

# Vibro level indicator

## Level limit switches for bulk goods

# VF1.

## Appliance information

Gas+  
Dust 

**Rhombus vibration rod**  
robust single rod - compact and versatile

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**MOLLET** accurate point level

ATEX option

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

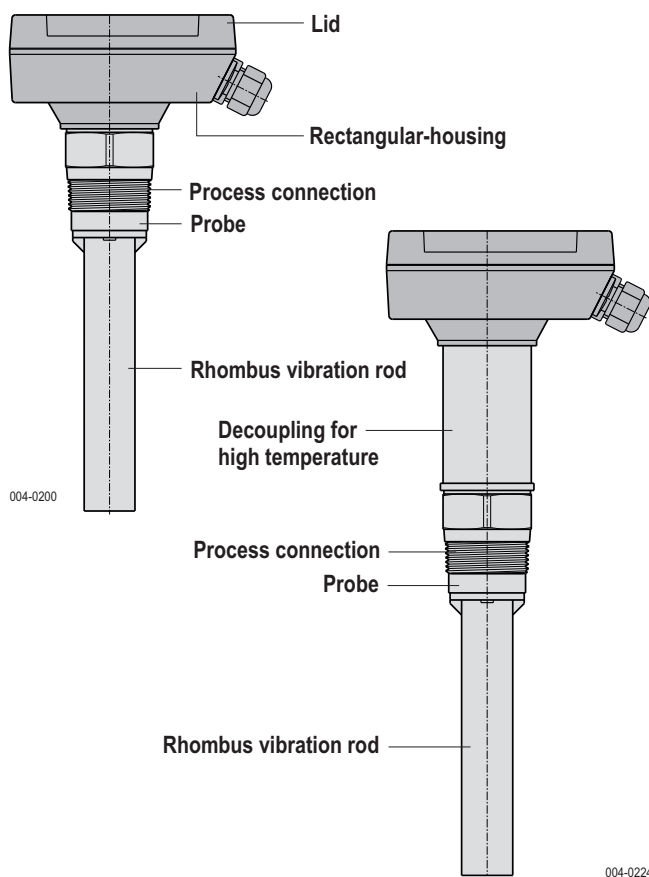
## Application (intended use)

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/m<sup>3</sup>.**

For application in **all industry sectors.**

## Construction



## 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

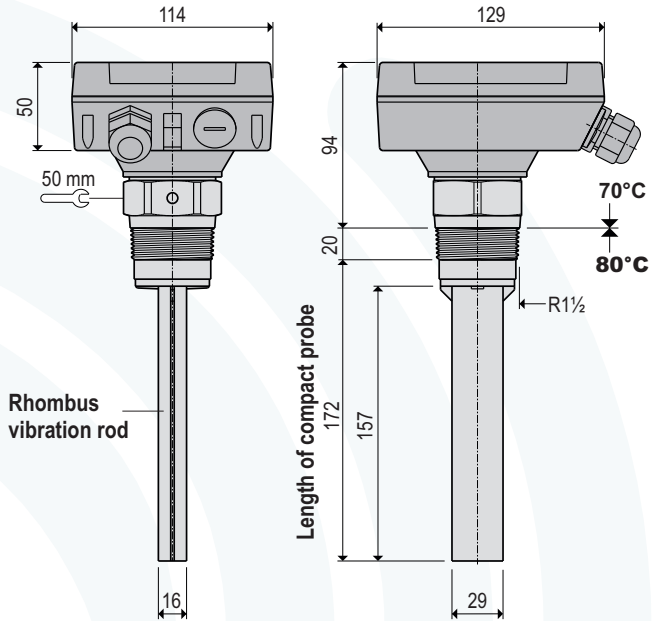
<b>Material</b>	Rectangular-housing Process connection and probe Rhombus vibration rod Suspension cable sheath	Aluminium, RAL7001 Stainless steel 1.4301 / 304 Stainless steel 1.4301 / 304 Polyurethane
<b>Process connection</b>	<b>R3</b>	R1½ EN 10226 or N3 1½" NPT
<b>Ambient temperature</b>	with separate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

## 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

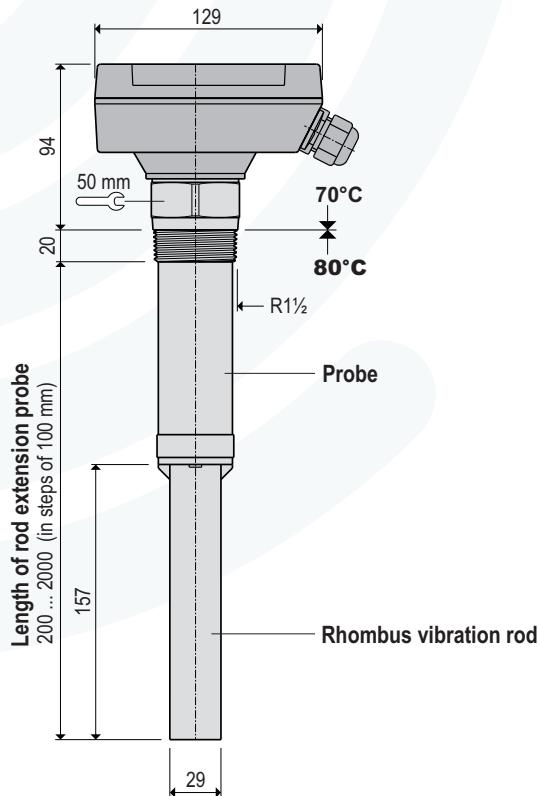
**Versions / Dimensions**

**VF12 Compact sensor**



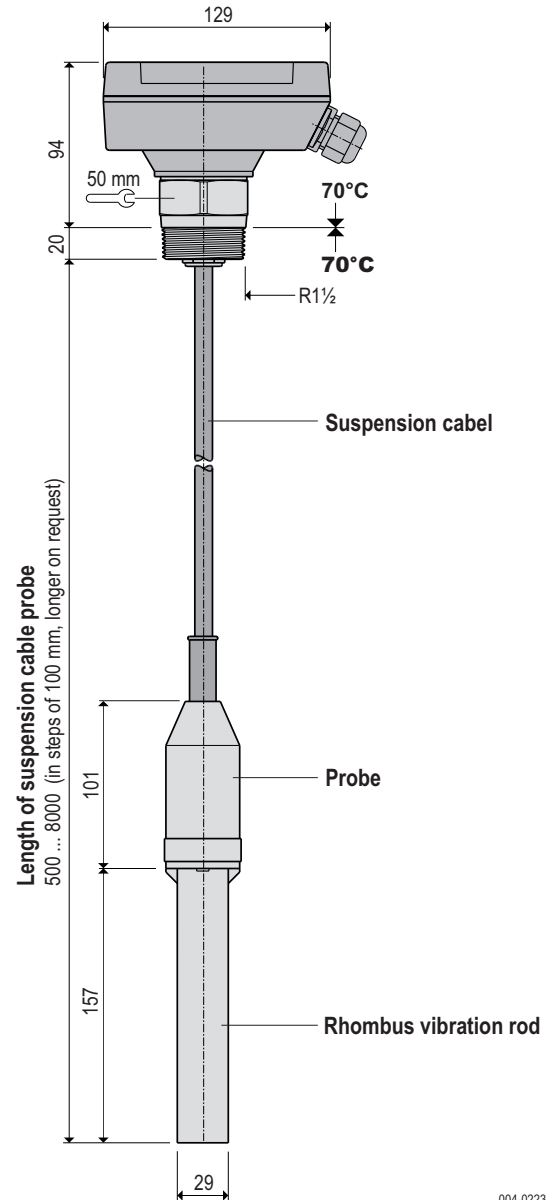
004-0221

**VF13 Rod extension sensor**



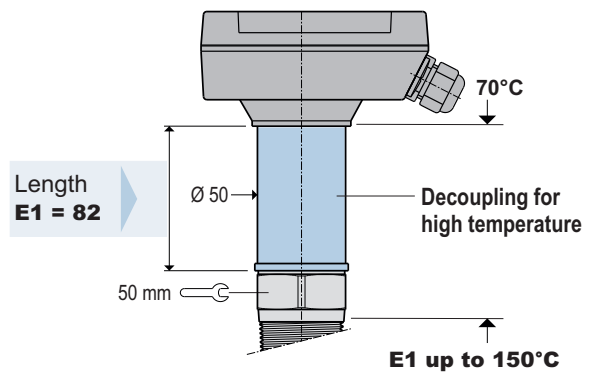
004-0222

**VF15 Suspension cable sensor**



004-0223

**E1 ... E3 High temperature**



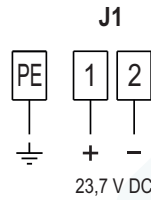
004-0224

## Two wire electronic C5i

### 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



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

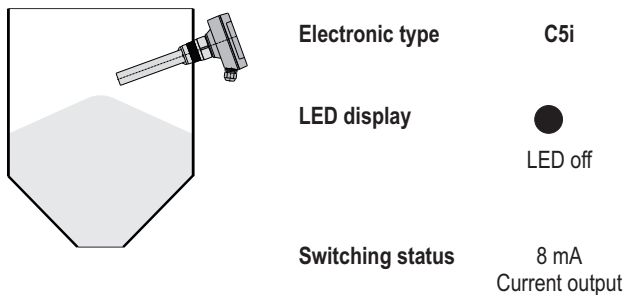
#### Current consumption

<b>High alarm FH</b>	Vibration rod oscillates freely	8 mA
	Vibration rod covered	16 mA
<b>Low alarm FL</b>	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.

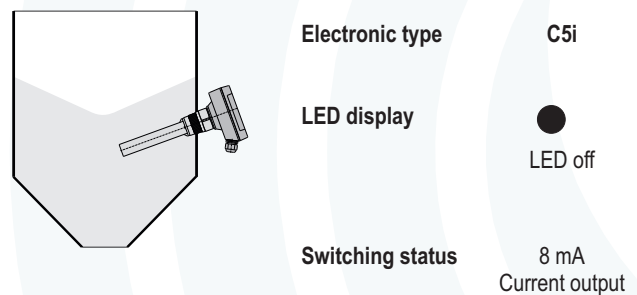
**Free status** - Vibration rod oscillates freely



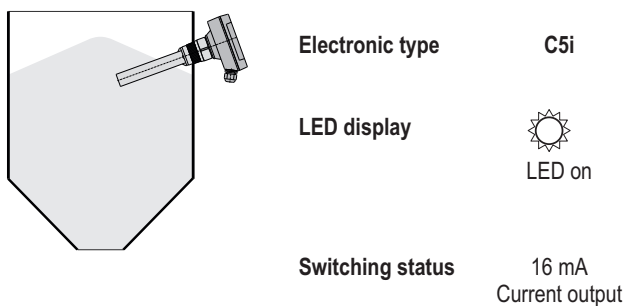
### Low alarm sensor FL (jumper repositioned)

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.

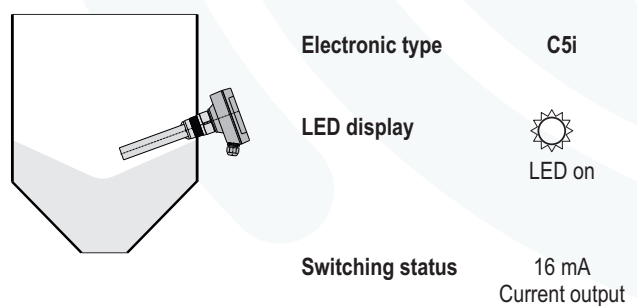
**Covered status** - vibration rod covered with bulk solids



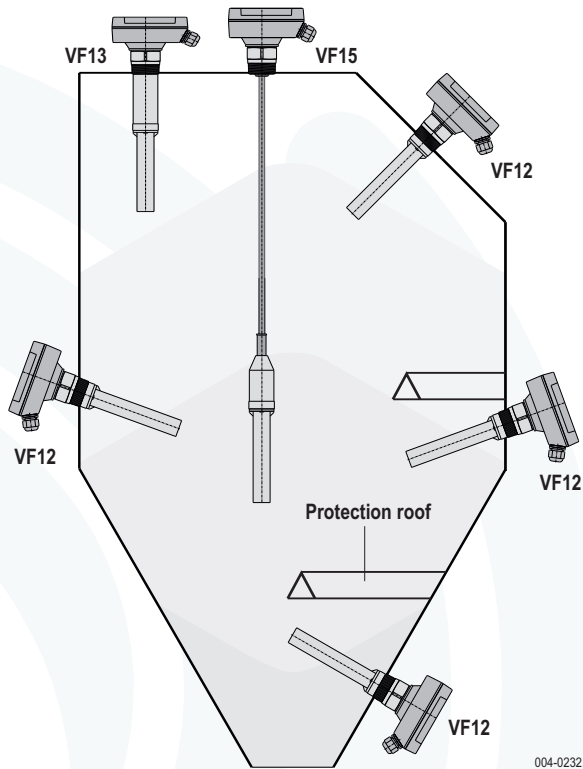
**High alarm** - vibration rod covered with bulk solids



**Low alarm** - vibration rod oscillates freely



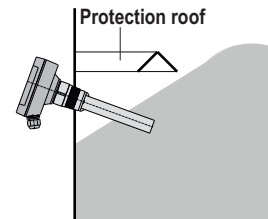
### Possibilities for installation



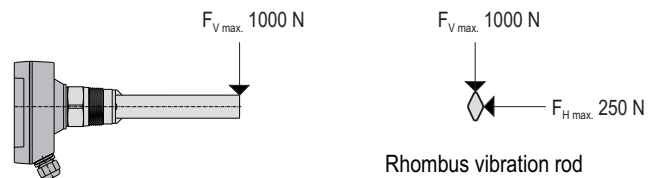
### Protection against heavy load

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.

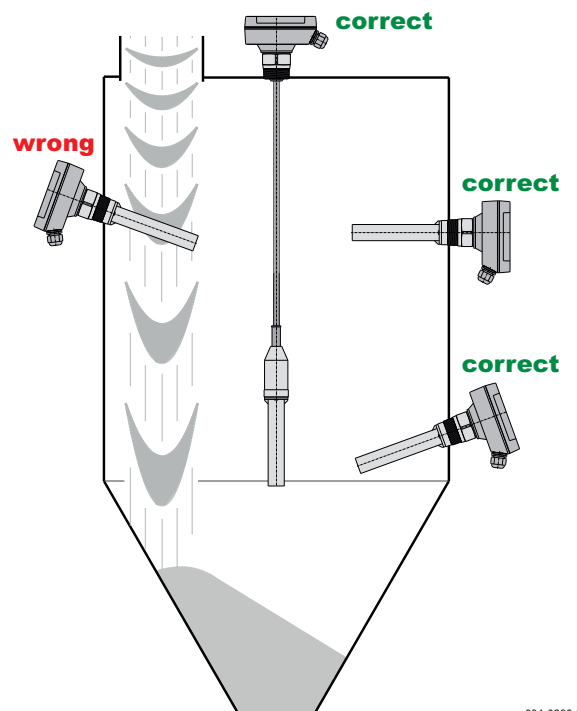
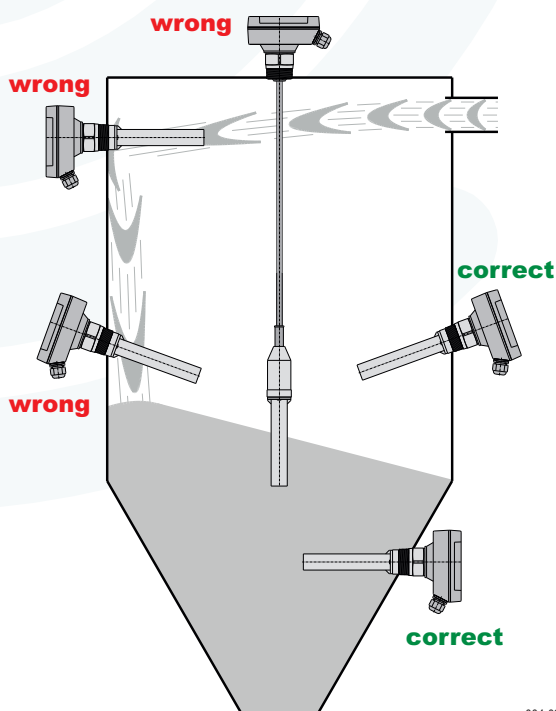


### Maximum load for vibration rod



### 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.

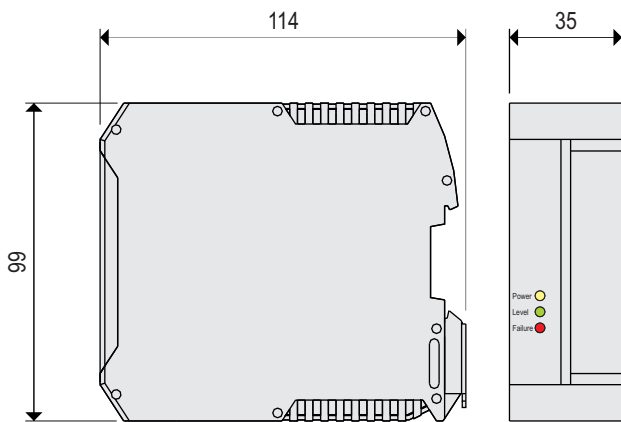


### Application (intended use)

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

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

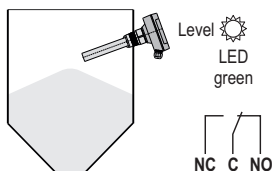
### High and low alarm sensor

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)

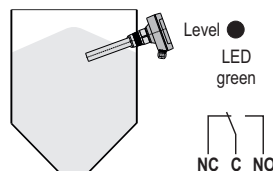
##### Free status

Vibration rod oscillates freely



##### High alarm

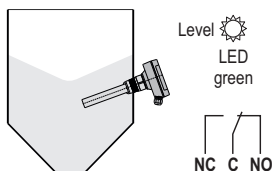
Vibration rod covered with bulk solids



#### Low alarm sensor FL (jumper repositioned)

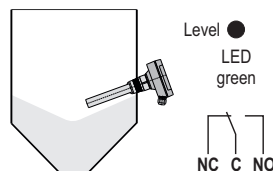
##### Covered status

Vibration rod covered with bulk solids

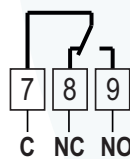


##### Low alarm

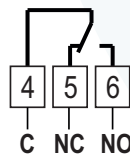
Vibration rod oscillates freely



### Electrical connection

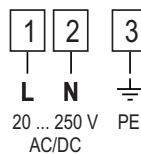


Signal relay for high and low alarm



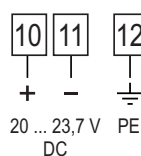
Error relay for short circuit and broken cable

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