



Brüel & Kjær Vibro



VIBROCONTROL 6000™

Dependable Safety Monitoring

Safety Monitoring with VIBROCONTROL 6000™



Brüel & Kjær Vibro has developed the VIBROCONTROL 6000™ Safety Monitoring system (VC-6000™) to the highest technical standards for reliability, scalability, performance in an uncomplicated design. This plant-wide safety monitoring system, representing the accumulation of over 50 years of experience in vibration monitoring and analysis, has been designed in close cooperation with both machine manufacturers and end-users. The system is also fully supported by our renowned worldwide sales and support network to ensure all components are optimally selected, installed and commissioned to satisfy the client's requirements for the most demanding applications.

Wide reaching applications

The VC-6000™ continuously monitors vibration and process signals from permanently installed sensors on machines in a number of different industries, such as the Oil & Gas, Petro-chemical, Power and other heavy process industries. It is

scalable and can be used as a plant-wide monitoring system covering a wide range of machines such as steam turbines, gas turbines, hydro turbines, axial, centrifugal and reciprocating compressors, motors and generators, pumps, ventilators, extruders, agitators, gearboxes, etc. It is well suited for both machine OEM installations and new or retrofit end-user installations.

One of the important applications for the VC-6000™ is replacing the growing number of ageing safety systems in the market; many of which are obsolete or no longer reliable. As Brüel & Kjær Vibro is completely independent of machine manufacturers, unbiased monitoring solutions can be provided to both OEM suppliers and end-users. The VC-6000™ is compliant to many international standards and is designed to be highly compatible with existing installations, thus simplifying retrofits.

Safety systems no longer belong to the "install and forget" product

concept. There is valuable information that can actively be used by operators on a daily basis. Powerful communications capability allows the VC-6000™ to be interfaced to most process control systems for visualization without jeopardizing its safety monitoring functionality. Of course the VC-6000™ can also be used as the data acquisition platform for the Compass 6000 Condition Monitoring system.

Most importantly, the VC-6000™ is based on a modular application design concept that allows it to cost-effectively fit most monitoring applications with minimal setup. High reliability with powerful performance and technology does not need to be complicated or expensive.

The unique VC-6000™ design gives added value to your application



The VC-6000™ design concept includes a number of features and functions that give you the high reliability and performance needed for today's machine operation and maintenance requirements.

Modular application concept

The VC-6000™ economically fulfills the most demanding applications quickly and easily. A number of factory pre-configured standard modules can be ordered to monitor specific machine types, thus reducing installation time and the risk of improper setup. For those special applications that require a non-standard monitoring strategy, Brüel & Kjær Vibro offers general-purpose modules with fully configurable measurements, outputs and voting logic relay control.

Compliance

The VC-6000™ fulfills all the important requirements of ISO-7919, ISO-10816 and API-670; the leading standards for vibration measurement and safety monitoring of machines.

Compatibility

The VC-6000™ can be delivered in high-quality 19" rack-based cabinets, or placed in existing cabinets on-site with a minimum depth of 400 mm. The high channel density monitor

modules (half normal height) can easily replace existing 19" rack-based safety systems with room to spare. The VC-6000™, with its versatility, can process signals from all commonly available sensors; vibration displacement, vibration velocity, vibration acceleration, temperature, pressure sensors, etc.

Reliability designed from the onset

All monitoring modules in the VC-6000™ operate completely independently of one another, so local faults remain local and do not affect the other modules. Applications using data visualization have no effect on the safety monitoring functions. Comprehensive self-monitoring with the control of a local OK-relay is provided in each module to annunciate errors due to sensor or cable faults. Redundant power supplies can also be configured for additional security.

Performance

Many safety systems provide "standard" broadband radial and axial safety related measurements and little else. This is fine for protecting machinery, but provides little help with operation & maintenance decisions. In addition to standard safety measurements, the VC-6000™ also

offers more advanced monitoring functionality without requiring a condition monitoring system or software. These include:

- Shaft eccentricity
- Vector measurements for various orders
- X-Y relative shaft vibration
- Casing vibration
- Shaft relative expansion
- Casing absolute expansion
- User-defined narrow band measurements (absolute and tracking)
- Speed, zero-speed
- Any process values, e.g. temperature, pressure, and many others
- Rolling-element bearing condition measurements
- Rod-drop for reciprocating compressors

Primary components and their functions



The system racks consist of 1 to 4 Safety Monitoring modules (SM-610), 1 to 2 Power Supply modules (PS-610) and one removable Communication interface module (CI-620), all within a 3U high 19" rack (RC-600). Several racks can be mounted within

a cabinet, which can include racks specifically designed for external power supplies (RC-610). The 7126 Setup and Data Display software runs on a Windows-based PC, utilizing data transferred from the CI-620 module.

SM-610 Safety Monitor modules

There are a number of different monitor modules designed for specific applications or tasks. Contact your Brüel & Kjær Vibro Sales representative for the current list. There can be up to four modules in a single RC-600 rack, and all monitoring modules in the VC-6000™ operate completely independently of one another. A local fault in one module will not affect the other modules.



Generic characteristics

Most of the modules include the following:

- DSP-based signal processing
- Up to 12 input channels (AC/DC)
- Up to 12 different output channels
- Trip Override and Trip Multiplier functions activated by binary signals, speed range or global (i.e. rack-wide) external control
- 10 ms reaction time (typical)
- Sensor power supply
- Time series signal export for post-processing analysis by the Compass 6000 Condition Monitoring system
- Potential-free relay outputs for alarms signalling
- Galvanically separated DC outputs
- Differential inputs
- "Fail-safe" operation
- Independently-operating measurement and monitoring
- Local Logbook.

Inputs

The modules accept most types of vibration and process sensor inputs. Contact your Brüel & Kjær Vibro Sales representative for the current list.

Outputs

Up to 12 buffered galvanically separated DC output signals and potential-free relay outputs.

Local display

- 3 LEDs displaying monitoring status (Alarm, Danger, Relay latching)
- 4 LEDs displaying system status (OK, TM, TO, Aux.)
- 12 LEDs displaying for sensor status (OK).



PS-610 Power Supply module

The PS-610 Power Supply module provides all the modules installed within a rack and their connected sensors with the necessary power. The modules can be used for different redundant power supply concepts.

The following input voltages can be used (in parallel):

- AC input (100-240 VAC, 2 A, 50-60 Hz)
- DC input (24-48 VDC, 7.2 A)

The following variants are available:

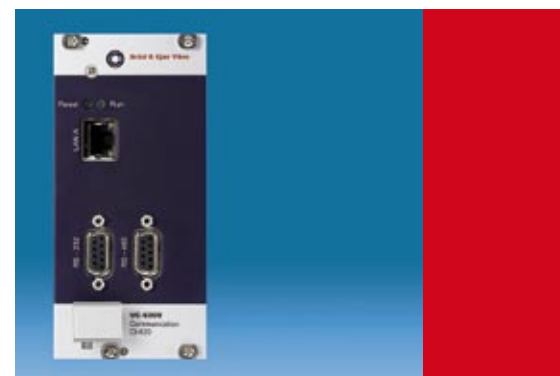
- PS-610/0 for installation into the RC-600 rack (including blind panel, length adapter, connection set)
- PS-610/1 for installation into the RC-610 rack for RC-600 external power supply

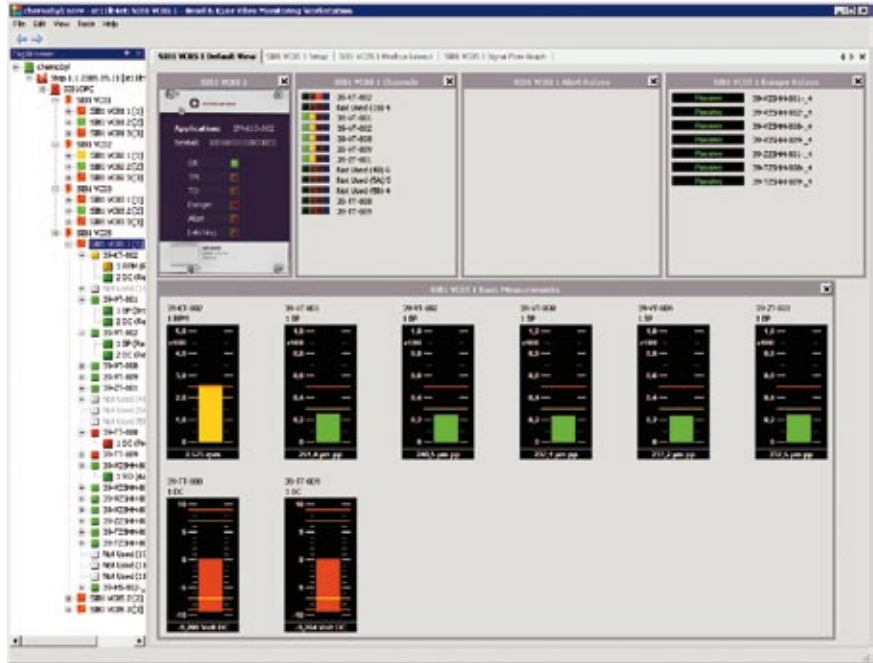
CI-620 Communication Interface module

The CI-620 is used to configure the VC-6000™ and for scalar data transfer (i.e. data visualization using the Type 7126 software). It has a LAN connection (Ethernet TCP/IP) and two serial interfaces (RS-232 and RS-485) for Modbus communication. The export of a digitized time series is carried out through the LAN interface for signal analysis and storage by the Compass 6000 Condition Monitoring system.

The CI-620 features and functions include:

- OPC display interface with RC-600 rack and SM modules
- Single / dual Modbus RTU
- Setup and Service functions (Firmware download)
- Data export
- Data import
- System OK relay
- Trip Multiply (binary input)
- Trip Override (binary input)
- LED display "Run" for the operating condition
- Reset relay function
- Time-synchronisation of modules





RC-600 19” rack

The rack has a standard 19” design with a depth of 325 mm (and half the height of conventional safety systems).

- Up to 36 input channels per rack with an internal PS-610/0 Power Supply module
- Up to 24 input channels per rack with two internal PS-610/0 Power Supply modules
- Up to 48 input channels per rack with an external Power Supply module in a RC-610 rack

RC-610 19” rack

A power supply rack, in 19” design and with a depth of 235 mm, is available for the external power supply for up to six RC-600 racks. Each RC-610 rack can hold up to six PS-610 Power Supply modules.

Type 7126 Setup and data display software

This basic software, which comes standard with the VC-6000™, is used to configure the communications and the monitoring modules of the VC-6000™. The easy-to-use Windows-based software can also be used as a control room user-interface for displaying measurement data, alarm status and setups, and for acknowledging of alarms from any number of VC-6000™ monitors. During machine commissioning, all measurement values and setups can automatically be stored at regular intervals in a file for baseline documentation.

VC-6000™ Accessories

AC-4608 Buffer panel

The 12-channel buffer panel is directly connected to a Safety Monitor module via a cable and provides the galvanically separated output signals at BNC sockets.

VC-6000™ - Integration into other systems

The VC-6000™ has a versatile high-speed communications interface capability for remote system setup, data visualization, resetting of relays, and condition monitoring.

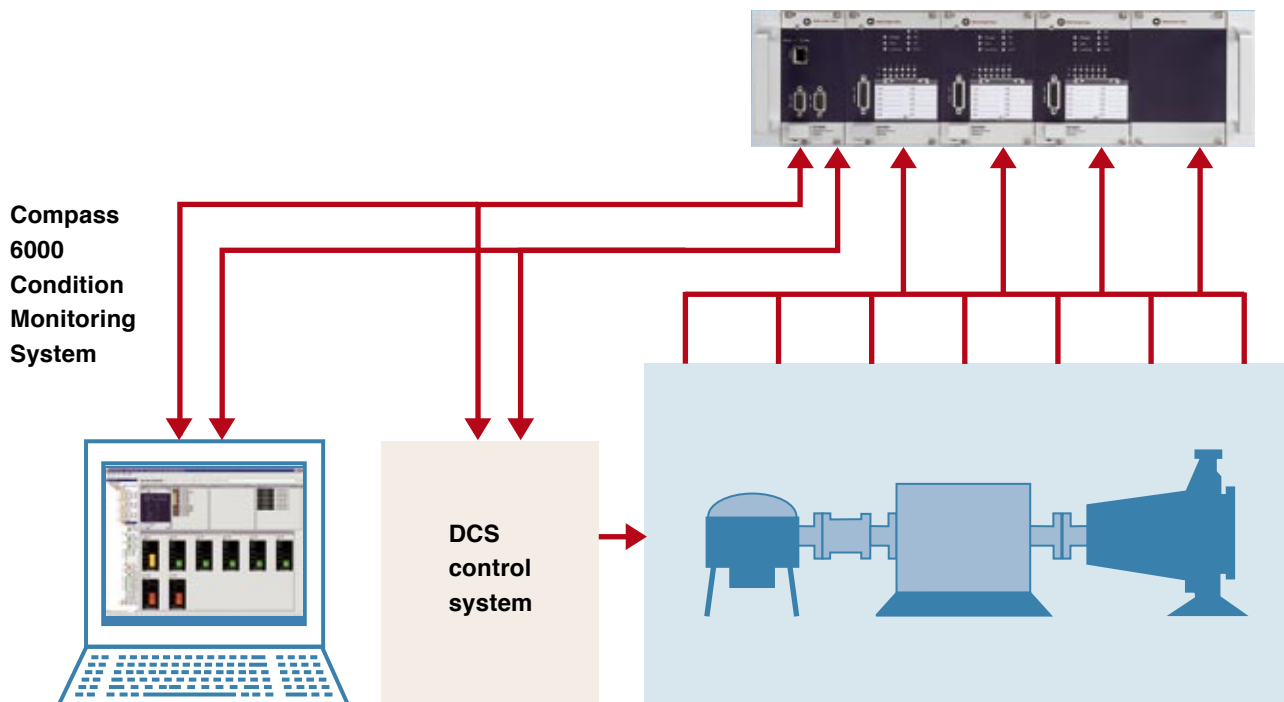
Integration to process control systems

Scalar vibration and process data can not only be exported to SCADA and distributed control systems (DCS) via relays and DC outputs (4-20mA), but also via digital interfaces (RS-232, -485 and 100 Mbit Ethernet) using the widely used communication protocols of OPC (OLE for process control) and also Modbus RTU (Modbus / Dual-Modbus). The digital interfaces also allow alarm and setup information to be exported, as well as for operators to reset relays from a remote location.

VC-6000™ in combination with the Compass 6000 Condition Monitoring System

The VC-6000™ can at anytime be upgraded as a data acquisition platform with the Compass 6000 Condition Monitoring system, without interfering with its safety monitoring functions. An OPC interface is used for sending scalar measurement data and alarm information over the LAN for processing in the Compass 6000 Condition Monitoring software and subsequent storage in a database. Time series data is continuously exported from the VC-6000™ by proprietary means over the LAN enabling more advanced post processing and analysis in the condition monitoring software, e.g. spectra, envelope analysis, vectors, orbits, etc.

VC-6000™ Safety Monitoring System



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