

VIBGUARD[®] compact

Installation and Operation



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Serial number and year of manufacture: see type plate
PRODUCER: PRUFTECHNIK, 85737 Ismaning, Deutschland
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1 Prior to starting

1.1 Scope of delivery

On delivery, check the goods for damaged or missing parts. Note any possibly objectionable parts on the shipping documents and claim them with the forwarder or your local PRUFTECHNIK partner.

1.2 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.

1.3 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**.

1.4 Abbreviations

The following designations are considered equivalent in these instructions:

- Condition Monitoring System = CMS
- VIBGUARD compact Condition Monitoring System = VIBGUARD compact or System
- VIBGUARD compact system module = system module
- Sensors, cables, mountingadapters = measuring equipment.
- Current Linedrive = CLD

1.5 Service addresses

Hotline	<p>+49 89 99616-0</p> <p>Please have the serial number of your system module ready when contacting our hotline ("Type plates" on page 9).</p>
Shipping address	<p>PRÜFTECHNIK Condition Monitoring GmbH</p> <p>Oskar-Messter-Str. 19-21, 85737 Ismaning, Germany</p>

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2 Safety

VIBGUARD compact 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 compact conforms to the relevant European directives. The complete text of the EU conformity declaration is available at the following Internet address:

:

- www.pruftechnik.com/downloads/certificate-overview/ce-certificate-overview.html



2.2 Intended use

VIBGUARD compact 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

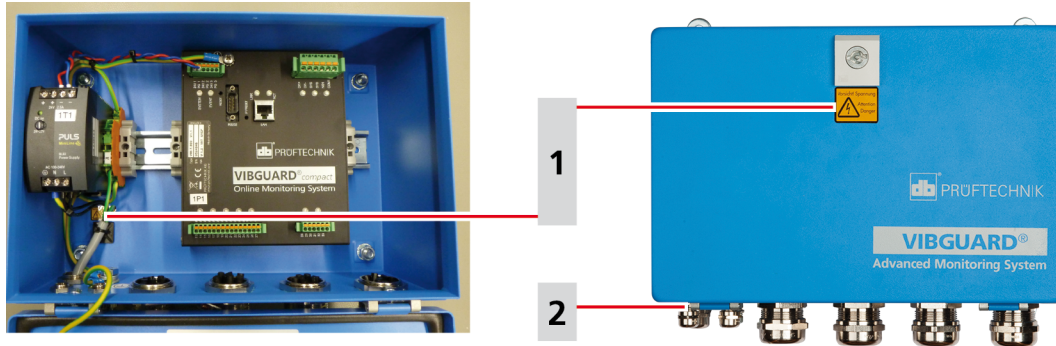
The system works continuously and records the machine signals synchronously on all channels¹. It is therefore suitable for machines with dynamic operational behavior for which the operating and process parameters need to be recorded simultaneously and at short intervals.


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


¹maximum number of channels is type-specific

2.3 Safety markings

Please refer to the following figure for the safety markings on the VIBGUARD compact. 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.

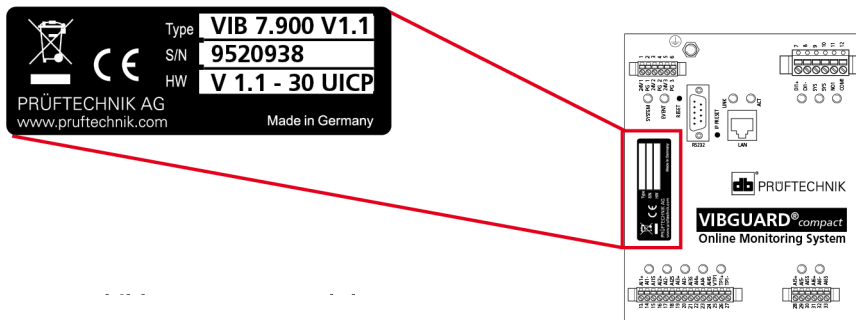


1	Vorsicht! Spannung Attention Danger	
VIB 7.900-LH	A yellow sticker each on the housing lock and below the power supply.	
VIB 7.900-PS	A yellow sticker on the top hat rail.	

2	100 - 240V AC / 1,3 A / 50-60 Hz	
VIB 7.900-LH	A yellow sticker on the outside of the cable gland for the mains supply.	
VIB 7.900-PS	A yellow sticker on the top hat rail.	

2.4 Type plates

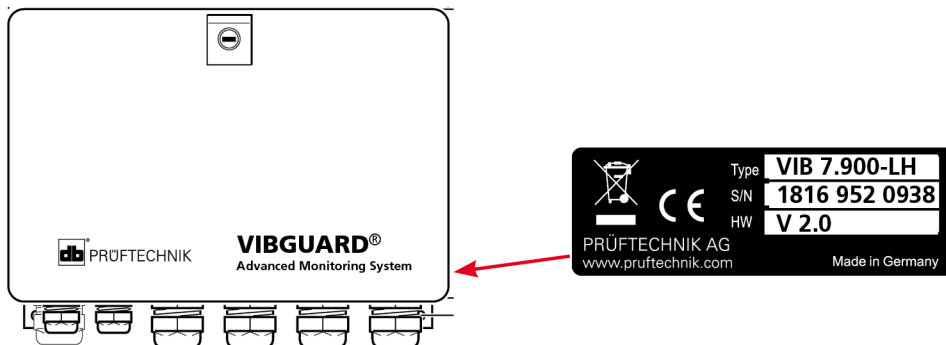
System module



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

- **Type:** Item number (VIB 7.900), hardware status (V1.1) of the System module.
- **S/N:** Serial number of the system module, 7 digits, starting with 95..
- **HW:** Status (V1.1), number (30), variant (UICP = Voltage ICP) 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 7.900-LH or VIB 7.900-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 compact 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 Technical data

3.1 System module - VIB 7.900

Parameter	VIB 7.900
INPUTS AND OUTPUTS	
Analog inputs	6 synchronous channels
Type of signal, channel distribution	6 x U / IEPE (ICP), selectable
Type of sensor	IEPE sensor; Sensor with voltage output
Tacho / pulse input	Frequency input: $\pm 30V$; Threshold $\pm 30V$ DC (default 2.5V)
Tacho / pulse output	Sensor voltage supply
Digital inputs	Optocoupler input: -3V to +30V, switching thresholds 6.5V to 8.5V DIN EN 61131-2 operating range DC 24V type I and II
Digital outputs	Relay turnkey: 30V DC / 30V AC / 2A DIN EN 61131-2 utilization category AC15 and DC13
System OK output	Relay opener: 30V DC / 30V AC / 2A DIN EN 61131-2 utilization category AC15 and DC13
Ethernet	Data rate: 100 MBit, half duplex
Serial interface	RS232, 115200 baud
Services	Modbus-TCP
LED indicators	6x analog IN, 1x tachometer IN, 1x system, 1x event, 2x Ethernet, 1x digital IN, 1x system OK, 1x digital OUT
MEASUREMENT	
Dynamic range	110 dB @ 24 bit
Sampling rate	131 kHz / 50 kHz range
FFT lines	6400 (default), 102400 (analysis)
Measuring range	$\pm 24V$
GENERAL	
Ambient temperature	Operation: -20°C ... +70°C [-4 °F ...+ 158 °F] Storage: -40°C ... +80°C [-40 °F ...+ 176 °F]
Relative humidity	max. 95 % (25°C [77°F], no condensation)
System supply	24 \pm 6 VDC / 0.25 A
Memory	Flash: 2 GB, RAM: 256 MB
Housing material	Aluminum

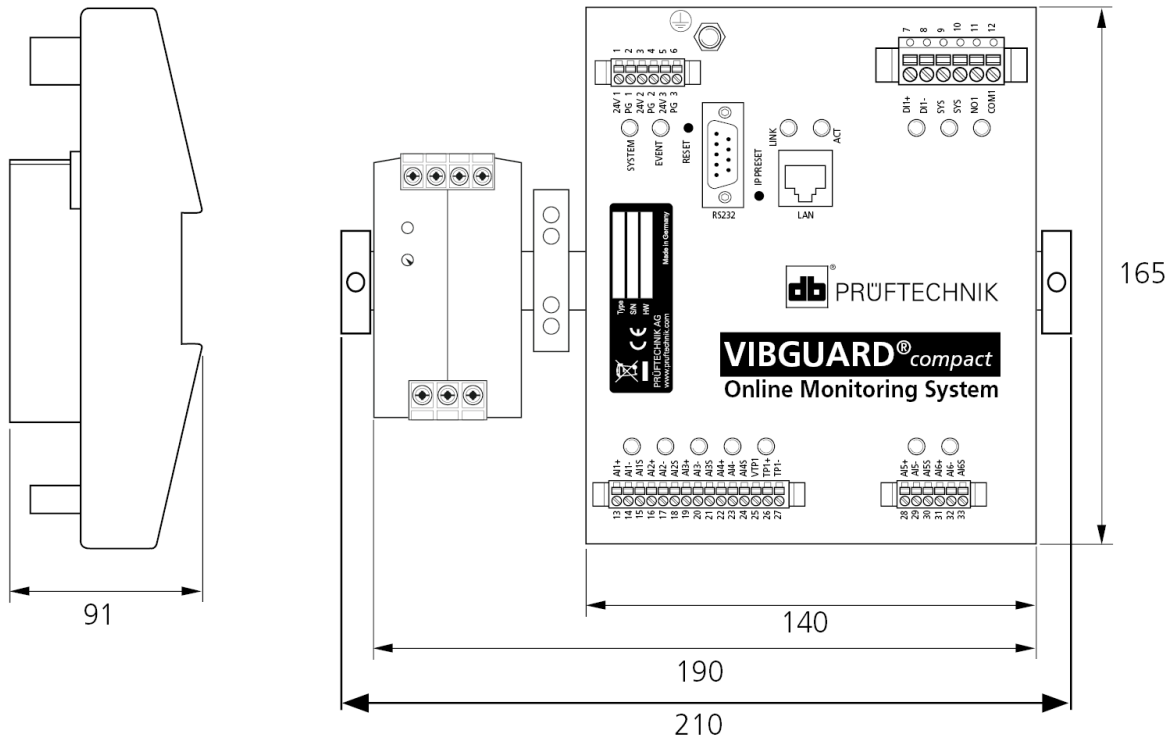
Parameter	VIB 7.900
Weight	approx. 0.7 kg [24,7 oz]
Protection class	IP 20

Parameter	Power supply, Safety, Protective housing
Power supply	
Voltage	100V ... 240V 1-phase / -10% ... +10% / 50Hz ... 60Hz
Current draw including system module	max 1.3A
Overvoltage category	II
Protection class	I
Protective housing	
Ambient temperature	-20°C ... +60°C [-4°F ... +140°F]
Relative humidity	max. 95% (25 °C [77°F], no condensation)
Altitude	max. 2000 m [6562 ft.]
Installation site	Indoor installation (no direct sunlight)
Mounting	Single housing wall-mounted, screw connections downwards
Protection class	IP 66
Weight	3,5 kg [123,5 oz] (VIB 7.900 LH)

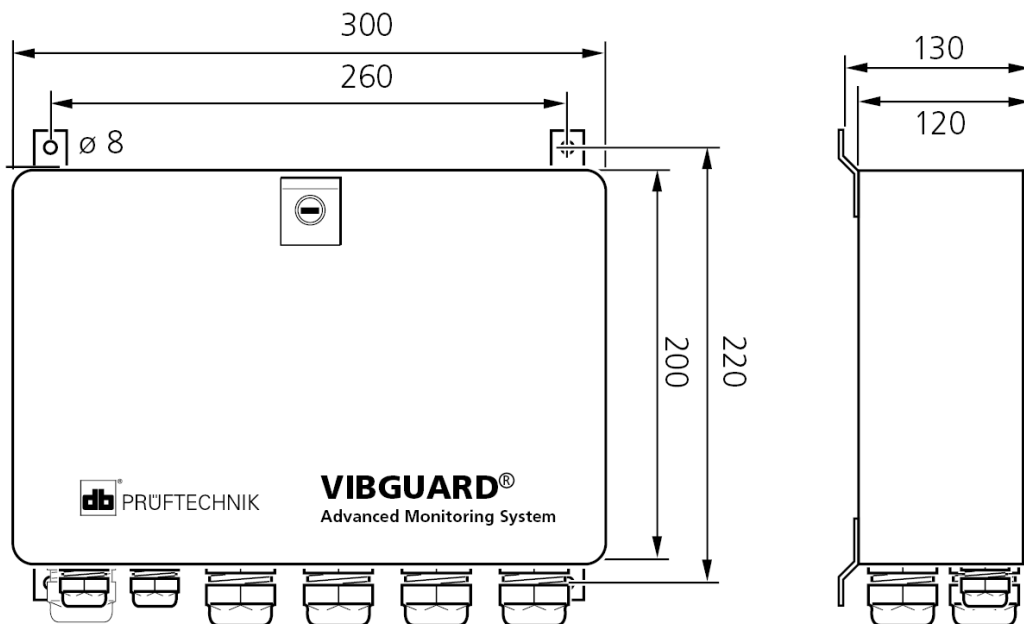
3.2 Dimensions

Values in millimeters.

System module on a top hat rail, VIB 7.900-PS

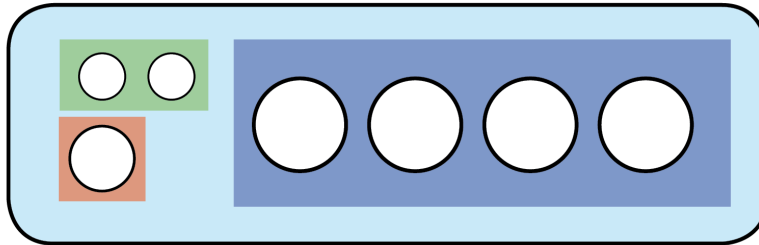


System module in the protective housing, VIB 7.900-LH



3.3 Cable glands

All cables and wires are inserted into the protective housing via metric cable glands. The size, material and clamping range of the cable glands can be found in the table below.



M 20

M 12

M 32

	Cable glands		
Material	Brass - nickel-plated		
Size	M 12	M 20	M 32
Clamping range, mm	3 ... 7	7 ... 13	5*
Width across flats, mm	16	24	36
	* Cable gland with 8 sealing inserts for cable diameter 5.3 mm		

4 Description

VIBGUARD compact is a stationary Condition Monitoring System (CMS) with the following features:

- Modular design
- Synchronous signal acquisition on all analog measuring channels
- Network-ready

The CMS is used for vibration monitoring and early damage detection on all machines with rotating components. The system records the following quantities:

- Housing vibration
- Bearing condition
- Rotational speed
- Process variables as current or voltage level or as digital input signals
- Temperature, oil quality, alignment condition, load, etc.

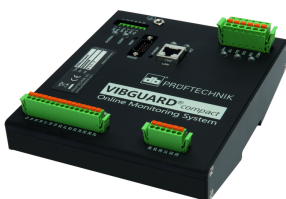
The system is primarily comprised of the VIBGUARD compact system module with the power supply in the protective housing and the sensors with cables. An expansion by several CMS is possible. The connection to computer or network is done via Ethernet (TCP/IP).



Network capable PC or notebook

The entire monitoring system is configured on the PC using software (OMNITREND Center). Measurement tasks are created and transferred as a measuring cycle to the VIBGUARD compact.

In contrast, the PC can receive the measurement data from VIBGUARD compact, process it and display it graphically for evaluation. With regard to sending the measurement data for evaluation, using the Internet via a local Internet Service Provider is recommended.



VIBGUARD compact

The system's basic unit checks and controls measurements; processes and saves measurement data, conducts preliminary diagnostics, supplies the sensors and outputs alarm messages. It also features interfaces for external measuring instruments.

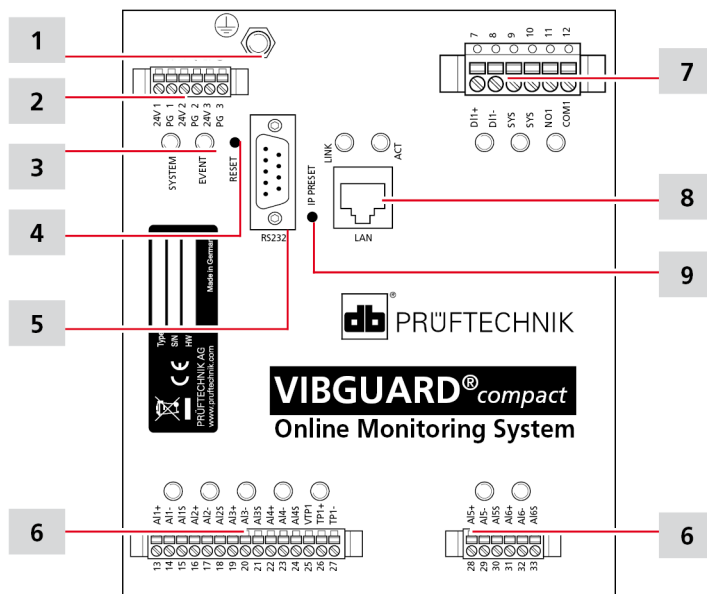


Sensor

Converts vibration, pulse, speed, temperature etc into electrical values.

4.1 System module

VIB 7.900



Schnittstellen, Anzeige- und Bedienelemente	
1	PE: Protective earth terminal connected to PE terminal; used for contacting the system housing, contacting the Ethernet socket.
2	24V 1, PG 1: Connection for the system module supply. 24V 2 / 24V 3: Supply for the accessories.
3	SYSTEM, EVENT: LEDs for system status and event recorder.
4	RESET: System reset button.
5	RS232: Serial interface for service.
6	Connection terminals for voltage signals/vibration sensors (AI1 to AI6) and for RPM sensor (TP) incl. status LEDs.
7	Connection terminals for digital input signal (DI), system OK relay (SYS) and relay output (NO) incl. status LEDs.
8	LAN: Ethernet connection with status LEDs (LINK, ACT) for data traffic.
9	IP PRESET: Button for standard IP configuration.

LED displays on the system module

Analog inputs / tachometer pulse input

LED status	AI1 ... AI6	Sensor fault
Off	Channel not configured	

LED status	A11 ... A16	Sensor fault
Green	Sensor OK	---
Flashing green	---	Sensor OK, impulses are registered
Flashing orange	Sensor fault	
Green, flashing orange	Measured value > Threshold for prewarning	
Orange	Measured value > Threshold for warning	
Red	Measured value > Threshold for alarm	

System status

LED status	SYSTEM - Statusanzeige	SYS - SYSTEM-OK Ausgang
Off	No supply	Fault present
Orange	Boot sequence running	---
Green	Operational	No faults
Flashing orange	Standard IP configuration loading	---

Digital input

LED status	DI
Green	Static signal pending
Flashing green	Dynamic signal pending, e.g. rpm signal

Ethernet

LED status	LINK	ACT
Green	Connection to LAN established	Data transfer active

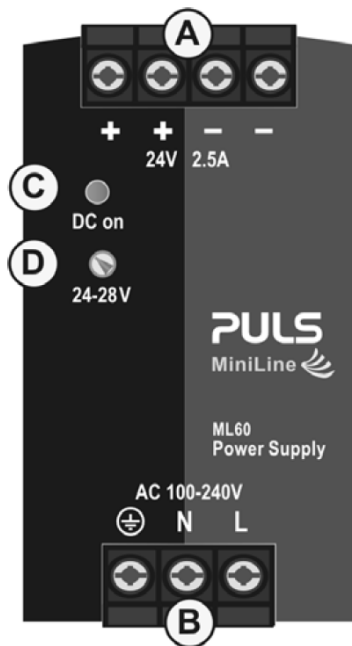
Event recorder

LED status	EVENT
Off	Once the LED is extinguished the event recorder starts up and records signals.
Green	Event for triggering the event recorder detected

Alarm output

LED status	NO1/ COM1
Green	Alarm output set

4.2 Power supply



Interfaces, display, operating elements

A	Output: In each case, two screw terminals for positive and negative poles. Both poles are equivalent.
B	Input: Connection terminals for the power line.
C	DC on, (readiness indicator): LED lights up green if the voltage at the output is > 17V.
D	24-28V: Potentiometer for output voltage is set ex works at 24 V.

5 Installation

In this section you will learn how to mount the system and how to establish the electrical connections. Information about installing the sensors on site can be found in the instructions for the respective sensors. For PRUFTECHNIK sensors these are:

- Installation instructions for IEPE-type sensors VIB 9.833

5.1 Preparation

For proper installation you, as the operator, must ensure that the following conditions are met and that the following preparations are made on site:

Ambient conditions

Temperature	-20°C to +60°C [-4°F ... +140°F] (system in protective housing)
	-20°C to +70°C [-4°F ... +158°F] (system without protective housing)
Rel. humidity	max. 95% (25 °C [77°F], no condensation)
Altitude	max. 2000 m [6562 ft.]
Installation site	Indoor installation (no direct sunlight)
EMC	There must be no strong electromagnetic fields in the immediate vicinity of the system, e.g. in the vicinity of a generator or a high voltage cable.

Connections

Power supply	100 - 240 V AC / 1.3 A / 50 to 60 Hz
Network	Ethernet TCP/IP / 100 Mbit
Connecting cables, general requirements	
Temperature range	-20°C to +80°C [-4°F ... +176°F]
Flammability	flame retardant according to UL 2556 VW-1 or equivalent (IEC 60332-1-2 / IEC 60332-2-2)
Shielded cable	shielding \geq 85%

5.2 Mains connection

VIBGUARD compact meets the requirements for protection class I. The resulting necessary **protective earth conductor** establishes the connection between the protective earth connection of the VIBGUARD compact and the external protective earth conductor system.

The protective earth conductor is part of the mains connection cable. There must be no fuse, switch or circuit breaker in this connection.

The protective conductor cross-section must correspond to the overcurrent protection device of the building installation and at least to the cross-section of the mains connection cables.

The cross-sections of the mains connection cables must correspond to the overcurrent protection device of the building installation and the minimum required cross-section resulting from the power consumption.

Requirements for the **mains connection cable**:

Diameter	7 mm ... 13 mm for M20 cable gland
Core cross-sections	according to upstream cable protection
Strain relief	Cable is specified for cable gland. Otherwise, the gland is not suitable as a strain relief.

The overcurrent protection device of the building installation also serves as an isolating device and must be designed as a circuit breaker.

Circuit-breaker requirements:

The circuit-breakers must...

- be installed in the building installation.
- correspond to the rated current 6A and the tripping characteristic C.
- meet the requirements of IEC 60947-2.
- disconnect all live conductors.
- be suitably arranged and easily accessible.
- be marked as a disconnecting device for VIBGUARD compact.
- be marked with a clear OFF position.
- be designed to meet the power supply requirements.

5.3 Tools and consumables

Tools for mounting the protective housing:

- Drill machine and drill (\varnothing 10 mm)
- Screws (\varnothing 6 to 8 mm) and suitable washers or assembly dowel (\varnothing 10 mm) for attaching the protective housing, in each case 4 items
- Spanner of a suitable size for the fastening screws

Tools for electrical installation:

- Flat head screwdriver, blade width 2.5 or 3.5
- Phillips screwdriver, size PZ2
- Crimp tool with square crimping, e.g.:
 - KNIPEX 975304 or PHOENIX Crimpfox UD 6-4 1205244
- Shield connection set for twisted pair cable: PRUFTECHNIK item no.: VIB 6.725-100
- Heat gun with reduction nozzle for shield connection set
- Standard tool for electric installations (wire cutters, wire stripper)
- Suitable spanner for the cable glands:
 - M12 > size 16; M20 > size 24; M32 > size 36

Materials for electrical installation:

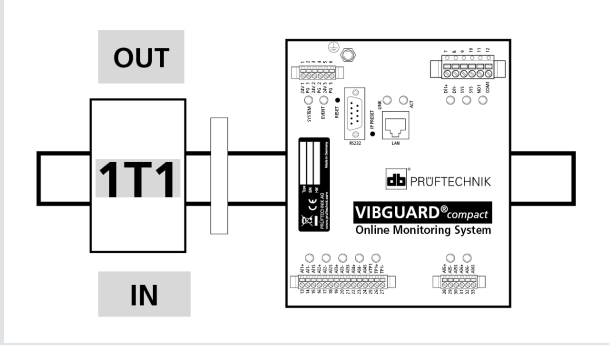
- 3-wire electric cable for low voltage supply
- Shielded industrial Ethernet cable (CAT 6 / CAT 7)
- Isolated ferrule for connecting the following lines:
 - Supply, e.g.:
 - KLAUKE 472/8 (1.5 mm² / black)
 - Sensor cable (VIB 90061, VIB 90008) and digital inputs/outputs e.g.:
 - KLAUKE 469/10 (0.5 mm² / white),
 - Shield via KLAUKE 472/12 (1.5 mm² / black)
- Suitable strain relief for cable protection
- Cable tie or Velcro fastener to fix the cable in place
- Labels to mark the cable routes

6 Mounting

6.1 Switch cabinet installation

The variants VIB 7.8xx-PS are intended for installation on a top hat rail in an existing switch cabinet. The components are mounted and wired on a top hat rail for transportation purposes. Observe the following specifications prior to installation in the switch cabinet.

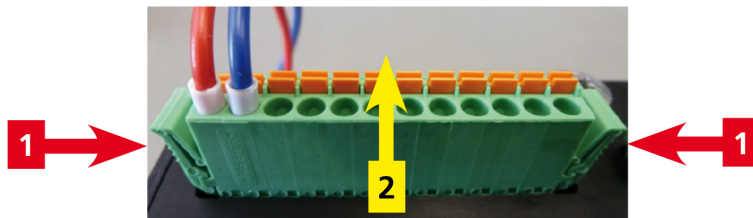
Installation specification, Type VIB 7.900-PS

Fastening	top hat rail (TS 35) in accordance with EN 60715
Required space, min.	210 x 91* x 165 mm (L x D x H)
Minimum installation distances for the power supply	40 mm above, 20 mm below, 0 mm to the right/left, or 15 mm if next to heat sources.
Default installation position	

** plus depth of the top hat rail

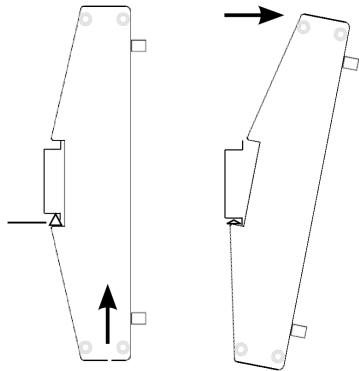
Removing system components from the top hat rail

- Fix the top hat rail with the system components in place on a stable base.
- Disconnect the terminal block for the supply from the system module:
 - To do so, press the two locking levers together (1) and remove the terminal block from the system module (2).

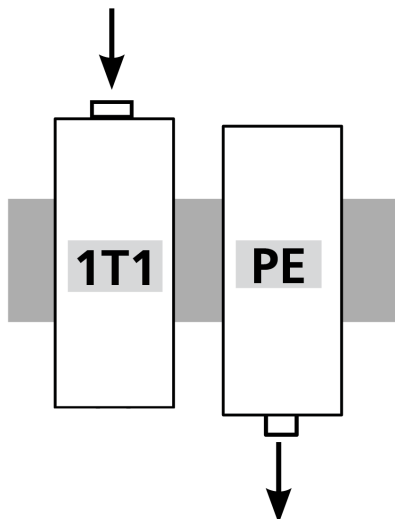


- Remove the protective conductor cabling between the PE terminal and the system module.
- Unscrew the gray end terminals from the top hat rail.
- Take the system module off of the top hat rail:

- To do so, press the bottom of the system module upward with your hand.
Tilt the system module forward slightly and remove it from the top hat rail.



- Take the PE terminal off of the top hat rail:
 - To do so, pull the locking lever downward using a suitable screwdriver and then remove the PE terminal. The PE terminal remains connected to the power supply via the protective conductor.



- Take the power supply (1T1) off of the top hat rail:
 - To do so, press the locking lever inward and then pull the power supply upward to remove it.

Installing system components in the switch cabinet

- Place the system module and the power supply on the top hat rail in the switch cabinet and let them lock in place.
- Reinsert the PE terminal between the power supply and the system module.



Note

Ensuring that the power supply is cooled

The power supply is designed for convection cooling and does not require an external air supply. Ensure that there is unrestricted air circulation at the power supply. Do not cover more than 30% of the ventilation slots on the power supply.

- Reconnect the supply terminal block to the system module.
- Reconnect the protective conductor on the system module to the PE terminal.
- Fix the system components in place with the gray end terminals on the top hat rail in the switch cabinet.

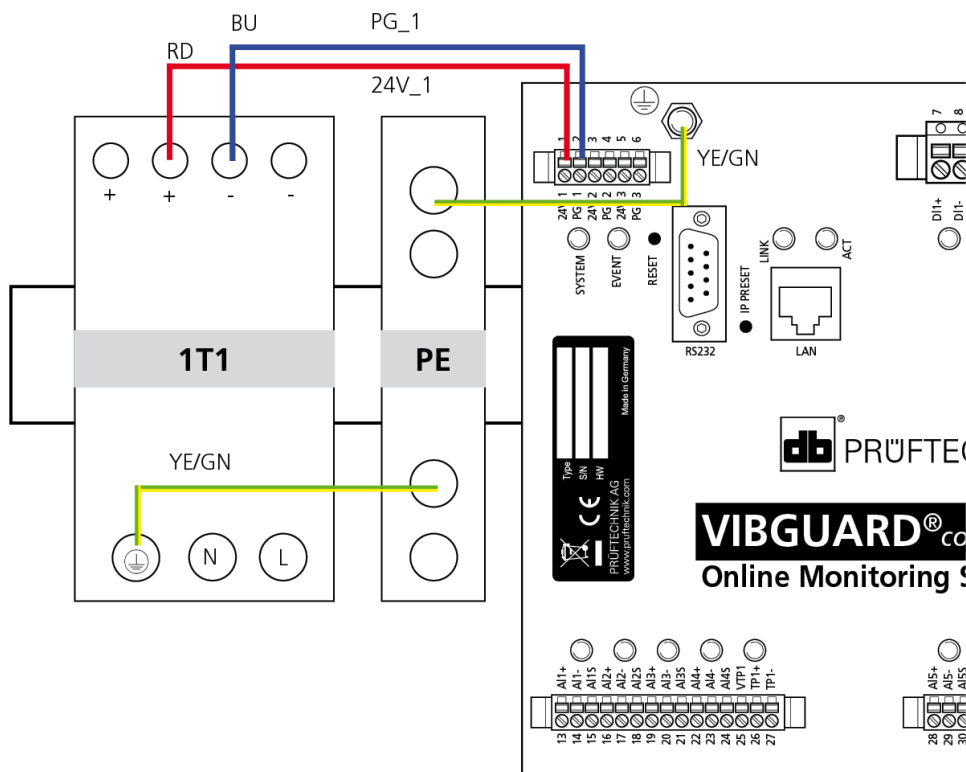


Note

Check the protective conductor wiring!

The resistance of all connections must not exceed 0.1 Ohm.

- Apply the safety labels from the top hat rail to a suitable place in the control cabinet.



6.2 Mounting the protective housing

In variant VIB 7.900-LH the system components are installed at the factory in a protective housing. Please consider the following criteria when selecting the installation site:

- Proximity to the machine reduces the cable routes to the sensors
- Accessibility facilitates installation and system maintenance
- Permanent mounting, preferably on a wall.
- External circuit breaker is provided as a disconnecting device for power supply close to the installation site.
- Sufficient space for cable loops (approx. 30 cm) and for opening the housing door (approx. 35 cm / 45 cm)
- Low vibration ground, e.g. foundation, building wall, base frame
- Active ventilation is not necessary.
- Mounting position: Single housing wall-mounting (cable glands pointing downwards)
- Mounting location: indoors (without direct sunlight)

To install the protective housing, proceed as follows:

- Drill four holes in the intended location for attachment of the protective housing. The distances between the holes can be found in the dimension outlines (refer to , "Dimensions" on page 15).
- If necessary, put assembly dowels in the drill holes.
- Fasten the protective housing with four M8 screws.



6.3 RPM sensor

i The following section regarding the mounting of an inductive proximity switch is intended for use with GL-certified VIBGUARD CMS on wind turbines

The machine RPM is a measurement taken with an inductive proximity switch as standard. The proximity switch is to be mounted as close to the measurement marks on the shaft as possible (e.g. mounted on a separate toothed washer).

In every revolution the measurement marks generate a pulse with an electrical field change. The RPM is then derived from the frequency divided by the number of measurement marks on the shaft. The function display (LED) of the sensor responds during an RPM measurement.

The RPM sensor supplies the raw signal to the VIBGUARD compact directly. It is not averaged. This is specifically necessary for variable speed units.

i A laser optical sensor (e.g. PRUFTECHNIK laser sensor, VIB 6.631) must be used to measure very low speeds (< 50 RPM). For high-speed applications, the reference mark is to be fastened to the shaft using a suitable adhesive (e.g. Loctite). The reference mark is to be fastened to a clearly defined position (e.g. key).

The quicker the shaft rotates and the more switching cams are measured, the more precisely the RPM can be determined. It is therefore recommended that the RPM sensor is installed on the shaft. The number of switching cams must be noted in the installation log and entered in the measurement configuration in the OMNITREND Center PC software (context: measuring channel).

! CAUTION! When installing the RPM sensor, ensure that the function of the unit's safety equipment is not impaired.

Mounting the RPM sensor

The RPM sensor of type VIB 5.992-xx is electrically insulated. You can mount it on the machine housing using a suitable mounting profile.



RPM sensor mounted, toothed washer as encoder.

i The sensor is a non-flush mounted proximity switch (recognizable by the caps). The active surface (cap) must protrude >24 mm from the metallic installation medium.

- Switch the machine off and secure it against a restart.
- Select a suitable location in the vicinity of the measurement marks.
The measurement mark should have a diameter of at least 10 mm. The distance between the measurement mark and the sensor must not exceed 8 mm.

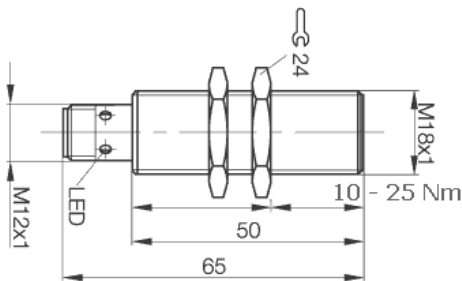
! **WARNING!** Risk of injury due to fragments!

Insufficient measuring distance can lead to contact between the measurement mark and the sensor. Contact may cause fragments to spall and cause serious injuries to persons.

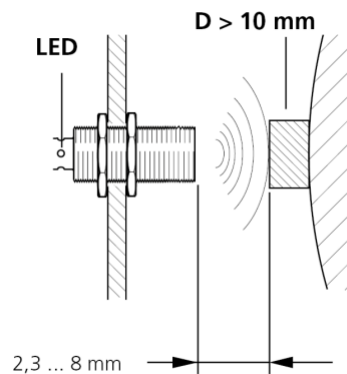
When setting the measuring distance, give due consideration to any radial shaft movement that may occur.

- Drill a hole in the mounting surface; diameter = 19 mm.
- Unscrew the front locking nut from the sensor and push the sensor through the mounting hole. Screw the locking nut back onto the sensor and tighten the arrangement.
- The optimum measurement distance can be adjusted with the locking nuts. The LED on the sensor head always lights up when a measurement mark passes the sensor.

i Mount the sensor using a suitable mounting bracket if it cannot be attached directly to the housing or a cover. Ensure that the arrangement is not excited by machine vibrations. If the RPM sensor is installed on the same retaining plate as the system RPM sensor, ensure that the system sensor is working flawlessly.



Dimensions



Measuring distance

7 Electrical connection

VIBGUARD compact is wired with the supply components at the factory. The following connections are to be established for installation on site:

- Connection to the mains supply
- Connection to the data network (Ethernet)
- Connection to the sensor lines and to the digital inputs and outputs



Installation description for the variant in the protective housing

The following installation steps illustrate installation for the variant in the protective housing. The connections for the variant in the switch cabinet (VIB 7.xxx-PS) are to be established in the same way.

7.1 Mains supply



CAUTION

Risk of injury due to electric shock!

Components may be live if not properly connected to the mains supply.

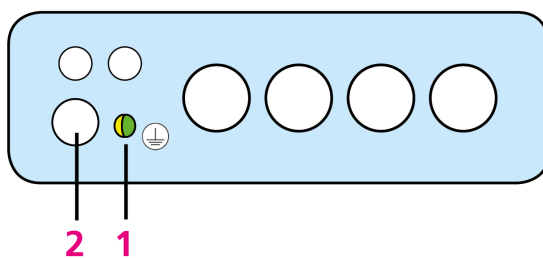
Only an electrical specialist is allowed to connect the mains supply.

The mains supply must comply with IEC guidelines.

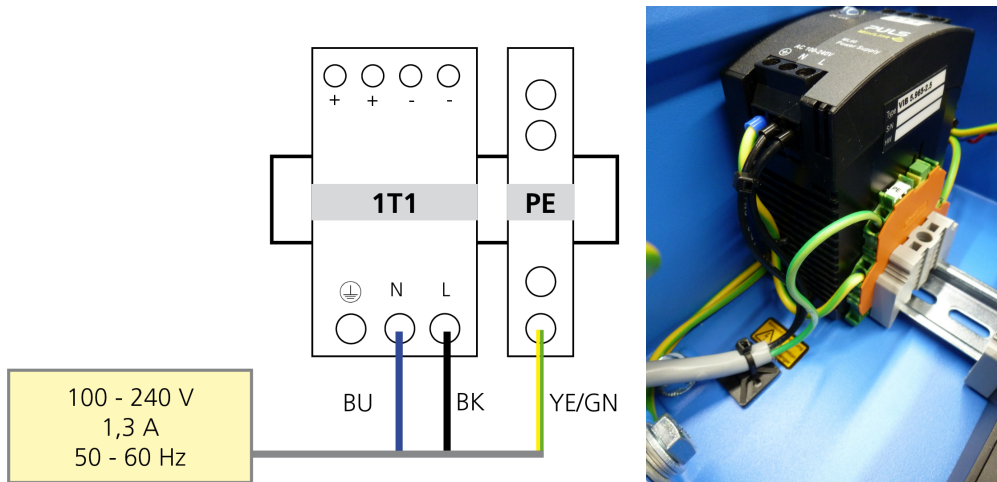
Before carrying out any installation, repair or maintenance work, disconnect the system from the power supply, determine that there is no voltage and secure the power supply against being switched on again.

The **protective earthing** is carried out via the mains connection cable. The PE bolt on the bottom side of the housing is used to increase the cross-section of components for overvoltage discharge.

- Connect the PE bolt (1) on the bottom side of the housing over a short distance with PE at the site of installation (cross section: 2.5 - 16 mm²).



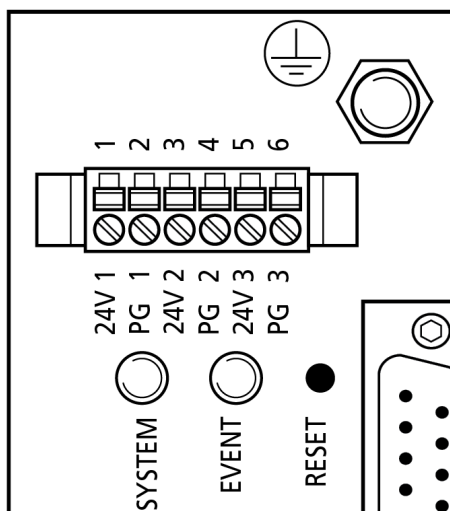
- Open the M20 cable gland (2) for the supply line with a suitable spanner (size 24) and remove the sealing insert.
- Place a cable loop in order to not put any strain on the connection during subsequent service work.
- Guide the supply line through the cable gland (clamping range 7 - 13 mm). The conductor cross section must be at least 1.5 mm².
- Crimp suitable ferrule sleeves onto the end of the ferrules. To do so, use a crimp tool with square crimping.
- Close the ferrules to the supply line on the power supply and on the PE terminal.



- Re-tighten the cable gland.
- Bundle and fix the cores of the mains cable as shown in the illustration.

Supply terminals on the system module

The supply lines from the power supply to the system module and from the protective earthing (PE) to the housing are connected at the factory. Terminals 3 to 6 are intended for the supply of additional equipment.

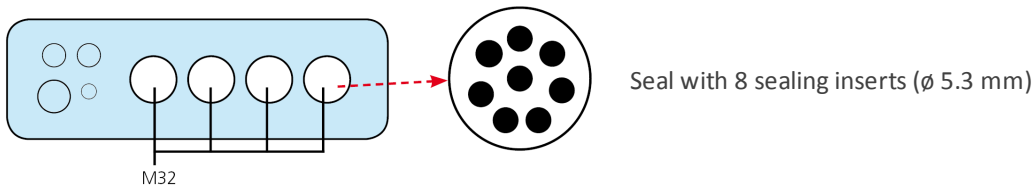


Terminal	Designation	Function
1	24V_1	Supply for system module
2	PG_1	
3	24V_2	Supply of additional equipment
4	PG_2	
5	24V_3	Supply of additional equipment
6	PG_3	
PE	Protective conductor terminal	Protective grounding of the housing and current path of the surge arrester.

7.2 Data line

The system module is connected to the data network via the LAN terminal using an standard Ethernet cable with pre-assembled RJ45 connector. The cable end is inserted into the protective housing through a cable gland with multiple sealings.

- Open a sensor cable gland (M32).
- Take the seal out of the cable gland.



- Remove one of the outer sealing inserts (1).



CAUTION!

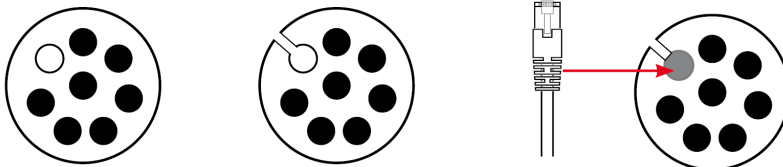
Risk of injury due to sharp knife blade!

A sharp knife blade can cause cuts if used improperly.

Always cut away from your body.

Use work gloves.

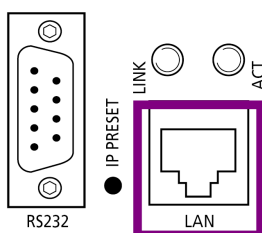
- Cut the seal at the opening radially using a sharp knife (2).
- Place the Ethernet cable across the incision to the opening (3).



1: Remove the sealing insert

3: Insert the cable

- Place a cable loop in order to not put any strain on the connection during subsequent service work.
- Insert the cable end with the plug into the protective housing.
- If necessary, pull the Ethernet cable to a length appropriate for the connection.
- Insert the seal back into the cable gland.
- Connect the Ethernet cable to the LAN terminal.
- Use the spanner to close the cable gland.



Connection for Ethernet cable (RJ45)

7.3 Signal lines

The sensors in the VIBGUARD compact CMS are wired with shielded cables by default. Depending on the sensor type installed, coaxial or two-wire twisted-pair cables are used.

The following rules must be observed when selecting the cable path:

- i** There are no frequency inverters or their supply lines in the wiring area.
- There are no radio or remote control systems in the wiring area.
- There are no power cables in the cable trays, cable ducts or cable conduits.
- The lines between the CMS module and the sensors must be kept short in order to minimize disturbing influences and cable costs.
- If necessary, special installation measures must be taken in an electromagnetically contaminated environment.
- Cables with no signal on their screen must be insulated on the sensor side.

Connecting the sensor cable to the sensor

- The sensor cables are assembled upon delivery. The connector plugs are to be inserted on-site and screw tightened by hand to prevent the threads being damaged.
- Check the tightness of the connector plugs.



Sensor installed and wired at measuring location A5.

Connecting the sensor cable to the CMS

Connect the open cable end to the CMS as follows:

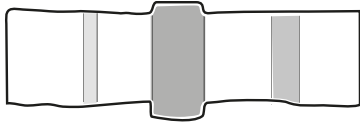
- Cut the cable to length and strip the insulation.
- Prepare the screen for connection
- Connect the signal lines to the CMS

Shield connection

The PRÜFTECHNIK shield connector for sensor cables (VIB 6.726-100) allows you to prepare the sensor cable for connection to the shield terminal in just a few simple steps.



The equipment supplied includes 100 solder sleeves. Per solder sleeve one single-core shield cable (AWG22 /0.38 mm²) is additionally required.



Transparent sleeve with fluxed solder preform

- Length: 42 mm [1.655"]
- Diameter: 6 mm [0.235"]



CAUTION!

Risk of burns through direct contact!

Heating tool and assembly become hot during installation.

- Allow tool and the assembly to cool down before handling.

Risk of burns from hot air jet!

The hot air jet can cause burns on the skin or inflame clothing.

- Keep the heating tool away from your body during operation.
- Do not point the heating tool at persons.
- Use a suitable reducing nozzle to direct the air jet onto the solder joint.

Danger from harmful fumes!

If the cable assembly heats up too much, it may char or burn. Charring or burning the cable assembly will produce fumes that may cause eye, skin, nose and throat irritation.

- Follow the installation instructions carefully.
- Avoid charring or burning the cable assembly.
- Use adequate ventilation.



Note

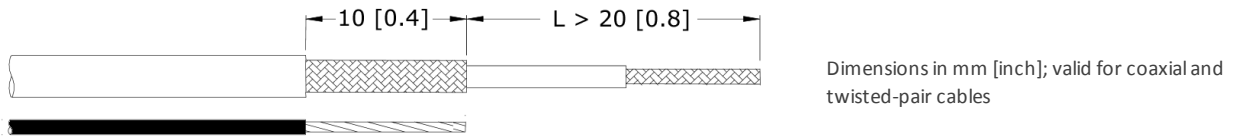
Hot air jet can damage the cable!

Improper use of the heating tool can cause the cable to heat up too much and damage it.

- Heat the cable assembly slowly and carefully.

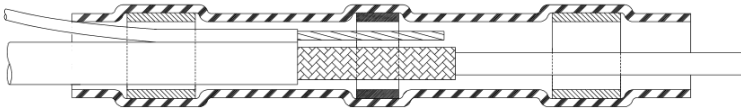
Cable preparation

- Remove length from the sensor cable and the shield cable according to the following figure:

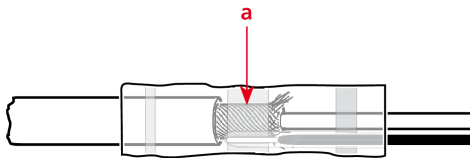


Assembly

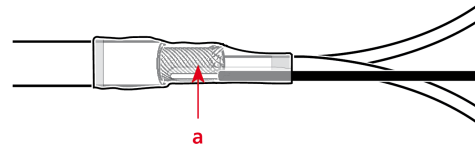
- Place the solder sleeve over the sensor cable. The solder preform should be centered over the shield braid.
- Insert the shield cable to be connected between the solder sleeve and the sensor cable. The shield cable can be laid in the direction of the sensor cable or in the opposite direction (see illustration).



- Fix the assembly in a suitable fixture.
- Heat the solder preform using a heating tool. The solder sleeve shrinks, the inner solder preform with flux melts and solders the shield braid to the shield cable (a). At the same time, both ends of the solder sleeve are hermetically sealed. The shield connection is thus reliably insulated and strain-relieved. The quality of the soldered connection can be inspected visually via the transparent sleeve.



Coaxial cable

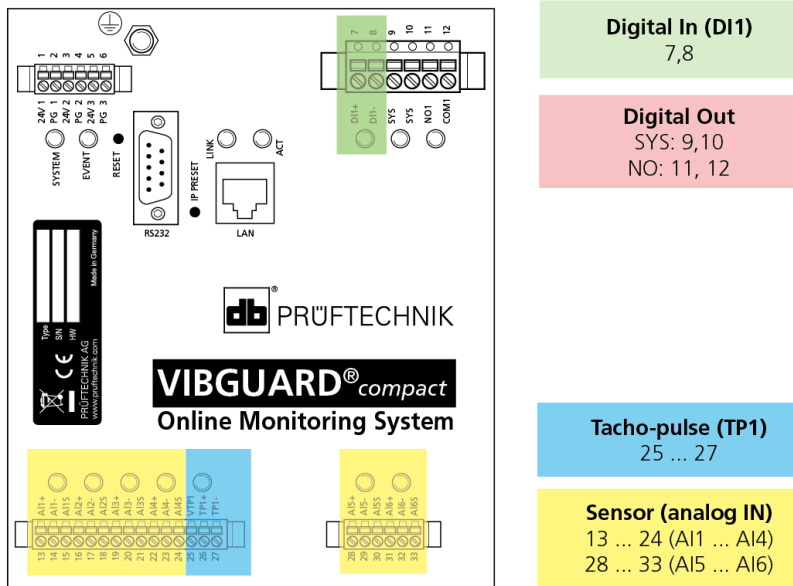


Twisted-pair cable

Clamping the signal lines

Terminals **AI1 to AI6** are provided for vibration signals. Connect the rpm sensor to the tachometer pulse input **TP1**. Connect a status signal to the digital input **DI1**. Connect the relay outputs **SYS** and **NO** to a digital input of an external system

Observe the connection specifications in this regard (see "Technical data" on page 13).



To connect a signal cable to the terminal block, proceed as follows:

- Open one of the large cable glands (M32) using a suitable spanner (Size 36).
- Take out the seal.
- Remove a sealing insert.
- Place a cable loop in order to not put any strain on the connection during subsequent service work.
- Insert the open cable end through the seal (max. \varnothing 5.3 mm). If necessary, apply some silicone oil to the cable sheath.
- Crimp ferrule sleeves onto the wire ends.
- Prepare the screen for connection, e.g. using the screen connection set VIB 6.725-100.
- If necessary, insulate exposed screen with shrink tubing. The screen must not come into direct contact with the protective housing or other conductive components.
- Connect the wires to the relevant terminals.
- Re-tighten the cable gland.
- Mark the cable on the sensor and system side to make it easier to identify cable routes when performing service work.



Note

Damage or incorrect measurements when feeding in analog signals

When feeding in analog process signals without potential separation, potential differences may arise which damage the inputs or result in incorrect measurements.

Input resistance of the voltage inputs = 200 kOhm.

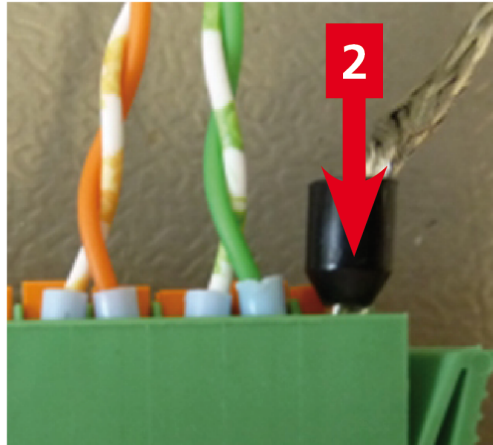
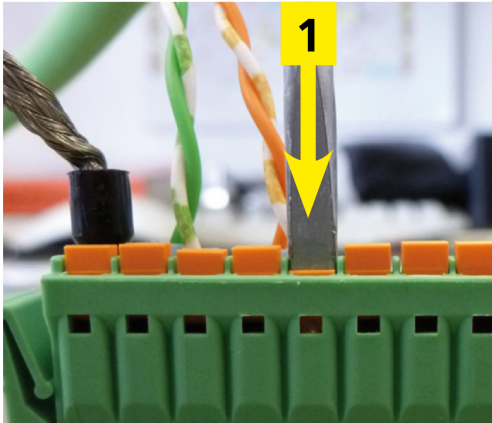
Observe the internal resistance of high-impedance voltage sources!

Galvanically isolate and feed in process signals. Determine compatibility with the CMS through tests.

Use suitable buffers.

How to install the cables on the connection terminals

- Open the terminal by pushing the orange lever with a flat head screwdriver (blade width 2.5 mm).
- Insert the crimped wire into the open terminal (2).



i You can unplug the green terminal block from the system module to make it easier to install the strands (see "Removing system components from the top hat rail" on page 24).

Use suitable, isolated ferrule sleeves (min. 10 mm long) as well as a crimp tool with square crimping to form the ferrules (see "Tools and consumables" on page 23).

7.4 Terminal diagram

Sensor 1 to 6 (analog IN)		
Number / Terminal		Designation
Sensor 1	13	AI1+ (Signal Plus)
	14	AI1- (Minus)
	15	AI1S (Screen)
Sensor 2	16	AI2+ (Signal Plus)
	17	AI2- (Minus)
	18	AI2S (Screen)
Sensor 3	19	AI3+ (Signal Plus)
	20	AI3- (Minus)
	21	AI3S (Screen)
Sensor 4	22	AI4+ (Signal Plus)
	23	AI4- (Minus)
	24	AI4S (Screen)
Sensor 5	28	AI5+ (Signal Plus)
	29	AI5- (Minus)
	30	AI5S (Screen)
Sensor 6	31	AI6+ (Signal Plus)
	32	AI6- (Minus)
	33	AI6S (Screen)

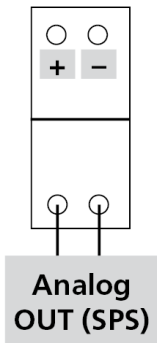
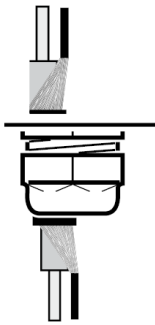
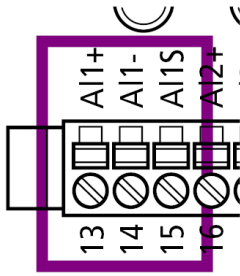
Voltage ($\pm 24V$) or IEPE signal selectable for every input via the measuring configuration in the PC software OMNITREND Center.

Digital inputs / outputs		
Terminal		Designation
Digital IN 1	7	DI1+ (Plus)
	8	DI1- (Minus)
System OK	9	AI4+ (Signal Plus)
	10	AI4- (Minus)
Digital OUT 1	11	NO1 (normally open switch)
	12	COM1 (Common)

7.5 Connection examples

#1: Process parameter as a voltage signal via coaxial cable

System module	Terminal	Instructions
All	13 to 24	<ul style="list-style-type: none"> • Signal at plus (+), • Screen at minus (-) • Leave the screening terminal (S) open.
All	28 to 33	



Example for channel AI1

- Terminal 13: Signal (+)
- Terminal 14: Screen (-).
- Terminal 15: open

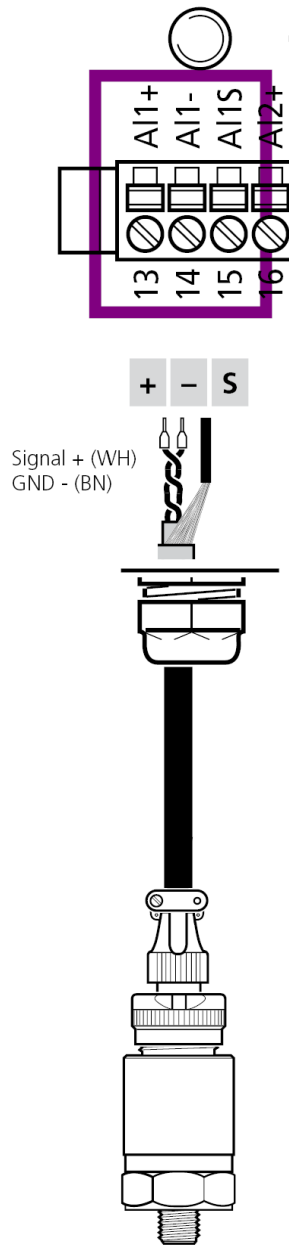


Prepare the cable screen with the shield connection set (VIB 6.725-100).

Connection to the buffer (voltage output, e.g. 0 to 10V).

#2: IEPE sensor via twisted pair cable

System module	Terminal	Instructions
All	13 to 24	<ul style="list-style-type: none"> Signal at plus (+), GND at minus (-),
All	28 to 33	<ul style="list-style-type: none"> Screen at screen terminal (S)



Example for channel AI1

- Terminal 13: Signal (+)
- Terminal 14: GND (-).
- Terminal 15: Screen (S).



Prepare the cable screen with the shield connection set (VIB 6.725-100).

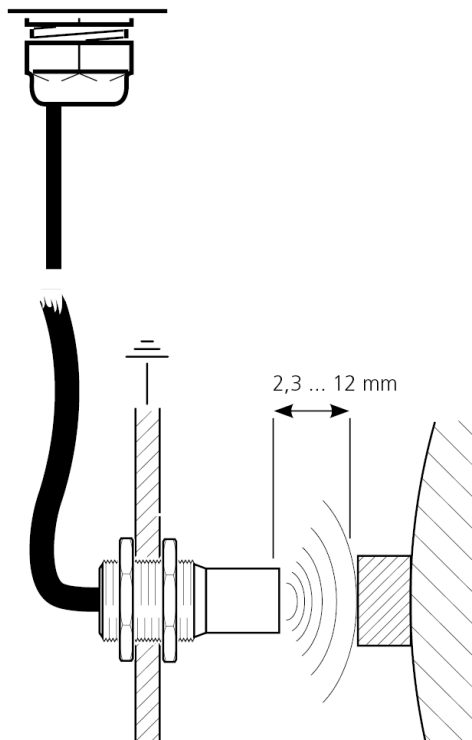
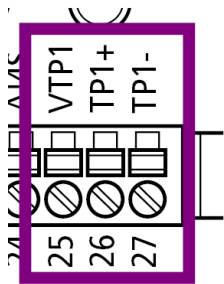
IEPE-Sensor VIB 6.172 with sensor cable, e.g. VIB 3.570-6.



Note: Cables with no signal on their screen must be insulated on the sensor side.

#3: Inductive rpm sensor, keyphasor

System module	Terminal	Instructions
All	25 to 27 (3-wire connection)	<ul style="list-style-type: none"> • Signal at plus (TP1+), • GND at minus (TP1-), • Supply at supply plus (VTP1+).



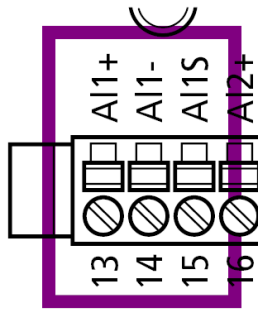
Example for channel TP1

- Terminal 25: +24 V (Supply)
- Terminal 26: Signal
- Terminal 27: GND/ Screen

RPM sensor, 3-wires

#4: Sensor signal via buffered voltage output (Buffered OUT)

System module	Terminal	Instructions
All	13 to 24	<ul style="list-style-type: none"> Signal at plus (+), Screen at minus (-),
All	28 to 33	<ul style="list-style-type: none"> Leave the screen terminal (S) open.

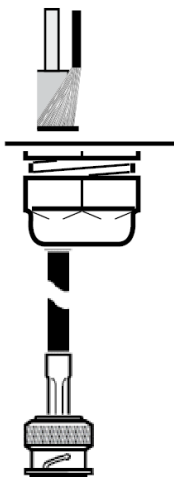


Example for channel A11

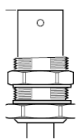
- Terminal 13: Signal (+)
- Terminal 14: GND (-)
- Terminal 15: open



Prepare the cable screen with the shield connection set (VIB 6.725-100).



Connect to a buffered voltage output via a coaxial cable with BNC plug.



**Buffered
OUT**

8 Commissioning

The system is configured via the PC software OMNITREND Center.

8.1 Switching on the VIBGUARD compact

- Switch on the mains supply. The system module starts up and launches the measuring configuration that is currently loaded on the system.
- Check the LED status on the system module. The system is operational if the system LED lights up green. With regard to the LEDs, monitor the analog channels for error messages ("LED displays on the system module" on page 18).

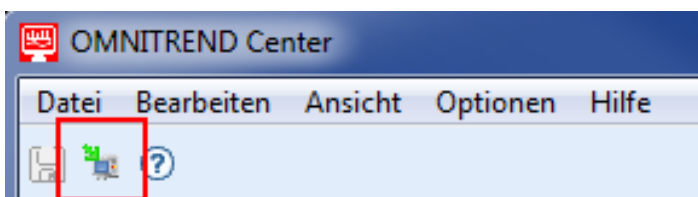
8.2 Transferring the measuring configuration

- Connect the computer to the LAN interface and switch it on.
- Launch the 'OMNITREND Center' program.
- Check the following prior to transferring the measuring configuration:
 - Do the designations in the OMNITREND Center correspond to the markings at the measurement location / cable route?
 - Are the measurement locations connected to the analog input that is set up in the measuring configuration?
 - Are the connections for the digital inputs and outputs correctly set up, marked and connected?
- Contact the system module. The connection data (IP address, gateway) can be found in the accompanying documentation.
- Transfer the measuring configuration.

The measuring configuration starts automatically as soon as the transfer has ended.

8.3 Functional check

- Download the measuring data manually from the system and check the plausibility of the measuring data.



Transfer the measuring data to the computer with "Upload to PC".

9 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

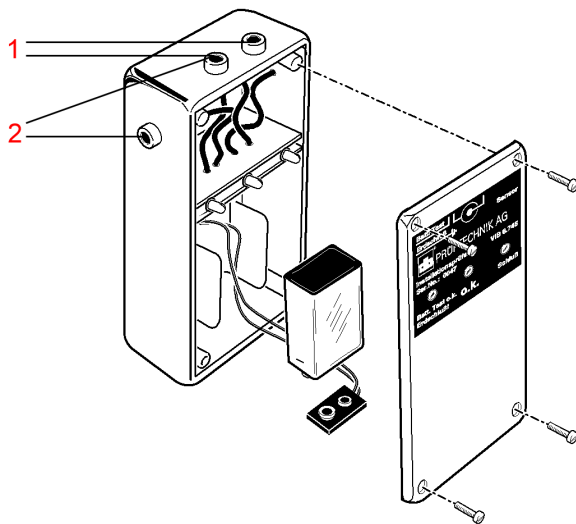
- **Remedy:** Check the cable connections with the **PRÜFTECHNIK installation checker** (item no. VIB 8.745).

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

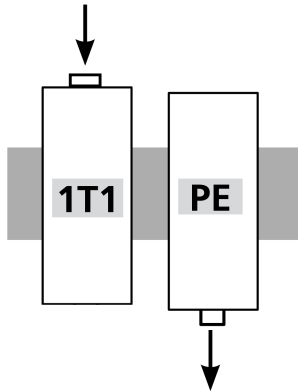
- **Possible cause:** Supply voltage parameters out of specification.
- **Remedy:** Provide suitable supply voltage.

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.

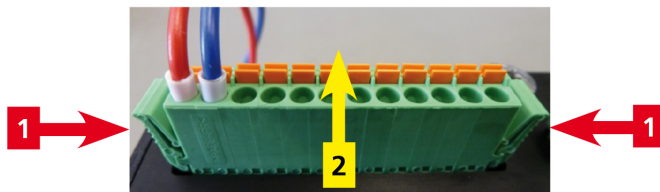


or

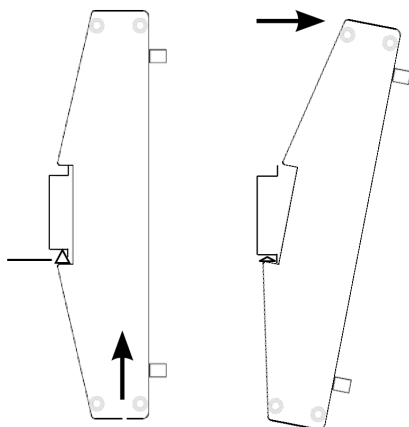
- **Possible cause:** Unknown fault on the system module.
- **Remedy:** It is not possible to troubleshoot the system module directly. In the event of a malfunction, the system module must be sent to the manufacturer.

Proceed as follows to remove the system module:

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



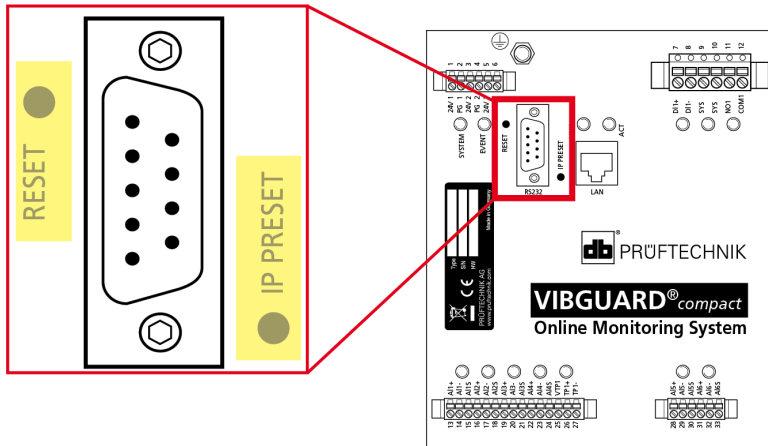
- Remove the system module from the top hat rail.



Symptom: The system module is not reachable via the network (LAN).

- **Possible cause:** Network settings have been changed and have not been documented.
- **Remedy:**
 - Restart the system module with the **RESET** button.
 - Load the default network setting using the **IP PRESET** button.

The system module has two operating buttons: the IP PRESET button to load the default IP address and the RESET button to restart the system.



Operating buttons on the VIBGUARD compact system module: RESET, IP PRESET

Restarting the system (RESET)

The RESET button can be reached via a small hole in the cover plate. You need a suitable object such as a screwdriver with a 2.5 mm blade width to actuate the button.

Loading the default IP address (IP PRESET)

With regard to incorrect inputs, changes to the network settings can result in the system no longer being accessible. In such cases, a standard network setting can be loaded in the system module via the IP PRESET button. This makes communication possible again.

The IP PRESET button can be reached via a small hole in the cover plate. You need a suitable object such as a screwdriver with a 2.5 mm blade width to actuate the button.

- Restart the system module either by actuating the **RESET** button or by switching the mains supply on and off.
- The system module gradually starts up and the SYSTEM LED lights up orange as it is doing so.
- While the system module is starting up, press and hold the **IP PRESET** button.
- Release the **IP PRESET** button as soon as the SYSTEM LED lights up green. The system module is again reachable at the following network address:
 - IP address: 192.168.1.184
 - IP gateway: 192.168.1.13
 - IP subnet mask: 255.255.255.0

10 Upkeep and Accessories

10.1 Upkeep

A VIBGUARD compact is to be treated with care just like any other electronic measuring device.

If necessary, the housing is to be cleaned with a damp cloth in order to ensure that the safety markings remain visible. Damaged cables and connector plugs are to be replaced immediately.

VIBGUARD compact does not require maintenance. The measurement database is to be backed up on a regular basis.

10.2 Accessories

The following accessories are available for the VIBGUARD compact :

- OMNITREND Center PC-Software, Client-Server - item no. VIB 8.200

Further sensors and cables in various designs can be found in the PRÜFTECHNIK Condition Monitoring catalog.

11 Decommissioning

VIBGUARD compact is used exclusively for commercial purposes. The system and measuring equipment must **not** be disposed of using public waste disposal companies. Upon reaching the end of the period of use, you can dispose of the system and the measuring equipment through the manufacturer::

- PRÜFTECHNIK Condition Monitoring
- Oskar-Messter-Str. 19-21
- 85737 Ismaning, Germany
- WEEE-Reg. No. DE 72273578

For decommissioning purposes, disconnect the CMS from the mains supply and dismantle the measuring equipment.



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