

Vibro level indicator

Level limit switches for bulk goods

VF6.


Operating instruction

Mini vibration rod
real 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	VF6 ...

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 **VF6.** series is intended for the use as **level limit switch** in **silos and vessels.**

For all bulk solids with a minimum density of **0.02 t/m³.**

For application in **all industry sectors.**

6. Function

- Oscillation of the mini vibration rod with a resonance frequency of approx. 460 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 +60°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 60°C by installation of a heat barrier between the enclosure and the bin wall or use the high temperature option E1.
- 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 Mini vibration rod Suspension cable sheath	Aluminium coated, RAL7001 Stainless steel 1.4301 / 304 Stainless steel 1.4301 / 304 Polyurethane
Process connection	R1	R1 EN 10226 or N1 1" NPT
Ambient temperature		-20 °C ... +60 °C T_a
Process temperature	VF62 and VF63 VF65 High temperature E1	-20 °C ... +80 °C -20 °C ... +70 °C -20 °C ... +150 °C T_(Process)
Process pressure		-0.95 bar ... 10 bar p_(Process)
Minimum density of bulk solids		0.02 kg/l (t/m ³)
Response delay	for damping for start oscillation	1 second 2 to 5 seconds
Cable entry		Gland 2 x M16x1,5
Type of protection		IP66/IP67 acc. DIN EN 60529 IP
Maintenance		none
Maximum load for the end of the vibration rod		80 N
Maximum tensile force at suspension cable of type VF65		2000 N
Installation position VF62, VF63 VF65		any vertical

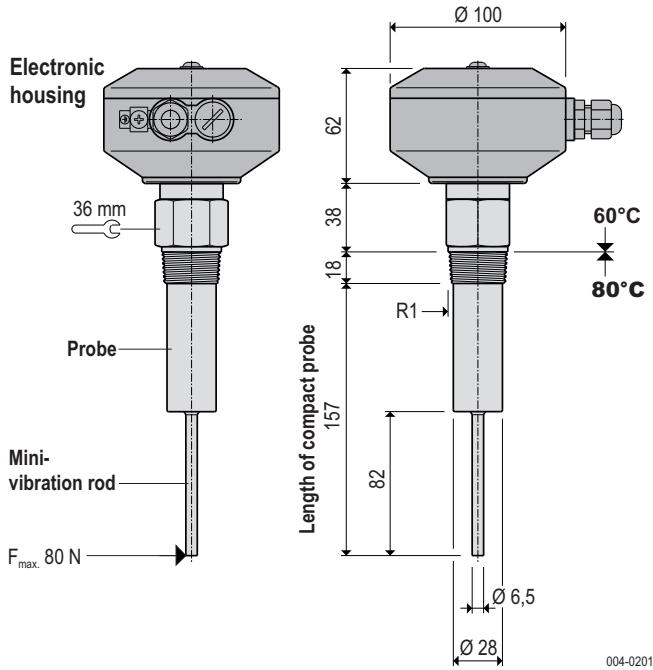
9. Electrical data

Wide range electronic C8

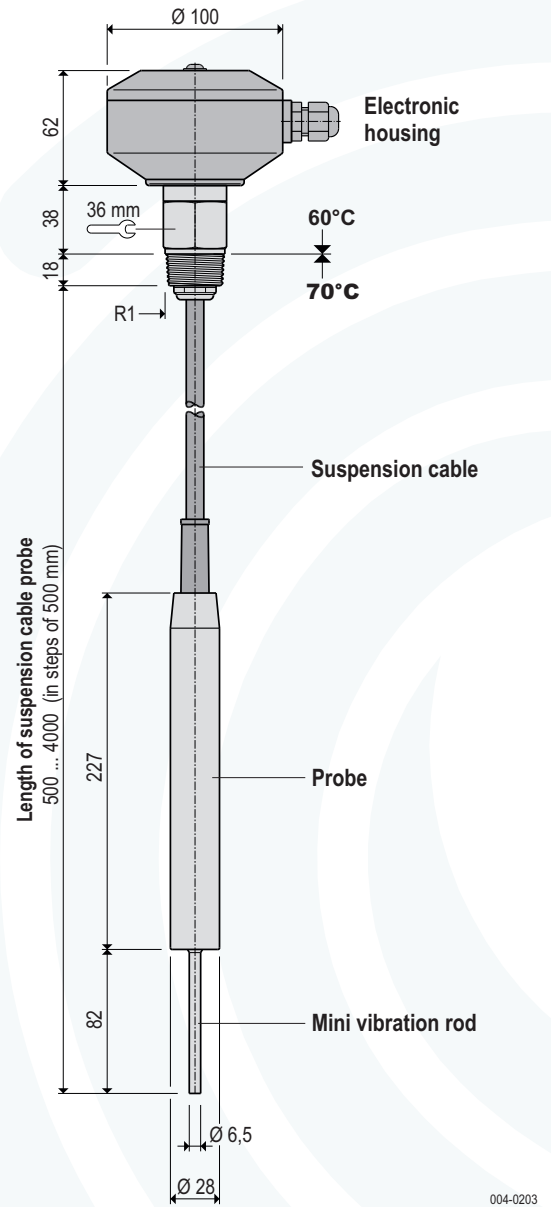
Supply voltage	20 ... 250 V AC / DC	supply
Power consumption	≤ 3 VA / 3 W	
Signal relay	potential free change-over-contact (SPDT)	
Capacity of contact	5 A / 250 V AC or 150 W at DC	
Connection clamps	maximum 1.5 mm ²	

10. Versions/Dimensions

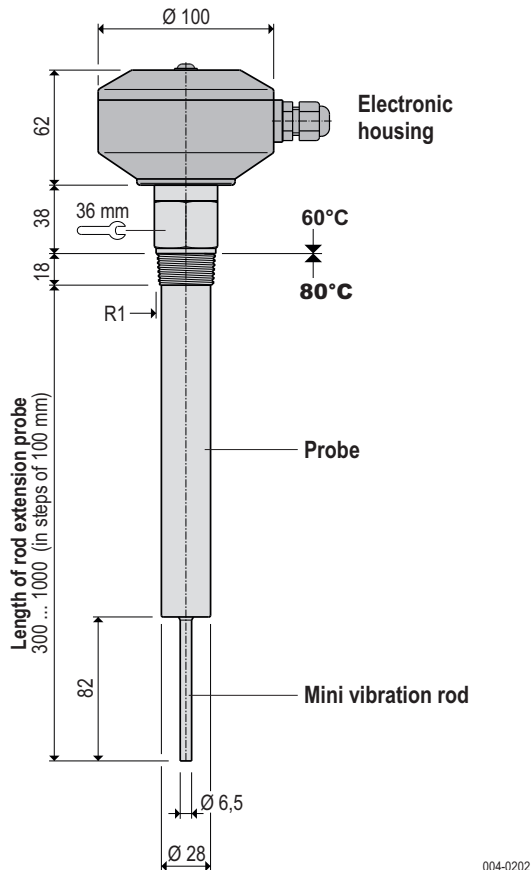
10.1 VF62 Compact sensor



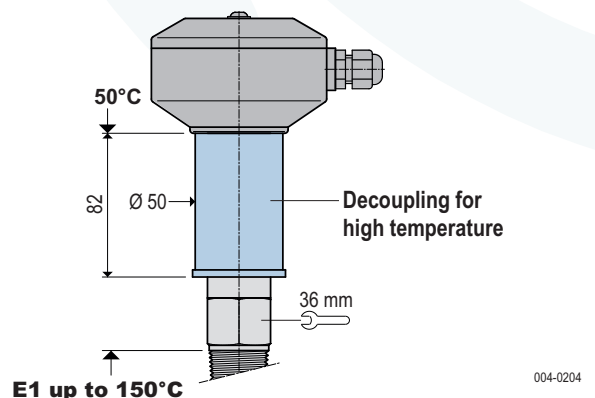
10.3 VF65 Suspension cable sensor



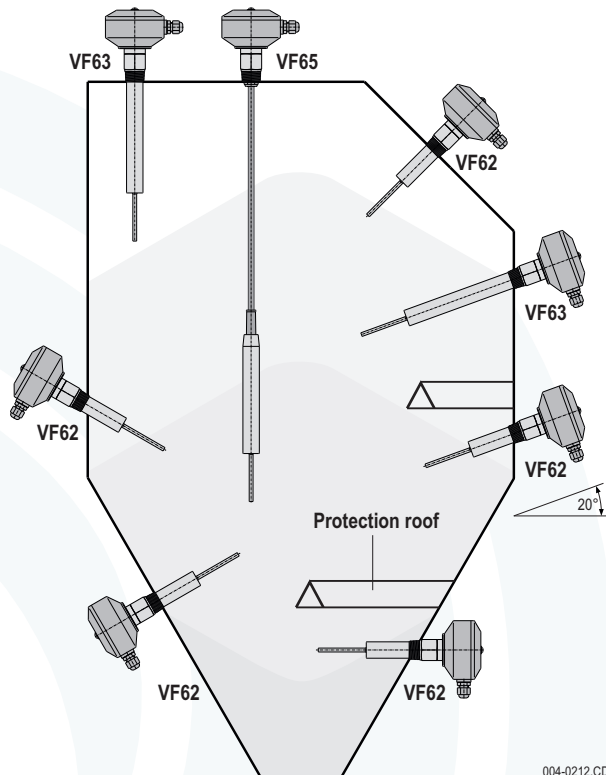
10.2 VF63 Rod extension sensor



10.4 E1 High temperature up to 150 °C



11. Possibilities for installation



Side mounting or vertical mounting:

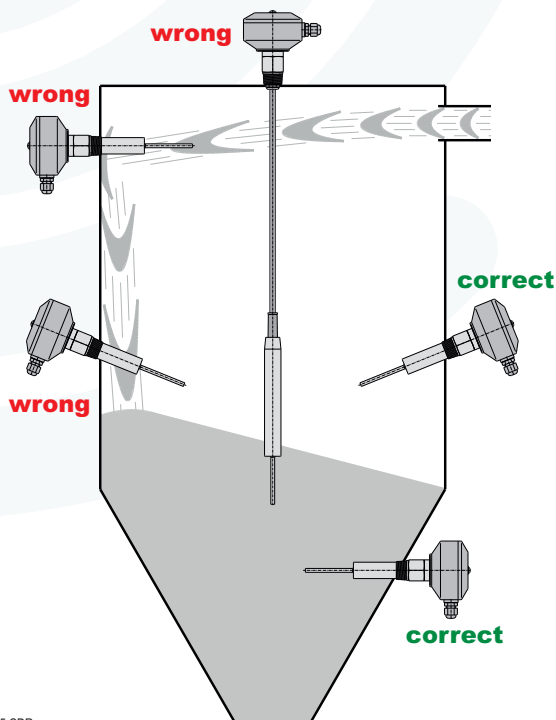
- VF62 and VF63 can be mounted either from the side or vertical.
- For side mounting it is recommended to screw the measuring device slightly downwards (approx. 20°) so that bulk solids can flow off.
- The measuring device has to be mounted in such a way that the filling stream cannot damage it.
- In 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.
- VF65 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 36 mm open end wrench.

Attention: Do not screw by turning the housing!

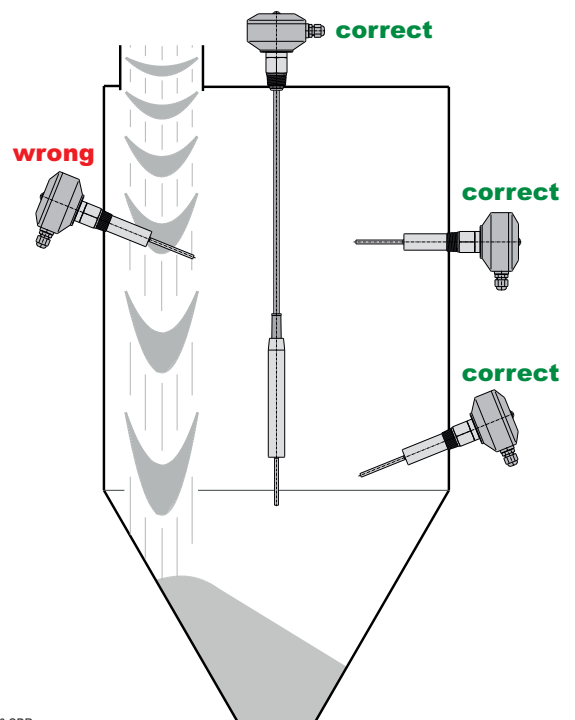
004-0212.CDR

12. 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.



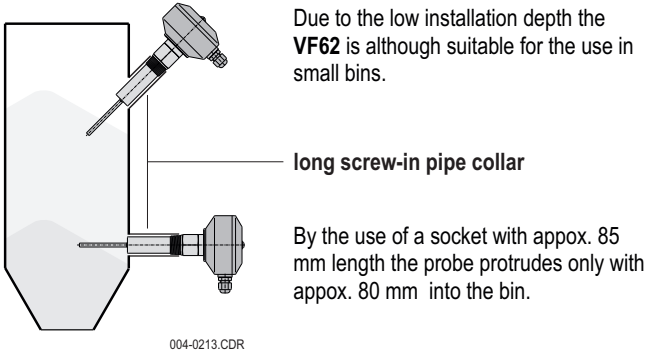
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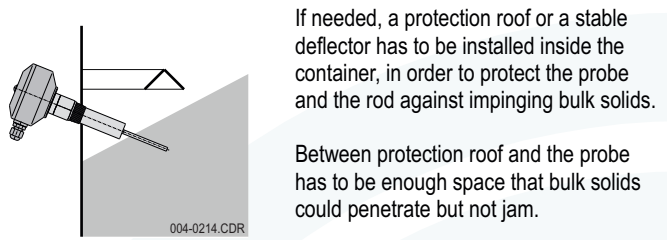
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Subject to modification.

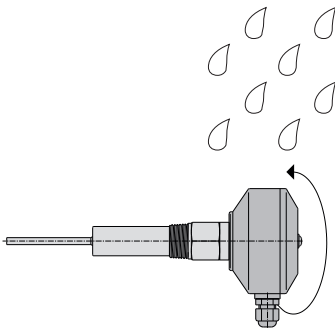
13. Flush installation



14. Protection against heavy load



15. 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 screw in the middle of the cover (4 mm Allen key) and open the housing.
- resolve the spacer nut M6 in the center of the enclosure (10 mm wrench) a little bit until the enclosure is turnable.
- turn the housing into the correct position so that the cable glands are pointing downwards.
- tighten the spacer nut M6 again, torque 3 to 4 Nm.
- put on the housing cover and tighten the screw, torque 3 Nm.

Cable ducts which are not used have to be sealed!

16. Allowed temperatures

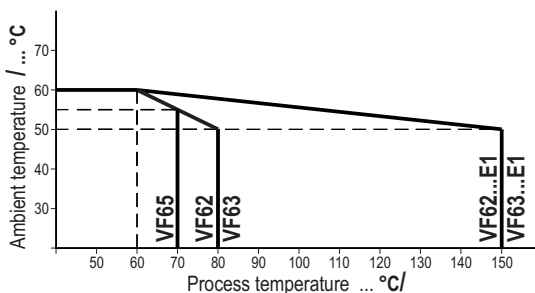
Ambient temperature at the probe (process temperature) $T_{(process)} -20^{\circ}\text{C} \dots +80^{\circ}\text{C}$

Ambient temperature at the electronic housing $T_a -20^{\circ}\text{C} \dots (+50^{\circ}\text{C}) +60^{\circ}\text{C}$

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.

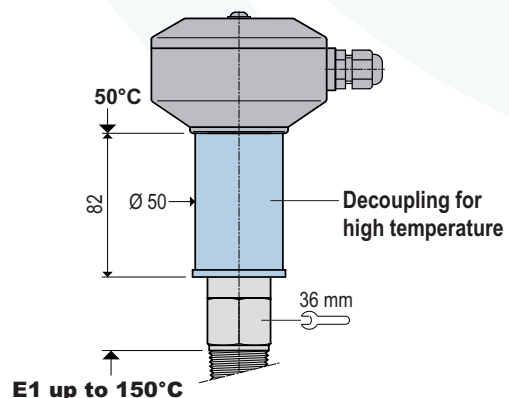
(see diagram)



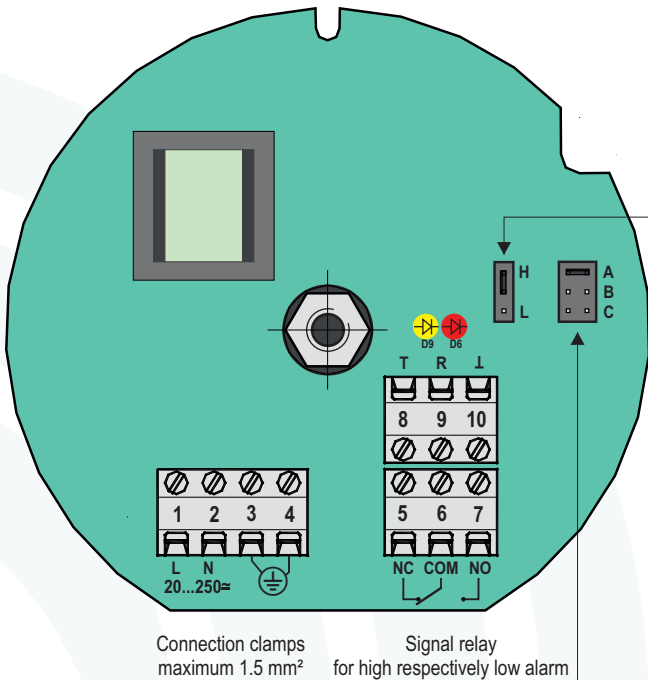
17. Bulk solids temperatures up to 150 °C

The high temperature option **E1** enables the use of the level indicators for bulk solids temperatures up to 150 °C.

- in order to protect the electronic against overheating by heat transfer from the process, a decoupling for high temperature **E1** is installed between probe and electronic housing.
- use for process temperatures above 80 °C only level indicators with the high temperature option **E1**.
- 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.



18. Electrical connection Wide range electronic C8



19. High alarm and low alarm sensor

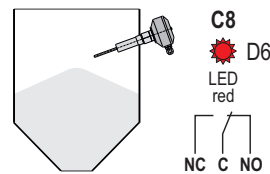
MOLOSvibro level indicator of the VF6. series can be used for **high level and low level alarm**.

- The function can be adjusted with a jumper on the electronic board.
- The switching status is indicated by a red LED on the electronic board, like it is explained below.

19.1 High alarm sensor H (factory setting)

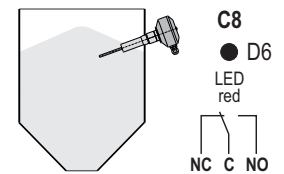
free status

vibration rod oscillates freely
C8 relay energized / red LED on



High alarm (covered status)

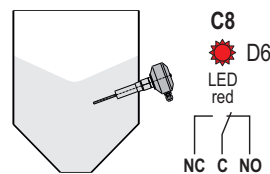
vibration rod covered with bulk solids
C8 relay de-energized / red LED off



19.2 Low alarm sensor L (jumper repositioned)

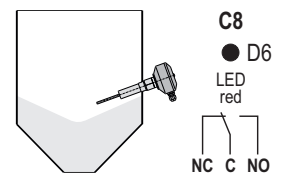
Covered status

vibration rod covered with bulk solids
C8 relay energized / red LED on



Low alarm (free status)

vibration rod oscillates freely
C8 relay de-energized / red LED off



20. Setting of sensitivity

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!

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

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.

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.

Vibro level indicators
Level limit switches for bulk goods

VF6.

Gas+
Dust



Explosion protection information
and supplement to the operating instructions

Type plate details with option B11

Gas+Dust

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

Model designation

Unique device serial number

Order number

MOLLET Füllstandtechnik GmbH Typ VF6.A1B11C5i... S# 1234567890 A.- Nr. 1234567890 03/19	Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		IBExU19ATEX1053X IP66/IP67
	II 1/2 D Ex ia IIIC TX Da/Db II 1/2 G Ex ia IIB T4 Ga/Gb -20°C ≤ Ta ≤ +80°C/+60°C p (Process) -0,95bar...+10,0bar		

Type of protection

Details to supply voltage, current consumption and intrinsic safety

Month and year of delivery

DustEx identification

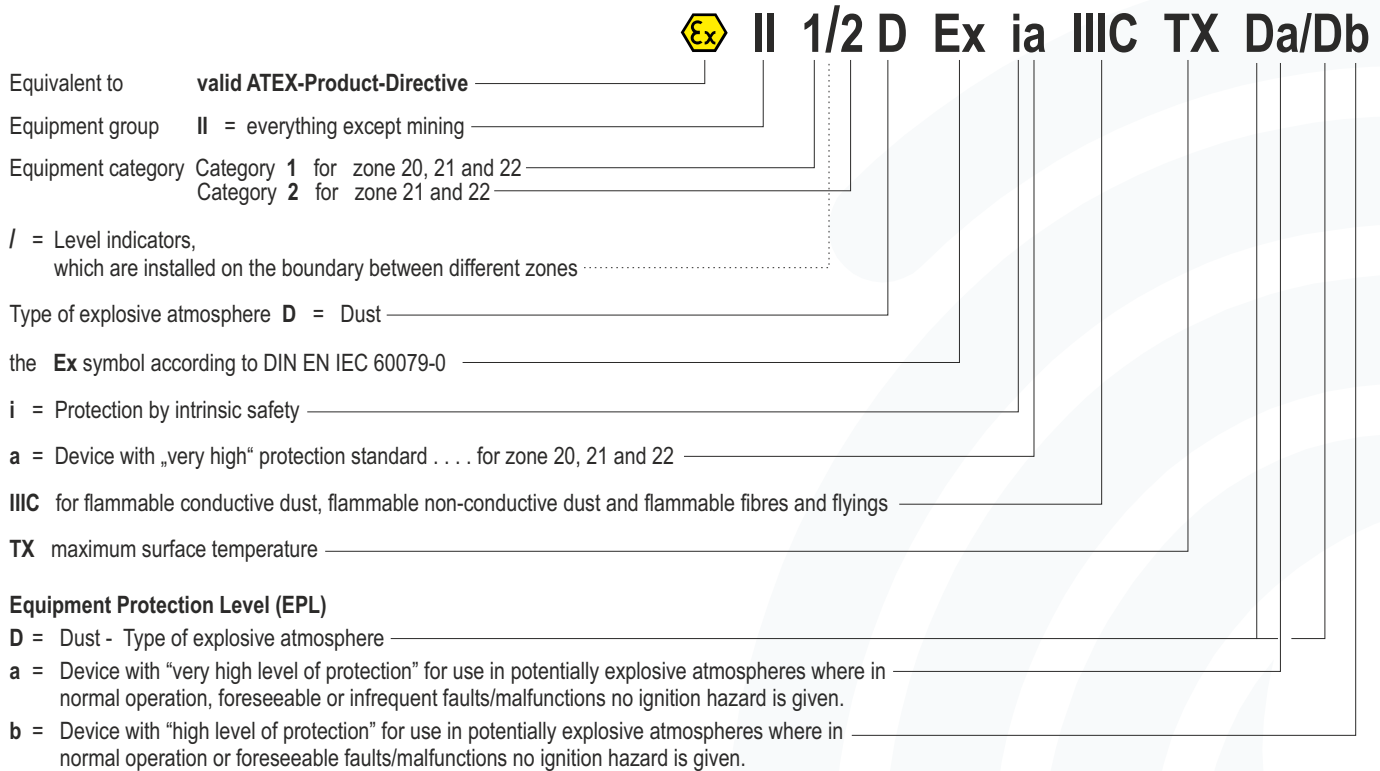
GasEx identification

Ambient temperature (process temperature)

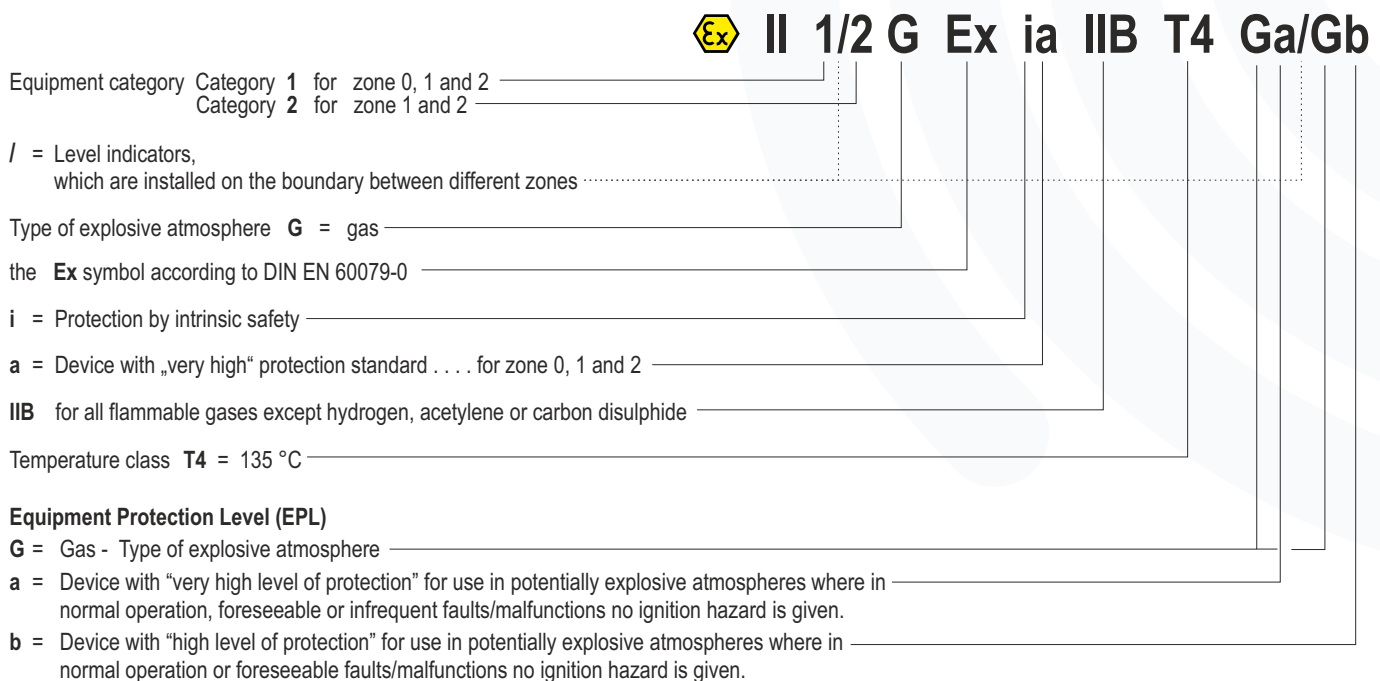
Design of the devices suitable for pressures in the vessel indicated here.

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

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



Vibro level indicator for use at the boundary from zone 0 to zone 1.



The „very high“ protection standard of the devices permits although the use complete in zone 20 and zone 0. Please request further information if needed.

Order code VF62A1B11C5i... and VF63A1B11C5i...

Marking:

II 1/2 D



II 1/2 G

Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 21 and for use at the boundary from zone 0 to zone 1.

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, TX

The maximum surface temperature T means the hottest point at the equipment. The device equates to temperature class T4

Note:

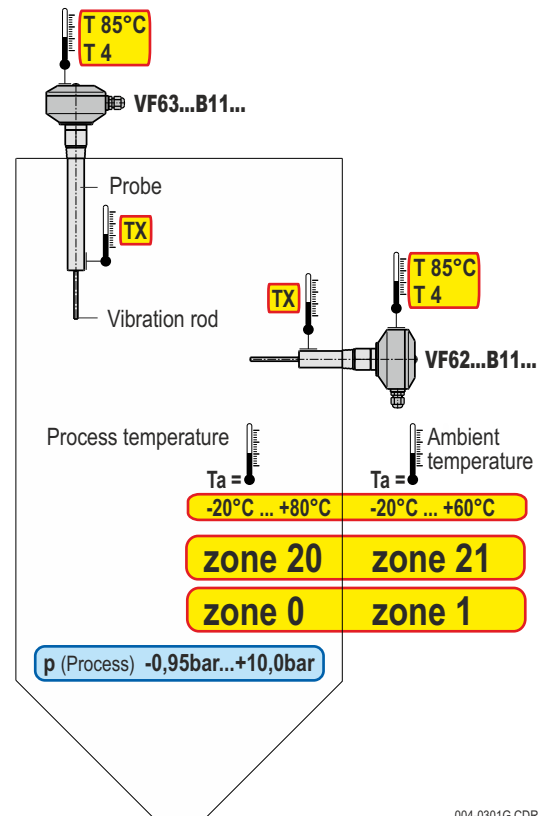
Probe and vibration rod produce no increase of temperature, but they are able to take high temperatures from inside of the vessel and forward it.

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

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.



004-0301G.CDR

MOLLET Füllstandtechnik GmbH		Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044	IExU19ATEX1053X IP66/IP67
Typ	VF6.A B11 C5i...	Ex	II 1/2D II 1/2G	Ex ia IIC TX Ex ia IIB T4	Ui = 23,7 V DC Ii = 167 mA Pi = 985 mW Ci = neglig Li = neglig
S#	1234567890	-20 °C ≤ Ta ≤ +80/+60 °C			
A.-Nr.	1234567890 03/19	p (Process) -0,95bar...+10,0bar			

maximum authorised process temperature

$$-20\text{ °C} \leq Ta \leq +80\text{ °C} / \leq +60\text{ °C}$$

maximum authorised ambient temperature at the electronic housing

Order code VF65A1B11C5i...

Marking: II 1/2 D
II 1/2 G



Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 21 and for use at the boundary from zone 0 to zone 1.

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, TX

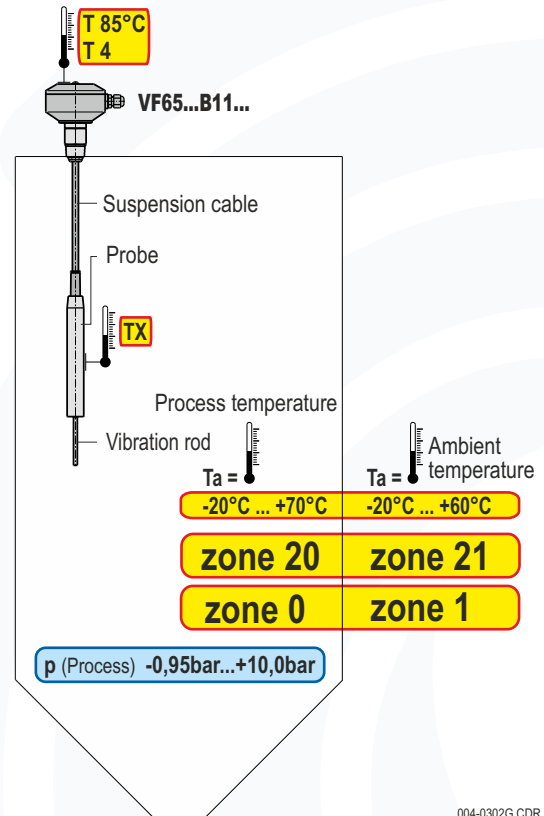
The maximum surface temperature T means the hottest point at the equipment. The device equates to temperature class **T 4**.

Note:

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 **TX** has to be determined according to the process temperature (temperature of bulk solids or ambient) inside of the vessel.

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.



004-0302G.CDR

MOLLET GmbH Füllstandtechnik		Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044	IBExU19ATEX1053X IP66/IP67
Typ	VF65A1 B11 G5i...	Ex II 1/2D Ex II 1/2G	Ex ia IIC Ex ia IIB	TX T4	Da/Db Ga/Gb
S#	1234567890	$-20^\circ\text{C} \leq T_a \leq +70/+60^\circ\text{C}$			
A.-Nr.	1234567890 03/19	p (Process) -0,95bar...+10,0bar			
		U _i = 23,7 V DC I _i = 167 mA		P _i = 985 mW	
		Ci = neglig		Li = neglig	

maximum authorised process temperature

$$-20^\circ\text{C} \leq T_a \leq +70^\circ\text{C} / \leq +60^\circ\text{C}$$

maximum authorised ambient temperature at the electronic housing

Inside high process temperature, outside ambient temperature

Order code **VF62A1B11C5i...E1...** and **VF63A1B11C5i...E1...**

Marking: **II 1/2 D**
II 1/2 G



Equipment category appropriation by zones

Vibro level indicator for use at the boundary from zone 20 to zone 21 and for use at the boundary from zone 0 to zone 1.

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, TX

The maximum surface temperature **T** means the hottest point at the equipment. The device equates to temperature class **T 4**

Note:

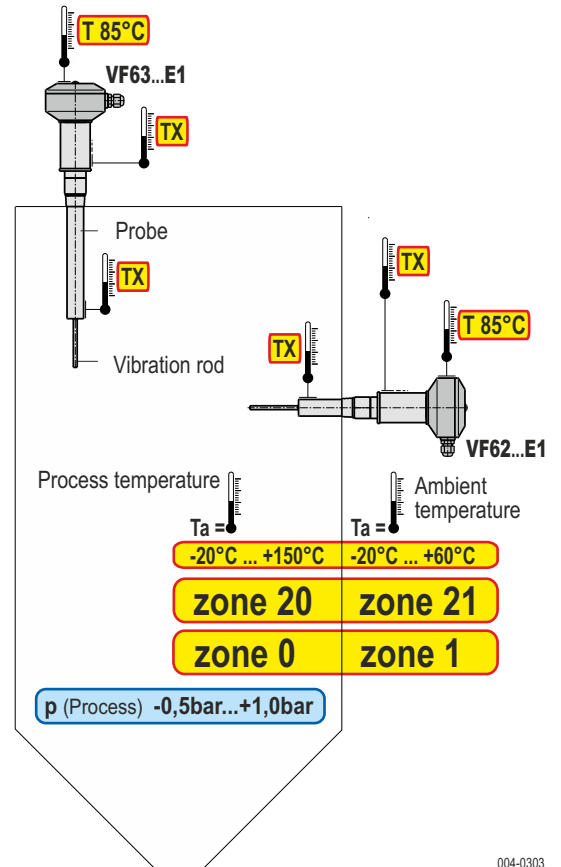
Probe and vibration rod produce no increase of temperature, but they are able to take high temperatures from inside of the vessel and forward it.

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

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.



004-0303

MOLLET Füllstandtechnik GmbH		Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044	IBExU19ATEX1053X IP66/IP67
Typ	VF6.A B11 C5i... E1 ..	Ex II 1/2D II 1/2G	Ex ia IIC Ex ia IIB	TX T4 Da/Db Ga/Gb	Ui = 23,7 V DC Ii = 167 mA
S#	1234567890	-20°C ≤ Ta ≤ +150/+60°C			PI = 985 mW
A.-Nr.	1234567890 03/19	p (Process) -0,95bar...+10,0bar			CI = neglig LI = neglig

maximum authorised process temperature

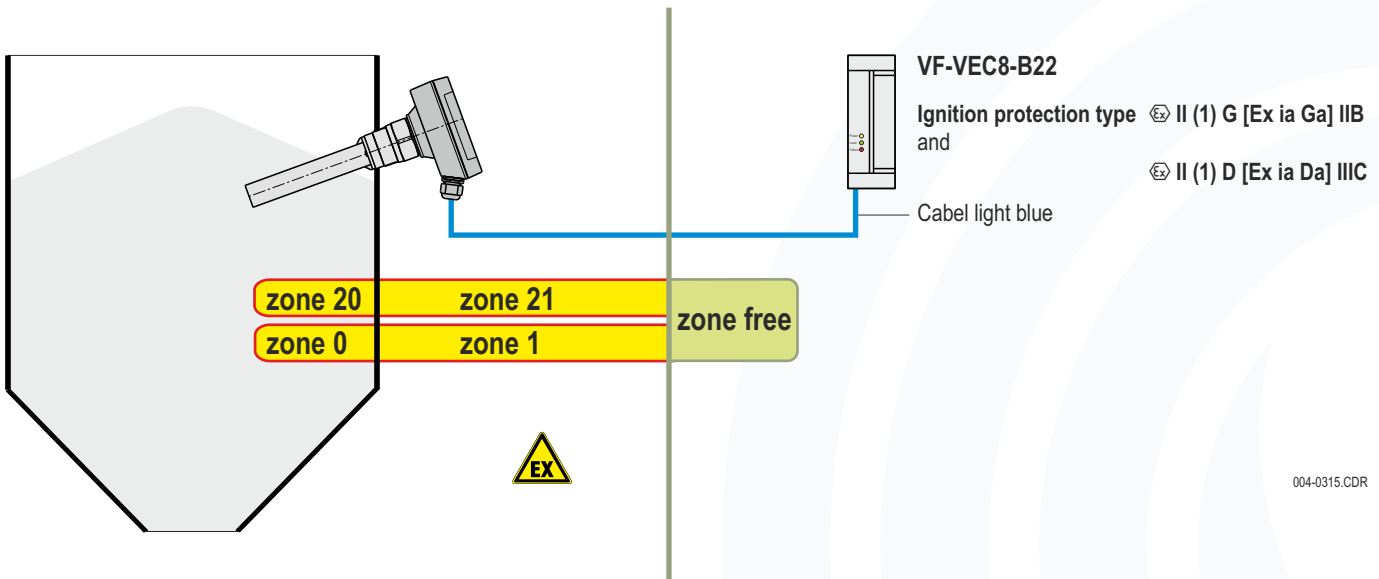
$$-20\text{ °C} \leq T_a \leq +150\text{ °C} / \leq +60\text{ °C}$$

maximum authorised ambient temperature at the electronic housing



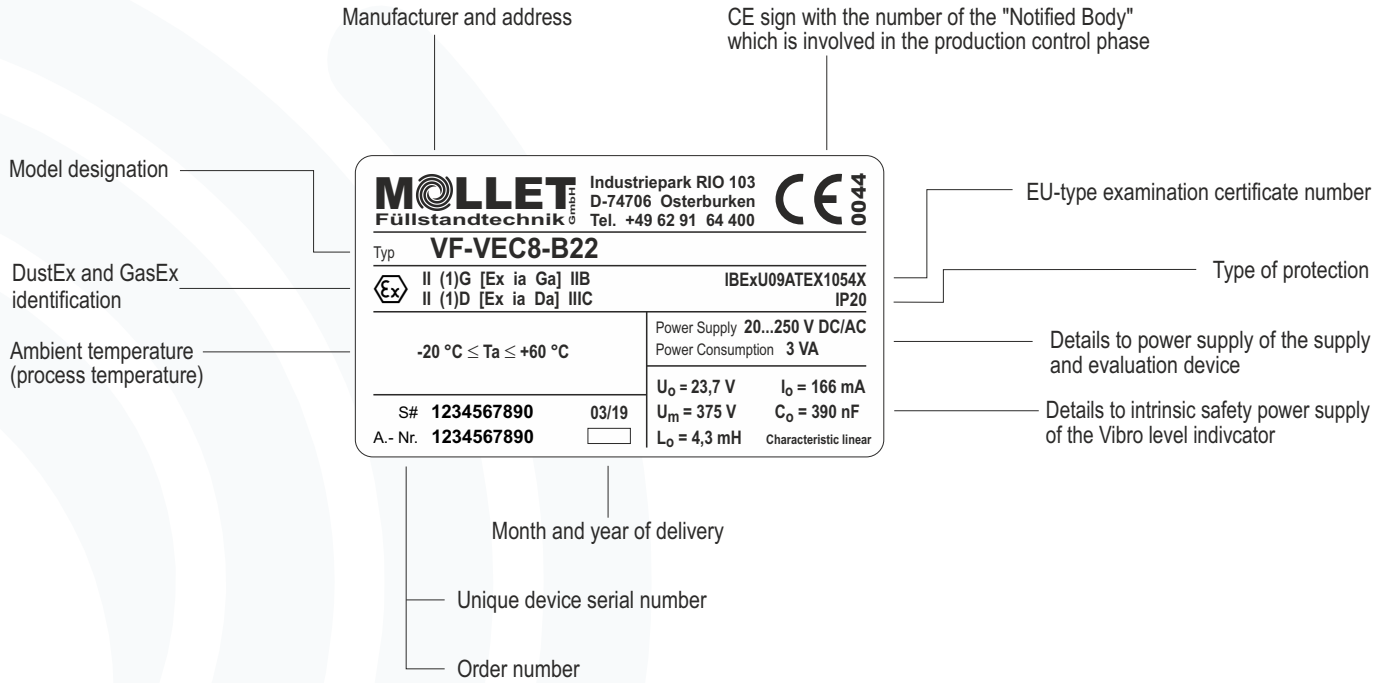
Special conditions and instructions for safe application

1. The installation, maintenance, initial operation, removal and repair have to be controlled resp. checked by an "authorized person" for explosion protection and has to be done according to the specifications in the operating instructions manual.
 - According to DIN EN 61010-1 a main switch for the supply and evaluation device has to be installed nearby and has to be made visible as such. It must be able to interrupt the power supply and relay circuit with this main switch.
 - For protection against surge voltages a overvoltage filter has to be installed accordingly.
2.
 - For the electrical connection you have to take notice of the local and statutory requirements and/or the VDE 0100 as well as the additional requirements for the ignition protection type „i“ - intrinsic safety according EN 60079-14 for associated equipments without galvanic isolation.
 - The vibro level indicator is a category 1 equipment that has to be installed in such a way that sparks can not be generated by shocks onto or friction at the aluminium housing.
3. The power supply must be provided by the associated equipment „Supply and evaluation device VF-VEC8-B22“ only.



4. Take notice of the specifications on the data plate.
5. Standards for the connection of intrinsic safe circuits according to EN 60079-14 must be observed.
6. The associated equipment „Supply and evaluation device VF-VEC8-B22“ has to be installed in a room without potentially explosive atmosphere (control cabinet).
7. 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.
8. 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.
9. 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.
10. 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.
11. The device may put into operation with built-in cap-sealing and when it is closed, only.
12. Remove the dust from the housing before you open it and make sure that no dust turbulences exist.
13. Please check position and intactness of all gaskets before you close the device.
14. Tightening torque of distance nut M6x40: 3 ... 4 Nm and of the lid screw M6x16: 3 Nm.
15. The maximum authorised temperatures for process (bulk solids) and ambience have to be observed.
16. Take notice of the requirements of DIN EN 60079-11, DIN EN 60079-17 and DIN EN 1127-1, especially regarding the dust deposits and temperatures and follow the pertinent rules and regulations.

Type plate details



MOLLET Füllstandtechnik GmbH		Industriepark RIO 103 D-74706 Osterburken Tel. +49 62 91 64 400		CE 0044	
Typ VF-VEC8-B22					
		II (1)G [Ex ia Ga] IIB II (1)D [Ex ia Da] IIIC		IBExU09ATEX1054X IP20	
-20 °C ≤ Ta ≤ +60 °C			Power Supply 20...250 V DC/AC Power Consumption 3 VA		
S# 1234567890		03/19		U ₀ = 23,7 V I ₀ = 166 mA	
A.-Nr. 1234567890				U _m = 375 V C ₀ = 390 nF	
				L ₀ = 4,3 mH Characteristic linear	

