



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Levelflex M FMP43

## Run Time Measurement

Guided Level-Radar; Smart Transmitter for continuous level measurement in liquids in hygienic applications.



### Application

The Levelflex M FMP43 is used for continuous level measurement of liquids in applications with special hygienic requirements:

### Materials

- All wetted components are FDA-listed and tested in accordance with USP Cl. VI.
- Choice of mechanically polished or electropolished metal surfaces up to 0.38 µm and low Δ ferrite content.

### Design

- The design is flush-mounted and gap-free and meets ASME BPE requirements.
- The probe is completely dismountable; the probe rod, process connection and seals are replaceable.
- Aseptic process connections from DN25 (1") are available.
- The probe is autoclavable and suitable for CIP, SIP.

### Approvals (hygiene)

- Approvals according to 3A and EHEDG
- Certificate of Compliance (CoC)

The following interfaces are available for system integration:


- HART (standard) with 4 to 20 mA analog; PROFIBUS PA, FOUNDATION Fieldbus

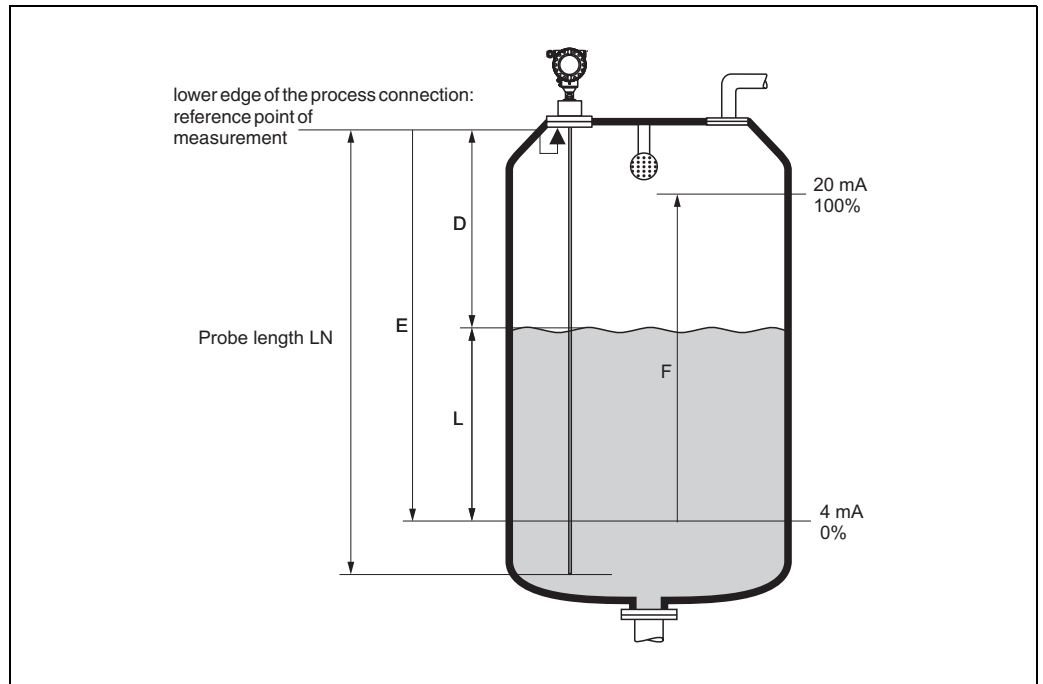
### Your benefits

- **Measurement independent** of product properties such as:
  - density,
  - dielectric constant,
  - conductivity.
- **Measurement possible despite very turbulent surfaces or foam.**
- Easy menu-guided onsite operation via four-line plain text display.
- Convenient remote operation, diagnosis and documentation of the measuring point via the FieldCare operating program which is provided free of charge.
- Optional remote display and operation.
- Envelope curve presentation onsite on the display for easy diagnosis.
- Electronics can be replaced without opening the tank.
- Application in safety related systems (overspill protection) with requirements for functional safety up to SIL 2 in accordance to IEC 61508/IEC 61511-1.
- Approvals:
  - Europe: ATEX
  - North America: FM, CSA
  - China: NEPSI (in preparation)

## Function and system design

### Measuring principle

The Levelflex is a "downward-looking" measuring system that functions according to the ToF method (ToF = Time of Flight). The distance from the reference point (process connection of the measuring device → ) to the product surface is measured. High-frequency pulses are injected to a probe and led along the probe. The pulses are reflected by the product surface, received by the electronic evaluation unit and converted into level information. This method is also known as TDR (Time Domain Reflectometry).



L00-FMP43xxx-15-00-00-en-001

Reference point of measurement, details s. Seite 26

### Dielectric constant

The dielectric constant (DK) of the medium has a direct impact on the degree of reflection of the high-frequency pulses. In the case of large DK values, such as for water or ammonia, there is strong pulse reflection while, with low DK values, such as for hydrocarbons, weak pulse reflection is experienced.

### Input

The reflected pulses are transmitted from the probe to the electronics. There, a microprocessor analyses the signals and identifies the level echo, which was generated by the reflection of the high-frequency pulses at the product surface. This clear signal finding benefits from the more than 30 years of experience with pulse time-of-flight procedures that have been integrated into the development of the PulseMaster® Software.

The distance  $D$  to the product surface is proportional to the time of flight  $t$  of the pulse:

$$D = c \cdot t/2,$$

with  $c$  being the speed of light.

Based on the known empty distance  $E$ , the level  $L$  is calculated:

$$L = E - D$$

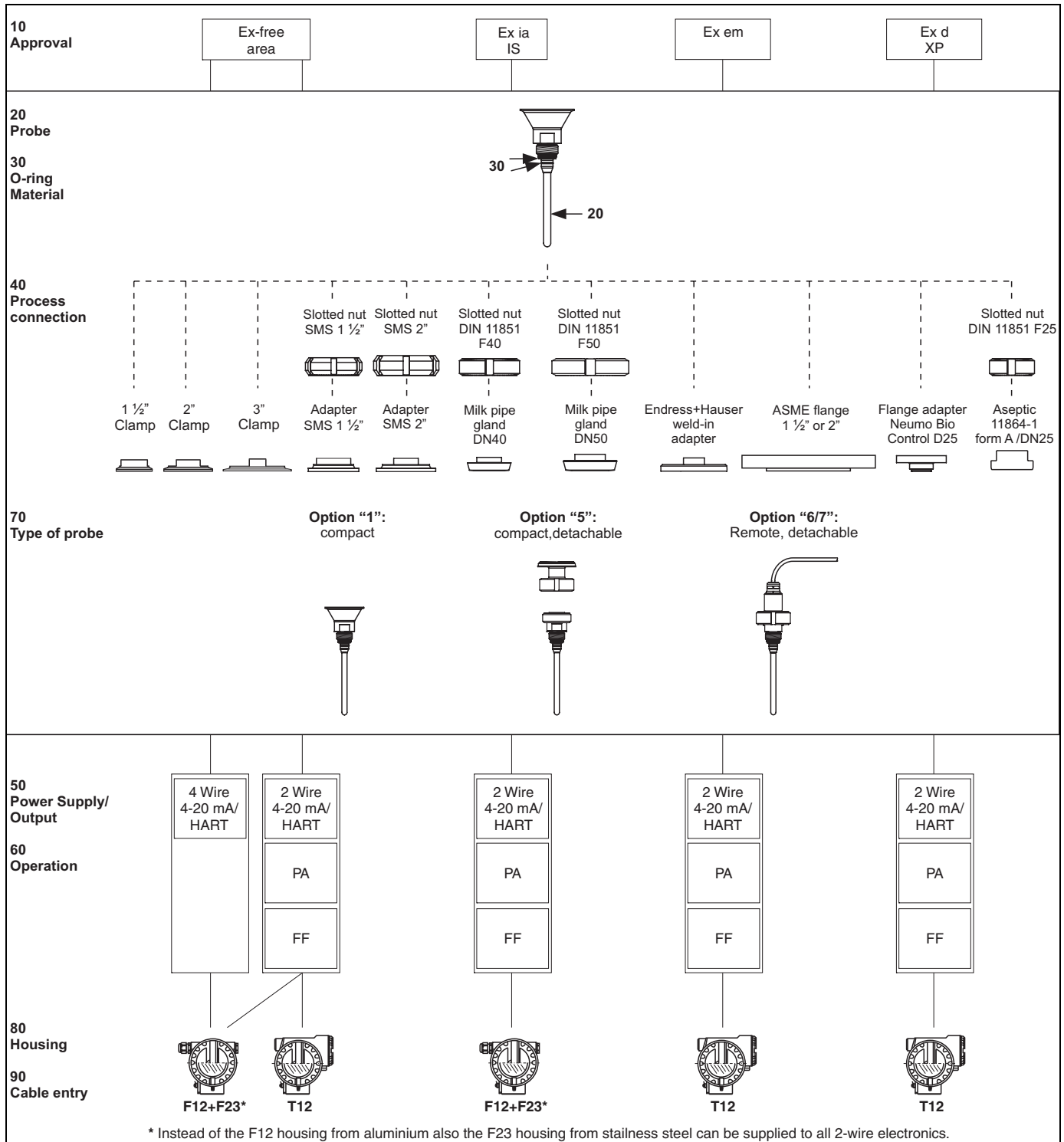
Reference point for "E" see above diagram.

The Levelflex possesses functions for the interference echo suppression that can be activated by the user. They guarantee that interference echoes from e.g. internals and struts are not interpreted as level echoes.

## Ordering information

Levelflex M FMP43

Instrument selection



L00-FMP43xxx-16-00-00-en-002



**Note!**  
 For orders with a display, the housing cover is delivered with an inspection glass. For orders without a display, a dummy cover is delivered.  
 Exception: For orders with the ATEX II 1/2 D dust ignition-proof certificate, a dummy cover is always delivered, even for orders with a built-in display.

In this diagram, mutually exclusive variants are not identified.

<b>10</b>	<b>Approval:</b>		
	A	Non-hazardous area	
	1	ATEX II 1/2 G Ex ia IIC T6	
	7	ATEX II 1/2 G Ex d (ia) IIC T6	
	5	ATEX II 1/2 G Ex ia IIC T6, ATEX II 1/3 D	
	3	ATEX II 2G Ex e mb (ia) IIC T6	
	2	ATEX II 1/2 D, Alu blind cover	
	4	ATEX II 1/3 D	
	M	FM DIP Cl. II Div. 1 Gr. E-G N. I.	
	S	FM IS Cl. I, II, III Div. 1 Gr. A-G N. I.	
	T	FM XP Cl. I, II, III Div. 1 Gr. A-G	
	N	CSA General Purpose	
	P	CSA DIP Cl. II Div. 1 Gr. G + coal dust, N. I.	
	U	CSA IS Cl. I, II, III Div. 1 Gr. A-D, G + coal dust, N. I.	
	V	CSA XP Cl. I, II, III Div. 1 Gr. A-D, G + coal dust, N. I.	
	K	*TIIS Ex ia IIC T4	
	I	*NEPSI Ex ia IIC T6	
	Y	Special version, to be specified	
<b>20</b>	<b>Probe:</b>		
		300 mm - 4000 mm/12 in - 157 in	
	K	..... mm, rod 8 mm, 316L, Ra < 0.76 µm/30 µin Price per 100 mm	
	M	..... in, rod 8 mm 316L, Ra < 0.76 µm/30 µin Price is based on one inch	
	S	..... mm, rod 8 mm, 316L, electropolished Ra < 0.38 µm/15 µin Price is based on 100 mm	
	T	..... in, rod 8 mm 316L, electropolished Ra < 0.38 µm/15 µin Price is based on one inch	
	Y	Special version, to be specified	
<b>30</b>	<b>O-ring Material; Temperature:</b>		
	5	EPDM, FDA, USP Cl. VI; - 20 °C to 130 °C	
	6	Kalrez, FDA, USP Cl. VI; - 20 °C to 150 °C	
	9	Special version, to be specified	
<b>40</b>	<b>Process Connection:</b>		
		– Threaded boss –	
	U1J	Thread M24, 316L, install > accessory weld-in adapter	
		– Clamp connections –	
	TCJ	Tri-clamp ISO2852 DN25-38 (1 to 1-1/2"), 316L, 3A, EHEDG	
	TDJ	Tri-clamp ISO2852 DN40-51 (2"), 316L, 3A, EHEDG	
	TFJ	Tri-clamp ISO2852 DN70-76.1 (3"), 316L, 3A, EHEDG	
		– Hygienic connections –	
	T7J	SMS 1-1/2" PN25, 316L, EHEDG	
	TXJ	SMS 2" PN25, 316L, EHEDG	
	MAJ	DIN11864-1 A DN25 tubr DIN11850, 316L, EHEDG	
	MQJ	DIN11851 DN40 PN40, 316L, EHEDG	
	MRJ	DIN11851 DN50 PN40, 316L, EHEDG	
	S1J	NEUMO BioControl DN25 PN16, 316L, EHEDG	
		– ANSI flanges –	
	AEJ	1-1/2" 150 lbs RF, 316L flange ANSI B16.5	
	AFJ	2" 150 lbs RF, 316L flange ANSI B16.5	
	YY9	Special version, to be specified	
<b>50</b>	<b>Power Supply; Output:</b>		
	B	2-wire ; 4 - 20mA SIL HART	
	D	2-wire; PROFIBUS PA	
	F	2-wire; FOUNDATION Fieldbus	
	G	4-wire 90 - 250 VAC; 4 - 20mA SIL HART	
	H	4-wire 10.5 - 32 VDC; 4 - 20mA SIL HART	
	Y	Special version, to be specified	
<b>60</b>	<b>Operation:</b>		
	1	W/o display, via communication	
	2	4-line display VU331,	
	3	Prepared for FHX40,	
	9	Special version, to be specified	
<b>70</b>	<b>Type of Probe:</b>		
	1	Compact, basic version	
	5	Compact, detachable	
	6	Remote, cable 3 m, detachable	
	7	Remote, cable 6 m, detachable	



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