

## ASSEMBLING OF INVERTERS & VOLTAGE STABILIZER

### Introduction:

An inverter is an electronic device that produces alternating current (AC) from direct current (DC). It is used to convert direct current electricity by cell. It allows consumer to run electrical equipment. A power supply that produces an AC out put, usually from a DC input used to convert independent DC power into standard household AC current. An Inverter output drives the critical load. An Inverter is used in wide range of application, from small switching power supplies to large electric utility applications that transport bulk power.

From the nineteenth century through the middle of the twentieth century, DC to AC power conversion was accomplished using rotary converters or motor-generator sets. In the early twentieth century, vacuum tubes and gas filled tubes began to use as switches in inverter circuits.

Voltage stabilizers are devices to regularize and control the variation and fluctuations in supply voltage within a desired range. This device is used in voltage stabilizing in a twin manner, i.e. controls voltage supply and prevents the peak voltage to go beyond a fixed limit.

### Product Uses:

An inverter is an electronic circuit that converts direct current (DC) to alternating current (AC). Inverter can be used for a great many things if they have the correct power output. Inverter can be used for television, refrigerator, micro-oven, lights around the house, air compressor and much more. Lighting is useful for many things from children being able to study at night to parents being able to make a few more works.

The voltage stabilizer finds the use in television, other sophisticated home appliances as well as laboratory equipments, refrigeration and air conditioning and other electrical appliances.

### Market Potential:

Very few nos. of manufacturers have launched the assembling of inverter and voltage stabilizer unit in northeastern region. Most of unbranded products are coming from outside the region. Digital Inverters, which save up to 70 per cent of electricity while charging the battery and ensure longer battery life and power backup. Digital inverters, with latest technology and excellent performance, offer the safety and protection of the gadgets and precious home appliances of the consumer because inverter does not affect the life span of the home appliances.

There is a great demand for this product at present, which is normally used in protecting and using electrical appliances from any fluctuations as well as power cut looking into the present power supply position in this region, because of erratic supply and frequent power cut in the region. Inverter and voltage stabilizer are invariably very useful in these days with television and other sophisticated home appliances as well as laboratory equipments, refrigeration and air conditioning etc. With increase of emergence and demand of such items, the demand of Inverter and Voltage Stabilizer increases proportionally. Thus few assembling units of inverter and voltage stabilizer may come up in northeast India.

### Services & Capacity (per annum):

The capacity of the proposed assembling unit has been estimated as under:

Services	Capacity in nos.	Avg. price Per unit (Rs.)	Turnover (Rs.)
Inverters	900	5000	45,00,000
Voltage Stabilizer	2000	950	19,00,000
Annual Turn Over			64,00,000

**Basis:**

No. of working days:	300 days per year
No. of Shifts:	one per day
One shift:	8 hours

**Infrastructure Requirement:**

The main Infrastructure facilities required are:

Working shed	400 Sq.ft.
Front Office cum store:	200 sq.ft.
Power requirement:	10 KW
Water	general purpose

**Raw Materials/consumables:**

Inverters- Commutating capacitors, transformers, filter chokes, filter capacitors, power diodes, thyristors, saturable reactors, high speed and HRC fuses, transistors, resistors, laminations, chassis etc.

Voltage Stabilizer- To assemble voltage stabilizer the components required are assembled PCB, transformer, voltmeter, metallic printed cabinet, switches, fuse, and fuse holder, socket & plug, screws & washers, rubber pad and 5 amp, flexible copper wire.

Most of these components are to be brought from outside the region-from reputed agencies of Kolkata, Delhi or Bangaluru.

**Process:**

Inverter- The raw materials required are thyristors, commutating capacitors, transformers, filter chokes, filter capacitors, power diodes, saturable reactors, high speed and HRC fuses, transistors, resistors, laminations, chassis etc. Various components are assembled on the printed circuit board as per the design. The wave forms and output voltage and power are checked, and the necessary adjustments are made. The chassis is then enclosed in a cabinet, and the connections are completed. Inverters of different capacity (power) are made with input voltage of 12 V/ 24 V DC and output of 230 V AC.

Voltage Stabilizer- A stabilizer is constructed as a single integrated unit and is enclosed in a sheet metal enclosure. The major and heaviest component is the multiwinding mains transformer. The cabinet is fitted with a front panel meter, sockets, controls and lamps. The transformer and the control circuit board as well as relays are mounted inside the enclosure and wired up as per the circuit diagram. The unit is then put to test at the lowest and highest input voltages with a specified load at the output. Then the enclosure cover is placed in position and tightened with screws. While designing a voltage stabilizer the following points should be taken care off-

- a) The output selector switch should be a heavy one. The motion over the different tapping should be smooth and there should be no wiring.
- b) The transformer should be properly earthed and provision should be made for ventilation so that it does not get excessive heat.
- c) A monitoring meter with selector switch should be provided to measure input and output voltages.
- d) A pilot lamp should be provided as an external indication as to when the stabilizer is in operation.

### Suggested Location:

The preferred locations based on techno-economic considerations, the typical unit may be set up in the capital cities, big towns or in major urban areas preferably nearby marketing centers of North Eastern region including Sikkim.

### PROJECT ECONOMICS

The total capital requirement estimated is Rs.16.48 Lakhs as given below:

<b>Fixed Capital:</b>		<b>Rupees</b>
Land		Own/lease
Building/Civil Works		
a.) Working shed 400 sq.ft. @ Rs. 700/sq.ft.		2,80,000
b.) Front office cum store 200 sq. ft. @ Rs 700/ sq.ft.		1,40,000
c.) Toilet/bathroom		60,000
Plant and Machinery		1,60,000
Miscellaneous Fixed Assets & Other equipments (Electrical fittings, furniture & office equipments)		1,50,000
Preliminary and pre-operative expenses		60,000
		<b>8,50,000</b>
<b>Working Capital:</b>		
	<b>(Norms)</b>	<b>(Rupees)</b>
Raw Materials/Consumables	1 month	2,90,000
Working Expenses	1 month	70,000
Finished Goods	15 days	2,24,000
Receivables	10 days	2,14,000
		<b>7,98,000</b>

Note: Working capital to be financed as:-

Margin Money :	2,98,000
Bank Finance :	5,00,000
	<b>7,98,000</b>

### Capital Cost of Project:

1. Fixed Cost	.....	Rs 8,50,000
2. Margin money for W.C.	.....	Rs 2,98,000
		<b>Rs 11,48,000</b>

### Means of finance

Promoter's contribution (35%)	Rs 4,02,000
Term Loan (65%)	Rs 7,46,000
	<b>Rs 11,48,000</b>

### Operating Expenses:

	(Rupees)
Raw Materials/Consumables	34,80,000
Wages & Salaries	7,40,000
Utilities	1,00,000
Repair & Maintenance	60,000
Administrative Overheads	50,000
Selling Expenses 5% on sales	6,40,000
Depreciation	55,000
Interest	<u>1,83,000</u>
	<b>53,08,000</b>

**Profitability:**

Based on the sales turn over and the production expenses, the profit would be Rs. 10.92 Lakhs per year. This works out to a return on capital investment of 66 %. The Unit would break-even at about 50% of the rated capacity.

**Break Even Analysis:**

A. Variable Cost:	(Rupees)
Raw Materials/Consumables	34,80,000
Utilities	1,00,000
Selling Expenses	6,40,000
	42,20,000
B. Semi-Variable Cost:	(Rupees)
Wages & Salaries	7,40,000
Repair & Maintenance	60,000
Administrative Overheads	50,000
Depreciation	55,000
Interest	1,83,000
	10,88,000
C. Sales Turnover:	64,00,000
D. Contribution:	21,80,000
E. Break Even Point:	50%

**Manpower Requirement:**

Personnel	Nos.	Salary per person (Rs.)	Salary Bill (Rs)
Technician	1	7000	7000
Assistant Technician	4	6000	24000
Marketing Personal	2	6000	12000
Accountant cum store	1	5000	5000
Manager	1	8000	8000
			56,000

Salary Bill Rs. 6.72 Lakhs + Benefits @ 10% annually i.e. Rs. 0.68  
Total Annual Salary Bill: Rs. 7.40

**List of Machinery & Equipments:**

Sl. No.	Particular	Nos
1	Shearing Machine	4
2	Bending Machine	6
3	Drill Machine with drill bits	4
4	Testing equipment	
	I) Oscilloscope	5
	II) Digital Multimeter	6
	III) RMS voltmeter	6
	IV) Distortion analyzer	3
	V) Transient Recorder	6
	VI) R.F. Interference meter	4
	VII) Frequency Counter Etc.	4
	VIII) Analog Multimeter	6 sets
	IX) Logic probes	4
5.	DC power supply Rectifier etc.	2
6	Assembly tools	6 sets

**Utilities:**

1.	Power:-	
	For Machine	8 KW
	For other purpose	2 KW
		10 KW
	10 KW X 6 effective working hours X 300days X 5.50	
		= Rs. 99,000
		Say Rs.1.00 lakhs

**Highlights:**

The Major highlights of the project are as follows:

Total Capital Requirement	Rs. 16.48 Lakhs
Promoter's Contribution	Rs. 2.88 Lakhs
Annual Sales Realization	Rs. 64.00 Lakhs
Annual Operating Expenses	Rs. 53.08 Lakhs
Annual Profit	Rs. 10.92 Lakhs
Return on Sales	17%
Break-even Point	50%
No. of person employed	9

**Address of Machinery & Equipment Suppliers:**

- 1) M/S Graphics (India)  
Shantiniketan  
Flat no.17, 6th Floor  
8, Camac Street,  
Kolkata-700 017
- 2) M/S Sunny Electricals,  
B-11, Sector-1  
Noida,UP.
- 3) M/S Industrial equipments  
A.T.Road  
Guwahati