VIBGUARD®
IIoT

Operation

ⓘ This manual is only intended for use with GL-certified VIBGUARD CMS on wind turbines.
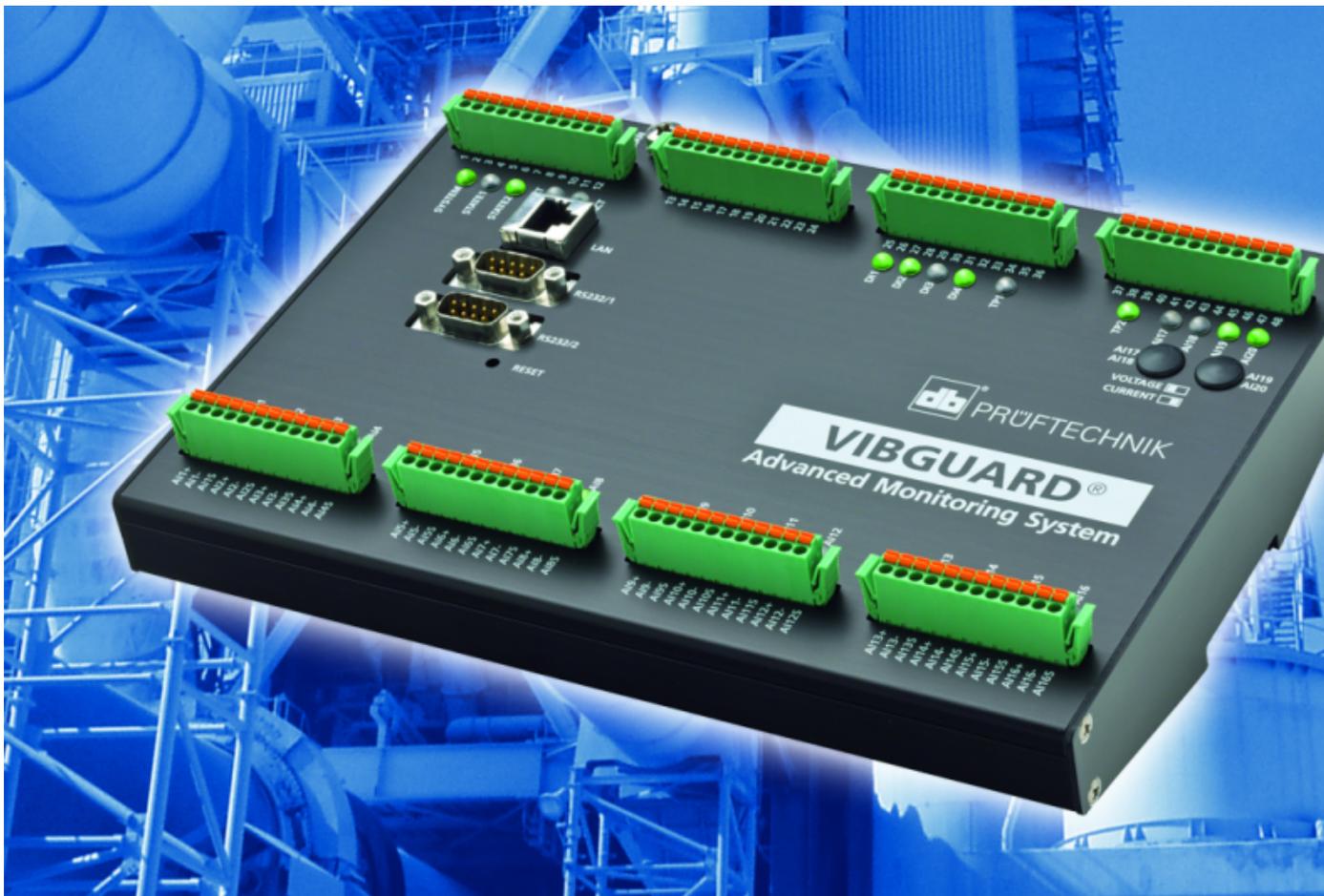
db PRÜFTECHNIK

LEGAL NOTES

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Contents

1 Prior to starting

1.1 Notes regarding these instructions

These instructions are a part of the product. As such, they must be kept throughout the product service life. These instructions must be handed over to any subsequent owner or user of the product.

1.2 Markup

Texts are marked as follows in these instructions:

- **Action steps** are indented and marked with a • bullet point.

- **List entries** are indented and marked with a dash -.

- **Functional elements** on the user interface, such as buttons, commands, links: <Element> in angle brackets.

- **Labels** on the user interface, such as window titles, field names: '"Designation" in quotation marks.

> ⓘ **Supplementary information / tips**: Functional notes are introduced with a context-dependent keyword.

> ⚠ **Safety notes**:Warnings are introduced with the keyword **CAUTION** if there is a danger of **personal injury**. Failure to observe these warnings may result in minor or moderate injury.
>
> If there is a danger of damage to **property**, warning notices are introduced with the keyword **Note**.

1.3 Abbreviations

The following designations are considered equivalent in these instructions:

- Condition Monitoring System = CMS

- VIBGUARD IIoT Condition Monitoring System = VIBGUARD IIoT or System

- VIBGUARD IIoT system module = system module

- Sensors, cables, mountingadapters = measuring equipment.

- VIB 7.800, VIB 7.810, VIB 7.811, VIB 7.815, VIB 7.820, VIB 7.825 = VIB 7.8xx

- Current Linedrive = CLD

1.4 Service addresses

Hotline	**+49 89 99616-0**
	Please have the serial number of your system module ready when contacting our hotline ("Type plates" on page 9).
Shipping address	Fluke Deutschland GmbH, Freisinger Str. 34, 85737 Ismaning, Germany

Empty page

2 Safety

VIBGUARD IIoT was designed and built following careful selection of the harmonized norms to be complied with as well as other technical specifications. The system therefore corresponds to the state of the art and ensures the highest degree of safety.

Nevertheless, there are still risks relating to installation, commissioning and operation which are to be avoided.

Observe the general safety instructions in this section as well as the warnings in the instructions. Safety instructions and warnings explain how you should act in order to protect yourself, others and objects from harm.

2.1 EU conformity

PRUFTECHNIK hereby declares that VIBGUARD IIoT conforms to the relevant European directives. The complete text of the EU conformity declaration is available at the following Internet address:

- https://www.pruftechnik.com/com/About-us/Company/Certificates-and-Material-Safety/

2.2 Intended use

VIBGUARD IIoT is a stationary condition monitoring system for monitoring the condition of machines mounted on anti-friction bearings. The system records and processes the following signals and parameters:

- Vibration parameters, broadband and narrow-band
- Time signals
- Spectra
- Temperature
- Process parameters

The system works continuously and records the machine signals synchronously on all channels[1]. It is therefore suitable for machines with dynamic operational behavior for which the operating and process parameters need to be recorded simultaneously and at short intervals.

The system may only be operated within the specifications given in these instructions. PRUFTECHNIK shall not be liable for any damage caused by misuse.

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[1]maximum number of channels is type-specific

2.3 Safety markings

Please refer to the following figure for the safety markings on the VIBGUARD IIoT. The safety markings must be observed and must not be concealed or removed. For the variants that are installed in a control cabinet (VIB 7.xxx-PS), the safety labels must be attached at a suitable point in the control cabinet.
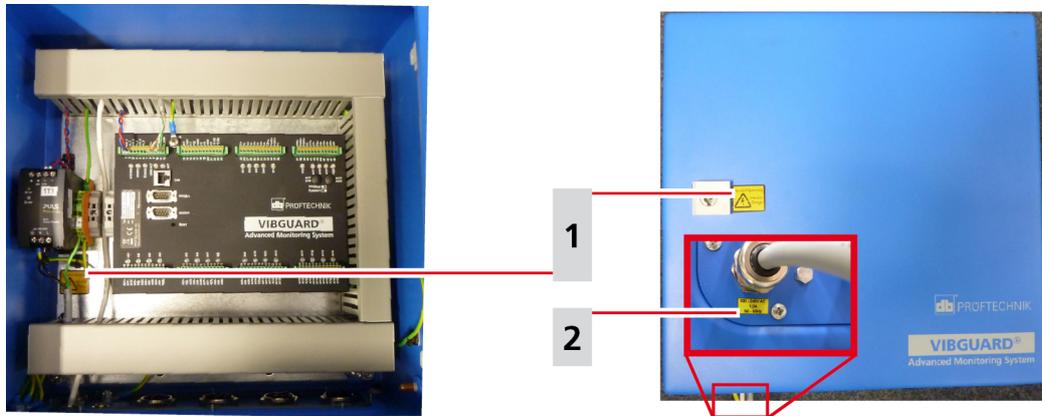
1	Vorsicht! Spannung Attention Danger	
VIB 7.8xx-SDH	A yellow sticker each on the housing lock and below the power supply.	
VIB 7.8xx-PS	A yellow sticker on the top hat rail.	

2	100 - 240V AC / 1,3 A / 50-60 Hz	
VIB 7.8xx-SDH	A yellow sticker on the outside of the cable gland for the mains supply.	
VIB 7.8xx-PS	A yellow sticker on the top hat rail.	

2.4 Type plates

System module
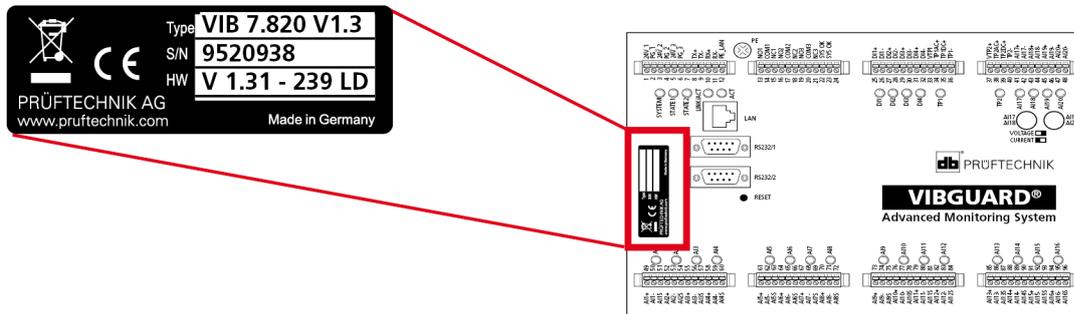
The type plate on the **system module** contains the following information:

- **Type**: Item number (VIB 7.820), hardware status (V1.3) of the System module.
- **S/N**: Serial number of the system module, 7 digits, starting with 95..
- **HW**: Status (V 1.31), number (239), variant (LD = LineDrive) of the built-in board.

Protective housing
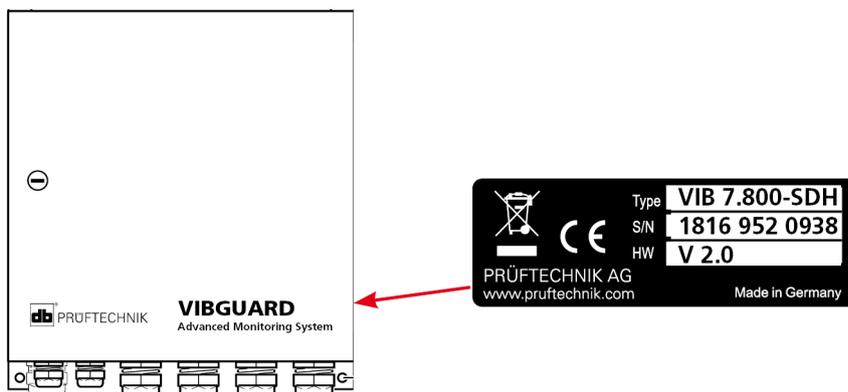
The type plate on the **protective housing**, or on the **power supply** cabling contains the following information about the entire system:

- **Type**: VIB 7.8xx-SDH or VIB 7.8xx-PS - Item number of the entire system.
- **S/N**: Production week (WWYY) of the entire system and serial number of the system module installed.
- **HW**: Hardware status of the protective housing (e.g. V 2.0).

2.5 Information for the operator

Obligations of the operator

Maximum safety can only be achieved in practice if all measures required for this are adopted. As the operator, it is part of your duty of care to plan these measures and monitor their implementation.

Ensure that the following requirements are met:

- Qualified specialist personnel for installation, commissioning and operation is available.
- Installation material and tools are provided.
- Voltage supply and network connection are present in accordance with the specification.
- Potential equalization is provided

Integration of the system into existing equipment

The safety of a plant in which the system is integrated is the responsibility of the installer of the plant.

⚠️ **CAUTION!** Except for the mains power supply to the system, all other connected circuits must be SELV circuits.

Ensure that the following requirements are noted:

- Use the system in accordance with the intended use.
- Only operate the system in a technically flawless state.
- Only use original accessories and original spare parts.
- Observe all nationally applicable regulations, all safety, accident prevention and environmental protection regulations as well as all recognized technical rules for safe and proper work.

Training

Provide ongoing training for operating personnel in relation to the application of all safety regulations in safety instructions. Ensure that the following requirements are complied with:

The applicable legal and otherwise binding safety and accident prevention regulations as well as the general safety instructions and warnings must be adhered to and followed.

Ensure that operating personnel work in a safety-conscious manner.

2.6 Information for operating personnel

Operating personnel qualifications

Installation and disassembly may only be performed by a qualified specialist electrician.

Commissioning and operation must only be performed by personnel who have been trained and authorized to do so.

Personal protective equipment

No protective equipment is required for installation, commissioning, normal operation and disassembly of the system.

Regulations for normal operation

The operating state of the system module is displayed via the SYSTEM LED. The LED lights up orange while the system module is starting up and changes to green (normal operation).

- Check the following points at regular intervals:
    - Is there any identifiable damage on the system components and on the measuring equipment?
    - Are the cables crushed or damaged?
- Rectify any defects detected immediately or report them to the operator. The system and measuring equipment must only be operated in a flawless state!
- In the event of functional faults, disconnect the system from the supply and secure it against a restart.

Operation of a machine is not impaired if the system is out of service. The machine can therefore remain in operation.

2.7 Residual hazards and protective measures

VIBGUARD IIoT is verifiably safe assuming it is used as intended. The following damage may occur if operated incorrectly or used improperly:

- Personal damage
- Damage to the system or to the machine

Danger due to running machine!

During installation and maintenance work on the machine, there is a risk of injury from moving machine components.

- Shut down the entire machine system and secure it against unintentional restarting.

Danger due to electric shock!

There is a risk of injury due to low voltage when working on the switch cabinet when it is open (230 V).

- Observe the safety markings on live components.
- Before carrying out any installation, repair or maintenance work, disconnect the system from the power supply, determine that there is no voltage and secure the power supply against being switched on again.
- Do not open, repair or modify with power supply VIB 5.965-2.5.

Danger due to improperly laid cables

Personnel may stumble over an improperly laid cable and injure themselves. The cable can be damaged due to external influences.

- Lay the cable in such a way that no one can stumble over it.
- Use cable ties or a Velcro fastener to fix the cable in place.
- Lay the cable in a cable duct or protective tube.

Damage due to electrostatic discharge

During installation, repair and maintenance work on the system, the electronic components can be damaged if touched due to electrostatic discharge.

- Use an earthing strap if contact with the components cannot be ruled out.

Damage due to contamination

In a loaded industrial environment, the system components may have their function impaired or be damaged due to contamination or moisture when the switch cabinet is open.

- Keep the switch cabinet closed as much as possible.

Incorrect measurements due to electromagnetic interference

High frequency rays or electrostatic discharge in the vicinity of the system and measuring equipment can lead to incorrect measurements.

- Do not lay the sensor cables in the vicinity of heavy current lines.
- Select an installation site with low electromagnetic radiation exposure.

3 Control software

Executable real time software for controlling inputs and outputs, sequence control and visualization is already pre-installed on the VIBGUARD IIoT. The following software is required for further parameterization, data storage and analysis. The software is installed on a powerful PC:

- Email client
- OMNITREND Center

3.1 Hardware and software philosophy

As open systems, the telediagnostic systems offered by PRUFTECHNIK provide a large number of programming and parameterization possibilities. The following section will provide an overview of the software structure.

As the VIBGUARD IIoT systems are certified together with the OMNITREND Center PC software, they are supplied with defined program sequence control to ensure the minimum scope of measurements required by the certification body.

The user is not permitted to change program sequences on the CMS. Three different user levels serve as a means of protection. The user names and passwords for each level can be found in your password document which is included in the scope of delivery.

- Security level 1: Allows the user to view the overview page, the alarm states, and the display of the readings on the CMS user interface.
- Security level 2: Allows the user to additionally output the log files and to download data as well as query the system status.
- Security level 3: Allows the user to configure the system and to change passwords.

⚠ Note!

With **Security level 3**, system configuration files can be changed or deleted. This can result in the CMS no longer functioning faultlessly. PRUFTECHNIK will support you should work need to be performed on the system which requires a high security level.

3.2 Programming of the control software

A real time operating system is installed on the VIBGUARD IIoT system. This operating system contains all of the functions for controlling the measuring components. A web server provides the HTML pages required for operation. These pages feature a series of parameterization, control and visualization masks.

A measuring program runs in parallel in different sections on the CMS to control the measuring and analysis functions as well as data handling. After the measuring program has been loaded and validated, the measurements start immediately, in parallel and continuously, in accordance with the configuration. Four parallel data calculation paths exist for each channel. These paths can be used. In addition, the monitoring of the sensors (SensorCheck) is done independently of the other measurements that are configured. The recording of the RPM or the Keyphaser signal (max. two independent RPM inputs) also takes place simultaneously.

Up to six overall readings (Characteristic Group), at least 1x per second for the 'Always' persistent setting, and two spectra or time signals or an envelope (Trending Group), at least 1x per minute, can be generated and stored per measuring channel. Adaptive storage is generally used to reduce the data volume with maximum benefit and minimum information. If more than the aforementioned trending signals are configured on one channel, such signals are processed successively and the minute interval may be exceeded under certain circumstances. A 1-minute interval cannot be adhered to if, for example, a prolonged time signal measurement over 180 seconds is configured.

The continuous storage of data in the minimum time units is only recommended for special cases when investigating a certain type of behavior over a limited period of time. Otherwise, the data volume becomes too large. It should also be noted that the data is usually sent via the Internet and the bandwidth is limited in this regard. The CMS offers intelligent mechanisms for data reduction, such as adaptive storage, in which data is only saved after a set variable change. There is no data loss with this function.

The measurements and program steps are generally processed continuously. Exceptions may, for example, occur if a special case for additional and longer diagnostic measurements is started from a 'Diagnostic Group' or is triggered and processed by an event.

⚠ Note!

It is not permissible to make changes to the program sequence.

If, however, changes are to be made, such as the extension of additional operational measurement variables, this can only be performed by using OMNITREND Center programming software. This software is not part of the scope of delivery for the CMS, which is why it is advisable for the programming to be done by trained personnel or by PRUFTECHNIK experts. The software can be purchased from PRUFTECHNIK if necessary.

The measurement configuration loaded upon delivery is monitored by means of a checksum. If changes have been made by mistake or for other reasons, such changes are detected and the OMNITREND Center software reports their occurrence immediately when processing the measurement data.

4 Dialing into the CMS

Each VIBGUARD IIoT system has an IP address through which you can dial in from a PC.

4.1 Direct network connection (LAN)

Use this option if the XP system or the PC are running in a common network or are connected to each other by means of a crossover network cable.

Prerequisites:

- Functioning network connection
- Internet browser
- VIBGUARD IIoT In a ready for operation state

 With regard to a direct network connection, the CMS and PC need to have an IP address in the same IP address range, i.e. the first three numerical blocks of the IP address are identical.

The IP address is set during commissioning.

- Enter the IP address of the CMS in the browser.
  "http://< IP address of the CMS>"
- Wait for the connection to be established.

4.2 Dial-up connection

If the CMS is connected via a router and dial-up connection, a PPP dial-up is required to establish the connection.

Procedure for Windows 7

- Open the Windows Start menu and select <Control Panel> / <Network and Sharing Center>.
- Select <Set up new connection ..>.
- Select <Set up dial-up connection>.
- Enter the <Dial-up number> and the <Username> and the <Password>.
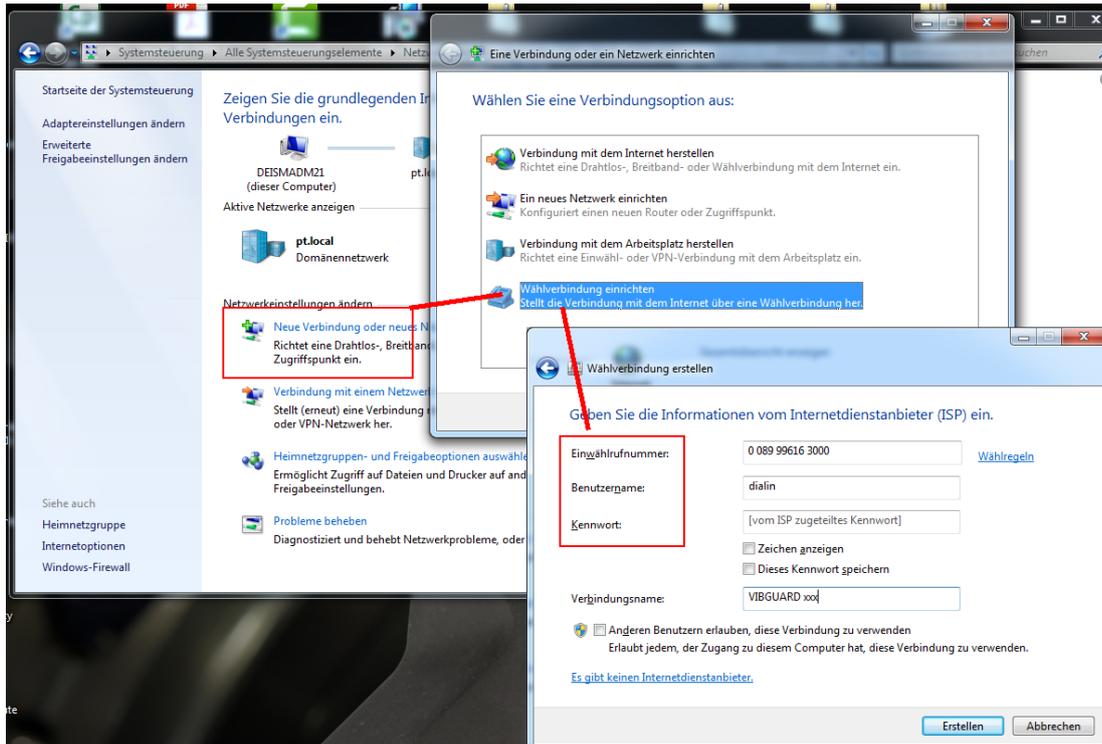
Setting up the dial-up connection (Windows 7)

> To dial up an analog modem connection, an analog telephone connection also needs to be dialed from the PC. The telephone number can be obtained from your telephone provider once the telephone line has been commissioned.
>
> The username and password are either included in the documentation for the CMS, to the extent that this is part of the scope of delivery, or they are to be obtained from the wind park operator.
>
> Where appropriate, the company firewall must be set up in such a way that access rights exist and the misuse of data is prevented.

4.3 Connection via a VPN tunnel

A VPN connection is required if the CMS is connected via a VPN network by means of an Internet router.

> ⓘ There are a number of VPN software providers. Setup may vary depending on the software package used. Please contact the supplier in this regard. PRUFTECHNIK generally uses the OpenVPN software for dialing the router packages they supply.

Installing the OpenVPN-Client

- Start the installation file (install.exe).
  Administrator rights are required to run the file.

- If necessary, ignore the certification warnings that are displayed.

> ⓘ With regard to an access certificate supplied separately, which you have requested and received beforehand from the relevant authority, such an access certificate still needs to be inserted. If it is already included in the installation file, this step is not required.

- If installation was successful, the openVPN icon appears in the bottom right corner of the system tray.

Establishing a connection to the VPN network

- Using the right mouse button, click on the openVPN icon and select "Connect".

- Enter the username and the password.

- If necessary, deactivate the Internet proxy.

- If the connection is established successfully, a confirmation message appears,
  e.g. "mdex fixedip now connected, assigned IP address: x.x.x.x".
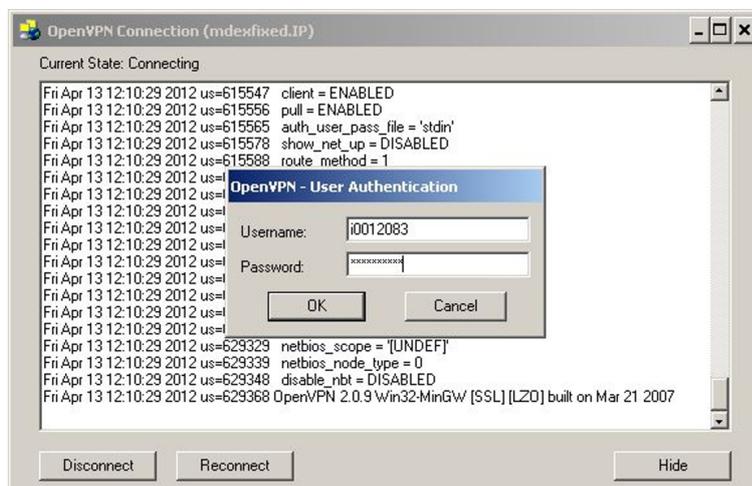
Example for entering the login details in an OpenVPN client using Windows.

Dialing into the CMS

- Start the dial-up connection to the CMS (see the previous section).

- Enter the IP address of the CMS in the browser.

- Wait for the connection to be established. This can take some time depending on the connection type as the user interface needs to be loaded.

The VIBGUARD IIoT homepage appears.

5 Operation via a web browser

VIBGUARD IIoT features a web server on which, inter alia, the user interface is implemented in the form of HTML pages. The HTML pages are only available in English.

The functions for user inputs are provided via input boxes and buttons. This makes it possible to visualize measurement data, display alarm states and status messages, and archive data. The communication is purely http based and only requires the standard web port 80 for data exchange.

The HTML pages are specifically customized to the system to be monitored and installed on the CMS prior to delivery.

5.1 Homepage

After entering the IP address, the local homepage is loaded in the browser. If there are several CMS in a network, each system can be reached via its IP address using the browser.
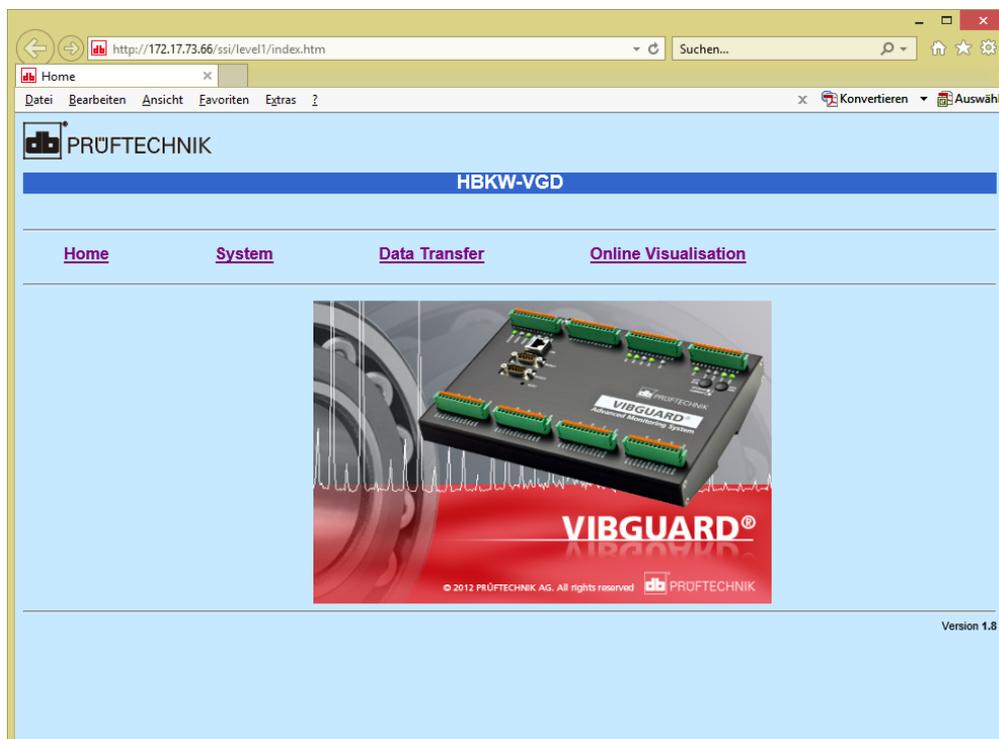
CMS homepage in the web browser

The homepage is the central document from which all other functions for oversight and monitoring are activated. The pages that have been stored with additional links can be accessed via the links in the horizontal navigation bar. Depending on the access level, it is necessary to enter a username and password in order to either branch out into further links or to execute a function.

Navigation bar (hyperlinks)

The horizontal navigation bar contains the following links:

- **Home**: the home page
- **System**: Save and create information, configurations, logs
- **Data Transfer**: Send, receive and delete data
- **Online Visualisation**: Monitoring and change individual values

The other links are explained in the following pages.

6 Alarm status

VIBGUARD IIoT provides an overview listing the current threshold violations and sensor errors.

Opening the alarm status page

- Click on <System> in the navigation bar.
- Click on <Alarm Status Information> in the "Administration" field. The **Alarm status page** is displayed:
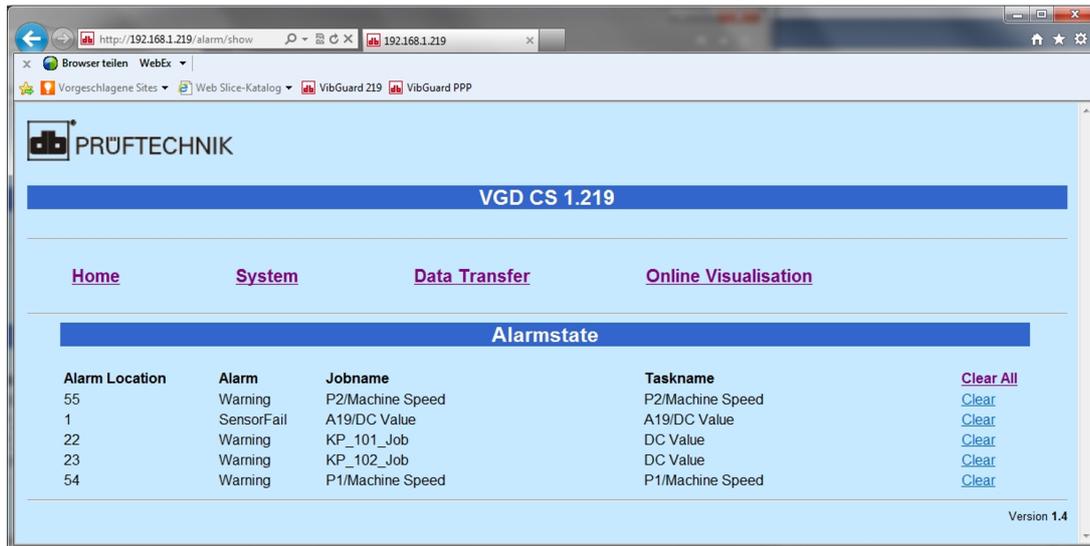
The list contains all the measurement locations that exhibit a deviation from the normal condition in the current measurement cycle. The list displays the following information:

- **Alarm Location**: Storage location number of the measurement in question
- **Alarm**: Error type; threshold violation as **Alarm, Warning, Prewarning** or **SensorFail** (sensor error)
- **Job name**: Label for measurement location
- **Task name**: Label for measurement task
- **Clear (All):** Resets the error message

Press the F5 key to update the list (refresh browser). You can reset an error message using <Clear>. However, the error message is displayed again if the status in question still exists at the next measurement cycle. To this end, the list must always be updated manually (F5).

> The alarm messages are archived in the OMNITREND Center software. They must also be acknowledged accordingly there.

> **Note**
>
> In the event of a sensor error, you must check the measurement location in question:
>
> • Visual inspection of the sensor and wiring;
>
> • Check the voltage supply if the sensors are supplied externally.

7 Displaying readings

The current readings can be displayed in two views:

- **Online readings**
- **Online readings and status**

Opening the views for the readings

- Click on <Online Visualisation> in the navigation bar.
- Click on
  - <System Online ISL Table> in the "Input Storage Locations (ISLs)" field to open the **Online readings** view or on
  - <Display Input Storage Location Values> to open the **Online readings and status** view.

Both views list the readings in tabular form:
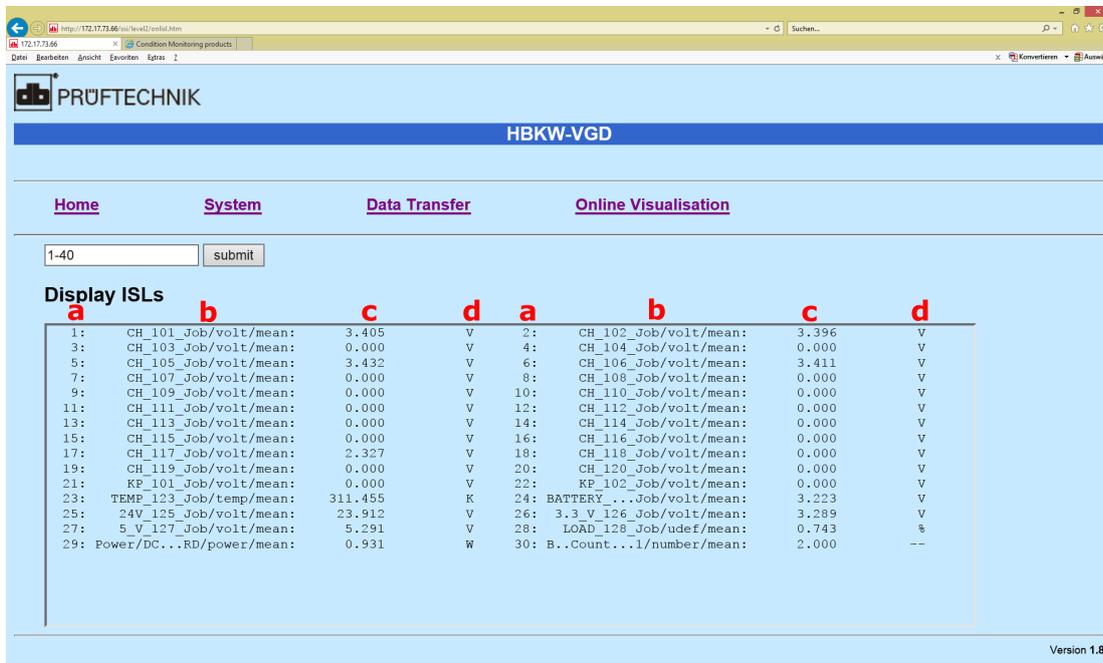
"Online readings" view

The **Online readings** view updates the values every 10 seconds. The table contains four columns (a-d):

- **a: Number of the input memory (ISL)**
- **B:**: label
- **c: Reading**
- **d**: Unit

The input memories can be selectively shown and hidden as required:

- To this end, enter the desired input memory (ISL = Input Storage Location) numbers in the input field and click on <submit>.
  Example: 1-9,15,24,34-38
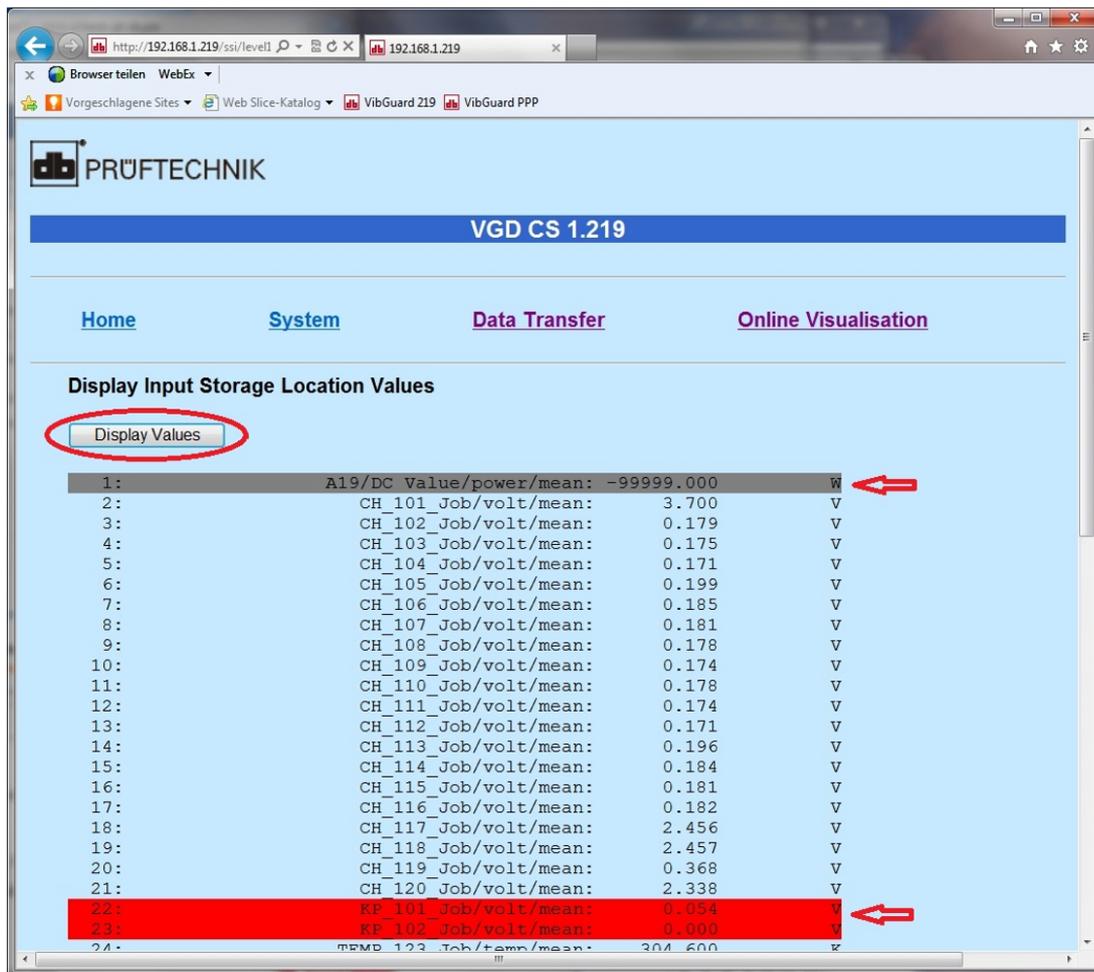
"Online readings and status" view

The **Online readings and status** view displays the current readings in all input memories and signalizes fault conditions by means of a colored background. The structure of the table is identical to the previous view (input memory number, label, reading, unit).

It is not possible to select the input memory. Click on <Display Values> (1) to update the display.

The status of a measurement or an error in the measurement chain is displayed in color:

OK	Alarm	Warning	Prewarning	Sensor error

Example: In the image above, input memory 1 signalizes a sensor error. The measurement tasks in memories 22 and 23 have exceeded an alarm threshold.

8 Deleting measurements

You can delete signal data or the contents in the ring buffers if you have the requisite authorization.

> ⚠️ Note! Danger of data loss!
>
> Deleted data cannot be restored!

8.1 Deleting signal data

With regard to signal data (DSP Data), you can delete all data in all subdirectories at once.

- Click on <Data Transfer> in the navigation bar.
- Click on <Delete Data> and then on <DSP Data>.
- Click on <DELETE all files in this Directory>.

8.2 Deleting the ring buffers

The ring buffers need to be deleted individually. For this purpose, proceed as follows:

- Click on <Data Transfer> in the navigation bar.
- Click on <Delete Data> and then on <Delete Final Storage Data>.
- Select the input memory (1 … n) and click on <Delete>.

> ℹ️ The measurement data from a measurement cycle (OMNITREND Center) is usually only stored in input memory # 3.
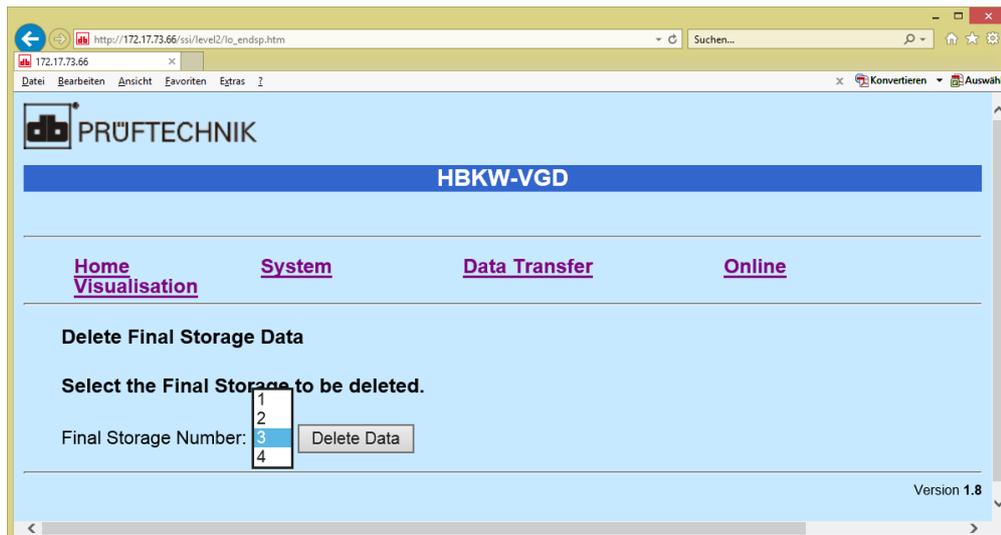
Deleting the ring buffers

The storage concept of VIBGUARD IIoT is designed in such a way that the most up-to-date data is available even if the measurement data is not backed up at regular intervals. Automatically generated measurement data can be stored despite the memory being full. In addition, a ring buffer architecture is used which always replaces the oldest measurement with the most recent measurement.

Therefore, manually measured data configured via a diagnostic group from the OMNITREND Center software should always be transferred and stored on the PC for analysis if such data is to be retained. This data should then be deleted from VIBGUARD IIoT in order to save memory space. This especially applies to time signals with lengthy measurement times which take up a considerable amount of memory space.

9 Triggering a measurement manually

You can manually trigger an additional diagnostic measurement at any time during the current measurement cycle. This type of measurement is configured in the OMNITREND Center software in the form of a diagnostics group and is linked to certain trigger conditions. For example, a threshold violation or an external signal can trigger diagnostic measurements during the measuring operation.

To trigger a diagnostic measurement manually, proceed as follows:

- Click on <System> in the navigation bar. The "System Menu" page is displayed.
- Click on <Trigger Diagnostic Group> in the "Administration" field. The "Diagnostic measurement" page is displayed.
- Select the measurement and click on <Start>.
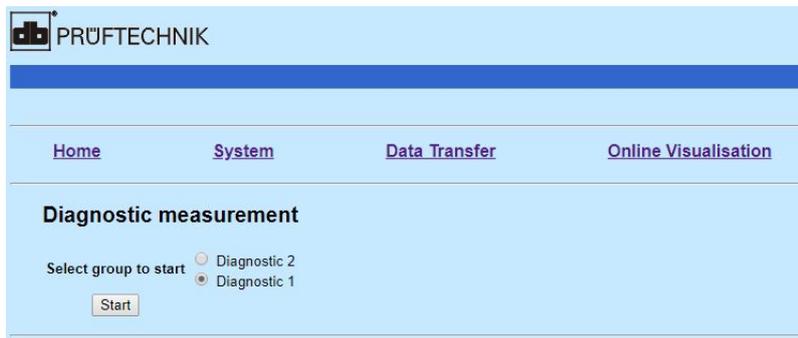
> If the CMS is currently busy with a measurement, the triggered measurement is put "on hold". The measurement does not start until the other diagnostic measurements (usually triggered automatically by an alarm) have been completed.

10 Data transmission by email

For security reasons, the measurement data is transferred from VIBGUARD IIoT to an SMTP server at least once every 24 hours. The input of the measurement data into the OMNITREND Center database can be triggered directly from the PC software or, automatically, via the **E-Mail Center** program.

The E-mail Center application is part of the **OMNITREND Center server installation** and is preferred for systems with very high data volumes. The measurement data is retrieved from the SMTP server and imported into the database. Emails with status information (alarms, sensor errors) are sent directly from the CMS to the intended recipients.

The following section describes configuration of the E-Mail Center application.

10.1 Configuring the E-Mail Center

- Start the **OMNITREND Center Utility** application.
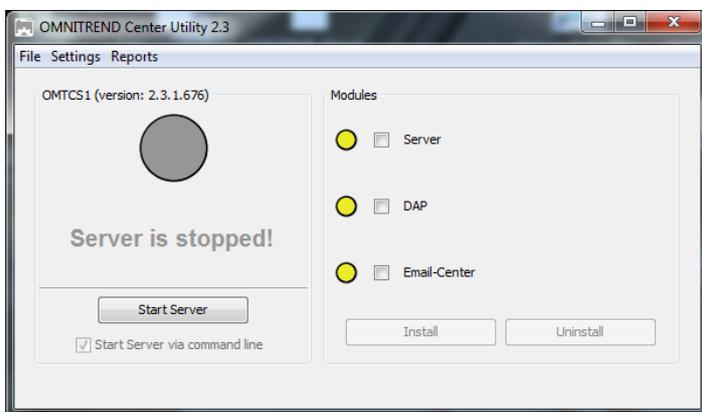
- If necessary, install the **Email-Center** module:
    - If the module status display is still gray, activate the "Email Center" checkbox.
    - Click on <Install>. The status display changes to yellow if installation was successful.
- Click on <Settings> in the main menu and then on <E-Mail Center Settings>.

> ⓘ The OMNITREND Center Server is stopped during configuration (status display: gray).

Enter the account and login details on the SMTP server in the following submenus. The emails are retrieved using a configurable task via POP3 and the Fetchmail function and are processed in the E-mail Center.

- Activate the Fetchmail function in the "E-Mail Center Administration" window (**Enable**).
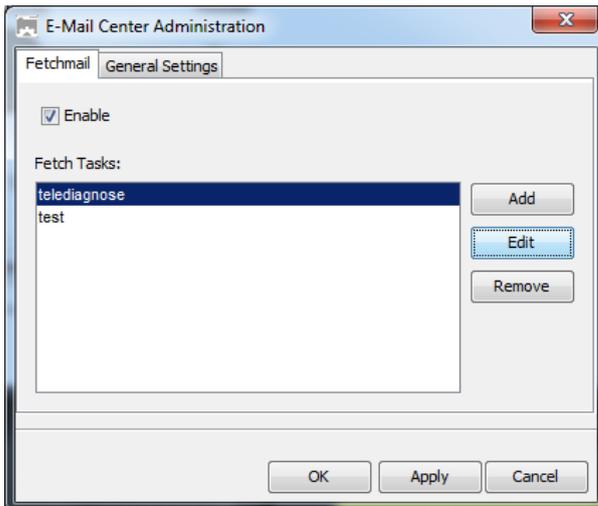
- Create a new task (<Add>) or edit an existing task (<Edit>). The "Fetch Task" window appears.
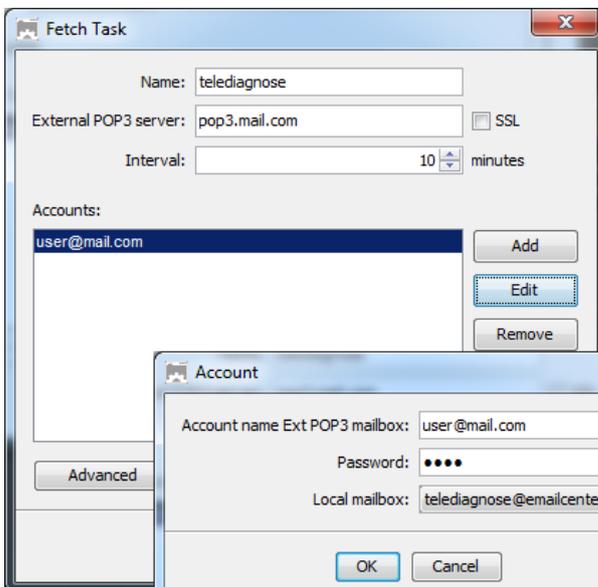
- Enter a **Name** for the task.
- Enter the **Server address** ("External POP3 server") and, if necessary, activate the "SSL" option.
- Specify a **Time interval** for retrieving the data.
- Configure the login details for the **E-mail account** on the server. To this end, click on <Add> for a new account or on <Edit> for an existing account. The "Account" window appears (see above).

> ⓘ The "Local mailbox" field contains the name of the email account that is set up as an inbox in the E-mail Center. You must specify this account as the recipient address for system emails in the OMNITREND Center software when you set up the data import via the E-Mail Center.

- Click on <OK> to apply the changes.
- You can make further settings for the data import in the "Fetch Task" window. Click on <Advanced>:
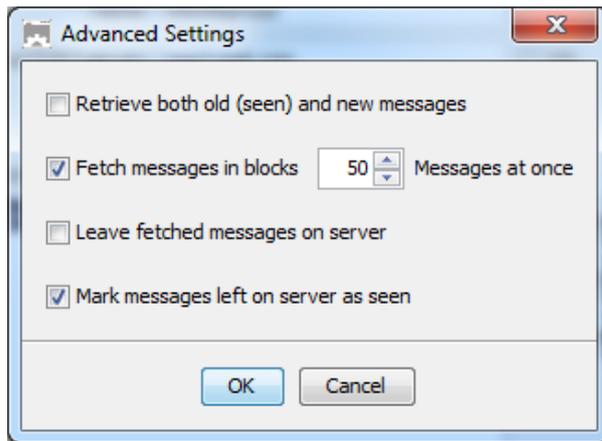
- If necessary, adjust the options and click on <OK>.
- Click on <OK> repeatedly to exit the configuration.

11 Troubleshooting

The following errors may occur during operation:

Symptom: Sensor status LED on the system module indicates a fault message (flashing orange).

- **Possible cause**: Sensor line is interrupted or has short circuited.
- **Remedy**: Check that the connections on the sensor and system are secure. Exchange any damaged cables

or

- **Remedy**: Check the cable connections with the **PRÜFTECHNIK installation checker** (item no. VIB 8.745).

Proceed as follows:

- Use a cable with banana plugs and alligator clips to connect the sensor cable to the input terminals **(1)**.
- The three status LEDs on the housing indicate the condition of the sensor cable:

  - Green LED: OK
  - Red LED: Short circuit
  - Yellow LED: Ground loop

If none of the LEDs illuminate during testing and the battery is known to be fresh, then the sensor connection is broken. The installation checker is powered by a 9V battery. Battery condition can be checked as follows:

- Connect the 'BATT. TEST' and 'GROUND' terminals **(2)**).
  If the yellow LED illuminates, then battery voltage is below 5 volts and is no longer sufficient for reliable testing.
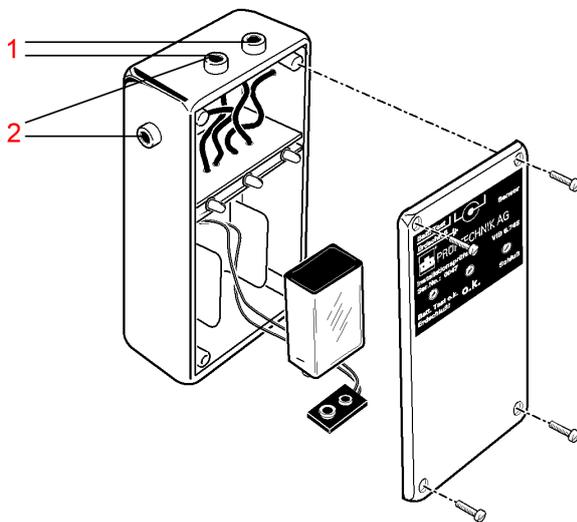
PRÜFTECHNIK-installation checker, VIB 8.745

Symptom: The SYSTEM LED on the system module does not light up.

- **Possible cause**: Supply voltage is not applied.
- **Remedy**: Connect to supply voltage.

or

- **Possible cause**: Supply voltage parameters out of specification.
- **Remedy**: Provide suitable supply voltage.

or

- **Possible cause**: No output voltage generated by power supply unit.
- **Remedy**: Replace power supply unit.

Proceed as follows to remove the defective power supply unit:

- Push in the locking lever and pull the power supply unit (1T1) upwards.
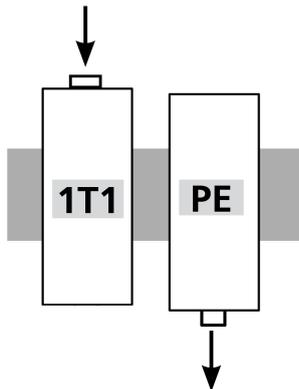
or

- **Possible cause**: Unknown fault on the system module.
- **Remedy**: It is not possible to troubleshoot the system module directly. In the event of a malfunction, the system module must be sent to the manufacturer.

Proceed as follows to remove the system module:

- Disconnect the green terminal connectors from the system module to which cables are connected.

- Remove the system module from the top hat rail.

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