Solutions for Sugar, Ethanol and Cogeneration
Developing high-performance products, with national technology expresses our main objective: offering solutions for your application.

We are part of your industry from the beginning to the end of the productive process. We have specialized support teams for all the stages of the project, from the specification to themaintenance of your plant, in order to ensure your company will never stop.

Reliability and productivity. This is WEG.
Hilo Unloaders and Feeder Table

WEG has the **complete solution for Hilo Unloaders and Feeder Tables**, being able to supply the motor + parallel gear unit or planetary gear unit + drive + couplings + frequency inverter + automation for the whole sugar cane reception system and feeder table.
Super W22 Premium, W22 IR3 Premium and W22 IR2 Lines
The industrial motors of the W22 line are reference in high performance and guarantee much more energy saving. WEG has the most complete portfolio on the market, from the standard to the highest efficiency level, and services that make all the difference for your business.

Applications
Pumps, fans, exhaust fans, leaf shredders, leaf/earth/chopped sugar cane carriers, among others.

Dry Cleaning System
This system reduces environmental impacts, as it replaces the traditional systems that use water. Therefore, a relevant amount of water used in this phase of the process is saved, in addition to the removal of the earth and other impurities from the sugar cane through an efficient system of air flow from fans installed in the feeder table and the conveyor belt of the mill.

The high efficiency of this system can be achieved by using frequency inverters, controlling the motor speeds (control of the fan air flow), and automation integrated to the other phases of the process (reception, feeding table, conveyor belt of the mill).
WEG’s experience with preparation driving systems provides the most reliable and efficient solutions for sugar, ethanol and cogeneration plants.

At the beginning of the milling process, the leveler, chopper and shredder drives are subject to severer loads (overloads and inertia); therefore, those machines must be driven by a solution package that adapts to the characteristics of the plant and raw material to be processed. In view of those premises, WEG offers a smart solution with motors able to provide high torques, low starting currents, robustness and project flexibility, in addition to the respective low and medium voltage drives, transformers and switch board panels. Through its vast knowledge and innumerable references in the segment, WEG can provide dedicated solutions for each operating condition of the customers, always focusing on the application of more efficient equipment in terms of energy consumption and maintenance, generating the highest return on investment. In addition to motors, WEG offers solutions with steam turbines for mechanical drives in installations that do not require electrification.
The motor starting method is chosen by analyzing the operating and mechanical characteristics of the machines, the processes and the plant generation capacity, in addition to the financial feasibility, aiming at the best return on investment. Among the main WEG starting methods, the following models are available.

**Main Starting Methods**
- Direct On Line Start (DOL)
- Start with rheostat (wound rotor)
- Start by frequency inverter
- Pony-motor start
- Start with soft-starter or autotransformer

**References**
Sugar Cane Mill

WEG has the solution to replace steam turbine drives by electric drives on the three-roll mills, for both single (center) drive and multimotor (roll by roll) drive.

The motors have protections and coatings suitable for the environment, being driven by LV or MV inverters, which incorporate modern technologies that enable torque control throughout the motor speed range, network communication, easy parameter view and change, providing great operation flexibility. The drive of the three-roll mills can be fed by dry-type or oil transformers, which were developed to withstand special operating conditions and to feed applications with 12, 18, 24 or 36-pulse inverters.

**Supervision and Control of the Mill**

With a team or experts in the sector, WEG can develop the supervisory and control system for the whole mill automation, providing a high level of integration with the other automation systems of the plant. The automation focused on the needs of each customer allows to create integrated and customized systems, simplifying the operation and maintenance of the plant.

**Main Characteristics**

- Speed synchronism between rolls
- Load distribution control
- Supervision of the auxiliary systems
- Cascade control for the three-roll mill level
- Local operation and supervision via HMI
- Automatic control for imbibition
- Production totalizers and indicators
WEG has a **complete solution for optimizing and controlling the extraction in the Diffuser**, being able to supply equipment for optimized control of the percolation, acting accurately on the process indicators (KPIs) and adjusting levels, speeds and temperatures, including protections against misalignment, water/juice pump control, synchronizing the dewatering and drying.

All that to ensure the highest efficiency in the separation of juice from bagasse. In order to do so, we use frequency inverters and soft-starters, direct on line starters with smart relays, advanced control strategies and interlocks - everything assembled in panels and tested at the factory so as to enable the fastest start-up of the equipment in the field.
Processes
WEG supplies **full solutions for the whole processing area of the plant** with a wide range of motors, gear units and gearmotors for different applications, frequency inverters, soft-starters, relays and motor control centers.

- WATER TREATMENT PLANT / DEMINERALIZATION
- Production of Ethanol / 2G Ethanol
- Juice Treatment
- Vinasse Treatment
- Production of Sugar

In those areas, due to the high number of motors, the LV Motor Control Centers (MCCs) are widely used. Designed with a high degree of standardization, these products allow ease of assembly, installation, maintenance, future expansion and interchangeability between units of the same CCM model and of the same size and function.

Certified according to DIN 61439-1 / 2, and coordination type 1 and type 2 according to IEC 60947, the WEG MCCs ensure high reliability of operation and maintenance safely.
Process Supervision and Control

Full automation solution for the whole process of Sugar & Ethanol production, from the instrumentation project to the development of the supervisory control system.

Through specialists in the sector, the solution provides a high integration level between the different process control and automation levels. The automation focused on the needs of each customer allows to create integrated and customized systems, simplifying the operation and maintenance of the plant.

Main Characteristics of the System Integration

- Automation architecture and networks
- Details of control variables
- P&I diagrams
- P&I data
- Interconnection diagram
- Descriptions of the loops and interlocks for the control
- Instrumentation data sheets
- Field project with routing and bulletin of materials
- Typical instrumentation details
- Calculation memories for process
- Calculation memories for communication networks
- Development of the application software for PLC, supervision and HMIs
- Integration of Smart MCCs
Motors for Hazardous Locations

**W22Xd Line**
They meet the requirements of hazardous locations, such as Zone 1 and 2 and follow high safety standards. With a robust construction, they are the most modern drives for machines in explosive atmospheres in the form of gas or vapor. Applications: ethanol distilleries, and sugar and bagasse handling.

**W22Xtb Line**
Reliability and safety are basic; therefore, WEG developed the W22Xtb line for applications with combustible dust suspended in the air (cloud) or in layers (up to 5 mm) in the hazardous locations such as Zone 21 and 22. Application: sugar plant.

**W22Xdb WELL Line**
With the operating reliability of WEG W22 Extra Long Life motor and the special characteristics of W22Xdb line, W22Xdb WELL line offers maximum performance and availability for the plant. It is the perfect motor for applications requiring extended life in environments with explosive atmospheres. Applications: ethanol distilleries, sugar and bagasse handling.

Lower Operational Cost Motors

**W22 Wash Line**
In the Sugar & Ethanol industry, the high concentration of dust and sugarcane bagasse on the engines makes this environment unsuitable for standard motors. With the W22 Wash it is possible to eliminate moisture infiltration and sanitize the equipment without damaging the motors. Applications: pumps, fans, mixers, agitators, mats, saws cutting, among others.

**W22 WELL Line**
The WEG WELL (WEG Extra Long Life) line of motors is suitable for continuous processing industries, such as the sugar and ethanol segment, which requires low vibration and noise levels, high mechanical precision, and where the reduction of maintenance interventions is essential. Developed for long service life, W3Seal™’s unique corrosion-resistant sealing system prevents penetration of contaminants (dust, water or mixtures thereof), which results in reduced temperature in the bearings and windings and, consequently, offers greater stability to the process.

<table>
<thead>
<tr>
<th>Problem found</th>
<th>WEG Solution</th>
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<tbody>
<tr>
<td>Water</td>
<td>High degree of protection</td>
</tr>
<tr>
<td>Inclement weather</td>
<td>WELL motor cabinet (reliability and high torque)</td>
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</tbody>
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Gear Units Dedicated to the Sugar and Alcohol Sector

Helimax 1st Stage  
Coupling  
Helimax Split  
W22 WELL
Power and Vapor Generation
Integrated Solution

WEG also has the complete solution for the high-performance power generation system, which encompasses products developed to a high standard of quality and technology demanded worldwide. It also has a team of engineers and specialists in generation and electrical systems available to develop the most efficient technical solution, being able to carry out studies of thermal balance.

Turbogenerators

Designed for applications in Thermoelectric Power Plants, the ST20 and ST41 turbogenerators come in a wide range of powers, which are determined based on WEG extensive experience in the supply and sizing of turbogenerators, being suitable for applications with steam and gas turbines.

These equipments are available in 2 and 4 poles with powers up to 160,000 kW (200,000 kVA) and operate with voltages up to 13,800 V and are supplied to meet the specifications of each application.

The turbogenerators are manufactured in a high technology vertical process, which guarantees the total quality and reliability of its components, WEG products require low maintenance, ensuring long service life.

TGM Turbines

Within the context of electric power generation are the steam turbines and turbo-reducers of TGM, a WEG Group company. The turbines operate at up to 140 MW, 540 °C temperature and 140 bar (a) pressure and are installed in power generators or boiler pumps.

A significant difference in post-sales market is the TGM 24/7, 365 days a year assistance, ensuring the provision of services with maximum speed and efficiency.
Energy Generation System

WEG offers products able to meet the application requirements of Power and Vapor Generation systems. With robust panels, the entire structure undergoes a special treatment for application in harsh environments, typical of Sugar and Ethanol plants.

- Control panel, protection and measurement of the generator
- Energy importation/exportation panel
- Generator neutral closing cubicle
- Generator surge cubicle
- Cubicles for interconnection with the utility company
- Utility measuring cubicles
- Supplier cubicles
- Control desk
- Grounding resistor
- Battery bank
- LV distribution panels
- MCC - Turbine
- MCC - Boiler
- MCC - Biomass Yard

Control, Protection, Measurement and Importation/Exportation Panels
Following the line of PNW panels, these WEG panels were developed to comply with NBR IEC60439-1 and NR10 standards. They are equipped with multifunction microprocessor-based relays, magnitude meters, columns for synchronization with analog instruments (optional), switches and push-button for the generators/generation system control.

Switchgears
Following the line of MTW switchgears, WEG switchgears were developed to comply with IEC standard 62271-200, keeping the characteristic easy assembly and maintenance, as well as the flexibility to adapt to the different market requirements.

MCC
They can be conventional or smart, certified according to NBR IEC 60439 -1 -TTA/PTTA, coordination type 1 and 2, according to IEC 60947, which ensures high operating and maintenance reliability, in addition to complying with the safety requirements of NR10 standard. The method of internal separation can be 3b and 4b. The configuration of the fixed or removable drawers can be supplied with WEG direct on line starters with smart relays, frequency inverters and soft-starters, with operating voltage up to 690 V ac, controlled via Fieldbus communication network.
Supervision and Control System
of the Steam and Energy Production (Turbogenerator and Boiler)

WEG automation systems for the electrical system comprise the whole cycle for energy generation: transportation control and biomass preparation, automatic boiler control and automatic operation of the turbine and generator. **Currently, hundreds of projects in the energy sector are in operation with WEG control systems.**

**Main Characteristics of the Steam and Energy Production**
- Complete automation of biomass boilers (sugar cane bagasse, straw)
- Automatic control of energy importation and exportation
- Full monitoring of steam turbines
- Integration of the water treatment system and biomass yard
- Integration of the medium voltage cubicles with high performance grids
- Process variable control by means of PID algorithms and advanced control
Supply of Energy
Energy supply is vital for any operation. Offering more and more complete solutions, WEG counts on a wide range of transformers and conventional substations, ensuring **full reliability in the energy supply for a great variety of applications**.

**Power Transformers**

Weight and size reduction, different insulating oil types, longer useful life and monitoring systems are just a few of the items assessed by WEG technical team to develop oil transformers that **provide high level solutions** for the customers.

The portfolio includes a full line of distribution and power transformers up to 550 kV, insulated with mineral oil, to reduce the equipment cost, or vegetable oil, to reduce the environmental impacts significantly.

**Medium Voltage Dry-Type Transformers for Secondary Substations**

Transformers insulated with epoxy are the best option to fulfill the demand for transformers that provide greater safety, use less space and reduce installation and maintenance costs.

This product line offers solutions for all kinds of environments. Vacuum pressure encapsulated with class H resin (certification UL at 200 °C), WEG transformers provide immunity to partial discharges and a relevant increase in the useful life of the equipment. They are available in powers from 112.5 to 20,000 kVA, in voltage classes up to 36.2 kV, with degrees of protection up to IP55.
Conventional High-Voltage Substations

WEG Substation division has know-how and **extensive experience in designing and building medium and high-voltage electrical systems** all over Brazil. It offers solutions for turnkey conventional substations, from the basic design to the detailed engineering design, comprising electrical studies, product and material supply, and specialized works and services, which include commissioning and after-sales support, coordinating and integrating all the participants of the process.

Proven experience in the delivery and energization of more than 350 substation at voltages up to 550 kV.

High-Voltage Equipment

**With more and more complete solutions,** WEG has a complete line of Switch-Disconnectors, which are electromechanical devices capable to interrupt or establish low-intensity currents when switched. In operating conditions, in the closed position, they are capable to withstand high-amplitude currents, such as those typical of short circuits.

They are intended to ensure the insulation of equipment or parts of lines or substations, allowing to confirm visually that the insulated segment is de-energized.

- Rated current: 630 to 4,000 A
- Voltage class: 15 to 550 kV
Mobile Substations and Transformers

Aiming at ensuring the uninterrupted supply of electric energy, WEG developed a line of mobile substations and transformers available for all sectors, from the conception of the solution to its commissioning. For either an emergency repair or scheduled maintenance in a conventional substation, the mobile solutions provide *quick restoration of the power supply.*
E-Houses

The ELW E-Houses represent an integrated solution, with design and manufacturing tailored to meet the specific needs of each client.

E-House Functions

Mounted on a single platform, WEG E-Houses integrate electrical and automation systems, such as transformers, medium voltage control and control sets, MCCs and auxiliary equipment, delivered assembled, interconnected and factory tested. It represents a customized solution, eliminating the need for masonry constructions and contracting of several suppliers. Also, WEG E-Houses do not have size limitations, and can be used in small installations to large, in various types of environments (including aggressive) and industrial activities.

Advantages

- Reduction of the execution time of the projects
- Less assembly time in the field
- Requires small infrastructure of construction site (lower cost of mobilization and demobilization)
- Factory set-up and field installation are not affected by weather conditions
- Unique engineering for the integration of all equipment and systems
- Reduction of storage area and interference in the field
- Better control of processes and quality systems

- Special lines of credit for being treated as equipment
- Reduction of customer resources for engineering, project management and supplies (optimization of the purchasing process)
- System does not generate taxation IPTU / ITR (does not add built-up area)
- Logistic gain in manufacturing, platform testing, start-up and commissioning
- Lead time of minor delivery
Power House

WEG solutions are also present in the control and supervision of substations for industries and utility companies, with automation of substations using the latest technology on the market. WEG MCC-MV (MV Switchgear and Control) is assembled and tested at the factory for voltages from 2.3 kV to 36 kV, interrupting current from 25 kA to 50 kA with vacuum or SF6 circuit breaker. They were developed to comply with the strict national and international standards NBR IEC 62271-200.

Substation Supervision and Control System

**Main Characteristics**
- Integration using IEC protocol 61850
- Time synchronism by GPS
- Remote monitoring via Internet
- Oscillography tools
In Sugar, Ethanol & Cogeneration Plants, the concern about quality is essential in the supply of the end product for the great consuming companies, especially the food and beverage industries. The process itself requires more resistant coatings so as to extend the intervals between maintenances, avoid accidents due to corrosion and reduce repair and painting expenses. When the equipment is painted with high performance coatings, such problems are prevented, ensuring greater productivity and consequent profit. Aware of that, WEG developed the following products:

**Coating of Tanks**

Tanks to store alcohol or vinasse are subject to the aggression of the content, because of the water produced by the condensation. In addition, the tank must prevent the evaporation of the stored product as much as possible. In order to meet such requirements, WEG Coatings offer high-performance products **(WEG FENOXI, WEGPOXI BLOCK N 2912, WEGTHANE 508 ANTIFUNGO)** that provide excellent durability and useful life of the equipment.
External Part - General Structure of the Plant
Painting scheme to resist severe weathering conditions, composed of epoxy primer (WEGPOXI ERP 322 or WEGPOXI WET SURFACE 89 PW) and aliphatic acrylic polyurethane top coat (WEGTHANE HPA 501) with excellent color and gloss retention, providing greater durability of the coating and easy cleaning.

Concrete Structures
WEG Coatings painting systems have good performance on concrete substrates, providing high chemical resistance, abrasion resistance and impermeability (W-POXI VERNIZ HSS 301, W-POXI HBA 301 E W-POXIDFA 301).

For the sugar production, which follow strict sanitation standards and consequently demand greater protection and cleaning, WEG offers lines with antimicrobial properties, preventing proliferation of fungi and bacteria (W-POXI HIDRO AVA 413 NOBAC E W-POXI 711 NOBAC).

Areas with High Temperature
In addition to the conventional painting schemes, WEG Coatings have solutions that provide greater resistance for areas subject to high temperatures.

For equipment such as chimneys, steam turbines, pipes and boilers, where the temperature may reach 600 °C, WEG Coatings has solutions of easy application and excellent durability (ETIL SILICATO ZINCO ALUMÍNIO N 2231).

For equipment that, in addition to the high temperature (maximum 200 °C), are also subject to abrasion, for example scrubbers, we provide special products that promote greater durability than the conventional schemes. Therefore, WEG Coatings helps extend the equipment maintenance intervals (WEGPOXI BLOCK N 2912 TIPO III).
Efficiency Indices

The electric motor is what makes the industry grow and, from 2019, it gains even more efficiency: Brazil adopts the **IR3 Premium** as the new standard efficiency level.

As of August 2019, the new Energy Efficiency Law for electric motors will be in force, which determines the minimum level of IR3 performance (power range from 0.16 to 500 HP, from 2 to 8 poles), valid for all commercially available engines, whether new or used.

However, although positive, the requirements do not cover equipment already installed and without provision for replacement.

Associated with the fact that the national industrial park has an average of 17 years (source: ABRAMAN), the modernization of industrial electric energy systems allows up to 60% reduction of consumption with energy efficiency actions of rapid implementation, considering that the Brazilian industrial sector consumes about 40% of the country’s electricity and 70% of the energy used in the industry is consumed by electric motors.

Migrate who is a benchmark for high performance and ensures more energy savings.

WEG has the most complete portfolio on the market, from the standard level to the top income, and services that make all the difference to your business.
In addition to IR2 and IR3 established in the standard, WEG offers the IR4 Super Premium and IR5 Ultra Premium lines that exceed the values of the standard.

**IR5 Ultra Premium**
Motor that exceeds in three levels the minimum efficiency levels demanded by the current law. Available Line: W22 Magnet IR5 Ultra Premium (permanent magnets).

**IR4 Super Premium**
Motor that exceeds in two levels the minimum efficiency levels demanded by the current law. Available Lines: W22 IR4 Super Premium (induction motor), WW22 Magnet IR4 Super Premium (permanent magnets) and W22 Quatro IR4 Super Premium (permanent magnets).

**IR3 Premium**
Motor that exceeds in one level the minimum efficiency levels demanded by the current law. Available Lines: W22 IR3 Premium (induction motor), W22 WELL IR3 Premium, W22 Mining IR3 Premium, W22 Wash IR3 Premium, W22 Motofreio IR3 Premium, W22 Bomba Monobloco IR3 Premium, W22 para Redutor Tipo 1 IR3 Premium, W22Xn IR3 Premium, W22Xb IR3 Premium and W22Xb IR3 Premium.

**IR2**

**IR1**
Used only for motors outside the scope of Directive 553. Available Lines: W22 IR! (induction motor - below 1cv), W21Xd IR1 and Double Speed Motors IR1.

**See+**
Simulador de Eficiência Energética

The See+ is an exclusive WEG application that simulates the application of more efficient motors to reduce energy consumption. It is possible to simulate the replacement of one or all the motors of the plant. The results show:
- The estimated potential of energy savings
- Necessary investment
- Financial indicators (Payback, Net Present Value and Internal Rate of Return)
- Simulations to obtain resources through loans.
Services and Support with the Quality of WEG Products

Protecting your investment means more than ensuring the plant. It also means to keep your equipment in excellent conditions to maximize its useful life. That is why you can count on WEG, which is responsive to the customer’s needs, offering comprehensive equipment, services and support.

When it comes to maintenance, WEG offers the most efficient solutions of the country, besides bringing equipment to be repaired inside the factories. WEG achieved a quality reputation by giving support with products and specialized technical services and the capacity to respond promptly to the customers’ demands.

An excellent service is assured by people who understand your equipment and process needs. Our experienced team of service engineers can detect possible performance problems and recommend corrective actions. Keep taking advantage of the benefits of first-hand product knowledge and of the capacity to solve problems with our training for your team at your place.

In this context of maintenance, WEG / TGM performs services in steam turbines, reducers, turbogenerators, generators and motors of medium and large size in a single structure.

Profit more! Maintain your equipment with the WEG / TGM team, the only one in the market that offers a complete scope of these services with its own structure and 24-hour technical assistance. Ensure greater operational availability with the largest scope of supply.

Maintenance Services at the Plant
WEG also has the same structure and manufacturing standards available to execute services such as: checkup, restoration, repowering, rewinding, testing and replacement of components, increasing the reliability and the service life of WEG large equipment and from other brands.

- DC Generators and Motors up to 10,000 kW
- Three-phase Induction Motors up to 50,000 kW
- Synchronous Motors up to 110,000 kVA
- Turbogenerators up to 200,000 kVA
- Synchronous Condensers up to 150,000 kVA
- Oil Transformers up to 550 kV
Commissioning and Start-Up
In view of the magnitude of the projects and the complexity of the equipment installed, WEG offers specialized technical support for the installation, from the beginning to the end, including supervision services. The inspection of details of the equipment and the concept integration with the whole system are also included.

Field Services
WEG has a qualified and trained team at the factory to carry out a series of activities in the field, minimizing the lead times and the impacts of equipment handling and costs.

- Assembly and installation
- Start-up
- Alignment, balancing, adjustment of bearings and machining
- Electromechanical expert report
- Boroscopy
- Partial checkup
- Complete checkup
- Partial repairs
- Rewinding
- Modernization of generators and compensators
- Vibration analysis

Supply of Genuine WEG Parts
After years in operation, the motors and generators need restoration to continue working properly. For this restoration, we recommend that you use genuine spare parts supplied by the manufacturer. WEG team is willing to promptly assist you in the correct identification of the parts.

Preventive Maintenance/Maintenance Engineering
Inspection and preparation of preventive plans according to maintenance concepts focused on reliability and adjustments according to the operating conditions of each plant.

Energy Efficiency
Identification of potential reduction in power consumption of electric motors, drives and deviations in the power factor, proposing solutions and defining the necessary retrofit. Results presented with individual return deadlines, making the decision flexible.

Limit of Restoration Capacity
Definition by means of technical and economic criteria of the feasibility to repair or replace the electric motors. The work is performed with the help of a specific software application, analyzing the data of each plant, allowing the cost analysis of the life cycle of the motors.

Service WEG-CESTARI - Because your Processes Cannot Stop

The Service WEG-CESTARI offers a wide range of special services, according to the requirements and necessities of the market, aiming at the complete satisfaction of the customers and the continuity of their productive processes with high efficiency levels in predictive, preventive and corrective maintenances.

Service 24 Hours
Seeking the greater operational availability of our customers’ equipment, we offer 24-hour on-call service 365 days a year for emergencies. The 24 hour service is our great differential. Reliable and efficient in solving problems in mechanical, electrical and renewable energy drives.
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