Magnetostrictive level transmitter
Version with local indication
Models FLM-TB and FLM-TH

For approvals, see page 4

Applications

- High-accuracy level detection for almost all liquid media in the process industry
- Suitable for interface layer applications or processes with heavy foaming
- Chemical, petrochemical industry, natural gas, offshore, shipbuilding, power generating equipment, power plants

Special features

- Insertion length 100 ... 6,000 mm [3.94 ... 236.22 in] (flexible version up to 22,000 mm [866.14 in])
- Version with LC display for local indication of the level (optionally with heatable LC display for lower ambient temperatures)
- High accuracy of up to ±0.2 mm [0.008 in] or ±0.01 % over the entire measuring range
- Very high resolution of < 0.1 mm [0.004 in]
- Version for hazardous areas

Level transmitter with LC display, model FLM-TB

Description

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

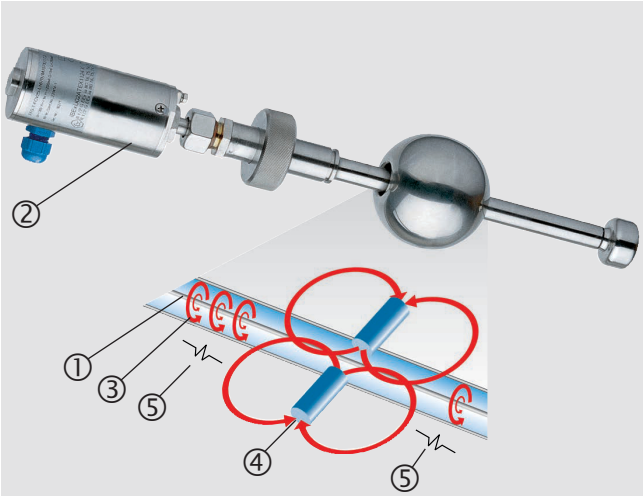
The model FLM-TB has a local LC display. For particularly low ambient temperatures, the model FLM-TH version can be used, which has a heated LC display.

Furthermore, the model FLM-TB and FLM-TH level transmitters with LC display are available as both an intrinsically safe version and a version with flameproof enclosure.

Data sheets showing similar products:
Magnetostrictive level transmitter; model FLM-Tx-FLEX; see data sheet LM 20.09

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-TB	LC display	Cable gland	-
FLM-TBI	LC display	Cable gland	Ex ia
FLM-TBD	LC display	Cable gland	Ex ia/db
FLM-TH	LC display with integrated heating	Cable gland	-
FLM-THI	LC display with integrated heating	Cable gland	Ex ia
FLM-THD	LC display with integrated heating	Cable gland	Ex ia/db

Basic information		
Connection housing		
Material	Stainless steel 1.4404 (316L), safety glass	
Sensor tube		
Material	Stainless steel 1.4571 (316Ti)	
	Further materials such as Hastelloy on request	
Diameter	12 mm [0.47 in]	
Insertion length	Rigid version	100 ... 6,000 mm [3.937 ... 236.221 in]
	Flexible version (with corrugated tube)	1,500 ... 22,000 mm [59.055 ... 866.142 in]
Accuracy specifications		
Level	Up to ±0.2 mm [0.008 in] or ±0.01 %	
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	
	→ Further thread sizes on request	
Output signal	4 … 20 mA (3.8 … 20.5 mA) / HART® version 6	
Residual current	3.6 mA or 21.5 mA (adjustable)	
Electrical connection		
Connection type	2-wire	
Cable diameter	5 ... 10 mm [0.2 ... 0.39 in]	
Supply voltage	Standard (non-Ex)	DC 12 ... 50 V
	Intrinsically safe version (Ex ia)	DC 12 ... 30 V
	Flameproof version (Ex db)	DC 12 ... 50 V
	Heating (model FLM-TH)	DC 24 V (±10 %)
Electrical output	■ Cable bushing M20 x 1.5 ■ Cable gland M20 x 1.5 ■ ½ NPT thread for conduit wiring	
Operating conditions		
Ambient temperature range	FLM-TB	-40 ... +85 °C [-40 ... 185 °F]
	FLM-TH	-55 ... +85 °C [-67 ... 185 °F] (with integrated heating)
Storage temperature range	-40 ... +85 °C [-40 ... +185 °F]	
Process temperature	Standard temperature	-40 … +85 °C [-40 ... 185 °F]
	Normal temperature (NT)	-40 … +125 °C [-40 ... 257 °F]
	High temperature (HT)	-40 … +250 °C [-40 ... 482 °F]
	Highest temperature (HHT)	-40 … +450 °C [-40 ... 842 °F]
	Low temperature (LT)	-65 … +125 °C [-40 ... 257 °F]
Other versions	■ Interface measurement, with two floats ■ Temperature sensors	

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 IIC T6 ... T1 Ga	
	Zone 0/1 gas	II 1/2G Ex ia IIC T6 ... T1 Ga/Gb	
	Zone 1 gas	II 2G Ex ia IIC 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 IIC T6 ... T1 Ga/Gb	
	Zone 1 gas	II 2G Ex db ia IIC T6 ... T1 Gb	
	Zone 1 dust	II 2D Ex ia tb IIIC TX °C Db (see thermal data on approval certificate)	
IEC IECEx	**IECEx** Hazardous areas		International
	- Ex ia 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 1 dust	Ex ia IIIC TX °C Db (see thermal data on approval certificate)	
	- Ex db Zone 0/1 gas	Ex ia/db IIC T6 ... T1 Ga/Gb	
	Zone 1 gas	Ex db ia IIC 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**

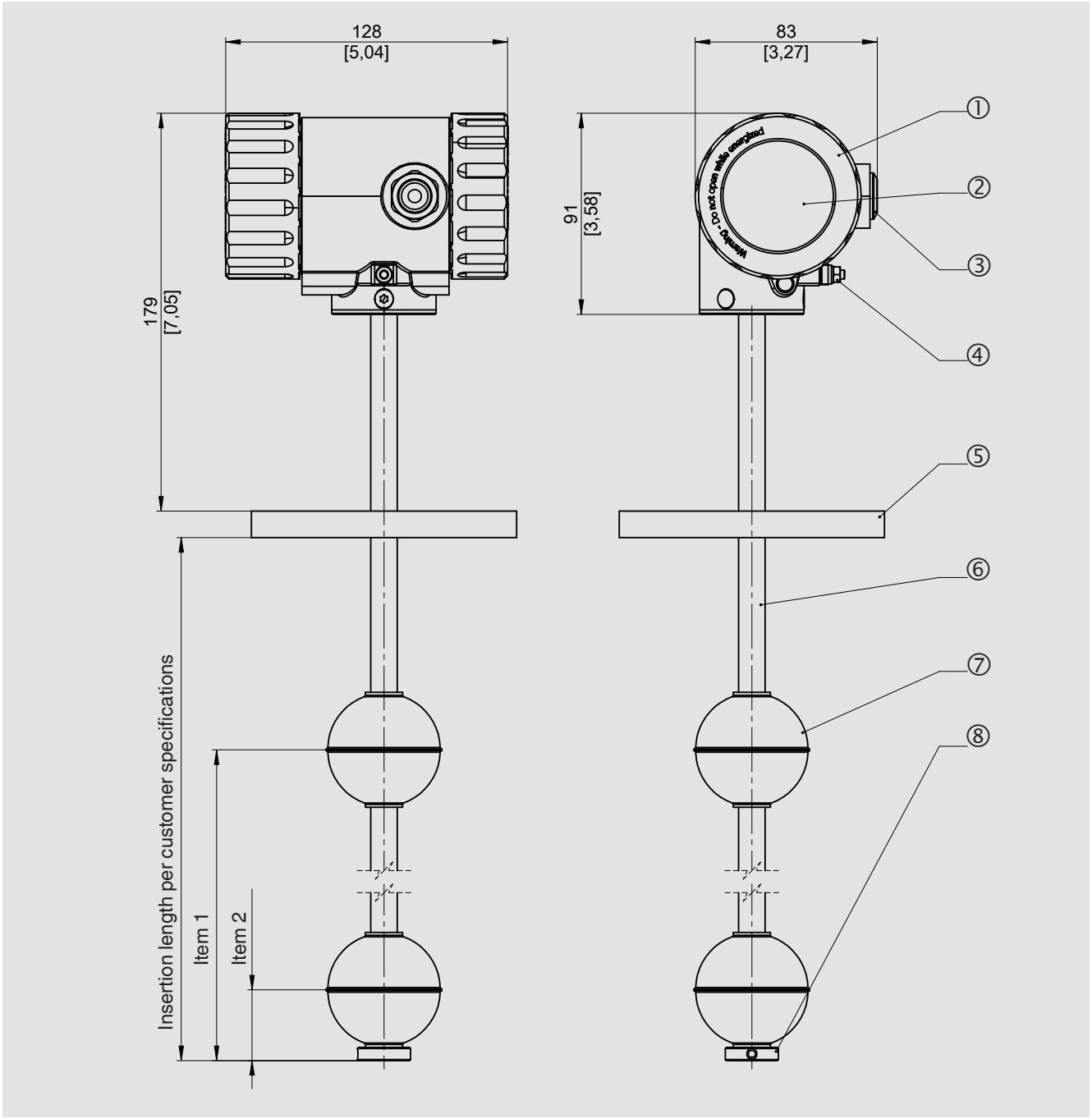
Certificates

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

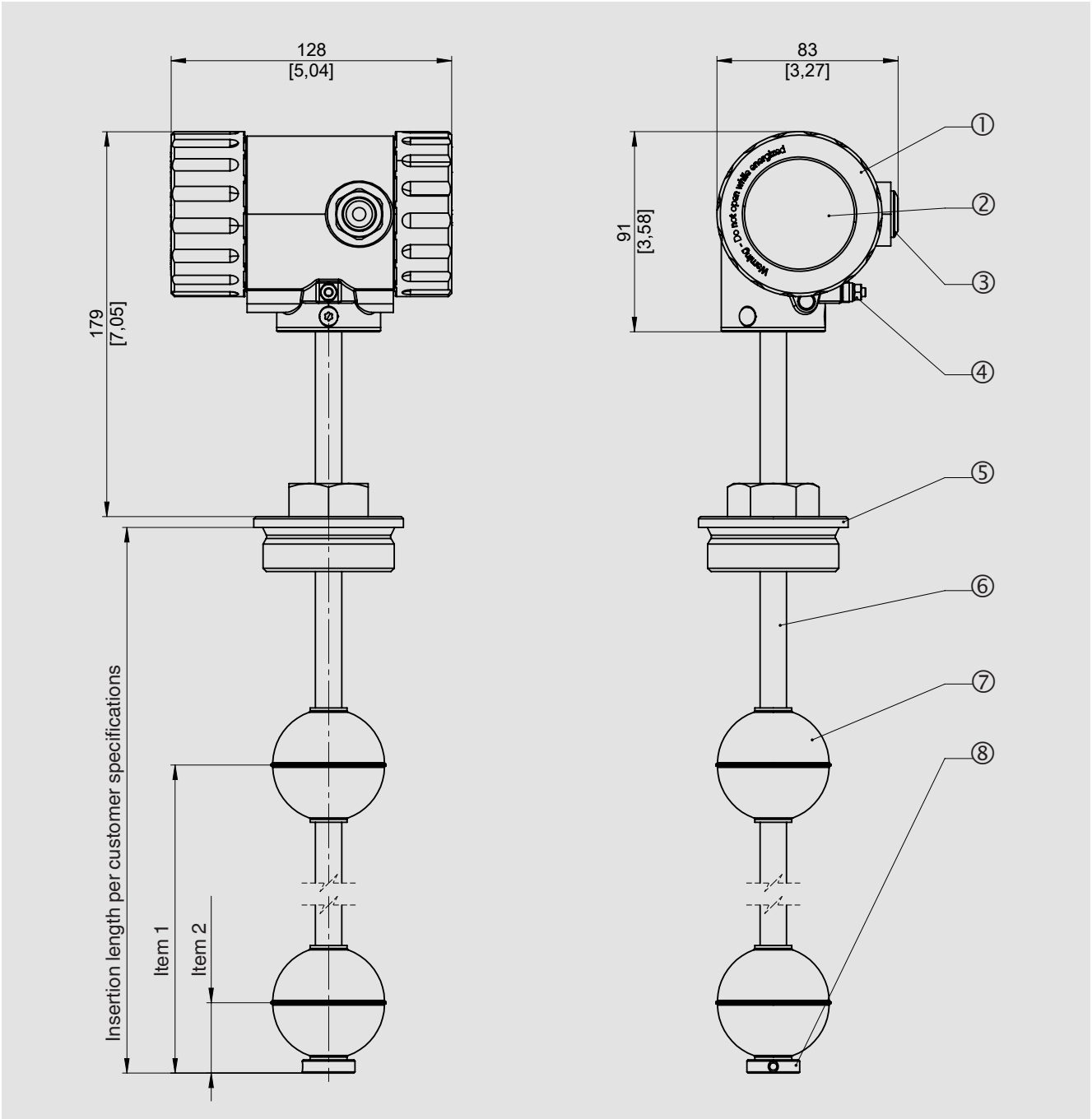
Dimensions in mm [in]

Version with process connection flange



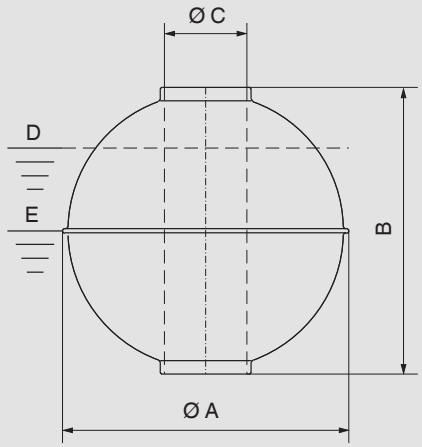
① Probe head
② Display unit
③ Plug screw M20 x 1.5
④ Ground connection
⑤ Flange per customer specifications
⑥ Probe tube Ø12
⑦ Float
⑧ Adjusting collar, can be dismounted

Version with mounting thread



① Probe head
② Display unit
③ Plug screw M20 x 1.5
④ Ground connection
⑤ Mounting thread per customer specifications
⑥ Probe tube Ø12
⑦ Float
⑧ Adjusting collar, can be dismounted

Spherical float



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

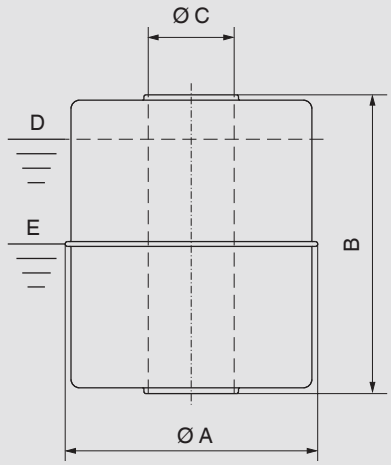
E = Nominal density of the medium, immersed float volume 50 %

Material	Version	Suitable for 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 an application 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	Suitable for 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 an application 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

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