From process monitoring to vibration analysis

Condition monitoring systems

www.ifm.com/us/octavis
Systems for vibration monitoring
The optimal solution for your requirements

Vibration monitoring

Condition monitoring

Machine protection Process monitoring

System Product overview

For industrial applications
Overall monitoring of machine vibrations according to the ISO 10816 standard.
Early recognition of vibration changes avoids consequential damage and increases machine availability.

6 - 7

Monitoring the condition of components. Using individual vibration characteristics to identify potential failures and root causes at an early stage.
Maintenance intervals become planned with optimal use of component life.

8 - 9

Fast reaction prevents damage to machine components, machine tool and workpiece.
Permanent monitoring of vibration characteristics in real time. Sharp rises in dynamic forces are detected enabling fast machine shutdown.

10 - 12

Evaluation of vibration signals are the basis for seamless integration of online condition monitoring in automation and control technology.
Easy:
Monitoring of overall machine health.

Standardized:
ISO 10816 conformance.

Safe:
Machine protection against failure.

Flexible:
Simple application integration.

Reliable:
Increase machine uptime.

**Monitoring vibration velocity.**
The vibration switch VK monitors the overall condition of machines and equipment according to ISO 10816. The sensor measures the rms values of overall vibration and signals when vibration levels are too high.
Early recognition of vibration changes and avoidance of consequential damage

Why is vibration monitoring necessary?
All machines are subject to vibrations. For example, machine unbalance, misalignment, and resonances can cause machines to vibrate above an acceptable level. A rise in vibrations is detrimental to machine health. This results in unexpected machine failure and reduced availability.

The solution with efector octavis:
Overall vibration velocity is used in industry standards to evaluate the overall machine condition. Recommendations for warning thresholds are given in ISO 10816. All ifm vibration sensors conform to the ISO 10816 standard. efector octavis detects the occurrence of potential damage at an early stage.

Machine vibration trend according to ISO 10816

Basic vibration transmitter type VT
Simple transmitter function 4…20 mA.

Basic vibration switch type VK
Switching output and analog function. Response delay to avoid triggers during start-up.

Intelligent vibration switch type VN
Local display, onboard time-stamped history function.

Vibration sensors type VSA/VSP
Robust accelerometers VSA or intrinsically safe sensors VSP, for connection to diagnostic electronics VSE.

Diagnostic electronics type VSE
Cabinet mounting, 4-channel diagnostic module with additional inputs for process values, onboard history function and analysis, suitable for networking.

Monitor up to 4 measurement points.
Using the accelerometers type VSA, it is possible to measure machine vibrations in locations which are difficult to access. With the diagnostic electronics type VSE, it is possible to measure and document up to 4 measurement points. The Ethernet interface enables integration into networks for remote diagnostics.

Early recognition of unbalance.
Due to unbalance or misalignment conditions, permissible machine vibrations can rapidly exceed allowable levels. The result is unexpected downtime and reduced availability. With sensor type VN it is possible to continually monitor, display and document vibrations for rotating equipment.
Safe: Vibration monitoring of critical machines.

Predictive: Machine diagnostics for early warning of ensuing damage and avoiding catastrophic failure.

Optimize: Maintenance intervals can be planned in advance.

Long lasting: Optimal use of component lifecycle.

Cost-effective: TCO (Total Cost of Ownership) model concepts.

Counting: Run-time counter function for performance-orientated production.

Vibration diagnostics on a mixer.
Unplanned down-time on critical machines is an enormous cost factor. The permanent condition monitoring of the complete plant makes it possible to act predictively and to optimize the process.

Machine protection and remote maintenance.
The monitoring of wear and tear of gears in wind turbines, generators and rotor bearings contributes to efficient maintenance. Alarm outputs are used to protect the equipment and for remote maintenance.
Why is condition monitoring necessary?
Condition monitoring makes it possible to recognize machine damage at an early stage. It is therefore possible to plan maintenance intervals and make optimum use of the lifecycle of critical components. Automated quality monitoring identifies deviations before parts are damaged. Run-time counters can be used to detect specific characteristics and influence factors (operating hours, production).

The solution with efector octavis
With efector octavis it is not only possible to monitor vibration values but also conduct signal analysis and machine diagnostics directly on the machine. Machine conditions are detected at the point of measurement and are transferred either as alarm or condition values to the plc or control level. The major requirements of modern machine monitoring are fulfilled: compatibility, modularity and transferable configuration.

Intrinsically safe accelerometer type VSP
In the chemical and mining industries, it is possible to transfer signals over long lengths. For use with a safety barrier and standard diagnostics unit mounted outside the ATEX area.

Vibration sensors type VSA
Small design for connection to diagnostic electronics VSE, ideal for mounting locations which are difficult to access. Max. cable length 250 m.

Intelligent vibration switch type VN
Local display, with data logging for validating fault conditions, for vibrations of rotating equipment.

Diagnostic electronics type VSE
Cabinet mounting, 4-channel diagnostic module with additional inputs for process values, onboard history function and analysis, suitable for networking.

Condition monitoring systems from ifm:
Oil humidity sensor, oil particle counter, encoders, speed sensors, temperature sensors, pressure sensors and compressed air meters complete the portfolio for condition monitoring. ifm also offers software tools for configuration, visualization and data recording.
Dynamic:
Monitoring of dynamic forces such as milling.

Fast:
Reaction times of 1 ms.

Safe:
Protects machines, tools and workpieces from costly damage.

Preventative:
Early recognition of arising damage avoids unplanned down-time.

Reliable:
Calibration-free due to integrated self-test.

Recognition of unusual vibrations.
The vibration sensor is screwed into the spindle and detects even the most subtle vibrations, e.g. unbalance. The sensor is also resistant to fast movements and high forces.

Photo source: DMG / MORI SEIKI
www.dmgmoriseiki.com
Why is machine protection and process monitoring necessary?
Incorrect settings or usage of incorrect tools can lead to crash situations between components and machine tool spindles. This results in high consequential costs.

The solution with ector octavis:
The early recognition of rising dynamic forces enables the energy to be withdrawn from the operating process. Scrap and consequential damages are reduced.

The permanent real-time monitoring of vibration characteristics and the integrated alarm interfaces (switching contacts / analog signals) enable the machine to be shut down before serious damage occurs. Shut down is possible within one millisecond.
Different alarm outputs make it possible to use progressive and differentiated alarms to the PLC level (green, yellow, red). The alarm thresholds can be adjusted online. Integration into the machine controls is possible using analog / binary signals / TCP/IP or fieldbus module.

Reducing scrap and consequential damage
Avoiding consequential damages on a machine tool.
Changes in cutting forces caused, for example, by blunt drills or blockage due to chips, are recognized by changes in the vibration behavior. Each tool can be assigned with individual tolerance levels, e.g. a warning and a shut-down threshold. It is thus possible to reliably avoid damage to the workpiece.
System product overview
The right product for your application

efector octavis
Type VT / VK
Basic vibration switch and transmitter

efector octavis
Type VN
Intelligent vibration switch and transmitter

efector octavis
Type VSA / VSP / VSE
Analysis systems

Software solutions and accessories
Vibration switch and transmitter for the permanent monitoring of overall machine vibrations according to ISO 10816. The sensor measures the rms values of overall vibration and signals when vibration levels are too high.

The compact vibration sensor type VN monitors the overall vibration conditions of machines and equipment according to ISO 10816. Distinguishing features are simple set-up and integrated display with green, yellow, red function and on-board memory for capturing machine trend history. A PC software is not necessary for programming.

In-depth vibration analysis using compact sensors and separate evaluation electronics. History function, real-time clock and counter functions enable detailed monitoring and analysis. Ethernet TCP/IP interface for integration into higher systems.

OPC – highly flexible and easy to implement.
OPC is the manufacturer independent standard for communication in the automation industry. It is used where sensors, actuators and control systems from different manufacturers form a common and flexible network.

The ifm OPC server supports the most commonly used OPC versions, OPC DA (Data Access) and OPC XML DA.
ifm offers a wide range of cables for different environmental conditions.
Seamless integration

From a simple switch to in-depth diagnostics.

Ifm systems for condition monitoring of machines are distinguished by their ease-of-use and consistency. The integrated intelligence for dynamic signal evaluation reduces the demands on bandwidth and algorithms at the control level.

Sensors are easy to retrofit and signify a low investment per machine.

Control level

<table>
<thead>
<tr>
<th>MES</th>
<th>SCADA</th>
<th>CMMS</th>
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</table>

Optional data acquisition

CMS Condition monitoring systems
Online diagnostics

User and parameter software VES003

OPC server software VOS001

User and parameter software VES003

Profibus-Gateway

Crossover cable E30112

Diagnostic electronics VSExxx

Vibration switch VKxxxx

Accelerometers type VSAxxx

Temperature sensor TRxxxx

Compressed air meter SDxxxx

Vibration transmitter VTxxxx

Vibration switch VNxxxx

Accelerometer VSPxxx

Safety barrier

ATEX
# Systems for vibration monitoring – You have the choice

## Basic vibration switch and transmitter

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Part No.</th>
<th>List Price</th>
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</thead>
<tbody>
<tr>
<td>Vibration transmitter according to ISO 10816</td>
<td>0...25 mm/s rms measurement range, 4...20 mA analog output, 316 stainless steel, IP 69K, M12 Micro DC connector</td>
<td>VTV122</td>
<td>$251.00</td>
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<tr>
<td>Vibration transmitter according to ISO 10816</td>
<td>VKV021: 0...25 mm/s rms measurement range, VKV022: 0...50 mm/s rms measurement range, 4...20 mA analog and DC PNP N.C. output, M12 Micro DC connector</td>
<td>VKV021</td>
<td>$230.00</td>
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<tr>
<td>VKV022</td>
<td>$230.00</td>
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## Intelligent vibration switches and transmitters

<table>
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</tr>
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<tr>
<td>Vibration switch and transmitter, up to 500 mm/s v-peak or v-rms measurement range (programmable), 2 switching outputs or one switching and analog output, M12 Micro DC connector</td>
<td>VNB001</td>
<td>$465.00</td>
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## Accelerometers

<table>
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<tr>
<th>Type</th>
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<tbody>
<tr>
<td>Accelerometer for connection to VSE diagnostic module, ± 25 g measuring range, 0...6000 Hz; M8 mounting thread, 316 stainless steel, M12 Micro DC connector</td>
<td>VSA001</td>
<td>$147.00</td>
<td></td>
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<tr>
<td>Accelerometer for connection to VSE diagnostic module, ± 25 g measuring range, 0...10,000 Hz; M16 mounting thread, 316 stainless steel, 0.6 m pigtail M12 Micro DC connector</td>
<td>VSA002</td>
<td>$219.00</td>
<td></td>
</tr>
<tr>
<td>Accelerometer for connection to VSE diagnostic module, ± 25 g measuring range, 0...10,000 Hz; 5.5 mm mounting hole, 316 stainless steel, VSA004: 3 m PUR cable, VSA005: 10 m PUR cable</td>
<td>VSA004 VSA005</td>
<td>$219.00 $233.00</td>
<td></td>
</tr>
<tr>
<td>Accelerometer for use in hazardous area; VSP01A: ATEX group II category 1D/1G, VSP02A: ATEX group I category M1, safety barrier required between accelerometer and VSE diagnostic module, cable length 10 m</td>
<td>VSP01A VSP02A</td>
<td>$460.00 $460.00</td>
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## Diagnostic systems

<table>
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<th>Type</th>
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<th>Part No.</th>
<th>List Price</th>
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<tr>
<td>Diagnostic electronics for type VSA / VSP accelerometers, 4 vibration inputs, 2 analog inputs, 2 switching outputs or one switching and analog output, Ethernet interface</td>
<td>VSE002</td>
<td>$658.00</td>
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<tr>
<td>Diagnostic electronics for type VSA / VSP accelerometers, 4 vibration inputs, 2 analog inputs, 2 switching outputs or one switching and analog output, Ethernet interface, 8 additional configurable I/O</td>
<td>VSE100</td>
<td>$848.00</td>
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## Software solutions · Accessories

<table>
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</thead>
<tbody>
<tr>
<td>efector octavis OPC server software for 25...1000 connections</td>
<td>VOS001 to VOS004</td>
<td>$478.00 $1,327.00</td>
<td></td>
</tr>
<tr>
<td>Software for configuration, detection of measurement data and export of history files for unit type VSE</td>
<td>VES003</td>
<td>$53.00</td>
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<tr>
<td>USB/M8 cable and history software for sensor type VN</td>
<td>E30136</td>
<td>$39.00</td>
<td></td>
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<tr>
<td>Protective cover for VK</td>
<td>E30094</td>
<td>$9.00</td>
<td></td>
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<tr>
<td>Crossover cable for VSE / VSA</td>
<td>EC2080</td>
<td>$19.00</td>
<td></td>
</tr>
<tr>
<td>Cable, M12, straight, 5-pole, 2 m PUR</td>
<td>EVC070</td>
<td>$16.00</td>
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</tr>
<tr>
<td>Cable, M12, straight, 5-pole, 5 m PUR</td>
<td>EVC071</td>
<td>$19.00</td>
<td></td>
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<tr>
<td>Cable, M12, shielded, straight, 5-pole, 30 m PUR</td>
<td>EVC561</td>
<td>$95.00</td>
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</tbody>
</table>
Why select ifm for your sensors and controls needs?

ifm people. The ifm team of employees is committed to helping you succeed in your business. We directly service and work with over 20,000 customers in the US.

ifm products. For over 40 years, ifm has developed, manufactured, and marketed sensors to industries that include assembly and robotics, automotive, material handling, packaging, metal forming, plastics, and food and beverage. We offer a complete family of position sensors, fluid sensors, diagnostic systems, networking products, and wiring solutions.

Quality. There can be no compromise in the quality and reliability of sensors that are applied in your production facility. The ifm new product development process incorporates specific testing for sensors and controls to withstand environments with shock and vibration, electrical noise and temperature fluctuations.

Investment in R&D. Developing new products that increase uptime and productivity is a core belief of our company. We apply practical innovation to simplify technology and develop products that can have a positive impact on your production process.

Application know-how. ifm has over 40 years of experience in working with industrial automation applications. Our knowledgeable team of technical support engineers will work with you to recommend the right solution, the first time.

ifm business philosophy. ifm provides a knowledgeable and courteous service center team to assist with order placement and technical support. We offer an efficient distribution center for accurate and on-time delivery of products. Ifm publishes list prices in literature and on our website, and we always stand behind the quality and performance of our products.

Global presence with local focus. With more than 4,800 dedicated ifm employees in over 70 countries, you can count on local support all over the world.