

# THREE-PHASE INDUCTION MOTORS – MASTER LINE

Reliability proved in operation



Motors | Automation | Energy | Transmission & Distribution | Coatings



# RELIABILITY PROVED IN OPERATION

The motors of the Master line (M line) stand out for the flexibility of their electrical and mechanical project. They are versatile motors with different configurations suitable for severe environments which demand high resistance and durability, adapting to different applications. Their design is easily customized so as to make them interchangeable with already existing motors, cutting down operating costs with downtime for motor replacement.

They can also be designed for inverter operation, enabling accurate speed control, as well as high torques during start.







## Benefits



High efficiency



Optimized project



Easily interchangeable  
with existing motors



Simple and reduced  
maintenance



Low noise level



Reliability and robustness

Three-Phase Induction Motors – Master Line | 3



## Technical Characteristics

### Scope

- Rated output: up to 50,000 kW
- Frame size: 208 up to 1,800
- Degree of protection: IP23 up to IP66
- Voltage: 220 up to 13,800 V
- Frequency: 50/60 Hz
- Rotation: up to 3,600 rpm
- Cooling System: IC01, IC31, IC06, IC37, IC81W, IC86W, IC511, IC611, IC616 and IC666
- Constructive form: horizontal or vertical
- Rotor type: cage or slip rings (wound) with fixed brushes or liftable brushes
- IEC, NBR or NEMA standard

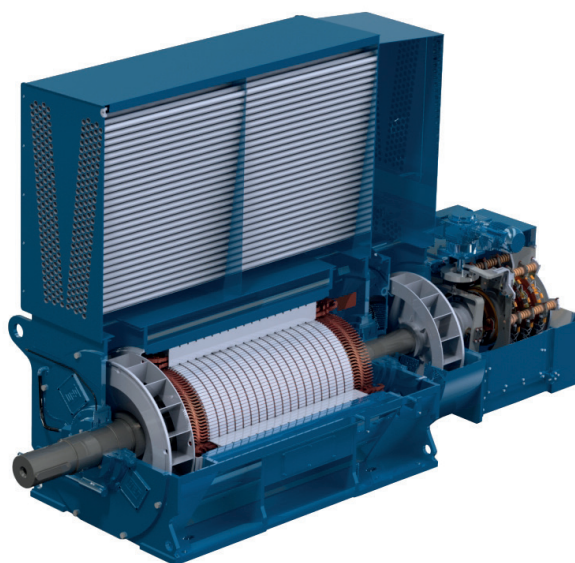
### Standard Features

- Starting method: DOL (Direct On Line)
- Class F insulation
- Class B temperature rise
- Duty: S1
- Service factor: 1.00
- Preformed winding with vacuum impregnation (VPI) for voltages above 1,000 V
- RTD Pt-100 temperature sensor, two per phase
- RTD Pt-100 temperature sensor, one per bearing
- Space heater
- Water leakage sensor (for IC81W and IC86W cooling type)

### Optional Features

- Starting Method: VFD, soft-starter or *reostato líquido* (when wound rotor motors)
- Vibration sensors: accelerometer, velomitor or proximitor
- Motors for hazardous areas classification: INMETRO, ATEX, IECex, CSA and TR-CU certifications
- Soleplate, anchor bolts, baseplate
- Both electrically insulated bearings
- Shaft grounding brush
- Class H insulation
- Capacitor and surge arrester for surge protection
- Capacitors bank for power factor correction
- Non-reverse ratchet
- Tapered shaft end, P-base, hollow shaft or double shaft end
- Vertical motors with bearings suitable to withstand external axial loads
- Stainless steel screws, nuts and washers

*Note: other features on request.*





## Three-Phase Induction Motors – Versatility

### Squirrel Cage Motor

Due to the versatility of the project, the motors of the Master line can be used in different industries to drive machines or equipment that require variable or constant torque, such as fans, pumps, crushers, conveyor belts, compressors, mills, mixers and others.

### Wound-Rotor Motors

The wound-rotor motors are normally used in loads with high inertia or high resistive torque at startup. They are also used when starting current limitations are present in the power supply system (for example, in the activation of pumps where a start with a current below the nominal is achieved). They are used to drive loads such as: ball mills, cement mills, fans, exhaust fans, shredders, rolling mills, among others. Given their reliability and robustness, they are used in the cement, sugar and alcohol, mining, steel industry, among others. They can be supplied with withdrawable (motorized/manual) brush holders or fixed brush holders, according to the load or operation requirements. The liftable brush holder wound-rotor motors have a control system that has complete operation logic. The goal was to combine a robust and easy implementation project in the application (only 2 input signals and 3 output signals). The control system has the capability to investigate faults and monitor system operation via integrated HMI, facilitating system maintenance, preventing undue maneuvering in the brush holder system and the main motor drive, and increasing safety in the motor operation.

### Vertical Motors

The vertical motors are designed and manufactured to meet the customer's requirements so as to apply them to pumps, crushers, mixers and motors. They can be supplied with rolling bearings or sleeve bearings (hydrodynamic), able to meet the most varied demands of external axial loads.

### Motors for Explosive Atmospheres

For applications in explosive gas and combustible dust atmospheres, WEG manufactures motors with specific safety features are able to operate in locations where flammable materials are handled, processed or stored, preserving human life and ensuring the integrity of property. The M line motors can meet the type of protection "Ex eb" (Increased Safety – with EPL Gb), "Ex ec" (Increased Safety – with EPL Gc), "Ex p" (Pressurized enclosure – with EPL Gb and Gc) protection, or "Ex t" (Dust Ignition Protection – with EPL Db and Dc) protection or as protection for Class I, division 2 or class II, division 1 and 2, according NEC 500/CEC Sec. 18, meet the requirements of national and international standards and are tested and approved by certifying bodies recognized worldwide.

### Low Inrush Current Induction Motors

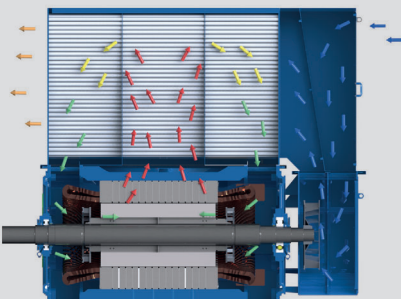
The low inrush current induction motors are specifically designed for applications in a weak supply network in order to provide a lower voltage drop without requiring auxiliary starting devices.

Typically, the inrush current in three-phase induction motors varies from five to seven times the rated current. In some applications, this level of inrush current may cause a significant voltage drop in the power supply network affecting the operation of other equipments and also the motor start itself. In extreme cases, the power supply system may even shut down. Using state-of-the-art designing tools, WEG can supply induction motors with inrush current from three to four times the rated current, significantly reducing the possible impacts on the power supply network.

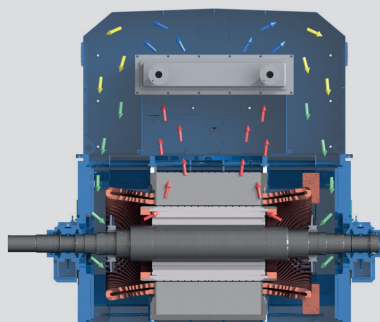


## Cooling

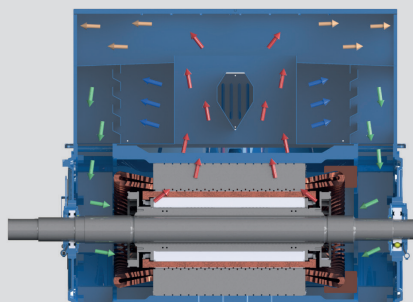
The motors of the Master line can be supplied with cooling systems which vary according to the type of driven machine, application and environment where they will be installed.



- Totally enclosed
- Air-air heat exchanger
- IC 611
- IP55 / IP56 / IP65 / IP66



- Totally enclosed
- Air-water heat exchanger
- IC 81W
- IP55 / IP56 / IP65 / IP66



- Open (self-ventilated)
- IC 01
- IP24(W)

### Others Cooling Methods Available

- Totally enclosed
- Independent ventilation
- Air-water heat exchanger
- IC 86W
- IP55 / IP56 / IP65

- Totally enclosed
- Independent ventilation by ducts
- Air-water heat exchanger
- IC 37
- IP55 / IP56 / IP65

- Totally enclosed
- Independent enclosed
- Air-air heat exchanger
- IC 616 or 666
- IP55 / IP56 / IP65

- Open
- Independent ventilation
- IC 06
- IP23 without ducts
- IP24W with ducts

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

- Open (self-ventilated)
- IC 01
- IP23W or IP24W



## Application

Maximum efficiency is obtained from the motors by means of modern software applications, which provide high precision to the project. Optimized design, high quality materials and strict control of all the manufacture phases make WEG motors ideal for different industries, such as:



**Oil & Gas**



**Cement**



**Mining**



**Sugar & Ethanol**



**Waste Water**



**Cellulose & Paper**



**Steel**



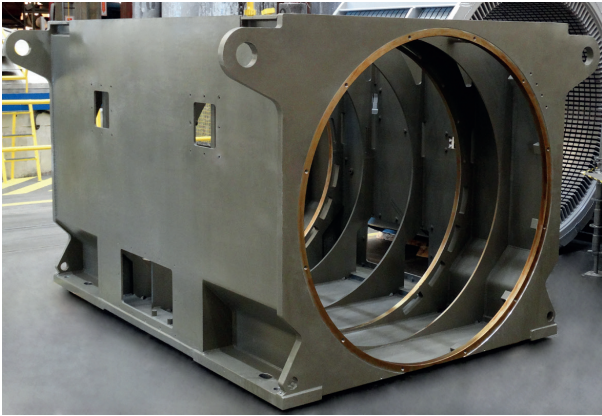
**Energy**



**Marine**

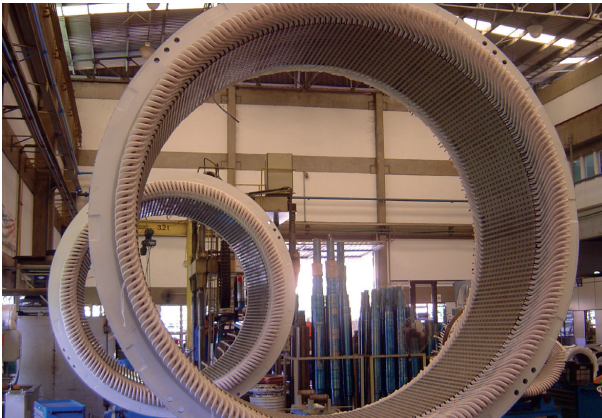
Furthermore, this great versatility allows you to choose the most suitable motor for your application or installation conditions. In order to meet the most demanding world markets, WEG's quality system is certified by the Bureau Veritas Quality Institute, in compliance with the requirements of ISO 9001, ISO 14001 and ISO 50001. The motors of the Master line are certified by internationally recognized certifying bodies, including INMETRO, CSA, PTB and Baseefa.

## Manufacturing



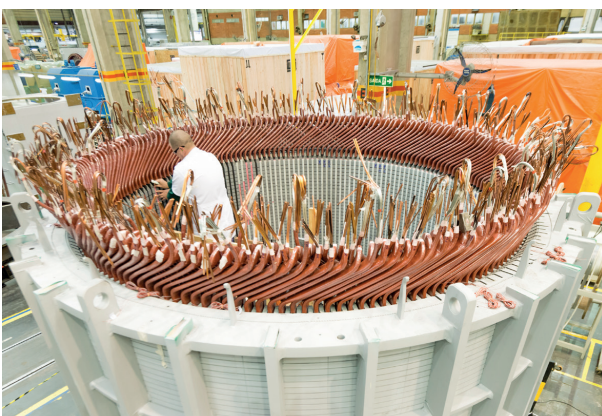
### Frame

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



### Stator

It is the active magnetic static part of the motor. It is a core composed of pressed silicon steel laminations with slots which house the coils forming the stator winding. The stator core is mounted directly on the frame.

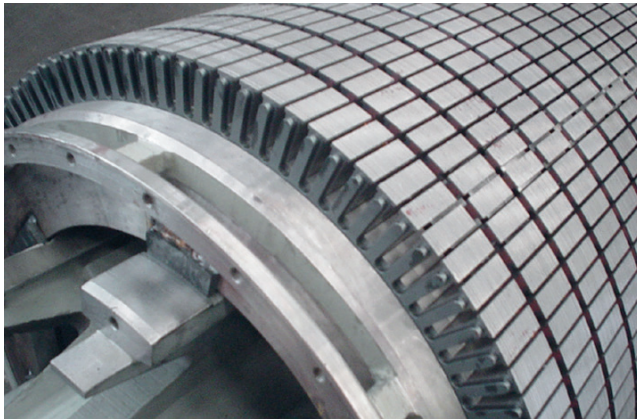


### Winding

The winding process adopted by WEG is especially developed for the voltage and application the motor is intended for. The coils can be made of round or rectangular copper wire, depending on the motor voltage. The round-wire coils are normally used in low-voltage motors, while the rectangular-wire coils are form wound and used in medium and high voltage motors. The coils of high-voltage motors are normally insulated with porous mica tape, and the protection against the corona effect is ensured by the application of conducting and semiconducting tapes.



## Manufacturing



### Rotor

It is the rotating component of the electric motor. Basically, composed of the shaft and a pressed silicon steel lamination core.

The slots of the core house the cage or the rotor coils, in case of wound-rotor motors. The cage can be made of cast aluminum or manufactured in copper or brass. The rotor is sized considering the torque required at the start and operating conditions of the motor.



### Insulation System

The WEG MICATHERM insulation system is based on the Vacuum Pressure Impregnation process (VPI). Using special epoxy resins, this system ensures perfect insulation of the motor coils, in a process totally free from gases harmful to the environment.

For many years the VPI process has proved its efficiency and reliability in rotating electrical machines in many different applications.

The insulation system is applied to machines with voltage of 380 to 15,000 V.



### 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 specified by the customer.



## Test Laboratory

WEG motors are tested according to NBR 5383, IEC 60034, NEMA MG 1 and API in modern laboratories. Capable of testing low and high voltage motors with power up to 20,000 kVA and voltages up to 15,000 V, WEG laboratories feature highly accurate controls and fully computerized test 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 the same motors or under the customer's request.



Surge Test



Control room



Test laboratory

## Parts and Components

After years in operation, the motors of the master line need restoration to continue working properly.

For this restoration, we recommend that you use original spare parts supplied by the manufacturer. WEG team is available to promptly assist you in the correct identification of the component parts.



## Technical Assistance

WEG technical team provides the customers with full after sale support. The services include consulting in general and services in the field, such as diagnosis, commissioning of machines and 24x7 support.

The technical assistance team is highly qualified and experienced, able to handle many different situations in the field and to give remote support, using state-of-the-art equipment, which ensures reliable results.

WEG also provides its network of authorized repair shops, present in Brazil and worldwide.



## Services

In order to restore medium and large electrical machines, count on WEG service team.

The same technology used to manufacture motors and generators is used for inspection and restoration. The services are executed in the field (at the customer's premises) or on factories: Jaraguá do Sul (Brazil), Sertãozinho (Brazil) and São Bernardo do Campo (Brazil), which is also homologated to execute services on equipment for use in explosive atmospheres. Those plants count on the full structure and support of the engineering, industrial process and quality control departments, enabling fast, reliable and quality service.

Service of WEG products and other brands:

- DC generators and motors
- Three-phase induction motors (squirrel cage or slip ring; medium and high voltage)
- Synchronous motors (with or without brushes; medium and high voltage)
- Synchronous condensers
- Turbogenerators
- Hydrogenerators
- Wind Turbines
- Hydraulic Turbines
- Steam Turbines

WEG Services: flexibility, agility and experience to optimize your time and productivity.



For WEG's worldwide  
operations visit our website



[www.weg.net](http://www.weg.net)



+55 47 3276.4000

[energia@weg.net](mailto:energia@weg.net)

Jaraguá do Sul - SC - Brazil

Cod: 50019089 | Rev: 13 | Date (m/a): 02/2021.

The values shown are subject to change without prior notice.  
The information contained is reference values.