

## REFLEX VF Series

Installation instructions

Dec. 2002

### Product liability and warranty:

The VF SERIES level gauge is designed solely for measuring the distance, level and volume of liquids, solids and particulate materials.

Special codes and regulations apply to its use in hazardous areas. Responsibility as to suitability and intended use of these level gauges rests solely with the user.

Improper installation and operation of our level gauges may lead to loss of warranty.

### 1.0 Range of use

The VF SERIES REFLEX level gauging system is a 2 wire transmitter, designed to measure the distance, level and volume of liquids, slurries, solids and particulate materials. It can be operated on storage, process tanks and stilling wells.

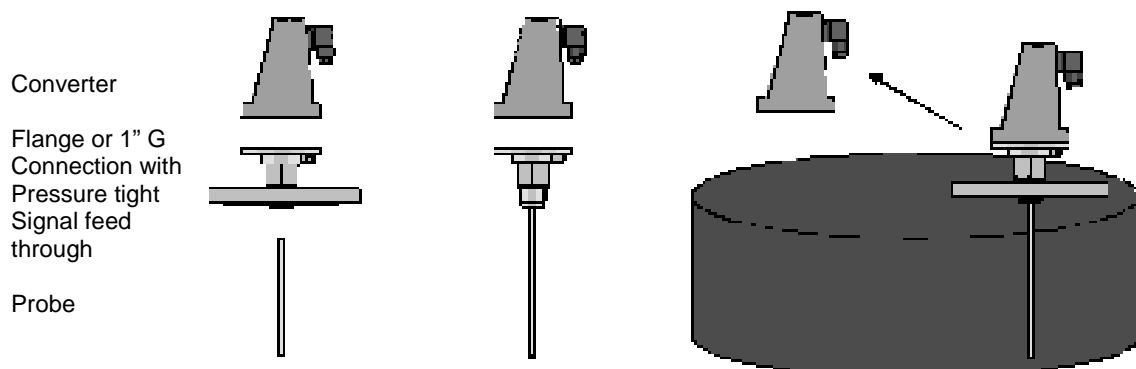
### 2.0 Description

The measuring system consists of the sensor and the signal converter.

The flange system is made up of the probe support, the sealing system with signal contact, and the process connection.

The compact signal converter contains the TDR measuring circuit and the entire signal processing system, including the provision of a standardised output signal (4 - 20 mA or digital interface).

The signal converter can be separated from the sensor system under process conditions, without compromising tank integrity.



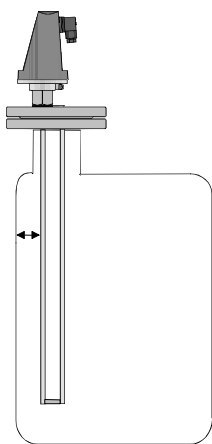
**3.0 Measured variable** (distance, level, volume)

The primary measured variable is the distance between the tank mounting flange and a reflecting surface (surface of the product measured). The output usually represents the difference between the primary measured variable and the length of the sensor.

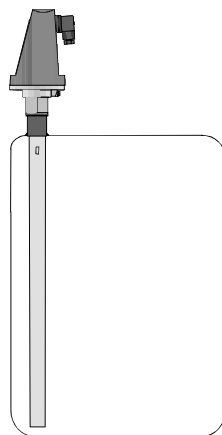
**3.1 Measuring range** [0.15 - 24 m (0.50 - 72 ft)]

The measuring range will depend on the sensor length, the reflection properties of the tanks contents, the installation position, and the presence of any interfering reflections.

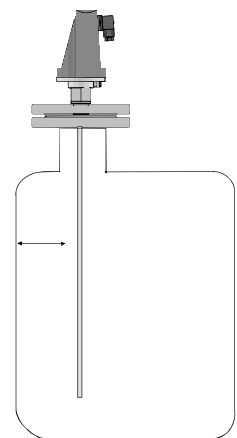
**4.0 Mounting, please refer to the following guidelines:**



Twin cable/rod  
100 mm. MIN



Coax  
0 mm. MIN

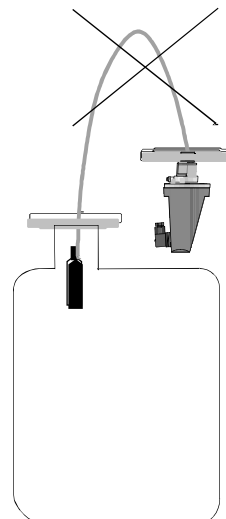


Single rod/cable  
300 mm Min

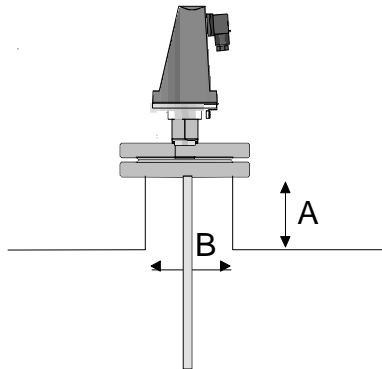
**ENSURE THE SENSOR LENGTH DOES NOT EXCEED THE INTERNAL DEPTH OF THE SILO, TANK OR VESSEL.**

**4.1 Excessive bending of the cable**

**BE CAREFUL NOT TO BEND CABLES TOO MUCH**



#### 4.2 Mounting on a nozzle

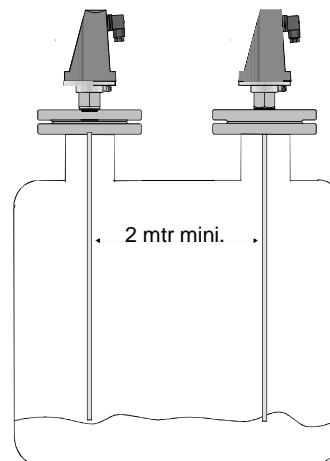


Avoid nozzle size higher than 150 mm (5.9"), especially when  $B < 80\text{mm}$  (3.1").

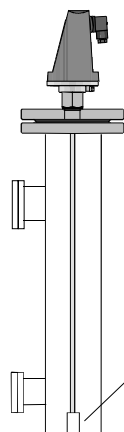
Try to ensure A does not exceed B

#### 4.3 Interference between two VF SERIES

There must be at least 2 metres between VF series devices if installed in the same vessel



#### 4.4 Mounting inside side mounted vessel or stilling well



Here we have an optimal mounting inside vessel or stilling well. Take care to fix or centre the probe end to prevent it from touching the vessel wall. In the case of rod or cable types, a "T" probe end is recommended

## 5.0 Electrical connection

The electrical connection for the power supply is made in the terminal compartment of the signal converter. Observe requirements specified in VDE 165.

In case of installation in hazardous areas, only certified **intrinsically safe** equipment may be connected to the VF SERIES.

Two kinds of electrical connection are available

### 1. DIN Connector:

Terminals: 3 poles + ground. Wire cross-section max 1.5 mm<sup>2</sup> ≈ (AWG 16).

Ex-equipotential bonding: U-clamp terminal (max. 4 mm<sup>2</sup> conductor cross section) at neck of signal converter.

Cable entries: M25x1.5 (PG11). Standard cable gland: cable clamping area = 8-10 mm).IP65

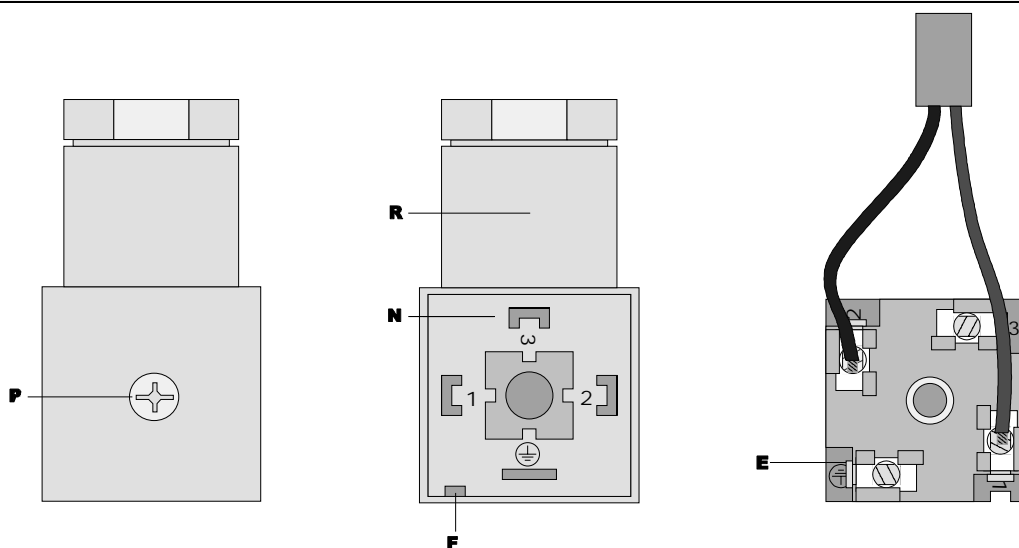
Signal cable shielding: No shielding needed.

### Power supply:

1. Remove the screw **P** and lift off the connector from the signal converter.
2. Put a screwdriver in **F** and separate **N** from **R**.
3. Connect the current loop to terminal 1 and 2 (there's no polarity to respect). Use ferrules to protect cable ends. The terminal 3 and **E** remain non-connected.
4. Re-assemble **N** and **R**.
5. Put the seal in place, connect **R** to the signal converter tighten and screw **P**.

The terminal **E** is not connected with the signal connector housing or with the flange system of the instrument.

For standard and Ex applications only the intrinsically safe 2-wire loop must be connected to the terminals 1 and 2. The terminal **E** as well as terminal 3 remains non-connected.



## 2. ISO16:

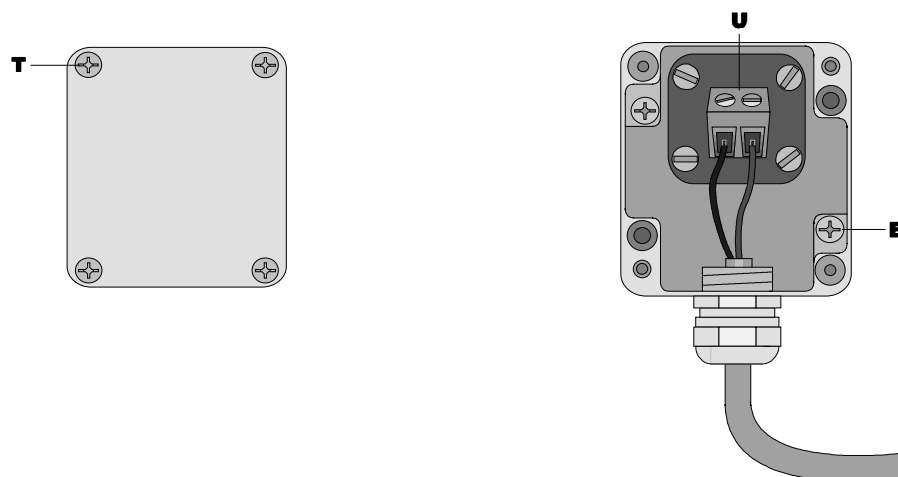
Terminals:	Wire cross-section max $1.5 \text{ mm}^2$ =(AWG 16)
Ex equipotential bonding:	U-clamp terminal (max. $4 \text{ mm}^2 \approx$ conductor cross-section) at neck of signal converter.
Cable entries:	M16x1.5. With standard cable gland: cable clamping area = 8 -10 mm). IP65
Signal cable_:	No shielding needed.

### **Power supply:**

1. Remove the 4 screws **T** and open the terminal compartment.
2. Connect the current loop to the terminal **U** (there's no polarity to respect). Use ferrules to protect cable ends.
3. Close the terminal compartment.

The terminal **E** is not connected with the signal connector housing or with the flange system of the instrument.

For standard and Ex applications only the intrinsically safe 2-wire loop must be connected to the terminals 1 and 2. The terminal **E** remains non-connected.



## Technical Specification

<b>Input</b>	
<u>Measured variable</u>	Primary variables: distance, reflection; derived variables: level, volume
<u>Measuring range</u>	Min. tank height: 0.15 m Max. measuring range: 24 m
<u>Rate of change in level</u>	≤ 10/min
<b>Output</b>	
<u>Ex-ia current output HART®</u>	Type: Passive (current sink); Current range: 4-20 mA (error 22 mA); 4 mA constant for HART®-Multidrop Temperature drift: ≤ 0.02 % / °K Accuracy/linearity: 0.05 % (rel. 20 mA; 25°C) Supply voltage 2: 20-30 V (terminals 1 and 2 see 9. Power supply). Load impedance: 0 – 750 Ω Max. electrical values see certificates Same characteristic
<b>Measuring accuracy</b>	
<u>Error of measurement</u>	Reference conditions and error curves: see Sect. 5.1 and 5.2
<u>Repeatability</u>	≤ 0.5 × error of measurement
<u>Measured-value resolution</u>	VF SERIES: 1 mm.
<u>Effect of ambient temperature</u>	No significant effect on measured value( 1 ppm / °K); (see also signal output accuracy).
<b>Operating conditions</b>	
<u>Installation conditions</u>	Avoid interference reflections and multiple reflections
<u>Ambient conditions</u>	
<u>Hazardous locations</u>	Approvals for: 1G EEx ia IIC T6...T3
<u>CENELEC</u>	1G EEx ia IIB T6...T3 1/2 D T 100°C EEx ia
<u>Ambient temperature at signal converter</u>	-20°C to +55°C
<u>Product temperature</u>	-50°C to + 90°C Higher on request
<u>Environment class</u>	Locations exposed direct to open-air climate, D1 Severity in conformity with EN 60654-1
<u>Protection category</u>	(signal converter) IP65
<u>Shock resistance</u>	Impact test according to EN 61010, Sect. 8.2 with 0.5 J energy; drop test to prEN 50178
<u>Vibration endurance limit</u>	IEC 68-2-6 and prEN 50178 (10-57Hz:0.075mm/57-150 Hz:1g)
<u>EMC</u>	EN 50081-1, EN 50082-2
<b>Product conditions</b>	
<u>Physical properties</u>	No effect on measurement results; to ensure reliable measurements, the relative permittivity ( $\epsilon_r$ ) should have the following minimum values:
<u>Relative permittivity</u>	$\epsilon_r \geq 1.5$ ; for coax probes $\epsilon_r \geq 1.8$ ; for twin cable probes $\epsilon_r \geq 2.3$ ; for mono cable probes
<u>Limitations</u>	Sticky products
<u>Operating pressure</u>	Standard: max. 4 bar (higher on request)
<u>Electrical connection</u>	DIN Connector. PG 13.5
<u>User language</u>	German, English, French
<u>Units of measurement</u>	Length: m, cm, mm, inch, ft, % Volume: m³, Liter, US Gal, GB Gal, ft3, bbl, % Conversion unit: any text
<b>Design</b>	
<b>User interface</b>	
<b>Power supply</b>	
<u>24 V DC</u>	20-30 V DC
<u>Power consumption</u>	Typically <70 mW.

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