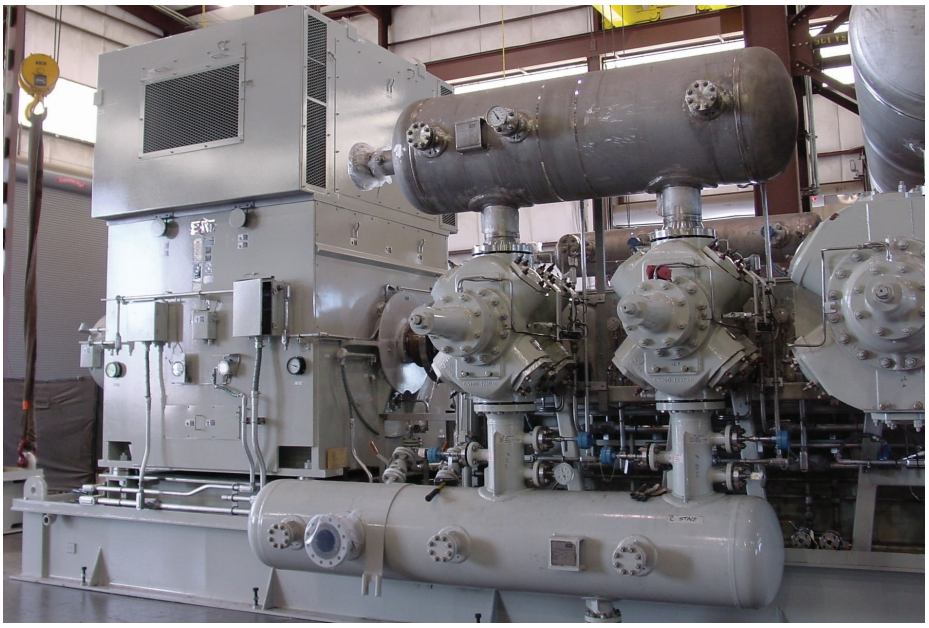
Synchronous Motors

Reciprocating Compressor Applications

Electric Machinery (EM) synchronous motors for reciprocating compressors provide dependable operation and are built to meet design parameters from compressor manufacturers along with on-site electrical requirements.



Synchronous motor driving a reciprocating compressor.

Ranges

Output: 500 to 25,000 HP
Speed: 180 to 900 RPM
Voltage: 2,300 to 13,800 VAC
Power factor: 0.8 leading to 1.0 unity

Advantages

- **Higher efficiency**
  Synchronous motors have a unique and merited position as the most efficient electrical drive in the industry and are often 1-2% more efficient than induction motors.

- **Power factor correction**
  Synchronous motors can operate at leading power factors, providing VARs to the power system, reducing demand charges often caused by induction motors.

- **Constant speed**
  Synchronous motor speed is unaffected by line or load conditions, providing greater operating flexibility. Starting and pull-in torques are designed to accommodate electrical system requirements and load limitations.

Rotor

- **Rotor construction**
  The rotor consists of a spider on which the field poles, amortisseur (cage) windings and brushless exciter armature are mounted; providing inertia to minimize current pulsations. Additional inertia can be added as required. Rotor insulation is a Class F system.

- **Rotor poles**
  The rotor poles are comprised of steel laminations pressed and bolted together to withstand rotational and electrical stresses and are mounted to the spider rim by bolts, studs or dovetails. The wire-wound poles are then epoxy bonded layer-by-layer to hold the windings firmly.

- **Rotor cage bars**
  Phosphorous-free brazing of cage bars prevents chemical corrosion which can cause machine failure.

- **Rotor shaft**
  An integral forged flanged shaft extension is standard. Shaft is designed to meet site ambient temperature requirements. It may be supplied by Electric Machinery EM or the compressor OEM.

- **Bearings**
  Standard configuration is a single sleeve bearing; pedestal mounted, self cooled, oil ring lubricated. Options include provisions for flood lubrication system, vibration probes, or two bearing configurations.

Stator

- **Stator construction**

  The stator is composed of a supporting structure, a core of electrical laminations and insulated windings. High grade silicon steel laminations that build up the core are precision punched from core-plated sheets. Pressed and held between end plates, these laminations are stacked in the support structure and spaced for radial ventilation to ensure even cooling throughout the core. The frame is welded and machined to withstand stresses exerted by electrical and mechanical forces in the core and provide low vibration levels.

- **Stator winding insulation**

  The Duraguard™ insulation system is a vacuum pressure impregnated epoxy-mica insulation system that provides Class F thermal capability, outstanding dielectric properties, superior moisture and chemical resistance and the superb mechanical integrity of an epoxy resin system. It is a sealed insulation system capable of passing the water immersion test as specified by NEMA MG 1 and IEEE 115. Abrasion-resistant coating is available for protection in demanding environments.

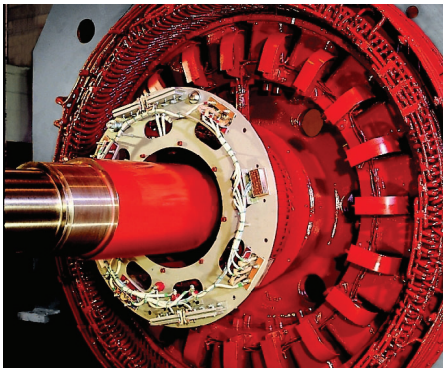
- **Stator shift**

  Stator shift is available on motors with pedestal type bearings to provide easier accessibility. Extra length soleplates provide stator shift to allow internal inspection of the motor.

Brushless Excitation

The brushless excitation system eliminates periodic brush and collector ring maintenance and replacement. Solid state excitation components are rated conservatively to provide dependable service and long life. Electric Machinery EM's Sync-Rite™ system applies the field automatically at the proper rotor angle to ensure smooth synchronization.

Baseplate with shipping cradle on flanged end.



Rotor and Stator in final assembly.

Industry standards

Electric Machinery EM manufactures synchronous motors to meet all current industry standards including NEMA MG 1, IEEE 115, IEC 60034/60079, API 546, and ISO 9001:2000 standards. Third party CENELEC/ATEX approval or CSA labeling is available upon request.

Enclosure

Typical motor enclosures are WP II (IC01/IP24), TEFV (IC37/IP44), TEWAC (IC817/IP54), and TEAAC (IC611 or IC616/IP54).

API 546

Electric Machinery EM builds motors for reciprocating compressors to exacting API 546 Standards; meeting welding, structural, vibration and testing requirements. This helps customers avoid costly down time because the motors start and run reliably, with these other advantages from API 546 design

- Stator core laminations are C-5 quality or better to withstand winding burnout if rewinding is required.
- Low impedance ground path is welded to the back of the machine's core to divert surges in the power system away from the motor, preventing damage.
- Factory balancing provides low vibration for smooth field operation. Dynamic balancing at full operating speed is standard for rotors above 600 rpm. Static balancing is standard for 600 rpm rotors and below.
- Starting conditions and starting capabilities are per API 546 requirements.

Hazardous Areas

Electric Machinery EM synchronous motors can be built for operation in classified hazardous areas per NEC or IEC/EN (ATEX) requirements. Standard brushless excitation is non-sparking for hazardous atmospheres.

Experience

Electric Machinery EM has over a century of experience in designing, manufacturing and serving large synchronous motors

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