

**FLUKE**<sup>®</sup>

**Reliability**

# Condition Monitoring Machine and System Monitoring

**db**<sup>®</sup> PRÜFTECHNIK





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# Condition Monitoring

## All advantages at a glance

This is how condition monitoring works – act instead of react!

### The secret is predictive maintenance

In short, and literally translated, predictive maintenance is “predictive maintenance”. Machines and systems are continuously monitored with the help of sensors and powerful software. As soon as there are significant changes in the trend, maintenance actions should be taken. In contrast to reactive maintenance, maintenance work can be planned and implemented more easily to conserve resources.

### Low efficiency without condition monitoring

- ▶ Strong vibrations, heat, and noise
- ▶ Rotor imbalance
- ▶ Bearing damage and failure
- ▶ Premature wear of components such as gears and/or bearings
- ▶ Loss-of-production and unplanned downtime

### Maximum performance with condition monitoring

- ▶ Early detection of machine problems
- ▶ Eliminate the causes of failure
- ▶ Reduce vibrations and heat
- ▶ Higher machine availability and system safety
- ▶ Reduce operating and maintenance costs

### Increase in profit by

- ▶ Early damage detection
- ▶ Optimum planning of repair work
- ▶ Increasing machine availability
- ▶ Reducing spare parts storage costs
- ▶ Avoiding unplanned loss of production

### Protection of man and machine by

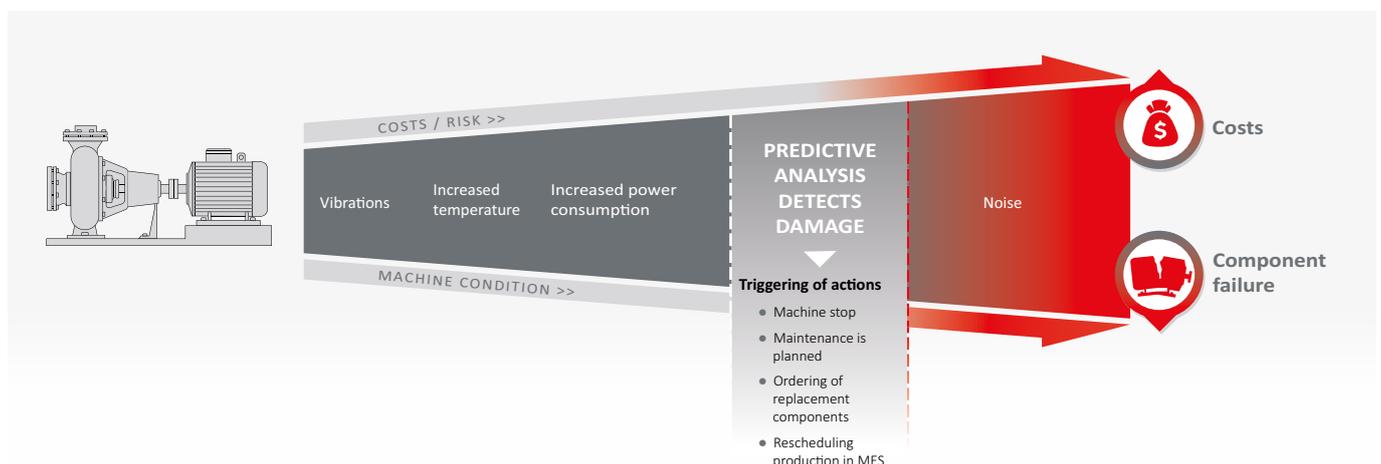
- ▶ Avoiding secondary damage
- ▶ Minimizing failures and accident risks

### Environmental protection by

- ▶ Extension of service life
- ▶ Reduction in electricity consumption

### More than just simple machine data collection!

- ▶ VIBSCANNER® 2
- ▶ VIBXPRT® II
- ▶ SONOCHEK®
- ▶ VIBGUARD® IIoT
- ▶ OMNITREND® Center
- ▶ OMNITREND® Asset View



# Condition Monitoring in Industry 4.0

Do you speak “IIoT”? We do!

The “Industrial Internet of Things”, IIoT for short, massively changes the maintenance of the present and the future. PRUFTECHNIK already has the right solutions for the future!

All kinds of sensors control and influence machine behavior in such a way that human interventions are often no longer necessary. Asset controls are stored on external servers, in "the cloud", and connected to the sensor measurement data. Intelligent software enables asset optimization for maximum productivity based on the sensor data. At the same time, the machine data can be called up at any time from anywhere in the world via Internet browser.

- ▶ Global data availability
- ▶ Reduced data transfer volume
- ▶ Optimized machine efficiency

Measurement data is now available anytime, anywhere in the world

Thanks to the new MQTT interface in our proven condition monitoring systems, all machine data can now be called up via the OMNITREND® Asset View Software- virtually in real-time!

The data is transferred using the MQTT protocol via the Internet to the cloud or an online server. Thus, the current data can be accessed from anywhere in the world. The highlight: No enormous data pools need to be sent during data communication. Instead, handy, small data packets are enough.

- ▶ Available in all VIBGUARD® online condition monitoring systems
- ▶ Available for the mobile high-speed data collector VIBSCANNER® 2
- ▶ MQTT Kernel update possible for all VIBGUARD® systems already in use
- ▶ Intuitive traffic light color system in OMNITREND® Asset View
- ▶ Real-time data and trends can be accessed globally
- ▶ Global machine networking
- ▶ 24/7 availability of machine data
- ▶ Measurement data transfer via MQTT to IoT server
- ▶ Real-time display of measurement data in OMNITREND® Asset View

# Vibration analyzer for professionals

## VIBXPERT® II

No other system is better known and more powerful

- ▶ Versatile use
- ▶ Route-based data acquisition, vibration diagnosis, one-level and two-level field balancing, acceptance measurements with machine templates, troubleshooting
- ▶ Powerful vibration analysis e.g., resonance investigations, run-up and coast-down curves, and impact tests
- ▶ High measuring precision and robust industrial design

The VIBXPERT® II from PRUFTECHNIK is the mobile power package for fast and reliable recording and analysis of machine condition data. After a very short measuring time, the current machine status data is shown. The maintenance expert can analyze the data on site. From the recorded machine condition data, all values can be read that are important for an exact machine condition analysis.

The VIBXPERT® II is used directly on site at the machine, from the machine hall with standard machines to the diesel generator of an oil tanker, or from a bucket excavator to a hydroelectric turbine.

- ▶ The standard in mobile industrial machine and system monitoring
- ▶ On-site data analysis
- ▶ Compatible with OMNITREND® Center software
- ▶ Can be used in all industrial sectors and branches
- ▶ Robust industrial design for the toughest conditions
- ▶ Automatic measurement point detection thanks to the patented VIBCODE® system



# The high-speed data collector

## VIBSCANNER® 2

Complete measurement in just a few seconds

- ▶ Quick – measuring times up to 4x shorter than the industry standard
- ▶ Easy – intuitive operation thanks to the graphical user interface
- ▶ ALL-IN-ONE – Comprehensive data collection at one push of a button

A unique measuring device with which even untrained personnel can easily and effectively measure machine vibrations on rotating systems. Thanks to its forward-looking measuring principle and data acquisition across three axes with the triaxial sensor, all relevant condition information is recorded with the touch of a single button. And at a measurement speed that opens up fully new dimensions. Not only is the VVIBSCANNER® 2 a breakthrough in terms of measurement speed and precision, but also due to its robust and intuitive operating concept.



- ▶ Fastest vibration data collector with triaxial measurement
- ▶ Intuitive user interface and convenient route guidance
- ▶ Uncomplicated data communication
- ▶ Maximum time savings with highest data quality
- ▶ Evaluation via OMNITREND® Center software or PRUFTECHNIK Service Center



# MOBILE DEVICES

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## VIBXPERT® II Balancer

Professional field balancing

Imbalances on rotating components such as rotors can be detected and eliminated with the VIBXPERT® II Balancer.

- ▶ One- or two-level balancing possible
- ▶ Diverse operating modes for optimum results
- ▶ Upgrade for vibration analysis sold separately



## VIBXPERT® Ex

Most powerful vibration analyzer in potentially explosive areas

Do you need a powerful signal analyzer with explosion protection for use in a potentially explosive environment? Then VIBXPERT® Ex is just right for you.

- ▶ Approved for ATEX zone 1
- ▶ Intuitive joystick operation (left- or right-handed)
- ▶ Fast data acquisition with "trending spectra"
- ▶ Robust aluminum housing
- ▶ Compatible with the VIBCODE® sensor
- ▶ Interface to machine protection systems for further analyses



## Fluke 805 FC

Compact and powerful

The Fluke 805 FC is highly reliable and provides consistent measurement data. The data can be retrieved from the cloud via the app. The Fluke Connect app enables easy and fast working on your mobile phone, tablet, and PC. Machine profiles can be created, and maintenance routes can be defined and optimized.

- ▶ Four-level fault severity scale for quick evaluation of the measure urgency
- ▶ Measuring frequency from 10- 1,000 Hz for acceleration, speed, and misalignment
- ▶ Consistent vibration measurement on bearings and other machine components in the low- and high-frequency range
- ▶ Compatible with an external accelerometer



## Fluke 810 FC

On-site vibration analysis: at a glance

The vibration analysis tool prioritizes measurement results to check or renew critical machine elements. In-depth diagnostic reports and spectral diagrams provide a comprehensive data quality check.

Narrows down the cause(s) of the potential defect. Tri-axial accelerometer (sensor) shortens the measurement time by up to two-thirds over single-axis accelerometers.

- ▶ Overall vibration level for quick assessment of the machine condition
- ▶ Four different fault severity levels indicate the prioritization of the defect
- ▶ Repair recommendations are issued directly
- ▶ Several different machine types can be configured individually based on the rotational speed
- ▶ Time-saving, tri-axial accelerometer
- ▶ Highly accurate determination of the machine speed by laser tachometer
- ▶ Presentation of the measurement results in individual spectral diagrams for precise fault determination



## Fluke 820-2

High-performance LED stroboscope tachometer

Using 30 to 300,000 FPM, it can capture any rotational speed on rotating machines. No physical contact is required between the stroboscope and the rotating surface. Likewise, there is no need for reflective tape, an existing mark (e.g., groove, screw, balance weight, etc.) is sufficient.

- ▶ Seven high-intensity LEDs with 4,800 lux at 6,000 FPM (30 cm distance)
- ▶ Maximum flash frequencies thanks to LED solid-state light source with constant flash characteristics
- ▶ Digital pulse width modulation for exceptionally sharp images even at very high rotational speeds
- ▶ Adjustable flash duration

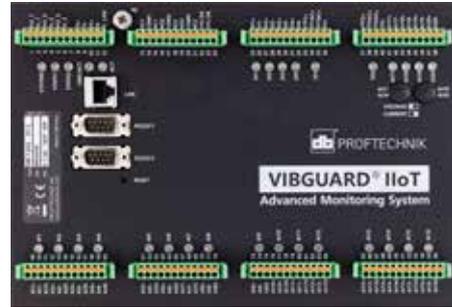


## VIBGUARD® IIoT

Online monitoring on 6, 16, and 20 channels

VIBGUARD® has either 6, 16, or 20 measuring channels which are sampled in parallel and synchronously. This allows even the most complex systems to be continuously monitored and protected against unplanned downtimes. VIBGUARD® IIoT works autonomously and performs the measurement tasks automatically.

- ▶ MQTT interface for seamless integration into Industry 4.0 environments
- ▶ Suitable for monitoring of standard machines to complex, dynamically operated systems
- ▶ Measurement: Time waveform, characteristic overall values, FFT spectrum, kinetic shaft orbit (orbit), and torque
- ▶ Targeted monitoring of imbalance, alignment errors, gear tooth errors, and bearing damage
- ▶ Available with 6, 16, and 20 analog measuring channels



## VIBRONET® Signalmaster

Monitoring of large machinery

Up to 162 measuring points can be installed and entire production areas can be included in the monitoring. The distance between the basic unit and the sensor does not play a decisive role. VIBRONET® Signalmaster is therefore one of the most efficient and cost-effective monitoring systems for large machinery and extensive systems.

- ▶ Up to 120 vibration sensors with EX protection are possible in ATEX zones
- ▶ Signals are merged via field multiplexer into one line

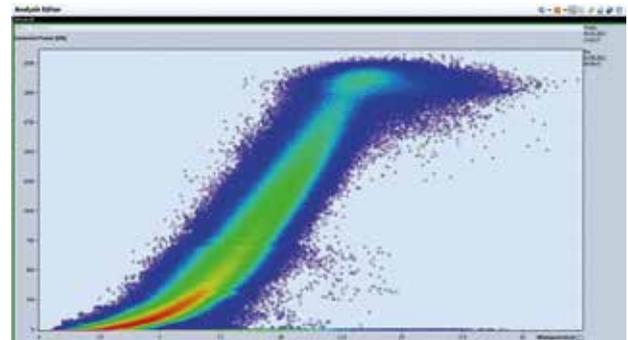
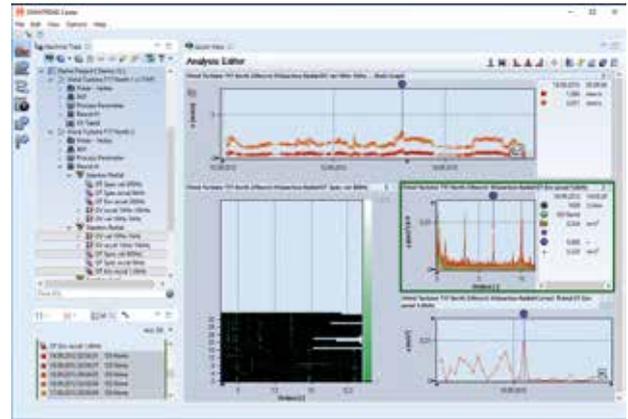


## OMNITREND® Center

Analysis and reporting of all monitoring data

OMNITREND® Center is the central software for the PRUFTECHNIK mobile measuring devices and online condition monitoring systems. Straightforward measurement configuration, central data management, structured archiving, powerful analysis and reporting – all the features you would expect from an intuitive software platform that is also easy to use, greatly reducing training time.

- ▶ Status display of the monitored machinery and equipment
- ▶ Interactive reporting function in HTML format with links to findings and measurement results
- ▶ Tools for dependency comparison of different measured values (XY plot, 3D waterfall chart)
- ▶ Intuitive, graphical interface for manual setup and configuration of machine trains
- ▶ Easy navigation in large machinery using intelligent search filters
- ▶ Server client architecture: Ideal for distributed networks and cloud-based solutions



## OMNITREND® Asset View

The smart IIoT solution for the visualization of machine data

OMNITREND® Asset View is a server-based software for displaying the current machine condition data. The design is intuitive and clearly structured – ideal for all managers and system operators.

- ▶ Real-time query of machine status via the Internet
- ▶ Traffic light colors immediately signal the current machine status
- ▶ Worldwide data access via MQTT data interface
- ▶ Exceeded alarm values are displayed
- ▶ Trend data visualization
- ▶ Runs on all PCs, smartphones, and tablets with an Internet connection
- ▶ Compatible with VIBGUARD® IIoT, VIBGUARD® compact, VIBGUARD® portable, VIBRONET® Signalmaster, and VIBSCANNER®2



## VIBREX®

Variable vibration and bearing monitoring

VIBREX® is a cost-effective, easy-to-install machine protection module. Due to the modular design of VIBREX, the machine vibrations and the bearing condition of your machines can be monitored either on 1 or 2 channels. The vibration monitoring is carried out according to DIN ISO 10816.

- ▶ Switch-off function via relay outputs
- ▶ Display of exceeded alarm values by colored LEDs
- ▶ Alarm value output directly in the machine control possible
- ▶ Machine protection system including machine switch-off function
- ▶ Analog signal output in 4-20 mA for machine control or process control system



## VIBROTECTOR®

Vibration measurement according to ISO as analog signal

VIBROTECTOR® is probably the simplest and most cost-effective solution to protect your constantly running machines from irregular vibrations. The vibration transmitter transmits the broadband characteristic values (as 4-20mA current level) directly to the connected process controller.

- ▶ Alarm exceeded according to DIN ISO 10816-3 or 7 and data transmission to the control system
- ▶ Intervention in process control in the case of excessive vibration values
- ▶ Automatic shutdown of the machine by the control system to avoid overloading



# ULTRASOUND

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## SONOCHEK®

Leak detection and structure-borne sound testing via ultrasound

Thanks to the new SONOCHECK® ultrasonic testing device, it is possible to localize specific leaks on high pressure lines (primarily compressed air) and, at the same time, to evaluate the total loss volume. Its extremely broad bandwidth of between 20 and 100 kHz allows almost every leak on all industrial compressed gas lines to be tracked over large distances and then be evaluated.

Search, find, and assess leaks!

- ▶ Leak localization
- ▶ Partial discharge test
- ▶ Condensate separator test
- ▶ Bearing lubrication condition through structure-borne sound

Three high-performance airborne and structure-borne sound sensors and other accessories support leakage location finding and record the ultrasonic frequencies of rotating machine parts.

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# POWER MONITORING

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## FLUKE 3540 FC

Detects power fluctuations and prevents wear

The Fluke 3540 FC Three-Phase Power Monitor and Condition Monitoring Kit reliably measures power (A), voltage (V), power (W), frequency (Hz), apparent power (VA), reactive power (var) power factor (PP), and total harmonic distortion / THD (%) as either a mobile or stationary unit. If limits are exceeded or undercut, the system automatically issues an alarm in real-time (including via push message on mobile devices).

- ▶ Compact dimensions for mobile and stationary application
  - ▶ Data monitoring in the cloud saves time – inspection routes can be shortened/changed
  - ▶ Continuous data stream for recording power trends
- 



## Vibration sensors and accessories

Sensors made in Germany

PRUFTECHNIK and Fluke Reliability supply the most suitable sensors for all devices and applications. With the tandem piezo design, our sensors are less sensitive and ideally suited for turbomachinery, gearboxes, roller bearings, and pump cavitation.

- ▶ Accelerometers: Standard sensors, miniature sensors for confined spaces, combination sensors,
- ▶ triaxial sensors, wireless sensors and sensors for low-frequency measurements
- ▶ Proximity sensors
- ▶ VIBCODE® sensor for automatic measurement point detection
- ▶ RPM sensors, keyphaser
- ▶ Temperature sensors
- ▶ Available for potentially explosive areas
- ▶ Sensor accessories: Adapters, tools, cables, interfaces, and more



## WEARSCANNER®

Powerful online oil particle counter

WEARSCANNER® identifies ferritic and non-ferritic particles and is ideal for the early detection of progressive damage to gear mesh or roller bearings.

- ▶ Size-dependent particle classification
- ▶ Patented eddy current principle
- ▶ Independent of oil temperature, flow rate, viscosity, air and water content or oil color (darkening)



PRUFTECHNIK stands for  
perfect solutions in maintenance.  
Worldwide!



Machine and shaft alignment



Machine and system monitoring



Non-destructive material testing

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