



## LFP Cubic

Flexible up to the probe tip

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### Additional information

Detailed technical data.....	3
Ordering information.....	5
Dimensional drawing .....	6
Connection type and diagram .....	6
Accuracy diagrams .....	7
Installation instructions .....	7
Recommended accessories.....	9



### Product description

The LFP Cubic is a level sensor that uses TDR technology (time domain reflectometry) and thus can be used in oil- and water-based liquids without calibration. The LFP's guided radar uses time-of-flight technology to measure electromagnetic pulses. The time difference between the sent pulse and the reflected pulse is used to calculate the level, both as a continuous value (analog output) and a freely positionable switching point (switching output). Due to its flexible

probe that can be changed or cut, it is possible to integrate the sensor quickly into any application. The LFP Cubic can work in deposit-forming and foaming liquids. The sensor's intuitive setup uses four buttons and a display to ensure quick and easy adaptation to the application. In addition to the discrete and analog output signals, an IO-Link interface is available to transmit additional valuable process data to the control unit.

### At a glance

- No mechanical moving parts
- Manually cuttable and exchangeable monoprobe with lengths from 200 mm up to 2,000 mm
- Immune to deposit formation
- Process temperature up to 100 °C; process pressure up to 10 bar
- Small inactive areas, ideal for small containers
- Accurate measurement, even when liquid type changes
- 3-in-1: combined display, analog output (acc. NAMUR NE 43) and binary output
- High enclosure rating of IP 67, rotatable housing

### Your benefits

- Rugged design increases service life
- High flexibility due to cuttable and exchangeable monoprobe
- Cost savings due to multiple output signals: one system for both level detection and continuous level monitoring
- Time and cost savings due to low maintenance and quick commissioning
- No calibration or recalibration required for commissioning, thus saving time and costs
- Compact and rotatable housing ensures flexible installation
- No crosstalk when several sensors are mounted next to each other
- Advanced technology enables adjustment-free measurement of oil- and water-based liquids

## Detailed technical data

### Features

Medium	Fluids
Measurement	Switch, continuous
Process pressure	-1 bar ... 10 bar
Process temperature	-20 °C ... +100 °C
GOST approval	✓
RoHS certificate	✓

### Performance

Accuracy of sensor element	± 5 mm
Repeatability	≤ 2 mm
Resolution	< 2 mm
Dielectricity constant	≥ 5
Conductivity	No limitation
Maximum level change	500 mm/s
Inactive area at process connector <sup>1)</sup>	25 mm
Inactive area at probe end <sup>2)</sup>	10 mm

<sup>1)</sup> With parameterized tank with water under reference conditions, otherwise 40 mm.

<sup>2)</sup> With water under reference conditions.

### Mechanics

Wetted parts	1.4404, PTFE
Process connection	G 3/4 A 3/4" NPT
Housing material	Plastic PBT
Max.probe load	≤ 6 Nm

### Electronics

Supply voltage <sup>1)</sup>	12 V DC ... 30 V DC
Power consumption	≤ 75 mA at 24 V without output load
Initialization time	≤ 2 s
Protection class	III
Electrical connection	M12x1, 5-pin
Output signal <sup>1)</sup>	Analog output 4 mA ... 20 mA, 0 V ... 10 V automatic switching to a current or voltage output depending on the load. 1 PNP transistor output (Q1) and 1 PNP / NPN transistor output (Q2) switchable
Hysteresis	Min. 2 mm, free adjustable
Signal voltage HIGH	V <sub>s</sub> - 2 V
Signal voltage LOW	≤ 2 V
Output current	< 100 mA
Inductive load	< 1 H
Capacitive load	100 nF
Response time	< 400 ms
Enclosure rating	IP 67: EN 60529
Temperature drift	< 0.1 mm/K

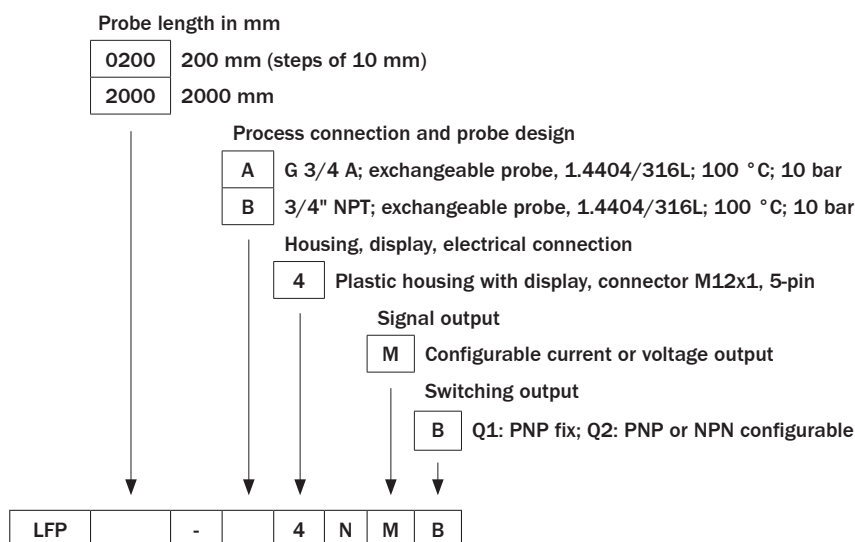
<sup>1)</sup> All connections are polarity protected. All outputs are overload and short-circuit protected.

Output load	4 mA ... 20 mA < 500 Ohm at $U_v > 15\text{ V}$ , 4 mA ... 20 mA < 350 Ohm at $U_v > 12\text{ V}$ , 0 V ... 10 V > 750 Ohm at $U_v \geq 14\text{ V}$
Lower signal level	3.8 mA ... 4 mA
Upper signal level	20 mA ... 20.5 mA
EMC	EN 61326-1:2006, 2004/108/EG
Interference resistance	EN 61000-6-2:2005
Interference emission	EN 61000-6-4:2007
Single shock	EN 60068-2-27
Continuous shock	EN 60068-2-29

### Ambient data

Ambient temperature, operation	-20 °C ... +60 °C
Ambient temperature, storage	-40 °C ... +80 °C

### Type code

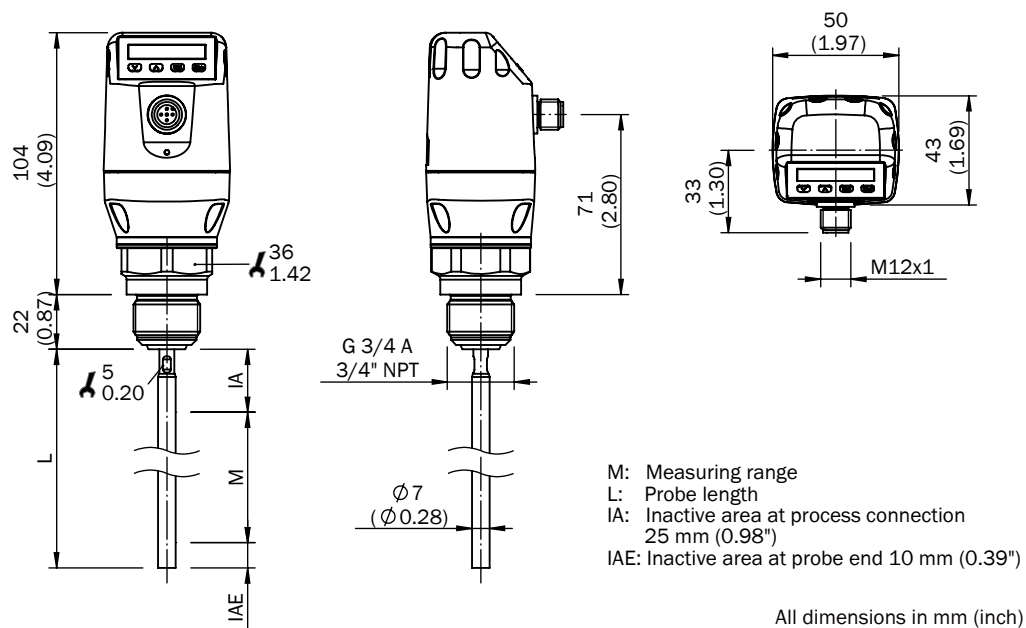


## Ordering information

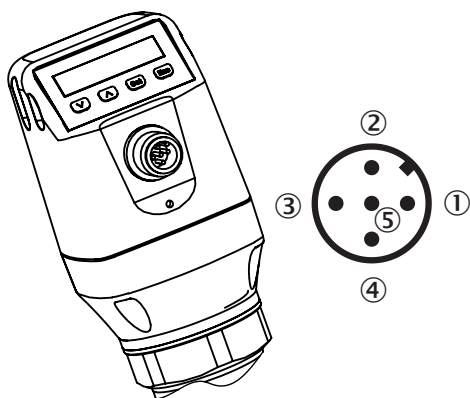
- **Output signal:** 1x PNP + 1x PNP/NPN + 4 ... 20 mA / 0 ... 10 V
- **Process temperature:** -20 °C ... +100 °C
- **Process pressure:** -1 bar ... 10 bar
- **Housing material:** Plastic PBT
- **Electrical connection:** M12x1, 5-pin
- **Enclosure rating:** IP 67: EN 60529

Process connection	Probe length	Model name	Part no.
G 3/4 A	200 mm	LFP0200-A4NMB	1057073
	300 mm	LFP0300-A4NMB	1057074
	400 mm	LFP0400-A4NMB	1057075
	500 mm	LFP0500-A4NMB	1057076
	600 mm	LFP0600-A4NMB	1057077
	700 mm	LFP0700-A4NMB	1057078
	800 mm	LFP0800-A4NMB	1057079
	900 mm	LFP0900-A4NMB	1057080
	1,000 mm	LFP1000-A4NMB	1057081
	1,100 mm	LFP1100-A4NMB	1057082
	1,200 mm	LFP1200-A4NMB	1057083
	1,300 mm	LFP1300-A4NMB	1057084
	1,400 mm	LFP1400-A4NMB	1057085
	1,500 mm	LFP1500-A4NMB	1057086
	1,600 mm	LFP1600-A4NMB	1057087
	1,700 mm	LFP1700-A4NMB	1057088
	1,800 mm	LFP1800-A4NMB	1057089
	1,900 mm	LFP1900-A4NMB	1057090
	2,000 mm	LFP2000-A4NMB	1057091
3/4" NPT	200 mm	LFP0200-B4NMB	1057092
	300 mm	LFP0300-B4NMB	1057093
	400 mm	LFP0400-B4NMB	1057094
	500 mm	LFP0500-B4NMB	1057095
	600 mm	LFP0600-B4NMB	1057096
	700 mm	LFP0700-B4NMB	1057097
	800 mm	LFP0800-B4NMB	1057098
	900 mm	LFP0900-B4NMB	1057099
	1,000 mm	LFP1000-B4NMB	1057100
	1,100 mm	LFP1100-B4NMB	1057101
	1,200 mm	LFP1200-B4NMB	1057102
	1,300 mm	LFP1300-B4NMB	1057103
	1,400 mm	LFP1400-B4NMB	1057104
	1,500 mm	LFP1500-B4NMB	1057105
	1,600 mm	LFP1600-B4NMB	1057106
	1,700 mm	LFP1700-B4NMB	1057107
	1,800 mm	LFP1800-B4NMB	1057108
	1,900 mm	LFP1900-B4NMB	1057109
	2,000 mm	LFP2000-B4NMB	1057110

## Dimensional drawing



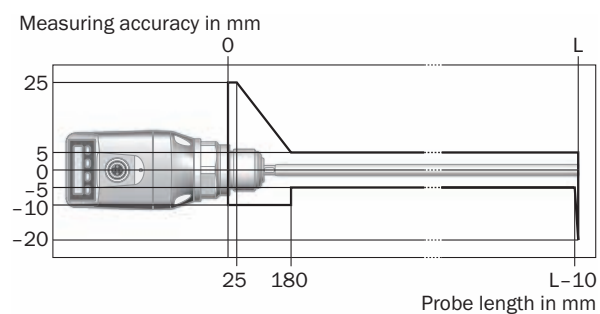
## Connection type and diagram



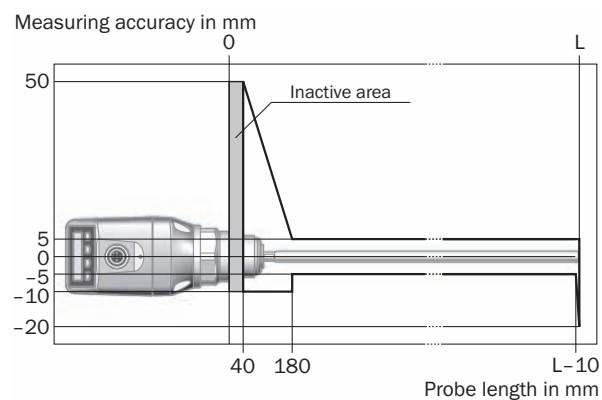
- ① L<sup>+</sup>: Supply voltage, brown
- ② Q<sub>A</sub>: Analog current-/voltage output, white
- ③ M: Ground, OUT- for current-/voltage output, blue
- ④ C/Q<sub>1</sub>: Switching output 1, PNP/IO-Link-communication, black
- ⑤ Q<sub>2</sub>: Switching output 2, PNP/NPN, grey

## Accuracy diagrams

### Accuracy diagram with parameterized tank

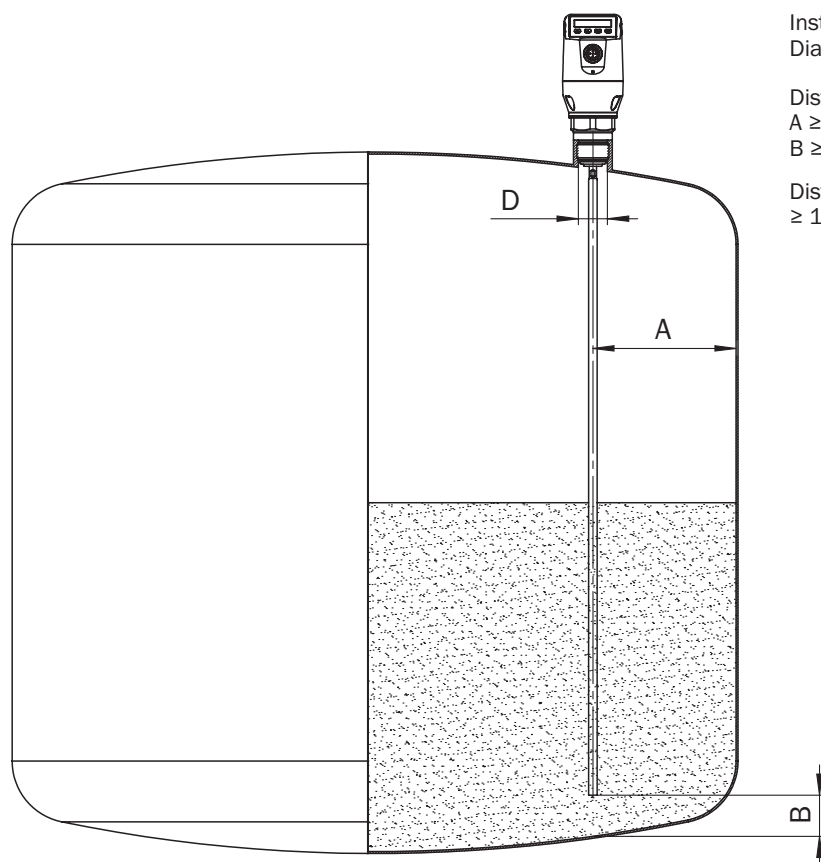


### Accuracy diagram without parameterized tank



## Installation instructions

### Installation in a metal tank



Installation in nozzle:

Diameter  $D \geq \text{DN } 25$

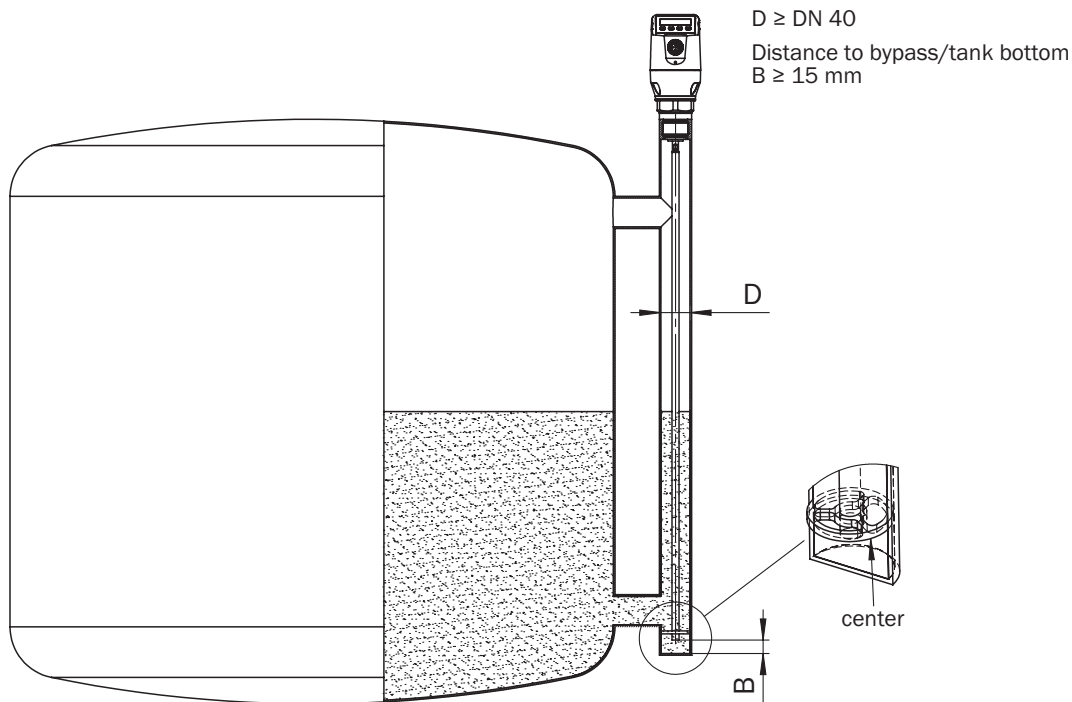
Distance tank wall/tank bottom:

$A \geq 50 \text{ mm}$

$B \geq 15 \text{ mm}$

Distance to other tank fittings

$\geq 100 \text{ mm}$

**Installation in a metal immersion tube or metal bypass**



Centering: To prevent contact between the probe and the bypass pipe during oscillations, the probe should be centered according to its length and depending on the diameter of the

bypass pipe. To do this, it is necessary to insert one or two centering pieces (see accessories).



## Recommended accessories

### Counter nuts

	Process connection	Material	Type	Part no.
	G 3/4 A	PA	BEF-MU-0PAG34-LFT1	5321681
	3/4" NPT	PA	BEF-MU-0PAN34-LFT1	5321680

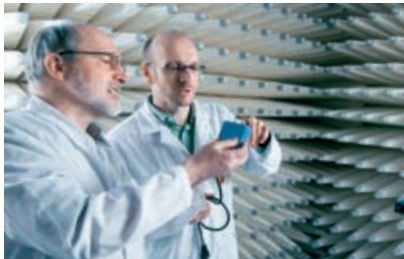
### Alignment brackets

Brief description	Material	Type	Part no.
Centering for bypass- and immersion tube installation with diameter 40 mm ... 100 mm	PTFE	BEF-FL-BYRD40-LFP1	2059612

### Plug connectors and cables

	Brief description	Type	Part no.
	Cable, M12, 5-pin, straight connector female with molded cable, 2 m, PVC	DOL-1205-G02M	6008899
	Cable, M12, 5-pin, straight connector female with molded cable, 2 m, PUR halogen free	DOL-1205-G02MC	6025906
	Cable, M12, 5-pin, straight connector female with molded cable, 5 m, PVC	DOL-1205-G05M	6009868
	Cable, M12, 5-pin, straight connector female with molded cable, 5 m, PUR halogen free	DOL-1205-G05MC	6025907
	Cable, M12, 5-pin, straight connector female with molded cable, 10 m, PVC	DOL-1205-G10M	6010544
	Cable, M12, 5-pin, straight connector female with molded cable, 10 m, PUR halogen free	DOL-1205-G10MC	6025908
	Cable, M12, 5-pin, angled connector female with molded cable, 2 m, PVC	DOL-1205-W02M	6008900
	Cable, M12, 5-pin, angled connector female with molded cable, 2 m, PUR halogen free	DOL-1205-W02MC	6025909
	Cable, M12, 5-pin, angled connector female with molded cable, 5 m, PVC	DOL-1205-W05M	6009869
	Cable, M12, 5-pin, angled connector female with molded cable, 5 m, PUR halogen free	DOL-1205-W05MC	6025910
	Cable, M12, 5-pin, angled connector female with molded cable, 10 m, PVC	DOL-1205-W10M	6010542
	Cable, M12, 5-pin, angled connector female with molded cable, 10 m, PUR halogen free	DOL-1205-W10MC	6025911

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