PRÜFTECHNIK

VIBCONNECT® RF

Installation and Operation

DRAFT

Compliance Statement acc. to Sect. 15.19:
This device complies with Part 15 of the FCC Rules.Operation is subject to the following two conditions:
(1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

User Information acc. to Sect.15.21:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Class B Statement Sect. 15.105 –)
NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/ TV technician for help.

VIBCONNECT® RF

Online Condition Monitoring
with Radio Communication

Installation and Operation

Series:

VIB 7.200	RF Bridge
VIB 7.220	RF Sensor unit
VIB 7.205-2.9	RF sensor

Firmware: 1.x

CE

Date: November 2011
Prod. no.: LIT 72.200.DE
Original manual

Foreword

Thank you for purchasing our VIBCONNECT RF online condition monitoring system. VIBCONNECT RF offers maximum flexibility at minimum costs for installation and operation. It caters for the continuous condition monitoring of machines for which wired systems would not be economically viable.

System properties

- Easy and fast installation without the need for wiring
- Full integration in OMNITREND PC software
- Each bridge caters for up to 50 sensor units
- Each sensor unit comes with two fully wire dual sensors for vibration and temperature
- Allows for optimized positioning of the sensors and the radio transmission unit anywhere in the machine
- Measurement of time signal
- Calculation of amplitude and envelope spectra
- Identification of broad and narrow band characteristic values
- Powered by battery or 24 V power supply
- Monitoring of battery charge
- Can be equipped with energy harvester
- IEEE 802.xxx compatible radio transmission

If you require more information, you might wish to attend a PRÜFTECHNIK seminar, which focuses on practical issues and has been found very useful by participants. Attending our seminars has proven to be a valuable investment for machine operators. To find out more, please contact us for seminar dates or visit our website at

http://www.pruftechnik.com

Ismaning, November 2011
PRÜFTECHNIK Condition Monitoring

Contents

Chapter 1: Introduction

1.1 First steps

Checking delivery

Please check the delivered goods without delay for defects or missing parts. If your delivery is incomplete or you detect defective parts, mark the respective components on the freight dockets and contact the shipping company or local PRÜFTECHNIK sales partner.

Responsibilities

The operator of the machine must ensure that:

- All applicable statutory regulations, including safety, accident prevention and environmental protection regulations, and the recognized technical safety rules are strictly adhered to
- All tasks for the proper installation of the system components are performed
- The system is installed by a qualified specialist technician
- All components and tools required for the installation are available on site (see also chapter "Installation")
- Electric power and a data network connection that conforms to the specifications are available on site
- A potential equalization connection is available on site

1.2 Service addresses

If you have any queries, contact us:

Hotline: +49 89 99616-0
E-mail: info@pruftechnik.com
Fax: +49 89 99616-300

PRÜFTECHNIK Condition Monitoring GmbH
Oskar-Messterstr. 19–21,
857373 Ismaning, Germany

Note

When calling our hotline, please have the serial number of the respective component at hand.

1.3 About this manual

This manual forms part of the product delivery and must be kept for the entire service life of the product. It might be necessary to update this document from time to time. If the product is handed on to another user, you must also hand over this manual.

Disclaimer

The information and data in this manual are provided for information purposes only. Although great care has been taken in the compilation of this document, PRÜFTECHNIK Condition Monitoring GmbH accepts no liability for the accuracy in terms of error or omission.
PRÜFTECHNIK Condition Monitoring GmbH shall not be liable for direct or indirect damage resulting from errors, omissions or inaccuracies in this document.
PRÜFTECHNIK Condition Monitoring GmbH accepts no liability for damage arising from non-compliance with the instructions in this manual.

Document structure

This manual contains important information for the proper installation, commissioning, troubleshooting maintenance, dismantling and disposal of the VIBCONNECT RF system components.

It has been complied in line with the requirements laid down in DIN EN 62079:2001.

Document layout

The text in this manual is formatted according to its purpose or function:

Explanatory text: No indent
Instructions, lists: List with • (bulleted)
General notes: *Text delimited with lines at the top and bottom, preceded by signal word* ***Note***

Note
For safety symbols and signs, refer to chapter 2 "SAFETY".

Definitions

The following short designations are used in this manual:

- VIBCONNECT RF bridge = bridge
- VIBCONNECT RF sensor unit = sensor unit
- VIBCONNECT RF sensor = sensor
- VIBCONNECT RF Condition Monitoring System = VIBCONNECT RF or system

Chapter 2: Safety

VIBCONNECT RF has been designed according to the harmonized standards and technical specifications listed below. It therefore conforms to the latest state of technology and provides best possible safety.

During installation and operation, there are, however, some residual risks that cannot be eliminated by technical measures.

Please always comply with the general safety instructions in this chapter, and with the safety instructions in the other chapters of this manual. The safety instructions tell you what you need to do to protect yourself and other persons as well as property and equipment from harm.

Please note that the system operator shall be responsible for any damage to persons or property resulting from non-compliance with the instructions in this manual.

2.1 Safety symbols

⚠ CAUTION

Instructions for the prevention of injury.
Non-compliance might result in minor or moderate injury.

Note

General notes
for the prevention of damage to property.

2.2 Information for the system operator

Duties of the system operator

During operation, maximum safety can only be achieved, if all necessary measures are taken. It is the duty of the operator to ensure that these measures are properly planned and implemented.

In particular, you must ensure that
- the system is only be used for its intended purpose
- the system is only operated when it is in proper working condition

- The system is installed and operated only by suitably qualified and authorized personnel
- All operating personnel have been instructed in the relevant occupational safety and environmental protection issues in relation to the system, and in the use of this manual, with particular reference to the safety instructions
- The responsibilities for installation, commissioning and operation have been assigned

Compliance with operating manual

You must ensure that

- This manual has been read and fully understood by all operating personnel, and that all instructions are strictly adhered to
- A copy of the manual is filed near the system and accessible at all times to the operating personnel
- The manual is handed over to any future owner of the system

Training

You must instruct the operating personnel on a regular basis on the application of all safety instructions. It is your duty to ensure that all safety instructions are strictly adhered to.

You must also instruct your personnel to comply with all statutory and other binding safety and accident prevention regulations and ensure that all warnings are observed.

As the system operator, you must ensure that all personnel work with due regard to safety.

2.3 Information for operating personnel

Qualification

The system must be commissioned and operated by properly instructed and authorized personnel. Installation and dismantling must be performed by a qualified electrician. All operating personnel must have read and fully understood the operating manual and must follow all instructions in the manual.

Personal protective equipment

All personnel involved in the installation and dismantling of the system must wear hard hats and protective goggles. No personal protective equipment is required for the operation of the system.

Rules for normal operation

The operating status of the bridge is indicated by the LED at the power supply. During normal operation, the LED is lit in green; if there is a power failure, the LED is off.

Regularly check for the following:
- Is there visible damage to the system components?
- Are any of the sensor or network cables squeezed or damaged?
- If you detect any defects, notify your supervisor and/or repair them. The system must only be operated when in proper working order!
- In the event of malfunction of the bridge or the sensor unit, disconnect the affected device from the power supply and secure it against switching on.

Please note that a failure of the system does not affect the machine operation. The machine can thus be operated as normal while the system is temporarily shut down.

2.4 Intended use

VIBCONNECT RF is a stationary, wireless system for condition monitoring of machines with roller bearings. It monitors machines by measuring the following parameters:
- Characteristic broad and narrow band vibration values
- Time signals
- Spectra
- Temperature

The system works more or less continuously. Measurements at the measuring points are performed at regular preset intervals, or based on events. The system is most suitable for machines where damage tends to occur slowly and gradually over time, which is the case with most standard machines (e.g. pumps, fans, compressors, etc.).

Sensor units that are powered through an energy harvester must only be installed in machines that operate at a constant speed in a frequency range that is adjusted for the harvester.

The system must only be operated within the limits specified in this manual.

Foreseeable misuse

The system must not be used for the monitoring of machines that are prone to damage developing over a short time (e.g. turbines).

PRÜFTECHNIK shall not be liable for any damage caused by incorrect use of the system.

2.5 Residual risks and safety measures

If installed and operated according to the instructions VIBCONNECT RF is a safe system. In the event of incorrect operation or use, the following damage might occur:

- Personal injury
- Damage to the system components or to the machine
- Impaired radio communication (poor reception/transmission)

⚠ CAUTION

Risk of injury from falling parts!

When installing a bridge at great height, there is a risk that the bridge or a tool might fall to the ground, causing injury.

» *Cordon off the area immediately below the installation site to prevent access to the danger area.*
» *Use fall-arresting equipment.*

⚠ CAUTION

Risk of injury from electric shock!

When connecting the bridge to the power supply without taking the necessary safety precautions, there is a risk of energy from high voltage (220 V).

» *The electrical connection must be established by a qualified electrician.*
» *The mains voltage must conform to the IEC guidelines.*
» *An external interface (fuse or switch) must be provided in order to disconnect the power supply securely.*
» *Before carrying out any installation, repair or maintenance work on the bridge, disconnect it from the power supply.*

⚠ CAUTION

Risk of injury from rotating machine parts!

When installing the sensor unit and the sensors while the machine is running, there is a risk of serious injury caused by exposed, moving machine parts.

» *Do not remove any guards on the machine.*
» *Always adhere to the safety instructions for work on running*

machinery.

Note

Risk of damage to equipment while housing is open!

Touching the electronic components on the mother board can lead to electrostatic discharge, which can damage system components.

» *If contact with such components cannot be excluded, wear an earthing wristband.*

Note

EMC

High-frequency radiation and electrostatic discharge (ESC) near the sensors can lead to incorrect measurements.

» *Do not install sensor cables in high-voltage cable ducts.*

Note

Avoid potential loops when extending the antenna

If you need to extend the antenna from the housing to achieve better reception, the antenna cable might cause a potential in the sensor unit / bridge.

» *Install the antenna cable so that potential differences are avoided.*

CERTIFICATE

Declaration of Conformity

according to EN ISO/IEC 17050-1

PRÜFTECHNIK Condition Monitoring GmbH
Oskar-Messter Str. 19–21, 85737 Ismaning, Germany
herewith declares that product

CE

Designation: **VIBCONNECT RF**
Product nos.: **VIB 7.200-XX / VIB 7.205-2.9 / VIB 7.210-XX / VIB 7.220-X**
Description: **Condition monitoring system with radio communication**

conforms to the applicable European Directives and standards. The product fully complies with the relevant safety requirements laid down in the directives.

Directive

EMC Directive 2004/108/EC

Applied standards

DIN EN 61000-6-1:2007
Electromagnetic compatibility – Immunity for residential, commercial and light industrial environments

DIN EN 61000-6-2:2006
Electromagnetic compatibility – Interference resistance for industrial environment

DIN EN 61000-6-3:2007
Electromagnetic compatibility – Interference emission for residential, commercial and light industrial environments

DIN EN 60204-1:2006
Safety of machinery – Electrical equipment of machines: General requirements

The CE mark was applied in 2011.

Ismaning, 3 December 2011
Place, date

Johann Lösl – Managing Director

PRÜFTECHNIK

TÜV MANAGEMENT SERVICE ISO 9001

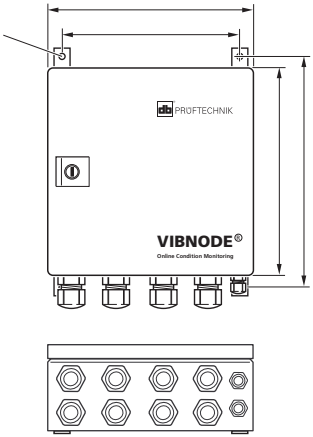
Quality management system certified according to EN ISO 9001: 2008

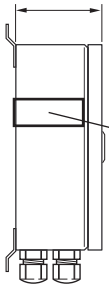
VIBCONNECT RF 11.2011

Chapter 3: Technical data

VIBCONNECT RF Bridge – VIB 7.220-...

Capacity
up to 50 sensor units
Radio transmission frequency band
ISM 868 MHz (Europe) – VIB 7.220-N
ISM 915 MHz (USA) – VIB 7.220-F
Ethernet
Baud rate: 10 / 100 Mbit/s
Power supply
100 ... 240 VAC / 50-60 Hz
Protection class
IP 66
Operating temperature
–25 °C ... +60 °C
Relative humidity
< 95 %, non-condensing
Housing
Steel, powder-coated
Weight
1.8 kg
Dimensions





Type plate with serial number

VIBCONNECT RF sensor unit – VIB 7.200-...

Measuring channels
Two synchronized channels. Each channel allows for the simultaneous measurement of vibration and temperature by the VIBCONNECT RF sensor.

Radio transmission frequency band
ISM 868 MHz (Europe) – VIB 7.200-N..U
ISM 915 MHz (USA) – VIB 7.200-F..U

Radio range
up to 300 meters (open field)

Power supply
a) 2 lithium batteries
b) 24 VDC
c) Energy harvester
(optimized for 50 Hz, 60 Hz, 100 Hz or 120 Hz vibration frequency)

Battery type
3.6 V lithium battery, size C

Battery service life
3 years, at 1 measuring sequence* per hour at 20 °C
* 2x vibration + 2x temperature

Protection class
IP 65

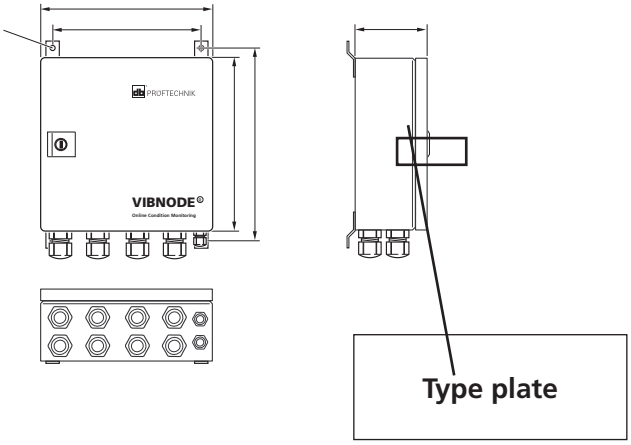
Operating temperature
-25 °C ... +80 °C

Relative humidity
< 95 %, non-condensing

Housing
ABS, shatter-proof

Weight
450 g (including batteries)
360 g (with supply via 24 VDC/energy harvester)

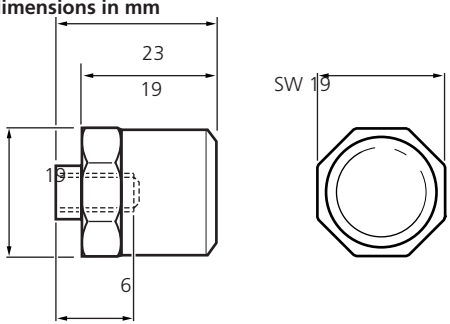
Dimensions



VIBCONNECT RF Sensor – VIB 7.205-2,9

Sensor type
Vibration acceleration sensor with integrated temperature sensor
Transmission factor
3.5 mV / ms^{-2} (± 10 %)
Linearity
± 500 ms^{-2} (rms)
Frequency range
10 Hz ... 10 kHz (± 3 dB)
Resonance frequency
29 kHz
Temperature measuring range
–40 °C ... +125 °C
Accuracy
±3 °C
Cable type
3-wire cable, shielded
Cable length
2.9 m
Wiring
AWG24; red: 5 VDC supply/black: temperature signal
white: vibration signal/shielding: GND
Chemical resistance of cable
Acids, alkalines, oils, fuels: very high resistance
Protection class
IP 65
Relative humidity
< 95 %, non-condensing
Fixture to machine
Mounting adapter with UNF 1/4" thread

Original size, dimensions in mm



Measuring tasks

(configurable through OMNITREND PC software)

Maximum number of measuring tasks per measuring point

4x vibration, 1x temperature (min. 1x vibration per measuring point)

Time signals

Vibration acceleration to 10 kHz
Vibration velocity to 10 kHz

Amplitude spectra

Vibration acceleration to 10 kHz
Vibration velocity to 1 kHz, 3 kHz or 10 kHz
Number of lines: 3200

Envelope spectra

Vibration acceleration to 3.2 kHz
Vibration acceleration to 1 kHz

Broad band values

Vibration acceleration 10 Hz to 6 kHz
Vibration velocity 10 Hz to 1 kHz
as 0-p, p-p, RMS

Chapter 4: System description

VIBCONNECT RF is a stationary, radio-based online condition monitoring system designed for easy installation and operation. The system consists of the following components:

1. VIBCONNECT RF bridge
2. VIBCONNECT RF sensor unit
3. VIBCONNECT RF sensor for vibration and temperature

4.1 VIBCONNECT RF bridge

The bridge is the central reception and transmission unit in wireless network (star topology) that can include up to 50 sensor units (see also "Topology of wireless network", page 24). It receives the measurements from the sensor unit(s), processes them and transfers them to the OMNITREND software for evaluation and archiving. The bridge is supplied by the OMNITREND software with the measuring configurations* for each measuring point and forwards this information via radio signal to the respective sensor units.

* **Measuring configuration =** measuring task + trigger settings + band analysis (if required)

Detailed description of function

OMNITREND loads the measuring configurations to the bridge, which is connected through a patch cable to the local network. The bridge then transmits this information via radio signal to the respective sensor units. This happens as soon as these sensor units signal to the bridge that they are active. The data transfer is bidirectional, i.e. the bridge can only communicate with one sensor unit at any one time.

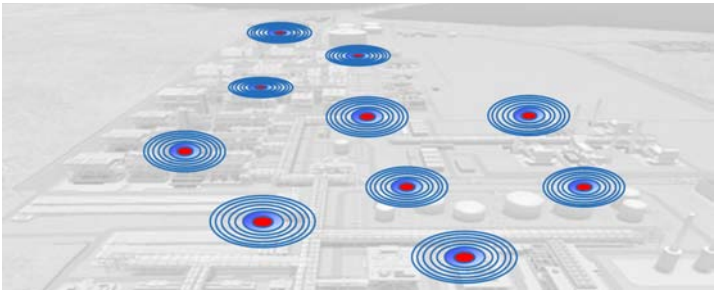
For vibration measurements, the sensor unit only records the related time signal. The further processing and analysis of the time signal

(characteristic value, FFT spectrum, envelopes) are performed on the bridge.

The bridge is equipped with a built-in memory, containing the actual measuring configurations and the measurements that have not yet been transferred to the OMNITREND software. Measurements that have been written to OMNITREND are automatically deleted from the bridge memory.

Note

The measurement import must be started manually in the OMNITREND software. Ensure that the data is regularly written to OMNITREND. Otherwise, the memory capacity of the bridge might be exceeded so the oldest measurements are automatically overwritten with the latest ones.



Large industrial sites can be serviced by installing several bridges, whereby the number of bridges is not limited.

For optimum reception, install the bridge in an exposed location, preferably within sight contact of all connected sensor units. The transmission range in the open field is maximum 300 m (optimum conditions). For larger machine parks, you might need to install several bridges operating separate wireless networks.

The bridge is powered by mains power.

4.2 VIBCONNECT RF sensor unit

The sensor unit is the transmitter and receiver unit attached to the machine. Each sensor unit comes with one or two connected sensors for the simultaneous measurement of vibration and temperature. By separating the sensors from the radio unit, it is possible to position the components in the most suitable locations on the machine. For sensors, these are the points with the highest signal level. For the sensor unit (transmitter/receiver), it is the point of best radio reception.

The sensor unit receives the measuring tasks from the bridge and performs them by means of the connected sensors. For vibration measurements, only the related time signal is recorded (see also "Detailed description of function", page 19). For each measuring point, up to four vibration measurements and one temperature measurement can be configured.

The sensor unit can be powered from three different sources:

- Battery
- 24 VDC
- Energy harvester

Sensor unit with two sensors, for vibration and temperature measurement respectively.

Battery

The VIB 7.200-FBU/VIB 7.200-NBU sensor units are powered by two lithium batteries. The battery charge level is automatically signalled to the bridge at each measurement transfer and displayed in OMNITREND. If a battery needs to be changed, a warning is displayed when the software is started.

The batteries are not included in the scope of delivery and must be purchased separately.
Battery type: 3.6 V lithium, size C (e.g.. Tadrian, type: SL-2770)

24 VDC

For VIB 7.200-FVU/VIB 7.200-NVU sensor units, the system operator must provide a 24 VDC power connection at the location of installation.

Energy harvester

For VIB 7.200-FHU / VIB 7.200-NHU sensor units, the operator must install an energy harvester (VIB 7.210-xxx*) that converts the vibration energy of the machine into electric power. This can only be done, if the machine speed is constant and within the useful frequency range of the energy harvester.

*xxx = 50, 60, 100, 120 (frequency range in Hz)

Operating cycle: measuring, sending, idling

The sensor unit performs the measuring tasks at preset intervals, sends the data and then returns to idle to save energy.

Event-controlled measurement

In addition to the time-controlled measurements, the sensor unit can be configured to perform vibration measurements based on events. In this mode, the sensor unit continuously monitors the respective measuring channel and automatically starts a measurement when the vibration exceeds a preset level (0-p). The power consumption for continuous monitoring is lower than that for actual measurements. For technical reasons, only one event-controlled measurement can be performed within the interval between two time-controlled measurements. The triggering conditions for each measuring task are set in OMNITREND.

Measuring time, transmission time, idle time

Each measuring sequence takes about 3 seconds, while the sending of the data might take up to 30 seconds. The duration of the idle phase is set in OMNITREND for each sensor unit to a time between 30 minutes and 1 week.

To explain the function of a sensor unit in a radio cell, a number of typical scenarios are described below in the form of questions and answers.

How does the bridge detect a sensor unit?

- Each sensor unit is assigned a unique code, known as the MAC address. This code is pre-programmed in the radio module and cannot be altered. A sensor unit is assigned to a bridge in the OMNITREND software, using its MAC address.

Note

The MAC address of a sensor unit is engraved in its cover. In addition, each sensor unit is equipped with an adhesive label bearing the MAC address that is used for the configuration of the measuring point database (see also "Installing sensor unit", page 40).

What happens, if ...

... a sensor unit "wakes up" from its idle time?

- The sensor unit first checks whether the idle time has been terminated based on the timer settings or due to an event (time-controlled or event controlled operation). It then performs the measurements, using the current measuring configuration, and transfers the data via radio signal to the bridge. The bridge confirms receipt of the data and sends a new measuring configuration to the sensor unit, if this is required. Subsequently, the sensor unit returns to idle mode.

... the radio channel is used by another sensor unit?

- The sensor unit waits for 2 seconds and then checks again whether the radio channel is available.

... the power supply to the sensor unit has been temporarily interrupted?

- When the sensor unit is switched off, the measuring configuration data is lost. When the unit is switched on again, it automatically requests a new configuration from the bridge. After this configuration has been received, the required measurements are performed and the data is sent to the bridge.

... a sensor unit is within the radio range of two bridges?

- Each sensor unit is assigned to one bridge in the OMNITREND software. All requests sent by the sensor unit are only replied to by this bridge.

... a sensor unit is installed in an existing radio cell?

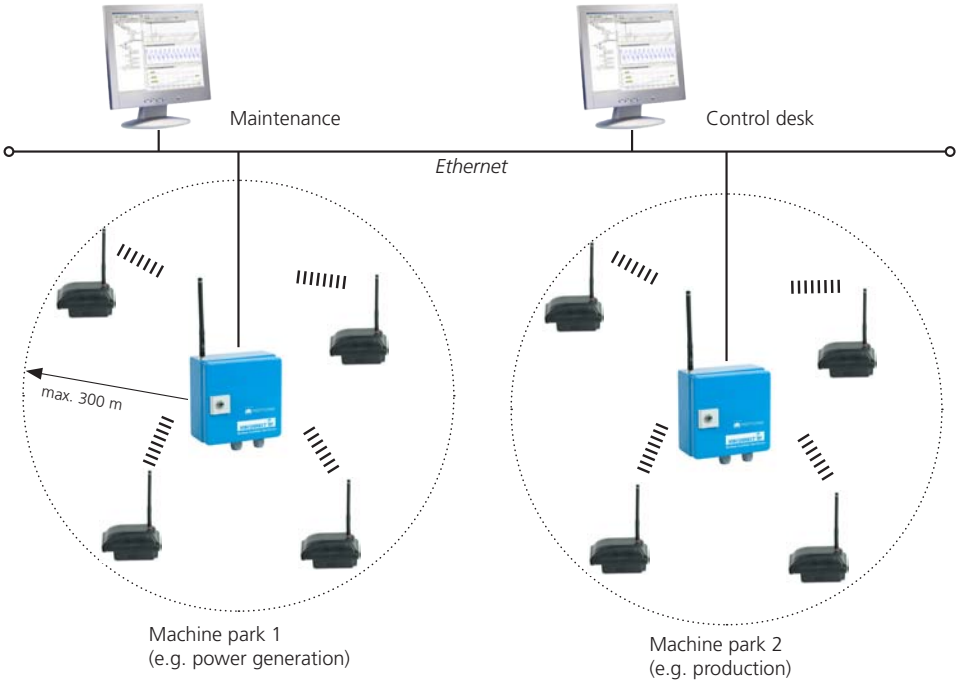
- Before installing the sensor unit, you must locate the point with the best radio reception. To do this, set the sensor unit to commissioning mode to measure the reception field strength at various possible locations of installation. Then install the sensors on the machine, connect them to the sensor unit and start the system. In a further step, configure the respective measuring points in OMNITREND. The relevant measuring configuration is then transmitted to the bridge with the best radio reception field strength.

Topology of radio cell

The radio network is of a star formation, and each sensor unit communicates with the bridge through bidirectional communication. The individual sensor units cannot communicate with each other.

This ensures that additional sensor units can be added to a cell at any time without affecting the existing components. The failure or switching off of a sensor unit does not in any way affect the rest of the network.

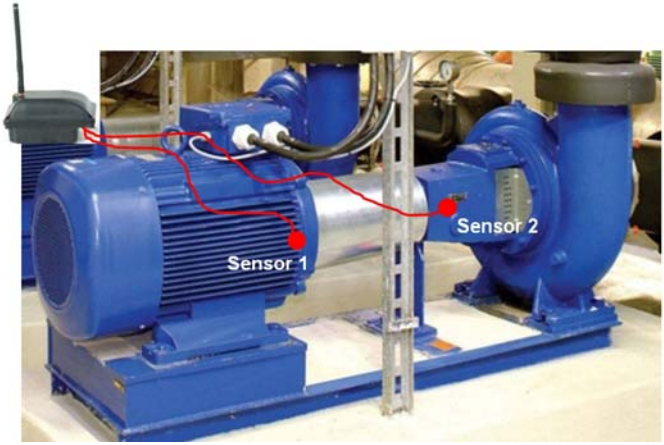
VIBCONNECT RF radio cells are of a star formation.



4.3 VIBCONNECT RF sensor

The sensor simultaneously measures the vibration acceleration and the temperature. It is equipped with a 2.9 m cable and is extremely compact, requiring only minimum space. It can thus be positioned at the best possible measuring point on the machine and connected to the sensor unit that is within the radio range of the bridge.

The sensor is mounted with a M8 threaded bolt to the machine. For special requirements, we supply adhesive and magnetic adapters (optional accessories).



Chapter 5: Installation & commissioning

5.1 Quick guide

5.1.1 Initial installation of system / radio cell

In OMNITREND at PC workstation

1. Register device driver
2. Set up measuring point database
3. Print measuring point report
4. Adjust IP address at the bridge

On site

5. Install and start bridge
6. Install sensor unit
7. Install sensors and connect them to the sensor unit
8. Enter the following data in the measuring point report: MAC address of sensor unit, measuring channel, measuring point
9. Start sensor unit
10. For additional sensor units, perform steps 6 to 9

In OMNITREND

11. Register bridge in OMNITREND
12. Register sensor units in OMNITREND
13. Assign measuring points to the bridge and the sensor unit (see measuring point report)
14. Configure measuring channels (see measuring point report)
15. Create measuring configuration for each measuring channel
16. Load measuring configurations to the bridge
17. Import first measurement data in OMNITREND

5.1.2 Subsequent installation of additional sensor unit

In OMNITREND

1. Add new measuring points to the measuring point database
2. Print measuring point report for the respective machine section

On site

3. Install sensor unit
4. Install sensors and connect them to the sensor unit
5. Enter the following data in the measuring point report: measuring channel, measuring point, MAC address of sensor unit
6. Start sensor unit

In OMNITREND

7. Register sensor unit in OMNITREND
8. Assign measuring points to the bridge and the sensor unit (see measuring point report)
9. Configure measuring channels (see measuring point report)
10. Create measuring configuration for each measuring channel
11. Load measuring configurations to the bridge
12. Import first measurement data in OMNITREND

As the system is based on wireless communication, the installation of the components is very simple. All you need to do is installing and connecting the bridge, the sensor unit(s) and the sensors. The few cable connections required for the system are normally short and easy to establish:

- Bridge: Power cable and network connection
- Sensor: Connection of sensor cable to sensor unit
- Sensor unit: 24 V or energy harvester power cable

Before installing the system in the machine park, configure the bridge in the OMNITREND software.

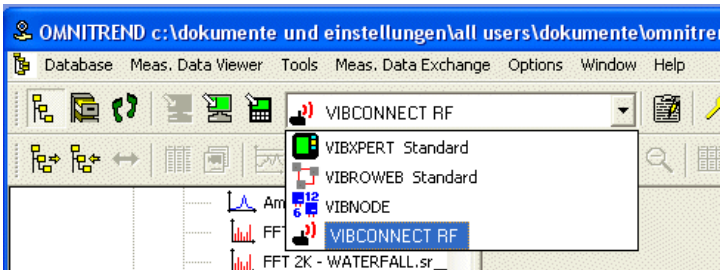
5.2 Configuration in OMNITREND

Note

These instructions assume that the operator is familiar with the OMNITREND software and its features. The instructions below are therefore kept brief.

5.2.1 Installing and registering device drivers

- Start OMNITREND.
- In the main menu, click <Options>/<Registration/Configuration>.
- In the 'Registration' window, click the <New (Demo) Version> button.
- Open the OMNITREND installation directory and select the 'VIBCONNECT_RF.OMT' device driver file.
- Click <Open>. The device driver is now being installed and registered (no need for activation by password).
- Click the <Close> button to close the 'Registration' dialog.
- In the device driver list, select 'VIBCONNECT RF'. OMNITREND and the yet to be created measuring point database are now set up to suit VIBCONNECT RF.



Activate VIBCONNECT RF device driver in OMNITREND.

5.2.2 Setting up measuring point database

- In the OMNITREND *Machinery Manager*, set up the tree structure for the machine park to be monitored, including a measuring point hierarchy.
- Select measuring point type 'Online'.

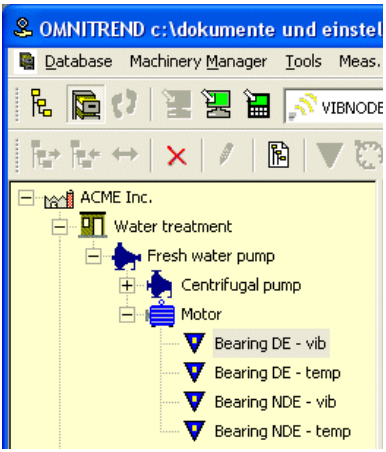
Online
Measuring point type for VIBCONNECT RF

*The term "measuring point" refers to the measuring channel of a sensor.

Note

If a sensor is to measure both vibration and temperature, you must set up two separate measuring points for this sensor. To facilitate the assignment of the measuring channels, we suggest that you include the type of measurement in the name of the measuring point (see screenshot). For more information on how to create a measuring point database, please refer to the OMNITREND online help.*

Typical machine tree with four measuring points at the motor for one sensor unit (2x vibration, 2x temperature).



5.2.3 Creating and printing measuring point report

During installation, you add the following information to the printed report:

- Machine on which the sensor unit is installed
- Measuring channel for each measuring point in the OMNITREND database

This information is required for the measuring configuration in OMNITREND. The report can be created to include all entries in the database or only a selection of records.

- To choose the records to be included in the report, open the *Machinery Manager*, and select the entry in the database tree for which you wish to create a report.
- Click <Tools>, <Reports> and <Report Selector>.
- Activate option 'Database Report' and click the <Next> button.
- In the subsequently displayed window, select option <Tree> and click the <Next> button.
- In the next window, select option <Meas. point info/meas. points>.
- To generate the report, click the <Finish> button.
- A list showing the measuring points and the respective machines is generated. To locate the points in the machine park, follow the path in the database.
- Print a copy of the report.

Pruftechnik Condition Monitoring
Oskar-Messter-Str. 19 - 21
85737 Ismaning
Germany
SW only for demonstration purposes

Date/Time 18.11.2011 14:46:01

Comments

ACME Inc.\Water treatment\Fresh water pump
Centrifugal pump
1. Bearing DE - vib
2. Bearing NDE - vib
Motor
3. Bearing DE - vib
4. Bearing DE - temp
5. Bearing NDE - vib
6. Bearing NDE - temp

Measuring point report for a machine train consisting of a pump and a motor.

5.3 Installation & commissioning of bridge

The bridge is contacted by OMNITREND through the network (Ethernet). The bridge is addressed through the IP address of the bridge. The factory-set address is:

192.168.63.01

If the address range of your network differs from the standard range (e.g. 172. ... or 10. ...), adjust the IP address of the bridge accordingly before you install the bridge in the machine park.

5.3.1 Changing IP address of bridge

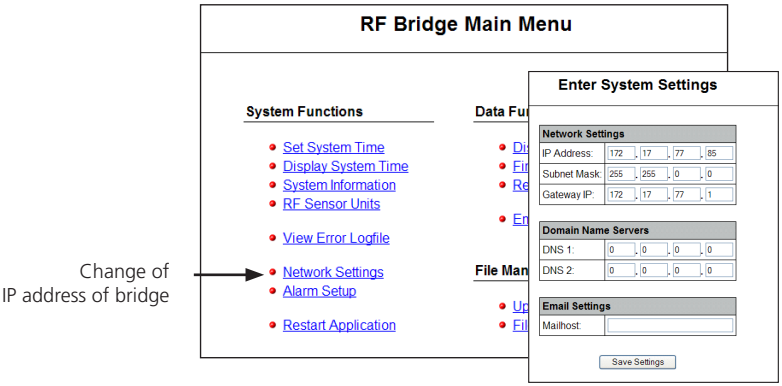
Note

The following steps must be carried out at a PC workstation that features a free network port and is located near a power socket. You also need an electric power cable to power the bridge. One end of the cable must be equipped with a suitable plug, while the other end must be prepared for connection to the bridge (see "Connecting bridge", page 34).

- Assign a static IP address that is within the range 192.168.... to the PC.
- Connect the bridge to the network and then to the power source.
- Enter the IP address of the bridge in the browser (see above). If no connection is established, change the connection settings of your browser (proxy server, firewall, etc.).
- In the login dialog, enter the following:

  User name: **user3**
  Password: **user3**

The main menu of the bridge is displayed.



- Click <Network Settings> and enter the new IP address for the bridge. If required, change the address of the Subnet Mask and Gateway, and then click the <Save Settings> button.

Note

Note down the new IP address of the bridge as it might be needed for maintenance or repairs. If you are unsure about the correct addressing procedure within your network, contact the network administrator.

- Repeat the above steps for all other bridges.
- Then reset the IP address of the PC to the initial one.

Preparations are now complete, whereupon the following requirements for installation on site have been created:

- Creation of measuring point report to document locations of installation
- Configuration of the bridge for proper integration into the company network

Proceed with installing the system components in the machine park. This must be done in the following sequence:

1. Installation of bridge
2. Installation of sensor unit
3. Installation of sensors

5.3.2 Installation requirements

For proper installation of the equipment on site, the operator must ensure that the following requirements are met:

Personnel qualification

The devices must be installed by a qualified electrician.

Location of installation

The bridge must be installed at an exposed position to ensure optimum radio reception from all machines in the radio cell. Ensure that there is sufficient space available for the installation of the bridge, so that it does not in any way interfere with the operation of the existing machine components.

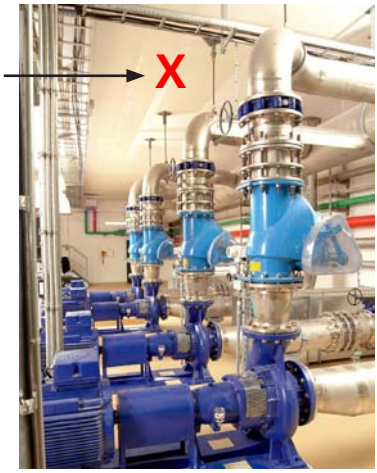
Permissible ambient conditions

Temperature: –25 °C to +60 °C
Relative air humidity: max. 95 %, non-condensing

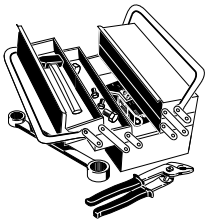
The bridge must not be installed in a location that is near a strong electromagnetic field (e.g. generator, high-voltage cable, electric drive unit, etc.).

Required connections

Power supply: 100–240 V AC, 50/60 Hz
0.33–0.19 A
Network: Ethernet with TCP/IP, baud rate: 10/100 Mbit/s



The bridge must be installed at an exposed location that is within sight of the machines.



Tools and materials

- Power drill, drill bit and thread cutter for M7 bolts
- M7 bolts and matching washers for fixture of bridge (4 bolts per bridge)
- Open-end spanner of suitable size
- Open-end spanner (size 22) for M16 cable glands
- 3-wire electric cable of appropriate length for power supply line
- Ferrules for connection of power supply line
- Ring terminal for connection of earth conductor to PE
- Industrial Ethernet cable (CAT 5) for data of appropriate length
- Standard tools for electrical installation (wire cutter, cable stripper, screwdriver)
- Suitable strain relief devices for cables
- If required: WLAN antenna extension cable (SMA)

⚠ CAUTION

Risk of injury from falling parts!

When installing a bridge at great height, there is a risk that the bridge or a tool might fall to the ground, causing injury.

» *Cordon off the area immediately below the installation site to prevent access to the danger area.*
» *Use fall-arresting equipment.*

5.3.3 Mounting bridge

- Drill four holes at a suitable location of installation. For the drill pattern, refer to the fixing tabs on the housing in the dimensional drawing in chapter 3 “Technical data”.
- Secure the bridge with four bolts to the machine.
- If radio reception at the location of installation is poor, remove the antenna from the housing and mount it in a suitable location. To connect the antenna to the bridge, use a SMA cable of appropriate length.

Note

Avoiding potential loops

If the antenna connection cable must be extended, ensure that you do not inadvertently create a potential loop.

» *The antenna cable must be installed so that potential differences are avoided.*

5.3.4 Connecting bridge

- Feed the network cable through the left gland and the power cable through the right gland.
- Connect the bridge to the data network and to the power source as shown in the following diagram.

⚠ CAUTION

Risk of injury from electric shock!

When connecting the bridge to the power supply without taking the necessary safety precautions, there is a risk of energy from high voltage (220 V).

» *The electrical connection must be established by a qualified electrician.*

» *The mains voltage must conform to the IEC guidelines.*

» *An external interface (fuse or switch) must be provided in order to disconnect the power supply securely.*

» *Before carrying out any installation, repair or maintenance work on the bridge, disconnect it from the power supply.*

Note

Risk of damage to equipment while housing is open!

Touching the electronic components on the mother board can lead to electrostatic discharge, which can damage system components.

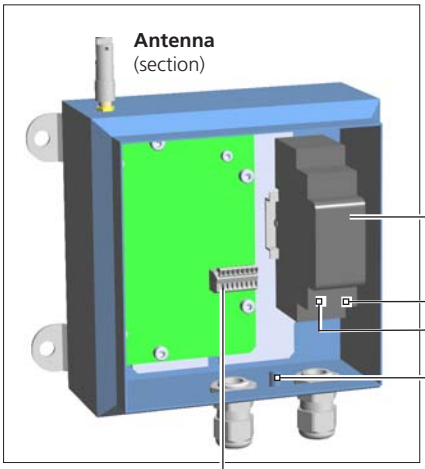
» *If contact with such components cannot be excluded, wear an earthing wristband.*

5.3.5 Commissioning bridge

- Before commissioning the bridge, check whether all cable connections and fixtures of the bridge are correctly executed.
- Switch on the power supply of the bridge.

The green LED on the power supply is on. After the operating software has fully booted (approx. 1 minute), the bridge is ready for operation.

5.3.6 Overview of connections and interfaces



Power supply

Terminal	Wire colour
N: Neutral conductor	blue
L: Phase	brown or black
PE: Protective earth conductor	green/yellow

EIA-TIA 568A	
Terminal	**Wire colour**
1	WH-GN (white/green)
2	GN (green)
3	WH-OG (white/orange)
4	BU (blue)
5	WH-BU (white-blue)
6	OG (orange)
7	WH-BN (white/brown)
8	BN (brown)

Technical data
Terminal strip for network connection:
- Crimp terminals
- Cross-section: < 0.5 mm²

Terminal strip on power supply:
- Screw terminals
- Size: < 1.5 mm²

Cable glands
- Size: M16

Clamping range: 5 ... 10 mm

Installation & commissioning of sensor unit

The operator of the system must ensure that the following conditions are met and all necessary preparations are completed.

Location of installation

- The sensor unit must be mounted on or near the machine. Choose a suitable position on the machine that is only exposed to low vibration. Alternatively, provide a suitable holder for the sensor unit.
- Ensure that the location of installation has good radio reception. Measure the reception field strength at several, potentially suitable installation points (see "Measuring reception field strength at location of installation", page 38).
- The distance between the measuring point and the sensor unit can be bridged with the 2.9 m sensor cable; before mounting the sensor unit and the sensors, ensure that they are not more than 2.9 m apart.

Permissible ambient conditions

Temperature range for sensor unit: –25 °C to +80 °C
Relative air humidity: max. 95 %, non-condensing

The sensor unit must not be installed in a location that is near a strong electromagnetic field (e.g. generator, high-voltage cable, electric drive unit, etc.).

Required connections/batteries:

- 24 V DC for sensor units VIB 7.200-FVU, VIB 7.200-NVU
- 3.6 V lithium batteries, size C; 2 batteries per sensor unit for VIB 7.200-FBU, VIB 7.200-NBU

Tools and materials

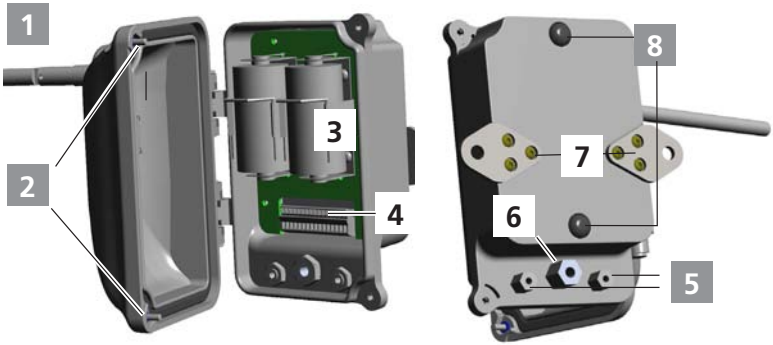
- Power drill, drill bit and thread cutter for M5 bolts
- M5 bolts and matching washers for fixture of sensor unit (2 bolts per sensor unit)
- Open-end spanner of suitable size
- Ferrules for connection of sensor line
- Standard tools for electrical installation (wire cutter, cable stripper, screwdriver)
- Suitable strain relief devices for cables
- If required: WLAN antenna extension cable (SMA)

For 24V sensor unit:

- 3-wire electric power cable for power supply line
- Ferrules for connection of power supply line

5.4.1 Overview of connections and interfaces

Battery-powered sensor unit
VIB 7.200-FBU or VIB 7.200-NBU



1. Antenna
2. Cover fixtures (Allen screws)
3. Lithium batteries
4. Terminal strip*
5. Cable gland for sensor line
6. Cable gland for 24V power supply cable/energy harvester cable
7. Fixing tabs for sensor unit
8. Vibration dampers

* the 24 V version is equipped with a second terminal strip for power supply

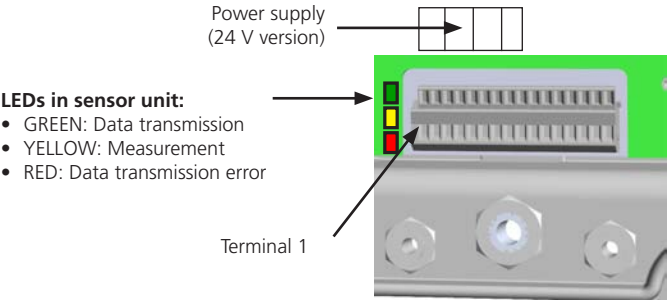
Terminal strip: sensor/power supply		
Terminal		**Function**
Sensor 1	1	5 VDC power supply (red wire)
	2	Vibration signal (white wire)
	3	Temperature signal (black wire)
	4	Shield earthing line, GND
Energy harvester/commissioning	5	Short-circuit bridge (commissioning)
	6	Short-circuit bridge (commissioning)
	7	+8 V (energy harvester)
	8	GND (energy harvester)
	9	7–9 V (external power supply)
	10	GND (external power supply)
	11	Reception field strength (0..1.25 V)
	12	Reception field strength (0..1.25 V)
Sensor 2	13	5 VDC power supply (red wire)
	14	Vibration signal (white wire)
	15	Temperature signal (black wire)
	16	Shield earthing line, GND

Additional terminal strip, 24V version		
Terminal		**Function**
Power supply	1	24 V
	2	
	3	GND
	4	

Technical data
Terminal strip:
- Crimp terminals
- Cross-section: < 0.5 mm²

Cable glands
- Size: M6 (sensor line)
- Clamping range: 2 ... 3.2 mm
- Size: M8 (24 V/harvester)
- Clamping range: 3 ... 5 mm

Terminal strips and LEDs in sensor unit



5.4.2 Measuring reception field strength at location of installation

- Open the sensor unit housing by loosening the two screws of the cover (size 2.5 Allen screws).

Note

Risk of damage to equipment while housing is open!

Touching the electronic components on the mother board can lead to electrostatic discharge, which can damage the sensor unit.

» *If contact with such components cannot be excluded, wear an earthing wristband.*

- Insert the batteries or connect the sensor unit to the 24 V power source respectively (for details, see "Connecting sensor unit", page 41).
- Connect a voltmeter to terminals 11 and 12.
- Short-circuit terminals 5 and 6 with a wire bridge.

Note

The sensor unit now sends repeat requests for a measuring configuration to the bridge. If the bridge is within the transmission range of the sensor unit, it responds by sending a measuring configuration or a test log without data content. By short-circuiting terminals 5 and 6, the bridge and the sensor unit remain in permanent communication, and the reception field strength at terminals 11 and 12 is indicated in the form of a voltage level.

- Wait for approx. 3–4 seconds until the reception/voltage has stabilized. Wait for approx. 3–4 seconds until the reception/ voltage has stabilized.
  U > 0.1 V: Reception OK
  $U_{max.}$ = 1.25 V
- If radio reception at the location of installation is poor, remove the antenna from the housing and mount it in a suitable location. To connect the antenna to the sensor unit, use a SMA cable of appropriate length.
- After completion of the field strength measurement, remove the short-circuit bridges and the voltmeter.
- If you do not intend to commission the sensor unit at that point in time, remove one of the batteries to save energy.

Notes

Avoiding potential loops

If the antenna connection cable must be extended, ensure that you do not inadvertently create a potential loop.

» *The antenna cable must be installed so that potential differences are avoided.*

Maintaining battery charge

Until the sensor unit has received a valid measuring configuration from the bridge, it continuously sends out requests, using battery power.

» *If you wish to program the measuring configuration at a later stage, switch off battery-powered sensor units by removing one battery.*

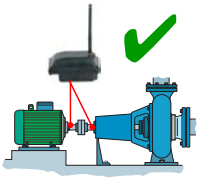
5.4.3 Mounting sensor unit

⚠ CAUTION

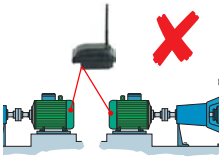
Risk of injury from rotating machine parts!

When installing the sensor unit while the machine is running, there is a risk of serious injury caused by exposed, moving machine parts.

» *Do not remove any guards on the machine.*
» *Always adhere to the safety instructions for work on running machinery.*



- Install the sensor unit at the location with the best possible radio reception.
- Drill two mounting holes. For the drill pattern, refer to the fixing tabs on the housing in the dimensional drawing in chapter 3 "Technical data".
- Secure the sensor unit with two bolts to the machine.



Note

It is also possible to use one sensor unit to monitor two separate machines of a machine train, for example in cases where only the bearing at the coupling side of the motor and the pump are to be monitored. It is, however, not possible to monitor two separate machine trains with a single sensor unit.

- Document the location of installation of the sensor unit in the measuring point report as follows: Each sensor unit is supplied with an adhesive label on which the MAC address of the sensor unit is printed. Remove this label and stick it to the measuring point report beside the name of the respective machine or machine train.

Adhere the label bearing the MAC address of the sensor unit on the measuring point report.

ACME Inc.\Water treatment\Fresh water pump\
Centrifugal pump
1. Bearing DE - vib
2. Bearing NDE - vib
Motor
3. Bearing DE - vib
4. Bearing DE - temp
5. Bearing NDE - vib
6. Bearing NDE - temp

1B-8F-DC-4C-00-38

1B-8F-DC-4C-00-36

5.4.4 Connecting sensor unit

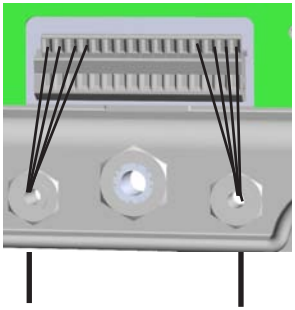
Note

The sensor cables must only be connected to the sensor unit after the sensors have been installed, so that you have the option to extend or shorten the cables if required (see also, "Installation of sensors", page 43).

- Open the sensor unit and feed the sensor cable through the cable gland provided.
- Connect the four tinned cable strands to the respective terminals for sensor 1 and sensor 2 (see also "Sensor unit: Overview of connections and interfaces", page 37).

Note

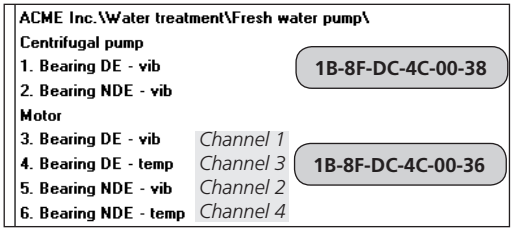
Each sensor can measure two channels. The assignment of the channels to the terminals is pre-configured as shown in the diagram below.



Terminal		CHANNEL	Function
Sensor 1	1	--	Power supply
	2	**1**	Vibration
	3	**3**	Temperature
	4	--	GND
Sensor 2	13	--	Power supply
	14	**2**	Vibration
	15	**4**	Temperature
	16	--	GND

The left sensor 1 is assigned to channels 1 and 3; the right sensor 2 is assigned to channels 2 and 4 (sectional diagram of terminal strip in sensor unit).

- In the measuring point report, document the channel assignment of the measuring points.



In the measuring point report, note down the channel assignment of the measuring points.

Sensor unit with external 24 V power supply:

- Connect the power supply cable to the second, 4-pin terminal strip (see also "Sensor unit: Overview of connections and interfaces", page 37).
- Tighten the cable glands at the sensor unit and close the housing.

5.4.5 Commissioning sensor unit

- Switch on the power supply of the sensor unit (insert battery, switch on 24 V power supply).

Note

Maintaining battery charge

Until the sensor unit has received a valid measuring configuration from the bridge, it continuously sends out requests, using battery power.

» *If you wish to program the measuring configuration at a later stage, switch off battery-powered sensor units by removing one battery.*

5.5 Installation of sensors

For proper installation of the sensors on site, the operator must ensure that the following requirements are met:

Location of installation

- The sensors are secured to the machine with the supplied M8 threaded bolt or with a suitable mounting adapter.
- Observe the rules for the choice of measuring points for vibration measurements.

Permissible ambient conditions

Temperature: −40 °C to +125 °C
Relative air humidity: max. 95 %, non-condensing
The sensors must not be installed in a location that is near a strong electromagnetic field (e.g. generator, high-voltage cable, electric drive unit, etc.).

Tools and materials

- Mounting adapter: Screw adapter (VIB 3.480*), adhesive adapter (VIB 3.418), magnetic adapter (VIB 3.423). For special tools and auxiliary materials required for the attachment of the various adapters, see chapter for adapter installation.
- Standard tools for electrical installation (wire cutter, cable stripper, screwdriver).
- Suitable strain relief devices for cables.

* included in scope of delivery

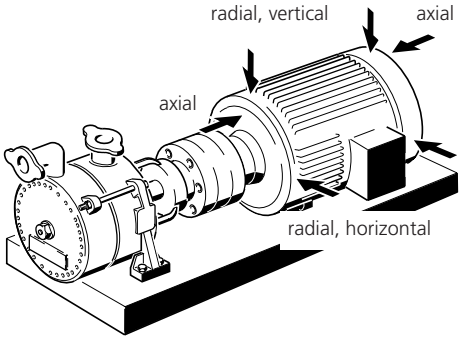
5.5.1 Choosing the measuring points

When choosing a location of installation for a sensor observe the following rules to ensure optimum signal transmission:

- Mount sensor in radial measuring direction (i.e. perpendicular to shaft, in vertical or horizontal position).
- Axial measuring points are recommended to monitor the machine for the following defects or faults: Misalignment, damaged geared wheels, loose fixtures, bent shafts, etc.
- Machines mounted on rigid foundations show high horizontal vibration. Fixed anchoring suppresses vertical vibration.
- Machines mounted on vibration-damped foundations show vibration that is equally strong in horizontal and vertical direction.
- The frequency behaviour and dynamic range of the sensor can be significantly influenced by the way the sensor is attached. Weak coupling to the measuring point results in attenuated signals and limits the frequency range. The sensor must be secured to the measuring point in a rigid, friction-locked way and free

of contact resonance. This is particularly important for measurements at high frequency.

Suitable measuring points on the machine



5.5.2 Mounting sensor

⚠ CAUTION

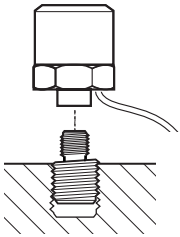
Risk of injury from rotating machine parts!

When installing the sensors while the machine is running, there is a risk of serious injury caused by exposed, moving machine parts.

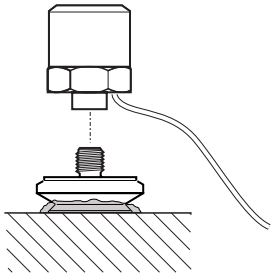
» *Do not remove any guards on the machine.*
» *Always adhere to the safety instructions for work on running machinery.*

Thanks to the compact design and cabling, the sensor can be installed in locations where limited space is available, using a suitable adapter.

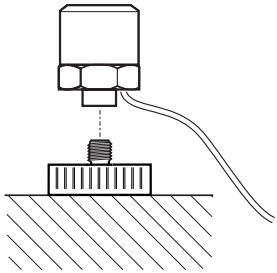
Screwing the sensor to the machine is, however, the most secure and stable option (VIB 3.480 adapter). The adapter with adhesive base (VIB 3.418) has been designed for attachment to measuring points where it is not possible to drill holes, for example because the housing wall is not thick enough. For attachment by magnetic force, use the VIB 3.423 magnetic adapter.



screwed (M8)
VIB 3.480



adhesive
VIB 3.418



magnetic
VIB 3.423

Mounting sensor with screw adapter

Tools and auxiliary equipment

- Power drill with two drill bits (3.5/6.8 mm) and depth gauge
- Spot facer
- M8 bottoming tap
- Size 19 torque spanner
- Compressed air to clean mounting point

Installation

Select drilling point:

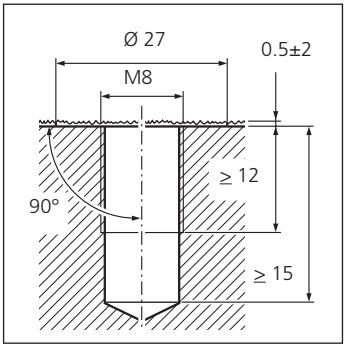
- The minimum distance between the drill hole and the protruding edges of the sensor housing is 35 mm. Ensure that there is sufficient space for the socket wrench used to tighten the adapter.

Drill hole:

- Using the 3.5 mm drill bit with depth gauge, pre-drill a hole of ≥ 15 mm.
- Drill out hole with 6.8 mm drill bit.
- Face the drill hole with the spot facer (depth: approx. 1 mm).
- Cut the thread (M8), thread length: ≥ 12 mm.

Note

Ensure that it is permissible to drill a hole at the selected location. For instructions, contact the machine manufacturer or refer to the machine documentation.



Drilling and facing hole, cutting thread

- Clean the drill hole and the area around it with compressed air; roughen the surface around the drill hole with sandpaper (grade 220).
- Clean the contact faces at the adapter and the machine with solvent.
- Allow the contact faces to dry, apply a thin layer of screw locking agent (LOCTITE 243) to improve signal propagation.
- Screw the threaded bolt into the sensor and tighten it with a size 4 Allen key.
- Screw the sensor into the mounting hole and tighten it with a size 19 socket wrench. Tightening torque: 10–20 Nm!
- Check the sensor for proper fixture (sensor must not rock).

Notes

Do not apply an excessive torque as this could damage the machine part or the thread at the sensor. If the tightening torque is too low, there might be insufficient contact between the sensor and the measuring point. Incorrect tightening torques result in incorrect measurements!

When installing sensors to machine parts that are not earthed (e.g. belt-driven fans), connect the sensors to an earthing conductor to prevent static charging.

Mounting sensor with adhesive adapter

Tools and auxiliary equipment
Hand drill and drill bit (3.5 mm) with depth gauge
Compressed air to clean mounting point
Two-component adhesive (e.g. WEICON HB 300)
File and size 19 torque wrench

Note

Before mounting the adapter, shut down the machine. Do not restart the machine for a period of 24 hours to prevent mechanical vibration while the adhesive is curing.
If the machine is restarted before the adhesive has properly cured, the adapter might become loose. This can cause damage to the sensor and/or to the machine. Incorrectly installed adhesive adapters can result in poor signal propagation to the sensor and measuring errors.

Installation

Select mounting point:

- In order to have sufficient space to apply the adhesive with a wooden spatula, keep a distance of minimum 35 mm between the adapter and the edges of the housing.

Level and roughen surface:

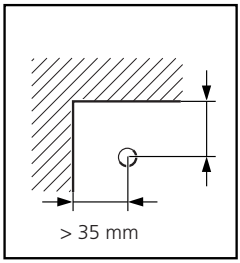
- Remove all paint from the mounting surface so that the adapter can be glued to bare metal (diameter of area > 30 mm). If necessary, level the mounting area.
- To ensure proper adhesion, roughen the surface with a file and produce a diamond pattern of grooves.

Optional:

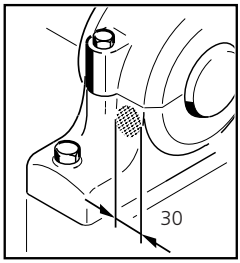
Drill hole for securing pin.

- Depth: approx. 5 mm; diameter 3.6 mm.
- The securing pin is mounted on the base and features a self-cutting thread; it can be removed, if necessary.

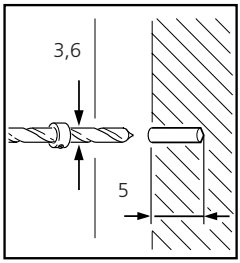
Dimensions in mm



Clearance



Level and roughen mounting surface



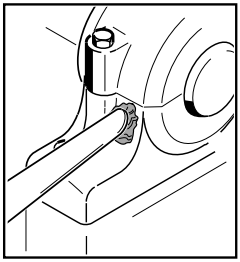
Optional: Drill hole for securing pin

Clean the measuring point and mix the adhesive:

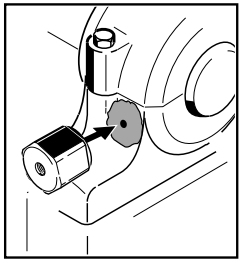
- Clean the roughened mounting area and the adhesive base with a clean cloth and a suitable cleaning agent, such as a brake or clutch cleaner (residue-free degreasing agent). Allows the metal surfaces to dry fully.
- Mix the two adhesive components at a ratio of 1:1. After mixing, the adhesive must be applied within 15 minutes!

Apply adhesive to the surfaces:

- Using a wooden spatula, apply a uniform layer of adhesive (approx. 1 mm thick) to the base and the mounting area on the machine.



Apply adhesive



Press down and turn adapter

Mount the adapter:
- Press the adapter with minimum force against the mounting area and turn it slightly to distribute the adhesive evenly.
- Do not remove adhesive escaping at the side of the adapter. For extra stability, also apply adhesive around the adapter edge.
- Allow the adhesive to cure (approx. 24 h at room temperature).

Note
If required, secure the adapter during the first hour of the curing period with the magnetic gluing aid VIB 8.477 or adhesive tape.

- Check the adapter for proper fixture (adapter must not rock).
- Screw the sensor onto the adapter and tighten it with a size 19 socket wrench. Permissible tightening torque: 10–20 Nm!

Mounting sensor with magnetic adapter

Note

The magnetic adapter is obviously only suitable for attachment to ferromagnetic parts with adequate iron content. This mounting option is only recommended if screw mounting or attachment with adhesive adapter is not possible.

- Screw the magnetic adapter VIB 3.423 to the sensor and attach it to the measuring point.

5.5.3 Installing and connecting sensor line to sensor unit

The sensor cable is permanently attached to the sensor. The other end of the cable must be connected to the sensor unit.

- Before installing the cable, mark the cable end with the sensor number to which it belongs. This ensures that there is no confusion when connecting the cables to the sensor unit. Take all necessary measures to prevent confusion of the sensor cables!
- Install the cables from the sensors to the sensor unit, using suitable equipment (cable ties, clips, ducts, etc.).

Notes

Steel conduits protect the line against mechanical damage and also reduce EMC interference.
Do not install the lines parallel to power supply lines. If parallel installation cannot be avoided, keep a minimum distance of 1 m between the power cable and the sensor data cable.

- At the sensor unit, produce a cable loop (length approx. 30 cm). This prevents strain to the cable during maintenance, etc.
- Connect the sensor line to the sensor unit (see also "Connecting sensor unit", page 41).

5.6 Configuration in OMNITREND (continued)

After the system components have been installed and commissioned, continue configuring the system in OMNITREND (see also "Configuration in OMNITREND", page 27). The configuration consists mainly of the following steps:

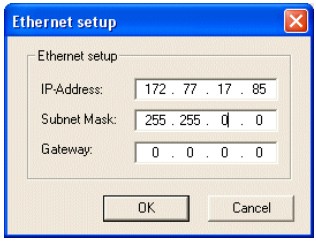
- Registration of bridge and sensor units
- Assignment of system components to the measuring points in the database
- Creation of measuring configurations and loading to bridge
- Reading of measuring data from bridge
- Evaluation of measuring data in OMNITREND

Note

These instructions assume that the operator is familiar with the OMNITREND software and its features The instructions below are therefore kept brief.

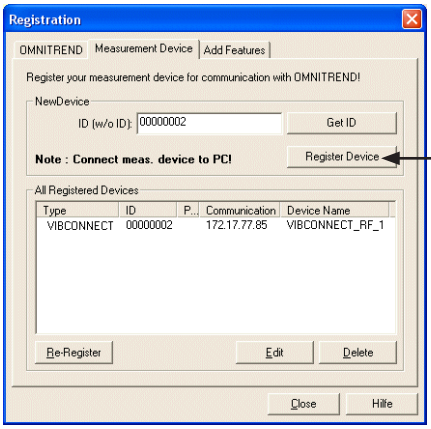
5.6.1 Registering bridge in OMNITREND

- In the main menu, click <Options>/<Registration/Configuration>.
- In the 'Registration' window ('OMNITREND' tab), check whether 'VIBCONNECT RF' is the current OMNITREND version. If this is not the case, change the settings.
- Call up the 'Measurement Device' tab.
- Click the <Get ID> button.
- Enter the IP address of the bridge in the 'Ethernet Setup' window (see also "Changing IP address or bridge", page 30). If required, adjust the Subnet Mask and the Gateway address. Click the <OK> button.



- Enter the name of the bridge in the 'Configuration' window and click the <OK> button. OMNITREND establishes a connection to the bridge, reads its serial number and indicates it in the 'ID' field.

- Click the <Register Device> button. The bridge is now registered in OMNITREND and logged on (no need for password).



You do not need a password to register the bridge.

5.6.2 Registering sensor units in OMNITREND

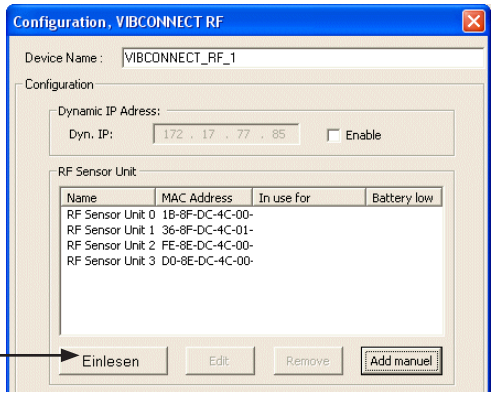
- In the main menu, click <Options>/<Registration/Configuration>.
- In the 'Registration' window ('OMNITREND' tab), check whether 'VIBCONNECT RF' is the current OMNITREND version. If this is not the case, change the settings.
- Call up the 'Measurement Device' tab.
- In the device list, select the bridge that is within the transmission range of the sensor unit(s).

Note

If there is more than one bridge in the system, you might need to check for every bridge whether the sensor unit is in its radio range and whether it has already established contact.

» *To do this, select "RF Sensor Units" in the main menu of the bridge (see also 'Main menu of bridge', page 30).*

- Click the <Edit> button.



To register the sensor units in OMNITREND, click the <Load> button.

- In the 'Configuration' window, click the <Add from device> button. OMNITREND establishes a connection to the bridge and then lists all sensor units that are within the radio range of the bridge and have sent requests for measuring configurations.

Note

Each sensor unit is clearly identified by its unique MAC address. Sensor units can thus be identified with reference to the completed measuring point report.

- Click the <OK> button. The sensor units are now available in OMNITREND and can be assigned to the measuring points.

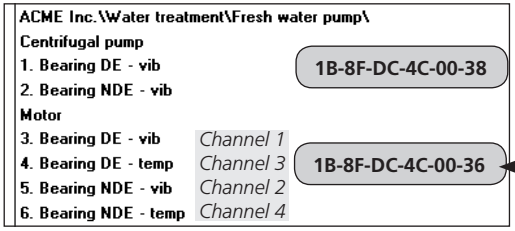
5.6.3 Assigning measuring points in the database to a sensor unit and bridge

The measuring point report contains all information regarding the assignment of channels to measuring points. The respective sensor units are identified in OMNITREND by means of their MAC address.

In systems with several bridges, you can assign the sensor units to any available bridge. However, the following issues should be kept in mind for proper assignment:

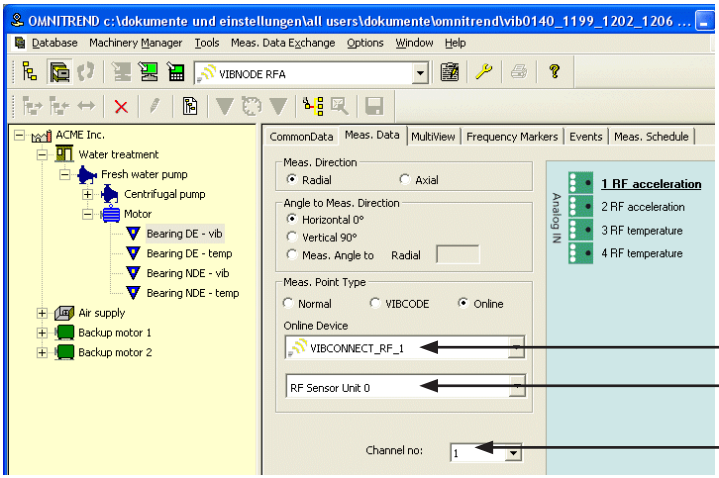
- Select the bridge with the best reception: At every bridge select "RF Sensor Units" in the main menu, and check the receive level of the sensor unit you wish to assign (see also "Changing IP address of bridge", page 30).
- Maximum 50 sensor units can be assigned to each bridge.

- In OMNITREND, open the *Machinery Manager*.
- Select one of the previously set up online measuring points (see also "Setting up measuring point database", page 28).
- Call up the 'Meas. Data' tab.
- In the 'Meas. Point Type' section, first select the bridge with the best reception in the 'Online Device' field.
- In the second field, select the sensor unit that is installed at the respective measuring point (refer to the measuring point report).



Assignment of sensor unit, channel and measuring points in the measuring point report

= "RF Sensor Unit 0"



Assignment of bridge, sensor unit and channel in the OMNITREND database

Bridge

Sensor unit

Channel

- In the 'Channel no.' field, enter the channel number as noted in the measuring point report for this sensor unit (see also "Connecting sensor unit", page 41).
- Repeat the above steps for all other measuring points.

5.6.4 Creating measuring configuration

This chapter explains how to create a measuring configuration for a measuring point in the VIBCONNECT RF system, using the OMNITREND software. A measuring configuration contains information regarding

- the measuring tasks
- the time intervals at which measurements are to be performed
- the trigger criteria for event-controlled measurements
- the measuring point assigned to a sensor unit
- the associated bridge.

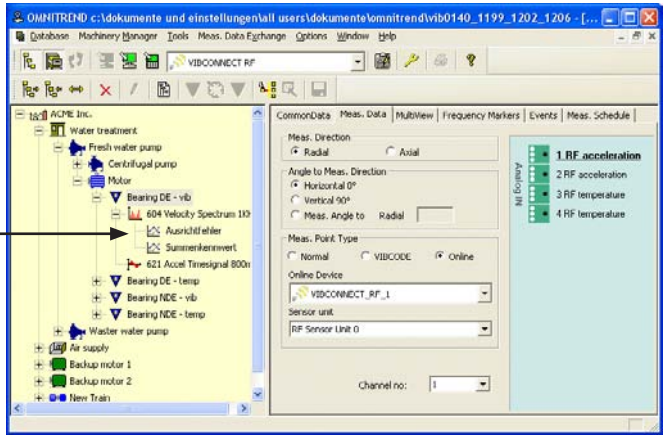
Measuring tasks

- Select a measuring point.

Note

Always observe the channel assignment:
Channels 1 and 2 are reserved for vibration measurements; channels 3 and 4 are reserved for temperature measurements (see also "Connecting sensor unit", page 41).

- In the main menu, select <Machinery Manager> / <Add> / <Measuring Task>.
- In the measuring task dialog, activate option <Select Setup Directly>.
- Select the applicable measuring task and click the <Next> button.
- In the next window, click the <Add> button.
- If you wish to set up another vibration measuring task, repeat the above steps (max. 4 tasks per measuring point).



The characteristic values are calculated from a spectrum by means of "band analyses"

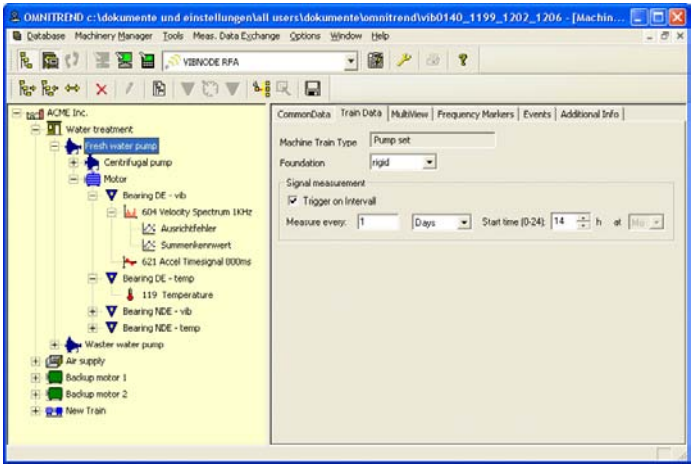
- For the calculation of the characteristic vibration values, define the respective band analysis in the alarm wizard.

Note

VIBCONNECT RF calculates the characteristic vibration values from a spectrum, using frequency bands. These bands are preset in the alarm wizard and are then assigned as a subordinate measuring task 'Bank analysis (Trending Task)' to the respective spectrum. For more information, please refer to the OMNITREND online help.

Time interval of idle phase

- Select the machine train in which the sensor unit is installed.
- Call up the 'Train Data' tab.



Time interval for idle phase of sensor unit

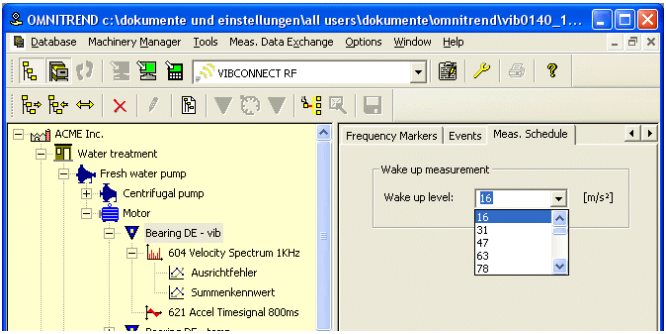
- In the 'Signal Measurement' field, select option 'Trigger on Interval'.
- Adjust the time interval as required (30 minutes to 1 week). If 't ≥ 1 day' and 't = 1 week', also enter the time and day of the week at which the measurement is to be started.

Event-controlled measurement

A measurement can be triggered if a specific vibration level (0-peak) in the 0–10 kHz frequency range is exceeded.

- Select the respective measuring point.
- Call up the 'Meas. Schedule' tab.

- Activate option ‘Wake up level’, and select the vibration level:



5.6.5 Loading measuring configurations to the bridge

After you have set up a measuring configuration for every measuring point in the system, these configurations must be transferred to the respective bridges:

- In the main menu, click  (route to device).
- In the ‘Select Device’ window, select the bridge.
- To start the data transfer, click the <OK> button.

Note

The measuring configuration is only forwarded by the bridge to the sensor unit after it has “woken up” from its idle phase. To force instant transmission, switch the sensor unit off and on again.

5.6.6 Importing measuring data in OMNITREND

Note

The measurement import must be started manually in the OMNITREND software. Ensure that the data is regularly written to OMNITREND. Otherwise, the memory capacity of the bridge might be exceeded so the oldest measurements are automatically overwritten with the latest ones.

- In the main menu, click  (route to device).

The data import starts automatically. If there are several bridges registered in OMNITREND, they are accessed in sequence.

5.7 Installing additional sensor unit after commissioning of the system

VIBCONNECT RF can be extended at any time, and sensor units and sensors can be added during operation of the system.

Setting up measuring points and printing reports

- Set up the required measuring points in the OMNITREND database (see also "Setting up measuring point database", page 28).
- Print the measuring point report of the respective machine train (see also "Creating measuring point report", page 29).

Installing sensor unit and sensors

- Identify a suitable location of installation for the sensor unit (see also "Measuring reception field strength at location of installation", page 38).
- Mount the sensor unit on the machine.
- Mount the sensors (see also "Installation of sensors", page 46).
- Establish the electrical connections and commission the sensor unit (see also "Connecting sensor unit", page 41).
- In the measuring point report, note down the machine on which the sensor unit is installed (see also "Mounting sensor unit", page 40). Also note down the channel to which the respective measuring points are connected (see also "Connecting sensor unit", page 41).

Configuring sensor unit in OMNITREND

- Register the sensor unit in OMNITREND.
- Assign the respective measuring points set up in the database to the sensor unit and the bridge.
- Adjust the measuring channels according to the measuring point report.
- Set up a measuring configuration for each measuring point.

Transferring configuration and loading data

- Load the measuring configuration to the bridge (see also "Loading measuring configuration to the bridge", page 56).
- Import the measuring data in OMNITREND.

Chapter 6: Maintenance

VIBCONNECT RF is an electronic measuring system that must be handled with care.

6.1 Cleaning

If required, clean the housings of the bridges and the sensor units with a damp cloth so that the system component details (serial number, MAC address) remain clearly visible at all times. Replace damaged cables without delay.

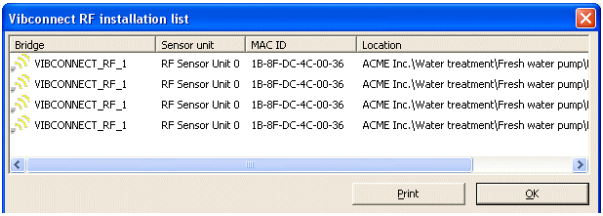
6.2 Installation report

The installation report contains a list of all measuring points in the database that are monitored through the VIBCONNECT RF system. The report can be printed and contains the following information:

- Measuring point with path in machine tree
- Assigned sensor unit including battery status (battery-powered version only)
- Assigned bridge

This report facilitates the identification of system components on site, for example for maintenance work.

- In the main menu, select <Tools> / <Reports> / <VIBCONNECT RF Installation>.



6.3 Battery-powered sensor unit

With normal operation, the lithium batteries of the sensor unit last for about 3 years. Normal operation means one measuring sequence* per hour and interference-free data transmission, at an ambient temperature of 20 °C.

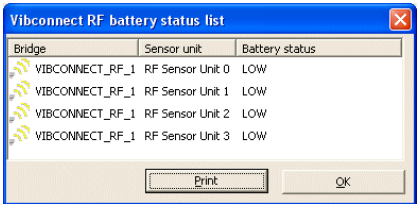
* 2x vibration + 2x temperature

The battery charge status is automatically transmitted by the sensor unit together with the measuring data and displayed in OMNITREND:

- **At program start:** If the battery charge at one of the sensor units is too low, a warning is displayed when the OMNITREND software is started. This warning is displayed at every program

start until the respective battery has been replaced and a new measurement record has been read.

- **Battery status report:** In the main menu, select <Tools> / <Reports> / <VIBCONNECT RF Battery Status>.



- **Configuration of the bridge:** In the configuration window for the bridge, the battery charge status of each assigned sensor unit is displayed (see also "Registering sensor units in OMNITREND", page 51).

Changing battery

- Open the sensor unit housing by loosening the two screws of the cover (size 2.5 Allen screws).

Note

Risk of damage to equipment while housing is open!

Touching the electronic components on the mother board can lead to electrostatic discharge, which can damage the sensor unit.

» *If contact with such components cannot be excluded, wear an earthing wristband.*

- Remove the spent batteries and replace them with new ones (see also "VIBCONNECT RF sensor unit", page 21). Do not confuse the battery poles!
- Close the sensor unit housing.
- Dispose of the spent batteries according to the applicable waste disposal regulations.

6.4 Warranty

The warranty period for the VIBCONNECT RF is 1 year. Unauthorized service work on the system shall automatically void all warranty.

6.5 Spare parts and accessories

Use only original spare parts and accessories. For details, refer to the VIBCONNECT product catalog (LIT 72.700). The latest catalog edition can be downloaded from the PRÜFTECHNIK website (www.pruftechnik.com).

Chapter 7: Troubleshooting

Symptom: The red LED of the sensor unit is lit, indicating an error in the data transmission (see also "Sensor Unit: Overview of connections and interfaces", page 37).

Possible cause(s): System crash

Remedy:
- Switch off the power supply to the sensor unit and then switch it on again.
- Check the connection to the bridge in OMNITREND or by means of the web browser.

Symptom: The bridge cannot be contacted (from OMNITREND or via web browser).

Possible cause(s): Incorrect IP address set; power failure at bridge.

Remedy:
- Check the IP address and correct it, if necessary.
- Check the bridge to ensure that the power LED at the power supply is on. Check the power source, cables and electrical connection. If necessary, re-establish the power connection.

⚠ CAUTION

Risk of injury from electric shock!

When carrying out installation, repair or maintenance work on the power supply system of the bridge, there is a risk of injury from electric shock (220 V voltage).

» *All work on the power supply system must be carried out by a qualified electrician.*
» *Disconnect the bridge from the power supply.*

Note

If a fault cannot be rectified by any of the above measures, please contact our technical support team (for details, see "Service contacts", page 7).

Chapter 8: Decommissioning and disposal

Decommissioning

Disconnect the bridge and the externally powered sensor units from the power supply. Remove the batteries from the battery-powered sensor units.

Disposal

PRÜFTECHNIK
Condition Monitoring
WEEE Reg. No.:
DE 72273578

Dispose of the system components and the spent batteries according to the applicable waste disposal regulations.

In EU member states where the *EU Directive 2002/96/EC "Waste Electrical and Electronic Equipment" (WEEE)* has been implemented in national law, the following rules apply:

PRÜFTECHNIK products that are covered by the WEEE Directive bear the waste bin label as shown below.

These devices can be returned to the manufacturer who is responsible for their proper disposal.

Consequences for end consumers:

- All electrical and electronic PRÜFTECHNIK products including electrical and electronic accessories (e.g. cables, sensors, etc.) must be disposed of through PRÜFTECHNIK or its waste disposal contractor. These products must not be disposed of as domestic waste.
- For information regarding the return of PRÜFTECHNIK products for disposal, please contact:
  – your local PRÜFTECHNIK sales office
  – your local PRÜFTECHNIK sales agent

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