

Vibro level indicator

Level limit switches for bulk goods

VF1.

Appliance information

Rhombus vibration rod
robust single rod - compact and versatile


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MOLLET accurate point level

ATEX option

B1 **Dust**  II 1/2D Ex ta/tb IIIC T95 °C Da/Db

ATEX option

B3 **Dust**  II 1/3D Ex ta/tc IIIC T95 °C Da/Dc

ATEX option

B11 **Gas+**  ^{und} **Dust**  II 1/2G Ex ia IIB T4 Ga/Gb
II 1/2D Ex ia IIIC TX Da/Db

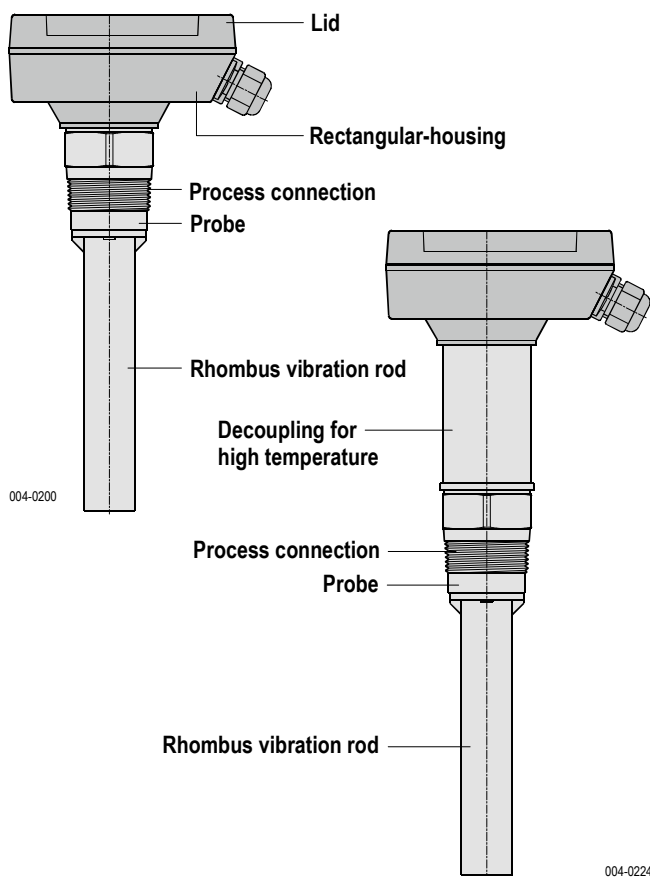
Application (intended use)

The **MOLOSvibro** of the **VF1.** series is intended for the use as
level limit switch
in **silos and vessels.**

For all bulk solids with a minimum density of
0.01 t/m³.

For application in **all industry sectors.**

Bauweise



Characteristics

- Very robust vibration rod in Rhombus shape
- High sensitivity for bulk solids with a minimum density of 10 g/l
- Interface measurement possible
- Patented, braced membrane
- No digging free within the bulk solids due to small vibration amplitude
- Adjustable sensitivity in three setting adjustments:
A for light, **B** for normal and **C** for sticking bulk solids
- High level and low level alarm selectable

Function

- Oscillation of the Rhombus vibration rod with a resonance frequency of approx. 285 Hz is stimulated by the electronic.
- As soon as the vibration rod has been covered by bulk solids, the oscillation will be damped.
- The electronic detects the damping and switches the relay signal.
- If the filling level sinks below the vibration rod, the rod starts vibrating with its resonance frequency again and the relay switches back.

Technical data

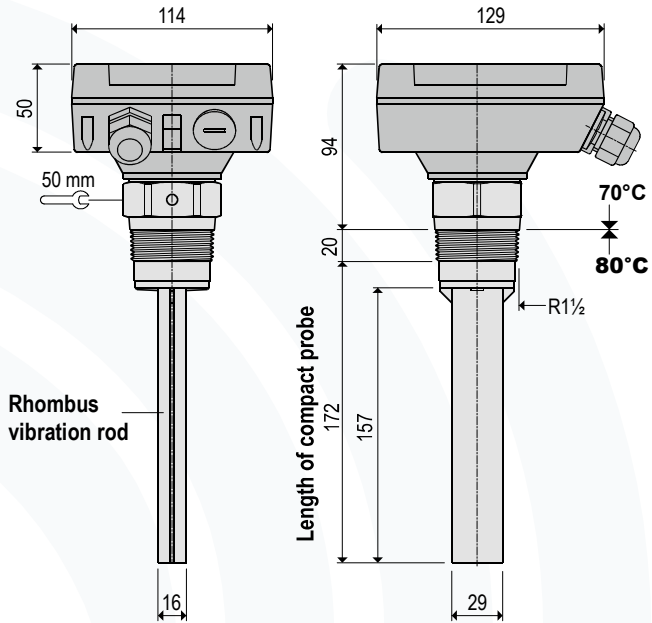
| | | |
|---|---|--|
| Material | Rectangular-housing Process connection and probe Rhombus vibration rod Suspension cable sheath | Aluminium, RAL7001 Stainless steel 1.4301 / 304 Stainless steel 1.4301 / 304 Polyurethane |
| Process connection | R3 | R1½ EN 10226 or N3 1½" NPT |
| Ambient temperature | with separate housing | -40 °C ... +70 °C -40 °C ... +80 °C |
| Process temperature | VF12, VF13 VF15 | -40 °C ... +80 °C -40 °C ... +70 °C |
| VF12, VF13 high temperature | E1 E2 E3 | -40 °C ... +150 °C -40 °C ... +200 °C -40 °C ... +250 °C |
| Process pressure | | -0.95 bar ... 10 bar |
| Minimum density of bulk solids | | 0.01 kg/l (t/m ³) |
| Response delay | for damping for start oscillation | 1 second 2 to 5 seconds |
| Cable entry | | Gland 2xM20x1,5 |
| Type of protection | with separate rectangular-housing | IP66/IP67 acc. DIN EN 60529 IP65 acc. DIN EN 60529 |
| Maintenance | | none |
| Maximum load for the end of the vibration rod | | 1000 N vertical (V) 250 N horizontal (H) |
| Maximum tensile force at suspension cable of type VF15 | | 2000 N |
| Installation position | VF12, VF13 VF15 | any vertical |

Electrical data

| | | | |
|----------------------------|-----------|--|---------------|
| Supply voltage | C8 | 20 ... 250 V AC / DC | Supply |
| Power consumption | | ≤ 3 VA / 3 W | |
| Signal relay | | two potential free change-over contacts | |
| Capacity of contact | | 8 A / 250 V AC 192 / 72 W at 24 / 48 V DC | |
| Supply voltage | C5 | 24 V DC ±10% | Supply |
| Power consumption | | ≤ 1 W (without load) | |
| Signal output | | potential free NPN / PNP | |
| Capacity of contact | | maximum 20 W switching capacity maximum 350 mA constant current | |

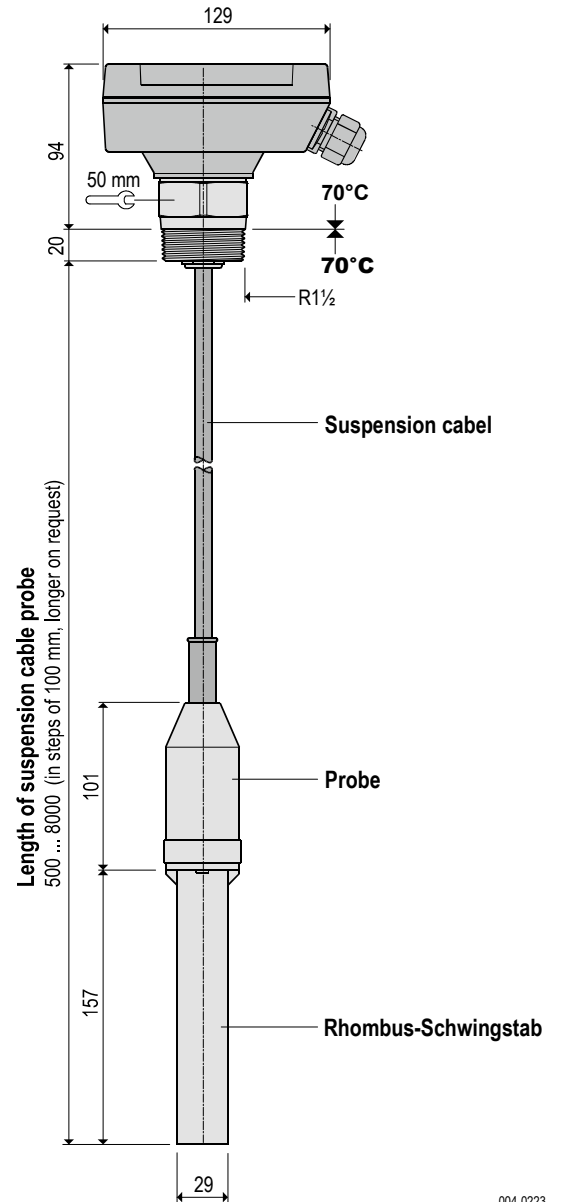
Versions / Dimensions

VF12 Compact sensor



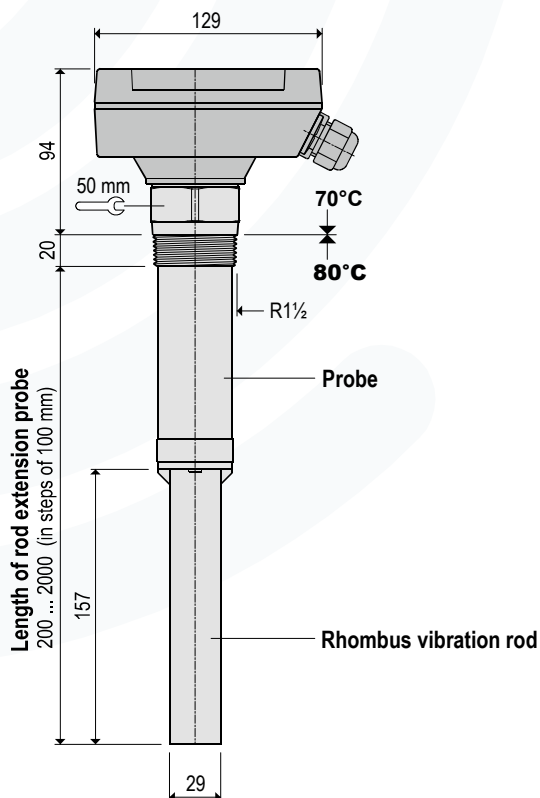
004-0221

VF15 Suspension cable sensor



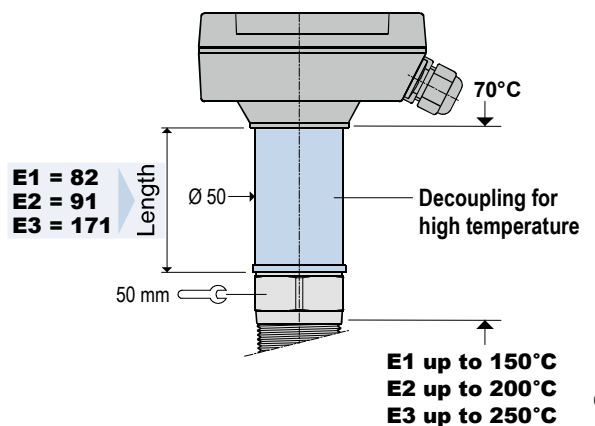
004-0223

VF13 Rod extension sensor



004-0222

E1 ... E3 High temperature

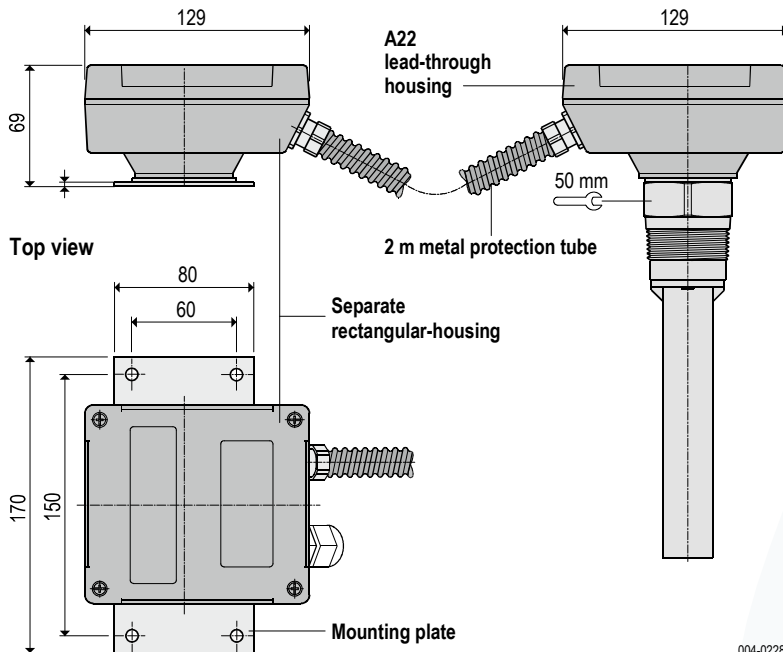


004-0224

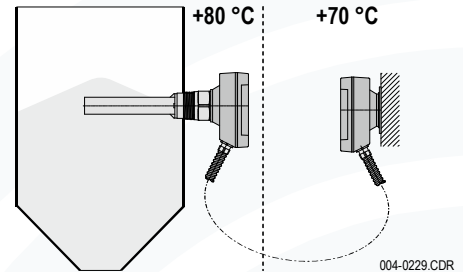
Dimensions

A22 Separate rectangular-housing

Front and side views



With the separate rectangular-housing the electronic will be mounted remote from the probe.



Application

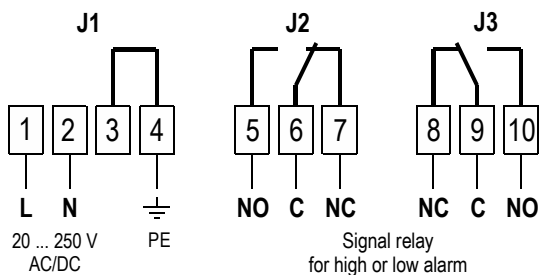
- In vessels with heavy vibrations
- Process temperatures of 150 °C to 250 °C only in combination with lead-through housing in high-temperature design
- Ambient temperatures up to +80 °C in close proximity to the container wall.

Separate rectangular-housing combinable with:
A22 lead-through housing at the probe

Metal protection tube with 2 m length.
Different length on request.

Electrical connection

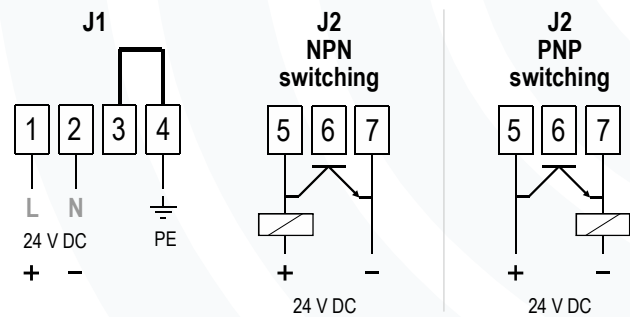
Wide range electronic C8 (not available with GasEx option B11)



004-0210.CDR

Electrical connection

DC voltage electronic C5 (not available with GasEx option B11)



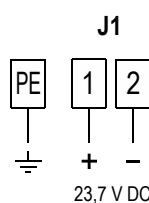
Terminals for signal output (transistor)
- Terminal 6 not used -

Electrical data

| | |
|----------------------|----------------------------|
| Supply voltage U_i | 23.7 V DC from VF-VEC8-B22 |
| I_i | 167 mA |
| P_i | 985 mW |
| L_i | negligible |
| C_i | negligible |

Electrical connection

Two wire electronic C5i (only available with GasEx option B11)



Supply only with supply and evaluation device VF-VEC8-B22 for GasEx.

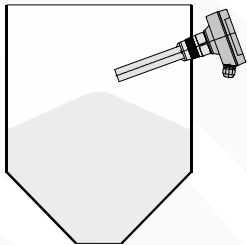
Current consumption

| | | |
|----------------------|---------------------------------|-------|
| High alarm FH | Vibration rod oscillates freely | 8 mA |
| | Vibration rod covered | 16 mA |
| Low alarm FL | Vibration rod covered | 8 mA |
| | Vibration rod oscillates freely | 16 mA |

High alarm sensor FH (factory setting)

MOLOSvibro level indicator of the VF1. series are configured for **high level alarm** in the factory setting. The function can be changed with a jumper on the electronic board. The switching status is indicated by a LED on the electronic board, like it is explained below.

Free status - vibration rod oscillates freely




Electronic type
LED display

C8

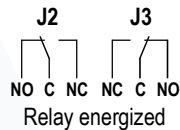
LED on

C5

LED on

C5i

LED off

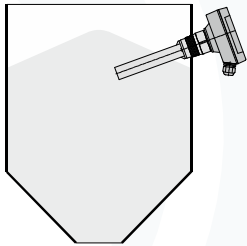
Switching status



Transistor conductive

8 mA
Current output


High alarm - vibration rod covered with bulk solids




Electronic type
LED display

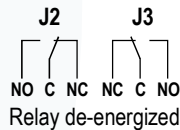
C8

LED blinking

C5

LED blinking

C5i

LED on

Switching status



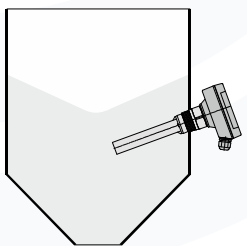
Transistor blocks

16 mA
Current output


Low alarm sensor FL (jumper repositioned)

MOLOSvibro level indicator of the VF1. series can be used for **low level alarm** with a changed factory setting. The function can be changed with a jumper on the electronic board. The switching status is indicated by a LED on the electronic board, like it is explained below.

Covered status - Vibration rod covered with bulk solids



Electronic type
LED display

C8

LED on

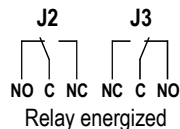
C5

LED on

C5i

LED off

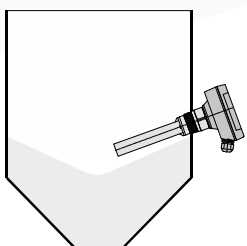
Switching status



Transistor conductive

8 mA
Current output

Leeralarm - Vibration rod oscillates freely



Electronic type
LED display

C8

LED blinking

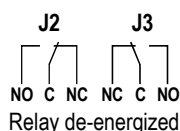
C5

LED blinking

C5i

LED on

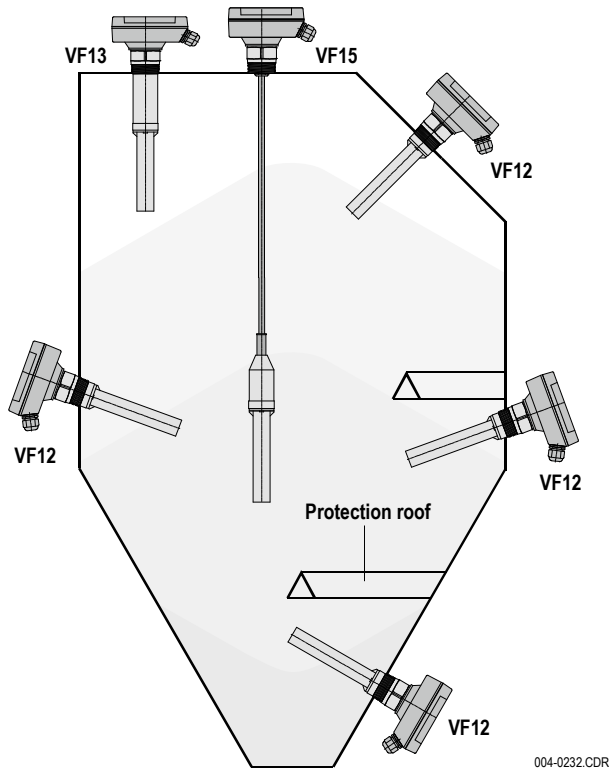
Switching status



Transistor blocks

16 mA
Current output

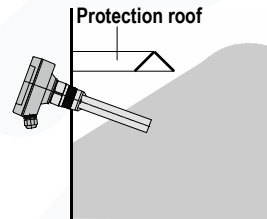
Possibilities for installation



Protection against heavy load

If needed, a protection roof or a stable deflector has to be installed inside the container, in order to protect the probe and the rod against impinging bulk solids.

Between protection roof and the probe has to be enough space that bulk solids could penetrate but not jam.

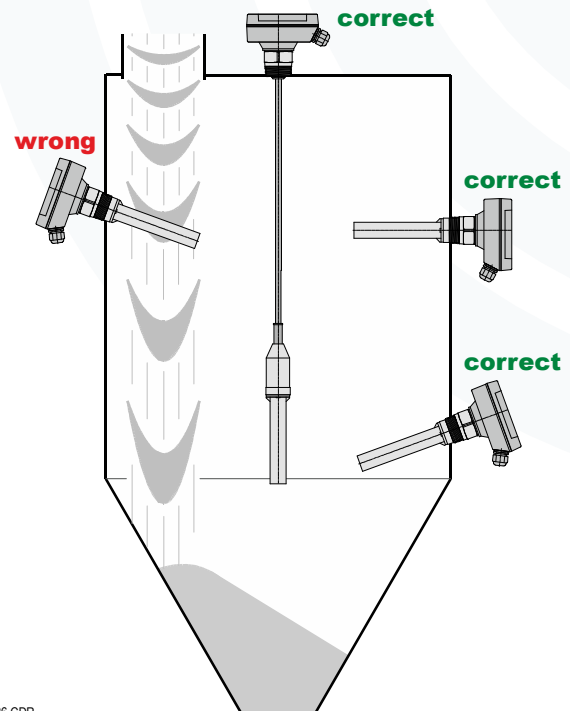
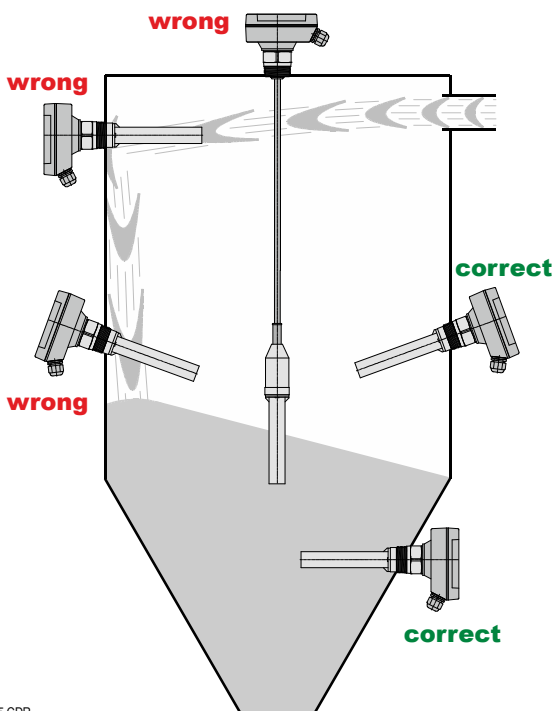


Maximum load for vibration rod



Protection against bulk solids crashing down upon the rod

Level indicators must not be affected by flying bulk goods particles e.g. from injection pies, filling pipes or down pipes. Therefore the bulk solids stream should be directed or redirected accordingly, or the level indicator should be placed so that bulk solids cannot impact directly onto the probe and vibration rod.

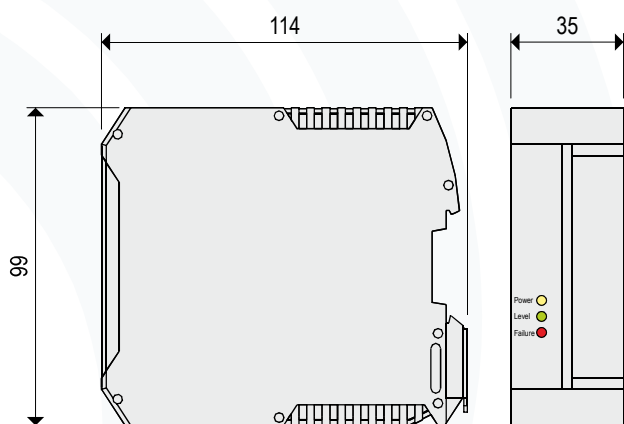


Application (intended use)

The supply and evaluation device type **VF-VEC8-B22** is intended for the use as power supply for **MOLOSvibro** level indicators that are used in potentially explosive gas atmospheres.

It detects and evaluates the damping of the vibration rod, switches the signal relay and diagnoses a short circuit or broken cable at the connection to the probe and switches the failure relay.

Dimensions



004-0240.CDR

Technical data

| | | | |
|--------------------------------------|-----------------------------|--|----------------------|
| Material | Housing | Polyamid, light gray | |
| Ambient temperature | | -20 °C ... +60 °C | T_a |
| Supply voltage | | 20 ... 250 V AC/DC | Supply |
| Power consumption | | ≤ 3 VA | |
| Connection to sensor | | Ex i | |
| | Supply voltage | ≤ 23.7 V DC | |
| | Connection cable light grey | 2-wire, maximum 35 Ω per wire | |
| | Switching threshold | 13 mA | |
| Signal relay (potential free) | | change-over contact (SPDT) | |
| Error relay (potential free) | | change-over contact | |
| Capacity of contact | AC | 6 A / 250 V | |
| | DC | ≤ 6 A at 24 V / 0,5 A at 48 V | |
| | DC | minimum 24 V / 100 mA | |
| Connection clamps | | maximum 2.5 mm ² | |
| Type of protection | | IP20 acc. DIN EN 60529 | IP |
| Ignition protection type | | ⊕ II (1) G [Ex ia Ga] IIB | |
| | | ⊕ II (1) D [Ex ia Da] IIIC | |
| LED display | Power yellow | Power supply available | |
| | Level green | Filling level (high / low) | |
| | Failure red | Error (short circuit / broken cable) | |
| Maintenance | | none | |
| Installation | | Top hat rail assembly (35 mm) | |
| Installation position | | any | |

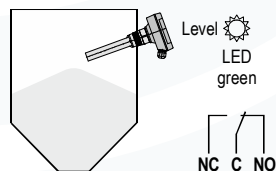
High and low alarm sensor

The signal relay of the supply and evaluation device **VF-VEC8-B22** has a separate switching logic, that is demonstrated below. The function can be changed with a jumper on the two wire electronic board **C5i** installed in the **MOLOSvibro** sensor housing.

High alarm sensor FH (factory setting)

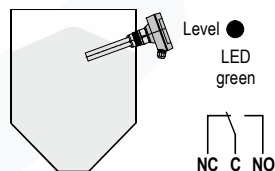
Free status

Vibration rod oscillates freely



High alarm

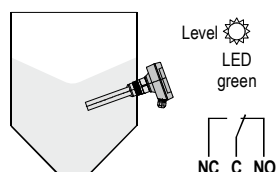
Vibration rod covered with bulk solids



Low alarm sensor FL (jumper repositioned)

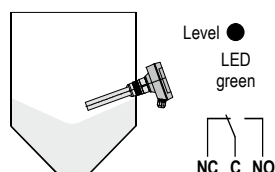
Covered status

Vibration rod covered with bulk solids

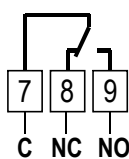


Low alarm

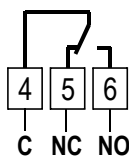
Vibration rod oscillates freely



Electrical connection

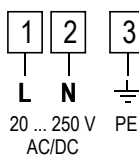


Signal relay for high and low alarm



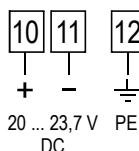
Error relay for short circuit and broken cable

OK = Relay energized Connection **C-NO**
Failure = Relay de-energized Connection **C-NC**



Supply voltage

Wide range electronic **C8**



Connection to sensor **MOLOSvibro Typ C5i**

Two wire electronic **Ex i** (intrinsically safe)
Blue clamps

Subject to modification

