

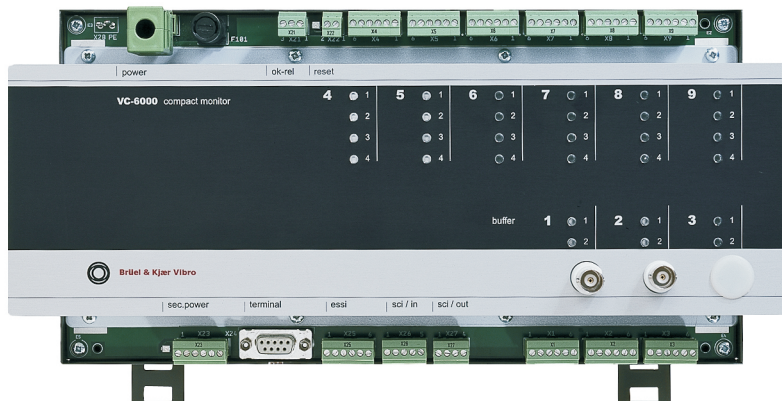


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Technische Dokumentation Technical Documentation Documentation Technique

VIBROCONTROL 6000 Compact monitor



Individuelle Gerätedokumentation
Individual instrument documentation
Documentation individuelle de l'appareil

A

Einführung
Introduction
Introduction

B

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Modules – Technical Data
Modules – Caractéristiques techniques

C

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Components of the signal flow chart
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Dialog mit dem User Terminal
Dialog with the User Terminal
Fenêtre de dialogue Terminal Utilisateur

E

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Individuelle Gerätedokumentation Individual instrument documentation Documentation individuelle de l'appareil

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- Konfigurationsblatt
- Parametereinstellblatt
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- User Terminal Passwort

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- Configuration sheet
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- Discription of configuration
- User Terminal password

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- Fiche des paramètres
- Description de configuration
- Terminal utilisateur le mot de passe

VC-6000 Compact monitor



User Terminal Superuser Passwort

Passwortgeschützter Menüzugriff

- ◆ Das Menüsystem zum VC-6000™ Compact monitor ist mit einem Passwortschutz ausgestattet. Es gibt zwei Sicherheitsstufen: USER und SUPERUSER.
- ◆ Ohne Passworteingabe wird der Benutzer als USER eingeordnet. Ein User kann nur lesend auf das Menüsystem zugreifen.
- ◆ Mit Passworteingabe wird der Benutzer als SUPERUSER eingeordnet. Ein SUPERUSER kann im Gegensatz zum gewöhnlichen USER sämtliche editierbaren Einstellungen auch ändern.

Privilegien und Zugriffsrechte eines SUPERUSER :

- ◆ den Parameter SPRACHE ändern.
Zur Auswahl stehen die Sprachen: Englisch, Deutsch, Französisch. Englisch ist die voreingestellte Sprache. Weitere Sprachen sind in Vorbereitung.
- ◆ Den Parameter REFERENZZEIT einstellen. Die REFERENZZEIT wird intern für das Erzeugen von Zeitstempeln (z.B. bei Logbucheinträgen) verwendet.
- ◆ den Parameter UEBERWACHUNG aktivieren oder deaktivieren.
- ◆ Ereignisse bestätigen und selbsthaltende Relais zurücksetzen.
- ◆ beim Abmelden ÄNDERUNGEN SPEICHERN oder VERWERFEN.
- ◆ PARAMETER-EINSTELLUNGEN der Signalfussgraphkomponenten ÄNDERN.

Das Passwort für Ihren VC-6000™ Compact monitor:

1000

Sicherheitshinweise:

- Das Passwort sollte nur an fachkundiges Personal weitergeben werden !
- Schützen Sie Ihre Überwachungsanlage vor Missbrauch !



Brüel & Kjær Vibro

A

Einführung
Introduction
Introduction

VC-6000 Compact monitor

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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!

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

The Safety requirements and Grounding recommendations are given separately with this manual.

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 operationally 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.

Commissioning!

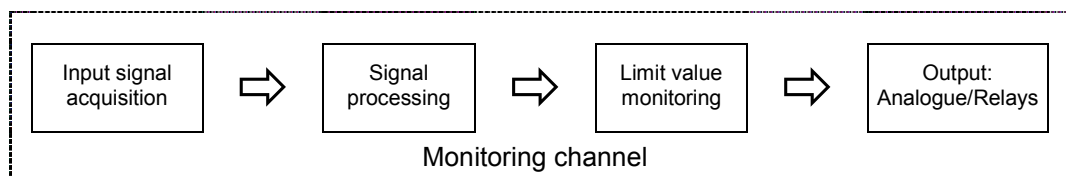
Commissioning may only be performed by trained personnel!

2 What is a VIBROCONTROL 6000 Compact monitor ?

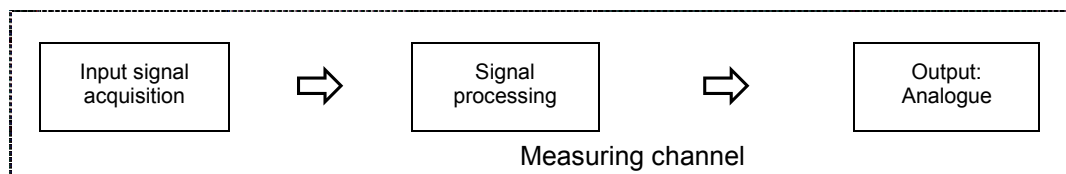
A VIBROCONTROL 6000 Compact monitor (VC-6000™ Compact monitor) is a measuring and monitoring system for machine safety monitoring and condition-oriented machine maintenance.

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:



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



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:

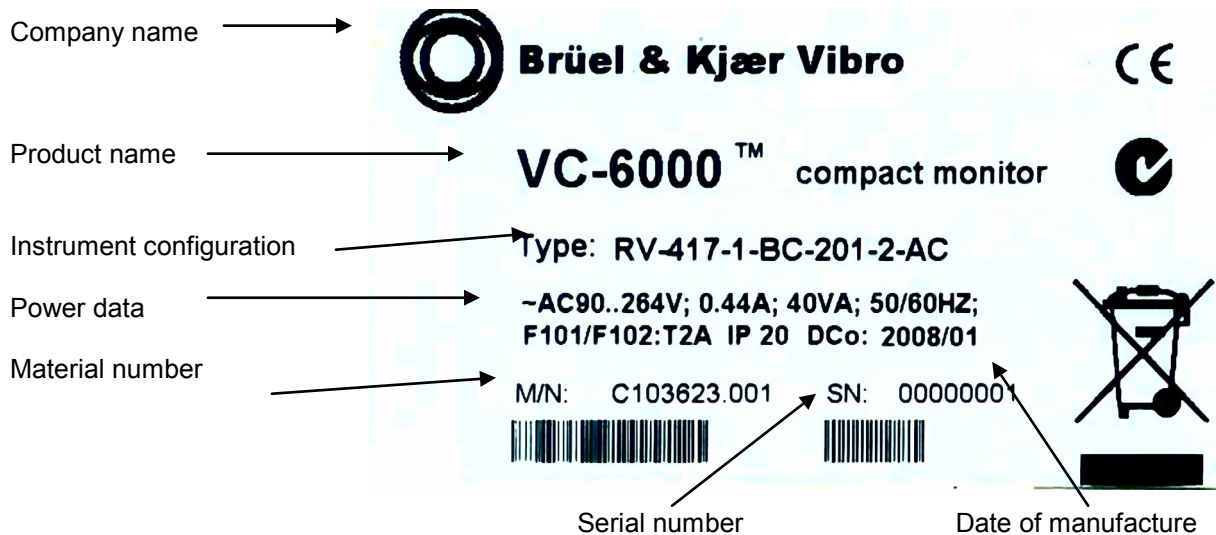
- Basic configuration description
- Signal-flow chart
- Configuration sheet
- Parameter setting sheet

Further information:

- ◆ You can find further language versions of the handbook on the CD which accompanies the handbook.
- ◆ 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 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* has 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:

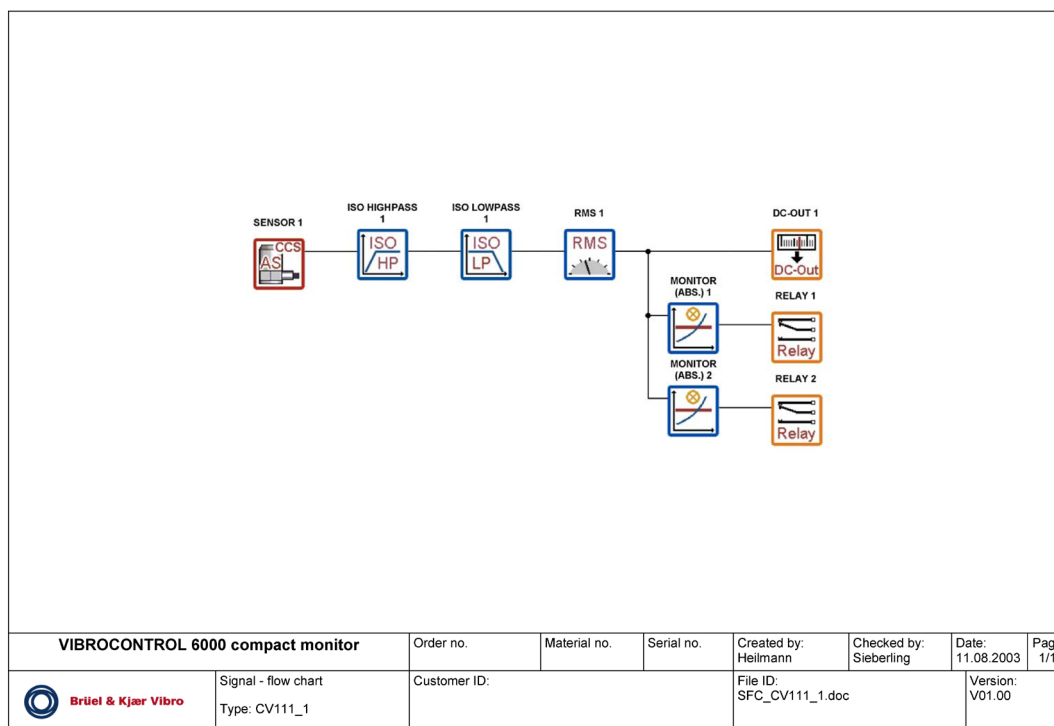


Please document all settings that are changed so the fastest possible assistance can be provided in case of an error. The changes can be documented in either a parameter setting sheet.

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



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):



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User-defined settings for VC-6000™ Compact monitor CV-111-1-X			
Customer:		Quotation no. / Order no.:	Date:
		Material no.:	03.12.2009
		C100596.001	Serial 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:

7 The configuration sheet

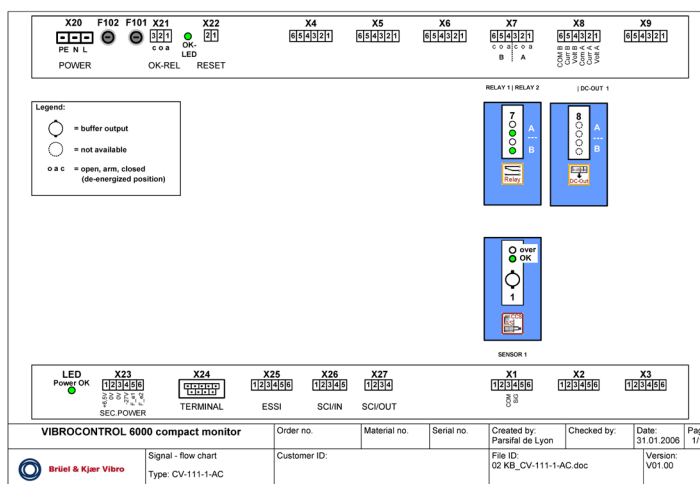
7.1 Configuration

Various information is evident from the configuration sheet:

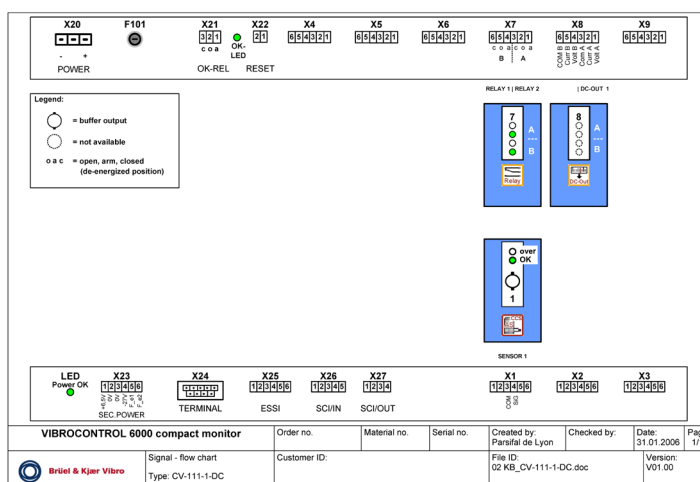
- ◆ Which module is to be found at which physical socket position
- ◆ How the connection plugs are laid out
- ◆ Which LEDs are assigned to which channels.

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



C-ticking confirms conformity with the EMV requirements of the Australian Government Agency (ACA)

Safety

EN 61010-1 “

CB Test Certificate

IEC 61010-1 : 2001

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

+70 °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: -30 °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

**Brüel & Kjær Vibro****EG-Konformitäts-Erklärung**
*Declaration of conformity*Hiermit bescheinigt das Unternehmen / *The company***Brüel & Kjær Vibro GmbH**
Leydheckerstraße 10
D-64293 Darmstadtdie 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*
EG-Richtlinie / *EC directive***2004/108/EG**
2006/95/EG**EMV-Richtlinie / EMC-Directive**
Niederspannungsrichtlinie / Low Voltage DirectiveAngewendete harmonisierte Normen / *Harmonized standards applied***EN 61326-1: 2013**
EN 61010-1: 2010Bereich / *Division*
Brüel & Kjær Vibro GmbHUnterschrift / *Signature*
CE-BeauftragterOrt/Place **Darmstadt**
Datum / *Date* **25.11.2013**
(N. Karg)

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 + 70 °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 as 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				 red	Wrong TIM module or TIM module corrupted

Legend:

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



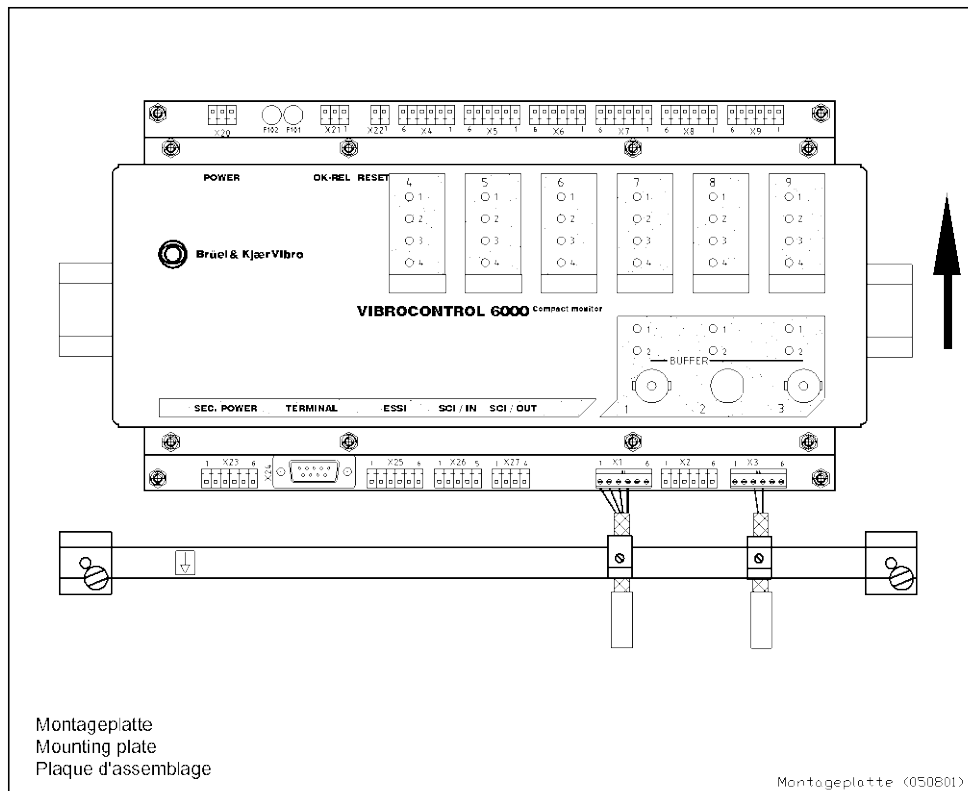
- ◆ The safety advice must be read and understood before putting the instrument into operation!
- ◆ All installation work must be carried out without power to the instrument!
- ◆ If parameters setting changes are to be carried out during operation, you should take into consideration the effect of the 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 as 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:

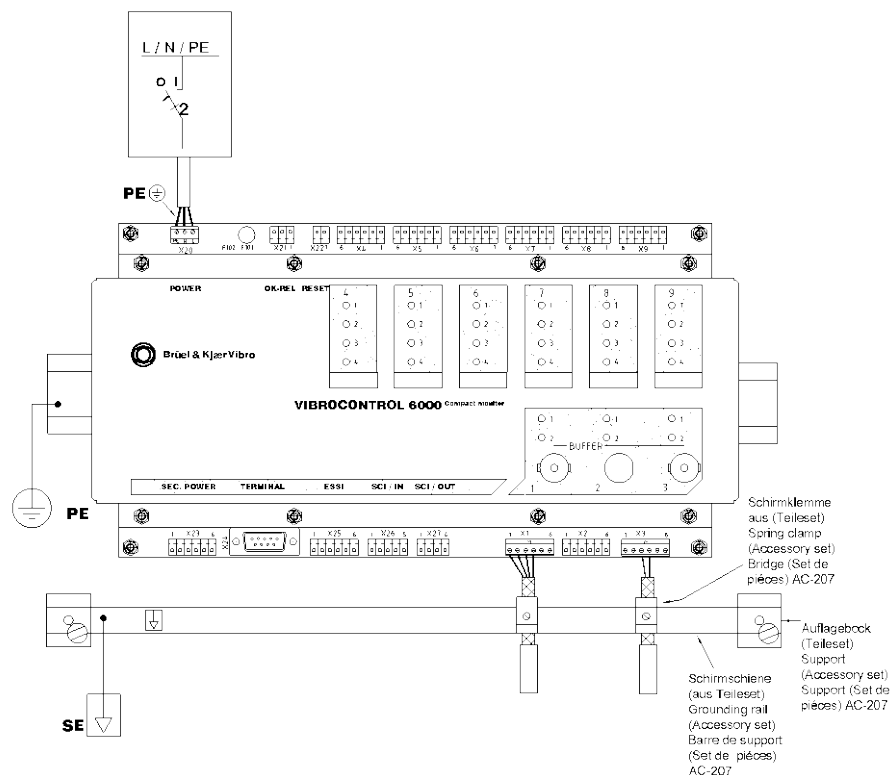


9.3 Grounding concept for *VIBROCONTROL 6000 Compact monitor*

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* :



Erddungsprinzip (050801)

9.4 Mounting the instrument

9.4.1 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!

9.4.2 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.

9.5 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!

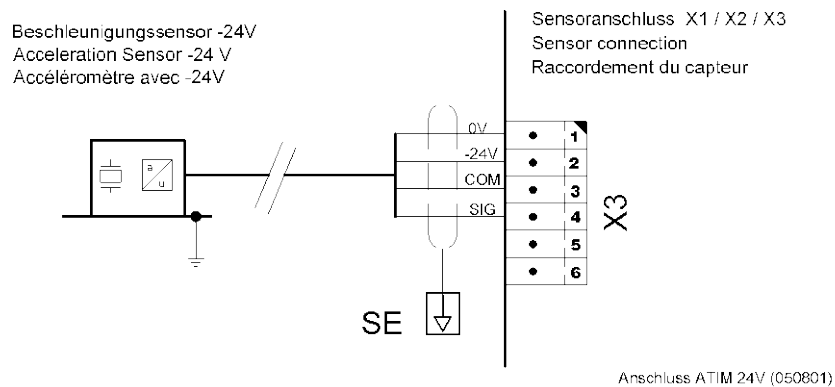
Depending on how the *VIBROCONTROL 6000 Compact monitor* is built up various connections will be made. See the corresponding configuration sheet for the instrument to determine which modules are contained in the *VIBROCONTROL 6000 Compact monitor* . (See also chapter 8 „Commissioning“).

9.5.1 Wiring and connection of sensors

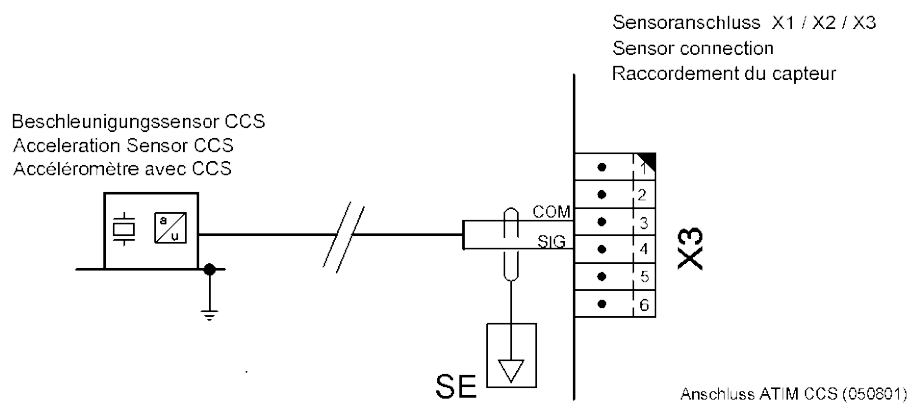


The following connection diagrams are principle illustrations; please always observe the corresponding documentation, the sensors that will be connected or the subsequent electronics!

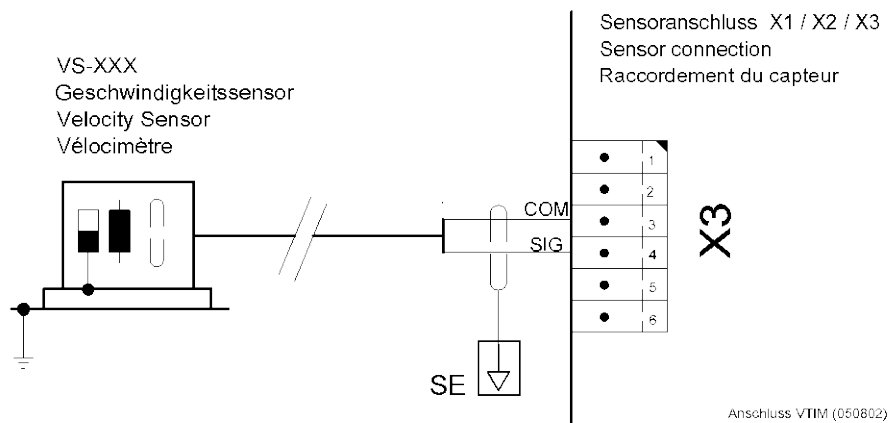
9.5.1.1 Acceleration sensors with –24 V DC power at A-TIM (–24 V)



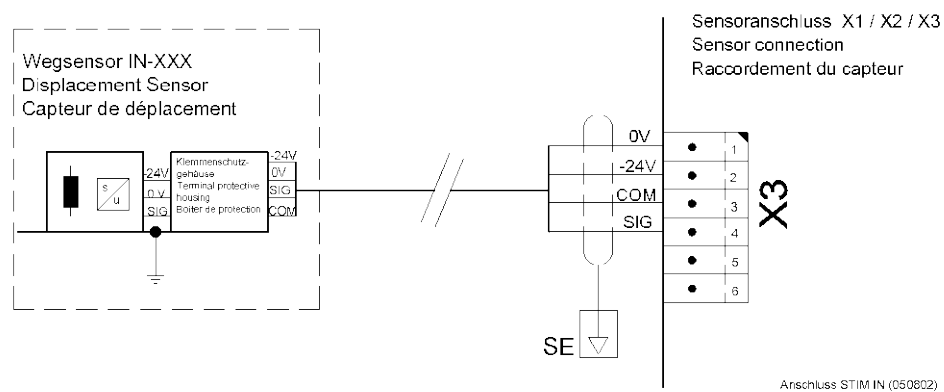
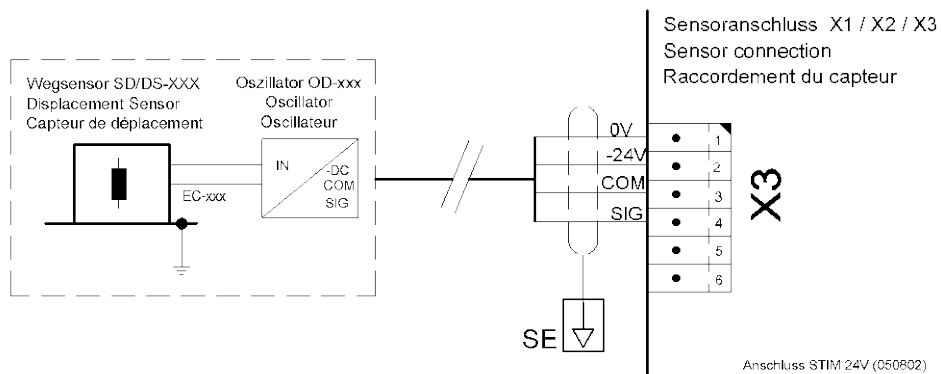
9.5.1.2 Acceleration sensors with constant-current power (CCS) at A-TIM (CCS)



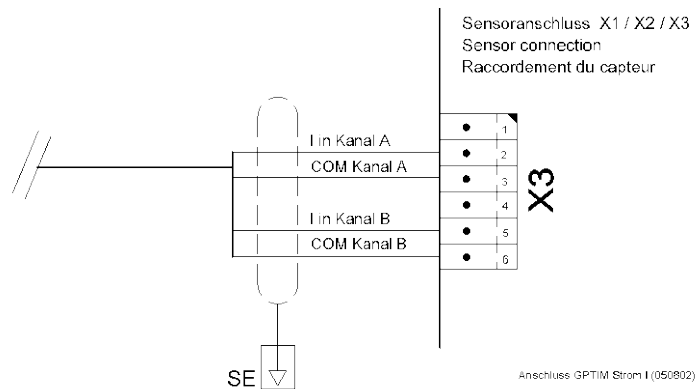
9.5.1.3 Vibration velocity sensors at V-TIM (8 Hz/15 Hz)



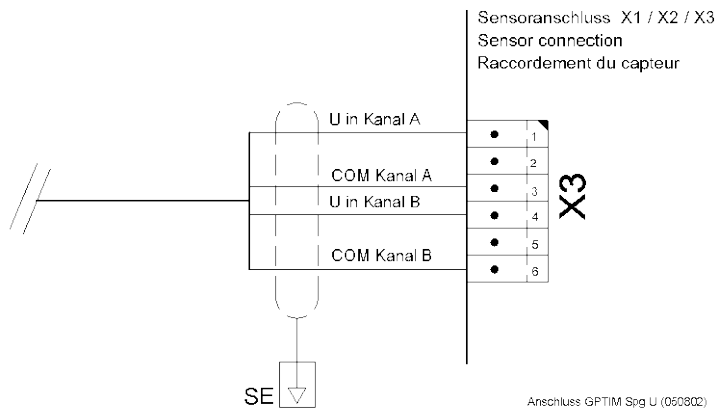
9.5.1.4 Displacement sensors at D-TIM



9.5.1.5 0/4...20 mA signals at GP input module (GP-TIM)



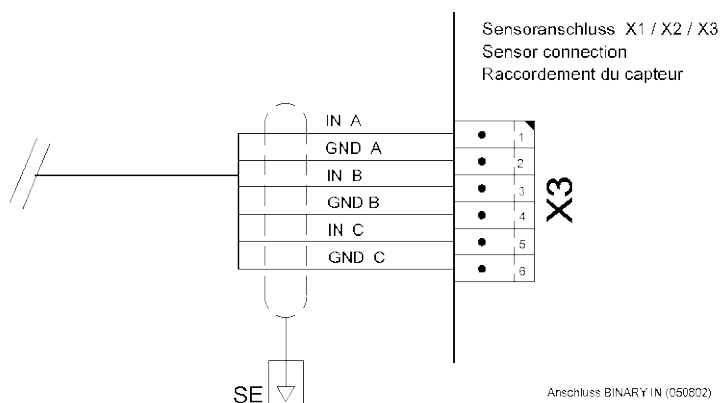
9.5.1.6 0/2...10 V signals at GP input module (GP-TIM)



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!

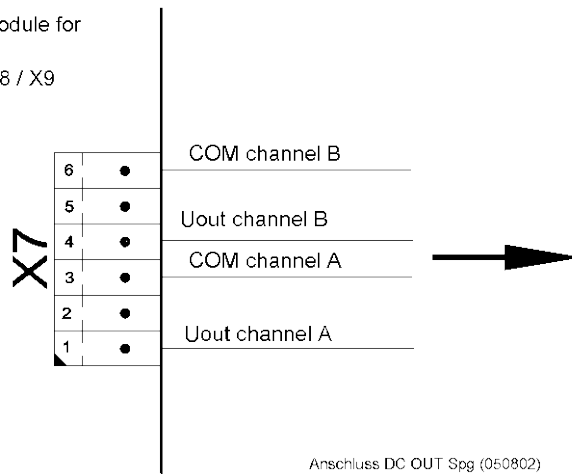
9.5.1.7 3-channel input module for binary status signals



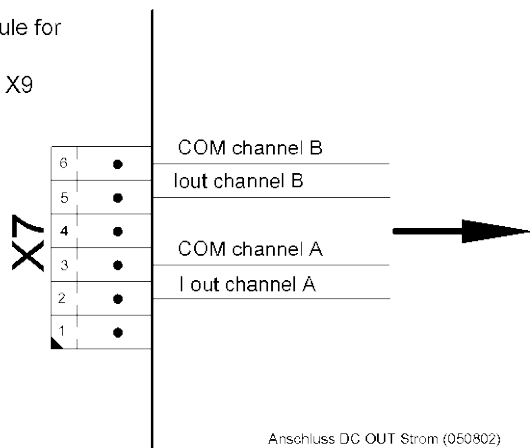
9.5.2 Wiring and connection of peripheral equipment

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

2-channel output module for
current / voltage
X4 / X5 / X6 / X7 / X8 / X9



2-channel output module for
current / voltage
X4 / X5 / X6 / X7 / X8 / X9

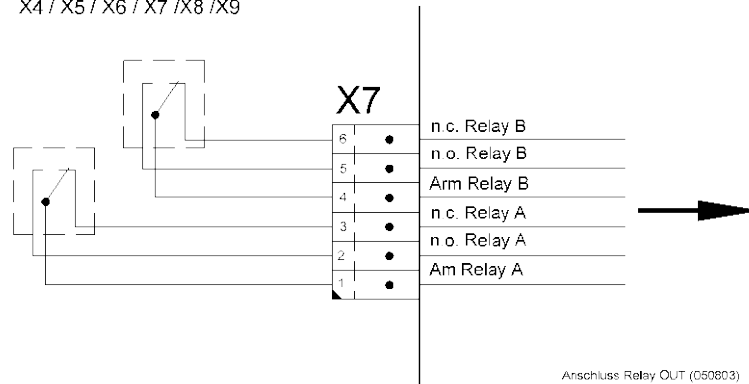


Note:

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 !

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

2-channel relay output module
X4 / X5 / X6 / X7 / X8 / X9

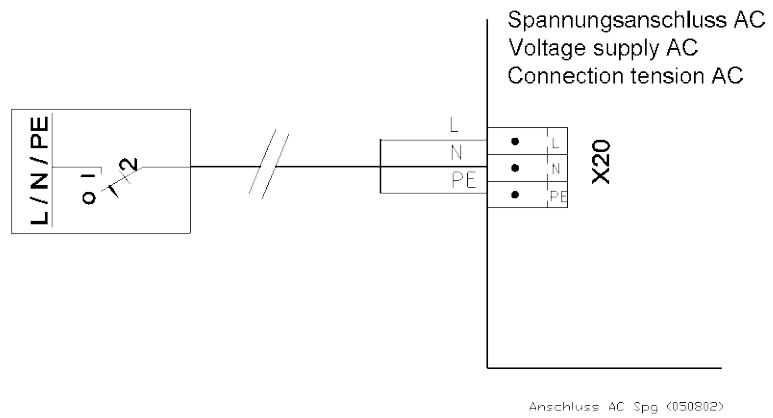
**CAUTION:**

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).

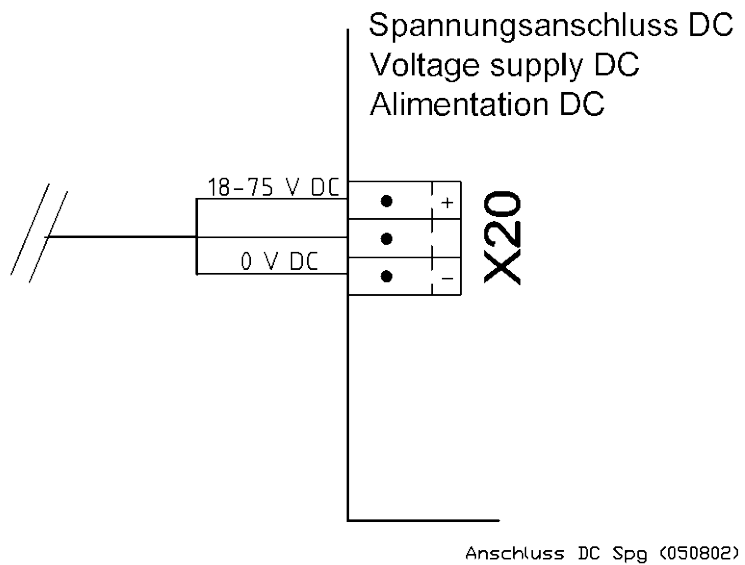
9.5.3 System connections

9.5.3.1 AC power supply



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

9.5.3.2 DC power supply



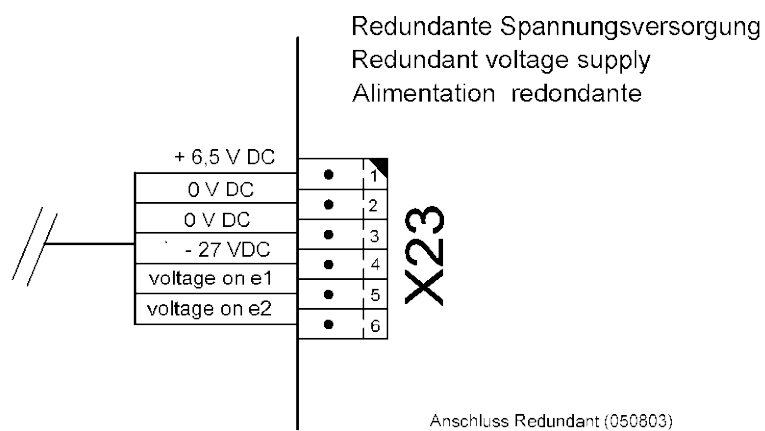
Recommended cross-sectional area for the connecting cables: 1,5 mm²



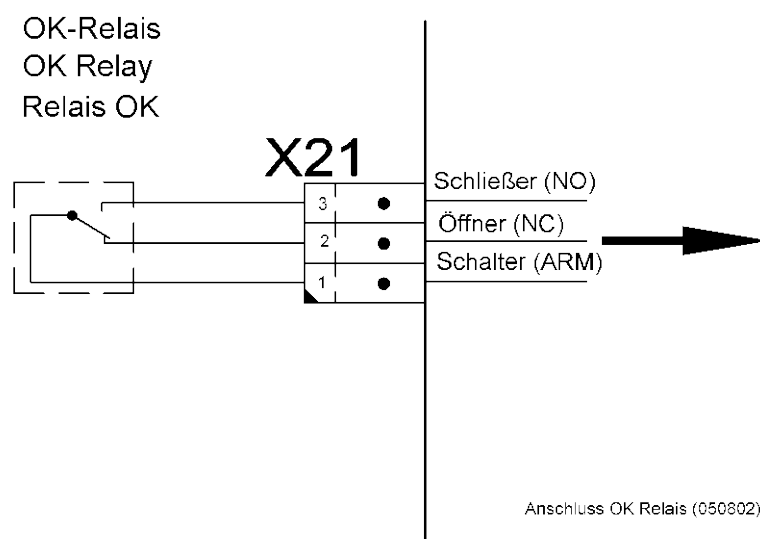
Caution!

Maximally 75 V smoothed DC voltage may be attached

9.5.3.3 Redundant power supply input

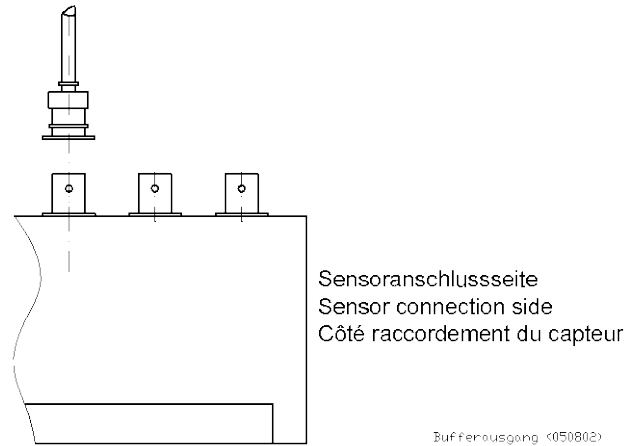


9.5.3.4 OK relay

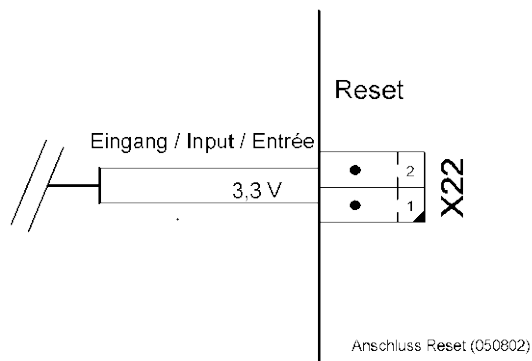


9.5.3.5 Buffered outputs

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



9.5.3.6 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!

9.6 Commissioning and function testing

9.6.1 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* for 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 requirements 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.

9.6.2 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 requirements 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.

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

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

Information 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: Normally 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

Input 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	<p>< 1 % of measured value plus 0,2 % of measurement range full-scale value;</p> <p>for phase information < 2°</p> <p>(valid under steady-state conditions with a measurement time > 100 ms)</p>	

12 Contents index for the following documentation

Section B: Technical data of the modules

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2	1-channel input module for acceleration sensors
3	1-channel input module for vibration velocity sensors
4	1-channel input module for displacement sensors
5	2-channel input module for current / voltage
6	2-channel conditioning module for BCU
7	3-channel input module for binary status signals
8	2-channel Relay output module
9	2-channel output module for current / voltage

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3	Binary in block
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5	Trigger block
6	BCU Measurement
7	DC Measurement
8	Speed Measurement
9	Peak Measurement
10	Peak-Peak Measurement
11	RMS Measurement
12	S_{max} Measurement
13	Vector Measurement
14	Cyclic DC Measurement
15	Computed Values
16	Monitor block (1 absolute limit)
17	Dual-Monitor block (2 absolute limits)
18	Logic block
19	DC Output
20	Relay Block
21	Communication (COM) block

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- 2 Function**
- 3 Advice about the documentation**
- 4 Logging in to the system**
- 5 Setting reference time**
- 6 Navigating the signal-flow charts**
- 7 Displaying parameters**
- 8 Display of measurements**
- 9 Setting the sensor sensitivity and input range**
- 10 Setting limit setpoints and time delays**
- 11 Logbook**
- 12 System block**
- 13 Communication block**



Brüel & Kjær Vibro

B

Module - Technische Daten
Modules - Technical Data
Modules - Caractéristique technique

VC-6000 Compact monitor

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1 BASE Module

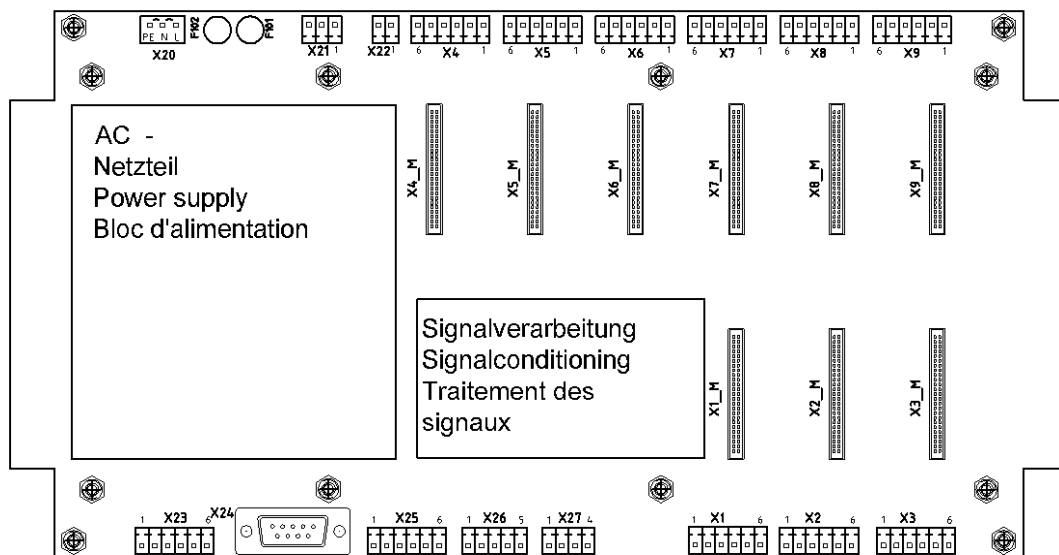
1.1 Function

The Base Module is the central hardware component of the *VIBROCONTROL 6000 Compact monitor*. It has the following functions and components:

- ◆ Base board AC with internal AC power supply
or
- ◆ Base board DC with internal DC power supply
- ◆ Digital Signal Processor (DSP)
- ◆ Flash-system memory (for the system software and Logbook)
- ◆ 3 socket positions for the Sensor Interface Modules
- ◆ 6 socket positions for the output modules and supplementary modules
- ◆ Analog/Digital converter for 6 independent signal paths / inputs
- ◆ OK-relay with a status LED for event signalling of the self-monitoring function (power supply, system condition, system function, sensor function)
- ◆ Groups of connections for sensors, signal outputs, power supply, Remote reset and digital interfaces (User-terminal, Network adapter, etc.)
- ◆ Essential functions of the DSP: Signal conditioning and measurement value formation
- ◆ Limit setpoint monitoring
- ◆ Control of all hardware modules
- ◆ Monitoring of the system integrity and system functions
- ◆ Controlling all signal outputs, incl. the OK-relay

1.2 Construction

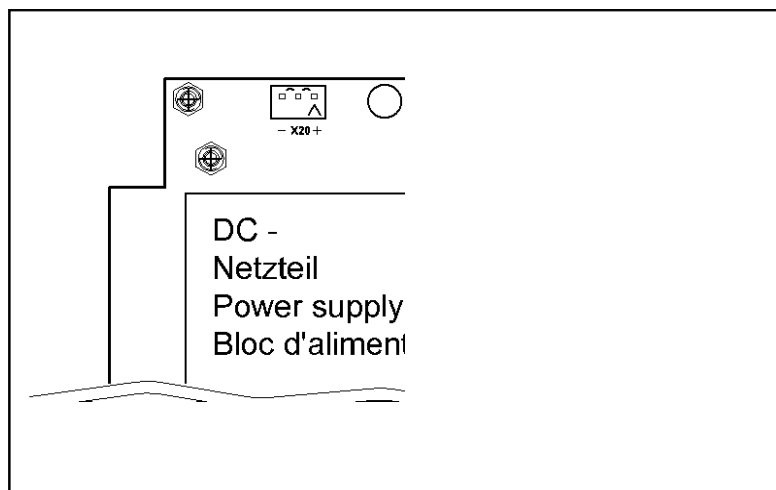
1.2.1 AC-board construction



Basismodul AC (050804)

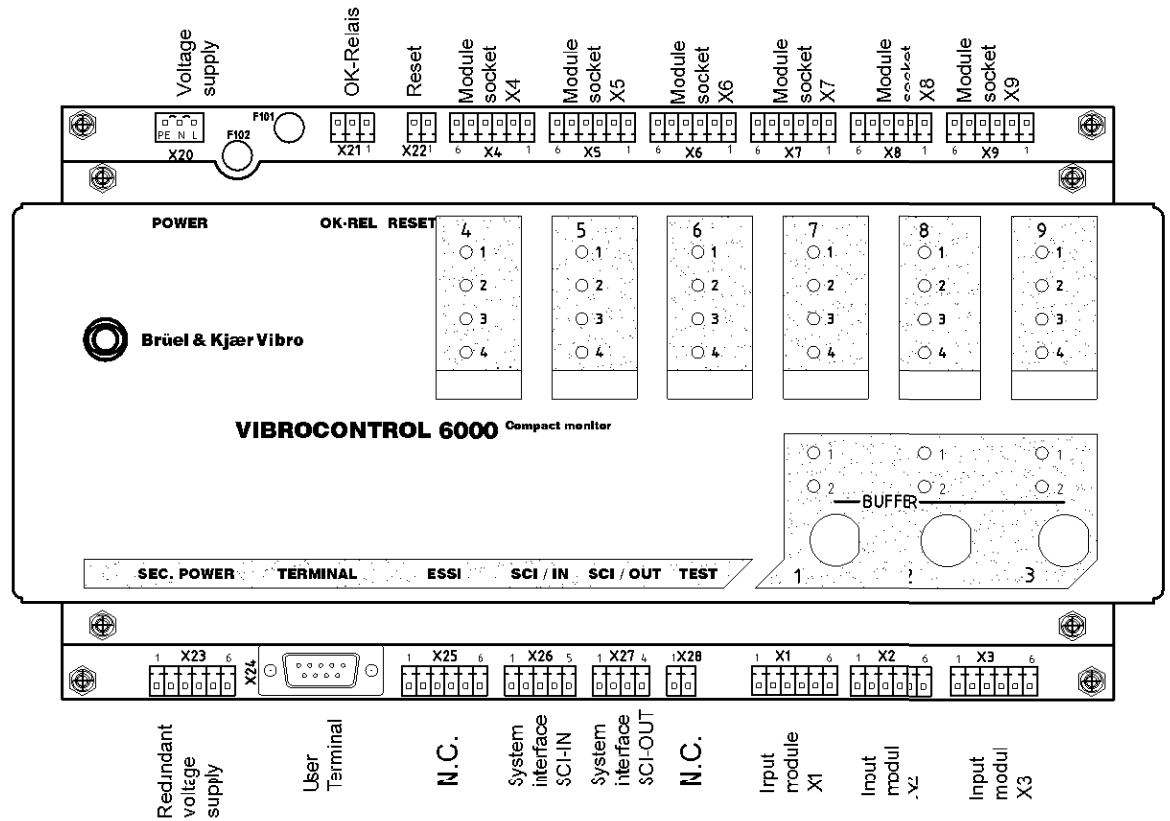
1.2.2 DC-board construction

The DC board is identical to the AC board as far as the power supply and power connections are concerned.



1.3 Connection plugs on the Base Module

1.3.1 Overview



Steckeranordnung (050804)

- * Please note the corresponding plug layout for DC power on the DC Base board!
See the configuration sheet of the *VIBROCONTROL 6000 Compact monitor*.

1.3.2 Socket position and assigned connection plug

Module socket no.	Assigned connection plug	Suitable for Sensor Interface Module	Suitable for BCU-CON	Suitable for DC-OUT Module	Suitable for RELAY-OUT Module	Suitable for BINARY-IN Module
1	X1	Yes	(Yes)	(Yes)	(Yes)	(Yes)
2	X2	Yes	Yes	(Yes)	(Yes)	(Yes)
3	X3	Yes	(Yes)	(Yes)	(Yes)	(Yes)
4	X4	No	No	Yes	Yes	Yes
5	X5	No	No	Yes	Yes	Yes
6	X6	No	No	Yes	Yes	Yes
7	X7	No	No	Yes	Yes	Yes
8	X8	No	No	Yes	Yes	Yes
9	X9	No	No	Yes	Yes	Yes

The connection plan for a *VIBROCONTROL 6000 Compact monitor* is exclusively determined through the hardware equipment in the module socket positions.

E.g. Socket position no. 1 contains a A-TIM-24 V → the terminal layout of A-TIM-24 V is valid for plug X1, etc.

1.4 The connections – their function and layout

1.4.1 Sensor Interface Module: Connections X1, X2 and X3

The socket positions X1_M, X2_M and X3_M belong to the connections X1 to X3.

These socket positions can be equipped with Sensor Interface Modules or the 2-channel conditioner module for BCU.

The input modules for sensors receive the input signals from the sensors at the connections associated with the appropriate socket positions.

A-TIM (-24 V): Connection layout for 1-channel input module for AS- sensor (e.g. AS-022, AS-030)

Connection X1/X2/X3	A-TIM (-24 V)		
Pin 1	0 V	OUT	Sensor power
Pin 2	-24 V	OUT	Sensor power
Pin 3	COM	IN	signal in (common)
Pin 4	SIG	IN	signal in (signal)
Pin 5			does not use
Pin 6	0 V	OUT	not occupied

A-TIM-CCS*: Connection layout for 1-channel input module for AS- sensor (e.g. AS-062, 8325, 8327)

* CCS = constant current supply

Connection X1/X2/X3	A-TIM (CCS)		
Pin 1	0 V	OUT	not occupied
Pin 2	-24 V	OUT	not occupied
Pin 3	COM	IN	signal in (common)
Pin 4	SIG	IN	signal in (signal + 8 mA current out)
Pin 5			does not use
Pin 6	0 V	OUT	not occupied

V-TIM (8 Hz) & V-TIM (15 Hz): Connection layout for 1-channel input module for VS-sensor

Connection X1/X2/X3	V-TIM (8 Hz and 15 Hz)		
Pin 1			does not use
Pin 2			does not use
Pin 3	COM	IN	signal in (common)
Pin 4	SIG	IN	signal in (signal)
Pin 5			does not use
Pin 6			does not use

D-TIM: Connection layout for 1-channel for input module for displacement sensor (e.g. Sensors of the series SD-xxx, IN-xxx and D-xxxx)

Connection X1/X2/X3	D-TIM		
Pin 1	0 V	OUT	does not use
Pin 2	-24 V	OUT	does not use
Pin 3	COM	IN	signal in (common)
Pin 4	SIG	IN	signal in (signal)
Pin 5			does not use
Pin 6	0 V	OUT	does not use

GP-TIM: Connection layout for 2-channel input module for current/voltage

Connection X1/X2/X3	GP-TIM		
Pin 1	Volt In A	IN	Voltage channel A
Pin 2	Curr In A	IN	Current channel A
Pin 3	COM A	IN	Common channel A
Pin 4	Volt In B	IN	Voltage channel B
Pin 5	Curr In B	IN	Current channel B
Pin 6	COM B	IN	Common channel B



Note:

Either two current inputs or two voltage inputs can be used at a GP-TIM. A mixture of these input signal types is not possible !

BINARY-IN: Connection layout for 3-channel input module for binary status signals

BINARY-IN Pin-connection layout (X1 –X3)X4 to X9		
PIN	Signal	Explanation
1	HI A	Channel A input SIG (HIGH)
2	LO A	Channel A input GND (LOW)
3	HI B	Channel B input SIG (HIGH)
4	LO B	Channel B input GND (LOW)
5	HI C	Channel C input SIG (HIGH)
6	LO C	Channel C input GND (LOW)

1.4.2 Output and supplementary modules: Connections X4 to X9

The socket positions X4_M to X9_M belong to the connections X4 to X9. These socket positions can be equipped with Output modules (Relay and DC out). The connection layout is dependent on the equipped module type.

DC-OUT (2-ch.): Connection layout for 2-channel output module for current/voltage

Connection X4 to X9	DC-OUT (2ch.)		
Pin 1	Volt In A	OUT	Voltage, channel A
Pin 2	Curr In A	OUT	Current, channel A
Pin 3	COM A	OUT	Common, channel A
Pin 4	Volt In B	OUT	Voltage, channel B
Pin 5	Curr In B	OUT	Current, channel B
Pin 6	COM B	OUT	Common, channel B

RELAY-OUT (2-ch.): Connection layout for 2-channel Relay output module

Connection X4 to X9	RELAY-OUT (2ch.) Pin layout in the de-energised condition	
Pin 1	ARM RelA	Arm, Relay A
Pin 2	NO RelA	Normally-open contact, Relay A
Pin 3	NC RelA	Normally-closed contact, Relay A
Pin 4	ARM RelB	Arm, Relay B
Pin 5	NO RelB	Normally-open contact, Relay B
Pin 6	NC RelB	Normally-closed contact, Relay B

1.4.3 System: Connections X20 to X27

The connections X20 to X27 are system connections, and their function and connection layout is dependent on the hardware equipment.

1.4.3.1 Internal power supply: X20 – Power supply

The internal power supply of the Base Module is provided with power through the connection X20.

According to the delivered Base Module a distinction must be made between AC power and DC power.

Connection X20	Power supply 230 V AC permissible power range: 90 ... 264 V AC / 50 ... 60 Hz		
Pin 1	L	IN	Live
Pin 2	N	IN	Neutral
Pin 3	PE	IN	Ground (Protective Earth)

Connection X20	Power supply 24 V DC (48 V DC) permissible power range 20 ... 75 V DC		
Pin 1	20-75 V DC	IN	Plus (+)
Pin 2	free		
Pin 3	0v	IN	Minus (-)



Caution!

Maximally 75 V smoothed DC voltage may be attached!

1.4.3.2 External power supply: X23 – Input for Redundant power supply

To increase the safety of a *VIBROCONTROL 6000 Compact monitor* against power failure it is possible to connect a 2nd power supply (redundant). It should be noted that only a power supply suitable for the power requirements of the internal power of the *VIBROCONTROL 6000 Compact monitor* should be used. This external power supply must provide all the necessary **irreversible** DC secondary voltages.

Connection X23	External power supply		
Pin 1	+ 6,5 V DC	IN	+ 6,5 V input for external power supply
Pin 2	0 V	IN	0 V reference potential secondary side
Pin 3	0 V	IN	0 V reference potential secondary side
Pin 4	-27 V DC	IN	-27 V input for external power supply
Pin 5	Pwrfailure e1	IN	Primary power failure at external power supply (binary signal)
Pin 6	Pwrfailure e2	IN	Secondary power failure at external power supply (binary signal)

1.4.3.3 User Terminal: X24 – Local operation

The User-terminal is connected to the *VIBROCONTROL 6000 Compact monitor* through this connection.

The User-terminal serves for local access to the *VIBROCONTROL 6000 Compact monitor* menus. (→ Chapter: Operation of the User-terminal).

Connection X24 (DSUB 9-pole socket)	User-terminal	
Pin 1	+ 5 V DC	OUT
Pin 2	Module Clock	OUT
Pin 3	0VD	OUT
Pin 4	nLOAD	OUT
Pin 5	nOutEnable	OUT
Pin 6	Not occupied	
Pin 7	serDataToDisplay	OUT
Pin 8	serDataFromDisplay	IN
Pin 9	Not occupied	

1.4.3.4 OK-relay: X21 – Signalling of system interruptions

The OK-relay signals system events from the *VIBROCONTROL 6000 Compact monitor* ("OK" and "not OK").

The potential-free contact of the OK-relay can be used to provide a signal to peripheral electronic equipment.

Connection X21	OK - RELAY Contact pin layout in normally-energised mode	
Pin 1	ARM	Arm of the OK-relay
Pin 2	NC	Normally-closed contact (normally-energised status)
Pin 3	NO	Normally-open contact (normally-energised status)



Note:

A list of possible reasons for initiation of an OK fault is contained in section D in the chapter on Instrument Operation. The Logbook function, which simultaneously records all events that occur, is described in the same chapter.

1.4.3.5 Remote reset: X22 – Binary input for a global reset

The Remote reset connection serves for a global reset of a *VIBROCONTROL 6000 Compact monitor* by a binary signal. All events are reset and all sensor OK faults and relays in the latching mode will be reset. The Remote reset is activated when pins 1 and 2 of the connection X22 are briefly short-circuited; e.g. by a push-button or a bridge.

A bridge can permanently connect the terminals. The Reset function then operates when the bridge is opened and then closed again (edge-triggered).

Connection X22	Remote Reset
Pin 1	Input
Pin 2	3,3 V



Note:

Limit setpoint violations that still exist will not be reset by the Remote reset. An existing limit setpoint violation will automatically be signalled again.

1.4.3.6 System interface: X25 – ESSI

This interface is reserved for future extensions.

1.4.3.7 System-interface: X26 and X27 – SCI-IN / SCI-OUT

SCI stands for **S**erial **C**ommunication **I**nterface

These two connections allow, in combination with a suitable converter (AC-5003), a serial communication to a PC (RS-232 interface) or a connection to a TCP/IP network through a Gateway (AC-5004). This communication is required, e.g. for a firmware download or to connect a *VIBROCONTROL 6000 Compact monitor* with an OPC-server (OPC DA-server – Type 7131).

Connection X26	SCI IN (Serial communication interface)		
Pin 1		OUT	Wire back extension
Pin 2	RXD	IN	Receive data
Pin 3	0 VD	OUT	Ground
Pin 4	SCLK	IN	Clock In
Pin 5	5 VD	OUT	5 V supply

Connection X27	SCI OUT (Serial communication interface)		
Pin 1		OUT	Wire back extension
Pin 2	TXD	OUT	Transmit data
Pin 3	0 VD	OUT	Ground
Pin 4	LOAD	OUT	Low for boot from SCI (download)



Note:

For more detailed information about the connection of the converter of the Gateway and the OPC DA-server – Type 7131 please use the corresponding product documentation.

1.5 Technical data

1.5.1 Electrical power supply

AC power supply

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



Note:

The PE-connection is attached to the instrument housing!

DC power supply

Input voltage range	20 ... 75 V DC
Maximum power consumption	40 VA
Instrument protection (F101)	T2A IEC 60127 Type 5 x 20 mm
LED power supply monitor	Green = OK; OFF = Interruption



Caution!

Maximally 75 V smoothed DC voltage may be attached!



Note:

The PE-connection can be attached at connection X28!

1.5.2 Mechanical execution

Socket positions

No. of socket positions (total)	9 (X1_M to X9_M)
No. of socket positions for input modules	3 (X1_M to X3_M)
No. of socket positions for output modules	6 (X4_M to X9_M)

1.5.3 System

System function

Processor	DSP Type 56309@ 98,304 MHz
Memory	16 Mbit Flash

Measurement and Monitoring function

A/D converter	6-channel with 14 bit resolution
Sampling frequency	64 kHz per channel
Signal processing	all channels continuous
Internal cycle time	5 ms
Minimum reaction time	5 ms + measuring time
Specialities	Hot-swap capability for module exchange

OK-relay

Maximum contact voltage	< 50 V
Maximum current	< 500 mA
Minimum current	10 µA
Minimum voltage	10 mV



Caution!

The maximum values must not be exceeded. Take precautions for inductive or capacitive loads.

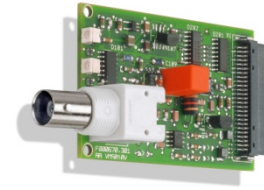
OK-LED	Green = OK; OFF = System interruption
--------	---------------------------------------



Note:

The OK-LED gives signals for various system conditions through a flashing pattern. For a corresponding description consult section D, chapter 12.4.

2 1-channel input module for acceleration sensors



2.1 Function

- ◆ The input module for acceleration sensors, abbreviated to A-TIM (**A**cceleration **T**ransducer **I**nterface **M**odule), is separately laid out for connection of a sensor.
- ◆ There are two executions for an A-TIM, distinguished by the type of sensor. As a result there are various requirements for the sensor that will be connected:
 - ◇ A-TIM (-24 V) for connection of sensors with a power requirement of -24 V/max. 30 mA.
 - ◇ A-TIM (CCS) for connection of sensors with a constant-current power requirement (max. 8 mA).
- ◆ Input modules are managed internally in the instrument through a Sensor block (Firmware), i.e. an A-TIM and Sensor block together form a physical interface between the *VIBROCONTROL 6000 Compact monitor* and the outside world. The measured signal from the sensor is acquired and made available to the signal path for further processing and assessment.
- ◆ An A-TIM combines the following hardware functions:
 - Differential input amplifier
 - Signal amplifier
 - Switchable integrator
 - De-coupled buffered output (BNC socket at front) for sensor output signal
 - Sensor power supply
 - LED signalling

2.2 Signal path

- ◆ The input to an A-TIM is a coupled differential input amplifier. The output signal of the input amplifier is passed on to two separate signal paths. Each path is assigned to an A/D converter channel.

- ◆ **DC-signal path** (DC coupled processing path)

This signal path has continuous access to the entire raw signal, including the available DC part of the signal.

In this path also the DC-operating point (sensor passive voltage) resulting from the sensor power supply is acquired and monitored (sensor OK-monitoring).

An error-free measurement chain is signalled through a green OK LED on the 1-channel input module for AS- sensors.

- ◆ **AC-signal path** (AC coupled processing path)

This signal path has access only to the AC part of the raw sensor signal. The dynamics of the processing can thus be used completely for the vibration measurement. As a result the acceleration signal from a connected sensor can be evaluated with maximum resolution and accuracy.

The input range of the AC signal path is continuously monitored for signal over-ranging. When over-ranging of an A/D converter occurs this is signalled by a red LED on the front of the A-TIM.

2.3 Technical data

2.3.1 Electrical properties

Input:

Input voltage range	-21,5 V ... + 2,5 V
Frequency range of input signal	> 0 ... 50 kHz
Input impedance	200 kΩ
Sensor Sensitivity	analogue adjustable
Amplification	in 8 steps from 1 ... 80 (6 0,75 %) with integration (6 2,75 %)

Buffered output:

Output voltage range	min. -21 V ... + 2 V
Frequency range of output signal	> 0 ... 50 kHz
Output load	min. 10 kΩ
Amplification	1 (6 2 %)
Phase shift (-24 V)	20 kHz < 15° 50 kHz < 35°
Phase shift (CCS)	20 kHz 180° + < 15° 50 kHz 180° + < 35°
Short-circuit proof	Yes

CCS Sensor power:

Supply current	8 mA (SIGNAL and COM)
----------------	-----------------------

-24 V Sensor power:

Supply voltage	-24 V DC
Supply current	Max. 30 mA

2.3.2 Equipment and signalling

- ◆ Possible socket positions on the Base Module:
X1_M X2_M X3_M
- ◆ Connection plugs on the Base Module (dependent on the selected socket position): X1 X2 X3

A-TIM (-24 V) Pin layout connections X1/X2/X3		
PIN	Signal	Explanation
1	0 V	Sensor power supply
2	-24 V	Sensor power supply
3	COM	Sensor signal reference potential
4	SIG	Sensor signal
5		Not connected
6	0 V	0 V

A-TIM (CCS) Pin layout connections X1/X2/X3		
PIN	Signal	Explanation
1	0 V	OUT
2	-24 V	OUT
3	COM	(-) Sensor signal reference potential
4	SIG	(+) Sensor signal and 8 mA constant current
5		
6	0 V	OUT

◆ **LED OVERLOAD (RD)**

The red LED provides information about the condition of the A/D converter. This will provide information whether an over-range exists or has existed through the input signal or whether everything is in order.

◆ **OK-LED (GN)**

The green LED signals the OK status of the sensor. If there is an OK-fault the **LED will be extinguished**. The OK monitoring checks the status of the sensor signal (including the DC value) with reference to the OK-voltage window. This OK-window (upper and lower limits) can be set up using the User Terminal.

An OK-fault exists as soon as a single sampled value is found to lie outside the set OK-window range.

OVERLOAD LED	LED	Status	Explanation
	Red	Off	No over-range
	Red	Flashing at 2 Hz	An over-range exists and has not yet been confirmed through the dialogue
	Red	Flashing at 0,5 Hz	Only with parameter OK latching: No over-range currently exists; an earlier over-range not yet confirmed through the dialogue.
	Red	On	Continuous over-range; has been confirmed through the dialogue

OK-LED	Green	Off	Continuous OK fault; has been confirmed through the dialogue
	Green	Flashing at 2 Hz	Sensor OK fault; not yet confirmed through the dialogue
	Green	Flashing at 0,5 Hz	Only with OK latching parameter: No sensor OK fault currently exists, an earlier fault not yet confirmed through the dialogue
	Green	On	No sensor OK fault

3 1-channel input module for vibration velocity sensors



3.1 Function

- ◆ The input module for vibration velocity sensors, abbreviated to V-TIM (Velocity Transducer Interface Module) is laid out for the connection of a sensor.
- ◆ There are two executions for a V-TIM, distinguished by built-in linearisation of the frequency response
 - V-TIM 8 Hz for vibration velocity sensors with a resonance at 8 Hz (e.g. Brüel & Kjær Vibro sensors VS-068, VS-069).
 - V-TIM 15 Hz for vibration velocity sensors with a resonance at 15 Hz (e.g. Brüel & Kjær Vibro sensors VS-077, VS-079).
- ◆ The input module is managed internally by a Sensor block (Firmware), i.e. V-TIM and Sensor block together form a physical interface between the *VIBROCONTROL 6000 Compact monitor* and the outside world. The measured signal from the connected sensor is acquired and provided to the signal path for further processing and evaluation.
- ◆ A V-TIM combines the following hardware functions:
 - Differential input amplifier
 - Signal amplifier
 - Frequency response linearisation for very low frequencies
 - De-coupled buffered output (front BNC socket) for sensor output signal
 - Auxiliary voltage for cable damage monitoring
 - LED signalling

3.2 Signal path

- ◆ The input of a V-TIM is a DC coupled differential input amplifier. The output signal of the input amplifier is passed on to two separate signal paths. Each path is assigned to an A/D converter channel.

◆ **DC-Signal path** (DC coupled processing path)

This signal path has continuous access to the entire raw signal, including the available DC voltage part of the signal.

In this path also the DC-operating point (sensor passive voltage) resulting from the sensor power supply is acquired and monitored (sensor OK-monitoring). An error-free measurement chain is signalled through an OK LED on the front panel of the V-TIM.

◆ **AC-path** (AC coupled processing path)

This signal path has access only to the AC part of the raw sensor signal. The dynamics of the processing can thus be used completely for the vibration measurement. As a result the velocity signal from a connected sensor can be evaluated with maximum resolution and accuracy.

The input range of the AC signal path is continuously monitored for signal over-ranging. When over-ranging of an A/D converter occurs this is signalled by a red LED on the front of the V-TIM.

3.3 Technical data

3.3.1 Electrical properties

Input:

Input voltage range	-21,5 V ... + 2,5 V
Frequency range of input signal	> 0 ... ≥ 20 kHz
Input impedance	50 kΩ
Settling time	ca. 45 s
Sensor Sensitivity	step adjustable
Amplification	in 8 steps from 1 ... 80 (6 0,75 %)

Buffered output:

Output voltage range	min. -21 V ... + 2 V
Frequency range of output signal	> 0 ... > 10 kHz
Output load	min. 10 kΩ
Amplification	1 (6 2 %)
Phase shift (8 Hz)	20 kHz < 15° 50 kHz < 35°
Phase shift (15 Hz)	20 kHz 180° + < 15° 50 kHz 180° + < 35°
Short-circuit proof	Yes

3.3.2 Equipment and signalling

- ◆ Possible socket positions on the Base Module X1_M X2_M X3_M
- ◆ Corresponding connections on Base Module X1 X2 X3
- ◆ Connection layout with a V-TIM

V-TIM Pin layout connections X1/X2/X3		
PIN	Signal	Explanation
1		
2		
3	COM	Sensor signal reference potential
4	SIG	Sensor signal
5		
6		

◆ LED OVERLOAD (RD)

The red LED provides information about the condition of the A/D converter. This will provide information whether an over-range exists or has existed through the input signal or whether everything is in order.

The red LED signals although, if the attached sensor is exposed to an inadmissibly large swinging displacement amplitude (sensor overload).

◆ OK-LED (GN)

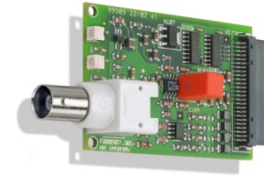
The green LED signals the OK status of the sensor. If there is an OK-fault the **LED will be extinguished**. The OK monitoring checks the status of the sensor signal (including the DC value) with reference to the OK-voltage window. This OK-window (upper and lower limits) can be set up using the User Terminal.

An OK-fault exists as soon as a single sampled value is found to lie outside the set OK-window range.

OVERLOAD LED	LED	Status	Explanation
	Red	Off	No over-range
	Red	Flashing at 2 Hz	An over-range exists; not yet confirmed through the dialogue
	Red	Flashing at 0,5 Hz	Only with OK latching parameter: No existing over-range; an earlier over-range not yet confirmed through the dialogue
	Red	On	Continuous over-range exists; has been confirmed through the dialogue

OK-LED	Green	Off	Continuous OK fault exists; has been confirmed through the dialogue
	Green	Flashing at 2 Hz	Sensor OK fault not yet confirmed through the dialogue
	Green	Flashing at 0,5 Hz	Only with the OK latching parameter: No OK fault currently exists; an earlier OK fault not yet been confirmed through the dialogue
	Green	On	No sensor OK fault

4 1-channel input module for displacement sensors



4.1 Function

- ◆ The input module for displacement sensors, abbreviated to D-TIM (**D**isplacement **T**ransducer Interface **M**odule) is laid out for connection of a displacement sensor.

Sensors of the series SD-xxx, IN-xxx and DS-xxx from the Brüel & Kjær Vibro delivery program can be connected.

- ◆ The input module is internally managed through a Sensor block (Firmware), i.e. the D-TIM and Sensor block together form a physical interface between the *VIBROCONTROL 6000 Compact monitor* and the outside world. The signal from the connected sensor is acquired and made available to the signal path for further processing and evaluation.
- ◆ A D-TIM combines the following hardware functions:
 - Differential input amplifier
 - Signal amplifier
 - De-coupled buffered output (front BNC socket) for sensor output signal
 - Sensor power supply
 - LED signalling

4.2 Signal path

- ◆ The input of a D-TIM is a DC coupled differential input amplifier. The output signal from the input amplifier is passed on to two separate signal paths. Each signal path is assigned an A/D converter channel.
- ◆ **DC-signal path** (DC coupled processing path)

This signal path has continuous access to the entire raw signal, including the available DC part of the signal.

In this path also the DC-operating point (sensor passive voltage) resulting from the sensor power supply is acquired and monitored (sensor OK-monitoring). An error-free measurement chain is signalled through an OK LED on the front panel of the D-TIM.

- ◆ **AC-path** (AC coupled processing path)

This signal path has access only to the AC part of the raw sensor signal. The dynamics of the processing can thus be used completely for the vibration measurement. As a result the displacement signal from a connected sensor can be evaluated with maximum resolution and accuracy.

The input range of the AC signal path is continuously monitored for signal over-ranging. When over-ranging of an A/D converter occurs this is signalled by a red LED on the front of the D-TIM.

4.3 Technical data

4.3.1 Electrical properties

Input:

Input voltage range	-21,5 V ... + 2,5 V
Frequency range of input signal	> 0 ... 50 kHz
Input impedance	200 kΩ
Sensor Sensitivity	analogue adjustable
Amplification	in 8 steps from 1 ... 80 (6 0,75 %)

Buffered output:

Output voltage range	min. -21 V ... + 2 V
Frequency range of output signal	> 0 ... 50 kHz
Output load	min. 10 kΩ
Amplification	1 (6 2 %)
Phase shift	20 kHz < 15° 50 kHz < 35°
Short-circuit proof	Yes

Sensor power supply:

Power supply	- 24 V DC
Current consumption	max. 30 mA

4.3.2 Equipment and signalling

- ◆ Possible socket positions on the Base Module X1_M X2_M X3_M
- ◆ Corresponding connections on the Base Module X1 X2 X3
- ◆ Connection layout with a D-TIM

S-SIM Pin layout connection X1/X2/X3		
PIN	Signal	Explanation
1	0 V	Sensor power supply
2	-24 V	Sensor power supply
3	COM	Sensor signal reference potential
4	SIG	Sensor signal
5		Not connected
6	0 V	0 V

◆ LED OVERLOAD (RD)

The red LED provides information about the condition of the A/D converter. This will provide information whether an over-range exists or has existed through the input signal or whether everything is in order.

◆ OK-LED (GN)

The green LED signals the OK status of the sensor. If there is an OK-fault the **LED will be extinguished**. The OK monitoring checks the status of the sensor signal (including the DC value) with reference to the OK-voltage window. This OK-window (upper and lower limits) can be set up using the User Terminal.

An OK-fault exists as soon as a single sampled value is found to lie outside the set OK-window range.

OVERLOAD LED	LED	Status	Explanation
	Red	Off	No over-range
	Red	Flashing at 2 Hz	An over-range exists; not yet confirmed through the dialogue
	Red	Flashing at 0,5 Hz	Only with OK latching parameter: No over-range currently exists; an earlier over-range not yet confirmed through the dialogue
	Red	On	Continuous over-range exists; has been confirmed through the dialogue

OK-LED	Green	Off	Continuous sensor OK fault exists; has been confirmed through the dialogue
	Green	Flashing at 2 Hz	Sensor OK fault exists; not yet confirmed through the dialogue
	Green	Flashing at 0,5 Hz	Only with OK latching: No OK fault currently exists; an earlier fault not yet confirmed through the dialogue
	Green	On	No sensor OK fault

5 2-channel input module for current / voltage

5.1 Function



- ◆ The input module for general current and voltage signals, abbreviated to GP-TIM (**G**eneral **P**urpose **T**ransducer **I**nterface **M**odule) is laid out for two measuring channels.
- ◆ Input signals of the type DC current (e.g. 4 - 20 mA), DC voltage (e.g. 0 - 10 V), or dynamic voltage signals (-15 to +15 V) can be processed. Selection of the desired input signal is done per channel through the corresponding connection layout and the matching configuration through the dialogue with the User-Terminal.
- ◆ A GP-TIM has no sensor power available, i.e. all input signals must be active signals.
- ◆ The input module is managed internally through a Sensor(A/B) block (Firmware), i.e. GP-TIM and Sensor(A/B) block together form a physical interface between the *VIBROCONTROL 6000 Compact monitor* and the outside world. The measured signal from the connected sensor is acquired and made available to the signal path for further processing and evaluation.
- ◆ A GP-TIM combines the following hardware functions:
 - Differential input amplifier
 - Input selection switch
 - Signal amplifier
 - LED signalling

5.2 Technical data

5.2.1 Electrical properties

Input:

Voltage range	-14 V ... + 14 V
Current range	-30 mA ... + 30 mA
Frequency range of input signal	> 0 ... 50 kHz
Input impedance	200 kΩ (with voltage)
Working resistance	100 Ω (with current)
Sensor Sensitivity	analogue adjustable
Amplification	1 (6 1 %)

5.2.2 Equipment and signalling

- ◆ Possible socket positions on the Base Module X1_M X2_M X3_M
- ◆ Connection plugs on the Base Module X1 X2 X3
- ◆ Connection plug layout of a GP-TIM

GP-TIM Pin layout connections X1/X2/X3		
PIN	Signal	Explanation
1	Volt in A	Voltage input, channel A
2	Curr in A	Current input, channel A
3	COM A	Reference potential, channel A
4	Volt in B	Voltage input, channel B
5	Curr B	Current input, channel B
6	COM B	Reference potential, channel B

Note:

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



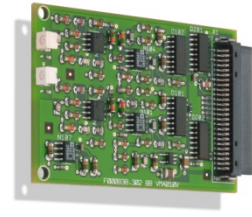
◆ OK-LED (GN)

The green LED signals the OK status of the sensor. If there is an OK-fault the **LED will be extinguished**. The OK monitoring checks the status of the sensor signal (including the DC value) with reference to the OK-voltage window. This OK-window (upper and lower limits) can be set up using the User Terminal.

An OK-fault exists as soon as a single sampled value is found to lie outside the set OK-window range.

OK-LED	Green	Off	Continuous sensor OK fault exists; has been confirmed through the dialogue
	Green	Flashing at 2 Hz	Sensor OK fault exists; not yet confirmed through the dialogue
	Green	Flashing at 0,5 Hz	Only with OK latching: No OK fault currently exists; an earlier fault not yet confirmed through the dialogue
	Green	On	No sensor OK fault

6 2-channel conditioning module for BCU



6.1 Function

- ◆ The conditioning module for BCU, abbreviated to BCU-CON (**BCU-Conditioning Module**), is laid out for two measuring channels. Two sensor signals can be evaluated independent of one another.
- ◆ The signal provided at each channel corresponds to the instantaneous value of the measurement type BCU.
- ◆ A BCU-CON is internally managed through a Sensor block (Firmware). Nevertheless the raw signals are continuously accessed from the adjacent sensor modules. The connection and power to the sensors must also be provided by the adjacent sensor modules.
- ◆ A BCU-CON combines the following hardware functions:
 - Signal access at the adjacent sensor modules
 - Signal amplifier
 - Bandpass filtering (15 – 60 kHz)
 - Signal evaluation by peak value detector
 - Output of the instantaneous value of BCU
 - LED signalling

6.2 Technical data

6.2.1 Electrical properties

Inputs:	2, from adjacent sensor modules
Signal filtering	15 ... 60 kHz
Signal detection	Peak value detector
Signal output	Instantaneous value of BCU
Accuracy error	< 4,5 % of instantaneous value plus 0,2 % of measurement range full scale value

6.2.2 Equipment and signalling

◆ Possible socket positions on the Base Module X2_M

When the BCU-CON is located at position X2_M, it can be operated as a 2-channel module. The signals from socket positions X1_M and X3_M can be acquired and processed.

◆ The BCU-CON occupies a socket of a sensor module. Theoretically more than one BCU-CON per Base module is possible, but the input signals would be missing. As a result one BCU-CON per Base module is the sensible limit.

◆ LED OVERLOAD (RD)

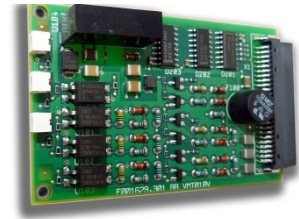
Each BCU-CON has 2 red LEDs.

The red LED provides information about the condition of the A/D converter channel for the respective signal path. This displays whether an over-range exists, or has existed, due to a high input signal or to a selected input range that is too small or also whether everything is in order.

	LED	Status	Explanation
AC-PATH	Red	Off	No over-range
	Red	Flashing at 2 Hz	A/D converter fault; not yet confirmed through the dialogue
	Red	Flashing at 0,5 Hz	No A/D converter fault currently existing; an earlier fault not yet confirmed through the dialogue
	Red	On	A/D converter fault confirmed through the dialogue; still existing.

7 3-channel input module for binary status signals

7.1 Function



- ◆ The input module for binary status signals, abbreviated to BINARY-IN, is laid out for a maximum of 3 input signals.
- ◆ Each BINARY-IN module is laid out to process either
 1. non-active signals from external potential-free contacts,
 2. active signals from external current sources (e.g. PNP open-collector) or
 3. active signals from external current sinks (e.g. NPN open-collector).
With non-active signals the required auxiliary power is prepared by the BINARY-IN module.

Active and non-active signals may not be simultaneously fed to the same module because the switching of the auxiliary voltage is not done separately to the channels.
- ◆ Each input channel of the BINARY-IN module is managed internally in the instrument through a binary block (firmware), i.e. a BINARY-IN input channel and a binary block together form a physical interface to the outside world for the *VIBROCONTROL 6000 Compact monitor*. The connected input signal is acquired and made available to the successive signal path for further processing and assessment, e.g. switching the Trip Multiply function on and off.
- ◆ The current **logical** state (ON or OFF) of each input channel is displayed respectively by a yellow LED.

7.2 Technical data

7.2.1 Electrical properties

Input:

General properties	galvanically-separate, polarized
Input impedance	3 kΩ
Maximum contact voltage	50 V
Minimum current load for potential-free contacts	5 mA
Accuracy	5 ms

Signal status LOW:

Nominal input voltage	0 V DC
Input voltage range	-50 V...+ 5,0 V DC
Maximum input current	1 mA

Signal status HIGH:

Nominal input voltage	+ 24 V DC
Input voltage range	+ 16,5 V...+ 50 V DC
Minimum input current	5 mA

7.2.2 Equipment and signalling

- ◆ Possible socket positions on the Base module X1_M to X9_M
- ◆ Connection plugs on the Base module X1 to X9
- ◆ Connection plug layout with BINARY-IN equipment

BINARY-IN Connection pin layout X4 to X9		
PIN	Signal	Explanation
1	HI A	Channel A input HIGH
2	LO A	Channel A input LOW
3	HI B	Channel B input HIGH
4	LO B	Channel B input LOW
5	HI C	Channel C input HIGH
6	LO C	Channel C input LOW



Note:

The inputs A,B,C are not separated galvanically

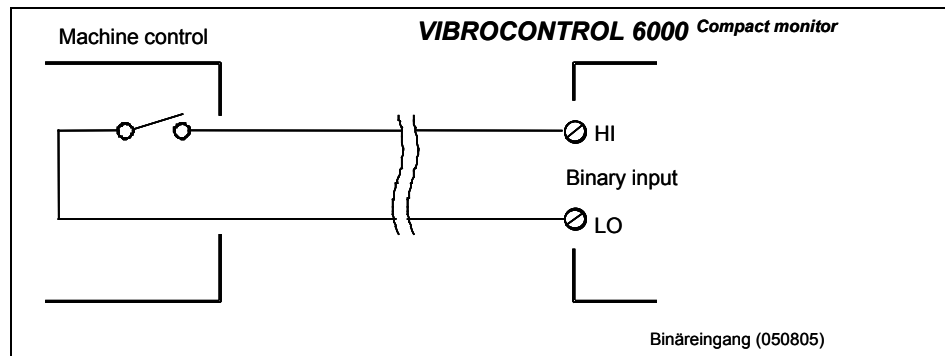
◆ Status LED (yellow)

The yellow LEDs signal the current logical evaluated state of the respective assigned channel.

Status LED (yellow)	Logical state	Input signal
Off	Undefined channels are not evaluated	
	OFF	Dependent upon the parameter „Active State“, see Binary block for details
On	ON	

7.3 Wiring of binary inputs

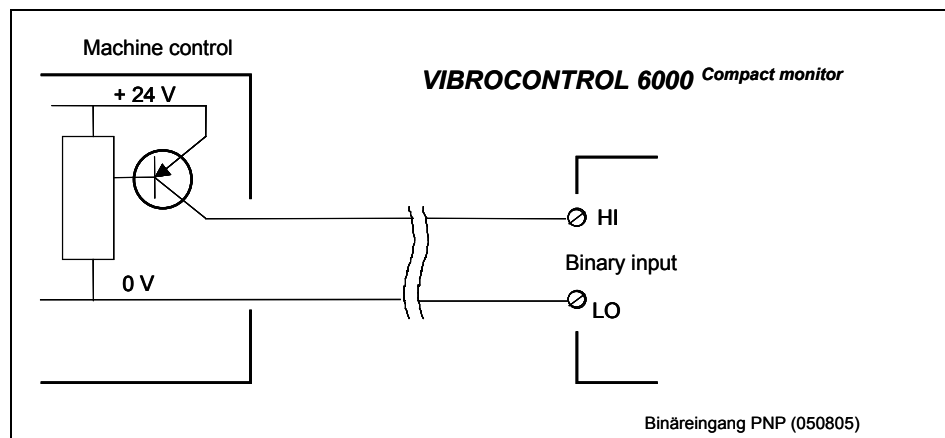
7.3.1 External potential-free contacts (non-active signals)



Note:

The setup parameter **<Active Signal>** **MUST** be given the setting „**NO**“. Thereby the auxiliary voltage source for the BINARY-IN module is switched on and supplies the necessary auxiliary power for the control circuit.

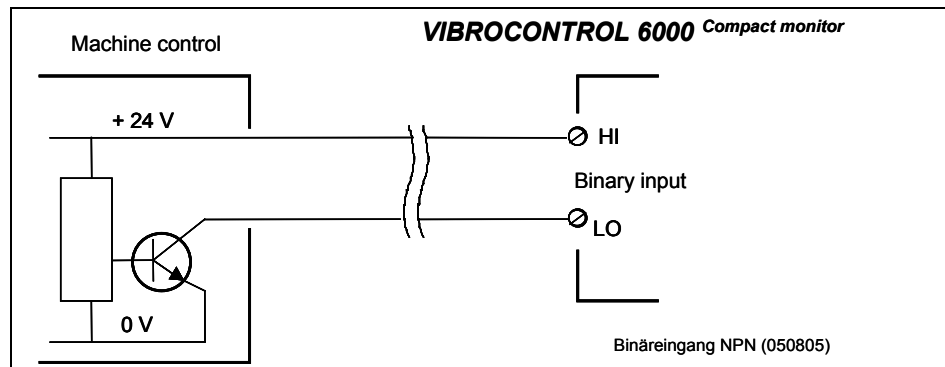
7.3.2 Active signals from external current sources (PNP open-collector)



Note:

The setup parameter **<Active Signal>** **MUST** be given the setting „**YES**“. Thereby the auxiliary voltage to the BINARY-IN module is switched off as active signals do not require auxiliary power.

7.3.3 Active signals from external current sinks (NPN open-collector)



Note:

The setup parameter **<Active Signal>** **MUST** be given the setting „YES“. Thereby the auxiliary voltage source to the BINARY-IN module is switched off as active signals do not require auxiliary power.

8 2-channel Relay output module

8.1 Function



- ◆ The relay output module is laid out for two output channels. Each output channel uses a change-over relay for switching of potential-free contacts.
- ◆ Each relay output module has 4 LEDs, of which 2 are respectively assigned to one relay. Each relay thus has two LEDs, one green and one two-colour red/yellow LED. All LEDs are used for local signalling of the operating and switching status of the relays.
- ◆ As a rule the Relay module is controlled internal to the system (see Signal-flow chart) by preceding Monitoring blocks (Monitor) or Logic blocks)
- ◆ The LEDs of the relay output modules signal the status of the limits monitored by the Monitor block. The type and manner of signalling is determined by global and internal block parameters.



Note:

The signalling of the LEDs is described in section „Introduction“, chapter 8.3.3.

8.2 Technical data

8.2.1 Electrical data

Relay type	change-over, mono-stable
Nominal operating voltage	24...48 V
Maximum contact voltage	< 50 V
Maximum current load	< 500 mA
Minimum current	10 µA
Minimum voltage	10 mV



Caution!

The maximum values must not be exceeded. Take precautions for inductive or capacitive loads.

8.2.2 Connection plug layout

Relay output module pin layout connections X1/X2/X3		
PIN	Signal	Explanation
1	ARM RelA	Arm, relay A
2	NO RelA	Normally-open contact, relay A
3	NC RelA	Normally-closed contact, relay A
4	ARM RelB	Arm, relay B
5	NO RelB	Normally-open contact, relay B
6	NC RelB	Normally-closed contact, relay B

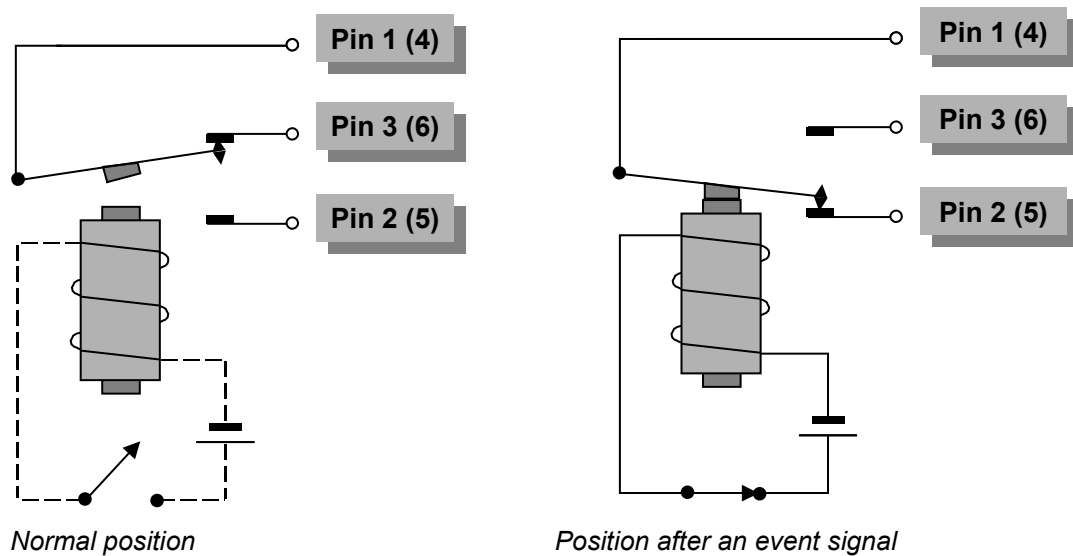
8.3 Wiring of relay outputs

8.3.1 Relay switch mode

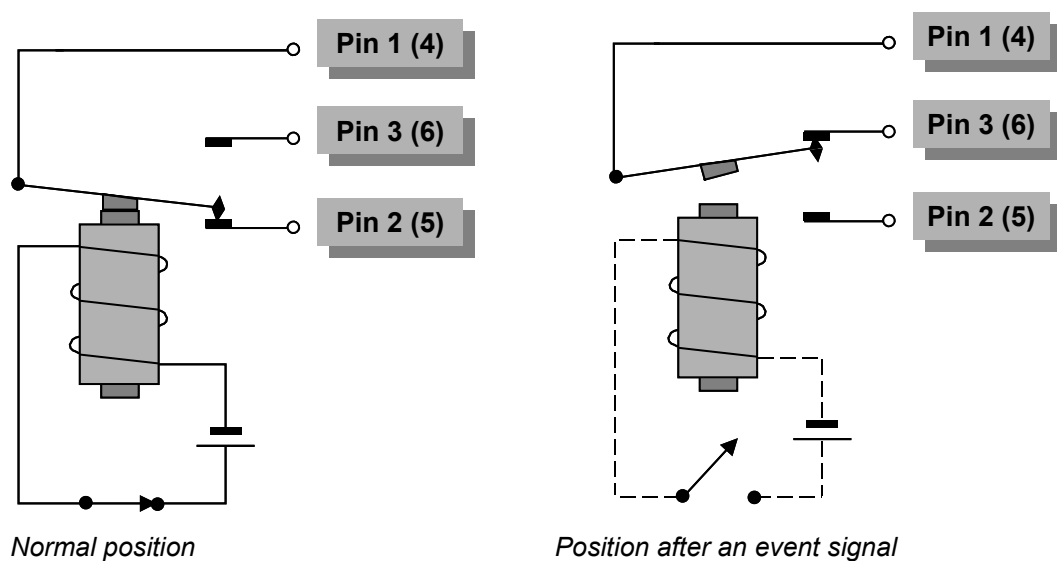
When connecting the relay contact it should be noted that the relay outputs can be operated selectively as normally de-energised or normally energised relays (see figure for details)

Pins no. 1-3 are referred to channel A, and pins no. 4-6 to channel B.

Principle diagram for normally de-energised switching:



Principle diagram for normally energised switching:



8.3.2 Controlling an external power relay

The relay output module is laid out for switching low power. If higher power switching is required this can be realised through supplementary externally mounted power relays.

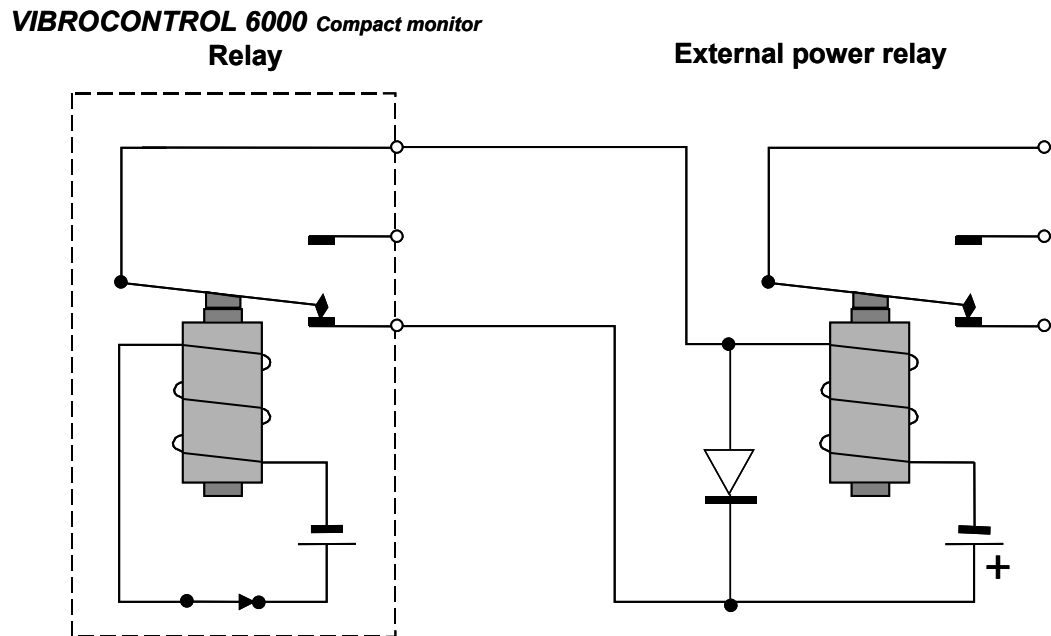
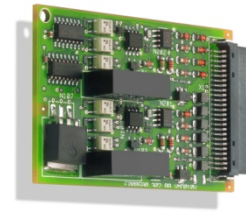


Figure. Example for controlling an external power relay

9 2-channel output module for current / voltage

9.1 Function



- ◆ The output module for current and voltage signals, abbreviated to DC-OUT (**DC-OUTPUT-Module**) is laid out as a 2-output channel.
- ◆ The DC-OUT module is an interface between the *VIBROCONTROL 6000 Compact monitor* and the outside world. The output can be selected as a potential-free DC-current signal (e.g. 4 ... 20 mA) or a potential-free DC voltage signal (e.g. 0 ... 10 V). Both signal types are presented at each DC-OUT Module. Selection is done respectively through a corresponding connection layout.
- ◆ A DC output is always directly linked with a measurement processor (e.g. an RMS block). The output signal level of the DC output represents, as a rule, the current measured value. The representation of the measured value by an output signal level is set up through the dialogue of the User-Terminal and can be changed at any time by the user.

9.2 Technical data

9.2.1 Output

General properties	galvanically separate, short-circuit proof
Output range for current signal	0 ... 20 mA and 4 ... 20 mA
Max. load for current signal	500 Ω
Output range for voltage signal	0 ... 10 V and 2 ... 10 V
Min. load for voltage signal	10 kΩ
Dynamics	1

9.2.2 Connection plug layout

Plug X4 to X9	DC-OUT (up to 2 channels: A and B)		
Pin 1	Volt A	OUT	Voltage output, channel A
Pin 2	Curr A	OUT	Current out, channel A
Pin 3	COM A	OUT	Common, channel A
Pin 4	Volt B	OUT	Voltage output, channel B
Pin 5	Curr B	OUT	Current output, channel B
Pin 6	COM B	OUT	Common, channel B



Brüel & Kjær Vibro

C

Komponenten des Signalflussgraphs
Components of the signal flow chart
Composantes de signaux flux

VC-6000 Compact monitor

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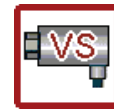
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1 Sensor block



1.1 Function

- ◆ The Sensor block is the configuration interface for all 1-channel input modules.
- ◆ The Sensor block contains all the parameters required for the configuration of input channels.
- ◆ All settings that directly affect the input channels are carried out in the Sensor block.

1.2 Parameters and setting ranges

1.2.1 Parameter list

- ◆ **<Socket no.>**

This parameter provides information about the physical socket number of the 1-channel input module.

The settings are determined through the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument.

**Note:**

The measurement and monitoring function of an input channel is guaranteed only when the physical module configuration is not changed!

Socket no.	1 / 2 / 3	No. of the socket on the Base module
------------	-----------	--------------------------------------

◆ <Sensitivity>

This parameter describes the sensor sensitivity (transmission factor) in the correct physical unit for the connected sensor. The unit of sensitivity (e.g. mV/g or V/m/s) is determined by the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument. The numeric value of the sensitivity can be changed within its setting range. The correct setting should be taken from the technical documentation of the connected sensor.

Setting range for the sensitivity:

Sensitivity	Minimum: -99999.99	Maximum: + 99999.99
-------------	--------------------	---------------------

Setting values for Brüel & Kjær Vibro sensors:

Sensor	Sensitivity
AS-02x, AS-03x, AS-06x	100 mV/g
VS-068, VS-069	100 V/m/s (= mV/mm/s)
For further values consult the sensor documentation	

◆ <Input range>

This parameter defines the maximum input signal (peak value) in the AC signal path that can be processed without over-ranging the signal path.

The unit of the <input range> corresponds to the physical unit of the value measured in the application. The input signal must be integrated if, for example, acceleration sensors are used to monitor vibration speeds. The physical unit of the <input range> must in this event be specified in mm/s. The <input range> is determined by the VIBROCONTROL 6000 Compact monitor application firmware; it cannot be changed later in the unit.

The physical unit of the input range (e.g. mm/s or g) is determined by the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument.

The numeric value of the input range can be changed within its setting range. The correct setting should be taken from the technical documentation of the connected sensor.

Setting range of the input range:

Input range	Minimum: 0	Maximum: + 99999.99
-------------	------------	---------------------

Maximum set-points for VS sensors:

Sensitivity	Input range
100 mV/mm/s	120 mm/s
75 mV/mm/s	160 mm/s
70 mV/mm/s	170 mm/s

Maximum set-points for AS sensors:

The input signal is automatically integrated by the application if an acceleration sensor is used to monitor the vibration speed. The maximum <input range> is limited to 300 mm/s in this configuration.

**Advice for setting the input range:**

A small input range can improve the quality of the measurement result (signal interruption span), but on the other hand will increase the risk of over-ranging the input electronics. If the input range is too small this can lead to a loss of the monitoring channel.

It should be noted that an existing damage to a machine will almost always effect a rise in the maximum signal level. Especially in the case of acceleration sensors, where in an extreme case the signal peak value can rise by a factor 10 or more.

◆ **<OK high> (OK-window, OK-LED)**

This parameter gives the upper limit of the OK-window for the DC signal path. The OK upper limit is always an absolute voltage value in the unit [V] and can be changed within the setting range. If the sensor output signal reaches an absolute voltage value higher than the OK upper limit (e.g. from a break in the cable), a sensor OK fault will be signalled. The works pre-settings should be changed with the greatest care, also in the case of special reasons.

Setting range for the <OK-high>:

OK high	Minimum: -21,5 V	Maximum: + 2,5 V
---------	------------------	------------------

◆ **<OK low> (OK-window, OK-LED)**

This parameter gives the lower limit of the OK-window for the DC signal path. The OK lower limit is always an absolute voltage value in the unit [V] and can be changed within the setting range. If the sensor output signal reaches an absolute voltage value lower than the OK lower limit (e.g. from a break in the cable), a sensor OK fault will be signalled. The works pre-settings should be changed with the greatest care, also in the case of special reasons.

Setting range for the <OK low>:

OK low	Minimum: -21,5 V	Maximum: + 2,5 V
--------	------------------	------------------

**Advice for setting the OK limits von Brüel & Kjaer Vibro sensors :**

VS-Sensor:	OK high= 0 V OK low = -20 V
SD/DS/IN-Sensor:	OK high = -1.8 V OK low = -18.2 V
AS-Sensor:	OK high = -2,0 V OK low = -18.0 V

◆ <OK latching>

This parameter defines whether the OK LED will operate in a latching or non-latching mode. The setting can be changed at the instrument.

Settings:

OK latching	Yes	No
-------------	-----	----

◆ <Hardware Id>

This parameter informs you about the type of the 1-channel input module. The setting is determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.

Hardware-Id	Module
1	A-TIM (CCS)
2	A-TIM (-24 V)
3	D-TIM
6	V-TIM (15 Hz)
7	V-TIM (8 Hz)

1.2.2 Summary of the parameters

Parameter name	Value range	changeable
Socket no.	1 to 3	No
Sensitivity	-99999.99...+ 99999.99	Yes
Input range	0...+ 99999.99	Yes
OK high	-21.5 V...+2.5 V	Yes
OK low	-21.5 V...+2.5 V	Yes
OK latching	Yes / No	Yes
Hardware Id	1, 2, 3, 6 or 7	No

2 Sensor-(A/B) block



2.1 Function

- ◆ The Sensor (A/B) block is the configuration interface for all 2-channel input modules (e.g. GP-SIM) and the 2-channel BCU conditioning module.
- ◆ The Sensor (A/B) block contains all parameters required for the configuration of input channels.
- ◆ All settings directly associated with the input channels are in the Sensor (A/B) block.

2.2 Parameters and setting ranges for GP-TIM

2.2.1 Parameter list

◆ <Socket no.>

This parameter informs you about the physical socket number of the input module. The settings are determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.



Note:

The measurement and monitoring function of an input channel is guaranteed only when the physical module configuration is not changed!

Socket no.	1 / 2 / 3	No. of the socket position on the Base module
------------	-----------	---

◆ <Sensitivity A> and <Sensitivity B>

This parameter describes the sensitivity (transmission factor) in the calibration unit of the incoming signal.

The unit of sensitivity (e.g. mV/eu or μ A/eu) is determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument. The numeric value of the sensitivity can be changed within the setting range.

The correct setting should be taken from technical documentation of the input signal.

Setting range for the sensitivity:

Sensitivity A	Minimum: -99999.99	Maximum: + 99999.99
Sensitivity B	Minimum: -99999.99	Maximum: + 99999.99

◆ **< OK-high A> and < OK-high B> (OK-window OK-LED)**

This parameter defines the high limit value of the OK-window for channel A and channel B. The OK-high limit is always an absolute voltage value in the unit [V] or an absolute current value in the unit [mA]. The OK-high limit can be changed within this setting range. If the sensor signal reaches an absolute voltage or absolute current value that is higher than the OK-high limit, an OK-fault will be signalled.

Setting range for the OK upper limit:

OK high limit	For voltage signals (GP-TIM)	
	Minimum: -15,0 V	Maximum: + 15,0 V
	For current signals (GP-TIM)	
	Minimum: -30,0mA	Maximum: + 30,0 mA

◆ **< OK-low A> and < OK-low B> (OK-window OK-LED)**

This parameter defines the low limit of the OK-window for channel A and channel B. The OK-low value is always an absolute voltage value in the unit [V] or an absolute current value in the unit [mA]. The OK-low limit can be changed within this setting range. If the sensor signal reaches an absolute voltage or absolute current value that is lower than the OK-low limit (e.g. through a cable break), an OK-fault will be signalled.

OK low limit	For voltage signals (GP-TIM)	
	Minimum: -15,0 V	Maximum: + 15,0 V
	For current signals (GP-TIM)	
	Minimum: -30,0mA	Maximum: + 30,0 mA

◆ **<OK latching>**

This parameter defines whether the OK LED will operate in a latching or non-latching mode. The setting can be changed at the instrument.

Settings:

OK latching	Yes	No
-------------	-----	----

◆ **<Hardware Id>**

This parameter informs you about the type of input module. The settings are determined by the application firmware and cannot be changed at the instrument.

Hardware-Id	Module
8	GP-SIM

2.2.2 Summary of the parameters for GP-TIM

Parameter name	Value range	changeable
Socket no.	1 to 3	No
Sensitivity	-99999.99...+ 99999.99	Yes
OK high	-15.0 V...+ 15.0 V bzw. - 30.0 mA...+ 30.0 mA	Yes
OK low	-15.0 V...+ 15.0 V bzw. - 30.0 mA...+ 30.0 mA	Yes
OK latching	Yes / No	Yes
Hardware Id.	8	No

2.3 Parameters and setting ranges for BCU-CON

2.3.1 Parameter list

◆ <Socket no.>

This parameter informs you about the physical socket number of the input module. The settings are determined by the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument.



Note:

The measurement and monitoring function of an input channel is guaranteed only when the physical module configuration is not changed!

Socket no.	1 / 2 / 3	No. of the socket position on the Base module
------------	-----------	---

◆ <Input range>

This parameter determines the measurement range, and as a result the maximum BCU value, that can be processed by the BCU-CON. If the acquired signal is larger than the set input range, a channel over-range will be signalled.

Setting range of the input:

Input range	Minimum: 10.0 BCU	Maximum: + 200.0 BCU
-------------	-------------------	----------------------

◆ <OK latching>

This parameter defines whether the OK LED will operate in a latching or non-latching mode. The setting can be changed at the instrument.

Settings:

OK latching	Yes	No
-------------	-----	----

◆ <Hardware Id>

This parameter informs you about the type of input module. The settings are determined by the application firmware and cannot be changed at the instrument.

Hardware-Id	Module
13	BCU-CON

2.3.2 Summary of parameters for BCU-CON

Parameter name	Value range	changeable
Socket no.	2 (1, 3)	No
Input range	+ 10.0...+ 200.0	Yes
OK latching	Yes / No	Yes
Hardware Id.	13	No

3 Binary-input block



3.1 Function

- ◆ The Binary (input) block is an optional signal path component. It contains all parameters necessary for exactly defining the properties of one input channel of a BINARY-IN module.
- ◆ Through the parameters of the Binary-input block the input signal type, active status and time delays can be defined.
- ◆ A BINARY-IN module has three input channels. Therefore three Binary-input blocks are necessary to describe all channels of the module.
- ◆ A Binary-input block can provide status information for various subsequent blocks, e.g. Monitor, Logic block etc.

3.2 Parameters and setting ranges

3.2.1 Parameter list

◆ <Socket no.>

This parameter provides information about the physical socket number of the BINARY-IN module on the Base module. The settings are defined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.



Note:

The function of the Binary-IN module is guaranteed only when the physical module configuration has not been changed !

Socket no.	1, 2, 3, 4, 5, 6, 7, 8 or 9
------------	-----------------------------

◆ <Channel no.>

This parameters informs you about the physical channel allocation of the BINARY-IN module. The settings are defined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.

Channel no.	A or B or C
-------------	-------------

◆ <Active Signal>

This parameter switches an auxiliary voltage within the BINARY-IN module either on or off.

Active signals from external current sources or open collector outputs require no auxiliary voltage.

Non-active signals from external potential-free contacts require an auxiliary voltage.

The selection whether you are dealing with active or non-active signals can be changed at the instrument.



Note:

The setting of the parameter „Active Signal“ **MUST** be identical for all three channels of a BINARY-IN module.

	Use of an active signal (auxiliary voltage off)	Use of an external potential-free contact (auxiliary voltage on)
Active Signal	Yes	No (Works pre-setting)

◆ <Active state>

This parameter defines the relationship between an electrical input signal and the logical switch state.

The electrical input signal is either HIGH (nominal + 24 V) or LOW (nominal 0 V). The parameter „Active state“ determines the respective associated logical switch state, either ON resp. OFF. The active state is always that state which is evaluated as ON.

The selection of the active state can be changed at the instrument using the User Terminal.

The BINARY-IN module has three yellow LEDs to display the current logical switch state of each of the three channels.

	Current signal state Electrical input signal			
	HIGH (+24V)	LOW (0 V)	HIGH (+24 V)	LOW (0 V)
Active state	high		low (Works default)	
Logical switch state	ON	OFF	OFF	ON
LED state	ON	OFF	OFF	ON

◆ <Delay high>

This parameter defines the time delay after a change of the signal state from LOW (0 V) to HIGH (+24 V)

The logical change of state is completed only after the new signal state HIGH (+24 V) has existed uninterrupted for longer than the set time delay.

Minimum: 0.0 s	Maximum: 999.99 s	Step size: 0.01
Works pre-setting	0.1 s	

◆ <Delay low>

This parameter defines the time delay after a change of the signal state from HIGH (+24 V) to LOW (0 V).

The logical change of state is completed only after the new signal state LOW (0 V) has existed uninterrupted for longer than the set time delay.

Minimum: 0.0 s	Maximum: 999.99 s	Step size: 0.01
Works pre-setting	0.1 s	

◆ <Hardware ID.>

This parameter provides information about the input module type.

The settings are defined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.

Hardware ID.	11
--------------	----

3.2.2 Summary of the parameters

Parameter name	Value range	changeable
Socket no.	1, 2, 3, 4, 5, 6, 7, 8, 9	No
Channel no.	A, B or C	No
Active signal	Yes / No	Yes
Active state	High / Low	Yes
Delay High	0.0 s...999.99 s	Yes
Delay Low	0.0 s...999.99 s	Yes
Hardware Id.	11	No



4 Highpass / Lowpass filter

4.1 Function

- ◆ Filters are used to objectively change the energy content of signals. Signal filtering can thus have various objectives as follows:
- ◆ E.g. on the following basis:
 1. Lowpass filter:
To filter out high-frequency energy such as high-frequency noise components.
 2. Highpass filter:
To filter out low-frequency energy and static signal components.
 3. Bandpass filter:
A combination of a lowpass and a highpass filter to concentrate on a specific frequency range.
 4. Bandpass filter for machine assessment according to DIN ISO:
Fixed bandpass from 10 Hz - 1 kHz with machine speeds > 600 rpm or 2 Hz - 1 kHz with machine speeds < 600 rpm.
 5. Bandpass filter for assessment of rolling-element bearing condition:
Fixed bandpass from 1 kHz - 10 kHz.
 6. Integration filter:
Conversion of the signal to another vibration parameter, e.g. from acceleration to velocity.
 7. Frequency response linearisation:
To extend the frequency range of a vibration velocity sensor.
- ◆ The VIBROCONTROL 6000 Compact monitor uses various configurations for signal filtering. Fundamentally digital filters are used (e.g. 3rd order Butterworth filter).
- ◆ The integration of acceleration signals in the VIBROCONTROL 6000 Compact monitor can also be effected by analogue techniques because with signal integration, analogue filters have the best technical measurement properties.

4.2 Parameter list with setting ranges

**Note:**

In the user menu of the User Terminal all filters are exclusively designated only as highpass filter or lowpass filter. The actual construction step of each signal path can be taken respectively from the individual instrument documentation (signal-flow chart).

4.2.1 Bandpass filter acc. to DIN ISO

The bandpass filter according to the recommendations of DIN ISO 10816 consists of limited adjustment highpass filter and a fixed setting lowpass filter.



4.2.2 Lowpass filter acc. to DIN ISO

◆ **<Corner frequency>** of the filter:

The corner frequency of the lowpass filter according to DIN ISO is set to 1 kHz and cannot be changed. This corner frequency corresponds to the recommendations of DIN ISO 10816.

4.2.3 Highpass filter acc. to DIN ISO

◆ **<Corner frequency >** of the filter:

The corner frequency of the highpass filter is preset to 10 Hz according to DIN ISO.

The settings in the instrument can be changed to values in the range from 1 Hz to 10 Hz.

Settings:

1 Hz, 1.25 Hz, 1.6 Hz, 2 Hz, 2.5 Hz, 3.15 Hz, 4 Hz, 5 Hz, 6.3 Hz, 8 Hz or 10 Hz



Setting advice:

Corner frequency = 10 Hz with machine speeds > 600 rpm (DIN ISO 10816)

Corner frequency = 2 Hz with machine speeds ≤ 600 rpm (DIN ISO 10816)

Corner frequency = 1 Hz with machine speeds ≤ 120 rpm

General: Corner frequency < machine speed

4.2.4 Bandpass filter for rolling-element bearing condition



The bandpass filter for the assessment of rolling-element bearing condition consists of a highpass filter and a lowpass filter each with a respectively fixed corner frequency.

4.2.5 Lowpass filter for rolling-element bearing condition

◆ **<Corner frequency >** of the filter:

The corner frequency of the lowpass filter for rolling-element bearing condition is fixed at 10 kHz. The sensible use of this filter is limited to the use of acceleration sensors.

4.2.6 Highpass filter for rolling-element bearing condition

◆ **<Corner frequency >** of the filter:

The corner frequency of the highpass filter for rolling-element bearing condition is fixed at 1 kHz. The sensible use of this filter is limited to the use of acceleration sensors.

4.2.7 Variable bandpass filter



The variable bandpass filter consists of a variable highpass filter and a variable lowpass filter with a respectively adjustable corner frequency.

4.2.8 Variable lowpass filter

◆ **<Corner frequency >** of the filter:

The corner frequency of the variable lowpass filter is as a rule preset to 1 kHz. The setting in the instrument can be changed according to the values shown in table 1.

Filter settings that are sensible for the machine being monitored are the responsibility of the user.

Corner frequency in Hz				
1	10	100	1 k	10 k
1.25	12.5	125	1.25 k	12.5 k
1.6	16	160	1.6 k	16 k
2	20	200	2 k	20 k
2.5	25	250	2.5 k	
3.15	31.5	315	3.15 k	
4	40	400	4 k	
5	50	500	5 k	
6.3	63	630	6,3 k	
8	80	800	8 k	

Table 1: Corner frequencies for the variable lowpass filter

4.2.9 Variable highpass filter

◆ **<Corner frequency >** of the filter:

The corner frequency of the variable highpass filter is as a rule preset to 10 Hz. The settings in the instrument can be changed according to the values shown in table 2. Filter settings that are sensible for the machine being monitored are the responsibility of the user.

Corner frequency in Hz				
1	10	100	1 k	10 k
1.25	12.5	125	1.25 k	12.5 k
1.6	16	160	1.6 k	16 k
2	20	200	2 k	20 k
2.5	25	250	2.5 k	
3.15	31.5	315	3.15 k	
4	40	400	4 k	
5	50	500	5 k	
6.3	63	630	6,3 k	
8	80	800	8 k	

Table 2: Corner frequencies for variable highpass filter

4.3 Summary of parameters for signal filtering

**Note:**

In the user menu of the User_Terminal the supplementary parameters are not displayed. The actual construction steps of each signal path can respectively be taken from the individual instrument documentation (signal-flow chart).

4.3.1 Analogue signal integration

- ◆ All highpass filters can be selectively combined with an analogue signal integration. The use of these filters is only possible in combination with single channels for acceleration sensors (Acceleration Interface Module = input modules A-TIM-CCS & A-TIM-24 V). The original signal from the acceleration sensor is converted to a vibration velocity signal. The activation is done by selecting the corresponding measurement unit, e.g.: mm/s in the configuration of the A-TIM module.
- ◆ The highpass filter according to DIN ISO, in combination with acceleration sensors, is coupled with an analogue signal integration as standard.
- ◆ Should the analogue signal integration be used in a signal path, this will be identified in the signal-flow chart of the instrument.

4.3.2 Frequency response linearisation

- ◆ All highpass filters can selectively be used in combination with frequency response linearisation. The use of this filter is limited to the use with single channels for vibration velocity sensors (Velocity Sensor Interface Module = V-TIM). The frequency range is extended toward the lower frequencies.
- ◆ The highpass filter according to DIN ISO, in combination with vibration velocity sensors is combined as standard with frequency response linearisation.
- ◆ There are two forms of frequency response linearisation:
 - ◇ for VS-068/VS-069 (Brüel & Kjær Vibro sensors):
8 Hz rectification in combination with input module V-TIM -8 Hz
 - ◇ for VS-077/VS-079 (Brüel & Kjær Vibro sensors):
15 Hz rectification in combination with input module V-TIM -15 Hz
- ◆ Should the frequency response linearisation be used in a signal path, this will be identified in the signal-flow chart of the instrument.



5 Trigger block

5.1 Function

- ◆ The Trigger block is an optional signal path component. It contains all necessary parameters to process trigger signals (impulses). The input signal (impulse) is compared to a trigger level to create an event sequence (series of reference time points).
- ◆ The trigger operating type (auto-trigger resp. fixed-value trigger), trigger level and hysteresis are defined by the parameters of the Trigger block .
- ◆ The Trigger block is necessary for the execution of impulse-based measuring and monitoring tasks, e.g.
 - Speed measurement
 - Rotor-synchronous measurement tasks (e.g. vector measurements)
 - Cyclic measurements tasks (e.g. Cycle-DC measurement)
- ◆ In the operation type Automatic Trigger the automatically evaluated trigger level can be read through the User Terminal or through the COM interface of a downstream OPC-server.
- ◆ The level for the automatic trigger can be given at the output of the DC-OUT Module as a voltage signal.

5.2 Parameters and setting ranges

5.2.1 Parameter list

◆ <Trigger type>

This parameter defines whether the trigger level will be automatically or manually determined.

With the automatic trigger the trigger level is calculated new for each trigger cycle from the signal increase. The actual trigger level corresponds to 50 % of the signal increase from the previous trigger cycle. With the fixed-value trigger the trigger level is maintained constantly at the defined value.

Trigger type	Automatic	Fixed-value
Works pre-setting	Automatic	

◆ <Signal slope>

This parameter determines whether the trigger event will be initiated by an increasingly positive or an increasingly negative signal slope.

Signal slope	Positive	Negative
Works pre-setting	Negative	

◆ <Trigger level>

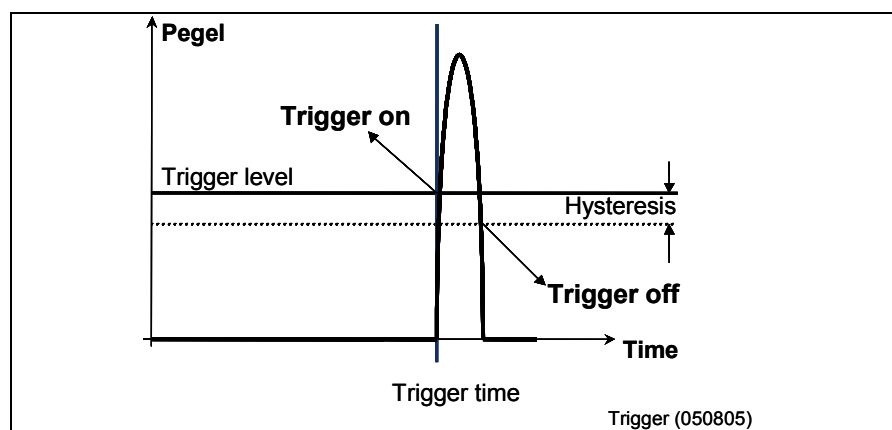
This parameter is relevant only for the fixed-value trigger option and determines the level of the fixed-value trigger.

Minimum: -25.0 V	Maximum: + 25.0 V	Step size: 0.01
Works pre-setting	-15.0 V	

◆ <Hysteresis>

With the automatic trigger the minimum signal increase for the trigger signal is determined by the hysteresis. For the automatic trigger the hysteresis must always be larger than the peak-peak value of signal noise and never larger than 50 % of the genuine signal increase.

In both the automatic trigger and the fixed-value trigger the hysteresis should minimize the risk of faulty multi-triggering. The hysteresis value defines a tolerance band. When triggering from the positive signal slope the trigger signal must fall below this tolerance band (trigger level MINUS hysteresis) before a new trigger event can be initiated (see figure). When triggering from the negative signal slope, this relationship must be exactly reversed, i.e. the tolerance band (trigger level PLUS hysteresis) must be exceeded before a new trigger event can be initiated.



Minimum: 0.0 V	Maximum: + 25.0 V	Step size: 0.01
Works pre-setting	+ 1.5 V	

5.2.2 Summary of the parameters

Parameter name	Value range	changeable
Trigger type	Automatic or Fixed-value	Yes
Signal slope	Positive or Negative	Yes
Trigger level	-25.0 V...+25.0 V	Yes
Hysteresis value	0.0 V...+25.0 V	Yes



6 BCU measurement

6.1 Function

- ◆ The BCU value is a proprietary measurement variable for the assessment of rolling-element bearing condition according to the BEARCON technique.
- ◆ BCU measurement is an optional signal path component. As a configuration interface, it also contains a group of parameters necessary for the setting.
- ◆ The BCU value to be calculated is formed over an adjustable averaging time. New measured values are only presented each time after the averaging time has run.
- ◆ For a better comparison of the measurements from various bearings / machines the BCU value can be normalised. This is sensible especially after maintenance work or a bearing has been replaced.
- ◆ The current value can be displayed using the User-terminal.
- ◆ The current value is also available as an analogue DC output signal for peripheral electronic equipment.
- ◆ The current measured value can be read through the COM interface of a downstream OPC-server.
- ◆ The BCU value can be monitored for limit setpoints through one or more Monitor blocks.

6.2 Parameters and setting ranges

◆ <Averaging time>

The parameter of averaging time determines over which time interval the BCU measurement will form its value. The averaging time can be changed within its setting range.

The averaging time and update interval for the measurement are identical.

Setting range for BCU averaging time:

Minimum: 0.01 s	Maximum: 99.99 s	Step size: 0.01s
Works pre-setting	1.00 s	



Advice for setting the averaging time:

Longer averaging times improve the reproducibility and reliability of the measurement but are costly in terms of time resolution.

Shorter averaging times increase the time resolution of the measurement at the cost of reproducibility.

◆ **<Multiplier> and <Divider>**

These two parameters can be used for normalising the BCU measurement. Both parameters are integral values that can be changed within a setting range.

The following is valid: $BCU_{\text{normalised}} = BCU_{\text{non-normalised}} * \text{multiplier} / \text{divider}$

Setting range - multiplier:

Minimum : + 1	Maximum: + 1000	Step size: 1
---------------	-----------------	--------------

Setting range - divider:

Minimum : + 1	Maximum: + 1000	Step size: 1
---------------	-----------------	--------------



Advice for setting the multiplier and divider:

To guarantee a good comparative value for BCU measurements, the measured BCU value is usually normalised through a multiplier / divider to the value 1. In the process of measuring and monitoring only the relative changes in the value are then interesting.

Example:

Initial measured BCU value (not normalised) = 5.

Normalise to BCU = 1 (Good condition / New condition) by a divider of 5.

After normalisation a relative change of 100 % is measured as BCU value = 2 (instead of BCU value = 10 without normalisation).

6.2.1 Summary of the parameters

Parameter name	Value range	changeable
Averaging time	0.01 s...99.9 s	Yes
Multiplier	1...1000	Yes
Divider	1...1000	Yes



7 DC measurement

7.1 Function

- ◆ The DC value describes the quasi-static DC part of a signal (DC signal, DC part of an AC/DC signal).
- ◆ A DC measurement is used to determine quasi-static measurements such as GAP voltage, axial shaft position, process values, etc.
- ◆ The DC measurement is an optional signal path component. As a configuration interface, it contains a group of parameters necessary for the setting.
- ◆ The physical unit of the DC measurement is determined by the preceding components in the signal path, especially the sensor / Sensor (A/B) block.
- ◆ The DC value to be calculated is formed over an adjustable averaging time. New measured values are only available each time after the averaging time has expired.
- ◆ The current measured value can be displayed using the User Terminal.
- ◆ The current measured value is also available as an analogue DC output signal for connection to peripheral electronic equipment.
- ◆ The current measured value can be read through the COM interface of a downstream OPC-server.
- ◆ The DC measurement can be monitored for violation of setpoints through one or more Monitor blocks

7.2 Parameters and setting ranges

◆ <Averaging time>

The averaging time parameter determines over which time interval the DC measurement will calculate its value. The averaging time can be changed within its setting range.

Setting range for the DC value averaging time:

Minimum: 0.01 ms	Maximum: 99.99 ms	Step size: 0.01 ms
Works pre-setting	1.00 s	



Setting advice

To filter out electrical stray fields the averaging times should be set to correspond to an integral number of the exciter period. Under some circumstances this can improve the reproducibility of the measurement. Typical known stray fields are to be found for example at 50/3 Hz, 50 Hz and 60 Hz.

◆ <Zero offset>

The zero offset of the units of the DC measured value. The set value corresponds to the measurement at an input of 0V or 0 mA.

Example:

Measured signal 4-20 mA at measurement range 0-16 eu → zero offset is at -4 eu.

The zero offset can be changed within the setting range.

Setting range of the DC zero offset:

Minimum: -9999.99	Maximum: + 9999.99	Step size: 0.01
Works pre-setting	0.000	

7.2.1 Summary of the parameters

Parameter name	Value range	changeable
Averaging time	0.01 s...99.99 s	Yes
Zero offset	-9999.99...+ 9999.99	Yes

8 Speed measurement

8.1 Function

- ◆ The Speed measurement is a signal path component to accurately acquire a scalar measured value, e.g. the rotational speed of a shaft or the time span between two trigger signals.
- ◆ The Speed measurement block, as a configuration interface, contains all the parameters required for setting up.
- ◆ The Speed measurement always needs the output signal (trigger event sequence) from a preceding Trigger block in the signal-flow chart.
- ◆ As a rule the physical measurement unit for the speed measurement is defined as [rpm] and cannot be changed at the instrument. Configurations can also be prepared with the units [cpm], [Hz], [s] or [ms] .
- ◆ During the progress of the measurement the results of the speed measurement are updated without any time delay. The current measurement can be read through the User Terminal.
- ◆ The current measurement can also be fed through an analogue DC output to downstream electronic equipment.
- ◆ The current measurement can also be read through the COM interface of a downstream OPC-server.
- ◆ The speed measurement can be monitored through one or more Monitor blocks for speed limit violation.
- ◆ The speed measurement is based on a frequency measurement:

$$\text{Speed [rpm]} = 60 * 1/p * f$$

$$f = \text{Trigger frequency in Hz}$$

$$p = \text{Trigger events per revolution}$$

In the case where a gearbox is used:

$$\text{Speed [rpm]} = 60 * 1/g * 1/p * f$$

$$f = \text{Trigger frequency in Hz}$$

$$p = \text{Trigger events per revolution}$$

$$g = \text{Transfer ratio}$$

When only one time period is to be acquired:

$$\text{Period [ms]} = t / n$$

$$t = \text{total measurement time in ms}$$

$$n = \text{Number of completed cycles}$$
- ◆ The signal flow component for speed measurement is used for various applications, e.g. speed measurement, overspeed protection, zero rpm identification, etc.

8.2 Parameters and setting ranges

8.2.1 Parameter list

◆ <Meas. time>

This parameter gives the measuring time. After the measuring time has expired the next trigger event ends the current measurement cycle. The actual measurement time corresponds to the sum of the predefined measuring time and the residual time span to the next trigger event.

Minimum: 0.01 s	Maximum: 100.00 s	Step size: 0.01 s
Works pre-setting	0.5 s	

◆ <Time out>

This parameter serves for zero rpm identification. When the time of the defined maximum impulse interval expires without a new trigger event occurring (zero rpm criterion) it is assumed that the machine is stationary and the measurement result „0 rpm“ is displayed. With the measurement of a time period (unit [s] or [ms]), instead of „0 rpm“ a „Time out“ is displayed.

Minimum: 1 s	Maximum: 999 s	Step size: 1 s
Works pre-setting	1 s	



Note:

For accurate zero-rpm identification it is sensible to assess a number of trigger events per shaft revolution, e.g. the trigger signal can be created by a gear wheel with N teeth.

◆ <Multiplier>

This parameter is required together with the parameter „Divider“ for consideration of a transfer ratio.

Minimum: 1	Maximum: 99999	Step size: 1
Works pre-setting	1	

◆ <Divider>

This parameter can have two functions:

- Whether together with the parameter „Multiplier“ the transfer ratio should be taken into consideration, or
- whether the speed measurement processes a number of trigger events per revolution and the divider must compensate for this., e.g. with a trigger signal from a gear wheel with N teeth the divider is set to N.

Minimum: 1	Maximum: 99999	Step size: 1
Works pre-setting	1	

8.2.2 Summary of the parameters

Parameter name	Value range	changeable
Measuring time	0.01 s...100.00 s	Yes
Time out	1 s...999 s	Yes
Multiplier	1...99999	Yes
Divider	1...99999	Yes

9 Vibration measurement



9.1 Function

- ◆ Vibration measurement is a Firmware component for the acquisition of vibration from one AC signal.
- ◆ The vibration signal detection type is selectable between RMS, Peak and Peak-peak.
- ◆ The RMS value (**R**oot **M**ean **S**quare) is identical to the effective value of a vibration signal (AC-Signals). Mathematically this corresponds to the the root from the square average value and is therefore a measure of the energy content of a vibration.
- ◆ The Peak value is the maximum value of a vibration signal within a prescribed measurement time period. It is thereby an over-energetic measured variable which, in contrast to the RMS value, is not directly related to the signal energy.
- ◆ The Peak-peak value is an absolute value of the sum of the maximum positive and maximum negative values of vibration within a prescribed measurement time period. It is thereby an over-energetic measured variable which, in contrast to the RMS value, is not directly related to the signal energy.
- ◆ The vibration measurement is an optional signal path component which as a configuration interface contains all the parameters necessary for the setup..
- ◆ The physical units of measurement can be set up as parameters.
- ◆ Through the parameter „Measurement time“ the various signal detection types can be configured.
- ◆ The current measured value can be fed to downstream electronic equipment as an analogue DC value.
- ◆ The current measurement can be read by a downstream OPC server over the Interface and Communication module.
- ◆ The vibration measurement can be monitored for limit value violation by one or more Monitor-blocks.

**Note:**

The vibration measurement block can be used only with pure AC signals (i.e. without a DC offset) because the algorithm cannot calculate and extract any DC component in the signal. A preceding highpass filter must always be used to filter out the DC component of the measured signal!

9.2 Parameters and setting ranges

9.2.1 Display parameters

◆ <Vibration value>

The parameter „**Vibration value**“ displays the current measured value.

RMS value	Current measured value with units and signal detection
------------------	--

◆ <Unit>

The unit of the measurement value is displayed together with the measured value. The unit is determined in the Sensor block.

Unit	m/s ² , g, mm/s, in/s, µm, mils, eu, mV
------	--

9.2.2 Configuration parameters

◆ <Detector>

Selection of the desired signal detection type for the measurement.

Detector	RMS, peak, peak-peak
----------	----------------------

◆ <Measuring time>

RMS evaluation:

For the RMS measurement the measurement time parameter corresponds to the averaging time. The averaging time determines the time period over which the RMS measurement will be evaluated. The averaging time can be changed within the setup range.



Setup hint:

Longer measurement times improve the reproducibility and reliability of the measurement at the cost of the time factor.

Shorter measurement times improve the time factor at the cost of measurement reproducibility.

With short averaging times the measurement result may vary. These variations can only be avoided when the averaging time is set longer than the largest time period in the signal to be evaluated.

If measurement time is set to 0 sec, there will be NO measurements and monitoring at all! So measurement time MUST be >0 sec!

◆ <Peak and Peak-peak evaluation:>

The highest (and lowest) value is used for the calculation of the peak or peak-peak values. After the measurement time has expired the value is actualised and the next measurement cycle begins.

Minimum: 0.1 s	Maximum: 100.0s	Increment 0.1 s
Works default setting	1.0 s	

9.2.3 Parameter summary

Parameter name	Value range	adjustable
Vibration value	Display only	No
Unit	m/s ² , g, mm/s, in/s, µm, mils, eu, mV	No
Detector	RMS, peak, peak-peak	Yes
Measuring time	0.1 s...100 s	Yes



10 Peak measurement

10.1 Function

- ◆ The peak value describes the largest dynamic excursion of a vibration signal (AC signal) from its position of rest or centre point. Thus it is a measurement variable which, in contrast to an RMS value, is not directly linked in any way to the signal energy.
- ◆ The peak measurement is an optional signal path component. As a configuration interface, it also contains a group of parameters necessary for the setting.
- ◆ The physical unit of peak measurement is determined through the preliminary components in the signal path, especially by the sensor / Sensor (A/B) block.
- ◆ The results of the peak value are updated without any time delay in the case of continuous measurement.
- ◆ The time conduct of the peak measurement is determined by the adjustable rise time and decay time parameters.
- ◆ The current measured value can be displayed using the User-terminal.
- ◆ The current measured value is also available as an analogue DC output signal for connection to peripheral electronic equipment.
- ◆ The current measured value can be read through the COM-interface of a downstream OPC-server.
- ◆ The peak measurement can be monitored for setpoint violations through one or more Monitor Blocks.

10.2 Parameters and their setting ranges

◆ <Rise time>

The rise time parameter corresponds to the charge time constant of the peak value measurement. The rise time can be changed within its setting range.

Setting range of the time constant for the rise time:

Minimum: 0 ms	Maximum: 99 ms	Step size 1 ms
Works pre-setting	3 ms	



Advice for setting the rise time:

A longer rise time smooths out a fast signal response. The resultant peak value will finally be lower than it would be with a short rise time.

With a rise time of 0 ms the actual maximum value in the signal curve will be acquired as the peak value.

◆ <Decay time>

The decay time parameter corresponds to the discharge time constant of the peak value measurement. The decay time can be changed within its setting range.

Setting range of the time constant for the decay time:

Minimum: 0,1 s	Maximum: 9,9 s	Step size: 0,1 s
Works pre-setting	5.0 s	



Setting advice for the decay time:

A longer decay time smooths out very fast signal curves. The measured peak value will thus be maintained for longer at a higher value than in the case of a short decay time.

10.2.1 Summary of the parameters

Parameter name	Value range	changeable
Rise time	1 ms...99 ms	Yes
Decay time	0.1 s...9.9 s	Yes



11 Peak-peak measurement

11.1 Function

- ◆ The peak-peak value describes the largest dynamic excursion of a vibration signal (AC or AC/DC signal) from the positive to the negative peak. Thus it is a dynamic measurement variable which, in contrast to an RMS value, is not directly linked in any way to the signal energy.
- ◆ The peak-peak measurement is an optional signal path component. As a configuration interface, it also contains a group of parameters necessary for the setting.
- ◆ The physical unit for peak-peak measurement is determined through the preceding components in the signal path, in particular through the sensor / Sensor(A/B) block.
- ◆ During the progress of the measurement the result of the peak-peak value is updated without any time delay.
- ◆ The time behaviour of peak-peak measurement is determined by the adjustable parameters 'rise time' and 'decay time'.
- ◆ The current measured value can be read through the User Terminal.
- ◆ The current measured value can also be read through the analogue DC-output by downstream electronic equipment.
- ◆ The current measured value can also be read through the COM-interface of a downstream OPC-server.
- ◆ The peak-peak measurement can be monitored for speed limit violations through one or more Monitor blocks.
- ◆ The peak-peak measurement result is a supplement to the measurement High-peak (peak value in the positive voltage direction) and Low-peak (peak-value in the negative voltage direction).

11.2 Parameters and setting ranges

11.2.1 Parameter list

◆ <Rise time>

The parameter 'Rise time' corresponds to the charge time-constant of the peak-peak measurement. The rise time can be set up within a specific setting range.

Setting range for the time-constant of the rise time:

Minimum: 0 ms	Maximum: 99 ms	Step size 1 ms
Works pre-setting	3 ms	



Hint for the rise time setting:

A long rise time tends to smooth out very fast signal progressions. The resultant measured value can therefore be lower than when a short rise time is set.

With a rise time of 0 ms, the actual maximum signal increase in the signal's progression will be acquired as the peak-peak measurement.

◆ <Decay time>

The parameter 'decay time' corresponds to the discharge time-constant of the peak-peak measurement. The decay time can be set up within a specific setting range.

Setting range for the time-constant of the decay time:

Minimum: 0.1 s	Maximum: 9.9 s	Step size 0.1 s
Works pre-setting	5 s	



Hint about the decay time:

A long time-constant for the decay time tends to also smooth out very fast signal progressions. Thus the measured peak-peak value will be maintained at a higher level for a longer period of time than when a short decay time-constant is set.

11.2.2 Summary of the parameters

Parameter name	Value range	changeable
Rise time	1 ms...99 ms	Yes
Decay time	0.1 s...9.9 s	Yes

12 Cyclic peak-peak measurement



12.1 Function

- ◆ The cyclic peak-peak value describes the largest dynamic excursion of a vibration signal (AC signal or AC/DC signal) from the positive to the negative peak in relation to an external trigger signal. It is therefore a super-energetic measurement variable which, in contrast to the RMS value, is not directly associated with the signal energy.
- ◆ Cyclic peak-peak measurement is an optional signal path component and as a configuration interface contains all the necessary parameters for the setup.
- ◆ The physical unit for cyclic peak-peak measurement is determined by the preceding components in the signal path, in particular through the Sensor / Sensor(A/B) block.
- ◆ The result of the cyclic peak-peak value is updated after expiry of the predefined number of averages.
- ◆ The behaviour of the cyclic peak-peak measurement over time is determined by the rise time parameter.
- ◆ The current measured value can be distributed through an analogue DC-output to downstream electronics.
- ◆ The cyclic peak-peak measurement can be monitored for limit violation by one or more Monitor blocks.
- ◆ Cyclic peak-peak measurement is carried out during monitoring of eccentric (deformed) shaft vibrations.



12.2 Parameters and setup ranges

12.2.1 Display parameters

◆ <Cyclic P-P value>

The parameter **Cyclic P-P value** displays the current measured value.

Cyclic P-P value	Current measured value
------------------	------------------------

◆ <Unit>

This parameter contains the unit for the DC value

Unit	m/s ² , g, in/s ² , mm/s ² , in/s, µm, mils, eu, 1
------	---

12.2.2 Configuration parameters

◆ <Rise time>

The parameter rise time corresponds to the charge time-constant of the peak-peak measurement. The rise time can be adjusted within the setup range.

Setup range for the time-constant of the rise time:

Minimum: 0 ms	Maximum: 99 ms	Increment size 1 ms
Works default setting	3 ms	



Setup hint for the rise time:

A longer rise time evens out fast changes in the signal progress. The resulting measured value will therefore be lower than with a shorter rise time.

With a rise time of 0 ms the actual maximum rise in the signal progression will be acquired as the peak-peak measurement value.

◆ <No. of averages>

The no. of averages parameter defines number of trigger cycles necessary to be able to receive an averaged cyclic peak-peak value.

Setup range for no. of averages:

Minimum: 1	Maximum: 999	Increment size 1
Works default setting	1	

◆ <Time out>

The time out parameter monitors the trigger signal. When no further trigger signals are acquired during the defined time period the measurement is stopped. When further trigger signals are received the measurement is started once again.

Setup range:

Minimum: 0.1 s (= 10 Hz)	Maximum: 100.0 s = 0.01 Hz	
Works default setting	3.0 s	

12.2.3 Parameter summary

Parameter name	Setup range	adjustable
Cyclic P-P value	Display only	No
Unit	m/s ² , g, in/s ² , mm/s ² , in/s, µm, mils, eu, 1	No
Rise time	1 ms...99 ms	Yes
No. of averages	1 ... 999	Yes
Time out	0.1 s..100.0 s	Yes



13 RMS measurement

13.1 Function

- ◆ The RMS value (**R**oot **M**ean **S**quare) is identical to the effective value of a vibration signal (AC signal). Mathematically speaking it is the square root of the quadratic average value of the signal and, as a result, is a measure of the energy content of a vibration.
- ◆ The RMS measurement is an optional signal path component. As a configuration interface, it also contains a group of parameters necessary for the setting.
- ◆ The physical unit of the RMS measurement is determined by the preceding components in the signal path, especially through the sensor / Sensor (A/B) block.
- ◆ The RMS value to be calculated is formed over an adjustable averaging time. New measurements are available only after the averaging time has run.
- ◆ The current measurement can be displayed using the User-terminal.
- ◆ The current measurement is also available as an analogue DC output signal for peripheral electronic equipment.
- ◆ The current measured value can be read through the COM-interface of a downstream OPC-server.
- ◆ The RMS measurement can be monitored for limit setpoint violation by one or more Monitor blocks.

13.2 Parameters and their setting ranges

◆ <Averaging time>

The averaging time parameter defines the time period over which the RMS measurement value will be averaged. The averaging time can be changed within its setting range. The setting range is from 25 ms to 204,800 ms. The step size doubles at each step for defining the averaging time. This gives the setting options:

25 ms, 50 ms, 100 ms, 200 ms, ... 51.2 s.

Averaging time	Minimum: 0.025 s	Maximum: 51.2 s
Works pre-setting	0.8 s	



Setting advice:

Longer averaging times improve the reproducibility and reliability of the measurement at the cost of time resolution.

Conversely shorter averaging times increase the time resolution at the cost of reproducibility.

The extreme short averaging times of 25 ms and 50 ms should be used only in special applications. If the signal to be evaluated has a fundamentally low-frequency energy content, the measurement result will be very unstable. This instability can be prevented only if the averaging time is selected longer than the longest period in the signal.

13.2.1 Summary of the parameters

Parameter name	Value range	changeable
Averaging time	0.025 s...51.2 s	Yes



14 s_{max} measurement

14.1 Function

- ◆ An s_{max} measurement is a dynamic displacement measurement for monitoring relative shaft vibration according to DIN ISO 7919. The measured value formed corresponds to the peak value of the dynamic excursion of a shaft from its centre position. This is equivalent to the maximum excursion of the kinetic orbit (orbit peak).
- ◆ As a rule the physical unit for s_{max} measurement is [μm].
- ◆ An s_{max} measurement is an optional signal path component. As a configuration interface it contains also a number of parameters that require setting up.
- ◆ The result of the s_{max} measured value is updated in virtual real-time with dynamic measurement.
- ◆ The behaviour of the s_{max} measurement in terms of time is determined by the variable parameters 'rise time' and 'decay time'.
- ◆ The current measured value can be displayed on the User Terminal.
- ◆ The current measured value can also be given as an analogue DC output signal for use by external electronic equipment.
- ◆ The current measured value can be read through the COM-interface of a downstream OPC-server.
- ◆ The s_{max} measurement can be monitored through one or more Monitor blocks for limit setpoint violation.

14.2 Parameters and their setting ranges

◆ <Rise time>

The rise time parameter corresponds to the charge time-constant of the s_{max} measurement. The rise time can be changed within its setting range.

Setting range for the time-constant of the rise time:

Minimum: 0 ms	Maximum: 99 ms	Step size: 1 ms
Worke pre-setting	3 ms	



Advice for setting the rise time:

A longer rise time tends to smooth out fast changes in the signal progression. The resultant s_{max} value will be lower in value than with a shorter rise time.

With a rise time of 0 ms the actual maximum value in the progression of the signal is acquired as the s_{max} value.

◆ <Decay time>

The decay time parameter corresponds to the discharge time-constant of the s_{\max} measurement. The decay time can be changed within its setting range.

Setting range for the time-constant of the decay time:

Minimum: 0.1 s	Maximum: 9.9 s	Step size: 0.1 s
Works presetting	5.0 s	

**Advice for setting the decay time:**

A longer decay time tends to smooth out fast changes in the signal progression. The measured s_{\max} value will be maintained at a higher value than with a shorter decay time. The decay time should be set at least 100 times longer than the rise time.

14.2.1 Summary of the parameters

Parameter name	Value range	changeable
Rise time	1 ms...99 ms	Yes
Decay time	0.1 s...9.9 s	Yes



15 MAX-HOLD

15.1 Function

- ◆ The MAX-HOLD measurement continuously acquires the maximum value of the scalar value.
- ◆ The maximum value is continuously overwritten by any new higher value.
- ◆ The MAX-HOLD measurement is an optional signal path component. The MAX-hold measurement is arranged in the signal-flow chart directly after a measurement value component.
- ◆ There are a number of ways to reset the MAX-HOLD block. The reset can be carried out locally or remotely:
 - (i) Over a connected Binary-input
 - (ii) Over the OPC-server
 - (iii) Through a global Reset

15.2 Parameters and setup ranges

15.2.1 Display parameters

◆ **<Max value>**

Corresponds to the actual stored maximum value.

Max value	Current value
------------------	---------------

◆ **<Unit>**

The unit parameter is determined by the application firmware creation and can only be changed by a new firmware download.

Unit	m/s ² , g, in/s ² , mm/s ² , mm/s in/s, mm, μm, mils, eu, 1, C, F, K, V, BCU, R, s, mA, in, rpm, Hz, cpm,
------	--

15.2.2 Configuration parameters

◆ <Reset / Reset>

The Reset parameter deletes the currently saved MAX-HOLD value so that a new maximum value can be saved. The parameter can be activated via an OPC-server or a BINARY-IN.

Reset	Yes	No
-------	-----	----

15.2.3 Parameter summary

Parameter name	Setup range	adjustable
Max value	Display only	No
Unit	m/s ² , g, in/s ² , mm/s ² , mm/s in/s, mm, µm, mils, eu, 1, C, F, K, V, BCU, R, s, mA, in, rpm, Hz, cpm,	No
Reset	Yes / No	Yes

16 MIN-HOLD measurement



16.1 Function

- ◆ The MIN-HOLD measurement continuously acquires the minimum value of a scalar value.
- ◆ The minimum value is continuously overwritten by a new lower value.
- ◆ The MIN-HOLD measurement is an optional signal path component. The MIN-Hold block is arranged in the signal-flow chart directly after a measurement value component.
- ◆ There are a number of ways to reset the MIN-HOLD block. The reset can be carried out locally or remotely:
 - (i) Over a connected Binary-input
 - (ii) Over the OPC-server
 - (iii) Through a global Reset
- ◆ The current measured value in the block, including a time stamp of the last archived value, can be read by a downstream OPC-server through the Interface or Communication module.

16.2 Parameters and setup ranges

16.2.1 Display parameters

◆ <Min value>

Corresponds to the actual stored value.

Min value	Current value
------------------	---------------

◆ <Unit>

The unit parameter is determined by the application firmware creation and can only be changed by a new firmware download.

Unit	m/s ² , g, in/s ² , mm/s ² , mm/s in/s, mm, µm, mils, eu, 1, C, F, K, V, BCU, R, s, mA, in, rpm, Hz, cpm,
------	--

16.2.2 Configuration parameters

◆ <Reset>

The Reset parameter deletes the currently saved MIN-HOLD value so that a new minimum value can be saved. The parameter can be activated via the OPC-server or a BINARY-IN.

Reset	Yes	No
-------	-----	----

16.2.3 Parameter summary

Parameter name	Setup range	adjustable
Min value	Display only	No
Unit	m/s ² , g, in/s ² , mm/s ² , mm/s in/s, mm, µm, mils, eu, 1, C, F, K, V, BCU, R, s, mA, in, rpm, Hz, cpm,	No
Reset	Yes / No	Yes

17 Vector measurement



17.1 Function

- ◆ The Vector measurement is a signal component for accurate measurement and calculation of the magnitude and phase of a vector (integer harmonic).

This is $X_n = X * n$ where

X_n = Vector resp. centre frequency of the vector

n = Trigger frequency

X = Factor

- ◆ The Vector measurement, as a configuration interface, contains all the necessary parameters for their settings, e.g. Factor, Bandwidth, Max. measurement time.
- ◆ The physical unit for vector measurement is determined by the preceding component in the signal-flow chart, in particular by the Sensor / Sensor(A/B) block.
- ◆ A vector measurement requires 2 sensor signals:
 - A sensor for the measurement variable and
 - A phase reference sensor (trigger signal).
- ◆ The result of the vector measurement after each cycle is updated without any time delay. The current measurement (magnitude and phase) can be read through the User Terminal.
- ◆ The current measurement can also be fed to downstream electronic equipment through a DC-voltage analogue output.
- ◆ The measurement (magnitude and phase) can also be read through the COM-interface of a downstream OPC-server.
- ◆ The measurement can be monitored through one or more Monitor blocks for limit violation.

17.2 Parameters and setting ranges

17.2.1 Parameter list

- ◆ **<Magnitude>**

The parameter magnitude displays the current magnitude of vectors.

Magnitude	Current value
------------------	---------------

◆ <Unit>

The parameter unit is in the preparation of the application firmware and is regulated by a firmware download changeable.

Unit	m/s ² , g, in/s ² , mm/s ² , in/s, μm, mils, eu, 1
-------------	---

◆ <Phase>

The parameter phase displays the value of the phase of the vector.

Phase	Current value Value range: -180° to 180°
--------------	---

◆ <Signal detection>

This parameter is a scaling factor for the measured vector magnitude

Signal detection	<ul style="list-style-type: none"> • RMS • peak (corr. to $\sqrt{2} \cdot RMS$) • peak-peak (corr. to 2 x peak)
-------------------------	---

◆ **<Max. meas. time>**

The parameter „Max. Measurement time“ defines an upper time limit for the actual measurement. Normally the actual measurement time is clearly determined from the selected bandwidth.

Minimum: 0.1 s	Maximum: 99.99 s	Step size: 0.01
Works pre-setting	2.0 s	

◆ **<Bandwidth>**

The parameter „Bandwidth“ determines the frequency resolution of the measured vector and thereby also the required measurement time for achievement of this bandwidth (selectivity). The bandwidth is always a constant relative bandwidth because the vector measurement should always have a selectivity which is largely independent of the rotational speed.

Bandwidth:	Corresponding meas. time:
• 44 %	• 1 Trigger period
• 22 % (Works pre-setting)	• 2 Trigger periods
• 11 %	• 4 Trigger periods
• 6 %	• 8 Trigger periods
• 3 %	• 16 Trigger periods



Note:

Note that the actual measurement time is determined decisively by the given trigger frequency (machine rotational speed). At very low rotational speeds and a selected bandwidth that is too narrow the set „Max. Meas. time“ can force a measured value with an increased bandwidth.

Example:

Trigger frequency = 0.5 Hz

Set bandwidth = 22%

Set maximum measurement time = 1 s

Set factor = 2

Required bandwidth for 22% resolution at 1 Hz = 2 s

Actual measurement time = max. meas. time = 1 s

Achieved resolution for the vector measurement value = 22%

See also chapter 17.2.3

◆ <Time out>

This parameter defines the maximum time interval between sequential trigger events. If the time interval is greater than the defined time, the measurement task is stopped (zero-speed criterion). The measurement task is automatically started when a new trigger event no longer fulfils the zero-speed criterion.

Minimum: 0.01 s	Maximum: 8.00 s	Step size: 0.01 s
Works pre-setting	0.5 s	

**Note:**

The parameter can also be used to start the vector measurement only once the steady-state operational condition has been reached.

◆ <Factor>

This parameter is used to select the harmonic that is to be measured, i.e. Factor = 1 for vector 1n, Factor = 2 for vector 2n, etc.

Minimum: 1	Maximum: 999	Step size: 1
Works pre-setting	1	

**Note:**

Vector measurement is limited to frequencies up to a maximum of 5 kHz. This is to be noted when selecting the factor with a given rotational speed.

17.2.2 Summary of the parameters

Parameter name	Value range	changeable
Betrag / Magnitude	Display: Current value	No
Einheit / Unit	m/s ² , g, in/s ² , mm/s ² , in/s, µm, mils, eu, 1	No
Phase / Phase	Display: Current value	No
Signalbewertung Signal detection	RMS, peak or peak-peak	Yes
Max. Messzeit Max. meas. time	0,1 s...99,99 s	Yes
Bandbreite Bandwidth	44%, 22%, 11%, 6%, 3% or 1%	Yes
Max. Impulsabt./ Time out	0,01 s...8,00 s	Yes
Faktor / Multiplier	1...99	Yes

17.2.3 Centre frequency, bandwidth and required measuring time


Trigger-frequency	Relative Bandwidth*	44 %	22 %	11 %	6 %	3 %
	No. of trigger periods	2	4	8	16	32
0,2 Hz	Req'd measuring time	10 s	20 s	40 s	80 s	
	Absolute bandwidth	0,088 Hz	0,044 Hz	0,022 Hz	0,011 Hz	
0,5 Hz	Req'd measuring time	4 s	8 s	16 s	32 s	64 s
	Absolute bandwidth	0,22 Hz	0,11 Hz	0,055 Hz	0,028 Hz	0,014 Hz
1 Hz	Req'd measuring time	2 s	4 s	8 s	16 s	32 s
	Absolute bandwidth	0,44 Hz	0,22 Hz	0,11 Hz	0,055 Hz	0,028 Hz
5 Hz	Req'd measuring time	0,4 s	0,8 s	1,6 s	3,2 s	6,4 s
	Absolute bandwidth	2,2 Hz	1,1 Hz	0,55 Hz	0,28 Hz	0,14 Hz
10 Hz	Req'd measuring time	0,2 s	0,4 s	0,8 s	1,6 s	3,2 s
	Absolute bandwidth	4,4 Hz	2,2 Hz	1,1 Hz	0,55 Hz	0,28 Hz
50 Hz	Req'd measuring time	40 ms	80 ms	160 ms	320 ms	640 ms
	Absolute bandwidth	22 Hz	11 Hz	5,5 Hz	2,8 Hz	1,4 Hz
100 Hz	Req'd measuring time	20 ms	40 ms	80 ms	160 ms	320 ms
	Absolute bandwidth	44 Hz	22 Hz	11 Hz	5,5 Hz	2,8 Hz
500 Hz	Req'd measuring time	4 ms	8 ms	16 ms	32 ms	64 ms
	Absolute bandwidth	220 Hz	110 Hz	55 Hz	28 Hz	14 Hz
1000 Hz	Req'd measuring time	2 ms	4 ms	8 ms	16 ms	32 ms
	Absolute bandwidth	440 Hz	220 Hz	110 Hz	55 Hz	28 Hz

* Values of the relative bandwidths are rounded off

18 Cycle-DC measurement

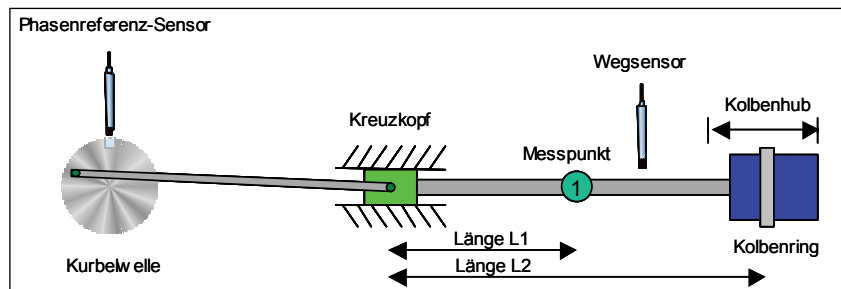


18.1 Function

- ◆ The Cycle-DC value describes the quasi-static DC part of a signal (DC signal, DC-component of an AC/DC signal), whereby the measurement acquisition is synchronized with a trigger cycle.
- ◆ The Cycle-DC measurement is an optional signal path component. As a configuration interface it contains all the parameters necessary for the measurement setup.
- ◆ The Cycle-DC measurement is most often used to monitor the wear of the piston rings in a reciprocating compressor. The wear is determined from the vertical displacement of the con-rod and assessed by observation of the trend of the value (Rod-drop monitoring). 
- ◆ The physical unit of the Cycle-DC measurement is determined in the preceding component in the signal path, in particular through the Sensor / Sensor(A/B) Block.
- ◆ The Cycle-DC measurement requires two sensor signals
 - One sensor for the measurement variable and
 - one reference sensor for the trigger signal.
- ◆ The Cycle-DC value to be calculated is averaged over an adjustable number of trigger cycles. New measured values are available only when the averaging time has expired.
- ◆ The current measured value can be read through the User Terminal.
- ◆ The current measured value can also be fed to downstream electronic equipment through an analogue DC output.
- ◆ The current measured value can also be read through the COM-interface of a downstream OPC-server.
- ◆ The Cycle-DC measurement can be monitored for limit violation through one or more Monitor blocks.

◆ The Cycle-DC measurement has three operating modes:

- ◇ One measurement position per trigger cycle



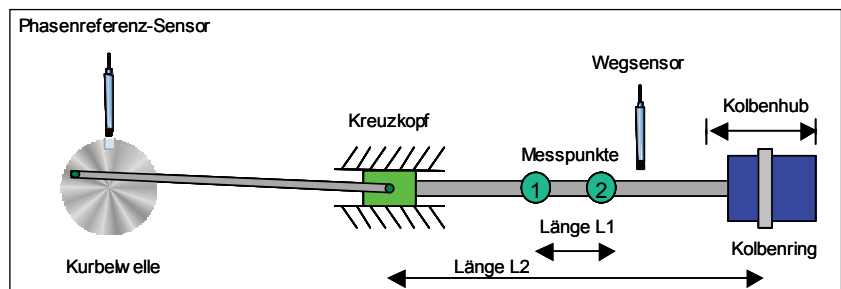
Length L1: Distance between crosshead and selected measurement position

Length L2: Distance between crosshead and piston ring

Geometry factor: Length L2 / Length L1

$$\text{Read value} = \frac{(\text{measured DC voltage})}{\text{Sensor sensitivity}} * \text{geometry factor} + \text{zero point}$$

- ◇ Two measurement positions per trigger cycle



Length L1: Distance between measuring points 1 and 2

Length L2: Distance between crosshead and piston ring

Geometry factor: Length L2 / Length L1

$$\text{Read value} = \frac{(\text{DC voltage in pos. 1} - \text{DC voltage in pos. 2})}{\text{Sensor sensitivity}} * \text{geometry factor} + \text{zero point}$$

- ◇ Continuous averaging of complete trigger cycles

While continuous averaging the length L1 is equal the length L2 (L1=L2), from this arises a geometry factor of 1.

Length L1: Distance between crosshead and the con-rod centre position

Length L2: Distance between crosshead and piston ring

Geometry factor: Length L2 / Length L1

$\text{Read value} = \frac{(\text{measured DC voltage})}{\text{Sensor sensitivity}} * \text{geometry factor} + \text{zero point}$



Note:

The read value is influenced by the sign preceding the value of the sensor sensitivity (see Sensor block).

18.2 Parameters and setting ranges

18.2.1 Parameter list

◆ **<Mode>**

This parameter defines the desired operating mode of the Cycle-DC measurement:

Mode	<ul style="list-style-type: none"> • One position • Two positions • Averaged cycle
Works pre-setting	One position

◆ **<No. of averages>**

This parameter defines the number of trigger cycles that are averaged for the measurement calculation.

Minimum: 1	Maximum: + 99999	Step size: 1
Works pre-setting	50	

◆ **<Zero offset>**

This parameter determines the zero point. The required value at the zero point is added to the measured value and the result is the final read value, i.e. the zero point that is set corresponds to the measurement result when the input signal is 0 V. The zero point has the same unit as the measured value.

Minimum: -9999.99	Maximum: + 9999.99	Step size: 0.01
Works pre-setting	0.00	

Example:

Zero point for the 1st measurement = 0 mm

1st read value = -0,3 mm

Required read value = + 2,24 mm

New zero point = required read value – 1st read value

New zero point = + 2,24 mm – (-0,3 mm) = + 2,54 mm

◆ **<Meas. position 1>**

This parameter defines the measurement position 1 in relation to the trigger point time. In the operating mode „Averaged cycle“ this parameter is ignored.

Minimum: 0.00	Maximum: + 359.00	Step size: 0.01
Works pre-setting	0.00	

◆ **<Meas. position 2>**

This parameter defines the measurement point 2 in relation to the trigger point time in the operating mode „Two positions“. In the other operating modes this parameter is ignored.

Minimum: 0.00	Maximum: + 359.00	Step size: 0.01
Works pre-setting	0.00	

◆ **<Time out>**

This parameter determines the maximum time interval between sequential trigger events. If the actual interval is greater than the defined interval, the measurement task is stopped (zero-rpm criterion). The measurement task is automatically started when a new trigger event no longer fulfils the zero-rpm criterion.

Minimum: 0.1 s	Maximum: + 100.0 s	Step size: 0.1 s
Works pre-setting	0.5 s	

◆ **<Multiplier>**

The Multiplier is length L2 (distance between crosshead and piston ring)

Minimum: 1	Maximum: 99999	Step size: 1
Works pre-setting	1	

◆ **<Divider>**

The Divider is length L1 (distance between crosshead and the con-rod centre position).

Minimum: 1	Maximum: 99999	Step size: 1
Works pre-setting	1	

The geometry factor is formed from the parameters „Multiplier“ and „Divider“. In the rod-drop monitoring application the geometry factor is used to geometrically compensate for the movement between the measurement position and the position of the piston ring.

If the geometry factor = Multiplier / Divider is set to 1, the Cycle-DC measurement can be used for general purpose applications.

18.2.2 Summary of the parameters

Parameter name	Value range	changeable
Mode	One position, two positions or averaged cycle	Yes
No. of averages	1...99999	Yes
Zero offset	-9999.99...+ 9999.99	Yes
Meas. position 1	0...+ 360°	Yes
Meas. position 2	0...+ 360°	Yes
Time out	0.1 s...100.00 s	Yes
Multiplier	1...99999	Yes
Divider	1...99999	Yes

19 Calculated scalar values

19.1 General

- ◆ Valid scalar values (e.g. RMS-value, Peak-value, Vector-magnitude, etc.) can be used in a subsequent processing calculation of further scalar values (computations); e.g. Max(X,Y)p-p, Crest Factor, sm@rt-values etc.
- ◆ If a *VIBROCONTROL 6000 Compact monitor* device configuration has the functionality to calculate derived scalar values, each calculated value is represented in its own block within the signal-flow chart. The 'shaping' of the scalar value calculation is determined during the device configuration and can thereafter no longer be changed in its function in the device setup. Any subsequent rearrangement of the scalar value calculation requires a new device configuration.
- ◆ Calculated scalar values can be tailored for very specific, individual requirements of a monitoring task, e.g. monitoring of a gearbox, pump, electric motor, etc. Each machine, machine type and machine component has its own fault symptoms which can be monitored using the appropriate measurement methods and scalar values. If a specifically calculated scalar value is 'tuned' to the properties of an individual monitoring task, then this scalar value is, in the terminology of Brüel & Kjaer Vibro, called a "sm@rt value".

A sm@rt value can, already during operation of the machine, identify faulty machine components more efficiently and accurately than general measurement types are able to. The appropriate service and repair measures can therefore be planned and carried out at an early stage according to the fault and danger potential.
- ◆ The physical unit of the calculated scalar value is determined through the preceding components in the signal path and cannot be changed at the instrument.
- ◆ The current calculated scalar value can be read through the User Terminal.
- ◆ This current value can also be fed to downstream electronic equipment through an analogue DC output.
- ◆ The current scalar value can also be read through the COM-interface of a downstream OPC-server.
- ◆ The current scalar value can be monitored for limit violations through one or more Monitor blocks.

19.2 Max (X,Y) peak-peak

- ◆ Measurement method B for monitoring shaft vibration according to DIN ISO 7919: An X/Y displacement sensor pair with relative orthogonal measurement directions produces two measured peak-peak values, of which only the greater of both current values is used for further assessment.



19.3 Peak calculated

- ◆ The peak-calculated value corresponds to the RMS-value multiplied by the factor $\sqrt{2}$.



19.4 Peak-Peak calculated

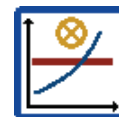
- ◆ The peak-peak-calculated value from the product of the RMS-value and the factor $2 \times \sqrt{2}$.



19.5 Crest Factor

- ◆ The Crest Factor is formed from the measured peak-value divided by the measured RMS-value.





20 Monitor (Absolute) block

20.1 Function

- ◆ The Monitor (Absolute) block is responsible for limit setpoint monitoring with absolute limit values. In the User Menu the block name is abbreviated to Monitor(Absolute). For the alert alarm, danger alarm and other limit values there is a respective Monitor (Absolute) block.
- ◆ The Monitor (Absolute) block is an optional signal path component. As a configuration interface it contains a group of parameters which are necessary for the settings.
- ◆ The Monitor (Absolute) block processes the measurements from preceding measurement blocks (e.g. RMS measurement, BCU measurement, etc.). The incoming measured value is compared with an absolute limit setpoint. With a high violation (or also a low violation) of the limit setpoint and after an adjustable time delay a corresponding event (Alert alarm, Danger alarm, or a message) is signalled.
- ◆ Often the Monitor (Absolute) block directly controls a relay output. If this is the case an LED on the relay module is used to signal the monitoring condition (see the chapter on the relay block in section C and the chapter on signalling in section A).
- ◆ If required the Monitor (Absolute) block can be operated with an automatic Trip-multiplier function. This function is however independent of the respective instrument configuration.

20.2 Parameters and their setting ranges

20.2.1 Parameter list

◆ <Limit type>

This parameter determines whether a high or a low limit setpoint is being handled. When it is a high limit setpoint, an event (e.g. an alert alarm) is initiated when the measured value is higher than this limit setpoint. Correspondingly when a low limit is violated by a measured value that is lower. The setting can be changed at the instrument.

Limit type	High limit or low limit
Works pre-setting	High limit for high alert alarm and high danger alarm; or low limit for low alert alarm and low danger alarm

◆ **<Limit setpoint>**

This parameter defines the absolute limit setpoint of the Monitor block, with which each measurement will be compared. The unit of the limit is of course identical with that of the preceding Measurement block. The setting can be changed at the instrument.

Minimum: -99999.99	Maximum: 99999.99	Step size: 0.01
Works pre-setting	Dependent on the monitoring task	

◆ **<Hysteresis>**

This parameter determines the hysteresis of the Monitor Block. After a limit setpoint high violation (or low violation) the measured value must go below (or above) the increased (or decreased) limit by the hysteresis value before the violation will be switched off. The unit of the hysteresis value is of course identical with that of the preceding Measurement Block. The setting can be changed at the instrument.

Minimum: -99999.99	Maximum: 99999.99	Step size: 0.01
Works pre-setting	Dependent on the monitoring task	

◆ **<Time delay>**

The time delay parameter determines the time period for which the limit violation must remain before an event (e.g. an alert alarm) will be signalled to the following block (e.g. relay output). The setting can be changed at the instrument.

Minimum: 0 s	Maximum: 99.99 s	Step size: 0.01 s
Works pre-setting	Dependent on the monitoring task	

◆ **<Acknowledge>**

This parameter provides the facility to acknowledge a limit violation through the User-terminal. This is valid for current and older limit violations that have not yet been confirmed. The setting can be changed from <NO> to <YES> to release the acknowledgement.

Acknowledge	YES or NO
-------------	-----------

◆ **<Trip Override>**

Through the parameter <Trip Override> a Monitor block can be disabled. The setting can be changed at the instrument.

Trip Override	ON or OFF
Works pre-setting	OFF

◆ <Trip Multiplier>

This parameter is for setting the value of the <Trip Multiplier> function, which can be a component of a monitoring system. With <Trip Multiplier ON> (only with automatic status identification!) the valid limit setpoint of a Monitor Block is multiplied by the value of the <Trip Multiplier>. The setting can be changed at the instrument.

The <Trip Multiplier> function should be used exclusively for a high limit setpoint. It is principally sensible for vibration measurements and permits a simple form of status-dependent machine monitoring. For example the limit setpoint can be increased for a short time so that during run-up of the machine, when there are anticipated resonance regions, no false alarms will be signalled.

To put the <Trip Multiplier> function into operation the *VIBROCONTROL 6000 Compact monitor* must be prepared in advance for this function at our works. In the simplest case the switching on and off is done through a binary status signal.

If the *VIBROCONTROL 6000 Compact monitor* is not equipped with this <Trip Multiplier> function, the <Trip Multiplier> will not appear.

Minimum: 1.0	Maximum: + 999.9	Step size: 0.1
Works pre-setting	1.0	

20.2.2 Summary of the parameters

Parameter name	Value range	changeable
Limit type	Upper or lower limit	Yes
Limit setpoint	-99999.99...+ 99999.99	Yes
Hysteresis	-99999.99...+ 99999.99	Yes
Time delay	0,00 s...99.99 s	Yes
Acknowledge	Yes or No	Yes
Trip override	Switch On or Off	Yes
Trip multiplier	1.0...999.9	Yes

21 Dual-Monitor (2 absolute limit values) function



- ◆ The Dual-Monitor(Absolute) block is responsible for limit monitoring with two absolute limit values. In the User Menu the block name is abbreviated to D.-MONI.(Abs.).
- ◆ The Dual-Monitor(Absolute) block is an optional signal path component. As a configuration interface it contains all the necessary parameters for the settings.
- ◆ The Dual-Monitor(Absolute) block processes the measured values from preceding measurement blocks (e.g. RMS-measurement, BCU-measurement, etc.). These measured values are compared with the absolute limits of the Alert alarm and Danger alarm setpoints. At an over-exceedance of the limit value (positive limit violation type) and after an adjustable time delay the corresponding event (Alert alarm or Danger alarm) is released and an alarm relay is activated. In the case of an under-exceedance (negative) limit violation type the comparison of the measured values is done by a negative limit violation.
- ◆ Very often the Dual-Monitor(Absolute) block directly controls a relay output. If this is the case the LEDs on the relay output module are used to signal the monitoring condition (see the chapter about Relay block in section C and the chapter on Signalling in section A).
- ◆ If required the Dual-Monitor(Absolute) block can operate with an automatic Trip-multiplier function.
This function is nevertheless dependent upon the respective instrument configuration.
- ◆ The Dual-Monitor(Absolute) block has a parameter called „Fail-safe danger“. This parameter determines the behaviour of the Danger alarm message when no valid measurement is existing, e.g. when there is a sensor OK-fault.

21.1 Parameters and setting ranges

21.1.1 Parameter list

- ◆ **<Limit type>**
This parameter defines whether the Dual-Monitor block monitors the measurements by positive or negative violation of the set limit values. With a setting of an upper limit a positive violation is monitored, with a setting of a lower limit a negative violation is monitored. The settings are valid for both limit values of the Dual-Monitor block. The settings can be changed at the instrument.

Limit type	Upper limit or lower limit
Works pre-setting	Upper limit

◆ **<Alert setpoint>**

This parameter defines the absolute value for the Alert alarm with which the measured value is compared in the Dual-Monitor block. The unit for the limit value is identical to that of the preceding Measurement block. The setting can be changed at the instrument.

Minimum: -99999.99	Maximum: + 99999.99	Step size: 0.01
Works pre-setting	Dependent upon the monitoring task	

◆ **<Danger setpoint>**

This parameter defines the absolute value for the Danger alarm with which the measured value is compared in the Dual-Monitor block. The unit for the limit value is identical to that of the preceding Measurement block. The setting can be changed at the instrument.

Minimum: -99999.99	Maximum: + 99999.99	Step size: 0.01
Works pre-setting	Dependent upon the monitoring task	

◆ **<Hysteresis>**

This parameter determines the hysteresis of the Dual-Monitor block. After a limit violation in the positive direction (upper limit type) the measured value must decrease below the limit value minus the hysteresis value before the limit violation can be regarded as having ended. After a limit violation in the negative direction (lower limit type) the measured value must increase above the limit value plus the hysteresis value before the violation can be regarded as having ended.

The hysteresis value is valid for the Alert as well as the Danger alarm.

The unit for the hysteresis value is identical to that of the preceding Measurement block. The setting can be changed at the instrument.

Minimum: -99999.99	Maximum: 99999.99	Step size: 0.01
Works pre-setting	Dependent upon the monitoring task	

◆ **<Alert delay>**

The parameter Alert delay defines the time period that the Alert limit violation must continuously exist before the alarm event will be passed further to the following block (e.g. Relay output).

This setting can be changed at the instrument.

Minimum: 0 s	Maximum: 99.99 s	Step size: 0.01 s
Works pre-setting	Dependent upon the monitoring task, typically 1 s	

◆ <Danger delay>

The parameter Danger delay defines the time period that the Danger limit violation must continuously exist before the alarm event will be passed further to the following block (e.g. Relay output).

This setting can be changed at the instrument.

Minimum: 0 s	Maximum: 99.99 s	Step size: 0.01 s
Works pre-setting	Dependent upon the monitoring task, typically 3 s	

◆ <Acknowledge>

This parameter allows acknowledgement of limit violations through the User Terminal. Selecting „Yes“ acknowledges all limit violations that have not yet been acknowledged.

Acknowledge	Yes or No
-------------	-----------

◆ <Trip Override>

Through the parameter Trip Override a Monitor block can be taken out of operation. The setting can be changed at the instrument.

Trip Override	On or Off
Works pre-setting	TO off

◆ <Fail-safe danger>

This parameter determines the behaviour of the Danger alarm when no valid measured value exists, when there is a sensor OK-fault.

- **Fail-safe danger „No“:** Danger alarm output will not be activated when there is no valid measured value .
- **Fail-safe danger „Yes“:** When there is no valid measured value the Danger alarm will be activated

The signal from the Alert alarm is not influenced by selection of any „Fail-safe danger“ parameter. The Alert alarm will only be activated if there are valid measured values above the Alert limit.

Fail-safe danger	No	Yes
Works pre-setting	No	

◆ **<Alert TM-value>**

This parameter is the multiplication factor for the Alert alarm of the <Trip Multiply> function, which, as the case may be, can be a component of the monitoring system. With <Trip Multiply ON> (automatic status-identification only by a binary input signal) the Alert alarm value that has been set in the Monitor block is multiplied by the number entered here. This value can be changed at the instrument.

The <Trip Multiply> function should be used exclusively for the upper limit type. This is predominantly sensible for use with vibration measurements and permits a simple form of operating mode-dependent machine monitoring. For example the limit value is increased for a short time by this factor so that during run-up of a machine no alarms will be raised at the anticipated traversing of resonance speeds.

To be able to put the <Trip Multiply> function into operation the VIBROCONTROL 6000 Compact monitor must be prepared at the works with the function. In the simplest case the switching of the function on and off is achieved by means of a binary status signal.

If the VIBROCONTROL 6000 Compact monitor is not equipped with the <Trip Multiply> function the parameter <Trip Multiply> will not be displayed.

Minimum: 1.0	Maximum: + 999.9	Step size: 0.1
Works pre-setting	1.0	

◆ **<Danger TM-value>**

This parameter is the multiplication factor for the Danger alarm of the <Trip Multiply> function, which, as the case may be, can be a component of the monitoring system. With <Trip Multiply ON> (automatic status-identification only by a binary input signal) the Danger alarm value that has been set in the Monitor block is multiplied by the number entered here. This value can be changed at the instrument.



Note:

See also the explanation under <Alert TM-value> !

Minimum: 1.0	Maximum: + 999.9	Step size: 0.1
Works pre-setting	1.0	

21.1.2 Summary of the parameters

Parameter name	Value range	changeable
Limit type	Upper or Lower limit	Yes
Alert setpoint	-99999.99...+ 99999.99	Yes
Danger setpoint	-99999.99...+ 99999.99	Yes
Hysteresis	-99999.99...+ 99999.99	Yes
Alert delay	0.00 s...99.99 s	Yes
Danger delay	0.00 s...99.99 s	Yes
Acknowledge	Yes or No	Yes
Trip override	Switch On or Off	Yes
Fail-safe danger	Yes or No	Yes
Alert TM value	1.0... 999.9	Yes
Danger TM value	1.0...999.9	Yes

22 Logic Block for relay control



22.1 Function

- ◆ The Logic block is typically used for relay control. The Logic block for relay control is available in only some instrument configurations. According to the configuration the relay is controlled by logic selection criteria (e.g. 2-of-3 redundancy).

When a VIBROCONTROL 6000 Compact monitor has this function this will be noted in the signal-flow chart of the instrument.

- ◆ The Logic block is an optional signal path component. A number of parameters of the Logic block are defined by the monitoring firmware and cannot be changed by the User Terminal.
- ◆ A Logic block serves for logic linking of binary status information from preceding Monitor blocks. The status of the input signals is assessed according to a laid down logic table. If the logic evaluation gives a positive output a corresponding event is signalled to the succeeding signal-flow component at the output of the Logic block. As an example if a relay succeeds the Logic block, it will be switched by the event.
- ◆ When a Logic block controls a relay output, the LED at the relay output module is used for signalling the monitoring status (see the Relay block chapter in section C and Signalling chapter in section A).

22.2 Typical variants of the Logic block



22.2.1 OR-link

An OR link is used typically for formation of collective alarms.

OR logic (Example with 2 inputs)			
Input 1	Input 2	Output	Relay position
0	0	0	Normal status
1	0	1	Reporting status
0	1	1	Reporting status
1	1	1	Reporting status
0 = OFF ; 1 = ON			

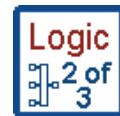
22.2.2 AND-link



An AND-link is used e.g. for 2-of-2 logic.

AND logic (Example with 2 inputs)			
Input 1	Input 2	Output	Relay position
0	0	0	Normal status
1	0	0	Normal status
0	1	0	Normal status
1	1	1	Reporting status
0 = OFF ; 1 = ON			

22.2.3 2-of-3 logic

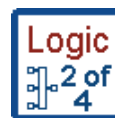


2-of-3 logic is predominantly used when a high degree of reliability for the signal is desired (and in the case of machine shutdown).

2-of-3 logic				
Input 1	Input 2	Input 3	Output	Relay position
0	0	0	0	Normal status
1	0	0	0	Normal status
0	1	0	0	Normal status
0	0	1	0	Normal status
1	1	0	1	Reporting status
1	0	1	1	Reporting status
0	1	1	1	Reporting status
1	1	1	1	Reporting status
0 = OFF ; 1 = ON				

22.2.4 2-of-4 logic

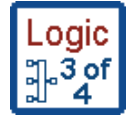
The 2-of-4 logic is predominantly employed when a high level of reliability for the signal (and as the case may be for the machine shut-down) is desired.



2-of-4 logic					
Input				Output	Relay position
1	2	3	4		
0	0	0	0	0	Normal status
1	0	0	0	0	Normal status
0	1	0	0	0	Normal status
0	0	1	0	0	Normal status
0	0	0	1	0	Normal status
1	1	0	0	1	Reporting status
1	0	1	0	1	Reporting status
1	0	0	1	1	Reporting status
1	0	1	1	1	Reporting status
1	1	0	1	1	Reporting status
0	1	0	0	0	Normal status
0	0	0	1	0	Normal status
0	1	1	1	1	Reporting status
1	1	1	0	1	Reporting status
0	1	1	1	1	Reporting status
1	1	1	1	1	Reporting status

0 = OFF ; 1 = ON

22.2.5 3-of-4 logic



The 3-of-4 logic is predominantly employed when a high level of reliability for the signal (and as the case may be for machine shut-down) is desired.

3-of-4 logic					
Input				Output	Relay position
1	2	3	4		
0	0	0	0	0	Normal status
1	0	0	0	0	Normal status
0	1	0	0	0	Normal status
0	0	1	0	0	Normal status
0	0	0	1	0	Normal status
1	1	0	0	0	Normal status
1	0	1	0	0	Normal status
1	0	0	1	0	Normal status
1	0	1	1	1	Reporting status
1	1	0	1	1	Reporting status
0	1	0	0	0	Normal status
0	0	0	1	0	Normal status
0	1	1	1	1	Reporting status
1	1	1	0	1	Reporting status
0	1	1	1	1	Reporting status
1	1	1	1	1	Reporting status

0 = OFF ; 1 = ON

22.3 Logic block status display

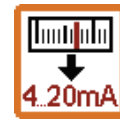
In addition to pure logic linking, the Logic block also has a status display for the conditions 'Trip over-ride (TO)' and 'Acknowledge (ACK)'.

These stati are formed through the logic linking from the status of the previous Monitor or Binary-input blocks. The results of these logic links are displayed by a status parameter in the UT-100 User Terminal.

The displayed status corresponds to the flashing pattern of the LEDs on the Relay-output module. (Compare chapter 8.3.3 in section A.)

23 DC output

23.1 Function



- ◆ The DC output is an optional signal path component. As a configuration interface it contains a group of parameters that are necessary for setting of a respective DC output channel. If more DC outputs are available, each individual output is set up by its individual DC output block.
- ◆ Each DC output is used for setting all the important output parameters. In particular the linearity of the DC output signal is set here.

23.2 Parameters and their setting ranges

23.2.1 Parameter list

◆ <Socket no.>

This parameter informs you about the physical socket number of the corresponding DC output, or the associated output module.

The settings are determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.



Note:

The function of a DC output is guaranteed only if the physical module configuration is not changed!

Possible socket numbers	1, 2, 3, 4, 5, 6, 7, 8 or 9
-------------------------	-----------------------------

◆ <Channel no.>

This parameter informs you about the physical channel layout of the DC output on the associated output module. The settings are determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.

Possible channel numbers	A or B
--------------------------	--------

◆ <Signal output>

This parameter defines whether the DC output will be operated with an offset (e.g. 4-20 mA, 2 -10 V) or without one (e.g. 0-20 mA, 0-10 V).

If either of the settings <4-20 mA / 2 -10 V> is selected, invalid measurements / measurement outputs are signalled to the peripheral electronic equipment as 2 mA - or 1 V - signals.

If either of the settings <0-20 mA, 0-10 V> is selected, when an invalid measurement / measurement output occurs, the output signal will drop to 0 V or 0 mA.

The setting of the signal output can be changed at the instrument.

Signal output	4-20 mA / 2-10 V	0-20 mA / 0-10 V
Works pre-setting	4-20 mA / 2-10 V	

◆ <X1, Y 1 ... X4, Y4>

These parameters are provided for setting the linearity of the DC output. The setting of the DC output curve linearity can be changed at the instrument.

With the setting of anchor points (X,Y) the output linearity is defined by the anchor points. By entering more than two anchor points the output curve will be made non-linear.

The following is generally valid for the output curves:

- ◇ At least **2 anchor points** are required to put a DC output into operation.
- ◇ A maximum of **4 anchor points** can be defined for the output curve.
- ◇ With more than 2 anchor points a “bend” is built into the output curve.
- ◇ There is always a linear interpolation between the anchor points.
- ◇ The output of DC voltages and DC current always have the same common output curve and cannot be set up separately.

The X-values of anchor points corresponds to the measurement in the physical unit of the signal path.

The maximum value range is from -99999.99 to + 99999.99

- ◇ Maximum X-range: $-99999.99 \leq X \leq + 99999.99$.
that means: $-99999.99 \leq X1 < X2 < X3 < X4 \leq + 99999.99$

The Y-values of anchor points corresponds to the desired output signal with reference to the maximum output signal. The available range is from 0 (corresponding to 0 %) to 1 (corresponding to 100 %). The associated voltage or current output is dependent on the parameter <Signal output>:

- ◇ Y-value range: $0.00 \leq Y \leq 1.00$ (corresponds to: $0 \% \leq Y \leq 100 \%$) that means: $0.00 \leq Y1 < Y2 < Y3 < Y4 \leq 1.00$
- ◇ Y-value 0.00 corresponds to 0 %
If no offset has been selected
(<Signal output> = 0-20 mA/0-10 V)
0 % also corresponds to 0 mA/0 V.
If an offset has been selected
(<Signal output> = 4-20 mA/2-10 V) 0 % corresponds to 4 mA/2 V.
- ◇ Y-value 1.00 corresponds to = 100 % and = 20 mA/10 V

When setting an output curve with 2 anchor points, the following must be observed:

1. X-values: $-99999.99 \leq X1 < X2 \leq + 99999.99$
2. Y-values: $0.00 \leq Y1 \leq 1.00$ and : $0.00 \leq Y2 \leq 1.00$

The maximum output range (0-20 mA or 0-10 V) can be reduced to any random output range within these limits.

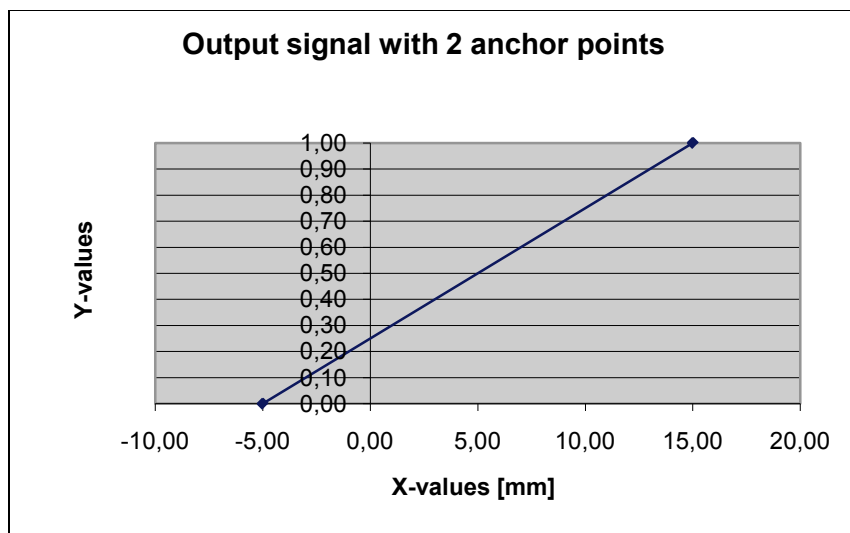
3. $X3 = 0.00$

Example:

A measuring range from -5 to + 15 mm is to be represented by an output signal of 4-20 mA (2-10 V).

Solution: $X1 = -5.00$, $Y1 = 0.00$, $X2 = 15.00$, $Y2 = 1.00$, $X3 = 0.00$

To achieve this the parameter 'Signal output' must be set to 4-20 mA / 2-10 V.



False entries are corrected by simply overwriting the values.

Deleting anchor points:

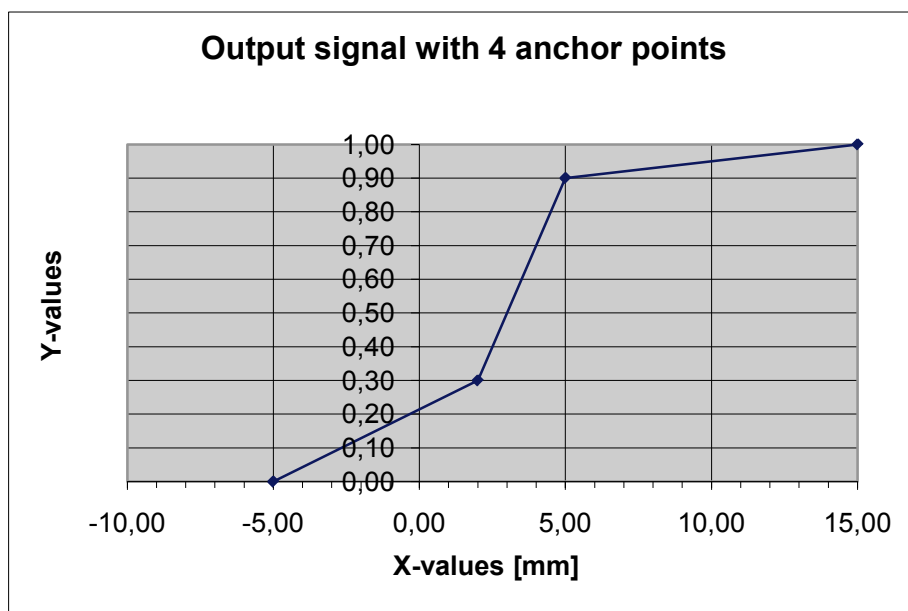
1. This is only possible and sensible for the anchor points (X3, Y3) and (X4, Y4), because without (X1, Y1) and (X2, Y2) no signal output is possible.
 2. Deleting (X3, Y3): X3-value is set to 0.0; (X4, Y4) will then also be invalidated
 3. Deleting (X4, Y4): X4-value is simply set to 0.0
- ◆ With the definition of a **curve with non-linearity** (at least 3 anchor points) a “zoom” range can be provided. Thus a small change in the measured value leads to a disproportionate change in the output signal

Example:

A measuring range from -5 to + 15 mm is to be spread out in the range from + 2 mm to + 5 mm because the measurement is especially important in this range.

The output signal is to be represented by the range 4-20 mA (2-10 V).

Solution: X1 = -5.00, Y1 = 0.00, X2 = 15.00, Y2 = 1.00,
X3 = 2.00, Y3 = 0.30, X4 = 5.00, Y4 = 0.90



◆ <Hardware Id.>

This parameter informs you about the type of the output module. The settings are determined by the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument.

Hardware Id.	4
--------------	---

23.2.2 Summary of the parameters

Parameter name	Value range	changeable
Socket no.	1 to 9	No
Channel no.	A or B	No
Signal output	4-20 mA/ 2-10 V or 0-20 mA / 0-10 V	Yes
X-values	-99999.99...+ 9999.99	Yes
Y-values	0 to 1	Yes
Hardware Id.	4	No



24 Relay block

24.1 Function

- ◆ The Relay block is a signal path component. As a configuration interface it contains a number of parameters that are required for setting a respective relay output. If a number of relays are available, each single relay output is equipped through its individual Relay block.
- ◆ Each Relay block is used for setting all the important relay parameters, especially the switching mode (normally energised or normally de-energised) and latching or non-latching operation.
- ◆ As a rule a Relay block is directly controlled from a monitor block. If this is not the case then the LED at the relay output module is used to signal the monitoring status and relay status. Each relay output has two LEDs for this purpose, one green LED and a dual-colour red-yellow LED.

An exact description of the LED signals can be found in chapter of section A of the handbook.

- ◆ The relay output is switched to correspond with the set signalling strategy and signal status of the preceding monitoring components (e.g. Monitor block).
- ◆ Status display of the output of the monitor module by LEDs.

24.2 Parameters and their setting ranges

The parameters described in the following section can be displayed and, when possible, changed using the User Terminal.

◆ <Socket no.>

This parameters provides information about the physical socket number of the relay output module. The settings are determined by the application firmware of the *VIBROCONTROL 6000 Compact monitor* and cannot be changed at the instrument.



Note:

The signalling function of a relay output is guaranteed only as long as the physical module configuration is not changed!

Socket position on the <i>VIBROCONTROL 6000 1 Basic</i> module	1, 2, 3,4, 5, 6, 7, 8 or 9
--	----------------------------

◆ <Channel no.>

This parameter provides information about the physical channel layout of the relay output on the associated Relay-output module.

The setting is defined by the application firmware of the VIBROCONTROL 6000 Compact monitor and cannot be changed at the instrument.

Possible channel numbers	A or B
--------------------------	--------

◆ <Reset>

This parameter is relevant only in a case where the relay is operated as a <latching> relay. Then the parameter <Reset> reverses the latching status of the relay after it has been activated by an event and can be executed in the VIBROCONTROL 6000 Compact monitor **only** by using the User Terminal.

Reset	Yes	No
-------	-----	----

◆ <Normal position>

This parameter defines whether the relay will operate with a normally energised or a normally de-energised switching mode. This setting can be changed at the instrument.

Switch mode Normal position	Normally energised	Normally de-energised
--------------------------------	--------------------	-----------------------

◆ <Latching>

This parameter defines whether the relay will operate as a latching on non-latching relay. This setting can be changed at the instrument.

If this parameter is set with Yes, when an event occurs the relay will remain latched until it is reset through the User Terminal or through the global Reset.

Latching	Yes	No
----------	-----	----

◆ <Ready / Enable>

With this parameter a relay output can be taken completely out of operation by the setting <disabled>. The relay contacts are then effectively inactive and are unable to switch any signals. For regular monitoring the relays should be set as <enabled>. This setting can be changed at the instrument.

Ready / Enable	enabled	disabled
----------------	---------	----------

◆ <Hardware Id.>

This parameter provides information about the type of output module. This parameter is defined by the application firmware and cannot be changed at the instrument.

Hardware Id.	12
--------------	----

24.2.1 Summary of the parameters

Parameter name	Value range	changeable
Socket no.	1 to 9	No
Channel no.	A, B	No
Reset	Yes / No	Yes
Switch mode Normal position	Normally de-energized / normally energized	Yes
Latching	Yes / No	Yes
Enable	On / Off	Yes
Hardware Id.	12	No



25 COM block

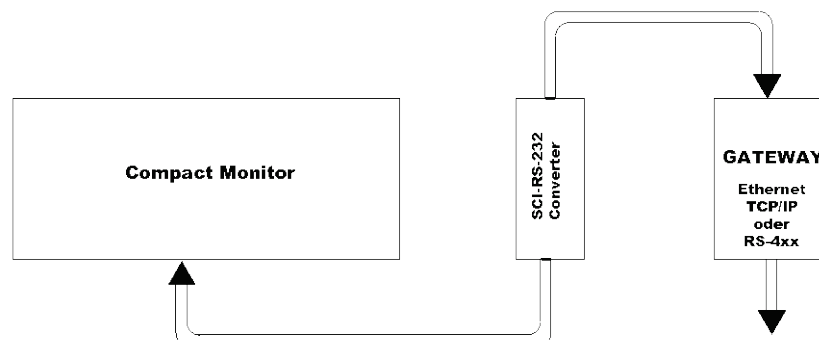
25.1 Function

- ◆ The *VIBROCONTROL 6000 Compact monitor* is able to export, in digital form, the continuously acquired measurement variable over a network. For this purpose the Communications block has an OPC-interface (OPC = OLE for process control) available, which can be integrated in a TCP/IP Ethernet network.
- ◆ The *VIBROCONTROL 6000 Compact monitor* can communicate with any PC in which the OPC DA-server – Type 7131 software has already been installed and taken into operation.

The OPC DA-server – Type 7131 itself is an open interface which makes the measured data and status information available to other systems for archiving or visualization (e.g. to xms Process Visualization).

Each OPC-Client that has been adapted to the OPC DA-server-Type 7131 can directly import digital measured data from the VIBROCONTROL 6000 Compact monitor. Details about the preparation and commissioning of an OPC-client can be taken from the handbook for the OPC DA-server – Type 7131 software.

- ◆ The Communications block is used for configuration of the network connection of the VIBROCONTROL 6000 Compact monitor. Only the parameters for the transfer path and data format are set up here.
- ◆ The network connection is physically realized over an SCI-RS-232 converter and a commercially-available Gateway (e.g. Ethernet).



Schematic representation of the signal process

25.2 Parameters and their setting ranges

25.2.1 Parameter list

◆ <Instrument address / Device address>

This parameter determines the address of the VIBROCONTROL 6000 Compact monitor in the network. Because many VIBROCONTROL 6000 Compact monitor in a network can communicate with a common OPC DA-server – Type 7131, each individual VIBROCONTROL 6000 Compact monitor must be assigned a unique instrument address (device address).

Instrument address/ Device address	1 ... 247
Works pre-setting	1



Note:

The OPC DA-server – Type 7131 takes over the setting of the instrument address. This setting should not be changed !

◆ <Baudrate>

This parameter determines the Baudrate that will be used for communication.

Baudrate	4,800 / 9,600 / 14,400 / 19,200 / 38,400 / 56,000 / 57,600 / 115,200
Works presetting	115,200

◆ <Data format>

This parameter is preset by selection of the protocol. However this can be changed if required due to the on-site conditions.

Data format with Byte size/Parity/Stopbits	8 / E / 1 8 / N / 1 8 / O / 1
Works presetting	8 / N / 1

◆ <RcvTx, TrmTx, TrmExcp, RcvBusy, RcvOvFl, RecDevErr, RcvFrmErr, RcvCRCErr>

These parameters are exclusively for fault analysis in special cases.



Brüel & Kjær Vibro

D

Dialog mit dem User Terminal
Dialog with the User Terminal
Fenêtre de dialogue Terminal Utilisateur

VC-6000 Compact monitor

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1 User Terminal



2 Function

- ◆ The User-terminal is an operating accessory that is connected directly to the *VIBROCONTROL 6000 Compact monitor* by a connecting cable. This permits a number of essential setting up tasks to be done on site and direct display of measured values.
- ◆ The operating options with the User-terminal include the following:
 - Displaying current measurement values,
 - Viewing the logbook contents,
 - Editing of parameters settings such as limit setpoints and sensor sensitivity.
 - Carrying out system-specific settings,
 - Acknowledging selected system conditions.
- ◆ Access with the User-terminal is organised through a menu system. Visualisation is by a 2-line display (2 x 16 characters), and the data selection and entry via the 5 push-buttons on the foil keypad.

2.1 How is the User Terminal connected?

The User-terminal is connected directly through a 2,5 m long connection cable to socket X24 of the *VIBROCONTROL 6000 Compact monitor*.



Note:

The connecting cable may not be lengthened!



2.2 The push-buttons

	ESC	Cancel the entry and/or go one menu level up
	Enter	Accept the entry and/or go one menu level down
	Next	Select the next element in a list or move the cursor one position to the right
	Previous	Select the previous element in a list or move the cursor one position to the left
	Shift	Editing of numeric parameters
	Shift + Next	Increase a number
	Shift + Previous	Decrease a number

2.3 The display

The display has two lines, each with 16 characters. This is displayed in the documentation as follows:

CV_112 12345678


1st line = Firmware number

2nd line = Serial number

3 Advice about the documentation

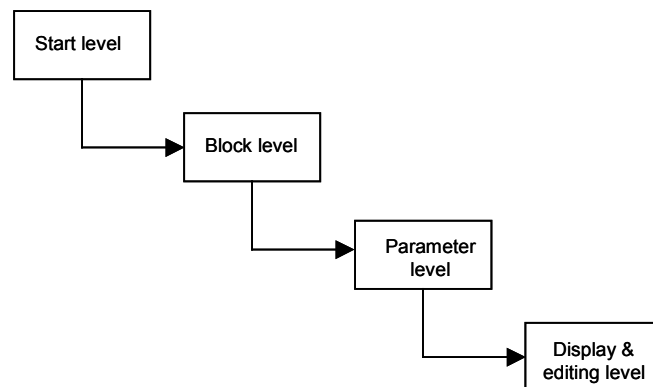
The operation of the User-terminal is illustrated by showing the button that is to be pushed (action), and the resulting display (reaction) is explained.

Example:

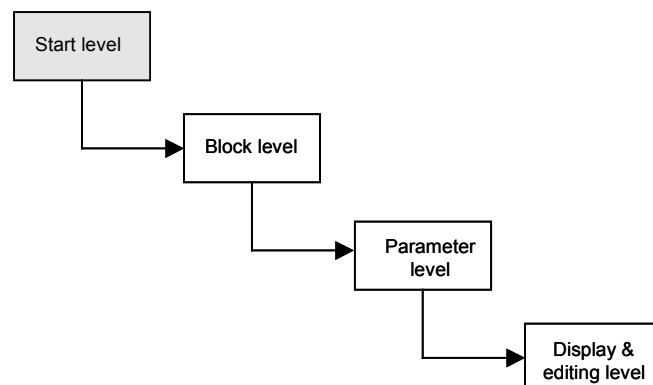
Start DISPLAY	CV_112 12345678
 Enter button	USER MENU 01

3.1 The menu levels

The dialogue of the User-terminal is organised into four hierarchical levels:

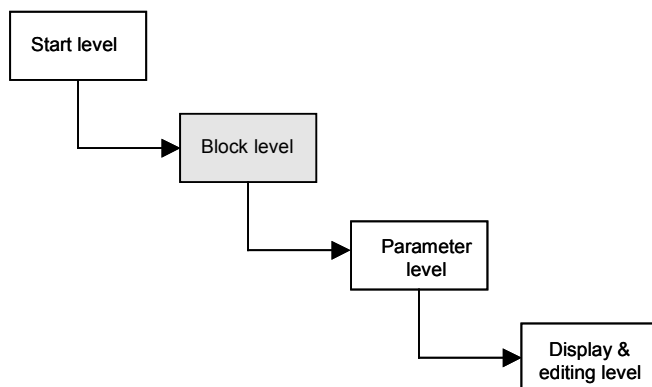


3.1.1 The Start level



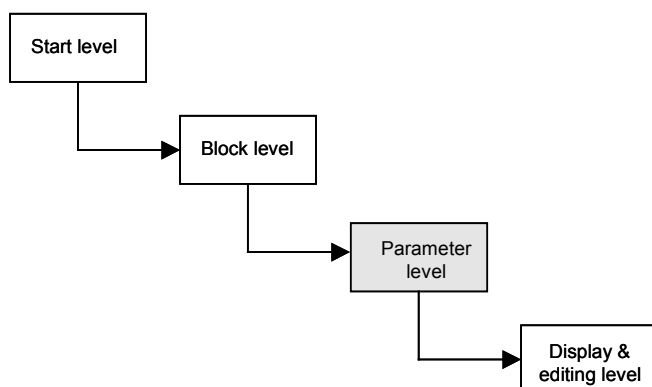
The Start level is the top level in the menu hierarchy and is displayed when the User Terminal is connected. The Start display contains information such as the application firmware number, serial number and perhaps error messages, e.g. <Set clock reference> if the time has not been set.

3.1.2 Block level



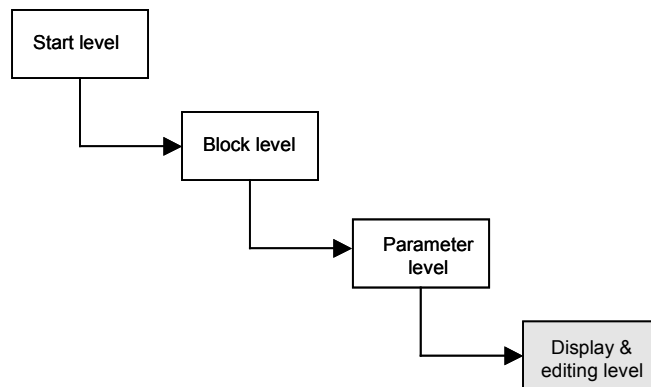
- ◆ The Block level is directly below the Start level. At this level are the USER MENU, the CLOCK REFERENCE menu, the LOGBOOK, the System menu, all signal-flow components and the possible OK relay option selection points.
- ◆ The Block level is the central menu level which serves for the navigation of the user.

3.1.3 Parameter level



- ◆ Each block contains a parameter level. Here all the parameters associated with the selected block are accessed.
- ◆ The offered list of parameters depends on whether you are logged in as a USER without editing rights, or as a SUPER USER with editing rights.

3.1.4 Display and editing level



- ◆ Each individual parameter has its own position arranged in the Display and Editing level, which can be used for displaying the settings and editing them.
- ◆ The display and editing level are context-sensitive, e.g. the menu option SAVE CHANGES is offered only when any settings have been changed.

3.2 Password-protected menu access

- ◆ The menu system of the *VIBROCONTROL 6000 Compact monitor* is equipped with a password protection. There are two security steps: USER and SUPER USER.
- ◆ Without a password the user will be automatically assigned USER status. This status only allows you to read from the menu system.
- ◆ With the correct password entry the user will be given SUPER USER status. In contrast to the normal USER, the SUPER USER can change any of the settings.

Privileges and access rights of a SUPER USER:

- ◆ Edit the password
- ◆ Change the language.
English, German and French are available for selection. English is the default language. Further languages are in preparation.
- ◆ Set up the parameter CLOCK REFERENCE. The CLOCK REFERENCE is used internally to time stamp events that occur (e.g. logbook entries).
- ◆ Set the parameter MONITORING to enabled or disabled.
- ◆ Confirm event messages and reset latching relays.
- ◆ SAVE changes or DISCARD them when logging off.
- ◆ EDIT PARAMETER-SETTINGS of the signal-flow chart components.

4 User Menus

4.1 Login to the system


First of all make sure that the User-terminal is properly connected to the *VIBROCONTROL 6000 Compact monitor*.

The Start display will appear when the connection is made. The following is an example only, as the text can be different for each application firmware.

Login as a SUPER USER:

Example: The Super User password is: 9000

Start DISPLAY	CV_112 12345678
⬅ ENTER BUTTON	USER MENU
⬅ ENTER BUTTON	USER MENU Login
⬅ ENTER BUTTON	Login +0000
Enter the password: Select the digit position with ➡ NEXT or ⬅ PREVIOUS	Login +0000
Change the digit: ➡ Push and hold SHIFT, then push ➡ NEXT / ⬅ PREVIOUS to change the digit.	Login +9000
⬅ ENTER BUTTON	USER MENU Confirm

The user then has the option to select the desired login block using the button ➡ NEXT or ⬅ PREVIOUS, or to switch to the next higher block level, using  ESCAPE(RETURN), in which the blocks of the signal-flow charts are also arranged.



Note:

You will receive the correct password for your VIBROCONTROL 6000 Compact monitor application firmware together with the signal-flow chart of your instrument. This is attached in section Individual instrument documentation of the VIBROCONTROL 6000 Compact monitor handbook folder. Please edit the default password (see chapter 4.6) and make sure that only authorized persons have access to the new password!

What happens if the incorrect password is entered?

If the incorrect password is entered, the dialogue will return to the start.

	USER MENU Log in
--	---------------------

Now the password can be entered once more. Without a successful login the user can only operate as a USER, without the authority to access and change the instrument settings.

4.2 Selecting the language

After entering the correct password:

Example: Change the language from German to English:

You are logged in as a SUPER USER	USER MENU Confirm
▶ NEXT	USER MENU Monitoring
▶ NEXT	USER MENU Logoff
▶ NEXT	USER MENU Language
↶ ENTER BUTTON	Language german
▶ NEXT / ◀ PREVIOUS, to select the language <english>	Language english
↶ ENTER BUTTON	LOGIN Language



Note:

To ensure that these changes will remain permanently effective they must be saved when logging out from the System; see chapter 4.5.




4.3 Confirm

In the USER MENU Block there is a parameter “Confirm”. This parameter has two setting options:

Acknowledge all: All messages in the systems will be acknowledged

RESET all: All relays will be reset **and** all messages acknowledged.

In the following example [Reset all] is selected:

You are logged in as a SUPER USER	USER MENU Confirm
 ENTER BUTTON	Confirm Acknowledge all
 NEXT	Confirm Reset all
 ENTER BUTTON	USER MENU Confirm






4.4 Enable / disable Monitoring

In the USER MENU Block there is a parameter “Monitor”. This parameter has 2 setting options:

Relays disabled: All relays in the system will be disabled.

Off: The monitoring function of the instrument will be disabled.

The example shows the On and Off switching of Monitoring.

You are logged in as a SUPER USER	USER MENU Confirm
 NEXT	USER MENU Monitoring
 ENTER BUTTON	Monitoring Relays disabled
 NEXT	Monitoring Off
 ENTER BUTTON	USER MENU Monitoring
 ENTER BUTTON	Monitoring On
Start display on the DISPLAY When Monitoring is switched On the <i>VIBROCONTROL 6000 Compact monitor</i> is newly started.	CV_112 12345678

4.5 Logging off from the system

There are three possibilities to log off from the user dialogue.

4.5.1 1st option: [Logoff & save]

In this case the changes made will be saved and the SUPER USER will be logged off.



Note:

With the acceptance of the new settings the changes are written to the FLASH memory of the VIBROCONTROL 6000 Compact monitor.

Many parameter settings require a re-initialisation (new start) of the VIBROCONTROL 6000 Compact monitor after being changed. This new start is carried out automatically if required. As a rule the monitoring function will be out of action for a few seconds.

▶ NEXT / ◀ PREVIOUS Select the user menu block	USER MENU
⬇ ENTER BUTTON	USER MENU Confirm
▶ NEXT	USER MENU Monitoring
▶ NEXT	USER MENU Logoff
⬇ ENTER BUTTON	Logoff with Save
⬇ ENTER BUTTON	SIMS-1g Mar 2002 Apl-ID: 4711-081

4.5.2 2nd option: [Logoff & discard]

In this case the changes made will not be saved and the SUPER USER will be logged off.



Note:

[Logoff & discard] means that the monitoring function will continue without interruption. Because data was changed, the original data must be restored from the FLASH memory of the system. This extracts an initialisation of the system. During the initialisation the monitoring function will be out of action for a few seconds.

▶ NEXT / ◀ PREVIOUS Select the USER MENU block	USER MENU
◀ ENTER BUTTON	USER MENU Confirm
▶ NEXT	USER MENU Monitoring
▶ NEXT	USER MENU Log off
◀ ENTER BUTTON	Logoff & save
▶ NEXT	Logoff & discard
◀ ENTER BUTTON	CV_112 12345678

4.5.3 3. Option: [No parameter changes - Logoff – direct]

If **no** changes have been made to the parameters, when selecting the Logoff parameters the option [Logoff – direct] will be offered. The SUPER USER will be logged off.

▶ NEXT / ◀ PREVIOUS Selecting the User menu block	USER MENU
◀ ENTER BUTTON	USER MENU Confirm
▶ NEXT	USER MENU Monitoring
▶ NEXT	USER MENU Logoff
◀ ENTER BUTTON	Logoff direct
◀ ENTER BUTTON	CV_112 12345678

4.5.4 Auto-logout

When you are logged on as a SUPERUSER and there have been no entries during the last 5 minutes, an automatic logout (Auto-logout) will take place. To be able to operate once more, you will have to log on again.

4.6 Editing the password

To make certain that no unauthorized changes can be made with the User-Terminal you should edit the default password after receiving the instrument.

On delivery the password is: 1000.

Example: The Super user password is to be edited to 9000

Start DISPLAY	CV_112 12345678
ENTER BUTTON	USER MENU
ENTER BUTTON	USER MENU Login
ENTER BUTTON	Login +0000
Entry of password number: Select digit position with NEXT or PREVIOUS	Login +_0000
Change the digit value: Push SHIFT and hold, then NEXT / PREVIOUS, to change the digit.	Login +_1000
ENTER BUTTON	USER MENU Confirm
NEXT	USER MENU Monitoring
NEXT	USER MENU Logoff
NEXT	USER MENU Language
NEXT	USER MENU Edit password
ENTER BUTTON	Edit password +0000
Enter the password number: Select the digit position with NEXT or PREVIOUS	Edit password +_0000
Change the digit value: Push SHIFT and hold, then NEXT / PREVIOUS, to change the digit.	Edit password +_9000
ENTER BUTTON	Edit password Confirm password
ENTER BUTTON	Edit password +_0000

Enter the password number: Select the digit position with ► NEXT or ◄ PREVIOUS	Edit password +0000
Change the digit value: Push ► SHIFT and hold, then ► NEXT / ◄ PREVIOUS, to change the digit value.	Edit password +9000
◄ ENTER BUTTON	USER MENU Edit password
◄ PREVIOUS	USER MENU Language
◄ PREVIOUS	USER MENU Logoff
◄ ENTER BUTTON	Logoff with Save
◄ ENTER BUTTON	CV_112 12345678

It is important to confirm the change in the password, i.e. repeat the entry of the new password!

If you enter a different password when repeating the password entry, the new number will be accepted as the password and the instrument will expect you to repeat this new password entry once more. The new password entry will be confirmed only after the same password has been entered twice in succession.

















For the changed password to take effect it is important that it must be saved! (see example) „Logoff – with Save“



If you exit the Block „USER MENU“ without saving, the changed password will be ignored and the old password will remain in effect.

5 Setting up the Clock reference

The block for setting up the CLOCK REFERENCE is on the same level as the USER MENU block.

Example: Date: 24th June 2002, Time:10:25:30 h



You are logged in as a SUPER USER	USER MENU Confirm
To get to the block Date and Time, switch to the next higher block level using  ESCAPE	USER MENU
 NEXT	DATE & TIME
 ENTER BUTTON	DATE & TIME Set date
 ENTER BUTTON	Set date +000000 YYMMDD
With  NEXT select the digit position to be changed.	Set date +0 <u>0</u> 0000 YYMMDD
Change the digit:  Push and hold SHIFT, then push  NEXT /  PREVIOUS to change the digit.	Set date +0 <u>2</u> 0000 YYMMDD
Then push  NEXT to select the next digit position and change this as well.	Set date +020 <u>0</u> 00 YYMMDD
Note the date format! First two digits for the year, then two digits for the month and finally two digits for the day.	Set date +020624 YYMMDD
After entering the date confirm the changes with  ENTER BUTTON.	DATE & TIME Set date
 NEXT	DATE & TIME Set time
 ENTER BUTTON	Set time +000000 HHMMSS
With  NEXT select the next digit position to be changed.	Set time + <u>0</u> 00000 HHMMSS
Changing the digit:  Push and hold SHIFT, then push  NEXT /  PREVIOUS to change the digit.	Set time + <u>1</u> 00000 HHMMSS

<p>Note the time format! First two digits for the hours, then two digits for the minutes and finally two digits for the seconds. It is not mandatory to enter the seconds.</p>	<p>Set time +<u>1</u>02530 HHMMSS</p>
<p>After completing the entry of the date confirm your entry with  ENTER BUTTON.</p>	<p>DATE & TIME Set time</p>
<p>With  ESCAPE change to the next higher block level.</p>	<p>DATE & TIME</p>

**Note:**

The time-stamp of the logbook entries will be correctly and accurately given only when DATE & TIME has been correctly set up. If the DATE & TIME is incorrectly set up, the chronological sequence of the logbook entries will nevertheless be guaranteed.

6 Navigating with the signal-flow charts

The components of the signal-flow chart are at the same level as the USER MENU. If this level is active the blocks of the signal-flow chart can be selected using the buttons  NEXT or  PREVIOUS.

Example of formation:

USER MENU
DATE & TIME
SYSTEM
LOGBOOK
OK-RELAY
COMMUNICATION
SENSOR01
TRIGGER01
SPEED01

The first six blocks are always available and in the same sequence; the other blocks are dependent on the application and correspond to the components that appear in the signal-flow chart.

7 Displaying parameters

In principle the method of displaying parameters is always the same:

- Select the block that is the prominent one for the parameter
- Select the desired parameter
- Display the values that have been set up

In the following example the socket number of a sensor module will be displayed:

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
↵ ENTER BUTTON	SENSOR 01 Socket no.
↵ ENTER BUTTON	Socket no. +003
ESC ESCAPE	SENSOR 01 Socket no.

Parameters which can be edited are marked by a cursor that is displayed.

7.1 Editing parameters

The procedure for editing parameters is first of all very similar to that of displaying parameters. First the corresponding block of the signal-flow chart must be selected, then the parameter to be edited.

There are in principle two types of parameters:

- Parameters with continuously variable settings
- Parameters with a discrete selection of setup values

7.1.1 Editing parameter settings with discrete selection:

The following example explains:

The averaging time for the RMS measurement is to be changed.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	OK-RELAY
▶ NEXT	COMMUNICATION
▶ NEXT	SENSOR 01
▶ NEXT (until the RMS block appears)	RMS 01
⬅ ENTER BUTTON	RMS 01 RMS value
▶ NEXT	RMS 01 Averaging time
⬅ ENTER BUTTON	Averaging time 800ms
▶ NEXT	Averaging time 1.6s
▶ NEXT	Averaging time 3.2s
⬅ ENTER BUTTON	RMS 01 Averaging time
⏮ ESCAPE (Return to Block level)	RMS 01

7.1.2 Editing continuously variable parameter settings:

The following example explains:

The rise time of the peak measurement is to be changed.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	OK-RELAY
▶ NEXT	COMMUNICATION
▶ NEXT	SENSOR 01
▶ NEXT (until the PEAK block appears)	PEAK 01
↵ ENTER BUTTON	PEAK 01 Peak value
▶ NEXT	PEAK 01 Rise time
↵ ENTER BUTTON	Rise time + <u>1</u> 0ms
With ▶ NEXT select the digit position to be changed.	Rise time + <u>1</u> 0ms
Changing the digit: ▶ Push and hold SHIFT, then push ▶ NEXT / ◀ PREVIOUS to change the digit.	Rise time + <u>2</u> 0ms
↵ ENTER BUTTON	PEAK 01 Rise time
⏮ ESCAPE (Return to the Block level)	PEAK 01

8 Displaying measurements

In principle the procedure for displaying measurements is identical to displaying parameters. A measurement is a further parameter in a block. The parameter for measurements is within all blocks that process measurements, e.g., RMS-, Peak-, BCU- and DC measurements.

The procedure is as follows:

- Select the block for the measurement
- Select the desired measurement parameter
- Display the measurement

In the following example the measured value for a peak measurement is displayed:

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	OK-RELAY
▶ NEXT	COMMUNICATION
▶ NEXT (repeat until the corresponding block is displayed)	PEAK 01
↵ ENTER BUTTON	Peak 01 Peak-value
↵ ENTER BUTTON	Peak-value 00010.00 mm/s
ESC ESCAPE	Peak 01 Peak-value



Advice:

When no actual measurement is available for some specific reason, a text message will be displayed instead of the measured value. The text message will depend on the cause:

„Sensor fault“ or „no data“ or „Time out“.

9 Setting of sensor sensitivity and input range

9.1 General

The sensor sensitivity and input range are dependent on the measurement task.

You should note that the settings for the sensitivity must correspond to the sensitivity of the connected sensors. The correct data is as a rule marked in the technical documentation for the sensor.

9.2 Setting up the sensor sensitivity

Setting up is shown in the following example:

The sensitivity of a sensor that will be connected is to be set to the value of 50 mV/g. The signal-flow chart shows the acceleration sensor is connected to the sensor module Sensor03.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until SENSOR03 block appears)	SENSOR 03
⬇ ENTER BUTTON	SENSOR 03 Socket no.
▶ NEXT	SENSOR 03 Sensitivity
⬇ ENTER BUTTON	Sensitivity +00100.00mV/g
With ▶ NEXT select the digit position to be changed.	Sensitivity +00 <u>1</u> 00.00mV/g
Changing the digit: ▶ Push and hold SHIFT, then push ▶ NEXT / ⬅ PREVIOUS to change the digit.	Sensitivity +000 <u>0</u> 0.00mV/g

With ► NEXT select the digit position to be changed.	Sensitivity +000 <u>0</u> 0.00mV/g
Changing the digit: ► Push and hold SHIFT, then push ► NEXT / ◀ PREVIOUS to change the digit.	Sensitivity +000 <u>5</u> 0.00mV/g
◀ ENTER BUTTON	SENSOR 03 Sensitivity
ESC ESCAPE (Return to Block level)	SENSOR 03

**Note:**

All changes are effective only after [Logoff & save].

9.3 Setting the sensor input range

Setting the sensor input range will be shown in the following example:

The input range of a connected sensor is to be set to the value 10 g peak (peak value). The signal-flow chart shows that the acceleration sensor is connected to the sensor module Sensor 03.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until the SENSOR 03 block appears)	SENSOR 03
⬅ ENTER BUTTON	SENSOR 03 Socket no.
▶ NEXT	SENSOR 03 Sensitivity
▶ NEXT	SENSOR 03 Input range
⬅ ENTER BUTTON	Input range +00005.00g
With ▶ NEXT select the digit position to be changed.	Input range +0000 <u>5</u> .00g
Changing the digit: ▶ Push and hold SHIFT, then push ▶ NEXT / ⬅ PREVIOUS to change the digit.	Input range +000 <u>1</u> 5.00g

With ► NEXT select the digit position to be changed.	Input range +00015.00g
Changing the digit: ► Push and hold SHIFT, then push ► NEXT / ◀ PREVIOUS to change the digit.	Input range +0001 <u>0</u> .00g
◀ ENTER BUTTON	SENSOR 03 Input range
ESC ESCAPE (Return to Block level)	SENSOR 03

**Note:**

All changes are effective only after [Logoff & save].

10 Setting of limit setpoints and time delays

10.1 General

When limit setpoints (MONITOR blocks) are entered into the signal-flow charts, there is the option to adapt the limit setpoints and time delay.

Caution !



The user bears the responsibility for any consequences that arise due to incorrect operation or incorrect parameter settings!

Special care is necessary when setting up alarm setpoints (Monitor blocks). When changing these settings the user should always make changes to the entered data (limit type, limit setpoints, time delays, etc.) that are consistent and correct for the machine being monitored. Illogical entries (e.g. monitoring a very high value for violations that are below the limit) will not be intercepted by the system and may, because of improper operation, e.g. result in a machine shutdown.

10.2 Setting up the limit type

Changing the limit type from <High> to <Low> e.g. in MONITOR (ABS) block:

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until the Monitor block appears)	MONITOR (ABS) 01
↶ ENTER BUTTON	MONITOR (ABS) 01 Alarm Type
▶ NEXT	MONITOR (ABS) 01 Limit type
▶ NEXT	Limit type High
▶ NEXT	Limit type Low
↶ ENTER BUTTON	Limit type Low

10.3 Entering the limit setpoints

Example: The limit setpoint is to be changed from 2.00 g to 2.50 g.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until the Monitor block appears)	MONITOR (ABS) 01
↻ ENTER BUTTON	MONITOR (ABS) 01 Alarm Type
▶ NEXT	MONITOR (ABS) 01 Limit type
▶ NEXT	MONITOR (ABS) 01 Limit setpoint
↻ ENTER BUTTON	Limit setpoint +00002.00g
With ▶ NEXT select the digit position to be changed.	Limit setpoint +00002.00g
Changing the digit: ▶ Push and hold SHIFT, then push ▶ NEXT / ◀ PREVIOUS to change the digit	Limit setpoint +00002.50g
↻ ENTER BUTTON	Limit setpoint



Note:

All changes are effective only after [Logoff & save].

10.4 Setting the hysteresis

The hysteresis is a further parameter of the Monitor block. To be changed it must be selected as a parameter and then changed in the Display & Editing level.

Similar to the limit setpoint, the hysteresis is also a continuously variable value. Entry of the value is done in the same manner as the limit setpoint.

Setting advice:



After a limit value has been violated (in the positive or negative direction) the measured value must decrease (or increase) by a value greater than the hysteresis value before the limit violation can be reset.

As a rule the hysteresis value can be set to „0.00“. Only in a case where very short relay time delays have been set should the hysteresis value be set higher than „0.00“ to prevent any „fluttering“ (repeat violations) of the limit relay due to small variations in the measured value.

10.5 Setting the time delay

The time delay is a further parameter of the Monitor block. To be changed it must be selected as a parameter and then changed in the Display & Editing level.

Similar to the limit setpoint the time delay is also a continuously variable value. Entry of the value is done in the same manner as the limit setpoint.

Setting advice:



The time delay is always a compromise between a fast reaction time in the case of a genuine event, and security against false alarms due to a short-term high measurement that is a single, unimportant impulse.

With a setting of very short time delays the hysteresis value should be set to a value higher than „0.00“.

10.6 Putting the DC outputs into operation

10.6.1 Setting the parameters of a linear DC-output

Example:

A measuring range from -5 to + 15 mm should be represented by an output signal of 4-20 mA (2-10 V).

Solution: X1 = -5.0, Y1 = 0.0, X2 = 15.0, Y2 = 1.0, X3 = 0.0

A detailed explanation of the DC output can be found in the description of the signal-flow components.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until the DC-output appears)	DC-OUT 01
⬅ ENTER BUTTON	DC-OUT 01 Socket no.
▶ NEXT	DC-OUT 01 Channel no.
⬅ ENTER BUTTON	DC-OUT 01 Signal output
▶ NEXT	Signal output 4-20mA / 2-10V
▶ NEXT	Signal output 0-20mA / 0-10V
▶ NEXT	Signal output 4-20mA / 2-10V
⬅ ENTER BUTTON	DC-OUT 01 Signal output
▶ NEXT	DC-OUT 01 X1
⬅ ENTER BUTTON	X1 +00000.00g
With ▶ NEXT select the digit position to be changed.	X1 +00000.00mm
Changing the digit: ▶ Push and hold SHIFT, then push ▶ NEXT / ⬅ PREVIOUS to change the digit.	X1 +00005.00g
⬅ ENTER BUTTON	DC-OUT 01

	X1
ENTER BUTTON	DC-OUT 01 Y1
ENTER BUTTON The value is correct; does not have to be changed !	Y1 0.00
ENTER BUTTON	DC-OUT 01 Y1
NEXT	DC-OUT 01 X2
ENTER BUTTON	X2 +00000.00mm
With NEXT select the digit position to be changed.	X2 +000 <u>0</u> 0.00mm
Changing the digit: Push and hold SHIFT, then push NEXT / PREVIOUS to change the digit.	X2 +00010.00mm
With NEXT select the digit position to be changed.	X2 +0001 <u>0</u> .00mm
Changing the digit: Push and hold SHIFT, then push NEXT / PREVIOUS to change the digit.	X2 +0001 <u>5</u> .00mm
ENTER BUTTON	DC-OUT 01 X2
NEXT	DC-OUT 01 Y2
ENTER BUTTON	Y2 0.00
With NEXT select the digit position to be changed.	Y2 <u>0</u> .00
Changing the digit: Push and hold SHIFT, then push NEXT / PREVIOUS to change the digit.	Y2 1.00
ENTER BUTTON	DC-OUT 01 Y2

**Note:**

All changes are effective only after [Logoff –with save].

10.6.2 Setting the parameters of a non-linear DC output

The procedure is in principle identical to that of setting the parameter of a DC output with a linear output curve. The difference lies in the number of anchor points to be defined on the curve that represents the output. A non-linear DC output (curve with at least one bend) requires at least three anchor points that must be set up with the value pairs (X1,Y1), (X2,Y2) and (X3,Y3).

A detailed explanation of the DC output can be read up in section C of the signal-flow chart components

10.7 Putting relay outputs into operation

10.7.1 Setting the parameters of a relay output

Example:

A disabled relay with latching is to be changed from a normal position of <normally energised> to <normally de-energised> without latching. The relay is also to be changed in monitoring from <disabled> to <enabled>.

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
▶ NEXT	SENSOR 01
▶ NEXT (until the Relay block appears)	RELAY 01
↶ ENTER BUTTON	RELAY 01 Socket no.
▶ NEXT	RELAY 01 Channel no.
▶ NEXT	RELAY 01 Reset
▶ NEXT	RELAY 01 Normal position
↶ ENTER BUTTON	Normal position Normally energised
▶ NEXT	Normal position Normally de-energised
↶ ENTER BUTTON	RELAY 01 Normal position
▶ NEXT	RELAY 01 Latching
↶ ENTER BUTTON	Latching Yes
▶ NEXT	Latching No
↶ ENTER BUTTON	RELAY 01 Latching

▶ NEXT	RELAY 01 Enable
↻ ENTER BUTTON	Enable Off
◀ PREVIOUS	Enable On
↻ ENTER BUTTON	RELAY 01 Enable
⏏ ESCAPE (Return to Block level)	RELAY 01

**Note:**

All changes are effective only after [Logoff & save].

11 Logbook








11.1 General

Various types of events are recorded in the Logbook. They are divided into three groups.

1. System: Messages about events that occur in the system, e.g. an error in the monitoring system
2. Access: Login and Logoff events by a SUPER USER. This concerns also all entries through the User Terminal.
3. Monitoring: Limit violations and alarm signals

The Logbook is in a block in the dialogue of the *VIBROCONTROL 6000 Compact monitor* and can be viewed using the User-terminal.

11.2 How are Logbook entries displayed?

The Logbook is reached by pushing the  NEXT button each time the dialogue jumps to the next block, until the Logbook is reached. With  ENTER you reach the first sub-menu <Show entries >. Pushing  ENTER again leads to an entry. If you push  ENTER again the most recent entry will be displayed.  NEXT leads to older entries in time,  PREV to newer entries in time. If there is no longer a change when a button is pushed it simply means there are no further entries. Please note that two sequential and identical entries will also produce the same appearance. With  ESC you will return to the sub-menu <Show entries>.

In the sub-menu <Filtered entries> one of the three entry groups can be selected. When you select a group, and then select the sub-menu <Show entries> only the entries of the selected group will be displayed. At initial delivery the entry filter is set to <all entries>.



Note:

The logbook may also contain messages when the instrument is first delivered. This can happen due to the pre-delivery testing procedure or during the configuration with customer-specific parameter settings.

Example:

Block level	USER MENU
▶ NEXT	DATE & TIME
▶ NEXT	SYSTEM
▶ NEXT	LOGBOOK
↩ ENTER BUTTON	LOGBOOK Show entries
↩ ENTER BUTTON	Show entries
▶ NEXT	Login 01 021103 103545.7
▶ NEXT	Sensor NOK 01 021103 102514.2
ESC ESCAPE	Show entries
ESC ESCAPE	LOGBOOK 01 Show entries

11.3 Which parameters are in the Logbook block?

◆ **<Show entries>**

Logbook entries can only be shown under this parameter.

◆ **<Filtered entries>**

With the parameter <Filtered entries> the entry type to be displayed can be restricted.

Filtered entries	All entries	All entry types will be displayed.
	System	Only entries associated with the System will be displayed.
	Access	Only entries associated with Access will be displayed.
	Monitoring	Only entries associated with Monitoring will be displayed.

**Note:**

If no entries of the selected type are available in the logbook, entries of another category can also be displayed.

11.4 How is a Logbook entry structured?

◆ Time stamp

Each Logbook entry contains a time stamp that is displayed in the lower line of the User-terminal display. The format is as shown:

LOGBOOK ENTRY
JJMMTT SSMMSS.Z

The first 6 digits describe the date, the last digits describe the time in the format <Hours><Minutes><Seconds>.<Decimals of a second>.

The time stamp is determined on the basis of the <CLOCK REFERENCE>. If the <CLOCK REFERENCE> is not defined, then 1st January 1950 is the reference date. In this case the time stamp will not be informative.

◆ Event description

In the upper line a short description of the event will simultaneously appear. The standard format for all access and monitoring messages and most system messages have the following format:

Message ##
YYMMDD HHMMSS.Z

This consists of clear text with a maximum of 13 characters and a two-digit block number. This block number is recorded in the individual instrument documentation (signal-flow chart) and thereby permits localization of the event. In some cases as mentioned at the end of chapter 11.6.3 not the block number but the socket position number will be displayed.

The clear text of the entry will be displayed in the language selected in the User Menu.

Entries from the error group „System“ that are as a result of a serious error have the following format:

E####	##### ##
YYMMDD	HHMMSS.Z

After the first letter ‚E‘ there is a four-digit number.

11.5 Signalling of the OK-LED

It is possible that the error is serious enough so that it is no longer possible for the *VIBROCONTROL 6000 Compact monitor* to create a logbook entry; the OK-LED will then provide a flashing representation of the error number.

The error number has 3 digits and is coded as follows:

A long pause (LED off) signals the start. Then the LED will flash the same number of times as the first digit of the error number. There follows a short pause and the LED then flashes the same number of times as the second digit of the error number; once again there is a short pause and then the LED flashes a number of times to correspond with the third digit of the error number. There is then a long pause that signals the end of the coding and the start of the same sequence once again.

Please make a note of this 3-digit number. Then repeat this procedure to ensure you have correctly recorded the 3-digit error number.

In the case of a system error with an E prefix in the logbook or the signalling of a serious error please make contact with the service department of Brüel & Kjær Vibro. So that you can receive the fastest possible assistance give the complete content of the first line, the error number with both digit sequences (a 5-digit number and a 2-digit number), resp. the error number given by the flashing OK-LED as described above. In addition you should also have the <Equipment ID.>, <Material No.>, <Serial No.>, <Application ID> and the <Release No.> of the instrument ready.

(This information is found in the SYSTEM block and on the instrument label).

See also chapter 11.6.5!

11.6 Possible logbook entries

11.6.1 Logbook entries for access events

Logbook entry	Cause	Responsible Block
Remote reset	A reset via the X22 connector was carried out.	None
Violat. reset	The limit violation was acknowledged.	MONITOR (ABS) ##
TO on	<Trip override> Parameter was switched on.	MONITOR (ABS) ##
TO off	<Trip override> Parameter was switched off.	MONITOR (ABS) ##
Monitor. on	The monitoring function is active.	USER MENU/OPC
Monitor. off	The monitoring function is inactive.	USER MENU/OPC
Global TO	The global <Trip override> was activated.	USER MENU/OPC
Acknowl. all	All unacknowledged limit violations and OK-faults were acknowledged.	USER MENU/OPC
Reset all	A reset was carried out for all unacknowledged limit violations, OK-faults and latching relays.	USER MENU/OPC
Login	A SUPER USER has logged on.	USER MENU
Logoff	A SUPER USER has logged off.	USER MENU
Setting edit	Parameter settings were changed.	USER MENU /OPC
Clock set	The clock reference was adjusted.	DATE / TIME
Relay reset	A relay has been reset.	RELAY ##
Rel. disabled	A relay has been disabled.	RELAY ##
Rel. enabled	A relay has been enabled.	RELAY ##
OK reset done	The OK relay was reset.	OK- RELAY
Download	An application firmware download was executed.	
Alarms reset	The limit violation (Alert and Danger) was acknowledged.	DMONI.(ABS.) ##
TO on (2)	<Trip override> parameter switched on.	DMONI.(ABS.) ##
TO off (2)	<Trip override> parameter switched off.	DMONI.(ABS.) ##

11.6.2 Logbook entries for monitoring events

Logbook entry	Cause	Responsible Block
Lim violated	A limit was violated.	MONITOR (ABS) ##
TM Lim viol.	A limit during <Trip multiply> operation was violated.	MONITOR (ABS) ##
Violat. Ended	Limit violation is ended	MONITOR (ABS) ##
Alert	An Alert limit was violated.	DMONI.(ABS.) ##
Alert ended	An Alert limit violation is ended	DMONI.(ABS.) ##
Alert TM	An Alert limit during <Trip multiply> operation was violated.	DMONI.(ABS.) ##
Danger	A Danger limit was violated	DMONI.(ABS.) ##
Danger ended	A Danger limit violation is ended	DMONI.(ABS.) ##
Danger TM	A Danger limit during <Trip multiply> operation was violated.	DMONI.(ABS.) ##

11.6.3 Logbook entries for System events

Logbook entry	Cause	Responsible Block
Logbuff. Full	The logbook buffer is full, some messages are lost.	LOGBOOK
Pwrfailure i1	Primary voltage failure in internal power supply	
Pwrfailure i2	Secondary voltage failure in internal power supply	
Pwrfailure e1	Primary voltage failure in external power supply	
Pwrfailure e2	Secondary voltage failure in external power supply	
Power up i1	Internal primary voltage on	
Power up i2	Internal secondary voltage on	
Power up e1	External primary voltage on	
Power up e2	External secondary voltage on	
Wrong Module	The given socket is equipped with an incorrect module	SENSOR ##, SENSOR (A/B)##, RELAY ##, DC_OUT ##
Over-range	The sensor signal lies outside the specification	SENSOR ##
Sensor NOK	The sensor in the given socket is producing an OK-fault	SENSOR ##, SENSOR (A/B)##
Over-range A	Signal channel A of SENSOR (A/B) lies outside the specification.	SENSOR (A/B)##
Over-range B	Signal channel B of SENSOR (A/B) lies outside the specification.	SENSOR (A/B)##
Meas.canceled	Trigger signal too fast	CYCLE-DC ##

**Note:**

The logbook entries "Overrange" and sensor NOK" appear only once per channel in the logbook, even if the event arises several times. New entries take place, if [logout with store] took place (initialization of the logbook).

Logbook full	No further events will be recorded	IOGBOOK
Power on	The power supply was switched on.	
Setup false	Storing configuration data failed. All parameter settings must be examined	USER MENU
Input b.false	The combination of measurement range and sensitivity that was selected requires an input voltage that is too high for the AD-converter.	SENSOR ##, SENSOR (A/B)##

**Note:**

The 2-digit number that follows the clear text entry in the logbook gives the number of the block that originated the message. When more than one block is responsible for the message, then the extension number does not represent the number of the responsible block but for the socket position in the Base board of the responsible module.

11.6.4 What to do when the Logbook is full?

How can you recognize that the Logbook is full?

When you can see that no further current entries are appearing in the Logbuch you should page approx. 20 entries back in the Logbook. If a message "Logbook full" is found further storage space must be created.

How can storage space be created in the Logbook for new messages?

There are three possibilities:

1. Switch the *VIBROCONTROL 6000 Compact monitor* off and then on again.
After the switch-on set up the date and time once more!
2. Change a parameter and save the change when logging off.
The parameter LANGUAGE is suggested since this has no active influence on the monitoring function.
3. Send via OPC the command RESET to the *VIBROCONTROL 6000 Compact monitor*.

In all cases during the loading process of the system the monitoring activity will be interrupted for a few seconds. After the load process is completed there will be sufficient space in the Logbook for approx. 10,000 new messages.

11.6.5 Logbook entries for serious System errors



In all cases where only an error number appears in the display of the User Terminal please make contact with the service department of Brüel & Kjær Vibro GmbH!

Brüel & Kjær Vibro GmbH
Leydheckerstraße 10
D-64293 Darmstadt
Service Hotline:
Tel.: +49 (0) 6151 / 428 1400
Fax: +49 (0) 6151 / 428 1401
E-Mail: info@bkvibro.com
Internet: www.bkvibro.com

12 System block

In the System menu you can find all the information necessary for the clear identification of a *VIBROCONTROL 6000 Compact monitor*.

The parameters of the System block:

◆ **<System Info>**

The identifiers of the *VIBROCONTROL 6000 Compact monitor* application can be found in the <System Info>-block.

Equipment ID	Identifier for the individual hardware
Material No.	Identifier for the instrument hardware type
Serial No.	Serial number of the <i>VIBROCONTROL 6000 Compact monitor</i>
Release No.	Describes the version of the application firmware
Application Id.	Identifier for the employed application firmware
Last calibration	Date of last calibration
Info Id	For test purposes only

13 Communications block

In the Communications block you can find the settings which are necessary for communication over the SCI-IN/OUT interface and an RS-232 converter via the OPC DA-server – Type 7131 to a computer.

Instrument address	1 . .247, unambiguous address for the network communication
Baudrate	4,800 / 9,600 / ... 11,5200,
Data format	The data format is dependent upon the selected Protocol.