Industrial Motors

Commercial & Appliance Motors

Automation

Digital & Systems

Energy

Transmission & Distribution Coatings

# WEG Motion Fleet Management

Technology for asset online monitoring and **smart management** 





Driving efficiency and sustainability



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# Smart monitoring of your plant



Condition-based maintenance



Data-driven decisions



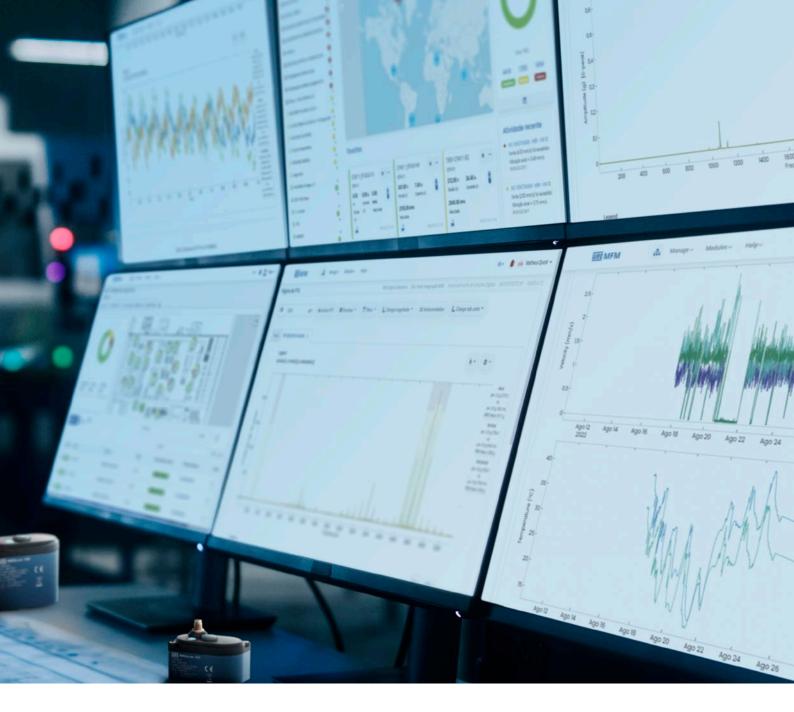
Lower operating costs



Safe and smart management

Developed to simplify and speed up the operation, maintenance and management of industrial plants, **WEG Motion Fleet Management** is the ideal solution for monitoring and increasing the uptime of the equipment and asset fleet. Based on cloud computing technology, multiple assets can be monitored at any time, from anywhere in the world, observing the most important aspects of cyber security.

With this technological solution, it is possible to monitor a wide range of assets and equipment online, thus reducing the need for verification routes and measurements for maintenance assessments and procedures related to their reliability. For example, frequency inverters, low and medium voltage Soft-starters, smart relays, low and medium voltage motors and generators, as well as gearboxes, gearmotors, pumps, compressors, fans, exhaust fans, conveyor belts, mills, planetary gearboxes, bearings in general, among other assets in any type of industry or installation.



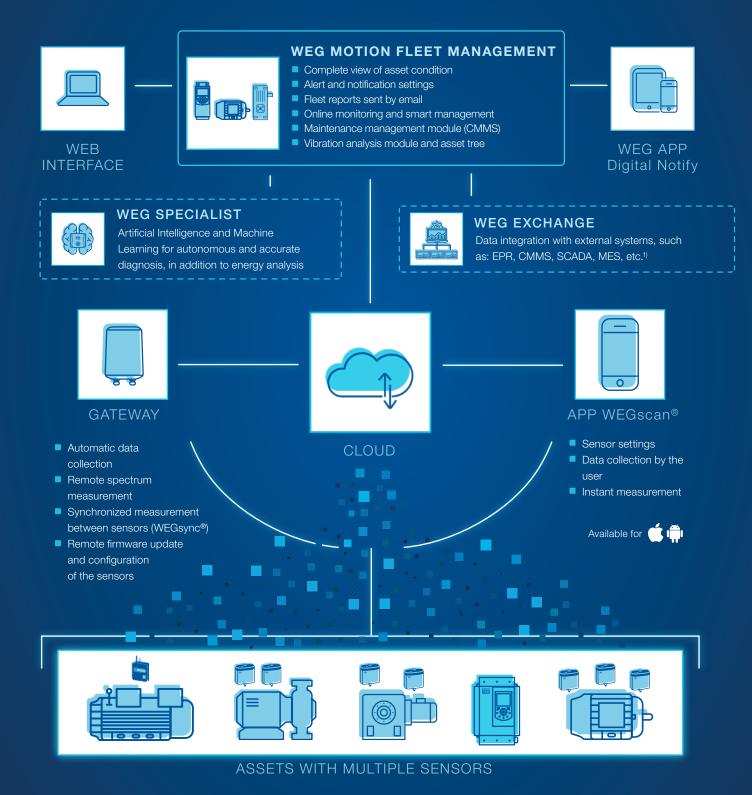
### Advantages and benefits of the MFM solution

- Monitoring of various types of equipment, assets and plants in a single environment and with a technical and managerial vision
- Ecosystem in constant development, both hardware and software
- Solution integrated with WEGscan, dedicated and robust hardware for acquiring application data
- Data processing on the edge and in the cloud, enabling advanced diagnoses
- Ready-to-use solution, suitable for a wide range of equipment and assets — just register the WEGscan in the application and use it
- Maintenance management based on the operating condition of the assets
- Flexible solution available for service providers
- Reduction of the plant operating cost (Total Cost of Ownership)
- Multi-language solution available globally





# WEG Motion Fleet Management structure



Note: 1) Automation system (SCADA), corporate management system (ERP), maintenance management system (CMMS), manufacturing execution and control systems (MES) or any other proprietary software.

## The importance of online asset monitoring

One of the main reason why an industry loses productivity and profitability is unplanned production downtime. Most corrective maintenance events could be avoided if machine and equipment parts were being continuously monitored (online monitoring).

The **WEG Motion Fleet Management** solution is a high-level tool for the operation and maintenance team to monitor and manage the equipment and assets by means of hardware for data collection, gateways for sending data to the cloud and software for data view and advanced analysis. The **WEG Motion Fleet Management**, allows implementing a predictive maintenance methodology, taking into account the operating condition of the asset and reliability practices.

Knowing the condition of assets online significantly contributes to optimizing operation and maintenance resources, for example, improving spare part management, increasing asset uptime and reducing direct and indirect costs related to operation and maintenance. Additionally, this kind of approaches contributes to increasing the service life of the assets, since, in general, a sudden failure results in stress and degradation of the equipment mechanical and electrical elements.

Through periodic and remote data collection with the **WEGscan** & Gateway devices, it is possible to conduct advanced data processing both on the edge and in the cloud, thus, valuable information about assets is generated and used in asset management. In this way, you can establish predictive maintenance plans taking into account the operating condition of the fleet (condition-based maintenance). This approach reduces unplanned downtime, optimizes repair jobs and speeds up the decision making of the operation and maintenance team. As a final result, an increase in plant uptime and reliability is observed, in addition to a reduction in the operating cost (Total Cost of Ownership) of assets and equipment.

#### Main features of the MFM solution

- Intuitive dashboards for management insights and technical analysis
- Asset tree for organizing the hierarchy (customer account, units, plants, assets) and measurement points
- Equipment registration by type, with construction features to determine failure frequencies and criticality
- Bearing database for diagnostic support
- View of assets on geographic maps, asset trees and multilevel navigation
- Operation reports on equipment, assets and plant on demand and periodically
- WEGsense<sup>®</sup>: technology to detect incipient mechanical failures
- WEGsync<sup>®</sup>: technology for synchronized measurement with multiple sensors for structural vibration analysis
- Customization of tolerances for temperature, global multipoint vibration and spectral band to generate alerts and notifications
- Daily notifications of assets in alert and/or critical condition (via email)
- Backup of parameters of frequency inverters, Soft-starters and smart relays
- Module for analyzing vibration signals (ISO 20816), in spectral mode and in the time domain, to carry out diagnoses
- Maintenance module with CMMS (Computerized Maintenance Management System) functionalities for creating and managing maintenance tickets, resources for planning and executing maintenance jobs
- WEGscan application for sensor activation, instant measurements and ODS (Operating Deflection Shape) analysis
- WEG Digital Notify app integrated with the Maintenance Module for fast flow of information to the team
- Specialist modules with Analytics and Artificial Intelligence for autonomous troubleshooting and energy analysis
- Exchange modules for data integration with other platforms and solutions (via REST API)
- Tool for storing digital documents (e.g.: manuals, photos, reports, etc.) related to the asset or equipment





#### www.weg.net

#### Segments



generation

Cement

Water &

Sewage

**Chemicals** 



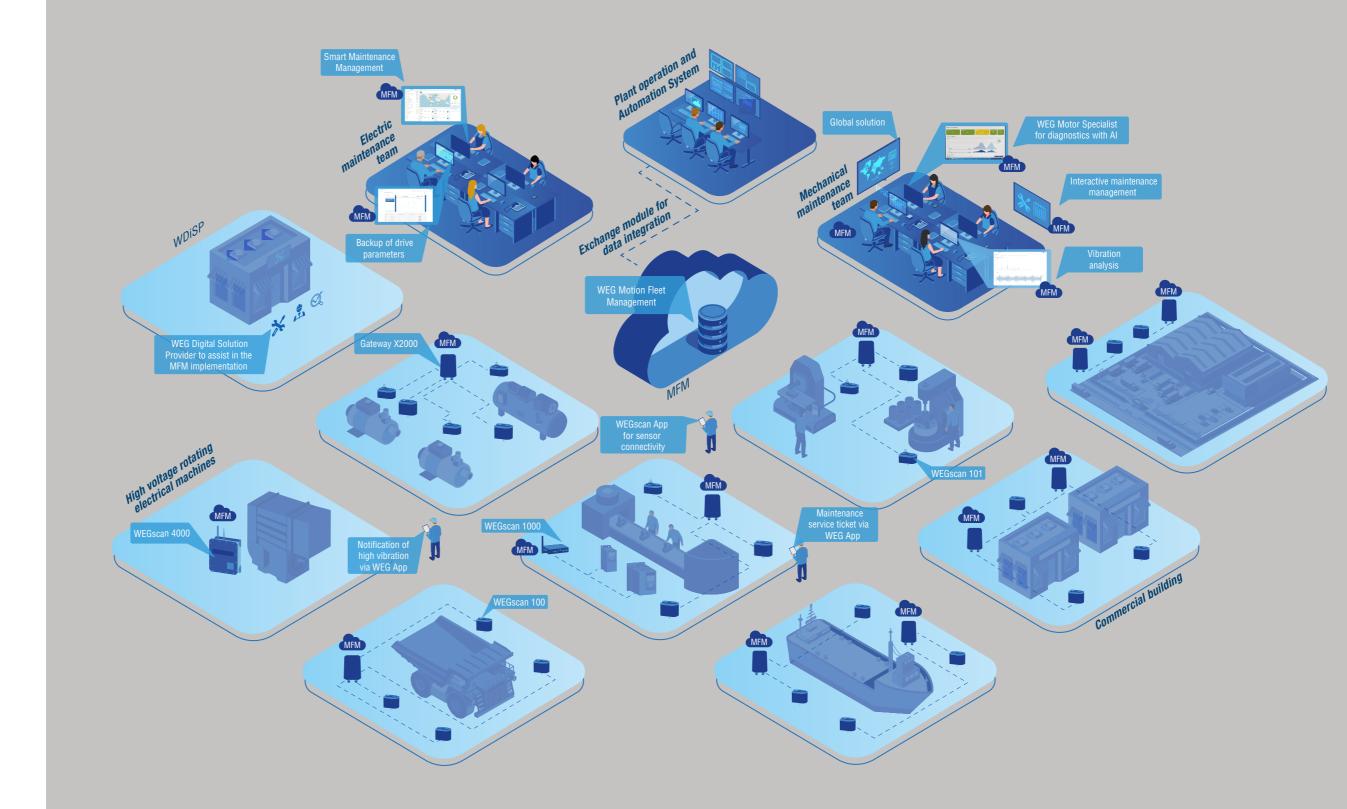
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Marine





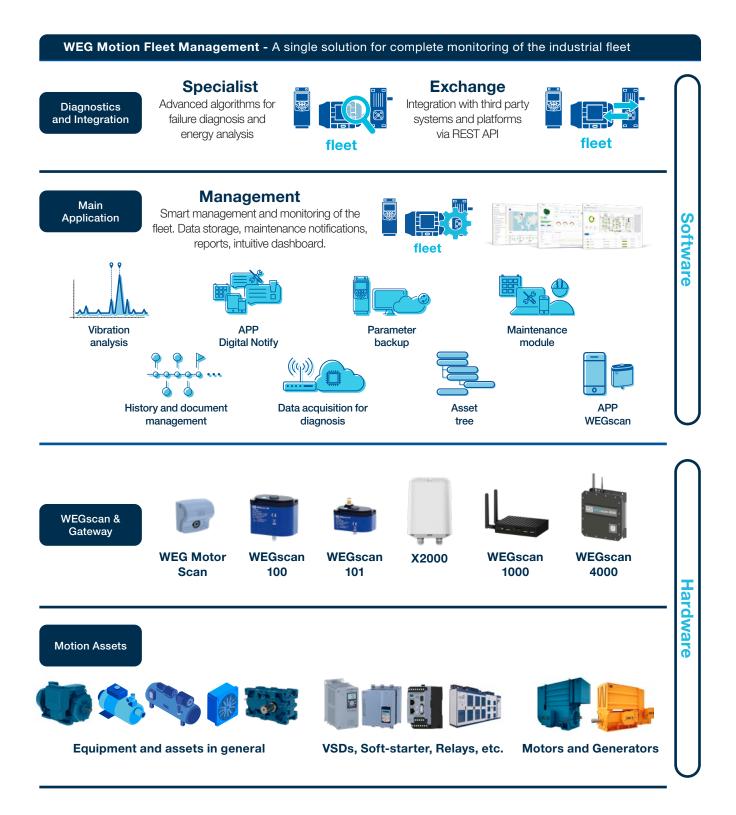


## **WEG Motion Fleet Management** A single solution for complete monitoring of the industrial fleet

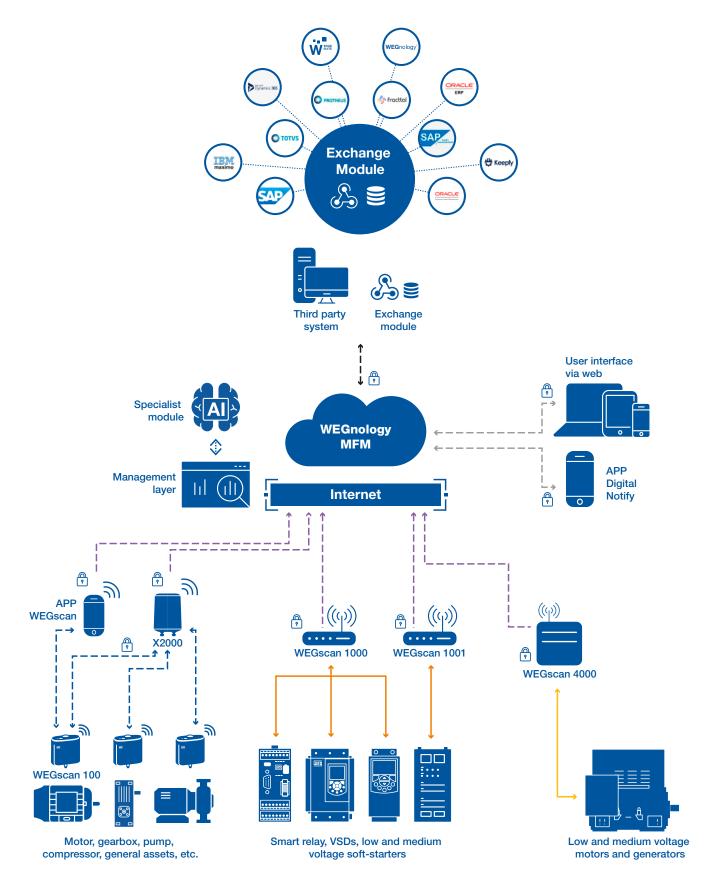
## Concept of the MFM solution

**WEG Motor Fleet Management** is a modular solution, with a flexible structure based on layers, which meets the customers' needs.

For such monitoring, data is collected (digitalization) and sent to the cloud by the **WEGscan** & Gateway layer. In the Management layer of the MFM, data is stored and viewed in a holistic and specific way through the numerous dashboards and functionalities. The upper layer offers advanced modules, such as the Specialist, which employs autonomous algorithms for failure diagnosis and energy consumption analysis. The Exchange module allows data integration with systems external to the MFM.



#### MFM architecture



### WEGscans and Gateways

**WEGscans** and Gateways are developed for equipment digitalization and secure connectivity with WEG's cloud server, which hosts the **WEG Motion Fleet Management** application. For monitoring each asset, a certain **WEGscan**, is used, as shown in the table below and described in detail in the respective catalog.

The WEGscans available for scanning and monitoring equipment and assets are:



Notes: 1) On request.

2) Specialist: Available for CFW11, MVW1000 and MVW3000.

### Management layer

The Management layer of the **WEG Motion Fleet Management** application receives data from **WEGscans** via gateway or app and allows exploring data and information in an intuitive and practical way. The **WEGscans** devices already have an annual subscription to the Management and Specialist layer available, which is activated automatically when you activate the **WEGscan** in the software. The MFM can be accessed anywhere via internet whenever a subscription plan is available.

The main information and parameters digitized and monitored by **WEGscans** are described in detail in the catalog of each **WEGscan**.

Some available information and parameters are:

- Global vibration of the three axes
- Vibration spectrum of the three axes
- Temperatures
- Power and consumption
- Voltage and harmonics
- Current and harmonics
- Rotational speed
- Water and oil flow
- Asset operating condition (normal, alert or critical)
- Operation history of quantities
- Faults and events
- Alerts and notifications
- Lubrication recommendation
- Backup of parameters for drives
- Data collection suitable for advanced analysis





## Management layer

The Management layer has numerous functionalities aimed at online monitoring and smart management of equipment and assets. Some of these features are described and presented below:

## Intuitive dashboards for management insights and technical analysis

The MFM dashboards allow exploring data for a holistic or specific analysis of equipment and assets. Thus, it is possible to carry out a global analysis of how the fleet is operating or a specific analysis, such as a vibration or thermal analysis.

For a continuous view of the equipment operating condition and update of the most critical and recent notifications, a special dashboard can be displayed on the screens in the maintenance room or the respective management.





## Customizable alert and notifications (RMS trend and FFT band)

For anomaly detection in a practical and accurate way, notification tolerances at alert and critical levels are customizable, both for temperature and vibration. For vibration, for example, it is possible to set the tolerance in multi-point mode and adjust the global vibration level so that an occurrence is actually detected, and the notification is activated.

In the advanced configuration, a vibration alert can be configured in specific bands of the spectrum (FFT), thus enabling to detect the change in vibration harmonics. This way, users can conduct the diagnosis independently and according to their needs.

#### WEG Digital Notify & WEGscan® app

The **WEGscan** app is used for sensor activation, instant measurements, ODS (Operating Deflection Shape) analysis, sensor updating and much more.

The **WEG Digital Notify** app allows checking notifications and service tickets in the palm of your hand, since the app is integrated with the MFM maintenance module. This way, the flow of information between the parties is optimized, speeding up the team's response time. Additionally, maintenance records are enhanced by filling in and viewing information at the palm of each team member. As a result, the level of management is enhanced.





#### **Backup of drive parameters**

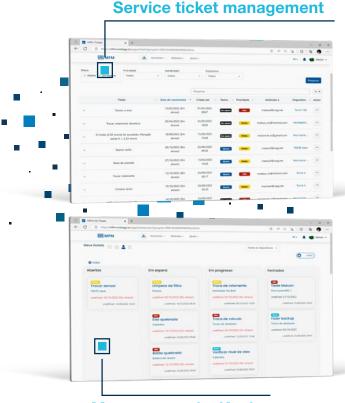
Every day, WEGscan 1000 devices perform the backup of monitored VSDs, Soft-starters and smart relays. This way, if a failure occurs, it is possible to conduct a quick check, which speeds up troubleshooting.

#### **Reports**

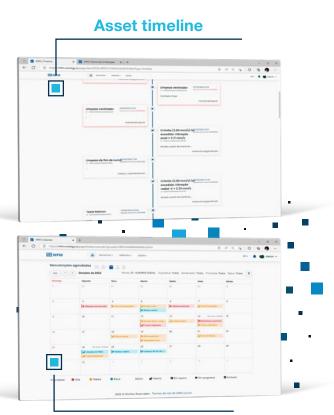
With equipment, asset and plant operation reports, which can be requested on demand and periodically, it is possible to know the operating condition in a practical and holistic way and thus properly plan maintenance actions. Report notifications can be sent daily via email accompanied by a report on the operating status of equipment and assets.

#### Maintenance module (with CMMS functionalities)

The MFM Maintenance module is available in the Management layer. This module has CMMS functionalities to enhance the positive impact the MFM causes on the daily routine of the maintenance team. With this module, you can manage maintenance with the following functionalities: creation and management of maintenance tickets, dossier of the asset on the timeline, maintenance management report, human resources management tool, planning and scheduling management tool, in addition to document management. This module is integrated with the Digital Notify App, allowing editing and viewing information in the palm of your hand.



Management by Kanban



#### Schedule and planning



# Technology for advanced data analysis and smart management of equipment and assets

Most of the time, knowing that a piece of equipment or asset has a problem is not enough to carry out a corrective action, maintenance planning or even to determine whether an emergency stoppage of the production line is necessary.

To help solve this kind of problems, WEG created IoT technologies to monitor the condition of equipment and assets, allowing you to determine the seriousness and origin of the failure. Such technology is enabled by the **WEG Motion Fleet Management** solution and by the **WEGscan** sensors.

In a production environment with difficult deadlines to meet and aggressive goals, knowing the operating condition of the equipment to answer the questions "how severe is this failure?", "how long has this failure existed?" and "should we act now?" is crucial. It was to answer these and other kinds of questions that the **vibration signal analysis** module and the **WEG Specialist** module were created: the former for human analysis, and the latter for autonomous analysis by means of algorithms with Machine Learning and Artificial Intelligence.

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### Module for vibration signal analysis

The WEG solution is designed to provide more than a simple alert. For this reason, the module for vibration signal analysis is available in the Management layer of the MFM and has numerous tools for exploration and advanced analysis of the signals collected by the WEG IoT sensors. Although vibration signals may indicate initial problems, analysis of these signals can help determine the cause of the problem, such as:

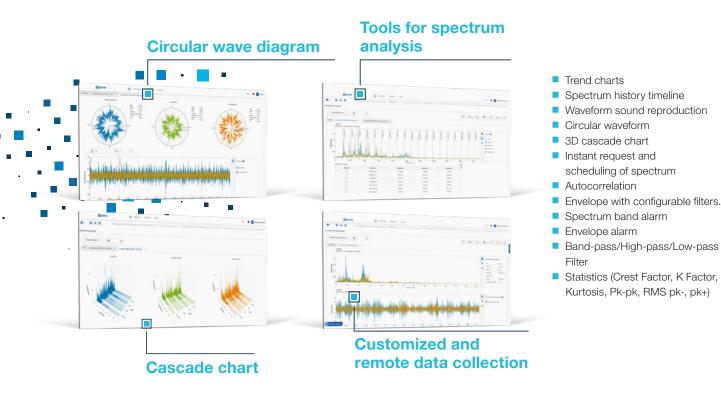
- Lubrication failure
- Bearing failure
- Misalignment
- External vibration
- Imbalance
- Broken bars
- Runout

- Gear backlash
- Defective or worn-out gears
- Cavitation
- Lack of rigidity
- Eccentricity
- Friction (dragging)
- Defective belts

In this module, it is possible to explore vibration data, both in the time domain and in the frequency domain (spectral mode or FFT – Fast Fourier transform), with numerous functionalities:

- Multiple-tab tool to organize and simplify the analyses
- Global vibration trend charts, with multipoint alert settings
- Spectrum (displacement, speed and acceleration) and waveform in the time domain charts
- Functions: envelope, autocorrelation and band, high and low-pass filters
- Alarm by spectral band, in speed and acceleration
- Cursors for analysis: harmonic sidebands (in dB), difference between cursors (Delta), peak-to-peak (pk-pk), etc.
- Quickly customizable spectral vibration measurement, whether in local or remote mode.
- Bearing database for diagnostic support
- View of multiple spectra in cascade mode
- Circular wave analysis



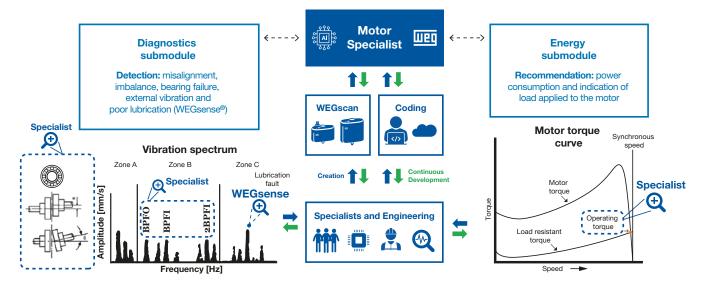


## Specialist layer

With active subscriptions to the Management layer of the **WEG Motion Fleet Management**, users will be able to complement their experience with the MFM advanced modules, such as WEG Specialist and WEG Exchange.

Created by WEG specialists and validated in the company's laboratories and industrial parks, the WEG Specialist modules apply Machine Learning and Artificial Intelligence algorithms to the collected data. There are two autonomous submodules, the diagnostics submodule and the energy submodule, minimizing the need for analysis by a specialized professional.

The WEG Specialist module is available for each **WEGscan** and for the main industrial assets, such as: **low voltage and medium voltage generators and VSDs.** The details and capabilities of the Specialist module for each **WEGscan** are presented in the respective catalog. Subscription to the WEG Specialist module is annual and per monitored asset.



In the diagnostics submodule, mechanical failures in rotational elements can be detected automatically, such as imbalance, misalignment, bearing failure, lubrication degradation and external vibration. As for VSDs, it is possible to identify problems relating to the cooling system in advance and thus avoid any early failure of the semiconductors.

## Specialist layer

In the energy submodule, depending on the capabilities of the **WEGscan**, it is possible to know details of energy consumption and energy quality indicators related to the powering of the asset and the plant. Then, it is possible to know which motors are less efficient and the periods of greatest energy consumption in the plant.

With WEG Specialist, it is possible to produce useful information to guide actions that generate efficiency gains, such as replacing oversized motors with motors with suitable rated power, and to plan predictive and preventive maintenance, like knowing that the fault detected is related to the replacement of the bearing and not to the alignment of the driving machine to the load. In general, this approach enhances the availability and reliability of the plant, increasing productivity and extending the life of its equipment and assets, which results in reduced operating costs.





# Sensor technology and software for advanced multi-application diagnostics

WEGscan® 100 and WEGscan® 101 collect data such as temperature, three-axis vibration, magnetic field and other relevant asset information. With the development of this sensor, WEG created and patented two innovative technologies: WEGsense® and WEGsync®, the former aimed at incipient failure detection and the latter for synchronized measurement of multiple sensors for advanced structural vibration analysis.



## WEGscan 1000

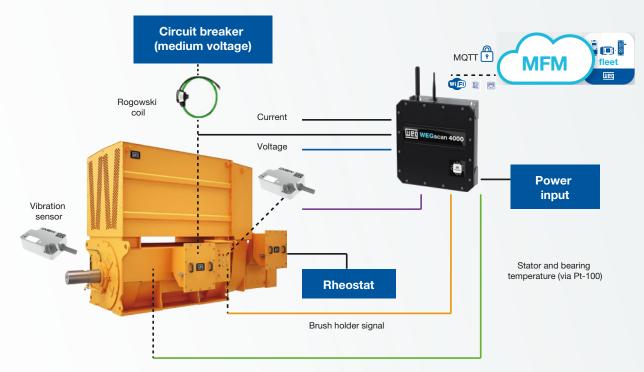
Learn more



The WEGscan 1000 solution is designed for advanced monitoring of low and medium voltage VSDs, Soft-starters and smart relays.



The WEGscan 4000 solution is intended for application in synchronous and asynchronous machines, such as induction motors, synchronous motors, wound-rotor motors, hydrogenerators and low and medium voltage turbogenerators.



## WEGsense

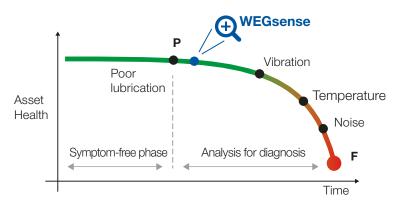
## Technology for detecting and diagnosing incipient mechanical failures



The **WEGsense®** technology combines sensor measurements with cutting-edge technology and advanced WEG algorithms to detect incipient failures in the monitored asset, such as the degradation of lubrication in a bearing even before its health is compromised; thus, bearing lubrication can be accomplished and bearing life maximized. This functionality is available in the diagnostics submodule of the WEG Motor Specialist module.

Note: functionality available in the WEG Motor Specialist module, Diagnostics submodule. For the proper operation of the WEGsense® function, the sensor must be installed close to the bearing, rigidly, according to the technical instructions in the manuals.

#### P-F Curve (Problem-Failure)



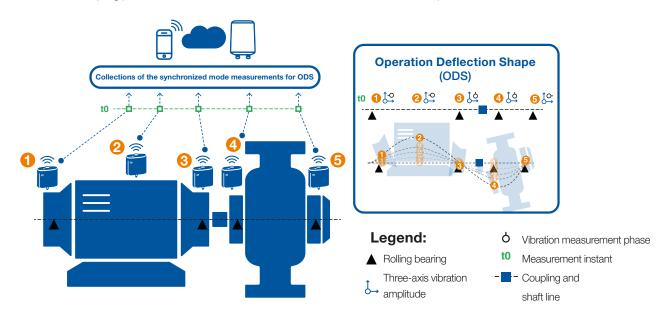
### WEGsync

#### Multi-sensor synchronized measurement technology for advanced structural vibration analysis



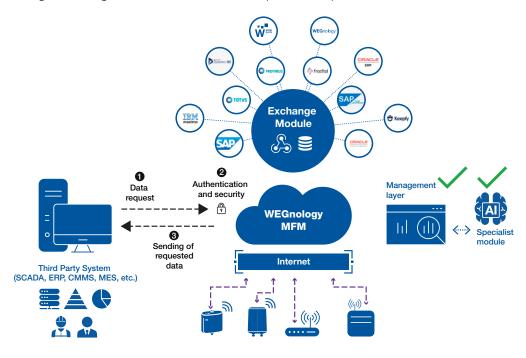
The **WEGsync** technology combines vibration measurement synchronized with multiple sensors and WEG advanced algorithms for **phase** and structural deformation analysis of the monitored assets.

With **WEGsync**, it is possible to qualitatively assess structural weaknesses of the application (via ODS). For example: region of greater deformation in the asset, coupling problems, backlash and fixation, verification of the rotor imbalance planes, and so on.



#### Exchange module

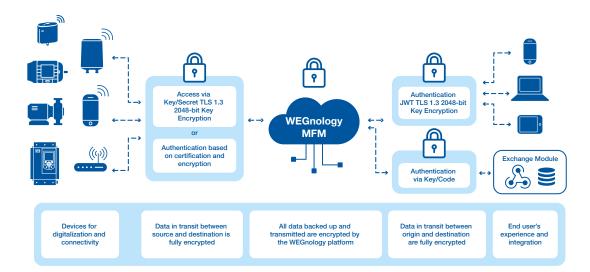
The Exchange module allows the customer to integrate the information collected and stored in the **WEG Motor Fleet Management** with their own management system and/or platforms. Through periodic and automatic data requests via REST API, data from the **WEG Motion Fleet Management** can be integrated into various systems such as: automation systems (SCADA), corporate management systems (ERP), maintenance management systems (CMMS), manufacturing execution and control systems (MES) or any other proprietary software. To benefit from the Exchange layer, the respective assets must have an active subscription to the Management layer. The Exchange subscriptions are annual and per data packet. If the customer wishes to obtain the data manually, it is possible to download the data in a csv file for each asset using the Exchange Lite module, which does not require a subscription.



## Cyber security

The device communication uses the MQTT protocol (Message Queuing Telemetry Transport). Data is end-to-end encrypted using the TLS protocol (Transport Layer Security). JWT authentication (JSON Web Token) is used to access the pages and dashboard, which only users registered in the MFM can access. The necessary connectivity settings (ports and addresses) are available in the manual for each gateway and edge device.

All data is stored using the persistent disk feature, which encrypts all data in transit and at rest. The server infrastructure for the MFM and WEGnology solutions meets the strictest physical and information security requirements. Periodically, WEG conducts security tests on the MFM and WEGnology solutions to ensure the highest aspects of cyber security.





#### WEGscan 100 WEGscan 1000 WEGscan 1000 WEG Motor Scan WEGscan 40001) Gateway X2000 WEGscan 101 (LV) (MV) 16437262 15956243 15474012 15474014 On request 16214567 16437478 п П п

#### Available hardware and software products

Note: 1) On request.

#### Features and functionalities of subscription plans

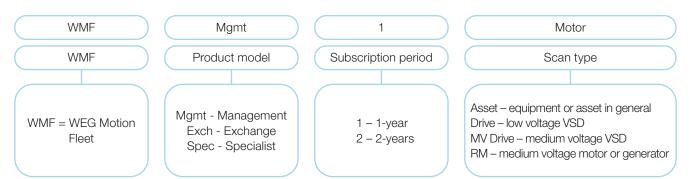
Feature or functionality	Subscription plans				
Feature or functionality	Management	Specialist <sup>1)</sup>	Exchange <sup>1)</sup>		
Number of users	Unlimited	-	-		
Number of units and plants in the hierarchy	Unlimited	-	-		
Number of equipment and assets monitored <sup>2)</sup>	Unlimited	-	-		
Data storage <sup>3)</sup>	365 days	365 days			
Subscription period <sup>3)</sup>	1 and 2-years	1 and 2-years	1 and 2-years		
Dashboards	Yes	Yes	-		
Email notifications	Yes	-	-		
Reports	Yes	-	-		
Maintenance module (with CMMS functions)	Yes	-	-		
Backing up parameters for drives	Yes -				
App WEG Digital Notify	Yes	-			
Module for vibration analysis with alert diagnosis in spectral band	Yes	-	-		
Software update	Automatic and continuous	Automatic and continuous	Automatic and continuous		
Algorithm with Artificial Intelligence for energy diagnosis and analysis	-	Yes	-		
Data integration via REST API	-	-	Yes		

Notes: 1) To purchase these packages, the active Management module is required.

 Monitored equipment and assets: LV and MV motors, LV and MV generators, LV and MV VSDs, gearboxes, gearmotors, compressors, pumps, fans, exhaust fans, mills, conveyors, equipment in general, etc.

3) Extra period upon request.

#### Subscription plans



Reference	Module	Function and details	Period (years)	Scan	Туре	Brazilian market	Other countries				
WMF-MGMT-1-Asset	-	Online monitoring and asset management Annual subscription required to connect a WEGscan to the MFM and allow exploring the main application with numerous functionalities	1	WEG Motor Scan WEGscan 100		80002160					
WMF-MGMT-2-Asset			asset management	2	WEGscan 101 WEGscan 200		80002169				
WMF-MGMT-1-Drive				1	WEGscan 1000		80002209				
WMF-MGMT-2-Drive	Management		2	WEGSCan 1000		80002210					
WMF-MGMT-1-Drive-MV	and allo mair with		1	WEGscan 1000		80002219					
WMF-MGMT-2-Drive-MV				2	WEGSCAIT 1000			80002220			
WMF-MGMT-1-RM		in in the intervention of	1	WEGscan 4000	SaaS	80002820	- On request				
WMF-MGMT-2-RM			2	WEGSCall 4000		80002821					
WMF-SPEC-1-Motor		Autonomous advanced data analysis with WEG Artificial Intelligence algorithm Annual subscription necessary to enable the advanced autonomous algorithm for energy diagnostic and analysis	1	WEG Motor Scan WEGscan 100		80002161					
WMF-SPEC-2-Motor			Autonomous advanced	Autonomous advanced	Autonomous advanced	Autonomous advanced	2		as a service	80002170	onroquoor
WMF-SPEC-1-Gear			1	WEG Gear Scan WEGscan 100 WEGscan 101 WEGscan 1000		80002922					
WMF-SPEC-2-Gear			2			80002923					
WMF-SPEC-1-Drive	Specialist		1		-	80002646					
WMF-SPEC-2-Drive	Specialist		2			80002647					
WMF-SPEC-1-Drive-MV			1			On request					
WMF-SPEC-2-Drive-MV			and analysis	and analysis	2	WEGSCAN 1000		On request			
WMF-SPEC-1-RM					1 WEGscan 4000		80003039				
WMF-SPEC-2-RM			2	weascan 4000		80003040					

Reference	Module	Function and details	Period (yars)	Calls/ month <sup>1)</sup>	Туре	Brazilian market	Other countries	
WFM-EXCH-1-BASIC	-		10.000		80002640			
WFM-EXCH-2-BASIC		Annual subscription required per customer account to	2	10,000	SaaS software as a service	80002643		
WMF-EXCH-1-STANDARD			1	50.000		80002641		
WMF-EXCH-2-STANDARD	Exchange		2	50,000		80002644	On request	
WMF-EXCH-1-PLUS	enable the data integration module	1	100.000		80002642			
WMF-EXCH-2-PLUS				2	100,000		80002645	

Note: 1) For applications above 100,000 calls/month, simply combine packages.



# **WEG**digital

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The constant evolution of the industry demands increasingly smart and integrated solutions. That is why we created the WEG Digital Solutions. An efficient set of optimized processes, internet of things (IoT) and data processing. With well-structured Big Data, the objective is to connect manufacturing plants to data generation, using information strategically to generate opportunities, improve productivity and increase assertiveness in decision-making.

This is efficiency. This is Industry 4.0. This is WEG Digital Solutions.

Driving efficiency and sustainability



Learn more

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Notes


## **Global presence** is essential, as much as understanding your needs.

#### **Global Presence**

With more than 40,000 employees worldwide, WEG is one of the largest electric motors, electronic equipments and systems manufacturers. We are constantly expanding our portfolio of products and services with expertise and market knowledge. We create integrated and customized solutions ranging from innovative products to complete after-sales service.

WEG's know-how guarantees the *WEG Motion Fleet Management* is the right choice for your application and business, assuring safety, efficiency and reliability.

- Availability is to have a global support network

  Partnership is to create solutions that suits your needs
  - Competitive edge is to unite technology and inovation





# **Know More**

High performance and reliable products to improve your production process.



Excelence is to provide a whole solution in industrial automation that improves our customers productivity.

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The scope of WEG Group solutions is not limited to products and solutions presented in this catalogue. **To see our portfolio, contact us.** 



#### www.weg.net



+55 47 3276.4000

kigitalesistemas@weg.net

🔘 Jaraguá do Sul - SC - Brazil

Cod: 50107620 | Rev: 01 | Date (m/y): 04/2024. The values shown are subject to change without prior notice. The information contained is reference values.