1 Application

Brüel & Kjær Vibro vibration velocity sensors operate in accordance with the electrodynamic principle and are used for measuring the bearing absolute vibration of machines.
2 Connection Diagram

2.1 Polarity

With the illustrated direction of movement of the bearing shell, a positive polarity signal is produced at the white wire of the cable.

3 Technical Data

3.1 General Data

Sensor cable
- Teflon cable; PTFE (C)
- 2 x 0.38 mm²; shielded

Length
- 5 m; wire ends: open
- Extension of the sensor connecting cable to a max. of 200 m is possible (with a terminal box)

Housing
- stainless steel; hermetically sealed

Fixing
- Central mounting by means of stud M10 x 25; DIN 914; A2F
- max. tightening torque 87 Nm

Protective class
- as per DIN 40 050
- IP 66

Weight of sensor without cable
- approx. 500 g

EMC
- EN 50082-2: 1995 Pkt. 1.1, 1.2, 1.4, 2.1, 2.2
- EN 50081-2: 1994 Pkt. 1.1, 1.2
3.2 Technical data for VS-068 and VS-069

Measuring parameter: Vibration velocity

Measuring principle: Electrodynamic

Sensitivity $E$ at $f = 80$ Hz

\[ E = \frac{100 \text{ mV/mm/s}}{4 \Omega + R_L} \times R_L \]

Typical frequency response and sensitivity

<table>
<thead>
<tr>
<th>Curve</th>
<th>$R_L$</th>
<th>Sensitivity ± 5%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$\approx 1 \Omega$</td>
<td>100 mV/mm/s</td>
</tr>
<tr>
<td>2</td>
<td>$50 \Omega$</td>
<td>92 mV/mm/s</td>
</tr>
<tr>
<td>3</td>
<td>$27 \Omega$</td>
<td>87 mV/mm/s</td>
</tr>
</tbody>
</table>

Internal impedance: $4 \Omega \pm 5 \%$

Transverse sensitivity: $\leq 7 \%$

Natural frequency $f_0$: $8 \text{ Hz} \pm 10 \%$

Operating temperature range: $-40 \ldots +80 \ ^\circ\text{C}$ (short-term max. + 100 °C)

Max. admissible vibration displacement: $\pm 0,45 \text{ mm}$

Cable protection: Flexible steel protective hose encased with PU material

Magnetic field sensitivity: $< 0,03 \text{ mm/s}$

$0,1 \text{ mT}$
3.3 Technical data for VS-077

- **Measuring parameter**: Vibration velocity
- **Measuring principle**: Electrodynamic

**Sensitivity $E$ at $f = 80$ Hz**

$$E = \frac{75 \text{ mV}}{\text{mm/s}} \times \frac{R_L}{3 \text{k} \Omega + R_L}$$

![Graph showing typical frequency response and sensitivity]

<table>
<thead>
<tr>
<th>Curve</th>
<th>$R_L$ (Ω)</th>
<th>Sensitivity (mV/mm/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 MΩ</td>
<td>75 mV/mm/s</td>
</tr>
<tr>
<td>2</td>
<td>27 kΩ</td>
<td>68 mV/mm/s</td>
</tr>
<tr>
<td>3</td>
<td>6.8 kΩ</td>
<td>53 mV/mm/s</td>
</tr>
</tbody>
</table>

**Typical frequency response and sensitivity**

- **Internal impedance**: $3 \text{k} \Omega \pm 5\%$
- **Transverse sensitivity**: $\leq 5\%$
- **Natural frequency $f_0$**: $15 \text{ Hz} \pm 2\%$
- **Operating temperature range**: -40 ... + 80 °C
- **Max. admissible vibration displacement**: $\pm 1 \text{ mm}$
- **Cable protection**: Flexible steel protective hose encased with PU material
- **Magnetic field sensitivity**: $< 0.024 \text{ mm/s}$

\[ \text{or} \quad 0.1 \text{ mT} \]
3.4 Technical data for VS-079

Measuring parameter: Vibration velocity
Measuring principle: electrodynamic

Sensitivity $E$ at $f = 80$ Hz:

$$E = \frac{70 \text{ mV}}{\text{mm/s}} \times \frac{R_L}{3 \text{ k}\Omega + R_L}$$

Typical frequency response and sensitivity

<table>
<thead>
<tr>
<th>Curve</th>
<th>$R_L$ (kΩ)</th>
<th>Sensitivity $\pm 6%$</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>1</td>
<td>70 mV/mm/s</td>
</tr>
<tr>
<td>②</td>
<td>27</td>
<td>6.3 mV/mm/s</td>
</tr>
<tr>
<td>③</td>
<td>6.8</td>
<td>48 mV/mm/s</td>
</tr>
</tbody>
</table>

Internal impedance: 3 kΩ $\pm 5\%$
Transverse sensitivity: $\leq 6\%$
Natural frequency $f_0$: 15 Hz $\pm 5\%$
Operating temperature range: -40 ... + 200 °C
Max. admissible vibration displacement: $\pm 1$ mm
Cable protection: Rust-free stainless-steel, not encased
Magnetic field sensitivity: $\leq 0.024$ mm/s, 0.1 mT
4 Mounting Instructions

4.1 Fastening of sensor

![Diagram of sensor fastening](image)

The following applies on principle:

- Mounting surface flat and clean, i.e. without paint, rust etc
- Threaded stud perpendicular to mounting surface; the sensor must be tightened to the mounting surface
- Secure stud with LOCTITE (e.g. LOCTITE 243 medium-duty, LOCTITE 270 heavy-duty)
- Avoid auxiliary fixtures for mounting; if unavoidable, the fixture should be as rigid as possible
- For protection against mechanical damage and for increase EMC safety, the connection cable should be laid in flexible steel protective conduit. Bending radius $r_{\text{min}} = 50$ mm
- Tighten sensor directly to mounting surface.
  Max. tightening torque 87 Nm

4.2 Preparing the steel protective conduit

Adapt the steel protective conduit to the site conditions by taking the following steps:

- If the protective conduit has a braided shield, to ensure a clean cut through the braided wrap a strip of metallised adhesive tape around the area where the cut is to be made before starting the cut.
- Cut the protective conduit with a suitable cutting tool, e.g. metal saw, cutting disc.
- De-burr the cut end.
4.3 Mounting steel protective hose at VS-068 / 069 / 077

To achieve the optimum shielding performance of AC-331 according VDE 0245 and DIN 47250 part 4, the protective conduit with connector should be assembled as follows:

- Cut protective conduit to appropriate length (see 3.2).
- Disassemble connector and slide pressure screw (long version) over the conduit.
- Slide sealing ring over the conduit with tapered edge facing the pressure screw.
- Uncover the outer jacket of the conduit with care leaving a section as long as 1.5 x the width of the brass-thrust collar.
- Cut copper shield with scissors flush with the conduit.
- Slide brass-thrust collar (with taper side as shown) over the conduit as illustrated above.
- Screw brass ferrule into the conduit until it stops.
- Assemble the rest of the individual components and tighten so that the O-ring is not movable.
- For liquid-tight installations install the additional O-ring at the connector thread side.
4.4 Fixing steel protective conduit at VS-079

- Cut protective conduit to appropriate length (see 3.2)
- Slide the union nut and sealing ring on steel protective hose behind the cutting point
- Screw the inner tube onto the steel protective conduit
- Slide steel protective hose slide over sensor cable and fix protective hose joint to the sensor and the steel protective hose
- Adjust sensor cable length to suit and insulate
- Solder screen onto sensor cable; protect soldering joint by means of shrink tubing and rubber bushing
- Fix end sleeves to cable ends