

**Commissioner of Industries  
Hyderabad  
Andhra Pradesh**

## **Soft Starter**

### **I. Introduction**

Soft Starter is used for starting electric motor smoothly through steady increase of supply voltage to motors using digital micro processor control programme. The important parameters of starters like starting torque, starting current and acceleration rate can be adjusted in the beginning to get required mode of starting. This starter reduces current surges and mechanical shocks during starting and thus increases life of motor and other driving equipments.

Energy saving is possible by soft starter, since it operates by sensing power factor, voltage and back EMF. It is useful when motor is under loaded for some reasons.

### **II. Market:**

In India in 1993 itself, 2350 MW (total) squirrel cage motors, and 280 MW (total) slip ring motors were produced. The present figure must be more than this. Out of them at least 2% of motors require precision control in starting and also for Energy conservation. Moreover, soft starters are already produced by few companies in India and by thanks to indirect publicity given by Energy Consultants, sufficient awareness is created among industrial users and contractors. The high costs of energy, expected rate of growth in tariff, explains the necessity of replacement of conventional motor starter with electronic soft starter. Economics will be very interesting for 3 shift operated motors and also frequently started motors.

The normal electrical motor of 6 million HP (total rating) was produced in 1993 itself. The possibility of using the soft starter in unattended pumping stations should also be seen. Then irrigation sector can be a good promising field.

About 9 lakh starters are produced (1993) per year. Out of them at least 5% can be replaced with electronic soft starter for better performance and energy conservation.

The soft starter is easy to install and 100% depreciation is allowed by government. M.D. charges can be reduced by using this starter. Contactors can be closed without any arc.

Starting current is limited to 2.5 to 3.5 times and between 15- 120 seconds, three phase models of 415 V are popular with torque variation from 200-500% and with ramp range of 0.5-120 seconds. Various models from 2 Kw to 300 kw can be assembled by varying component capacities but using similar circuit.

Fenner electronics, Hyderabad is one of the manufacturers in India. The final price ranges from 20,000 to 80,000 for motor range of 15 kw to 90 Kw.

### **III. Manufacturing Process:**

After finalisation of electrical circuit, the electronic components like thyristors, transistors, ICs and passive components are assembled on PC Board. It is mounted in a frame for fixing within the main cubicle. It can also be made as separate equipment with control switches to the front.

#### IV. Plant Capacity:

1000 starters per annum @ Rs.15,000 each.

#### V. Raw Materials:

Electronic passive and active components, aluminium frames, knobs, switches, potentiometers, fuses, PC boards, hardware.

#### VI. Infrastructure:

Land : 3000 sq. yds.

Building : 1000 sq. ft.

#### VII. Plant and Machinery:

- Work Benches
- Electronic assembly Tools
- Control Panel with variable load and motors for testing
- High Voltage Testers
- Electronic Component Tester
- Workshop fitting tools
- Engraving Tools

#### VIII. Utility:

Power : 60 HP

Water : 0.5 KL/day

#### IX. Manpower:

Manager	:	
Engineer	:	1
Supervisors	:	1
Skilled persons	:	6
Unskilled persons	:	3
Office Staff	:	2
Security	:	1
15		

#### X. Working Capital:

Considering one month requirement of raw materials, packing materials, utilities salaries and wages, finished goods realisation, bills receivables, the total working capital requirement works out to Rs.12.94 lakhs in 1st year, Rs.15.52 lakhs in 2nd year am Rs.18.06 lakhs in 3rd year.

#### XI. Preliminary and Pre-operative Expenses:

Prior to commencing the regular production, expenses towards salaries and wages during construction stage, acquired loan costs, interest charges, project report preparation cost, trial production cost etc., are to be provided as POP expenses. The total preliminary and pre-operative expenses works out to Rs. 1.50 lakhs.

#### XII. Project Cost & Means of Finance

Particulars	Soft Starter(Rs.lakhs)
I. Project Cost	
a) Land	Rented
b) Building & Civil Works	Rented
c) Machinery & Civil Works	8.80
d) Miscellaneous fixed assets	4.00
e) Preliminary & preoperative expenses including deposit	1.50
Total fixed capital	14.30
f) Working capital margin (III yr)	3.76
Total project cost	18.06
II. Means of Finance	
Promoter's contribution	8.99
Term loan	9.07

#### XIII. Annual Operation Results (at 70% capacity utilisation in IIIrd year)

Particulars	Rs. lakhs
A. Cost of Production	
a. Rent/lease	0.72
b. Raw materials	63.00
c. Utilities	1.93
d. Salaries	2.75
e. Packing materials	3.09
f. Repairs, maintenance, insurance	0.27
g. Depreciation	0.48
h. Telephone & post	2.06
i. Selling expenses	5.25
j. Preliminary & preoperative expenses written off	0.15
k. Interest	3.57
l. Administrative overheads	5.19

Total	90.34
B. Net sales	97.76
C. Profit before tax	7.42
D. Break even point (% of installed capacity)	48.57%
E. DSCR	2.22
F. Cumulative cash surplus (by the end of V yr.)	15.19
G. Rate of returns on promoters contributions before taxes	82.50%

#### XIV. Raw material suppliers:

1. Bharat Electronics Ltd.,  
Jalahalli, Bangalore.
2. Khandelweall Herman Electronics Ltd.,  
Khandelwal Estate, Bhandup, Mumbai.
3. E C I L  
Cheriapalli, Hyderabad
4. Hind Rectifiers Ltd.,  
Lake Road, Bhandup, Mumbai.

#### XV. Machinery Suppliers:

Work Benches, Assembly Tools, Soldering Tools are locally available

Testing equipment :- 1) British Physical Laboratory  
2) Philips [India]