# Reversing Starter For Motors

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|---|---|
| PRODUCT CODE (ASICC) | 77328 |
| QUALITY AND STANDARDS | IS 13947 (Part 1) : 1993 |
| PRODUCTION CAPACITY | Quantity : 1,11,000 Nos. (per annum)<br>Value : Rs. 2,36,54,100 |
| YEAR OF PREPARATION | 2002 _ 2003 |
| PREPARED BY | Small Industries Service Institute<br>P.O. Tadong,<br>Gangtok - 737102<br>(Sikkim)<br>and<br>Office of the Development Commissioner<br>Small Scale Industries<br>Electrical and Electronics Division<br>7th Floor,<br>Nirman Bhavan,<br>New Delhi - 110 011. |

**Introduction**

This project profile envisages the production of Reversing Starter. Starter is used for starting and stopping of motor. The starter in addition to starting and stopping, protects the motor from over voltage, over current, short circuit, single facing etc. The Reversing Starter is a special type of push button starter wherein addition to starting/ stopping of motors the director of rotation of a three phase induction motor can be done by inter changing the connection of any two terminals of the supplies which is done through two separate contactors, one for forward and other for reverse operation to prevent both the contactors getting energized simultaneously and causing short circuit some preventing methods called inter locking methods are employed. Inter locking is done by connecting closed auxiliary contact of forward contactor in series with the coil of the reverse contactor and vice versa. When push button for forward is pressed motor rotates in forward direction and the motor direction is reversed by pressing reverse direction push button.

**Market Potential**

With rapid industrialization in urban and semi urban areas the demand of reversing starter is increasing. It is been used in various machine tools, machines, cranes for forward and reverse operation of the induction motor.

**Basis and Presumptions**

i) The basis for calculation of production capacity has been taken on single shift basis on 75% efficiency.

ii) The maximum capacity utilization on single shift basis for 300 days a year. During first year and second year of operations the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards.

iii) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in and around Sikkim. These cost factors are likely to vary with time and location.

iv) Interest on term loan and working capital loan has been taken at the rate of 15% on an average. This rate may vary depending upon the policy of the financial institutions/agencies from time to time.

v) The cost of machinery and equipments refer to a particular make/model and prices are approximate.

vi) The break-even point percentage indicated is of full capacity utilization.

vii) The project preparation cost etc. whenever required could be considered under pre-operative expenses.

viii) The essential production machinery and test equipment required for the project have been indicated.

The unit may also utilize common test facilities available at Electronics Test and Development Centres (ETDCs) and Electronic Regional Test Laboratories (ERTLs) and Regional Testing Centres (RTCs).

**Implementation Schedule**

The major activities in the implementation of the project has been listed and the average time for implementation of the project is estimated at 12 months:

| ***Sl. No.*** | ***Activity*** | ***Period (In Months)*** |
|---|---|---|
| 1. | Preparation of project report | 1 |
| 2. | Registration and other formalities | 1 |
| 3. | Sanction of loan by financial institutions | 3 |
| 4. | Plant and Machinery: | |
| | a) Placement of orders | 1 |
| | b) Procurement | 2 |
| | c) Power connection/ Electrification | 2 |
| | d) Installation/Erection of machinery/Test Equipment | 2 |
| 5. | Procurement of raw materials | 2 |
| 6. | Recruitment of Technical Personnel etc. | 2 |
| 7. | Trial production | 11 |
| 8. | Commercial production | 12 |

*Notes*

1. Many of the above activities shall be initiated concurrently.

2. Procurement of raw materials commences from the 8th month onwards.

3. When imported plant and machinery are required, the implementation period of project may vary from 12 months to 15 months.

**Technical Aspects**

**Process of Manufacture**

The process consists of cutting of CRCA sheets into proper and required size on shearing machine. The cutted sheet is then pressed into deep drawing press for making top and bottom covers. The covers are cleaned, drilled for holes, painted and wielding done as required. The bought out components like contactor, relays, timers, connectors are fitted in the bottom cover. Beading/rubber gaskets are provided between top and bottom cover in order to make it weather proof. Push button is fitted for starting and stopping operation. Neutral link is provided in the bottom cover. The starter inspected and tested for proper operation as per IS 13947 (Part 1):1993. Rubber knockouts are fitted. The circuit line diagram is pasted inside the top cover. Nameplate is riveted on the outside of the top cover. The instruction and maintenance manual is packed along with the starter.

**Quality Control and Standards**

IS 13947(Part 1):1993

**Production Capacity (per annum)**

Quantity : 11100 Nos.

Value : Rs. 236,54,100

**Motive Power** 25 HP.

**Pollution Control**

The Government accords utmost importance to control environmental pollution. The small-scale entrepreneurs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology substitution.

India having acceded to the Montreal Protocol in September 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluore Carbon (CFCs), Carbon Tetrachloride, Halons and methyl Chloroform etc. need to be phased out immediately with alternative chemicals/solvents. A notification for detailed Rules to regulate ODS phase out under the Environment Protection Act, 1986 have been put in place with effect from 19th July 2000.

**Energy Conservation**

With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Govt. of India since 1980s. The Energy Conservation Act, 2001 has been enacted on 18th August 2001, which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

i) Adoption of energy conserving technologies, production aids and testing facilities.

ii) Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation.

iii) Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and de-soldering stations.

iv) Periodical maintenance of motors, compressors etc.

v) Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of compact fluorescent lamps wherever possible etc.

**Financial Aspects**

**A. Fixed Capital**

**(i) Land and Building (per month) (Rs.)**

Rented cover shed of floor area of 14,000

about 350 sq. mtr. to be taken on rent @ Rs. 40/ i.c.

**(ii) Plant and Machinery**

| **Sl. No.** | **Name of the Machine and Specification** | **Ind./ Imp.** | **Qty. Nos.** | **Rate (Rs.)** | **Total (Rs.)** |
|---|---|---|---|---|---|
| 1. | 16/18 SWG × 1200 mm type heavy duty Treadle operated Guillotine Shearing machine manually | Ind. | 1 | 21,000 | 21,000 |

| | | | | | |
|---|---|---|---|---|---|
| | operated with HCHC blades. | | | | |
| 2. | Deep Drawing press fitted 20 Tonne fitted with 2 HP, 440 volts. Motor with all standard accessories | -do- | 1 | 72,000 | 72,000 |
| 3. | 3.00 kva Spot wielding machine | -do- | 1 | 28,000 | 28,000 |
| 4. | 1/2 Inch Bench Drilling machine fitted with 1/2 HP 440 volts motor with drill chuck and arbor. | -do- | 1 | 5,000 | 5,000 |
| 5. | Bench Grinder 200 mm. Wheel double ended fitted with 1 HP, 440 volts Motor, with one fine and other course grinding wheel. | -do- | 1 | 4,000 | 4,000 |
| 6. | Pneumatic Riveting with 2.0 HP/440/50 Cy AC Electrical with compressor. | Ind. | 1 | 21,000 | 21,000 |
| 7. | Hand Shearing machine, 12 Inch Blade capacity, Heavy Duty Geared Type, HCHC Blade, 4 Edge hand lever. | -do- | 1 | 5,000 | 5,000 |
| 8. | 500 x 500 x 500 mm pickling plant | -do- | 1 | 7,000 | 7,000 |
| 9. | 100 lbs. working pressure Air Compressor | -do- | 1 | 14,000 | 14,000 |

| | | | | | |
|---|---|---|---|---|---|
| | fitted with 1 HP, 440 volts Motor, single stage, single cylinder with spray painting unit | | | | |
| 10. | 3.0 kW heating chamber | -do- | 1 | 55,000 | 55,000 |
| | **Total** | | | | **2,32,000** |

*Testing Equipments*

| **Sl. No.** | **Name of the Machine and Specification** | **Ind./ Imp.** | **Qty. Nos.** | **Rate (Rs.)** | **Total (Rs.)** |
|---|---|---|---|---|---|
| 1. | Megger volts DC. Hand operated with testing leads and carrying case | 500 Ind | 1 | 3,500 | 3,500 |
| 2. | Multimeter | -do- | 2 | 500 | 1,000 |
| 3. | Wattmeter 3 Phase 4 Wire | -do- | 1 | 3,500 | 3,500 |
| 4. | Auto Transf-ormer 0.5 kva | Ind. | 2 | 1,750 | 3,500 |
| 5. | 3 ½ Digit Digital Clamp Meter Range 0_200 Amps. | -do- | 1 | 3,500 | 3,500 |
| 6. | Leakage current Earth Leakage Tester | -do- | 1 | 3,500 | 3,500 |
| 7. | 2.5 kV High Voltage Tester | -do- | 1 | 7,500 | 7,500 |
| 8. | Test Bench with fittings | -do- | 2 | 5,000 | 10,000 |
| 9. | Other misc. instruments and meters | _ | _ | _ | 4,000 |
| | **Total** | | | | **40,000** |
| | **Total Cost of Plant and Machinery and Testing Equipment** | | | | **2,72,000** |
| (a) Electrification and | | | | | 27,200 |

| | | | | |
|---|---|---|---|---|
| Installation at 10% of cost of above | | | | |
| (b) Office Equipments and furniture's | -do- | _ | LS | 25,000 |
| (c) Cost of Tools, Dies and fixture | -do- | _ | LS | 30,000 |
| **Pre-operative Expenses** | _ | _ | **LS** | **15,000** |
| **Total** | | | | **3,69,200** |

**B. Working Capital (per month)**

**(i) Staff and Labour (per month)**

| **Sl. No.** | **Description** | **No.** | **Salary (Rs.)** | **Total (Rs.)** |
|---|---|---|---|---|
| 1. | Plant Engineer | 1 | 7,000 | 7,000 |
| 2. | Supervisor (Technical) | 1 | 4,000 | 4,000 |
| 3. | Skilled worker | 3 | 3,000 | 9,000 |
| 4. | Semi-skilled worker | 2 | 2,000 | 4,000 |
| 5. | Un-skilled worker | 2 | 1,500 | 3,000 |
| 6. | Electrician | 3 | 3,000 | 9,000 |
| 7. | Accountant | 1 | 3,500 | 3,500 |
| 8. | Store Keeper | 1 | 3,000 | 3,000 |
| 9. | Office Assistants | 2 | 2,500 | 5,000 |
| 10. | Peon | 1 | 2,000 | 2,000 |
| 11. | Watchman | 2 | 2,000 | 4,000 |
| 12. | Sales Officer | 1 | 5,000 | 5,000 |
| **Total** | | | | **58,500** |
| *Add 15% perquisites of above* | | | | 8,775 |
| **Total** | | | | **67,275** |

**(ii) Raw Materials (per month)**

| **Sl. No.** | **Name of the Materials** | **Ind./ Imp.** | **Qty.** | **Rate (Rs.)** | **Total (Rs.)** |
|---|---|---|---|---|---|
| 1. | CRCA Sheet 18/20 SWG | Ind. | 800 Kgs. | 22 | 17,600 |
| 2. | Contactor | -do- | 1850 Nos. | 450 | 8,32,500 |
| 3. | Relays | -do- | 925 Nos. | 450 | 4,16,250 |
| 4. | Terminal Block | -do- | 925 Nos. | 155 | 1,43,375 |
| 5. | Push button | -do- | 1850 Nos. | 105 | 1,94,250 |

| | | | | | |
|---|---|---|---|---|---|
| | knobs with red and green colour | | | | |
| 6. | Rubber bead, Knockout, hardware, silver rivets, paints, Earth Terminal, acids, packaging material and other misc. | -do- | LS | _ | 35,000 |
| | **Total** | | | | **16,38.975** |

| **(iii) Utilities (per month)** | **(Rs.)** |
|---|---|
| Electricity bill per month @ Rs. 3.50 for 3000 Units | 10,500 |
| **Total** | **10,500** |

| **(iv) Other Contingent Expenses (per month)** | **(Rs.)** |
|---|---|
| i. Rent | 14,000 |
| ii. Postage and stationery | 2,000 |
| iii. Insurance and Taxes | 1,500 |
| iv. Telephone, | 1,000 |
| v. Repair and Maintenance | 1,800 |
| vi. Publicity and Advertisement | 2,500 |
| vi. Travelling and Transport | 5,500 |
| vii. Renewal and Replacement | 1,500 |
| viii. Other Misc. Expenses. | 3,000 |
| **Total** | **32,800** |

| **(v) Total Recurring Expenses (per month)** | **(Rs.)** |
|---|---|
| a) Staff and labour | 67,275 |
| b) Raw material | 16,38,975 |
| c) Utilities | 10,500 |
| d) Other contingent expenses | 32,800 |
| **Total** | **17,49,550** |

**(vi) Total Working Capital Requirement**

**(for 3 Months)**

Rs. 17,49,550 × 3 = **Rs. 52,48,650**

**C. Total Capital Requirement**

| | |
|---|---|
| (i) Fixed capital | Rs. 3,69,200 |
| (ii) Working capital (for 3 Months) | Rs. 52,48,650 |
| **Total** | **Rs. 56,17,850** |

**Financial Analysis**

| **Cost Of Production (per annum)** | **(Rs.)** |
|---|---|
| i. Recurring Expenses | 2,09,94,600 |
| ii. Depreciation on Machinery @ 10% | 27,200 |
| iii. Depreciation on Tools and Equip. @ 20% | 6,000 |
| iv. Depreciation on Furniture and Fixture @ 20% | 5,000 |
| v. Interest on Total capital investment @ 15% | 8,42,677 |
| **Total** | **2,18,75,477** |

**(2) Sales (per annum)**

11100 nos. of Reversing Starter Rs. 2,36,54,100

**(3) Profit (per annum)**

Sales - Cost of Production = **Rs. 17,74,523**

**(4) Percentage of Profit on Sales**

$$= \frac{\text{Profit per annum} \times 100}{\text{sales per annum}}$$

= **7.5%**

**(5) Rate of Return**

$$= \frac{\text{Profit per annum} \times 100}{\text{Total Capital Investment}}$$

= **32%**

**(6) Break-even-Point**

| **Fixed Cost (per annum)** | **(Rs.)** |
|---|---|
| i. Rent | 1,68,000 |
| ii. Depreciation on Machinery @ 10% | 27,200 |

| | |
|---|---|
| iv. Depreciation on Tools and Equip. @ 20% | 6,000 |
| v. Depreciation on Furniture and Fixture @ 20% | 5,000 |
| vi. Interest | 8,42,677 |
| vi. 40% Of salary and wages | 3,22,920 |
| vii. 40% of utilities and other expenses (Excluding rent) | 1,40,640 |
| **Total** | **15,12,437** |

**B.E.P.**

$$= \frac{\text{Fixed cost} \times 100}{\text{Fixed cost + Profit}}$$

$$= \frac{15,12,437 \times 100}{15,12,437 + 17,78,623}$$

= **46%**

**Additional Information**

a. The Project Profile may be modified/tailored to suit the individual entrepreneurship qualities/capacity, production programme and also to suit the locational characteristics, wherever applicable.

b. The Electrical Technology is undergoing rapid strides of change and there is need for regular monitoring of the national and international technology scenario. The unit may, therefore, keep abreast with the new technologies in order to keep them in pace with the developments for global competition.

c. Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The ISO 9000 defines standards for Quality Management Systems and ISO 14001 defines standards for Environmental Management System for acceptability at international level. The unit may therefore adopt these standards for global competition.

d. The margin money recommended is 25% of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.

**Addresses of Machinery and Testing Equipment Manufacturers**

1. M/s. H P Singh Machinery (Pvt.) Ltd.

75, Ganesh Chandra Avenue, Kolkata - 700 013

2. M/s. Nandy and Co.

125 Belilious Road, Howrah - 711 101

3. M/s. Turnwell Machine Tools
16, Ganesh Chandra Avenue, Kolkata - 700 013

4. M/s. Turner and Tools
15. Ganesh Chandra Avenue, 2nd Floor, Kolkata - 700 013

5. M/s. Pathak Machine Tools Pvt. Ltd.
116, G.T. Road, Salkia, Howrah - 711 106

6. M/s. Goliya Electricals Pvt. Ltd.
Plot No. 64, G.I.D.C Estate, Phase - I, OPP. Sunita Textiles, Vapi, Distt. Bulsar-396195, Gujarat.

7. M/s. Goliya Instrument Pvt. Ltd.
311, Bharat Industrial Estate, T.J. Road, Sewree, Mumbai -400 015

8. M/s. Bengal Trading Co.
Sevoke Road, P.O. Siliguri, District- Darjeeling (W.B.)

**Addresses of Raw Material Suppliers**

1. M/s. H.K. Agarwal and Co.
Sevoke Road, Sililguri - 734 401

2. M/s. Beekay Hardware
Tadong, Gangtok, Sikkim-737 102.

3. M/s. Cherry Pvt. Ltd.
31-A, National Highway, Gangtok, Sikkim -737 101

4. M/s. Vinod Enterprise Near Convey Ground,
Tadong, Gangtok, Sikkim-737 101.