

Accelerometer (Industrial)

VIB 6.12x, VIB 6.14x

Installation and Operation



Sensors of series VIB 6.12x / VIB 6.14x are used in industry to measure the following parameters:

- Vibration acceleration on rotating machines
- Cavitation in pumps
- Shock pulse signals in roller bearings

Sensors of series VIB 6.1**DEX are permitted for use in the Ex-zone in accordance with ATEX guidelines.

Safety instructions

- Read these operating instructions carefully and keep them in a safe place.
- Observe the operating instructions of the devices to be connected.
- Only use the sensors as intended and only for the permitted purpose of application.
- Only use original accessories.
- Replace defective sensors and cables.
- Have installation carried out by qualified personnel exclusively.
- Comply with the applicable safety regulations when performing installation tasks on the machine in operation.
- Lay the cables in accordance with the applicable safety regulations.
- Observe the technical specifications and permissible operating conditions. If in doubt, contact PRUFTECHNIK.
- The sensors are compliant with the applicable European directives. The complete Declaration of Conformity is available under www.pruftechnik.com/certificates.

Safety instructions for installation and operation in the **Ex-zone**:

- Only sensors of series VIB 6.1**DEX are permitted to be operated in the Ex-zone.
- Sensors of series VIB 6.1**DEX are only to be connected to certified intrinsically safe circuits giving due consideration to the following maximum values:
 $U_i = 24\text{ V}$; $P_i = 300\text{ mW}$; $C_i = 15\text{ nF}$; $L_i =$ negligibly small.

- The permissible ambient temperature range is between -30°C and $+80^\circ\text{C}$ [-22°F ... $+176^\circ\text{F}$].
- The European installation regulations are to be observed (EN 60079-14).
- The information in the type-examination certificate is to be observed: TÜV 02 ATEX 1865, incl. 1st supplement, issued march 1st, 2007 and 2nd supplement, issued June 22nd, 2011. Available on www.pruftechnik.com/certificates.
- Labeling of the sensors:



II 2G Ex ib IIC T4

II 2D Ex ib IIIB T₅ 187°C

Maintenance and repair work

Operation of the sensors does not require any maintenance. Repair work is not possible.

Storage

The following instructions are to be observed in relation to temporary storage of the sensors prior to installation:

- Store the sensors in the original packaging.
- Conditions at the storage location:
 - Dry and free of dust
 - Temperatures are within the permissible range
 - Vibration-free
 - No high electromagnetic fields
 - No corrosive materials

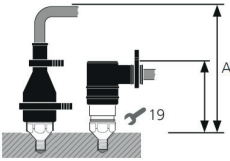
Disposal

After use, dispose of the sensors in an environmentally friendly manner and in accordance with national provisions.



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

Technical data

PARAMETER		VIB 6.122 R / DEX VIB 6.125 R / RIP / IDEX VIB 6.142 R / DEX	VIB 6.127 / DEX VIB 6.129 IP / IDEX VIB 6.147 / DEX
Measurement	Signaling system	Current Line Drive (CLD)	
	Transmission factor (Ref.: 159 Hz; 25 °C [77°F])	1.0 $\mu\text{A}/\text{ms}^{-2}$ [9.8 $\mu\text{A}/\text{g}$] \pm 3%	5.35 $\mu\text{A}/\text{ms}^{-2}$ [52.43 $\mu\text{A}/\text{g}$] \pm 4%
	Frequency range \pm 3dB	1 Hz ... 20 kHz	0.3 Hz ... 12 kHz
	Resonance frequency	36 kHz	17 kHz; > 20 dB damped
	Linearity range \pm 10%	\pm 961 ms^{-2} [\pm 98g]	\pm 450 ms^{-2} [\pm 46g]
	Transverse sensitivity	< 5 %	
Electrical	Power supply	> 10 mA / 7-18 VDC	
	Noise, rms	< 0.01 ms^{-2} as of 2 Hz	< 0.002 ms^{-2} as of 2 Hz
	Output impedance	> 1 MOhm (VIB 6.12**) > 0.3 MOhm (VIB 6.14 R / DEX)	> 0.3 MOhm
	Electrical insulation	> 10 ⁹ MOhm	
Environment	Degree of protection	IP 65 w/ cable connected IP 67 w/ straight protective cap and clamp rings IP 68 w/ cable option VIB 6.760 / VIB 6.761 (only for series VIB 6.1**IP)	
	Shock resistance	< 250 kms^{-2} [25000 g]	< 50 kms^{-2} [5000 g]
	Temperature sensitivity	< 0.05 ms^{-2}/K	< 0.01 ms^{-2}/K
	Magnetic sensitivity	< 5 ms^{-2}/T (at 50 Hz)	< 1 ms^{-2}/T (at 50 Hz)
	Base strain sensitivity	< 0.1 $\text{ms}^{-2}/\mu\text{m}/\text{m}$	
	Temperature range, w/ cable VIB 90093 (¹ w/ cable VIB 90007)	- 30 °C ... + 80 °C [-22 °F ... + 176 °F] (VIB 6.1**DEX) - 40 °C / °F + 100 °C [+ 212 °F] (VIB 6.122 R, VIB 6.142, VIB 6.127, VIB 6.147) ... + 125 °C [+ 257 °F] (VIB 6.125 R, VIB 6.125 RIP, VIB 6.129 IP) ... + 135 °C [+ 275 °F] (VIB 6.125 R, VIB 6.125 RIP, VIB 6.129 IP) ¹	
Mechanical	Case material	Stainless steel VA 1.4305 Stainless steel VA 1.4571 (VIB 6.125 RIP / IDEX, VIB 6.129 IP / IDEX)	
	Weight	38 ... 43 g [1.3 ... 1.5 oz]	
	Socket	TNC	
	Mounting thread	M8, 90° cone (VIB 6.12x) M5, flat (VIB 6.14x)	
	Mounting height A 	> 120 mm / 60 mm (straight / angled plug) > 140 mm / 120 mm (w/ IP68 cable option VIB 6.760 / VIB 6.761)	

Installation

The frequency behavior and dynamic range of the sensor can be heavily influenced by installation. Poor coupling with the measurement location dampens the signal and restricts the frequency range. As a general rule, the sensor requires firm, friction-locked, contact and resonance-free attachment to the measurement location. This particularly applies to measurements at high frequencies.

Basically, the following applies:

$$10 \times \text{Weight}_{\text{Sensor}} < \text{Weight}_{\text{object to be measured}}$$

The stabilized coupling can be achieved by **screw-ing** the sensor onto the measurement location. If screw mounting is not possible or inadmissible, the sensor can be attached with an **adhesive** adapter. A **magnetic** coupling saves time and expenditure on installation. It does however restrict the upper frequency range.

Screw mounting

Applies to sensors of series VIB 6.12x (M8 / 90°).

Required tools and resources

- Hand-held drill
- Drill bits (3.5 mm / 6.8 mm) with depth gage ring
- 90° countersink bit (VIB 8.694)
- M8 thread tap
- Torque wrench with 19 mm / 3/4" hex socket
- Compressed air for cleaning out the hole
- Solvent for degreasing
- Threadlocker (LOCTITE 243)

Select the point of installation

- The drilled hole must have direct connection to the bearing carrier if the sensor should measure shock pulse signals.
- Minimum distance between the drilled hole and protruding edges of the housing must be 35 mm (A). Allow adequate clearance to attach the wrench.

Note

Ensure that a hole can be drilled at the chosen location.

Drill threaded hole M8 / 90°

- Drill pilot hole: 3.5 mm / 15 mm deep (B).
- Bore out hole: 6.8 mm / 15 mm deep (C).
- Countersink hole: 90° / 3 mm deep (D).
- Blow out the hole.
- Grease thread tap.
- Tap thread: M8 / 12 mm deep (E).
- Blow out the hole.

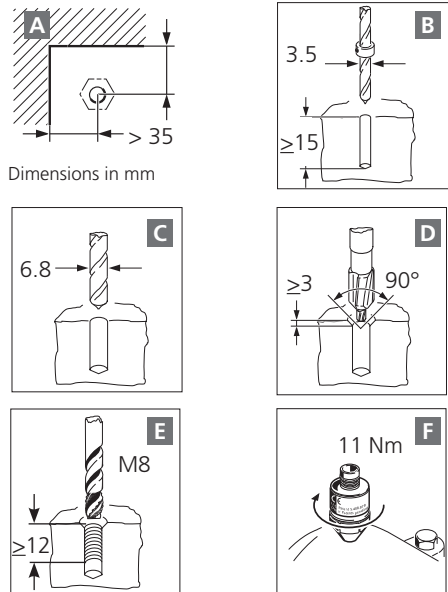
Mount sensor

- Clean the contact surfaces of the sensor and the machine with solvent.
- Allow contact surfaces to dry.
- Thinly apply LOCTITE 243 to improve signal transmission.
- Screw in the sensor and tighten with a torque wrench (11 Nm, F).
- Check the sensor for tight mechanical fit.

Notes

Excessive torque can damage the thread or the machine housing. Too little torque can allow the sensor to work loose. Incorrect torque always causes measurement errors!

The sensor must be protected against static charging if it is installed on a non-grounded machine (e.g. belt-driven fan).



Adhesive mounting

Applies to sensors of series VIB 6.12x, VIB 6.14x, and appropriate mounting adapters VIB 3.431 / VIB 3.430.

Required tools and resources

- Hand-held drill and drill bit (3.5 mm)
- Angle grinder and rasp
- Torque wrench with 19 mm / 3/4" hex socket
- Compressed air for cleaning out the hole.
- Solvent for degreasing
- Threadlocker (LOCTITE 243)
- 2-Component adhesive (WEICON HB 300,..)

Note

Switch off the machine and secure it against a restart. Do not switch on the machine until the adhesive has hardened (approx. 24 hours).

Select the point of installation

- The point of installation must have direct connection to the bearing carrier if the sensor should measure shock pulse signals.
- Allow sufficient space for applying the adhesive with a wooden spatula.

Prepare bonding location

- Grind down existing coats to the bare metal ($\emptyset > 30$ mm, **G**).
- If necessary, grind down the location (**G**).
- Sand down the point of installation with a rasp and file several grooves in a diamond pattern for greater adhesive strength (**G**).

Optionally, and only if drilling is possible:

- Drill hole for centering pin: 3.5 mm / 5 mm deep (**H**). Remove the centering pin from the mounting adapter if drilling is not possible.
- Blow out the hole.
- Clean the contact surfaces of the mounting adapter and the machine with solvent.
- Allow contact surfaces to dry.

Apply adhesive

- Prepare the adhesive for use.
- Apply the adhesive with a wooden spatula evenly to the base of the mounting adapter and the bonding location (approx. 1 mm thick, **I**).

Affix mounting adapter

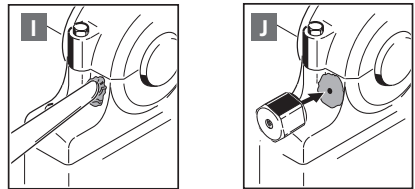
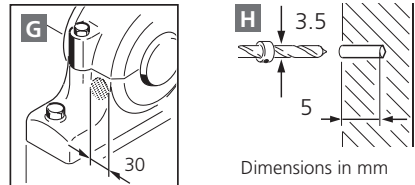
- Press the adapter gently against the bonding location and turn it to evenly distribute the adhesive. If applicable, screw in the centering pin (**J**).
- Do not remove excess adhesive. If necessary,

apply additional adhesive around the bonding location for greater stability.

- If necessary, use adhesive tape to hold the adapter in place during hardening.

Mount sensor

- Clean the contact surfaces of the sensor and the adapter with solvent.
- Allow contact surfaces to dry.
- Thinly apply LOCTITE 243 to improve signal transmission.
- Screw in the sensor and tighten with a torque wrench (3 Nm, **F**).
- Check the sensor for tight mechanical fit.



Magnetic coupling

Applies to sensors of series VIB 6.14x (M5) and appropriate magnetic holders (VIB 3.420, VIB 3.422).

Mount sensor

- Screw the sensor into the holder by hand.
- Place the holder with its outer edge on the measuring location and lay it down in a controlled movement.
- Check the sensor for tight mechanically fit.

Notes

At close-up range, the magnetic attraction can be unexpectedly strong. An uncontrolled, heavy snap-on mounting can exert high shock loads on the sensor and impair its function.

Shock pulse (roller bearing condition) and cavitation measurements are not possible with a magnetic coupling.

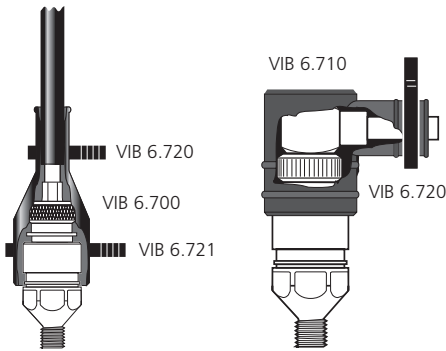
When disconnecting, grasp the sensor and the magnet adapter. Do not pull on the sensor cable!

Electrical connection

The signal is transmitted via a coaxial cable. On the sensor side, the cable is assembled with a TNC plug and, if necessary, equipped with protective caps. The other end of the cable is either equipped with a measuring device plug or open for the terminal connection in a stationary signal evaluation device.

Connect the sensor

- Screw the TNC connector on the sensor and tighten by hand.
- If the sensor is permanently installed, push the protective cap (VIB 6.700 / VIB 6.710) over the plug and hermetically seal the connection with clamp rings (VIB 6.720 / VIB 6.721).



Lay the cable

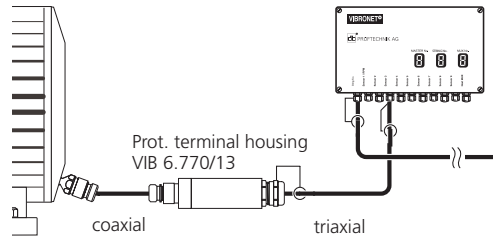
- Have the electrical connection established by a qualified electrician exclusively.
- Observe the regulations for setting up electrical systems.
- Do not kink, pinch, knot, twist or mechanically overload the cables.
- It is preferable to lay the cable in a cable duct or protective tube.
- Use cable ties and Velcro fasteners to fix the cables in place.
- Do not lay cables parallel to power lines. Adhere to the minimum spacing (> 1 m).
- Lay a loop with sufficient reserve traction ahead of a cable gland.
- Label the cable ends to avoid getting them mixed up

Extend the cable

- Observe the maximum cable lengths (see the device installation manual).
- Use appropriate coaxial cables for extension purposes.
- Connect the cable ends inside a protective terminal housing.
- Mount the metallic protective terminal housing so that it is electrically insulated. With regard to installation **outside** the Ex-zone, lay the shield wire of the incoming and outgoing line on the protective terminal housing.

EMC protection

- Use triaxial cables in environments subject to a strong electromagnetic load.
- Keep the coaxial cable a short distance from the sensor.
- Connect the triaxial cable and the coaxial cable in a protective terminal housing.
- Mount the protective terminal housing in the vicinity of the sensor.



Ex-zone

If the cable ends are connected **inside** the Ex-zone, the ignition protection type must not be impaired with due consideration being given to the intended use.

Prerequisites for safe operation of the signal analysis units and the sensors:

Responsibility

Each intrinsically safe company has an authorized EX protection representative who is solely aware which conditions, norms, etc. must be observed in his company. Only the specialist personnel he authorizes are allowed to work on the system.

The following installation recommendations must be authorized by the EX protection representative:

Limiting device VIB 3.550

- The limiting device is to be installed in a switch cabinet or housing (at least IP 20).
- The intrinsic connections for the limiting device must be installed at a distance of at least 50 mm from non-intrinsically safe circuits.
- Potential equalization (PA) is to be applied first and must not be looped through.
- The signal analysis unit must be grounded with potential equalization at the location of the limiting device.
- The limiting device is the only grounded point of the intrinsically safe circuit in the Ex-zone.
- Potential equalization is to be established between the limiting device and monitored machines.

Sensor

- Sensors of the series VIB 6.1xy DEX are electrically insulated. Sensors and protective terminal housings must be reliably protected against physical contact. To do this, they must be fitted with the IP68 option or with protective caps beyond the insulated position and fixed with clamp rings

Wiring to potential equalization

- A line resistance of <math><120\text{ m}\Omega</math> is recommended for interference protection reasons ($=1.5\text{ mm}^2/10\text{ m}</math>).$
- Due consideration is to be given to personnel, goods, lightning, explosion protection - as well as other protection types where appropriate - for the respective customer, trade association, insurer, state, federal government etc.

- In this regard, the relevant implementation provisions are to be observed. This also applies to provisions relating to the safety of the connection type. In accordance with these provisions, wiring is only to be carried out by an approved specialist who is insured for such purposes.

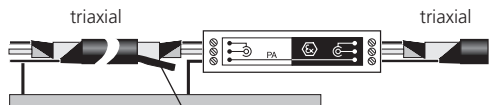
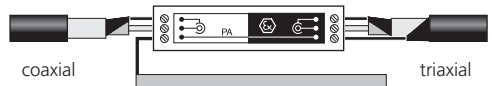
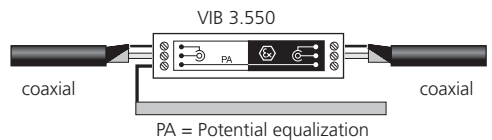
Connector cable

The following applies to **coaxial** cable:

- The shield is laid on the shield terminal of the limiting device. PA and the shield terminal are connected with each other.
- With regard to extension by means of a metallic protective terminal housing, the shield must not have any electrical contact with the housing. The shield is to be electrically insulated.
- The metallic protective terminal housing is to be protected against being touched by means of heat-shrink tubing or grounding with PA.

The following applies to **triaxial** extension cable:

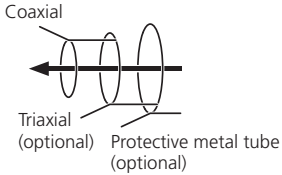
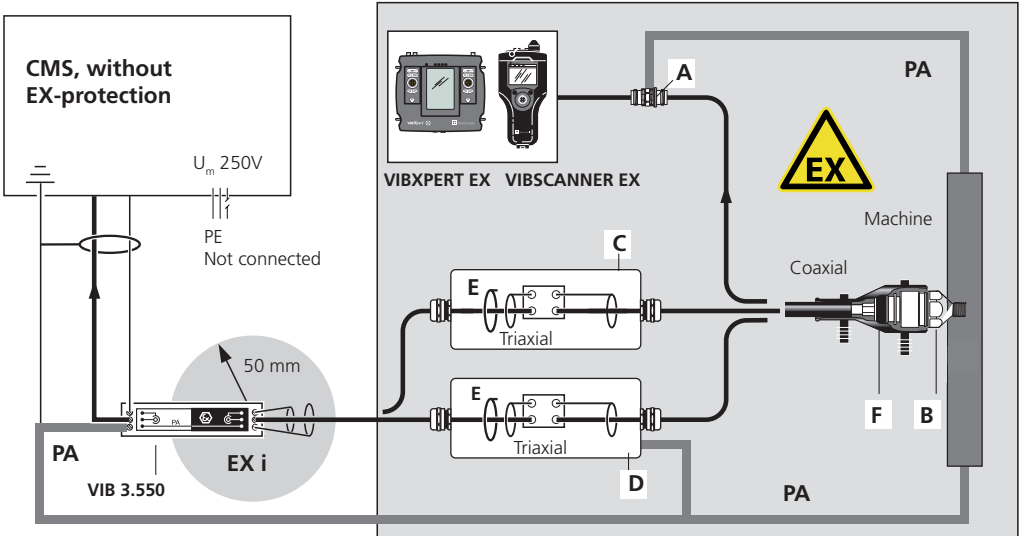
- The outer shield is laid on PA of the limiting device.
- With regard to extension by means of a metallic protective terminal housing, the outer shield is not laid on the protective terminal housing but is reliably insulated. Alternatively, the metallic housing can be insulated by means of heat-shrink tubing.
- With regard to outward-facing cable interfaces, the outer shield is insulated by means of heat-shrink tubing or with an insulating cap.



Device side:
Connect outer
shield with PA!

Insulate shield!

Connection examples for the Ex-zone



A: VIB 93036 S / VIB 93036 F / VIB 91000

B: VIB 6.12x DEX

C: Protective terminal housing, plastic

D: Protective terminal housing, metallic, mounted and insulated, housing at PA

E: Outer shield not laid

F: Protective cap w/ clamp ring or IP68 cable option (VIB 6.760 / 6.761)

PA = potential equalization

VIB 9.831.G
08.2018

 **PRÜFTECHNIK**

Fluke Deutschland GmbH
Freisinger Str. 34
85737 Ismaning, Germany
+ 49 89 99616-0
www.pruftechnik.com

Productive maintenance technology