



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Liquiphant M FTL50(H), FTL51(H)

Vibronic

Point level switch for all kinds of liquids



### Application

The Liquiphant M is a point level switch which can be used in all liquids

- for process temperatures from  $-50\text{ °C}$  to  $150\text{ °C}$
- for pressures up to 100 bar
- for viscosity up to  $10,000\text{ mm}^2/\text{s}$
- for densities  $\geq 0.5\text{ g/cm}^3$  or  $\geq 0.7\text{ g/cm}^3$ , other settings available on request
- foam detection on request

The reliable function is not affected by flow, turbulence, bubbles, foam, vibration, solids content or buildup. The Liquiphant is thus the ideal substitute for float switches.

### FTL50:

Compact design, ideal for mounting in pipes and for installation in areas difficult to access

### FTL51:

With extension pipe up to 3 m (6 m on request)

### FTL50H, FTL51H:

With polished tuning fork and easy-to-clean process connections and housings for food and pharmaceutical applications

High corrosion-resistant AlloyC4 (2.4610), AlloyC22 (2.4602) is available for the fork and process connections for applications in very aggressive liquids.

International approvals certify use in hazardous areas.

### Your benefits

- Use in safety systems requiring functional safety to SIL2/SIL3 in accordance with IEC 61508/IEC 61511-1
- Large number of process connections to choose from: universal usage
- Suitable for use in sterile applications in the life science industry (device design according to ASME BPE-2007)
- PROFIBUS PA protocol: for commissioning and maintenance
- No adjustment: quick, low-cost startup
- No mechanically moving parts: no maintenance, no wear, long operating life
- Monitoring of fork for damage: guaranteed function
- FDA-approved material (PFA Edlon)
- Compact stainless steel housing (optional): the IP69K protection rating guarantees the unit remains permanently tight and can keep out water even in the event of intensive cleaning or flooding for several hours.

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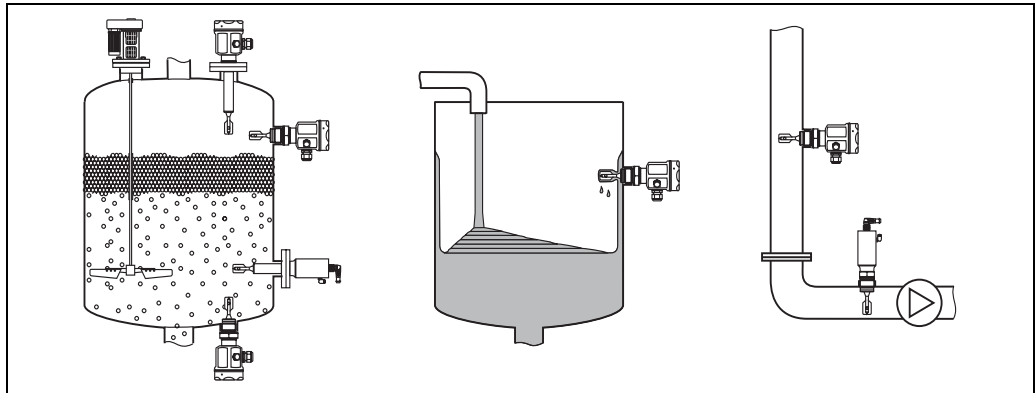
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## Application

### Point level detection

Maximum or minimum detection in tanks or pipes containing all kinds of liquids, including use in hazardous areas, food and pharmaceuticals.



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## Function and system design

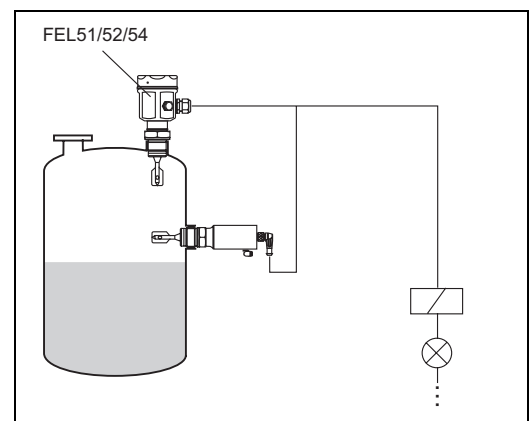
### Measuring principle

The sensor's fork vibrates at its intrinsic frequency. This frequency is reduced when covered with liquid. This change in frequency causes the point level switch to switch.

### Modularity

#### Point level switch

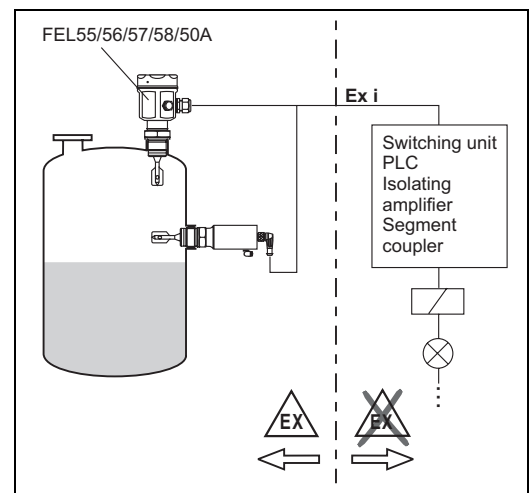
Liquiphant M FTL with electronic versions FEL51, FEL52, FEL54



L00-FTL5xxxx-15-05-xx-xx-000

#### Point level switch

Liquiphant M FTL with electronic versions FEL55, FEL56, FEL57, FEL58 for connecting to a separate switching unit or an isolating amplifier FEL50A for connecting to a PROFIBUS PA segment



L00-FTL5xxxx-15-05-xx-en-000

<b>Electronic versions</b>	<p>FEL51: Two-wire AC version; Switches the load directly into the power supply circuit via an electronic switch.</p> <p>FEL52: Three-wire DC version; Switches the load via the transistor (PNP) and separate connection.</p> <p>FEL54: Universal current version with relay output; Switches the loads via 2 floating change-over contacts.</p> <p>FEL55: For separate switching unit; signal transmission 16/8 mA on two-wire cabling.</p> <p>FEL56: For separate switching unit; signal transmission L-H edge 0.6 to 1.0 / 2.2 to 2.8 mA to EN 50227 (NAMUR) on two-wire cabling.</p> <p>FEL58: For separate switching unit; signal transmission H-L edge 2.2 to 3.5 / 0.6 to 1.0 mA to EN 50227 (NAMUR) on two-wire cabling. Checking of connecting cabling and other devices by pressing a key on the electronic insert.</p> <p>FEL57: For separate switching unit; PFM signal transmission; Current pulses superposed on the power supply along the two-wire cabling. Cyclical checking from the switching unit without changing levels.</p> <p>FEL50A: For connecting to PROFIBUS PA; Cyclic and acyclic data exchange acc. to PROFIBUS-PA Profile 3.0 Discrete Input</p>
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<b>Electronics for continuous density measurement</b>	<p>FEL50D: For connecting to Density Computer FML621</p>
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<b>Galvanic isolation</b>	<p>FEL51, FEL52, FEL50A: Between sensor and power supply</p> <p>FEL54: Between sensor and power supply and load</p> <p>FEL55, FEL56, FEL57, FEL58, FEL50D: See connected switching unit</p>
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<b>Design</b>	<p>FTL50: Compact</p> <p>FTL51: With extension pipe</p> <p>FTL50H: Compact, with polished tuning fork and hygienic process connections</p> <p>FTL51H: With extension pipe, polished tuning fork and hygienic process connections</p>
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## Input

<b>Measured variable</b>	Level (limit value)
<b>Measuring range (detection range)</b>	<p>FTL50: Depends on mounting point</p> <p>FTL51: Depends on mounting point and the pipe extension. Standard 3000 mm (up to 6000 mm on request)</p>
<b>Density</b>	Adjustment on the electronic insert > 0.5 g/cm <sup>3</sup> or > 0.7 g/cm <sup>3</sup> (other on request)

## Electronic insert FEL51 (AC 2-wire)

### Power supply

Supply voltage: 19 to 253 V AC  
 Power consumption: < 0.83 W  
 Residual current consumption: < 3.8 mA  
 Short-circuit protection  
 Overvoltage protection FEL51: overvoltage category III

### Electrical connection

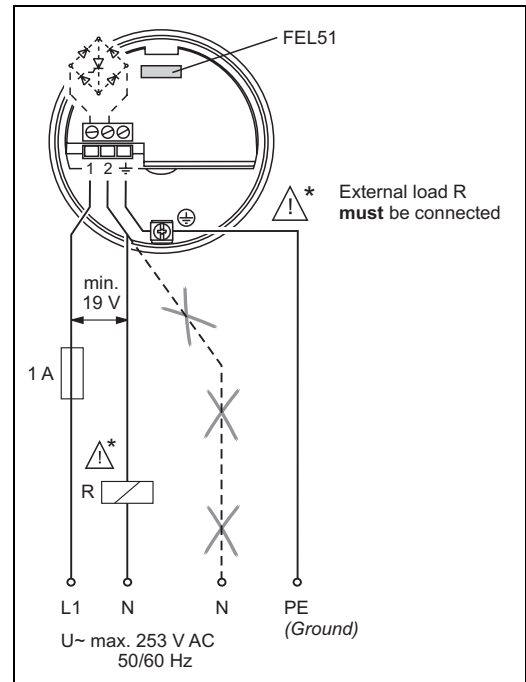
#### Two-wire AC connection

Switches the load directly into the power supply circuit via an electronic switch.

Always connect in series with a load!

Check the following:

- The residual current in blocked state (up to 3.8 mA)
- That for low voltage
  - the voltage drop across the load is such that the minimum terminal voltage at the electronic insert (19 V) when blocked is not undershot.
  - the voltage drop across the electronics when switched through is observed (up to 12 V)
- That a relay cannot de-energize with holding power below 3.8 mA.  
 If this is the case, a resistor should be connected parallel to the relay. An RC module is available under the modification number MVT2Y1278.
- When selecting the relay, pay attention to the holding power / rated power (see "Connectable load")



L00-FTL5xxxx-04-05-xx-xx-007

### Output signal

$I_L$  = load current (switched through)

< 3.8 mA = residual current (blocked)

= lit

= unlit

L00-FTL2xxxx-07-05-xx-xx-000

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		1 $I_L$ → 2		
		1 < 3.8 mA → 2		
Min.		1 $I_L$ → 2		
		1 < 3.8 mA → 2		

L00-FTL5xxxx-04-05-xx-xx-001

### Signal on alarm

Output signal on power failure or in the event of damaged sensor: < 3.8 mA

### Connectable load

- For relays with a minimum holding power/rated power > 2.5 VA at 253 V AC (10 mA) or > 0.5 VA at 24 V AC (20 mA)
- Relays with a lower holding power/rated power can be operated by means of an RC module connected in parallel.
- For relays with a maximum holding power/rated power < 89 VA at 253 AC or < 8.4 VA at 24 V AC
- Voltage drop across FEL51 max. 12V
- Residual current with blocked electrical switch: max. 3.8 mA.
- Load switched directly into the power supply circuit via the thyristor.  
 Transient (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 36 VA at 24 V (not short-circuit proof)

## Electronics FEL51 (AC, in compact housing)

**Power supply**

Supply voltage: 19 to 253 V AC  
 Power consumption: < 0.83 W  
 Residual current consumption: < 3.8 mA  
 Short-circuit protection  
 Overvoltage protection FEL51: overvoltage category III

**Electrical connection**

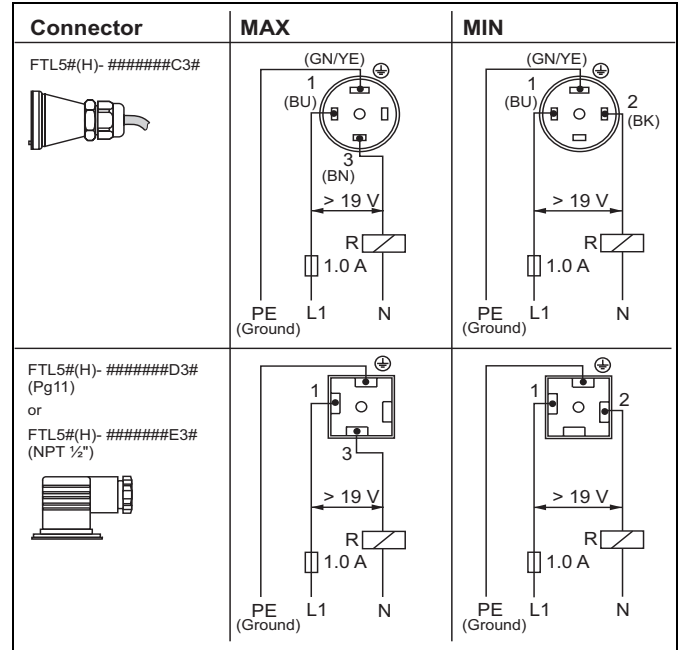
**Two-wire AC connection**

Switches the load directly into the power supply circuit via an electronic switch.

Always connect in series with a load!

Check the following:

- The residual current in blocked state (up to 3.8 mA)
- that for low voltage
  - the voltage drop across the load is such that the minimum terminal voltage at the electronic insert (19 V) when blocked is not undershot.
  - the voltage drop across the electronics when switched through is observed (up to 12 V)



L00-FTL5xxxx-04-05-xx-en-008

- That a relay cannot de-energize with holding power below 3.8 mA.  
 If this is the case, a resistor should be connected parallel to the relay (RC module available on request).

**Output signal**

$I_L$  = load current (switched through)  
 < 3.8 mA = residual current (blocked)

☀ = lit  
 ● = unlit

L00-FTL2xxxx-07-05-xx-xx-000

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		1 → $I_L$ → 3	☀	●
		1 - - - - - > 3.8 mA - - - - - 3	☀	☀
Min.		1 → $I_L$ → 2	☀	●
		1 - - - - - < 3.8 mA - - - - - 2	☀	☀

L00-FTL5xxxx-04-05-xx-xx-001a

**Signal on alarm**

Output signal on power failure or in the event of damaged sensor: < 3.8 mA

**Connectable load**

- For relays with a minimum holding power/rated power > 2.5 VA at 253 V AC (10 mA) or > 0.5 VA at 24 V AC (20 mA)
- Relays with a lower holding power/rated power operated by means of an RC module connected in parallel.
- For relays with a maximum holding power/rated power < 89 VA at 253 AC or < 8.4 VA at 24 V AC
- Voltage drop across FEL51 max. 12V
- Residual current with blocked electrical switch: max. 3.8 mA.
- Load switched directly into the power supply circuit via the thyristor.  
 Transient (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 36 VA at 24 V (not short-circuit proof)

## Electronic insert FEL52 (DC PNP)

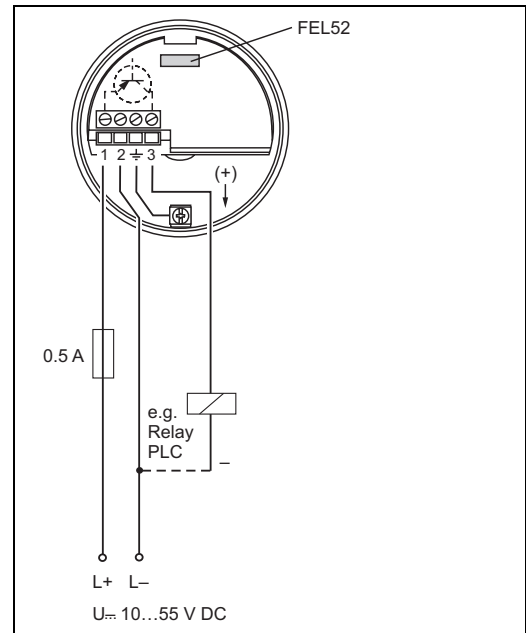
### Power supply

Supply voltage: 10 to 55 V DC  
 Ripple: max. 1.7 V, 0 to 400 Hz  
 Current consumption: max. 15 mA  
 Power consumption: max. 0.83 W  
 Reverse polarity protection  
 Overvoltage protection FEL52: overvoltage category III

### Electrical connection

#### Three-wire DC connection

Preferably used with programmable logic controllers (PLC).  
 DI module as per EN 61131-2.  
 Positive signal at switching output of the electronics (PNP);  
 Output blocked on reaching limit.



L00-FTL5xxxx-04-05-xx-xx-001

### Output signal

$I_L$  = load current (switched through)

$< 100 \mu A$  = residual current (blocked)

= lit

= unlit

L00-FTL2xxxx-07-05-xx-xx-000

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		$L+ \xrightarrow{I_L} +$ 1 → 3		
		$1 \xrightarrow{< 100 \mu A} 3$		
Min.		$L+ \xrightarrow{I_L} +$ 1 → 3		
		$1 \xrightarrow{< 100 \mu A} 3$		

L00-FTL5xxxx-04-05-xx-xx-004

### Signal on alarm

Output signal on power failure or in the event of damaged sensor:  $< 100 \mu A$

### Connectable load

- Load switched via the transistor and separate PNP connection, max. 55 V DC
- Load current max. 350 mA (pulsed overload and short-circuit protection)
- Residual current  $< 100 \mu A$  (with transistor blocked).
- Capacitance load max.  $0.5 \mu F$  at 55 V, max.  $1.0 \mu F$  at 24 V
- Residual voltage  $< 3 V$  (with transistor switched through);



## Electronics FEL52 (DC PNP, in compact housing)

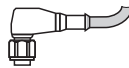
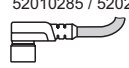
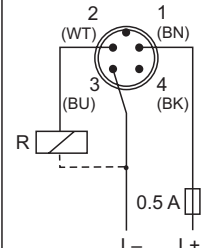
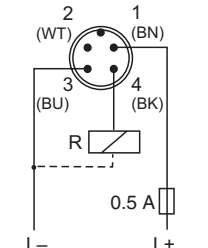

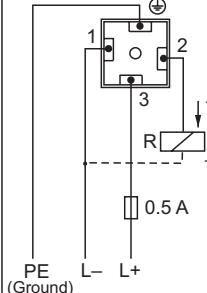
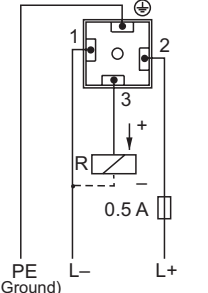
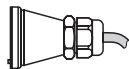
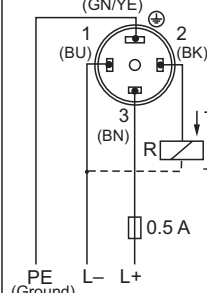
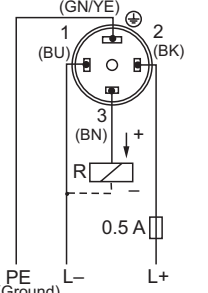
### Power supply

Supply voltage: 10 to 55 V DC  
 Ripple: max. 1.7 V, 0 to 400 Hz  
 Current consumption: max. 15 mA  
 Power consumption: max. 0.83 W  
 Reverse polarity protection  
 Overvoltage protection FEL52: overvoltage category III

### Electrical connection

#### Three-wire DC connection

Preferably used with programmable logic controllers (PLC).  
 DI module as per EN 61131-2.  
 Positive signal at switching output of the electronics (PNP);  
 Output blocked on reaching limit.

Connector	MAX	MIN
FTL5#(H)- #####N3# (M12x1) 52018763  FTL5#(H)- #####N3# (M12x1) 52010285 / 52024216 		
FTL5#(H)- #####D3# (Pg11) or FTL5#(H)- #####E3# (NPT 1/2") 		
FTL5#(H)- #####C3# 		

L00-FTL5xxxx-04-05-xx-en-010

### Output signal

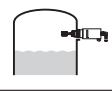


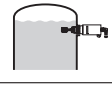


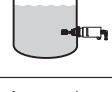





#### With valve connector or cable tail

$I_L$  = load current (switched through)

$< 100 \mu A$  = residual current (blocked)

 = lit

 = unlit

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		$L+ \xrightarrow{I_L} +$ 3 → 2		
		$L+ \xrightarrow{< 100 \mu A} +$ 3 → 2		
Min.		$L+ \xrightarrow{I_L} +$ 2 → 3		
		$L+ \xrightarrow{< 100 \mu A} +$ 2 → 3		

L00-FTL2xxxx-07-05-xx-xx-000

L00-FTL5xxxx-04-05-xx-xx-004

**With M12x1 connector 52010285 / 52024216 (without LEDs)**

 100-FTL5xxxx-16-05-  
xx-xx-002

 $I_L$  = load current  
(switched through)

 $< 100 \mu\text{A}$  = residual current  
(blocked)

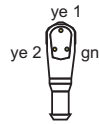
= lit

= unlit

 100-FTL2xxxx-07-05-  
xx-xx-000

Safety mode	Level	Output signal	LEDs
Max.		$L^+$ 1 $\xrightarrow{I_L}$ 2	
		$L^+ < 100 \mu\text{A}$ 1 $\xrightarrow{\text{dashed}}$ 2	
Min.		$L^+$ 1 $\xrightarrow{I_L}$ 4	
		$L^+ < 100 \mu\text{A}$ 1 $\xrightarrow{\text{dashed}}$ 4	

100-FTL5xxxx-04-05-xx-xx-010

**With M12x1 connector 52018763 (with LEDs)**

 100-FTL5xxxx-16-05-  
xx-xx-001

 $I_L$  = load current  
(switched through)

 $< 100 \mu\text{A}$  = residual current  
(blocked)

= lit

= unlit

 100-FTL2xxxx-07-05-  
xx-xx-000

Safety mode	Level	Output signal	LEDs
Max.		$L^+$ 1 $\xrightarrow{I_L}$ 2	
		$L^+ < 100 \mu\text{A}$ 1 $\xrightarrow{\text{dashed}}$ 2	
Min.		$L^+$ 1 $\xrightarrow{I_L}$ 4	
		$L^+ < 100 \mu\text{A}$ 1 $\xrightarrow{\text{dashed}}$ 4	

100-FTL5xxxx-04-05-xx-xx-010

**Signal on alarm**

 Output signal on power failure or in the event of damaged sensor:  $< 100 \mu\text{A}$ 
**Connectable load**

- Load switched via the transistor and separate PNP connection, max. 55 V DC
- Load current max. 350 mA (pulsed overload and short-circuit protection)
- Residual current  $< 100 \mu\text{A}$  (with transistor blocked).
- Capacitance load max. 0.5  $\mu\text{F}$  at 55 V, max. 1.0  $\mu\text{F}$  at 24 V
- Residual voltage  $< 3 \text{ V}$  (with transistor switched through);

## Electronic insert FEL54 (AC/DC with relay output)

**Power supply**

Supply voltage: 19 to 253 V AC, 50/60 Hz or 19 to 55 V DC  
 Power consumption: max. 1.3 W  
 Reverse polarity protection  
 Overvoltage protection FEL54: overvoltage category III

**Electrical connection**

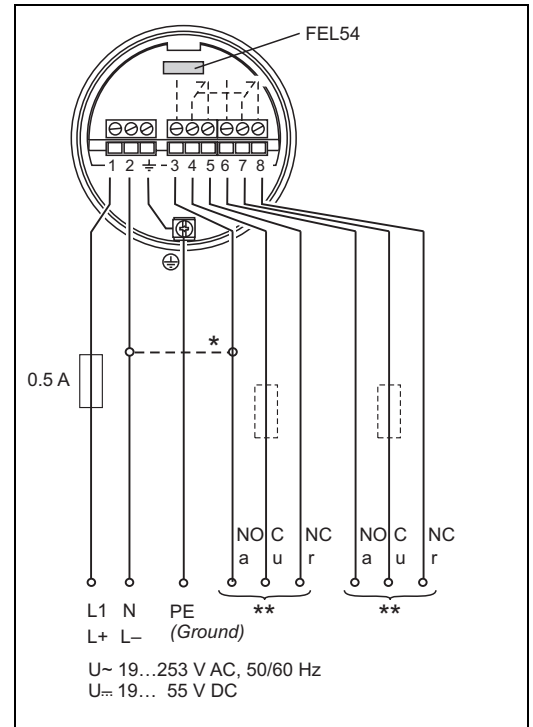
**Universal current connection with relay output**

Power supply:  
 Please note the different voltage ranges for AC and DC.

Output:  
 When connecting an instrument with high inductance, provide a spark arrester to protect the relay contact.  
 A fine-wire fuse (depending on the load connected) protects the relay contact on short-circuiting.  
 Both relay contacts switch simultaneously.

\* When jumpered, the relay output works with NPN logic.

\*\* See "Connectable load"



**Output signal**

- = relay energized
- = relay de-energized
- = lit
- = unlit

L00-FTL2xxxx-07-05-xx-xx-001

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		 3 4 5    6 7 8		
		 3 4 5    6 7 8		
Min.		 3 4 5    6 7 8		
		 3 4 5    6 7 8		

L00-FTL5xxxx-04-05-xx-xx-002

**Signal on alarm**

Output signal on power failure or in the event of damaged sensor: relay de-energized

**Connectable load**

- Loads switched via 2 floating change-over contacts (DPDT).
- I~ max. 6 A (Ex de 4 A), U~ max. 253 V AC; P~ max. 1500 VA, cos φ = 1, P~ max. 750 VA, cos φ > 0.7
- I= max. 6 A (Ex de 4 A) bis 30 V DC, I= max. 0.2 A to 125 V
- When connecting a low-voltage circuit with double isolation according to IEC 1010, the following applies: total of voltages of relay output and power supply max. 300 V.

## Electronic insert FEL55 (8/16 mA)

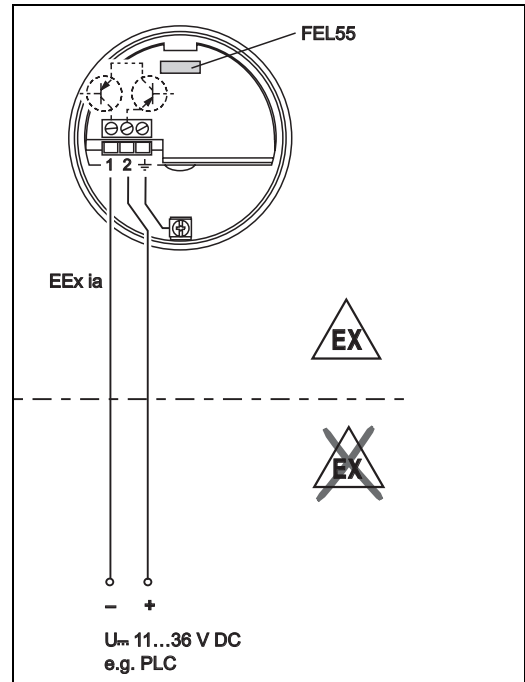
### Power supply

Supply voltage: 11 to 36 V DC  
 Power consumption: < 600 mW  
 Reverse polarity protection  
 Overvoltage protection FEL55: overvoltage category III

### Electrical connection

#### Two-wire connection for separate switching unit

For connecting to programmable logic controllers (PLCs) for example, AI module 4 to 20 mA to EN 61131-2. Output signal jump from high to low current on limit.



L00-FTL5xxxx-04-05-xx-xx-000

### Output signal

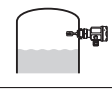


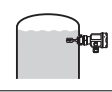


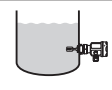


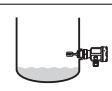


$$\sim 16 \text{ mA} = 16 \text{ mA} \pm 5 \%$$

$$\sim 8 \text{ mA} = 8 \text{ mA} \pm 6 \%$$

 = lit

 = unlit

L00-FTL2xxxx-07-05-xx-xx-000

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		+ 2 $\xrightarrow{\sim 16 \text{ mA}}$ 1		
		+ 2 $\xrightarrow{\sim 8 \text{ mA}}$ 1		
Min.		+ 2 $\xrightarrow{\sim 16 \text{ mA}}$ 1		
		+ 2 $\xrightarrow{\sim 8 \text{ mA}}$ 1		

L00-FTL5xxxx-04-05-xx-xx-000

### Signal on alarm

Output signal on power failure or in the event of damaged sensor: < 3.6 mA

### Connectable load

- $R = (U - 11 \text{ V}) : 16.8 \text{ mA}$
- $U = \text{connection voltage: } 11 \text{ to } 36 \text{ V DC}$

Example:  
 PLC with 250  $\Omega$  with 2-wire version

$$250 \Omega = (U - 11 \text{ V}) / 16.8 \text{ mA}$$

$$4.2 [\Omega / \text{A}] = U - 11 \text{ V}$$

$$U = 15.2 \text{ V}$$

## Electronic insert FEL56 (NAMUR L-H edge)

**Power supply**

Power consumption: < 6 mW at I < 1 mA; < 38 mW at I = 2.8 mA  
 Connection data interface: IEC 60947-5-6

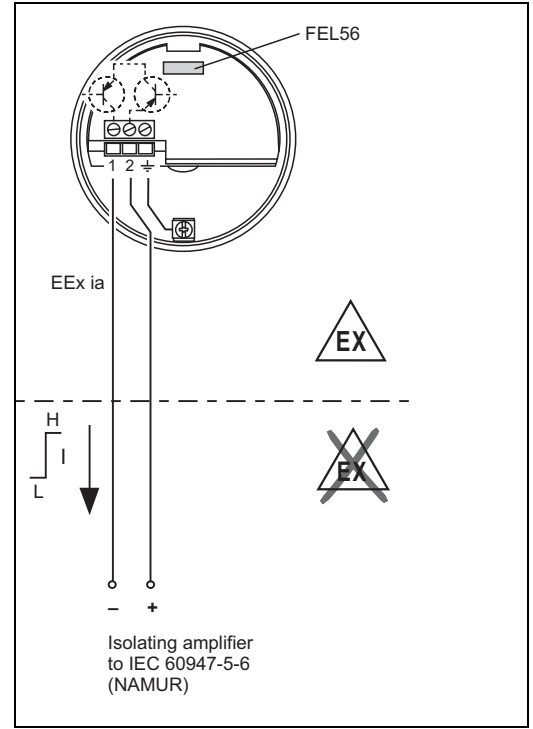
**Electrical connection**

**Two-wire connection for separate switching unit**

For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FTL325N, FTL375N from Endress+Hauser.  
 Output signal jump from low to high current on limit.

**(L-H edge)**

Connecting to multiplexer:  
 Set clock time to min. 2 s.



L00-FTL5xxxx-04-05-xx-en-004

**Output signal**

- = lit
- = flashes
- = unlit

L00-FTL5xxxx-07-05-xx-xx-002

Safety mode	Level	Output signal	LEDs	
			green	red
Max.		+ 0.6 ... 1.0 mA 2 → 1		
		+ 2.2 ... 2.8 mA 2 → 1		
Min.		+ 0.6 ... 1.0 mA 2 → 1		
		+ 2.2 ... 2.8 mA 2 → 1		

L00-FTL5xxxx-04-05-xx-xx-003

**Signal on alarm**

Output signal in the event of damaged sensor: > 2.2 mA

**Connectable load**

See Technical Data of the isolating amplifier connected according to IEC 60947-5-6 (NAMUR)

## Electronic insert FEL58 (NAMUR H-L edge)

### Power supply

Power consumption: < 6 mW at I < 1 mA; < 38 mW at I = 3.5 mA  
 Connection data interface: IEC 60947-5-6


### Electrical connection

#### Two-wire connection for separate switching unit

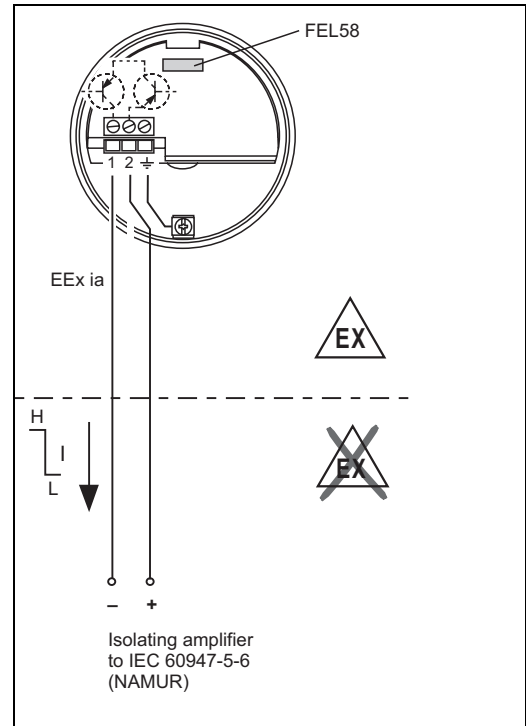
For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FTL325N, FTL375N from Endress+Hauser.  
 Output signal jump from high to low current on limit.

#### (H-L edge)

Additional function:  
 Test key on the electronic insert.  
 Pressing the key breaks the connection to the isolating amplifier.




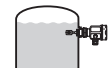








 **Note!**  
 In Ex-d applications, the additional function can only be used if the housing is not exposed to an explosive atmosphere.




Connecting to multiplexer:  
 Set clock time to min. 2 s.



L00-FTL5xxxx-04-05-xx-en-002

### Output signal

Safety mode	Level	Output signal	LEDs green yellow
Max.		+ 2.2 ... 3.5 mA → 1	 
		+ 0.6 ... 1.0 mA → 1	 
Min.		+ 2.2 ... 3.5 mA → 1	 
		+ 0.6 ... 1.0 mA → 1	 

 = lit  
 = flashes  
 = unlit

L00-FTL5xxxx-07-05-xx-xx-002

L00-FTL5xxxx-04-05-xx-xx-007

### Signal on alarm

Output signal in the event of damaged sensor: < 1.0 mA

### Connectable load

- See Technical Data of the isolating amplifier connected according to IEC 60947-5-6 (NAMUR)
- Connection also to isolating amplifiers which have special safety circuits (I > 3.0 mA)

## Electronics FEL58 (NAMUR H-L edge, in compact housing)

**Power supply** Power consumption: < 6 mW at I < 1 mA; < 38 mW at I = 3.5 mA  
 Connection data interface: IEC 60947-5-6

**Electrical connection**

**Two-wire connection for separate switching unit**

For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FTL325N, FTL375N from Endress+Hauser. Output signal jump from high to low current on limit



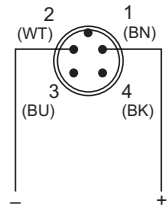
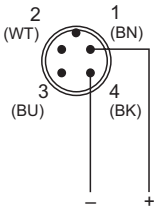
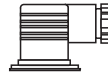
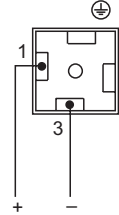
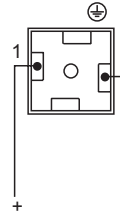
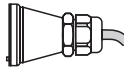
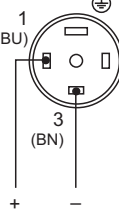
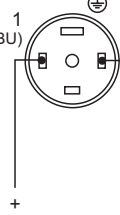
**(H-L edge)**

Additional function: If the test magnet is held against the marking on the nameplate, the output signal is inverted.

Connecting to multiplexer: Set clock time to min. 3 s.

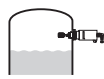


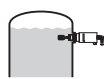


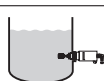


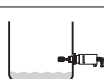


The NAMUR interface has a defined power consumption rate.




Thus, it is not possible to use the M12 connector with an integrated LED (52018763)

Connector	MAX	MIN
<del>FTL5#(H)- #####N3# (M12x1) 52018763</del>  FTL5#(H)- #####N3# (M12x1) 52010285 / 52024216 		
FTL5#(H)- #####D3# (Pg11) or FTL5#(H)- #####E3# (NPT 1/2") 		
FTL5#(H)- #####C3# 		

L00-FTL5xxxx-04-05-xx-en-009

**Output signal**

Safety mode	Level	Output signal	LEDs green yellow
Max.		+ 2.2... 3.5 mA - 3	 
		+ 0.6... 1.0 mA - 3	 
Min.		+ 2.2... 3.5 mA - 2	 
		+ 0.6... 1.0 mA - 2	 

 = lit  
 = flashes  
 = unlit

L00-FTL5xxxx-07-05-xx-xx-002

L00-FTL5xxxx-04-05-xx-xx-007a

**Signal on alarm** Output signal in the event of damaged sensor: < 1.0 mA

**Connectable load**

- See Technical Data of the isolating amplifier connected according to IEC 60947-5-6 (NAMUR)
- Connection also to isolating amplifiers which have special safety circuits (I > 3.0 mA)

## Electronic insert FEL57 (PFM)

### Power supply

Supply voltage: 9.5 to 12.5 V DC  
 Current consumption: 10 to 13 mA  
 Power consumption: < 150 mW  
 Reverse polarity protection

### Electrical connection

#### Two-wire connection for separate switching unit

For connecting to Nivotester switching units FTL320, FTL325P, FTL370, FTL372, FTL375P (also with cyclical checking) from Endress+Hauser. Output signal jump of the PFM signal from high to low frequency when sensor is covered. Switching between minimum/maximum safety in the Nivotester.

Additional function "cyclical checking": After interruption of the power supply, a test cycle is activated which checks the sensor and electronics without any change in level. Approved for overfill protection acc. to WHG (German Water Resources Act). The following can be switched at the electronic insert:

#### – Standard

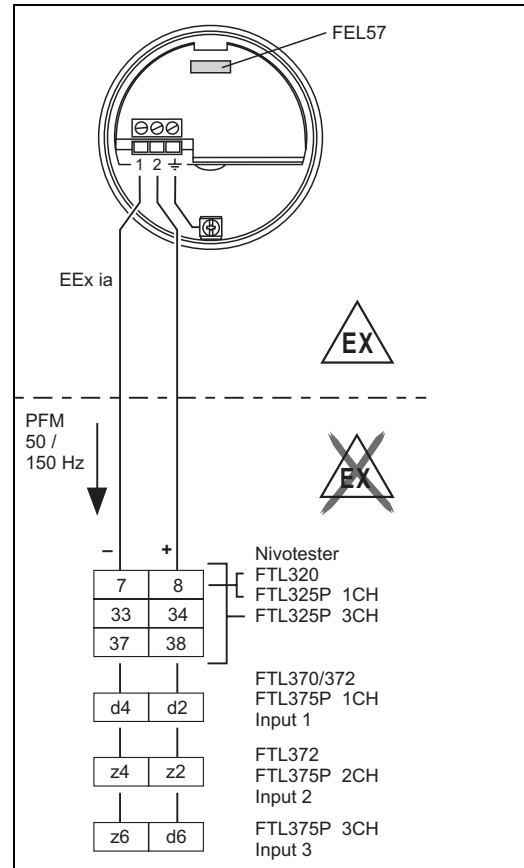
##### (STD):

Corrosion of the fork unlikely; simulation approx. 8 s tuning fork exposed – covered – exposed. This setting tests level reporting in the Nivotester during cyclical checking.

#### – Extended (EXT):

Corrosion of the fork possible; Simulation approx. 41 s: tuning fork exposed – covered – corroded – exposed. This setting tests level reporting and alarm notification in the Nivotester during cyclical checking.

The check is activated and monitored at the switching unit.



L00-FTL5xxxx-04-05-xx-en-003



**Switching behavior of the connected device:**

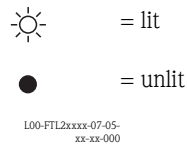
Fail-safe mode set at switching unit	Setting at FEL57	Fork	Switching status of relay in switching unit	
			on = energised	off = de-energised
			⚡ Test start (power off) > 3 s	⚡ End of test start (power on)
Max.	STD	free	on   off	~ 5 s off   ~ 2 s on   ~ 2 s off   on
Max.	EXT	free	on   off	~ 5 s off   ~ 2 s on   ~ 35 s off   //   on
Max.	STD	covered	off   off	off
Max.	EXT	covered	off   off	off
Min.	STD	free	off   ~ 3 s on *	~ 5 s off   ~ 3 s on   off
Min.	EXT	free	off   ~ 3 s on *	~ 7 s off   ~ 30 s on //   off
Min.	STD	covered	on   ~ 3 s on *	~ 5 s off   on
Min.	EXT	covered	on   ~ 3 s on *	~ 5 s off   ~ 35 s on //   ~ 3 s off   on

L00-FTL5xxxx-05-05-xx-en-000

\* De-energized on power supply failure

Please note this switching response and function of the plant especially when replacing a Liquiphant with an EL17Z or FEL37 electronic insert with a Liquiphant M with an FEL57 electronic insert.

**Output signal**



Safety mode	Level	Output signal (PFM)	LEDs green yellow
		150 Hz 	
		50 Hz 	

L00-FTL5xxxx-04-05-xx-xx-000

**Signal on alarm**

Output signal on power failure or in the event of damaged sensor: 0 Hz

**Connectable load**

- Floating relay contacts in the connected switching device Nivotester FTL320, FTL325P, FTL370, FTL372, FTL375P
- For contact load, see the Technical Data of the switching unit

## Electronic insert FEL50A (PROFIBUS PA)

### Power supply

Bus voltage: 9 to 32 V DC

Bus current:

- 12.5 mA +/- 1.0 mA (software version: 01.03.00, hardware version: 02.00)
- 10.5 mA +/- 1.0 mA (software version: 01.03.00, hardware version: 01.00)

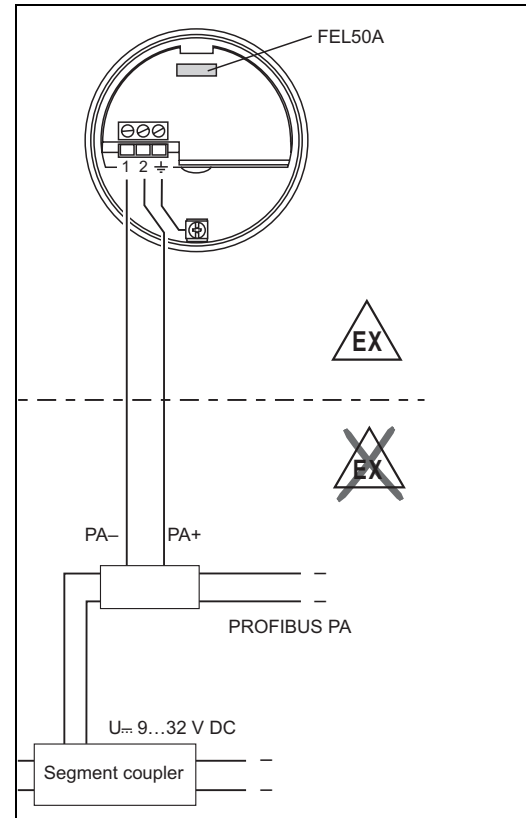
### Electrical connection

#### Two-wire connection for power supply and data transfer

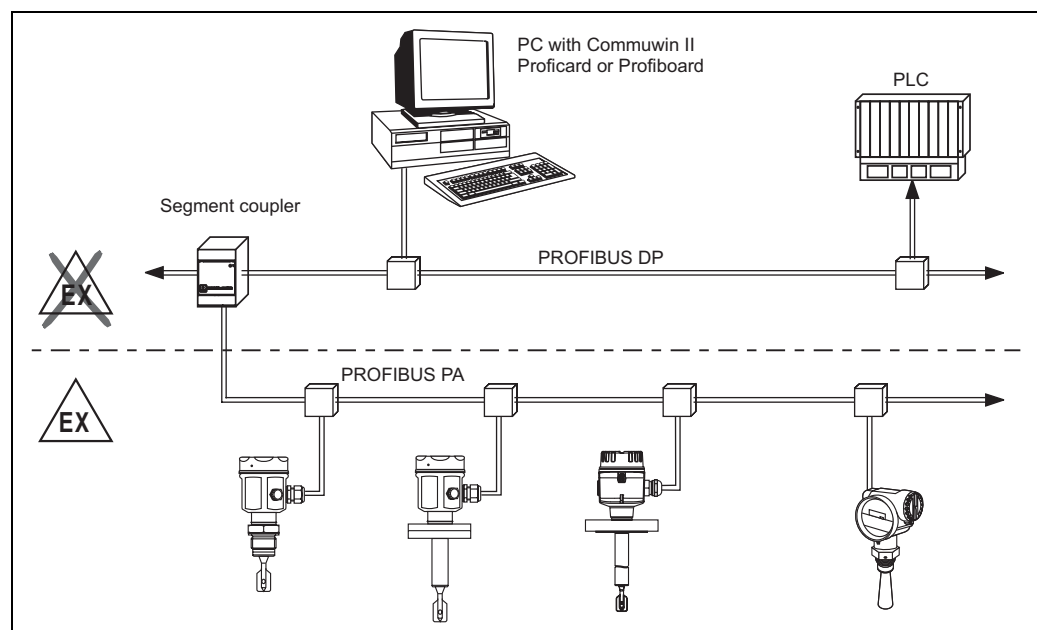
For connecting to PROFIBUS PA

Additional functions:

- Digital communication enables the representation, reading and editing of the following parameters:  
Fork frequency, switch-on frequency, switch-off frequency, switch-on time and switch-off time, status, measured value, density switch.
- Matrix locking possible
- Switch to WHG mode possible (WHG approval).
- For a detailed description, see BA198F
- You can also visit [www.profibus.com](http://www.profibus.com) for more information





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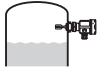


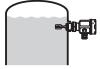


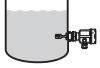


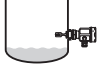




L00-FTL5xxxx-04-05-xx-en-006

**Output signal**

 = lit  
 = unlit

L00-FTL2xxxx-07-05-  
xx-xx-000

Setting	Level	LEDs		FEL50A
		green	yellow	
not inverted				OUT_D = 0 PA bus signal
				OUT_D = 1 PA bus signal
inverted				OUT_D = 1 PA bus signal
				OUT_D = 0 PA bus signal

L00-FTL5xxxx-04-05-xx-xx-000

**Signal on alarm**

- Failure information can be opened using the following interfaces:  
Yellow LED flashing, status code, diagnostic code; see BA198F

## Electronic insert FEL50D (density)

### Power supply

Frequency range: 300 to 1500 Hz  
 Signal level: 4 mA  
 Pulse height: 16 mA  
 Pulse width: 20  $\mu$ S

### Electrical connection

#### Two-wire connection at Density Computer FML621

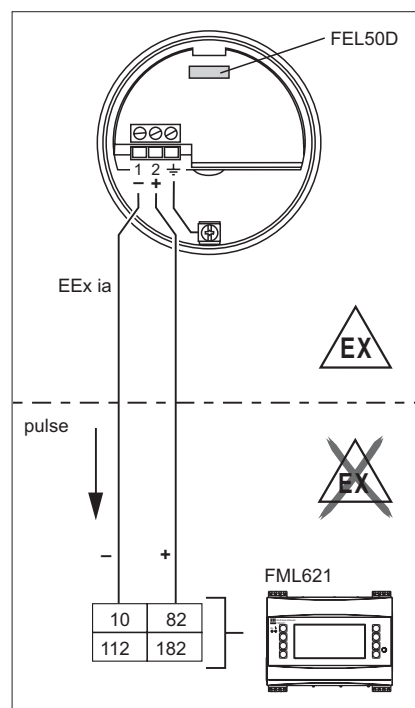
For connecting to the density and concentration computer FML621.

The output signal is based on pulse technology.  
 With the aid of this signal, the fork frequency is constantly forwarded to the switching unit.



**Caution!**  
 Operation with other switching units, such as FTL325P, is not permitted.

This electronic insert cannot be installed in devices that were originally used as a point level switch.



TI420Fd-004

### Signal on alarm

Output signal on power failure or in the event of damaged sensor: 0 Hz

### Adjustment

In the Liquiphant M modular system, the option of adjustment is also provided in addition to the electronics (see feature 60: "Accessories").

There are three types of adjustment:

#### Standard adjustment (see ordering information for additional options, basic version A)

- Here, two fork parameters are determined to describe the sensor characteristics, indicated in the adjustment report and provided with the product.  
 These parameters must be transmitted to the Density Computer FML621.

#### Special adjustment (see ordering information for additional options, special adjustment, density H<sub>2</sub>O (K) or special adjustment, density H<sub>2</sub>O with 3.1 certificate (L))

- Here, three fork parameters are determined to describe the sensor characteristics, indicated in the adjustment report and provided with the product.  
 These parameters must be transmitted to the Density Computer FML621.  
 Greater accuracy is achieved with this type of adjustment (see also "Performance characteristics").

#### Field adjustment

- During field adjustment, a density value actually determined by the customer is entered and the system is automatically adjusted to this value (wet adjustment).

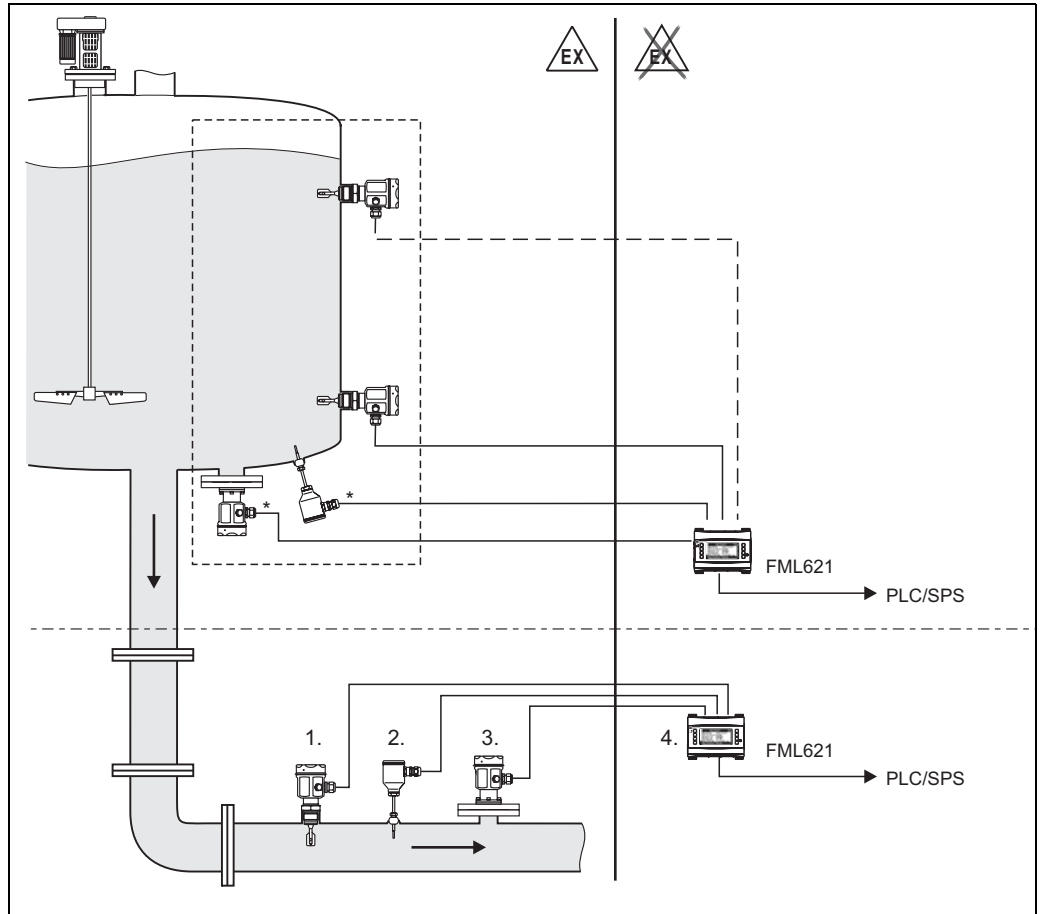


Note!

Further information on Liquiphant M Density is available in Technical Information TI420F. This document is available for download at [www.endress.com](http://www.endress.com) => Download.

**Operating principle**

Measuring the density of a liquid medium in pipes and tanks. Also suitable for use in hazardous areas, and preferably for applications in the chemical and food industry.



- \* 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 to 20 mA output);
  3. Pressure transmitter (4 to 20 mA output);
  4. Liquiphant density and concentration computer FML621 with display and operating unit

T1420Fxx016

**Light signals**

LED	Symbol	Information
Yellow		Measurement valid
		Unstable process situation
		Maintenance required
Green		Power on
		Power off
Red		No fault
		Maintenance required
		Device failure

## Connection and function

<b>Connecting cables</b>	<ul style="list-style-type: none"> <li>■ Electronic inserts: cross-section max. 2.5 mm<sup>2</sup>; strand in ferrule to DIN 46228</li> <li>■ Protective earth in housing: cross-section max. 2.5 mm<sup>2</sup></li> <li>■ External equipotential bonding connection on housing: cross-section max. 4 mm<sup>2</sup></li> </ul>
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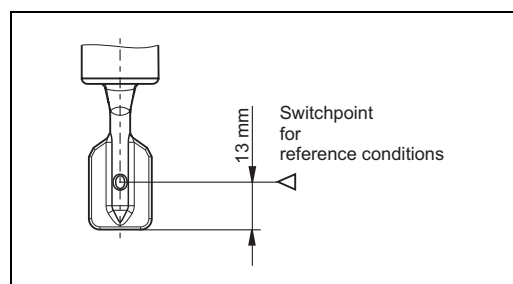
<b>Safety mode</b>	<p>Minimum/maximum residual current safety selectable on electronic insert. (with FEL57 on Nivotester only)</p> <p>Max. = maximum safety: The output switches to the power fail response when the fork is covered For use with overflow protection for example</p> <p>Min. = minimum safety: The output switches to the power fail response when the fork is exposed For use with dry running protection for example</p>
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<b>Switching time</b>	<p>When fork is covered: approx. 0.5 s When fork is exposed: approx. 1.0 s (Other switching times on request.)</p> <p>Additionally configurable for PROFIBUS PA: 0.5-60 s</p>
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<b>Switch-on behavior</b>	<p>When switching on the power supply, the output assumes the alarm signal. After max. 3 s it assumes the correct switching mode (exception: FEL57)</p>
---------------------------	---

## Performance characteristics

<b>Reference operating conditions</b>	<p>Ambient temperature: 23 °C Medium temperature: 23 °C Medium density: 1 g/cm<sup>3</sup> (water) Viscosity: 1 mm<sup>2</sup>/s Medium pressure <math>p_e</math>: 0 bar Sensor mounting: vertical from above Density switch: to &gt; 0.7</p>
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L00-FTL5xxxx-06-05-zz-en-000

<b>Maximum measured error</b>	Max. +/- 1 mm (at reference operating conditions)
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<b>Repeatability</b>	0.1 mm
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<b>Hysteresis</b>	Approx. 2 mm
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<b>Influence of medium temperature</b>	Max. +1.8 to -2.8 mm (-50 to +150 °C)
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<b>Influence of medium density</b>	Max. +4.8 to -3.5 mm (0.5 to 1.5 g/cm <sup>3</sup> )
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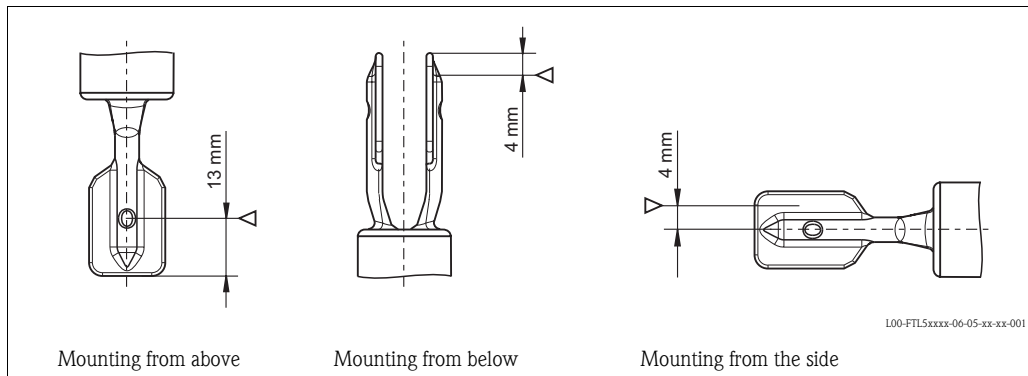
<b>Influence of medium pressure</b>	Max. 0 to -2.5 mm (-1 to 64 bar)
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## Operating conditions

### Installation

#### Installation instructions

Switch points  $\triangleright$  on the sensor depend on the mounting position, with reference to water,  
Density  $1 \text{ g/cm}^3$ ,  $23 \text{ }^\circ\text{C}$ ,  $p_e 0 \text{ bar}$ .



Note!

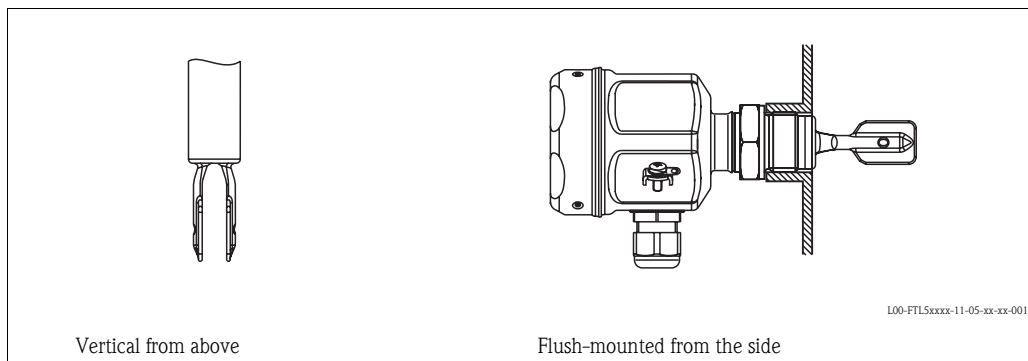
The switch points of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

### Examples of mounting

Examples of mounting with regard to the viscosity  $\nu$  of the liquid and the tendency to form buildup

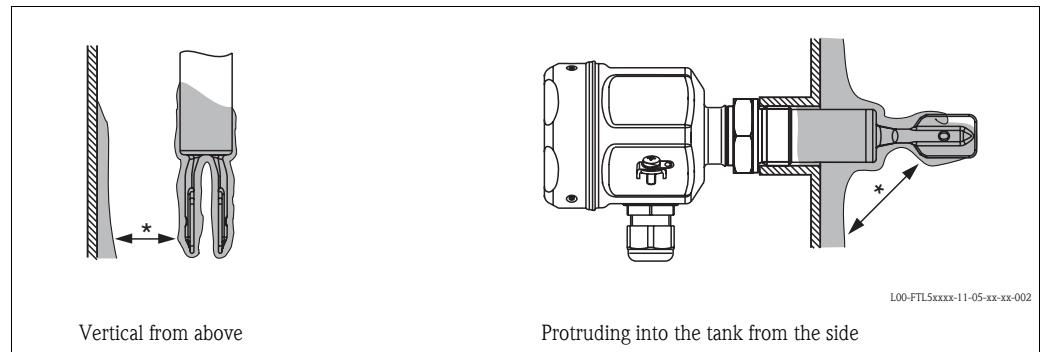
#### Optimum mounting, without problem even with high viscosity:

Position the fork so that the narrow edge of the tines is vertical to ensure that the liquid can run off easily.



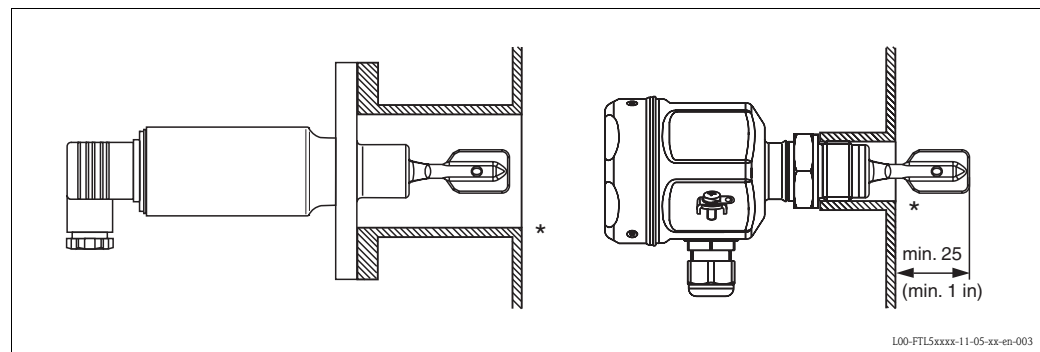
**With buildup on the tank walls:**

\* Ensure that there is sufficient distance between the buildup expected on the tank wall and the fork.



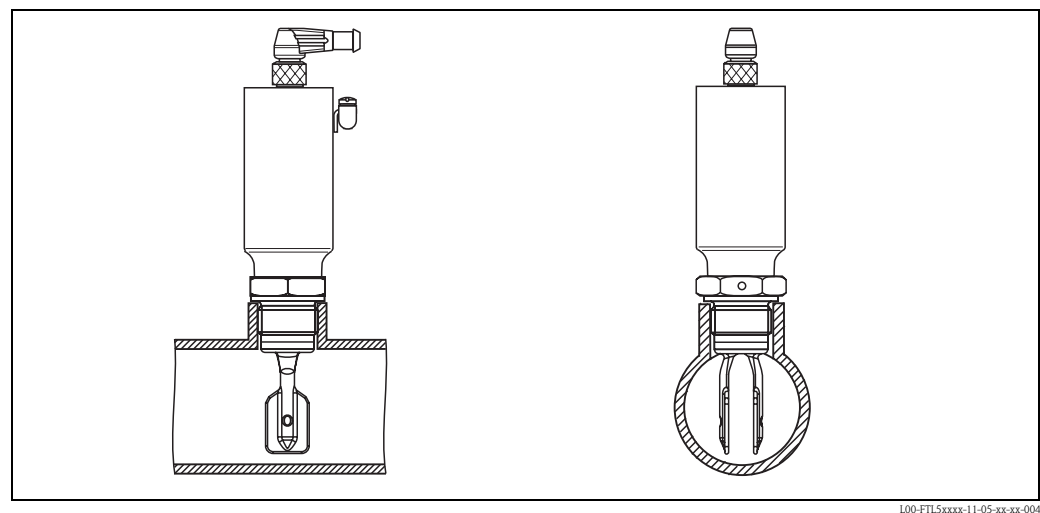
**Mounting positions with low viscosity (up to 2000 mm<sup>2</sup>/s):**

\* Deburr the nozzle surfaces



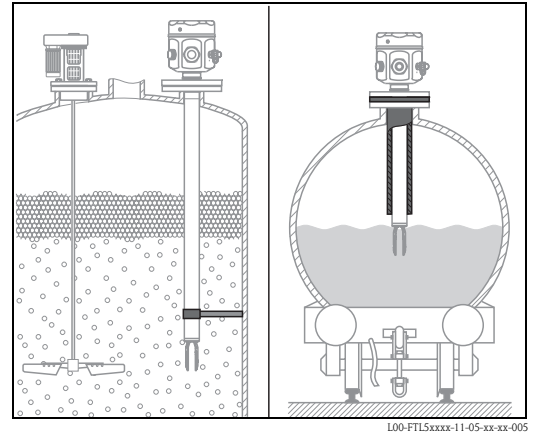
**Mounting in piping from 2"**

Flow velocities up to 5 m/s for viscosity 1 mm<sup>2</sup>/s and density 1 g/cm<sup>3</sup>.  
(Check the function for other medium conditions.)

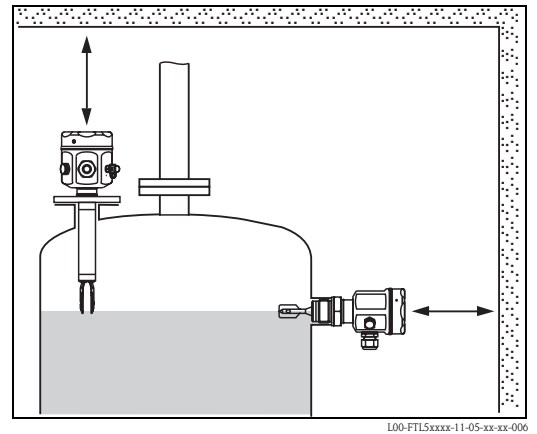




Support the Liquiphant M FTL51(H) in the event of severe dynamic load.



Ensure adequate space outside the tank for mounting, connection and configuration.



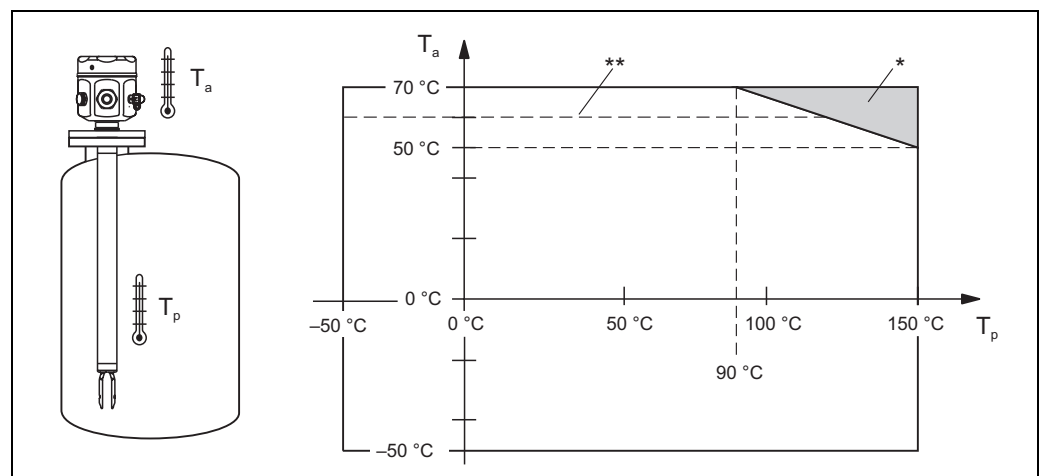
**Orientation**

FTL50(H) and FTL51(H) with short pipe (up to approx. 500 mm) - any position,  
FTL51(H) with long pipe - vertical

**Environment**

**Ambient temperature range**

Permitted ambient temperature  $T_a$  at the housing depending on the medium temperature  $T_p$  in the tank:



\* Additional temperature range for devices with a temperature spacer or Pressure tight feed through.  
\*\* Maximum ambient temperature with FEL50D/FEL50A in hazardous areas.

**Ambient temperature limits**

-50 to +70 °C (function with restricted data)

**Storage temperature** -50 to +80 °C

**Climate class** Climate protection to IEC 68, Part 2-38, Fig. 2a

**Degree of protection**

Types of housing	IP65	IP66*	IP67*	IP68*	IP69k	NEMA4X**
Compact housing with valve connector Pf11/NPT 1/2	X	-	-	-	-	-
Compact housing with 5 m cable tail	-	X	-	X	-	-
Compact housing with M12x1 connector (52010285) 316L (metal)	-	X	-	X	-	-
Compact housing with elbowed connector (52024216) / L= 5 m, without integrated LEDs	-	X	-	X	X	-
Compact housing with elbowed connector (52018763) / L= 5 m, with integrated LEDs	-	X	-	X	X	-
Polyester housing F16	-	X	X	-	-	X
Stainless steel housing F15	-	X	X	-	-	X
Aluminum housing F17	X	X	X	-	-	X
Aluminum housing F13	X	X	-	X***	-	X
Stainless steel housing F27	-	X	-	X	-	4x/6P
Aluminum housing T13 with separate connection compartment (EEx d)	X	X	-	X***	-	4x/6P

\* As per EN60529

\*\* As per NEMA 250

\*\*\* Only with M20 cable entry or G1/2 thread

**Vibration resistance**

To IEC 68, Part 2-6 (10 to 55 Hz, 0.15 mm, 100 cycles)  
In the event of increased vibrations, we recommend the additional fitting feature "060" version "P" 100 bar process pressure.

**Electromagnetic compatibility**

Interference emission to EN 61326, Electrical Equipment Class B  
Interference immunity to EN 61326; Annex A (Industrial) and NAMUR Recommendation NE 21 (EMC)

## Medium conditions

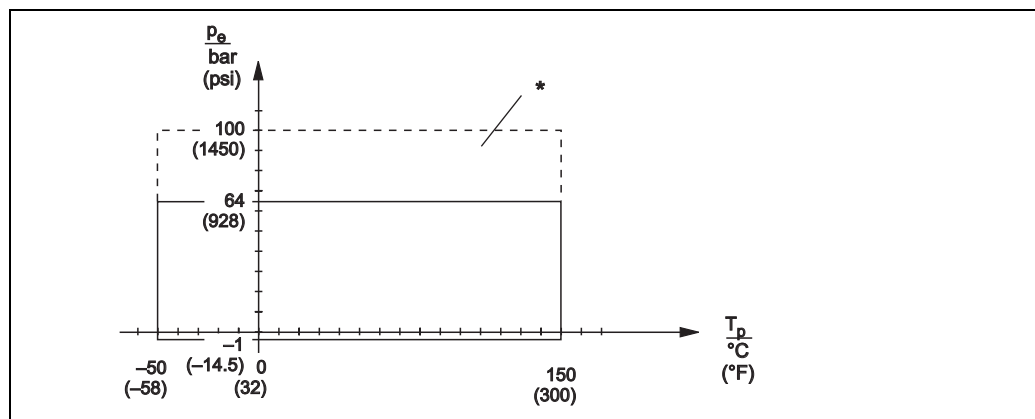
**Medium temperature**

-50 to +150 °C; see "Process connections" for exceptions

**Thermal shock**

Max. 120 °C/s

**Medium pressure  $p_e$**



\* Allowed pressure rating when the "100 bar" option is selected (see "Product structure FTL51", feature 060, → 41ff.). See "Process connections" for exceptions.

Please refer to the standards listed for the permitted pressure values of the flanges at higher temperatures:

- pR EN 1092-1: 2005  
With regard to their stability-temperature property, the materials 1.4435 and 1.4404 are identical and are grouped together under 13E0 in EN 1092-1 Tab. 18. The chemical composition of the two materials can be identical.
- ASME B 16.5a - 1998 Tab. 2-2.2 F316
- ASME B 16.5a - 1998 Tab. 2.3.8 N10276
- JIS B 2220

The lowest value from the derating curves of the device and selected flange applies in each case.

<b>Test pressure</b>	<p><math>p_e = 64</math> bar: Max. 100 bar (1.5 times the medium pressure <math>p_e</math>); no function during test pressure Sensor burst pressure 200 bar</p> <p><math>p_e = 100</math> bar: Max. 150 bar (1.5 times the medium pressure <math>p_e</math>); no function during test pressure Sensor burst pressure 400 bar</p>
----------------------	--

<b>State of aggregation</b>	Liquid
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<b>Density</b>	<p>0.7 g/cm<sup>3</sup> = delivery status 0.5 g/cm<sup>3</sup>* can be adjusted via switches</p> <p>* Density settings for the compact housing on request</p>
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<b>Viscosity</b>	Max. 10000 mm <sup>2</sup> /s
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<b>Solids content</b>	Max. ø5 mm
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<b>Lateral loading capacity</b>	≤ 75 Nm
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## Mechanical construction

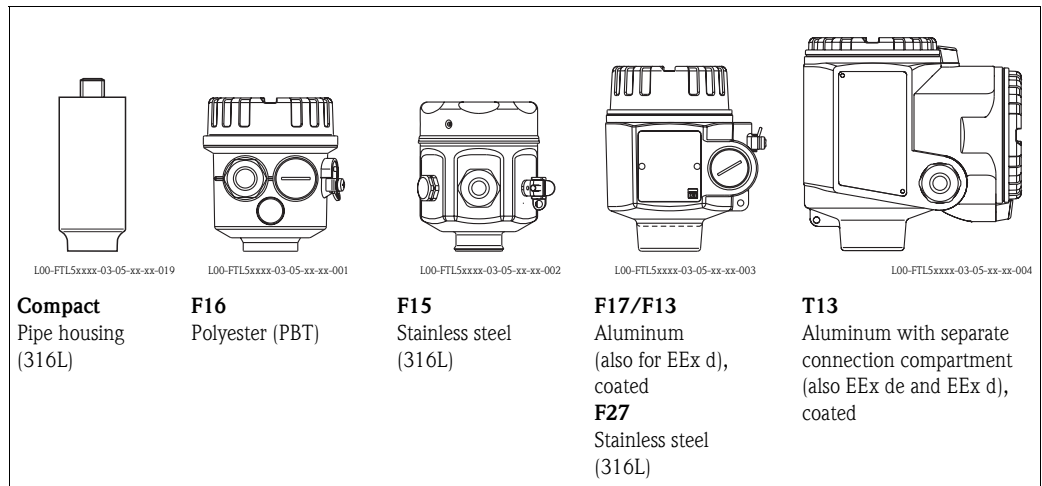
### Design

#### Summary of all electrical and mechanical versions

*Plug-in electronic inserts to mount in the housing*

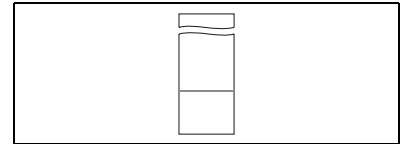
 <p>100-FTL5xxxx-03-05-xx-xx-000</p>	<p>FEL51*: Two-wire AC connection                  FEL52*: Three-wire DC connection PNP                  FEL54: Universal current connection, 2 relay outputs                  FEL55: Output 16/8 mA for separate switching unit                  FEL56: Output 0.6 to 1.0 / 2.2 to 2.8 mA for separate switching unit (NAMUR)                  FEL58*: Output 2.2 to 3.5 / 0.6 to 1.0 mA for separate switching unit (NAMUR)                  FEL57: Output 150/50 Hz, PFM, for separate switching unit (Nivotester)                  FEL50A: Digital communication PROFIBUS PA                  FEL50D: Pulse output for Density Computer FML621</p>
* Electronics also available as compact housing. The electronics cannot be exchanged!	

*Housing*



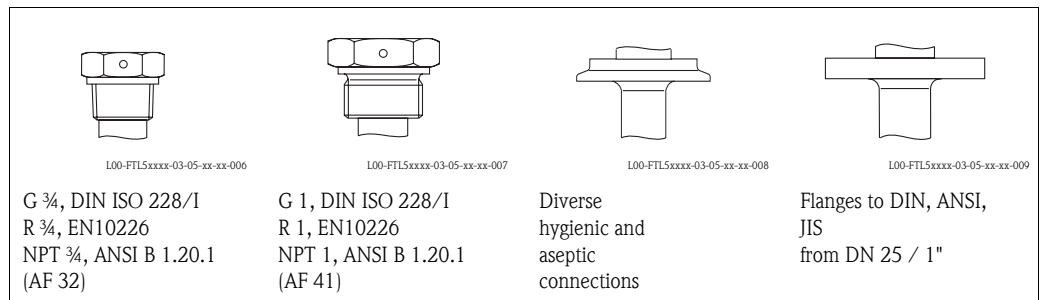
*Bushings (optional)*

Temperature spacer and pressure tight feed through



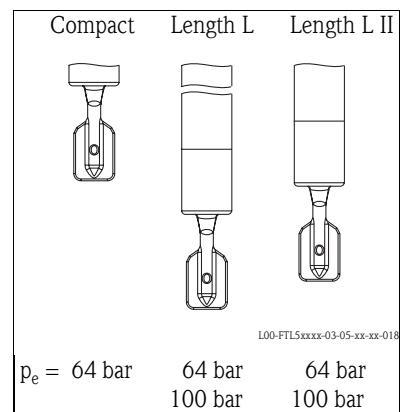
L00-FTL5xxxx-03-05-xx-xx-005

*Process connections*



*Sensors*

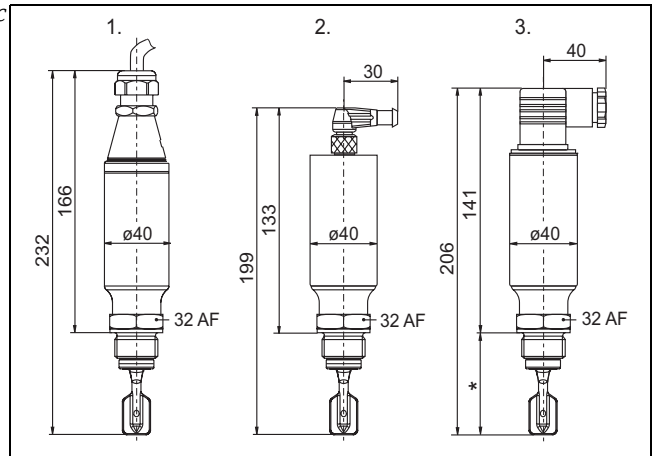
Compact,  
with extension pipe up to 3 m (up to 6 m on request)  
or special "length L II" (see → 30ff.)



**Dimensions (in mm)**

Housing and sensor FTL50(H)

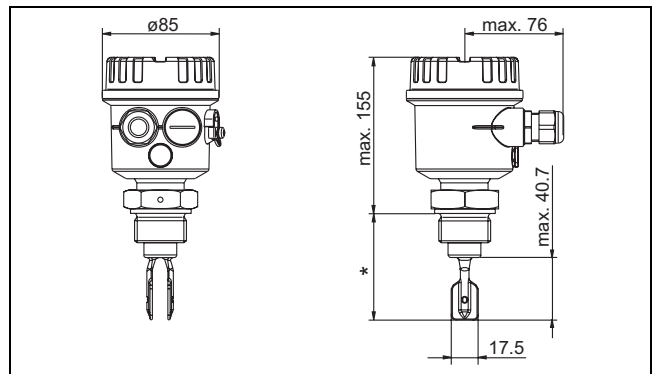
*Compact housing, primarily for hygienic applications*



- 1. 5 m cable
- 2. M12 connector
- 3. Pg11/NPT 1/2 connector

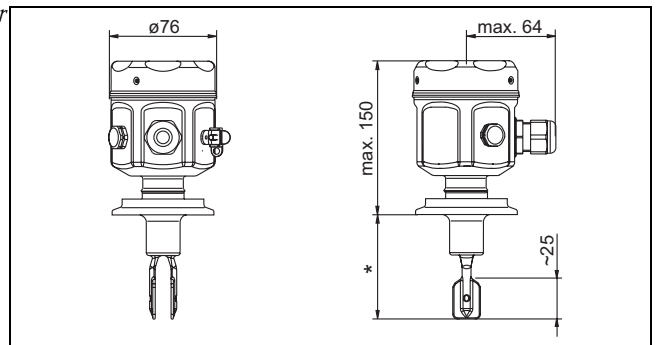
L00-FTL5xxxx-06-05-xx-en-008

*Polyester housing F16*



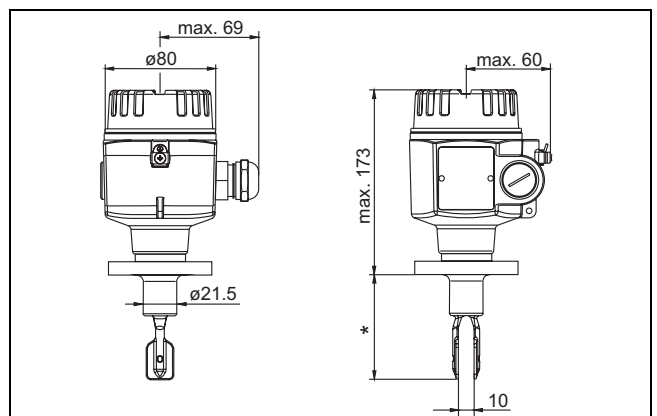
L00-FTL5xxxx-06-05-xx-xx-004

*Stainless steel housing F15, primarily for hygienic applications*



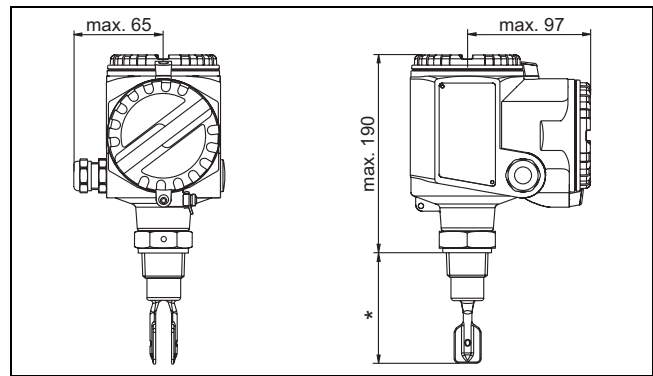
L00-FTL5xxxx-06-05-xx-xx-005

*Aluminum housing F17/F13  
Stainless steel housing (316L) F27*



L00-FTL5xxxx-06-05-xx-xx-006

Aluminum housing T13  
with separate connection  
compartment



\* See "Process connections"



Note!

The switch points of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

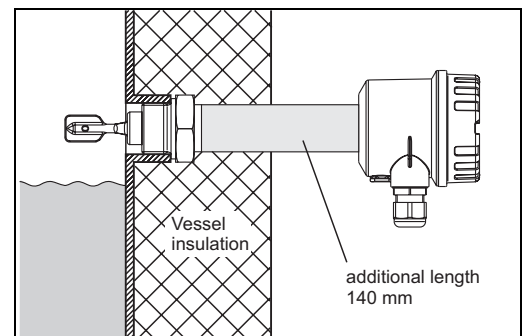
Bushings: temperature spacer, pressure tight feed through

#### Temperature spacer

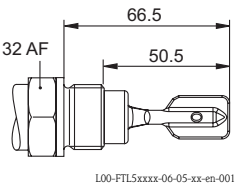
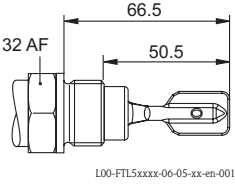
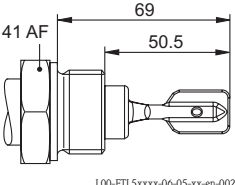
Provides sealed insulation for the vessel and normal ambient temperatures for the housing.

#### Pressure tight feed through

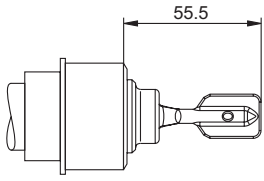
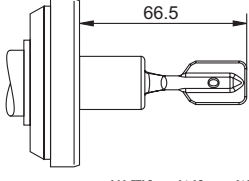
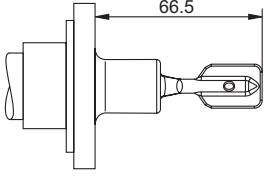
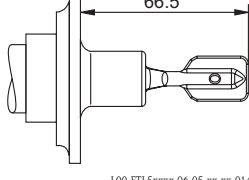
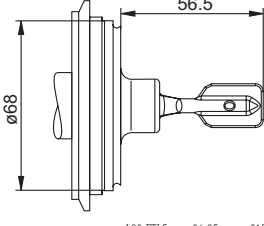
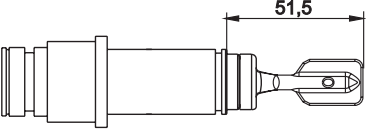
Protects the housing from pressures up to 100 bar if the sensor is damaged. Provides sealed insulation for the vessel and normal ambient temperatures for the housing.



#### Process connections for FTL50(H) and FTL51 (H)

Process connection		Dimensions	Accessories	Pressure Temperature
<b>G 3/4</b> DIN ISO 228/1 with defined thread start  With elastomer flat seal to DIN 7603: supplied	GQ2 GQ5 GQ6			Max. 100 bar (only FTL51) Max. 150 °C
<b>G 3/4</b> DIN ISO 228/1 with defined thread start  For flush-mounted installation in welding neck	GQ2 GQ5 GQ6		<b>Welding neck</b> (with defined thread start) with silicone O-ring Endress+Hauser 52001052  In conformity with FDA* See "Accessories"	Max. 25 bar Max. 150 °C  Max. 40 bar Max. 100 °C
<b>G 1</b> DIN ISO 228/1  With elastomer flat seal to DIN 7603: supplied	GR2 GR5 GR6			Max. 100 bar (only FTL51) Max. 150 °C

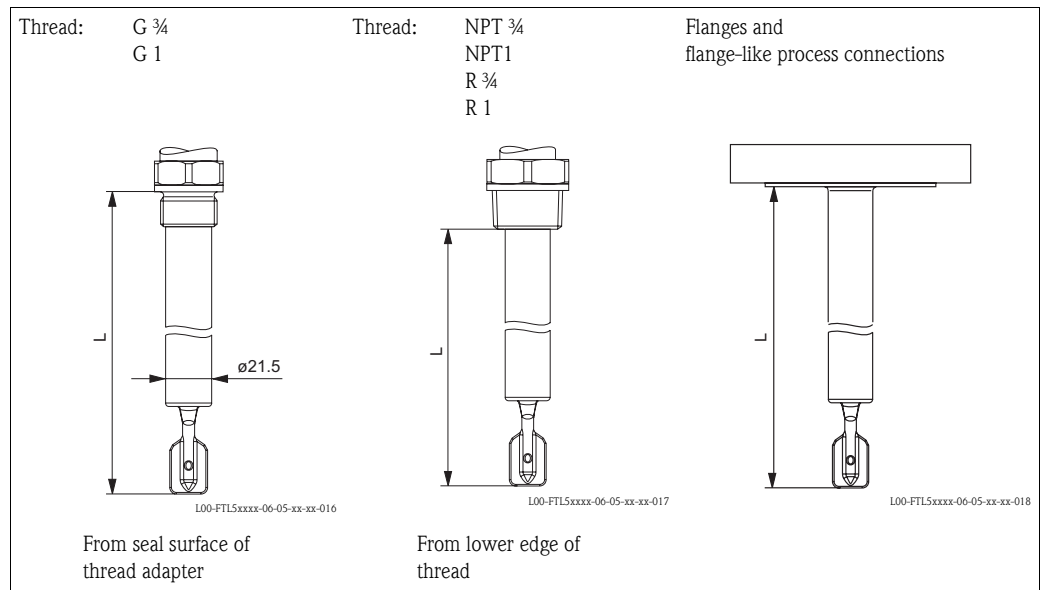
Process connection		Dimensions	Accessories	Pressure Temperature
* FDA approved materials according to 21 CFR Part 177.1550/2600				
<b>G 1</b> DIN ISO 228/1 with defined thread start  With seal surface for flush-mounted installation in welding neck	GW2		<b>Welding neck</b> (with defined thread start) with silicone O-ring Endress+Hauser 52001051  In conformity with FDA*  See "Accessories"	Max. 25 bar Max. 150 °C  Max. 40 bar Max. 100 °C
<b>NPT 3/4</b> ANSI B 1.20.1  or  <b>R 3/4</b> EN10226	GM2 GM5 GM6  GE2 GE5 GE6		In conformity with FDA*	Max. 100 bar (only FTL51) Max. 150 °C
<b>NPT1</b> ANSI B 1.20.1  or  <b>R 1</b> EN10226	GN2 GN5 GN6  GF2 GF5 GF6		In conformity with FDA*	Max. 100 bar (only FTL51) Max. 150 °C
<b>Flanges</b> ANSI B 16.5 EN 1092-1 (DIN 2527 B) JIS B2220	A## B## C## F## N## K##		Seal depending on design installed on site  In conformity with FDA*	See nominal pressure of flange, however Max. 100 bar (only FTL51) Max. 150 °C
AlloyC4/C22 -plated flanges are available for higher chemical-resistance. The flange carrier material comprises 316L and is welded with a 2 to 3 mm thick AlloyC4/C22 disk.				
<b>Tri-Clamp</b> 1 1/2" = ø50.5 mm 2" = ø64.0 mm ISO 2852	TC2 TE2		Clamping ring and front seal installed on site  In conformity with FDA*	Max. 16 bar Max. 120 °C  Max. 2 bar Max. 150 °C
Mounting with NA connector (as per ASME, TUBE Standard ASTM A276) only in conjunction with T13, F13 and compact housing. Other housings on request.				
<b>Threaded pipe joint</b> DN 32 DN 40 DN 50 DIN 11851  With thread adapter nut	MA2 MC2 ME2		Sealing ring with collar, installed on site  In conformity with FDA*	DN 32, DN 40: Max. 40 bar to 100 °C Max. 25 bar to 140 °C  DN 50: Max. 25 bar Max. 140 °C
* FDA approved materials according to 21 CFR Part 177.1550/2600				

Process connection		Dimensions	Accessories	Pressure Temperature
<b>Flush-mounted for welding neck</b> Factory standard Endress+Hauser with silicone seal and thread adapter nut: supplied	EE2	 L00-FTL5xxxx-06-05-xx-xx-011	<b>Welding neck</b> (fork can be positioned) Endress+Hauser 52001047  In conformity with FDA*  See "Accessories"	Max. 40 bar Max. 100 °C  Max. 25 bar Max. 150 °C
<b>Aseptic</b> DN 50 DIN 11864-1 Form A for pipe DIN 11850 with thread adapter nut	HE2	 L00-FTL5xxxx-06-05-xx-xx-012	Sealing ring, installed on site  In conformity with FDA*	Max. 25 bar Max. 140 °C
<b>DRD</b> With clamped flange	PE2	 L00-FTL5xxxx-06-05-xx-xx-013	Welding flange with PTFE flat seal (fork can be positioned) Endress+Hauser 52002041  In conformity with FDA*  See "Accessories" (or installed on site)	Max. 40 bar Max. 100 °C  Max. 25 bar Max. 150 °C
<b>SMS</b> 2" (DN 51) with thread adapter nut	UE2	 L00-FTL5xxxx-06-05-xx-xx-014	Sealing ring, installed on site  In conformity with FDA*	Max. 25 bar Max. 140 °C
<b>Varivent</b> for piping ≥ DN 65 ≥ O.D. 3" ≥ I.P.S. 3"	WE2	 L00-FTL5xxxx-06-05-xx-xx-015	Clamping ring and O-ring seal, installed on site  In conformity with FDA*	See specification as per Tuchenhagen VARIVENT-Inline housing, however:  Max. 25 bar Max. 150 °C
<b>Ingold fitting</b>  DN 25 Fitting length 46 mm  Thread adapter nut G 1 ¼  With EPDM O-ring seal	TT2	  L00-FTL5xxxx-06-05-xx-xx-104	In conformity with FDA* (USP Class VI)	Max. 10 bar Max. 150 °C

\* FDA-compliant material in accordance with 21 CFR Part 177.1550/2600



Sensor length L for FTL51 and FTL51H,  
depending on process connection



Any length L:  
148 mm to 3000 mm (6 to 115 in); special version (TSP) on request up to 6000 mm (235 in)



Note!

The switch points of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

Special length "L II":

With vertical mounting from above the same switchpoint as for the Liquiphant II  
FTL360, FTL365, FDL30, FDL35

"L II" depends on process connection:

L = 115 mm for flanges and flange-like process connections

L = 99 mm for threads NPT and R (BSPT)

L = 118 mm for threads G1 (BSP 1)

L = 115 mm for threads G  $\frac{3}{4}$  (BSP  $\frac{3}{4}$ )

L = 104 mm for flush-mounted 1" (Endress+Hauser)

**Weights** See "Product structure"

**Material** Material specifications as per AISI and DIN-EN.

#### Parts in contact with process

- Process connection and extension pipe: 316L (1.4435) optionally 2.4610 (AlloyC4), 2.4602 (AlloyC22)
- Tuning fork: 316L (1.4435) optionally 2.4610 (AlloyC4), 2.4602 (AlloyC22)
- With a surface roughness quality  $R_a < 0.38 \mu\text{m}$  (electropolished), the wetted parts are made of 316L (1.4435) in accordance with BN2 (delta ferrite content  $< 1\%$ )
- Flanges: 316L (1.4435 or 1.4404)
- Flange plating: AlloyC4, AlloyC22
- Flat seal for process connection G  $\frac{3}{4}$  or G 1: elastomer fiber, asbestos-free

#### Parts with no process contact

- Tuning fork/housing seal: EPDM
- Temperature spacer: 316 L (1.4435)
- Pressure tight feed through: 316L (1.4435)
- Grounding at housing (outside): 304 (1.4301)
- Nameplate at housing (outside): 304 (1.4301)
- Cable glands
  - Housing F13, F15, F16, F17: polyamide (PA)
  - With B or C approval (→ 41 ordering information): nickel-plated brass
  - Housing F27: 316L

- Housing T13: nickel-plated brass
- Polyester housing F16: PBT-FR with PBT-FR cover or with PA12 transparent cover
  - Cover seal: EPDM
  - Nameplate glued: polyester film (PET)
  - Pressure compensation filter: PBT-GF20
- Stainless steel housing F15: 316L (1.4404)
  - Cover seal: silicone
  - Safety claw: 304 (1.4301)
  - Pressure equalizing filter: PBT-GF20, PA
- Aluminum housing F17/F13: EN-AC-ALSi10Mg, plastic-coated
  - Cover seal: EPDM
  - Safety claw: nickel-plated brass
  - Pressure compensation filter: silicone
- Stainless steel housing F27: 316L (1.4435)
  - Cover seal: FVMQ (optional: EPDM seal available as spare part)
  - Safety claw: 316L (1.4435)
- Aluminum housing T13: EN-AC-ALSi10Mg, plastic-coated
  - Cover seal: EPDM
  - Safety claw: nickel-plated brass
- Compact housing (valve connector or M12 connector): 316L (1.4435)

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### Process connections

- Parallel thread G ¾, G 1 to DIN ISO 228/1 with flat seal to DIN 7603
- Tapered thread R ¾, R 1 to EN10226
- Tapered thread ¾ -14 NPT, 1 - 1½ NPT to ANSI B 1.20.1
- Flush-mounted installation with welding neck to factory standard Endress+Hauser (G ¾, G 1)
- Flush-mounted installation with welding neck to factory standard Endress+Hauser (1"), sensor can be positioned
- Tri-Clamp 1½", 2" to ISO 2852
- Threaded pipe joint DN 32, 40, 50 to DIN 11851
- Aseptic connection DN 50 to DIN 11864-1 Form A for pipe DIN 11850
- SMS connection 2" (DN 51)
- DRD flange
- Varivent® DN 50 (50/40) to factory standard Tuchenhagen
- Flanges to EN/DIN from DN 25, for standards see "Product structure," to ANSI B 16.5 from 1", to JIS B2220 (RF)
- Ingold DN25 fitting length 46 mm with thread adapter nut G1 ¼

## Human interface

### Electronic inserts

With FEL51, FEL52, FEL54, FEL55:

- 2 switches for safety mode and density change,
- green LED to indicate operational status,
- red LED to indicate the switching status, flashes in the event of corrosion damage on sensor or if the electronics are defective

With FEL56:

- 2 switches for safety mode and density change,
- green LED flashes to indicate operational status,
- red LED to indicate the switching status, flashes in the event of corrosion damage on sensor or if the electronics are defective

With FEL57:

- 2 switches for density change and cyclical checking,
- green LED to indicate operational status,
- yellow LED to indicate the covered status, flashes in the event of corrosion damage on sensor or if the electronics are defective

With FEL58:

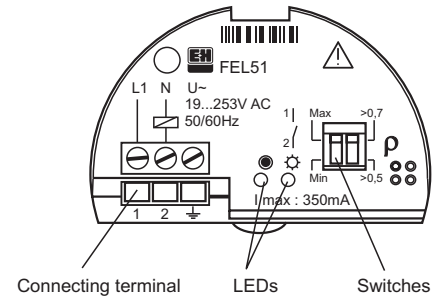
- 2 switches for safety mode and density change,
- green LED
  - flashes quickly to indicate operational status,
  - flashes slowly in the event of corrosion damage on sensor or if the electronics are defective,
- yellow LED to indicate the switching status, Test key – breaks the cable connection

With FEL50A:

- 8 switches for configuring the device address
- green LED to indicate operational status, pulsing to indicate communication;
- yellow LED to indicate the switching status, flashes in the event of corrosion damage on sensor or if the electronics are defective

With FEL50D:

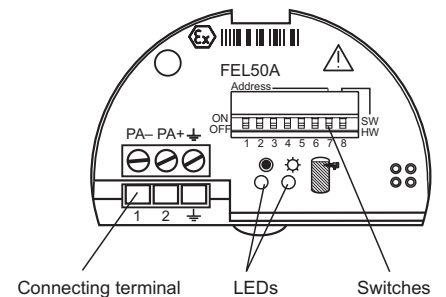
- yellow LED: to indicate the validation of the measurement
- green LED: to indicate the operational status
- red LED: to indicate faults



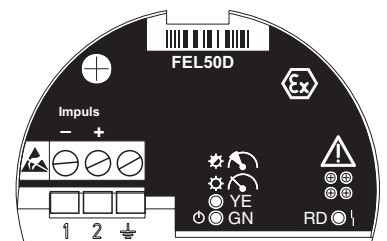
L00-FTL5xxxx-03-05-xx-en-001



L00-FTL5xxxx-03-05-xx-en-013



L00-FTL5xxxx-03-05-xx-en-002



TI328Fxx004

### Compact housing

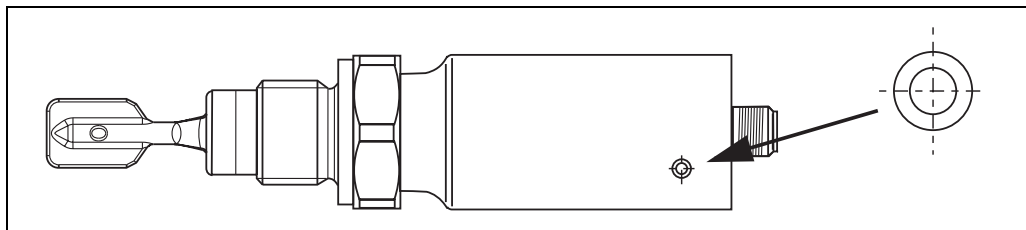
#### Function test with test magnet

*Versions AC, DC-PNP and NAMUR:*

During the test, the current state of the electronic switch is reversed.

*Performing the test*

Hold the test magnet against the marking on the nameplate:

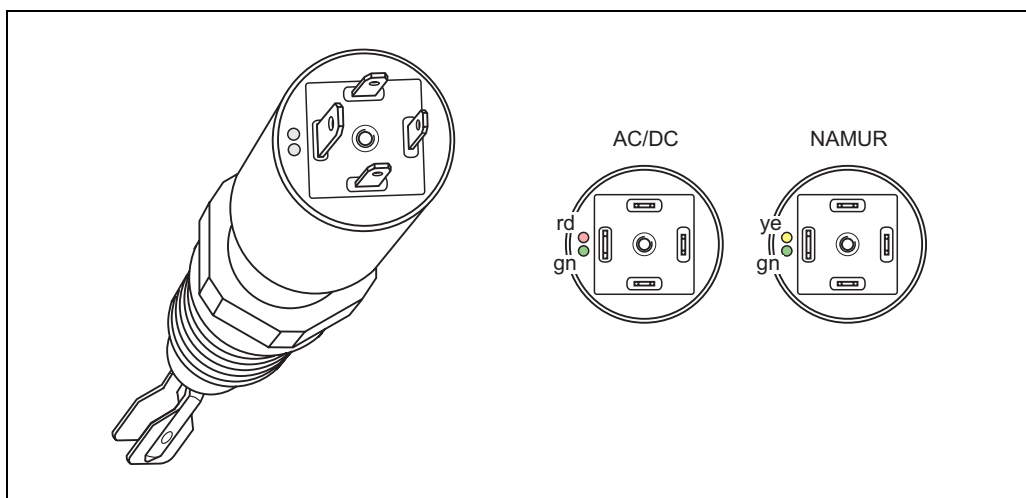


L00-FTL5xxxx-19-05-xx-xx-001

The switching status is changed.

**Light signals**

*Versions AC and DC-PNP with valve connector or cable tail*



L00-FTL5xxxx-07-05-xx-xx-005

**Green light (gn) lights up (AC/DC):**

Liquiphant M is connected to the power supply and is operational.

**Green light (gn) flashing (NAMUR):**

Liquiphant M is connected to the power supply and is operational.

**Red light (rd) lights up (AC/DC):**

MAX application mode (overflow protection): sensor is immersed in liquid.

MIN application mode (dry running protection): sensor is not immersed in liquid.

**Yellow light (ye) lights up (NAMUR):**

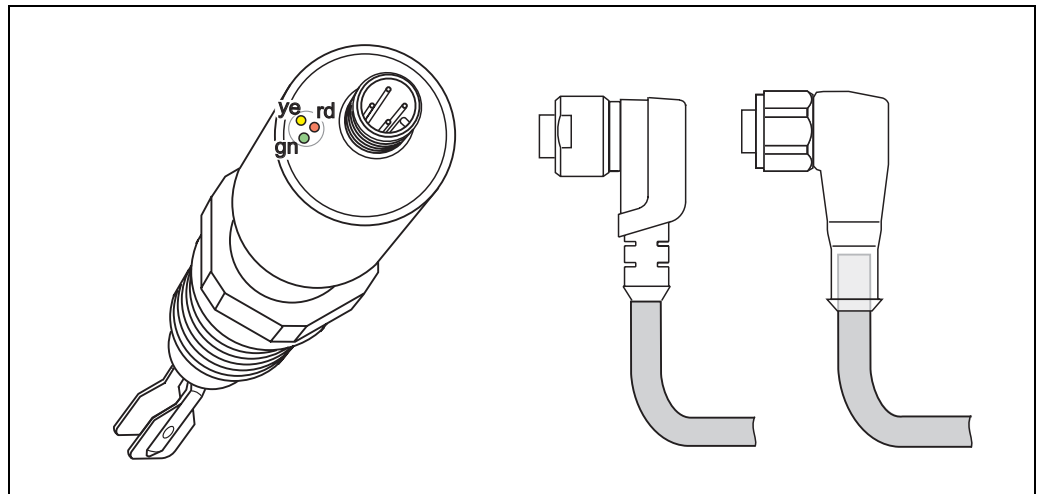
MAX application mode (overflow protection): sensor is not immersed in liquid.

MIN application mode (dry running protection): sensor is immersed in liquid.

**Red light (rd) flashing (AC/DC):**

Liquiphant M has detected a fault.

*Version NAMUR and DC-PNP with M12x1 round connector 316L*



L00-FTL5xxxx-07-05-xx-xx-003

**Green light (gn) lights up (DC-PNP):**

Liquiphant M is connected to the power supply and is operational.

**Green light (gn) flashing with 1 Hz (NAMUR):**

Liquiphant M is connected to the power supply and is operational.

**Yellow light (ye) lights up (DC-PNP):**

Sensor is immersed in liquid.

**Yellow light (ye) lights up (NAMUR):**

MAX application mode (overflow protection): sensor is not immersed in liquid.  
MIN application mode (dry running protection): sensor is immersed in liquid.

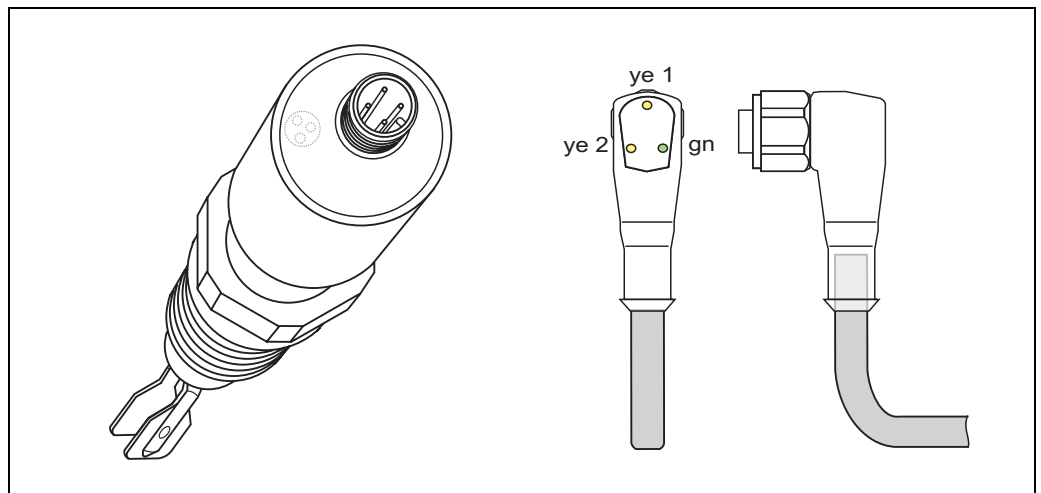
**Red light (rd) flashing (DC-PNP):**

Liquiphant M has detected a fault.

**Green light (gn) flashing with 0.3 Hz (NAMUR):**

Liquiphant M has detected a fault.

*Version DC-PNP with M12x1 round connector 316L*



L00-FTL5xxxx-07-05-xx-xx-004

**Green light (gn) lights up:**

Liquiphant M is connected to the power supply and is operational.

**Yellow light (ye 1) lights up:**

MAX application mode (overflow protection): sensor is not immersed in liquid.

MIN application mode (dry running protection): sensor is not immersed in liquid.

**Yellow light (ye 2) lights up:**

MAX application mode (overflow protection): sensor is immersed in liquid.

MIN application mode (dry running protection): sensor is immersed in liquid.

**Green light (gn) lights up, both yellow lights (ye 1+2) do not light up:**

Liquiphant M has detected a fault.

---

**Operating concept**


Onsite configuration

## Certificates and approvals

### General approvals

The following approvals are available for Liquiphant M FTL50(H), FTL51(H):

- EHEDG: certification (from TNO, The Netherlands), Report No. V99.394:
- 3A: 3A Certificate (USA), Authorization No. 459
- Certificate of Compliance as per ASME BPE-2007. For further information, please refer to SD310F. (Order code: additional option = B)

Process connections	Order code			ASME BPE + CoC	
				Ra (µm)	
				< 0.38	< 1.5
Flush-mounted G ¾, G1 (with welding neck)	GQ2, GW2	X	X	-	X
Tri-Clamp 2" (special seal from Hyjoin Limited, UK)	TE2	X	X	X	X
Threaded pipe joint	MA2, MC2, ME2	X	X	X	X
Flush-mounted (can be positioned)	EE2	X	X	X	X
Aseptic	HE2	X	X	X	X
DRD	PE2	X	-	-	X
SMS	UE2	X	X	X	X
Varivent®	WE2	X	X	X	X
Ingold	TT2	X	-	X	-



Note!

- For CIP (Clean in Place) and SIP (Sterilize in Place) processes the pressure and temperature specifications of the process connections must be observed.
- Suitable fittings and seals must be used to ensure hygiene-compliant design according to 3A, EHEDG, ASME BPE etc.
- Surface Ra < 0.38 µm (< 15 µin) electropolished; surface Ra < 1.5 µm (59 µin) mechanically polished.



Warning!

To avoid risk of contamination, install according to the "Hygienic Equipment Design Criteria (HDC)" as stated in the Subgroup Design Principles of the EHEDG, Doc. 8, July 1993.

The flow of liquid during cleaning is important and should be in compliance with the HDC.

### CRN approval

Versions with a CRN approval (Canadian Registration Number) are marked with "\*" in ordering information feature 20 "process connection" (see Page 41 ff.). CRN-approved devices are fitted with a separate plate bearing the registration number 0F10525.5C.

### Other certificates

- Leak-detection system in conjunction with WHG approval

Approval number: Z-65.40-446

(See also "Ordering information" → 41)

- TSE Certificate of Suitability

The following applies to wetted device components:

- They do not contain any materials derived from animals.
- No additives or operating materials derived from animals are used in production or processing.



Note!

Wetted device components are listed in the "Mechanical construction" (see Page 27 ff.) and "Ordering information" (see Page 41 ff.) sections.

### Combinations of housings and electronic inserts

Based on the various certificates, permissible combinations of housings \* ) and electronic inserts are given in the following table.

\*) Abbreviations: Polyester = PBT, Stainless steel 316L = St., Aluminum = Alu  
Aluminum housing with separate connection compartment = Alu/sep

Certificate, applications		Housing	Electronic inserts
A	Without any special certificate (for non-hazardous area)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A/50D
D	Overfill protection to WHG (Germany)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A
B	ATEX II 3G EEx nC IIC T6, WHG	PBT, St., Alu, Alu/sep.	FEL54
	ATEX II 3G EEx nC IIC T6, WHG ATEX II 3D T85°C, WHG	St., Alu, Alu/sep.	FEL54
C	ATEX II 3G EEx nA II T6, WHG	PBT, St., Alu, Alu/sep.	FEL51/52, FEL55/56/57/58/50A/ 50D***
	ATEX II 3G EEx nA II T6, WHG ATEX II 3D T85°C, WHG	St., Alu, Alu/sep.	FEL51/52, FEL55/56/57/58/50A/ 50D***
E	ATEX II 1/2 G, EEx de, WHG	Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A/50D
F	ATEX II 1/2 G, EEx ia IIC T6, WHG	PBT, St., Alu, Alu/sep.	FEL55/56/57/58/50A/50D
	ATEX II 1/2 G, EEx ia IIC T6, WHG ATEX II 1/2 D, T80°C	St., Alu, Alu/sep.	FEL55/56/57/58/50A/50D
G	ATEX II 1/2 G, EEx ia IIC T6	PBT, St., Alu, Alu/sep.	FEL55/56/57/58/50A/50D
	ATEX II 1/2 G, EEx ia IIC T6 ATEX II 1/2 D, T80°C	St., Alu, Alu/sep.	FEL55/56/57/58/50A/50D
H	ATEX II 1G, EEx ia IIC T6		FEL55/56/57/58/50A/50D
J	ATEX II 1G, EEx ia IIC T6, WHG		FEL55/56/57/58/50A
I	ATEX II 1/2 G, EEx de	Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A/50D
K	ATEX II 1/2 G, EEx d IIC T6	Alu	FEL51/52/54, FEL55/56/57/58/50A/50D
L	ATEX II 1/2 G, EEx d IIC T6, WHG	Alu	FEL51/52/54, FEL55/56/57/58/50A/50D
P	FM, IS, Cl. I, II, III, Div. 1, Gr. A-G	PBT, St., Alu, Alu/sep. with NPT cable entry	FEL55/56/57/58/50D FEL50A
Q	FM, XP, Cl. I, II, III, Div. 1, Gr. A-G	Alu with NPT cable entry	FEL51/52/54 FEL55/56/57/58/50D/50A
R	FM, NI, Cl. I, Div. 2, Gr. A-D	St., Alu, Alu/sep. with NPT cable entry	FEL51/52/54, FEL55/56/57/58/50D
		PBT with NPT cable entry	FEL55/56/57/58/50D/50A
U	CSA, General Purpose	St., Alu, Alu/sep. with NPT cable entry	FEL51/52/54, FEL55/56/57/58/50D/50A
		PBT with NPT cable entry	FEL51/52, FEL55/56/57/58/50D/50A
S	CSA, IS, Cl. I, II, III, Div. 1, Gr. A-G	PBT, St., Alu, Alu/sep. with NPT cable entry	FEL55/56/57/58/50D/50A
T	CSA, XP, Cl. I, II, III, Div. 1, Gr. A-G	Alu with NPT cable entry	FEL51/52/54, FEL55/56/57/58/50D/50A
V	TIIS Ex ia IIC T3	PBT, St., Alu	FEL57/50D***
W	TIIS Ex d IIB T3	Alu	FEL52/54/50D***
Y	Other certificate (for non-hazardous area)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A/50D
*** In preparation!			





Note!

With polyester housing (PBT), electric connecting cables run in pipes:  
Do not screw cable entries firmly to the piping. Use flexible connections (e.g. with armored hose).  
If piping is used for grounding, then ensure that there is a continuous electrical connection.



Note!

Despite the additional dust ignition-proof certificates, the FTL5x(H) is to be used as a liquid point level switch only.

## Ordering information



Note!

Versions that are mutually exclusive are not indicated in this list.

### Liquiphant M FTL50 FTL51 product structure

Design		Basic weight
FTL50	Compact	0.6 kg
FTL51	With extension pipe	0.6 kg
<b>10</b>	<b>Approval:</b>	
A	Non-hazardous area	
B	ATEX/NEPSI II 3 G/ ATEX/NEPSI II 3 D	EEx nC II T6 T 85 °C* Overfill protection to WHG (Germany)
C	ATEX/NEPSI II 3 G ATEX /NEPSI II 3 D	EEx nA II T6 T 85 °C* Overfill protection to WHG (Germany)
D	Non-hazardous area	Overfill protection to WHG (Germany)
E	ATEX II 1/2 G	EEx de IIC T6 Overfill protection to WHG (Germany)
F	ATEX II 1/2 G ATEX II 1/2 D	EEx ia IIC T6 T 80 °C* Overfill protection to WHG (Germany)
G	ATEX II 1/2 G ATEX II 1/2 D	EEx ia IIC T6 T 80 °C*
H	ATEX II 1 G	EEx ia IIC T6
I	ATEX II 1/2 G	EEx de IIC T6
J	ATEX II 1 G	EEx ia IIC T6 Overfill protection to WHG (Germany)
K	ATEX II 1/2 G	EEx d IIC T6
L	ATEX II 1/2 G	EEx d IIC T6 Overfill protection to WHG (Germany)
M	NEPSI	Ex ia IIC T6
N	NEPSI	Ex d IIC T6
P	FM	IS, Class I, II, III Division 1, Group A–G
Q	FM	XP, Class I, II, III Division 1, Group B–G, for E5 housing Group A–G
R	FM	NI, Class I Division 2, Group A–D
S	CSA	IS, Class I, II, III Division 1, Group A–G
T	CSA	XP, Class I, II, III Division 1, Group A–G
U	CSA	General Purpose
V	TIIS	Ex ia IIC T3
W	TIIS	Ex d IIB T3
X	TIIS	Ex ia IIC T6
7	TIIS	Ex d IIC T3
8	TIIS	Ex d IIC T6
Y	Special version	
	*) Not for PBT	
<b>20</b>	<b>Process connection:</b>	<b>Additional weight</b>
	Note! For a process pressure of 100 bar, please select the appropriate option under "Additional options"	
GQ2	G ¾ Installation > accessories: welding neck	316L Thread ISO 228
GQ5	G ¾	Alloy C4 Thread ISO 228
GQ6**	G ¾	AlloyC22 Thread ISO 228
GR2	G 1	316L Thread ISO 228
GR5	G 1	Alloy C4 Thread ISO 228
GR6**	G 1	AlloyC22 Thread ISO 228
GW2*	G 1 Installation > accessories: welding neck	316L Thread ISO 228
		0.2 kg
		0.2 kg
		0.2 kg
		0.2 kg

20	Process connection:				Additional weight	
	GM2*	NPT 3/4		316L	Thread ANSI	
	GM5*	NPT 3/4		Alloy C4	Thread ANSI	
	GM6**	NPT 3/4		AlloyC22	Thread ANSI	
	GN2*	NPT1		316L	Thread ANSI	0.2 kg
	GN5*	NPT1		Alloy C4	Thread ANSI	0.2 kg
	GN6**	NPT1		AlloyC22	Thread ANSI	0.2 kg
	GE2	R 3/4		316L	Thread EN10226	
	GE5	R 3/4		Alloy C4	Thread EN10226	
	GE6**	R 3/4		AlloyC22	Thread EN10226	
	GF2	R 1		316L	Thread EN10226	0.2 kg
	GF5	R 1		Alloy C4	Thread EN10226	0.2 kg
	GF6**	R 1		AlloyC22	Thread EN10226	0.2 kg
	BA2	DN32	PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.2 kg
	BB2	DN32	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.0 kg
	BC2	DN40	PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	BD2	DN40	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BE2	DN50	PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.6 kg
	BG2	DN50	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	3.2 kg
	BH2	DN65	PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BJ2	DN50	PN100 A	316L	(FTL51) Flange EN 1092-1 (DIN 2527 B)	
	BK2	DN65	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	4.3 kg
	BM2	DN80	PN10/16 A	316L	Flange EN 1092-1 (DIN 2527 B)	4.8 kg
	BN2	DN80	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	5.9 kg
	BO2	DN100	PN10/16 A	316L	Flange EN 1092-1 (DIN 2527 B)	5.6 kg
	BR2	DN100	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	7.5 kg
	B12	DN80	PN100 A	316L	(FTL51) Flange EN 1092-1 (DIN 2527 B)	
	B82	DN25	PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	CA2	DN32	PN6 B1	316L	Flange EN 1092-1 (DIN 2527 C)	1.1 kg
	CA5	DN32	PN6	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	1.1 kg
	CA6**	DN32	PN6 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	1.1 kg
	CE2	DN50	PN6 B1	316L	Flange EN 1092-1 (DIN 2527 C)	1.5 kg
	CE5	DN50	PN6	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	1.5 kg
	CE6**	DN50	PN6 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	1.5 kg
	CG2	DN50	PN25/40 B1	316L	Flange EN 1092-1 (DIN 2527 C)	2.9 kg
	CG5	DN50	PN25/40	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	2.9 kg
	CG6**	DN50	PN25/40 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	2.9 kg
	CJ2	DN50	PN100 B2	316L	(FTL51) Flange EN 1092-1 (DIN 2527)	
	CN2	DN80	PN25/40 B1	316L	Flange EN 1092-1 (DIN 2527 C)	5.2 kg
	CN5	DN80	PN25/40	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	5.2 kg
	CN6**	DN80	PN25/40 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	5.2 kg
	CO2	DN100	PN10/16 B1	316L	Flange EN 1092-1 (DIN 2527 C)	5.3 kg
	CO5	DN100	PN10/16	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	5.3 kg

20	Process connection:					<i>Additional weight</i>
	CQ6**	DN100	PN10/16 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	5.3 kg
	C12	DN80	PN25/40 B1	316L (FTL51)	Flange EN 1092-1 (DIN 2527)	
	C82	DN25	PN25/40 B1	316L	Flange EN 1092-1 (DIN 2527 C)	1.3 kg
	C85	DN25	PN25/40	Alloy C4 >316L	Flange EN 1092-1 (DIN 2527)	1.3 kg
	C86**	DN25	PN25/40 B1	AlloyC22 >316L	Flange EN 1092-1 (DIN 2527)	1.3 kg
	DG2	DN50	PN40 B1	316L	Flange EN 1092-1 (DIN 2526 D)	
	DN2	DN80	PN40 B1	316L	Flange EN 1092-1 (DIN 2526 D)	
	D82	DN25	PN40 B1	316L	Flange EN 1092-1 (DIN 2526 D)	
	FG2	DN50	PN40 C	316L	Flange EN 1092-1 (DIN 2512 F)	2.6 kg
	NG2	DN50	PN40 D	316L	Flange EN 1092-1 (DIN 2512 N)	2.9 kg
	AA2*	1¼"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.2 kg
	AB2*	1¼"	300 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	2.0 kg
	AC2*	1½"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.5 kg
	AD2*	1½"	300 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	2.7 kg
	AE2*	2"	150 lbs	RF 316/316L	Flange ANSI B16.5	2.4 kg
	AE5*	2"	150 lbs	RF Alloy C4 >316/316L	Flange ANSI B16.5	2.4 kg
	AE6**	2"	150 lbs	RF AlloyC22 >316/316L	Flange ANSI B16.5	2.4 kg
	AF2*	2"	300 lbs	RF 316/316L	Flange ANSI B16.5	3.2 kg
	AG2*	2"	600 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	4.2 kg
	AJ2*	2½"	300 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	4.8 kg
	AL2*	3"	150 lbs	RF 316/316L	Flange ANSI B16.5	4.9 kg
	AM2*	3"	300 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	6.8 kg
	AM6**	3"	300 lbs	RF AlloyC22 >316/316L	Flange ANSI B16.5	6.8 kg
	AN2*	3"	600 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	
	AP2*	4"	150 lbs	RF 316/316L	Flange ANSI B16.5	7.0 kg
	AQ2*	4"	300 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	11.5 kg
	AQ6**	4"	300 lbs	RF AlloyC22 >316/316L	Flange ANSI B16.5	11.5 kg
	AR2*	4"	600 lbs	RF 316/316L (FTL51)	Flange ANSI B16.5	17.3 kg
	A82*	1"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.0 kg
	KA2	10 K 25		RF 316L	Flange JIS B2220	
	KC2	10 K 40		RF 316L	Flange JIS B2220	
	KE2	10 K 50		RF 316L	Flange JIS B2220	1.7 kg
	KE5	10 K 50		RF Alloy C4 >316L	Flange JIS B2220	1.7 kg
	KE6**	10 K 50		RF AlloyC22 >316L	Flange JIS B2220	1.7 kg
	KL2	10 K 80		RF 316L	Flange JIS B2220	
	KP2	10 K 100		RF 316L	Flange JIS B2220	
	TC2*	DN25-38 (1 to 1½")		316L	ISO 2852 Tri-Clamp	
	TE2*	DN40-51 (2")		316L	ISO 2852 Tri-Clamp	0.1 kg
	YY9	Special version				
				* With CRN approval.		
				** AlloyC22 in preparation		
30	Probe length; Type:					
	FTL50					
	AA	Compact;		Ra <3.2 µm/80 grit		
	IA	Compact;		Temperature spacer		0.6 kg
	QA	Compact;		Pressure tight feed through		0.7 kg
	FTL51					
	BB	..... mm;	316L**	Ra <3.2 µm/80 grit		
	BE	..... mm;	Alloy**	Ra <3.2 µm/80 grit		
	CB	..... inch;	316L**	Ra <3.2 µm/80 grit		
	CE	..... inch;	Alloy**	Ra <3.2 µm/80 grit		2.3 kg/100 in
	DB	Length: type II*;	316L	Ra <3.2 µm/80 grit		0.1 kg
	DE	Length: type II*;	Alloy	Ra <3.2 µm/80 grit		0.1 kg
	JB	..... mm;	316L**	+ Temperature spacer		0.9 kg/m +0.6 kg
	JE	..... mm;	Alloy**	+ Temperature spacer		0.9 kg/m +0.6 kg


30		Probe length; Type:	
KB	..... inch;	316L**	+ Temperature spacer 2.3 kg/100 in +0.6 kg
KE	..... inch;	Alloy**	+ Temperature spacer 2.3 kg/100 in +0.6 kg
LB	Length: type II*;	316L	+ Temperature spacer 0.1 kg +0.6 kg
LE	Length: type II*;	Alloy	+ Temperature spacer 0.1 kg +0.6 kg
RB	..... mm;	316L**	+ Pressure tight feed through 0.9 kg/m +0.7 kg
RE	..... mm;	Alloy**	+ Pressure tight feed through 0.9 kg/m +0.7 kg
SB	..... inch;	316L**	+ Pressure tight feed through 2.3 kg/100 in +0.7 kg
SE	..... inch;	Alloy**	+ Pressure tight feed through 2.3 kg/100 in +0.7 kg
TB	Length: type II*;	316L	+ Pressure tight feed through 0.1 kg +0.7 kg
TE	Length: type II*;	Alloy	+ Pressure tight feed through 0.1 kg +0.7 kg
YY	Special version		
<p>*) Replacing devices: when vertically mounting a Liquiphant <b>M</b> FTL51 with length II, the switch point is at the same height as for a Liquiphant <b>II</b> FTL360, FTL365, FDL30, FDL35. See also → 33, "L II" depends on process connection. **) Order 3001 to 6000 mm (116 to 235 in) via yy</p>			
40		Electronics; output:	
A	FEL50A	PROFIBUS PA	
D	FEL50D	Density/concentration	
1	FEL51*	2-wire,	19 to 253 V AC
2	FEL52*	3-wire PNP,	10 to 55 V DC
4	FEL54	Relay DPDT,	19 to 253 V AC, 19 to 55 V DC
5	FEL55	8/16 mA,	11 to 36 V DC
6	FEL56	NAMUR (L-H signal)	
7	FEL57	2-wire PFM	
8	FEL58*	NAMUR + test keys (H-L signal)	
9	Special version		
*) Also available in compact housing			
50		Housing; cable entry:	
C3	Compact 316L	IP66/68;	Cable 5 m
D3	Compact 316L	IP65;	Plug Pg11 ISO4400
E1*	F27 316L	NEMA6P;	Thread NPT ¾
E3	Compact 316L	NEMA4X;	Plug NPT ½ ISO4400
N3	Compact 316L	IP66/68;	M12 connector
E4	F16 Polyester	NEMA4X;	Thread NPT ½
E5	F13/F17 Alu	NEMA4X;	Thread NPT ¾ 0.5 kg
E6	F15 316L	NEMA4X;	Thread NPT ½ 0.1 kg
E7	T13 Alu	IP66;	Thread NPT ¾ 0.9 kg
Separate connection compartment			
F1*	F27 316L	IP68	Thread G1/2
F4	F16 Polyester	IP66;	Thread G ½
F5	F13/F17 Alu	IP66;	Thread G ½ 0.5 kg
F6	F15 316L	IP66;	Thread G ½ 0.1 kg
F7	T13 Alu	coated, IP66;	Thread G ½ 0.9 kg
Separate connection compartment			
G1*	F27 316L	IP68;	M20 threaded joint
G4	F16 Polyester	IP66;	M20 threaded joint
G5	F13/F17 Alu	IP66;	M20 threaded joint 0.5 kg (EEx d > M20 thread)
G6	F15 316L	IP66;	M20 threaded joint 0.1 kg
G7	T13 Alu	coated, IP66;	M20 threaded joint 0.9 kg (EEx d > M20 thread)
Separate connection compartment			
N4	F16 Polyester	IP66;	M12 connector
N5	F13/F17 Alu	IP66;	M12 connector
N6	F15 316L	IP66;	M12 connector
Y9	Special version		
* F27 housing in preparation.			



**Liquiphant M  
FTL50H  
FTL51H product structure**

<b>Design</b>				<b>Basic weight</b>	
FTL50H	Compact			0.7 kg	
FTL51H	With extension pipe			0.7 kg	
<b>10</b>		<b>Approval:</b>			
A	Non-hazardous area				
B	ATEX/NEPSI II 3 G	EEx nC II T6	Overfill protection to WHG (Germany)		
	ATEX/NEPSI II 3 D	T 85 °C*			
C	ATEX/NEPSI II 3 G	EEx nA II T6	Overfill protection to WHG (Germany)		
	ATEX/NEPSI II 3 D	T 85 °C*			
D	Non-hazardous area		Overfill protection to WHG (Germany)		
E	ATEX II 1/2 G	EEx de IIC T6	Overfill protection to WHG (Germany)		
F	ATEX II 1/2 G	EEx ia IIC T6	Overfill protection to WHG (Germany)		
	ATEX II 1/2 D	T 80 °C*			
G	ATEX II 1/2 G	EEx ia IIC T6			
	ATEX II 1/2 D	T 80 °C*			
H	ATEX II 1 G	EEx ia IIC T6			
I	ATEX II 1/2 G	EEx de IIC T6			
J	ATEX II 1 G	EEx ia IIC T6	Overfill protection to WHG (Germany)		
K	ATEX II 1/2 G	EEx d IIC T6			
L	ATEX II 1/2 G	EEx d IIC T6	Overfill protection to WHG (Germany)		
M	NEPSI	Ex ia IIC T6			
N	NEPSI	Ex d IIC T6			
P	FM	IS, Class I, II, III	Division 1, Group A–G		
Q	FM	XP, Class I, II, III	Division 1, Group B–G, for E5 housing Group A–G		
R	FM	NI, Class I	Division 2, Group A–D		
S	CSA	IS, Class I, II, III	Division 1, Group A–G		
T	CSA	XP, Class I, II, III	Division 1, Group A–G		
U	CSA	General Purpose			
V	TIIS	Ex ia IIC T3			
W	TIIS	Ex d IIB T3			
X	TIIS	Ex ia IIC T6			
7	TIIS	Ex d IIC T3			
8	TIIS	Ex d IIC T6			
Y	Special version				
	*) Not for PBT				
<b>20</b>		<b>Process connection:</b>		<b>Additional weight</b>	
	GQ2	G ¾	316L (FTL50H)	Thread ISO 228	
		Installation > accessories: welding neck			
	GW2*	G 1	316L	Thread ISO 228	0.2 kg
		Installation > accessories: welding neck			
	BA2	DN32 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.2 kg
	BB2	DN32 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.0 kg
	BC2	DN40 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	BD2	DN40 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BE2	DN50 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.6 kg
	BG2	DN50 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	3.2 kg
	BH2	DN65 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BK2	DN65 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	4.3 kg
	BM2	DN80 PN10/16 A	316L	Flange EN 1092-1 (DIN 2527 B)	4.8 kg
	BN2	DN80 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	5.9 kg
	BO2	DN100 PN10/16 A	316L	Flange EN 1092-1 (DIN 2527 B)	5.6 kg
	BR2	DN100 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	7.5 kg
	B82	DN25 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	CG2	DN50 PN25/40 B1	316L	Flange EN 1092-1 (DIN 2527 C)	3.2 kg

20	Process connection:					Additional weight
	CN2	DN80	PN25/40 B1	316L	Flange EN 1092-1 (DIN 2527 C)	5.9 kg
	CO2	DN100	PN10/16 B1	316L	Flange EN 1092-1 (DIN 2527 C)	5.6 kg
	EE2	1" flush-mounted (52001047)		316L		0.3 kg
	Installation > accessories: welding neck					
	HE2	DN50	Pipe DIN 11850	316L	DIN 11864-1 A	0.3 kg
	AA2*	1¼"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.2 kg
	AC2*	1½"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.5 kg
	AE2*	2"	150 lbs	RF 316/316L	Flange ANSI B16.5	2.4 kg
	AF2*	2"	300 lbs	RF 316/316L	Flange ANSI B16.5	3.2 kg
	AJ2*	2½"	300 lbs	RF 316/316L (FTL51H)	Flange ANSI B16.5	4.8 kg
	AL2*	3"	150 lbs	RF 316/316L	Flange ANSI B16.5	4.9 kg
	AM2	3"	300 lbs	RF 316/316L (FTL51H)	Flange ANSI B16.5	6.8 kg
	AP2*	4"	150 lbs	RF 316/316L	Flange ANSI B16.5	7.0 kg
	AO2*	4"	300 lbs	RF 316/316L (FTL51H)	Flange ANSI B16.5	11.5 kg
	A82*	1"	150 lbs	RF 316/316L	Flange ANSI B16.5	1.0 kg
	KA2	10 K 25		RF 316L	Flange JIS B2220	
	KC2	10 K 40		RF 316L	Flange JIS B2220	
	KE2	10 K 50		RF 316L	Flange JIS B2220	1.7 kg
	KL2	10 K 80		RF 316L	Flange JIS B2220	
	KP2	10 K 100		RF 316L	Flange JIS B2220	
	MA2	DN32	PN25	316L	DIN 11851	0.1 kg
	MC2	DN40	PN25	316L	DIN 11851	0.2 kg
	ME2	DN50	PN25	316L	DIN 11851	0.3 kg
	PE2	DRD	65 mm	316L		0.3 kg
	TC2*	DN25-38 (1 to 1½")		316L	ISO 2852 Tri-Clamp	
	TE2*	DN40-51 (2")		316L	ISO 2852 Tri-Clamp	0.1 kg
	TT2**	Ingold fitting 25x46mm		316L		
	UE2	SMS 2"	PN25	316L		0.2 kg
	WE2*	DN65-162	PN10	316L	Varivent N pipe	0.5 kg
	YY9	Special version				
		* CRN approval				
		** In preparation				
30	Probe length; Type:					
	FTL50H					
	AC	Compact;		Ra <1.5 µm/120 grit		
	AD	Compact;		Ra <0.3 µm/320 grit / A3		
	IC	Compact;		Ra <1.5 µm/120 grit + temperature spacer		0.6 kg
	ID	Compact;		Ra <0.3 µm/320 grit / A3 + temperature spacer		0.6 kg
	QC	Compact;		Ra <1.5 µm/120 grit + Pressure tight feed through		0.7 kg
	QD	Compact;		Ra <0.3 µm/320 grit / A3 + Pressure tight feed through		0.7 kg
	FTL51H					
	BC	..... mm;		Ra <1.5 µm/120 grit		0.9 kg/m
	BD	..... mm;		Ra <0.3 µm/320 grit / A3		0.9 kg/m
	CC	..... inch;		Ra <1.5 µm/120 grit		2.3 kg/100 in
	CD	..... inch;		Ra <0.3 µm/320 grit / A3		2.3 kg/100 in
	DC	Length: type II*;		Ra <1.5 µm/120 grit		0.1 kg
	DD	Length: type II*;		Ra <0.3 µm/320 grit / A3		0.1 kg
	JC	..... mm;		Ra <1.5 µm/120 grit + Temperature spacer		0.9 kg/m +0.6 kg
	JD	..... mm;		Ra <0.3 µm/320 grit + Temperature spacer		0.9 kg/m +0.6 kg
	KC	..... inch;		Ra <1.5 µm/120 grit + Temperature spacer		2.3 kg/100 in +0.6 kg
	KD	..... inch;		Ra <0.3 µm/320 grit + Temperature spacer		2.3 kg/100 in +0.6 kg
	LC	Length: type II*;		Ra <1.5 µm/120 grit + Temperature spacer		0.1 kg +0.6 kg
	LD	Length: type II*;		Ra <0.3 µm/320 grit + Temperature spacer		0.1 kg +0.6 kg
	RC	..... mm;		Ra <1.5 µm/120 grit + Pressure tight feed through		0.9 kg/m +0.7 kg
	RD	..... mm;		Ra <0.3 µm/320 grit + Pressure tight feed through		0.9 kg/m +0.7 kg
	SC	..... inch;		Ra <1.5 µm/120 grit + Pressure tight feed through		2.3 kg/100 in +0.7 kg
	SD	..... inch;		Ra <0.3 µm/320 grit + Pressure tight feed through		2.3 kg/100 in +0.7 kg
	TC	Length: type II*;		Ra <1.5 µm/120 grit + Pressure tight feed through		0.1 kg +0.7 kg

30		Probe length; Type:	
		TD	Length: type II*; Ra <0.3 µm/320 grit + Pressure tight feed through
		YY	Special version
			*) Replacing devices: when vertically mounting a Liquiphant <b>M</b> FTL51H with length II, the switch point is at the same height as for a Liquiphant <b>II</b> FTL360, FTL365, FDL30, FDL35. See also →  33, "L II" depends on process connection.
			0.1 kg +0.7 kg
40		Electronics; output:	
		A	FEL50A PROFIBUS PA
		D	FEL50D Density/concentration
		1	FEL51* 2-wire, 19 to 253 V AC
		2	FEL52* 3-wire PNP, 10 to 55 V DC
		4	FEL54 Relay DPDT, 19 to 253 V AC, 19 to 55 V DC
		5	FEL55 8/16 mA, 11 to 36 V DC
		6	FEL56 NAMUR (L-H signal)
		7	FEL57 2-wire PFM
		8	FEL58* NAMUR + test keys (H-L signal)
		9	Special version
			*) Also available in compact housing
50		Housing; cable entry:	
		C3	Compact 316L IP66/68; Cable 5 m
		D3	Compact 316L IP65; Plug Pg11 ISO 4400
		E1*	F27 316L NEMA6P; Thread NPT ¾
		E3	Compact 316L NEMA4X; Plug NPT ½ ISO 4400
		N3	Compact 316L IP66/68; M12 connector
		E4	F16 Polyester NEMA4X; Thread NPT ½ -0.1 kg
		E5	F13/F17 Alu NEMA4X; Thread NPT ¾ 0.4 kg
		E6	F15 316L NEMA4X; Thread NPT ½
		E7	T13 Alu coated, IP66; Thread NPT ¾ 0.8 kg
			Separate connection compartment
		F1*	F27 316L IP68 Thread G1/2
		F4	F16 Polyester IP66; Thread G ½ -0.1 kg
		F5	F13/F17 Alu IP66; Thread G ½ 0.4 kg
		F6	F15 316L IP66; Thread G ½
		F7	T13 Alu coated, IP66; Thread G ½ 0.8 kg
			Separate connection compartment
		G1*	F27 316L IP68; M20 threaded joint
		G4	F16 Polyester IP66; M20 threaded joint -0.1 kg
		G5	F13/F17 Alu IP66; M20 threaded joint 0.4 kg
			(EEx d > M20 thread)
		G6	F15 316L IP66; M20 threaded joint
		G7	T13 Alu coated, IP66; M20 threaded joint 0.8 kg
			Separate connection compartment (EEx d > M20 thread)
		N4	F16 Polyester IP66; M12 connector
		N5	F13/F17 Alu IP66; M12 connector
		N6	F15 316L IP66; M12 connector
		Y9	Special version
			* F27 housing in preparation.
60		Additional options	
		A	Basic version
		B*	CoC, EN 10204 - 3.1 material (316L wetted) Inspection certificate
		C	EN 10204 - 3.1 material (316L wetted), Inspection certificate
		K	Special adjustment, density H20
		L	Special adjustment, density H20, EN10204-3.1 (316L wetted) inspection certificate
		S	GL/ABS marine approval (FTL51H: max. 1600 mm)
		Y	Special version
			* In preparation.
		FTL5#H -	Complete product designation



Note!

Basic weight = compact sensor, thread adapter G ¾, electronic insert, stainless steel housing



## Accessories

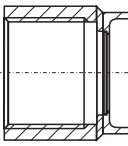
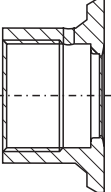
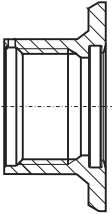
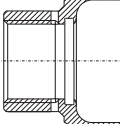
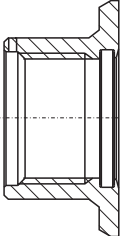
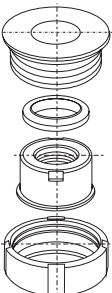


Note!

- All dimensions in mm
- For more detailed information on welding necks, please refer to TI426F/00.
- The tolerance of the defined thread start between the welding neck and sensor is  $\pm 15^\circ$ .

### Welding neck


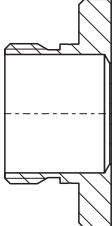
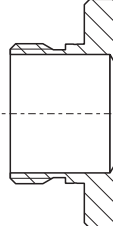
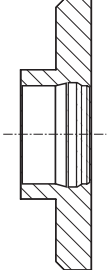

### Overview

							
	a0008246	a0008251	a0008256	a0011924	a0008248	a0008253	
	<b>G<math>\frac{3}{4}</math>, d=29 without flange</b>	<b>G<math>\frac{3}{4}</math>, d=50 with flange</b>	<b>G<math>\frac{3}{4}</math>, d=55 with flange</b>	<b>G1, d=53 with flange</b>	<b>G1, d=60 with flange</b>	<b>G1 can be positioned</b>	
Material	316L	316L	316L	316L	316L	316L	
roughness $\mu\text{m}$ ( $\mu\text{in}$ )	1.5 (59.1)	0.8 (31.5)	0.8 (31.5)	0.8 (31.5)	0.8 (31.5)	0.8 (31.5)	
Without inspection certificate EN10204-3.1 material	–	–	52001052	–	52001051 <sup>1)</sup>	52001221 <sup>2)</sup>	
With inspection certificate EN10204-3.1 material	52028295	52018765	52011897	71093129 <sup>1)</sup>	52011896 <sup>1)</sup>	52011898 <sup>2)</sup>	
Seal (set of 5)	Silicone O-ring 52021717 <sup>3)</sup>	Silicone O-ring 52021717 <sup>3)</sup>	Silicone O-ring 52014473 <sup>3)</sup>	Silicone O-ring 52014472 <sup>3)</sup>	Silicone O-ring 52014472 <sup>3)</sup>	Silicone profile gasket 52014424 <sup>3)</sup>	
Weld-in dummy	–	–	MVT2L0692	MVT2L0691	MVT2L0691	M40167	
<b>Liquiphant M</b>	Feature	<b>Version</b>					
FTL50	020			GQ2			
FTL5x					GW2	GW2	
FTL50H				GQ2			
FTL5xH					GW2	GW2	GW2

1) This welding neck replaces the welding neck with the order number 917969-1000.

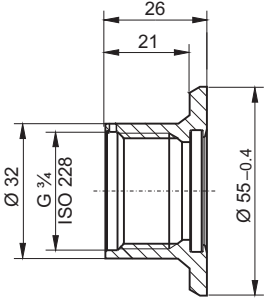
2) This welding neck replaces the welding neck with the order number 215159-0000.

3) A seal is included in the delivery.

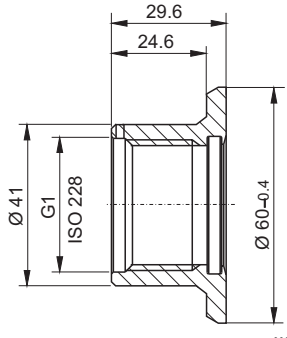
					
	a0008252	a0008245	a0008245	a0008552	a0008254
	<b>RD52</b>	<b>Uni D85</b>	<b>Uni D65</b>	<b>M24 D65</b>	<b>DRD DN50 (65 mm) (welding flange)</b>
Material roughness $\mu\text{m}$ ( $\mu\text{in}$ ), process side	316L 0.8 (31.5)	316L 3.2 (126)	316L 0.8 (31.5)	316L 0.8 (31.5)	316L/304 0.8 (31.5)
Without inspection certificate EN10204-3.1 material	52001047 <sup>1)</sup>	52006262	214880-0002	71041381	52002041/ 916743-0000
With inspection certificate EN10204-3.1 material	52006909 <sup>1)</sup>	52010173	52010174	71041383	52011899/ -
Seal (set of 5)	Silicone profile gasket 52014424	Silicone profile gasket 52023572	Silicone profile gasket 52023572	-	PTFE flat seal 52024228
Weld-in dummy	M40167	71093102	71093102	-	-
<b>Device</b>	<b>Feature</b>	<b>Version</b>			
<b>Liquiphant M</b>					
FTL5xH	020	EE2			PE2

1) This welding neck replaces the welding neck with the order number 942329-0001.

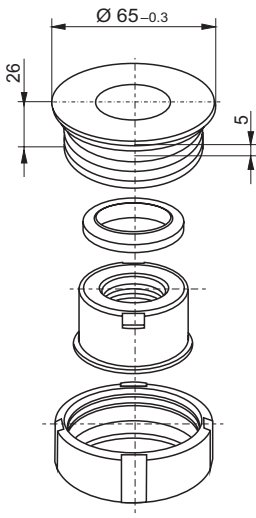
**G $\frac{3}{4}$ , d=55  
with flange for  
flush-mounted installation**

Dimensions	Version	Order number
 <p> <ul style="list-style-type: none"> <li>■ Max. 25 bar / max. 150 °C</li> <li>■ Max. 40 bar / max. 100 °C</li> </ul> </p>	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435)</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52001052
	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435) with inspection certificate EN10204-3.1 material</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52011897
	Silicone O-ring, Ø 21.89 x 2.62 Material: VMQ70, FDA	52014473 (set of 5)
	Sensor dummy for welding in the welding neck	MVT2L0692
	FDA-compliant material in accordance with 21 CFR Part 177.1550/2600 Approval: 3A, EHEDG	
	<b>Alternative seals Ø 21.89 x 2.62</b>	<b>Order number</b>
	Material: EPDM, FDA	MVT2L1148
	Material: Kalrez Comp. 2035	MVT2L0666
	Material: Viton	MVT2L0655
	Material: Viton/FEP-FEK 75 Shore	MVT2L1748
Material: Silicone, VMQ23-70, FDA, USP Class VI	71086100 (set of 3)	

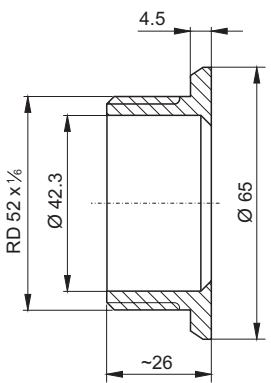
**G1, d=60**  
with flange for flush-mounted  
installation with sealing  
surface

Dimensions	Version	Order number
 <p> <ul style="list-style-type: none"> <li>Max. 25 bar / max. 150 °C</li> <li>Max. 40 bar / max. 100 °C</li> </ul> </p>	<ul style="list-style-type: none"> <li>AISI 316L (1.4435)</li> <li>Roughness: Ra &lt;0.8 µm</li> </ul>	52001051
	<ul style="list-style-type: none"> <li>AISI 316L (1.4435) with inspection certificate EN10204-3.1 material</li> <li>Roughness: Ra &lt;0.8 µm</li> </ul>	52011896
	Silicone O-ring, Ø 28.17 x 3.53 Material: VMQ70, FDA	52014472 (set of 5)
	Sensor dummy for welding in the welding neck	MVT2L0691
	FDA-compliant material in accordance with 21 CFR Part 177.1550/2600 Approval: EHEDG, 3A	
	Alternative seals Ø 28.17 x 3.53	Order number
	Material: EPDM70, FDA	MVT2L0920
	Material: Viton665, FDA	MVT2L0705 (set of 5)
	Material: Viton971, V, FDA	MVT2L1682
	Material: Kalrez comp. 4079	MVT2L0567
Material: Silicone, VMQ23-70, FDA, USP Class VI	71086102 (set of 3)	

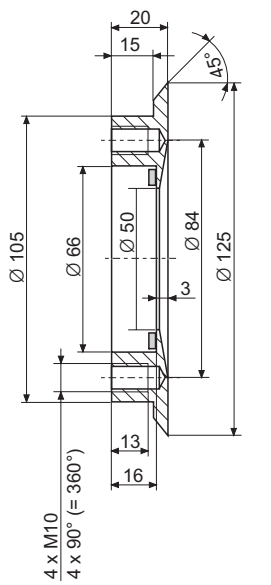
**G1**  
Sensor can be positioned

Dimensions	Version	Order number
 <p> <ul style="list-style-type: none"> <li>Max. 25 bar / max. 150 °C</li> <li>Max. 40 bar / max. 100 °C</li> </ul> </p>	<ul style="list-style-type: none"> <li>AISI 316L (1.4435)</li> <li>Roughness: Ra &lt;0.8 µm</li> </ul>	52001221
	<ul style="list-style-type: none"> <li>AISI 316L (1.4435) with inspection certificate EN10204-3.1 material</li> <li>Roughness: Ra &lt;0.8 µm</li> </ul>	52011898
	Silicone profile gasket 29 x 36 x 3.7 Material: SI-60, FDA	52014424 (set of 5)
	Sensor dummy for welding in the welding neck	M40167
	FDA-compliant material in accordance with 21 CFR Part 177.1550/2600 Approval: 3A, EHEDG	
	Alternative seals 29 x 36 x 3.7	Order number
	Material: EPDM-60, FDA	52012805
	Material: Silicone, VMQ60, FDA, USP Class VI	71075662 (set of 5)

**RD52**  
Sensor can be positioned

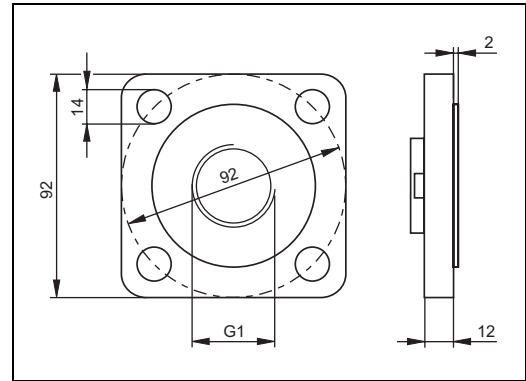
Dimensions	Version	Order number
 <ul style="list-style-type: none"> <li>■ Max. 25 bar / max. 150 °C</li> <li>■ Max. 40 bar / max. 100 °C</li> </ul>	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435)</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52001047
	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435) with inspection certificate EN10204-3.1 material</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52006909
	Silicone profile gasket 29 x 36 x 3.7 Material: SI-60, FDA <ul style="list-style-type: none"> <li>■ The seal can be easily replaced with this version.</li> </ul>	52014424 (set of 5)
	Sensor dummy for welding in the welding neck	M40167
	FDA-compliant material in accordance with 21 CFR Part 177.1550/2600 Approval: 3A, EHEDG	
	Alternative seals 29 x 39 x 3.7	Order number
	Material: EPDM-60, FDA  Material: Silicone, VMQ60, FDA, USP Class VI	52012805  71075662 (set of 5)

**DRD DN50 (65 mm)**  
for flush-mounted installation of devices with DRD flange

Dimensions	Version	Order number
 <ul style="list-style-type: none"> <li>■ Max. 25 bar / max. 150 °C</li> <li>■ Max. 40 bar / max. 100 °C</li> </ul>	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435)</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52002041
	<ul style="list-style-type: none"> <li>■ AISI 316L (1.4435) with inspection certificate EN10204-3.1 material</li> <li>■ Roughness: Ra &lt;0.8 µm</li> </ul>	52011899
	AISI 304 (1.4301)	916743-0000
	Flat seal, 50 x 65 x 1 Material: PTFE, FDA	52024228 (set of 5)
	FDA-compliant material in accordance with 21 CFR Part 177.1550/2600	

**Flange**

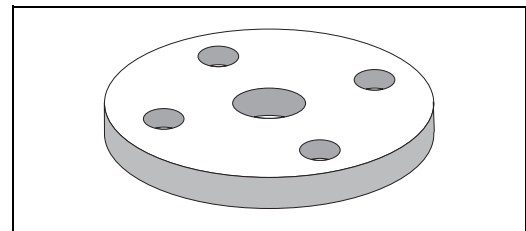
Order number: 918158-0000  
 With G 1 thread for mounting  
 a Liquiphant FTL50, FTL51  
 with process connection GR2  
 Pressure up to 40 bar  
 Material: corrosion-resistant steel  
 1.4301 (AISI 304)  
 Weight: 0.54 kg



L00-FTL5xxxx-06-05-xx-xx-024

**Flange**

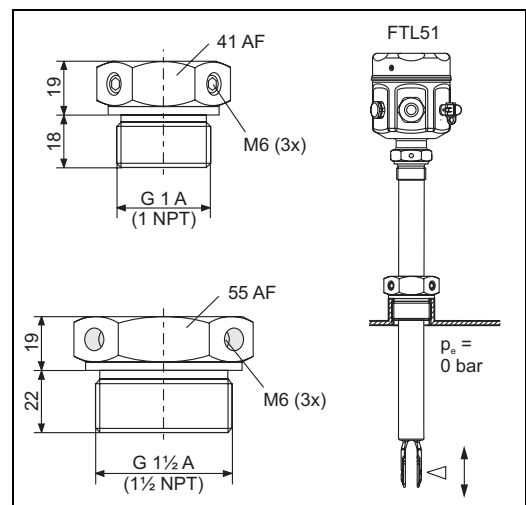
With G 1 thread for mounting  
 a Liquiphant FTL50, FTL51  
 with process connection GR2  
 Material: corrosion-resistant steel  
 1.4571 (AISI 316Ti)  
 – Order number: 918143-0000  
 Flange DN50 PN40, EN 1092-1  
 Weight: 3.11 kg  
 – Order number: 918144-0000  
 Flange ANSI 2", 150 psi, RF  
 Weight: 2.38 kg



L00-FTL5xxxx-03-05-xx-xx-015

**Sliding sleeves for  
 unpressurized operation**

For continuous adjustment of the switch  
 point of a Liquiphant M FTL51  
 Material: corrosion-resistant steel  
 1.4435 (AISI 316 L)  
 Weight for G 1, NPT 1: 0.21 kg  
 Weight for G 1½, NPT 1½: 0.54 kg



L00-FTL5xxxx-06-05-xx-en-006

Thread	Standard	Material	Order number	Approval
G 1	DIN ISO 228/1	1.4435 (AISI 316 L)	52003978	
G 1	DIN ISO 228/1	1.4435 (AISI 316 L)	52011888	3.1 inspection certificate EN 10204 - 3.1 material
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003979	
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011889	3.1 inspection certificate EN 10204 - 3.1 material
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52003980	
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52011890	3.1 inspection certificate EN 10204 - 3.1 material
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003981	

Thread	Standard	Material	Order number	Approval
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011891	3.1 inspection certificate EN 10204 - 3.1 material

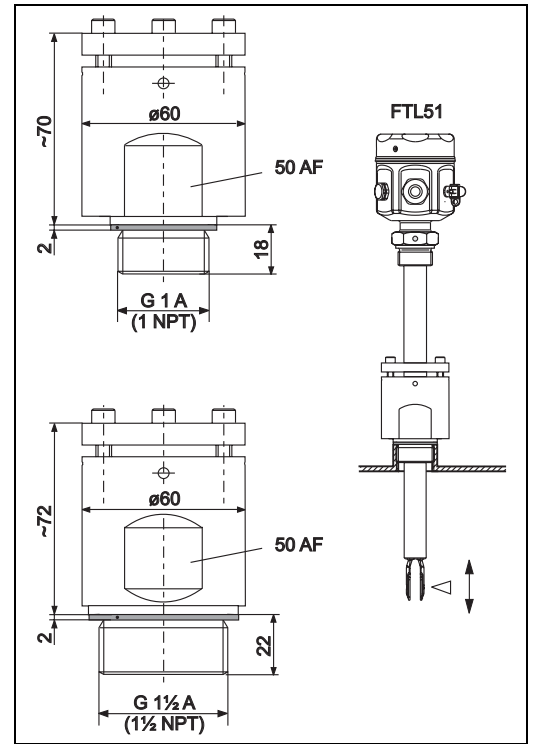
**High pressure sliding sleeves**

For continuous adjustment of the switch point of a Liquiphant M FTL51.  
Also for use in hazardous areas.  
For further information → 59ff. (ATEX, NEPSI).

Material: corrosion-resistant steel  
1.4435 (AISI 316L) or AlloyC4

Weight for G 1, NPT 1: 1.13 kg  
Weight for G 1½, NPT 1½: 1.32 kg

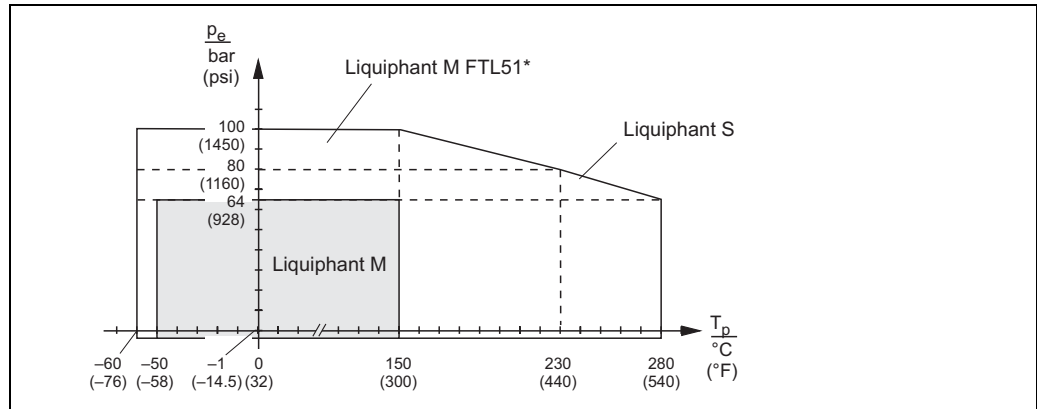
Seal package made of graphite



L00-FTL5xxxx-06-05-xx-en-007

Thread	Standard	Material	Order number	Approval
G 1	DIN ISO 228/1	1.4435 (AISI 316 L)	52003663	
G 1	DIN ISO 228/1	1.4435 (AISI 316 L)	52011880	3.1 inspection certificate EN 10204 - 3.1 material
G 1	DIN ISO 228/1	Alloy C4	52003664	
G 1	DIN ISO 228/1	AlloyC22	*	
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003667	
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011881	3.1 inspection certificate EN 10204 - 3.1 material
NPT1	ANSI B 1.20.1	Alloy C4	52003668	
NPT1	ANSI B 1.20.1	AlloyC22	*	
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52003665	
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52011882	3.1 inspection certificate EN 10204 - 3.1 material
G 1½	DIN ISO 228/1	Alloy C4	52003666	
G 1½	DIN ISO 228/1	AlloyC22	*	
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003669	
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011883	3.1 inspection certificate EN 10204 - 3.1 material
NPT1½	ANSI B 1.20.1	Alloy C4	52003670	
NPT1½	ANSI B 1.20.1	AlloyC22	*	

\* AlloyC22 in preparation.



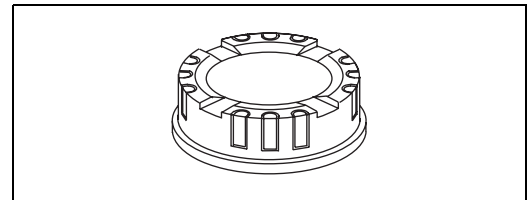
\* FTL51 with high-pressure sliding sleeve (100 bar). See "Additional fitting" → 41 option "P" or "R".I

### Transparent cover

Order number: 943461-0001  
for polyester housing F16

Material: PA 12

Weight: 0.04 kg



L00-FTL5xxxx-03-05-xx-xx-016

### Cover with sight glass

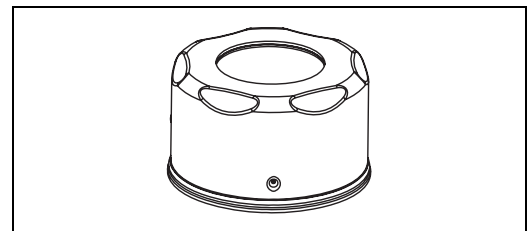
For stainless steel housing F15

Material: AISI 316L

Weight: 0.16 kg

– Order number: 943301-1000  
With glass sight glass

– Order number: 52001403  
With PC sight glass  
(Not for CSA, General Purpose)



L00-FTL5xxxx-03-05-xx-xx-017

### Circular connector

Order number: 52010285

4x0.34 M12 socket

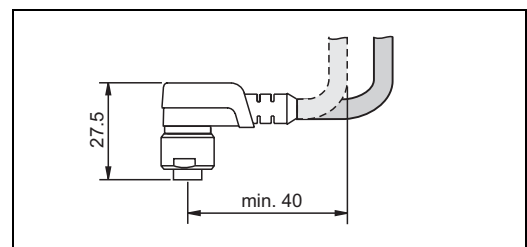
Cable: PVC (gray) 5 m

Body: PUR (blue)

Thread adapter nut: Cu Sn/Ni

Degree of protection: IP67

Temperature range: -25 to +70 °C



L00-FTL20Hxx-07-05-xx-xx-004

Order number: 52024216

4x0.34 M12 socket

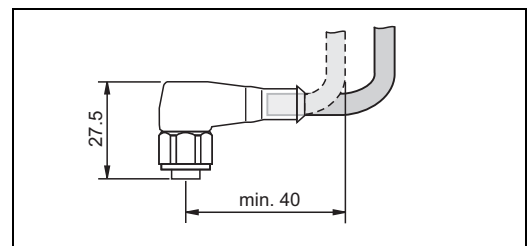
Cable: PVC (orange) 5 m

Body: PVC (orange)

Thread adapter nut: 316L

Degree of protection: IP69K (fully locked)

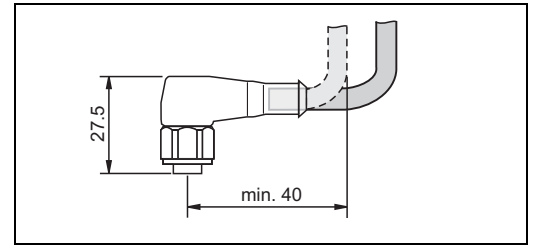
Temperature range: -25 to +70 °C



L00-FTL20Hxx-07-05-xx-xx-005



Order number: 52018763  
4x0.34 M12 socket with integrated LEDs  
Cable: PVC (orange) 5 m  
Body: PVC (transparent)  
Thread adapter nut: 316L  
Degree of protection: IP69K (fully locked)  
Temperature range: -25 to +70 °C



100-FTL20Hxx-07-05-xx-xx-005

## Documentation



Note!  
You can find supplementary documentation on the product pages at [www.endress.com](http://www.endress.com)

### Operating Instructions

Electronic insert FEL50A for Liquiphant M/S  
PROFIBUS PA  
BA141F/00/en

Liquiphant M Density,  
Density Computer FML621  
BA335F/00/en

Liquiphant M FTL50, FTL51  
KA143F/00/a6

Liquiphant M FTL50(H), FTL51(H)  
KA144F/00/a6

Liquiphant M FTL51C  
KA162F/00/a6

Liquiphant M FTL50-##### # 7 #, FTL51-##### # 7 #  
KA163F/00/a6

Liquiphant M FTL50H-##### # 7 #, FTL51H-##### # 7 #  
KA164F/00/a6

Liquiphant M FTL51C-##### # 7 ##  
KA165F/00/a6

Liquiphant M FTL5#-# ### # # #3 #, FTL5#H-# ### # # #3 #  
KA220F/00/a6

Liquiphant M Density FTL50, FTL51  
Electronic insert: FEL50D  
KA284F/00/a6

Liquiphant M Density FTL50H, FTL51H  
Electronic insert: FEL50D  
KA285F/00/a6

Liquiphant M Density FTL51C  
Electronic insert: FEL50D  
KA286F/00/a6

Liquiphant M Sliding Sleeve for FTL51, G 1, NPT 1  
KA151F/00/a6

Liquiphant M Sliding Sleeve for FTL51, G 1½, NPT 1½  
KA152F/00/a6

Liquiphant M High-pressure Sliding Sleeve for FTL51, G 1, NPT 1  
KA153F/00/a6

Liquiphant M High-pressure Sliding Sleeve for FTL51, G 1½, NPT 1½  
KA154F/00/a6

### Technical Information

Nivotester FTL370/372, switching units in Racksyst design

for Liquiphant M with electronic insert FEL57  
TI198F/00/en

Nivotester FTL320, switching unit in Minipac design  
for Liquiphant M with electronic insert FEL57  
TI203F/00/de

General instructions for electromagnetic compatibility  
(Test procedure, installation recommendation)  
TI241F/00/en

Liquiphant M FTL51C, wetted parts with highly corrosion-resistant  
ECTFE, PFA or enamel coating  
TI347F/00/en

Isolating amplifier FTL325P, 1 or 3-channel switching units for top-hat rail mounting  
for Liquiphant M/S with electronic insert FEL57  
TI350F/00/en

Isolating amplifier FTL325N, 1 or 3-channel switching units for top-hat rail mounting  
For Liquiphant M/S with electronic insert FEL56, FEL58  
TI353F/00/en

Liquiphant S FTL70/71, for medium temperatures up to 280 °C  
TI354F/00/en

Isolating amplifier FTL375P, 1 to 3-channel switching units for top-hat rail mounting  
for Liquiphant M/S with electronic insert FEL57  
TI360F/00/en

Isolating amplifier FTL375N, 1 to 3-channel switching units for top-hat rail mounting  
For Liquiphant M/S with electronic insert FEL56, FEL58  
TI361F/00/en

Liquiphant M Density,  
Density Computer FML621  
TI420F/00/en

Welding neck,  
TI426F/00/en

ASME-BPE  
Certificate of Compliance  
SD310F/00/en

**Functional safety (SIL)**

Liquiphant M/S with electronic insert FEL51 (MAX)  
SD164F/00/en

Liquiphant M/S with electronic insert FEL51 (MIN)  
SD185F/00/en

Liquiphant M/S with electronic insert FEL52 (MAX)  
SD163F/00/en

Liquiphant M/S with electronic insert FEL52 (MIN)  
SD186F/00/en

Liquiphant M/S with electronic insert FEL54 (MAX)  
SD162F/00/en

Liquiphant M/S with electronic insert FEL54 (MIN)  
SD187F/00/en

Liquiphant M/S with electronic insert FEL55 (MAX)  
SD167F/00/en

Liquiphant M/S with electronic insert FEL55 (MIN)  
SD279F/00/en

Liquiphant M/S with electronic insert FEL57 + Nivotester FTL325P (MAX)  
SD111F/00/en

Liquiphant M/S with electronic insert FEL57 + Nivotester FTL325P (MIN)  
SD231F/00/en

Liquiphant M/S with electronic insert FEL57+ Nivotester FTL375P (MAX)

SD113F/00/en

Liquiphant M/S with electronic insert FEL56 + Nivotester FTL325N (MAX)  
SD168F/00/en


Liquiphant M/S with electronic insert FEL56 + Nivotester FTL325N (MIN)  
SD188F/00/en


Liquiphant M/S with electronic insert FEL58 + Nivotester FTL325N (MAX)  
SD161F/00/en


Liquiphant M/S with electronic insert FEL58 + Nivotester FTL325N (MIN)  
SD170F/00/en


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**Safety Instructions (ATEX)**

**CE**  II 1/2 G, EEx d IIC/B  
(KEMA 99 ATEX 1157)  
XA031F/00/a3

**CE**  II 1/2 G, EEx ia/ib IIC/B  
(KEMA 99 ATEX 0523)  
XA063F/00/a3

**CE**  II 1 G, EEx ia IIC/B  
(KEMA 99 ATEX 5172 X)  
XA064F/00/a3

**CE**  II 1/2 G, EEx de IIC/B  
(KEMA 00 ATEX 2035)  
XA108F/00/a3

**CE**  II 3 G, EEx nA/nC II  
(EG 01 007-a)  
XA182F/00/a3

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**Safety Instructions (NEPSI)**

Ex d IIC/IIB T3-T6, Ex d IIC T2-T6  
(NEPSI GYJ06424)  
XA401F/00/B2

Ex ia IIC T2-T6, Ex ia IIB T3-T6  
(NEPSI GYJ05556, NEPSI GYJ06464),  
XC009F/00/b2

Ex nA II T3-T6, Ex nC/nL IIC T3-T6  
(NEPSI GYJ04360, NEPSI GYJ071414)  
XC010F/00/b2

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**Control Drawings**

Liquiphant M/S (IS and NI) Current output PFM, NAMUR Entity installation  
Class I, Div. 1, 2, Groups A, B, C, D  
Class I, Zone 0  
Class II, Div. 1, 2, Groups E, F, G  
Class III  
ZD041F-I/00/EN

Liquiphant M, Liquiphant S (cCSAus / IS)  
Class I, Div. 1, Groups A, B, C, D Ex ia IIC T6  
Class II, Div. 1, Groups E, F, G  
Class III  
ZD042F-G/00/EN

Liquiphant M/S (NI), FTL50(H), FTL51(H), FTL51C, FTL70, FTL71  
Class I, Div. 2, Groups A, B, C, D  
Class II, Div. 2, Groups F, G  
Class III  
ZD043F-C/00/EN

Liquiphant M, Liquiphant S (cCSAus / XP)  
Class I, Groups A, B, C, D  
Class II, Groups E, F, G

Class III  
ZD240F/00/EN

Liquiphant M/S (IS and NI) PROFIBUS PA, FOUNDATION FieldbusClass I, Zone 0, IIC  
Class I, Division 1, 2, Groups A, B, C, D  
Class II, Division 1, 2, Groups E, F, G  
Class III  
ZD244F/00/EN

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**System information**

Liquiphant M  
SI040F/00/en







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