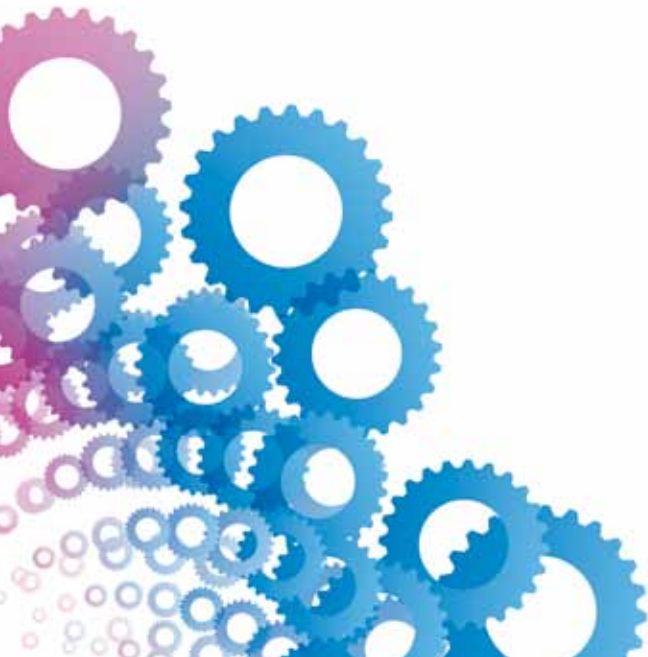




Moventas Condition Management System



moventas | GEARED FOR
NEW ENERGY

How does it work?

Moventas' Condition Management System

Moventas' Condition Management System has been designed as a smart, compact, value-added package that monitors a range of performance parameters, stores and analyzes this data, and reports it over the Internet using the standard TCP/IP protocol (Ethernet and/or GPRS) to a remote server.

It is up to customers to decide whether they want Moventas to handle data analysis and provide them with peace-of-mind reporting, or whether they prefer to handle this themselves, calling on Moventas for expert assistance when required.

The system operates as a fully customizable portal that can handle a very large number of parameters, including those from other systems, providing access to just the "one-stop" analytical toolbox needed.

SEVEN KEY PARAMETERS

The Condition Management System's sensors monitor seven key parameters:

- Temperature
- Vibration
- Load
- Pressure
- RPM
- Oil ageing, and
- Oil particle content.

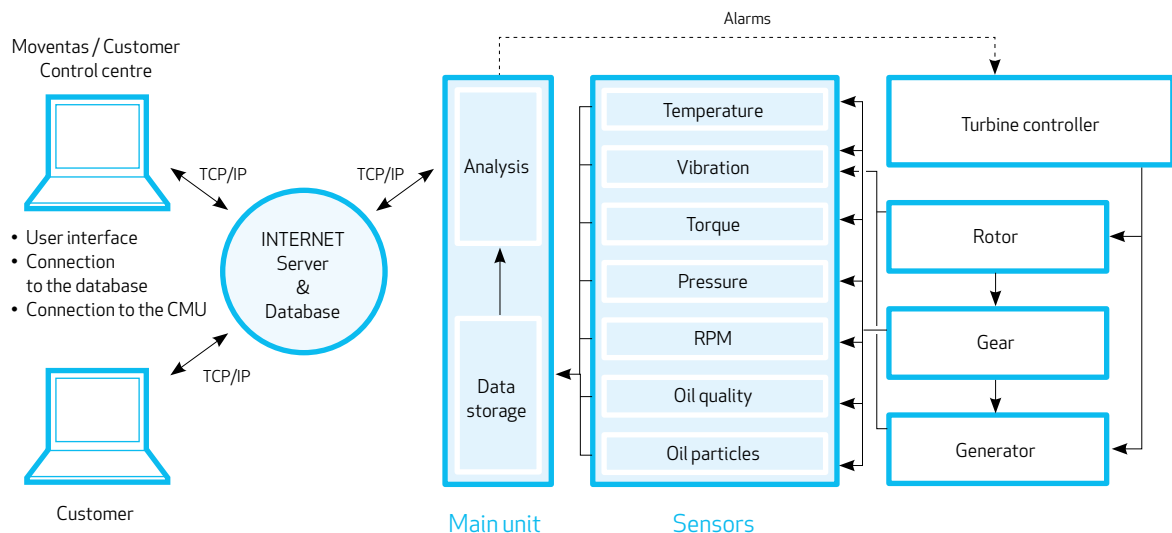
WHY THESE PARAMETERS?

- Because measuring a turbine's bearing and oil temperature profiles provides excellent advance indication of possible malfunctions in cooling systems or problems with a turbine's lubrication
- Because excessive vibration is an early signal of bearing misalignment and friction issues
- Because torque and RPM data gives you up-to-the-minute information on actual load conditions and prior warning of out-of-spec operations
- And because oil quality and particle content provide advance warning of wear-related problems – and everyone knows that the cleaner your lubricant, the better it performs to maximize the lifetime of bearings and gears.

In addition to these seven parameters, others can be added in line with customers' needs, covering even phenomena such as wind speed.

The more data that can be analyzed, the more valuable the results will be. This kind of flexibility comes as standard with Moventas solutions.

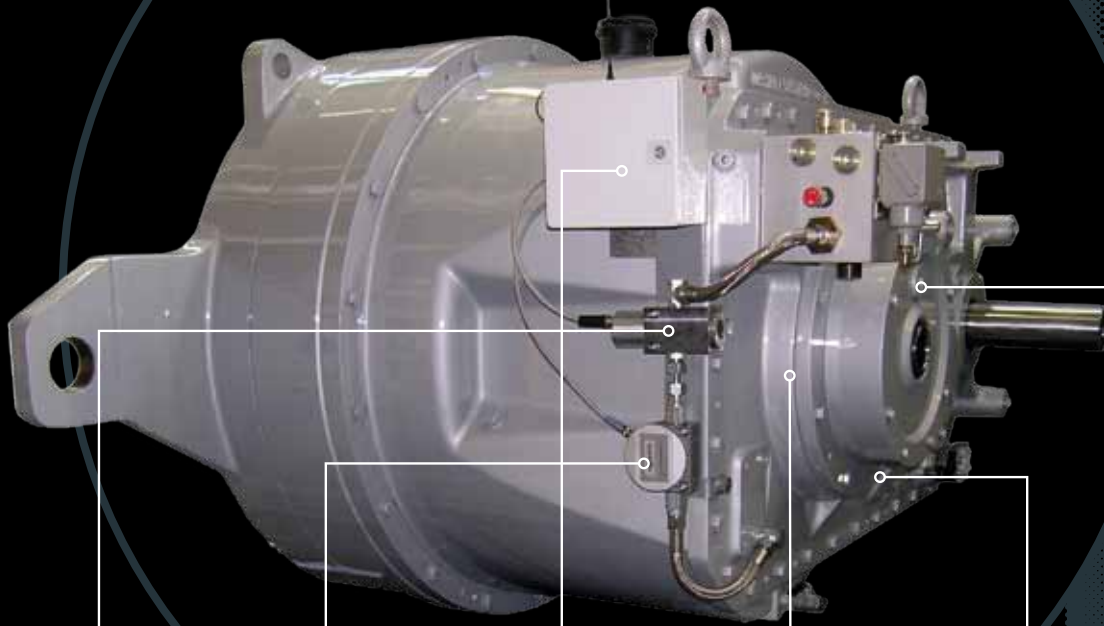
The system monitors a range of performance parameters, stores and analyzes the data, and reports it over the Internet to a remote diagnostics center. Sensors can monitor not only a turbine's gearbox and transmission, but numerous other components and phenomena as well.



Outside

Generator bearings
Main bearing(s)
Hydraulics

To server



Oil ageing

Oil particles

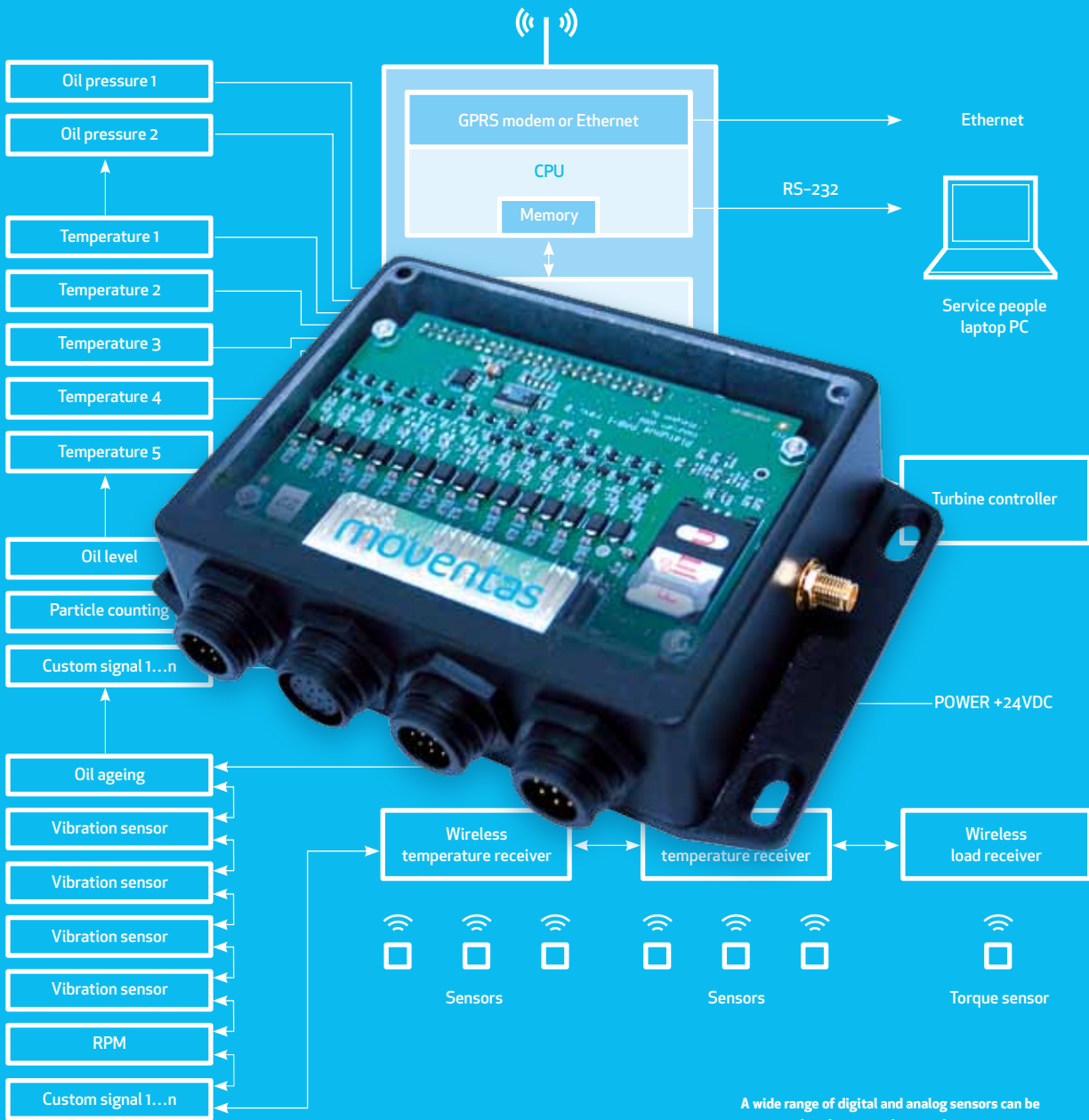
Main unit

Temperature control

Vibration sensors

Wireless load measurement

Inside



A wide range of digital and analog sensors can be connected to the system's central processor.

Moventas CMA5, Technical Specification

Inputs

- 16 A/D-channels
 - mA, AC/DC voltage, digital, pulse, PT100
 - More analog channels can be added with adapter
- Modbus RTU

Outputs

- Relay connection
- Field bus to control logic (option)

Data transfer

- GPRS & Ethernet, SD-memory card

Electrical & environmental characteristics

- Supply voltage: +24 VDC
 - With adapter 90-264 VAC
- Size: 200 × 150 × 120 mm, IP54
- Temperature range: -20 - +65 °C

Hardware

- ARM-9190 MHz,
- RAM 64 Mb

Software

- Linux operating system v.2.6 kernel
- M2M-embedded environment designed for wind turbines application

THE LATEST SENSORS AND SOFTWARE

As a specialist in wind power technology, Moventas' Condition Management System is tailor-made to the specific needs of wind turbines and the tough conditions that they operate in.

Custom configured for the job

The system's smart software and analysis algorithms are designed for monitoring the performance of all types of gearboxes, both units supplied by Moventas itself and those supplied by other manufacturers. The sensor technology used is the latest available, and all the key electronics and mechanical components have been developed by Moventas.

The heart of the system is a RISC processor-based, PC host running on Linux. The system is highly scalable and can handle up to 200+ analog and digital sensors. As a result, it has the potential to monitor much more than just your gearbox.

EASY ACCESS

Thanks to its use of the TCP/IP protocol, the system can be easily integrated into corporate intranets or extranets, matching other Web-based solutions and minimizing people's learning curve.

It also means that you can log on when you are on the move via your mobile phone. And we have designed the mobile interface to be as flexible as the PC one, so you can access even very detailed information, such as data from individual sensors, from your mobile phone.

YOUR SYSTEM

With such a flexible interface and in-built scalability, Moventas' Condition Management System is ideal for a wide range of installations, ranging from a couple of units to a full-blown offshore wind park featuring tens or hundreds of units, or installations across an entire region. And it can grow with you as your needs change.

THE BENEFITS

The benefits are obvious. The key word here is management. While the system provides round-the-clock monitoring, it does this to provide you with early warning of potential problems, not tell you that a failure has already occurred.

Using this data, you can limit loads, for example, giving you time to fix a minor problem before a major failure occurs.

The combination of Condition Management System and Moventas remote services will provide you with quick response time on field service repairs and shortest lead time of factory services. Thus will optimize spare part inventories to minimum.

The system also provides valuable input for designing your maintenance program to prevent failure situations developing in the first place, and eliminate the costs these involve. This translates into higher availability, lower overall costs, and longer unit lifetimes.

Higher availability and lower overall costs

The condition analysis data provided by the system gives you the potential to develop and adopt optimum operating models for your installations.

And thanks to the data link with Moventas, you can be sure of getting the support you need, when you need it.

PART OF OUR OVERALL COMMITMENT

The Condition Management System forms an integral part of Moventas' commitment to proactive lifecycle drive services, aimed at increasing operational reliability and reducing unscheduled shutdowns and delivering best-in-class performance with maximized profit.



Foresee the

What's the story?

Out of the office? In a meeting with some important customers?
On vacation even? No need to worry, as everything is under control.
Thanks to Moventas' Condition Management System.

This has been developed to monitor how the gearbox and other drive train components in a wind turbine are performing, 24/7 – and even more importantly, anticipate possible upcoming failures. It then responds by providing the right people with timely updates, and alerting maintenance crews to get on the job.

And what is even better is that it can do this for hundreds or even thousands of units spread over a wide geographical area. Think what that could mean in terms of cost efficiency.

unexpected.

Why is that so valuable?

To put it simply, peace of mind. For everyone.

For end-users, it guarantees the continuity of their electricity supply. For energy utilities, it transforms conventional maintenance into smart, proactive maintenance and longer, more trouble-free operations for their turbines.

And for turbine and system suppliers, it adds a new, value-added dimension to their product offering.

Who wants to detect failures after they have happened when you can detect them before they do, and take the action necessary in advance?

The cost savings inherent in this type of preventive maintenance are obvious.

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Moventas is one of the largest manufacturers of wind turbine gears in the world. The company also manufactures power transmission solutions for industry use and provides services for their overhaul and maintenance. Majority of the products' end use is connected with renewable energy. In 2009 Moventas generated net sales of EUR 237 million. The company has approximately 1200 employees in 8 countries globally with a world-wide partner network. European private equity investor IK Investment Partners holds the majority of the shares in Moventas.
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