



**Brüel & Kjær Vibro**



# Product Overview

# Condition Monitoring Solutions for Machines



*We offer solutions for machine protection, condition monitoring and advanced diagnostics of rotating machinery in the oil and gas, process and power generation industries.*

When choosing a suitable vibration monitoring instrument to protect a machine, the following points must be taken into account:

- What type of machine is to be monitored?
- Is the machine designed with rolling-element or friction bearings?
- How many measuring points are to be monitored?
- Which sensors provide optimal results – displacement sensors, velocity sensors or acceleration sensors?
- Should specific frequency bandpass filters be set?
- Is the monitoring equipment to be stored in a control cabinet or mounted near to the machine?
- What are the requirements regarding the communication of measurement data (process control system, network structure)?

- Is an offline portable measuring instrument to be used to detect early damage to the machine?
- Is it necessary to field-balance rotors?

These are questions that need answering at the outset in order to select the best possible solution from a multitude of possibilities. Fans, separators, pumps, compressors in a variety of designs, transmissions, wind turbine generator systems, turbines (whether steam, gas or hydro turbines) – we have the solution for machine protection and machine diagnosis. In addition to the extensive hardware, we support our customers with sophisticated diagnostic software.

Our instruments and systems are based on many decades of experience in which we have focused on vibration measurement and balancing. Today we are the world's leading independent manufacturer of condition monitoring systems with sales offices all over the world.

# Machine Safety Monitoring



**VIBROCONTROL 868/869**  
(VC-868/VC-869)

Easy to use and install. With machine protection according to DIN ISO 10816. The single-channel vibration monitors VC-868 and VC-869 for horizontal and vertical measuring directions are compact and extremely robust vibration switches. They offer sufficient machine protection and security for many types of machines in accordance with DIN ISO 10816.

An integrated vibrational velocity sensor provides the signal. If the vibrations exceed a pre-set limit, an alarm is triggered via a relay contact. Easy installation: Mount the switch onto the machine, connect the cables and your machine is protected in accordance with DIN ISO 10816.



**VIBROCONTROL 920**  
(VC-920)

Compact design and extremely flexible connections (inputs and outputs).

VC-920 is intended for installation in a control cabinet. This electronic measuring instrument can be operated with vibrational velocity or acceleration sensors. The single-channel electronic device

protects machines reliably thanks to an alert and danger alarm. OK-monitoring of the entire measuring chain to detect cable breaks or sensor defects is also integrated in the device. In addition, the measured values can be transferred to a higher level process control system.



**VIBROCONTROL 1000**  
(VC-1000)

Proven technology in a robust casing for mounting onto the machine.

Equipped with similar features as the VC-920, the VC-1000 is intended for on-site installation. A robust die-cast aluminium casing protects the electronic equipment from external damage and therefore a control cabinet is not needed. Vibrational velocity sensors can be connected.

The root mean square or peak value of the vibration velocity is measured accurately in the range between 10 Hz and 1,000 Hz and is compared against pre-set limits. Relay contacts for triggering an alarm or shutting down the machine offer maximum protection. The additional analogue outputs enable the measurement signal to be transmitted to a process control system.



**VIBROCONTROL 1100**  
(VC-1100)

The long-runner: monitoring of casing vibration and rolling-element bearing vibration with one instrument.

VC-1100 is a two-channel monitoring instrument in a robust die-cast aluminium casing. The system monitors the vibrations of both measurement points as a sequential arrangement and, if desired, also the condition of the rolling-element bearings.

The system makes use of the proven BCU method (if vibrational acceleration sensors are used) which is a measured variable reduced to a specific value indicative of damage on rolling-element bearings. This measuring device is also equipped with relay contacts for triggering alarms or shutting down the machine. Analogue outputs enable data to be exported to a control system. The instrument is mounted on-site near to the machine. A control cabinet is not necessary. Multiple instruments can be combined into one system via an RS-232 interface.



**VIBROCONTROL 1500**  
(VC-1500)

For sophisticated protective and diagnostic systems – with remote data access.

If, apart from the overall vibration parameters, individual frequencies are of interest to the diagnostics of the machine condition, the VC-1500 is the perfect solution.

Vibration, rolling-element bearing condition and temperature can be monitored and measured simultaneously at two measuring points. During the frequency analysis operation, the display shows the largest vibration values with the corresponding frequencies.

# Machine Safety Monitoring

In addition, trends of the vibrations, rolling-element bearing conditions and temperatures can be displayed. PT-100 temperature sensors can be connected directly to the measurement point. Alternatively, our vibrational acceleration sensor AS-062/T1 with integrated PT-100 elements can be used. Via the optional Control-Center-Software, it is possible to re- motely set up the parameters for the VC-1500 over the Internet and visualise the measuring results – remote moni- toring thanks to CAN bus. Up to 40 devices can be combined into one system, thus enabling larger systems to be monitored and diagnosed effec- tively. For this, the following measurement values are available: Total vibra- tion of 1/3/10 Hz to 1000 Hz, frequency spectra, rolling-element bearing condition, temperatures and trend curves. The VC-1500 thus offers great diagnostic capability otherwise only available in large built-in systems.



## VIBROCONTROL 6000® Compact monitor (VC-6000® Compact monitor)

**More than just the standard: one device for a variety of monitoring parameters.**

VC-6000® Compact monitor is a versatile measuring instrument which allows the user to optimally configure the monitoring equipment for the respective application. A library containing more than 200 different applications ensures that there is a suitable solution for every task.

Individually set band-pass filters or measured values that have been off- set against each other as well as standard values can be monitored. Any type of vibration sensor can be connected. Up to three measuring channels can be monitored. Together

with the xms® software, the user is offered visualisation and access to the database and can easily and quickly get an overview of the machines.



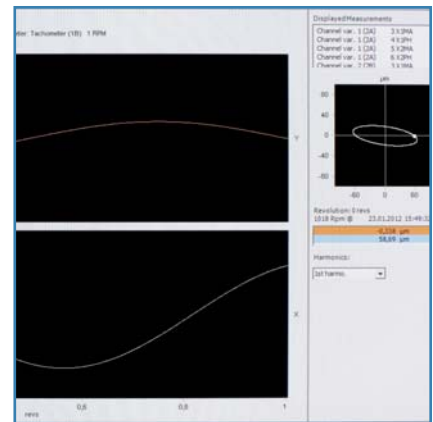
## VIBROCONTROL 6000® (VC-6000®)

**Advanced machine protection with maximum flexibility and reliability.**

VC-6000® is a modular machine safety system for installation in a control cabinet. It is characterised by a particularly high channel density. Up to 48 vibration channels can be realised in one 19"/3HE rack. All classical measurements aimed at protecting valuable machines can be performed with VC-6000®. All types of vibration sensors can be connected and thus offer the right technical solution to suit every application. The system is characterised by a high degree of flexibility combined with maximum reliability.

Of course, redundant power supply and dual modbus are available as options.

Thanks to the user-friendly software, type 7126, it is very easy to configure the VC-6000® system. Software navigation is intuitive and the measured values can be displayed graphically. Relay contacts, analogue outputs and buffer outputs – the system can be optimally adapted to the application.



## 7126 plus

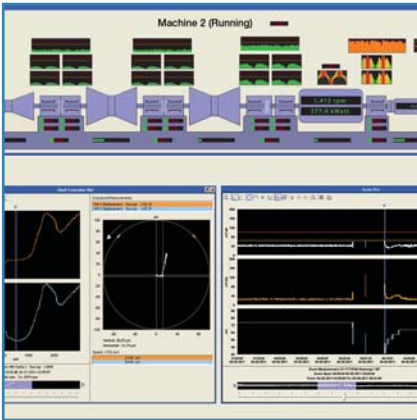
**Analyse machine vibration with a single mouse click.**

A unique, user-friendly software addition to the VIBROCONTROL 6000® safety monitoring system enables on-demand analysis of the vibrational behaviour of the machine using FFT spectra, Bode plots and orbit plots. This functionality is ideally suited for obtaining "snapshots" for machine acceptance tests, machine commissioning, sudden vibrational problems or the like. The measurement results can also be stored and exported for further diagnosis.

## ★ Machine Safety Monitoring

Safety monitoring reliably detects severe machine faults and subsequently initiates an immediate shutdown in order to prevent catastrophic failure and damage to man, machine or environment.

# Condition Monitoring



## Compass 6000

Hand in hand: Safety, condition and performance monitoring in a single system.

Based on the vibration monitoring system VIBROCONTROL 6000®, Compass 6000 is a platform for comprehensive, condition-based machine maintenance. A powerful database, an adaptive monitoring strategy and alarm limits for spectra are the characteristic features of Compass 6000.

Our many years of experience in dealing with machine vibration have been incorporated into the platform.

For integral machine monitoring the modules provide safety monitoring, condition monitoring and machine analysis as well as performance monitoring (monitoring of performance and efficiency).

By using these modules, machine malfunctions can be quickly and accurately assessed and corrective measures can be initiated.

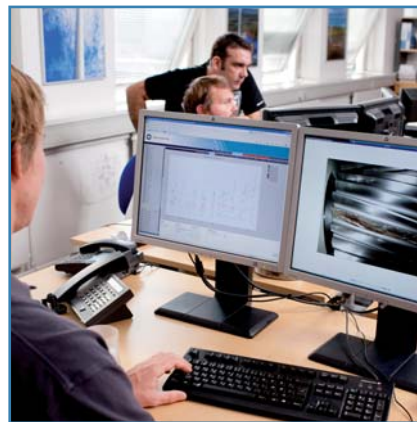
Compass 6000 allows for sensitive measurement methods even for complex machine designs and is therefore often used as a plant-wide monitoring approach in all industries.



## VDAU-6000

Scalar condition monitoring of machine faults together with advanced diagnostics.

The VDAU-6000 introduces powerful yet easy-to-use scalar condition monitoring functionality that provides up to 16 different frequency band measurement tasks per vibration input channel, together with speed and process parameter measurements. These scalar measurements include running speed and harmonics, vectors, bearing fault frequencies, etc. The scalar values are easy to monitor and trend, provide early fault detection without false alarms, and do not require in-depth diagnostic expertise for interpretation. Moreover, each of these measurements can be monitored for specific operating conditions, thus providing even earlier reliable fault detection.



## Condition Monitoring of Wind Turbines

Dedicated early fault detection system with GL certification.

This online condition monitoring system employs specialized measurement techniques, process classes and an intelligent alarm manager to ensure early, reliable fault detection of a wide range of wind turbine drive train machine faults. The system eliminates "alarm flooding" and increases the lead time for cost-effectively planning maintenance, resulting in less downtime and maintenance costs. The system is designed for monitoring all types of wind turbines and park sizes under varying operating conditions.

With the full-service solution, Brüel & Kjær Vibro undertakes the fault detection and analysis, and

recommends operation and maintenance actions to be taken in case of a developing fault. Data from the windpark are stored, monitored and analysed by ISO 18436 certified vibration specialists in one of several Surveillance and Diagnostic Centres (certified by Germanischer Lloyd). The stand-alone solution enables customers to analyse data in-house, using the VibroSuite software packages (the same used in the Surveillance and Diagnostic Centres).

## ★ Condition Monitoring

Condition Monitoring refers to the trending and monitoring of machine and component-specific parameters that provide a reliable indication of the overall operating condition of the machine for early detection of developing faults. As part of a predictive maintenance strategy, early detection provides sufficient lead-time for cost-effectively planning maintenance ahead of time, and for focusing maintenance activities only on defective components. This reduces maintenance costs, machine downtime and the risk of an inopportune machine shutdown. Vibration monitoring is the most widely used Condition Monitoring technique for rotating machinery, as it provides valuable insights into the broadest range of potential machine faults.

# Portable Vibration Measurement Instruments



## **VIBROPORT 80 / VIBROTEST 80** (VP-80 / VT-80)

Machine Diagnosis.  
Field Balancing.  
Condition Monitoring.

With its extended monitoring, balancing and data collection versatility, the VIBROPORT 80 / VIBROTEST 80 can be used to monitor a wide range of machines in the petrochemical, power and process industries. VIBROTEST 80 is a more compact, lightweight version of the VIBROPORT 80. Both have extensive measurement and sensor input capabilities that make them the perfect choice for early detection and diagnosis of incipient faults in bearings, shafts, gears, couplings, casings, etc. This includes everything from balance-of-plant to critical machines, and even those in ATEX-certified areas.

The powerful balancing function is without equal, and the comprehensive analysis capability (time signal recording, post-processing capability and transfer function analysis) meets all sophisticated user requirements. The data collector module allows the user to efficiently manage machines via route-based inspection.

## **Report & Examiner Software**

This modern software package, compatible with Windows® PCs, supports the VIBROPORT 80 and the VIBROTEST 80 measurement modules. Reports can be generated quickly and easily from measurements stored in the instrument and uploaded into the software.

For the analysis of rolling-element bearing defects, the software provides an OEM bearing database that lists the characteristic fault frequencies from all standard rolling-element bearing manufacturers. The software is flexible, and it can also be used for creating user-defined templates for Microsoft® Word reports and machine templates for acceptance tests.

## **Report & Route Manager**

This Windows® based software manages machine measurement data and routes, analysis and trend diagrams, data storage and reporting. It is based on an application-oriented, flexible and expandable architecture, which enables future enhancement. The setup of measurement configurations, alarms and routes is easy to handle. The software provides special plots and cursors (gearbox cursor) and includes a database of bearing fault symptoms (user-defined faults can be added). An alarm indicator allows the fast detection of machine faults. Data from the VIBROTEST 60 and xms® software can be imported.

## ★ **Portable Vibration Measurement Instruments**

Non-critical and balance-of-plant machines are usually not monitored online; however, portable offline measurement instruments provide a cost-effective solution for monitoring such machines. In addition to being user-friendly, such instruments must be able to perform both standard and demanding measurement tasks. Moreover, two PC software packages either for analysis and reporting or a database host software should complement the portable device. Portable instruments are for example also used for field balancing, saving time and cost by eliminating the need for disassembling/mounting the rotor.

## Sensors and Accessories



### Sensors

Brüel & Kjær Vibro provides a range of sensors that fulfill the monitoring and diagnostic requirements of most vibration and process applications. They are designed for standard applications (including retrofit into other monitoring systems) as well as for specialized applications, which include harsh operating conditions and ATEX environments. Although robust, the sensors are built to the highest quality standards for precision, reliability and long life.

### Accessories

The correct choice of installation accessories and installation technology can improve system performance and increase the performance of safety or condition monitoring in the long term.

One of the key factors in this respect is the correct choice of installation accessories for the vibration, displacement and reference sensors that are used.

Our range of accessories are designed for a multitude of applications and ensure that the monitoring system functions as intended.

## Services



### After-Sales Services

Brüel & Kjær Vibro has developed a wide range of support services that ensure our customers maintain optimal use of their products. In addition to rental equipment, calibration and repair, our product services include upgrades, commissioning and training (which can be performed in one of our service centres or on-site). Other after-sales services include field balancing, remote data analysis and fault detection, advanced diagnostics and service agreements. All of these services can be tailored to meet customer-specific requirements. Hotline service is also available. Long-term service agreements (LTSA) incorporating any combination of the above services can also be provided.



### Project Management

Our international project delivery services enable customers to reap the maximum operational value out of their newly purchased products and systems. For large, complex turnkey projects, this is a vital necessity. Our Project Team has been implementing monitoring system solutions for over

30 years with many of the world's leading oil and gas, petrochemical and power companies, engineering procurement and construction contractors, OEM suppliers, distributed control systems (DCS) suppliers and even other monitoring system suppliers. Our project management services include single-contact communications, documentation, drawings, factory acceptance and site testing, system commissioning, reporting, training, on-going services and long-term service agreements. System implementation services include site surveys, establishing monitoring strategies, building up monitoring cabinets, and setting up the LAN network or field bus communication interfaces to a number of remotely located operators, the process control system and even to other monitoring systems.



### Seminars

With the B&K Vibro Academy, we offer basic and advanced seminars on vibration measurement and field balancing. Each year we train a large number of engineers and technicians to become vibration experts.

For more information on our trainings and seminars, please refer to [www.bk-vibro.com](http://www.bk-vibro.com)!

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