Level

Pressure

Flow

Temperature

Analytics

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Level measurement

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Level switch selection table

Legend: ■ = Applicable · ◪ = Applicable with restrictions · □ = Not applicable

	Conductivity level switches	Liquiphant level switches	Soliphant level switches	Capacitive level switches	Rotary paddle level switches
Solids	□	□	■	■	■
Liquid, conductive	■	■	□	■	□
Liquid, non-conductive	□	■	□	■	□
Solid particles > 10mm	□	□	□	■	■
Solid particles 5-10mm	□	□	■	■	■
Solid particles < 5mm	□	□	■	■	■
Pressure: 0 - 16 bar	■	■	■	■	□
Pressure: 0 - 40 bar	■	■	□	■	□
Pressure: 0 - 64 bar	■	■	□	■	□
Temperature: -20...+80°C	■	■	■	■	■
Temperature: -20...+150°C	■	■	■	■	□
Temperature: -20...+200°C	□	280°C	280°C	■	□
Teflon/Halar coating	□	■	◪	■	□
Viscosity > 100mm^2/sec	■	■	□	■	□
Viscosity > 10,000mm^2/sec	■	□	□	■	□

Applicable	■
Applicable with restrictions	◪
Not applicable	□

Continuous level selection table

	Hydrostatic level measurement	Capacitive level measurement	Ultrasonic level measurement	Radar level measurement	Guided wave radar level measurement
Vacuum (< 0.5 bar absolute)					
Pressure: 0.5 - 3.5 bar					
Pressure: 0 - 64 bar					
Pressure: > 64 bar (on request)				160 bar	400 bar
Temperature: -20...+80℃					
Temperature: -20...+200℃			< 150˚C		
Temperature > 250℃				450˚C	450˚C
Teflon/PVDF coating					
Other materials possible	Hastelloy C stainless steel/Ti/Ta	PFA	Stainless steel/PP	Various	
Tank with agitator mechanism					
Top installation					
Bottom installation					
Liquids					
Viscosity > 4,000mm^2/sec					
Solids					
Powders					
Large particles					

Applicable	
Applicable with restrictions	
Not applicable	

Level

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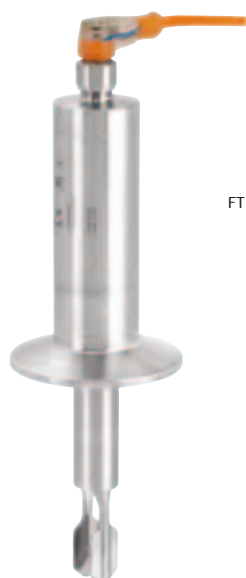Recorders &
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Liquiphant FTL31/33

Compact level limit switch for liquids.

FTL31

FTL33

- Smallest vibronic sensor on the market
- Robust stainless steel design
- Plug & play: no adjustment necessary
- Continuous self-monitoring
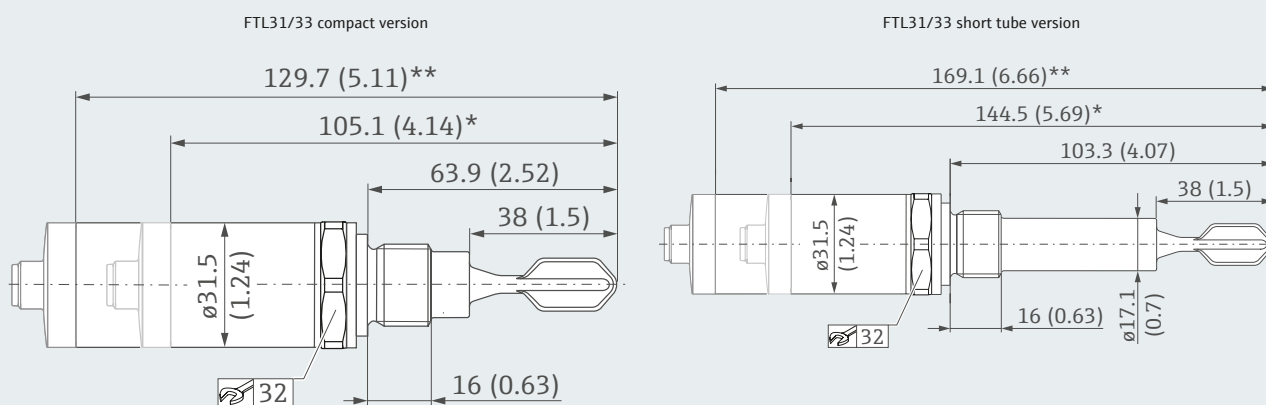- External function test with test magnet

The Liquiphant FTL31 liquid level switch is designed for industrial applications across all industries. It is ideal for overfill prevention or pump dry-run protection in cleaning and filter systems as well as in cooling and lubrication vessels.

3-A and EHEDG certified, the Liquiphant FTL33 is especially designed for hygienic applications in the food & beverage industry. It is perfect for overfill prevention or pump dry-run protection in storage tanks, mixing vessels and pipes. Better still, it offers CIP and SIP cleaning as standard and IP69K protection as an option.

Technical data

		FTL31	FTL33
Version	:	Process	Hygienic (3-A and EHEDG compliant)
Surface roughness	:	Ra ≤3.2µm	Ra ≤1.5µm (EHEDG), Ra ≤0.76µm (EHEDG, 3-A)
Temperature	:	-1 to +40 bar	-1 to +40 bar
Min denisty of medium	:	> 0.7g/cm³ (> 0.5g/cm³ optional)	> 0.7g/cm³ (> 0.5g/cm³ optional)
Solids content	:	ø < 5mm	ø < 5mm
Switch point	:	13mm ±1mm	13mm ±1mm
Process connections	:	Threads	Threads, hygienic

Level

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Dimensions (mm)

FTL31/33 compact version

129.7 (5.11)**
105.1 (4.14)*
63.9 (2.52)
38 (1.5)
ø31.5 (1.24)
32
16 (0.63)

FTL31/33 short tube version

169.1 (6.66)**
144.5 (5.69)*
103.3 (4.07)
38 (1.5)
ø31.5 (1.24)
32
16 (0.63)
ø17.1 (0.7)

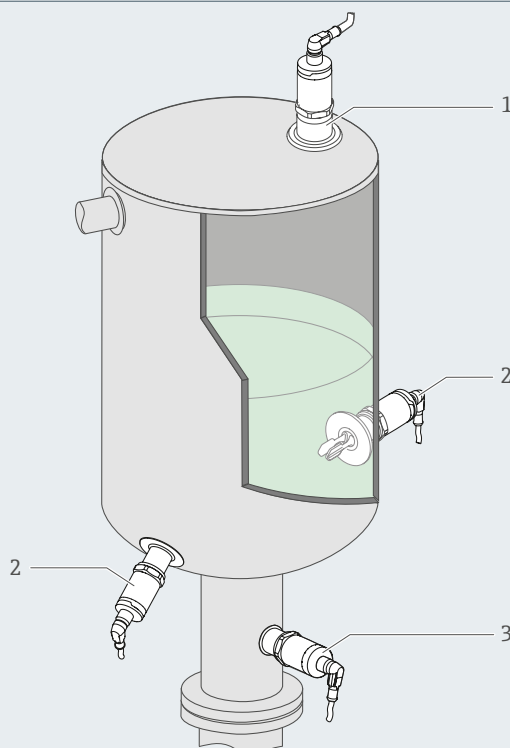## Installation

Installation options:

1. Overfill prevention or upper level detection
2. Lower level detection
3. Dry run protection for pump

1

2

2

3

Level

Pressure

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Temperature

Analytics

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Liquiphant M FTL50/51/51C

Vibrating liquid level switch.
Suitable for use in hazardous areas.

Liquiphant M FTL50
with plastic housing and
G¾" process connection.

FTL51C ECTFE coated
fork, extension and flange.
Aluminium housing.

- **Functional safety up to SIL3
  (IEC61508/IEC61511)**
- **¾" process connection for use in
  small spaces**
- **Maintenance-free – no moving
  parts**
- **Unique fork corrosion monitoring
  system**

Applications
The Liquiphant M is a level switch for
use with all types of liquid:
- Temperatures between -40ºC
  and +150ºC
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm^2/s
- Density of 0.5g/cm^3 and above

Operation is not affected by flow,
turbulence, air bubbles, foam,

vibration, solid constituents or build-
up. The Liquiphant is therefore the
ideal replacement for float switches.

Hastelloy C, ECTE, PFA and enamelled
versions are available for use with very
corrosive liquids. EEx ia and EEx d(e)
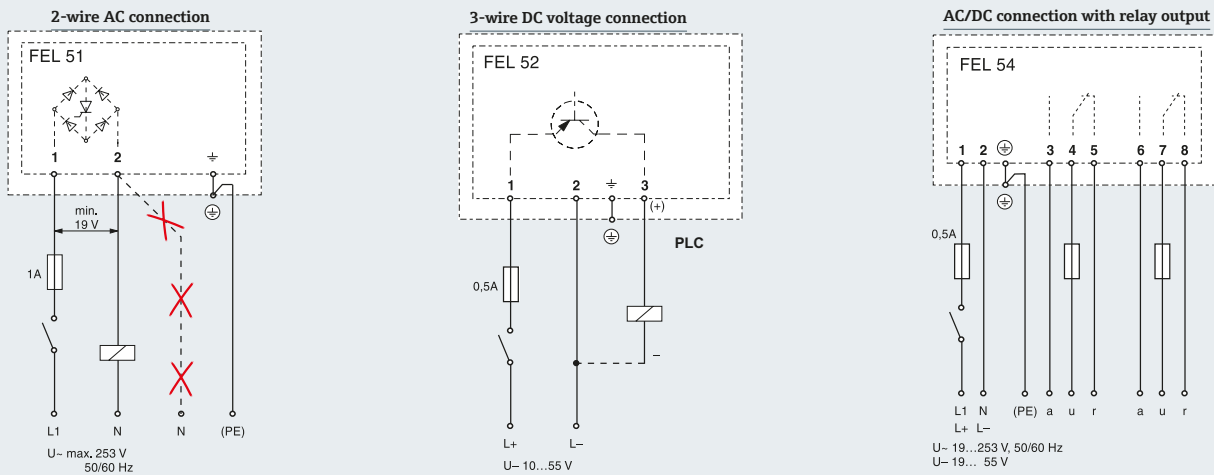protection allow use in hazardous
areas.

Important features
- Large choice of process connections
  for universal use.
- Process connections starting at ¾"
  and the small vibrating fork allow
  use in tight spaces.
- Large selection of electrical outputs,
  e.g. 8...16mA, NAMUR, relay,
  thyristor and PFM signal outputs:
  a suitable signal for any process
  control.
- No adjustment: rapid and
  economical commissioning.
- No mechanical moving parts:
  maintenance-free, no wear and
  tear.
- Sensor has function monitoring to
  check for damage: safe and reliable.
- ATEX II certified.
- Gastight sensor cable feed-through
  available as an option.

Technical data

Process temperature	: Between -40°C...+150ºC
Process pressure	: -1 bar...100 bar
Product density	: > 0.5g/cm^3
Viscosity	: < 10,000mm^2/s (cSt)
Power supply/output	: See options
Sensor material	: Stainless steel 316L (1.4435), optional: Hastelloy C22
Process connections	: G¾", G1" thread or DIN/ANSI flanges from DN25/1" (other process connections optional)
Housing material	: PBT-FR polyester, epoxy coated aluminium (EEx d version without cable entry but with ¾" tapped hole)
Degree of protection	: IP66/IP67
Certificates	: WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA

Electrical connection

2-wire AC connection

FEL 51

min.
19 V

1A

1   2

L1   N   N   (PE)

U~ max. 253 V
50/60 Hz

3-wire DC voltage connection

FEL 52

1   2   3

(+)

PLC

0,5A

L+   L−
U− 10…55 V

AC/DC connection with relay output

FEL 54

1   2   3   4   5   6   7   8

0,5A

L1   N   (PE)   a   u   r   a   u   r
L+   L−
U~ 19…253 V, 50/60 Hz
U− 19… 55 V

Installation examples
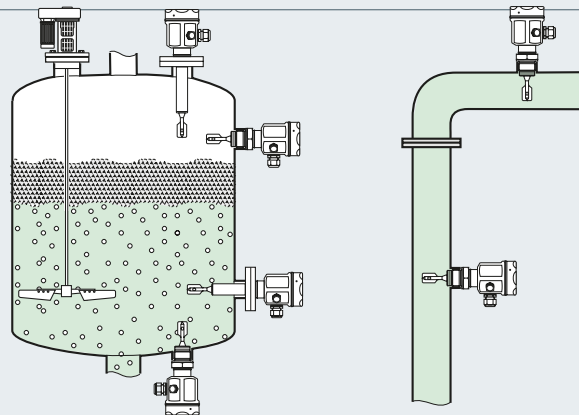
Process connections and welding sleeves for FTL50 and FTL51

process connection	dimensions	welding sleeve	dimensions
BSP ¾" GQ2	66.5	For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001052	26 21 ø32 G ¾ ISO 228 ø55 −0,4
G1" GW2	80	For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001051, 60mm dia. version 129855-0000, 65mm dia. version (standard)	29,6 24,6 ø41 G1 ISO 228 ø60 −0,4

Other process connections possible.

- For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
- To download technical documentation, please visit our website: www.uk.endress.com
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Liquiphant M FTL50H/51H

For universal application with food and pharmaceutical products. Suitable for hazardous areas.

Liquiphant M FTL50H with stainless steel housing and Triclamp.

Liquiphant M FTL50H with plastic housing and G¾" process connection.

- Vibrating fork length 40mm, connection from ¾" or DN25 flange
- New electronics variants, 8...16mA for a 4...20mA loop or a NAMUR switching signal in accordance with EN 50227
- Active function safety device in line with quiescent current principle (min/max failsafe adjustable)

Applications

The Liquiphant M is a level switch for use with all types of liquid:

- Temperatures between - 40ºC and +150ºC
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm^2/s
- Density of 0.5g/cm^3 and above.

Operation is not affected by flow, turbulence, air bubbles, foam, vibration, solid constituents or build-up. The Liquiphant is therefore the ideal replacement for float switches.

A version in highly durable Hastelloy C is available for use with very corrosive liquids. EEx ia and EEx d protection allow use in hazardous areas.
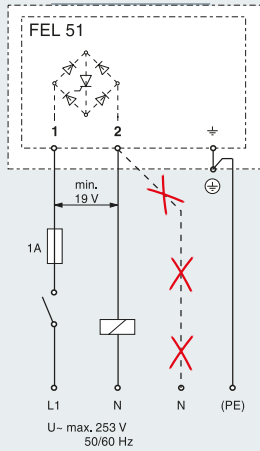
Important features

- Wide range of process connections.
- Wet components made entirely in 316L, including the weld seam.
- EHEDG and 3-A certified.
- Process connections starting at ¾" and the small vibrating fork allow use in tight spaces.
- Large selection of electrical outputs, e.g. 8...16mA, NAMUR, relay, thyristor and PFM signal outputs: a suitable signal to any process control.
- No adjustment: rapid and economical commissioning.
- No mechanical moving parts: maintenance free, no wear and tear.
- Sensor has function monitoring to check for damage: safe and reliable.
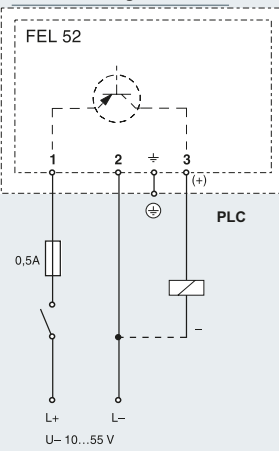
Technical data

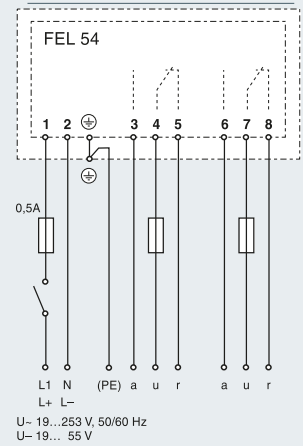|	
Process temperature	: Between -40ºC...+150ºC
Process pressure	: -1 bar...100 bar
Product density	: > 0.5g/cm^3
Viscosity	: < 10,000mm^2/s (cSt)
Power supply/output	: See options
Sensor material	: Stainless steel 316L (1.4435), optional: Hastelloy C22
Process connections	: G¾" , G 1" thread or DIN/ANSI flanges from DN25/1" (other process connections optional)
Housing material	: PBT-FR polyester, stainless steel 316L (1.4435)
Degree of protection	: IP66/IP67
Certificates	: WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA, EHEDG, 3-A

Electrical connection

| 2-wire AC connection	3-wire DC voltage connection	AC/DC connection with relay output

FEL 51

1   2   ⏚

min.
19 V

1A

L1   N   N   (PE)

U~ max. 253 V
50/60 Hz

FEL 52

1   2   ⏚   3
(+)
⏚
PLC

0,5A

L+   L−

U− 10…55 V

FEL 54

1   2   ⏚   3   4   5   6   7   8
⏚

0,5A

L1   N   (PE)   a   u   r   a   u   r
L+   L−

U~ 19…253 V, 50/60 Hz
U− 19… 55 V

Process connections

process connection	dimensions	welding sleeve	dimensions
BSP ¾" GQ2	66.5	For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001052	26 / 21 / Ø32 / G ¾ ISO 228 / Ø55−0,4
G1 GW2	80	For flush installation Material: stainless steel 316L (1.4435) Seal: silicone O-ring. Remove standard sensor gasket. Sensor cannot be aligned. Part number 52001051, 60 mm dia. version 129855-0000, 65mm dia. version (standard)	29,6 / 24,6 / Ø41 / G1 ISO 228 / Ø60−0,4
Flush mounted EE2	56.5	For high-grade sanitary installation. Fork can be aligned. Material: stainless steel 316L (1.4435) Seal: silicone O-ring (included). Part no. 52001047	4,5 / RD 52 x ¹/₆ / Ø 42.3 / Ø 65 / ~26
Varivent WE2	56.5 / Ø68		

Other sanitary process connections such as Tri-Clamp, DIN11851 dairy and aseptic couplings are also available.

ℹ
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- To download technical documentation, please visit our website: www.uk.endress.com
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Liquiphant S FTL70/71

For universal use in liquids in temperatures up to 280 ˚C. Suitable for hazardous areas.
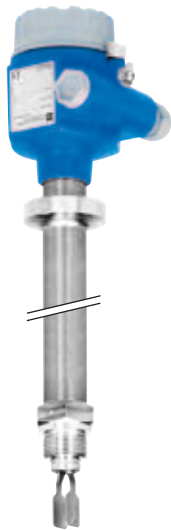
FTL70 with G1″
process connection
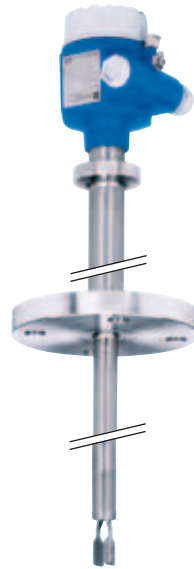
FTL71 with DN50
process connection

- Vibrating fork length 40mm, connection from ¾″ or DN25 flange
- For use in SIL2/3 certified applications
- Active function safety device in line with quiescent current principle (min/max failsafe adjustable)
- Not susceptible to temperature shocks

Applications
The Liquiphant S is a level switch for use in all types of liquid:
- Temperatures between -40ºC and +280ºC
- Maximum pressure of up to 100 bar
- Viscosity of up to 10,000mm^2/s
- Density of 0.5g/cm^3 and above

Operation is not affected by flow, turbulence, air bubbles, foam, vibration, solid constituents or build-up. The Liquiphant is therefore the ideal replacement for float switches. A Hastelloy C version is available for use with very corrosive liquids. EEx ia and EEx d(e) protection allow use in hazardous areas. For use as a SIL2/3 certified level switch.
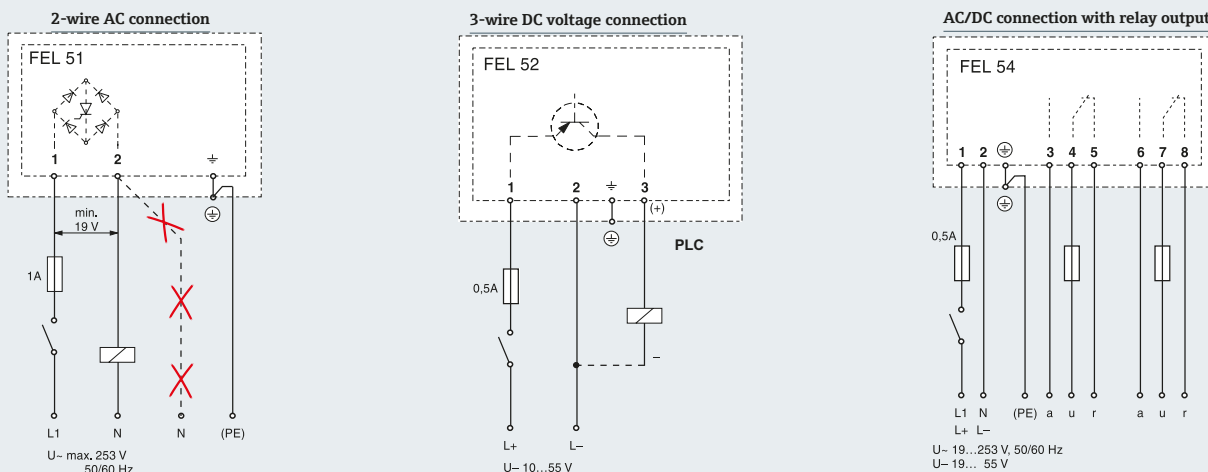
Important features
- Wide range of process connections.
- Process connections starting at ¾″ and the small vibrating fork allow use in tight spaces.
- Large selection of output options, e.g. 8...16mA, NAMUR, relay, thyristor and PFM signal outputs: a suitable signal for any process control.
- No adjustment: rapid and economical commissioning.
- No mechanical moving parts: maintenance-free, no wear and tear.
- Sensor has function monitoring to check for damage: safe and reliable.
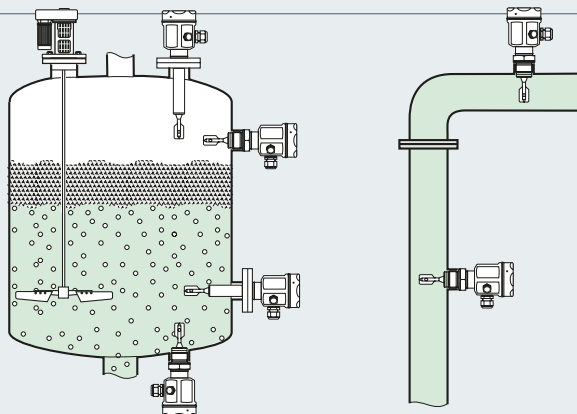- Second gas-tight sensor cable feed-through provided as standard.

Technical data

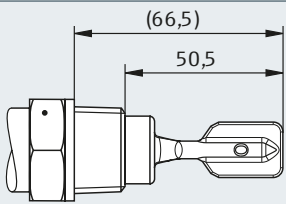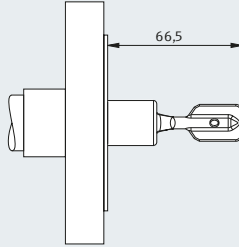|	
Process temperature	: Between -40ºC...+280ºC
Process pressure	: -1 bar...100 bar
Product density	: > 0.5g/cm^3
Viscosity	: < 10,000mm^2/s (cSt)
Power supply/output	: See options
Sensor material	: Stainless steel 31803 (1.4462), optional : Hastelloy C22
Process connections	: G¾″, G1″ thread or DIN/ANSI flanges from DN25/1″ (other process connections optional)
Housing material	: PBT FR polyester, epoxy coated aluminium (EEx d version without cable entry but with ¾″ tapped hole)
Protection	: IP66/IP67
Certificates	: WHG (overfill protection), ATEX, EEx ia, EEx d, EEx de, FM, CSA

Level

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Electrical connection

2-wire AC connection

FEL 51

1   2

min.
19 V

1A

L1   N   N   (PE)

U~ max. 253 V
50/60 Hz

3-wire DC voltage connection

FEL 52

1   2   3
(+)

PLC

0,5A

L+   L–

U– 10…55 V

AC/DC connection with relay output

FEL 54

1   2   ⊕   3   4   5   6   7   8

0,5A

L1   N   (PE)   a   u   r   a   u   r
L+   L–

U~ 19…253 V, 50/60 Hz
U– 19… 55 V

Installation examples

FTL70 and FTL71 process connections

process connection	dimensions	pressure and temperature
¾" NPT GM2	(66,5) 50,5	max. 64 bar max. 280°C
Flange ANSI A ## CIN2525 B ###	66,5	max. 64 bar max. 280°C

Other process connections available.

- For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
- To download technical documentation, please visit our website: www.uk.endress.com
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Liquiphant FailSafe FTL80/81/85/825

For functional safety applications requiring a high degree of failure safety and availability.

FTL80   FTL81   FTL85   FTL825
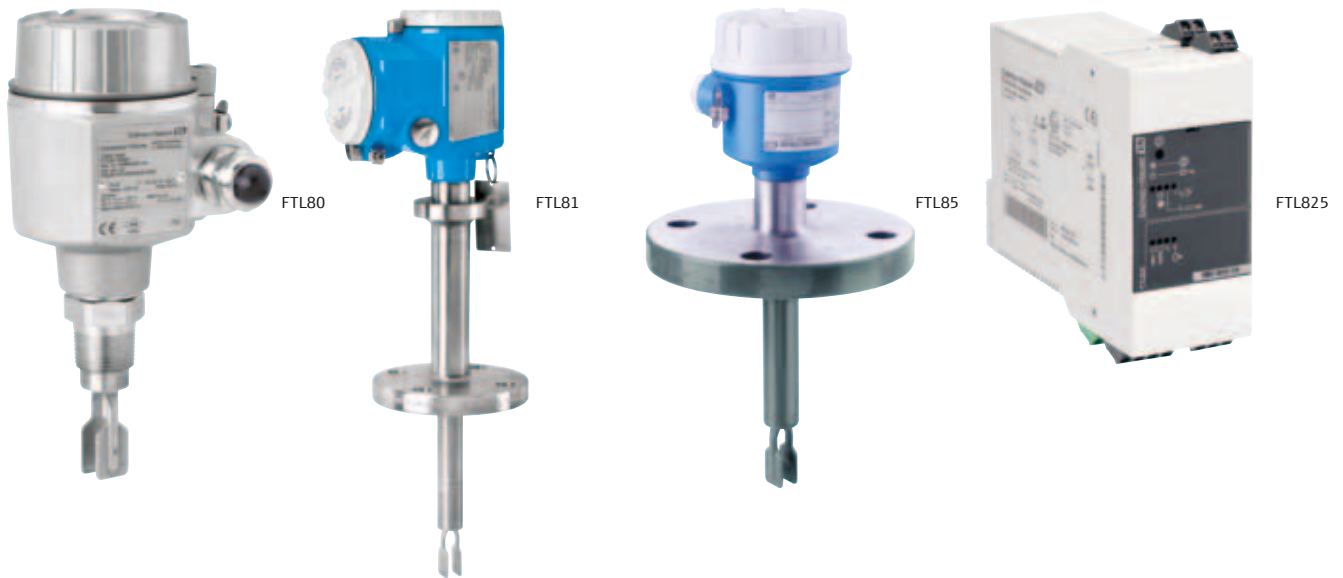
- **Min/max safety applications up to SIL3**
- **Permanent live signal monitors function safety**
- **Proof testing according to IEC 61508/IEC 61511**
- **Slave devices tested at the touch of a button**

The Liquiphant FailSafe point level switch offers Safety Integrity Levels up to SIL3 with a single instrument, making it ideal for functional safety applications requiring a high degree of failure safety and availability. The high SIL rating is achieved by dual redundancy and permanent self-monitoring of the instrument. In addition, a constant live signal monitors vital functions.

Another benefit is the significantly simplified proof test according to IEC 61508/IEC 61511 functional safety requirements. This allows the proof test interval to be extended by up to 12 years. Downstream devices in the safety loop such as valves are checked by simply pressing a button at the sensor or switching unit – saving both time and money.

Liquiphant FailSafe FTL80, FTL81 and FTL85 are available with a variety of coatings to cope with even highly corrosive media. Additional options provide a special design and materials to allow the sensor to resist process temperatures of up to 280°C. All of the relevant international explosion protection certificates are also available. Liquiphant FailSafe can either be directly integrated into a (safety) PLC via a 4-20mA interface or can be installed with the Nivotester FailSafe FTL825.

All of the general advantages of the vibration measuring principle apply: measurements are unaffected by the physical properties of the medium such as conductivity, dielectric constant or density changes, foam and turbulence do not influence the measurement and there is no need to calibrate for the respective medium.

Technical data

Process temperature	: -60°C...+280°C
Process pressure	: Up to 100 bar
Product density	: From 0.4 g/cm³
Viscosity	: Up to 10000 mPa·s
Sensor material	: Stainless steel, Hastelloy or coated
Process connections	: Thread or flange
Housing material	: Polyester, stainless steel or aluminium
Degree of protection	: IP66, IP67, IP68/NEMA 4X/6P (depending on housing)
Certificates	: ATEX, IEC Ex, FM, NEPSI

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Installation

Switch points on the sensor depend on the mounting position (outside reference conditions).
A: Mounting from above
B: Mounting from below
C: Mounting from the side

A   B   C

18 (0.71)   38 (1.5)

18 (0.71)   38 (1.5)

7 (0.28)   7 (0.28)

mm (in)
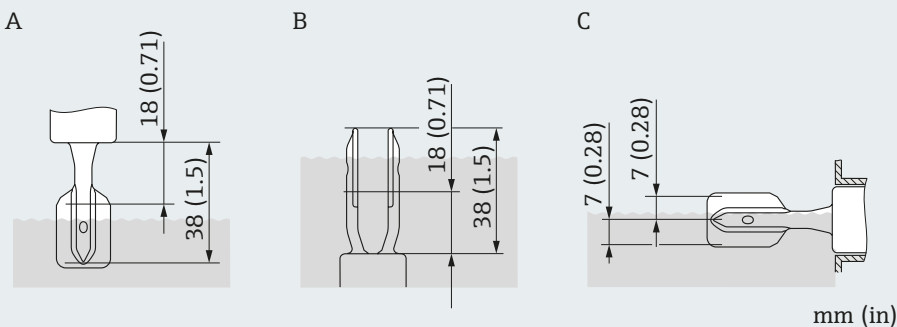
Optimum mounting

Position the fork so that the narrow edge of the tines is vertical to ensure that the liquid can run off easily.
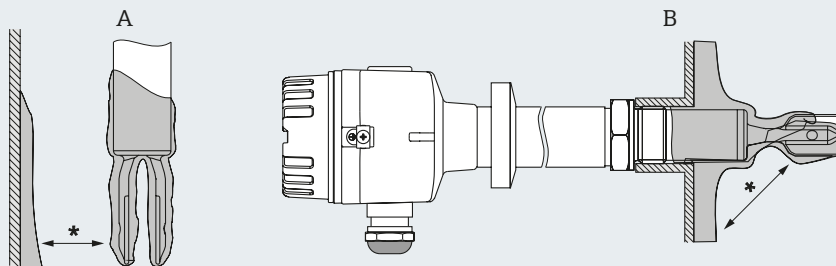A: Vertical from above
B: Flush-mounted from the side

A   B
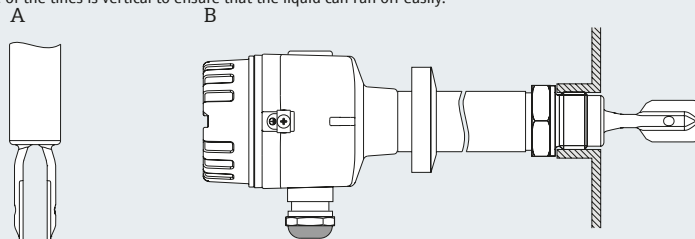
Mounting with build-up on the tank walls

Ensure that there is sufficient distance between the buildup expected on the tank wall and the fork.
A: Vertical from above
B: Protruding into the tank from the side

A   B

*   *

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▪ To download technical documentation, please visit our website: www.uk.endress.com
▪ For product selection help, try our online Application tool: www.uk.endress.com/applicator

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Nivotester FTL325P/375P

Level limit switches with intrinsically safe signal circuit for connection to Liquiphant and Soliphant.

FTL325P,
single channel

FTL325P,
3-channel

- Intrinsically safe signal circuits [EEx ia] for problem-free use in hazardous areas
- Highest functional SIL safety – fault-free PFM technology, line monitoring through to sensor, corrosion monitoring of tuning fork (Liquiphant)
- Compact housing for simple series installation on standard rails in switch cabinet
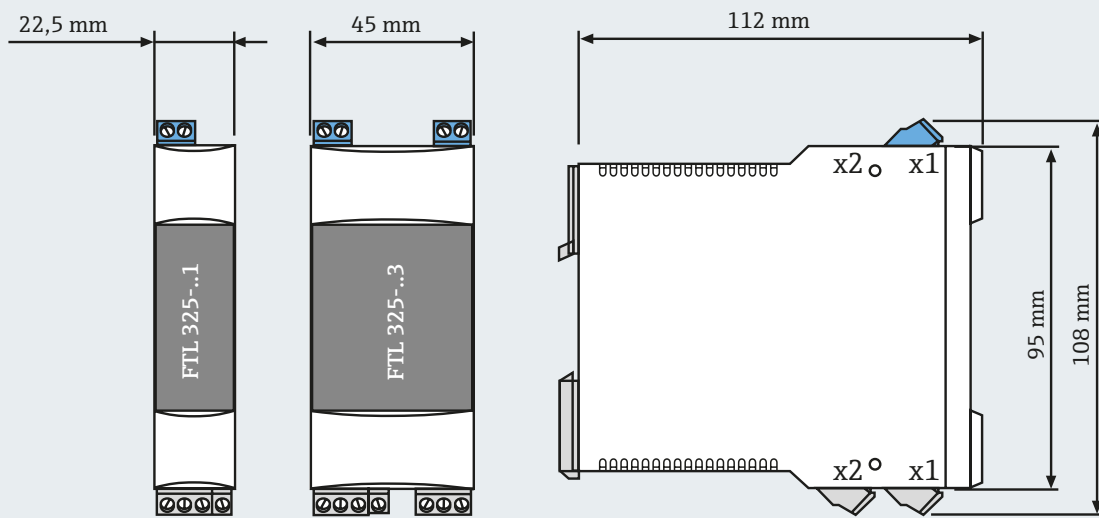- Functional safety up to SIL3

Applications
Both the Nivotester FTL325P and FTL375P are ideal for level limit detection in tanks (liquids) and silos (bulk solids) and are ATEX certified for hazardous area use. They offer liquid level detection in pipes for dry-run protection of pumps, overspill protection in tanks with combustible/non-combustible liquids harmful to water and offer two-point control and level limit detection using only one switching instrument.

Technical data

	FTL325P	FTL375P
Construction :	DIN rail mounting	Eurocard or Monorack
Certification :	ATEX II (1) GD (EEx ia) IIC	ATEX II (1) GD (EEx ia) IIC
Input :	PFM, 1, 2 and 3-channel	PFM, 1, 2 and 3-channel
Output :	Relay for alarm and fault	Relay and transistor
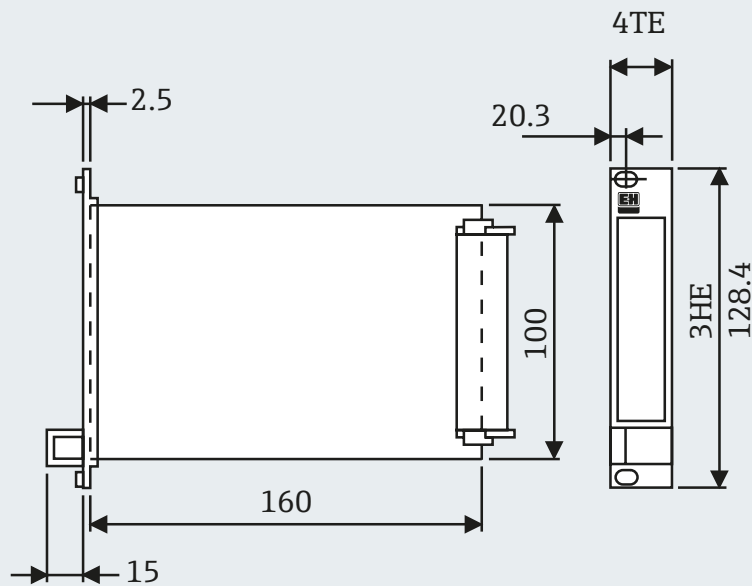
Level

Pressure

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Dimensions (mm)

22,5 mm

45 mm

112 mm

FTL 325-..1

FTL 325-..3

x2 x1

95 mm

108 mm

x2 x1

FTL375N/P

4TE

2.5

20.3

100

3HE
128.4

160

15

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   • To download technical documentation, please visit our website: www.uk.endress.com
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Nivotester FTL325N

Level limit switch with isolating amplifier with NAMUR input for connection to any NAMUR sensor.

FTL325N

FTL325N,
3-channel

- Intrinsically safe signal circuits [EEx ia] for problem-free use in hazardous areas
- Highest functional SIL safety – line monitoring through to sensor, corrosion monitoring of tuning fork (Liquiphant)
- Compact housing for simple series installation
- Functional safety up to SIL2

Applications

The Nivotester FTL325N is ideal for level limit detection in tanks (liquids) and is ATEX certified for hazardous area use. It offers liquid level detection in pipes for dry-run protection of pumps, overspill protection in tanks with combustible/non-combustible liquids harmful to water and offers two-point control and level limit detection using only one switching instrument.
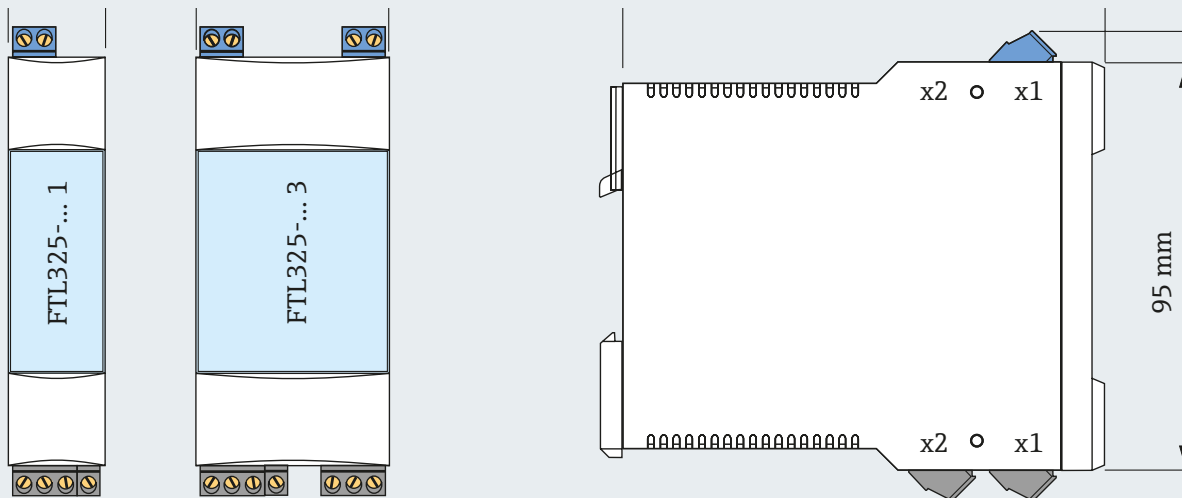
Technical data

	FTL325N
Construction :	DIN rail mounting
Certification :	ATEX II (1) GD (EEx ia) IIC
Input :	NAMUR, 1, 2 and 3-channel
Output :	Relay for alarm fault

E direct

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Dimensions (mm)

FTL325N

FTL325-...1

FTL325-...3

x2   x1

x2   x1

95 mm

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Liquiphant density system

Density and concentration measurement system.

Liquiphant M

FML621

- Maintenance-free, no moving parts
- Pump protection can be provided with the same process connection
- ATEX certification
- EHEDG and 3-A approvals

Dosing preliminary, interim and final products; determining exact density or concentration; monitoring quality and controlling processes: all these activities rely on accurate and reliable density measurement. Endress+Hauser's Liquiphant density system offers outstanding product quality data, helping you to streamline your process, improve yield and save money!

Endress+Hauser makes use of the tried and trusted vibronic principle

to provide reliable data on density and quality just as reliable as it does level limits. As soon as the density or the concentration of the medium changes, the resonant frequency changes too. The tines of Liquiphant sense this change in frequency and the FML621 density calculator displays this information in measurements you understand, be it °Brix, °Baume or indeed any units specific to your application.

In the chemical and food & beverage industries, concentration is an important process variable. In order to determine concentration levels, extensive offline procedures and expensive laboratory analysis are often required. Liquiphant M, in combination with a temperature probe and FML621 density controller offers a cost-effective alternative. They provide reliable online density measurement at a glance, increasing plant availability, improving process control and reducing product wastage.

More than just a density controller
The Liquiphant M density measurement system can be used

Technical data

Span (measuring range)	: 0.3...2.0g/cm^3
Temperature sensor measured error	: < 1°C
Max viscosity	: 350mPa (exception: max 50mPa*s for FTL51C)
Max flow velocity	: 2m/s
Fluid temperature	: 0...+80°C (validity of accuracy data)
Power supply	: In accordance with specification FML621
Standard calibration	: ±0.02g/cm^3 (±1.2% of the span, under general measuring conditions)
Special calibration	: ±0.005g/cm^3 (±0.3% of the span, under reference conditions)
Field calibration	: ±0.002g/cm^3 (in operating point)

across the process industries for concentration measurement, quality statements and purity indications or even as a basic variable in calculations and simulations. What's more, Liquiphant M can simultaneously provide dry-run protection and can be combined with other measuring instruments (e.g. flowmeters or radar devices) to provide additional values such as mass or mass flow information.
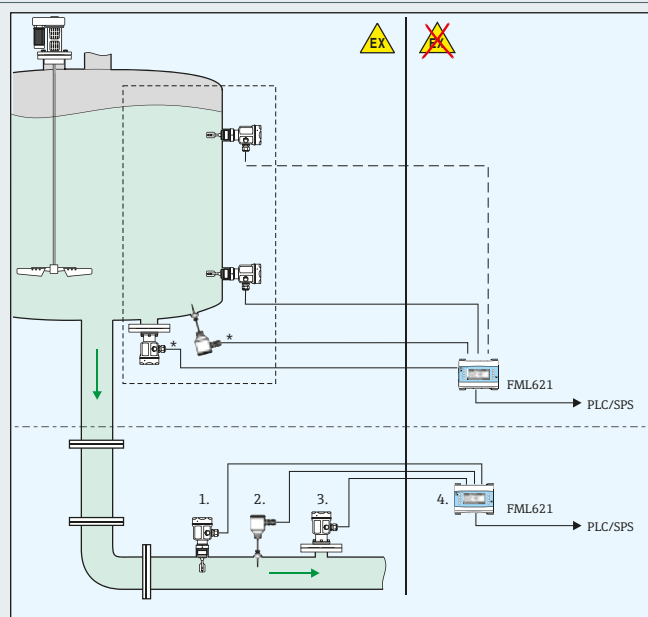
Application

* Pressure and temperature information required depending on the application.
   1. Liquiphant M sensor with electronic insert FEL50D (pulse output)
   2. Temperature sensor (e.g. 4...20mA output)
   3. Pressure transmitter (4...20mA output)
   4. Liquiphant density and concentration computer FML621 with display and operating unit
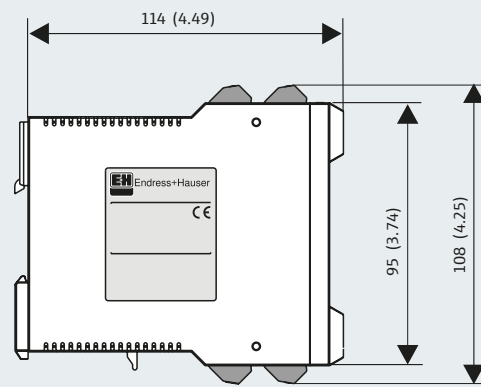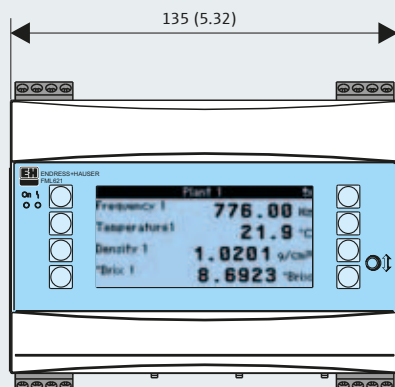
Please note

Measurement can be affected by:
- Air bubbles at the sensor
- Unit not fully covered by medium
- Solid media build-up on sensor
- High fluid velocity in pipes
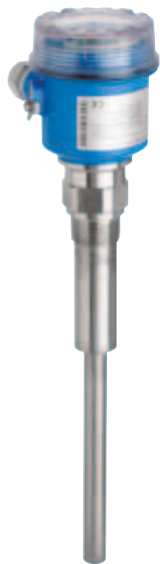

Dimensions (mm)

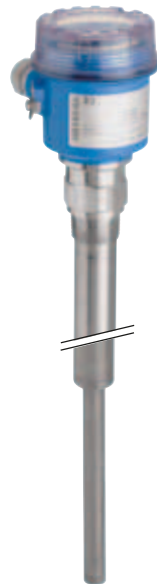Housing for top-hat rail as per IEC 60715

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Level
Pressure
Flow
Temperature
Analytics
Recorders & System Components
Services & Solutions

Soliphant T FTM20/21

Vibrating level switch for fine-grained or course-grained solids.

FTM20
compact version

FTM21
with extention

- **Insensitive to external vibrations and build-up: maintenance-free operation**
- **Simple commissioning: no calibration necessary**
- **Maintenance-free: no mechanically moving parts**
- **ATEX II 1/3 D, FM or CSA approval**

Soliphant T is a robust level limit switch for use in silos with fine-grained or coarse-grained, non-fluidised bulk solids. The various designs means the device has a wide range of applications. Certificates are available for use in dust incendive hazardous areas.

FTM20: compact design (250mm) vibrating rod for installation in any direction.
FTM21: vibrating rod with extension pipe (500mm, 1000mm, 1500mm) for installation in any direction.

Applications
Typical applications include cereals, coffee beans, sugar, animal feed, rice, detergents, dye powder, chalk, gypsum, cement, sand and plastic granules.

Technical data

Switching delay	: 0.5s when sensor is covered, 1s when sensor exposed
Measuring frequency	: 700...800Hz
Max measured error	: ≤ 5mm
Repeatability	: < 1mm
Protection	: IP66/67 (F16/F18 housing)
Thermal shock resistance	: 120K
Pressure range	: -1...25 bar
Density	: Bulk solids weight: ≥ 200g/l (not fluidised)
Grain size	: ≤ 25mm

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Dimensions (mm)

max. 60 · 21.5 · 159.5 + L · L = x · 151 · 41 AF / 1 · R 1 / NPT 1

max. 65 · ø 80 · 105 · 50 AF · R 1 · ø29 · ø16

ø85 · 372 · 21.5 · 225 · 151 · 41 AF / 1 · R 1 / NPT 1
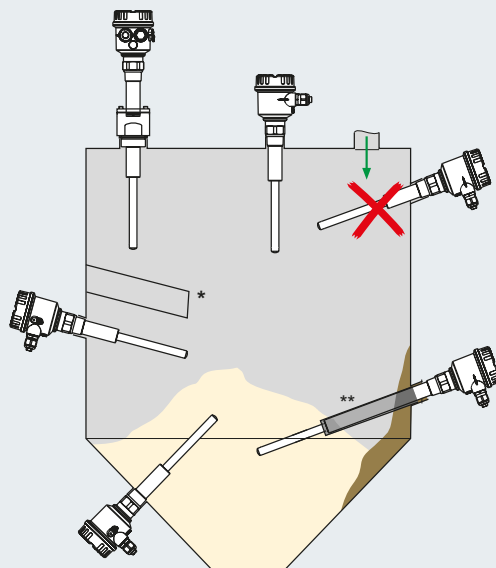
max. 76 · 100 · 50 AF · R 1 · ø29 · ø16

Installation

*

**

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Soliphant M FTM50/51/52

Vibrating level switch for fine-grained solids. Suitable for hazardous area use.

FTM50

FTM51

FTM52

- Insensitive to external vibrations and build-up: maintenance-free operation
- Short fork version (100mm): fits into processes where space is limited
- Integrated self-checking function: reduces time spent on manual checking
- Maintenance-free: no mechanically moving parts
- ATEX, FM or CSA approvals

Soliphant M level limit switch for fine-grained or powdery solids offers outstanding performance, even in hazardous areas (ATEX and SIL2 certified). Available as a compact, extension tube or cable version, Soliphant M provides reliable level measurement from 145mm to 20m in solids applications from cement, mortar and dye powders to powdered milk, sugar and animal feed.

Applications
Soliphant M is perfect for a variety of applications. It can even be used to detect solids levels underwater - the probe recognises the difference between liquid and solid and only switches if covered by sand or sludge.

Technical data

Switching delay	: 0.5s when sensor is covered, 1.5s when sensor exposed, 1s for short fork
Measuring frequency	: Standard fork approx 140Hz
	: Short fork approx 350Hz
Protection	: IP66/NEMA4X (F15, F16, F17 housing) IP66/IP68 NEMA4X/6P (F13, T13 housing)
Process temperature	: Up to 150°C
Thermal shock resistance	: 120K
Pressure range	: -1...25 bar
Bulk density	: Standard fork ≥ 10g/l
	: Short fork ≥ 50g/l
Grain size	: ≤ 10mm
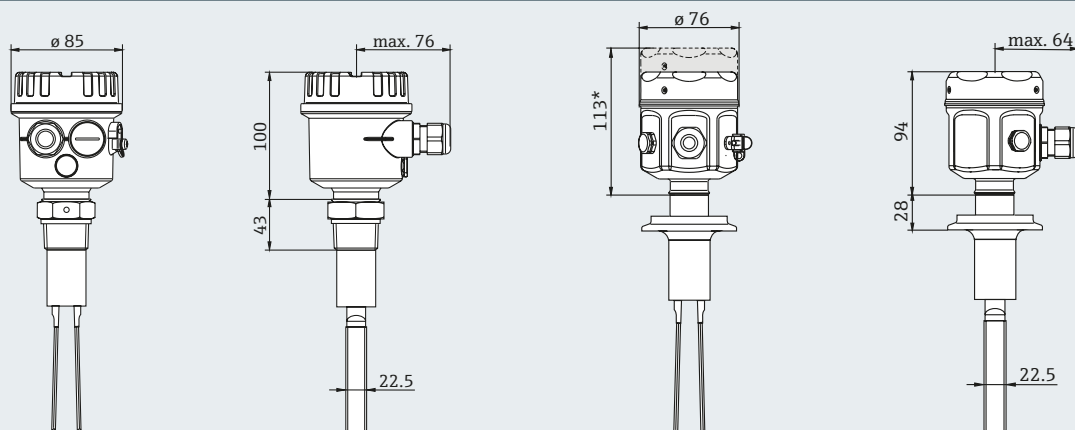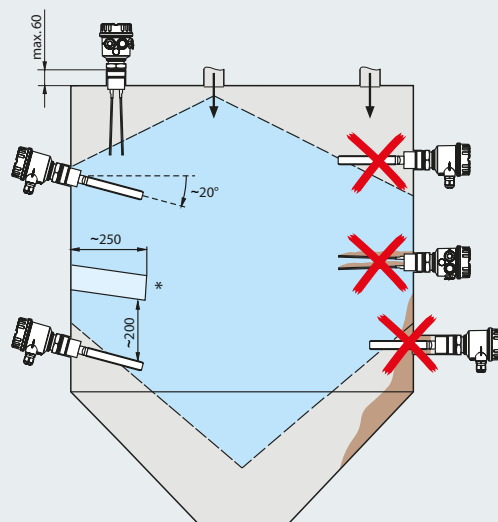
Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Dimensions (mm)

ø 85

max. 76

100

43

22.5

ø 76

113*

max. 64

94

28

22.5

Installation

max. 60

~20°

~250

*

~200

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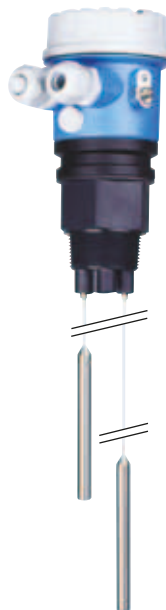- To download technical documentation, please visit our website: www.uk.endress.com
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Liquipoint FTW31/32/33

Cost-effective level limit switches for multiple point detection in conductive liquids.

FTW31
Rod version

FTW32
Rope version

FTW33

- ■ **Detect up to five point levels with one probe (FTW31/32)**
- ■ **Two-point control and additional min/max detection (FTW31/32)**
- ■ **Rod or rope version (FTW31/32)**
- ■ **CIP/SIP cleaning (FTW33)**
- ■ **3-A and EHEDG approvals (FTW33)**

Applications

Liquipoint T sensors are used in conductive liquids (as of 10µS/cm) for determining level limits. Depending on the number of measuring points (up to 5 rods or ropes), measuring tasks such as overspill protection, dry-run protection, two-point control of pumps or multiple point detection can be implemented for an existing process connection.

Liquipoint T sensors feature a built-in electronic insert with either a transistor or relay output for 2 or 3 rod/rope probes. With no moving parts in the tank, they offer reliable operation and a long service life.

Specially designed for hygienic applications, the FTW33 meets all international hygiene requirements. It is particularly suited to applications where flush mounting is necessary and can be used in processes up to 100°C with no limits and in cleaning and sterilization processes to 150°C for 60 minutes. And, with build-up compensation, reliable switching is guaranteed time after time.

Technical data

	FTW31/32	FTW33
Rod/rope	: 2, 3, 5	-
Switching delay	: 0s, 2s	0.5s (covered), 1s (free)
Pressure	: -1 bar…+10 bar	-1 bar…+25 bar
Temperature	: -20°C…+100°C	-20°C…+100°C
Detection range	: 100kΩ	-
Process connection	: G1½" thread	Full range of hygienic connections
Length	: 4m (rod), 15m (rope)	-
Protection	: IP66	IP65 to 1P69K (depending on options selected)

E**direct**

Installation (FTW33)

Caution:
Vertical orientation can affect the measurement. It can be influenced by the fact that the sensor is not completely covered with liquid or by air bubbles at the sensor. Ideally, the device should be fitted horizontally or diagonally in a tank or pipe
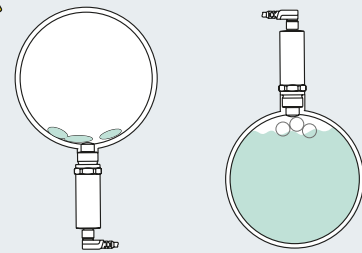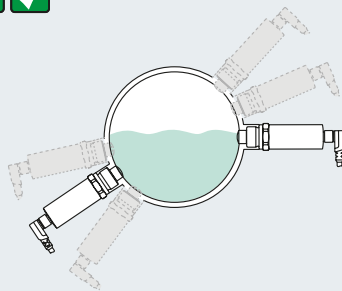
Dimensions (mm)

Rod and version with G1½" (compact version with electronic insert)

Rod and version with G1½" (remote version without electronic insert)

FTW31 (rod)   FTW32 (rope)   FTW31 (rod)   FTW32 (rope)
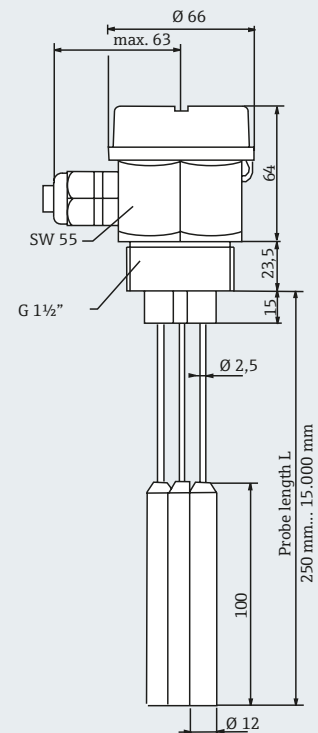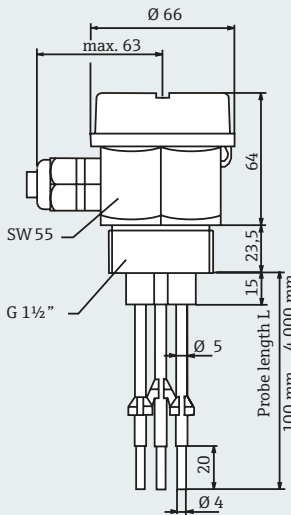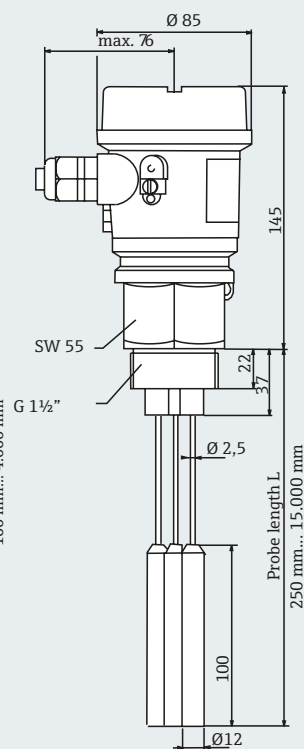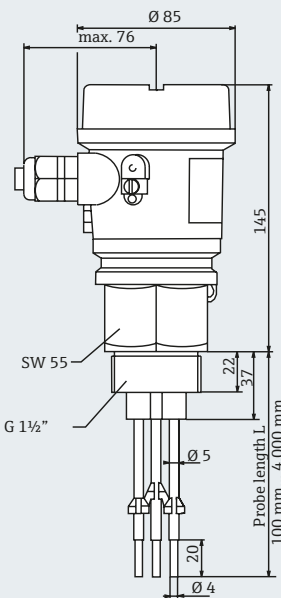
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Level
Pressure
Flow
Temperature
Analytics
Recorders & System Components
Services & Solutions

Liquicap M FMI51/52

Capacitance transmitters for continuous level measurement. Suitable for hazardous area use.

WirelessHART

- Suitable for interface measurement
- ATEX, SIL2 and EHEDG certified
- Electronics can be switched for media prone to build-up
- No calibration required for conductive media

Available as both a rope and rod version, Liquicap M accurately measures level up to 10m. It offers a variety of housings, process connections (starting from ½"), certification and approvals, so that you get exactly what you need. Liquicap M offers outstanding performance in storage, buffer and process tanks.

Ideal for the food industry, Liquicap M is suitable for both CIP and SIP systems, has a wide range of hygienic process connections and comes with FDA and EHEDG approvals. In applications with strong build-up, Liquicap M has cutting edge

algorithms to safeguard stable measured values. And, its short response time means it is particularly suitable for use in small tanks where rapid level changes occur and the measurement range must cover the entire content of the tank.

Also ideal for the chemical industry, Liquicap M offers a SIL2 rating according to IEC61508 for both low and high demand mode and is ATEX certified to EEx ia and EEx d for hazardous area use. It features a gas-tight feedthrough for protection against aggressive or toxic media, often found in solvent or hydrocarbon applications. Best of all, the device continuously monitors the probe insulation, so that any rod breakage or damage to insulation is immediately detected to minimise measurement errors and plant downtime.

Technical data

Process temperature :	-80...+200℃
Process pressure :	Up to 100 bar
Output :	2-wire 4...20mA HART, PFM, PROFIBUS PA or FOUNDATION Fieldbus
Certification :	ATEX II ½ GD EEx ia, ATEX II 1/2G EEx d, ATEX 3GD EEx nA

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Connections

Polyester housing
F16

Aluminiumhousing
F17

Stainless steel housing
F15

Aluminiumhousing
T13
with a separate connection
compartment and gas-tight
process seal

Aluminiumhousing
F13
with a gas-tight
process seal

Display

Display holder

Electronics

Thread
(G
G
G1, NPT1)

Hygiene connections

Hose gland
(DN50 PN40)

Tri-Clamp
(DN25 (1"));
DN38 (1

Flush-mounted seal
Hygiene
(G

Flanges
(EN, ANSI, JIS)

Rod/rope probe

Flanges
(EN, ANSI, JIS)

Hygiene connections

Hose gland
(DN50 PN40)

Tri-Clamp
(DN38 (1
DN40-51 (2"))

Hygiene
(universal adapter)

Thread
(G
G1, NPT1;
G1

Clad flanges
(EN, ANSI, JIS)

Rod/rope probe
with inactive length

Rod/rope probe
with inactive length

Rod/rope probe

Fully insulated rod/rope probe
with fully insulated inactive length

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Liquicap M FTI51/52

Capacitance limit switches for liquids. Suitable for hazardous area use.

- **Active build-up compensation for highly viscous products**
- **Corrosion-resistant material and FDA-listed materials for wetted parts**
- **Two-stage overvoltage protection against electrostatic discharge**
- **Automatic monitoring of electronics**

Available as both a rope and rod version, Liquicap M offers accurate and reliable level limit detection. It offers a variety of housings, process connections (starting from ½"), certification and approvals, so that you get exactly what you need. Liquicap M offers outstanding performance in storage, buffer and process tanks.

Thanks to its robust and tried-and-tested construction (self-sealing cone), the probe can be used both in vacuums and in overpressure up to 100 bar. The sealing and insulation materials used allow operation in temperatures from -80°C up to 200°C.

Technical data

Temperature	: Up to 200°C
Pressure	: Up to 100 bar
Output	: Relay, PNP, 2-wire PFM (FTC325/625)
Ambient temperature (housing)	: -50°C...+70°C
Protection	: IP66, IP67, NEMA4X (F15, F16, F17 housing) IP66, IP68, NEMA4X (F13, T13 and remote housing)
Certification	: ATEX, CSA, TIIS
Electrodes	: Cable or rod
Reproducibility	: 0.1%
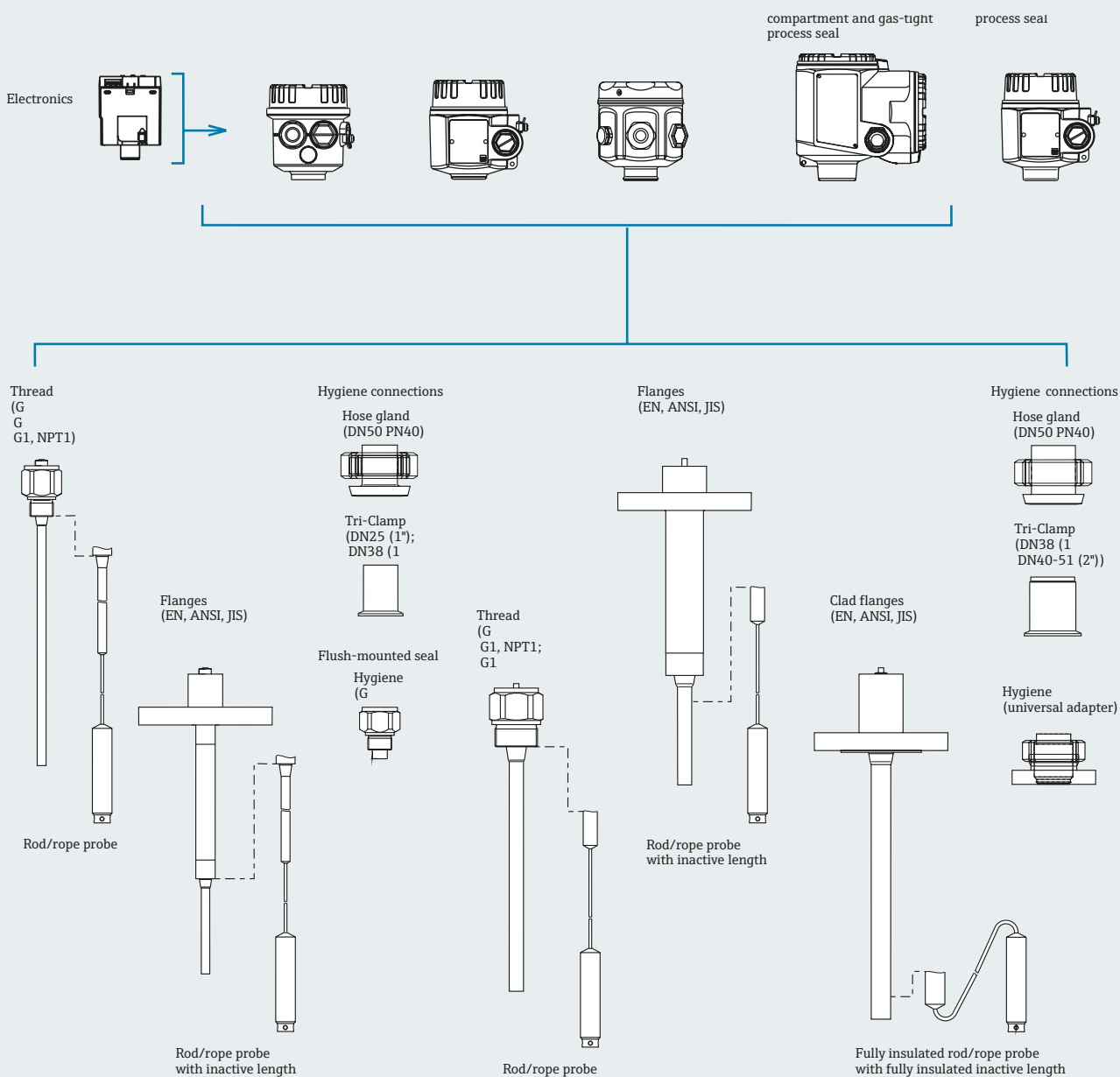
Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Connections

compartment and gas-tight
process seal

process seal

Electronics

Thread
(G
G
G1, NPT1)

Rod/rope probe

Flanges
(EN, ANSI, JIS)

Rod/rope probe
with inactive length

Hygiene connections

Hose gland
(DN50 PN40)

Tri-Clamp
(DN25 (1"));
DN38 (1

Flush-mounted seal

Hygiene
(G

Thread
(G
G1, NPT1;
G1

Rod/rope probe

Flanges
(EN, ANSI, JIS)

Rod/rope probe
with inactive length

Clad flanges
(EN, ANSI, JIS)

Fully insulated rod/rope probe
with fully insulated inactive length

Hygiene connections

Hose gland
(DN50 PN40)

Tri-Clamp
(DN38 (1
DN40-51 (2"))

Hygiene
(universal adapter)

i   ▪ For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
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Solicap M FTI55/56

Capacitance limit switch for bulk solids.
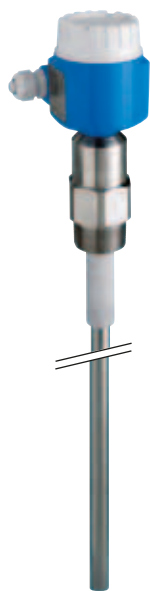
FTI55
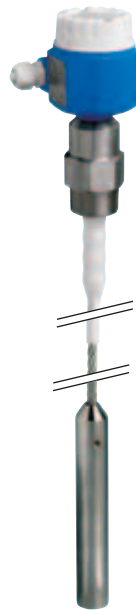
FTI56

- **Active build-up compensation**
- **Automatic monitoring of electronics**
- **Two-stage overvoltage protection**
- **Simple commissioning**

The Solicap M compact transmitter offers reliable level limit detection in bulk solids. Available as a rod (FTI55) or rope (FTI56) version, it can be operated in minimum or maximum failsafe mode and is used for level limit detection in storage, buffer and process tanks and for two-point control. Due to its robust construction, it can also be used to provide accurate measurement in applicat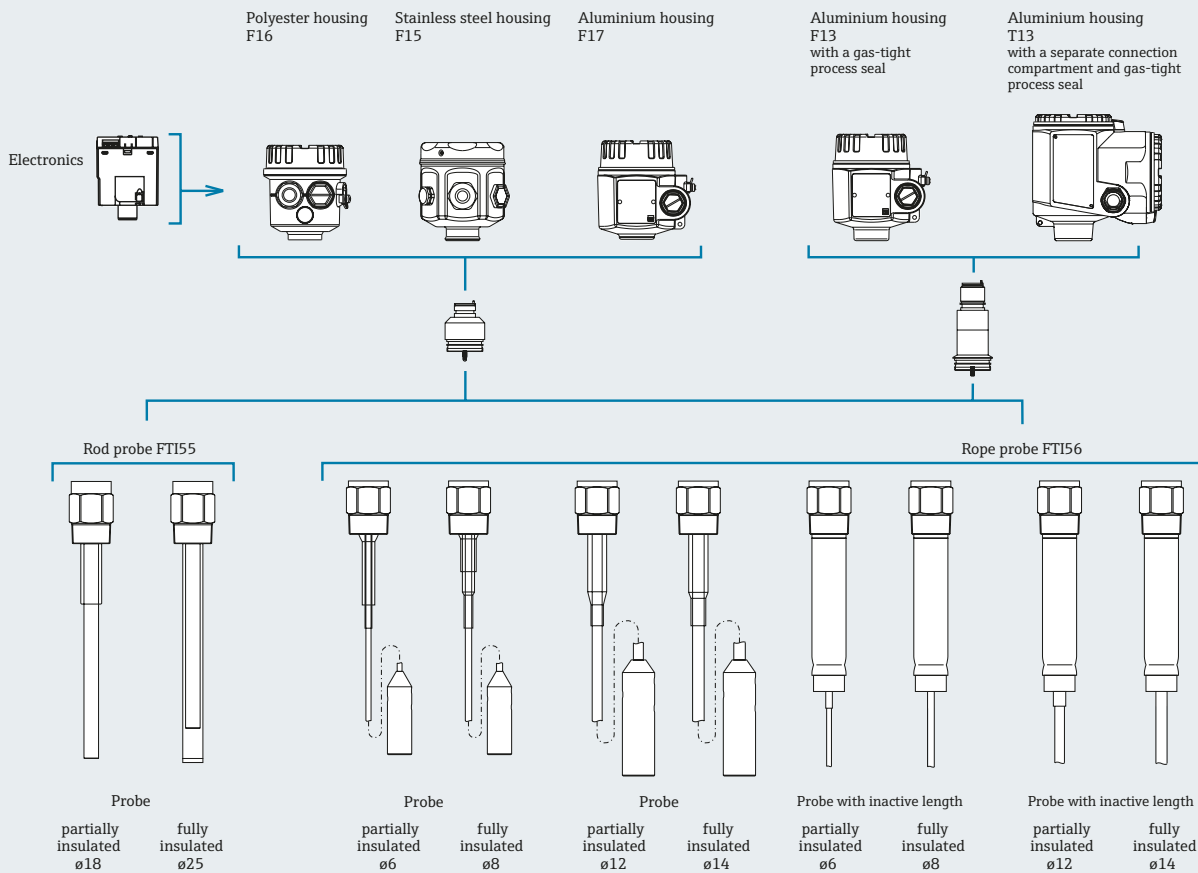ions with very high tensile loads (up to 60kN for rope version) or lateral loads (up to 300Nm for rod version). In addition, the gastight probe seal prevents the effects of aggressive and toxic media and rough ambient conditions, such as strong vibration and increased temperatures, are overcome by separate electronics (up to 6m).

Solicap M is easily and quickly calibrated on site by simply pressing a button, facilitating quick and simple commissioning. An intelligent electronic memory (EEprom) saves instrument and calibration parameters so that all of the data is automatically transferred to the new electronics in case of an exchange. Time-consuming manual instrument calibration is unnecessary so downtime is kept to a minimum.

Technical data

Measured variable	: Capacitance change between probe and vessel wall
Min capacitance change	: ≥ 5pF
Process temperature	: -50...+180°C
Measuring frequency	: 500kHz
Probe capacitance	: Rod: approx 1.3pF/100mm in air rope: approx 1.0pF/100mm in air
Housing	: Aluminium, polyester or stainless steel
Input signal	: Probe covered: high capacitance probe uncovered: low capacitance
Cable entry	: M20, G½, NPT½, NPT¾
Reproducibility	: 0.1% (related to probe length)
Certification	: ATEX, CSA, FM and TIIS

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Connections

	Polyester housing F16	Stainless steel housing F15	Aluminium housing F17	Aluminium housing F13 with a gas-tight process seal	Aluminium housing T13 with a separate connection compartment and gas-tight process seal

Electronics

Rod probe FTI55	Rope probe FTI56

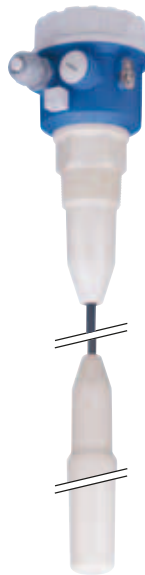| Probe		Probe		Probe		Probe with inactive length		Probe with inactive length	
partially insulated ø18	fully insulated ø25	partially insulated ø6	fully insulated ø8	partially insulated ø12	fully insulated ø14	partially insulated ø6	fully insulated ø8	partially insulated ø12	fully insulated ø14

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Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Minicap FTC260/262

Compact limit switch with active build-up compensation.

FTC260

FTC262

- Easy installation and no calibration on start-up
- Maintenance-free – no moving parts
- Compact unit consisting of probe and electronic insert
- Version available for dust explosion areas

Applications
Simple to install and maintain, Minicap is designed for limit detection of light bulk solids, such as grain products, flour, milk powder, animal feed, cement, chalk and gypsum. It offers high operational safety, providing an accurate switch point and uses active build-up compensation to ensure reliability even with heavy build-up.

Technical data

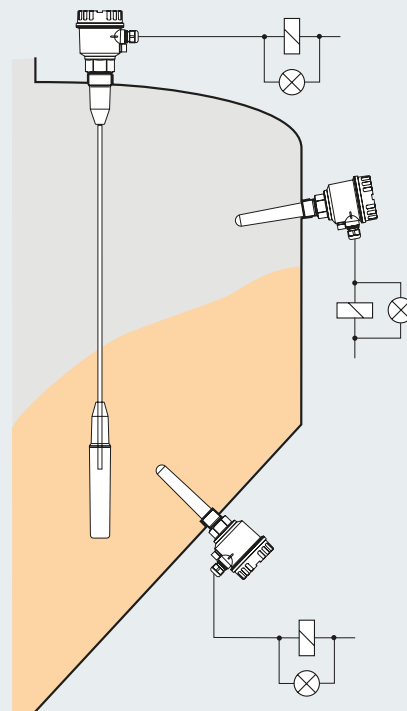|	
Electronic output	: DC PNP transistor (11...45V DC), AC/DC relay output (20...253V AC or 20...55V DC)
Product	: Grain size max 30mm, min dielectric constant 1.6
Protection	: IP66
Operating temperature	: -40°C...+130°C
Process connection	: 1" BSP thread (FTC260), 1½" BSP thread (FTC262)
Probe material	: PPS
Probe length	: 140mm (FTC260), 500mm...6000mm (FTC262)

Dimensions (mm)

FTC260
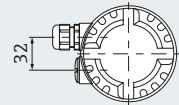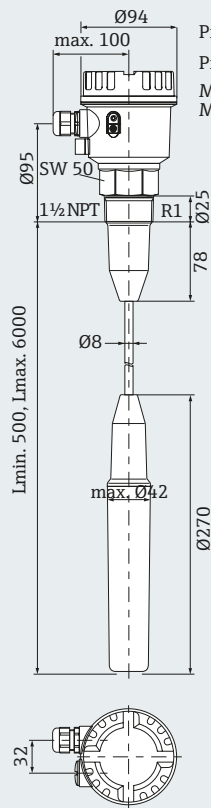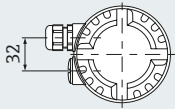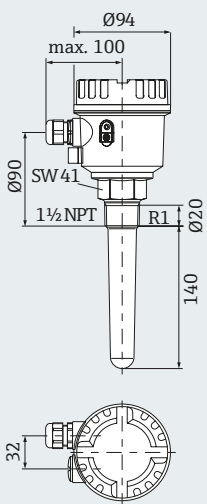
Probe length tolerances:

Probe length L	Tolerance
Max 1000mm	+0, -10mm
Max 3000mm	+0, -20mm

Limit detection in silos
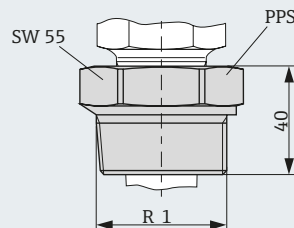
Ø94
max. 100
Ø90
SW 41
1½ NPT   R1   Ø20
140
32

Ø94
max. 100
Ø95
SW 50
1½ NPT   R1   Ø25
78
Ø8
Lmin. 500, Lmax. 6000
max. Ø42
Ø270
32

Adapter

SW 55   PPS
40
R 1

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Level

Pressure

Flow

Temperature

Analytics

Recorders & System Components

Services & Solutions

E**/**direct

Nivector FTC968

Capacitive level switch for solids.

FTC968 with
Protector

- **No moving parts (no maintenance)**
- **For lightweight products**
- **Simple installation**

Applications
This capacitive level switch has been designed primarily to detect solids (powders, pellets, granulates etc.). They are used mostly for high and/or low level detection or as a start/stop control for a conveyor or mixer. These level switches differ from one another in size and installation facilities. They are not suitable for abrasive and heavy products such as sand, gravel and limestone. Please contact Endress+Hauser for information about alternatives for these applications.

Function
The sensor forms a capacitor with its internal earth screen. Capacitance is determined by the difference in the dielectric constant of air in relation to the product to be detected. As the sensor is covered or uncovered by the product, this value will either fall short of or exceed switching capacitance, thus activating the switch.
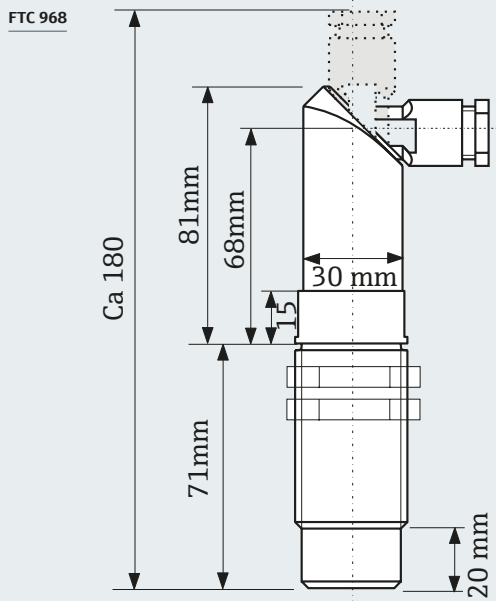
Installation guidelines
The Nivector FTC 968 is installed in the side of a silo or vessel and preferably in a special holder, thus enabling periodic inspection. In addition, this holder protects the Nivector against wear.

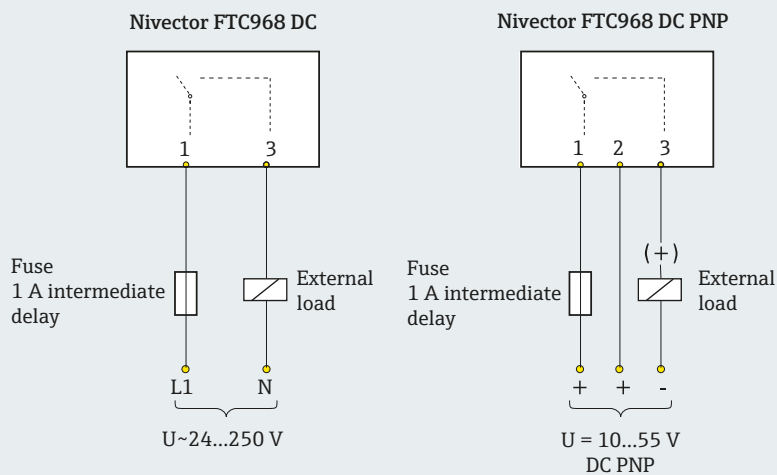| Technical data		
Output(s)	:	Choice of direct thyristor switching, twin-wire 21...250V 50Hz, or PNP/NPN output, 10...55V DC.
Degree of protection	:	IP55 of IP66 (optional)
Process connection	:	Nivector FTC 968 1"BSP (with Protector 1½"BSP)
Sensor material	:	Polycarbonate (protector in fibreglass-reinforced polyester)
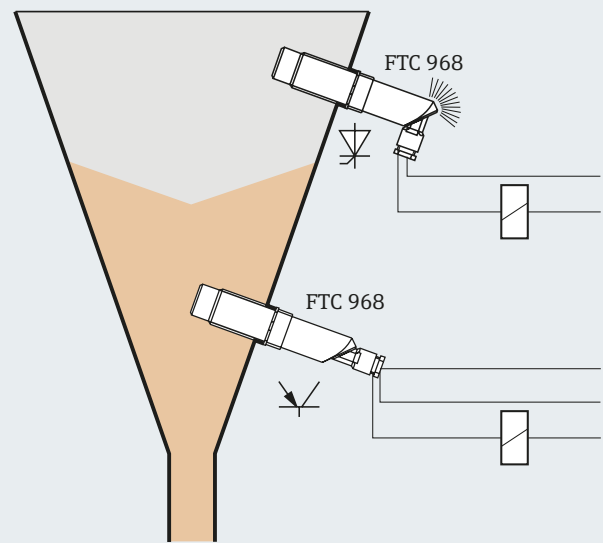
Level

Pressure

Flow

Temperature

Analytics

Recorders & System Components

Services & Solutions

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Dimensions

FTC 968

Ca 180

81mm

68mm

30 mm

15

71mm

20 mm

Installation

FTC 968

FTC 968

Connections

Nivector FTC968 DC

1   3

Fuse
1 A intermediate
delay

External
load

L1   N

U~24...250 V

Nivector FTC968 DC PNP

1   2   3

Fuse
1 A intermediate
delay

(+)

External
load

+   +   -

U = 10...55 V
DC PNP

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Level

Pressure

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Analytics

Recorders &
System Components

Services &
Solutions

Waterpilot FMX21

Hydrostatic cable-mounted level sensor for clean water, wastewater and saltwater applications.

Clean water

Saltwater

Wastewater

WirelessHART

- **High overload resistance**
- **Climate-proof sensor: potted electronics**
- **Robust ceramic cell for long-term stability**
- **Integrated temperature measurement (Pt100 optional)**
- **Accessories for complete measuring point solution**

Waterpilot FMX21 is a robust 2-wire hydrostatic level sensor that comes in three versions to suit a wide range of applications which include the measurement of groundwater, wastewater and saltwater. It is also available with an integrated temperature transmitter as an additional measurement point. Waterpilot offers a variety of measuring ranges, configurable using HART protocol, and its potted electronics and double breather tube filters make it highly resistant to environmental conditions for reliable results, time after time.

With marine and drinking water approvals, Waterpilot is available with three diameter versions:
- 42mm heavy duty version for use in wastewater and sewage treatment plants
- 29mm anti-corrosion version for use in saltwater applications
- 22mm for use in rivers, reservoirs, wet wells and boreholes, for e.g. groundwater level measurement
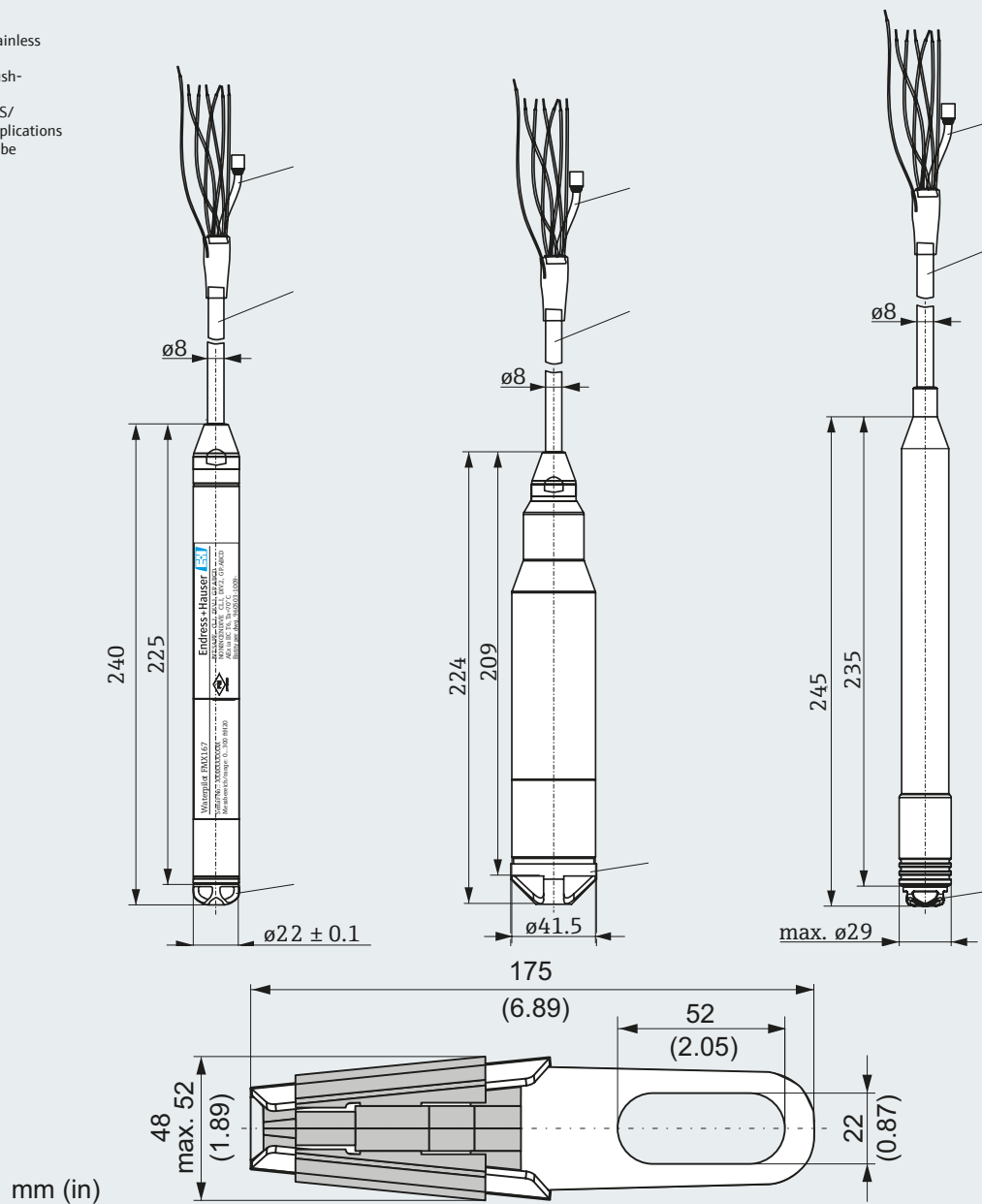
Technical data

Measuring range	: 0...0.1 bar to 0...20 bar
Reference accuracy	: Standard accuracy ±0.2% (platinum ±0.1% optional)
Long-term stability	: ≤0.1% of upper range limit / year; ≤0.25% of upper range limit / 5 years
Temperature range	: -10...+70°C
Output(s)	: 4...20mA HART (Pt100 optional)
Power supply	: 10.5...30V DC
Protection	: Sensor IP68, terminal box IP66/67
Sensor housing	: Stainless steel (PPS coating for seawater optional)

Level

Pressure

Flow

Temperature

Analytics

Recorders &
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Dimensions (mm)

FMX21 versions

1 = 22mm outer diameter, stainless
    steel
2 = 42mm outer diameter, flush-
    mounted, stainless steel
3 = 29mm, stainless steel, PPS/
    polyolefin for saltwater applications
4 = Pressure compensation tube
5 = Extension cable
6 = Protection cap

ø8

240

225

Endress+Hauser

Waterpilot FMX167

ø22 ± 0.1

ø8

224

209

ø41.5

ø8

245

235

max. ø29

175
(6.89)

52
(2.05)

48
max. 52
(1.89)

22
(0.87)

mm (in)

Suspension clamp: stainless steel and fibreglass reinforced polyamide

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Deltapilot M FMB50/51/52/53

Cost-effective hydrostatic level measurement.

FMB50   FMB51   FMB52   FMB53

WirelessHART

- **SIL2 to IEC61508**
- **0.2% accuracy (0.1% optional)**
- **100:1 turndown**
- **IP69K rated sensor**

Recognising that our customers need a hydrostatic level measurement option for more basic applications, the Deltapilot M range has a more compact design without

compromising on accuracy or reliability. Proven-in-use in thousands of applications, all the benefits of the hermetically sealed CONTITE cell are retained in the Deltapilot

Technical data

		FMB50	FMB51	FMB52	FMB53
Sensor design	:	Compact	Rod	Rope	Rope and suspension clamp
Measuring ranges	:	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar	-0.1...+0.1 bar to -1 bar to +10 bar
Process connections	:	Thread, flange or hygienic	Thread or flange	Thread or flange	Suspension clamp
Reference accuracy	:	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%	Standard ±0.2%, platinum ±0.1%
Turndown	:	100:1	100:1	100:1	100:1
Over-pressure limit (OPL)	:	Up to 40 bar	Up to 40 bar	Up to 40 bar	Up to 40 bar
Supply voltage	:	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC	11.5...45V DC (versions with plug-in connection 35V DC). For intrinsically safe device versions: 11.5...30V DC
Output	:	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus	4...20mA with superimposed HART protocol, PROFIBUS PA, FOUNDATION Fieldbus

M device, offering the condensate-resistance that is vital to reliable level measurement in cold liquids. With an accuracy of 0.2% (0.1% optional) and a turndown of 100:1, Deltapilot M instruments are available with the same range of process connections, materials of construction and housings as their predecessors and can be retrofitted

directly in place of the old unit, so there is no disruption to your process on commissioning. Difficult to access areas on plant that require a hydrostatic level measurement can be a problem. By using Endress+Hauser's Deltapilot M with remote housing, commissioning, adjustment and viewing can be carried out at a potentially safer place

of work. The remote housing option is also a bonus in applications with high plant vibration as the transmitter and display can be protected from potential damage. Better still, with an IP69K rated sensor, you can be sure that your device will still perform even after high temperature and high pressure washdowns.
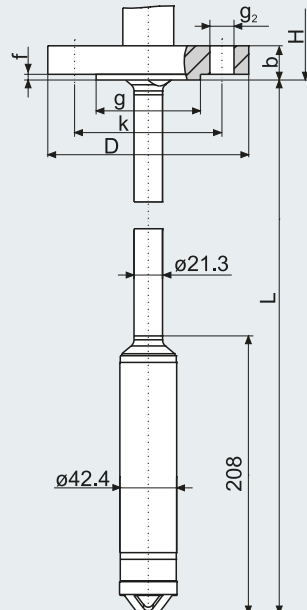
Dimensions (mm)

FMB51:

rod version with thread G1½ or 1½NPT
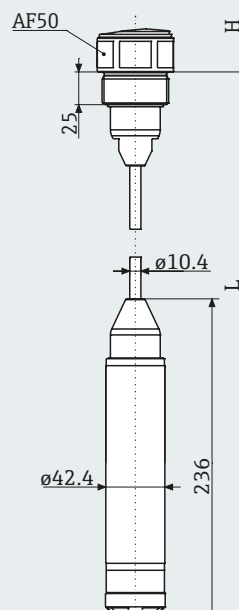L = probe length 0.4 to 4m
H = installation height
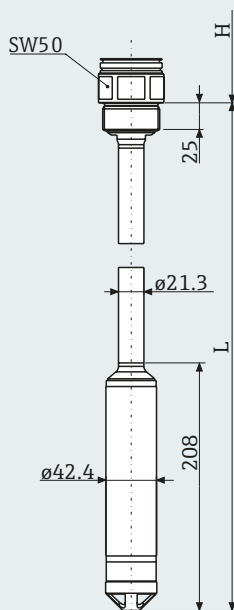
FMB51:

rod version with flange
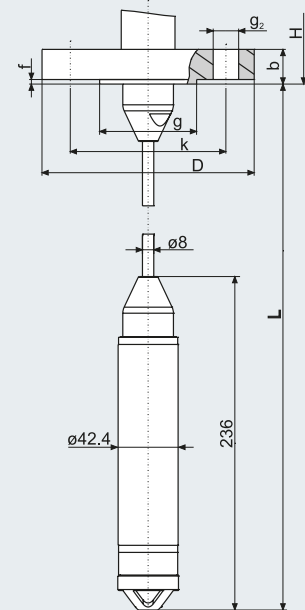L = probe length 0.4 to 4m
H = installation heigh

FMB52:

cable version with thread G1½ or 1½NPT
L = probe length 0.5 to 400m
H = installation height

FMB52:

cable version with flange
L = probe length 0.5 to 400m
H = installation height

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Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Level

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Deltapilot S FMB70

Hydrostatic level transmitter with hermetically-sealed CONTITE measuring cell.

FMB70 with
stainless steel
housing

FMB70 with
aluminium housing

WirelessHART

- **High reproducibility and long-term stability**
- **Extensive diagnostic functions**
- **Simple commissioning via Quick Setup menu**
- **ATEX and SIL3 certification**
- **HART, PROFIBUS and FOUNDATION Fieldbus compatible**

The Deltapilot S FMB70 is specially designed for hydrostatic level measurement of liquids and pastes and is suitable for use across the process industries, particularly in hygienic applications as it is suitable for CIP/SIP cleaning and has a wide range of hygienic process connections. It also offers additional volume and mass measurements in liquid media.

The heart of the device is the CONTITE measuring cell, which is fully encapsulated to resist and prevent the ingress of liquids that can be triggered by plant maintenance or condensate for continuous measurement integrity.

As an option, Deltapilot S FMB70 features an integrated HistoROM/ M-DAT memory chip for simple acquisition, back-up and display of key process data. It also offers diagnostic functions, additional process information, simulation and analysis for improved process control.

Technical data

Measuring ranges	: 100 mbar...10 bar
Process connections	: Thread, flange or flush-mounted hygienic connections
Reference accuracy	: ±0.1% (0.075% optional)
Overpressure limit (OPL)	: 40 bar
Supply voltage	: 4...20mA HART: 10.5...45VDC, EEx ia: 10.5...30VDC PROFIBUS PA: 9...32VDC FOUNDATION Fieldbus: 9...32VDC
Output	: 4...20mA with overlaid HART protocol, PROFIBUS PA or FOUNDATION Fieldbus

Connections
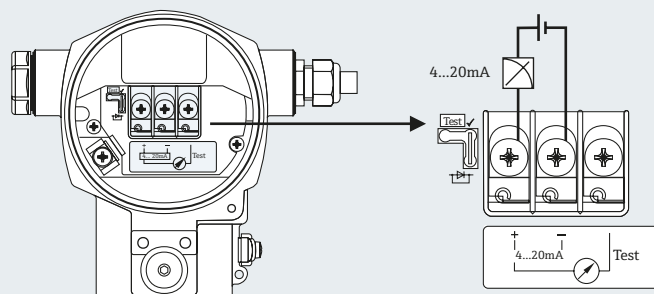
Dimensions (mm)
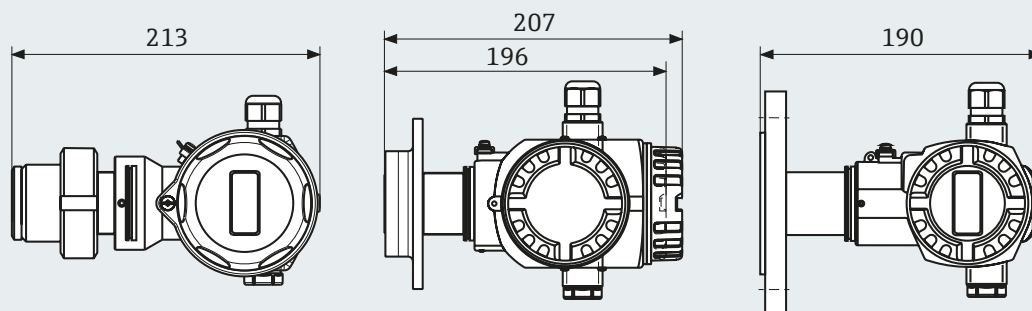
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Level

Pressure

Flow

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Analytics

Recorders & System Components

Services & Solutions

Prosonic M FMU40/41/42/43/44

Non-contact ultrasonic level measurement for liquids and solids using the Time of Flight principle.

FMU40   FMU41   FMU42   FMU43   FMU44

WirelessHART

- Simple menu-guided operation with 4-line plain text display
- Envelope curves on display - you see what the instrument sees
- Maintenance-free
- Free Fieldcare Device Setup software

Applications

Prosonic M is both compact and reliable, providing continuous, non-contact level measurement in both liquids and bulk solids. For liquid level measurement, Prosonic is ideal for continuous monitoring of water and waste levels, with the whole instrument tested to IP68/ NEMA 6P standards. In bulk solids applications, Prosonic provides reliable measurement in controlled monitoring of silo levels, conveyer transfer stations and hoppers.

Prosonic M is robust, cost-effective and versatile. It can be used for flow measurement in open channels and weirs and in conjunction with our RMA42 display (see Recorders & System Components section), Prosonic M is a cost-effective solution for both screen and pump control.

Available in both 2 and 4-wire versions, Prosonic M features an integrated temperature sensor for Time of Flight correction so that measurement is accurate, even with temperature changes. Prosonic M has a 4-line menu-driven display and comes with free Fieldcare Device Setup software for simple commissioning, maintenance, diagnosis and documentation of the measuring point.

Technical data

Process temperature	: -40°C...+80°C
Protection	: Closed housing: IP68, NEMA 6P (24h at 1.83m under water surface)
Process pressure	: 3 bar abs (FMU40/41) 2.5 bar abs (FMU42/43)
Certification	: ATEX II 1/2 G and ATEX II 1/3 D
Process connection	: G1½" BSP thread (FMU40) G2" BSP thread (FMU41) DN80/DN100 universal slip-on flange (FMU42/43) + DN150 (FMU44)
Wetted parts	: PVDF/EPDM (FMU40/41) UP and VA stainless steel 316Ti (FMU43)
Power supply	: 2-wire 4...20mA loop powered, 4-wire AC/DC, PROFIBUS PA, FOUNDATION Fieldbus
Measuring range	: 5m in liquids/2m in solids (FMU40) 8m in liquids/3.5m in solids (FMU41) 10m in liquids/5m in solids (FMU42) 15m in liquids/7m in solids (FMU43) 20m in liquids/10m in solids (FMU44)

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Prosonic M is easily integrated into existing process control systems such as HART®, PROFIBUS PA and FOUNDATION Fieldbus, and comes with both EEx ia and EEx d approvals for hazardous area use.

Dimensions (mm)
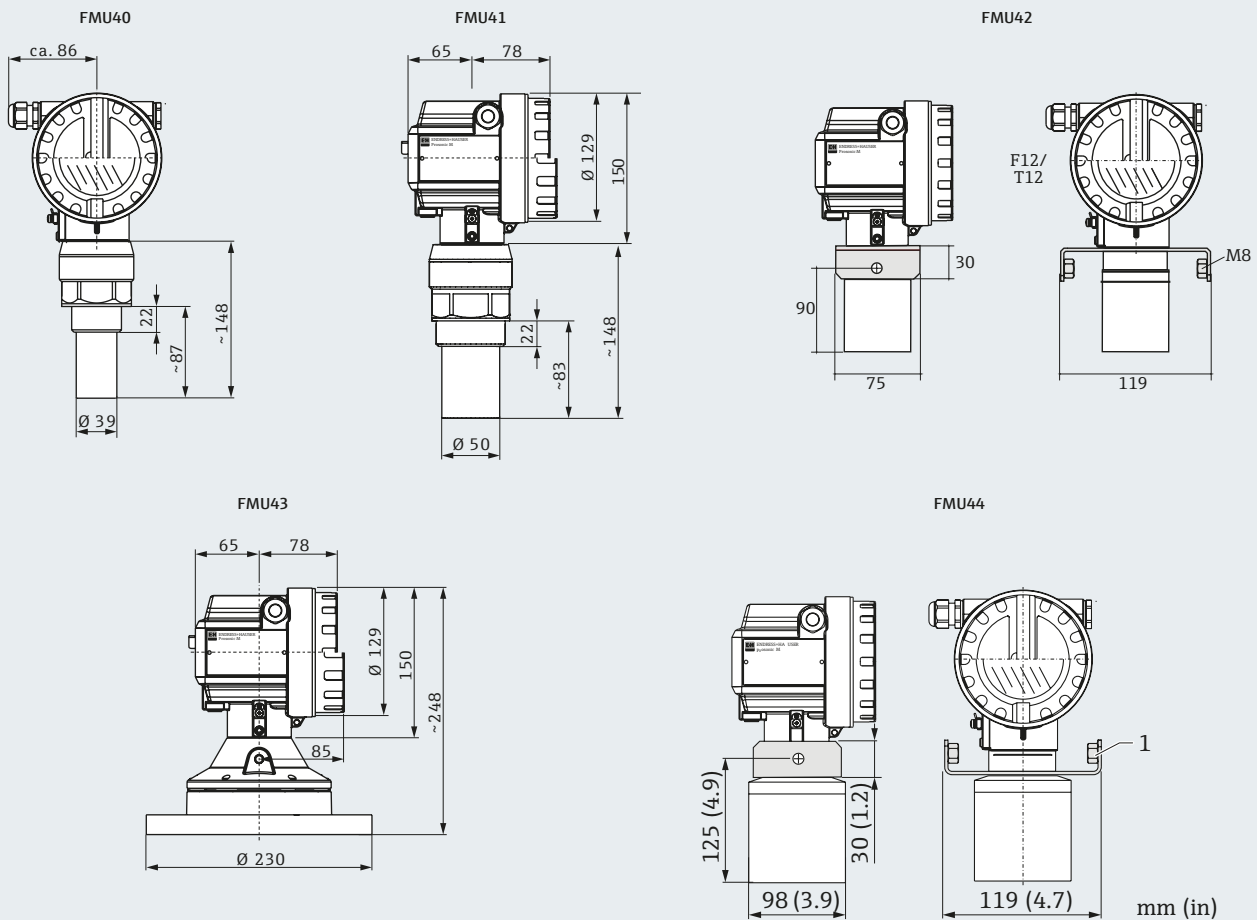
FMU40

FMU41

FMU42

FMU43

FMU44

mm (in)

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Level

Pressure

Flow

Temperature

Analytics

Recorders & System Components

Services & Solutions

Prosonic S FMU90/95 with FDU9x sensors

Ultrasonic transmitter and FDU9x range of sensors.

- **Simple menu-guided operation via 6-line display**
- **Linearisation (up to 32 points)**
- **Backwards compatible with FDU8x sensor range**
- **HART and PROFIBUS DP compatible**

The Prosonic S ultrasonic transmitter cleverly combines level measurement, flowmetering and pump control - all in one single device! Choose from the top-hat rail version for space-saving installation or a robust, weather-resistant (IP66/NEMA4X) field housing for outdoor use. With a measuring range of up to 70m, Prosonic S offers continuous, non-contact level measurement of not only fluids, pastes and sludge but also powdery and coarse grained bulk solids. What's more, calculations can be displayed as average, difference or sum to get t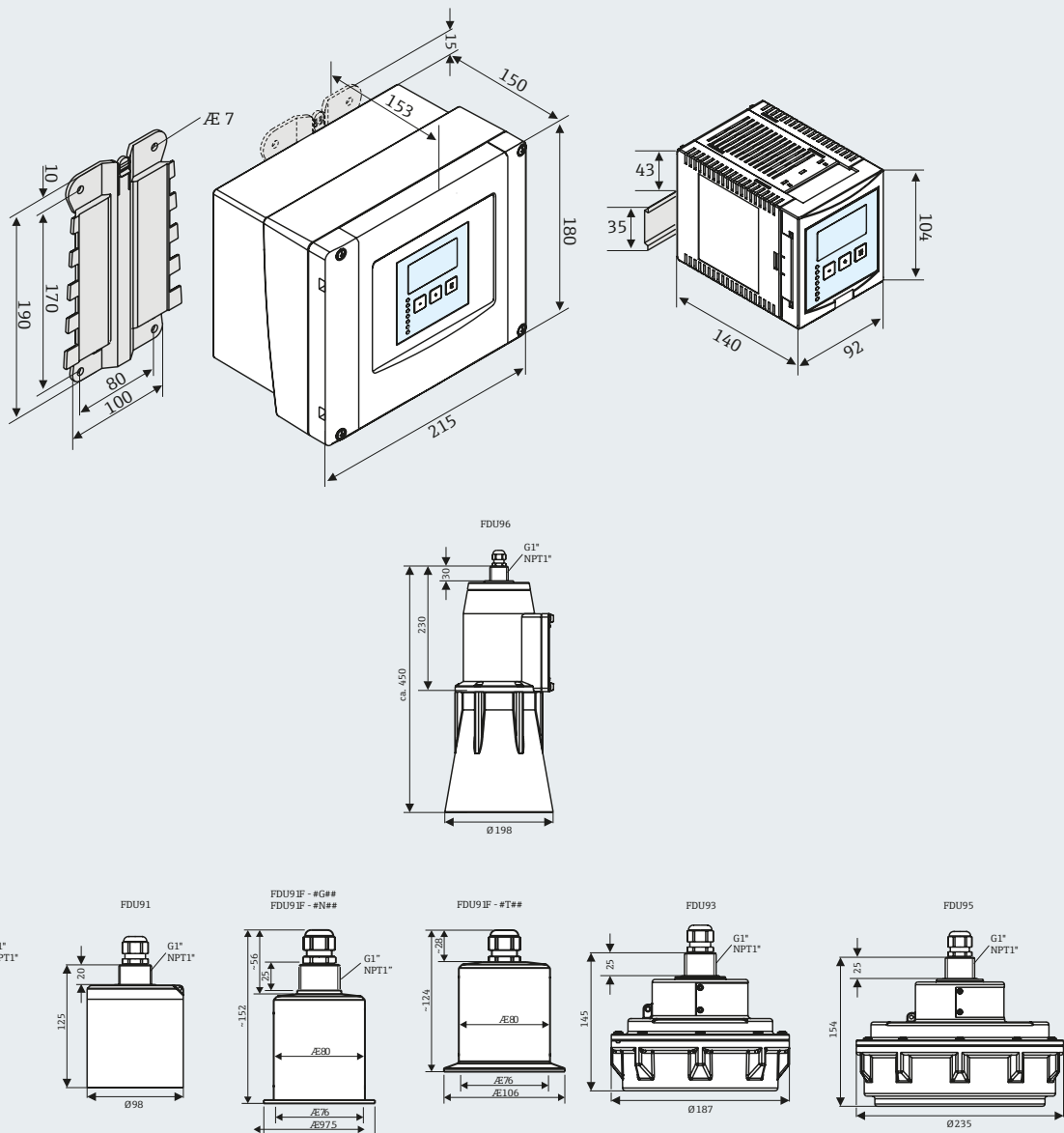he most out of your available measurement data. Prosonic S is also an effective flowmeter, providing accurate measurement in open channels and weirs. It also allows the simultaneous measurement of level and flow in stormwater overflow basins for maximum functionality. The integral linearisation tables provide the most common flumes and weirs and allow the online calculation of flume and weir flow via integrated flow curves.

Prosonic S features simple, menu-guided operation via its 6-line plain text display. With no codes to decipher, you can concentrate on getting the job done! What's more, the envelope curves on the display allow you to see exactly what the instrument sees and operation couldn't be easier with the free of charge operating software for reliable commissioning, maintenance and documentation of the measuring point.

Technical data

Measuring range :	up to 70m (depending on sensor)
Output :	4...20mA HART or PROFIBUS DP
Protection :	IP68 (sensor), IP66/NEMA4X (field housing)
Cable :	5m standard, up to 300m

Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

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Dimensions (mm)

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Micropilot FMR10/20

Compact and cost-effective non-contact radar level devices.

- **Best price-performance ratio on the market**
- **Bluetooth commissioning, operation and maintenance via free SmartBlue app**
- **Unique radar chip design is perfect for applications with limited space**
- **Fully encapsulated electronics**

Our Micropilot FMR10/20 radar level transmitters offer genuine state-of-the-art technology with the cleverly designed radar chip that allows it to be small enough to install in difficult-to-access applications with limited space. They also feature Bluetooth communication for simple commissioning via any smartphone or tablet via the free SmartBlue app.

Technical data		FMR10	FMR20
Measuring range	:	Up to 8m	Up to 20m
Process connections	:	Thread	Thread or flange
Accuracy	:	±5mm	±2mm
Temperature	:	-40℃...+60℃	-40℃...+80℃
Pressure	:	-1 to +3 bar	-1 to +3 bar
Output	:	2-wire (4...20mA)	4...20mA HART
Communication	:	Bluetooth	Bluetooth
Measuring frequency	:	26GHz	26GHz
Certification	:	CSA C/US	ATEX, CSA C/US, IEC Ex

Level

Pressure

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Temperature

Analytics
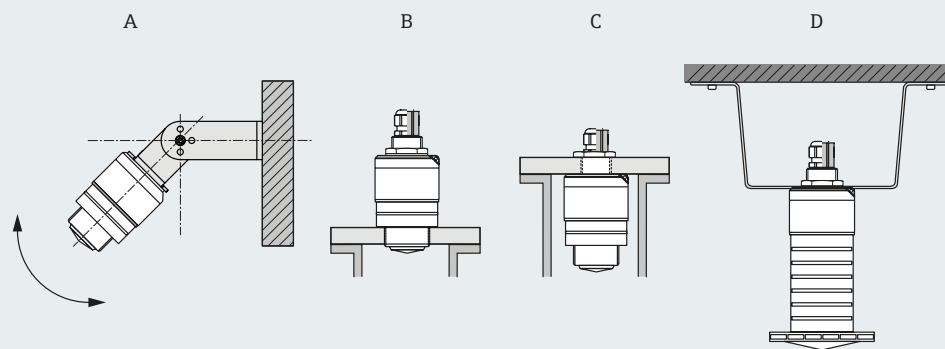
Recorders &
System Components

Services &
Solutions

FMR10/20 Installation

Wall, ceiling or nozzle installation:

A. Wall or ceiling mount, adjustable
B. Mounted at front thread
C. Mounted at rear thread
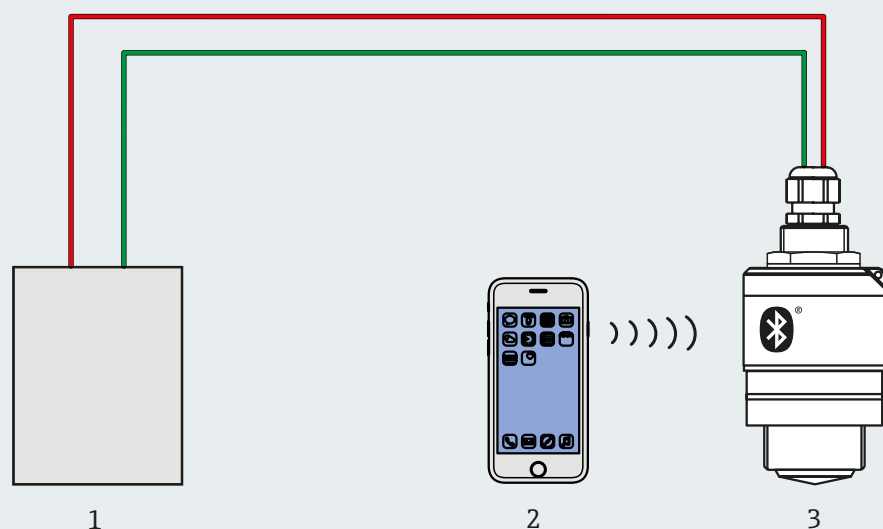D. Ceiling installation with counter nut
   (included)

Please note:

The sensor cable is not designed as
supporting cable - do not use as a
suspension wire.

A   B   C   D

FMR10/20 'Bluetooth operation

Possibilities for remote operation via Bluetooth:

1. Transmitter power supply unit
2. Smartphone/tablet with SmartBlue app
3. Transmitter with Bluetooth wireless technology.

1   2   3

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Level

Pressure

Flow

Temperature

Analytics

Recorders &
System Components

Services &
Solutions

Micropilot FMR50/51/52/53/54

Non-contact radar level measurement using the Time of Flight principle.

FMR50   FMR51   FMR52   FMR53   FMR54

WirelessHART

- ■ **Dual compartment housing for increased safety**
- ■ **Dual 4...20mA outputs**
- ■ **SIL2/SIL3 certification**
- ■ **4...20mA, HART, PROFIBUS PA, FOUNDATION Fieldbus**

The Micropilot range of free space radar transmitters offers outstanding non-contact continuous level measurement in liquids, pastes and slurries. Available with rod, horn or planar antenna and a range of

process connections (including hygienic) to suit your process, Micropilot radar devices offer reliable measurement as they are unaffected by pressure, temperature, gas layers or condensation.

Technical data

		FMR50	FMR51	FMR52	FMR53	FMR54
Measuring range	:	30m, enhanced dynamics 40m	40m, enhanced dynamics 70m	40m, enhanced dynamics 60m	Up to 20m	Up to 20m
Antenna	:	Horn	Horn	Flush-mounted horn	Rod	Horn or parabolic
Process connection	:	1½" thread or flange mounting	1½" thread or flange mounting	Flange mounting	1½" thread or flange mounting	Flange mounting
Output	:	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus
Accuracy	:	±2mm	±2mm	±2mm	±6mm	±6mm
Temperature	:	-40℃...+130℃	-196℃...+450℃	-40℃...+200℃	-40℃...+150℃	-60℃...+400℃
Pressure	:	-1 bar..+3 bar	-1 bar..+160 bar	-1 bar..+16 bar	-1 bar..+40 bar	-1 bar..+160 bar
Certification	:	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS
Degree of protection	:	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/NEMA6P (dependent on housing)

Multi-echo tracking

Developed to allow for a more reliable measurement by utilising multiple echoes to track obstacles accurately within a vessel, the software combines increased echo rate and analysis with the automatic suppression of interfering echoes. Dynamic, continuously adapting evaluation algorithms guarantee precise measurement results.

The 4-line plain text display provides step-by-step menu-driven commissioning and troubleshooting as standard and features either simple pushbutton operation or external touch control. With the added functionality of data backup, data comparison and data transfer, Micropilot level gauges offer outstanding functionality at an attractive price.

- **FMR50**: For basic supply and storage applications and utility processes.
- **FMR51**: Reliable measurement even under extreme process conditions (up to +450°C and 160 bar).
- **FMR52**: Meets the highest hygienic requirements (ASME BPE, USP Class VI).
- **FMR53**: For small process connections and aggressive media.
- **FMR54**: For measurement in bypass and stilling wells.

Benefit from devices with Heartbeat Technology

The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.

Installation

Mounting position for the measurement of liquids
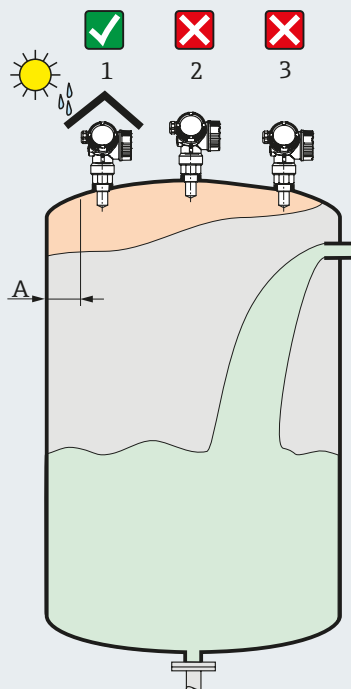
A. Distance from wall to outer edge of the nozzle
1. Weather protection cover
2. No mounting in the centre
3. No mounting above a fill stream

- Recommended distance (A) from wall to outer edge of nozzle: ~ 1/6 of tank diameter. However, the device should not be installed closer than 15cm to the tank wall.
- Not in the centre (2), as interference can cause signal loss.
- Not above the fill stream (3).
- It is recommended to use a weather protection cover (1) in order to protect the device from direct sun or rain.

Vessel installations

Avoid any installations (limit switches, temperature sensors, braces, vacuum rings, heating coils, baffles, etc) inside the signal beam. Take the beam angle into account.
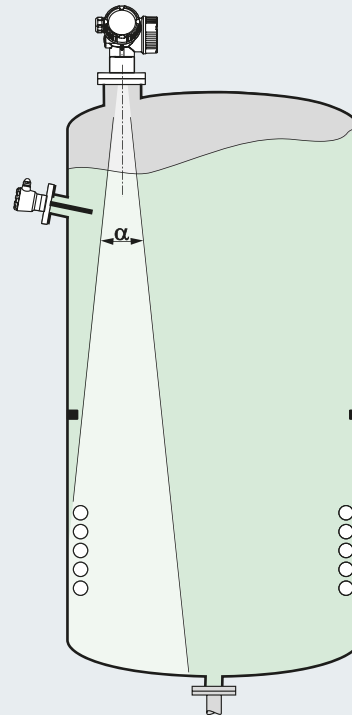
- For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
- To download technical documentation, please visit our website: **www.uk.endress.com**
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Micropilot FMR56/57

Non-contact radar level measurement for solids.

FMR56

FMR57

WirelessHART

- **Dual compartment housing for increased safety**
- **Dual 4...20mA outputs**
- **SIL2/SIL3 certification**
- **4...20mA, HART, PROFIBUS PA, FOUNDATION Fieldbus**

The Micropilot range of free space radar transmitters offers outstanding non-contact continuous level measurement in powdery to granular bulk solids. Available with horn or parabolic antenna and a range of process connections to suit your process, Micropilot radar devices offer reliable measurement as they are unaffected by pressure, temperature, gas layers or condensation.

The 4-line plain text display provides step-by-step menu-driven commissioning and troubleshooting as standard and features either simple pushbutton operation or external touch control. With the added functionality of data backup, data comparison and data transfer, Micropilot level gauges offer outstanding functionality at an attractive price.

- **FMR56**: For standard bulk solids applications e.g. bulk cargo silos and storage tanks.

- **FMR57**: For demanding solids applications e.g. measurements in high silos, bunkers and stockpiles. With integrated air purge as standard.

Technical data

		FMR56	FMR57
Measuring range	:	Up to 30m	Up to 70m
Antenna	:	Horn	Horn or parabolic
Process connection	:	Flange mounting	1½" thread or flange mounting
Output	:	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus	4...20mA, HART, PROFIBUS, FOUNDATION Fieldbus
Accuracy	:	±3mm	±3mm
Temperature	:	-40°C...+80°C	-40°C...+400°C
Pressure	:	-1 bar...+3 bar	-1 bar...+16 bar
Certification	:	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS	ATEX, IEC Ex, CSA, FM, NEPSI, TIIS
Degree of protection	:	IP66/NEMA4X-IP68/ NEMA6P (dependent on housing)	IP66/NEMA4X-IP68/ NEMA6P (dependent on housing)

Benefit from devices with Heartbeat Technology
The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.

Installation

Mounting position for the measurement of solids.
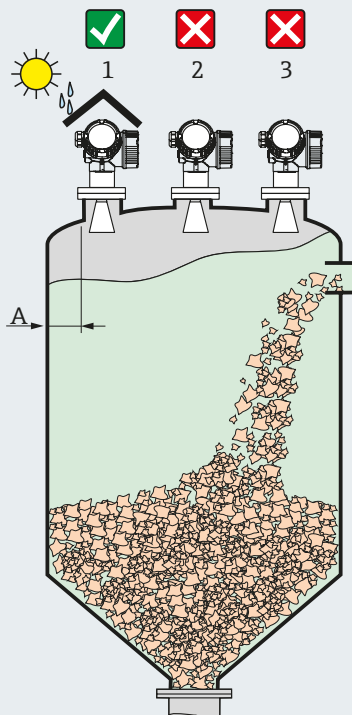

A. Distance from wall to outer edge of the nozzle
    1. Weather protection cover
    2. No mounting in the centre
    3. No mounting above a fill stream

- Recommended distance (A) from wall to outer edge of nozzle: ~ 1/6 of vessel diameter.
  However, the device should not be installed closer than 20cm to the vessel wall. If the wall of the vessel is not smooth, (corrugated metal, welding seams, irregularities, etc.) the distance from the wall should be kept as large as possible. If necessary, use an alignment device to prevent interference reflections from the wall.
- Not in the centre (2), as interference can cause signal loss.
- Not above the fill stream (3).
- It is recommended to use a weather protection cover (1) in order to protect the device from direct sun or rain.
- In extremely dusty applications, the integrated air purge connection can prevent clogging of the antenna.

Vessel installations

Avoid any installations (limit switches, temperature sensors, braces, etc.) inside the signal beam. Take into account the beam angle.
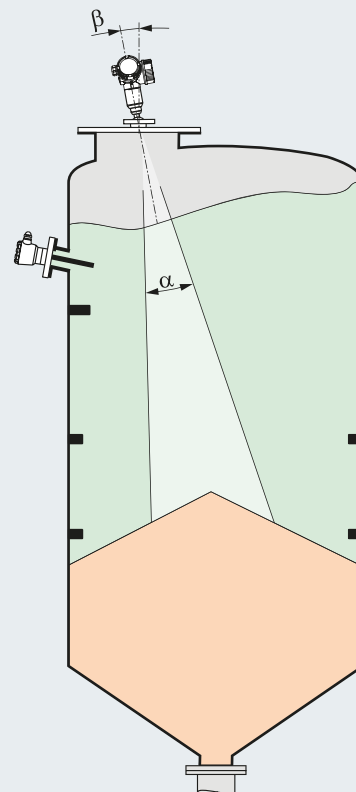
ℹ️
- For more information, specific application advice or to order, please contact us on **0161 286 5000** or email: **info@uk.endress.com**
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Micropilot NMR81/84

Non-contact radar for high accuracy custody transfer applications.

NMR81

NMR84

WirelessHART

- Maximum reliability with accuracy up to ±0.5mm
- Developed according to international metrology recommendations such as OIML R85 and API MPMS
- Hardware and software developed according to IEC 61508 up to SIL3 (in homogeneous redundancy) for a high level of safety
- 79GHz technology for narrow beam angle for sharper focus, without interference from tank wall and obstructions
- All relevant certification for custody transfer applications

The Micropilot NMR81/NMR84 intelligent tank gauges are designed for high accuracy liquid level measurement in storage and process applications. They fulfil the exacting demands of tank inventory management, inventory control, custody transfer, loss control, total cost saving and safe operation. Micropilot NMR81 and NMR84 are used for custody transfer and inventory control applications with NMi and PTB approvals and meet the requirements according to OIML R85 and API 3.1B.

Micropilot NMR81 is particularly suited for free space applications up to 70m. The drip-off lens antenna with 80GHz transmitting frequency produces a sharply focused beam angle of 3° and avoids obstacles even close to tank wall.

Micropilot NMR84 free space radar with drip-off planar antenna is specifically suited for stilling well applications. The superior drip-off antenna design with proven track record eliminates problems caused by condensation.

Technical data		NMR81	NMR84
Measuring range	:	Up to 70m	Up to 40m
Process connections	:	Flange	Flange
Accuracy	:	±0.5mm	±0.5mm
Temperature	:	-40°C...+200°C	-40°C...+150°C
Pressure	:	-1 to +16 bar	-1 to +25 bar
Measuring frequency	:	79GHz	6GHz
Hazardous area approvals	:	ATEX	ATEX

Local operation

Local operation of the Micropilot NMR81/NMR84

1. Display and operating module
   - 4-line display
   - White background lighting: switches to red in event of device errors
   - Format for displaying measured variables and status variables can be individually configured
   - Permitted ambient temperature for the display: −20 to +70°C (readability of the display may be impaired at temperatures outside this range)
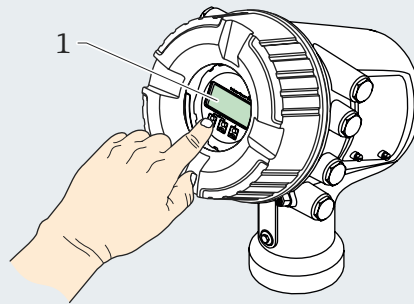

Operating elements
- External operation via touch control: 3 optical keys
- Operating elements also accessible in various hazardous areas

Remote operation

**Remote operation of tank gauging devices:**

1. Proservo NMS8x
2. Tankside Monitor NRF81
3. Micropilot NMR8x
4. Field protocol (e.g. Modbus, V1)
5. Tankvision Tank Scanner NXA820
6. Ethernet
7. Computer with operating tool (e.g. FieldCare)
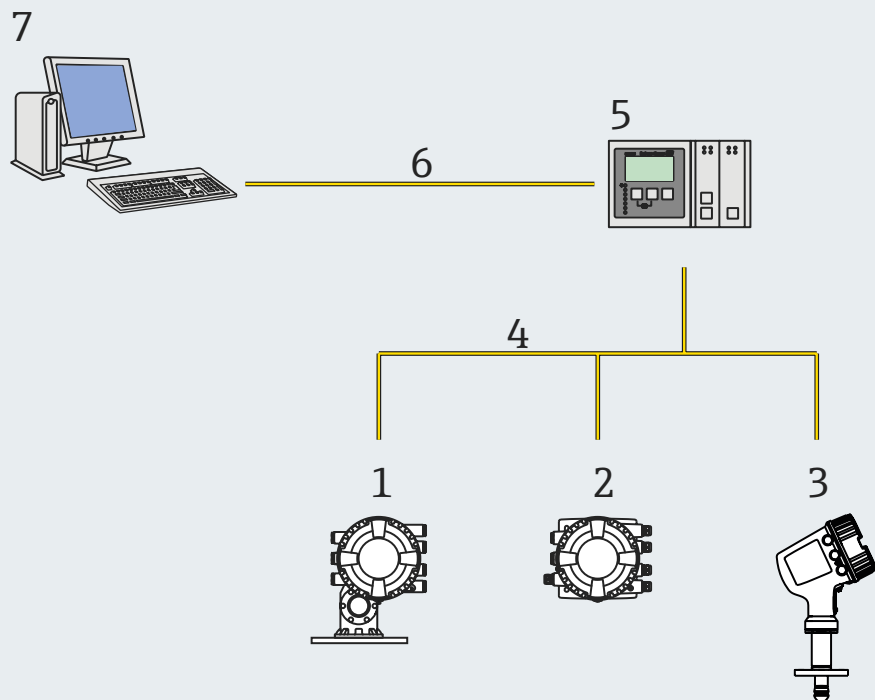
Service interface operation

Operation via service interface:

1. Service interface (CDI = Endress+Hauser Common Data Interface)
2. Commubox FXA291
3. Computer with FieldCare operating tool and CDI Communication FXA291 COM DTM
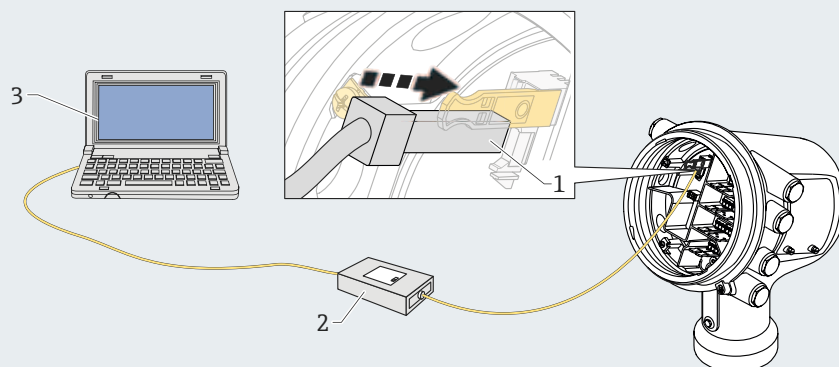
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Levelflex FMP50/51/52/53/54/55/56/57

Guided wave radar level measurement in liquids and solids.

FMP50   FMP51   FMP52   FMP53   FMP54   FMP55   FMP56   FMP57

WirelessHART

- **Ideal for difficult applications e.g. interface measurement with emulsions**
- **Multi-echo tracking – no signal loss**
- **Developed to SIL IEC 61508**
- **Documented ±2mm accuracy as standard**

For use across industry
With a choice of sensors (rod, coaxial or rope) covering liquids, solids, pastes, liquefied gases or bulk solids, exactly the right model can be selected for a variety of industrial applications including chemical, cement, food, life science and hydrocarbon processing. Severe

conditions are not a problem as the sensors handle low/high pressures (vacuum up to 400 bar), low/high temperatures (-200℃ up to +450℃) and corrosive or abrasive materials.

Multi-echo tracking
Developed to allow for a more reliable measurement by utilising

Technical data

	FMP50	FMP51	FMP52	FMP53	FMP54	FMP55	FMP56	FMP57
Process media :	Liquids	Liquids	Liquids	Liquids	Liquids	Interface	Solids	Solids
Measuring range :	Up to 12m	Up to 45m	Up to 45m	Up to 6m	Up to 45m	Up to 10m	Up to 12m	Up to 45m
Output :	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch	4...20mA, HART, PROFIBUS PA, switch
Power supply :	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC	2-wire; 4...20mA loop, 4-wire 90...253V AC, 4-wire 10.4...48V DC
Temperature :	-20...+80℃	-40...+200℃	-50...+200℃	-20...+150℃	-196...+450℃	-50...+200℃	-40...+120℃	-40...+150℃
Pressure :	-1...+6 bar	-1...+40 bar	-1...+40 bar	-1...+16 bar	-1...+400 bar	-1...+40 bar	-1...+16 bar	-1...+16 bar
Certification :	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex	ATEX, CSA, IEC Ex
Protection :	IP68	IP68	IP68	IP68	IP68	IP68	IP68	IP68

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multiple echoes to track obstacles accurately within a vessel, the software combines increased echo rate and analysis with the automatic suppression of interfering echoes. Dynamic, continuously adapting evaluation algorithms guarantee precise measurement results.

Better by design

Fully modular with a modern product design, the new Levelflex series is based on a standard housing, display (angled for better readability), power supply and software, allowing simple cost-effective operation and maintenance regimes. With the option of a second analogue or switch output and the advanced process diagnostic capabilities, it is possible to control processes such as antenna cleaning or foam reduction locally.

Menu-guided setup reduces installation time and effort, which can be completed in six simple steps. Maintenance is reduced as the sensors have no moving parts and the device's configuration settings are stored in the innovative HistoROM® data memory module. This allows for easy system restoration and multi-point commissioning without the need for specialised technical knowledge. It's a real bonus for tank farms or any multi-vessel processes as data can simply be transferred from one device to the next, significantly simplifying commissioning and maintenance procedures.

Levelflex FMP55 with SensorFusion technology cleverly combines capacitance and guided radar

measurement in one device. The instrument guarantees safe measured value acquisition even in emulsion layers and issues level and interface layer signals simultaneously.

Benefit from devices with Heartbeat Technology

The integrated Heartbeat Technology means you'll how your device is performing in order to minimise downtime and maximise plant productivity. Device diagnostics guarantee safe operation with extended proof test cycles and provides documented evidence of device performance necessary to meet legislative requirements.
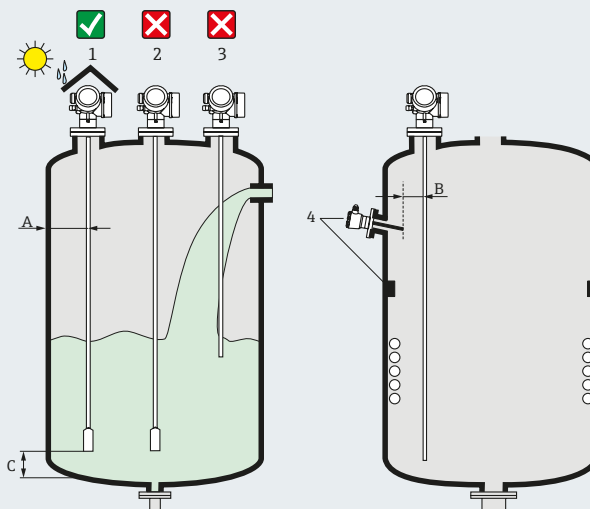
Dimensions (mm)

Housing dimensions
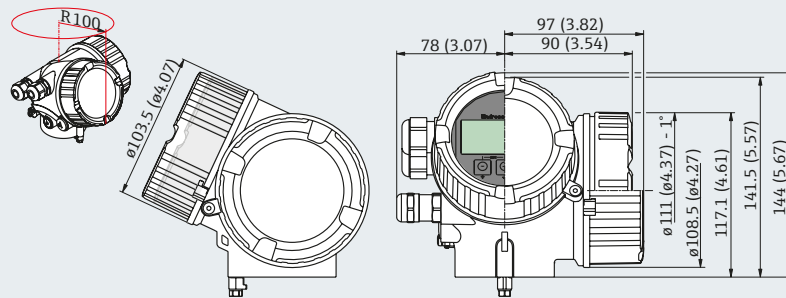
Installation

Mounting distances

- Distance (A) between wall and rod or rope probe:
- – for smooth metallic walls: >50mm
- – for plastic walls: >300mm to metallic parts outside the vessel
- – for concrete walls: >500mm (or measuring range may be reduced)
- Distance (B) between rod or rope probe and internal fittings in the vessel: >300mm
- Distance (C) from end of probe to bottom of the vessel: >10mm

Additional conditions

- When mounting in the open, use a weather protection cover (1).
- In metallic vessels, do not mount the probe in the centre of the vessel (2).
- Do not mount the probe in the filling curtain (3).
- Avoid buckling the rope probe during installation or operation (e.g. through product movement against silo wall) by selecting a suitable mounting location.

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