



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Levelflex M FMP40

## Guided Level-Radar

Smart Transmitter for continuous level measurement in liquids and bulk solids.



### Application

The Levelflex M performs continuous level measurement of powdery to granular bulk solids e.g. plastic granulate and liquids.

Probes are available with threaded process connections from 3/4" and flanges from DN40 / 1 1/2":

- Rope probes, above all for measurement in bulk solids, measuring range up to 35 m/1378"
- Rod probes, above all for liquids
- Coax probes, for liquids

The following interfaces are available for system integration:

- HART (standard), 4...20mA
- PROFIBUS PA
- FOUNDATION Fieldbus

### Your benefits

- **Measurement independent of:**
  - Density, resp. Bulk density,
  - Temperature,
  - Dust, e.g. **during pneumatic filling.**
- **Measurement also possible with foam** on the surface.
- Simple, menu-guided on-site operation with four-line plain text display.
- On-site envelope curve on the display for easy diagnosis.
- Easy operation, diagnosis and measuring point documentation with the supplied ToF Tool operating program.
- Optional remote display and operation.
- With coax probes the measurement is completely independent of internals in the tank and of the installation in the nozzle.
- Probe rod and probe rope can be replaced.
- Application in safety related systems (overspill protection) with requirements for functional safety up to SIL 2 in accordance to IEC 61508/IEC 61511-1.



TI358F/00/en

# Endress+Hauser



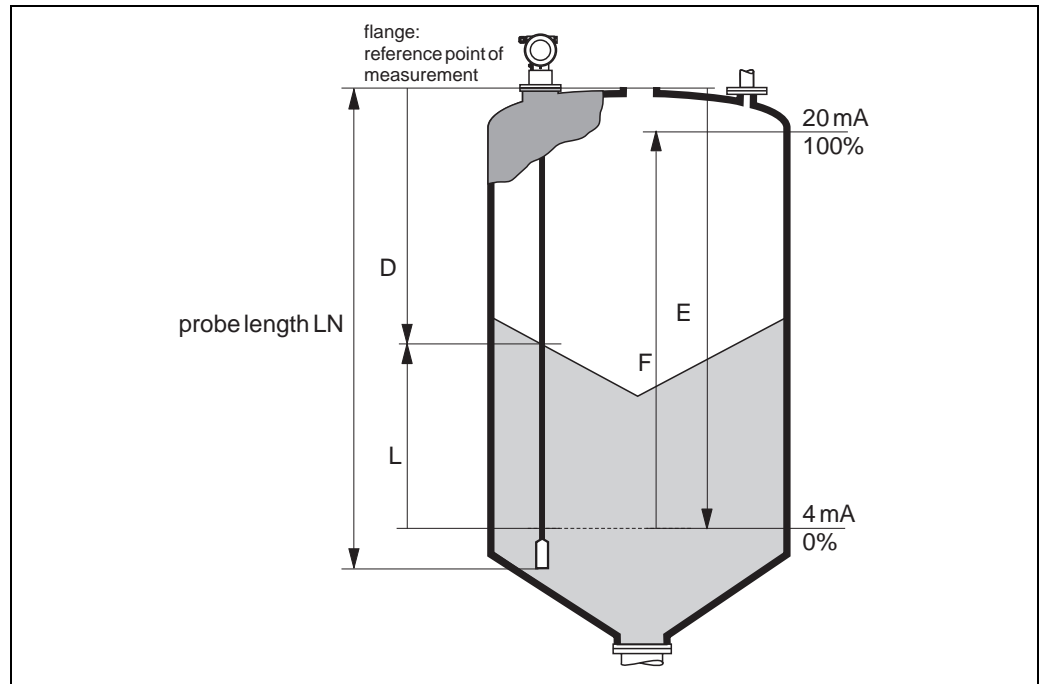
People for Process Automation

## 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 → 34) 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).



Reference point of measurement, details → 34

100-FMP4xxxx-15-00-00-en-002

### 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 impulse:

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

with c being the speed of light.

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

$$L = E - D$$

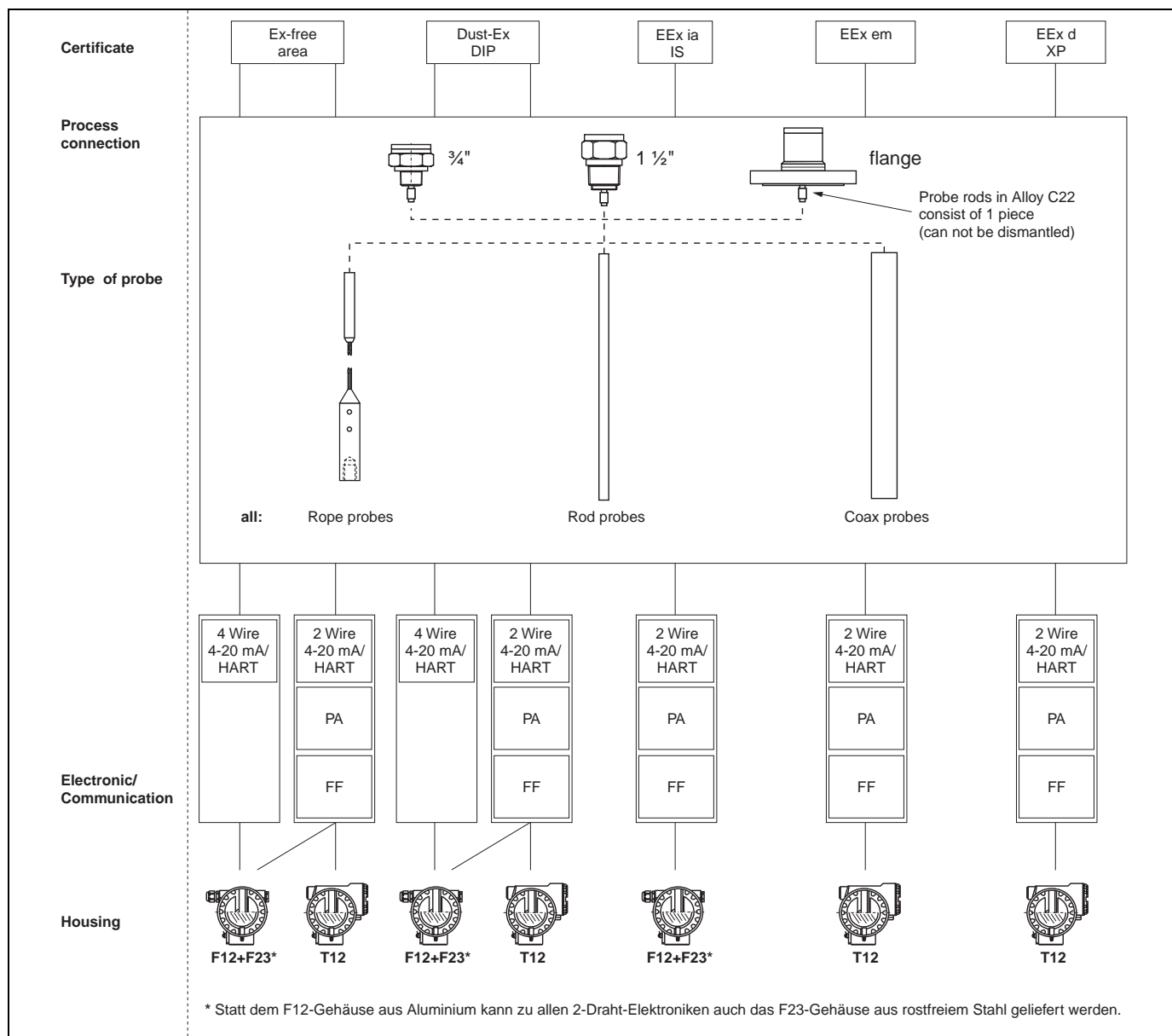
Reference point for "E" see above diagram.

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 FMP40

Instrument selection



100-FMP4xxxx-16-00-00-en-001

<b>Temperature:</b> (depended on o-ring)	<b>V</b> Viton, -30 °C...+150 °C (-22 °F...+302 °F)		
	<b>E</b> EPDM, -40 °C...+120 °C (-40 °F...+248 °F)		
	<b>K</b> Kalrez, -5 °C...+150 °C (23 °F...+302 °F)		
<b>Pressure:</b> (all types)	-1...40 bar (...580 psi)		
<b>Wetted parts</b>	<table border="0"> <tr> <td>Rope probes: Process connection: 1.4435 (SS316L), 1.4462 Rope: 1.4401 (SS316) Weight: 1.4435 (SS316L)</td> <td>Rod probes: Process connection: 1.4435 (SS316L) Rod and coax pipe: 1.4435 (SS316L)</td> </tr> </table>	Rope probes: Process connection: 1.4435 (SS316L), 1.4462 Rope: 1.4401 (SS316) Weight: 1.4435 (SS316L)	Rod probes: Process connection: 1.4435 (SS316L) Rod and coax pipe: 1.4435 (SS316L)
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The bare metallic probes are only insulated in the area of the bushing. Thus there is no danger of electrostatic charging. The PA-coated rope has been tested and there is no dangerous electrostatic charging. As a result, there are no restrictions on use in Ex-areas for any of the probes.

**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.

**Ordering structure Levelflex M FMP40**

<b>10</b>	<b>Approval:</b>	
	A	Non-hazardous area
	F	Non-hazardous area, WHG
	1	ATEX II 1/2G EEx ia IIC T6/IECEx Zone 0/1
	2	ATEX II 1/2D, Alu blind cover
	3	ATEX II 2G EEx em (ia) IIC T6/IECEx Zone1
	4	ATEX II 1/3D
	5	ATEX II 1/2G EEx ia IIC T6, ATEX II 1/3D
	6	ATEX II 1/2G EEx ia IIC T6, WHG
	7	ATEX II 1/2G EEx d (ia) IIC T6
	8	ATEX II 1/2G EEx ia IIC T6, ATEX II 1/3D, WHG
	G	ATEX II 3G EEx nA II T6
	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	*TIS Ex ia IIC T4
	L	TIS Ex d (ia) IIC T5
	D	AUS Ex DIP A20/A21
	Y	Special version
<b>20</b>	<b>Probe:</b>	
	A	Rope 4mm / 1/6", mainly liquids
	B	Rope 6mm / 1/4", solid
	H	Rope 6mm / 1/4", PA > steel, solid, T <sub>max</sub> = 212 °F
	P	Rod 6mm, liquids
	1	Rod 12mm, liquids
	K	Rod 16mm, mainly liquids
	L	Coax, liquids
	Y	Special version
<b>30</b>	<b>Probe length:</b>	
	A	..... mm, rope 4mm, 316
	B	..... mm, rope 6mm, 316
	C	..... inch rope 1/6", 316
	D	..... inch, rope 1/4", 316
	E	..... mm, rope 6mm, PA > Stahl
	F	..... inch, rope 1/4", PA > Stahl
	K	..... mm, rod 16mm, 316L
	L	..... mm, coax, 316L
	M	..... inch, rod 16mm, 316L
	N	..... inch, coax, 316L
	P	..... mm, rod 6mm, 316L
	R	..... inch, rod 6mm, 316L
	1	..... mm rod 12mm, AlloyC22
	2	..... mm coax, AlloyC22
	3	..... inch, rod 12mm, AlloyC22
	4	..... inch, coax, AlloyC22
	Y	Special version
<b>40</b>	<b>O-ring Material; Temperature:</b>	
	2	Viton; -30...150°C/-22...302°F
	3	EPDM; -40...120°C/-40...248°F
	4	Kalrez; -5...150°C/23...302°F
	9	Special version
<b>FMP40-</b>		
	Product designation (part 1)	

Ordering structure Levelflex M FMP40 (continued)

50					Process Connection:					
					ACJ	1-1/2" 150lbs RF, 316/316L flange ASME B16.5				
					ACM	1-1/2" 150lbs, AlloyC22 >316/316L flange ASME B16.5				
					ADJ	1-1/2" 300lbs RF, 316/316L flange ASME B16.5				
					ADM	1-1/2" 300lbs, AlloyC22 >316/316L flange ASME B16.5				
					AEJ	2" 150lbs RF, 316/316L flange ASME B16.5				
					AEM	2" 150lbs, AlloyC22 >316/316L flange ASME B16.5				
					AFJ	2" 300lbs RF, 316/316L flange ASME B16.5				
					AFM	2" 300lbs, AlloyC22 >316/316L flange ASME B16.5				
					ALJ	3" 150lbs RF, 316/316L flange ASME B16.5				
					ALM	3" 150lbs, AlloyC22 >316/316L flange ASME B16.5				
					AMJ	3" 300lbs RF, 316/316L flange ASME B16.5				
					AMM	3" 300lbs, AlloyC22 >316/316L flange ASME B16.5				
					APJ	4" 150lbs RF, 316/316L flange ASME B16.5				
					APM	4" 150lbs, AlloyC22 >316/316L flange ASME B16.5				
					AQJ	4" 300lbs RF, 316/316L flange ASME B16.5				
					AQM	4" 300lbs, AlloyC22 >316/316L flange ASME B16.5				
					AWJ	6" 150lbs RF, 316/316L flange ASME B16.5				
					AWM	6" 150lbs, AlloyC22 >316/316L flange ASME B16.5				
					A3J	8" 150lbs RF, 316/316L flange ASME B16.5				
					CFJ	DN40 PN25/40 B1, 316L flange EN1092-1 (DIN2527 C)				
					CFM	DN40 PN25/40, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CGJ	DN50 PN25/40 B1, 316L flange EN1092-1 (DIN2527 C)				
					CGM	DN50 PN25/40, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CMJ	DN80 PN10/16 B1, 316L flange EN1092-1 (DIN2527 C)				
					CMM	DN80 PN10/16, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CSJ	DN80 PN25/40 B1, 316L flange EN1092-1 (DIN2527 C)				
					CSM	DN80 PN25/40, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CQJ	DN100 PN10/16 B1, 316L flange EN1092-1 (DIN2527 C)				
					CQM	DN100 PN10/16, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CTJ	DN100 PN25/40 B1, 316L flange EN1092-1 (DIN2527 C)				
					CTM	DN100 PN25/40, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CWJ	DN150 PN10/16 B1, 316L flange EN1092-1 (DIN2527 C)				
					CWM	DN150 PN10/16, AlloyC22 >316L flange EN1092-1 (DIN2527)				
					CXJ	DN200 PN16 B1, 316L flange EN1092-1 (DIN2527 C)				
					CRJ	Thread ISO228 G3/4, 316L				
					GRJ	Thread ISO228 G1-1/2, 316L				
					GRM	Thread ISO228 G1-1/2, AlloyC22				
					CNJ	Thread ANSI NPT3/4, 316L				
					GNJ	Thread ANSI NPT1-1/2, 316L				
					GNM	Thread ANSI NPT1-1/2, AlloyC22				
					KDJ	10K 40A RF, 316L flange JIS B2220				
					KDM	10K 40A, AlloyC22 >316L flange JIS B2220				
					KEJ	10K 50A RF, 316L flange JIS B2220				
					KEM	10K 50A, AlloyC22 >316L flange JIS B2220				
					KLJ	10K 80A RF, 316L flange JIS B2220				
					KLM	10K 80A, AlloyC22 >316L flange JIS B2220				
					KPJ	10K 100A RF, 316L flange JIS B2220				
					KPM	10K 100A, AlloyC22 >316L flange JIS B2220				
					YY9	Special version				
60					Power Supply; Output:					
					B	2-wire; 4-20mA HART				
					D	2-wire; PROFIBUS PA				
					F	2-wire; FOUNDATION Fieldbus				
					G	4-wire 90-250VAC; 4-20mA HART				
					H	4-wire 10.5-32VDC; 4-20mA HART				
					Y	Special version				
FMP40-										Product designation (part 2)

**Ordering structure Levelflex M FMP40 (continued)**

<b>70</b>	<b>Operation:</b>
	1 W/o display, via communication 2 4-line display VU331, Envelope curve display on site 3 Prepared for FHX40, Remote display (Accessory) 9 Special version
<b>80</b>	<b>Type of Probe:</b>
	1 Compact, basic version 2 Temp. separator, 400mm 3 Remote, cable 3m, top entry 4 Remote, cable 3m, side entry 9 Special version
<b>90</b>	<b>Housing; Cable Entry:</b>
	A F12 Alu, coated IP68; gland M20 B F12 Alu, coated IP68; thread G1/2 C F12 Alu, coated IP68; thread NPT1/2 D F12 Alu, coated IP68; plug M12 E F12 Alu, coated IP68; plug 7/8" G T12 Alu, coated IP68; gland M20 H T12 Alu, coated IP68; thread G1/2 J T12 Alu, coated IP68; thread NPT1/2 K T12 Alu, coated IP68; plug M12 L T12 Alu, coated IP68; plug 7/8" M T12 Alu, coated IP68; gland M20 + OVP OVP = overvoltage protection N T12 Alu, coated IP68; thread G1/2 + OVP OVP = overvoltage protection P T12 Alu, coated IP68; thread NPT1/2+OVP OVP = overvoltage protection Q T12 Alu, coated IP68; plug M12 + OVP OVP = overvoltage protection R T12 Alu, coated IP68; plug 7/8" + OVP OVP = overvoltage protection 1 F23 316L IP68; gland M20 2 F23 316L IP68; thread G1/2 3 F23 316L IP68; thread NPT1/2 4 F23 316L IP68; plug M12 5 F23 316L IP68; plug 7/8" 9 Special version
<b>100</b>	<b>Additional Option:</b>
	A Basic version B EN10204-3.1 material, rod/coax, (316L wetted parts) inspection certificate C EN10204-3.1 material, rope, (316L wetted parts) inspection certificate N EN10204-3.1 material, NACE MR0175 (316L wetted parts) inspection certificate S GL/ABS marine certificate Y Special version
<b>FMP40-</b>	Complete product designation

**Please enter probe length in mm or inch / 0.1 inch**

mm

inch / 0.1 inch

probe length LN → 34

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