Intelligent Vibration Monitoring

Diagnostic Systems Condition Based Monitoring
Monitor equipment condition online in real time

Permanent machine protection

Root cause analysis

Solutions for Predictive Maintenance
Increase Uptime, Reduce Maintenance Costs, Simplify Analysis

Increase machine uptime, reduce maintenance costs, and assure production quality.

- efector Octavis vibration monitoring system easily automates machine monitoring.
- Direct Ethernet connectivity
- Internal microprocessor tracks up to 24 different machine components.
- Monitors rolling element bearings, rotational unbalances, gear drive train issues.
- Online diagnosis of machine condition supports a continuous Predictive Maintenance Strategy (PdM).
- Enables operator to schedule corrective maintenance and avoid unplanned interruptions, increasing uptime.
- Seamless integration with higher level data acquisition and control systems via digital and analog outputs or standardized OPC (Open Protocol Communication) interface.

Protection from environmental hazards or secondary damage to expensive fixed assets.

- efector Octavis can be permanently installed to provide real-time monitoring
- On-board digital and analog alarm outputs for simple system integration.
- Provides advance warning of changes to equipment's condition.
- Multiple programmable alarm levels (green/yellow/red) offer sophisticated coordination of planned reaction.
- Integrated alarming provides automated shutdown before catastrophic failure can occur.
- Additional damage to other machinery or dangerous conditions to the facility can be avoided.

Analysis tools to identify causes, document findings, create reports and optimize equipment usage.

- efector Octavis offers multiple tools to identify and document equipment damage and possible causes.
- An internal memory records and time stamps monitored equipment components vibration levels
- Detects trends and the progression of wear.
- Stored history files graphically identify trends and events such as crashes, overheating, running speed, etc.
Intelligent Vibration Monitoring

A complete solution
efector Octavis is an easy to implement vibration monitoring system that collects vibration data and automatically conducts signal analysis for machine diagnosis. The condition of the equipment is continually monitored and evaluated for any changes in the operating parameters. Time and frequency domain data is locally processed for triggering of the integrated programmable analog and digital outputs, or for transmission to SCADA systems via the integrated Ethernet communication port. Compatibility with high level control systems is ensured using the standardized OPC compatible server software. The efector Octavis modular approach allows limitless network expansion.

No nonsense software
Programming of the monitor is straightforward using the “wizard” guided configuration software. Programmed parameter sets can be both uploaded from the monitor or downloaded from a PC for safe storage and transferability. Analysis tools included in the programming software give you the ability to remotely evaluate machine conditions. The green/yellow/red damage level screen allows for a quick check on monitored components condition. The spectrum screen allows for in depth evaluation of all critical frequencies and includes a recorder to save actual spectrums for later evaluation. Also included is a trend history chart plotter to evaluate condition changes over time.

Real-time monitoring

Configuration software
Proven Industrial Performance
Application Examples

Assure quality: machine tools

Prevent waste: steel processing

Increase uptime: process equipment

Target:
- Improve quality and reduce scrap due to spindle damage.
- Reduce repair costs by early detection of failing spindle bearings.
- Detect spindle crashes and automate requalification test.

Application Description: An accelerometer type VSA mounted in the spindle housing supplies vibration data to a Octavis VSE Multiplex monitor for continuous monitoring of spindle load and bearing condition. The load data is recorded into memory for tracking overload conditions during machine operation. If an unusual operation occurs, such as a spindle crash, the machine automatically performs a spindle bearing, unbalance, and overall vibration qualification test to ensure that no damage has occurred that will affect production quality or any additional damage to the machine.

Benefits: The machines control system was improved to add prevention of harmful forces by displaying and/or shutting down the machine as well as damage tracking and monitoring of spindle and bearing condition.

Target:
- Assure product quality
- Prevent material waste

Application Description: Two VSA accelerometers connected to an efector Octavis monitor type VSE monitors stripping and unwinding of steel coils for changes in operating conditions.

Benefits: Irregularities in material and machine setup are detected early to eliminate defective parts and prevent machine damage.

Target:
- Assure system availability

Application Description: Accelerometers type VSA are connected to Octavis VSE units to monitor critical components of the process (pumps, motors, agitators). A multitude of diagnostic characteristics are monitored online and transmitted via Ethernet to the maintenance planning system for scheduling and work order release.

Benefits: Assurance of maximum process uptime by trending failures and identifying the process’ weak areas for optimizing the system.
Online centralized monitoring: wind power

Target:
• Early detection of critical failures
• Coordination and scheduling of maintenance and repairs

Application Description: Accelerometers type VSA are connected to Octavis VSE Multiplex units to monitor the mechanical condition of rotor blades, rotor bearings, gearbox components, and generator components. The vibration data is continually evaluated within the VSE Multiplex unit’s microprocessor. When changes in machine condition are detected the VSE Multiplex unit automatically sends digital output error signals to the turbine control as well as alarm warnings via Ethernet to a central monitoring facility. Trend analysis data is internally stored on all monitored components and made available through Ethernet for further vibration analysis.

Benefits: A complete remote vibration monitoring system that monitors the entire mechanical drive system of today’s high power wind turbines for early detection of potential damage and the identification of failing components.

Remote equipment monitoring: pumping stations

Target:
• Early detection of motor and pump failures
• Assurance of process integrity

Application Description: Using both the VE Compact and VSE Multiplex condition monitoring systems, critical pumps, blowers, ventilators, and cooling towers are monitored for unbalance, bearing damage, and general vibration levels. The data is either locally handled to trigger alarms, or sent via Ethernet to a central control station.

Benefits: Whether a roof top ventilator, or a multiple pump station, the most cost effective application solution is now possible from a single hardware platform. This allows for easy facility integration as well as simplified vibration monitoring and staff training.
efector Octavis for real-time vibration monitoring

System selector guide

Data acquisition system

- OPC server software
  Part No. VOS001
- Visualization and database

Vibration monitoring software

- Programming and Analysis Software
  Part No. VES003
- Ethernet cable
- PLC
- Programming and Analysis Software
  Part No. VES001

Vibration monitoring hardware

1. Distributed system – Multiplex monitor
   - Cabinet mount
     - Multiplex unit
     - Part No. VSE002
     - Part No. VSE100
   - Connection cables
     - Part No. EVC002 (5m straight)
     - Part No. EVC003 (10m straight)
     - Part No. EVC005 (5m right angle)
     - Part No. EVC006 (10m right angle)
   - Mounting accessories
     - Part No. F90042 (magnetic base)
     - Part No. F90043 (glue-on base)

2. Local system – Compact monitor
   - I/O cable
     - Part No. VSE002 (5m)$\text{S}$
     - Part No. VSE072 (10m)$\text{S}$
   - Communication cable
   - Part No. E11572
   - Part No. E30098
   - Compact unit
     - Part No. VE1001
   - Compact unit
     - Part No. VE1101
     - Part No. VE1103
   - Mounting accessories
     - Part No. U90002 (magnetic base)
     - Part No. F90022 (glue-on base)
     - Part No. F90037 (330 adhesive)

For additional ifm vibration sensors, visit www.ifm.com/us
## Vibration diagnostic products

### Multiplex monitors – distributed system

<table>
<thead>
<tr>
<th>Type</th>
<th>Accelerometer Channels</th>
<th>Frequency Range [Hz]</th>
<th>Spectral Resolution [Hz]</th>
<th>Diagnostic Method</th>
<th>Comm. Port</th>
<th>Switching Inputs/Outputs</th>
<th>Part No.</th>
<th>List Price</th>
</tr>
</thead>
<tbody>
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<td></td>
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<tr>
<td></td>
<td>4 channels 1 configurable IEPE / MEMS 3 MEMS</td>
<td>0…10,000</td>
<td>Variable</td>
<td>FFT, envelope curve FFT, trend analysis</td>
<td>Ethernet</td>
<td>2 inputs 2 outputs</td>
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<tr>
<td></td>
<td>4 channels 1 configurable IEPE / MEMS 3 MEMS</td>
<td>0…10,000</td>
<td>Variable</td>
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<td>Ethernet</td>
<td>2 inputs 8 configurable I/O</td>
<td>VSE 100</td>
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### Accelerometers

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring range (g)</th>
<th>Frequency range (Hz)</th>
<th>Housing</th>
<th>Operating temp (C)</th>
<th>Mounting Thread</th>
<th>Protection</th>
<th>Part No.</th>
<th>List Price</th>
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</thead>
<tbody>
<tr>
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<td>±25 (nominal ± 20) resolution 1.0 mg</td>
<td>0…6,000</td>
<td>Stainless steel (316S12)</td>
<td>-30…125</td>
<td>M8</td>
<td>IP69K</td>
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<td>±25 (nominal ± 20) resolution 1.0 mg</td>
<td>0…10,000</td>
<td>Stainless steel (316S12)</td>
<td>-30…85</td>
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<tr>
<td></td>
<td>±25 (nominal ± 20) resolution 1.0 mg</td>
<td>0…10,000</td>
<td>Stainless steel (316S12)</td>
<td>-20…80</td>
<td>M5</td>
<td>IP 67, III</td>
<td>VSA 004</td>
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### Required accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Part No.</th>
<th>List Price</th>
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<tbody>
<tr>
<td></td>
<td>Parameter software</td>
<td>VES 003</td>
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<td>OPC server software (optional)</td>
<td>VOS 001</td>
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<td>Ethernet cable cross-over</td>
<td>EC 2080</td>
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<td>5 m cable</td>
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<td></td>
<td>10 m cable</td>
<td>EVC 003</td>
<td>$15.75</td>
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### Optional accessories

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
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<th>List Price</th>
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<tbody>
<tr>
<td></td>
<td>Magnetic mounting base</td>
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<td></td>
<td>Glue-on base</td>
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<td></td>
<td>Conical mounting washer (5 pack)</td>
<td>E 30115</td>
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<tr>
<td></td>
<td>330 adhesive</td>
<td>F 90037</td>
<td>$41.00</td>
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</table>

### Compact monitors – local system

<table>
<thead>
<tr>
<th>Type</th>
<th>Measuring range (g)</th>
<th>Frequency range (Hz)</th>
<th>Spectral resolution (Hz)</th>
<th>Diagnostic method</th>
<th>Protection</th>
<th>Minimum Measuring Time (S)</th>
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<td>0.125…6,000</td>
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<td>FFT, envelope curve FFT, trend analysis</td>
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<td>VE 1001</td>
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<tr>
<td></td>
<td>±25 (nominal ± 20) resolution 1.0 mg</td>
<td>0.125…6,000</td>
<td>1.25</td>
<td>FFT, envelope curve FFT, trend analysis</td>
<td>IP69K</td>
<td>0.8</td>
<td>VE 1101</td>
<td>$823.00</td>
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<th>Type</th>
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<th>List Price</th>
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<tbody>
<tr>
<td></td>
<td>Parameter software</td>
<td>VES 001</td>
<td>$49.00</td>
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<tr>
<td></td>
<td>RS232 cable – use with VE10xx</td>
<td>E 11572</td>
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<td></td>
<td>RS485 cable – use with VE11xx</td>
<td>E 30098</td>
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<td></td>
<td>5 m cable</td>
<td>EVC 071</td>
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<td></td>
<td>10 m cable</td>
<td>EVC 072</td>
<td>$22.00</td>
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### Optional accessories

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<tr>
<th>Type</th>
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<th>Part No.</th>
<th>List Price</th>
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<tbody>
<tr>
<td></td>
<td>Magnetic mounting base</td>
<td>U 90002</td>
<td>$129.00</td>
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<td></td>
<td>Glue-on base</td>
<td>F 90022</td>
<td>$17.50</td>
</tr>
<tr>
<td></td>
<td>330 adhesive</td>
<td>F 90037</td>
<td>$41.00</td>
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</table>
ifm offers more predictive maintenance products

**Pressure sensors**
ifm's PIM Series pump diagnostic pressure sensor provides numeric indication of pressure and independent continuous diagnosis of the pump’s condition.

**Flow sensors:**
*efector Metris Flow Meter*
effecto Metris monitors compressed air and speciality gases to detect leakage areas in plants and improve energy efficiencies.

**Temperature sensors**
Monitoring and controlling temperature is essential in a variety of process applications. Industrial applications require an continuous, exact temperature reading to protect against dangerous conditions and to insure safety.