

Vibro level indicator
Level limit switches for bulk goods

VF1.A3


Operating instruction

Rhombus vibration rod
robust single rod - compact and versatile

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► Please, read and obey these safety instructions and the complete operating manual.

1. Safety instructions

- 1.1 The installation, initial operation and maintenance must be done by a qualified expert with electrical know-how.
- 1.2 Check before installation whether the measuring device is in compliance with the specification of the point of measurement as process and ambient temperature as well as the measuring range.
- 1.3 Use in potentially explosive atmospheres only devices with  - identification marking.
- 1.4 For the electrical connection take notice of the local and statutory rules and regulations and/or the VDE 0100.
- 1.5 Consider the data of the name plate on the device.
- 1.6 A fuse (max. 4 A) and a main switch have to be connected in series to the voltage supply.
- 1.7 Switch off the voltage supply before you open the measuring device (dangerous voltages in case of contact).
- 1.8 Check the cable entry, cable gland and clamping nut, to see if they are sitting correctly and are sealed.
- 1.9 Put the device into operation only when the unit is closed and the cover sealing is intact.
- 1.10 Changes and repairs of the device are allowed only in so far as it is permitted in the operating instructions.

►  Prior to the use of the device in potentially explosive atmospheres please, read and obey the

Special conditions and guidance for safe use

in the attached

Explosions protection information

and observe the operating instruction.

2. Use of the device

2.1 Intended use

- The device is used as a level limit switch for bulk solids in silos, bins and so on.

2.2 Normal operation

- Please operate the measuring device only according the intended use.
- Use the measuring device only within the specified temperature ranges for process and ambience.
- Protect the electronics compartment against pollution.
- In case the measuring device becomes damaged, please stop operation immediately.

2.3 Improper use

- Ignoring safety regulations and operating instruction.
- Operation of the measuring device in inappropriate use.
- Installation of spare parts that are no original parts.
- Removal, addition or modification of components as far as it is not described in the documentation of the manufacturer.
- Violation of applicable standards and laws.

3. Data of manufacturer

Manufacturer	MOLLET Füllstandtechnik GmbH
Address	Industriepark RIO 103 74706 Osterburken Germany
Name of part	MOLOSvibro Vibro level indicator
Type	VF1.A3 ...

4. Receiving department and storage

4.1 Receipt of goods

- Please check whether packaging or content are damaged.
- Please check whether the supplied goods are incomplete or do not comply the requirements as set out in your order.

4.2 Storage

- For storage and transportation the measuring device has to be packed shock-resistant.
- Store the device at a place protected against moisture and dust.
- Take care that the probe will not be bended.
- **Temperature range for storage** -40 °C ... +85 °C

5. Application (intended use)

The **MOLOSvibro** of the **VF1.A3** 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**.

6. 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.

7. Information for use

Please obey the following for the use of the Vibro level indicator:

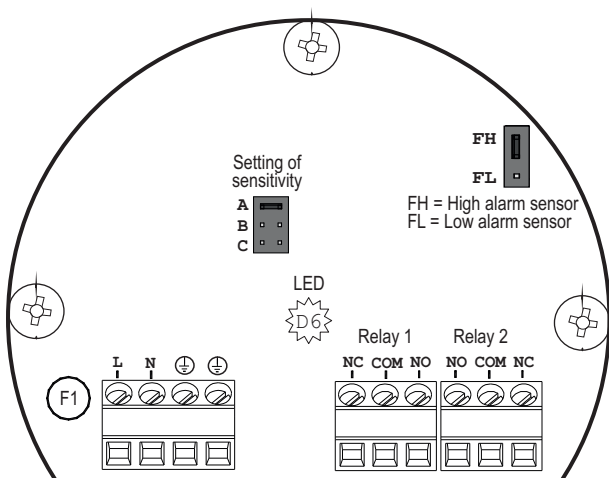
- **Switch point dependent of bulk density (t/m³; kg/l):**
 - with heavy bulk solids only the tip of the rod has to be covered for damping the vibration.
 - with light bulk solids the complete rod has to be covered for damping the vibration.
- **In order to keep the ambient temperature of the PCB below +70°C please**
 - protect the housing from direct sunlight by installing a sun shield.
 - protect the housing against temperature transfer from the silo in cases the process temperature exceeds 70°C by installation of a heat barrier between the enclosure and the bin wall or use the high temperature option **E1 / E2 /E3**.
- **The measuring device must not be mounted in or near the filling stream. The falling bulk solids could damage the probe.**

8. Technical data

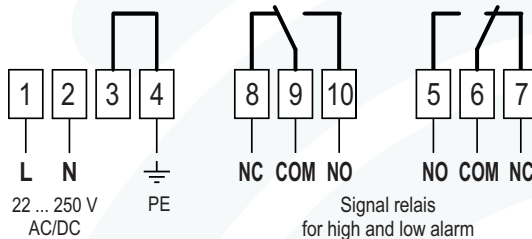
Material	Round-housing Process connection and probe Rhombus vibration rod Suspension cable sheath	Aluminium, RAL7001 Stainless steel 1.4301 / 304 Stainless steel 1.4301 / 304 Polyurethane	
Process connection	R3	R1½ EN 10226 or N3 1½" NPT	
Ambient temperature		-40 °C ... +70 °C with separate housing -40 °C ... +80 °C	T_a
Process temperature	VF12, VF13 VF15	-40 °C ... +80 °C -40 °C ... +70 °C	T^(Process)
VF12, VF13 high temperature	E1 E2 E3	-15 °C ... +150 °C -20 °C ... +200 °C -20 °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 1 second for start oscillation 2 to 5 seconds	
Cable entry		Gland 2xM20x1.5	
Type of protection		IP66/IP67 acc. DIN EN 60529 IP65 acc. DIN EN 60529	IP
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	

9. Electrical connection and data

9.1 Wide range electronic C8



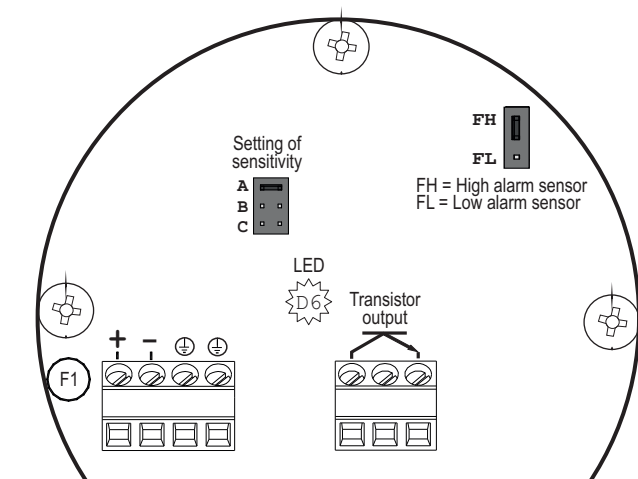
Supply voltage	22 ... 250 V AC / DC
Power consumption	≤ 3 VA / 3 W
Signal relay	two potential free change-over contacts (SPDT)
Capacity of contact	8 A / 250 V AC 192 / 72 W at 24 / 48 V DC
Connection clamps	maximum 2.5 mm ²



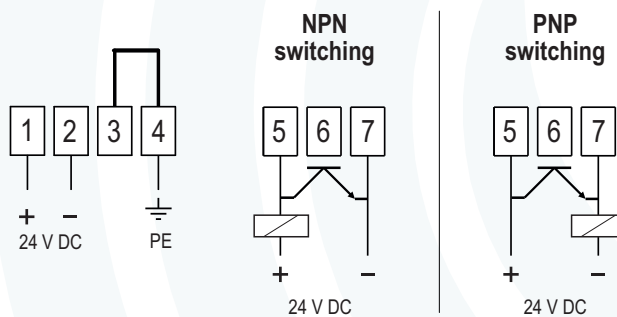
Supply

004-0210.CDR

9.2 DC voltage electronic C5



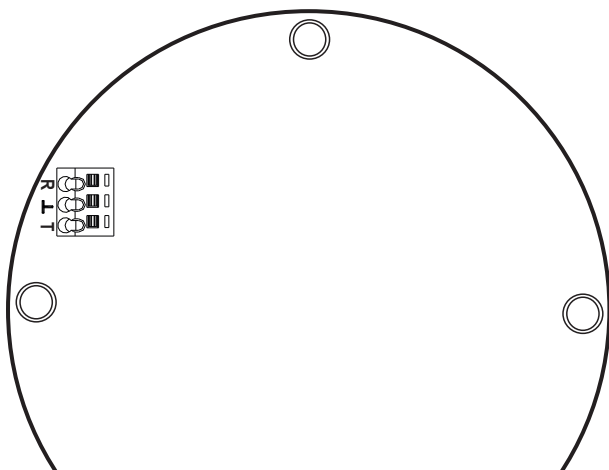
Supply voltage	24 V DC ±10%
Power consumption	≤ 1 W (without load)
Signal output	potential free NPN / PNP
Capacity of contact	maximum 20 W switching capacity maximum 350 mA constant current
Connection clamps	maximum 2.5 mm ²



Supply

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

9.3 Bottom side of PCB from C8 and C5

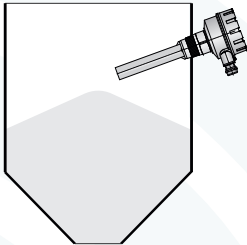


Probe connection	T = red ┘ = black R = yellow
Connection type	Spring terminal

10. 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

C8

C5

LED display



LED on

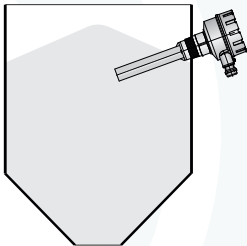
LED on

Switching status



Transistor conductive

High alarm - vibration rod covered with bulk solids



Electronic type

C8

C5

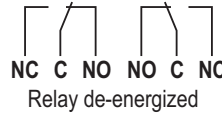
LED display



LED blinking

LED blinking

Switching status

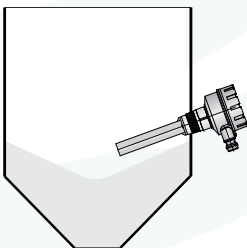


Transistor blocks

11. 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

C8

C5

LED display



LED on

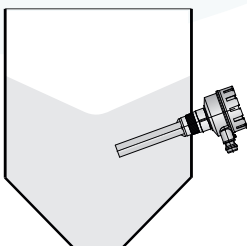
LED on

Switching status



Transistor conductive

Leeralarm - Vibration rod oscillates freely



Electronic type

C8

C5

LED display



LED blinking

LED blinking

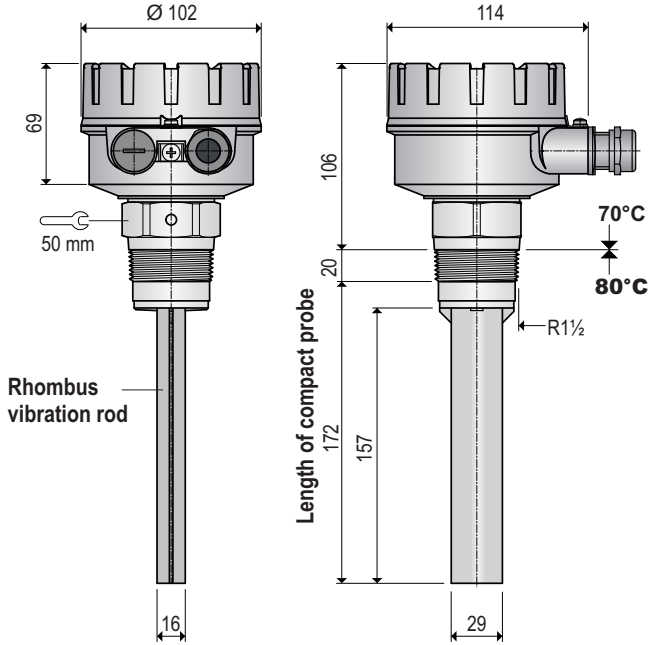
Switching status



Transistor blocks

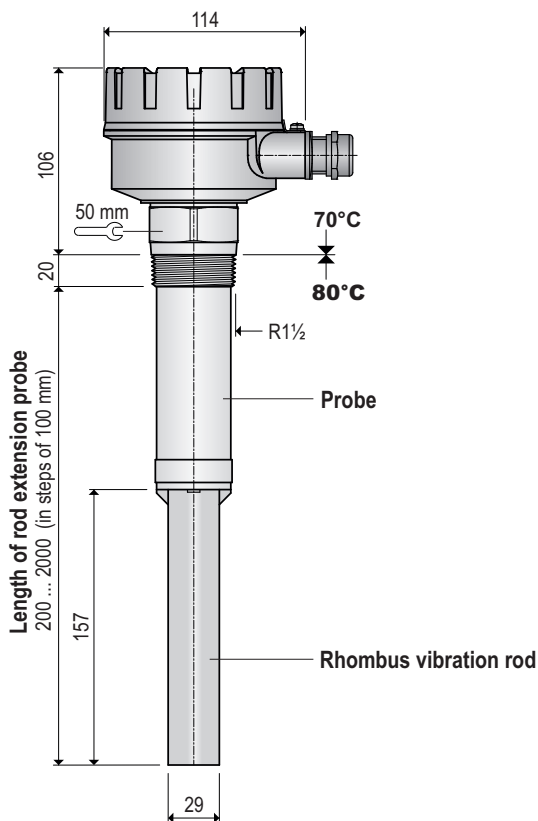
12. Versions/Dimensions

12.1 VF12 Compact sensor



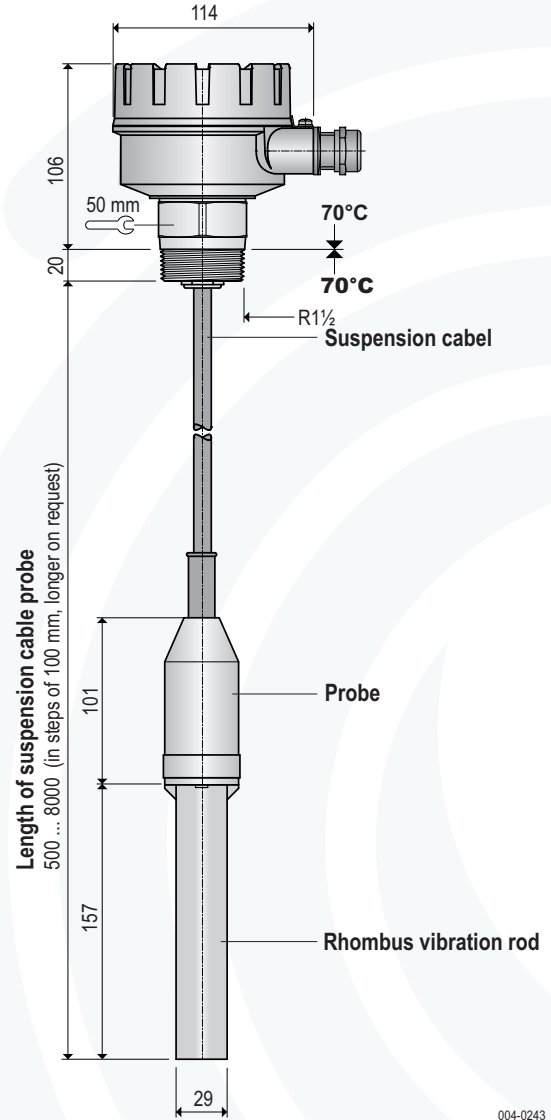
004-0221

12.2 VF13 Rod extension sensor



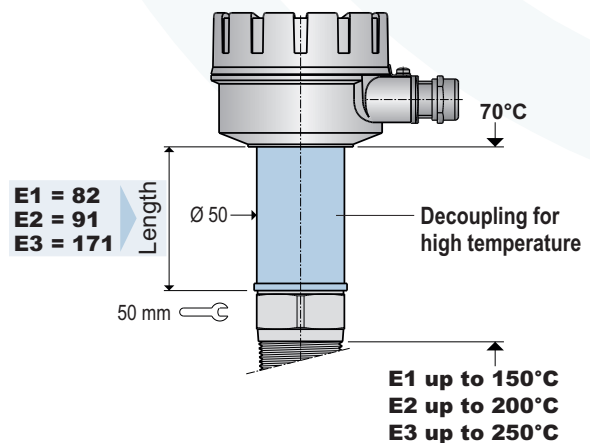
004-0242

12.3 VF15 Suspension cable sensor



004-0243

12.4 E1 ... E3 High temperature

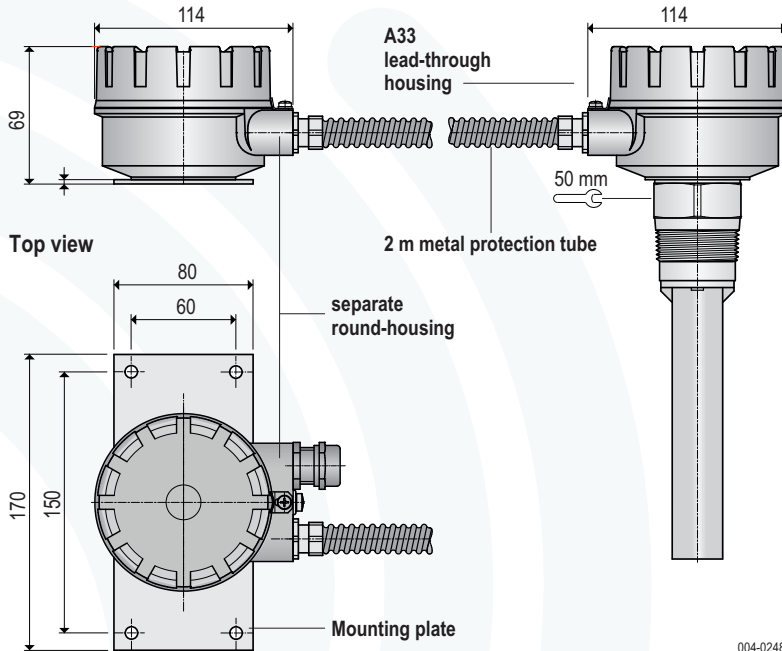


004-0224

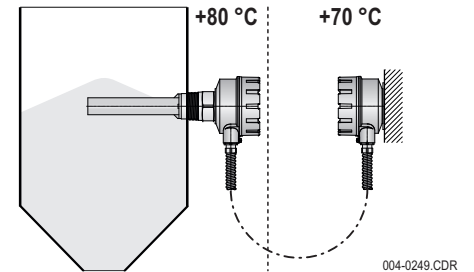
12. Versions/Dimensions

12.5 A33 separate round-housing

Front and side views



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



Application

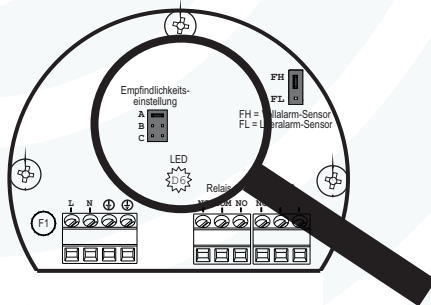
- In vessels with heavy vibrations
- Process temperatures of 150 °C to 250 °C only in combination with lead-through housing in high-temperature design
- Ambient temperatures up to +80 °C in close proximity to the container wall.

Separate round-housing combinable with:
A33 lead-through housing at the probe

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

13. Setting of sensitivity

13.1 Wide range electronic C8



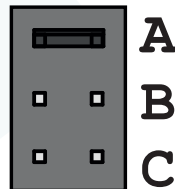
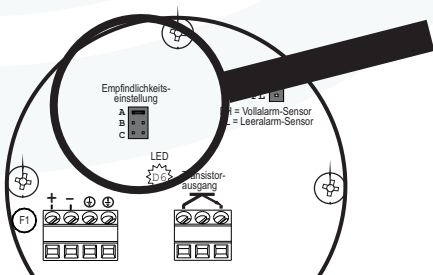
Adjustment by jumper at **A - B - C**

Position **A**: highest sensitivity level
for light bulk solids with a density above 0.02 kg/l

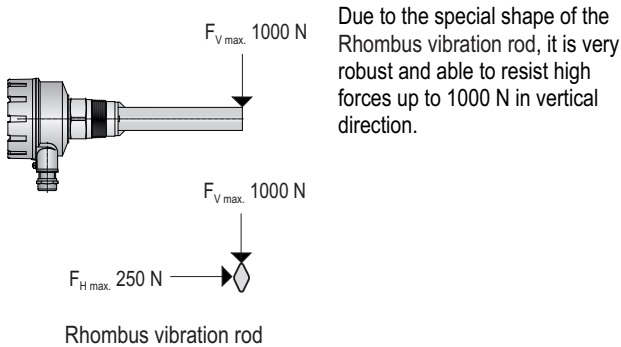
Position **B**: standard sensitivity level (factory setting)
sufficient for most bulk solids.

Position **C**: lowest sensitivity level
for heavy materials with high densities which may form a deposit on the vibrating rod.
Light materials can not be detected at this setting!

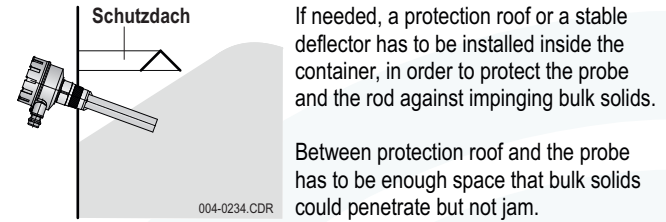
13.2 DC voltage electronic C5



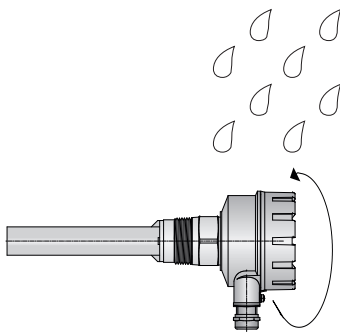
14. Load for vibration rod



15. Protection against heavy load



16. Protection against moisture by alignment of cable glands



The cable glands must always point downwards to prevent moisture seeping inside the housing. If the housing is not in the correct position after the probe has been firmly screwed into the bin wall, proceed as follows:

- remove the cover of the housing
- use a screw driver to loosen the screw in the center of the PCB
- turn the housing into the correct position so that the cable glands are pointing downwards
- tighten the screw in the center of the PCB, torque 3Nm
- close the cover of the housing.

Cable ducts which are not used have to be sealed!

17. Allowed temperatures

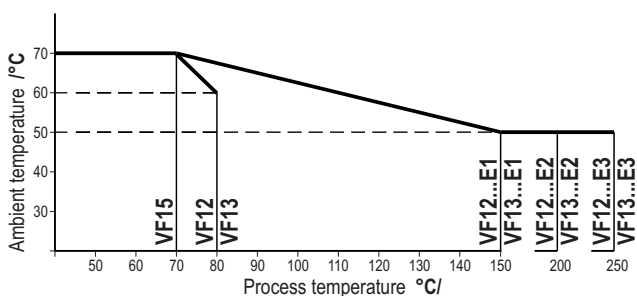
Ambient temperature at the probe (process temperature) $T_{(process)}$ **-40°C ... +80°C**

Ambient temperature at the electronic housing T_a **-40°C ... (+60°C) +70°C**

Due to the process temperature of 80 °C reduced maximum allowed ambient temperature at the electronic housing

Maximum allowed ambient temperature at the electronic housing is dependent of the process temperature.

(see diagram)

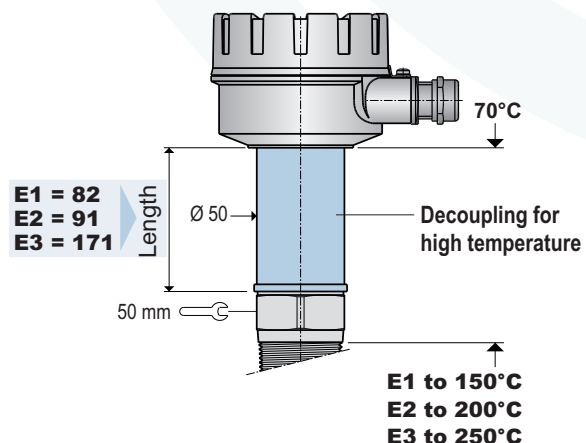


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18. Bulk solids temperatures up to 250 °C

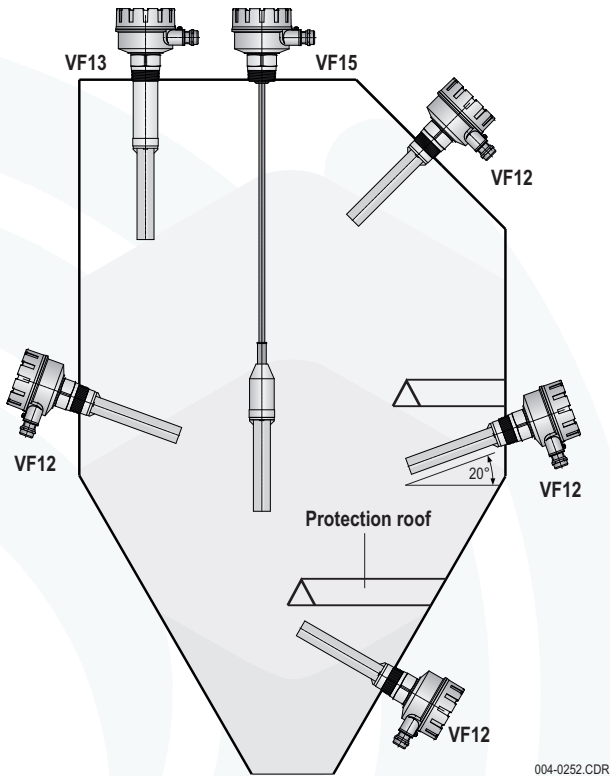
The high temperature options **E1 / E2 / E3** enables the use of the level indicators for bulk solids temperatures up to 250 °C.

- in order to protect the electronic against overheating by heat transfer from the process, a decoupling for high temperature **E1, E2 or E3** is installed between probe and electronic housing.
- use for process temperatures above 80 °C only level indicators with the high temperature option.
- due to high process temperatures the maximum allowed ambient temperature at the electronic housing is reduced (see diagram)
- please mind for exchange of electronics that only PCBs with the marking „Special Model HT“ may be used.



004-0224

19. Possibilities for installation



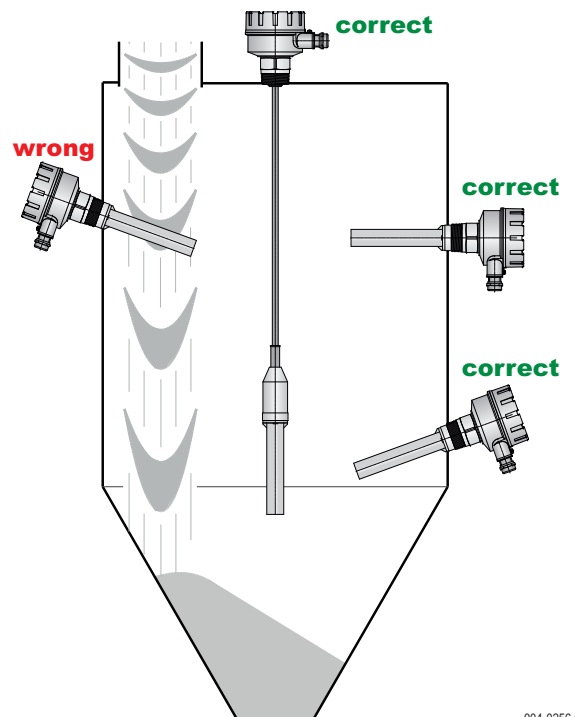
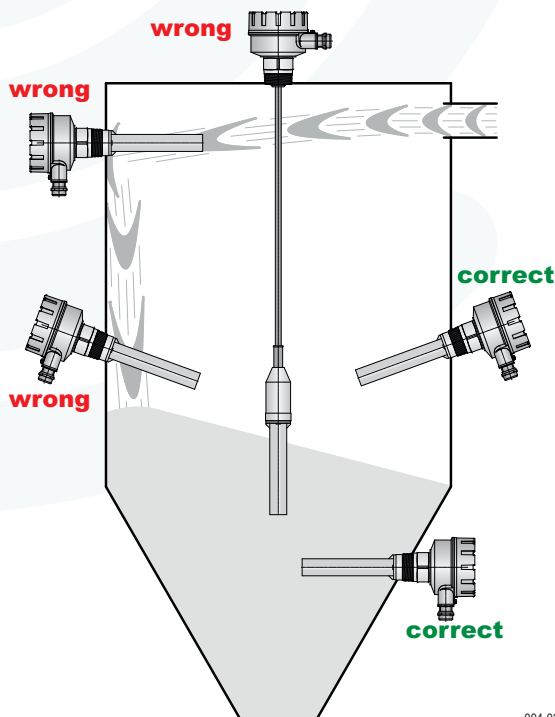
Side mounting or vertical mounting:

- VF12 and VF13 can be mounted either from the side or vertical.
- In order that bulk solids can flow off easily
 - it is recommended to screw the measuring device slightly downwards (approx. 20°)
 - the blade of the probe has to be oriented vertically. Correct alignment of the blade is given as soon as the two marks in the mounting socket point up and down.
- The measuring device has to be mounted in such a way that the filling stream cannot damage it.
- In case the filling stream reaches the probe nevertheless, it has to be protected by a suitable protection roof.
- If the probe is used as empty indicator in the lower area of bins/silos with heavy bulk solids, a protection roof has always to be installed.
- VF15 is suitable for top mounting only.
- A suitable sealing, (like Teflon tape), must be applied onto the thread and the VF has to be screwed into the provided socket with a 50 mm open end wrench.

Attention: Do not screw by turning the housing!

20. 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.



Subject to modification.

21. Maintenance

The Vibro level indicators require no maintenance.

- For applications with materials that are a little bit sticky we recommend to clean the vibrating blade of the instrument in certain periods of time.
- If the instruments are exposed to corrosive atmosphere, they must be inspected in certain periods of time regarding corrosion of probe and enclosure in order to ensure the tightness of the instruments.

22. Disposal

- Level indicator **VF** can be recycled.
- Disposal of the **VF** is subject to the environmental legislation of the respective country in effect for the operator's premises.

23. Returns to MOLLET

23.1 Remove all adherent material residues of filling material from the measuring device. Be aware of seal grooves and cracks where material residues could stick.

**In particular if the bulk goods or liquids has been dangerous to health,
e. g. flammable, toxic, caustic or cancer-producing.**

23.2 Furthermore please state:

- Chemical and physical characteristics of the bulk goods or liquid
- Description of the application
- Description of the failure occurred
- Operating time of the measuring device.

Vibro level indicators

Level limit switches for bulk goods

VF1.A3

Dust



Explosion protection information

and supplement to the operating instructions

Prior to the use of the device in potentially explosive atmospheres please, read and obey the special conditions and instructions for safe application on page VF1.A3-EID-05.

Please observe rules for maximum allowed ambient temperatures shown on page VF1.A3-EID-04.

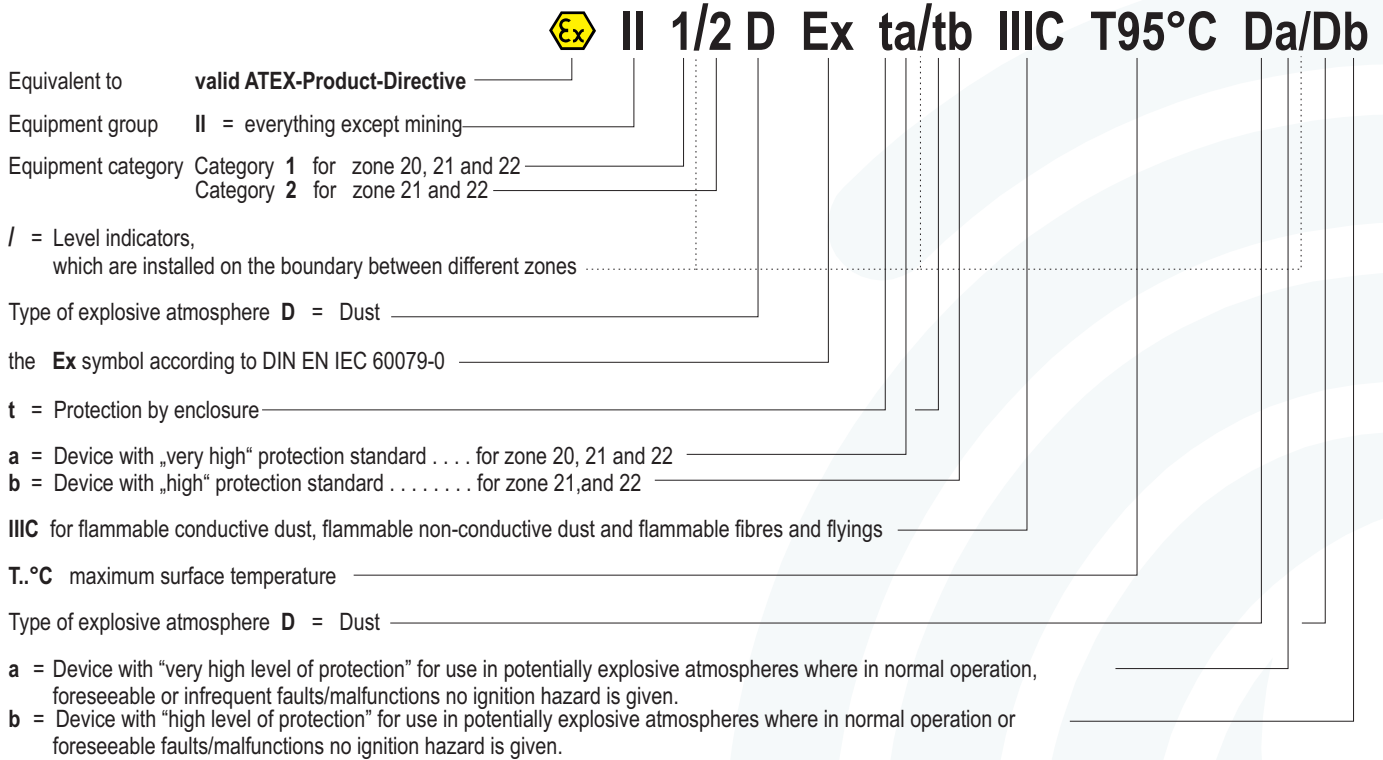
Type plate details with option B1



Manufacturer and address		CE sign with the number of the "Notified Body" which is involved in the production control phase		EU-type examination certificate number	
MOLLET Füllstandtechnik GmbH Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400				IBExU19ATEX1052 IP66/IP67	
Model designation	VF1.A3B1...	DustEx identification II 1/2D Ex ta/tb IIIC T95°C Da/Db -20°C ≤ Ta ≤ +60 °C -20°C ≤ T _{Process} ≤ +80°C		Type of protection Details to supply voltage and current consumption Supply 20...250 V AC/DC Consumption 3 VA	
Unique device serial number	S# 1234567890 A.-Nr. 1234567890	Ambient temperature (process temperature) Design of the devices suitable for pressures in the vessel indicated here.		Details to loadability of the signal contact Contact 5 A / 250 V AC~	
Order number	02/21	Month and year of delivery			

Marking in accordance with ATEX and DIN EN IEC 60079-0:2019

Vibro level indicator for use at the boundary from zone 20 to zone 21.



Order code **VF12A3B1...** and **VF13A3B1...**

Marking: **II 1 / 2 D** Dust **Ex**

Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 21.

Ambient temperatures Ta

The ambient temperature **Ta** defines the maximum operating temperature of the indicators. Inside the vessel this is process temperature (the air or the bulk goods temperature) nearby the device.

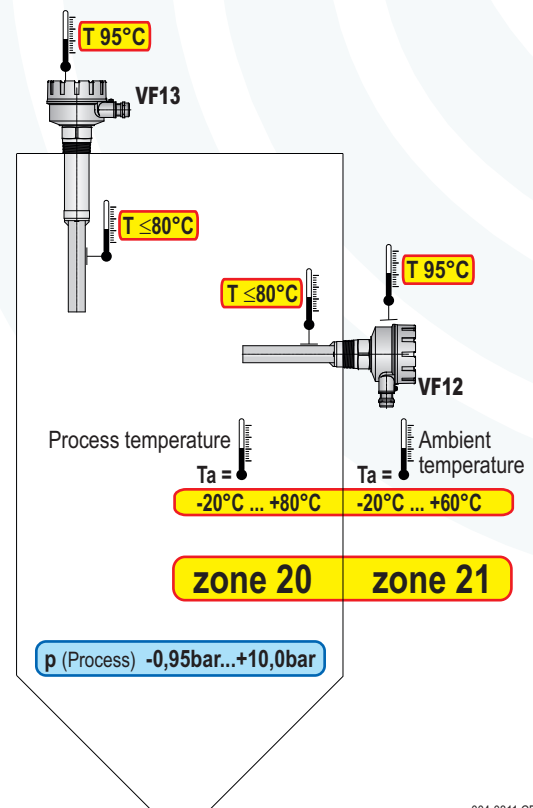
Maximum surface temperature T

The maximum surface temperature **T** means the hottest point at the equipment.

Pressure, vacuum

Design of the devices is suitable for indicated pressures in the vessel.

These pressures are outside of the range for atmospheric conditions defined in the guidance to the ATEX-Product-Directive.



MOLLET Füllstandtechnik GmbH	Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400	CE 0044	IBExU19ATEX1052 IP66/IP67
VF1.A3 B1 ...	II 1/2D Ex ta/tb IIIC T95°C Da/Db		Supply 20...250 V AC/DC
S# 1234567890	-20°C ≤ Ta ≤ +60 °C -20°C ≤ T _{Process} ≤ +80°C		Consumption 3 VA
A.-Nr. 1234567890 02/21	p (Process) -0,95bar...+10,0bar		Contact 5 A / 250 V AC~

004-0311.CDR

Order code **VF15A3B1 ...**
Marking: **II 1 / 2 D**



Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 21.

Ambient temperatures T_a

The ambient temperature T_a defines the maximum operating temperature of the indicators. Inside the vessel this is process temperature (the air or the bulk goods temperature) nearby the device.

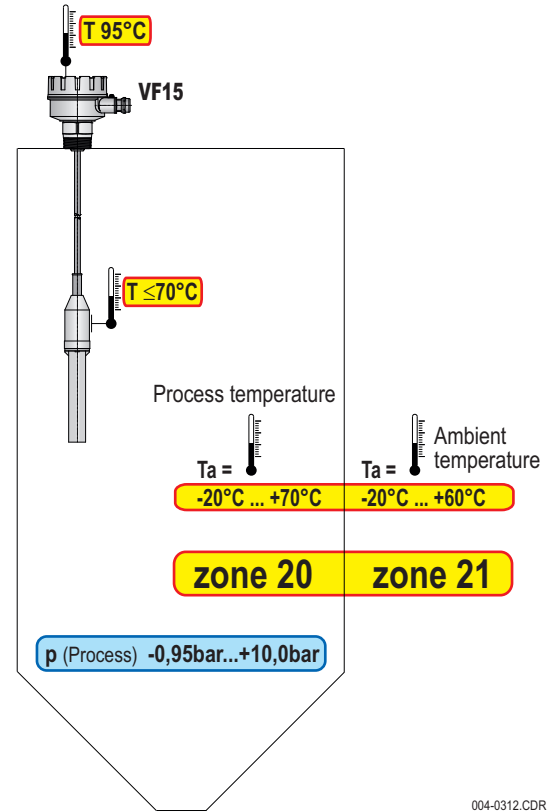
Maximum surface temperature T

The maximum surface temperature T means the hottest point at the equipment.

Pressure, vacuum

Design of the devices is suitable for indicated pressures in the vessel.

These pressures are outside of the range for atmospheric conditions defined in the guidance to the ATEX-Product-Directive.



MOLLET Füllstandtechnik GmbH Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044 IIBExU19ATEX1052 IP66/IP67
VF15 A3 B1 ...	II 1/2D Ex ta/tb III C T95°C Da/Db	Supply 20...250 V AC/DC Consumption 3 VA Contact 5 A / 250 V AC~
S# 1234567890 A.-Nr. 1234567890 02/21	-20°C ≤ T_a ≤ +60 °C -20°C ≤ $T_{Process}$ ≤ +70°C p (Process) -0,95bar...+10,0bar	

004-0312.CDR

Inside high process temperature, outside ambient temperature

Order code **VF12A3B1...E1...** and **VF13A3B1...E1...**

Marking: **II 1 / 2 D**

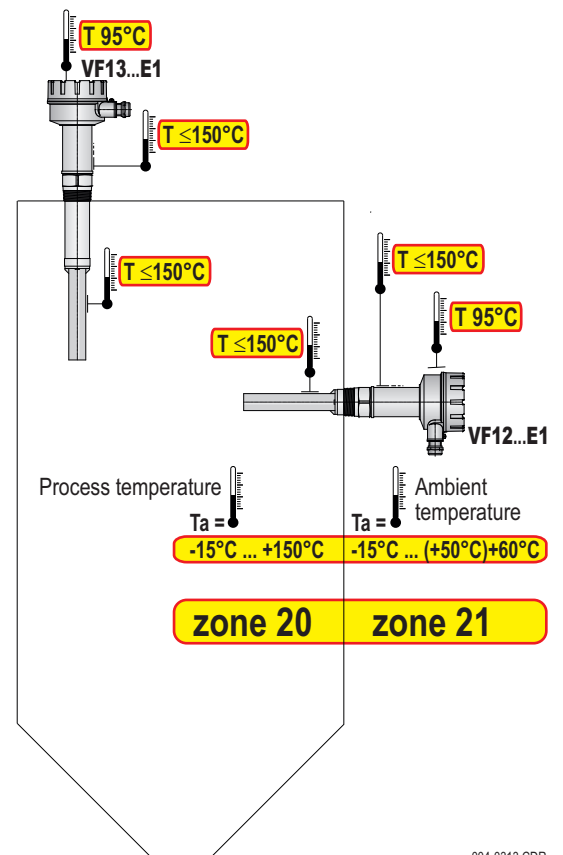


Maximum surface temperature T

Probe and vibration rod produce no increase of temperature, but they are able to take high temperatures from inside of the vessel and forward it.

Due to this, the surface temperature has to be determined according to the process temperature (temperature of bulk solids or ambient) inside of the vessel.

The maximum authorised ambient temperature / ... °C at the electronic housing is dependent from the process temperature ... °C/.
(Please notice diagram at page VF1.A3-EID-04)



MOLLET Füllstandtechnik GmbH Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044 IIBExU19ATEX1052 IP66/IP67
VF1.A3 B1...E1...	II 1/2D Ex ta/tb III C T95°C Da/Db	Supply 20...250 V AC/DC Consumption 3 VA Contact 5 A / 250 V AC~
S# 1234567890 A.-Nr. 1234567890 02/21	-20°C ≤ T_a ≤ +60 °C -15°C ≤ $T_{Process}$ ≤ +150°C p (Process) -0,95bar...+10,0bar	

004-0313.CDR

Separate electronic housing

Order code **VF12A33B3...** and **VF13A33B3...**

Marking: **II 1 / 3 D**



Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 22.

Ambient temperatures T_a

The ambient temperature T_a defines the maximum operating temperature of the indicators. Inside the vessel this is process temperature (the air or the bulk goods temperature) nearby the device.

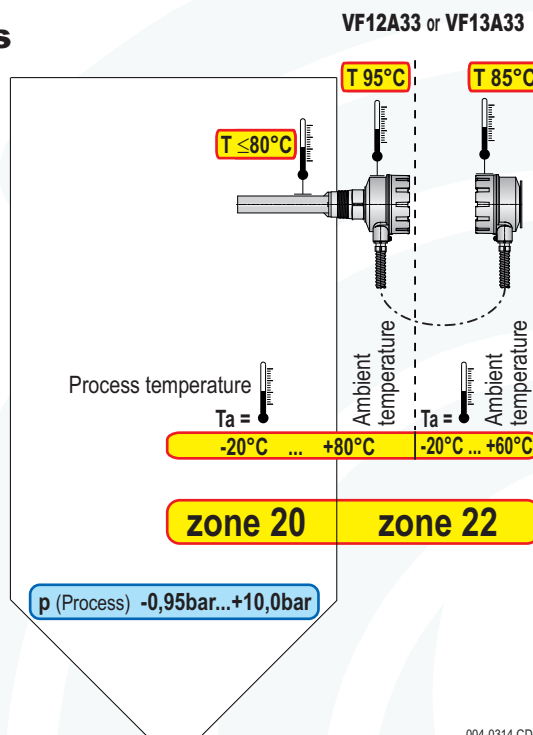
Maximum surface temperature T

The maximum surface temperature T means the hottest point at the equipment.

Pressure, vacuum

Design of the devices is suitable for indicated pressures in the vessel.

These pressures are outside of the range for atmospheric conditions defined in the guidance to the ATEX-Product-Directive.



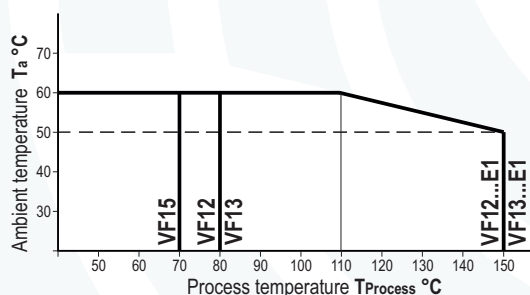
MOLLET Füllstandtechnik GmbH	Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400	CE 0044	IBExU19ATEX1052 IP66
VF1 A33 B3 ...	Ex II 1/3D Ex ta/tc III C T95°C Da/Dc	Supply 20...250 V AC/DC	Consumption 3 VA
S# 1234567890 A.-Nr. 1234567890 02/21	-20°C ≤ T_a ≤ +60 °C -20°C ≤ $T_{Process}$ ≤ +80 °C p (Process) -0,95bar...+10,0bar	Contact 5 A / 250 V AC~	

004-0314.CDR

Maximum ambient temperatures

The maximum authorised ambient temperature °C at the electronic housing is dependent from the process temperature °C

(please notice diagram)





Special conditions and instructions for safe application

1. The installation, maintenance, initial operation, removal and repair have to be controlled resp. checked by an “authorized person” for explosion protection.
2. For the electrical connection you have to take notice of the local and statutory requirements and/or the VDE 0100.
3. Take notice of the specifications on the data plate.
4. A fuse (with max. 4A) has to be connected in series to the voltage supply.
5. Protect the signal contact from voltage peaks when inductive loads are connected.
6. As soon as the device will be brought into the explosion hazardous area it has to be mounted immediately at the intended place and a cable has to be brought into the cable gland.
7. Please check if the cable gland have loosened during mounting process or transport. When it is loosened, it has to be fixed again with a torque of 3.75 Nm.
8. To secure the type of protection, the screw nut of the cable gland has to be fixed at the installation with a minimum torque of 2.7 Nm.
ATTENTION! If it will be fastened too strong, the IP-protection can be affected.
9. The device has to be grounded and the ground connection of the device has to be installed in such a way that mechanical damage will be excluded.
10. The device may put into operation with built-in cap-sealing and when it is closed, only.
11. Remove the dust from the housing before you open it and make sure that no dust turbulences exist.
12. Switch off the power supply, before opening the device. (touchdangerous voltage)
13. Please check position and intactness of all gaskets before you close the device.
14. The housing lid has to be screwed completely and hand-tight down to the sealing ring and must be subsequent fixed with the protection clamp (Phillips screw M4).
15. The maximum authorised temperatures for process (bulk solids) and ambience have to be observed.
16. Take notice of the requirements of DIN EN 60079-14, DIN EN 60079-17 and DIN EN 1127-1, especially regarding the dust deposits and temperatures and follow the pertinent rules and regulations.

EU-Konformitätserklärung EU-Declaration of Conformity

Wir/We

MOLLET Füllstandtechnik GmbH

Industriepark RIO 103
D-74706 Osterburken
Tel. 06291 64400 Fax 06291 9846

erklären in alleiniger Verantwortung, dass das Produkt:
declares under our sole responsibility, that the product:

Vibro-Füllstandanzeiger / Vibro level indicator
Schwingstab-Füllstandanzeiger / Vibration rod level indicator

Typ/Type **VF ...**



den folgenden Europäischen Richtlinien entspricht:
conforms with the following European directives:

EMV-Richtlinie	EMC directive	2014/30/EU
Niederspannungsrichtlinie	Low voltage directive	2014/35/EU

Angewandte harmonisierte Normen oder normative Dokumente:
Applied harmonized standards or normative documents

DIN EN 61326-1:2013

DIN EN 61010-1:2020

Und die Geräte mit  - Kennzeichnung entsprechen zusätzlich der folgenden Europäischen Richtlinie:
And the devices with  - marking conform additional with the following European directive:

ATEX-Richtlinie	ATEX directive	2014/34/EU
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Je nach Ausführungsvariante angewandte harmonisierte Normen oder normative Dokumente:
Depending on the design applied harmonized standards or normative documents:

DIN EN IEC 60079-0:2019

DIN EN 60079-31:2014

EU-Baumusterprüfbescheinigungsnummer:
EU-Type Examination Certificate:

IBExU19ATEX1052

Ausgestellt von:.
Issued by:

IBExU Institut für Sicherheitstechnik GmbH, 09599 Freiberg (0637)

Qualitätssicherung:
Quality assurance:

TÜV NORD CERT GmbH, 30159 Hannover (0044)

Osterburken, den 20.03.2021



Wolfgang Hageleit
Geschäftsführer / Managing director

Diese Erklärung darf nur unverändert weiterverbreitet werden.
This declaration is only allowed to hand out in unchanged form.