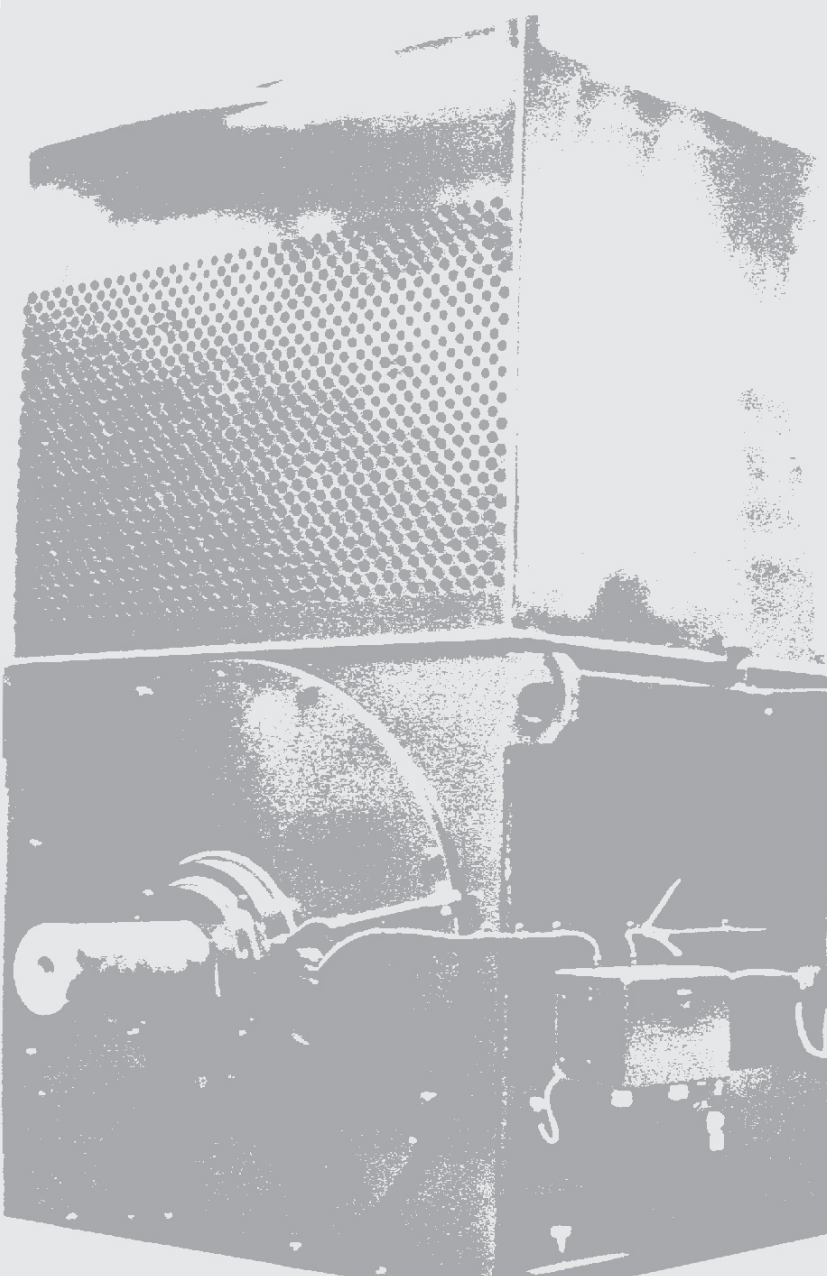


Emco Electrodyne Pvt. Ltd.



MEDIUM & HIGH VOLTAGE
ASYNCHRONOUS

- SQUIRREL CAGE

- SLIPRING

INDUCTION MOTORS

www.emcoelectrodyne.com

Emco Electrodyne Pvt. Ltd.

THE COMPANY

EMCO has been producing quality electrical equipment such as motors, motor controls and high voltage panels since 1976. The company was founded by Mr. P.S. Matharoo in Chandigarh to manufacture electrical control panels. Keeping in pace with technology and advancement in manufacturing techniques EMCO grew up to three subsidiaries.

- EMCO Switchgears
- EMCO Electrodyne
- EMCO Electrodynamics



OVERVIEW

EMCO manufactures machines for large pumps, fan & blowers, refineries & extruders, mills and other industrial applications, made as special tailor-made solution for every customer.

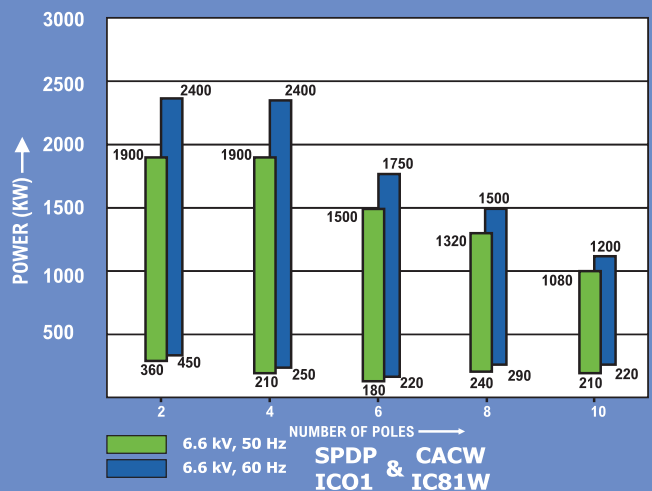
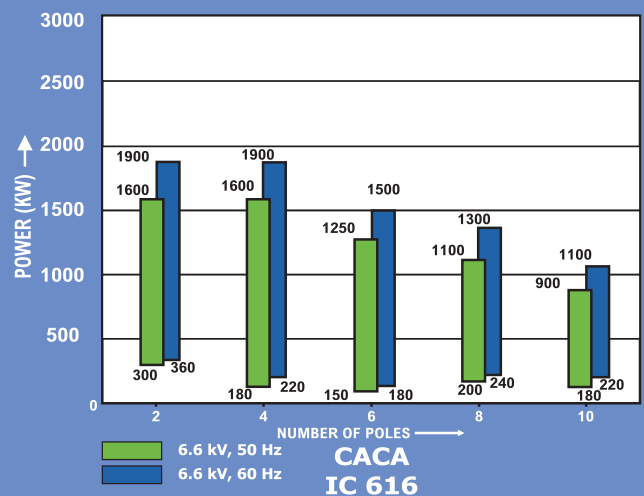
EMCO motors bank on the robustness, reliability and maintenance free design.

TYPE

Asynchronous Slip Ring and Squirrel Cage Induction motor.

FEATURE

Frame	: IEC 355 to 560
Rating	: 150 KW to 2400 KW
Voltage	: 400 to 11,000 VOLTS
Speed	: 2 Pole to 10 Pole (12 and above on request)
Supply	: Line (50Hz & 60Hz) and converter
Cooling	: Air Cooled & Water Cooled (IC 01, IC 611, IC616 and IC81W.)
Mounting	: IMV1 and IMB3 as standard (other on request)
Protection	: IP23, IP54 and IP55.
Insulation	: Vacuum Pressure Impregnation (VPI) Class "F" as a standard with temp use as Class "B".



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FRAME

The modular frame is torsionally stable and vibration resistant, mild steel structure. All frame size have the same basic modular structure, wherein the bearings are supported on end shield and the dynamic forces are transmitted, not allowing resonant vibration. Slipping chamber are separate to the modular structure.

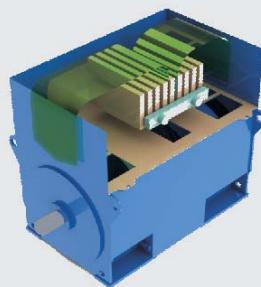
Before painting, the frame is sandblasted and then sprayed with a coat of primer. Depending on operating conditions, special anti-corrosive protections can be offered.



LAMINATION

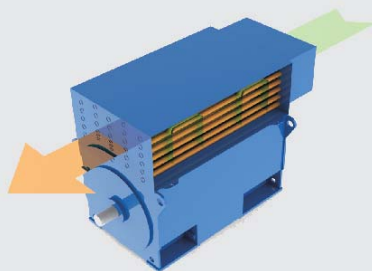
Low loss silicon steel is employed to the active part of the motor i.e. the lamination. Ventilation ducts are provided to optimise cooling efficiency. The laminations are stacked between finger end plates which ensure high degree of compactness, reduces the magnetic loss, core loss and chances of winding failure.

COOLING



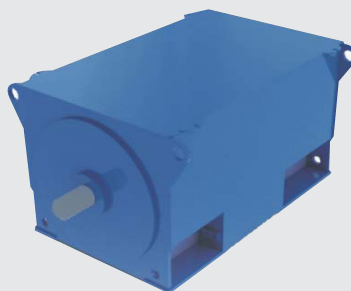
IC81W

Internal air is cooled by passing it through a bank of tubes, which are cooled by water flowing inside them



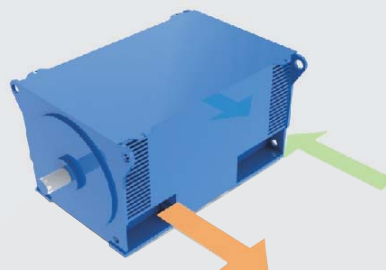
IC616

Internal air is cooled by passing it through a bank of tubes, which are cooled by air forced through them with blowers mounted on the heat exchanger



IC611

Internal air is cooled by passing it through a bank of tubes, which are cooled by air from a shaft mounted fan.



ICO1

Stator & rotor is cooled by passing air from outside and expelling it from the drive end.



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COILS & INSULATION

Coil are produced on state of art CNC machines with high purity electrolytic copper with mica covering for high volts/turn ratio. Groundwall and endwinding insulation are porous Mica tapes which are suitable for vacuum pressure impregnation. Stress grading is standard above 5 KV. Surge testing is carried out before insulation in core. Resin Rich Insulation can also be provided upon request.



VACUUM PRESSURE IMPREGNATION

The impregnation system employed is a global vacuum pressure impregnation scheme which ensures excellent thermal, electrical as well as mechanical properties. High absorbent tapes and bracing/tying methods are designed for frequent switching and also for the highest stress that can endured e.g. operating at 100% voltage in phase opposition.

Parameters such as viscosity, impregnating temperature, vacuum/ pressure cycle times are checked and recorded. Rated surge withstand levels are achieved in accordance to IEC 60034-15



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ROTOR

The rotor core is produced of laminations and is either, placed directly on shaft, or on a set of spiders (welded ribs) for low speed motor. The core is pressed hydraulically between finger end plates, Ventilation ducts are provided to optimise the cooling and they are aligned with stator ducts. For 2 pole-machines, the core stack is "Hot shrunk" on the shaft

CAGE ROTOR

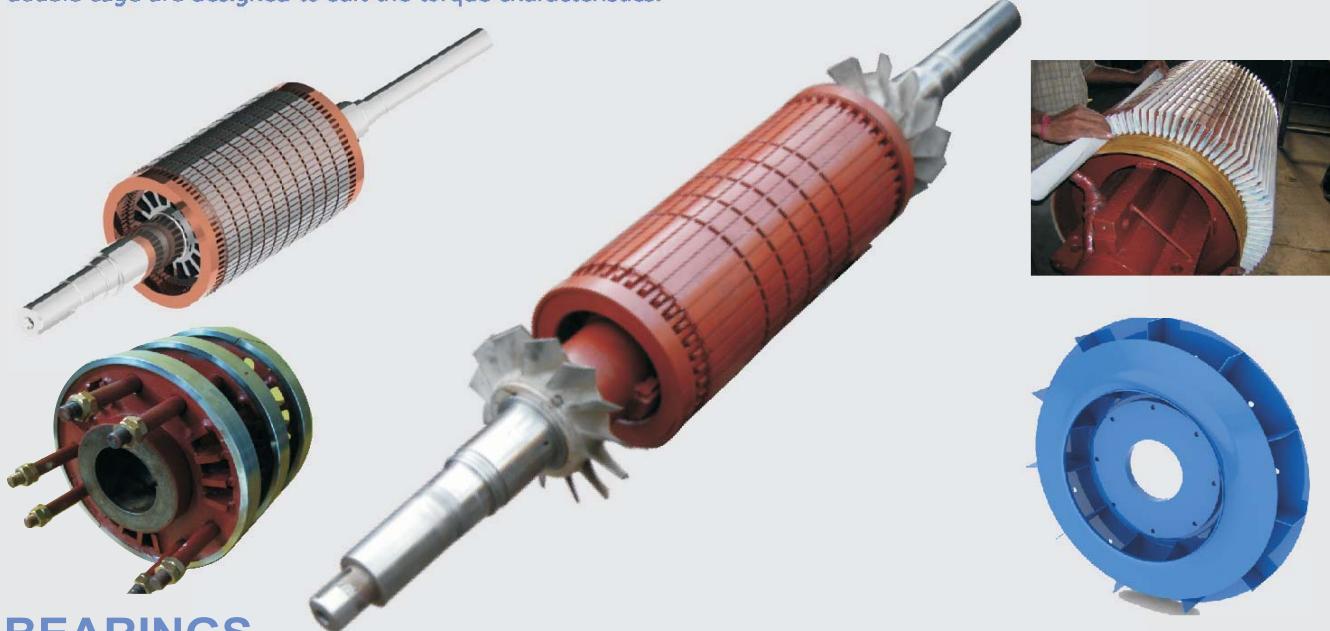
The deep bar design is basic wherein the cage is of copper or copper alloy, brazed to short circuiting rings. Short circuiting rings are mill grooved as standard, which ensure high performance rotors under extreme starting and operating stresses. Low resistance copper winding reduces current, heat loss, which result is high efficiency.

Silver alloy brazing, optimum tightness of bar in slot, swaging, sometimes VPI and final machining ensure low unbalance and eccentric masses. For high starting torques, special double cage are **designed to suit the torque characteristics.**

WOUND ROTOR

The rotor winding is typically a two layer winding. The Class of insulation being 'F' and vacuum pressure impregnation, a standard. The VPI ensures excellent thermal, electrical and mechanical properties to the windings. Res-i-glass banding under requisite tension is done to negate effects of centrifugal forces.

Winding is connected to a stainless steel slipring which is housed is an integral chamber with adequate carbon brush holder arrangements.



BEARINGS

Grease lubricated, anti-friction rolling element bearings are a standard for all ranges. However, sleeve bearings can also be provided on request.



Drive end bearing are axially locked and non drive end bearing are kept axially free, as standard. Also non drive end housing is kept insulated free as standard



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QUALITY ASSURANCE & TESTING

The following is a list of the routine tests carried out on all induction motors produced in the factory.

- Windings ohmic resistance measurement
Test Method : IEEE 118
- Direction of rotation check
Test Method: IEC 60034-8
- Phase sequence check
Test Method: IEC 60034-8
Acceptance criteria: IEC 60034-8
- No-load characteristic determination
Test Method: IEEE 112
- Locked rotor test
Test Method: IEEE 112
Acceptance Criteria: IEC60034-1
- Vibration level measurement
Test Method: IEC 60034-14
Acceptance Criteria: IEC60034-14
- High voltage test
Test Method: IEC60034-1
Acceptance Criteria: IEC60034-1
- Insulation resistance measurement
Test Method: IEEE43
Acceptance Criteria: IEEE 43
- Visual and dimensional check
Test Method: as per drawing



"Machines upto 1,500KW can be tested on D.O.L. (direct-on-line) and upto 5,000KW can be satisfactorily tested at rated speeds. Machines with split-sleeve bearings can also be tested. With acquisition of the testing outputs, accurate performance results are automatically ascertained and recorded.

All tests are done on fully assembled machine.

Special tests which may be carried out in the factory:

- Heat run test
- Current, speed and torque V/s time during acceleration (squirrel cage motor only)
- Inertia moment evaluation
- Shaft voltage measurement
- Noise (SPL, sound pressure level) at no load (according to IEC60034-9)
- Breakdown torque evaluation
- Polarization index
- Dielectric loss factor on test coils
- Impulse voltage test
- Core test (on stator cores before winding assembly).



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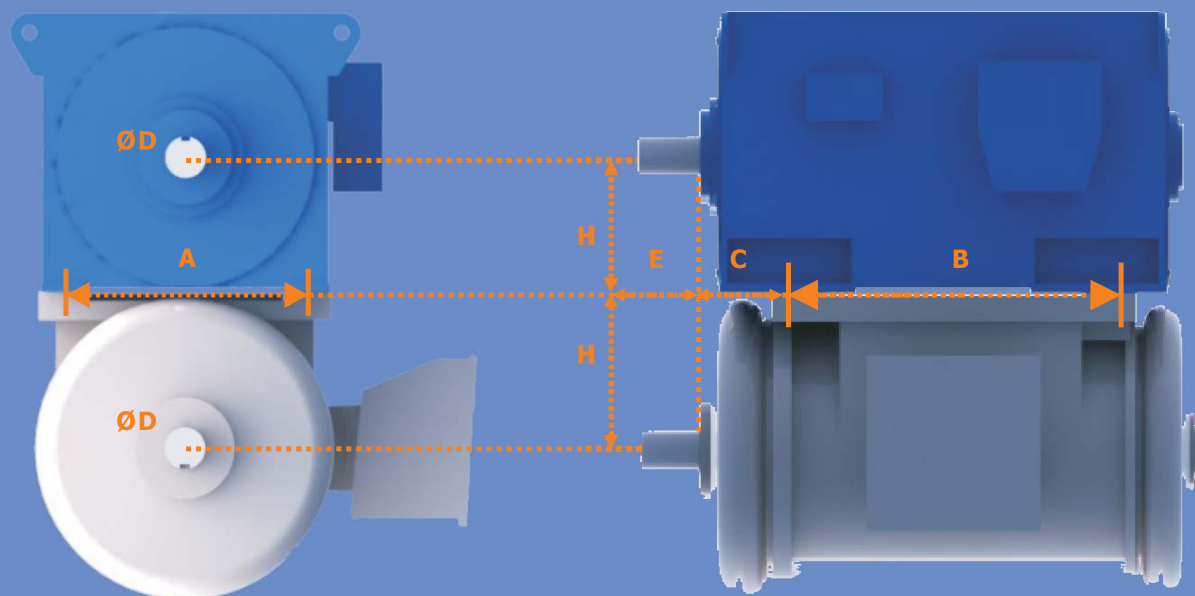
REPLACEMENT MOTORS

**EMCO POSSESSES THE CAPABILITY BY WAY OF "REVERSE ENGINEERING",
REDESIGN A MACHINE FOR REPLACEMENT WITH GUARANTEED :**

- Mechanical inter changeability with footprints, shaft dimensions and extensions.
- Electrical performance w.r.t. efficiency, insulation and cooling.

**VINTAGE MOTORS OF DIFFERENT AND OBSOLESCENT MANUFACTURERS
CAN BE MANUFACTURED TO SUIT DIFFERENT OPERATING PARAMETERS SUCH AS :**

- Increased output
- Change of synchronous speed
- Increased thermal & mechanical performance by Vacuum Pressure Impregnation.
- Finer balancing tolerances leading to smoother operations
- Change of cooling circuits to enhance cooling and avoid damage due to change of environment etc.





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