

Magnetostrictive level transmitter

For sanitary applications, high-resolution measurement principle

Model FLM-H

WIKA data sheet LM 20.03



Applications

- Bioreactor and fermenter applications
- Applications with heavy foaming
- Applications with a dynamic dielectric constant
- Pharmaceuticals and biotechnology with CIP and SIP processes

Special features

- Fully welded and dead-space free
- Insensitive to foaming, ideal for interface measurement
- High-precision level measurement: accuracy < 0.5 mm [0.02 in]
- 3-A marked hygienic design



Level transmitter, model FLM-H

Description

The model FLM-H magnetostrictive level transmitter has been specifically designed for the requirements of the pharmaceutical and biotechnology industries. The level transmitter is particularly suitable for the special conditions of CIP/SIP cleaning processes, such as chemical stability towards cleaning liquids and high temperatures.

The guide tube is directly welded to the process connection. This guarantees a crevice-free joint, additional seals are not required.

A special advantage of the level transmitter is its easy parameterisation and fast commissioning.

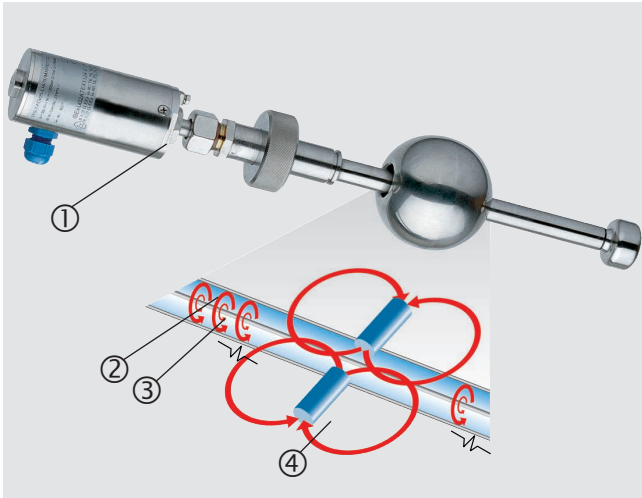
A 4 ... 20 mA HART® signal is available as the electronic output signal. The hygienically designed sensor housing, with an ingress protection of up to IP68, offers a secure protection for external cleaning with splash water and enables its use in high-humidity environments.

The model FLM-H level transmitter fulfils the high requirements of sanitary applications.

In addition, the FLM-H is also available as an angled variant (up to 90°).

Specifications

Functionality

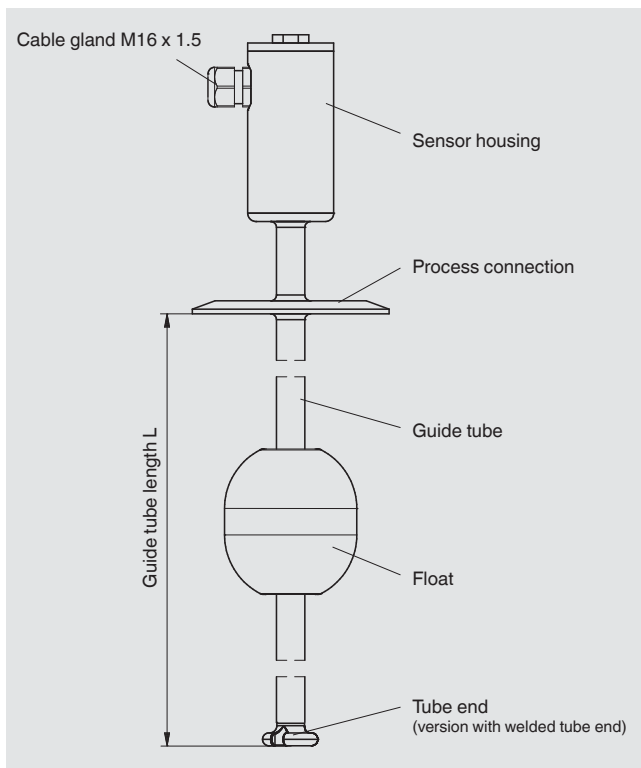


- ① Sensor housing
- ② Wire
- ③ Magnetic field
- ④ Permanent magnet
- ⑤ Torsional wave

Design and operating principle

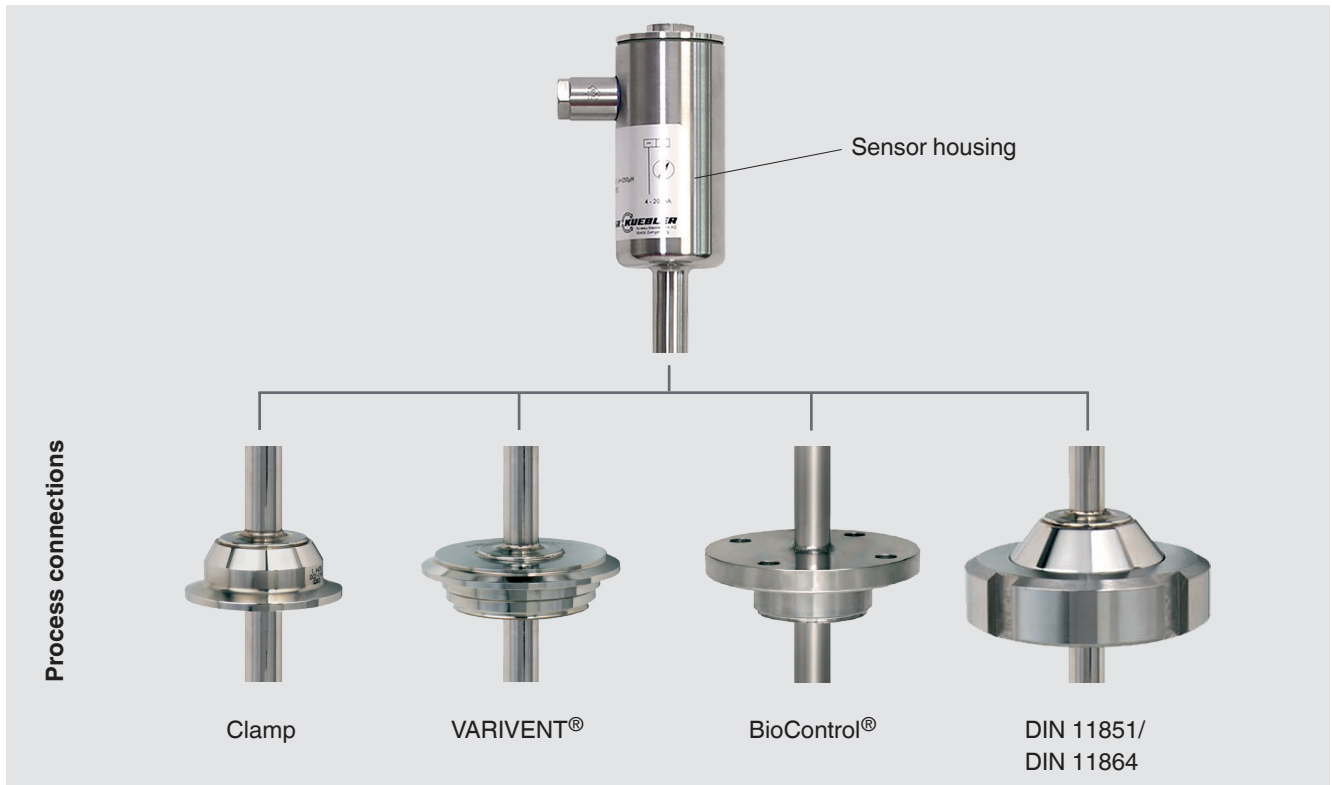
- The measurement process is triggered by a current impulse. This current produces a circular magnetic field ③ along a wire ① made of magnetostrictive material which is held under tension inside the corrugated tube.
- At the measuring location (liquid level) there is a float with permanent magnets ④ acting as a position transducer.
- The superposition of these two magnetic fields triggers a mechanical torsional wave ⑤ in the wire.
- This is converted into an electrical signal at the end of the wire in the sensor housing ② by a piezoceramic converter.
- The measured propagation delay enables the origination point of the mechanical wave, and thus the float position, to be determined with high accuracy.

Components of the level transmitter



- Large range of application due to the simple, proven functional principle
- For harsh operating conditions, long service life
- Continuous detection of levels, independent of physical and chemical changes of the media such as: foaming, conductivity, dielectric, pressure, vacuum, temperature, vapours, condensation, bubble formation, boiling effects, density change
- Signal transmission over long distances
- Simple installation and commissioning, onetime calibration only, no subsequent calibration after commissioning necessary
- Level displayed proportional to volume or height

Overview of the process connections

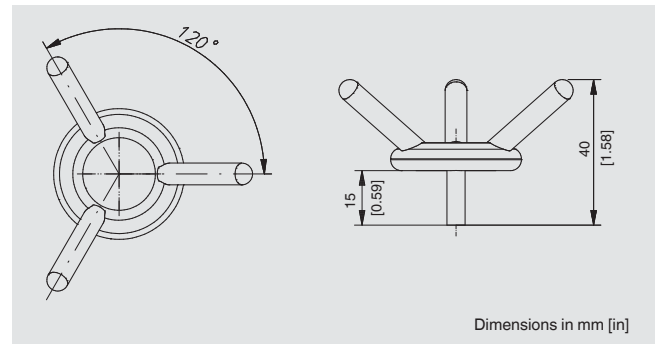


Tube ends

Version with separate sensor base support

This sensor base support is welded "separately" at the bottom of the tank. When mounting the level transmitter, the guide tube with the float can be fitted into the sensor base support inside the container to fix it. Thus the float is held in position and serves as a position transducer for the level. With stirring movement within the container, the level transmitter is fixed.

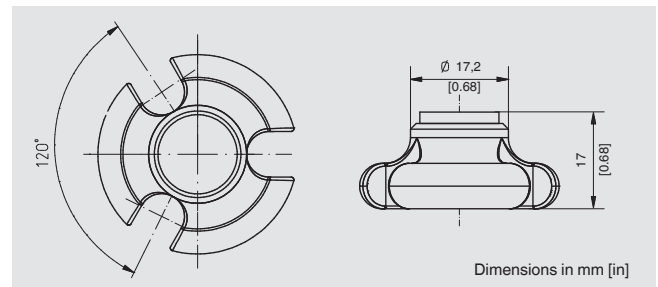
Additional advantage: If the cover of the process container is large enough and the float can be placed onto the level transmitter, then small process connections can be used.



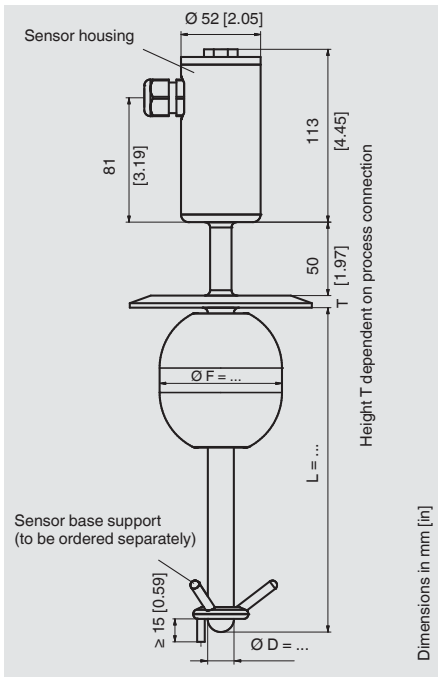
Version with welded tube end

This tube end is fully welded at the end of the guide tube and offers a dead-space free end to the level transmitter's guide tube.

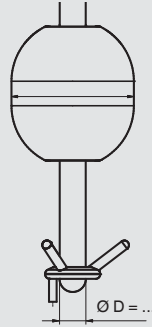
The geometry of the end of the guide tube enables CIP/SIP cleaning. This variant can be selected when the level transmitter including the float (taking into account the float diameter) can be mounted through the process connection.



Level transmitter, sterile version, model FLM-H



Version with separate sensor base support



Version with welded tube end



Dimensions in mm [in]

Basic information

Measurement principle Magnetostriction

Measurement accuracy $< \pm 0.5$ mm [0.02 in]

Resolution < 0.1 mm [0.004 in]

Sensor housing

Ingress protection IP68

Material Stainless steel 1.4305

Guide tube

Max. length L

FLM-H	<ul style="list-style-type: none"> ■ 14 mm [0.55 in]: 100 ... 4,000 mm [3.94 ... 157 in] ■ 17.2 mm [0.68 in]: 100 ... 6,000 mm [3.94 ... 236 in]
FLM-H-FLEX, with flexible insert	1,500 ... 6,000 mm [59.06 ... 236.22 in]

Diameter D

- 14 mm [0.55 in]
- 17.2 mm [0.68 in]

Material

- Stainless steel 1.4435 (316L)
- Stainless steel 1.4404 (316L)

Float

Diameter F

- 50 mm [1.97 in]
- 55 mm [2.17 in]
- 80 mm [3.15 in]

Material

- Stainless steel 1.4435 (316L)
- Stainless steel 1.4404 (316L)

Sealing range

Float V80/88/A34/35	770 ... 1,162 kg/m ³
Float V50/55/17/A34/35	995 ... 1,860 kg/m ³
Float V55/70/17/A34/3A/35	780 ... 1,200 kg/m ³




Process connection	
Standard	<ul style="list-style-type: none"> ■ DIN 32676 ■ DIN 11864-1 ■ DIN 11864-2 ■ DIN 11864-3
Thread size	
Clamp connection per ISO 2852	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 4"
Clamp connection per DIN 32676	<ul style="list-style-type: none"> ■ DN 32 ... DN100 ■ 1.5" ... 4"
Aseptic mounting thread downwards per DIN 11864-1	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 4"
Aseptic liner per DIN 11864-1	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 4"
Aseptic flange connection per DIN 11864-2	<ul style="list-style-type: none"> ■ DN 32 ... DN 50 ■ 1.5" ... 2"
Aseptic clamp connection DIN per 11864-3	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 4"
VARIVENT®	Form F, N and G
BioConnect® threaded connection	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 2"
BioConnect® flange connection	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 2"
BioConnect® clamp connection	<ul style="list-style-type: none"> ■ DN 32 ... DN 100 ■ 1.5" ... 2"
Surface finish quality (wetted)	Surface ground and polished, $R_a \leq 0.38 \mu\text{m}$, alternatively electropolished

Output signal	
Current output	
Signal type	4 ... 20 mA / HART® version 6
Auxiliary power	DC 10 ... 30 V
Surge protection	→ On request


Electrical connection	
Connection type	2-wire
Cable diameter	5 ... 10 mm [0.2 ... 0.39 in]
Supply voltage	DC 8 ... 30 V
Electrical output	<ul style="list-style-type: none"> ■ Cable gland M16 x 1.5 ■ Cable gland M20 x 1.5 ■ M12 connector ■ ½ NPT thread for conduit wiring

Operating conditions	
Medium temperature range	
FLM-H	-40 ... +250 °C [-40 ... +482 °F]
FLM-H-FLEX	-40 ... +150 °C [-40 ... +302 °F]
Ambient temperature range at the sensor housing	-40 ... +85 °C [-40 ... +185 °F]
Storage temperature range	-20 ... +60 °C [-40 ... +140 °F]
Max. operating pressure	10 bar [145 psi]
Mounting position	Vertical ±30°
Ingress protection of the complete instrument	IP68 per IEC/EN 60529

Approvals

Logo	Description	Region
	3-A Hygienic design This instrument is 3-A marked, based on a third party verification for conformance to the 3-A standard.	USA
	EU declaration of conformity ATEX directive Hazardous areas - Ex i Zone 0 gas II 1 G Ex ia IIC T6...T1 Ga Zone 0 / 1 gas II 1/2 G Ex ia IIC T6...T1 Ga/Gb Zone 1 gas II 2 G Ex ia IIC T6...T1 Gb Zone 21 dust II 2 D Ex ia IIIC TX°C Db	European Union
	IECEx Hazardous areas - Ex i Zone 0 gas Ex ia IIC T6...T1 Ga Zone 0 / 1 gas Ex ia IIC T6...T1 Ga/Gb Zone 1 gas Ex ia IIC T6...T1 Gb Zone 21 dust Ex ia IIIC TX°C Db	International

Manufacturer's information and certificates

Logo	Description
	SIL 2 Functional safety
-	In accordance with EMEA/410/01 free from substances of animal origin (ADI-free) Use of materials without any verifiable risk of infection with BSE/scrapie

Certificates

Certificates	
Certificates	<ul style="list-style-type: none"> ■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy, wetted metal parts free from substances of animal origin (ADI-free)) ■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy, calibration certificate) ■ Proof for hygienic floats: pressure and X-ray test; surface roughness and delta ferrite content ■ Sanitary applications: FDA conformity ■ Confirmation of approval; SIL 2 manufacturer's declaration ■ Measurement accuracy: test certificate confirming sensor accuracy ■ Material proof: wetted, pressurised metal parts with subsupplier certificate (melting analysis) ■ Proof for sanitary applications: Ra < 0.38 µm surface roughness of wetted parts ■ Proof of material properties: ferrite: basic material <= 1 %, weld seams <= 3 %

→ For approvals and certificates, see website

Ordering information

Model / Version / Cable gland / Process connection / Guide tube diameter / Guide tube length (insertion length) L / 100 % mark L1 / Measuring range M (span 0 ... 100 %) / Process specifications (operating temperature and pressure, limit density) / Options

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