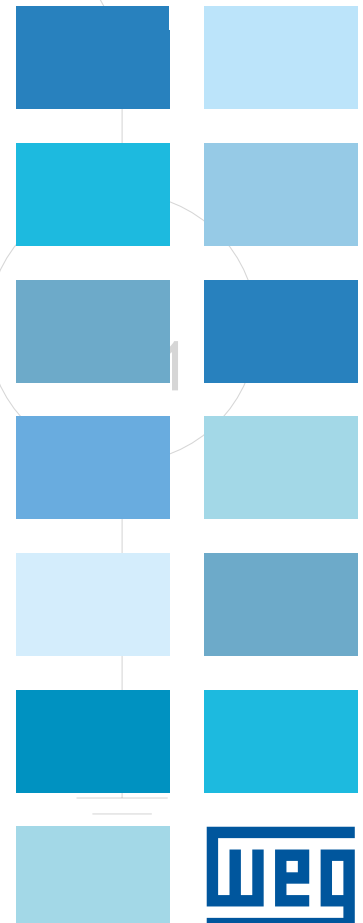


Three-Phase Induction Motors

Master Line



Three-Phase Induction Motors Master Line

The Master line (M line) motors stand out for the flexibility of their electrical and mechanical design, adapting to the strictest operating requirements in different applications.

The result of this innovative development is a product with high efficiency, meeting the requirements of international standards and in line with the world market trends.

Their design is also flexible about adaptations so as to make them interchangeable with already existing motors, cutting down operating costs due to downtime to replace motors.

This attests to the commitment WEG has to its customers and the environment, bringing solutions in optimized products and processes.



Maximum performance of these motors can be achieved through the use of software applications developed in partnership with universities in Europe, the United States and Brazil which ensure accuracy in the design.

The optimized design, the excellent quality materials used and the strict control of all phases of the manufacturing process allow WEG motors to be applied in different segments, such as: mining, sanitation, cement, oil and gas, naval, steel, sugar and ethanol, cellulose and paper, among others. Furthermore, this great versatility allows choosing the most suitable motor for your application or installation conditions.

In order to meet the most demanding world markets, WEG's quality system is certified by Bureau Veritas Quality Institute in compliance with the requirements of ISO 9001, ISO 14001 and ISO 50001. The motors of the Master line are also certified by recognized certifying bodies, including the CSA from Canada, PTB from Germany and Baseefa from the UK.



Mounting Characteristics

Manufactured in different configurations of cooling methods and degrees of protection, adapting to the operating and environmental conditions.

Motors with IEC frame sizes 280 to 500 can be manufactured with cast iron or welded steel plate frames. For IEC sizes 560 and above, the frames are made of welded steel plates only.

Main mounting features:

- Protection degree IP23, IP24(W), IP55(W), IP56(W), IP65(W)
- Rotor
 - Cage
 - Rings (winding) - fixed or motorized brush holder
- Bearings
 - Hydrodynamic oil-lubricated
 - Bearing with lubrication by grease (with taconite seal), oil or oil mist system

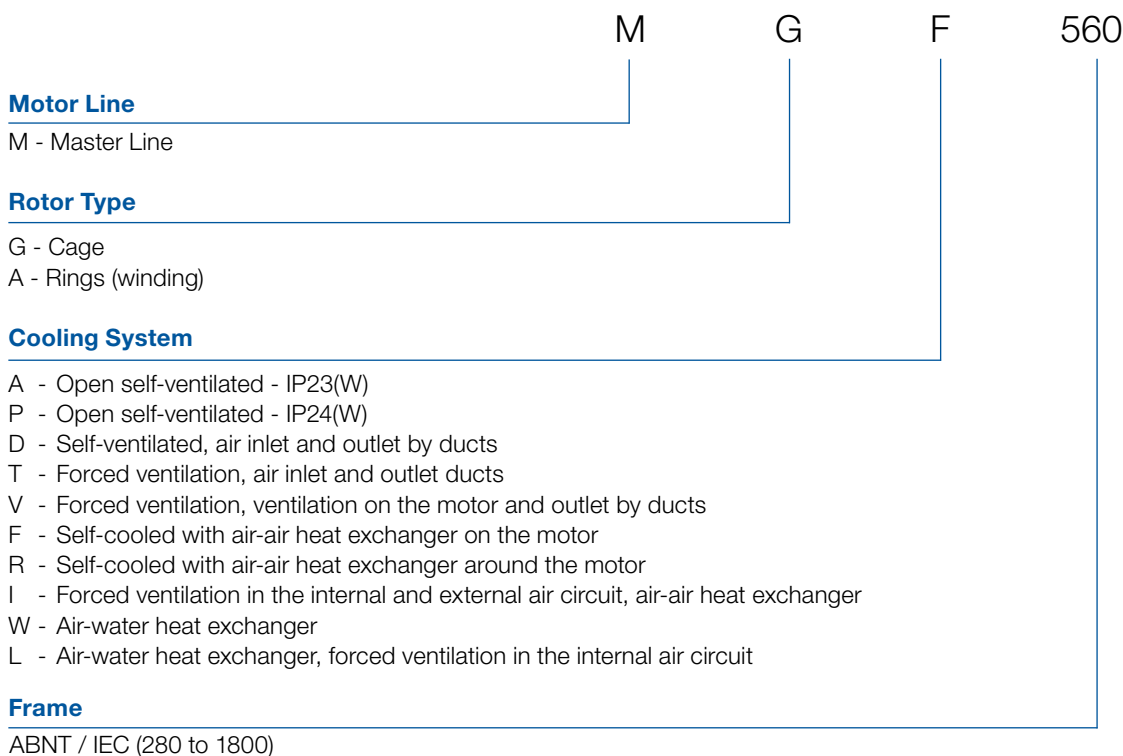
Advantages of using the motors of the Master line:

- High performance
- Low noise level
- Simple and reduced maintenance
- Easily interchangeable with existing motors
- Optimized project



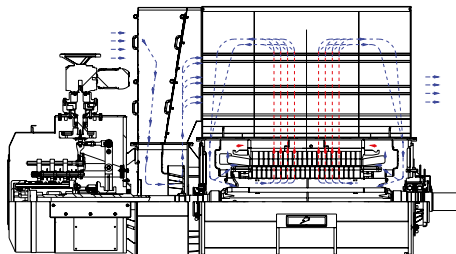
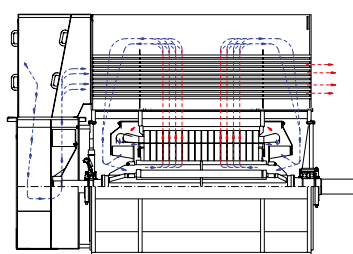
Powers up to 50,000 kW
 Voltages from 220 to 13,800 V
 Speed from 3,600 to 300 rpm

Terminology

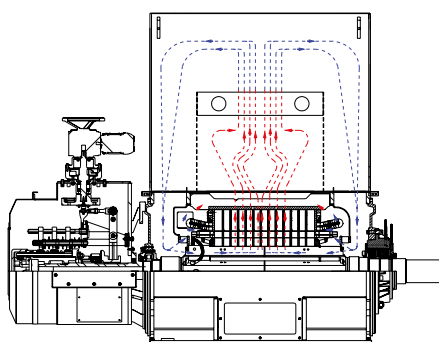
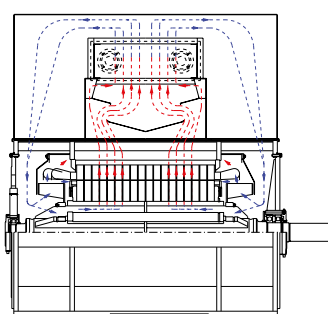


Cooling

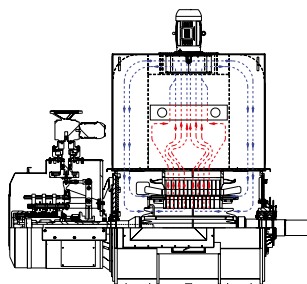
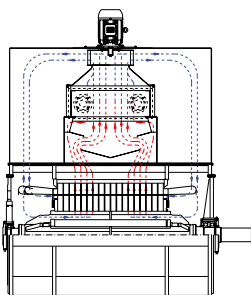
The motors of the Master line offer cooling systems which vary according to the type of machine to be driven, application and environment where they will be installed.



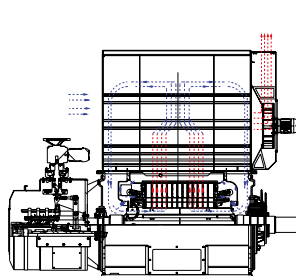
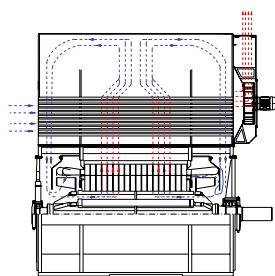
- Totally enclosed
- Air-air cooling system
- IC 0611
- IP55 / IP56 / IP65
- MGF, MAF



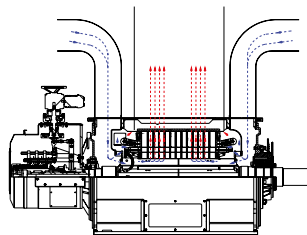
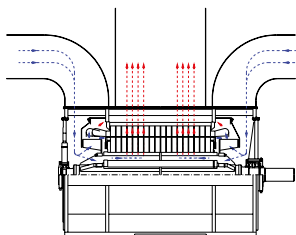
- Totally enclosed
- Air-water cooling system
- IC 37A81(W)
- IP55 / IP56 / IP65
- MGW, MAW



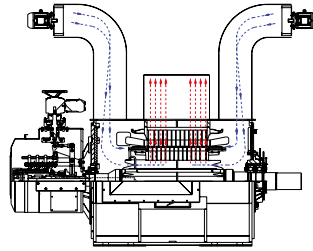
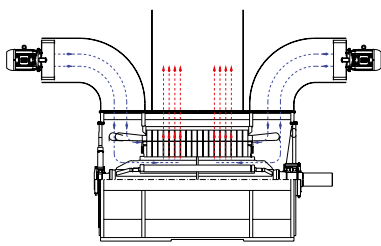
- Totally enclosed
- Independent ventilation
- Air-water cooling system
- IC 37A86(W)
- IP55 / IP56 / IP65
- MGL, MAL



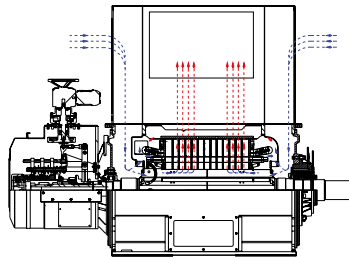
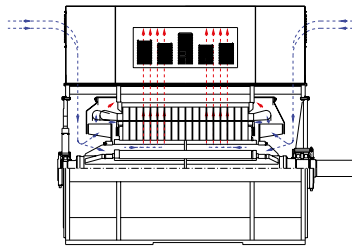
- Totally enclosed
- Independent ventilation
- Air-air cooling system
- IC 0666
- IP55 / IP56 / IP65
- MGI, MAI



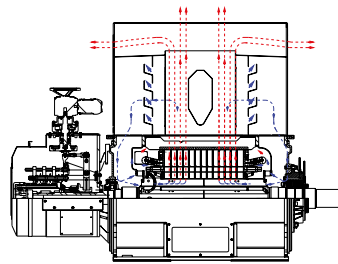
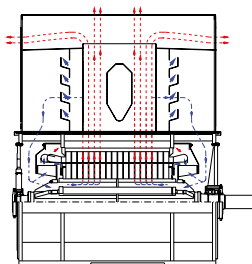
- Totally enclosed
- Self-cooled by ducts
- IC 31
- IP55 / IP56 / IP65
- MGD, MAD



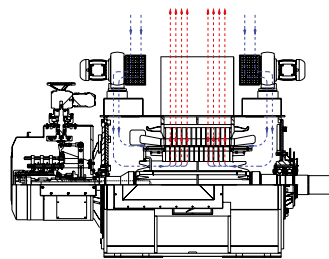
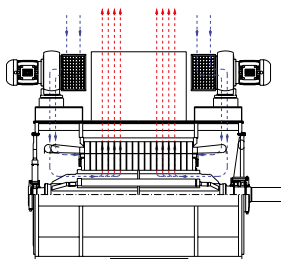
- Totally enclosed
- Independent ventilation by ducts
- IC 37
- IP55 / IP56 / IP65
- MGT, MAT



- Open (self-ventilated)
- IC 01
- IP23(W)
- MGA, MAA



- Open (self-ventilated)
- IC 01
- IP24(W)
- MGP, MAP



- Open
- Independent ventilation
- IC 06
- IP23 without ducts
- IP24(W) with ducts
- MGv, MAV



Manufacturing



Frame

Frame

Made of welded steel plate or cast iron, it is the structural component of the motor, holding, supporting and protecting the active magnetic part of the motor. With rugged construction, it provides the motor with excellent strength and low vibration levels.



Stator

Stator

It is the active magnetic static part of the motor. It consists of a core of pressed steel laminations in whose slots the coils forming the stator winding are inserted. The stator core is mounted directly in the frame.



Winding

Winding

The winding process adopted by WEG is especially developed for the voltage and application the motor is intended for. The low, medium and high voltage motors can have circular and form-wound coils manufactured of copper wire; after the winding, they are completely insulated with porous mica tape. Conducting and semi-conducting tapes are also used in the winding process, covering the coils and ensuring their resistivity.



Rotor

Rotor

It is the rotating component of the electric motor. Basically composed of the shaft and a pressed steel lamination core. In the slots of the core, the cage is mounted – or the rotor coils are inserted, in the case of wound-rotor motors. The cage can be made of cast aluminum, copper or brass. The sizing of the rotor is done considering the torque required at the start and operating conditions of the motor.

In the manufacture of the shaft, ABNT 1040/45, 1524 or 4140H heat-treated materials are used.



Vacuum impregnation (VPI)

Insulation System

WEG MICATHERM insulation system is based on the "Vacuum Pressure Impregnation" process (VPI), which was developed together with the world's most renowned suppliers of insulating materials.

Using special epoxy resins, this system ensures perfect insulation of the motor coils, in a process totally free from emission of gases harmful to the environment.

For many years the VPI process has shown its efficiency and reliability in rotating electrical machines in many different applications. The insulation system is used in low and high voltage machines that use form-wound coils of 380 to 15,000 V.



Balancing

Balancing

WEG uses equipment that allows performing balancing at up to 3,600 rpm.

Computerized balancing equipment allows the accurate balancing of the motors. As a result, WEG motors present very low vibration levels. The standard balancing is done in two planes, but WEG can perform the balancing in three planes when required or when specified by the customer.

Applications

Squirrel Cage Motor

Because of the versatility of the design and excellent operating conditions, the motors of the Master line are used in different industries for driving machines or equipment that require variable or constant torque such as fans, pumps, crushers, belt conveyors, compressors, mills, mixers and others.

Wound-Rotor Motors

The wound-rotor motors are normally applied in cases where loads have high inertia or with highly resistive torque at startup. They are also used when there are starting current limitations in the power system.

They are used for driving loads such as: ball mills, cement mills, fans, exhaust fans, shredders and rolling mills, in the cement, mining and steel industries, among others.

They can be supplied with withdrawable (motorized) brush holders or fixed brush holders, according to the load or operation. The slip ring tracks are made of copper, a material with excellent electric conductivity.

The wound-rotor motors with withdrawable (motorized) brush holder have important advantages in terms of maintenance, because they allow the brushes to remain in contact with the slip rings only during the start, minimizing the wear of brushes and slip rings, thereby extending intervals between maintenance.

Vertical Motors

The motors of the Master line with vertical mounting are designed and manufactured to meet the customer's requests for applications in pumps, crushers, mixers and motors.

They can be supplied with deep groove ball bearings, angular contact thrust ball bearings or self-aligning roller bearing, lubricated with grease or oil, with water cooling.

Motors for Explosive Atmospheres

For applications in explosive atmospheres, WEG manufactures motors with specific safety features, able to operate in locations where flammable materials are handled, processed or stored, preserving human life and ensuring the integrity of property.

The motors of the Master line with Ex-e (increased safety), Ex-n (nonincendive) and Ex-p (pressurized) specification meet the requirements of national and international standards and are tested and approved by certifying bodies recognized worldwide.



Application Examples



Supply: 9,900 HP, 13,200 V, 8 poles, frame 900
Application: Fan



Supplies: 9,000 kW, 6,600 V, 8 poles, frame 900
Application: Exhaust fan



Supply: 2,000 kW, 11,000 V, 4 poles, frame 560
Application: Water pump



Supply: 6,500 kW, 11,000 V, 6 poles, frame 900
Application: Ball mill



Supply: 14,000 kW, 10,000 V, 4 poles, frame 1000
Application: Test laboratory



Supply: 12,000 kW, 6,000 V, 4 poles, frame 800
Application: Centrifugal compressor

Accessories and Special Features

The motors of the Master line can be supplied with the accessories and special features listed below, as requested by the customer. In the specification of the motor, it is important to inform WEG of the accessories and special features to be included in the motor.

Accessories

- Pt-100 type temperature sensors on the stator windings
- Pt-100 type temperature sensors on the bearings
- Temperature sensors thermocouple-type and thermistors
- Space heater (for dehumidification)
- Brush for grounding the shaft
- Motorized system for lifting brushes (for wound-rotor motor)
- Vibration sensors
- Accessories for bearings:
 - Thermometer
 - Thermometer for oil
 - Flow switch for oil
 - Hydraulic unit for lubrication and oil cooling
 - System for injecting oil under pressure to start and stop the motor (Hydrostatic Jacking)
- Capacitors for correction of power factor or voltage surge protection
- Lightning arrester for protection against voltage surges
- Current transformers (CT) for measuring or differential protection
- Temperature sensors for air inlet and outlet (ventilation)
- Indicators of position or speed (encoder or tacogenerator)
- Accessories for air-water heat exchanger:
 - Flow switch for water
 - Sight glass of water flow
 - Temperature sensor for water
 - Water leak sensor
- Anchor plate and anchors
- On base
- Ratchet for no rotation reverse
- Other accessories under consultation

Special features

- Class H insulation
- Reduced vibration level
- Reduced noise level
- Degree of protection IP56 / IP56(W) / IP65 and IP66(W)
- Hydrodynamic bearings
- Oil-lubricated rolling bearings
- Provision for bearing lubrication by oil mist
- Special shaft:
 - Tapered shaft end
 - Double shaft end
 - Hollow shaft
 - Shaft with collar
 - Material other than standard
- Modified main terminal box
- Additional main terminal box
- Additional terminal box for neutral or accessories
- Motors for hazardous areas:
 - Ex-n (nonincendive)
 - Ex-e (increased safety)
 - Ex-p (pressurized)
- Class I, division 2



Thermometer



Pt-100 on the bearing



Tapered shaft



Hydrodynamic bearing



Pressurization system for hazardous area

Test Laboratory

WEG motors are tested according to NBR 5383, IEC 60034, NEMA MG 1 and API in a modern laboratory. Having the capacity to test low and high voltage motors with power up to 20,000 kVA and voltages of up to 15,000 V, WEG test laboratory features highly accurate test controls and fully computerized monitoring systems.

The tests are divided into three categories: routine, type and special tests. Routine tests are performed in all motors. In addition to routine tests, type and special tests are usually performed in one of a series of equal Motors or under the customer's request.

Routine Tests

- Cold ohmic resistance measurement
- No load test
- Blocked-rotor test
- Applied potential test
- Measurement of insulation resistance

Type Tests

- All routine tests
- Measurement of maximum torque
- Temperature rise test
- Test under constant voltage load

Special Tests

- Noise level measurement
- Shaft voltage measurement
- Overspeed test
- Vibration test
- Cold vibration measurement



Test laboratory



Surge test



Control room

Technical Assistance

WEG offers its customers technical support services, responsible for all the after sales support. General queries and support in the field are part of those services, including diagnostics, commissioning of machines and 24-h on call service. The technical assistance is composed of a trained and experienced team, able to deal with a wide range of situations and remote support, using state-of-the-art equipment, which produces reliable results. It also offers its network of authorized repair shops, present in Brazil and worldwide.



Services

WEG, market leader in motors and generators, also offers services of checkup, restoration and rerating on medium and large electrical machines performed at our factory or in the field, including other brands, as follows:

- DC generators and motors
- Three-phase induction motors (low, medium and high voltage/cage or wound-rotor)
- Synchronous motors (with or without brushes/low, medium and high voltage)
- Turbogenerators
- Hydrogenerators

When performing repair services, WEG uses the same technology and processes as those used in the manufacture of new machines.



Parts and Components

After years in operation, the motors of the Master line need restoration to continue working properly. For this restoration, it is recommended the use of genuine parts supplied by the manufacturer. WEG's team is available for immediate support and assistance with the proper identification of components.



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For those countries where there is not a WEG own operation, find our local distributor at www.weg.net.



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