Brüel & Kjær Vibro
A member of the NSK Group

Instruction

VIBROCONTROL 1800 Series

Four-channel vibration monitors
- VC-1850 Accelerometers
- VC-1860 Velocity sensors
- VC-1870 Vibration Displacement sensors

Extension modules
- VC-1801 Additional relays
- VC-1803/04 Communication and data storage

CE

Retain for subsequent use

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Technical alterations reserved!

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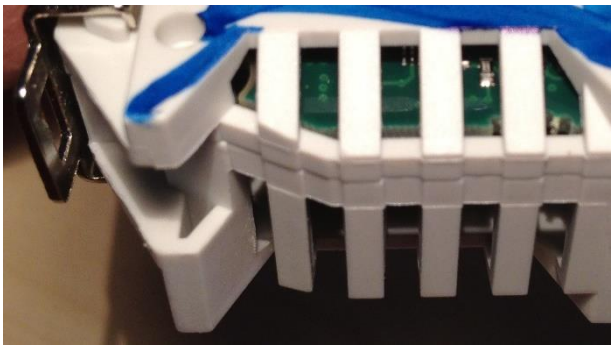
WARNING!

This symbol warns of dangerous situations, which can result from misuse of the product.

NOTE!

This symbol provides general and useful information for using the product.

WARNING!



Electromagnetic compatibility (EMC)
The VIBROCONTROL 18xx complies with the relevant requirements of the Electromagnetic Compatibility Directive 2014/30/EU for electromagnetic compatibility. EMC was tested in accordance with EN 61326-1, with the reduction of requirement for static electricity (ESD).
When handling the VC-18xx, pay close attention to protective measures against electrostatic discharge. This applies in particular to the area of the ventilation slots.

Electrostatic discharges in this area can lead to destruction of the device.

1 Applications

The VIBROCONTROL 18xx vibration monitor is a maintenance-free device mounted in a DIN-rail enclosure. It is used to monitor vibration parameters and protect machines like pumps, blowers, ventilators, decanters, separators, centrifuges, cement mills and similar machines.

The VIBROCONTROL 18xx vibration monitor continuously monitors a maximum of four measuring points in each of which an external sensor is positioned. A tachometer input is also available for recording and synchronizing the machine speed. There is also a process input for measuring pressure, temperature or other characteristic values.

Using a PC on which the Compact Setup software is installed, it is possible to read the different vibration parameter levels and status information. In addition, this software can be used to carry out a remote parameter setup of a device.

The VIBROCONTROL 18xx has direct access via a USB interface. The USB interface is used if the device is not connected to a fieldbus, LAN or if the data transmission speed (= baud rate) with RS-485 is too slow.

2 VIBROCONTROL 18xx Types

VIBROCONTROL 1800xx monitoring devices enable cost effective protection for all critical rotating equipment with rolling element bearings as well as sleeve bearings.

The following versions are available:

- **VIBROCONTROL 1850**
  Accelerometers (CCS)

  and

- **VIBROCONTROL 1860**
  Velocity sensors

  each with

  - 4 vibration measurement channels for case vibrations
  - 1 measurement channel for process variables
  - 1 measurement channel for rotational speed

- **VIBROCONTROL 1870**
  Vibration Displacement sensors

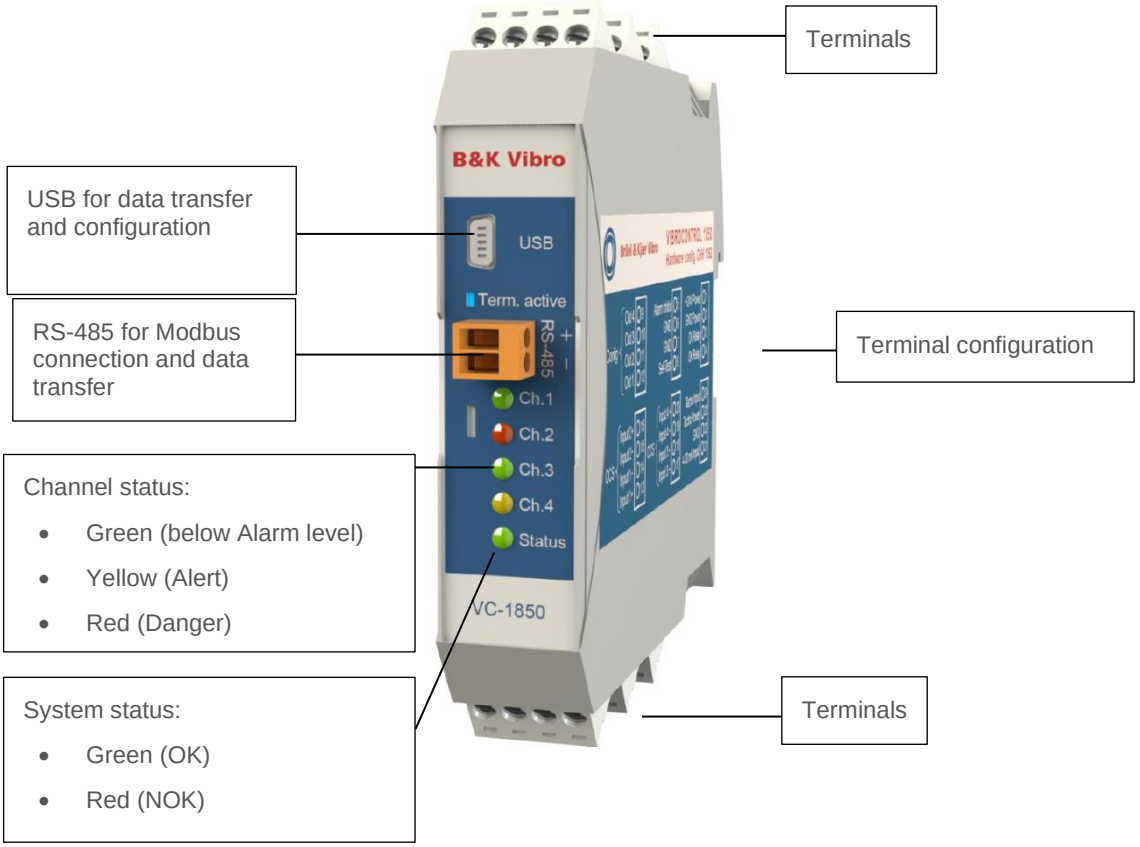
  - 4 vibration measurement channels for relative shaft vibration (RSV)
  - 1 measurement channel for axial position (trust position)
  - 1 measurement channel for rotational speed

Extension modules:

- **VIBROCONTROL 1801**
  Relay module (12 relays)

- **VIBROCONTROL 1803 / 1804**
  Communication module / Ethernet Bridge / data storage

2.1 VIBROCONTROL 18xx Structure



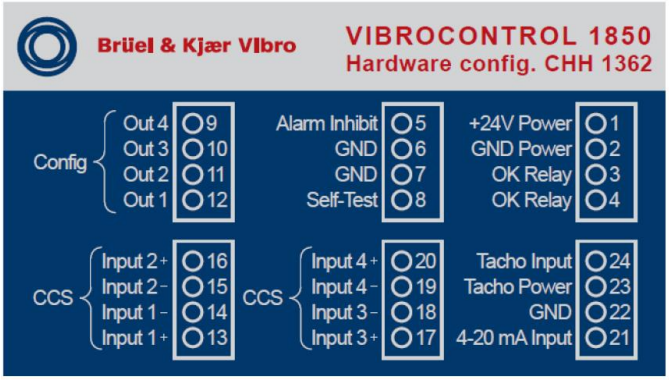
2.2 Terminal Configuration

NOTE

The VC 18xx devices are equipped with resistors or diodes at the connection input for sensors. If the inputs remain unused, the resistors must remain in place. Before using the connections, remove the resistors or diodes. In addition, disable any sensor channels not being used with the setup software.

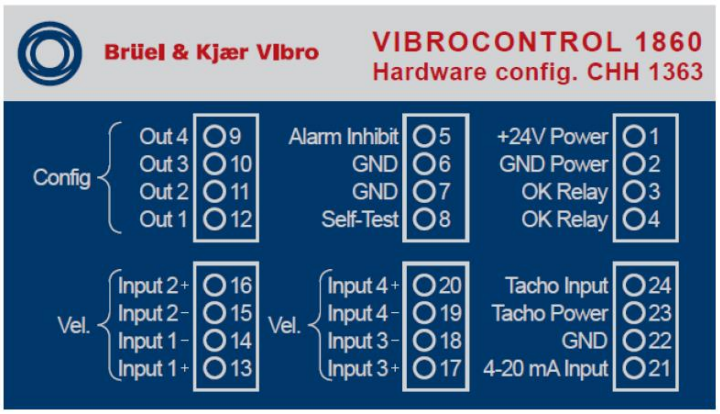
2.3 VIBROCONTROL 1850 (Accelerometers CCS)

Terminal configuration



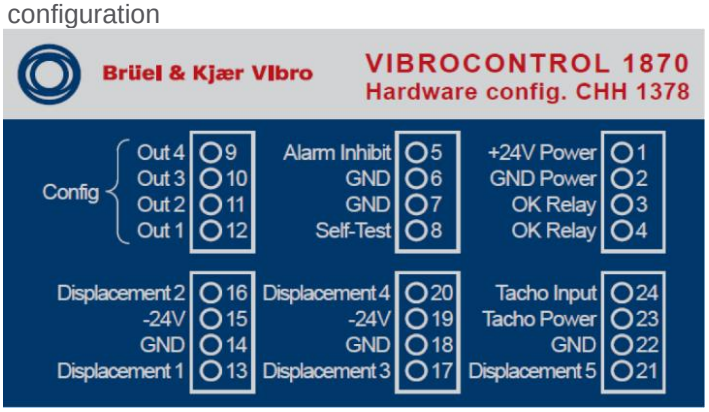
2.4 VIBROCONTROL 1860 (Vibration Velocity Sensors)

Terminal configuration



2.5 VIBROCONTROL 1870 (Vibration Displacement Sensors)

Terminal configuration



Please note: Sensor inputs "Displacement 1-4" are used to measure relative shaft vibration. "Displacement 5" is used for axial position only.

3 Tips for Safe Operation of VIBROCONTROL 18xx

Safety:

This user manual contains information which must be followed by the user in order to ensure safe operation.

If the VIBROCONTROL 1800 monitor indicates a device error (system status LED is red), machine protection is no longer ensured. Please carry out a self-test, correct errors, switch off the device if necessary and protect it against unintentional reuse.

General:

WARNING!

VIBROCONTROL 18xx and VC-1801 devices can be damaged by a "HOT-Swap."
The VIBROCONTROL 18xx must be disconnected from the main power supply first.

Please carefully read the operating instructions prior to setting up the device. Make sure that your VIBROCONTROL 18xx device is suitable for your application without any restrictions.

Improper use:

Any improper or non-intended use may lead to malfunctions of the VIBROCONTROL 18xx or to unwanted effects in your application. If the VIBROCONTROL 18xx is used in a way not described in the relevant user manual, function and protection may be impaired and serious personal injury, death or serious, irreversible injuries may result.

Installation and operation:

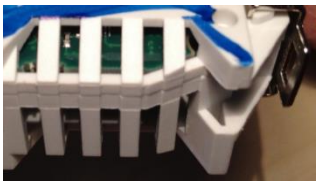
Installation, electrical connection, set-up, operation and maintenance of your VIBROCONTROL 18xx must only be carried out by qualified/trained personnel (electrician) authorized by the machine operator in accordance with local and national regulations for the installation of electrical equipment.

Changing the setup parameters:

Before applying a new set of setup parameters to the VIBROCONTROL 18xx, please make sure that doing so cannot cause any damage to persons and/or machinery.

Connecting sensors:

Please make sure to meet the safe extra-low voltage (SELV) criteria when any sensors are connected to the VIBROCONTROL 18xx so that no dangerous contact voltages are applied to the sensor and/or transferred to the device. The sensor and the power supply of the VIBROCONTROL 18xx are not electrically isolated.



Electromagnetic compatibility (EMC)
The VC-18xx complies with the relevant requirements of the Electromagnetic Compatibility Directive 2014/30/EU. The EMC has been tested according to EN 61326-1, with the reduction of the requirement for static electricity (ESD). When handling the VC-18xx, pay close attention to protective measures against electrostatic discharge. This applies in particular to the area of the ventilation slots. Electrostatic discharges in this area can destroy the device.

Sensor cable mounting:

To prevent negative effects on the functioning of the VIBROCONTROL 18xx caused by noise voltages, please lay shielded sensor cables and power supply separately.

Cable break, cable short-circuit and sensor overload:

For a detailed description of how a VIBROCONTROL 18xx device reacts to a breakage of the sensor cable or an overload of the sensor signal, please read section 6.17 of this manual.

Ingress protection (IP):

The VIBROCONTROL 18xx has an ingress protection of IP20. The VIBROCONTROL 18xx must be mounted in a control cabinet with an ingress protection of at least IP54. The control cabinet should be installed in accordance with local and national rules and regulations.

Mounting:

Mount the VIBROCONTROL 18xx on a 35-mm DIN-rail inside the control cabinet. Mount the device vertically. Make certain to leave enough space between the device and the top and/or bottom of the control cabinet. Only in this way will the air circulation be sufficient to avoid excessive heating of the device.

Connecting to a power supply:

The VIBROCONTROL 18xx has a voltage tolerance of +24 V DC ±5 %.
Before connecting the VIBROCONTROL 18xx to a +24 V DC supply voltage, please make sure that all terminal blocks are completely inserted. The external +24 V DC supply voltage must be generated and supplied according to the SELV requirements with power limiting.

ATTENTION!
The power supply unit may only be supplied with power via a disconnecting device (switch or circuit breaker)!
The disconnecting device must meet the requirements of IEC 6094-7 and IEC 60947-3 and be suitable for the application.

Protect the +24 V DC supply voltage externally with max. 2A. The ground (GND) of the DC supply is directly connected with the ground (GND) of the sensor supply, if any. The SELV criteria must therefore be met for the DC supply (safety extra-low voltage, circuit electrically isolated from other circuits, not grounded). If the DC circuit is to be grounded (e.g. due to national regulations), the protective-extra-low-voltage (PELV) criteria must be adhered to (SELV with circuit electrically isolated from other circuits).

Maintenance:

If used correctly, no maintenance and repair measures are necessary.
Only the manufacturer is allowed to repair the unit.

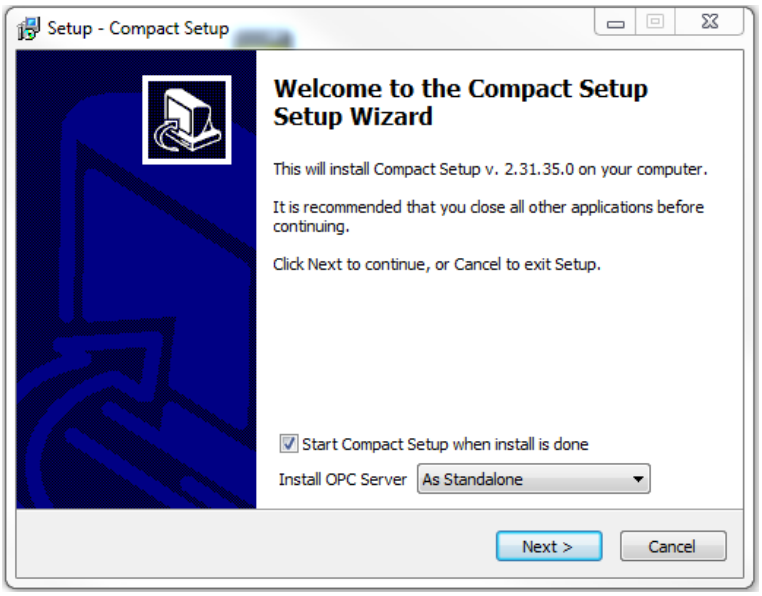
4 Setup and Configuration

Connect the VIBROCONTROL 18xx to a (Notebook) PC that has the Compact Setup software installed. Use one of the interfaces (USB, RS-485 or LAN via VIBROCONTROL 1803 Ethernet Bridge).

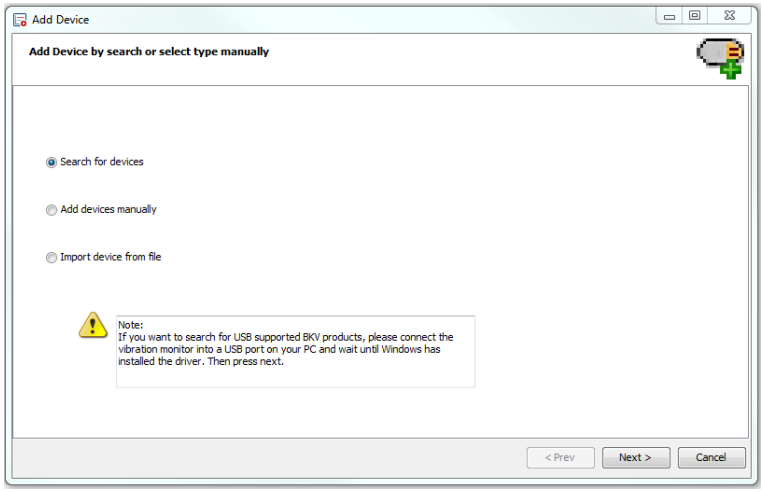
4.1 Configuration of VIBROCONTROL 18xx with PC (Compact Setup Software)

Figure 1) *Connection diagram*

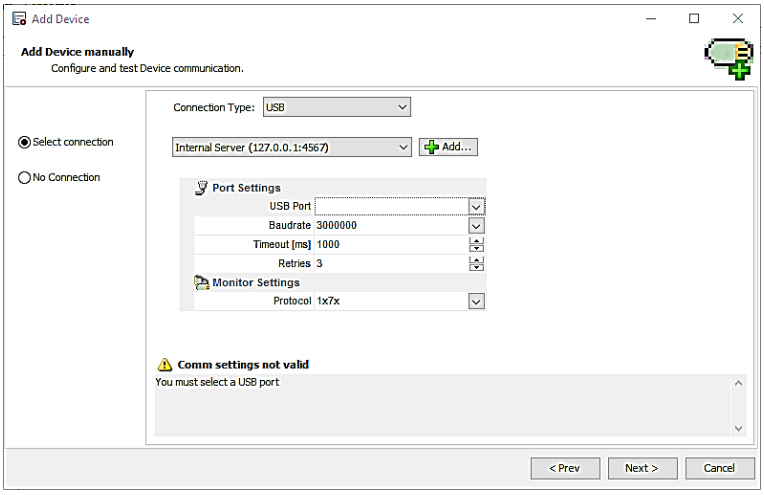
Install the Compact Setup software from the CD.



Follow the installation wizard.

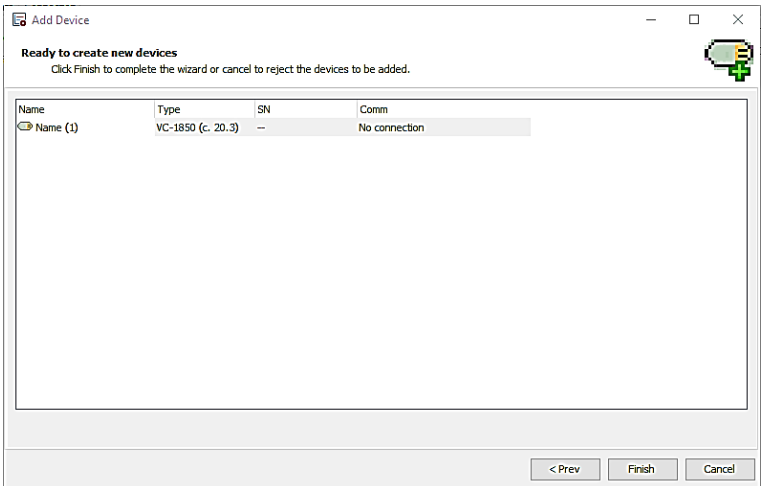


In the "Add device" window, choose "Search for measuring device" (= automatic search) and continue with "Next."

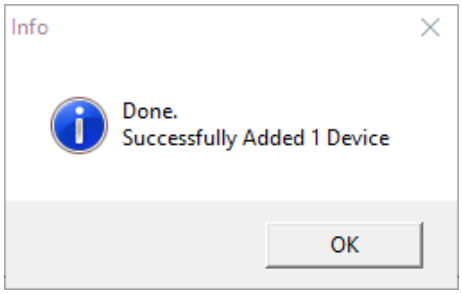


A successful search will result in a VIBROCONTROL 18xx with a serial number (S/N).

Click on "Next."

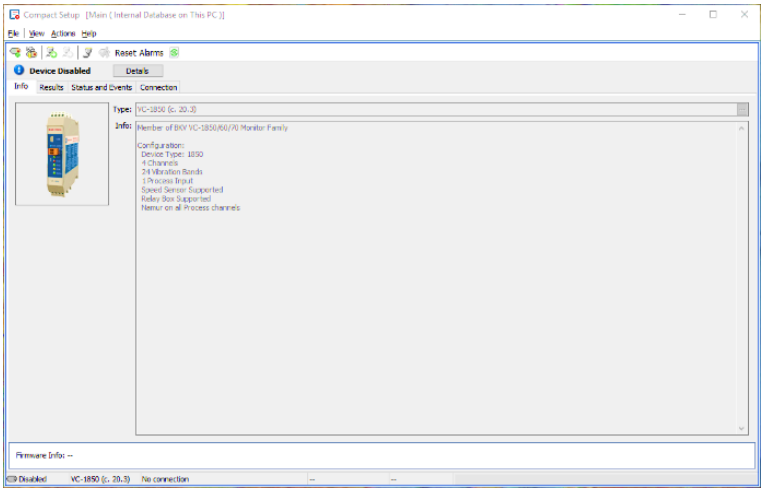


Click on "Finish" to end the search.



The information at the right indicates that your VIBROCONTROL 18xx is successfully connected to the PC and the software.

Confirm the notice with OK.



The software view of the VIBROCONTROL 18xx device shows the most important setting options.

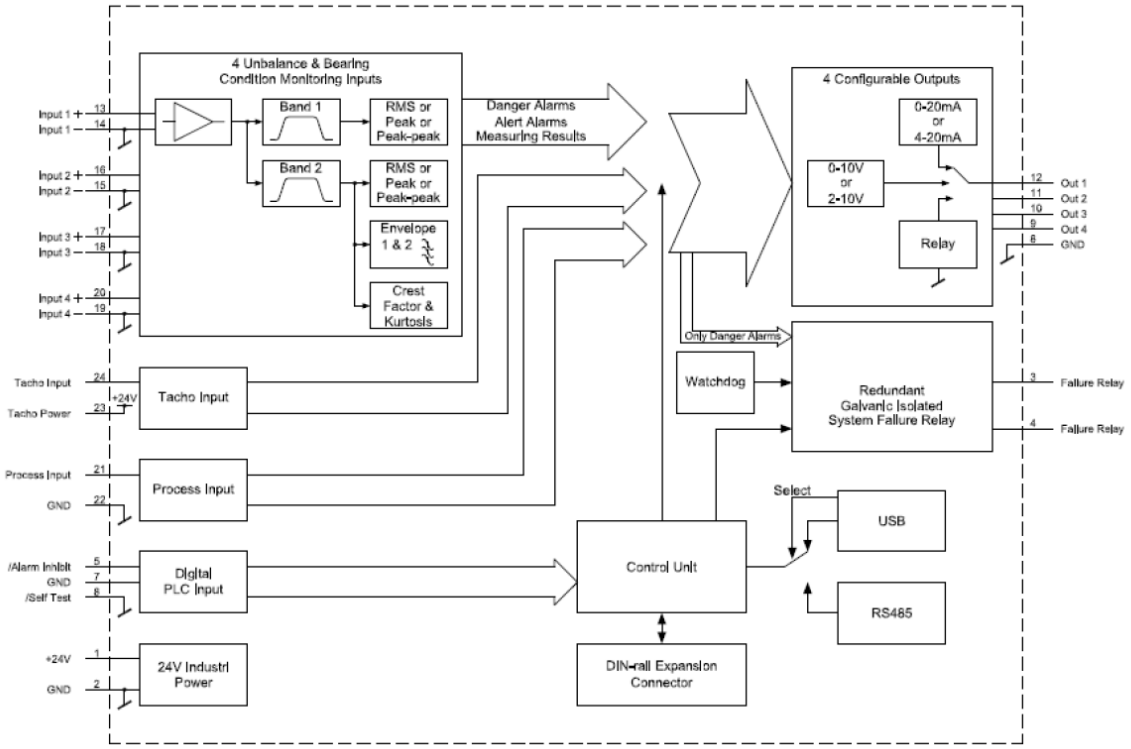
4.2 Cable Connections

Install the different terminals on the VIBROCONTROL18xx in the following sequence:

- Sensor input on terminals #13 to #20. Observe polarity.
- Relay, current and/or voltage outputs on terminals #9 to #12.
- Tacho power and Tacho input signal terminals #23 and #24.
- Process input (relative to GND) on terminals #21 and #22.
  (VIBROCONTROL 1870: This input is used for the axial position)
- System errors on terminals #3 and #4 via redundant, electrically isolated OK relay.
- Power supply (+24 VDC) and ground (GND) on terminals #1 and #2.
- Optional: External connection to terminals #5 and #8 to initiate respectively "Alarm Inhibit" or self-test.
- Connect the VIBROCONTROL18xx to a PC so that communication can be established between these two devices. The VIBROCONTROL 18xx has RS-485 and USB interfaces for communications. Communication is optionally possible via a LAN connection using a VIBROCONTROL 1803 Ethernet Bridge module.

4.3 Powering and Starting up the Device

After the +24 V DC supply voltage is connected or a device setting is changed, the monitoring system runs through a start program. The measurement channel LEDs and/or the OK LEDs flash or are lit red for about 30 seconds.
Provided there is no violation of Alert and Danger levels and the system status is OK, all LEDs should turn to green.



5 Functionality

5.1 General for VIBROCONTROL 1850

The VIBROCONTROL 1850 vibration monitor has four inputs for accelerometers.

5.2 Functions of VIBROCONTROL 1850

The VIBROCONTROL 1850 vibration monitor provides two independent frequency bands (band 1 and band 2) for each vibration measurement channel:

Band 1 and band 2:

- Full scale in True RMS, Peak or Peak-to-Peak values of the momentary vibration parameters acceleration (m/s^2), speed (mm/s) or displacement (µm);
  - Band-pass filters for selection within the ranges:
    Band 1:
    0.1 to 1500.0 Hz or 5.0 to 11500.0 Hz; 10 Hz – 1000 Hz,
    Band 2:
    2 kHz - 10 kHz
  - Alert alarm and Danger alarm limits can be configured.
    Default setting:
    Alert alarm is 7.1 mm/s; Danger alarm is 11.0 mm/s.

Band 2 only:

- Two separate envelope detectors. Each envelope detector has its own band-pass filter. Each envelop analyzer has its own Alert and Danger alarms.
- Crest factor detector with Alert and Danger alarms
- Kurtosis detector with Alert and Danger alarms

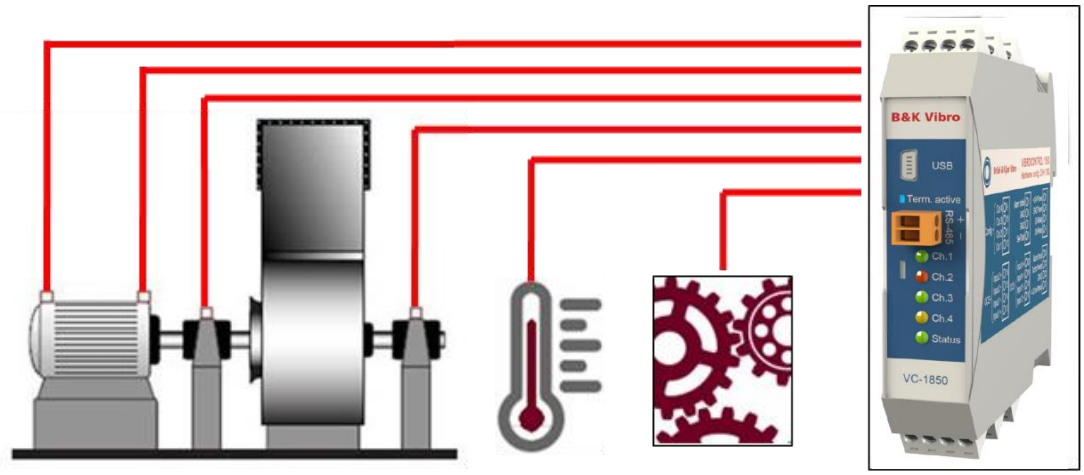
General for ALL VIBROCONTROL VC-18xx:

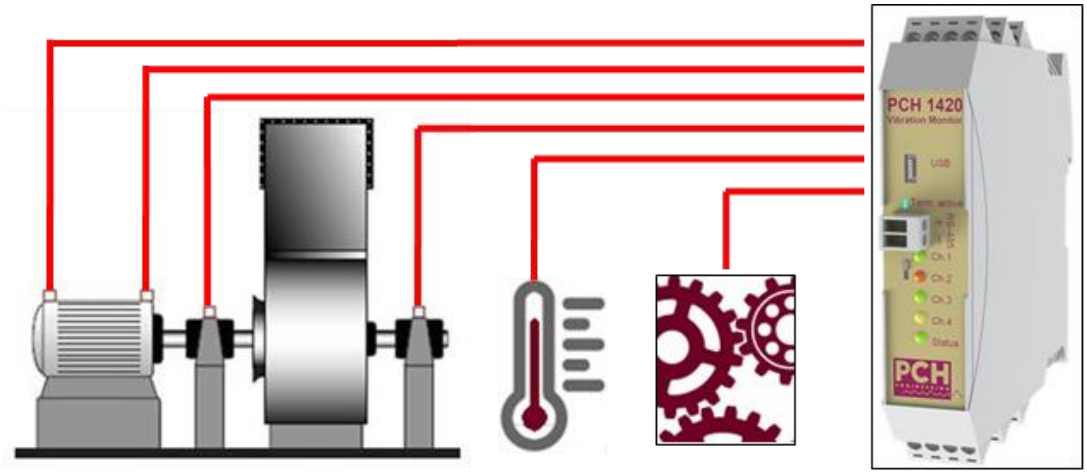
- An individual Alert or Danger alarm can be assigned to each vibration parameter. If an Alert or Danger alarm occurs, the corresponding LED is lit:
  Green = No alarm, Yellow = Alert alarm and Red = Danger alarm
- The Alert and/or Danger alarms can be configured as "Low Level" or "High Level" alarms.
- The Alert and/or Danger alarms can be set to latching or non-latching. **This setting of an alarm can only be changed by the software (Compact Setup or Compact Analyzer).**
- Four independent configurable outputs (terminals # 9, # 10, # 11 and # 12), can be defined as **relay outputs** (for Alert or Danger alarm) or as **analog outputs**. Each of the outputs can have any (or just any one) of the following functions:
  ~ Solid-state relay. When the relay is enabled, a message (warning light, signal tone) can be sent or the machine can be shut down.
  ~ Analog DC current output: 0-20 mA or 4-20 mA;
  The default value is 4-20 mA
  ~ Analog DC voltage output: 0-10 V or 2-10 V
  The default value is 2-10 V

- **System status/OK status**
  An internal watchdog monitors the functional capability of the complete monitor continuously.
  If a **non-critical** system error occurs, the LED on the front is lit **Red**.
  If a **critical** system error occurs, the **Red** LED **flashes**.
  Using two mechanical relays in series for the same event adds redundancy to the system error output and thus considerably increases the reliability that a system failure alarm will be detected.
    - A complete self-test of the vibration monitor can be started by connecting the "Self-Test" terminal #8 to ground.
      A flashing Yellow "Status" LED on the front of the enclosure indicates an ongoing self-test.
    - "Alarm Inhibit": Terminal #5 (against GND) suppresses all alarms.
    - A process input (terminal #21) can be used to connect an analog current (0-20 mA) input signal or voltage (0-10 VDC) input signal.
    - A tachometer connection (terminal #24)

The VIBROCONTROL 18xx vibration monitor has an RS-485 and a USB interface.
The USB interface can be used on a PC for configuration and data acquisition.

Using the VIBROCONTROL 1803/04 Ethernet Bridge, the VIBROCONTROL 18xx can be coconnected to a LAN network via the RS-485 interface.





6 Installation and Operation of VIBROCONTROL 18xx

6.1 General

The setting of the measuring parameters of the VIBROCONTROL 18xx can be carried out with the Compact Setup software:

- The setup parameters can be adjusted using the Compact Setup software. Only one device can be configured at the time.

The measuring parameter setup for channels with accelerometers (CCS) for VIBROCONTROL 1850 or a speed sensor for VIBROCONTROL 1860 is very much similar.

Working Offline with the Configuration Software

NOTE

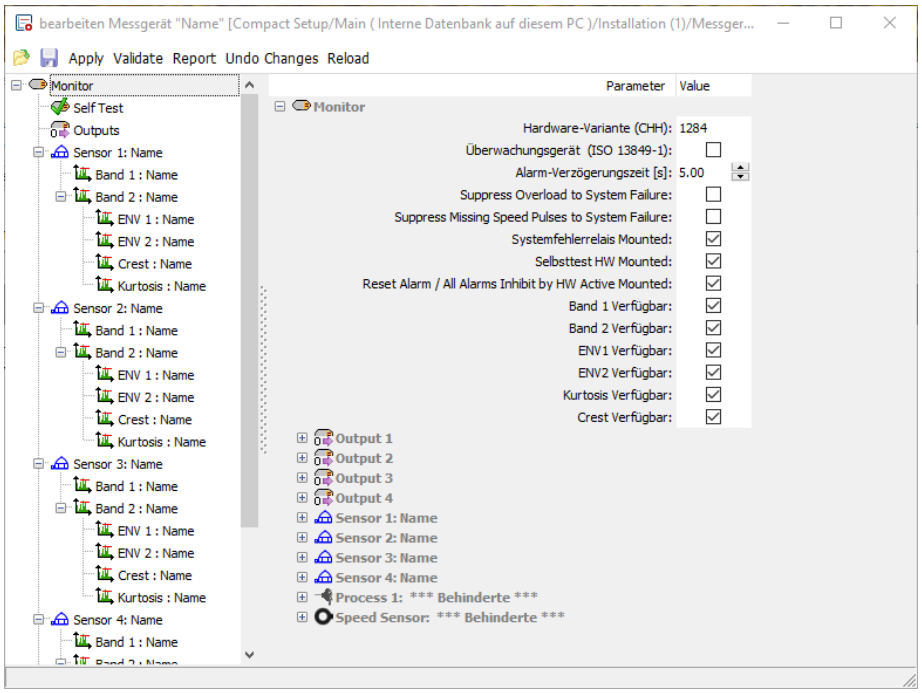
The configuration software only works correctly if the template file for the respective product is used.

For offline configuration, load the setup file (.mse) from the CD included with delivery.

- Load the template file, *"product type".mse*

6.2 "Monitor" View

The "Monitor" page of the Compact Setup software shows the basic functions.



6.3 Self-Test

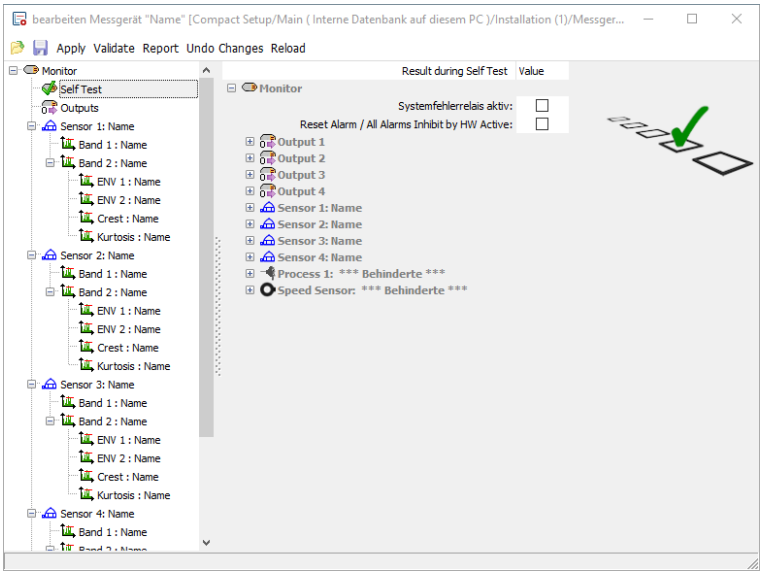
The VIBROCONTROL 18xx includes a "Self-test" function that can be enabled externally. This can be done by connecting a ground (GND) signal to terminal #8 on the enclosure or by using the Compact Commander software to enable the self-test.

Only individual functions can be addressed during a self-test. But there are NO consequences, i.e. no alarms will be triggered if a certain vibration level set during self-test exceeds an alarm trigger level.
If an alarm must be triggered during self-test, the alarm in question must be marked. The behavior of outputs during a self-test must also be specified separately.

Thus, the user will have to specify/set the following in connection with a self-test:

- The unit for each vibration parameter, for example mm/s.
- The status of alarms during a self-test.
- All four outputs, either as status of a relay or a certain measured value for:
  - DC current (mA) or
  - DC voltage (V).
- The process input must be specified in detail (measuring range and alarms).

The "Status" LEDs flash yellow for the duration of the self-test.

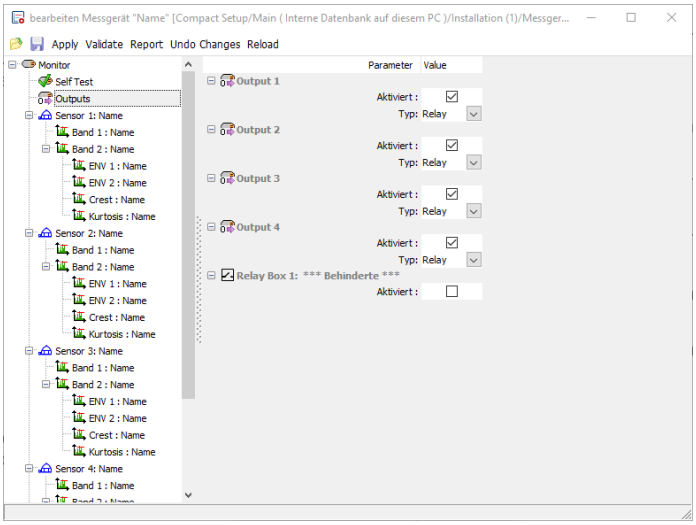


6.4 Setting of the Outputs (Analog Output or Relay)

The VIBROCONTROL 18xx has four configurable outputs on terminals #9, #10, #11 and #12. Each of these outputs can be enabled or disabled. An enabled output can have any of these output functions:

- A solid-state relay, which is closed and connected to ground (GND) when not enabled. When enabled the relay breaks.
- An analog DC current output of 0-20 mA or 4-20 mA, directly proportional to the measured parameter between 0 and full scale.
- An analog DC voltage output of 0-10 volts or 2-10 volts, directly proportional to the measured parameter between 0 and full scale.

In the example below output type "Relay" is selected. It can be changed to Analog Output.



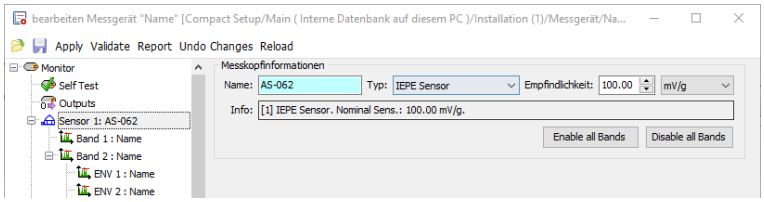
If all outputs (1-4) are defined as analog outputs, the OK relay can be used as a collective relay for all Danger alarms (Setup Monitor: Safety Monitor (ISO 13849-1).

Please note that all configurable outputs refer to common ground (**GND**). Outputs selected to be a current source or voltage source will have an output value that can be directly measured between the respective output terminal and GND.

Please be aware that each of the four outputs can have only one function attached to it. For example, if all four outputs are selected to be 4-20 mA current outputs, there will be NO relays available.
Exception: The Protection System feature has been enabled (see section 6.14), which will cause ALL Danger alarms to trigger the protection system (= system error relay). The extension module VC-1801 provides 12 additional relays.

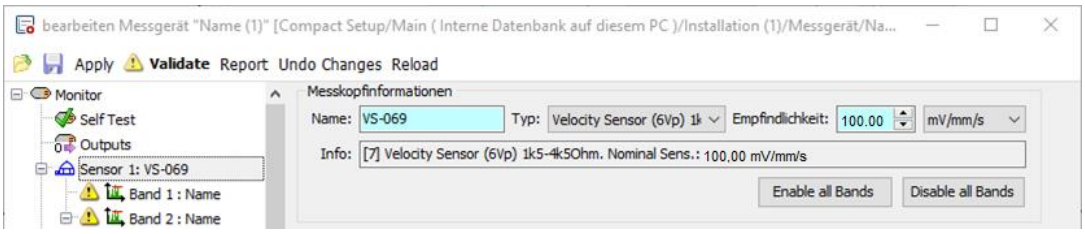
6.5 Sensors

VIBROCONTROL 1850 with CCS accelerometer:



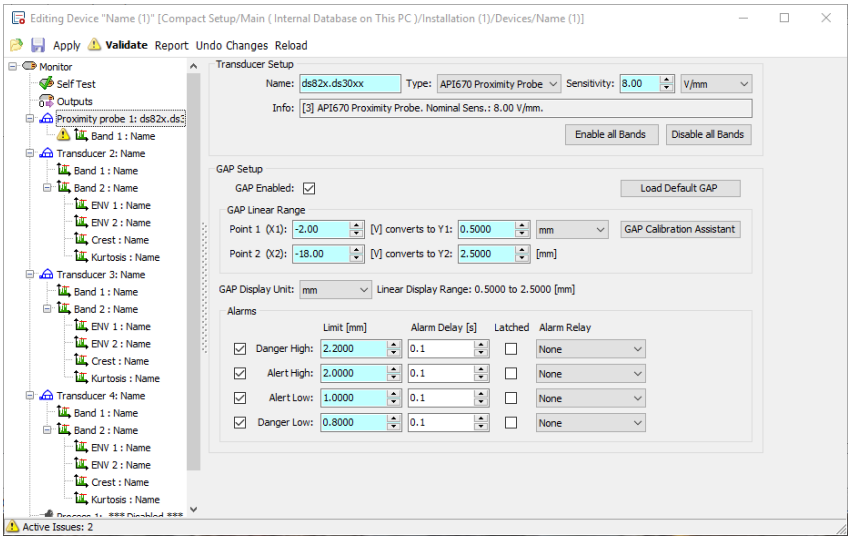
Enter the sensitivity of the connected CCS (IEPE) accelerometer. This is a value normally provided by the manufacturer of the sensor. A typical value is 100 mV/g.

VIBROCONTROL 1860 with vibration velocity sensor:



Enter the sensitivity of the connected vibration velocity sensor. It is indicated by the sensor manufacturer. A typical value is 100 mV/mm/s (possible setting range 80-120 mV/mm/s).
If a speed sensor of Brüel & Kjær Vibro is used, the frequency linearization (8 Hz) for a VS-068/69 is implemented.

VIBROCONTROL 1870 with non-contacting displacement sensors:



Enter the sensitivity of the connected displacement sensor. It is indicated by the sensor manufacturer. A typical value for standard displacement sensor is 8 V/mm.

The adjustment of the displacement sensor also sets up the distance measurement (GAP) (if enabled). This also makes it possible to check whether the sensor is working in its defined measuring range.
The sensitivity of the sensor is normally given in V/mm or mV/µm.
Low-level and High-level alarms are available for distance measurements (GAP alarms) to indicate that something is wrong with the setup of the displacement sensor.

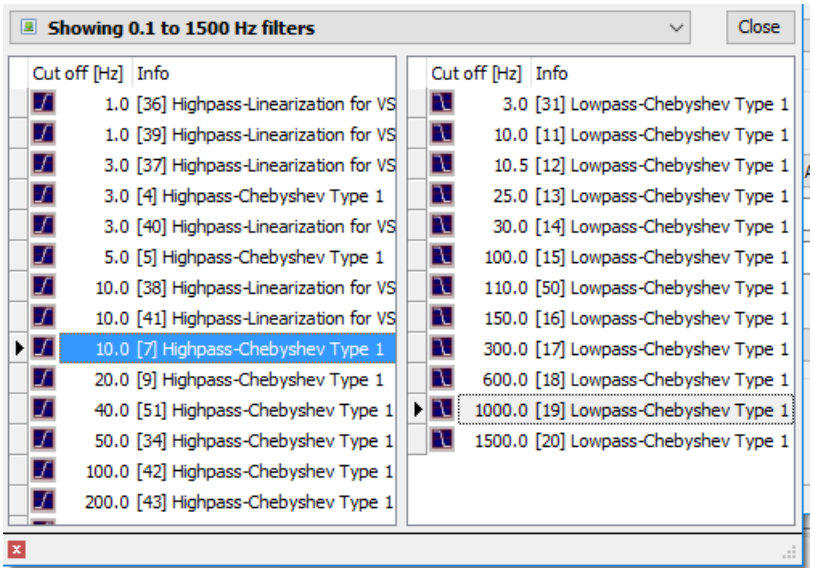
6.6 VIBROCONTROL 18xx: Setting of Band-Pass Filter 1

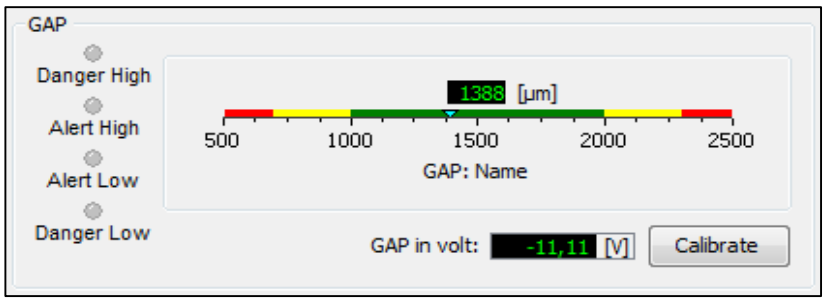
When a band is disabled, the respective vibration parameter will disappear from the result display of the Compact Setup software.
The following measuring units are possible depending on the sensor:

- VC-1850: Vibration (CCS) accelerometer: g, m/s^2, mm/s, mm or µm
- VC-1860: Vibration velocity sensor: mm/s
- VC-1870: Vibration displacement sensor: mm, µm or mils

The following band-pass filter is available:

- **- 0.1 Hz to 1500 Hz:**
  This filter range is used for classic vibration monitoring. The default value is: 10.0 Hz - 1000.0 Hz.

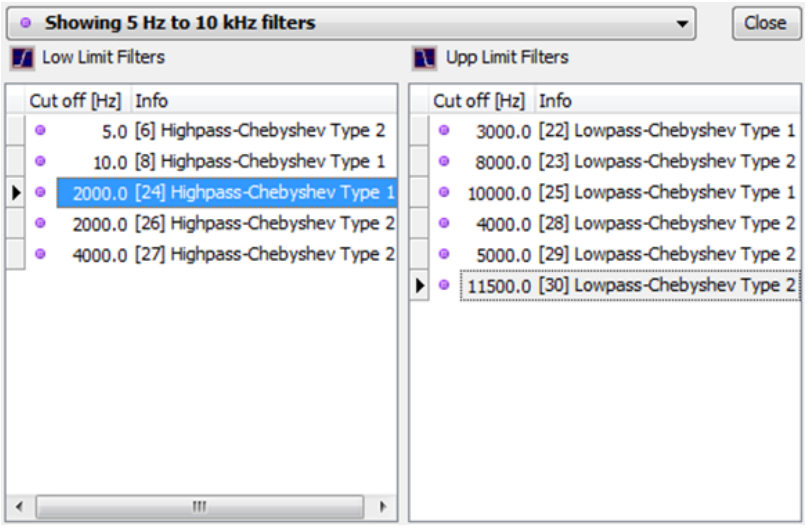




6.7 VIBROCONTROL 1850: Setting of Band-Pass Filter 2

- **- 5 Hz to 10 kHz:**
  The filter range is used mainly in band 2 for high-frequency vibration monitoring of rolling element bearings with a CCS accelerometer.

The default is a band-pass filter from 2000.0 Hz to 10000.0 Hz.



Depending on the application, the VIBROCONTROL 18xx has three signal detectors to select from:

- **True RMS detector (true root mean square value):**
  By default the detector for any band is pre-set to "RMS."
  The only additional parameter that will have to be set is the RMS Averaging Time (in seconds), which may have a value between 0.1 and 60.0 seconds. By default the value of the RMS Averaging Time is pre-set to: 3 seconds.
- **Peak value detector**:
  The Peak detector has two additional parameters that will have to be set:
- **Attack time (in milliseconds):**
  The attack time may have a value between 0.1 and 1000.0 milliseconds. Typical time is 1.0 millisecond
- **Decay time (in seconds):**
  The decay time may have a value between 0.1 and 20.0 seconds.
  Typical decay time 3 seconds

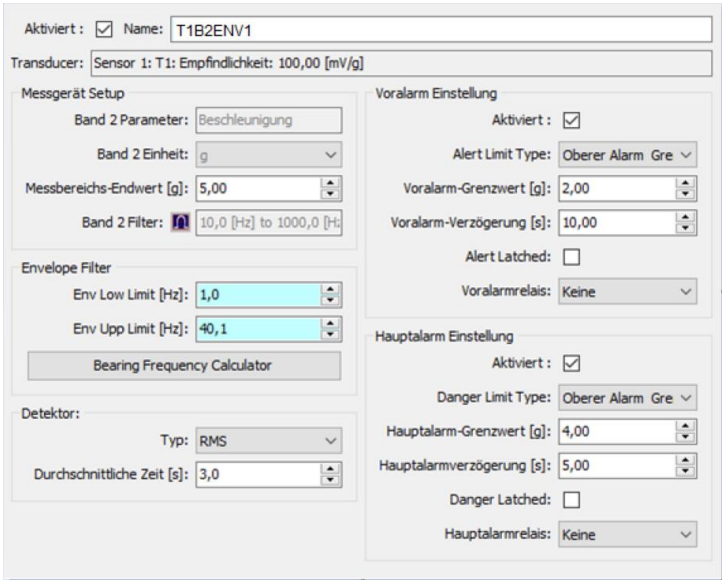
6.8 VIBROCONTROL 1850: Setting of the First and Second Envelope Detector

Bearing damage is one of the most common faults in rotating machines and the envelope detector is primarily used to detect and diagnose Rolling Element Bearing (REB) damage. When a fault develops, the vibration becomes amplitude modulated due to periodic changes in the forces. The low frequency vibrations are filtered away in order only to extract the modulated periodic information from the more sensitive and pure envelope signal.

The envelope spectrum has shown several major advantages over other methods in very early detection and fault symptom identification.

VIBROCONTROL 1850 has two integrated envelope detectors, which can be adjusted individually. However, the envelope detectors are part of band 2 and as such are assigned to the bandwidth of the band-pass filter selected in band 2. Please note that the choice of bandwidth in band 2 affects the crest factor and kurtosis as well.

The envelope detector must be "enabled."



The envelope is measured in m/s² (g) RMS of the unit type selected in band 2. m/s2 (g) must therefore be pre-defined in band 2 if envelope analysis will be used.

The user can set/change the following parameters related to the envelope detector with the Compact Setup software:

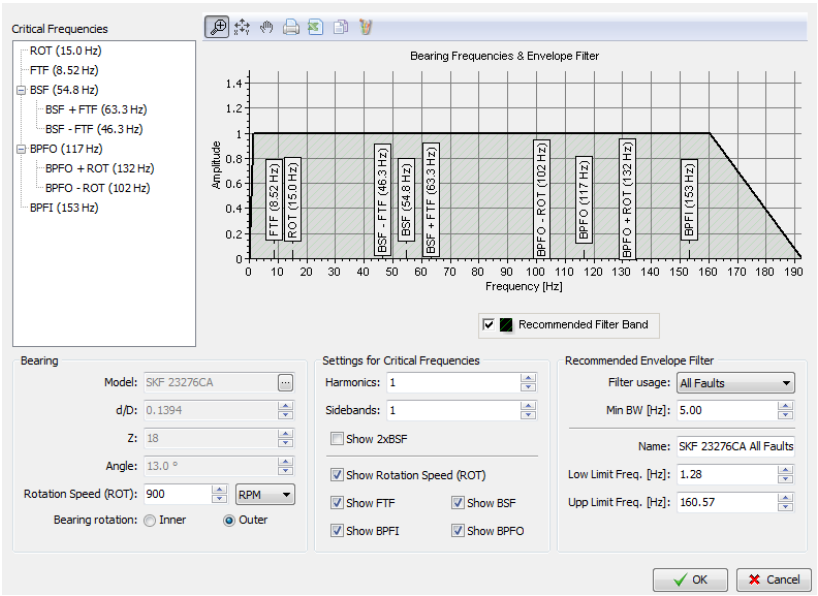
- Measured value in m/s²:
- RMS averaging time in seconds:
  This value may vary between 0.1 and 10.0 seconds.
  The default value for this parameter is: 3 seconds
- Lower limit frequency envelope in Hz:
  This value may vary between 0.9 Hz and 500.0 Hz.
  Use: Calculation of position error frequency
  The default value for this parameter is: 1 Hz
- Upper limit frequency envelope in Hz:
  This value may vary between 4.5 Hz and 500.0 Hz.
  Use: Calculation of position error frequency
  The default value for this parameter is: 500 Hz
  Please note that the upper limit must be set at a higher value than the lower limit.

There are two independent envelope detectors that may each have a different envelope lower/upper limit. The Bearing Frequency Calculator can provide suggestions for envelope filter settings.

6.9 Bearing Damage Frequency Calculator

For this purpose, the Compact Setup software includes a database with numerous well-known bearing manufacturers.

Click in the "Edit" menu in the "ENV" parameter setup view on the "Bearing Frequency Calculator" button. A window similar to that on the next page then appears.



Once the manufacturer and the bearing model have been selected, a number of parameters that are proprietary for this particular bearing will be calculated and displayed:

- d/D:
  d/D is the ratio between the diameter of the balls (d) and the diameter of the circle formed by the center-points of the balls in the bearing.
- Z:
  Z is the total number of balls or rollers in the bearing.
- Angle:
  Angle is the contact angle.

List of predominant critical frequencies in rolling element bearings:

- ~ BFPO: **B**all-**P**ass **F**requency - **O**uter = rollover frequency of outer ring
- ~ BPFI: **B**all-**P**ass **F**requency - **I**nner = rollover frequency of inner ring
- ~ FTF: **F**undamental **T**rain **F**requency – cage rotation frequency
- ~ BSF: **B**earing **S**pin **F**requency - rollover frequency of the rolling element

Several parameters are needed to evaluate the damage frequencies:

- Inner ring or outer ring rotation:
"**R**olling **E**lement **B**earings **REB**" typically consists of two circular rings (outer and inner ring), between which there are balls or other types of rolling elements.
Please determine whether it is the inner ring or the outer ring of the bearing that is rotating. Indicate the correct movement by marking either "Inner ring rotation" or "Outer ring rotation" in the Frequency Calculator setup menu.

- Rotation speed:
Next enter the rotation speed (ROT) of the bearing (= shaft). The value entered must be in either revolutions per minute (RPM) or revolutions per second (Hz).

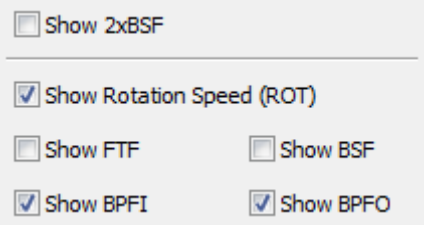
Bearing damage frequencies:
Critical frequencies are the bearing specific vibration frequencies that will be induced on the whole machine as the result of damage in the ball bearing.

~ Harmonics of the bearing damage frequencies
Under "Harmonics," the number of harmonics that must be taken into consideration for the calculation of the limit frequencies can be entered.
The number of harmonics considered should not exceed the number of balls in the ball bearing.
The number of harmonics can be an integer number between 1 and 10. The default value is 1.
When all parameters related to the critical frequencies have been selected/entered, a list of the calculated critical frequencies will appear in the top left corner of the Bearing Frequency Calculator window.

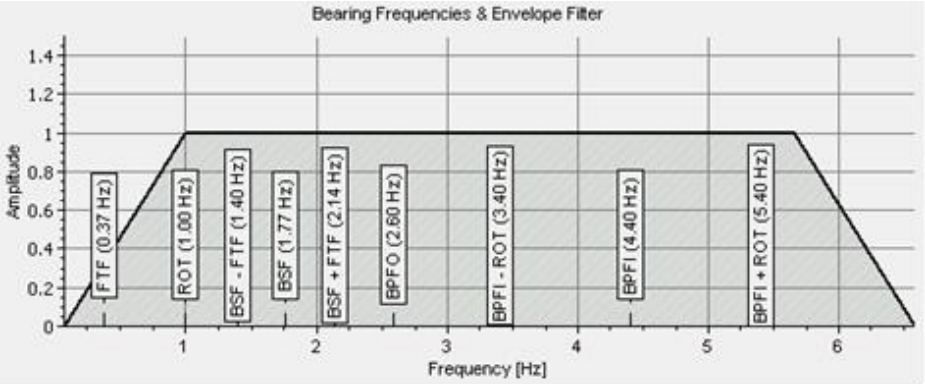
~ Sidebands
Under "Sidebands," the number of side bands that must be taken into consideration for the calculation of the limit frequencies can be entered.
The number of side bands can be between 0 and 10. The default value is 1.
When all parameters related to the critical frequencies have been selected/entered, a list of the calculated critical frequencies will appear in the top left corner of the Bearing Frequency Calculator window.

- Recommended envelope filters:

- Calculating all critical frequencies at once leaves an untidy graph that is difficult to read. Study each predominant critical frequency and its harmonics as well as sidebands on an individual basis. A number of narrow band-pass filters must be used. Two of them can be analyzed simultaneously.
  By sending the same CCS accelerometer input signal to more than one channel, the same VIBROCONTROL 18xx can produce up to eight different bearing analyses simultaneously. The desired critical frequency can be selected under "Use filter." The corresponding filters are calculated automatically by the Compact Setup software.
- **~ Minimum bandwidth (in Hz):**
  Under Minimum bandwidth, the most suitable bandwidth is calculated and set automatically by the Compact Setup software.
- **~ Name:**
  The name is generated automatically and is composed of: "Bearing model" + "Filter."
- **~ Low limit frequency (Low Limit Freq) (in Hz):**
  Depending on the parameter settings, the low limit frequency is set automatically.
- **~ High limit frequency (Upp Limit Freq) (in Hz):**
  Depending on the parameter settings, the high limit frequency is set automatically.
- **- Bearing frequencies & envelope filter diagram:**
  The calculated critical frequencies can be displayed in a graph. To have a clear overview it is once again recommended to display the rotation speed ("Show Rotation Speed (ROT))" and one or only a few critical frequencies in the graph. In the view below, in addition to "Show Rotation Speed (ROT)," "Show BPFI" was selected. If critical frequencies will be displayed in the diagram, they must be marked in the bearing frequency calculator.



Depending on the parameter setup, vertical markers indicate critical frequencies where rolling element bearing problems are expected.



A number of small icons at the top of the window can be used for further processing of the graph:

Zoom, Zoom Reset, Pan, Print Graph, Export to CSV File in Microsoft Excel, Copy to Clipboard and Copy to Microsoft Paint.

If the "Recommended Filter Band" is marked, a shaded area indicates the filter band recommended by the ball bearing manufacturer, which covers all selected critical frequencies.

When leaving the "Bearing Frequency Calculator," the set parameters are saved with OK.

6.10 Crest Factor

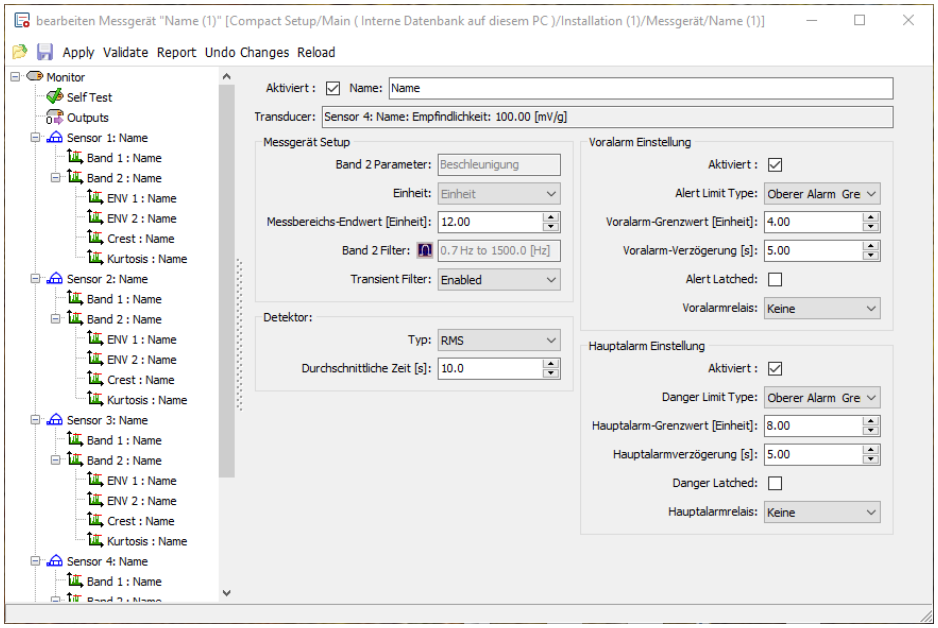
The "Crest Factor" is the ratio of the peak value to the RMS value of the vibration signal.

To include the crest factor as part of the general vibration analysis, this function must be enabled by marking: "Enabled." The crest factor of a signal is a unit-less entity.

The calculation of the crest factor is carried out within the bandwidth of the band-pass filter selected in band 2. Please keep in mind that the crest factor function only makes sense for high frequency analysis, i.e. with a band-pass bandwidth starting at 2 kHz.

A "transient filter" is used to remove unwanted non-periodical noise spikes in the vibration signal that might otherwise corrupt the measuring result and cause false alarms.

For the crest factor the RMS detector is automatically selected and cannot be changed.



The user can set/change the following parameters related to the crest factor with the Compact Setup software:

- End value unit-less
  This value depends on the application but should never be set below 10.0. The default value for this parameter is: 20.00
- RMS averaging time (in seconds). Selectable between 0.1 and 10.0 seconds This value should never be set below 3 seconds.
  The default value for this parameter is: 3 seconds
- Transient filter: enabled or disabled. This function is by default: enabled.

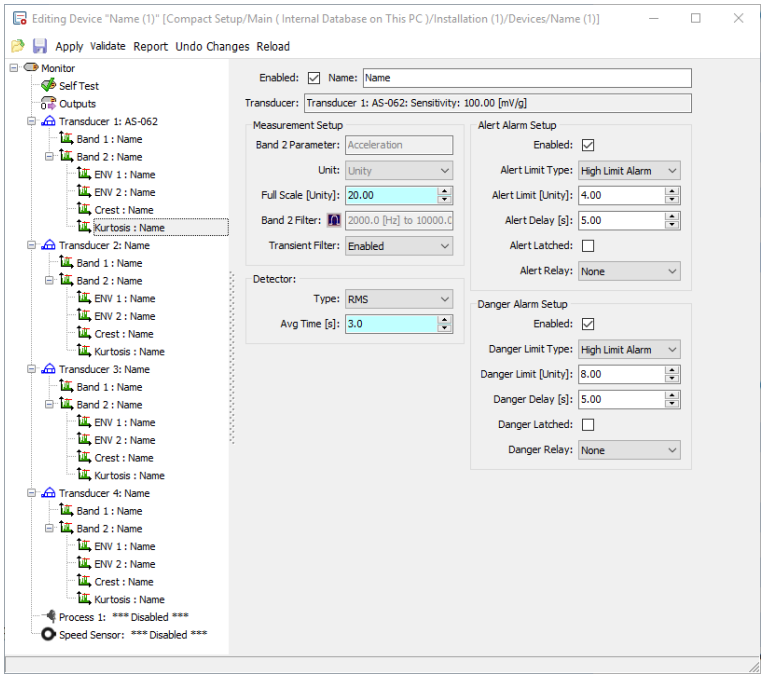
6.11 Kurtosis

The unit-less statistic index "Kurtosis" represents a very good indicator for the analysis in low (rotational) speed machines.
To include the kurtosis as part of the vibration analysis, this function must be enabled by marking: "Enabled." The kurtosis value of a signal is a unit-less entity.

A transient filter is used to remove unwanted non-periodical noise spikes in the vibration signal that might otherwise corrupt the measuring result and cause false alarms.
The user can set/change the following parameters related to the kurtosis with the Compact Setup software:

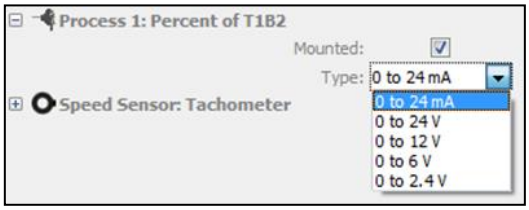
- End-value (unit-less)
  This value depends on the application but should never be defined as follows: 10.0 The default value for this parameter is: 20.00
- RMS averaging time (in seconds). Selectable between 0.1 and 10.0 seconds. This value should never be below 3 seconds
  The default value for this parameter is: 3 seconds
- Transient filter: enabled or disabled. This function is by default: enabled

The calculation of the kurtosis is carried out within the bandwidth of the band-pass filter selected in band 2. Please keep in mind that the kurtosis function only makes sense for high frequency analysis, i.e. with a band 2 band-pass bandwidth starting at 2 kHz.



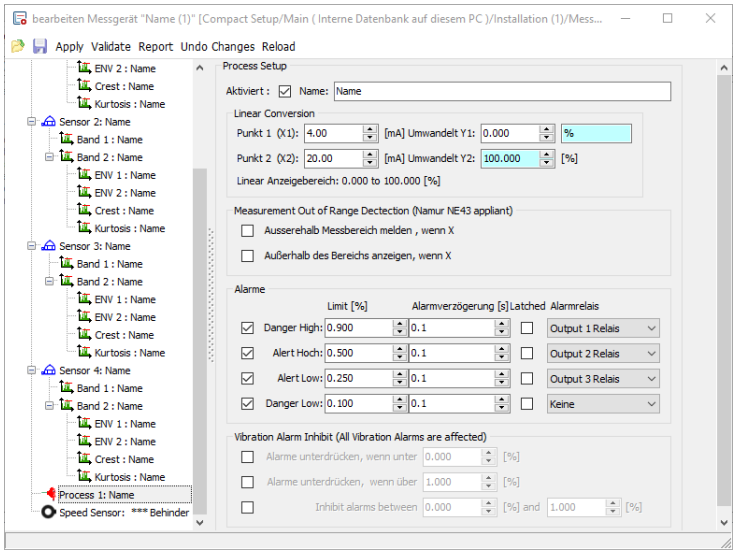
6.12 Process Input (with VC-1870 Input for Axial Position)

VC-18xx has an additional process input. The input signal can be a current or a voltage, which allows for a linear measurement and display between the voltage / current and a physical parameter such as pressure or temperature, etc.
Example: 0- 20mA is equivalent to 0- 20 bar.
Select process input type:



General setting of the process input under "Process 1: Name"

The parameter settings of the process entry (Process Setup) are made under "Edit / Process 1: Name." The process input is enabled.

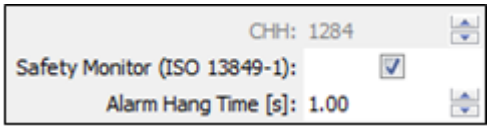


The current parameter settings of the process input (Process Setup) are carried out: In four (4) steps: "Name Edit / Process 1"

- Linear Conversion
Under Linear Conversion the operator defines the linear relationship between the input voltage/current and the corresponding value of the physical parameter, e.g. °C or Pa.
A straight line between two points X1Y1 and X2Y2 represents the linear relationship.

- **Measurement outside of the measuring range (Namur NE43 Directive):**
If the value is outside of the measuring range.
- If the input has a value of 10% less than X_1.
- If the input has a value of 5% more than X_2

- Alarms
The user can set four (4) alarms within the values Y1 and Y2:
- Danger alarm: Whenever the Y value exceeds a maximum value.
- Alert alarm: Whenever the Y value exceeds a maximum value that requires action.
- Below Alert alarm: Whenever the Y value drops below a minimum value that requires action.
- Below Danger alarm: Whenever the Y value drops below a minimum value.



Enabling of the "Safety Monitor" function.

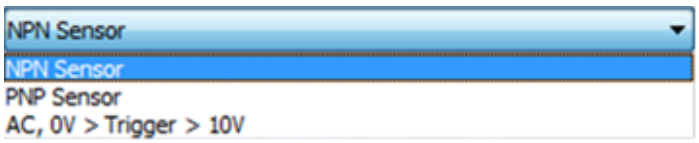
When this function is selected, the safety relay is triggered every time Danger alarm is exceeded or the value drops below Danger alarm.

6.13 Rotational Speed Sensor (Tacho) Input

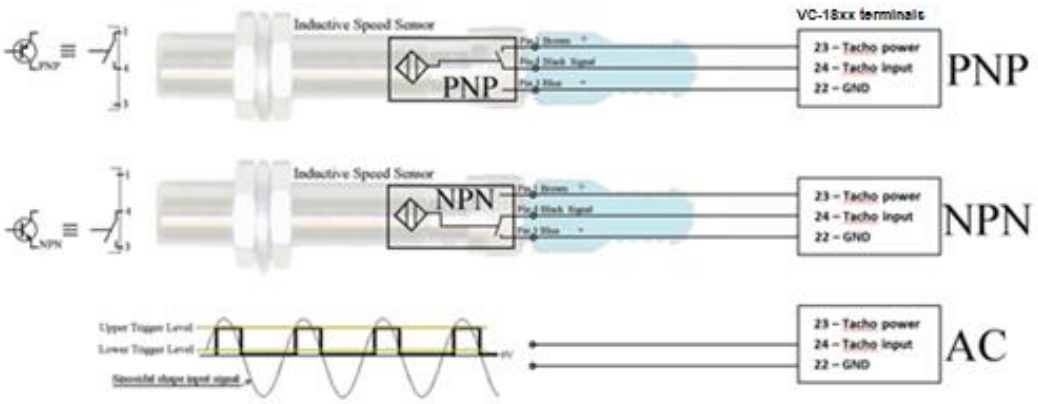
General settings of the Tacho input under "Speed Sensor: Name"
The parameter settings of the Tacho input are defined in the Speed Sensor setup. The current parameters of the Tacho input (Speed Sensor setup) can be set under "Edit / Speed Sensor.

To do this the function must first be set to "Enabled." The actual parameter settings of the Tacho input (rotational speed encoder setup) are made under "Edit/Rotational speed encoder": Name," which is divided into four areas.

- **Properties:**
  Under "Properties" first define the kind of rotational speed sensor.



The connection drawing shows the connection of different sensor types to the VC-18xx rotational speed sensor input:

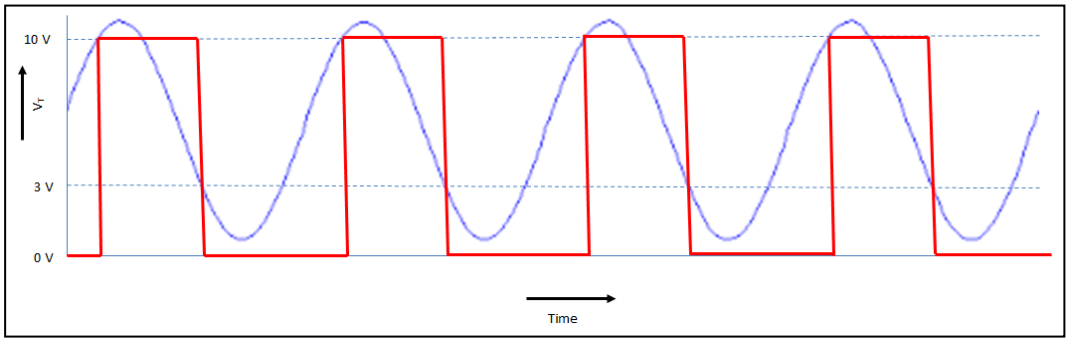


NOTE!

The signal presented by the rotational speed sensor to Tacho input terminal #24 must meet the following conditions.

(-) Negative level: 0 - 3 volts pp
(+) Positive level: 10 - 24 volts pp

The drawing below explains the function of the AC-triggered type of rotational speed sensor:



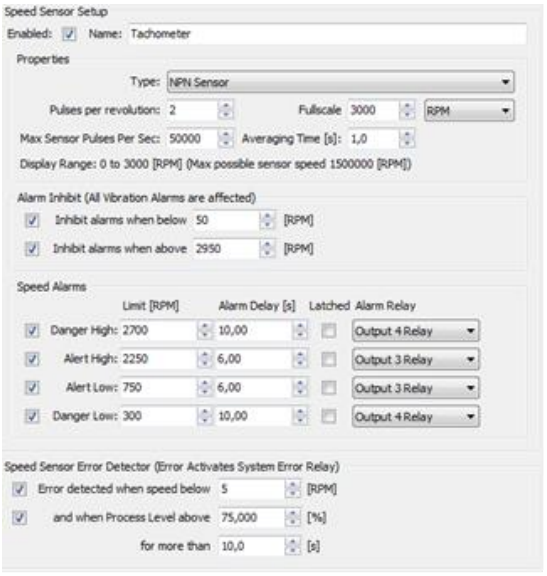
- The next step is to define the unit of rotation to be used: Rotational speed sensor:

  ~ Number of revolutions per second (RPS)
  ~ Number of revolutions per minute (RPM).
- The number of "Pulses per revolution (PPR)" is the number of pulses presented to the Tacho input per **one (1)** revolution of the application.
- The value for the full scale (FS) in the display is chosen in the "Fullscale" field.
  The maximum number of "Sensor pulses per second (SPS)" must be within the range from 1-10000 or 1- 600000 for RPM.

- Alarm Inhibit (All vibration alarms are affected)
In order to suppress alarms in certain speed ranges, the user can define speed intervals, speed overruns or speed underruns for which no alarm is to be triggered.

Rotational speed sensor error detector (system error and OK relay are enabled) if:
1) A rotational speed limit is underrun.
2) A process parameter exceeds a defined value
3) The limit value overrun has been pending for a certain amount of time

Parameter setup for rotational speed monitoring:



6.13.1 Rotational Speed Sensor Selection

It is recommended to use either an NPN or PNP type, i.e. a standard interface that all rotational speed sensor suppliers meet with a variety of different probes.
Only three wires are needed: DC supply sensor, signal and ground.
Some suppliers refer to NPN and PNP type rotational speed sensors as "3-wire DC."

6.14 Alert and Danger Alarms

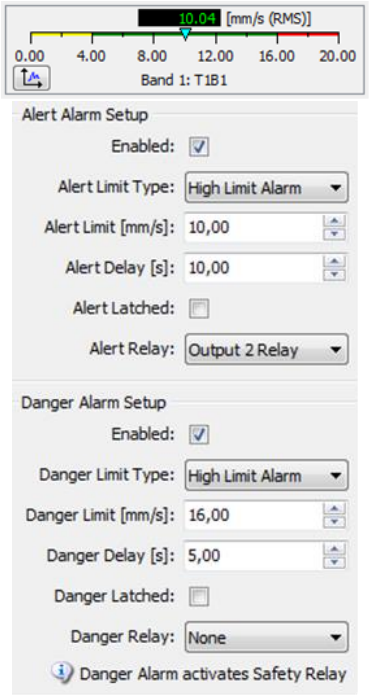
The final task associated with setting the parameters of each function, such as vibration, process and RPM measurements, is to define the alarm values. There are two alarms attached to each vibration measuring function: an Alert alarm and a Danger alarm.

The alarm output in the VC-18xx will only respond if the alarm function is enabled in the measurement tasks.

The parameter setup of the Alert alarm and the Danger alarm are very similar and consists of setting the following parameters:

- **Alarm Limit Type**
  A High Limit Alarm or Low Limit Alarm can be defined. For normal operation (= default) an alarm is set for the high limit value. The alarm is triggered as soon as the measured value exceeds the pre-set limit value of the respective alarm and that state is present for longer than the set delay time.

Alarms can generally be based on overrunning or underrunning the limit values.



- **Alert and Danger Alarm Delay Time**
  The Alert and Danger alarm delay time is the minimum amount of time for which the vibration value must exceed the alarm level.
- **Alert alarm Latched and Danger alarm Latched:**
  The alarm latch function can be enabled by marking the Alert or Danger alarm Latched.
- The alarm latch function can be enabled or disabled with the "Inhibit" input.
- **Alert and Danger alarm relay**
  When an alarm is triggered, it can be signaled by one of the 4 outputs through one of the relays. For increased functional safety, the Danger alarm can also be coupled with the highly reliable system error redundant mechanical relays. See section 6.14 of this manual. By default the alarm relays are pre-set to "Disabled."

6.15 System Error (OK)

The internal monitoring system monitors continuously for correct functioning of the unit. As soon as an internal error is discovered, for example a broken sensor wire, a processor error or the non-existence of a self-test, this is classified as a very serious situation and a system error process is enabled.

The system error safety relay has a "break" function so that a power failure will also be detected and considered to be a system error as well.

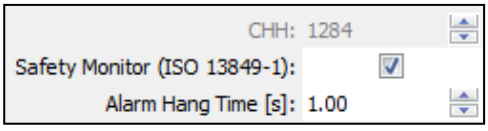
Whenever a system error is detected, the following actions are performed:

- System error safety relay is activated (break)
- Analog output drops to 0 mA
- The "OK" LED on the front panel of the enclosure flashes **red** to indicate critical errors or is lit **red** continuously for non-critical errors.

The effects of the system error relay outputs on terminal #3 and terminal #4 are isolated from ground (GND) and are hence electrically isolated from the measuring device.

The system error output of the VC-18xx consists of two mechanical relays that are coupled in series. This redundancy considerably increases the reliability of the System Failure Safety Relay.

During the configuration of the VC-18xx it is possible under Edit/Monitor to mark the feature "Safety Monitor (ISO 13849-1)" and set the alarm hang time.



When this function is activated, the highly reliable System Failure Relay is activated. All Danger alarms can be "coupled" with the System Failure Safety Relay. This drastically increases the reliability of the danger alarm function and thus the functional safety of the machine.

NOTE!

When the protection system function is activated, this is indicated by the "Danger alarm enabled OK relay."

NOTE!

If a system failure persists, please send your device to the manufacturer for repairs. Follow the instructions in section 12 of this manual.

WARNING!

The system error relays are mechanical relays. Excessive current and/or voltage will damage the relay. For this reason please do not apply any power source directly to the relay. Protect the relay with a resistor in series that will limit the current.

The following conditions for the system error relay should not be exceeded in your application:
- Insulation 100 V
- Maximum current load 100 mA
- Max. load voltage ± 28 V

Further specifications:
- ON resistance <12.9 Ω
- Off state leakage current max. 10 µA

6.16 Alarm Hang Time

The "Alarm Hang Time" is the time an Alert or Danger alarm remains activated even though the vibration level has decreased to below the trigger level.

The system failure relay has no hang time, but will remain activated until the system failure condition has ended.

6.17 Overload, Cable Short and Cable Break

The VC-18xx watchdog monitors each input channel where a sensor is connected to the device:

- Terminals #13 and #14 for sensor 1
- Terminals #15 and #16 for sensor 2
- Terminals #17 and #18 for sensor 3
- Terminals #19 and #20 for sensor 4

Overload, cable break and short circuit generate a system error (NOK status). The OK relay is active. The OK LED shows NOK (lit red).

The DC analog output changes to 0 mA to indicate the system error.

6.18 Over Range

The VIBROCONTROL 18xx vibration detects when the measured value exceed the set measuring range.

The detection of an over range will not generate a system error.

The DC analog output will change to 20.5 mA.

The status of the alarm relays will not change.

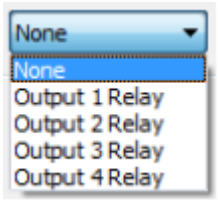
6.19 Configuration of Analog Outputs

The VC-18xx has four independent analog outputs on terminals #9, #10, #11 and #12 that can be configured either as a relay output or as an analog DC output. When configured as a DC output, it is proportional to the vibration measurand. The selection of the four analog outputs is described in section 6.4.

6.19.1 Relays

The VC-18xx vibration monitor has four alarm relays that can be attached to any of the Alert and Danger alarms. Relays must be enabled in the menu in order to become activated, if triggered. One alarm relay can serve more than one alarm thus making it not always possible to determine immediately exactly which vibration measuring function caused an alarm relay to become activated.

The "contacts" of all alarm relays are closed (= make) while in standby and open (= break) when activated. Therefore the alarm relays also appear to be activated whenever the main power of the VC-18xx vibration monitor fails.



The four VC-18xx status alarm relays are named respectively: "Output 1 Relay" (terminal #12), "Output 2 Relay" (terminal #11), "Output 3 Relay" terminal #10) and "Output 4 Relay" (terminal #9).

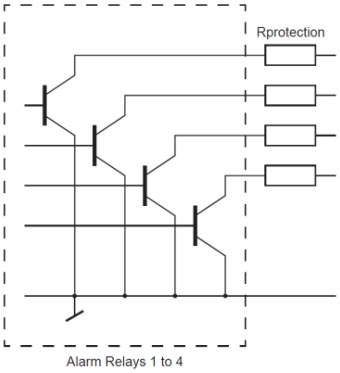
Relays will only be available at a particular output (terminal) if a relay was assigned to that output during configuration. For a detailed description about how to configure the outputs of the VC-18xx, please read section 6.4 of this manual.

WARNING!

The alarm relays are non-insulated MOSFET relays that will work only with positive voltages. Excessive current and/or voltage will damage the relay. For this reason please do not apply any power source directly to the relay. Protect the relay with a resistor in series to limit the current.

The following conditions for the relays should not be exceeded in your application:

- Type:	Open drain
- Isolation voltage	30 V
- Maximum current load	100 mA
- Max load voltage	+28 V
Further specifications:	
- Series resistance	< 12.9 Ω
- Leakage current	max. 10 µA



6.19.2 Analog Output

There are four different analog DC output configurations that can be selected:

- 0 - 20 mA
- 4 - 20 mA, which is the default configuration of an analog DC output
- 0 - 10 V
- 2 - 10 V

Example of 4- 20 mA output
An output current of 4 mA on the current output means a vibration speed of 0 mm/s, while 20 mA on the output means max., 100 mm/s.
Each value between 0 mm/s and 100 mm/s is thus assigned directly linearly between 4 mA and 20 mA on the analog output.

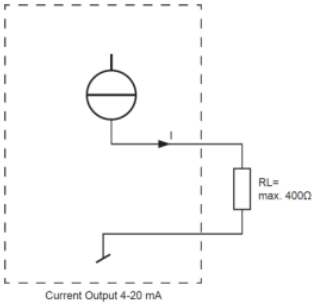
Example 1: The specified vibration value is 60 mm/s. The following current must therefore be present on the analog output:

$$I_{out} = 4\ \text{mA} + \frac{\text{Velocity}}{\text{Full scale}} * (16\ \text{mA}) = 4\ \text{mA} + \frac{60\ \frac{\text{mm}}{\text{s}}}{100\ \frac{\text{mm}}{\text{s}}} * (16\ \text{mA}) = 13.6\ \text{mA}$$

Example 2: The analog output shows a current of 15 mA. The speed is:

$$Velocity = Full\ scale + \frac{I_{out} - 4\ mA}{16\ mA} = 100\frac{mm}{s} * \frac{15\ mA - 4mA}{16\ mA} == 68.75\frac{mm}{s}$$

The resistance on the AC current output must not exceed 400 Ω.



6.20 LEDs

Term. active

A blue LED marked "Term. active" on the front of the VC-18xx indicates whether a 120-Ω terminating resistor is activated for the RS-485 connection. This is required in case the VC-18xx in question is the last device in a chain of devices on an RS-485 bus.
The termination resistor is (de-)activated by sliding (left/right) a very small button that can be found behind a small hole at the front of the enclosure.

Ch. 1/2/3/4

Green:

- Normal operation. No events.

Yellow:

- Alert alarm

Red flashing:

- Broken cable/short circuit

Red:

- Danger alarm

OK:

Green:

- Normal operation.
  No events.

Green flashing:

- Setup Download

Yellow flashing:

- Self-test

Red flashing:

- System error

Red:

- Broken cable/short circuit
  (with additional red flashing channel LED).

6.21 Alarm Reset

If alarms are not defined as latching, they will be reset as soon as the actual level drops below the limit value level. The hang time is typically 1 s.

Please note that system error(s) cannot be reset as described in the section above. Alarms that are latching can be reset by briefly connecting the "Alarm Inhibit" (on terminal no. 5) with ground (GND). In this manner all the Alert and Danger alarms can be reset at once.
For further information on how to reset a system error, please refer to section 6.14 in this manual.

After the alarm is reset, the LED of the measurement channel changes from **Red** to **Green**.

The alarm reset function of latching alarms is only possible by means of the Compact Setup software.

6.22 Alarm Inhibit

Alarms can be inhibited (disabled) under certain process conditions (for example for certain speed ranges).

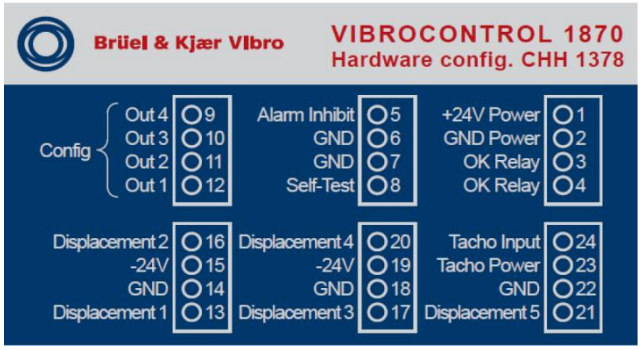
Inhibit is activated by connecting terminal #5 on the enclosure (marked: "Alarm Inhibit") to ground (GND), e.g. terminal #6. This procedure will inhibit all Alert and Danger alarms at once, but NOT a system error alarm.

Please note that inhibit overrules the latch function.
After alarm inhibit has ended, the alarms will be reset automatically.

Alarm inhibit should be used with care. When this function is activated, Alert and Danger alarms are disabled.

7 VIBROCONTROL 1870 - Vibration Measurement and Axial Position

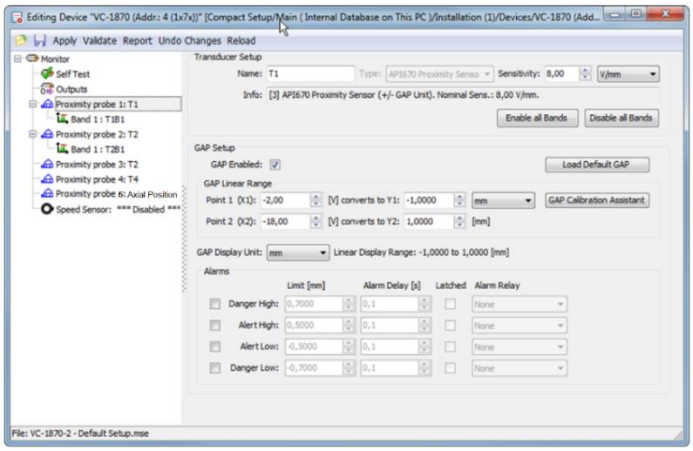
- Relative shaft vibration — 4 channels (inputs 13 – 20)
- Axial shaft position — 1 channel (inputs 21 – 23)
- Rotational Speed — 1 channel (inputs 23 – 24)



7.1 VIBROCONTROL 1870 – 4 Channels - Relative Shaft Vibration

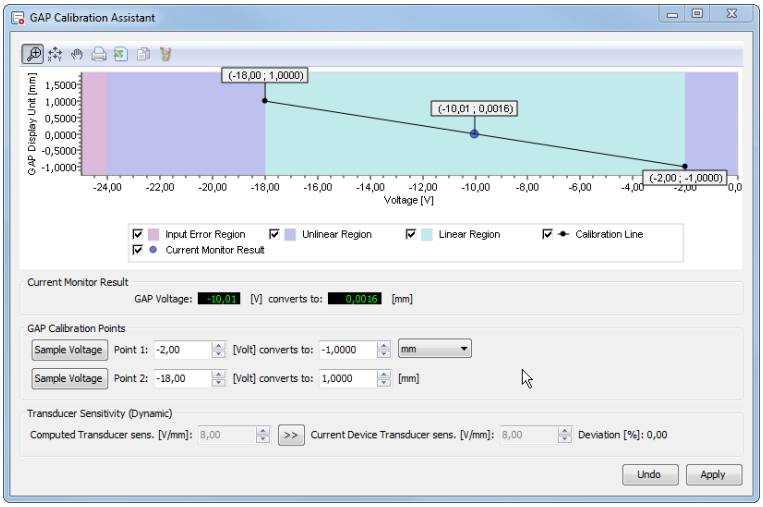
Specific settings for VIBROCONTROL 1870 Relative shaft vibration

The configuration of the measuring parameters of the VIBROCONTROL 1870 can be carried out with Compact Setup software:

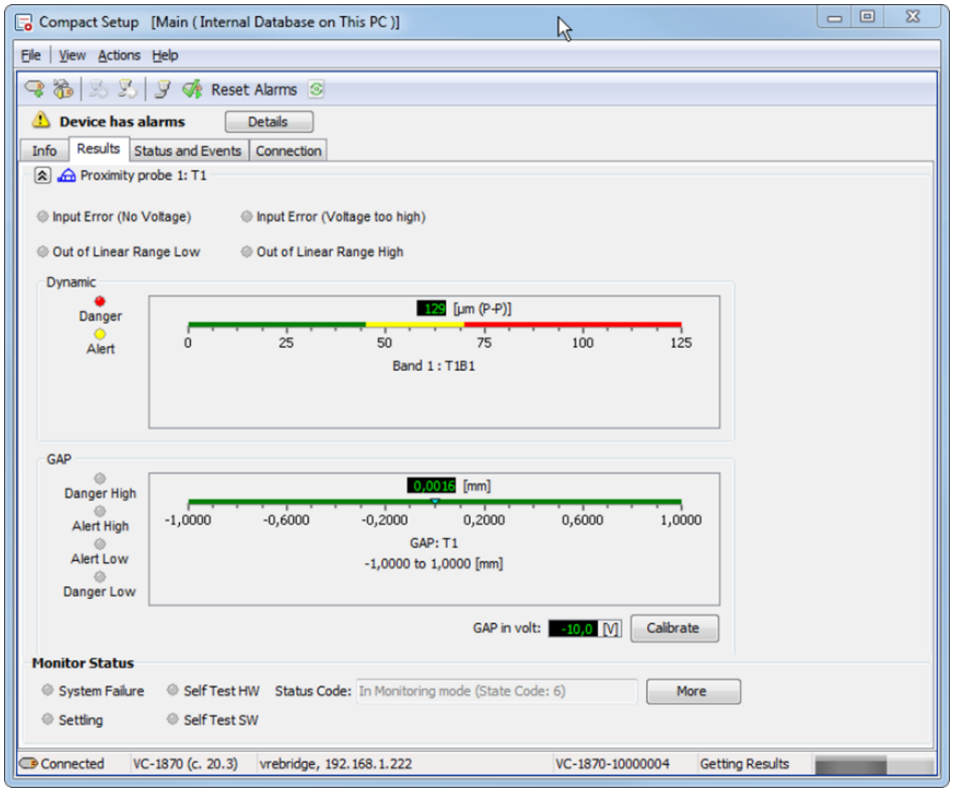


Four vibration displacement sensors can be connected to monitor relative shaft vibration.
For setup of the sensors, the gap voltage needs to be adjusted within a range from -2 to -18 V DC. Ideally the sensor positioning should be close to -10 V DC to allow maximum measuring range of relative shaft vibration.

The GAP Calibration Assistant provides setup support with a graphical display:

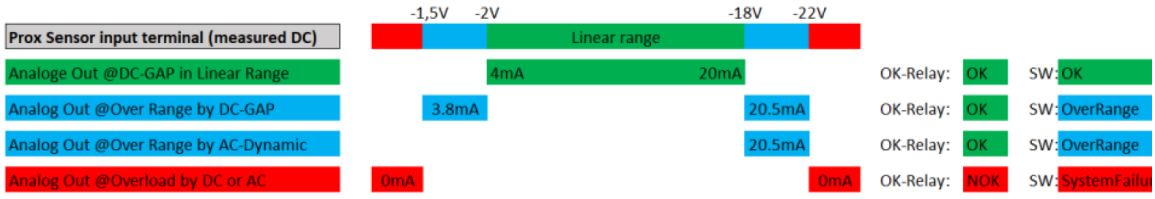


The measurement results for the relative shaft vibration and corresponding GAP value are displayed via tabs (results):



Response to overload and over range detection

The graphic below describes the behavior of the monitoring device in response to over range and overload situations:



Response to over range detection
When the relative shaft vibration (dynamic AC value) is in over range:

- the corresponding analog output shows 20.5 mA.

When the static sensor position (DC-GAP) is in over range:

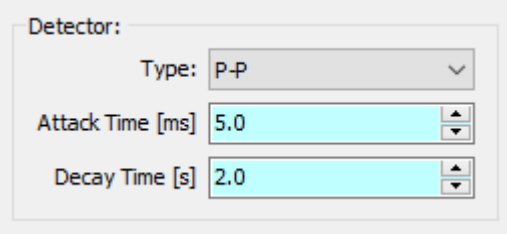
- The corresponding analog output shows either 3.8 mA (below – sensor moving towards the shaft) or
- The corresponding analog output shows 20.5 mA (above – sensor moving away from the shaft)

- See also the blue graphic above.

Overload
When overload of both the relative shaft vibration (AC value) and the static sensor position (DC value) is detected:

- The analog output is 0 mA
- A system error (OK) is activated (red LED)

Special note for peak-to-peak measurements:



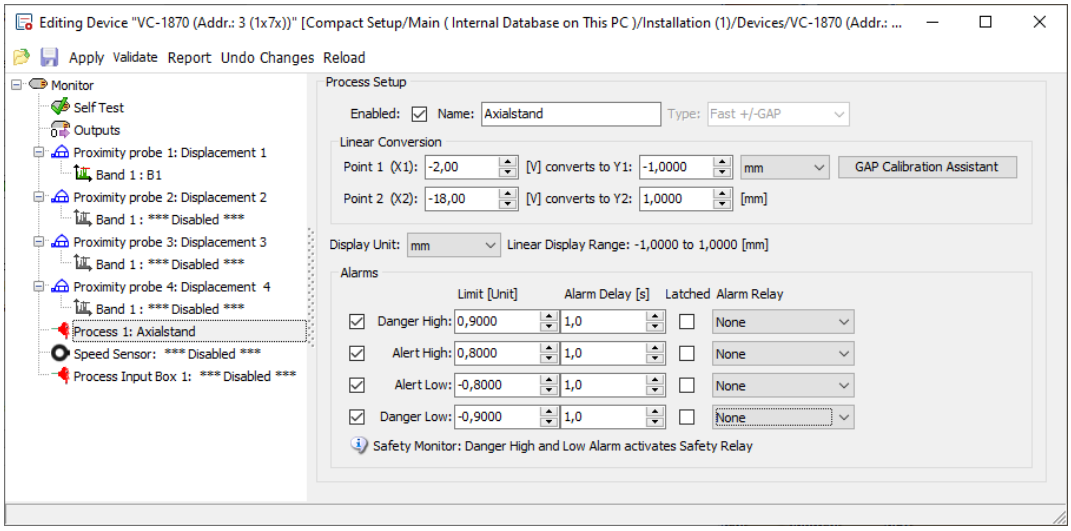
- The default setup for peak-to-peak (P-P) measurements shows an attack time of 5.0 ms and a decay time of 2.0 s.
- Shorter attack and decay times may lead to reduced accuracy of the measurements. This also applies to the peak value measurement (peak) of the vibration displacement.

7.2 VIBROCONTROL 1870 – Axial Shaft Position

Specific setting for VIBROCONTROL 1870
- One channel – axial position (terminals 21 & 22)

PLEASE NOTE:
For VIBROCONTROL 1850 & 1860, this measurement channel (terminal 21 & 22) is used for monitoring process variables.

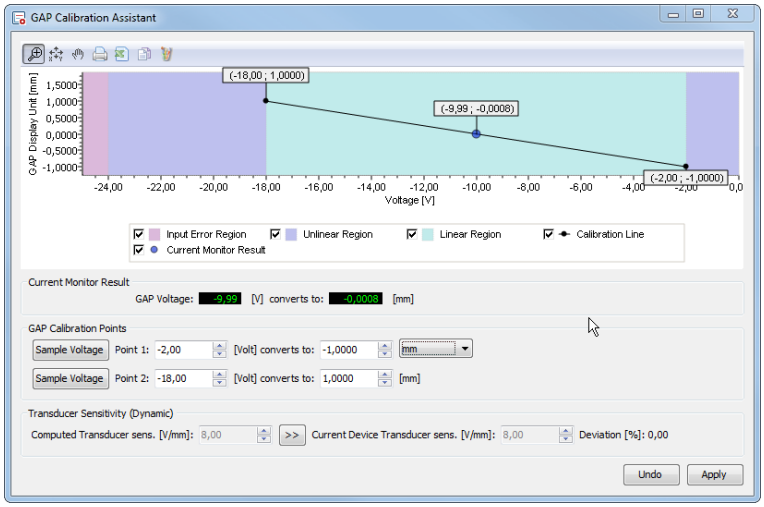
The setting of parameters for monitoring the axial shaft position can be carried out for the VIBROCONTROL 1870 with the Compact Setup software for channel 5 (process 1):



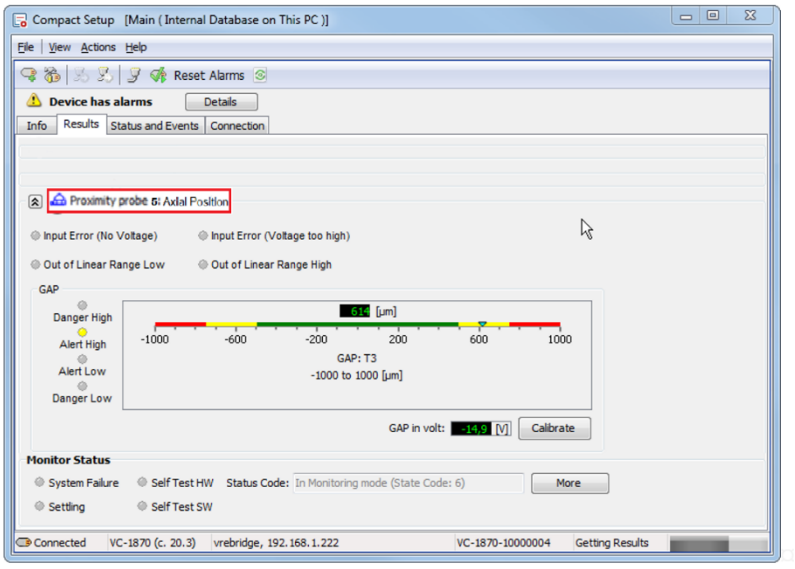
A vibration displacement sensor can be connected for monitoring the axial position (terminals 21 and 22).
The gap voltage should be adjusted within a range from -2 to -18 V DC.

- For monitoring the axial position in both direction (towards and away from the sensor).
  Ideally the sensor positioning should be close to -10 V DC to allow a maximum measuring range of relative shaft vibration (in this case +1 mm and –1 mm).
- For monitoring axial shaft position in one measurement direction only, the GAP voltage should be close to either -2 V DC or -18 V DC.

The GAP Calibration Assistant provides setup support with a graphical display.



The current measurement results for the axial shaft position are displayed under the tab (Results):



Response to overload and over range detection

See VIBROCONTROL 1870

8 Extension Modules for VIBROCONTROL 1850/1860/70

WARNING!

VIBROCONTROL 18xx and VC-1801 devices can be damaged by a "HOT-Swap."
The VIBROCONTROL 18xx must be disconnected from the main power supply (+24 VDC) first.

8.1 VIBROCONTROL 1801 Relay Module - 12 Relays

8.1.1 General

Series VC-18xx vibration monitors have a maximum of four (4) analog outputs that can be configured either as a DC output or as a relay output. Therefore if all outputs are configured as DC output, there will be no more relay outputs available. The relays are typically used to signal Alert and Danger alarms.
When connecting a VC-1801 relay module to a VC-18xx vibration monitor, there will always be twelve additional alarm relays available. In combination with VC-18xx, provided no DC outputs are combination, there are even sixteen alarm relays available.

ATTENTION

For offline configuration, load the appropriate setup file (.mse) from the CD included with delivery.

Working offline with the configuration software.

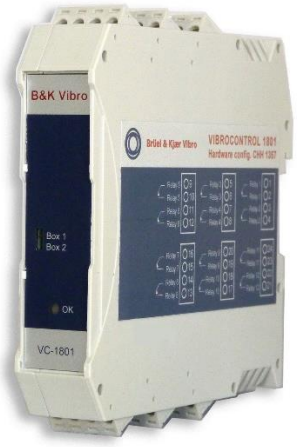
For the correct "offline function," i.e. if no VC-18xx is connected directly, the template function for the relevant product must be loaded.
This template file is saved on the CD included with delivery with the corresponding filename *product type*. Mse.

8.1.2 VIBROCONTROL 1801 Relay Module

Connecting a VC-1801 relay module to a VIBROCONTROL 18xx will increase the number to 12 additional relays.

Relay module:
The front panel of the VC-1801 relay module has a small switch (box) that has two switch positions:

- Box (1) (default position): If a VC-1801 is connected with a VC-18xx.
- Box (2) for future expansions.



NOTE!

Only connect one measurement module with a relay module at a time.

8.1.3 Make/Break Relays

All relays of a VC-1801 relay module are by default configured to go from the "make" to the "break" status when the associated alarm in a VIBROCONTROL 18xx is activated.
This has the advantage that the relays will act as being activated in case of a power failure.

8.1.4 Mounting

The relay modules VIBROCONTROL 18xx and VC-1801 must be positioned next to each other with the two 5-pin DIN-rail bus connectors:

The VC-1801 relay module can be positioned on either side.

WARNING!

No more than one (1) VC-1850/60/70 can be connected with a VC-1801 relay module with the same DIN-rail bus.

8.1.5 External Connections

DC supply:
The VC-1801 relay module is supplied with the necessary voltage through the adjacent VC-18xx module via the 5-pin DIN-rail connection. A 5-pin DIN-rail connection is in the standard configuration as a standard feature with every VC-18xx and VC-1801 relay module.

WARNING!

VIBROCONTROL 18xx and VC-1801 devices can be damaged by a "HOT-Swap."
The VIBROCONTROL 18xx must be disconnected from the main power supply (+24 VDC) first.

- Turn off the supply voltage
- Connect the VIBROCONTROL 18xx and the VC-1801 with each other using the DIN-rail plug connection
- Turn on the power supply again

Data:
The data flow between the VIBROCONTROL 18xx and the VC-1801 relay module is (also) via the 5-pin DIN-rail bus connector.

Relays:
The "contacts" of the twelve relays are present pairwise at the screw terminals at the side. A label on the VC-1801 relay module clearly indicates the relationship between the relays and the terminals.

8.1.6 Front Panel Status LEDs (OK)

The front panel of the VC-1801 relay module has a multi-colored LED that indicates the current status of the device:

- **Green:** Indicates that the supply voltage (+24 VDC) is connected and that the VC-1801 is in good working condition.
- **Yellow:** Upon initialization after start-up, the LED turns yellow for a very short time to indicate a system boot up.
- **Red:** Indicates an improper condition on the VC-1801. The cause is often a communication or configuration error. If the LED is lit **red** on the VC-1801, the "OK" LED on the VIBROCONTROL 18xx also flashes **red** (System Error).

8.1.7 Configuration of VC-1801 with the Compact Setup Software

First the relay module function must be activated in the Compact Setup software.

- Under menu:
  Edit / Monitor / Outputs / Relay Box 1 / activate the selection box (✓).

The LED on the front of the VC-1801 relay module indicates with a **Green** LED when the VC-18xx and VC-1801 modules are communicating.

To set up an independent VIBROCONTROL 18xx, a list of zero to four relays is displayed, depending on the number of outputs that were assigned to a relay. As soon as a VC-1801 relay module has been connected to a VIBROCONTROL 18xx, twelve more relays are added to the list above.

NOTE!

One vibration parameter alarm can have only one relay associated with this alarm.
An alarm relay can be associated with one or more vibration parameter alarms.

8.1.8 Connecting a VIBROCONTROL 18xx and a VC-1801

The procedure is as follows:

- Set the relay box selector switch on the front of the VC-1801 to "Box 1" (or "Box 2" for future expansions)
- Connect the VIBROCONTROL 18xx relay module and VC-1801 with each other via the DIN-rail bus connector.
- Mount the two modules on a 35 mm DIN-rail
- Connect the VIBROCONTROL 18xx to the +24 VDC power supply
- You will now see that the status LED on the front panel of the VC-1801 is lit red.
- Connect the VIBROCONTROL 18xx to a PC that has the Compact Setup software installed (for example using a USB connection cable).
- Enable the Compact Setup software of the relay module:
  Edit / Monitor / Outputs / Relay Module 1/ check selection box (✓).
- In the Compact Setup click on "Apply" to apply the changes.
- Note that the VC-1801 status LED changes color from Red to Green.

NOTE!

In the unlikely event that there is a loss of communication between the VC-18xx and the VC-1801 relay box, the procedure described above may also be used to re-establish communication between the two devices.

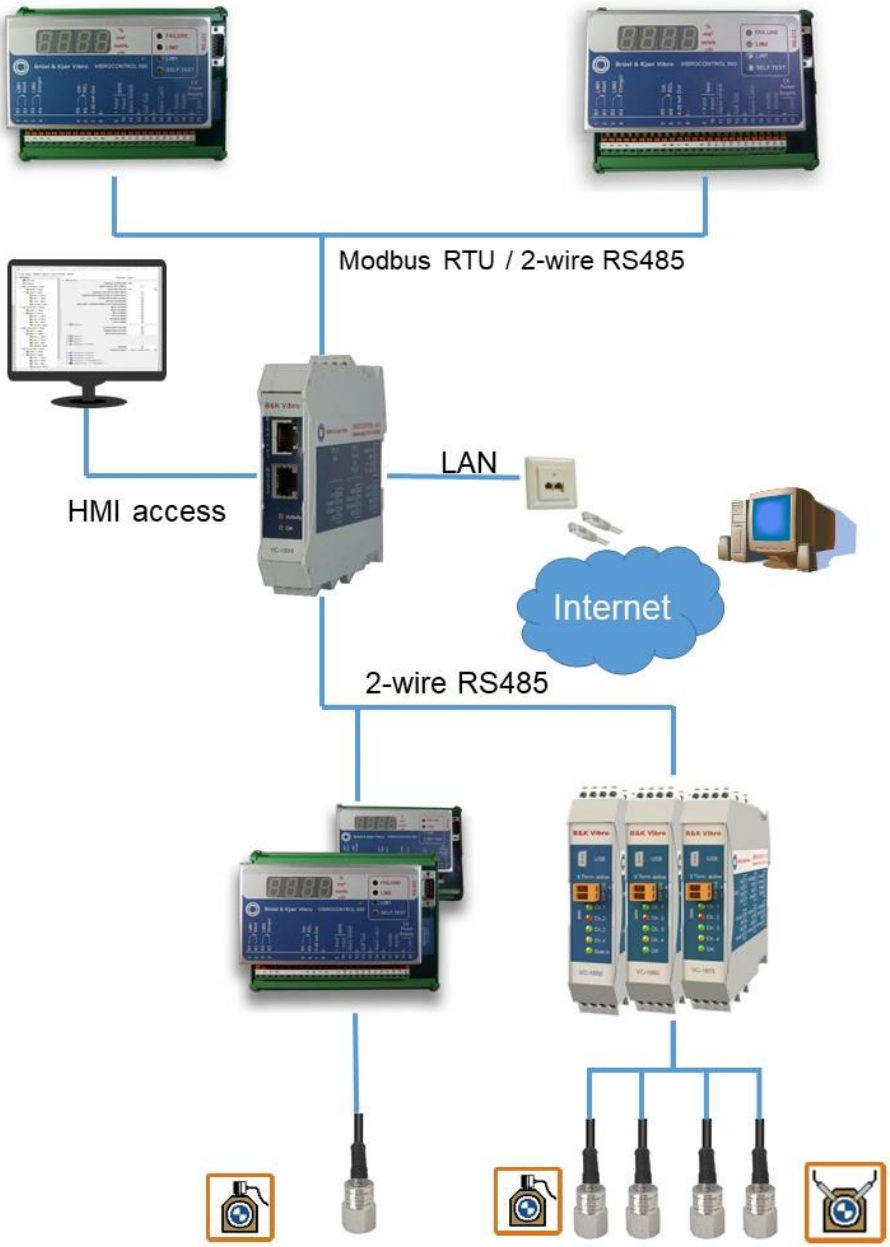
8.1.9 Specifications of the VC-1801 Relay Module

Relays	The relays are self-latching solid-state relays. Due to the enclosure temperature, the error short-circuit current on each relay output should not exceed 100 mA. The relays are EMC-protected by means of TWS/transorbers, which limit the maximum voltage to about 30 V DC.
Power supply	Max. power consumption.....+24 V DC, ±5 %, Total power loss .....1.5 W Short circuit of all relays .....4 W (please avoid this, it may be up to 10 W)
Enclosure	Material ..... PA66 Protection class……..…..IP20 Dimensions (HxWxD)…….....109x 22.5x114.5 mm
Ambient temperature range	Working temperature range: ..... -10 °C ≤ Ta ≤ +50 °C Storage temperature range:..... -40 °C ≤ Ta ≤ +85 °C

8.2 VIBROCONTROL 1803/1804 Communication Module Ethernet Bridge

8.2.1 Network

VIBROCONTROL 1803/1804 are the interface between the vibration monitors, which have RS-232 or RS-485 (port 1 only), and an external PC (via LAN and/or the Internet).



8.2.2 Applications

VIBROCONTROL 1803/1804 (VC-1803/-1804) enables communication between one or more vibration monitors and one or more PCs or PLCs in a local network (LAN) or via the Internet. Furthermore, the VIBROCONTROL 1804 includes data logging of measurement data and alarms for off-line post analysis. Data logging is especially useful if there is no Internet connection and/or no local PC available.
Permanent cable installation is simply via terminals. There are LAN and RS-232 connections on the front.
Only port 1 of the device can be used for communication by means of a daisy chain of vibration monitors using a proprietary RS-485 protocol.

8.2.3 Properties/Functions

Communication Hardware

- Ethernet (front)
- RS-232 (front)
- Port 2: RS-485/-232 (RS-485 is not supported)
- Port 1: Main RS-485 (terminals 13,14,15,16)

Communication protocols

- Modbus TCP over Ethernet to RS-485

OPC UA

- On request (contact local sales representative)

Data storage (VIBROCONTROL 1804 only)

- Storage capacity 4 GB

Administrative features

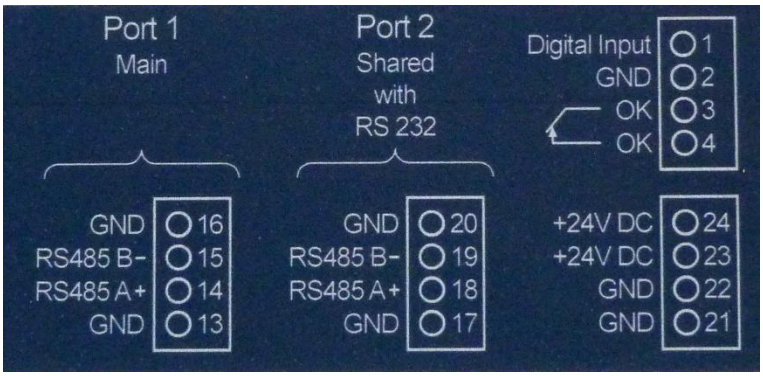
- Load firmware (upload)
- SLP Discovery (Service Local Discovery)
- Configuration / administration of the VIBROCONTROL 1803/1804 via HTTP (the device has its own "homepage")
- **Power Supply:** +24 VDC
- **Mounting:** on a DIN-rail in an enclosure (recommended)
- **Dimensions:** 120 x 110 x 23 mm
- **Enclosure:** hard plastic, light grey RAL 7031

8.2.4 Functionality

VIBROCONTROL 1803/1804 connects multiple vibration monitors to Ethernet and offers communication protocols including Modbus TCP (port 1 only) and OPC UA for HMI devices.

The screw terminals on the side are numbered from #1 to #24:

Terminal #	Function
1	Digital input
2	GND
3	Relay A
4	Relay B
5	NC
6	NC
7	NC
8	NC
9	NC
10	NC
11	NC
12	NC
13	Port 1 GND
14	Port 1 - RS-485; A+
15	Port 1 - RS-485; B-
16	Port 1 GND
17	Port 2GND
18	Port 2 - RS-485; A+
19	Port 2 - RS-485; B-
20	Port 2 GND
21	GND
22	GND
23	+ 24 VDC
24	+ 24 VDC



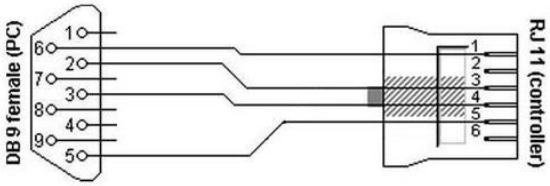
As described later in this manual, a VIBROCONTROL 1803/1804 has two serial ports: Port 1 (communication terminals #14 and #15) and port 2 (communication terminals #18 and #19). Only port 1 is used for RS-485 communication with vibration monitors!

Screw terminals #21 to #24 are used to connect the VIBROCONTROL 1803/1804 to the +24 V DC power supply. There are two +24 VDC connections (terminals #21 to #24).
We recommend using a connection as the main power supply for the nearest active module on the DIN-rail, then the second connection in the daisy-chain connection for additional modules on the DIN-rail that are not yet supplied with power.

In addition, there are two connectors on the front panel marked "Ethernet" and "RS232" respectively.

The Ethernet (LAN) connection is used for the permanent communication channel between the PC and the VIBROCONTROL 1803/1804. The recommended connection cable is a standard LAN cable (CAT.5E or higher).

To connect measuring devices with RS-232 connectors (VIBROCONTROL 950/960), use a female 9-pin DB connector on one side (RS-232 connector on vibration monitor) and an RJ11 connector on the other side (RS-232 connector on VIBROCONTROL 1803/1804).



DB9	RJ11	Function
2	3	RxD ← TxD
3	4	TxD → RxD
5	5	Signal ground
6	1	DSR ← DTR

8.2.5 Configuration of VIBROCONTROL 1803/1804

Upon delivery, the setup parameters of the VIBROCONTROL 1803/1804 are set to factory default values. Connect the device to your local network (LAN) using a LAN-cable.
The device is set by default to DHCP, which means that it will automatically be given an IP address.
Any PC attached to the same network should now be able to "see" this device.
Any software capable of finding devices on a local network should be able to find the VIBROCONTROL 1803/1804 and disclose the actual IP address.
The Compact Setup software is required for the configuration.

8.2.5.1 Access to Website of VIBROCONTROL 1803/1804

If the IP address is 192.168.1.50, for example, please use a web browser and enter the URL: http://192.168.1.50.
You will now be connected to the "homepage" of the device:

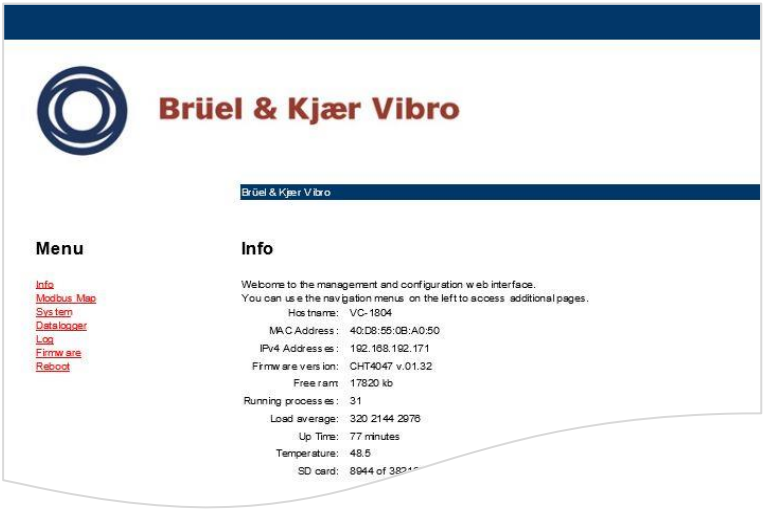
Enter the following data:

- User name: root
- Password: password

Confirm with **OK**.

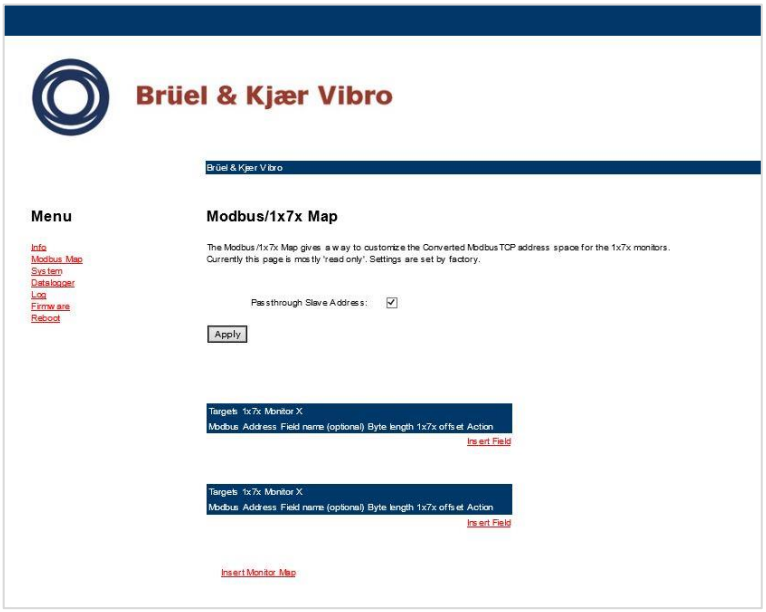
8.2.5.2 Menu: Info

This information window lists a number of the current parameters used by the device.



The MAC address is a given value that can be changed only by the manufacturer.
The IPv4 address is the address provided under IPv4 settings by the DCHP procedure defined earlier in section 8.2.5.4 Menu: System of this manual.

8.2.5.3 Menu: Modbus



The VC-1803/04 has two ways of communicating:

- Modbus
  Data transfer between VC-1803/04 and the PC is via LAN.

The ModbusBaudRate set to 38400 by default and should only be changed if absolutely necessary.

There are two options for Modbus communication. Each has its own TCP interface:

- ModbusTCP port 1, set by default to 4571.

The selected IP addresses of the VC-1803/1804 devices must not be identical with the IP addresses of other devices.

- Serial (1x7x)
  Serial communication allows for data transfer between VC-1803/04 and the vibration monitor via the RS-232 connection or an RS-485 interface.

The 1x7xBaudRate should be set to 115200.

There are two options for serial communication. Each has its own TCP interface:

- 1x7x: Enable and use Enabled_1x7x and TCP interface.
  1x7x_TcpPort, set by default to 4570.
- 1x7xModbus: Enable and use 1x7xModbus and TCP interface.
  1x7xModbus_TcpPort (port 1), set by default to 4571.

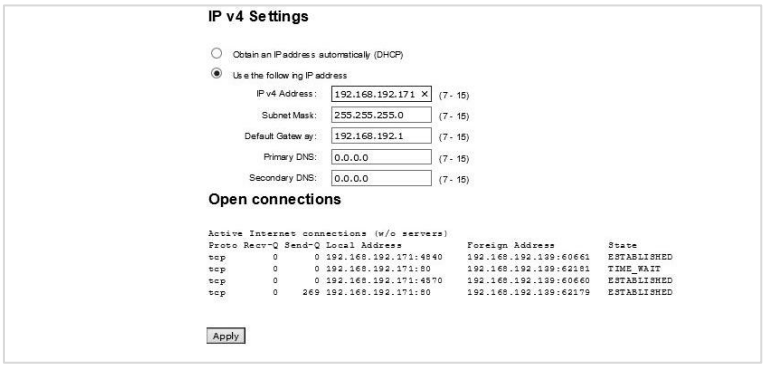
The selected IP addresses of the VC-1803/1804 devices must not be identical with the IP addresses of other devices.

The VC-1803/04 has two ports available for serial communication. Only one port can be active at once. If the "None" setting is selected, the top COM port will be used. It will then work as an RS-232 connection.

8.2.5.4 Menu: System

The following general settings can be made under "System."

- Hostname: The user is free to enter a relevant name for the device here.
- Typename: Manufacturer's product name (read only).
- Log to flash: If "Log to flash" is enabled, log files will be stored in the internal flash memory of the device.
- Date/Time (UTC): Time organization in combination with data logging. Please note that Date/Time will be reset to its default value (2007-01-01 00:00:24) each time the power has been removed from the device.
- Serial number: the number set in the factory (read only)
- MAC: MAC address, set in the factory (read only).
- Firmware: Firmware version of the device (read only, update is possible.
- Comport termination: Selection between COM1 and COM2



This menu page is also used to control the IP v4 address. At start-up the IP address is assigned automatically by the network (DHCP).

However, the IP v4 address can also be set individually:

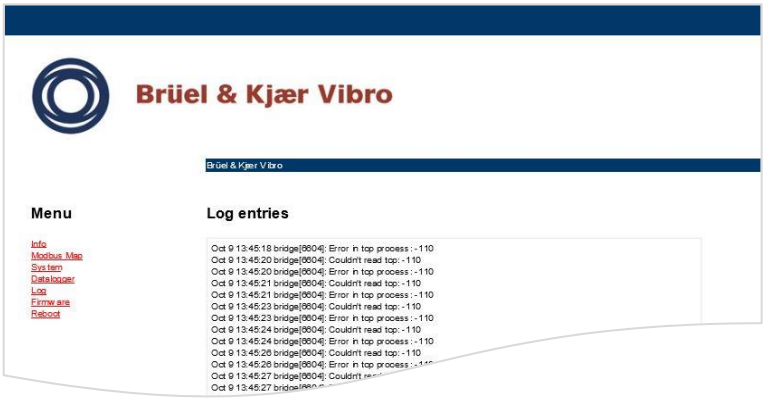
- IP v4 address: "A.B.C.D" is the individual address in the network. A, B and C are identical to the gateway. "D" can be any number between 2 and 255, but must NOT be identical with another device within the network.
- Subnet Mask: Normally “255.255.255.0”
- Default Gateway: "A.B.C.1" is the address of the host in the local network.
- Primary DNS: The default value is "0.0.0.0"
- Secondary DNS: The default value is "0.0.0.0"

8.2.5.5 Menu: Data Logger (VC-1804 only)

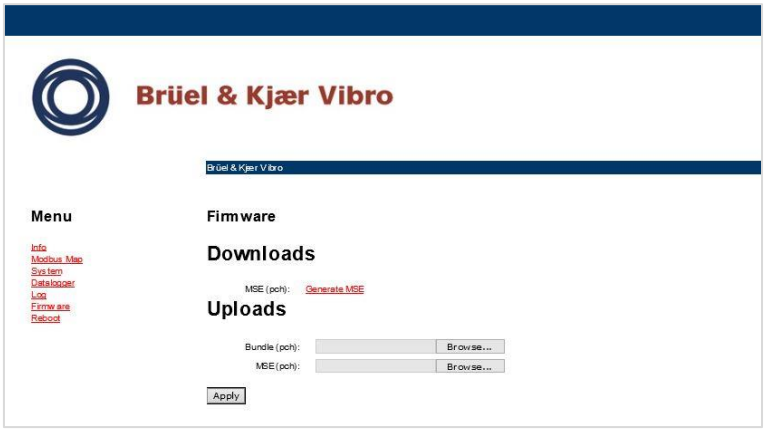
Only the VC-1804 has installed memory for logging measurement data. The data is saved either via RS-232 or via the port 1/port 2 interface. Data logging is enabled in the "System" menu.

8.2.5.6 Menu: Log

This is a "log file" for listing errors. There are no measured values here.



8.2.5.7 Menu: Firmware



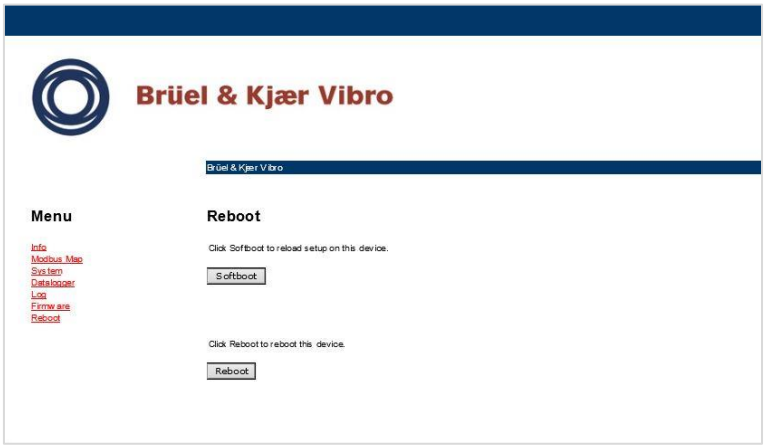
If the device is functioning properly the parameter settings should be saved under "Downloads"

- Click on "Generate MSE."
- Mark text.
- Click on the "Send to OneNote" icon.
- Select the "OneNote section" to save the .MSE file.

New firmware versions can be loaded in this way. The manufacturer's
BDL or .MSE files are needed to do this. There are two different files available for an upload:

- "Bundle" (pch): Specify the path to load files.
- "MSE" (pch): Specify the path to load files.

8.2.5.8 Menu: Reboot



Any changes made to the settings of the VC-1803/04 will only be activated after the device is restarted.

To activate restart, click on the Reboot button. The status LED flashes Green during the reboot process.

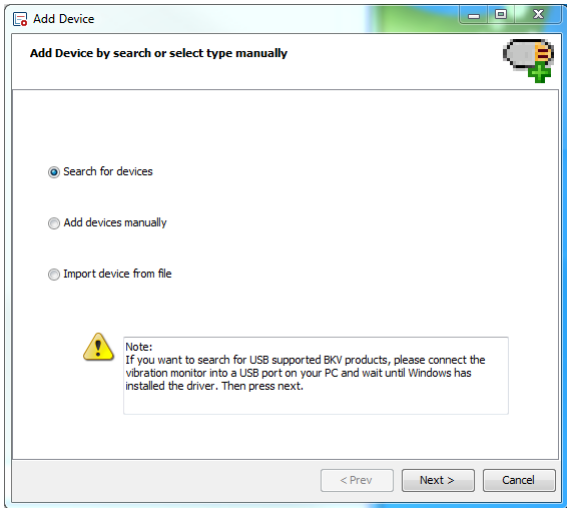
As soon as the status LED stops flashing, the new parameters are implemented in the device.

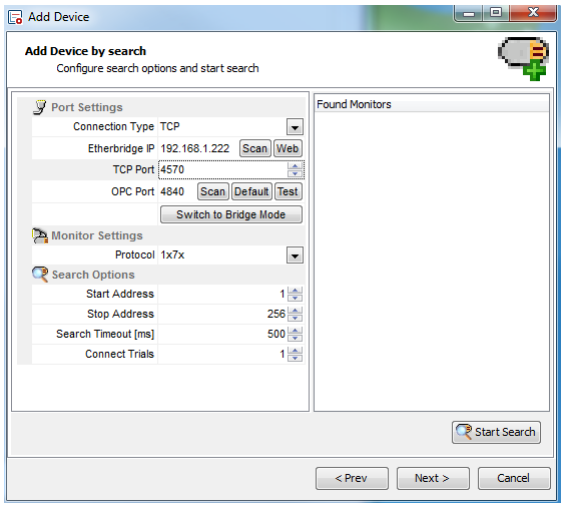
8.2.6 VIBROCONTROL 1803/04 with Compact Setup Software

VIBROCONTROL 18x0x series monitors can be connected with a PC in various ways.

- Direct connection via USB.
- As part of an RS-485 communication chain (VC-1803/04).
- Via a local network (LAN) and VC-1803/04.

After the Compact Setup software starts, open "Add Device."



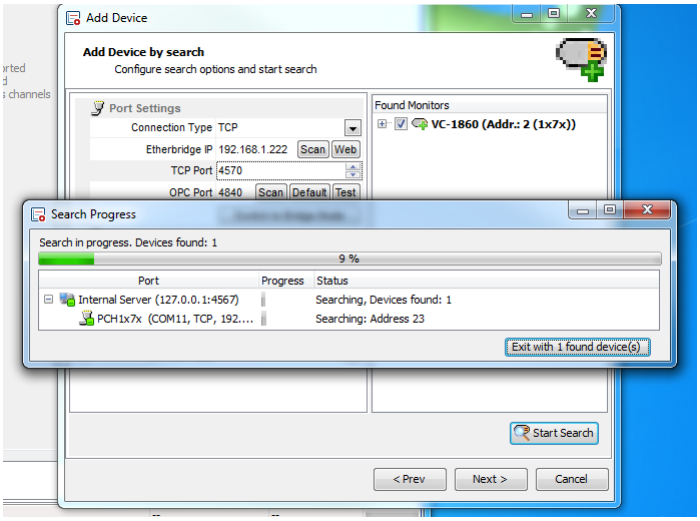


Select the LAN connection under port settings:

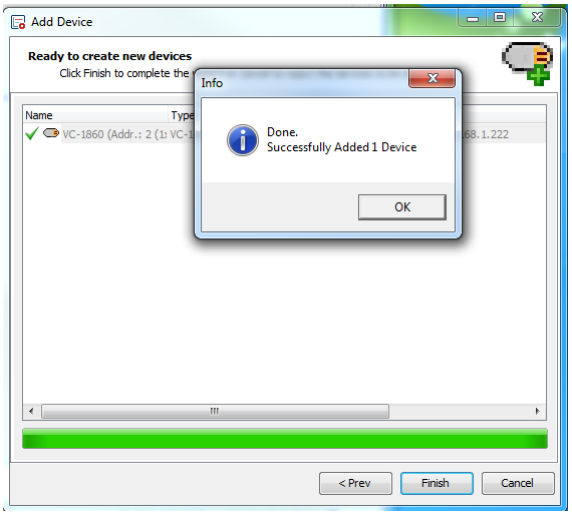
- Connection type: TCP
- Ethernet Bridge IP: <IP address>
- TCP Port: 4570

- RS-485: Connection of the RS-485 chain to VC-1803/04 only via the COM1 screw terminals (port 1).

- RS-232: To use the monitors with RS-232, activate the RS-232 interface on the VC-1803/04. Select the port under "Port settings."
- The RS-232 interface is activated in the web browser. In the System configuration menu under "com port termination," select COM2 (port 2) and save with "Apply."
- Check to ensure the wiring of the connected devices is correct.
- If communication is not established, check the port under "Port settings."
- Start the search process of the connected monitoring modules with "Start search."

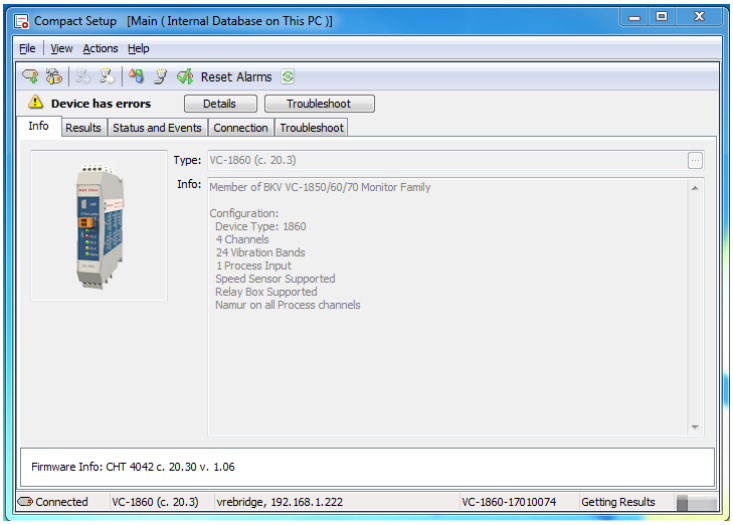


- After the search function has ended with "Start search," all VC-18xx monitors present in the network are displayed.
- Select the required device and continue the process with "Next."



- To save the complete settings definitively, the VC-1803/04 must be booted again (Reboot).
- The status LED flashes Green during the restart.
- RS-485: Connection of the RS-485 chain to VC-1803/04 only via the COM1 screw terminals (port 1).

The VIBROCONTROL 18x0 is now connected by way of the VC-1803/04 communication module.


Compact Setup [Main (Internal Database on This PC)]
File View Actions Help
Reset Alarms
Device has errors
Details
Troubleshoot
Info
Results
Status and Events
Connection
Troubleshoot
Type: VC-1860 (c. 20.3)
Info: Member of BKV VC-1850/60/70 Monitor Family
Configuration:
Device Type: 1860
4 Channels
24 Vibration Bands
1 Process Input
Speed Sensor Supported
Relay Box Supported
Namur on all Process channels
Firmware Info: CHT 4042 c. 20.30 v. 1.06
Connected
VC-1860 (c. 20.3)
vrebridge, 192.168.1.222
VC-1860-17010074
Getting Results

9 Connecting the VIBROCONTROL 18xx to a PLC/PC

The VIBROCONTROL 18xx vibration monitor has an RS-485 and a USB 2.0 interface, which allows the user to change many of the setup parameters for the application using the corresponding Compact Setup software. Status information or measured values can also be read over the same interface.
The VC-18xx vibration monitor comes with pre-configured settings.

NOTE!

The Compact Setup software overwrites these factory settings when the user transfers the changes to the monitor. Then the official factory setting will no longer be in effect.

The factory settings can be loaded onto the device again under the "Default Setup" function in the Compact Setup software.

9.1 USB 2.0 Interface

To use the USB-2.0 interface, a USB cable is needed to connect the VC-18xx vibration monitor to the computer. The maximum data transfer speed between a PC and a VC-18xx device is 3 MBaud.

NOTE!

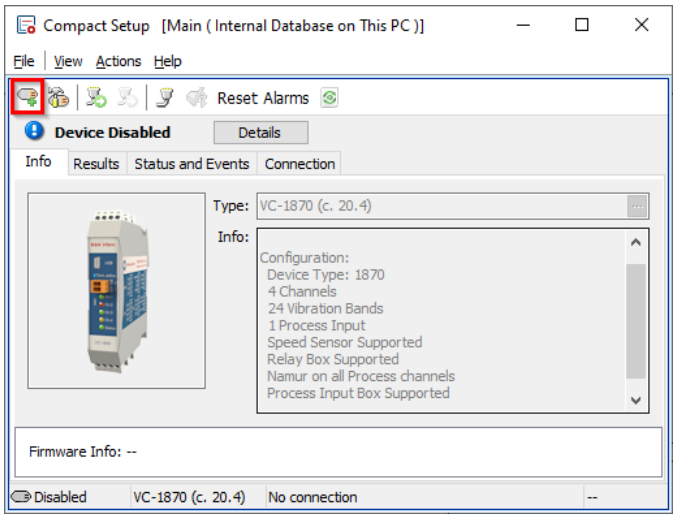
Only one device (VC-1850/1860/1870) is accessed via the USB-2.0 interface.

NOTE

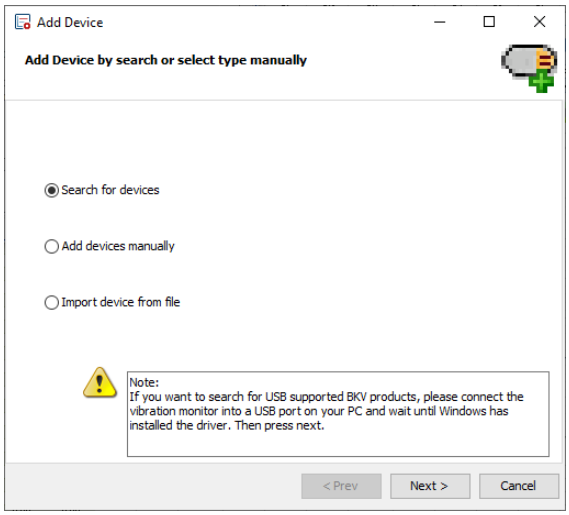
This method is used mainly for the temporary connection of a permanently mounted VC-18x0 and a (Notebook) PC in the field, for example for an upgrade (new firmware) or an update (new setup parameters).

9.1.1 Making Settings with the "Compact Setup" Software

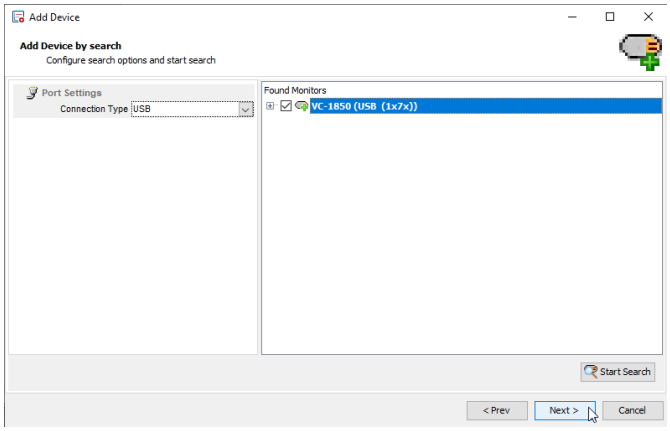
1. Set up a connection with a VC-18x0 via the USB-2.0 interface
2. Open the "Compact Setup" software.
3. To add a VC-18x0 module, follow the operating sequence:



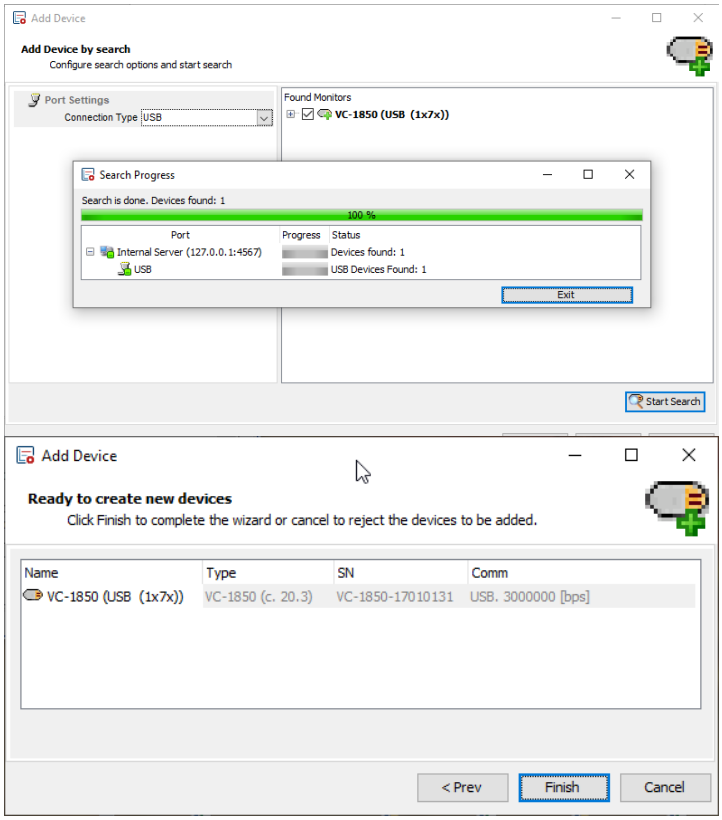
- Select "Add Device."



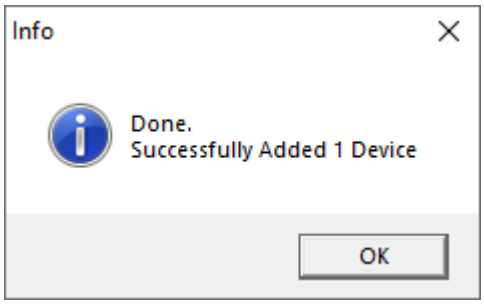
- Click on the "Search for devices" option.
- Continue with "Next."



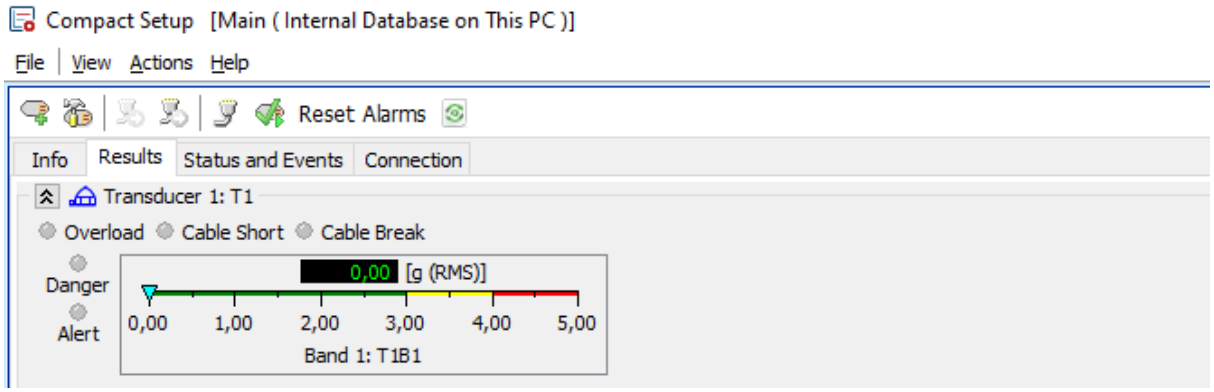
- Select VC-18xx.
- Confirm with "Next."



- Finish with "Finish."



- Confirm notice with "OK."



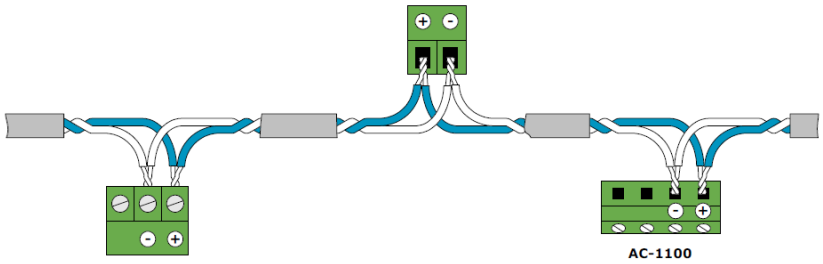
9.2 RS-485 interface

The VIBROCONTROL 18xx vibration monitor allows "Daisy-Chain" connection. Theoretically up to 254 devices can be addressed individually in an RS-485 chain of devices. We recommend not to connect more than 50 devices.

NOTE

The RS-485 interface is used for internal communication of the devices. It is not possible to access a device directly via the RS-485 interface. To set up communication with a PC, a VIBROCONTROL 1803/04 is also needed (see also 8.2 VIBROCONTROL 1803/1804 Communication Module Ethernet Bridge).

To use the RS-485 interface, connect the yellow connector (marked: "RS-485") at the front of the VIBROCONTROL 18x0 enclosure to the RS-485 chain of devices using a two-wire twisted and shielded cable.



The cable must be terminated with a 120-Ω resistor at both ends, i.e. on the PC side and at the last device on the RS-485 chain of devices.

The VIBROCONTROL 18xx vibration monitor has a built-in 120-Ω terminating resistor which can be used for this purpose.
To switch the terminating resistor on, use the small left/right sliding switch behind a small hole on the front of the VIBROCONTROL 18xx enclosure.

When the terminating resistor is turned on, a **blue** LED is lit on the front of the VC-18xx.
The maximum data transfer speed between the PC and the VC-18xx is 115 kBaud.

WARNING!

Make certain you do not add a new device to your fieldbus that has an address occupied by another device already present in the RS-485 chain of devices.

9.3 VIBROCONTROL 1803/04 LAN interface

The VIBROCONTROL 18xx can also be remotely operated using a LAN connection. This makes it possible to use an additional VIBROCONTROL 1803/04 communication module.
The VIBROCONTROL 1803/04 communication module is connected with an Ethernet network via a LAN cable.

Communication module is connected with the VC-18xx via the respective RS-485 connection. Use a two-wire twisted and shielded cable for the connection.

Go through the following steps to set up Modbus TCP communication of the VC-18xx devices via the LAN interface in the VC-1803/04.

1. Set up a LAN connection with the PC via the Ethernet interface on the VC-1803/04.

The RS-485 interface makes it possible to connect multiple VIBROCONTROL 1850/60/70 devices with each other using the VC-1803/04 communication module:

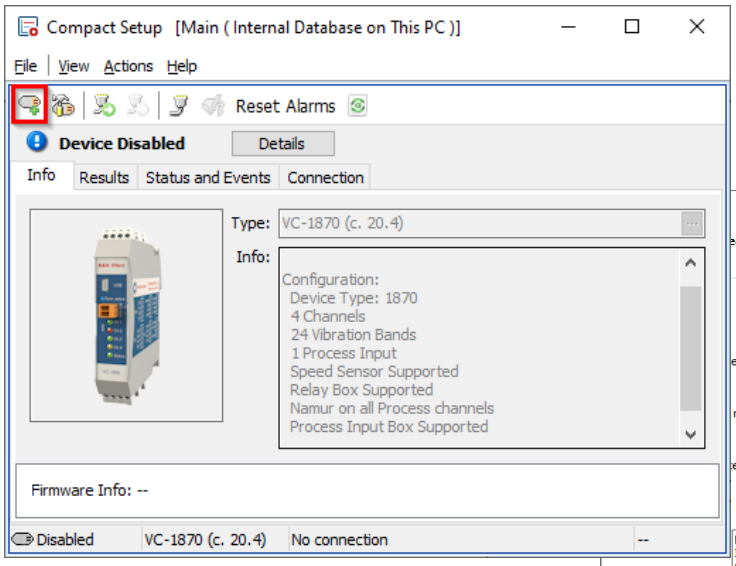
2. Connect the VC-1803/04 communication module with one or more VIBRONTROL 1850/60/70 devices via the RS-485 interface
   (see also 9.2 RS-485 interface).

NOTE

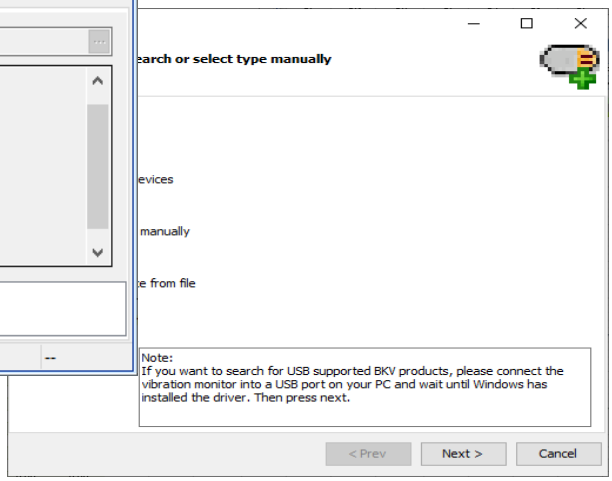
Only one unique IP address may be assigned for a VC-1803/04 module. It multiple VC-803/04 modules are being used, IP addresses must not be assigned double.

Setting up a connection via Compact Setup software

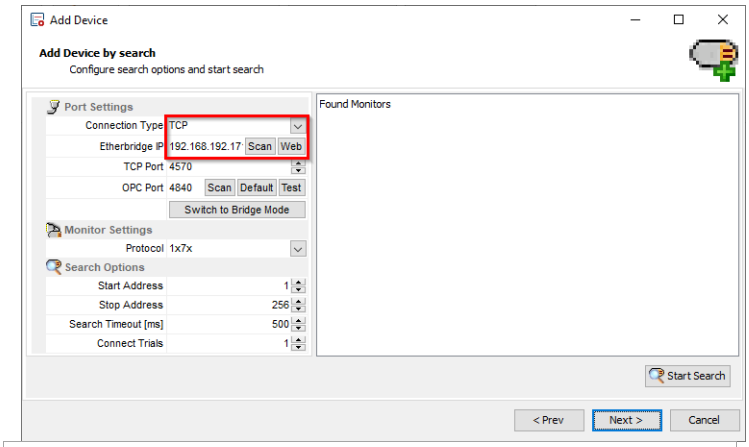
3. Open the "Compact Setup" software
4. To add a VC-18x0 module, follow the operating sequence:

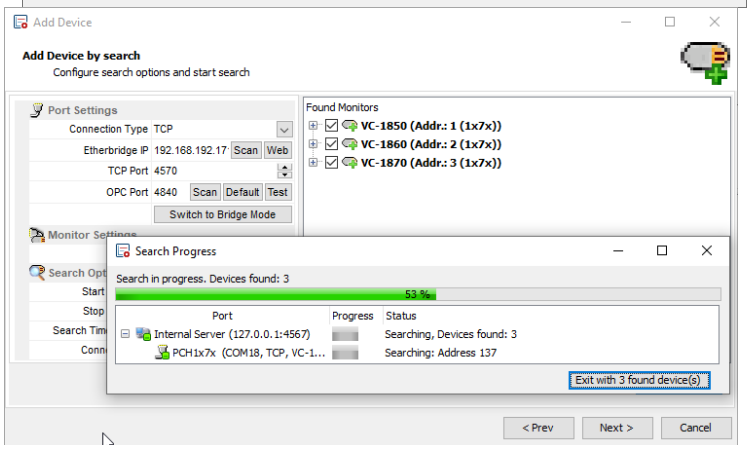


- Select "Add Device."

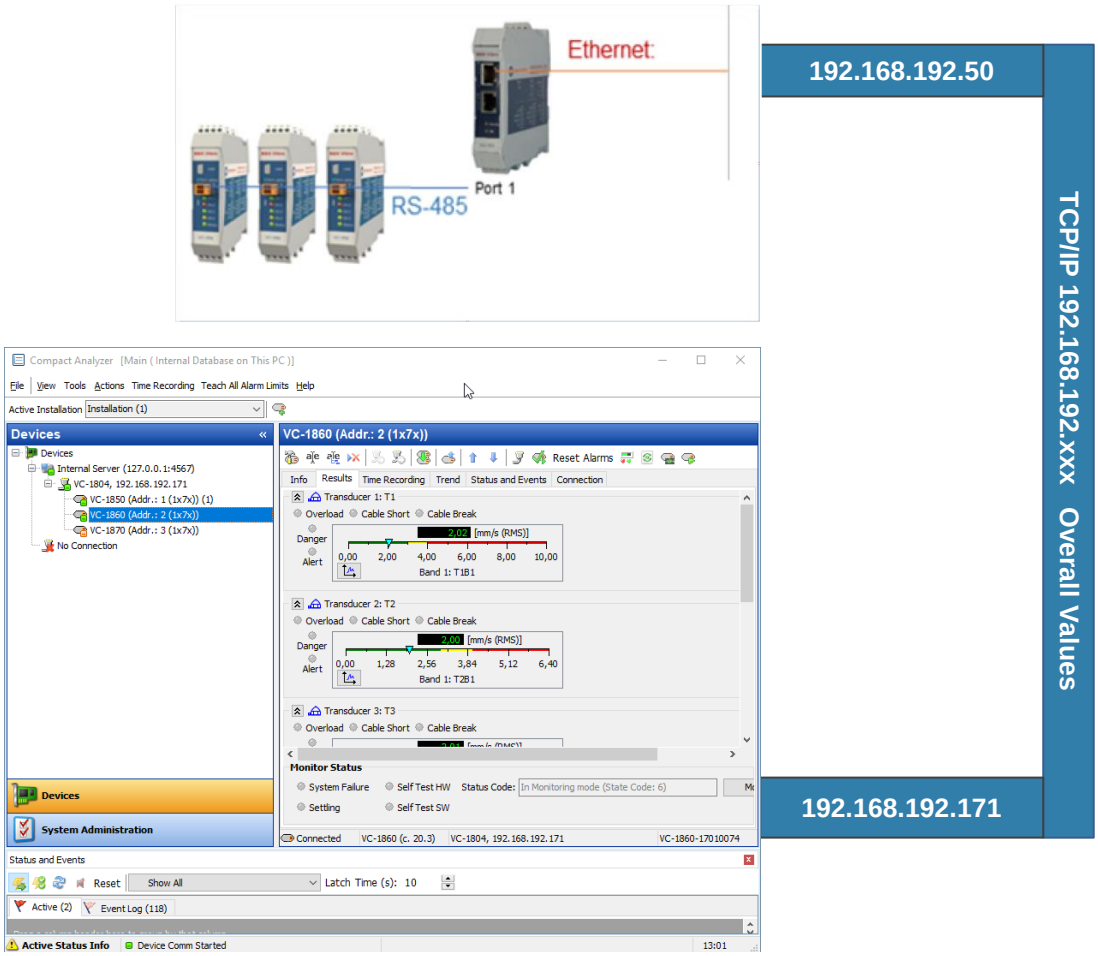


- Click on the "Search for devices" option.
- Continue with "Next"





9.3.1 Example of Compact Setup Communication



9.4 Modbus Connection for VIBROCONTROL 18xx via VIBROCONTROL 1803/04

Go through the following steps to set up Modbus TCP communication of the VC-18xx devices via the LAN interface in the VC-1803/04.

1. Set up a LAN connection via the Ethernet interface on the VC-1803/04

The RS-485 interface makes it possible to connect multiple VC-18xx modules with each other using the VC-1803/04 communication module.

2. Connect the VC-1803/04 communication module with one or more VIBRONTROL 18xx devices via the RS-485 interface
   (see also 9.2 RS-485 interface).

Making Settings with the Modbus Program:

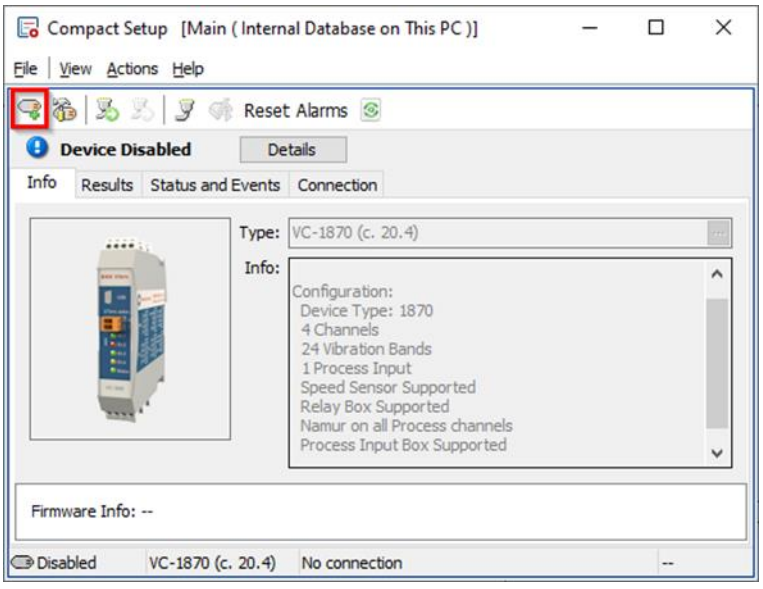
1. Open the Modbus program, for example "ModScan32" or "Modbucfg."
2. Configure the Modbus program according to the IP network.
3. Query measured values via the register addresses

NOTE

Only one unique IP address may be assigned for a VC-1803/04 module. It multiple VC-803/04 modules are being used, IP addresses must not be assigned double.

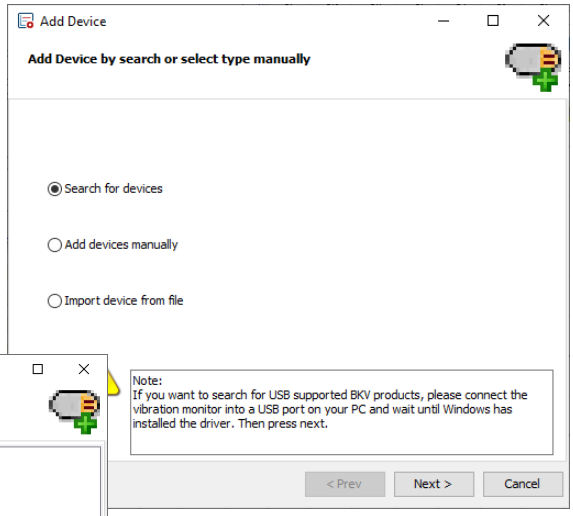
Setting up a connection via Compact Setup software

4. Open the "Compact Setup" software
5. To add a VC-18x0 module, follow the operating sequence:

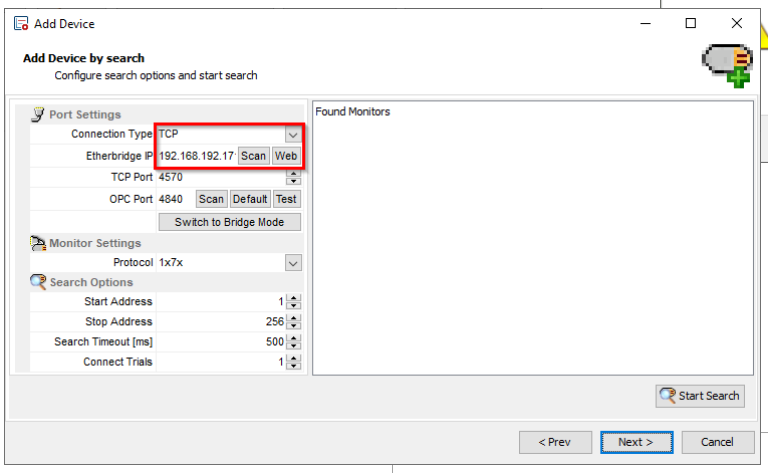


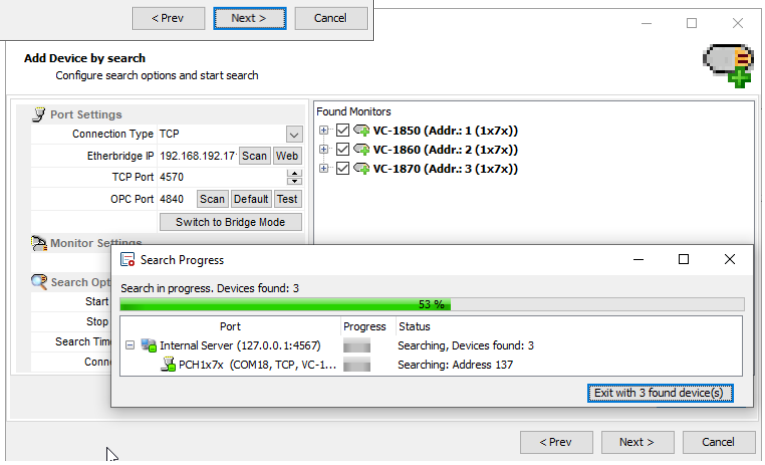
- Select "Add Device"

- Click on the "Search for devices" option
- Continue with "Next"

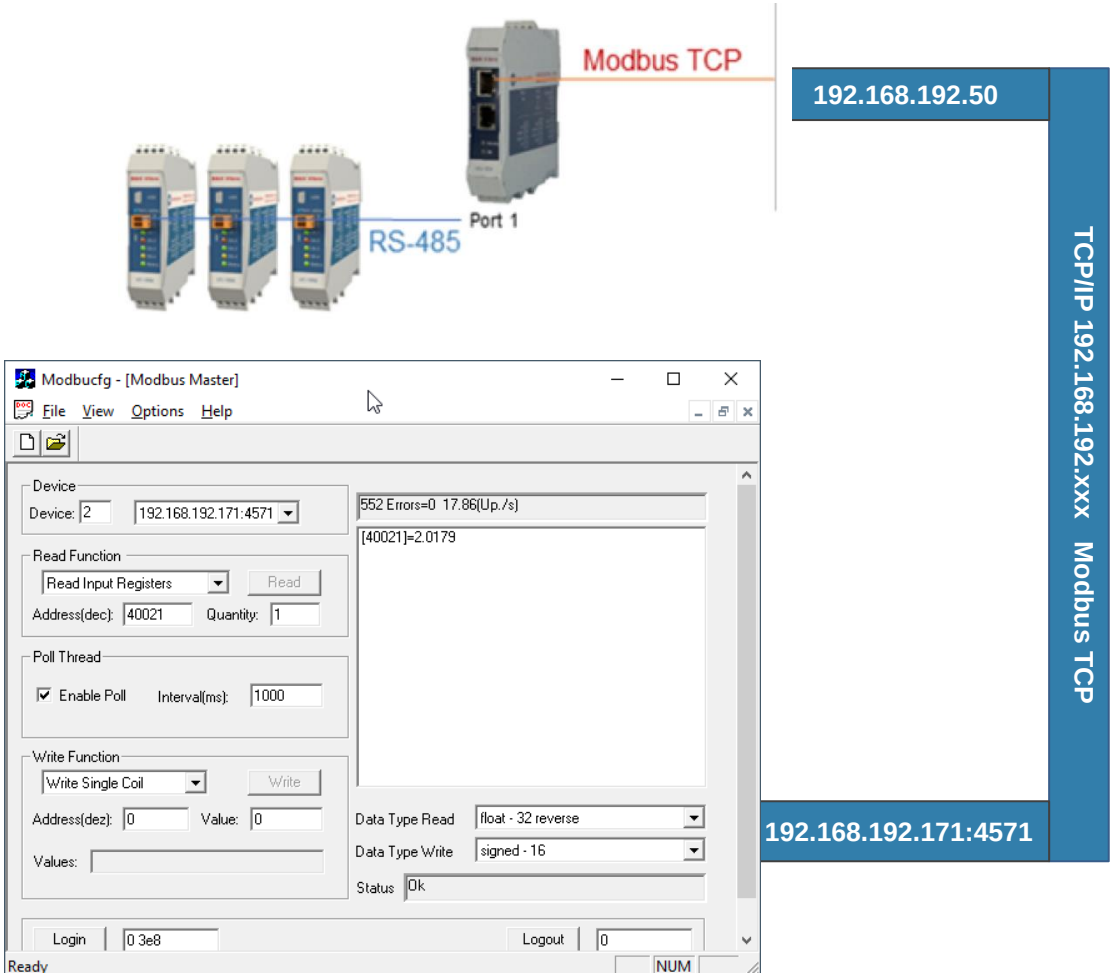


- Continue with "Next"





9.4.1 Example of Modbus TCP Communication



9.4.2 Modbus Addresses and Registers

The Modbus TCP address and registers for VIBROCONTROL 18xx are listed below. A register consists of 2 bytes. An address can also be split up, for example "1000,5". This means that the register will not start at the first byte, but at the second. The "second" byte is the LSB in a Big Endian Word.
Proper conversion will also make it the LSB in Little Endian, thereby converting it to the "first" byte instead.

Flash data (Read only)

Status				
Modbus address	**Register length**	**Register type**	**Register name**	
General critical registers, must be read:				
40000	0.5	U8	status_code [OK: Monitoring_state=6]	Error_state = 3 Settling_state = 4 Self_test_state=5 Monitoring_state=6
29738	2	s32	ccw_flash [OK: 0x20300]	CCW = 0x2030
40006	0.5	u8	system_failure_relay [OK: state = 0]	No Alarm = 0 Alarm = 1
40019.5	0.5	u8	transducer_input_1.overload [OK: Overload_state=0]	Overload_state = 0 Overload_state = 1
40046.5	0.5	u8	transducer_input_2.overload [OK: Overload_state=0]	Overload_state = 0 Overload_state = 1
40073.5	0.5	u8	transducer_input_3.overload [OK: Overload_state=0]	Overload_state = 0 Overload_state = 1
40100.5	0.5	u8	transducer_input_4.overload [OK: Overload_state=0]	Overload_state = 0 Overload_state = 1
Optional registers to be read:				
Transducer 1:				
40021	2	float	transducer_input_1.band_1.vibration_detector.measuring_result	
40023	0.5	u8	transducer_input_1.band_1.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40023.5	0.5	u8	transducer_input_1.band_1.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40024	2	float	transducer_input_1.band_2.vibration_detector.measuring_result	
40026	0.5	u8	transducer_input_1.band_2.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40026.5	0.5	u8	transducer_input_1.band_2.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40027	2	float	transducer_input_1.band_2.envelope_detector_1.measuring_result	

40029	0.5	u8	transducer_input_1.band_2.envelope_detector_1.alert_alarm	No Alarm = 0 Alarm = 1
40029.5	0.5	u8	transducer_input_1.band_2.envelope_detector_1.danger_alarm	No Alarm = 0 Alarm = 1
40030	2	float	transducer_input_1.band_2.envelope_detector_2.measuring_result	
40032	0.5	u8	transducer_input_1.band_2.envelope_detector_2.alert_alarm	No Alarm = 0 Alarm = 1
40032.5	0.5	u8	transducer_input_1.band_2.envelope_detector_2.danger_alarm	No Alarm = 0 Alarm = 1
40033	2	float	transducer_input_1.band_2.crest_factor_detector.measuring_result	
40035	0.5	u8	transducer_input_1.band_2.crest_factor_detector.alert_alarm	No Alarm = 0 Alarm = 1
40035.5	0.5	u8	transducer_input_1.band_2.crest_factor_detector.danger_alarm	No Alarm = 0 Alarm = 1
40036	2	float	transducer_input_1.band_2.kurtosis_detector.measuring_result	
40038	0.5	u8	transducer_input_1.band_2.kurtosis_detector.alert_alarm	No Alarm = 0 Alarm = 1
40038.5	0.5	u8	transducer_input_1.band_2.kurtosis_detector.danger_alarm	No Alarm = 0 Alarm = 1
Transducer 2:				
40048	2	float	transducer_input_2.band_1.vibration_detector.measuring_result	
40050	0.5	u8	transducer_input_2.band_1.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40050.5	0.5	u8	transducer_input_2.band_1.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40051	2	float	transducer_input_2.band_2.vibration_detector.measuring_result	
40053	0.5	u8	transducer_input_2.band_2.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40053.5	0.5	u8	transducer_input_2.band_2.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40054	2	float	transducer_input_2.band_2.envelope_detector_1.measuring_result	
40056	0.5	u8	transducer_input_2.band_2.envelope_detector_1.alert_alarm	No Alarm = 0 Alarm = 1
40056.5	0.5	u8	transducer_input_2.band_2.envelope_detector_1.danger_alarm	No Alarm = 0 Alarm = 1
40057	2	float	transducer_input_2.band_2.envelope_detector_2.measuring_result	
40059	0.5	u8	transducer_input_2.band_2.envelope_detector_2.alert_alarm	No Alarm = 0 Alarm = 1

40059.5	0.5	u8	transducer_input_2.band_2.envelope_detector_2.danger_alarm	No Alarm = 0 Alarm = 1
40060	2	float	transducer_input_2.band_2.crest_factor_detector.measuring_result	
40062	0.5	u8	transducer_input_2.band_2.crest_factor_detector.alert_alarm	No Alarm = 0 Alarm = 1
40062.5	0.5	u8	transducer_input_2.band_2.crest_factor_detector.danger_alarm	No Alarm = 0 Alarm = 1
40063	2	float	transducer_input_2.band_2.kurtosis_detector.measuring_result	
40065	0.5	u8	transducer_input_2.band_2.kurtosis_detector.alert_alarm	No Alarm = 0 Alarm = 1
40065.5	0.5	u8	transducer_input_2.band_2.kurtosis_detector.danger_alarm	No Alarm = 0 Alarm = 1
Transducer 3:				
40075	2	float	transducer_input_3.band_1.vibration_detector.measuring_result	
40077	0.5	u8	transducer_input_3.band_1.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40077.5	0.5	u8	transducer_input_3.band_1.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40078	2	float	transducer_input_3.band_2.vibration_detector.measuring_result	
40080	0.5	u8	transducer_input_3.band_2.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40080.5	0.5	u8	transducer_input_3.band_2.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40081	2	float	transducer_input_3.band_2.envelope_detector_1.measuring_result	
40083	0.5	u8	transducer_input_3.band_2.envelope_detector_1.alert_alarm	No Alarm = 0 Alarm = 1
40083.5	0.5	u8	transducer_input_3.band_2.envelope_detector_1.danger_alarm	No Alarm = 0 Alarm = 1
40084	2	float	transducer_input_3.band_2.envelope_detector_2.measuring_result	
40086	0.5	u8	transducer_input_3.band_2.envelope_detector_2.alert_alarm	No Alarm = 0 Alarm = 1
40086.5	0.5	u8	transducer_input_3.band_2.envelope_detector_2.danger_alarm	No Alarm = 0 Alarm = 1
40087	2	float	transducer_input_3.band_2.crest_factor_detector.measuring_result	
40089	0.5	u8	transducer_input_3.band_2.crest_factor_detector.alert_alarm	No Alarm = 0 Alarm = 1
40089.5	0.5	u8	transducer_input_3.band_2.crest_factor_detector.danger_alarm	No Alarm = 0 Alarm = 1

40090	2	float	transducer_input_3.band_2.kurtosis_detector.measuring_result	
40092	0.5	u8	transducer_input_3.band_2.kurtosis_detector.alert_alarm	No Alarm = 0 Alarm = 1
40092.5	0.5	u8	transducer_input_3.band_2.kurtosis_detector.danger_alarm	No Alarm = 0 Alarm = 1
Transducer 4:				
40102	2	float	transducer_input_4.band_1.vibration_detector.measuring_result	
40104	0.5	u8	transducer_input_4.band_1.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40104.5	0.5	u8	transducer_input_4.band_1.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40105	2	float	transducer_input_4.band_2.vibration_detector.measuring_result	
40107	0.5	u8	transducer_input_4.band_2.vibration_detector.alert_alarm	No Alarm = 0 Alarm = 1
40107.5	0.5	u8	transducer_input_4.band_2.vibration_detector.danger_alarm	No Alarm = 0 Alarm = 1
40108	2	float	transducer_input_4.band_2.envelope_detector_1.measuring_result	
40110	0.5	u8	transducer_input_4.band_2.envelope_detector_1.alert_alarm	No Alarm = 0 Alarm = 1
40110.5	0.5	u8	transducer_input_4.band_2.envelope_detector_1.danger_alarm	No Alarm = 0 Alarm = 1
40111	2	float	transducer_input_4.band_2.envelope_detector_2.measuring_result	
40113	0.5	u8	transducer_input_4.band_2.envelope_detector_2.alert_alarm	No Alarm = 0 Alarm = 1
40113.5	0.5	u8	transducer_input_4.band_2.envelope_detector_2.danger_alarm	No Alarm = 0 Alarm = 1
40114	2	float	transducer_input_4.band_2.crest_factor_detector.measuring_result	
40116	0.5	u8	transducer_input_4.band_2.crest_factor_detector.alert_alarm	No Alarm = 0 Alarm = 1
40116.5	0.5	u8	transducer_input_4.band_2.crest_factor_detector.danger_alarm	No Alarm = 0 Alarm = 1
40117	2	float	transducer_input_4.band_2.kurtosis_detector.measuring_result	
40119	0.5	u8	transducer_input_4.band_2.kurtosis_detector.alert_alarm	No Alarm = 0 Alarm = 1
40119.5	0.5	u8	transducer_input_4.band_2.kurtosis_detector.danger_alarm	No Alarm = 0 Alarm = 1

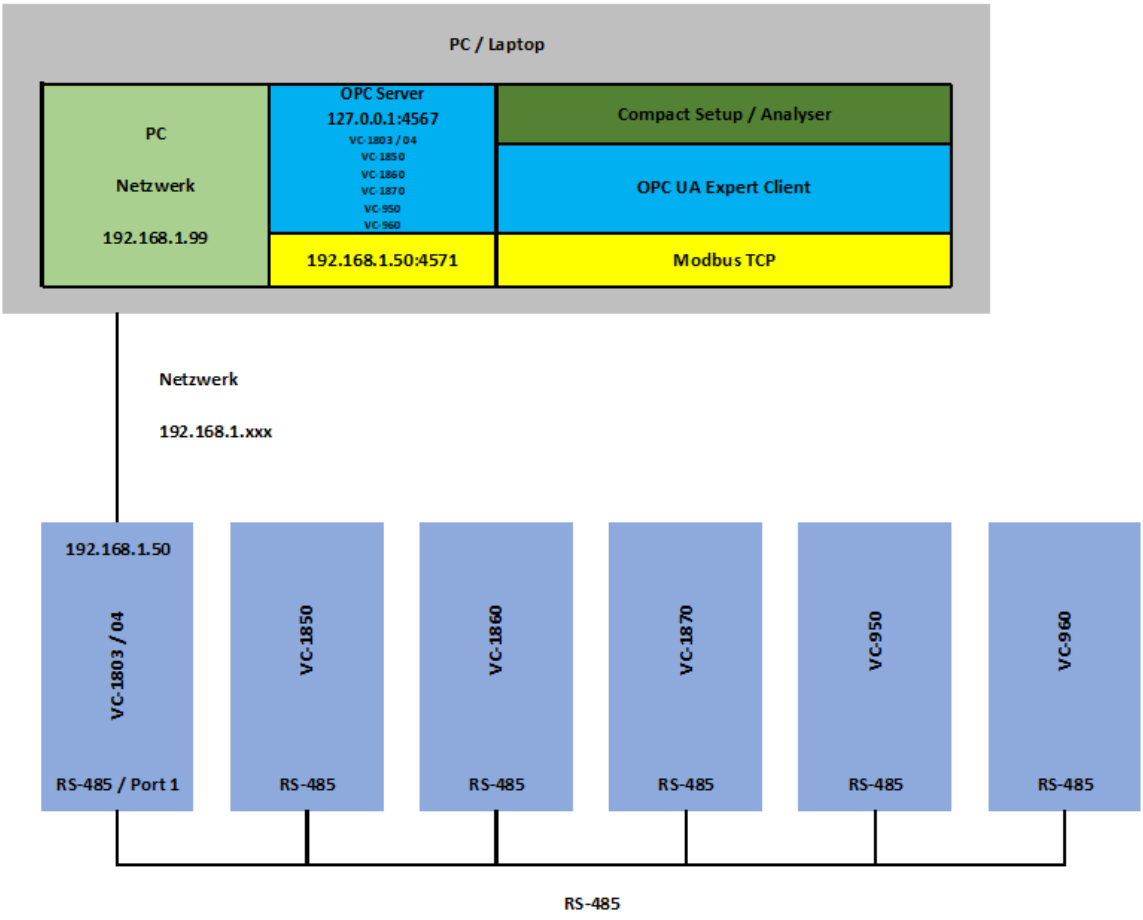
Additional parameters, optional:				
40009.5	0.5	u8	configurable_output_1.relay [OK: Relay closed=0]	Relay closed = 0 Relay open = 1
40010	2	float	configurable_output_1.analog	
40012	0.5	u8	configurable_output_2.relay [OK: Relay closed=0]	Relay closed = 0 Relay open = 1
40012.5	2	float	configurable_output_2.analog	
40014.5	0.5	u8	configurable_output_3.relay [OK: Relay closed=0]	Relay closed = 0 Relay open = 1
40015	2	float	configurable_output_3.analog	
40017	0.5	u8	configurable_output_4.relay [OK: Relay closed=0]	Relay closed = 0 Relay open = 1
40017.5	2	float	configurable_output_4.analog	
40130.5	2	float	process_input_1.measuring_result	
40132.5	0.5	u8	process_input_1.danger_alarm_low	No Alarm = 0 Alarm = 1
40133	0.5	u8	process_input_1.alert_alarm_low	No Alarm = 0 Alarm = 1
40133.5	0.5	u8	process_input_1.alert_alarm_high	No Alarm = 0 Alarm = 1
40134	0.5	u8	process_input_1.danger_alarm_high	No Alarm = 0 Alarm = 1
40136	2	float	tacho_input_1.measuring_result	
40138	0.5	u8	tacho_input_1.danger_alarm_speed_low	No Alarm = 0 Alarm = 1
40138.5	0.5	u8	tacho_input_1.alert_alarm_speed_low	No Alarm = 0 Alarm = 1
40139	0.5	u8	tacho_input_1.alert_alarm_speed_high	No Alarm = 0 Alarm = 1
40139.5	0.5	u8	tacho_input_1.danger_alarm_speed_high	No Alarm = 0 Alarm = 1

9.5 OPC UA Interface

Structure of the network connection

OPC communication can only take place via a TCP network connection. A network connection must therefore be set up between the VC-1803 or VC-1804 communication module and a PC client. For communication between VC-18x0 vibration monitors and the VC-1803/VC-1804 communication module, an RS-485 connection must be set up from the VC-18x0 devices to port 1 of the VC-1803/VC-1804. To prevent a communication conflict, each of the vibration monitors used must have its own IP device address.

The VC-1803/VC-1804 communication module that is used must have a unique IP address in the network that is used. This can be configured in the web browser of the VC-1803/VC-1804 communication module. Settings for OPC communication cannot be made in the web browser.



10 Mounting/installation of VC-18xx

These tasks may only be carried out by qualified electricians or by trained persons under the direction and supervision of a qualified electrician in accordance with electrical engineering rules and regulations.

WARNING!

The series VC-1800 vibration monitors can be damaged by a "HOT-Swap."
Series VC-1800 vibration monitors must be disconnected from the +24 V DC supply voltage.

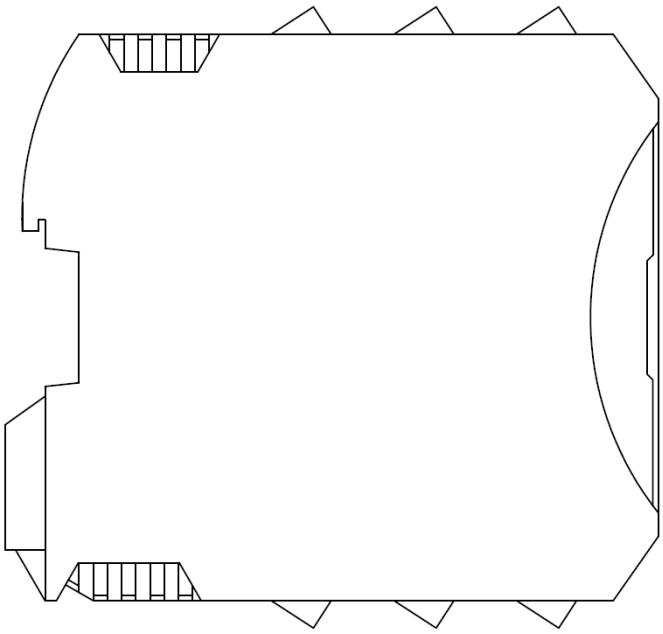
CAUTION!

Ambient temperatures that are too hot can destroy the electronics in the device. Please make certain to observe the specified temperature ranges in 11 Technical Data.

10.1 Assembly / Disassembly of the Device

The VIBROCONTROL 18xx vibration monitor can be clipped directly onto a standard DIN-rail.

- Make certain the device is supplied with sufficient air circulation.
- A metal clip at the rear of the enclosure is used to (un-)mount the device on the DIN-rail.
- The device is mounted on a DIN-rail by simply clicking on it.



Improper opening of the product or removal of components, improper use, incorrect installation or operation may result in personal injury or property damage

If the VIBROCONTROL 18xx device is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. The safety of any machine/system incorporating the VIBROCONTROL 18xx device is the sole responsibility of the assembler of the system.

To avoid fading of the text on the label, please try to keep the device out of direct sunlight.

The assembly may only be carried out in a de-energized state!

10.2 Terminal Connections

There is a risk of mismatch when setting up the connections. An incorrect connection can destroy the device.

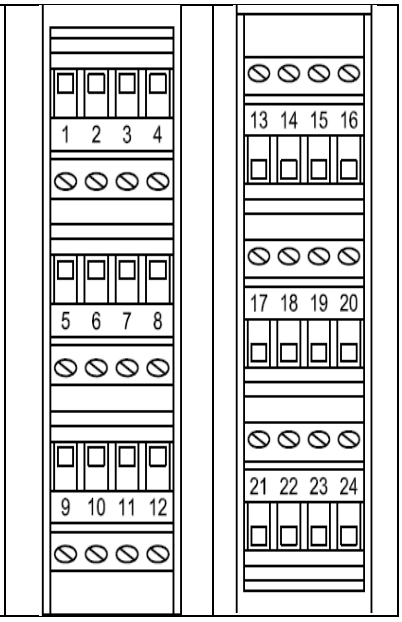
A label on the side of the VIBROCONTROL 18xx enclosure indicates the function of the terminals of the device. The connection of all sensor inputs, analog and relay outputs and the power supply is made through dedicated terminals.
Each monitoring system is equipped with six terminal blocks, each with 4-pin connections labeled from 1 to 24.

Clamping area for terminals (gray):

For rigid cable / For flexible cable: AWG 24

Clamping area for terminals (orange):

For rigid cable / For flexible cable: AWG 24



NOTE!

The VC 18xx devices are equipped with resistors or diodes at the terminals for sensors. If the inputs are not used, the resistors must remain connected. In addition, disable any sensor channels not being used with the Compact Setup software.
Before connecting sensors, remove the resistors or diodes from the relevant terminals.

10.3 Connection of Sensors, Outputs and Power Supply

Cables connected to the VC-18xx must be suitable for an ambient temperature of -10 ° C to + 80 ° C

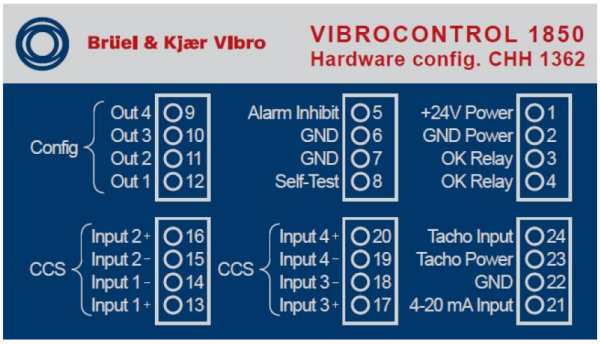
External strain relief of the cables is recommended

The shields of the incoming and outgoing cables must be laid on suitable equipotential bonding.

The following order is recommended during installation:

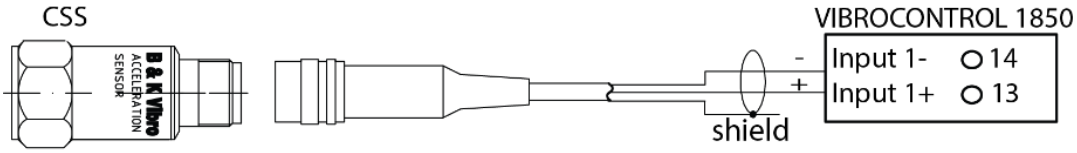
1. Connect the sensors
2. Connect the relay and analog outputs
3. Connect the power supply

10.3.1 VIBROCONTROL 1850 Terminals



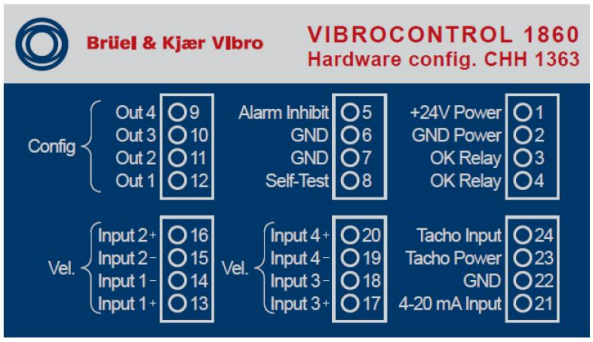
CCS accelerometers

The 2-wire accelerometers are connected to the terminals (signal (Input+) and GND (Input-)). Up to 4 accelerometers can be connected to a VC-1850:



Additional sensor connections are:
Sensor 2: 16 (Input 2+) / 15 (Input 2-) sensor 3: 17 (Input 3+) / 18 (Input 3-)
Sensor 4: 20 (Input 4+) / 19 (Input 4-)

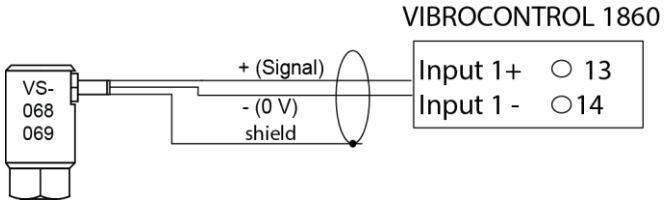
10.3.2 VIBROCONTROL 1860 Terminals



Vibration Velocity Sensors

The 2-wire speed sensors are connected to the terminals (signal (Input+) and GND (Input-)). Up to 4 velocity sensors can be connected to a VC-1860

.

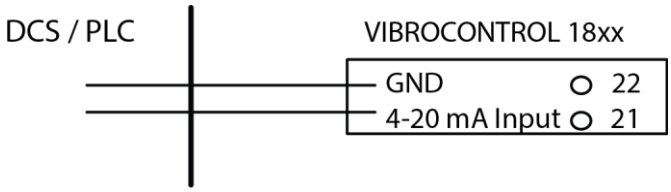


Additional sensor connections are:

- 16 (Input 2+) / 15 (Input 2-)
- 17 (Input 3+) / 18 (Input 3-)
- 20 (Input 4+) / 19 (Input 4-)

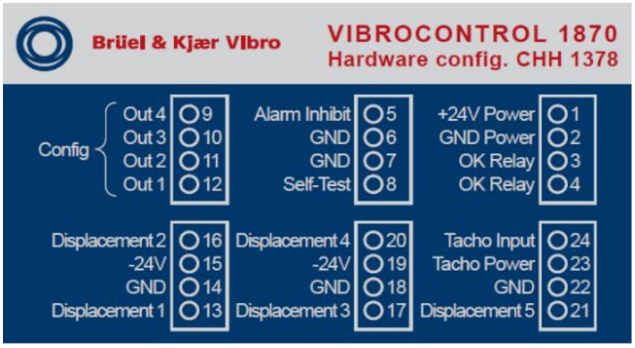
10.3.3 Process Variables Input (for VC-1850 & VC-1860)

Sensors for process data 4-20 mA input



The process Inputs (transmitters) must be **powered** externally.

10.3.4 VIBROCONTROL 1870 Terminals

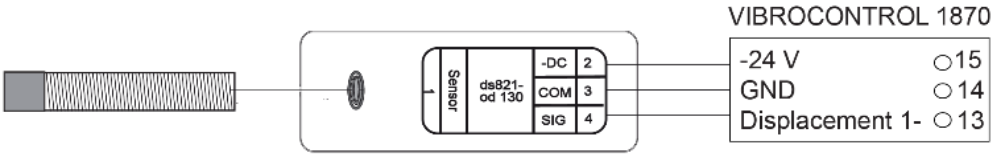


Non-contacting vibration displacement sensors

The sensor inputs "Displacement 1-4" for monitoring the relative shaft vibration.
The sensor input "Displacement 5" is used exclusively for the axial position!

The 3-wire displacement sensors are connected to the following terminals:
Signal (Displacement 1-5) and GND (shared) and voltage (-24 V shared). Up to 5 displacement sensors can be connected to a VC-1870.

Vibration displacement sensors



Relative shaft vibration:

13 (Displacement 1) / 15 (-24 V) / 14 (GND)
16 (Displacement 2) / 15 (-24 V) / 14 (GND)
17 (Displacement 3) / 19 (-24 V) / 18 (GND)
20 (Displacement 4) / 19 (-24 V) / 18 (GND)

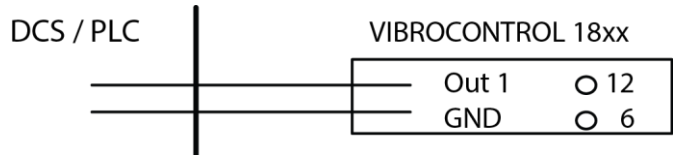
Axial position:

21 (Displacement 5) / 19 (-24 V) / 22 (GND)

Connections for analog output and relay (Alert and Danger)
OK relay & tacho, alarm inhibit and self-test

The four outputs can be configured (via Compact Setup software) either as analog signal outputs or as relays outputs.

Analog outputs 1-4



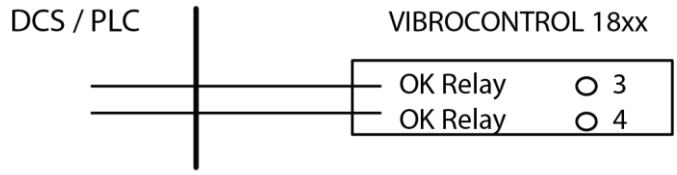
Additional output connections are:

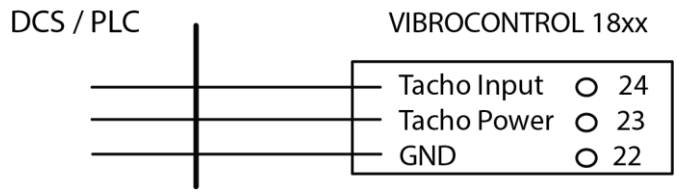
- 11 (Out 2) / 6 or 7 (GND)
- 10 (Out 3) / 6 or 7 (GND)
- 9 (Out 4) / 6 or 7 (GND)

NOTE!

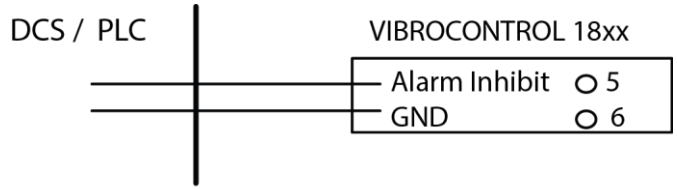
GND terminals can be used for multiple connections.

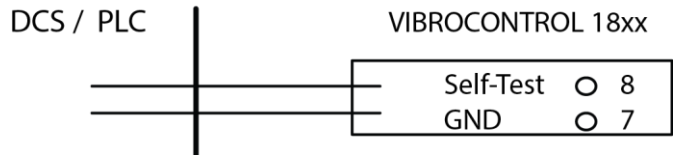
OK relay & Tacho input





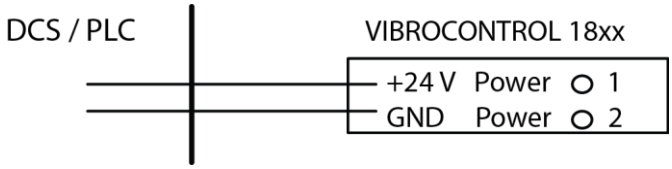
Alarm inhibit and self-test





10.3.5 Power Supply

Power supply of the power supply unit may only be implemented by means of a disconnecting device (switch or circuit breaker)!
The circuit breaker must meet the requirements of IEC 60947-1 and IEC 60947-3 and be suitable for the application.



10.4 Powering and Starting up the Device

After the +24 V DC supply voltage is connected or a device setting is changed, the monitoring system runs through a start program. The measurement channel LEDs and/or the OK LEDs flash or are lit red for about 30 seconds.
Provided there is no violation of Alert and Danger levels and the system status is OK, all LEDs should be lit Green.

10.5 Connection to Ethernet Bridge and / or Additional VC-18xx

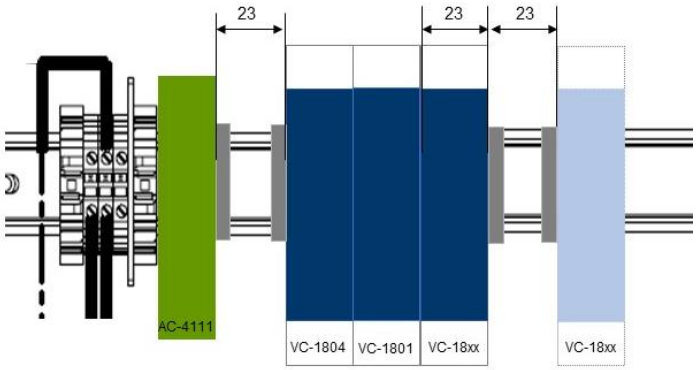
There is a 5-pin DIN-rail bus connection on the back of the enclosure that can be used to transfer a power supply or signals to nearby modules of type VC-18xx:

- VC-1803/04 Ethernet-Bridge and / or
- other VIBROCONTROL 18xx vibration monitors.

The DIN-rail bus module is connected with spring contacts on five small PCBs to the back of the PCB in the enclosure of the VIBROCONTROL 18xx.
The DIN-rail bus module can easily be removed by carefully pulling the DIN-rail bus module down in the direction of the longitudinal axis of the VIBROCONTROL 18xx enclosure. It can be mounted in the same way.

NOTE!

Make certain when placing the modules on the DIN-rail that 23 mm of free space (the width of one module) is left on at least one side for each monitor of type VC-1850, VC-1860, or VC-1870!



Preparation

- In order to make the electrical connection, it is best to first disconnect the Phoenix connectors from the VC-18xx modules.
- Operate the clip using a slotted screwdriver in order to remove the VC-18xx modules from the DIN-rail.
- The numbering on the Phoenix connectors must be observed when connecting the VC-18xx devices later.
- Configure the wiring with the Phoenix connectors accordingly. Carefully apply the cable shields to the threaded cable connectors.
- Connect the modules using the lower "Link-Concept" connection.

On the front of the VC-1850/60/70 there are two connections marked "S-485" and "USB" for connecting to the corresponding interface of a PLC, PC or VIBROCONTROL 1803 Ethernet-Bridge.

The VIBROCONTROL 18xx device has no internal forced ventilation. This device has no external ventilation requirements as long as the surface temperature during operation does not exceed the maximum ambient temperature value T_a stated elsewhere in this manual in section 11: "Technical Data."

10.6 AC -2114 Protective Housing with Viewing Window

The AC-2114 is a protective housing with a lid used to install electronic measurement equipment (e.g. VC-1800 series).

For further information on the AC-2114, refer to the corresponding operating manual.

11 Technical Data

For further technical data please refer to our VC-18xx product specification BPS0155-DE.

Configurable outputs:	• The user can configure up to 4 analog DC outputs or alarm relays in total. • Each of the 4 DC outputs can be configured as: 4-20 mA, 0-20 mA, 2-10 V or 0-10 V. • Any of the measuring parameters can be assigned. The output is proportional to the measuring range. Tolerance Analogue output: .....±1.5% of reading, ... ±1% of Full Scale Voltage load: .....min. 10 kΩ Current load: ..... max. 400 Ω Max voltage..... 28 V Max current: ..... 100 mA ON resistance: .....12.9 Ω Max OFF status leakage current: ..... 10 uA
	Max voltage..... 28 V Max current: ..... 100 mA Max isolation voltage..... 100 V ON resistance: .....12.9 Ω Max opened leakage current: ..... 10 µA
Supply voltage	**VC-1850/60/70 monitor module:** +24 V DC, ±5 %; Max. power consumption:10 W **VC-1801 relay module** +24 V DC, ±5 %; Max. power consumption: 10 W Total power loss 4 W if all relays are short-circuited (this should be avoided, as the total power loss may be up to 10 W.) **VC-1803/04 communication module** +24 V DC, ±5 %; Max. power consumption: 6 W Total power loss 4.0 W Etherbridge = 1.5 W (24 volts)

Ambient temperature range	Operation: ..... -10 °C ≤ Ta ≤ +50 °C Storage: .....-40 °C ≤ Ta ≤ +85 °C **HINT!** Please note that when connecting the VC-18xx series to a computer and/or LAN devices that are certified in accordance with IEC 60950-1 or IEC 62368-1, the restrictions regarding the ambient temperature and relative humidity must be observed.
Maximum relative humidity	95 % RH (non-condensing at +40 °C)
Pollution degree	2 (indoor use)
Maximum altitude	4000 m
Temperature for all VC-18xx models	EN 60068-2-1:2007 Cold EN 60068-2-2:2007 Dry heat Operating: -10 to +50°C Storage: -40 to +85 °C
Maximum relative humidity	EN 60068-2-78:2001; 95% RH (non-condensing at +40 °C)
Enclosure	EN 60529 + A1:2002; Ingress Protection IP20 including screw terminals

12 Maintenance

Devices of type VC-18xx are generally maintenance-free.

12.1 Cleaning

NOTE!

To clean the VC-18xx device, wipe off the enclosure with a moist cloth and if necessary with a small amount of a mild cleaning agent. Use of a strong/aggressive cleaning agent may cause the labels on the enclosure to fade so they will no longer be legible.

Do not introduce any moisture such as water or other liquids into the device!

If you notice a red LED for one of the channels and a red LED for "Status," this means that the connection between the vibration monitor and the sensor is disconnected for that specific channel. Please check the integrity of the connection cable on both sides, i.e. at the side of the sensor and at input terminals on the enclosure of the vibration monitor.

If faulty behavior of the device occurs, for example the "OK" LED (System Failure) flashing red continuously, we recommend you take a few minutes to run a complete self-test. If the system failure is still present after a complete self-test, we strongly recommend you contact Brüel & Kjær Vibro for a check or repair of the device.

Whenever you contact the manufacturer for a repair of the device you are kindly requested to have the following information at hand:

- The type number of the vibration monitor: VIBROCONTROL 1850, VIBROCONTROL 1860, VIBROCONTROL 1870, VC-1801, VC-1803/04.
- The serial number of the device. It is clearly visible on a label on the device enclosure.
- The color of the status displays in the Compact Setup software that may be active. Indicators pointing to a malfunction are normally colored Red.

13 Disposal

Disassembly may only be carried out in a de-energized state!

Dispose of systems, cables and sensors after use in an environmentally responsible manner and in compliance with national regulations.

You can also send the device back to

Brüel & Kjær Vibro
Leydheckerstrasse 10
64293 Darmstadt
Germany.

WEEE Reg. No. DE 69572330

14 Appendix A: Backup Battery Data Sheet

The VIBROCONTROL 1804 includes RAM and contains a backup battery with this Product Safety Data Sheet:

Product Information Sheet

Panasonic Batteries
Panasonic Industrial Company
A Division Panasonic Corporation of North America
5201 Tollview Drive, 1F-3
Rolling Meadows, IL 60008
Toll Free: 877-726-2228
Fax: 847-637-4660
Internet: www.panasonic.com/industrial/batteries-oem
e-mail: oembatteries@panasonic.com

Product: Manganese Dioxide (CR Type) Lithium Batteries
Applicable models/sizes: All CR type cylindrical and coin batteries

Revision: January 1, 2015

The batteries referenced herein are exempt articles and are not subject to the OSHA Hazard Communication Standard requirement. This sheet is provided as a service to our customers.

MSDS

Material Safety Data Sheets (MSDS) are a sub-requirement of the Occupational Safety and Health Administration (OSHA) Hazard Communication Standard, 29 CFR Subpart 1910.1200. This Hazard Communication Standard does not apply to various subcategories including anything defined by OSHA as an "article". OSHA has defined "article" as a manufactured item other than a fluid or particle; (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g. minute or trace amounts of a hazardous chemical, and does not pose a physical hazard or health risk to employees.

Because all of our batteries are defined as "articles", they are exempt from the requirements of the Hazard Communication Standard; hence a MSDS is not required.

The following components are found in a Panasonic Manganese Dioxide (CR) Lithium battery:

Cylindrical Cell Components	Material	Formula	CAS #
Positive Electrode	Manganese Dioxide	MnO_2	1313-13-9
Negative Electrode	Lithium	Li	7439-93-2
Electrolyte	Propylene Carbonate-Solvent	$C_4H_6O_3$	108-32-7
	1,2 Dimethoxyethane-Solvent	$C_4H_{10}O_2$	110-71-4
	Lithium Triflate-Salt	CF_3SO_3Li	33454-82-9
Coin Cell Components	**Material**	**Formula**	
Positive Electrode	Manganese Dioxide	MnO_2	1313-13-9
Negative Electrode	Lithium	Li	7439-93-2
Electrolyte	Propylene Carbonate-Solvent	$C_4H_6O_3$	108-32-7
	1,2 Dimethoxyethane-Solvent	$C_4H_{10}O_2$	110-71-4
	Lithium Perchlorate-Salt	$LiClO_4$	7791-03-9

Lithium Triflate is Lithium Trifluoromethanesulfonate.

DISPOSAL

Lithium batteries are neither specifically listed nor exempted from the Federal Environmental Protection Agency (EPA) hazardous waste regulations as promulgated by the Resource Conservation and Recovery Act (RCRA). The only metal of possible concern in a lithium battery is lithium that is not a listed or characteristic toxic hazardous waste. Waste lithium batteries can be considered a reactive hazardous waste if there is a significant amount of unreacted, or unconsumed lithium remaining in the spent battery. The key to disposing of a lithium battery as a non-hazardous waste is to guarantee that it is fully or mostly discharged. Once it is discharged it can be disposed of as non-hazardous waste.
You can dispose of a fully charged or partially discharged lithium battery as a hazardous waste after they are first neutralized through an approved secondary treatment. The need for a secondary treatment prior to disposal is a requirement of the U.S. Land Ban Restrictions of the Hazardous and Solid Waste Amendments of 1984. A secondary treatment center can only receive these batteries as manifested hazardous waste. The waste code for charged lithium

batteries is D003, reactive. **In either case, button cell batteries contain so little lithium that they never qualify as a reactive hazardous waste. These batteries are safe for disposal in the normal municipal waste stream.** Disposal of large quantities of undischarged lithium batteries should be performed by permitted, professional disposal firms knowledgeable in Federal, State and local hazardous materials and hazardous waste transportation and disposal requirements. As always, households are exempt from the RCRA hazardous waste guidelines.

In California, packages that contain CR lithium coin cells and the Owners/Operating Instructions of products that contain CR lithium coin cells must include the following statement: "Perchlorate Material – special handling may apply, See www.dtsc.ca.gov/hazardouswaste/perchorate".

TRANSPORTATION

All Panasonic lithium batteries are not subject to the requirements of the Department of Transportation (DOT) Subchapter C, Hazardous Materials Regulations if shipped in compliance with 49 CFR 173.185.

Effective January 1, 2015 all Panasonic lithium batteries can be shipped by air in accordance with International Civil Aviation Organization (ICAO), 2015-2016 edition, Section II or Section 1B or International Air Transport Association (IATA) 56th edition, Section II or Section 1B Packing Instructions (PI) 968 (Batteries), PI 969 (Batteries, packed with equipment) and PI 970 (Batteries, contained in equipment) as appropriate

All Panasonic lithium batteries are regulated by the International Maritime Organization (IMO), 2012, 36th amendment, under Special Provisions 188 and 230.

All Panasonic lithium cells are tested and comply with the UN Model Regulations, Manual of Test and Criteria, Part III, subsection 38.3.

If you build any of our lithium cells into a battery pack, you must also assure that they are tested in accordance with the UN Model Regulations, Manual of Test and Criteria. Part III, subsection 38.3, 5th revised edition, Amendment 2.

The DOT requires that the outside of each package that contains lithium metal batteries, regardless of size or number of batteries, be labeled with the following statement: "**LITHIUM METAL BATTERIES- FORBIDDEN FOR TRANSPORT ABOARD PASSENGER AIRCRAFT**". The labeling requirement covers shipments via highway, rail, vessel or cargo-only aircraft and covers all shipments inside, into or out of the US. The label must be in contrasting color and the letters must be 12 mm (0.5 in) in height for packages weighing more than 30 Kg and 6 mm (0.25 in) in height for packages weighting less than 30 Kg.

If you plan on transporting any untested prototype battery packs contact your Panasonic Sales Representative for regulatory information.

First Aid

If you get electrolyte in your eyes, flush with water for 15 minutes without rubbing and immediately contact a physician. If you get electrolyte on your skin wash the area immediately with soap and water. If irritation continues, contact a physician. If a battery is ingested, call the National Capital Poison Center (NCPC) at 202-625-3333 (Collect) or your local poison center immediately. Lithium coin batteries lodged in the esophagus should be removed immediately. Leakage, chemical burns and perforation can occur within hours of ingestion.

General Recommendations

CAUTION: Risk of fire, explosion and burns. Do not recharge, crush, heat above 212°F (100°C) or incinerate.

Fire Safety

In case of fire, you can use a Class "D" fire extinguisher or other smothering agent such as Lith-X, copper powder or dry sand. If you use water, use enough to smother the fire. Using an insufficient amount of water will only make the fire worse. Cooling the exterior of the batteries will help prevent rupturing. Burning of these batteries will generate toxic and corrosive lithium hydroxide fumes. Fire fighters should use self-contained breathing apparatus. Detailed information on fighting a lithium metal battery fire can be found in Guide 138 (Substances – Water – Reactive) of the US DOT Emergency Response Guide.

15 CE Declaration

Brüel & Kjær Vibro

EU-Konformitätserklärung / *EU- Declaration of conformity*

Hiermit bescheinigt das Unternehmen / *The company*

Brüel & Kjær Vibro GmbH
Leydheckerstraße 10
D-64293 Darmstadt

CE

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

Vierkanal-Schwingungsüberwachungsgerät / *Four channel vibration monitor*

VIBROCONTROL 1800

Typ / *Type*

VC-1850, VC-1860, VC-1870

Mit Komponenten / With Components

VC-1801, VC-1803, VC-1804

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

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

2011/65/EU + (EU) 2015/863 Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten/ *EU Directive for the restriction of the use of certain hazardous substances in electrical and electronic equipment*

Angewendete harmonisierte Normen / *Harmonized standards applied*

EN 61326-1: 2013
EN IEC 63000:2018

Bereich / Division
Brüel & Kjær Vibro GmbH

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

Ort/*Place* **Darmstadt**
Datum / *Date* **25.03.2021**

i.A. (Niels Karg)

Contact

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Leydheckerstrasse 10
64293 Darmstadt
Germany

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Fax: +49 6151 428 1000

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Denmark

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Fax: +45 69 89 03 01

Homepage: www.bkvibro.com

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Gardnerville NV 89410
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Phone: +1 (775) 552 3110

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