Brüel & Kjær Vibro

A

Einführung
Introduction
Introduction

VC-6000 Compact monitor

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Contents

1 Safety advice

This operating instruction document contains information and advice which must be observed for the installation and operation of the *VIBROCONTROL 6000 Compact monitor .*

Please read these operating instructions carefully before installing a *VIBROCONTROL 6000 Compact monitor* and putting it into operation!

Attached safety instructions for installation, commissioning and disposal must be observed!

Please read the attached Grounding recommendations before installing and putting it into operation!

Design concept application

A *VIBROCONTROL 6000 Compact monitor* is exclusively conceived for measuring and monitoring vibrations, operating speeds and DC measurements in the discipline of machine protection and condition-dependent machine maintenance.

Any application outside of this conceptual scope is not considered valid.

Operational safety

A *VIBROCONTROL 6000 Compact monitor* is an operationaly secure instrument and corresponds to the most modern standard of technology. Each instrument leaves our works in a fault-free and safe condition.

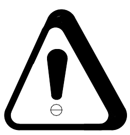
Any person executing the installation or operation of the instrument must have read and understood the operating instructions and especially the safety advice notes.

The operational safety of the instrument cannot be guaranteed in the case of improper procedures or non-observance of the operating instructions.

Warning note

Advice is given in the operating instructions concerning possible risks and danger during installation and commissioning. This advice is emphasised by the following:

Caution



Caution advises that by not observing the safety instructions the possibility of danger to property and persons exists.

Commisioning!

Commissioning may only be performed by trained personnel!

2 What is a *VIBROCONTROL 6000 Compact monitor* ?

A *VIBROCONTROL 6000 Compact monitor* (VC-6000™ Compact monitor) is a measuring and monitoring system for machine safety monitoring and condition-oriented machine maintenance.

Depending on the configuration, up to a maximum of 6 input signals can be acquired, assessed and monitored. For externally connected systems there are up to 12 analogue outputs and up to 12 relays can be switched.

As a rule **a monitoring channel** is constructed with the following main components:

Input signal acquisition	⇨	Signal processing	⇨	Limit value monitoring	⇨	Output: Analogue/Relays

Monitoring channel

A **measuring channel** without a monitoring function is constructed with the following main components:

Input signal acquisition	⇨	Signal processing	⇨	Output: Analogue

Measuring channel

This structure is found either singly or in multiples in each channel *VIBROCONTROL 6000 Compact monitor.*

- ♦ The input signal acquisition is either a single-channel sensor acquisition channel, or a two-channel process-value acquisition channel.
- ♦ The signal processing consists of:
  - – Signal filtering (e.g. acc. to DIN ISO or a variable frequency filter)
  - – Measured value formation: RMS-value, peak-value, DC-value, BCU-value for rolling-element bearing monitoring, etc.
- ♦ Limit setpoint monitoring is carried out with reference to absolute limit values.
- ♦ The measured values are available as analogue voltage or current output signals proportional to the measured values or can be checked with the User Terminal.
- ♦ Events arising out of the limit value monitoring (e.g. Alert alarms and Danger alarms) are available as relay outputs.

Which type of input signals can be acquired ?

The following sensors can be connected:

- ♦ Vibration acceleration sensors (AS-sensors)
- ♦ Vibration velocity sensors (VS-sensors)
- ♦ Displacement sensors (SD/OD, resp. DS/OD and IN-sensors)
- ♦ Transmitters, which produce signals in the ranges 0/4-20 mA and -15 V ... + 15 V.

3 Structure of this documentation

This documentation is divided into 5 sections:

Individual instrument documentation

B. Introduction to the *VIBROCONTROL 6000 Compact monitor* with the objective toward commissioning

C. Technical data for the hardware

D. The signal-flow chart components and their parameters

E. User's dialogue of the *VIBROCONTROL 6000 Compact monitor*

Where can I find which type of information?

➢ **Commissioning:**

When a prepared *VIBROCONTROL 6000 Compact monitor* is to be taken into operation, it is generally sufficient to read individual instrument documentation and section A.

➢ **Technical data of the module:**

When your interest is in special technical data, you will find it in section B.

➢ **Parameter settings:**

When any parameters are to be edited the background information can be found in section C.

➢ **User Terminal dialogue description:**

In section D the options for communicating with the *VIBROCONTROL 6000 Compact monitor* via the User Terminal are described.

➢ **Technical schedules:**

In section "Individual instrument documentation" you will find the individual instrument documents:

- Basic configuration description
- Signal-flow chart
- Configuration sheet
- Parameter setting sheet

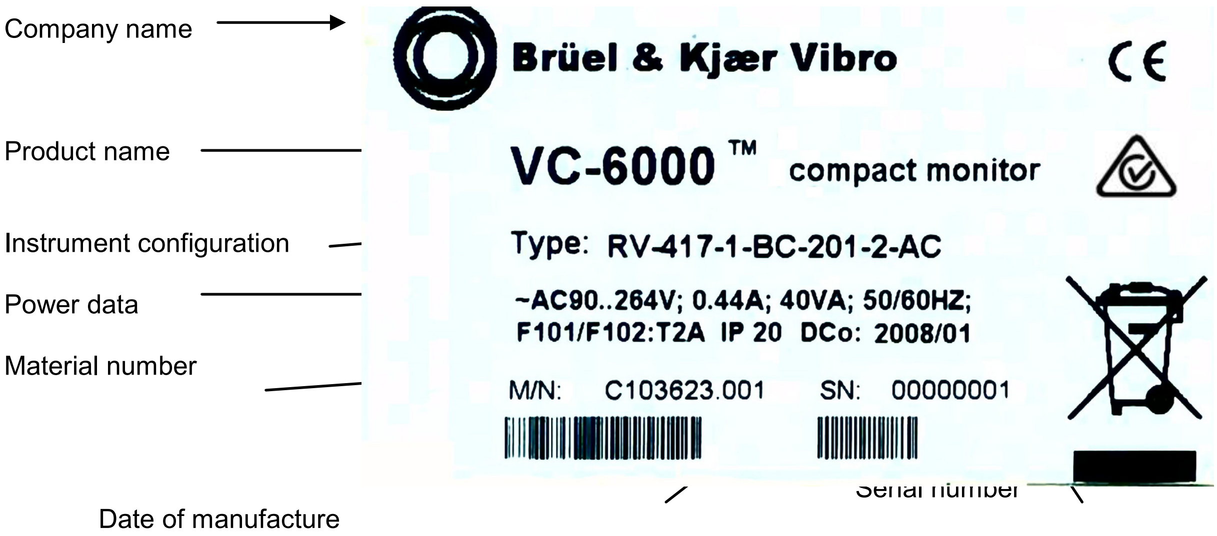
Further information:

♦ You can find further language versions of the handbook on the CD which accompanies thrhandbook.

♦ On the internet under www.bkvibro.com you can also find further information about the *VIBROCONTROL 6000 Compact monitor .*

4 The name plate

Some important information about your *VIBROCONTROL 6000 Compact monitor* can be found on the name plate.



- Company name and CE mark
- Product name
- Instrument configuration and order code (different according to the configuration)
- Power data (different according to the main power supply) and information about the fuse protection used
- Material number:
  An internal number of the delivered basic configuration
- Serial number
  Instrument's individual serial number depending on the material number.
- Protection class identification
- In accordance with Electrical and electronics law (Elektro-G)

ADVICE

☛ ***Please check that the information related to the type identification, material number and serial number on the name plate corresponds with the information on the signal-flow chart, configuration sheet and parameter setting sheet. This guarantees that that the correct documentation enclosures for the instrument are being used!***

5 The signal-flow chart

The signal-flow chart describes the functional construction of the monitoring system.

Here all the measuring and monitoring tasks with their signal-flow components are displayed. Each signal-flow component is characterised by its properties and parameters. The entire functionality is a result of the cooperative operation of the individual components.

The basic properties of a measuring and monitoring task are defined by the instrument’s implemented firmware. These properties cannot be changed at the instrument.

Parameter settings, (e.g. limit setpoints, relay switching mode, averaging times, DC output characteristics, etc.) can be edited using the User-terminal. These setting options are identified in parameter configuration sheet.

Each *VIBROCONTROL 6000 Compact monitor h*as a valid signal-flow chart and a valid parameter configuration sheet. In this signal-flow chart and the parameter configuration sheet all existing available components in the system, with their links, are displayed in an overview.

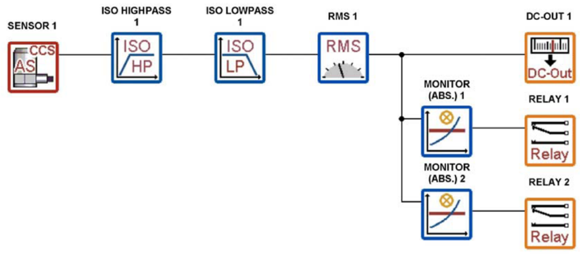
NOTE:

☛ ***Please document all settings that are changed so the fastest possible assistance can be provided in case of an error. The changes can be documented in either a parameter setting sheet.***

What information is evident in the signal-flow chart?

- The components on the left (red frame) are assigned for acquisition of the input signals. These input components form the interfaces for the sensors.
- Components on the right (yellow frame) are assigned the task of outputs for events that occur. These form the interfaces to external, peripheral electronic equipment.
- The signal-flow chart is to be used to identify in which functional relationship the components are linked to one another.
- The type identification of the basic configuration, material number and serial number are entered in the footline of the signal-flow chart. This information must correspond with the information on the name plate of the *VIBROCONTROL 6000 Compact monitor !*

Example of a signal-flow chart



VIBROCONTROL 6000 compact monitor		Order no.	Material no.	Serial no.	Created by: Heilmann	Checked by: Sieberling	Date: 11.08.2003 / Page 1/1
Brüel & Kjær Vibro	Signal - flow chart Type: CV111_1	Customer ID:			File ID: SFC_CV111_1.doc		Version: V01.00

6 Parameter configuration sheet

The parameters that are preset in the basic configuration are entered in the parameter setting sheet. If the preset parameters are changed with the use of the User Terminal, the changes can be entered on the parameter setting sheet in a further column.

- ♦ Each component is listed with its parameters and pre-defined settings.
- ♦ Each component of the input or output modules has a parameter <socket number>. These particulars identify the physical socket number for the components. This information is needed to assign the connection plugs.
- ♦ The displayed parameters can all be displayed on the User Terminal. Parameters which cannot be edited are displayed the following way: [Hardware id.]. All other parameters can be edited.
- ♦ The meanings and functions of the parameters, and their setting ranges are described at the corresponding locations. (see section C: Components of the signal-flow chart)

Example of a parameter configuration sheet):

Brüel & Kjær Vibro

User-defined settings for VC-6000™ Compact monitor CV-111-1-X				
Customer:		Quotation no. / Order no.:	Date: 03.12.2009	
		Material no.: C100596.001	Serial no.:	
No.	**Monitoring of absolute casing vibration according DIN ISO 10816**			
1	AC power supply (85-264 V / 50-60 Hz):		**CV-111-1-AC**	
2	DC power supply (20-75 VDC):		**CV-111-1-DC**	
	Parameter settings			
		Works pre-settings	**Channel 1**	
10	**Transducer**		**Sensor 1**	
11	CCS accelerometer (fixed setting)	e.g. AS-062		
12	Sensitivity	100 mV/g		
13	AC input range peak	100 mm/s		
14	Sensor OK latching	no		
20	**Measurement**		**RMS 1**	
21	Parameter (fixed setting)	RMS velocity	RMS velocity	
22	Unit (mm/s OR ips)	mm/s		
23	Averaging time	0.8 s		
24	**ISO HIGHPASS 1** (1, 2 OR 10 Hz)	10 Hz		
25	**ISO LOWPASS 1** (fixed setting)	1 kHz	1 kHz	
26	Full-scale measurement range	20 mm/s RMS		
30	**Analogue DC output**		**DC-OUT 1**	
31	Signal type	4 - 20 mA		
32	Output value range & unit	0 - 20 mm/s		
33	Non-linear output curve	no		
34	Additional fix point(s)	-		
40	**Monitoring Limit 1**		**MONI(ABS) 1**	
41	Limit type	high		
42	Limit setpoint	7.1 mm/s		
43	Hysteresis	0.1 mm/s		
44	Alarm delay	1 s		
45	**Alert Relay**		**RELAY 1**	
46	Voting logic (fixed setting)	no		
47	Normal position energized	no		
48	Relay latching (alarm hold)	no		
50	**Monitoring Limit 2**		**MONI(ABS) 2**	
51	Limit type	high		
52	Limit setpoint	11.0 mm/s		
53	Hysteresis	0.1 mm/s		
54	Alarm delay	1 s		
55	**Danger Relay**		**RELAY 2**	
56	Voting logic (fixed setting)	no		
57	Normal position energized	no		
58	Relay latching (alarm hold)	no		
100	**Comments:**			
101	**Date:**	**Name of customer:**		**Signature of customer:**

Version 05.03 page 1 of 1

7 The configuration sheet

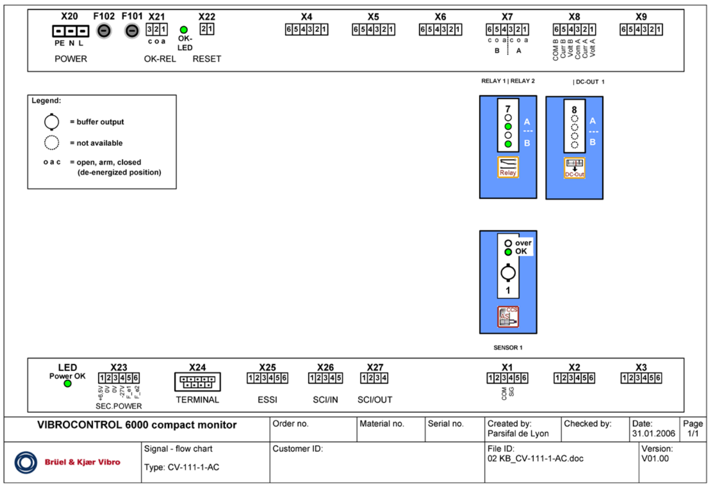
7.1 Configuration

Various information is evident from the configuration sheet:

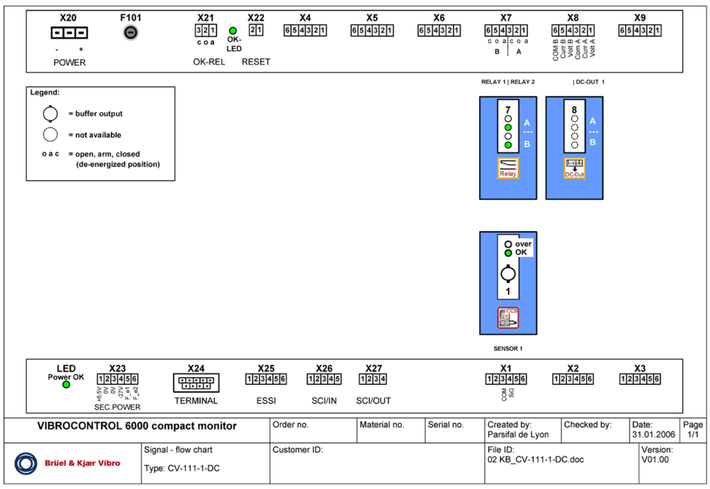
- Which module is to be found at which physical socket position
- How the connection plugs are laid out
- Which LEDs are assigned to which channels.

This information is required to be able to put a *VIBROCONTROL 6000 Compact monitor* into operation.

Example of a configuration sheet:



AC



DC

Explanation of the example:

- In this example not all the available sockets are occupied. Depending on the monitoring task, it is possible that not all or other module sockets will be necessary in a particular case.
- The sensor modules are at sockets 1 and 3. In the example these are respectively input modules for AS- sensors (CCS).
- The 2-channel relay output modules are at sockets 7 and 9.
- The 2-channel DC output modules for voltage/current outputs is located at socket 8.

7.2 Plug to socket position arrangement (in the example):

Connection plug	Physical socket of the module	Module in example configuration	Description on housing cover
X1	X1_M	A-TIM (CCS)	1
X2	X2_M	Not used	2
X3	X3_M	A-TIM (CCS).	3
X4	X4_M	Not used	4
X5	X5_M	Not used	5
X6	X6_M	Not used	6
X7	X7_M	RELAY-OUT (2-ch.)	7
X8	X8_M	DC-OUT (2-ch.)	8
X9	X9_M	RELAY-OUT (2-ch.)	9

7.3 Connection plug layout

The connection plug layout differs according to the input, respectively output modules used. In the description of the Base module (section B – Modules Technical data) all layout options are given.

8 System reliability

8.1 Standards conformity

Safety

EN 61010-1 “

CB Test Certificate

IEC 61010-1

EMC

EN 61326-1 “

Temperature

DIN EN 60068-2-1 : 1995-03	Cold	20 °C Working -40 °C Storage
DIN EN 60068-2-2 : 1994-08	Dry heat	+65 °C Working +85 °C Storage

Note:

If the VC-6000 Compact monitor is mounted in a protective housing AC-2112, the following temperature ranges are recommended:
-20 °C… +40 °C (ambient temperature).

Housing

EN 60529: Housing protection class (IP-Code): IP 20

Electrical and electronics law (ElektroG)

WEEE-Reg.-No.: DE 69572330

Product category / application area: 9

8.2 Technical data

Housing

Protection class	IP 20
Dimensions	311 x 170 x 113 mm (width x height x depth)
Weight, housing (empty)	approx. 1,5 kg
Weight, base module	approx. 450 g
Weight, plug-in module	approx. 35 g
Material	St 12 ZE 25/25, Surface powder-sprayed
Operating temperature range	-20 °C to +65 °C [1]
Storage temperature range	-40 °C to +85 °C
Maximum humidity	95% non condensing
Mounting	**according to regulation, in a control cabinet or protective housing!**

Electrical power requirements

AC power supply

Input voltage range	90 ... 264 V AC
Frequency range	50 / 60 Hz
Maximum power consumption	40 VA
Power supply LED display	Green = OK, OFF = Interruption
Instrument fuses (F101, F102)	T2A IEC 127 size 5 x 20 mm

CAUTION!

The voltage supply may be connected only by isolating equipment (e.g. a switch or circuit-breaker).

The device used an an isolator must fulfil the requirements of IEC 60947-1 and IEC 60947-3 and be suitable for the application.

CAUTION HIGH VOLTAGE!

The housing cover of the* VIBROCONTROL 6000 Compact monitor *may be removed only by technical personnel!!

[1] Due to the principle conditions of heat development of the current outputs of the DC output modules, a maximum of 3 DC output modules can be permitted at this ambient temperature.

DC power pack

Input voltage range	20 ... 75 V DC
Maximum power consumption	22 W
Power supply LED display	Green = OK; OFF = Interruption
Equipment protection	T 3, 15A IEC 127 size 5 x 20 mm

Caution!

Maximally 75 V smoothed DC voltage may be attached

Advice:

The PE connection of the power supply is linked to the housing !

8.3 Operational safety of *VIBROCONTROL 6000 Compact monitor*

8.3.1 OK-monitoring function

The OK-monitoring function monitors the following:

- The power supply
- The microprocessor system
- The A/D converter
- The module equipment
- The connected sensors

When a fault occurs at one of the above, the LED is extinguished and the associated OK-relay will change over contacts (normally-energised). The OK-relay has potential-free contacts.

Each OK-fault is recorded in the Logbook. In the case of a serious system error it is possible that no logbook entry will be recorded.

The OK-LED signals an error number by way of a flashing sign. Please note the detailed information in section D „Dialogue with the User-Terminal“, chapter „Logbook“.

Electrical voltages supplied from an external source may be connected to the relay contacts! Please note that making contact with these voltages at the relays may cause injury or damage, even if the power to the VIBROCONTROL 6000 Compact monitor itself is switched off.

The OK-relay in the User-terminal dialogue:

- In the dialogue there are one parameter for the OK-relay:
  - ◊ Reset
- The parameter <Reset> in the dialogue will reset the latching OK-relay after a fault has occurred, on condition the fault no longer exists.
- A further possibility for resetting the OK-relay is the parameter <Confirm> in the dialogue in the block USER MENUS. This parameter has the option <Reset all>. The OK-relay will also be reset with this option.
- In addition the central OK-relay can also be reset remotely using a push-button connected to the Reset input on the Base module (X22).
- When the monitoring function of the system is switched off (USER MENU – Monitoring), an OK fault will be reset, but the OK-relay will only be switched back to the fault-free status when the monitoring function is activated once more.

8.3.2 Channel over-ranging identification function

Each A/D converter channel is permanently monitored for over-ranging. Should it detect an over-range condition at an input channel, this is signalled by the red LED on the input module (sensor interface or BCU CON module). Furthermore a corresponding entry is recorded in the logbook.

8.3.3 LED signal at a relay module

- As a rule a relay output signal is:directly controlled from a Monitor block. If this occurs the LED at the relay output module is used to signal the monitoring status and relay status. Each relay output has 2 LEDs for this purpose, a green LED and a two-colour (red and yellow) LED.
- The LEDs at the relay module signal two bits of information:
  - ◊ Functional status of the associated relay output
  - ◊ Announcement status of the preceding Monitor block (Logic block)

Switch conditions and their meaning

- ♦ The green LED shows the current status of a relay output.
  - Relay enable off:
    The relay does not operate, a limit violation is displayed only by the LEDs
  - Relay enable on:
    The relay operates with a limit violation
- ♦ The red LED signals an existing announcement status, which as a rule is linked to an existing Alert or Danger alarm.
- ♦ The yellow LED is used for signalling supplementary information, e.g. <Trip override> active, or <Relay latching> active.

Note:

The status of the logical connection between the conditions of TRIPOVERRIDE and ACKNOWLEDGE can be queried as a parameter in the Logic block using the User Terminal.

LEDs – Status and meanings:

Case	LED green		LED yellow	LED red	Meaning
	enabled	disabled			
1	green	green	off	off	There are no violations.
2	green	green	off	red	A limit violation exists that has not been reset.
3	green	green	off	red	A limit violation exists that has been reset.
4	green	green	off	red	A limit violation existed but is no longer present. The limit violation has not been reset.
5	green	green	yellow	off	Only with latching relay output: A limit violation existed that has been reset. The relay is still latched and has not been reset.
6	green	green	yellow	off	<Trip override> active
7	green	green	off	red	A limit violation has occurred but no longer exists. The violation has not been acknowledged. The relay was latched but has been reset.
8	green		yellow	red	Relay has an error function
9		off	off	off	Relay not configured
10					Wrong TIM module or TIM module corrupted

Legend:

Green LED	Meaning	Status of the LEDs	Meaning
			LED is off
	Relay is enabled		LED is on
	Relay is disabled		LED flashing at 0,5 Hz
	Relay in service		LED flashing at 2 Hz
			LED flashing at 8 Hz

8.3.4 Instrument conduct after a power failure

If there is a power failure the *VIBROCONTROL 6000 Compact monitor* will be shut down and thus the monitoring function as well. In this case a Logbook entry is always recorded.

After restoration of the power the *VIBROCONTROL 6000 Compact monitor* re-initialises and auto-matically resumes its monitoring functions. A Logbook entry is also recorded.

Alarm signals that existed before the power failure will only be recorded in the Logbook and will no longer exist, i.e. a system cold start always effects a complete reset of the *VIBROCONTROL 6000 Compact monitor .*

♦ **Redundant power supply**

To reduce the risk of power drop-outs of the *VIBROCONTROL 6000 Compact monitor* , a second external power supply should be connected to entrance connector X23. (Connection details can be found in section B.) If the primary power fails this will be signalled over the message management Prim. Power Fail (Pin 5) and Sec. Power Fail (Pin 6)). An entry will be recorded in the Logbook. The second power supply will take over supplying power to the *VIBROCONTROL 6000 Compact monitor.* The monitoring function can then continue without interruption.

♦ **Signalling of the power supply by LED**

In the area of connector X23 for the redundant power supply you will see a green LED. This LED signals the system status. This LED signals the status of the power supply. If the LED is off there is a fault in the power supply.

8.3.5 Error signalling through the DC output

An error in the signal path (saturation, sensor OK-fault) is signalled through the DC output. The output value in case of an error is set to a fixed value corresponding to the selected parameter setting, whereby a distinction must be made between two different cases:

1. **Signal output 4...20 mA / 2...10 V:**

   If an error occurs the output signal will drop to 2 mA or 1V.

2. **Signal output 0...20 mA / 0...10 V:**

   If an error occurs the current output value will drop to 0 mA or 0 V

☛ Further information about DC outputs can be found in section B – Module Technical Data and section B – Components (DC-output block)

8.3.6 Significance of the logbook

Various events are recorded in the logbook. These events are divided into three groups.

1. System messages (incl. errors in the monitoring system)
2. System access (changes in parameters of the monitoring system)
3. Monitoring events

The Logbook is displayed in a block in the dialogue of *VIBROCONTROL 6000 Compact monitor* and can be viewed with the User Terminal.

More information about the contents and use of the Logbook can be found in chapter 2 of section D „Dialogue with the User Terminal“

8.3.7 Calibration

We recommend that the *VIBROCONTROL 6000 Compact monitor* be calibrated every 5 years. This will ensure that the correct functionality of the system is checked, and that the certification according to the quality standard is maintained.

The last calibration date can be called to the dialogue with the User Terminal.

This is found in the System block under System Info.

User Terminal button	USER MENU
NEXT	REFERENCE TIME
NEXT	SYSTEM
NEXT	LOGBOOK
ENTER BUTTON	SYSTEM System Info
ENTER BUTTON	System Info Equipment No.
NEXT (repeat until <Last Calibr.> appears	System Info Last Calibr.
ENTER BUTTON	Last Calibr. 03.03.2003
ESCAPE	SYSTEM System Info.

The last calibration date can only be read with the User Terminal but cannot be changed!

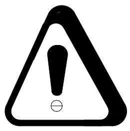
More detailed information about the handling with the User Terminal can be found in section D „Dialogue with the User Terminal“

9 Mounting and Installation

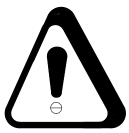
9.1 Safety advice

The general safety advice of Brüel & Kjær Vibro GmbH is applicable.

- The safety advice must be read and understood before putting the instrument into operation!



- All installation work must be carried out without power to the instrument!
- If parameters setting changes are to be carried out during operation, you should take into consideration the effect of the changes on the active monitoring function!
- Switch off the power to the instrument before cleaning!
  The instrument can be cleaned using a damp cloth. Do not spray water or any other fluids onto the instrument!
- Connect only the power specified on the name plate!
- All cables must be laid out in such a manner that they cannot be damaged!
- Observe all grounding instructions for the instrument and screened cables!
- Electro static discharge upon the connectors may cause damage!

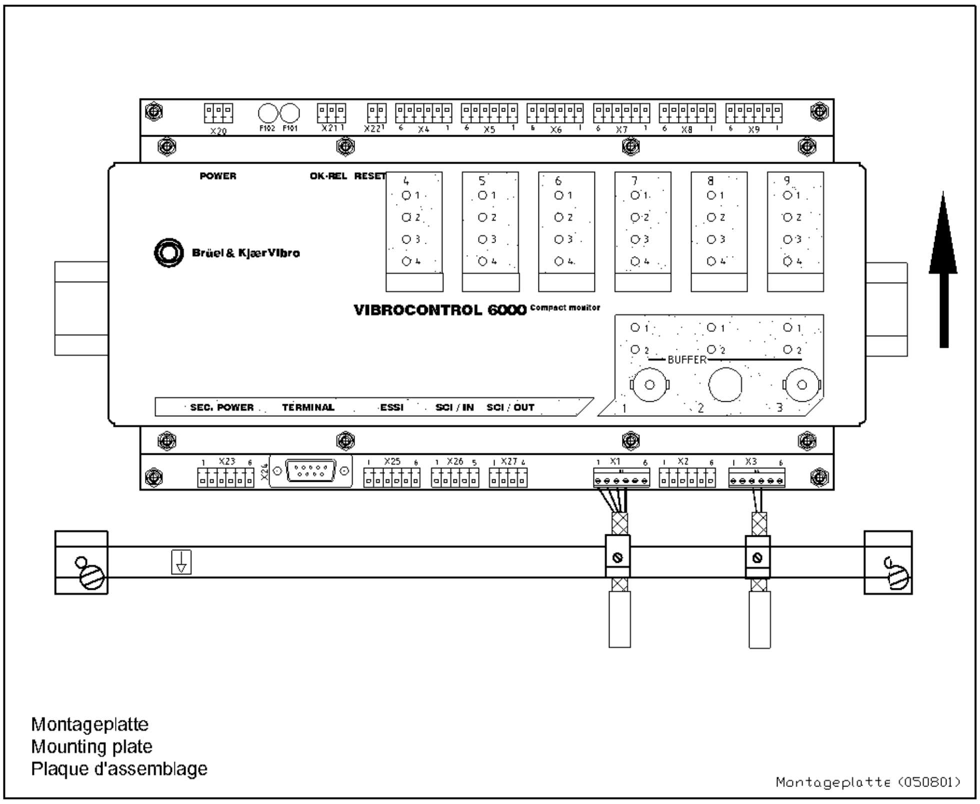


- CAUTION! The voltage supply may be connected only by isolating equipment (e.g. a switch or circuit-breaker).The device used an an isolator must fulfil the requirements of IEC 60947-1 and IEC 60947-3 and be suitable for the application.

9.2 Site conditions

With the installation of the *VIBROCONTROL 6000 Compact monitor* the following requirements for site conditions must be observed:

- *VIBROCONTROL 6000 Compact monitor* is designed for mounting onto a mounting rail according to DIN EN 50022.
- *VIBROCONTROL 6000 Compact monitor* is to be mounted horizontally on the mounting rails, see drawing:



Hinweis:

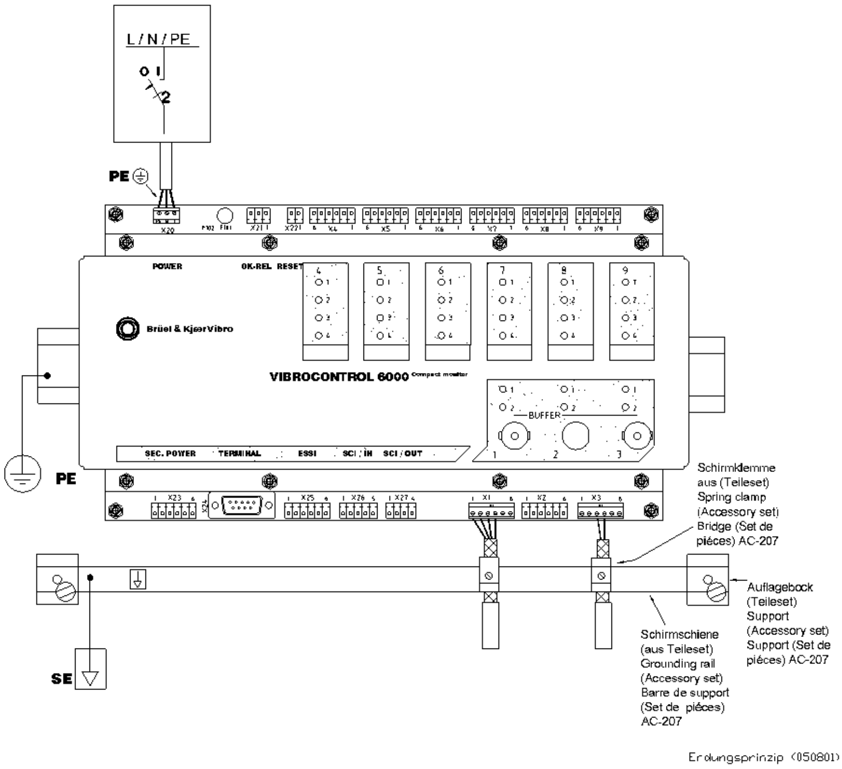
The assembly of the VIBROCONTROL 6000 Compact monitor must not be undertaken in areas with permanent vibrations. Possibly a vibration-isolated installation must be implemented.

Grounding concept for VIBROCONTROL 6000 Compact monitor

Optimum screening is obtained, when a separate protective ground (SE) to the potential-equalisation ground (PE) is available.

- The screen of the connecting cable should be made flat when being connected to the grounding rail.
- The housing of the *VIBROCONTROL 6000 Compact monitor* is connected through the power supply and mounting rail to PE.
- Further advice for correct grounding of the housing and cable screens can be found in the brochure „General grounding prescriptions".
- Ideally the grounding rail should be isolated from PE and connected to a separate protective ground. For this purpose the isolated supports (AB/SS) in the accessory set should be used for securing the collective rail.
- If there is no separate protective ground available for the screen rail, a connection to the mounting plate can be made with the supports which make contact (AB/SS-M).
- All input signals (X1 / X2 / X3) are to be connected to the *VIBROCONTROL 6000 Compact monitor* through screened cables. The cable screens should be made flat when being connected to the grounding rail.

Grounding concept for VIBROCONTROL 6000 Compact monitor



9.3 Mounting the instrument

9.3.1 Mounting on a rail according to DIN EN 50022

- ♦ The mounting of the *VIBROCONTROL 6000 Compact monitor* has to be done according to the regulation in a control cabinet or protective housing !
- ♦ Position the *VIBROCONTROL 6000 Compact monitor* on the rail and push downward until the instrument clips onto the rail.
- ♦ Check that the *VIBROCONTROL 6000 Compact monitor* is securely fixed to the rail!

9.3.2 Removing from a rail

- ♦ For removal from a rail you need an adequately large, flat screwdriver.
- ♦ First of all lever one side of the clip device downward using the screwdriver.
  Then loosen the housing of the *VIBROCONTROL 6000 Compact monitor* from the rail on the same side by hand.
- ♦ Then lever the other side clip device downward using the screwdriver. Now loosen this side of the housing from the rail.
- ♦ The *VIBROCONTROL 6000 Compact monitor* can now be removed.

9.4 Making the connections

The electrical connections to the *VIBROCONTROL 6000 Compact monitor* may be carried out only by technical personnel!

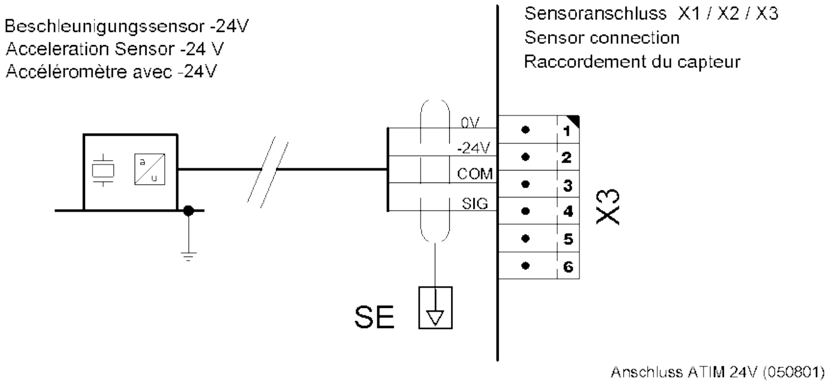
It is important to observe the grounding instructions!

Depending on how the *VIBROCONTROL 6000 Compact monitor* is built up various connections will be made. See the corresponding configuration sheet for the instrument to determine which modules are contained in the *VIBROCONTROL 6000 Compact monitor .* (See also chapter 8 „Commissioning“).

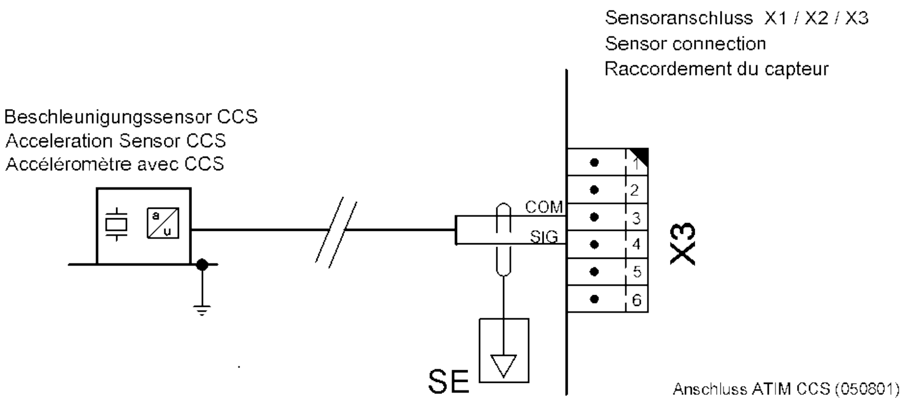
9.4.1 Wiring and connection of sensors

The following connection diagrams are principle illustrations; please always observe the corresponding documentation, the sensors that will be connected or the subsequent electronics!

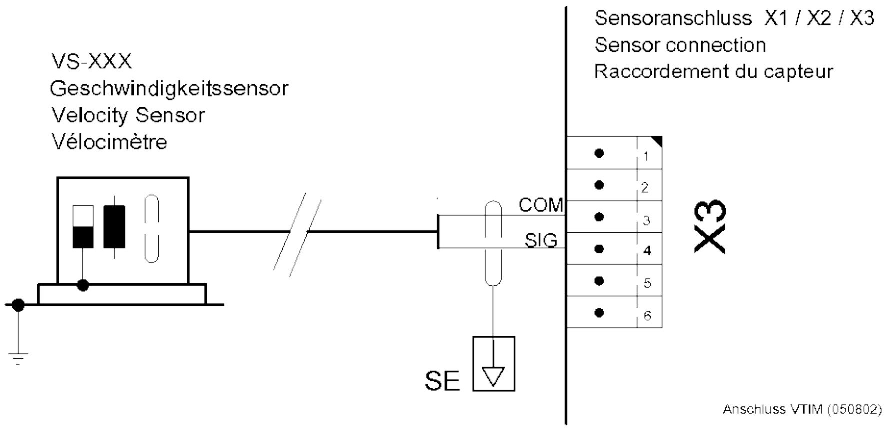
9.4.1.1 Acceleration sensors with –24 V DC power at A-TIM (-24 V)



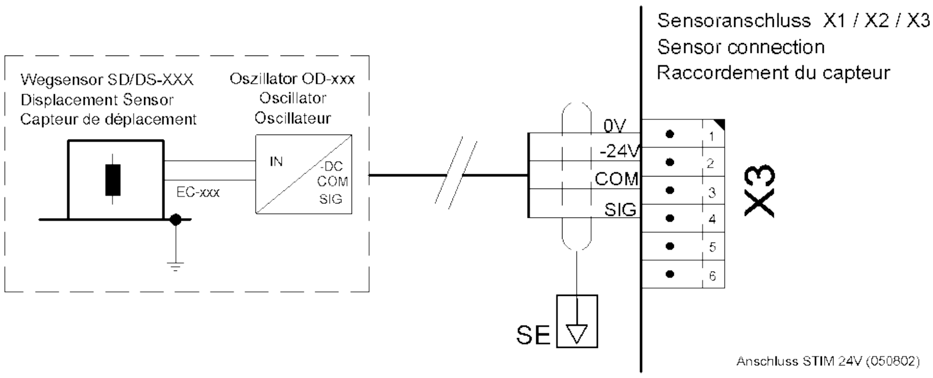
9.4.1.2 Acceleration sensors with constant-current power (CCS) at A-TIM (CCS)

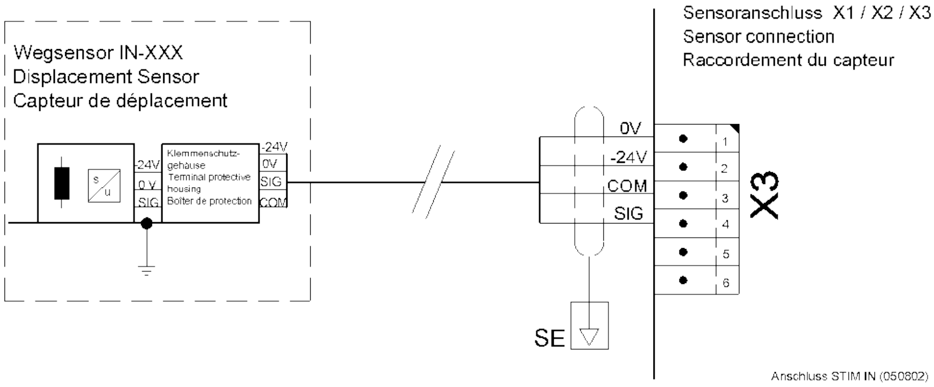


9.4.1.3 Vibration velocity sensors at V-TIM (8 Hz/15 Hz)

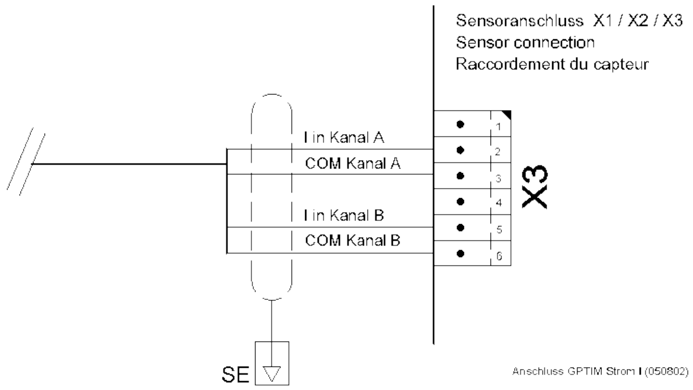


9.4.1.4 Displacement sensors at D-TIM

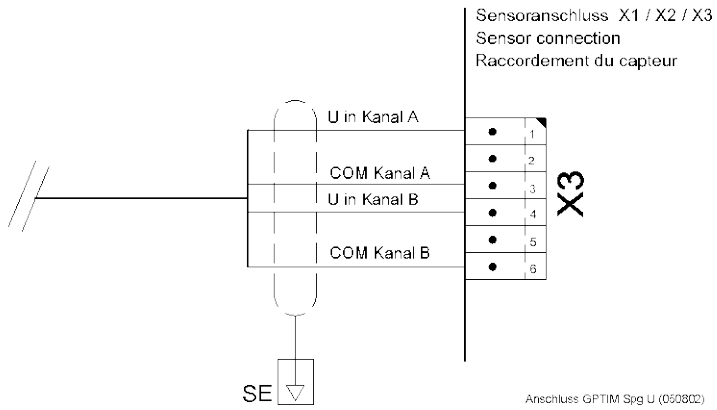




9.4.1.5 0/4..20 mA signals at GP input module (GP-TIM)



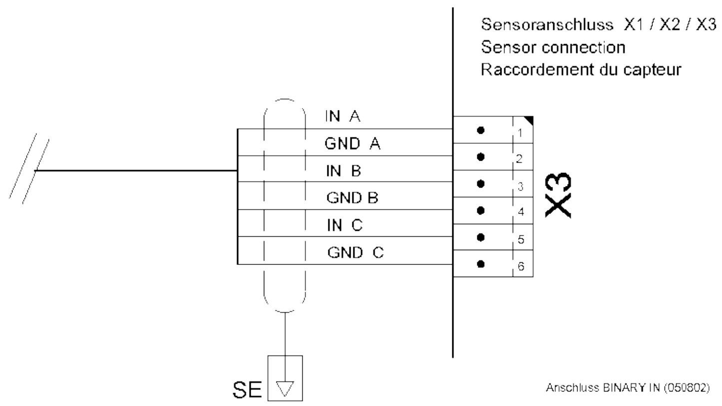
9.4.1.6 0/2...10 V signals at GP input module (GP-TIM)



Note:

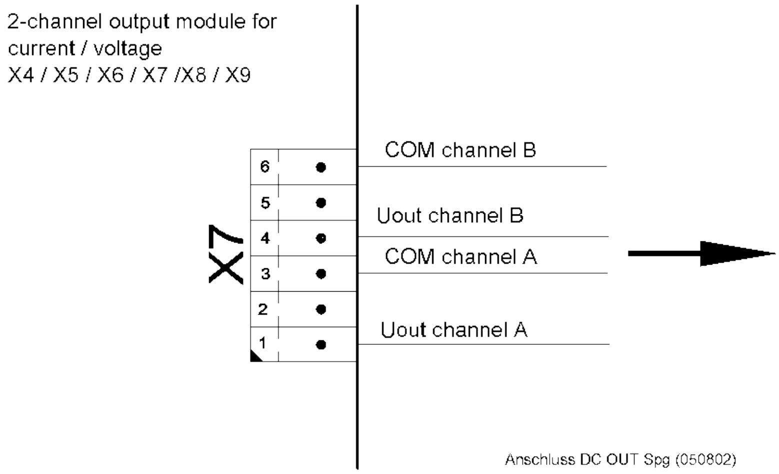
*At one GP-TIM either **two current inputs** or **two voltage inputs** can be used. A mixture of the two signal types at one GP-TIM is not possible!*

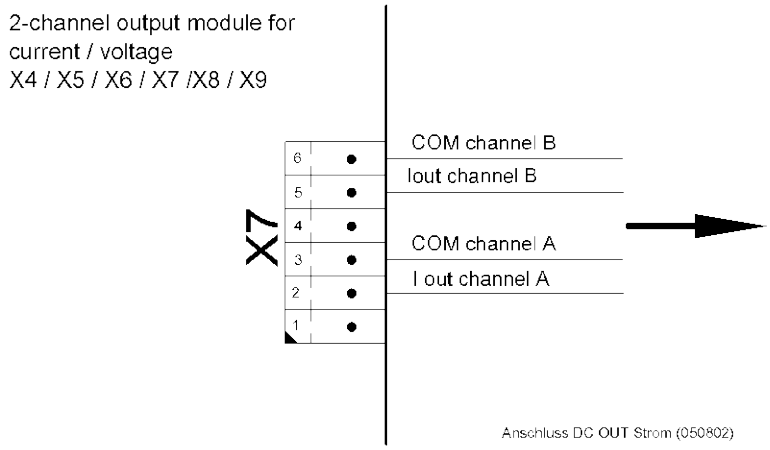
9.4.1.7 3-channel input module for binary status signals



9.4.2 Wiring and connection of peripheral equipment

9.4.2.1 DC output at DC-OUT (2-ch.)

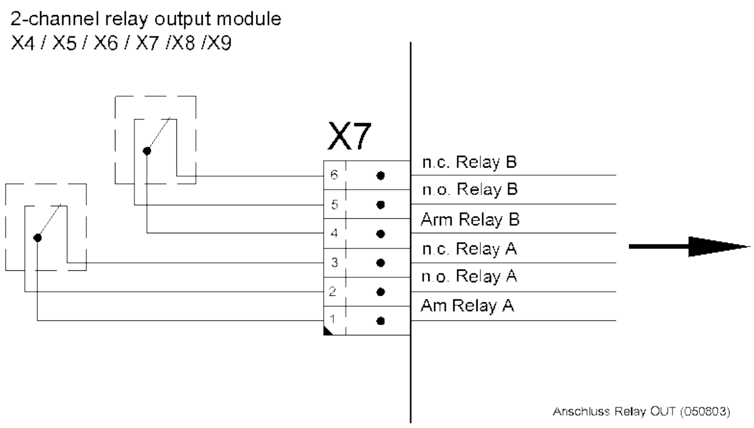




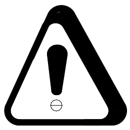
Note:

A current or a voltage output signal may be selected for each channel separately. They do not have to be the same type of output signals !

9.4.2.2 Relay output at RELAY-OUT(2-ch.)



CAUTION:

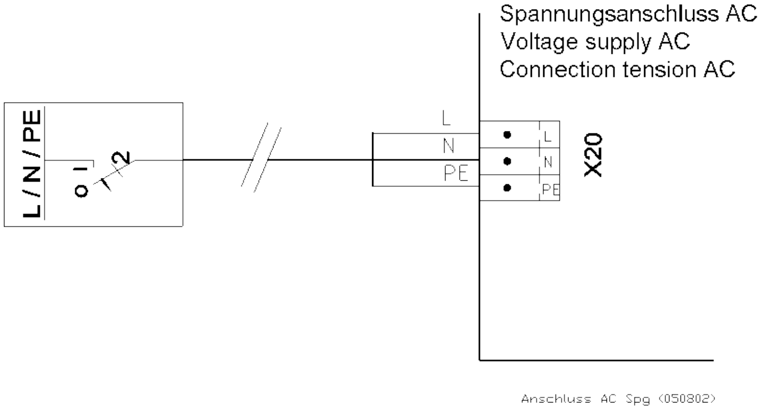


Because external voltages are connected to the relay contacts, there may be dangerously high voltages at these contacts even after the power to the VIBROCONTROL 6000 Compact monitor has been switched off.

The maximum voltages and switching capacity of the relays must be strictly observed (see section B: Relays technical data).

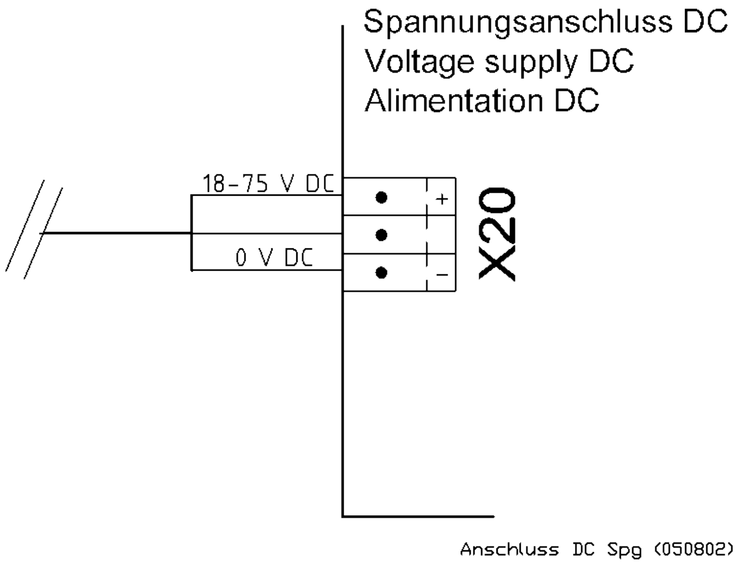
9.4.3 System connections

9.4.3.1 AC power supply



Recommended cross-sectional area for the connecting cables: 1,5 mm²

9.4.3.2 DC power supply

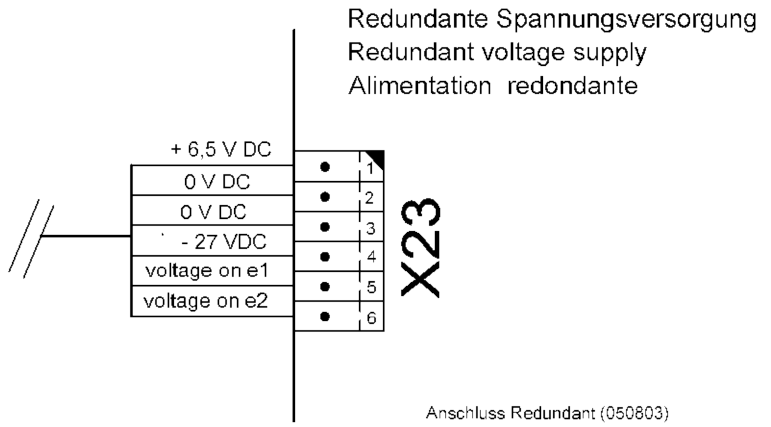


Recommended cross-sectional area for the connecting cables: 1,5 mm²

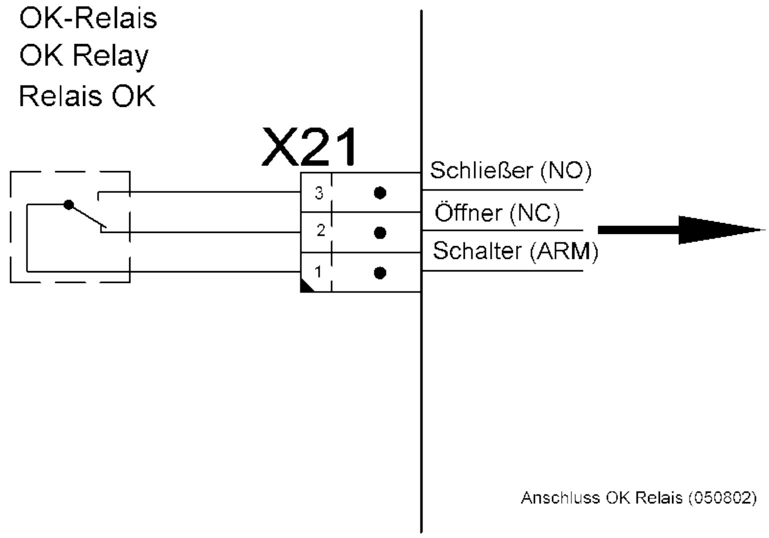
Caution!

Maximally 75 V smoothed DC voltage may be attached

9.4.3.3 Redundant power supply input

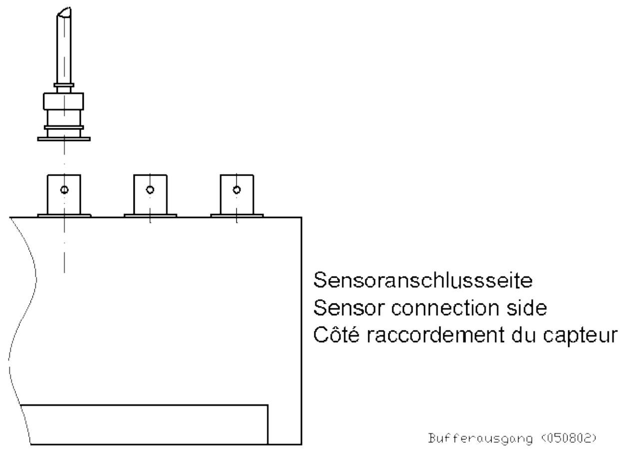


9.4.3.4 OK relay

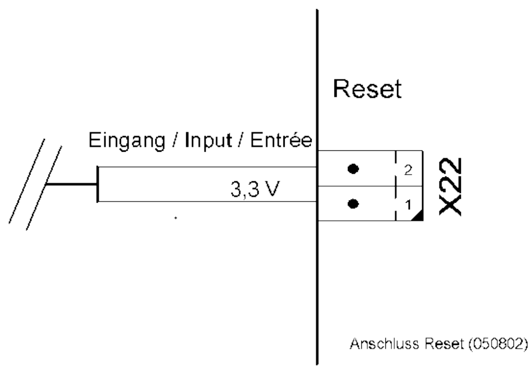


9.4.3.5 Buffered outputs

The buffered outputs are at BNC sockets, located on each sensor input module.



9.4.3.6 Reset input



CAUTION!

The peripheral components connection variants shown here do not claim to be comprehensive or complete.

Please also consult the technical documentation of the peripheral equipment you wish to connect to the* VIBROCONTROL 6000 Compact monitor*!

9.5 Commissioning and function testing

9.5.1 Commissioning

♦ Signal-flow chart and configuration sheet

An individual signal-flow chart and configuration sheet exists for each *VIBROCONTROL 6000 Compact monitor .*

These two documents can be found at two locations:

1. In a document pocket on the housing cover of the *VIBROCONTROL 6000 Compact monitor* . The document pocket has an adhesive strip which you can use to attach it e.g. to the control cabinet door. The document pocket with the individual instrument documents should be secured in the near vicinity of the installed *VIBROCONTROL 6000 Compact monitor f*or ready access.
2. In section individual instrument documentation of the handbook.

♦ **Checking the instrument** using the signal-flow chart and the configuration sheet:

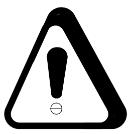
The signal-flow chart shows the structure of the *VIBROCONTROL 6000 Compact monitor ;* the configuration sheet shows the physical construction and the connection plug layout.

Using this documentation please check your *VIBROCONTROL 6000 Compact monitor .*

♦ **Making the connections**

The connections should be made only by technical personnel!

The connections for the input signals, output signals, reporting signals and power supply can be identified using the configuration sheet.



We recommend that the connections be made in the following sequence:

1. The input signals (sensors) = X1 / X2 / X3
2. The output signals (current/voltage outputs, relays) = X4 to X9
3. The reporting signals (OK relay, Power fail) = X21, X23
4. The power supply = X20

♦ **How to switch on?**

After establishing the power supply the *VIBROCONTROL 6000 Compact monitor* will be switched on. The instrument will self-load the firmware in the back-ground of the Flash memory.

- **What happens after the start-up?**

  The *VIBROCONTROL 6000 Compact monitor* is configured to correspond to the require-ments of the application. When all the sensors are correctly installed the monitoring task proceeds 10s after being switched on.

  In applications that contain at least one V-TIM the settling time amounts to approx. 45 seconds. During this time all modules, i.e. all LEDs, relays and current outputs, assume the condition they had at the last save action.

  If there is an error on the side of the sensors, this will be signalled by the LEDs on the sensor modules and the relay modules and by the OK LED (Please consult also chapter 8.3.3).

- **What to do in case of an error?**

  In case of an error we recommend that you connect the User-terminal and check out the contents of the logbook.

9.5.2 Function testing

- **How will I know that the** *VIBROCONTROL 6000 Compact monitor* **is functioning correctly?**

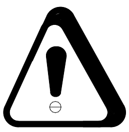
  All LEDs will be green and the connected outputs will be signalling no errors.

- **What are the meanings of the LED signals at the sensor and relay modules?**

  Please consult chapter 6.2.3

- **Function testing with the User Terminal**

  We recommend that you check all the settings with the User Terminal after the instrument start-up.



  Connect the User Terminal to the *VIBROCONTROL 6000 Compact monitor* at the connection plug X24 (DSUB connection). The User Terminal will login with a display of the Start screen, or the request for entry of the CLOCK REFERENCE (date and time) will appear.

  It is important that the CLOCK REFERENCE (date and time) be set up so that future entries in the logbook can be correctly recorded.

  When you carry out the CLOCK REFERENCE set-up consult section D „Dialogue with the User-terminal“.

  Then check out the parameter settings entered in the signal-flow chart.

- **Are the parameter settings correct?**

  Now check the signal-flow chart for the parameter settings entered there.

  The *VIBROCONTROL 6000 Compact monitor* is configured to correspond with the require-ments of the application. As a rule the sensor settings, processing criteria and limit setpoints will correspond to the works pre-settings.

  These works pre-settings must be adapted to the known monitoring task (e.g. other sensor sensitivity, other limit setpoint settings.

  These changes can be made with the User Terminal using the SUPER USER password. (See section D: Dialogue with the User Terminal)

10 Digital Communication

The *VIBROCONTROL 6000 Compact monitor* is able to export its continuously acquired measurement data also as digital data. For this purpose an OPC interface, which can optionally be integrated in a TCP/IP Ethernet network, is available. With this function the *VIBROCONTROL 6000 Compact monitor* is a data source which makes your measured data and status information available to a OPC-server *(OPC DA-server – Type 7131)* in a prepared form.

Through the use of the OPC-interface it is possible to pass the data further to process visualization systems.

For the data transfer the SCI-interface of the *VIBROCONTROL 6000 Compact monitor* is used together with an RS-232 converter (AC-5004).

If the *VIBROCONTROL 6000 Compact monitor* is connected to a network, a Gateway (AC-5002) is also required.

Detailed information about the SCI-interface can be found in section
B – Basic module.

Infomation about the configuration of this interface can be found in section
C – COM-Block.

Infomation about the OPC-server can be found in the OPC DA-server – Type 7131 handbook.

Infomation about the RS-232 converter is found in the AC-5003 data sheet.

Information about the Gateway is found in the AC-5002 data sheet.

11 Typical measurement tasks

11.1 General

As a rule the parameters to be set up are dependent on the application. All the parameters of an application are marked in the signal-flow chart.

The parameters that can be changed are correspondingly identified.

Some parameters are always set the same at our works. These parameters are dealt with in the next chapter.

11.2 Works settings for the basic configurations

11.2.1 Absolute housing vibration according to DIN ISO 10816

	
Input sensitivity	For vibration acceleration sensors 100 mV/g For vibration velocity sensors (e.g. VS-068/VS-069) 100 mV/mm/s
Measurement type	RMS value of vibration velocity from 10 Hz to 1 kHz
Measurement range	0...20 mm/s RMS with a Crest Factor 5 (= 0 ... 100 mm/s input range)
Averaging time	800 ms
Measurement accuracy	< 0,75 % of measured value (with analogue integration < 2,75 % of measured value) plus 0,1 % of measurement range full-scale value
DC-output	4 ... 20 mA corresponding to 0 ... 20 mm/s RMS
Monitoring	Alert alarm: Limit value 7.1 mm/s; relay delay time 1 s Danger alarm: Limit value 11 mm/s; relay delay time 1 s
Relay output	Alert alarm: Normally de-energized, non-self-latching Danger alarm: Normally de-energized, non-self-latching

11.2.2 Rolling-element Bearing Condition Unit – BCU

Input sensitivity	For vibration acceleration sensors 100 mV/g
Measurement range	0 ... 100 BCU
Averaging time	1 s
Measurement accuracy	< 4,5 % of measured value plus 0,2 % of measurement range full-scale value
Monitoring	Alert alarm: Limit value 1 BCU; relay delay time 1 s Danger alarm: Limit value 2 BCU; relay delay time 1 s
Relay output	Alert alarm: Normally de-energized, non-self-latching Danger alarm: Normally de-energized, non-self-latching

11.2.3 Rolling-element bearing condition BC-BP (bearing condition bandpass)

Input sensitivity	For vibration acceleration sensors 100 mV/g
Measurement type	RMS value of vibration acceleration from 1 kHz to 10 kHz
Measurement range	0 ... 16 g RMS at a Crest Factor of 5 (= 0 ... 80 g peak value)
Averaging time	800 ms
Measurement accuracy	< 0,75 % of measured value plus 0,2 % of measurement range full-scale value
Monitoring	Alert alarm: Limit value 1 g; relay delay time 1 s Danger alarm: Limit value 4 g; relay delay time 1 s
Relay output	Alert alarm: Nromally de-energized, non-self-latching Danger alarm: Normally de-energized, non-self-latching

11.2.4 Relative shaft vibration acc. to DIN ISO 7919

	oder	
Input sensitivity	For displacement sensors 8 mV/µm	
Measurement type	s_{max} in the frequency range from 10 Hz to 1 kHz resp. Max (x,y) peak-peak in the frequency range from 10 Hz to 1 kHz	
Measurement range	0 ... 250 µm for s_{max} / 0 ... 500 µm for Max (x,y)	
Peak-value detector	Rise-time 3 ms, decay-time 5 s	
Measurement accuracy	for peak-peak < 0,75 % of measured value / for s_{max} < 1% of measured value plus 0,1 % of measurement range full-scale value	
DC-output	4 ... 20 mA corr. to 0 ... 250 µm (s_{max}) resp. 0 ... 500 µm (Max (x,y))	
Monitoring	Alert alarm: Limit value 50 µm resp. 100 µm; relay delay time 1 s Danger alarm: Limit value 70 µm resp. 140 µm; relay delay time 1 s	
Relay output	Alert alarm: Normally-de-energized, non-self-latching Danger alarm: Normally de-energized, non-self-latching	

11.2.5 Axial shaft position

Inuput sensitivity	For displacement sensors - 8 mV/µm
Measurement type	Static displacement (DC-value) of axial shaft position
Measurement range	-1 ... + 1 mm
Averaging time	1 s
Measurement accuracy	< 0,75 % of measured value, plus 1 % of measurement range full-scale value
DC-output	4 ... 20 mA corr. to –1 ... + 1 mm
Monitoring	Alert alarm: Limit value +/- 0,5 mm; relay delay time 1 s Danger alarm: Limit value +/- 0,8 mm; relay delay time 1 s
Relay output	Alert alarm: Normally de-energized, non-self-latching Danger alarm: Normally de-energized, non-self-latching

11.2.6 Process value

Input sensitivity	4 ... 20 mA corr. to 0 ... 150 eu
Measurement type	Quasi-static process value (DC-value)
Measurement range	0 ... 150 eu
Averaging time	1 s
Measurement accuracy	< 1 % of measured value plus 0,1 % of measurement range full-scale value

11.2.7 Speed

Input sensitivity	1 mV/mV
Measurement type	Shaft speed in [rpm]
Factor & Divisor	Resp. 1 (corr. to 1 impulse per revolution)
Measurement time	0,5 s
Max. impulse interval	1 s
Measurement accuracy	Approx. 0.01 % of measured value

11.2.8 Rod-drop

Input sensitivity	For displacement sensors 4 mV/µm
Measurement type	Cycle DC-value of the geometrically corrected rod-drop
Measurement range	4 mm (without geometric correction)
Averaging time	50 cycles
Operating type	Customer-specific (one position, two positions or averaged cycle)
Measurement position in the cycle	Customer-specific
Measurement accuracy	< 0,75 % of measured value plus 1 % of measurement range full-scale value

11.2.9 Vector

Input sensitivity	For vibration acceleration sensors	100 mV/g
	For vibration velocity sensors (e.g. VS-068/VS-069)	100 mV/mm/s
	For displacement sensors	8 mV/µm
Measurement type	Vector of 1n, with magnitude and phase	
Signal detection	RMS	
Bandwidth	22 %	
Max. impulse interval	1 s	
Measurement accuracy	< 1 % of measured value plus 0,2 % of measurement range full-scale value; for phase information < 2° (valid under steady-state conditions with a measurement time > 100 ms)	

12 Contents index for the following documentation

Section B: Technical data of the modules

Section C: Description of signal-flow chart components

Section D: Dialogue with the User-terminal

For your notes:

Brüel & Kjær Vibro

EU-Konformitätserklärung / *EU- Declaration of conformity*

Hiermit bescheinigt das Unternehmen / *The company*

Brüel & Kjær Vibro GmbH
Leydheckerstraße 10
D-64293 Darmstadt

CE

die Konformität des Produkts / *herewith declares conformity of the product*

Mess – und Überwachungsgerät / *Measuring and monitoring equipment*

Typ / *Type*

VIBROCONTROL 6000 Compact Monitor

mit folgenden einschlägigen Bestimmungen / *with applicable regulations below*
EU-Richtlinie / *EU-directive*

2014/30/EU EMV-Richtlinie / *EMC-Directive*

2014/35/EU Niederspannungsrichtlinie / *Low Voltage Directive*

2011/65/EU Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten/ *EU Directive for the restriction of the use of certain hazardous substances in electrical and electronic equipment*

Angewendete harmonisierte Normen / *Harmonized standards applied*

EN 61326-1: 2013
EN 61010-1: 2010
EN 50581 : 2012

Bereich / Division
Brüel & Kjær Vibro GmbH

Unterschrift / Signature
CE-Beauftragter / *CE-Coordinator*

Ort/*Place* **Darmstadt**
Datum / *Date* **17.07.2017**

i.A.
(Niels Karg)