Vibro level indicator

Level limit switches for bulk goods

VF1.

Operating instruction

Rhombus vibration rod

robust single rod - compact and versatile

Index

MOLLET accurate point level

▶ **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 ⟨Ex⟩ - 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 devive (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.

▶ ⟨Ex⟩ **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.

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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 ...**

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.** 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	Rectangular-housing	Aluminium, RAL7001
	Process connection and probe	Stainless steel 1.4301 / 304
	Rhombus vibration rod	Stainless steel 1.4301 / 304
	Suspension cable sheath	Polyurethane
Process connection	**R3**	R1½ EN 10226 or **N3** 1½" NPT
Ambient temperature		-40 °C ... +70 °C T_a
Process temperature		
	VF12 and **VF13**	-40 °C ... +80 °C
	VF15	-40 °C ... +70 °C
	high temperature **E1**	-40 °C ... +150 °C $T_{(Process)}$
	E2	-40 °C ... +200 °C
	E3	-40 °C ... +250 °C
Process pressure		-0.95 bar ... 10 bar $p_{(Process)}$
Minimum density of bulk solids		0.01 kg/l (t/m³)
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 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**	any
	VF15	vertical

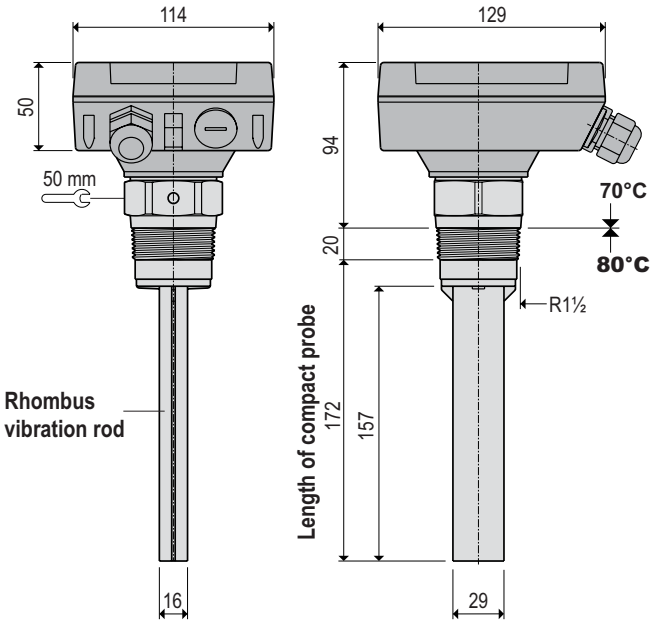
9. Electrical data

Wide range electronic C8	
Supply voltage	20 ... 250 V AC / DC
Power consumption	≤ 3 VA / 3 W Supply
Signal relay	two potential free change-over-contact (SPDT)
Capacity of contact	8 A / 250 V AC 192 / 72 W at 24 / 48 V DC
Connection clamps	maximum 2.5 mm²

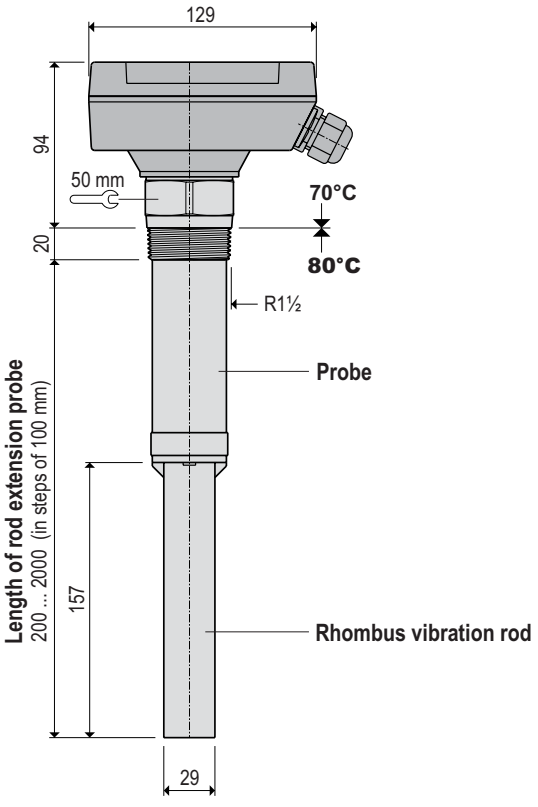
Subject to modification.

10. Versions/Dimensions

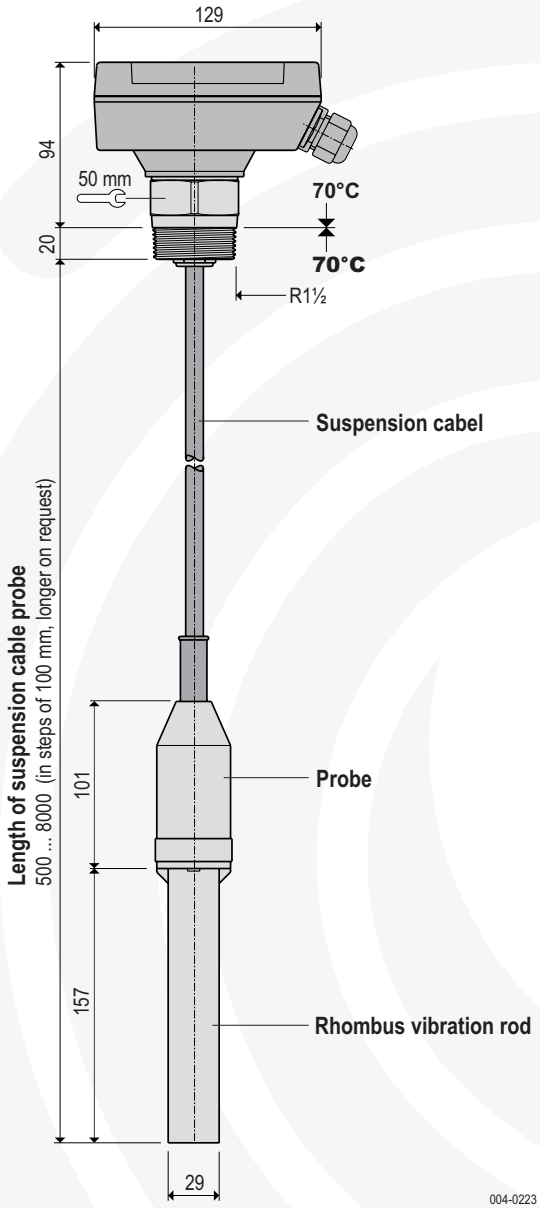
10.1 VF12 Compact sensor



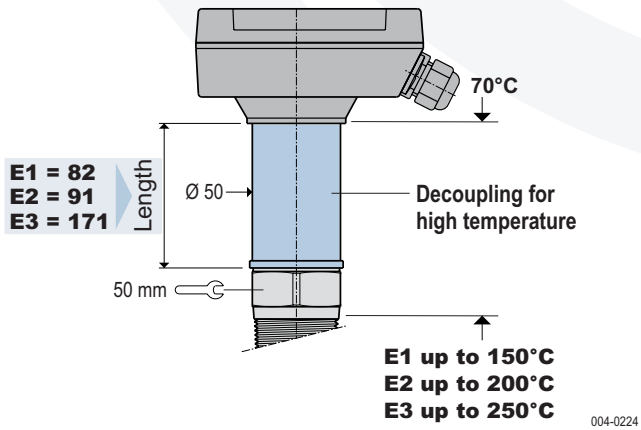
10.2 VF13 Rod extension sensor



10.3 VF15 Suspension cable sensor

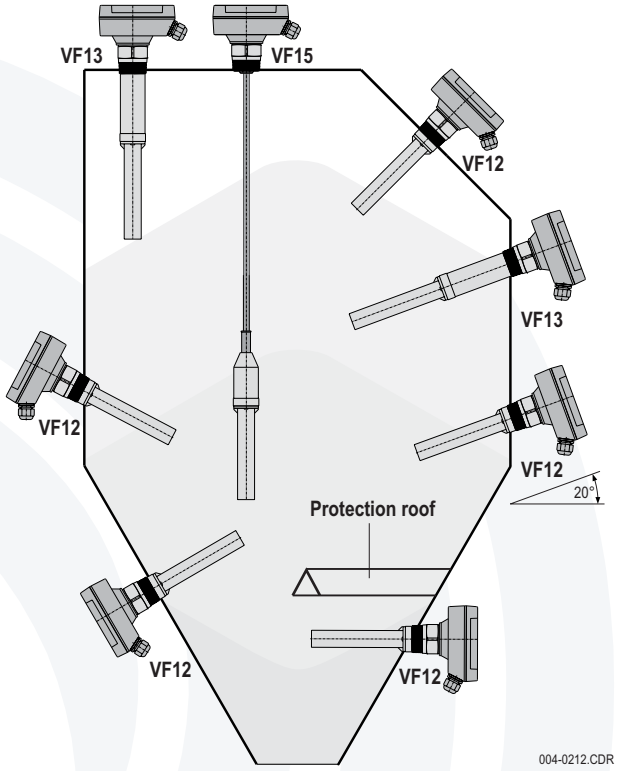


10.4 E1 ... E3 high temperature up to 250 °C



Subject to modification.

11. Possibilities for installation



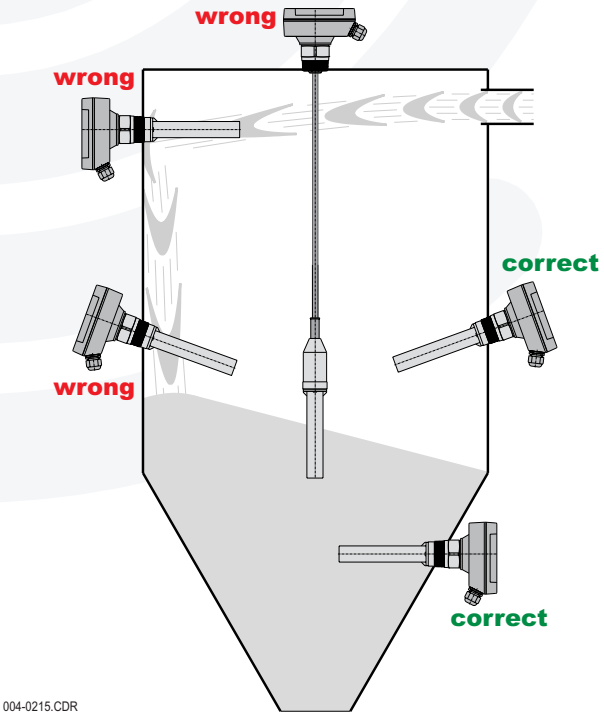
Side mounting or vertical mounting:

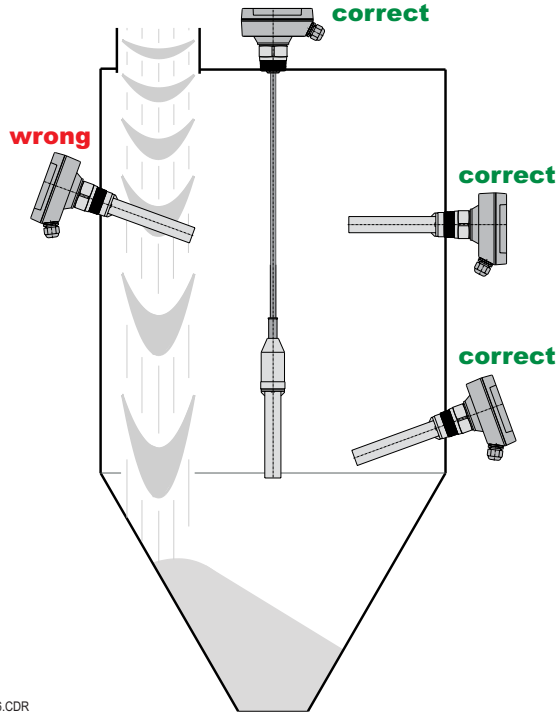
- **VF12** and **VF13** can be mounted either from the side or vertical.
- In order that bulk solids can flow off easily
  - - it is recommended to screw the measuring device slightly downwards (approx. 20°)
  - - the blade of the probe has to be oriented vertically. Correct alignment of the blade is 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!

12. Protection against bulk solids crashing down upon the rod

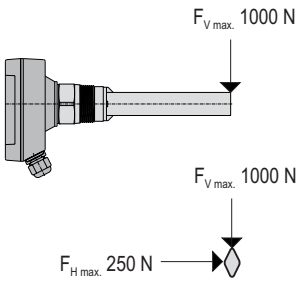
Level indicators must not be affected by flying bulk goods particles e.g. from injection pies, filling pipes or down pipes. Therefore the bulk solids stream should be directed or redirected accordingly, or the level indicator should be placed so that bulk solids cannot impact directly onto the probe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





Subject to modification.

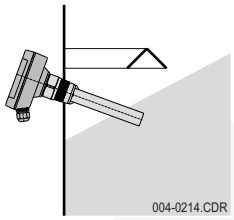
13. Load for vibration rod



Rhombus vibration rod

Due to the special shape of the Rhombus vibration rod, it is very robust and able to resist high forces up to 1000 N in vertical direction.

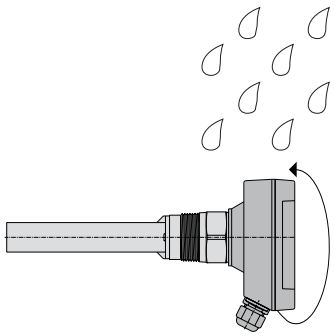
14. Protection against heavy load



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.

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 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!

16. Allowed temperatures

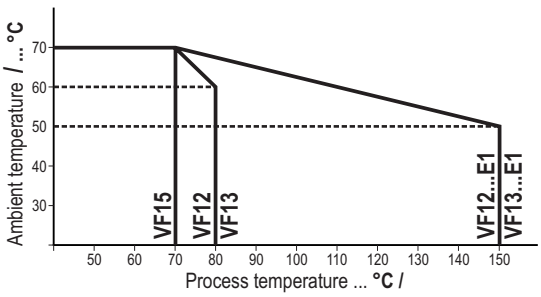
Ambient temperature at the probe (process temperature) **$T_{(process)}$ -40°C ... +80°C**

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.

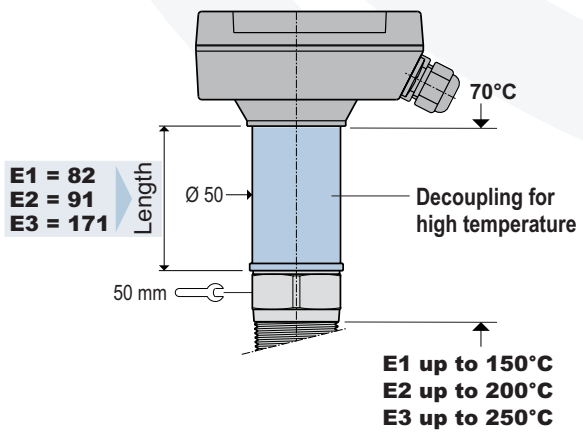
(see diagram)



17. Bulk solids temperatures up to 250 °C

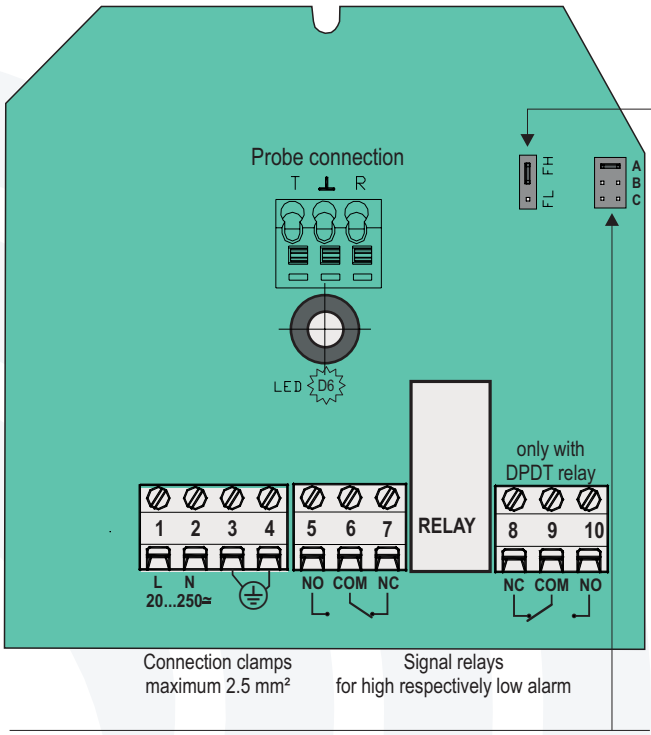
The high temperature options **E1 / E2 / E3** enables the use of the level indicators for bulk solids temperatures up to 250 °C.

- in order to protect the electronic against overheating by heat transfer from the process, a decoupling for high temperatur **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.



Subject to modification.

18. Electrical connection Wide range electronic C8



Connection clamps
maximum 2.5 mm²

Signal relays
for high respectively low alarm

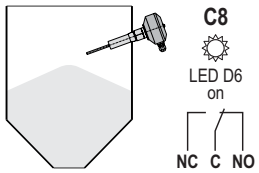
19. High alarm and low alarm sensor

MOLOSvibro level indicator of the **VF1.** series can be used for **high level and low level alarm**.

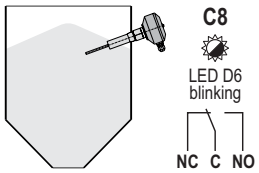
- The function can be adjusted with a jumper on the electronic board.
- The switching status is indicated by a red LED on the electronic board, like it is explained below.

19.1 High alarm sensor FH (factory setting)

Free status
vibration rod oscillates freely
C8 relay energized / LED on

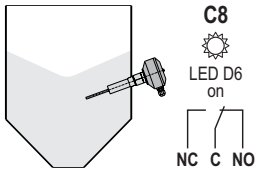


High alarm (covered status)
vibration rod covered with bulk solids
C8 relay de-energized / LED blinking

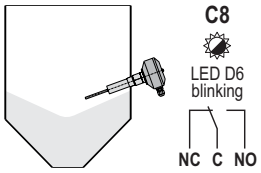


19.2 Low alarm sensor FL (jumper repositioned)

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



Low alarm (free status)
vibration rod oscillates freely
C8 relay de-energized / LED blinking



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.

Subject to modification.