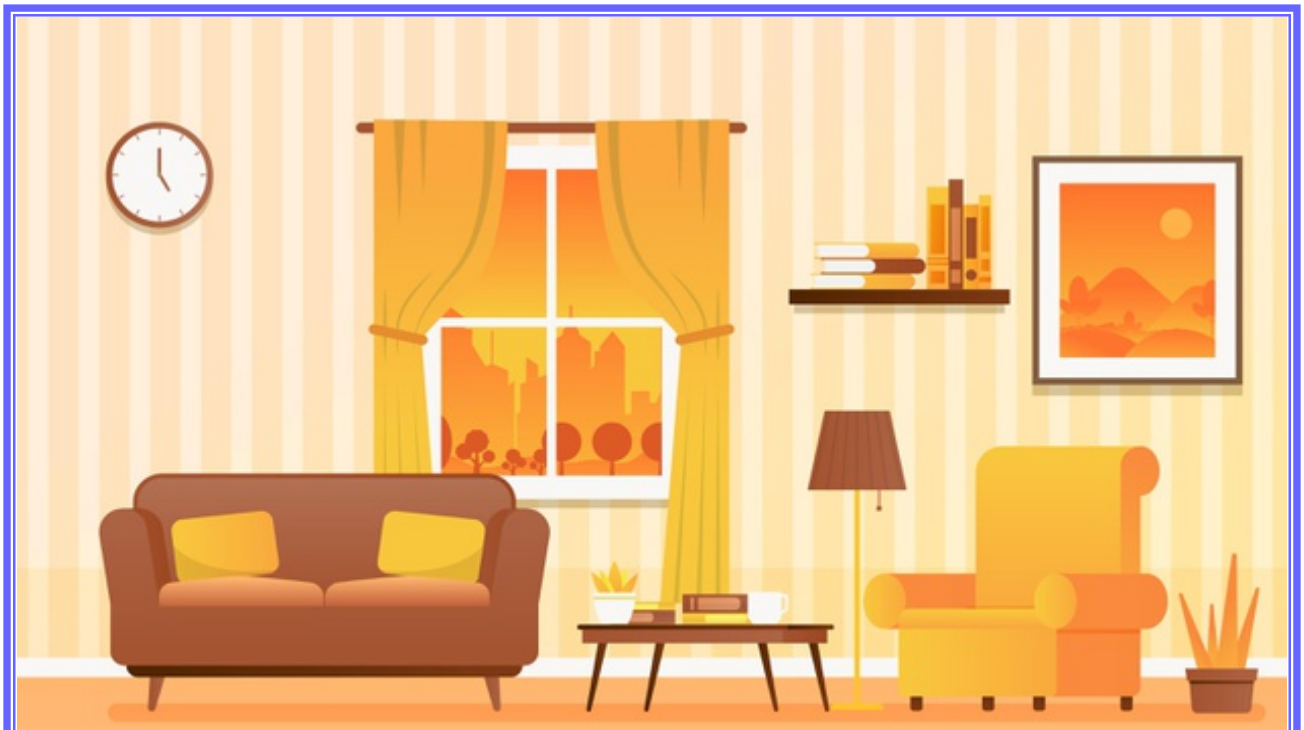


Once all those Steps are decided and you are ready to Order, give this small information to the Electrician who comes to make connections.

Use following format:

Sr. No.	Description	No. of Lights	No. of Fans	Extra Point	Mobile Charging
1.	Hall				
2.	Kitchen				
3.	Bedroom – I				
4.	Bedroom – II				
5.	Guest Room				
6.	Toilet				
7.	Passage				
8.	Balcony				
9.	Any other place				
Total Points					

If YOU follow these STEPS in sequence,
YOU could help yourself in better manner
and can be organized before you buy.



Finding an ideal place to install the Inverter {Find Ideal space}

An ideal place to keep Inverter should be :

- Away from Heat and Direct sunlight.
- Away from Dripping Water or Rain Water.
- Cross Ventilated and airy.
- Easier for Battery and other maintenance purpose.
- On the Loft, on Stand or on the Ground.
- Away from the reach of small Children
- Such that minimum Wiring is needed.
- Safe from rodents.

Preparation for the Good Place

Preparing a place to keep the Inverter, in all Jargon free and easy to understand language.

If you follow those Steps in sequence you could help yourself in better manner and can be organized before you buy.

Please prepare the place where you intend to keep the Inverter.
Be sure to read the section on it. Finding the ideal place to install Inverter.

The following Steps may help you:

- Clean the Place. Remove any dust around it.
- Keep any insulative base for Inverter and Battery.
- Use plain piece of Wood, Rubber or Matting as base to keep Inverter and Battery.
  This has two Benefits :
  [1] It absorbs the vibrations generated during Inverter operators making it completely silent.
  [2] It prevents self discharge of Battery and insulation from ground for the Inverter.
- Have at least one feet space around Inverter & Battery. This helps in desired proper ventilation.
- Keep the Inverter and Battery in such a way that it will be easier for Service.

The Caution List
while choosing the Points to connect

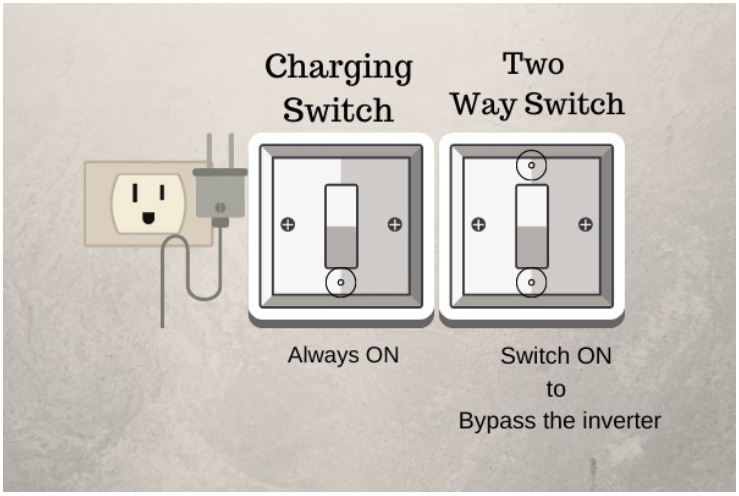
What to look for while choosing the Points to connect to the Inverter, in all Jargon-free and easy to understand language.

- As far as possible connect only Tubelights, CFL, LED-Lights and Fans on Single Phase only. If you want to connect Points on other Phase, take care to inform the Electrician so.
- As far as possible do not connect Plugs, since this could damage the Inverter in case any extra load is connected.
- Have a different colour Wire to connect points from Inverter. This will help any Electrician and Technician to identify location of points, probable problems and solutions to it.
- Keep the list of points that are connected to Inverter handy. It will help avoid problems, when you want to add new point or do any other Electrical Wiring.
- Mark the points on Inverter by special labels, marks, or stickers to identify them. This will avoid occasional mishaps due to ignorance of Electricians. Thus will save a lot of money by avoiding problems.
- Keep the Wiring Diagram / Layout of the Inverter handy or better file it.
- Never allow un-authorized person to carry out Electrification for you.
- Make sure to check Earthing. If proper Earthing is not available, get it done at the first place before connecting the Inverter. Absence of Earthing will result in shock on the body of Inverter. It may also damage the Inverter.
- Tell your Electrician to remove faults of Neutral Return and / or Floating Supply.
- Ensure that the Phase is connected to the right hand side of any plug to have systematic flow of Wiring.
- These Tips will avoid the Accidents, mishaps and problems that may arise due to ignorance about Electricity.

Precautions
that are essential after the Inverter is installed

What to look for after the Inverter is installed, in all Jargon free and easy to understand language.

- Before installing any new Electrical Gadget consult, Inverter Manufacturer. Mostly it is found that Customers unknowingly connect the Gadgets to Inverter and later on the Gadgets are damaged.
- REPORT to your Supplier, if the Charging Indication remains on even after 48 hours, to avoid Battery over-charging and further damage it. If you could locate it this will save your Battery.
- Never switch OFF the Mains D.P. Switch to test the Inverter. When you do it, the neutral gets cut off resulting in no power.
- If at all, you want to test the workings of Inverter, simply switch off the Charging Switch. This will create a temporary situation of power failure. This way you will be able to test the working of Inverter. Once you have tested it and are satisfied with the results, do not forget to switch on CHARGING Switch to normalize the function.



- Do not connect heavy Appliances to the Plug to which Inverter connection is given. Since it may result in damaging the Inverter. The heavy Loads could be a Mixer, Iron, Washing Machine, Fridge, Toaster, Oven, and many more.
- Never keep anything (Particularly Metallic Object) on the top of Battery. Eventually it may short circuit the Battery and there are chances of Battery to explode.

The above Tips will avoid any kind of Accidents, Mishaps and Problems that may arise due to any ignorance about Electricity and would save your Money thus giving you the pleasure of enjoying the Electricity during power-cuts.

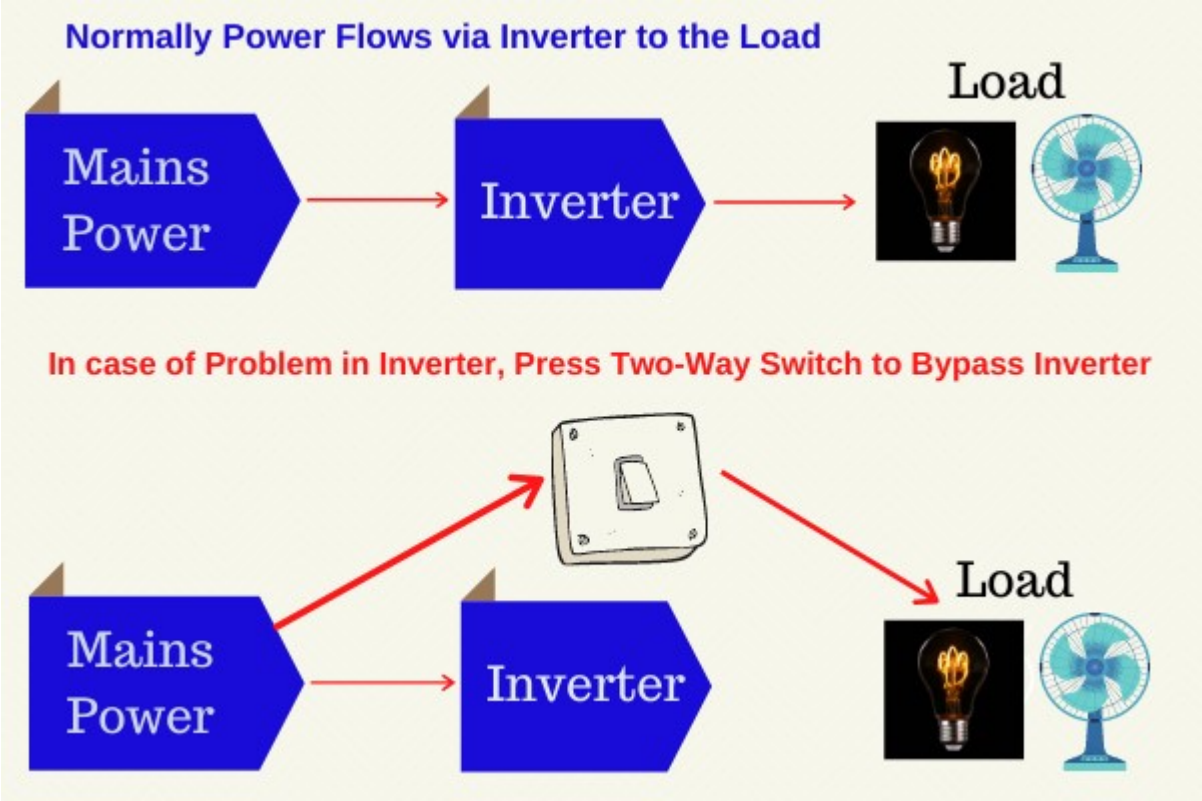
Bypassing the Inverter, in all Jargon free and easy to understand language

You may ask the Question why we may need to bypass the Inverter?

The Answer is pretty simple.

During faulty condition, sometimes the supply which passes through the Inverter gets blocked. Hence although the power may be on, the points which are connected through Inverter, may not be working. Under such circumstances it is really necessary to bypass the Circuit and connect the points through different route.

Not understood clearly?
OK. Here is the **Block Diagram** which explain how this process takes place :-



How to identify any type of Complaints in an Inverter System and give Complaint

First look at the front side of Inverter Panel, see which light (L.E.D.) Light is glowing. Note it down. Read the label for the information.

Please try to describe the exact problem. Be specific about it. Try to explain where the exact problem is, whether it is in the Battery, Inverter or Wiring.

Below are the common Complaints. You can choose one of them so that your supplier will be able to fix the problem quickly for you.

Common Complaints observed

Battery Related Complaints	**Inverter Related Complaints**	**Wiring Related Complaints**
Battery Cell damaged	Inverter works for less time	Earthing faulty
Battery Terminal damaged	Dim lights on Inverter	Loose Contact
Battery Dry-No Water	Fuse Blown	Faulty wiring
Battery Damaged	Fuse Holder burnt	Inverter Socket burnt
Battery Leakage	Humming noise in Fans	Two way Switch Damaged
Battery Low	Lights flickers when Inverter starts	
Battery Lugs Damaged	Mains Chord Burnt	
Battery Pole Damaged	The Front Switch (ON/OFF) broken	
Weak Battery Cell	Points on Inverter are not working	
	Charging Indication & Inverter Indication ON at same time	
	Charging problem	
	Continuously charging Indicator ON	
	Delayed start on power cut	
	Battery Low Indication ON	
	Overload Indication in ON	
	Strange Smell OR Smoke coming from Inverter	
	Mains Socket Burnt	
	Noise/Vibration in Inverter	
	No Indication are ON in Inverter	

TIPS and TRICKS to enhance life of your Inverter.

- Keep the exterior of the Inverter clean by wiping it with plain dry cloth once in a week. This avoids dust, which is the main culprit to absorb moisture and ruin parts of Inverter. Never use wet cloth to clean the Inverter.
- You may use wet cloth to clean Battery . Remove salts formed around the Terminals/Nutbolts of the Battery. Apply Petroleum Jelly once in 3 Months depending on use.
- Keep the System in well ventilated area to diffuse little Gas Formation during charging.
- A good Temperature range between 20º Celsius to 25º Celsius increases the backup time and enhances the life of Battery.
- Put De-ionized Water in the Battery to enhance the life of Battery. Never put tap water, or fridge water or water from water purifier in Battery, as it may damage Battery.
- Never put any metallic objects near or over the Battery. It may lead to short-circuit of the Battery and may lead to explosion.
- Please get yourself acquainted to the working of Inverter.
- Make sure that you know HOW TO BYPASS & SWITCH OFF the Inverter during an emergency. Discharge the Battery once in a Month if electricity does not fail.
- Never! Never put any extra load other than specified load on the Inverter.
- And last but not the least ,NEVER TRY TO REPAIR INVERTER by yourself, if you are not familiar with Electronics and Electricity. There are chances of heavy Electric shocks if you don't know the Circuits. Please save your life by not opening the cover box of Inverter.

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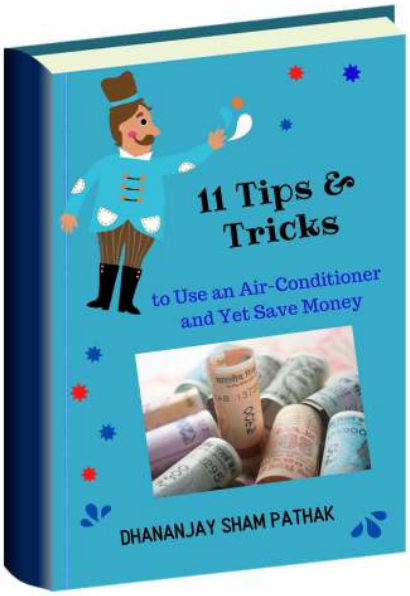

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Thankyou for reading my E-Book

Dear Sir / Madam,

Thank you for reading my E-Book.

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Please click here to send me the Feedback.

I feel sometimes that knowledge is priceless, it's a Gift from Goddess of Wisdom, Devi Saraswati and so shouldn't be sold hence I have not kept any price tag on this E-Book. It is completely FREE ONLINE GIFT to you. However if you like this Book and feel to do something, I would like you to contribute for a just cause. And that is helping the poor Students getting their Education.

I will explain it how and what I want to say.
I had seen, so many children who are deserving but are deprived from Education, only because they simply can't afford it. They make their living somehow. They try to keep their Body & Soul Together. You will surprised to know that such places are not far off, but are located within the periphery of 60 km from MUMBAI (where all the Money and costly Education is available at abundance).

Many tribal and economically backward children need a basic Education but they can't afford it. Although individually you and me can't do something great, we can certainly make a difference by contributing a small amount.

Here is an Opportunity to MAKE A DIFFERENCE IN IMPROVING THEIR LIFE.
*It is said "**If You are Good to Others, You are Best to Yourself**."*
There is one Non Government Organization "Vanvasi Kalyan Sanstha" which is doing the great job of giving FREE EDUCATION for years.

What I request you to please donate to the same Organization for the following reasons:

- *It is a Reputed and Government approved Institution.*
- *The people who work there are highly intellectual and motivated who work for a cause.*
- *It has Income Tax (80-G) that will be beneficial for you.*
- *You get immense joy and satisfaction by giving small amount.*
- *You can support so many deprived children getting Education and make them a good, knowledgeable & responsible Citizens.*
- *If you can do it, I feel I will get the price of this E-Book, multifold.*
  And that is exactly what I want to do.

Thank You once again.
Yours in Success

Dhananjay Pathak