ifm electronic

From process monitoring to vibration analysis

efector octavis

Condition monitoring systems

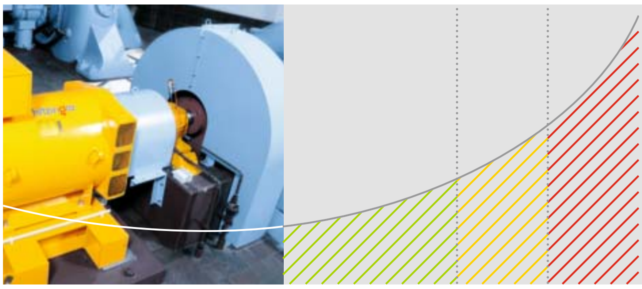
www.ifm.com/gb/octavis

For industrial applications

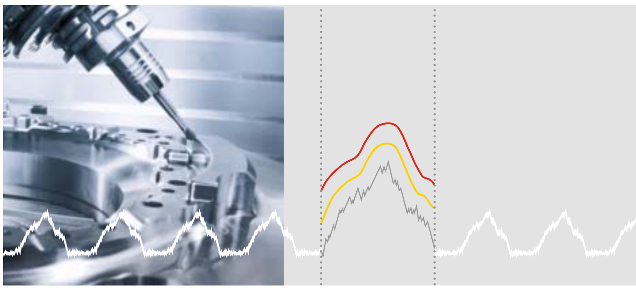
Systems for vibration monitoring

The optimal solution for your requirements

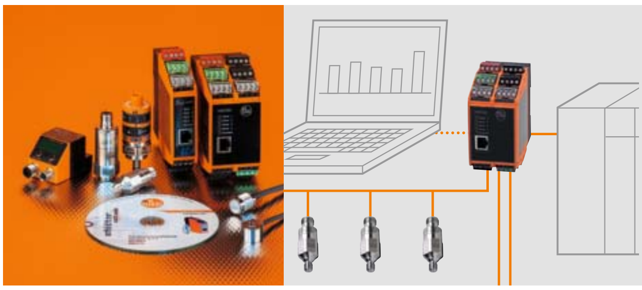
Vibration monitoring



Condition monitoring



Machine protection
Process monitoring



System
Product overview

efector® octavis

Overall monitoring of machine vibrations according to the ISO 10816 standard. Early recognition of vibration changes avoids consequential damage and increases machine availability.	4 - 5	Vibration monitoring
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.	6 - 7	Condition monitoring
Permanent monitoring of vibration characteristics in real time. Sharp rises in dynamic forces are detected enabling fast machine shutdown. Fast reaction prevents damage to machine components, machine tool and workpiece.	8 - 9	Machine protection Process monitoring
ifm electronic: development, design, and production with the highest quality standards. Detection with integrated evaluation of vibration signals are the basis for seamless integration into online condition monitoring in automation and control technology.	10 - 12	System Product overview

Vibration monitoring

Easy:
Monitoring of overall machine health.

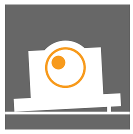
Standardized:
ISO10816 conformance.

Safe:
Machine protection against failure.

Flexible:
Simple application integration.

Reliable:
Increase machine uptime.

Loose foot, unbalance



Misalignment

Monitoring vibration velocity.

The vibration switch VK monitors online 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

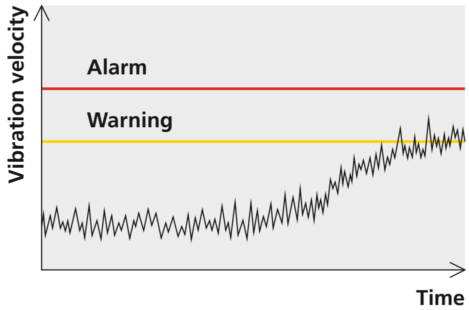
Why is vibration monitoring necessary?

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:

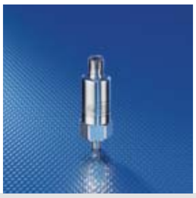
Overall vibration velocity is used in industry standards to evaluate the overall machine condition. Recommendations for switching thresholds are given in ISO 10816. All ifm vibration sensors conform to the ISO 10816 standard.

efector octavis detects the occurrence of potential damage at an early stage.



Machine vibration trend according to ISO 10816

Vibration sensors – easy setup:
www.ifm.com/gb/octavis-setting-guide



Basic vibration transmitter type VT

Simple transmitter function 4…20 mA.

Basic vibration switch type VK

Switching output and analogue function. Response delay to avoid triggers during run-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.

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 over 120 rpm.

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.

Condition monitoring

Safe:
Vibration monitoring of critical machines.

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

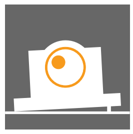
Optimize:
Maintenance intervals can be planned in advance.

Long lasting:
Optimal use of component life-time.

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

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

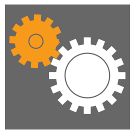
Loose foot, unbalance



Misalignment

Rolling element bearing

Gears Gear mesh, defective gear teeth



Pumps eccentricity, cavitation

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.

Increase availability and reliability, reduce maintenance costs and ensure quality

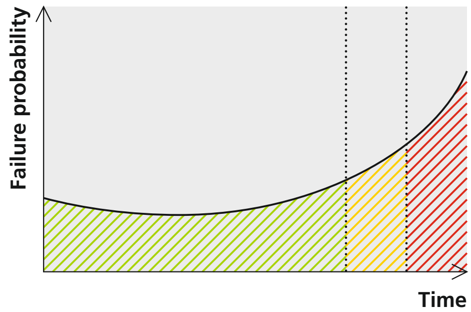
Why is condition monitoring necessary?

Condition monitoring makes it possible to recognise machine damage at an early stage. It is therefore possible to plan maintenance intervals and make optimum use of the life-time 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.



Condition monitoring

Vibration monitoring

Condition monitoring

Machine protection
Process monitoring

System
Product overview

Intelligent vibration switch type VN

Local display, with data logging for validating fault conditions, for vibrations above 120 rpm.

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.

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.

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, visualisation and data recording.

More information on systems for condition monitoring of machines:
www.ifm.com/gb/condition-monitoring

Machine protection and process monitoring

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.

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

Machine component protection

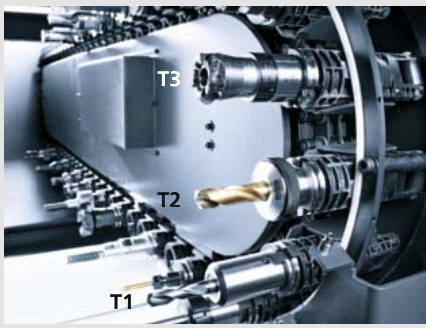
Workpiece protection

Tool protection

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



Reduction of scrap and consequential damage

Why is machine protection and process monitoring necessary?

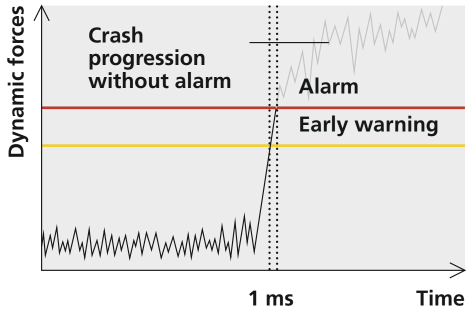
Incorrect settings or usage of incorrect tools can lead to crash situations between components and machine tool spindles. This results in high consequential costs.

The solution with efector octavis:

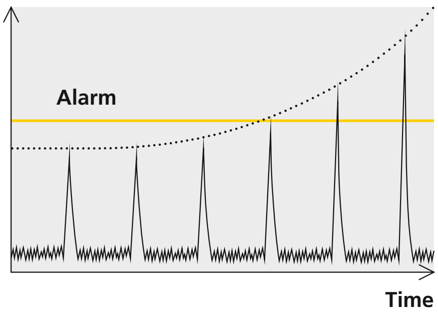
The early recognition of rising dynamic forces enables the energy to be withdrawn from the operating process. Scrap and consequential damages are reduced.

The permanent real-time monitoring of vibration characteristics and the integrated alarm interfaces (switching contacts / analogue 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 adapted online. Integration into the machine controls is possible using analogue / binary signals / TCP/IP or fieldbus module.



Machine protection:
Spindle collision is recognised with 1 ms



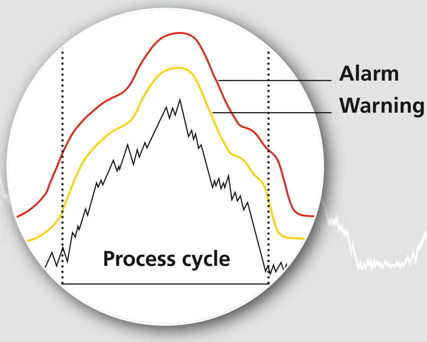
Trending in a stamping process

Accelerometer type VSA

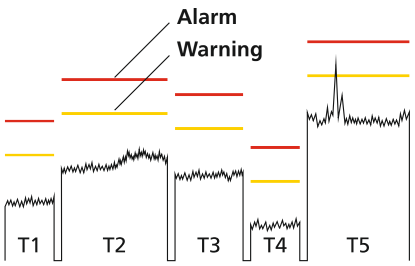
Failure-free operation even when subject to fast movements or high forces. Integrated self-test for continuous safety.

Diagnostic electronics type VSE

Frequency-selective monitoring, suitable for networking. Onboard time-stamped history function, counter function.



Adaptive thresholds



Avoiding consequential damages on a machine tool.

Changes in cutting forces, caused for example by blunt drills or blockage due to chips, are recognised by changes in the vibration behaviour. 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.

For industrial applications

Systems for vibration monitorings
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

efector octavis

	Analogue output	Switching output	Integrated display	History function	Network capability	Signal inputs e.g. temperature	Diagnosis	Counters	
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.	✓ VT ✓ VK	✓ VK							Vibration monitoring
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. A PC soft-ware is not necessary.	✓	✓	✓	✓		✓			Condition monitoring
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.	✓	✓		✓	✓	✓	✓	✓	Machine protection Process monitoring

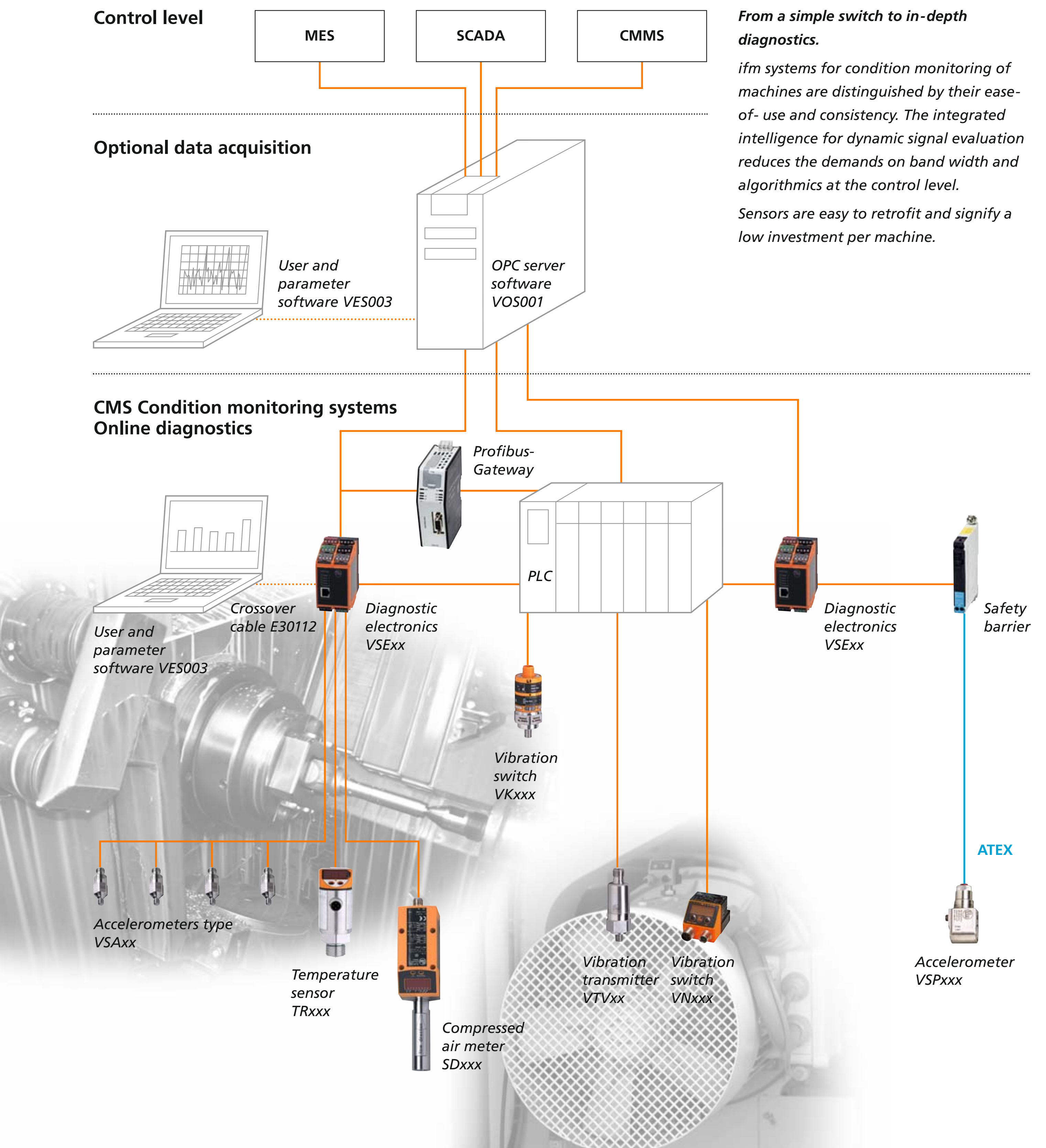
OPC – highly flexible and easy to implement.
OPC is the manufacturer independent standard for communication in the automation industry. It is used where sensors, actuators and control systems from different manufacturers form a common and flexible network.

The ifm OPC server supports the most commonly used OPC versions, OPC DA (Data Access) and OPC XML DA.

ifm electronic offers a wide range of cables for different environmental conditions.

System
Product overview

Seemless 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 band width and algorithmics at the control level.

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

Systems for vibration monitoring –
You have the choice

Basic vibration switch and transmitter

Description	Order no.
Vibration transmitter according to ISO 10816; measurement range RMS: 0...25 mm/s; analogue outputs 4...20 mA; high-grade stainless steel 316L; IP 69K; M12 connector	**VTV122**
Vibration monitor according to ISO 10816; measuring range RMS: 0...25 / 0…50 mm/s; 1 switching output and response delay (1…60 s) via dial setting; 1 analogue output 4...20 mA; M12 connector	**VKV021** **VKV022**

Intelligent vibration switches and transmitters

Description	Order no.
Vibration switch; measurement range 0...25 mm/s; frequency 2/10...1000 Hz, (selectable); v-peak or v-RMS, switching outputs or 1 switching and 1 analogue output; 1 analogue input 4...20 mA; history function; data interface USB (M8 x 1); 4-digit alphanumeric display; M12 connector	**VNB001**

Accelerometers

Description	Order no.
Accelerometer for connection to diagnostic electronics VSE; measuring range ± 25 g, 0…6000 Hz; thread M8 x 1.25; 90 ° conus; max. 125 °C; IP 69K; M12 connector	**VSA001**
Accelerometer for connection to diagnostic electronics VSE; measuring range ± 25 g, 0…10000 Hz; thread M16 x 1.5; temperature max. 85 °C; IP 67; cable length 0.6 m	**VSA002**
Accelerometer for connection to diagnostic electronics VSE; measuring range ± 25 g, 0…10000 Hz; height 13.6 mm; mounting hole 5.5 mm; temperature max. 80 °C; IP 67; cable length 3 m / 10 m	**VSA004** **VSA005**
Accelerometer for use in hazardous area; ATEX group II category 1D/1G; connection to diagnostic electronics VSE via safety barrier; cable length 10 m	**VSP01A** **VSP02A**

Diagnostic systems

Description	Order no.
Diagnostic electronics for accelerometers type VSA / VSP; cabinet mounting; frequency-selective machine monitoring of up to 4 measurement points; Ethernet interface TCP/IP; onboard time-stamped history function; 2 switching outputs or 1 switching and 1 analogue output; counter function	**VSE002**
Diagnostic electronics for accelerometers type VSA / VSP; cabinet mounting; frequency-selective machine monitoring of up to 4 measurement points; Ethernet interface TCP/IP; onboard time-stamped history function; 2 switching outputs or 1 switching and 1 analogue output; further freely configurable I/O; counter function	**VSE100**

Software solutions · Accessories

Description	Order no.
efector octavis OPC server software for 25...1000 connections	**VOS001** **to** **VOS005**
Software for configuration, detection of measurement data and export of history files for unit type VSE	**VES003**
USB/M8 cable and history software for sensor type VN	**E30136**

Description	Order no.
Peek adapter for VSA001	**E30132**
Protective cover for VK	**E30094**
Crossover cable for VSE / VSA	**E30112**
Adapter UNF/M5 for type VN	**E30137**
Cable, M12, straight, 5-pole, 2 m PUR	**EVC070**
Cable, M12, straight, 5-pole, 5 m PUR	**EVC071**
Cable, M12, screened, straight, 5-pole, 30 m PUR	**E12008**

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