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WEGscan

Technology driving
the **best results**



Driving efficiency and sustainability





S U M M A R Y

WEGscan

05

WEGsense

07

WEGsync

07

WEG Motion Fleet Management

09

WEG Motor Specialist

13

WEG Motion Fleet Management structure

18

WEGscan technical data sheet

19

WEGscan & MFM technical data sheet

20

WEG X2000 gateway

20



WEGscan

Technology driving
the **best results**





Sensor technology and software for advanced diagnostics

WEGscan is an innovative solution for online monitoring of the equipment and assets fleet, which uses predictive analysis to ensure a level of operational excellence.

WEGscan collects data such as temperature, three-axis vibration, magnetic field and other key information from the asset. Through the development of this sensor, WEG has created and patented two innovative technologies: **WEGsense** and **WEGsync** (page 6).

For improved management of industrial maintenance, **WEGscan** provides a cloud solution, within **WEG Motion Fleet Management**, for data storage, advanced analysis by a technician or specialist, and also for data processing by Artificial Intelligence for autonomous diagnosis. This solution allows a reduction in equipment fleet operating costs (total cost of ownership - TCO) through condition monitoring with IoT technology (Internet of Things).

WEGscan

Technology for general monitoring of equipment

WEGscan and **WEG Motion Fleet Management** technologies for online asset monitoring are constantly evolving, **and now offer the possibility of customizing how data collection and analysis are performed.**

The solution was developed to meet all types and sizes of companies and industries, large or small, that wish to increase operational efficiency through online monitoring and intelligent asset management.

Equipment and assets that can be monitored with WEGscan include electric motors, reducers, gear motors, pumps, compressors, fans, exhaust fans, conveyor belts, mills, planetary reducers, bearings in general, and so on.



When developing the **WEGscan** sensor, which seeks to extend the range of applications to other types of assets besides electric motors, four technological design criteria were applied:

+power

The power system has been optimized to make better use of the battery and to allow even more sophisticated data collection. Now with external power supply option.

+flexibility

Modular and versatile, the new sensor and software can be customized and used for virtually any type of equipment or asset.

+sensing

The **WEGsense** and **WEGsync** technologies allow even more accurate and earlier diagnostics to be performed, and a simplification of complex analyses.

+connectivity

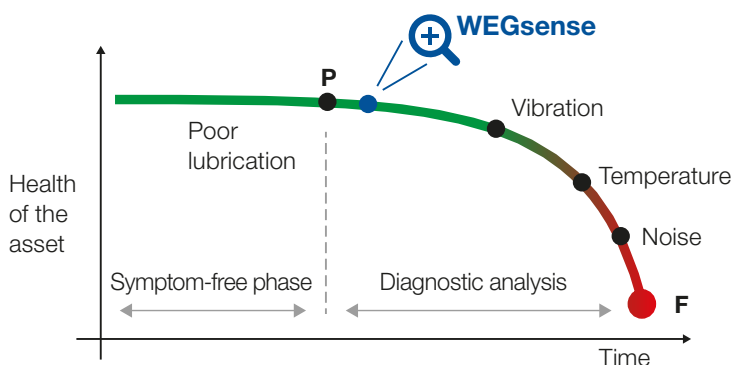
The range and communication have been improved, allowing the fullest possible use to be made of the sensors, with even greater functionality. This allows measurement and sensor update requests to be made via the gateway.



WEGsense

Technology for detection and diagnosis of incipient mechanical faults

P-F (Problem-Failure) curve



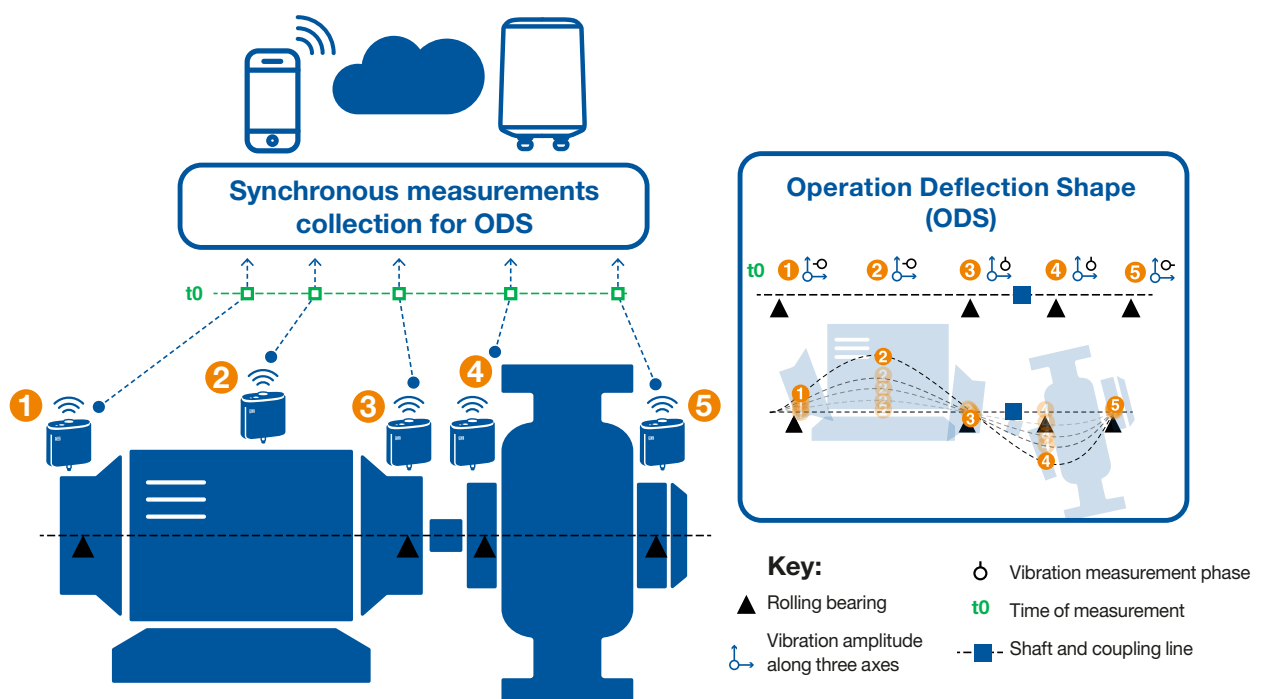
WEGsense technology combines sensor measurements with state-of-the-art technology and advanced WEG algorithms for **EARLY** detection of faults in the monitored asset, for example deterioration in the lubrication of a bearing, before harm to its health can occur.

WEGsync

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

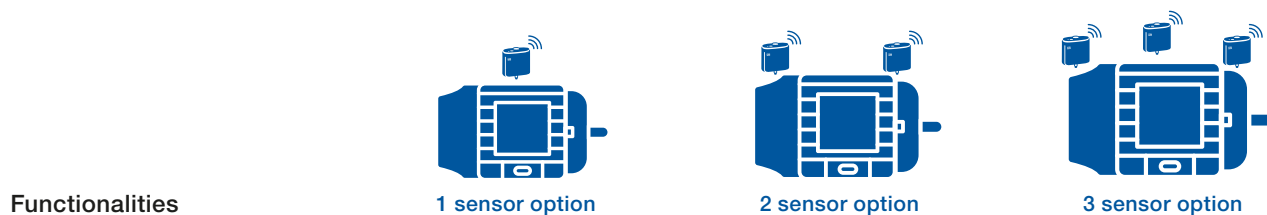
With **WEGsync** it is possible to qualitatively assess structural weaknesses of the application (via ODS¹⁾). For example: region of greatest deformation in the asset; coupling, clearance and attachment issues; verification of the unbalance planes of a rotor; among others.

*Notes: Functionality initially available in the WEGscan App. Functionality via gateway with MFM planned in the solution development road map for Q2-2023.
1) ODS - Operating Deflection Shape.*



Flexibility in asset monitoring

With **WEGscan**, electric motors can be equipped in different ways, in a 1, 2 or 3 sensor configuration, as seen below:



Functionalities

Bearing vibration measurement



Estimation of load and power consumption



Estimation of winding temperature



WEGsense for incipient bearing fault detection



WEG Motion Fleet Management

Online monitoring and intelligent management of the equipment and asset fleet



WEG Motion Fleet Management is the ideal solution for monitoring and increasing the availability of your fleet of equipment and assets. Based on cloud computing technology, asset monitoring can be tracked at any time and from anywhere in the world. The solution uses a layered concept, these layers being Management, Specialist, and Exchange, to respectively visualize and manage information, for advanced analysis by AI (Artificial Intelligence) and for integration with external systems.

To keep pace with the technological evolution provided by **WEGscan**, **WEG Motion Fleet Management** has also undergone extensive improvements, which have expanded the tool's potential for online monitoring and asset management.

WEG Motion Fleet Management allows an awareness of the operating condition of equipment and assets in general, as applied in any type of industry or installation. Through periodic collection and advanced processing of data, both at the edge and in the cloud, valuable information is generated. In this way, it is possible to establish predictive maintenance plans, by observing the operating condition of the fleet (condition-based maintenance). This approach reduces the number of unplanned stoppages, optimizes repair actions and speeds up the decision making of the operation and maintenance team.

The end result is clear from the increased availability and reduced operating cost (TCO) of the drive fleet.

Key features of the **WEG Motion Fleet Management** include:

- Module for advanced vibration signal analysis¹⁾
- Asset trees for hierarchy organization
- Early alert setting, by trend and spectral band
- Maintenance module, with CMMS²⁾ functionalities
- WEG Digital Notify application
- **Exchange** module for data integration

Notes: 1) Applicable standard for vibration analysis: ISO 20816.

2) Computerized maintenance management system.



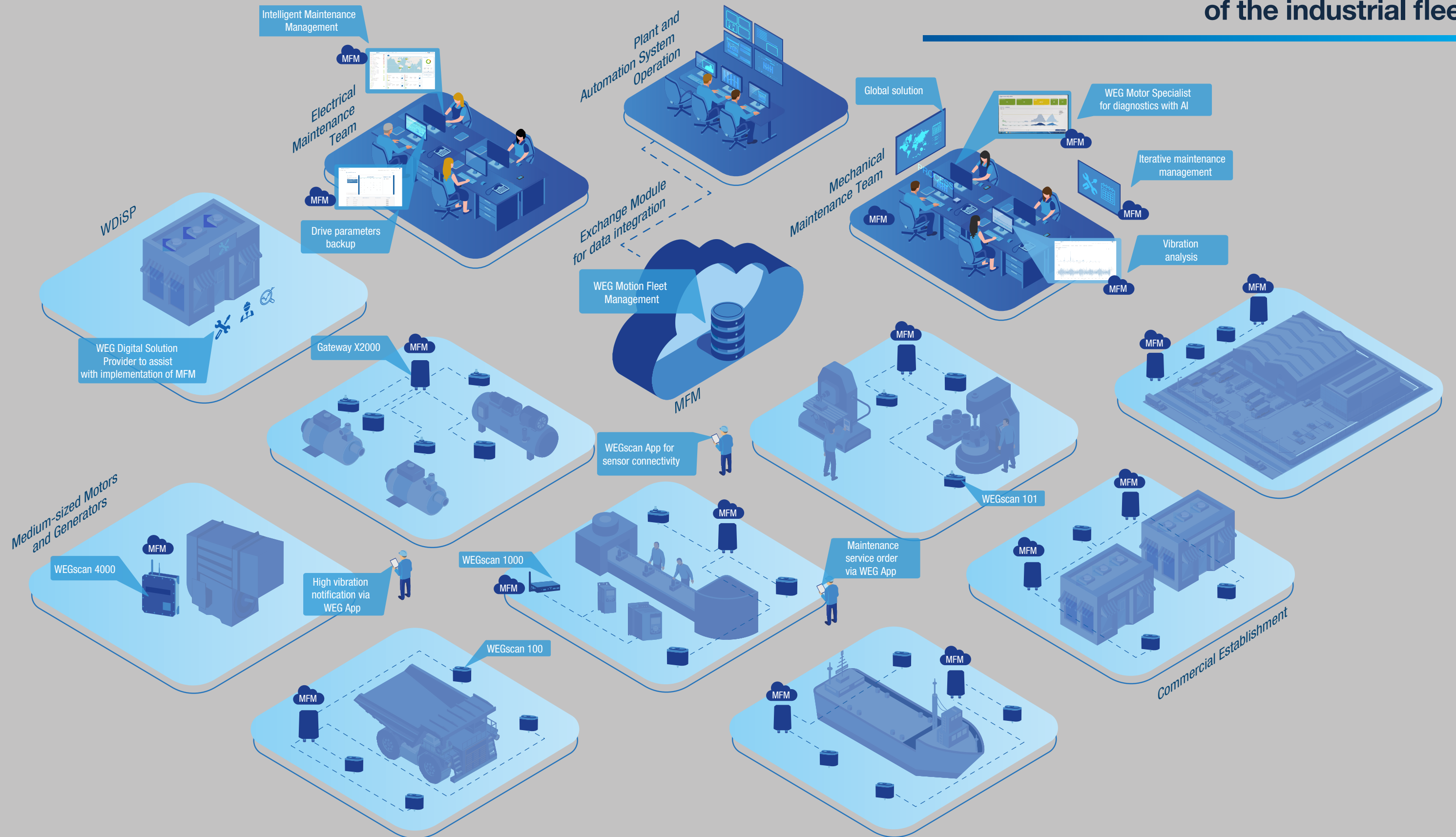
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WEG Motion Fleet Management

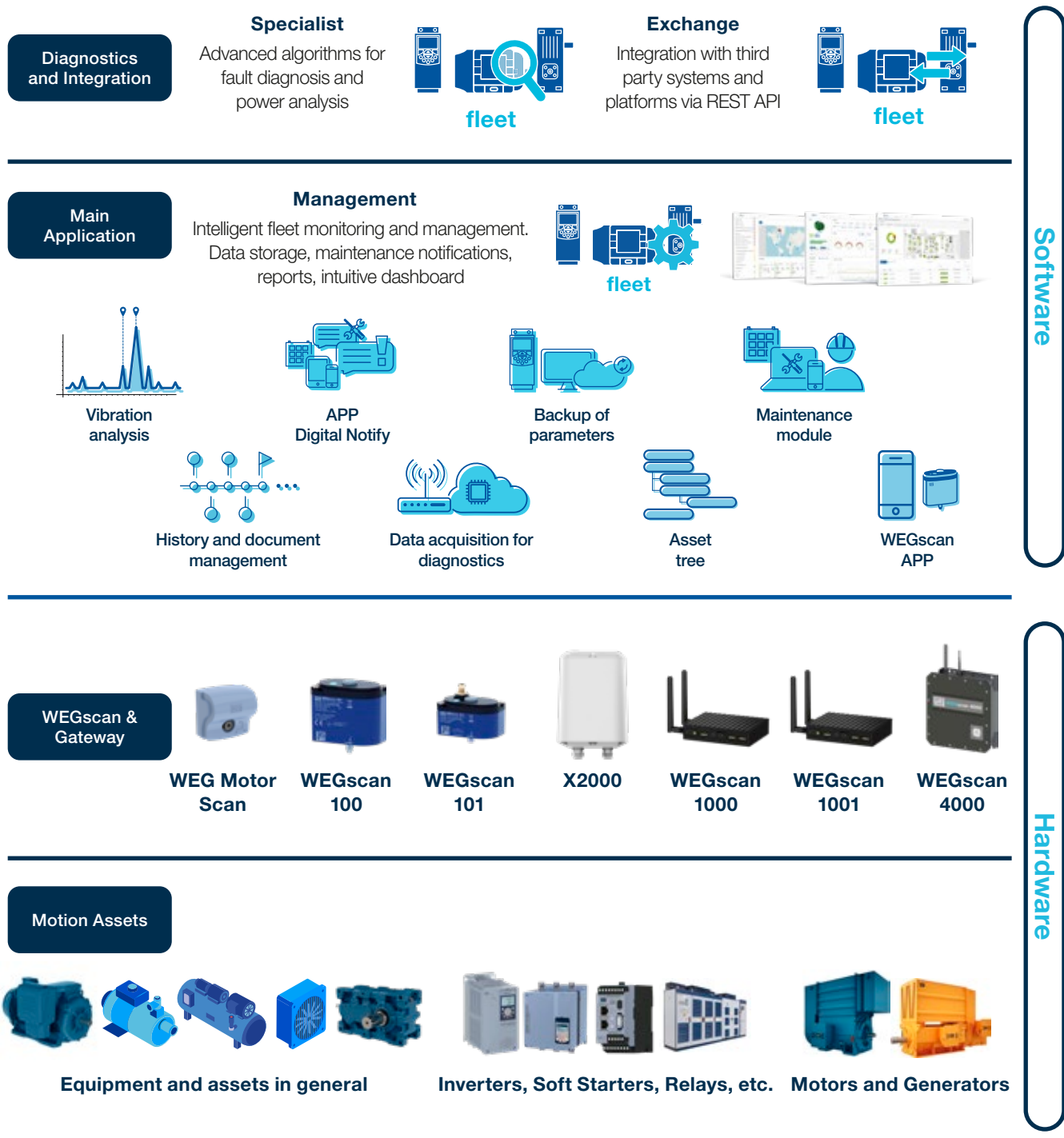
A single solution for complete monitoring of the industrial fleet



WEG Motion Fleet Management is a modular solution with a flexible, layer-based structure that adapts to customer needs. With this solution, it is possible to perform online monitoring of Motion assets: drives, motors and generators of low and medium voltage, as well as gearboxes, gear motors, compressors, pumps, fans/exhaust fans, bearings, conveyors and many other items of equipment and assets.

For such monitoring, data are collected (scanning) and sent to the cloud by the WEGscan & Gateway layer. Data is stored and displayed in a holistic and specific way through the numerous functionalities available in the MFM Management layer. The top layer provides the advanced modules, such as Specialist, which applies autonomous algorithms for fault diagnosis and power consumption analysis, and **Exchange** for data integration with systems external to the MFM.

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



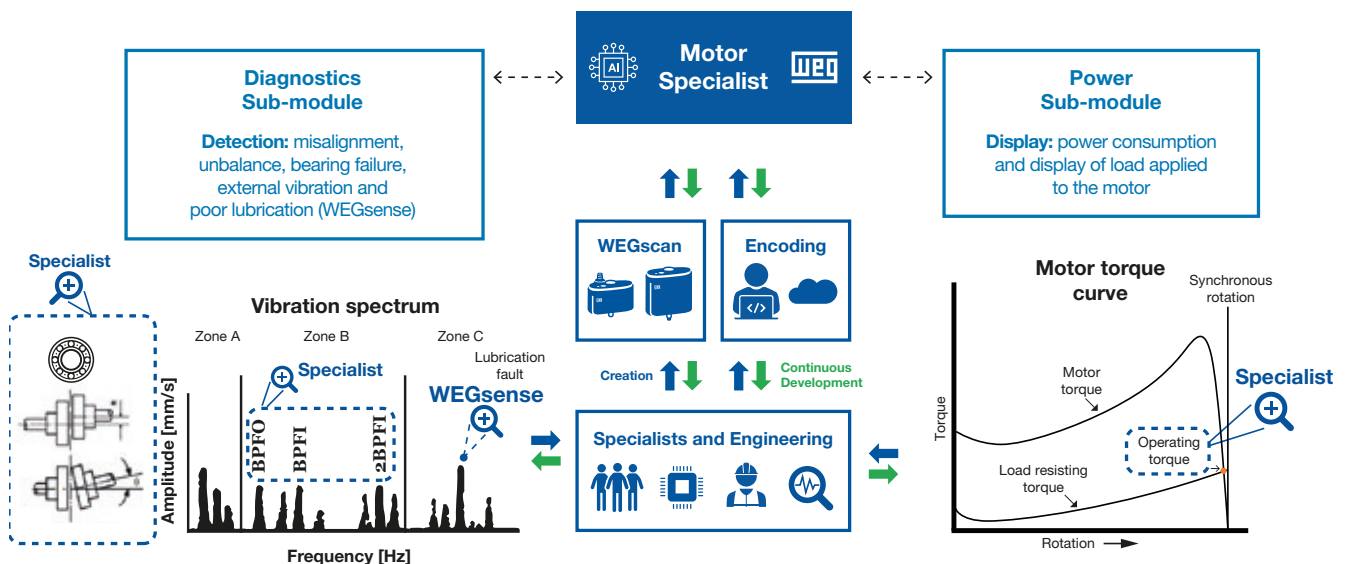
WEG Motor Specialist

Your motor powered by intelligence

WEG Motor Specialist is a solution available in **WEG Motion Fleet Management** for advanced analysis of the data collected by **WEGscan**, which draws on WEG's expertise in vibration and power consumption analysis for electric motors, from any manufacturer.

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 sub-modules, minimizing the need for analysis by a specialized professional. With this tool, the user will receive notification with early fault diagnosis to carry out precise maintenance planning.

To activate a Specialist subscription, the respective **WEGscan** must have an activated subscription plan for **Management**. **WEGscan** comes with **Management** and **Specialist** subscriptions included, for 1 year.



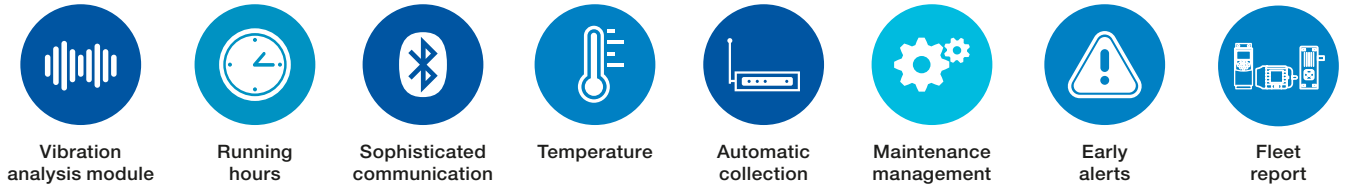
Note: Functionality available for induction motors, from any manufacturer. For correct operation of the WEG Motor Specialist function, the sensor must be installed according to the technical guidance in the manuals together with setting of the motor data in MFM.

Artificial intelligence for real results

With **WEG Motor Specialist** and **WEGsense** it is possible to obtain power consumption analysis and fault diagnosis, in an autonomous and precise way, by means of Artificial Intelligence and Machine Learning algorithms. These algorithms developed by WEG specialists, observe and learn the patterns and operating deviations of the monitored motor, generating failure indicators, such as: unbalance, misalignment, bearing damage, inefficient lubrication and external vibration. The learning and diagnostics process takes place without human interference, maximizing the delivery of value to the drive fleet maintenance and operation teams. It is also possible to infer the motor load and power consumption. **WEG Motor Specialist** allows the user to perform maintenance quickly and in line with the actual operational condition of the assets. Now you can avoid downtime, plan maintenance, optimize power consumption and increase your operational efficiency with **WEG Motor Specialist** - your motor powered by intelligence.



Full monitoring



Technology for advanced data analysis and intelligent management of equipment and assets

In the majority of cases, simply knowing that a piece of equipment or asset is faulty is not enough to allow corrective action, maintenance planning or even a decision on whether an emergency shutdown of the production line is necessary.

To help solve problems of this nature, WEG has created IoT technologies to perform condition monitoring of equipment and assets, making it possible to know the degree of severity and the origin of the fault. This technology is provided by the **WEG Motion Fleet Management** solution and by the **WEGscan** sensors.



In a production environment with tough deadlines and aggressive targets, knowing the operational condition of the equipment in order to answer questions such as 'how serious is the fault?', 'how long has this fault existed?' and 'should we act now?' is crucial. It was to respond to these and other types of questions that the **vibration signals analysis module** and **WEG Specialist** were created, the former for human analysis, and the latter for autonomous analysis by means of algorithms with Machine Learning and Artificial Intelligence.



Vibration signal analysis module

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

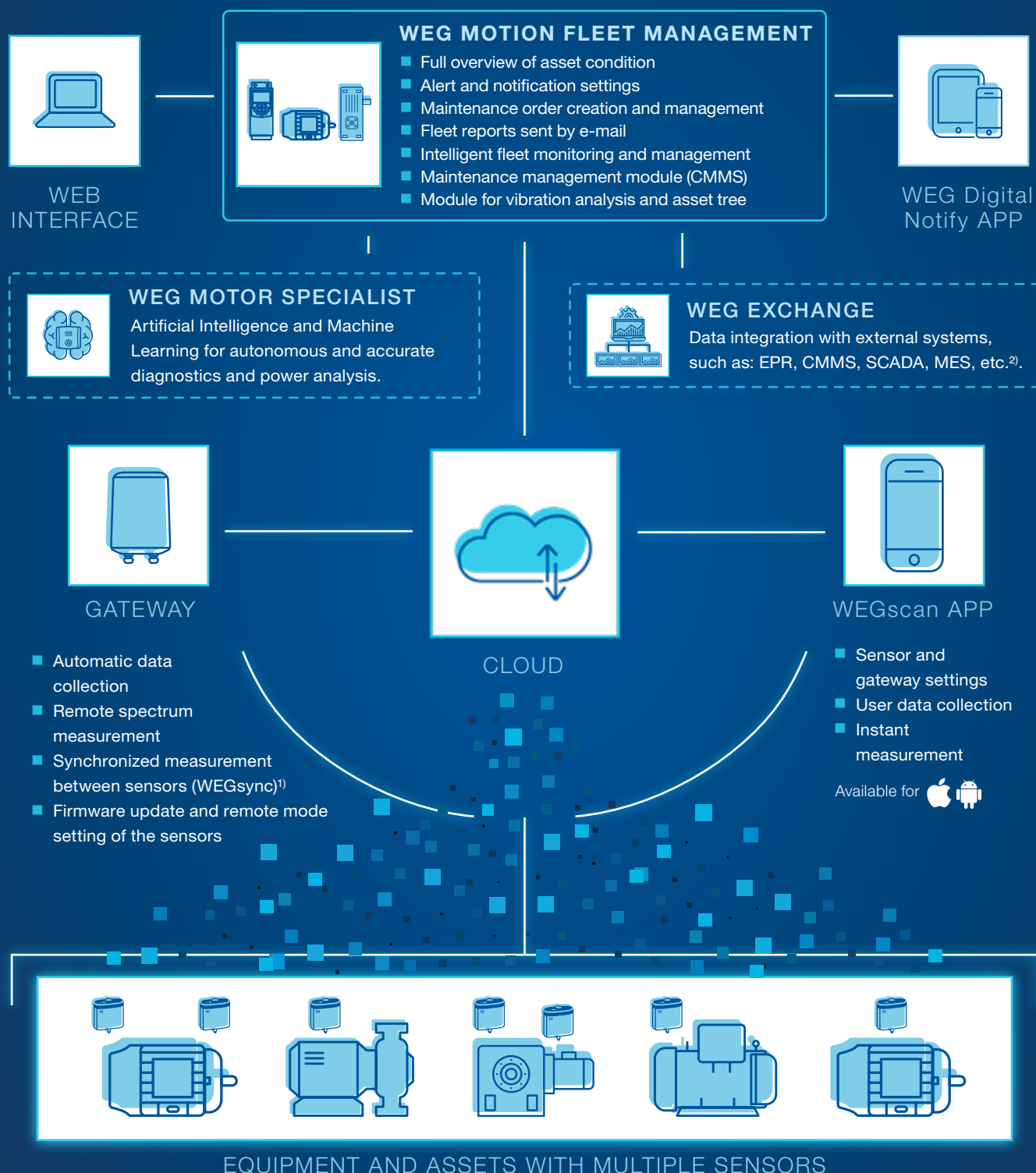
- Lubrication fault
- Bearing failure
- Misalignment
- External vibration
- Unbalance
- Broken bars
- Beating
- Backlash
- Defective or worn gears
- Cavitation
- Lack of rigidity
- Eccentricity
- Friction (rubbing)
- Defective belts

In this module, it is possible to explore the data both spectrally (FFT, fast Fourier transform) and in the time domain using numerous functionalities, such as:

- Multi-tab tool to organize and facilitate analysis.
- Global RMS vibration trend graphs, with time window and multi-point alert setting.
- Spectrum graphs (displacement, velocity and acceleration) and time domain waveform.
- Envelope functions, auto correlation and high, low and band pass filters.
- Alarm by band of the vibration spectrum, for speed and acceleration.
- Cursors for analysis: sidebands of harmonics (in dB), difference between cursors (Delta), peak-to-peak (pk-pk), etc.
- Agile and instantaneous full spectrum vibration measurement.
- Bearing database for diagnostic support.
- Waterfall graph with magnitudes indicating alarms.



WEG Motion Fleet Management structure



Notes: 1) Functionality initially available in the WEGscan App. Functionality via gateway with MFM planned in the solution development road map for Q2-2023.
2) Automation system (SCADA), enterprise management system (ERP), maintenance management system (CMMS), manufacturing execution and control systems (MES) or any other proprietary software.

WEGscan technical data sheet

General characteristics

| | |
|-------------------------|--|
| Housing material | Polycarbonate |
| Encapsulation | Epoxy |
| Protection rating | IP66 |
| Electronics temperature | -40 °C to 80 °C |
| Compliance | ANATEL (Brazil) ¹⁾ |
| Advanced functions | WEGsense, WEGsync and WEG Motor Specialist |

Communication

| | |
|-----------------|---|
| RF Module | Bluetooth® 2.4 GHz (Version BLE 5.1) |
| Frequency range | 2,402 - 2,480 MHz |
| Range (maximum) | Smartphone ~25m ²⁾ Gateway X2000 ~100m and 40 sensors ²⁾ |

Data storage

| | |
|------------------------|---------|
| Data Storage in sensor | 1 month |
| Cloud storage (MFM) | 1 year |

Measurements

| | |
|---------------------------------|--|
| Vibration | 3 axis Maximum frequency 13.3 kHz Maximum amplitude ±16 g Resolution 12,288 lines |
| Surface temperature | Ventilated motors -40 °C to 135 °C Unventilated motors -40 °C to 100 °C |
| Estimation of load and rotation | <10% (error) |

Item, size, weight and power supply

| | | |
|-------------|------------------------------------|---|
| WEGscan 100 | Item | 16437262 |
| | Size | 56 x 62 x 34 mm (H x W x D) |
| | Mass | 277 g |
| | Battery material | Lithium Thionyl Chloride (Li-SOCl ₂) |
| | Rated capacity | 1.65 Ah (2x) |
| | Rated voltage | 3.6 V |
| | Battery life expectancy ex factory | 3 years (ambient 25 °C - 24 acquisitions per day) |
| | Suggested batteries | Saft - LS17330 and Xeno - XLP-055F |
| WEGscan 101 | Item | 16437478 |
| | Size | 49 x 62 x 34 mm (H x W x D) |
| | Mass | 259 g |
| | Specification | 10-24 V DC / 10-24 V AC @ 50/60 Hz |
| | Minimum source current | 100 mA (max. consumption 25 mA per sensor) |

Notes: 1) Classified Area Certification: in progress. Certification for other countries: in progress.

2) Environment with partial obstacles, without total blocking of the signal between sensor and gateway, considering a gateway with the two external antennas (included in the product) installed in the bottom of the gateway.

WEGscan & MFM technical data sheet

Available software functionalities

Management layer

Vibration along 3 axis

Surface temperature

Running time

Power supply frequency

Rotation (rpm)

Key MFM software features

- Intuitive dashboards for managerial overview and technical analysis
- Equipment, asset and plant operation reports
- Asset trees for hierarchy organization
- Customizable early alert, by trend and spectral band
- Maintenance module, with CMMS³⁾ functionalities
- WEG Digital Notify application
- Exchange module for data integration

Module for advanced vibration signal analysis⁴⁾

- Vibration trend graphs
- Spectrum graphs (displacement, velocity and acceleration)
- Time domain waveform graphs
- Envelope functions and autocorrelation
- High, low and band pass filters.
- Alarm by band of the spectrum
- Analysis cursors with metrics
- Remote vibration measurement with spectrum
- Waterfall graph with indication of alarms.

Notes: 1) Feature available for direct drive or soft-starter.

2) Feature available for frequency inverter drive.

3) Computerized maintenance management system.

4) Applicable standard for vibration analysis: ISO 20816.

WEG Motor Specialist

Power sub-module

- Charge (%)¹⁾
- Power consumption (kWh)¹⁾

Diagnostics sub-module

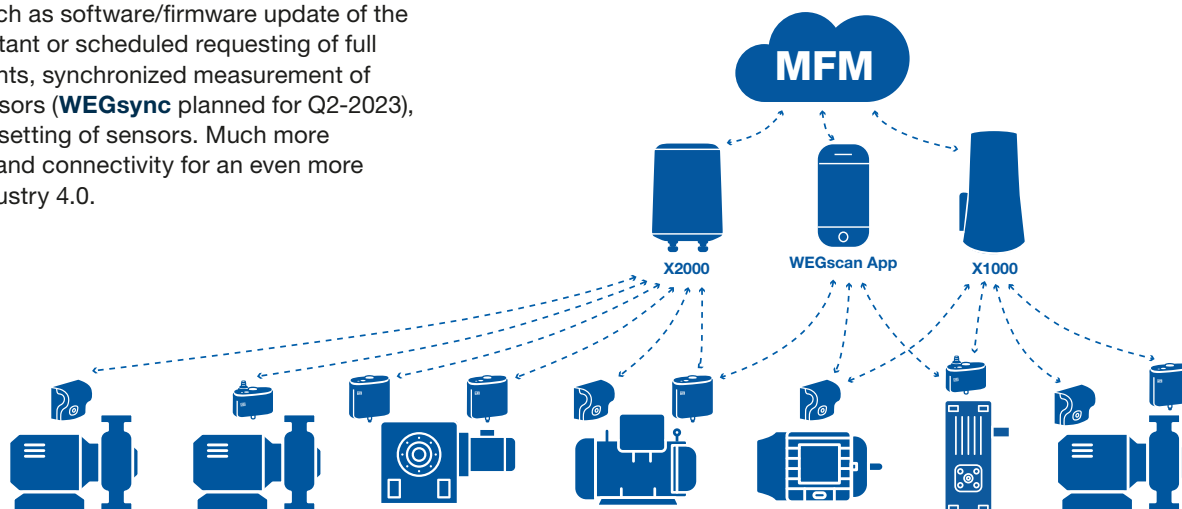
- Unbalance¹⁾²⁾
- Misalignment¹⁾²⁾
- Bearings¹⁾²⁾
- Lubrication (WEGsense)¹⁾²⁾
- External vibration¹⁾²⁾

WEG X2000 gateway

Advanced connectivity for sophisticated collection

The WEG X2000 Gateway sends real-time information from the **WEGscan** sensor to the cloud via WiFi, Ethernet cable or 3G/4G network, allowing remote, secure and agile online monitoring of the drive fleet.

The differences between the new technology used for the WEG Gateway and **WEGscan** include: greater distance between the sensor element and the gateway, possibility to perform remote operations via the gateway, such as software/firmware update of the sensors, instant or scheduled requesting of full measurements, synchronized measurement of multiple sensors (**WEGsync** planned for Q2-2023), and remote setting of sensors. Much more technology and connectivity for an even more efficient Industry 4.0.



Notes: The detailed operating characteristics of the X1000 Gateway and WEG Motor Scan within MFM are presented in the MFM manual. Remote vibration spectrum measurement is only available with WEGscan.



YOUR MOTOR POWERED BY **INTELLIGENCE**

WEG Motor Specialist is a solution that uses artificial intelligence and machine learning to diagnose, monitor and indicate predictive maintenance in electric motors. This innovative tool transforms WEG's 60 years of expertise into algorithms, making motor fleet management much more effective. It is artificial intelligence for real results.

PLAN MAINTENANCE | AVOID DOWNTIME | OPTIMIZE CONSUMPTION

Learn more



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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 that the **WEGscan 100 and the WEGscan 101** are 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 innovation



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

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www.weg.net



 **+55 47 3276.4000**

 **digitalesistemas@weg.net**

 **Jaraguá do Sul - SC - Brazil**

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