Magnetostrictive level transmitter
Flexible version
Model FLM-Tx-FLEX

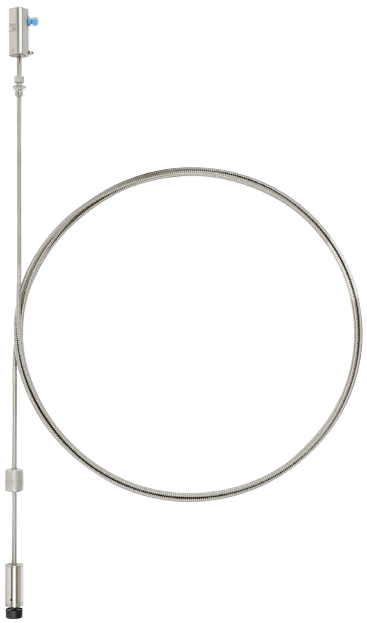
For approvals, see page 4

Applications

- High-accuracy level detection for almost all liquid media
- Particularly suited for large storage tanks
- Advantageous for installation situations with limited ceiling clearance
- Chemical, petrochemical industry, natural gas, offshore, shipbuilding, machine building, power generating equipment, power plants

Special features

- Probe length 1,500 mm … 22,000 mm [59.06 ... 866.14 in]
- High accuracy of ± 2 mm [± 0.08 in] over a wide measuring range
- Very high resolution of < 0.1 mm [0.004 in]
- Explosion-protected versions possible



Level transmitter in flexible version, model FLM-TAI-FLEX

Description

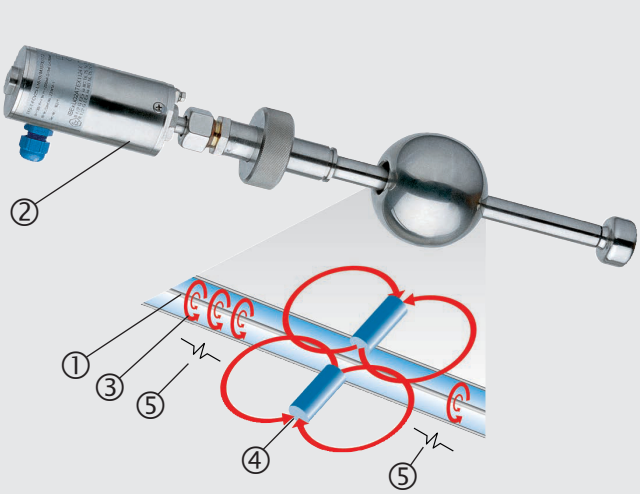
The model FLM-Tx-FLEX magnetostrictive level transmitter is used for high-accuracy, continuous level detection of liquids, also with long insertion lengths.

The model FLM-Tx-FLEX is fitted with a flexible probe tube in the form of a stainless steel spiral armour.

At the lower end of the sensor, there is a magnetic foot, which serves both to fix the stainless steel corrugated tube to the tank floor and as a ballast weight. Due to the flexible probe tube, the FLM-Tx-FLEX has an advantage in installation in applications with low ceiling clearances. Transport, due to the flexible design, is also easier than with a rigid probe. Interface measurements are also possible with the flexible version.

Specifications

Functionality



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 point being measured (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.

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

Overview of versions

Model	Display	Electrical connection	Ex version
FLM-TA-FLEX	Without	Cable gland	-
FLM-TAI-FLEX	Without	Cable gland	Ex ia
FLM-TM-FLEX	Without	M12 connector	-
FLM-TMI-FLEX	Without	M12 connector	Ex ia
FLM-TB-FLEX	LC display	Cable gland	-
FLM-TBI-FLEX	LC display	Cable gland	Ex ia
FLM-TBD-FLEX	LC display	Cable gland	Ex ia/db
FLM-TH-FLEX	LC display with integrated heating	Cable gland	-
FLM-THI-FLEX	LC display with integrated heating	Cable gland	Ex ia
FLM-THD-FLEX	LC display with integrated heating	Cable gland	Ex ia/db

Basic information		
Connection housing		
Material	Stainless steel 1.4305 (303)	
Sensor tube		
Material	Stainless steel 1.4571 (316Ti)	
Diameter	12 mm [0.47 in]	
Length from top to start of flexible corrugated tube	500 mm [19.69 in]	
Length from bottom to start of flexible corrugated tube	500 mm [19.69 in]	
Corrugated tube		
Material	Stainless steel 1.4404 (316L)	
Diameter	12 mm [0.47 in]	
Insertion length	1,500 ... 22,000 mm [59.06 ... 866.14 in]	
Accuracy specifications		
Level	±2 mm [±0.08 in]	
Resolution (HART®)	0.1 mm [0.004 in]	
Process connection		
Thread size	Mounting thread	■ G ½ ... G 2" ■ ½ NPT ... 2 NPT
	Mounting flange	■ DIN EN DN 50 ... DN 200, PN 6 ... PN 100 ■ ANSI 2 ... 8", Class 150 ... 600
	Height-adjustable bite-type fitting	
	→ Other thread sizes on request	
Output signal	4 ... 20 mA / HART® version 6	
IP ingress protection	IP68	
Electrical connection		
Connection type	2-wire	
Cable diameter	5 ... 10 mm [0.2 ... 0.39 in]	
Supply voltage	8 ... 30 V DC	
Electrical output	■ Cable gland M16 x 1.5 ■ Cable gland M20 x 1.5 ■ M12 connector ■ ½ NPT thread for conduit wiring	
Operating conditions		
Ambient temperature range	-40 ... +85 °C [-40 ... +185 °F]	
Storage temperature range	-40 ... +85 °C [-40 ... +185 °F]	
Process temperature	-40 ... +85 °C [-40 ... +185 °F]	
Other versions	■ Interface measurement, with two floats ■ Temperature sensors ■ Pharmaceutical design, FLM-H ... -FLEX, up to 150 °C [302 °F]	

Approvals

Logo	Description	Region
CE	**EU declaration of conformity**	European Union
	EMC directive EN 61326 emission (group 1, class B) and immunity (industrial environments)	
	RoHS directive	
UKCA	**UKCA**	United Kingdom
	Electromagnetic compatibility regulations	
	Restriction of hazardous substances (RoHS) regulations	

Optional approvals

Logo	Description		Region
Ex	**EU declaration of conformity**		European Union
	ATEX directive		
	Hazardous areas		
	- Ex i Zone 0 gas	II 1G Ex ia IIB T6 ... T1 Ga	
	Zone 0/1 gas	II 1/2G Ex ia IIB T6 ... T1 Ga/Gb	
	Zone 1 gas	II 2G Ex ia IIB T6 ... T1 Gb	
	Zone 1 dust	II 2D Ex ia IIIC TX °C Db (see thermal data on approval certificate)	
	- Ex db Zone 0/1 gas	II 1/2G Ex ia/db IIB T6 ... T1 Ga/Gb	
	Zone 1 gas	II 2G Ex db ia IIB T6 ... T1 Gb	
	Zone 1 dust	II 2D Ex ia tb IIIC TX °C Db (see thermal data on approval certificate)	
IEC IECEx	**IECEx**		International
	Hazardous areas		
	- Ex ia Zone 0 gas	Ex ia IIB T6 ... T1 Ga	
	Zone 0/1 gas	Ex ia IIB T6 ... T1 Ga/Gb	
	Zone 1 gas	Ex ia IIB T6 ... T1 Gb	
	Zone 1 dust	Ex ia IIIC TX °C Db (see thermal data on approval certificate)	
	- Ex db Zone 0/1 gas	Ex ia/db IIB T6 ... T1 Ga/Gb	
	Zone 1 gas	Ex db ia IIB T6 ... T1 Gb	
	Zone 1 dust	Ex ia tb IIIC TX °C Db (see thermal data on approval certificate)	

Manufacturer's information and certificates

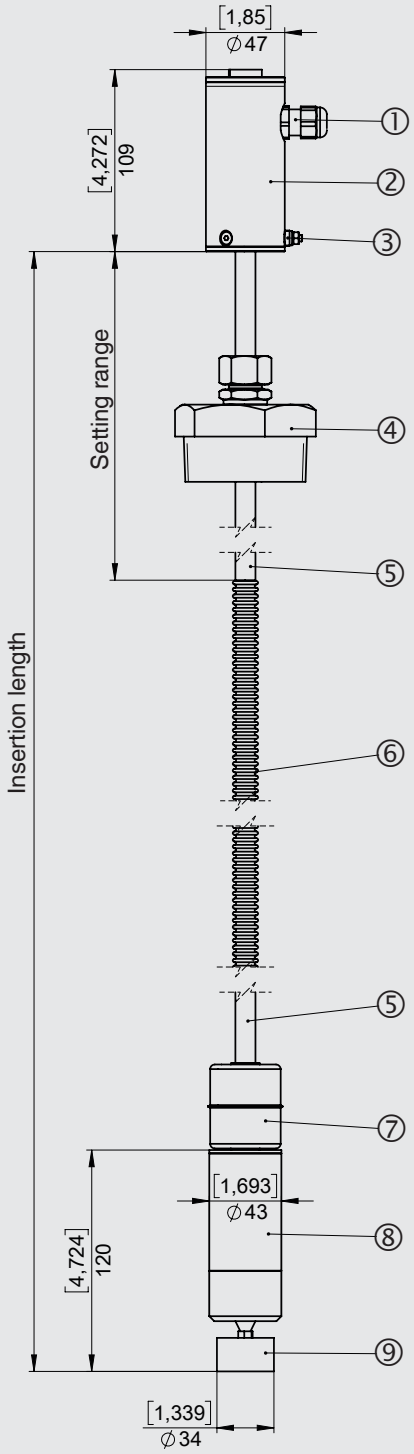
Logo	Description
SIL	**SIL 2** Functional safety
-	**China RoHS directive**

Certificates

Certificates	
Certificates	■ 2.2 test report per EN 10204 (e.g. state-of-the-art manufacturing, material proof, indication accuracy) ■ 3.1 inspection certificate per EN 10204 (e.g. material proof for wetted metal parts, indication accuracy, calibration certificate)

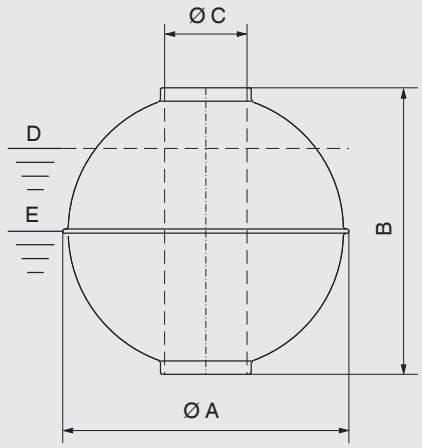
→ For approvals and certificates, see website

Dimensions in mm [in]



① Cable gland
② Connection housing
③ Equipotential bonding connection
④ Process connection
⑤ Probe tube Ø12 [0.472], stainless steel
⑥ Corrugated tube
⑦ Float
⑧ Weight, stainless steel
⑨ Magnetic foot

Spherical float



D = Limit density of the medium, immersed float volume 85 %

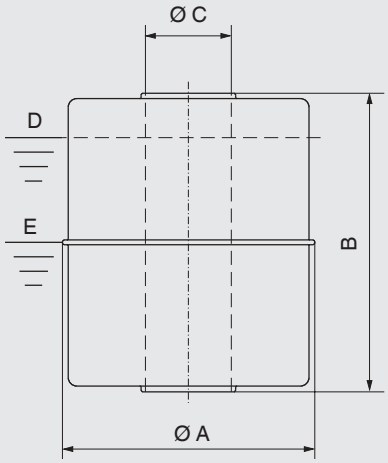
E = Nominal density of the medium, immersed float volume 50 %

Material	Version	Suits guide tube Ø in mm [in]	Ø A in mm [in]	B in mm [in]	Ø C in mm [in]	Max. operating pressure in bar [psi]	Max. operating temp. in °C [°F]	Limit density 85 % in kg/m³ [lb/ft³]
Stainless steel 316Ti	V52A	14 [0.55]	52 [2.05]	52 [2.05]	15 [0.59]	40 [580.15]	250 [482]	720 [44.95]
	V62A	14 [0.55]	62 [2.44]	61 [2.4]	15 [0.59]	32 [464.12]	250 [482]	597 [37.27]
	V83A	14 [0.55]	83 [3.27]	81 [3.19]	15 [0.59]	25 [362.59]	250 [482]	430 [26.84]
	V80A	18 [0.71]	80 [3.15]	76 [2.99]	23 [0.91]	25 [362.59]	250 [482]	660 [41.2]
	V98A	18 [0.71]	98 [3.86]	96 [3.78]	23 [0.91]	25 [362.59]	250 [482]	597 [37.27]
	V105A	18 [0.71]	105 [4.13]	103 [4.06]	23 [0.91]	25 [362.59]	250 [482]	533 [33.27]
	V120A	18 [0.71]	120 [4.72]	117 [4.61]	23 [0.91]	25 [362.59]	250 [482]	389 [24.28]
	V120/38A	18 [0.71]	120 [4.72]	116 [4.57]	38 [1.5]	25 [362.59]	250 [482]	537 [33.52]
Titanium 3.7035 (grade 2)	T52A	14 [0.55]	52 [2.05]	52 [2.05]	15 [0.59]	25 [362.59]	250 [482]	570 [35.58]
	T62A	14 [0.55]	62 [2.44]	62 [2.44]	15 [0.59]	25 [362.59]	250 [482]	505 [31.53]
	T83A	14 [0.55]	83 [3.27]	81 [3.19]	15 [0.59]	25 [362.59]	250 [482]	350 [21.85]
	T80A	18 [0.71]	80 [3.15]	76 [3.0]	23 [0.91]	25 [362.59]	250 [482]	665 [41.51]
	T98A	18 [0.71]	98 [3.86]	96 [3.78]	23 [0.91]	25 [362.59]	250 [482]	495 [30.9]
	T105A	18 [0.71]	105 [4.13]	103 [4.06]	23 [0.91]	25 [362.59]	250 [482]	369 [23.04]
	T120A	18 [0.71]	120 [4.72]	117 [4.61]	23 [0.91]	25 [362.59]	250 [482]	329 [20.54]

Special floats for higher temperature and pressure ranges are available on request.

Note: The optimum float will be selected after a feasibility test carried out by WIKA.

Cylindrical float



D = Limit density of the medium, immersed float volume 85 %

E = Nominal density of the medium, immersed float volume 50 %

Material	Version	Suits guide tube Ø in mm [in]	Ø A in mm [in]	B in mm [in]	Ø C in mm [in]	Max. operating pressure in bar [psi]	Max. operating temp. in °C [°F]	Limit density 85 % in kg/m³ [lb/ft³]
Stainless steel 316Ti	V44A	14 [0.55]	44 [1.73]	52 [2.05]	15 [0.59]	16 [232.06]	250 [482]	818 [51.07]
	V44A	14 [0.55]	44 [1.73]	52 [2.05]	15 [0.59]	25 [362.59]	200 [392]	800 [49.94]
Titanium 3.7035 (grade 2)	T44A	14 [0.55]	44 [1.73]	52 [2.05]	15 [0.59]	16 [232.06]	250 [482]	550 [34.34]
PVC	P55A	16 [0.63]	55 [2.17]	54 [2.13]	22 [0.87]	3 [43.51]	60 [140]	798 [49.82]
	P80A	20 [0.79]	80 [3.15]	79 [3.11]	25 [0.98]	3 [43.51]	60 [140]	573 [35.77]
Polypropylene	PP55A	16 [0.63]	55 [2.17]	54 [2.13]	22 [0.87]	3 [43.51]	80 [176]	595 [37.14]
	PP80A	20 [0.79]	80 [3.15]	79 [3.11]	25 [0.98]	3 [43.51]	80 [176]	431 [26.91]
PVDF	PF55A	16 [0.63]	55 [2.17]	69 [2.72]	22 [0.87]	3 [43.51]	100 [212]	821 [51.25]
	PF80A	20 [0.79]	80 [3.15]	79 [3.11]	25 [0.98]	3 [43.51]	100 [212]	681 [42.51]

Special floats for higher temperature and pressure ranges are available on request.

Note: The optimum float will be selected after a feasibility test carried out by WIKA.

Ordering information

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

To order the described product the order number is sufficient.

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