Brüel & Kjær Vibro

VIBROCONTROL 4000

Sensitive Machine Monitoring

Reliable Machine Protection with VIBROCONTROL 4000

Brüel & Kjaer Vibro

has for many years been one of the leading manufacturers of machine protection systems. From our extensive product range VIBROCONTROL 4000 is one of the most tried and tested machine protection systems on the market. Highest precision and reliability are distinctions of the systems.

VIBROCONTROL 4000 offers optimum protection through permanent condition monitoring.

This means:

- Acquisition of current machine condition through continuous measurement of relevant condition and operating parameters
- Recognition of deviations from the desired condition
- Alarming at violation of limit values
- Plant shutdown when dangerous conditions exist
- Communication with control systems

VIBROCONTROL 4000 meets all important requirements of internationally recognised guidelines such as API 670 and DIN 45670

Measured values are processed and compared with adjustable limit values in the individual monitoring modules of VIBROCONTROL 4000. 4 limit relays are available for each module for alarm signalling. In addition to the general customary limit values for pre- and main-alarms, in this protection system the measured values trend is also monitored. Unexpected sudden changes in the measured value which indicate abnormal behaviour initiate a trend alarm and thus permit an extraordinary level of sensitive monitoring of the machine condition.

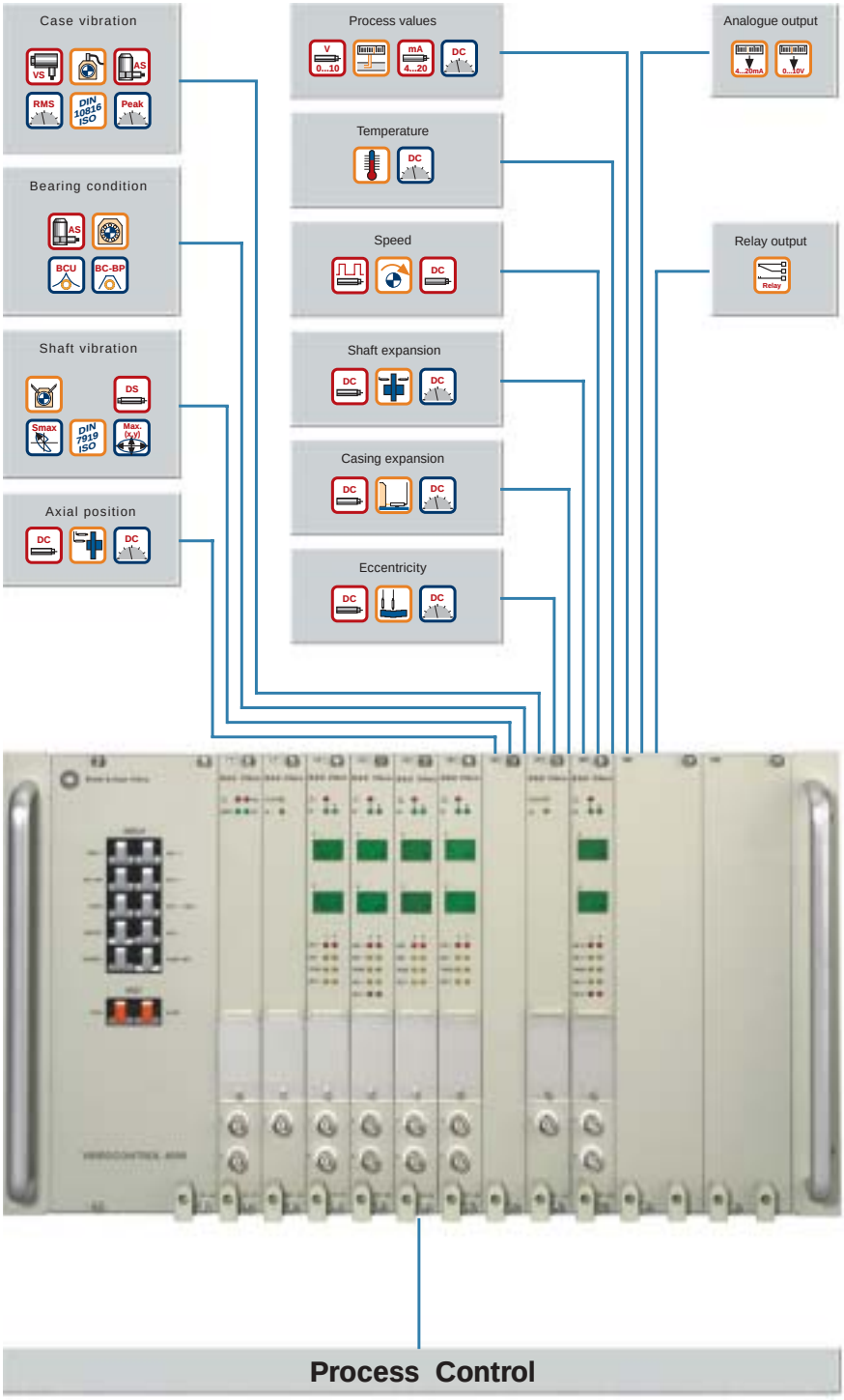
VIBROCONTROL 4000 guarantees high operational security through:

- Variable time delay of the alarm signalling
- Adjustable limit value multiplier for monitoring transient operating conditions with elevated limit values
- Power-up error protection switching for prevention of false alarms after a power failure
- Self-monitoring of the measurement circuits for recognition of defective measurement circuits
- Limit value blocking at disturbances in the input measurement circuits

VIBROCONTROL 4000 passes every practical test

- Digital display for monitored variables
- Status displays for self-monitoring and limit value signalling
- Buffered analogue outputs for each channel
- The Modbus interface simplifies communication with any control system
- Standard 19" technique with short rack depth for standard cabinets.
- Plug-in terminals blocks permit extremely easy cabling connection
- Power supply module with extraordinary wide power tolerances.
- Small variety of universal modules and therefore lower spare parts inventory costs
- Sheet-steel encapsulated modules guarantee ruggedness and interference suppression

VIBROCONTROL 4000 - Professional Machine Monitoring at an Attractive Price



VIBROCONTROL 4000 allows continuous monitoring of all measurement variables that are monitored today for assessment of machine condition:

- Absolute case vibrations
- Relative shaft vibrations
- Relative axial shaft position
- Rolling-element bearing condition
- Speed
- Temperature
- Shaft and casing expansion
- Eccentricity
- Pressure, bearing forces, etc.

Quality and operational security

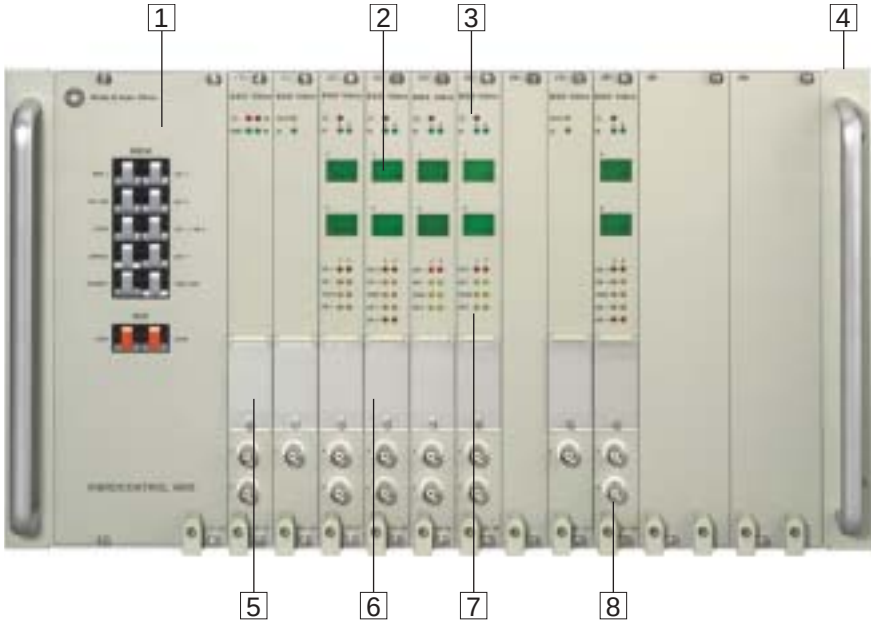
The high quality standard and operational security are guaranteed through consistent checking and control from manufacturing to delivery.

The Brüel & Kjær Vibro test programme includes, amongst others, 100% product input testing, "Burn In" methods for component selection, pre-ageing and testing of equipped printed circuit boards as well as testing and function checking of complete constructional units with the most modern, automatic test systems.

Moreover the operational security of VIBROCONTROL 4000 is further heightened through microprocessor techniques.

These include:
- Permanent RAM and ROM tests
- Watchdog check of all cyclic sequences
- Redundant archiving of all data.

Central Components and their Functions



1 Control panel for display and reset functions

2 Backlit LCD display for measurements and limit values

3 Status displays and LEDs

4 Sheet-steel encapsulated 19" rack

5 Service interface for connection of programming instruments

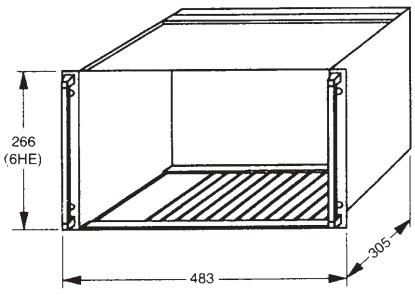
6 Fields for measurement point labelling

7 Alarm signalling through LEDs

8 Diagnosis outputs at BNC sockets

RC-400 rack

The RC-400 rack corresponds to the international 19" system. The connections for all modules slots are provided through the transverse wiring (back panel). When extending an existing monitoring system, no further back panel wiring is necessary. Two slots in the RC-400 rack are fixed. On the extreme left is the Power Supply module with the Control Panel in front. Next to this in module slot position "0" is the first Computer-Interface. The remaining 12 module slots can be arbitrarily equipped with monitoring modules or multiplexer modules.



Dimensions:

- 6 HE high, 19" wide
  84 TE for modules

PS-410/420/430
Power Supply

This Power Supply module provides the necessary power to the rack, modules and all connected sensors.

Input power
PS-410:
- 93 ... 140 VAC
  184 ... 264 VAC
  45 ... 400 Hz

Power consumption
PS-410:
- 160 VA

Input power
PS-420:
- 19 ... 38 V DC

Power consumption
PS-420:
- 205 W

TP-419
Control panel

Using the pushbuttons on the TP-419 Control Panel, the various measurements and setup values can be displayed at the monitoring modules.

In addition the
- Alarm signals can be reset and
- the trend monitoring can be adapted to changing operational requirements.

MX-410
Multiplexer

This module operates in conjunction with the CI-421 Measurement and Interface module as a programmable measurement point selection switch. Controlled by the programme the desired measurement channel is selected and the existing signal is processed in the CI-421 according to the predefined measurement instruction.

Inputs
- 31; dynamic and static signals

Output:
- 1; selected input signal

Signal span:
- 50 V p-p in the range ± 25 V

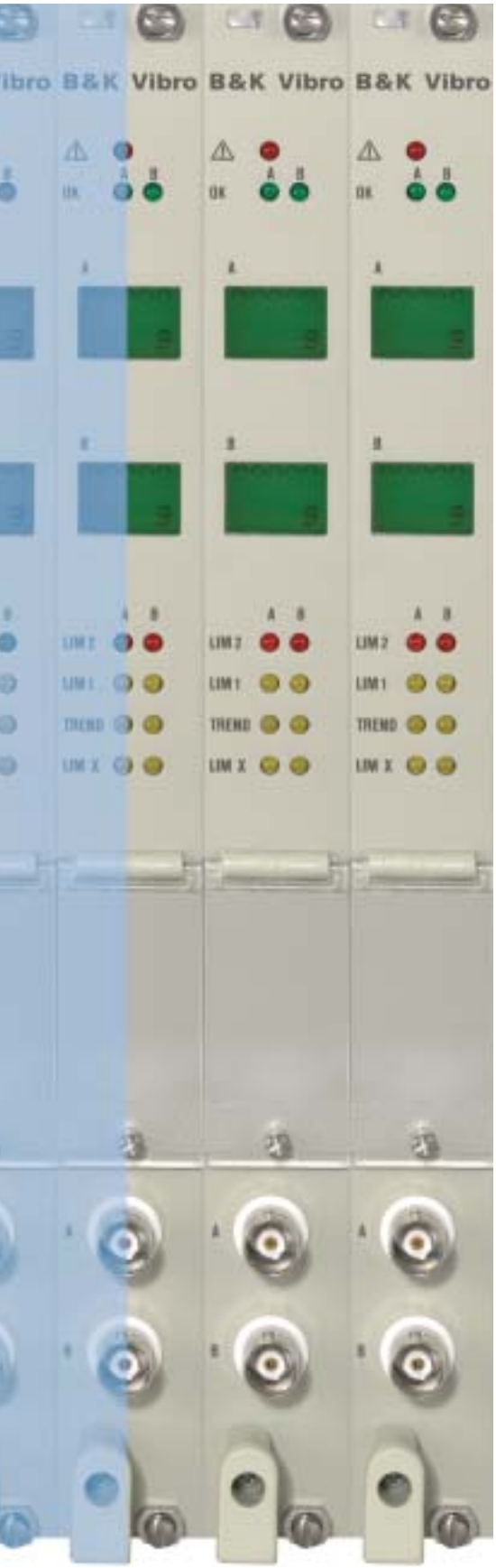
CI-411
Interface module for
- Communication between PC and monitoring module through the RS-232 interface

CI-412
Modbus Interface module for
- Communication between PC and monitoring modules through the RS-232 interface
- Communication between process control system and monitoring modules through the supplementary Modbus interface

This Interface module provides the RS-232 interface through a Modbus interface with the following features:
- rear panel, RS-232-C full duplex, asynchronous point-to-point

CI-421
Measurement and Interface module for
- Communication between PC and Monitoring modules through the RS-232 interface
- Control of Multiplexer modules MX-410
- Measurement processing and intermediate storage
- analogue measurement preparation
- digital signal processing (characteristic variable formation, FFT)
- frequency-selective measurement when operating with a shaft reference sensor

VIBROCONTROL 4000 Monitoring Modules



Vibration and dynamic signals

All types of vibrations, such as:
- absolute case vibrations
- relative shaft vibrations

can be monitored with this module in the frequency range 1 Hz...10 kHz

VB-430

Inputs: 2
Signal span:
- max. 30 V p-p in the range ± 25 V

Measurement variables:
1) Vibration displacement
- vibration velocity
- vibration acceleration

2) Radial shaft displacement in V

Signal detection:
- RMS
- Peak value (p)
- Peak-peak value (p-p)
- Calculated peak value (pc)
- Maximum excursion (smax)
- 1X integration selectable

Measurement ranges:
- freely programmable

Limit values:
- LIM 1 / LIM 2 (Measurement variable 1)
- Trend (ISO 7919)
- LIM x (Measurement variable 2)

VB-410

This module contains additionally the frequency linearisation for Brüel & Kjær Vibro vibration velocity sensors and thus is suitable for monitoring low-frequency case vibrations.

VB-420

This module offers additionally the possibility for rolling-element bearing condition monitoring with Brüel & Kjær Vibro acceleration sensors. Simultaneous monitoring of:
- case vibrations and
- bearing condition

is possible with **one** acceleration sensor at each measurement point.

Static signals (<10 Hz)

This module offers universal measurement processing of static and quasi-static signals. The two input signals can be coupled with one another, e.g. for monitoring
- axial shaft position
- relative and absolute expansion
- any current / voltage signals

GP-410

Inputs: 2
Signal span:
- max. 50 V, in the range ± 25 V

Measurement variables:
- static and quasi-static

Limit values:
- LIM 1 / LIM 2 (pos. violations)
- Trend (ISO 7919)
- LIM 1 / LIM 2 (neg. violations)

GP-420

This module is used for monitoring of quasi-static signals. A typical application is monitoring of eccentricity.

Speed, Rotation direction and speed change

Using only one sensor, monitoring of
- speed, speed change and zero-speed is possible.

Through the use of a second sensor, monitoring the rotation direction is also possible.

TA-410

Inputs: 2 (Impulse)
Impulse frequency / input:
- 1 Hz ... 20 kHz / > 0.5 V... 60 Vpp

Translation:
- 5-character multiplier/divider

Measurement variables:
1) Speed; 2) Speed change

Limit values:
- LIM 1 / LIM 2 (pos. violations)
- Trend (speed change)
- LIM 1 / LIM 2 (neg. violations)

VIBROCONTROL 4000 – the Hardware

Generally valid technical data for the modules

Configuration:	through computer
Measurement processing:	digital with microprocessor
Connections:	Plug-in terminal strips
Inputs:	2
Measurement range:	freely programmable
Display:	LCD, digital, 2-line, graphic-capable for displaying measured values and units at the monitoring modules.
Status displays:	with LED With self-monitoring and limit value signalling
Buffered outputs:	2 per channel (Original signal) Front panel BNC sockets; Rear panel terminals
Analogue outputs:	2 at the rear panel 0 ... 20 mA, 4 ... 20 mA 0 ... 10 V, 2 ... 10 V Update rate 0.5 s
Limit value delay: Limit value multiplier:	0...999 s, programmable Factor 1 ... 10 for dynamic measurements
OK monitoring:	effective at LED and central OK relay
limit relays:	4 per monitoring module
Relay data:	max. switch load: 1.25 KVA (AC) Ohmic load: 96 W (DC) max. switching voltage 250 V (AC) 48 V (DC) max. switching current: 5 A (AC/DC)
Control inputs:	**central**, at the Power Supply module for the entire rack ■ Limit value multiplier ■ Alarm override ■ Alarm reset ■ Trend reset **local** at the monitoring module ■ Limit value multiplier ■ Alarm suppression ■ Switch off self-monitoring ■ Switch over the monitoring of channel A to channel B
Sensor power	2 x -24 V; max. 30 mA; Short-circuit proof
Operating temperature range:	0°... 50°C
Storage temperature range:	-20°... 70°C

VIBROCONTROL 4000 – an information centre for machine diagnosis

By connecting to the prepared interfaces of VIBROCONTROL 4000 a problem-free system for diagnostic monitoring of machine condition is available.

In conjunction with the VIBROEXPERT CM-400 Software and a commercially-available PC, VIBROCONTROL 4000 forms a network-capable on-line system for intermittent monitoring the machine condition in a complete machine plant. Simple operation and overview displays distinguish the VIBROEXPERT CM-400 software. It is a powerful tool for trend analysis of vibration characteristics and process parameters or for analysis of spectra, time signals or harmonics. With the help of this system, the optimum maintenance time can be reliably assessed and damaged machine components can be clearly identified.

30. (Status) 0307 o All data is non-binding. Changes remain reserved. Druckerei Drach • Design: LowinskyART • BBR 0025-EN-01

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