

WEGscan

Technology driving the best results



WEGscan

Technology driving the best results

Good results are achieved with technological intelligence. Therefore, we developed the WEGscan, which meets the needs of companies and industries with maximum precision and reliability. Modular, versatile and multipurpose, the sensor can be coupled to different types of equipment and assets, automatically collecting data and performing online monitoring.

- Remote operation for update, measurement and setup
- Integrated with WEG digital solutions
- Versatile and multipurpose solution
- WEGsync: synchronized measurement of multiple sensors for structural vibration analysis
- WEGsense: technology to detect incipient mechanical failures, such as poor lubrication
- With the WEG Motion Fleet Management, intelligent management is possible



WEGscan

Technology driving the best results



Designed to transform technology into a strategic advantage, the WEGscan carries WEG's technological expertise, integrating hardware and software that connect your production line to Industry 4.0, optimizing assets, increasing operational efficiency and boosting your growth.

The WEGscan can be used in gearboxes, gearmotors, pumps, compressors, electric motors, fans, exhaust fans, conveyor belts, mills, planetary gearboxes, bearings in general, among other equipment and assets, in any type of industry or installation.

WEGscan Architecture | Product Design

WEGscan 100



Oct/2022



Q2-2023



Digitalization of equipment
and assets in general



WEGscan App
WEG Digital Notify App

Gateway
X2000



Connectivity, Setup, Notifications &
Maintenance Management

WEG Motion Fleet Management



MFM evolves to
Version 2.0

+ Features

<https://mfm.wnology.io/>



Cloud solution for online monitoring
and smart management of
equipment and assets

WEGscan new possibilities

When creating the **WEGscan** sensor, four **technological** drivers were adopted in the design:



+energy

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



+flexibility

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



+sensing

The **WEGsense** and **WEGsync** technologies allow conducting even more precise and earlier diagnoses, in addition to simplifying complex analyses.



+connectivity

Range and communication have been improved, making it possible to exploit sensors comprehensively and in an even more functional manner. Possibility of measurement requests, with vibration spectrum, and sensor updates via gateway.

WEGscan 100



WEGscan 101



WEGscan online asset monitoring

WEGscan 100

- **3-axis** vibration measurement up to 16 g (~145 mm/s² RMS)
- Maximum spectral frequency of **13.3 kHz** and **12,288** resolution lines
- Surface temperature measurement **-40 °C to 135 °C** (with ventilation)
- Sensor ambient temperature (electronics): -40 °C to 80 °C
- Power supply with **replaceable Lithium-Thionyl Chloride (Li-SOCl₂) battery¹**
- Data storage: 1 month in the sensor and 1 year in the MFM software
- Gateway communication: **Bluetooth 5** connected mode
- Measurement interval and modes: **customizable**
- Protection rating: IP66
- Cloud software: **WEG Motion Fleet Management** with subscription plans
- Advanced functions: **WEGsense, WEGsync and WEG Motor Specialist**

¹ two 1.65 Ah 3.6V cells, estimated life of 3 years (depending on the application)



WEGscan online equipment monitoring

WEGscan 101

- Sensor with **external power supply**
- Ideal for applications with a **high number of daily measurements**
- Power supply: external power supply via cable¹ with M8 connector
- Minimum source capacity: **100 mA**
(maximum consumption 25 mA per sensor)
- Functional characteristics similar to the **WEGscan 100**
- Protection rating: **IP66**

Measurements via Gateway

- Communication with MFM (cloud server) via internet²:
 - Wi-Fi
 - 3G/4G Modem/Dongle (LTE)
 - Ethernet cable



¹ not included in the sensor package







² requirements for connecting the gateway to the MFM server: ports and addresses allowed on firewall and network without proxy

WEGscan optimized operation

The **WEGscan** is equipped with LED indicator and button, allowing to know the operating status of the sensor and change it. The button can be used to carry out the following commands: turn on, turn off, speed up the communication mode or request an instant measurement.



WEGscan expanding online monitoring

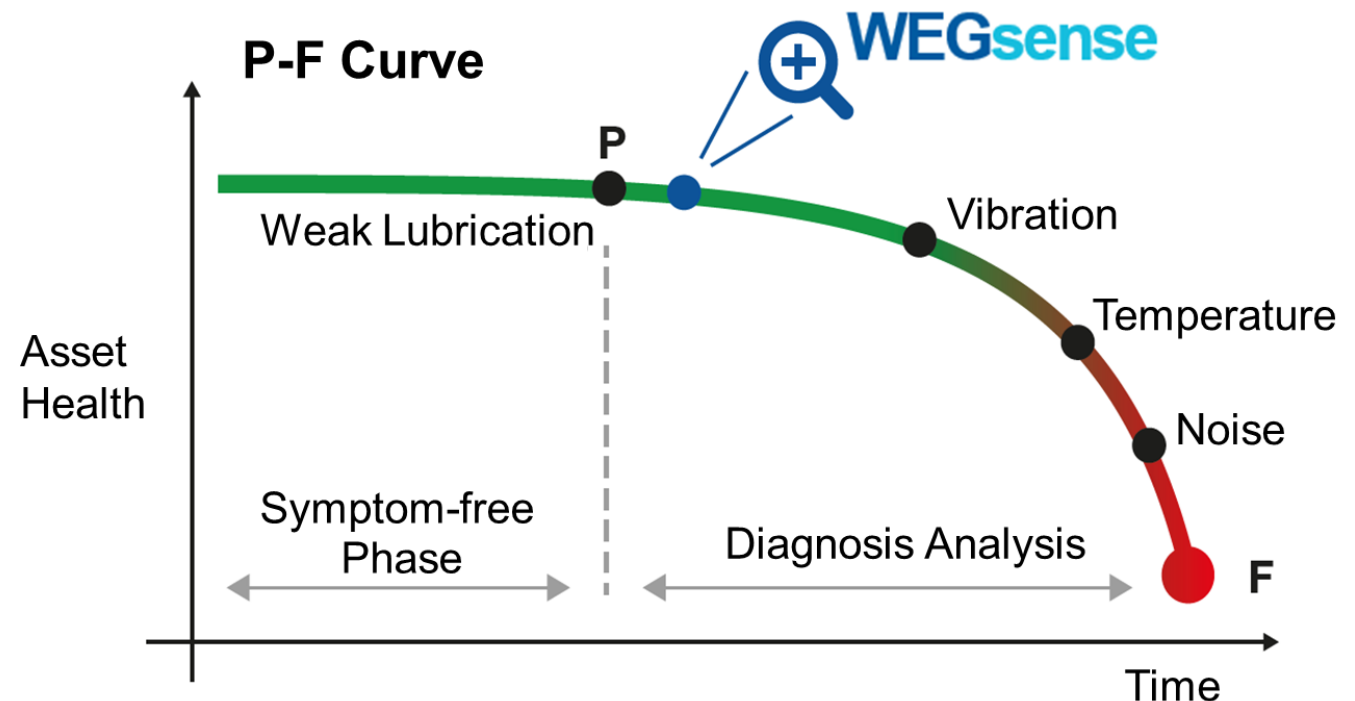
Parameters		WEG Motor Scan 	WEGscan 	Notes
 +sensing	Vibration (spectrum resolution/range)	820 Hz 1024 lines	13.3 kHz 12,288 lines	Detection and diagnosis of incipient failures
	WEGsense	-	48kHz	Detection and diagnoses such as lubrication degradation Other advanced analyses
	Temperature	-40 °C to 135 °C ± 3 °C	-40 °C to 135 °C ± 0.2 °C	Temperature measurement and load/consumption estimation
	Magnetic Field	16 gauss	16 gauss	Estimated operating time Estimated motor speed and load
 +connectivity	Connectivity	Bluetooth 4	Bluetooth 5	Distance enhancement (100 m) Remote sensor update Vibration measurement with spectrum Measurement scheduling
 +energy	Power supply	Encapsulated	Replaceable battery	Extended battery time
			External power supply	New version
 +flexibility	Flexibility	-	Hardware	Power supply flexibility Solution for monitoring multiple assets
			Firmware	Flexible for new applications WEGsync - synchronized measurement of multiple sensors

WEGsense incipient failure detection



Technology for detecting and diagnosing incipient mechanical failures

The **WEGsense** technology combines sensor measurements with state-of-the-art technology and WEG advanced algorithms to detect incipient failures in the monitored asset, such as degradation of bearing lubrication even before the health of the bearing is impaired.

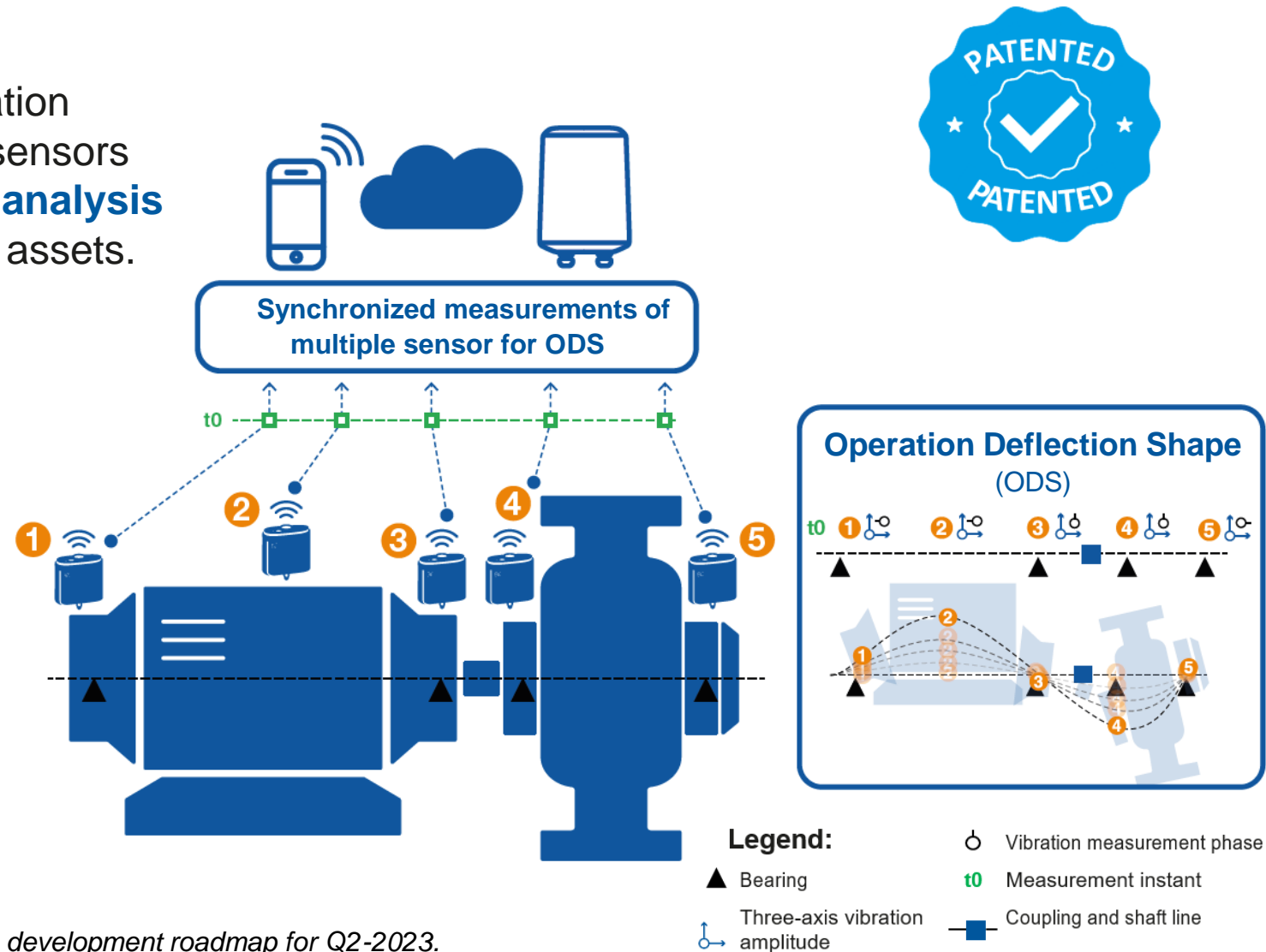


Note: Functionality available in the WEG Motor Specialist module, Diagnostics sub-module. For the proper operation of the WEGsense function, the sensor must be installed close to the bearing, rigidly, according to technical directions in the manuals.

WEGsync structural analysis with synchronized measurement

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

With **WEGsync**, it is possible to assess structural weaknesses of the application qualitatively (via ODS*), for example, if an unbalance is happening in one or two planes—something enabled by the phase analysis among the measurement points, which is only possible with synchronized measurements.



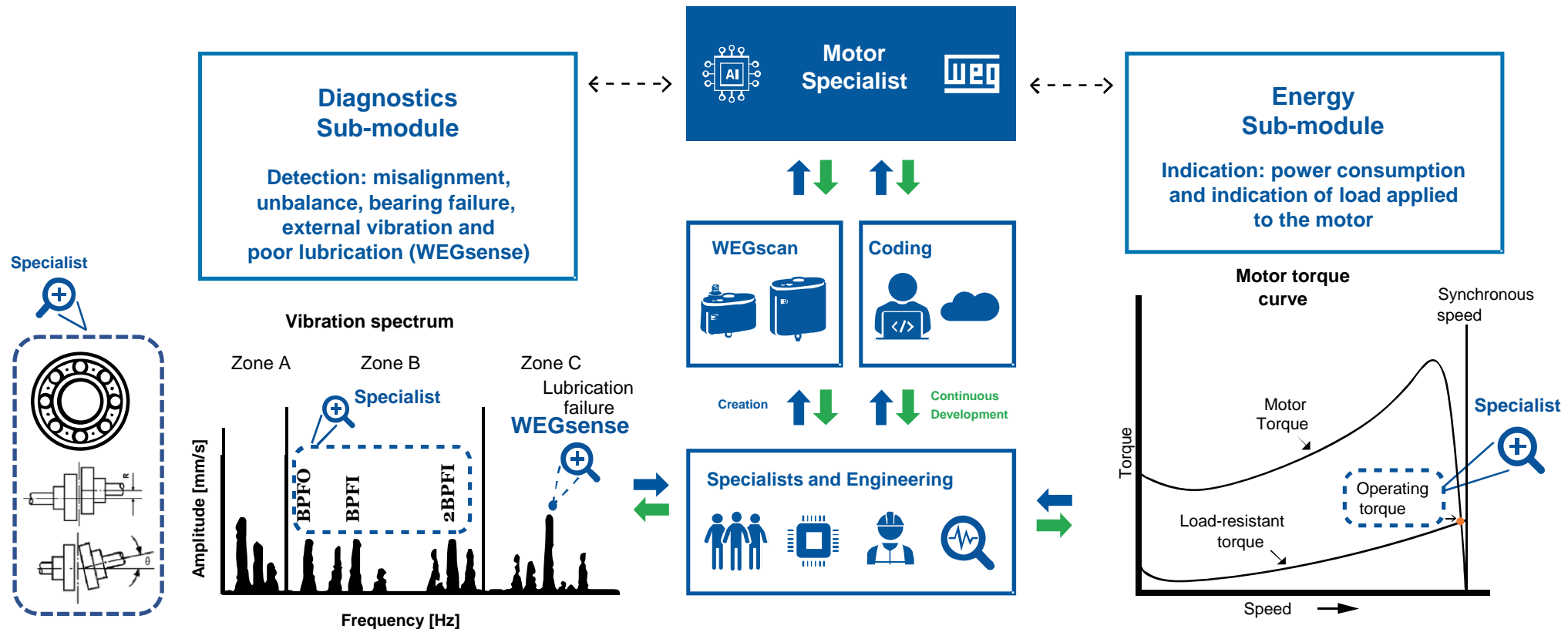
Note: Functionality initially available in the WEGscan App.

Functionality via gateway and MFM provided for in the solution development roadmap for Q2-2023.

**ODS - Operating Deflection Shape.*

Motor Specialist intelligence in reliability

Created by WEG specialists and validated in the company's laboratories and industrial plants, 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 a specialized professional's analysis.



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

WEGscan sophisticated motor monitoring

When the **WEGscan** is applied to **electric motors**, from any manufacturer, some specific features are available, such as:

- **WEG Motor Specialist** module with algorithms for fault diagnosis and energy analysis.
- Specific dashboard to facilitate the interpretation of measurements and speed up analysis.
- Measurement of the motor power supply frequency¹
- Measurement of operating hours (motor hour meter)
- Lubrication recommendation based on hour meter

With **WEGscan**, electric motors can be equipped in different ways, in the configuration with 1, 2 or 3 sensors:

Functionalities

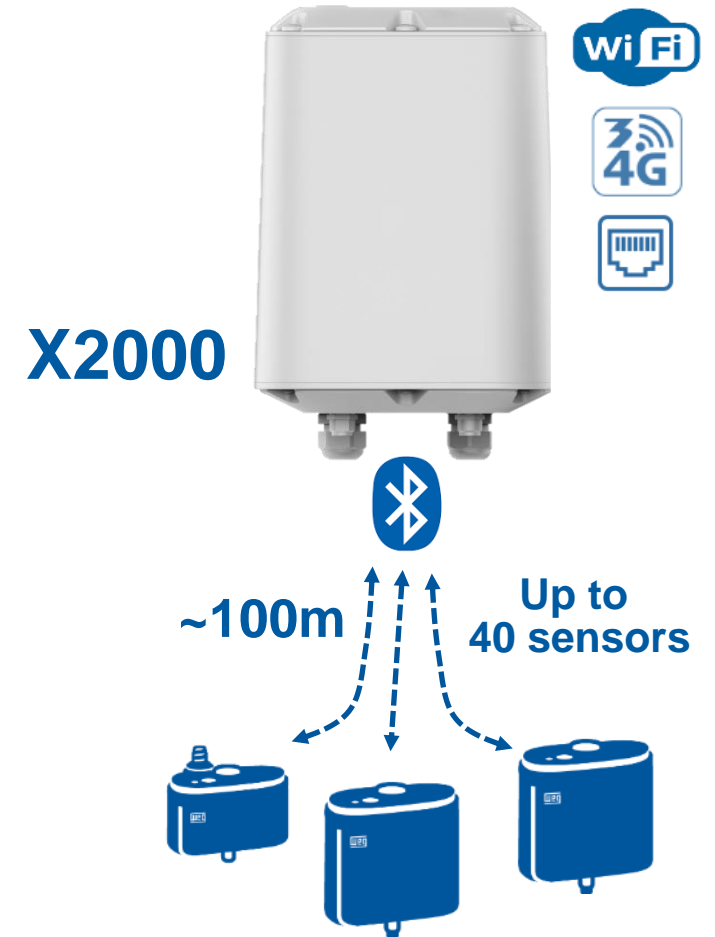
	Options: 1 sensor	2 sensors	3 sensors
Bearing vibration measurement	■ ■ ■ □ □	■ ■ ■ ■ ■	■ ■ ■ ■ ■
Load estimation and energy consumption	■ ■ ■ ■ ■	□ □ □ □ □	■ ■ ■ ■ ■
Winding temperature estimation	■ ■ ■ ■ ■	□ □ □ □ □	■ ■ ■ ■ ■
WEGsense to detect incipient bearing failures	□ □ □ □ □	■ ■ ■ ■ ■	■ ■ ■ ■ ■

¹ Resource available for direct-on-line starter or soft-starter.

Gateway X2000 connectivity and flexibility

The gateway allows monitoring the equipment fleet online, in a safe and agile way. Characteristics of the connectivity solution:

- Number of sensors per gateway: **40 sensors**
- Range: **100 meters** in an industrial environment¹
- Power supply: PoE (power over ethernet) or adapter
- **Connectivity** with Internet:
 - Wi-Fi
 - 3G/4G Modem/Dongle (LTE)
 - Ethernet cable
- Communication protocol with MFM (cloud): **MQTT² with TLS³**
- Communication protocol with sensor: **Bluetooth 5** connected mode
- Settings **via MFM platform**



¹ Environment with partial obstacles, without total signal blockage between sensor and gateway, considering gateway **with two external antennas** (included in the product) installed at the bottom of the gateway;

² MQTT - Message Queuing Telemetry Transport;

³ TLS - Transport Layer Security.

X2000 Gateway connectivity and flexibility

New functionalities in the communication with X2000 Gateway:

- **Remote** request for measurements, **with vibration spectrum**, of instant mode
- Possibility to conduct **remote operations** on the sensor, by **MFM**, via gateway
- Remote **setting** of the sensors to customize intervals and measurement modes
- Remote **measurement scheduling** according to the application requirements
- Remote sensor **software/firmware update** (FOTA¹)
- Data storage on the gateway in offline periods (Internet) for 30 days
- **Synchronized measurement²** of multiple sensors (**WEGsync**)

¹ Firmware Over The Air

² Functionality via gateway and MFM provided for in the solution development roadmap for Q2-2023.



WEGscan & MFM software enhancing human action

To keep up with the technological evolution provided by the **WEGscan**, the **WEG Motion Fleet Management** also had numerous enhancements, expanding the tool potential for online monitoring and asset management.

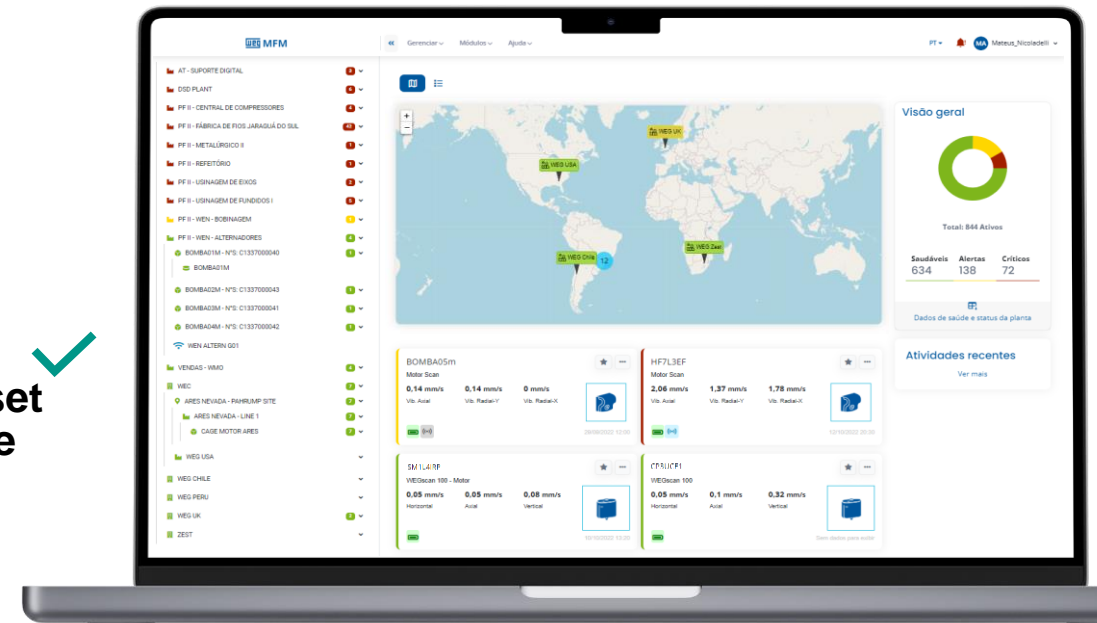
With recent improvements, the software version has evolved and reached **Version 2.0**, with new features such as:

- Module for advanced analysis of vibration signals¹;
- Asset trees for hierarchy organization;
- Advanced alert configuration, by trend and spectral band;
- Maintenance module, with CMMS² functionalities;
- WEG Digital Notify app;
- (and much more)



Broad View of the Plant Condition ✓

Asset Tree ✓

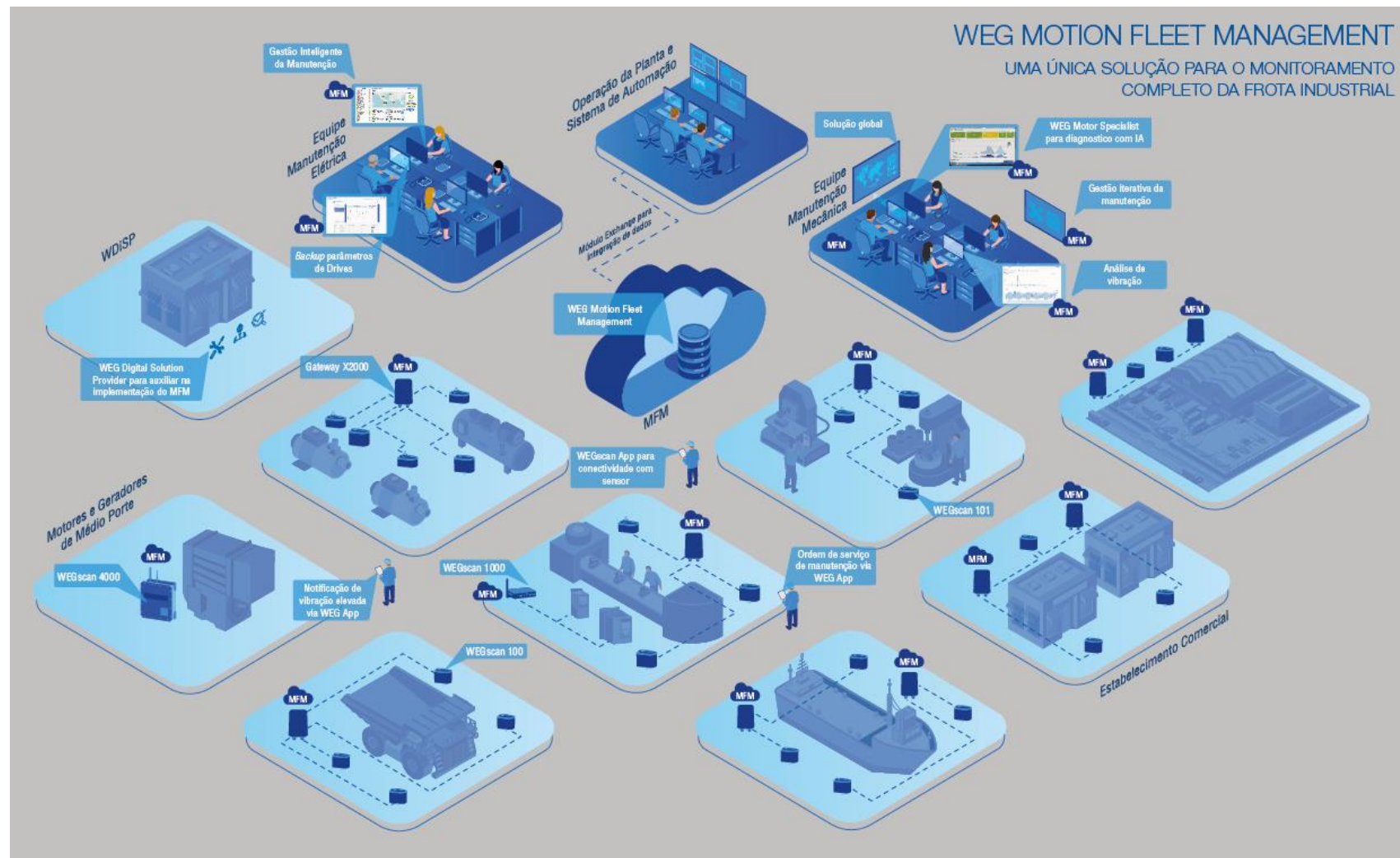


¹ Applicable standard for vibration analysis: ISO 20816.

² Computerized maintenance management system.

WEGscan & MFM broad and global solution

- Broad and global solution
- Maintenance based on condition
- Reduction in operating cost (TCO¹)
- Specialist module for diagnosis
- Reliability with technology
- Online fleet monitoring
- Effective communication
- Mobility
- Reduction in the number of failures
- Minimization of unexpected downtime
- Safety for the team



¹Total Cost of Ownership

WEGscan & MFM technology for all companies

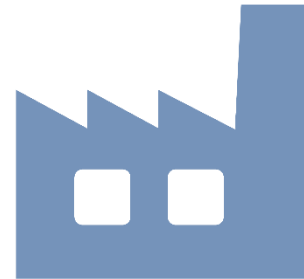
The **WEGscan & MFM** solution was developed, and is under continuous development, to serve all types of companies and customers, including service providers.



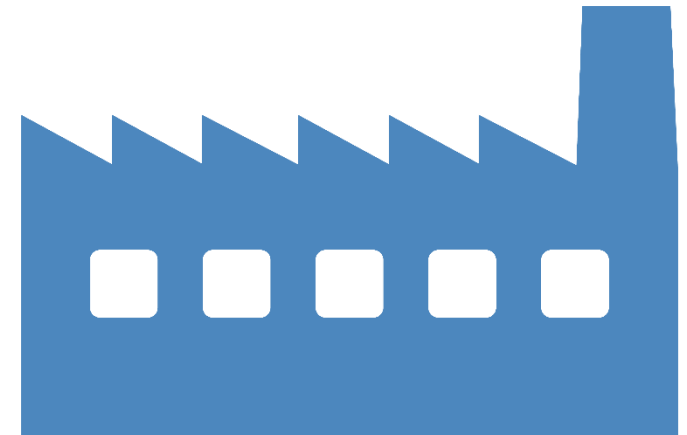
**Installations
in general**



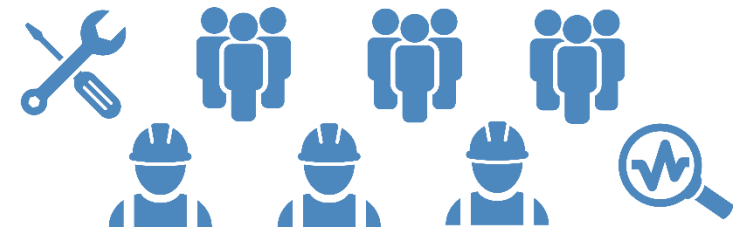
**Service
providers**



**Companies or
industries in general**



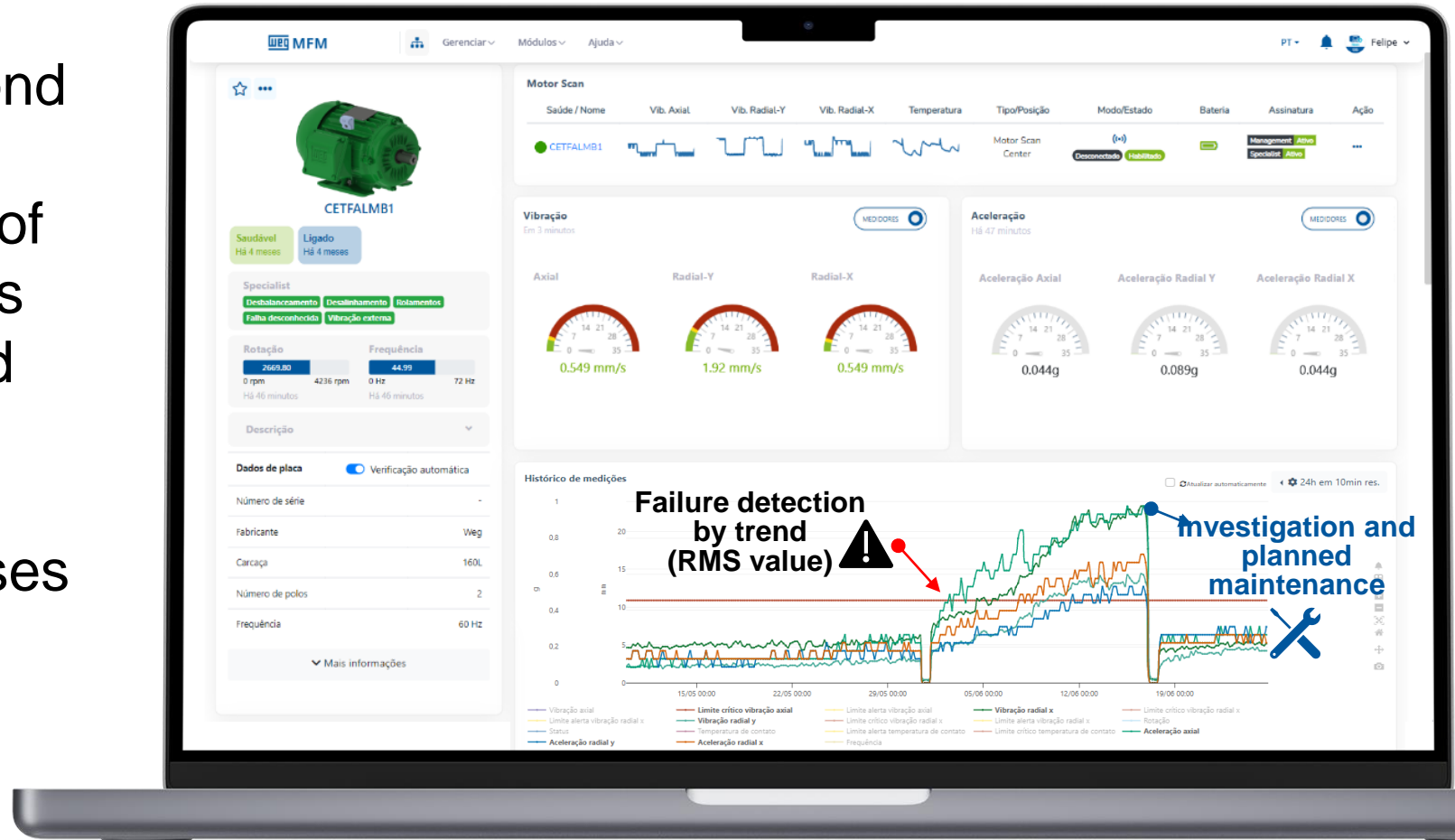
Large companies or industries



WEGscan & MFM online reliability

In this real case, the vibration elevation beyond the limits was noticed through the notification of the MFM solution. In this occurrence, the planned maintenance prevented unexpected production downtime, avoiding losses in production and maintenance.

Modern dashboards and graphics ✓
for vibration trend analysis



WEGscan & MFM online reliability

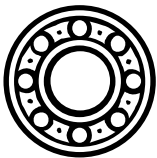
With an advanced analysis module, the vibration signal (spectrum) is analyzed in depth, thus allowing to diagnose the fault.

In this way, it is possible to determine the best action to solve the problem.

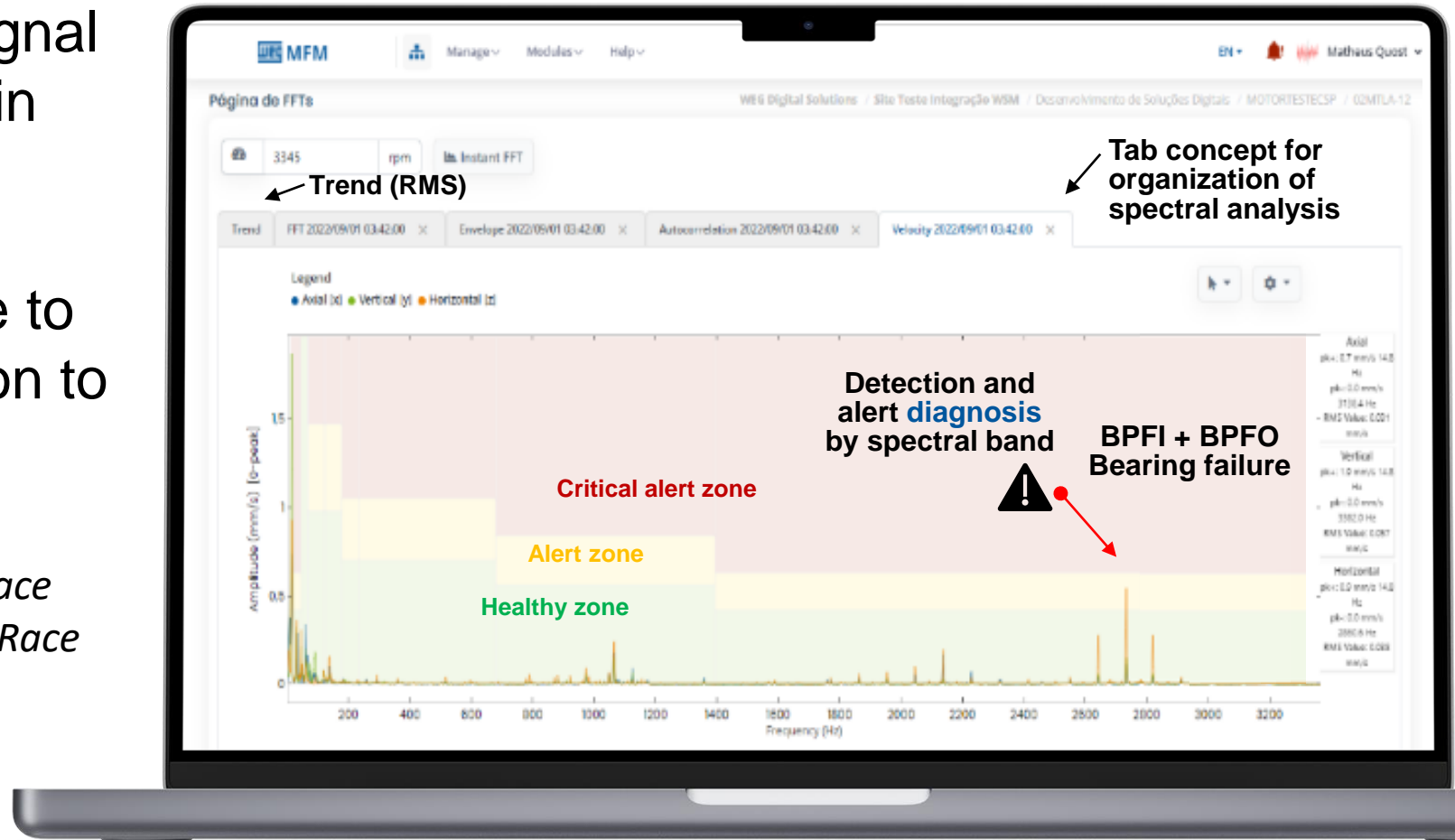
Bearing Failure

BPFI - *Ball Pass Frequency Inner Race*

BPFO - *Ball Pass Frequency Outer Race*



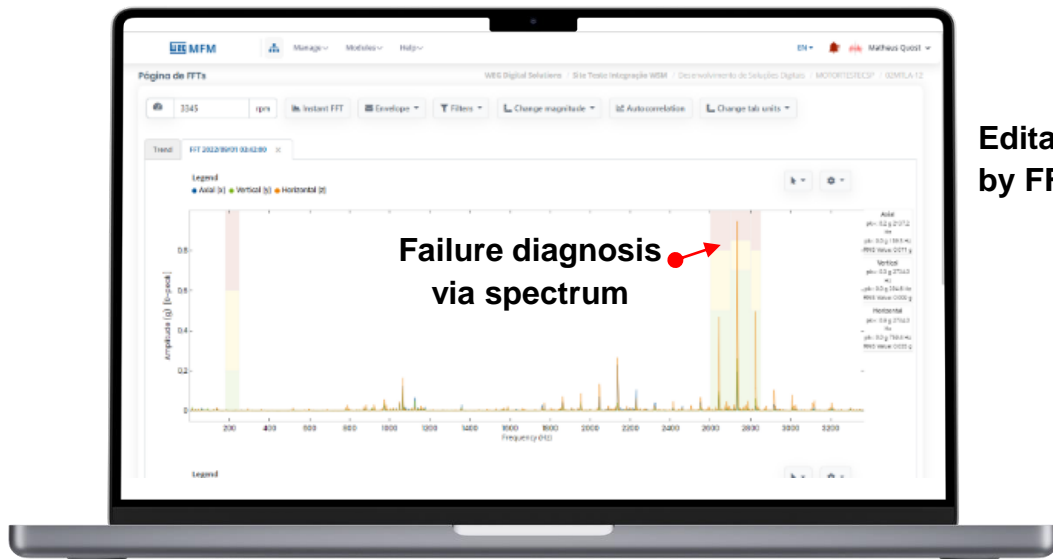
Module for Advanced Analysis
of Vibration Signals ✓



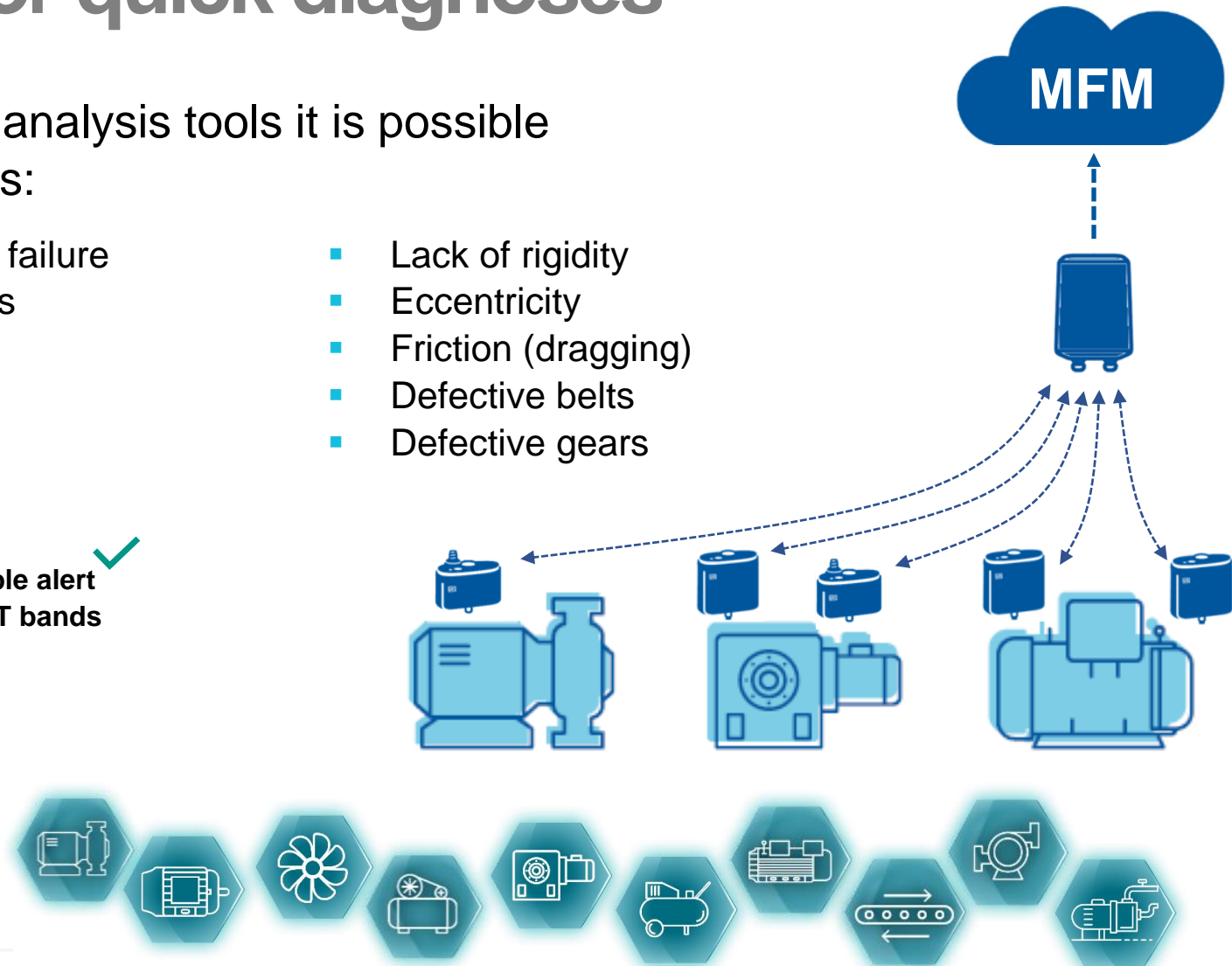
WEGscan technology for quick diagnoses

With the **WEGscan** and the **MFM** signal analysis tools it is possible to perform advanced diagnoses*, such as:

- Bearing failure
- Misalignment
- External vibration
- Unbalance
- Lubrication failure
- Broken bars
- Runout
- Cavitation
- Lack of rigidity
- Eccentricity
- Friction (dragging)
- Defective belts
- Defective gears



✓
Editable alert
by FFT bands

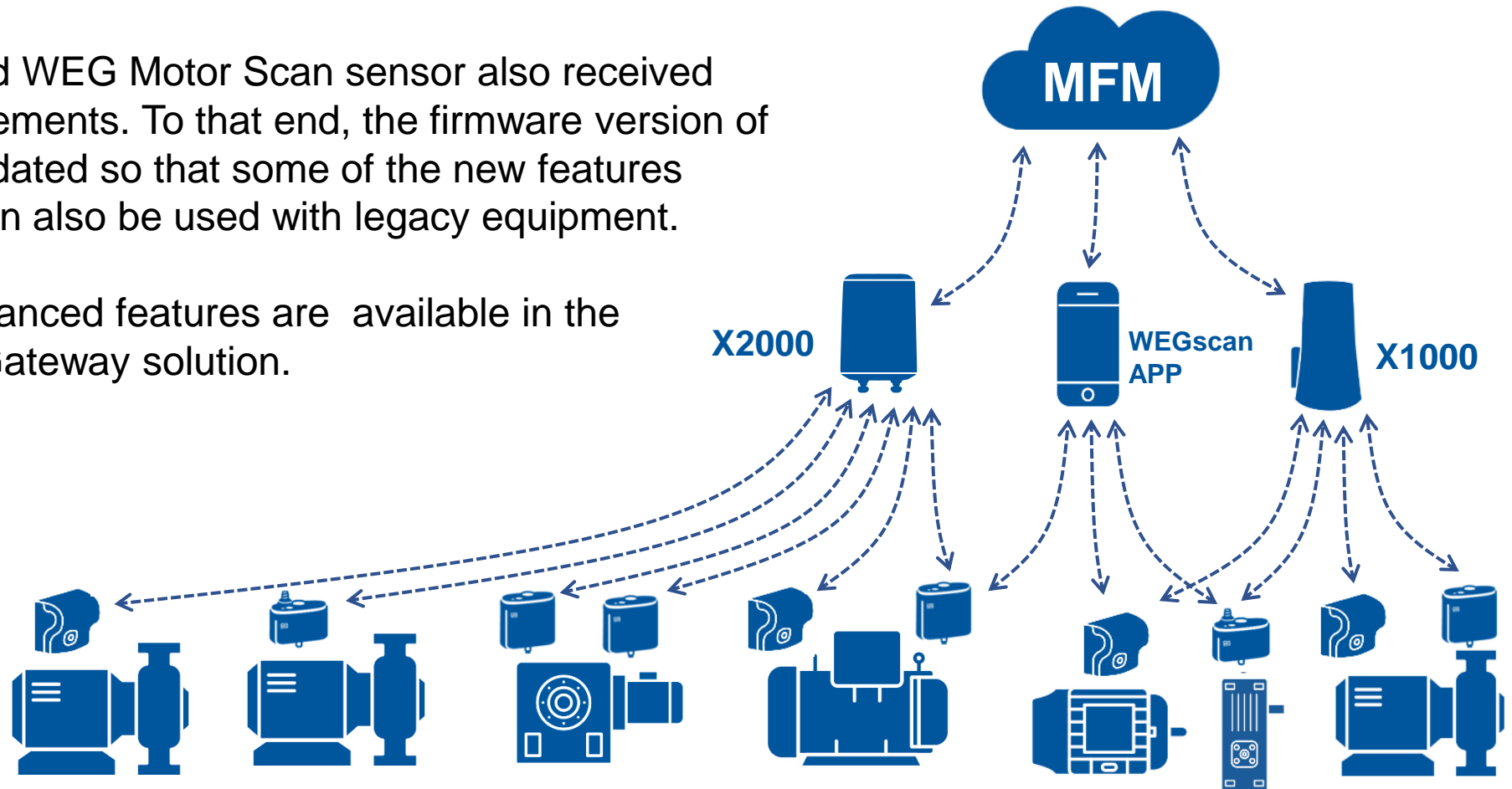


* Autonomous diagnosis via WEG Motor Specialist for electric motors or diagnosis by technical analysis via advanced analysis module of vibration signals, observing ISO 20816 standard.

WEGscan flexibility and legacy operation

The X1000 gateway and WEG Motor Scan sensor also received some functional improvements. To that end, the firmware version of the devices must be updated so that some of the new features available in the MFM can also be used with legacy equipment.

Remember that the advanced features are available in the WEGscan and X2000 Gateway solution.

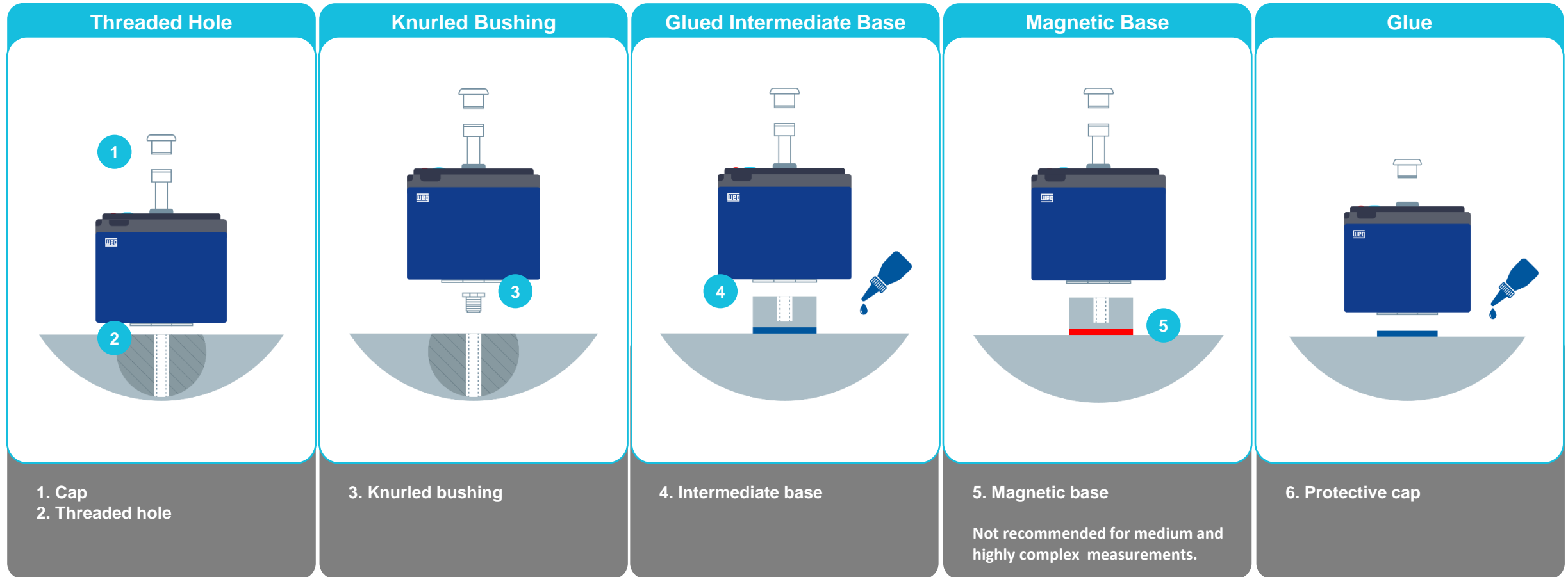


* The detailed operating characteristics of the X1000 Gateway and WEG Motor Scan in the MFM are described in the MFM manual.

** The remote vibration spectrum measurement is only available in the WEGscan.

WEGscan versatile installation

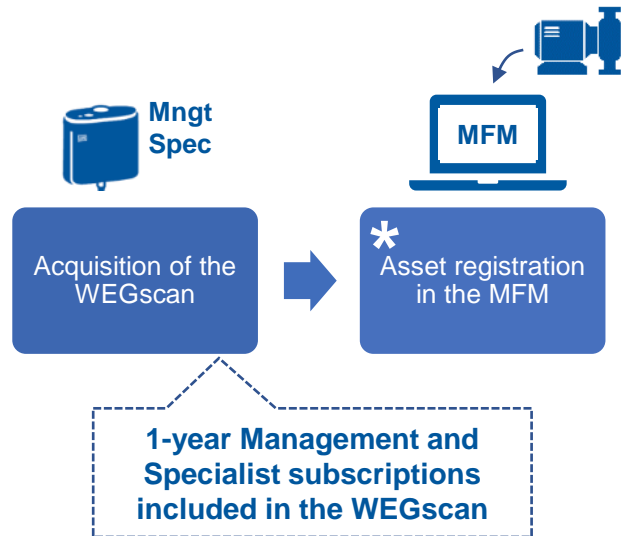
There are different ways to install the **WEGscan** on equipment or assets:



For more details on each sensor installation mode, see the guidelines in the technical documents.

WEGscan cloud solution with subscription

WEGscan activation in the MFM solution process and subscription management (assignment and renewal).

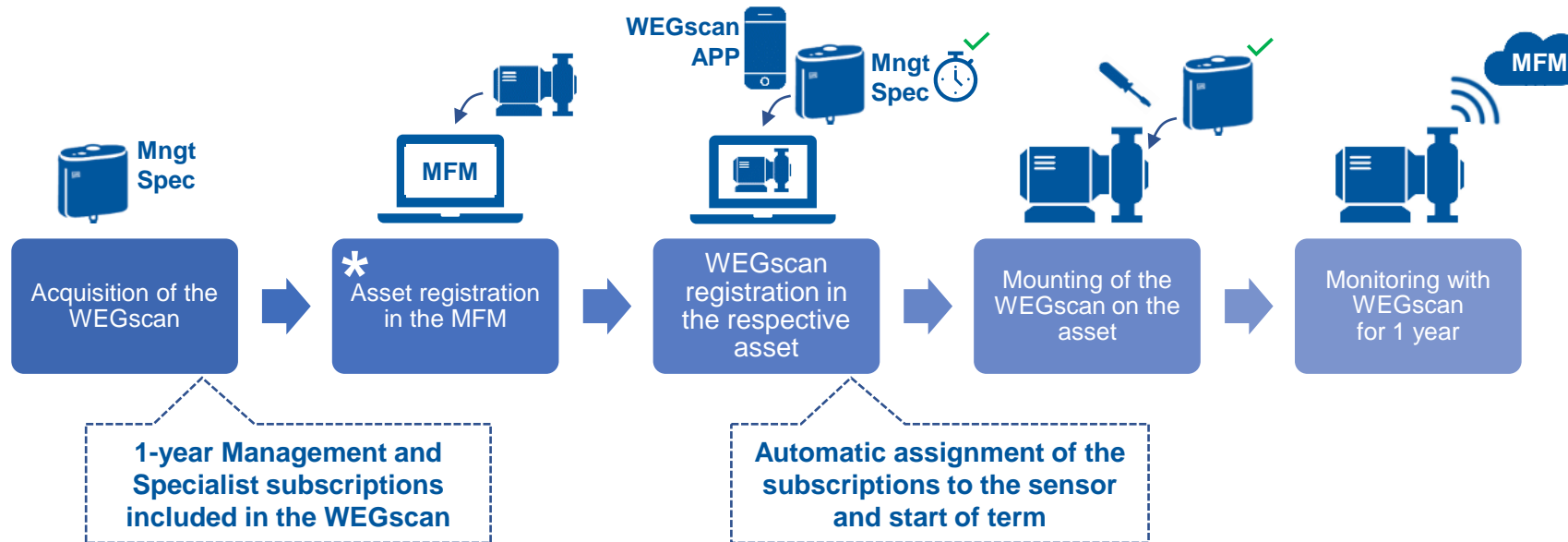


***preliminary activity required in the MFM**



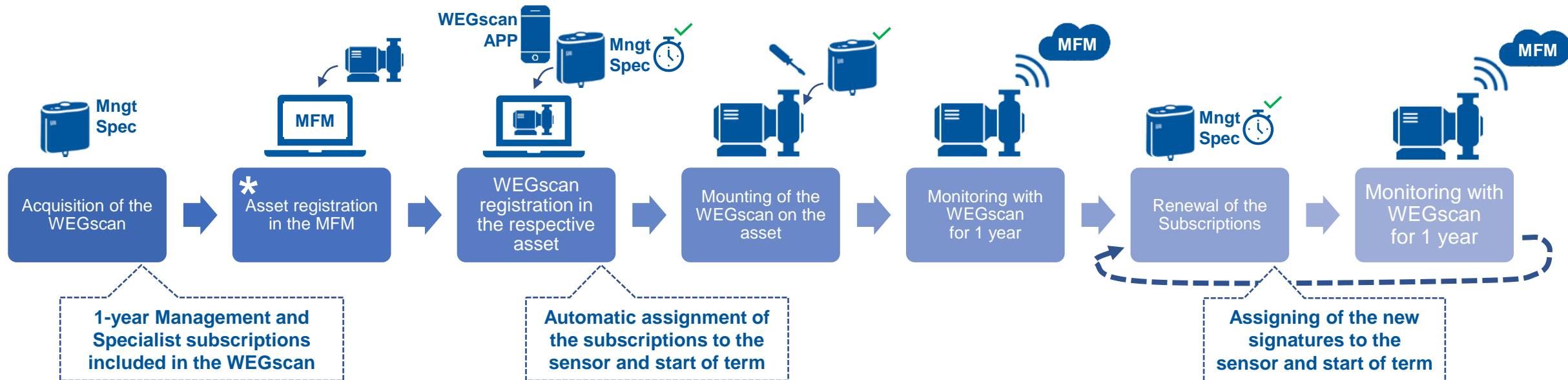
WEGscan cloud solution with subscription

WEGscan activation in the MFM solution process and subscription management (assignment and renewal).



WEGscan cloud solution with subscription

WEGscan activation in the MFM solution process and subscription management (assignment and renewal).



For further technical installation information, see the manuals.












For more commercial and subscription renewal information, contact the commercial representatives.

*Note: Management subscription required **by sensor** / Specialist subscription required **by asset**.*

WEGscan flexibility

Accessories for the WEGscan application

-  3G/4G dongle for mobile internet
-  Li-SOCl2 3.6 V 1.65 Ah battery
-  Repair kit¹
-  Intermediate base
-  Cable with M8 connector for WEGscan 101 power supply
-  External Bluetooth antenna for X2000 Gateway (replacement)
-  24 Vdc power supply
-  Glue
-  Magnetic base



¹ Consisting of: central cap, cover screw, fixing screw, knurled bushing, battery centering bracket and rubber seals;

WEGscan certifications

WEGscan

- Anatel (Brazil): 13320-22-07908
- USA(FCC), China (SRRC), Canada (IC) and Europe/UK (CE), Australia (ACMA), New Zealand (NZRSM), Peru (MTC), South Africa (ICASA), Colombia (CRC), Chile (SUBTEL) and Mexico (IFT): in progress
- Other markets: planned
- Hazardous area: planned

X2000 Gateway

- Anatel (Brazil): 13481-21-12464
- FCC(USA), SRRC (China), IC(Canada), CE(Europe), ICASA(South Africa), ACMA(Australia), NZRSM(New Zealand), CRC(Colombia), TELEC(Japan) and SUBTEL(Chile)
- Hazardous area: planned



WEGscan highlights

- The **WEGscan** able for multiple application
- The **WEGscan** with replaceable battery or external power supply
- The X2000 Gateway is Bluetooth 5, +connectivity +flexibility
- Now the **WEG Motion Fleet Management** is **V2.0**
- Vibration measurement with **13.3 kHz** and **12,288 lines** resolution
- Measurements can be **customized** by user
- The electric motor can be monitored with **multiple sensors**
- Solution under **continuous development**
- Product designed for **reliability and predictive maintenance**

- Patented technologies

- **WEGsync** synchronized measurement for structural analysis (ODS)
- **WEGsense** detects incipient mechanical failures via measurement up to 48 kHz



+energy



+flexibility



+sensing



+connectivity

Thanks!



www.weg.net



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