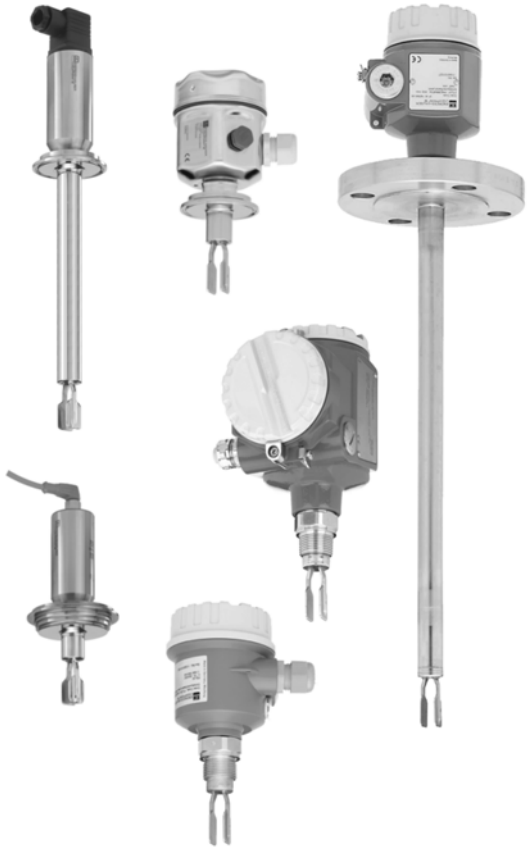
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

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 °C to 150 °C
– for pressures up to 100 bar
– for viscosity up to 10,000 mm^2/s
– for densities ≥ 0.5 g/cm^3 or ≥ 0.7 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: 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
- Design in accordance with ASME B31.3
- 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.

TI328F/00/en
71184702

Endress+Hauser
People for Process Automation

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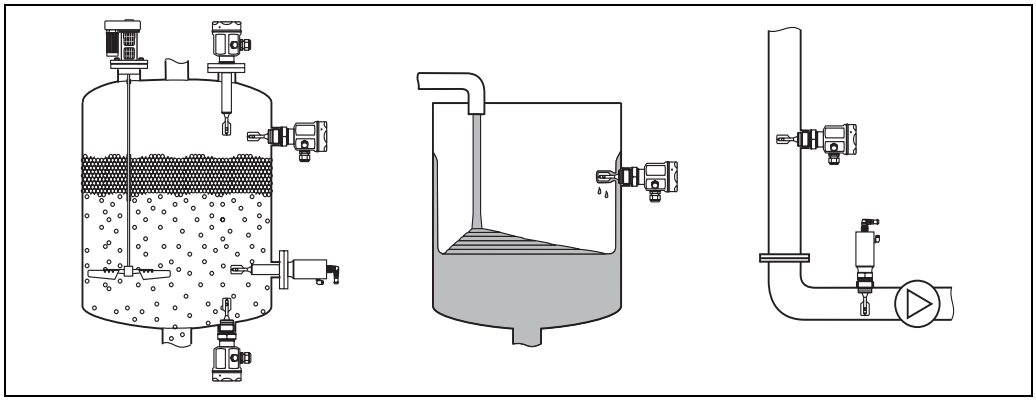
Application

Point level detection

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



L00-FTL5xxxx-11-05-xx-xx-000

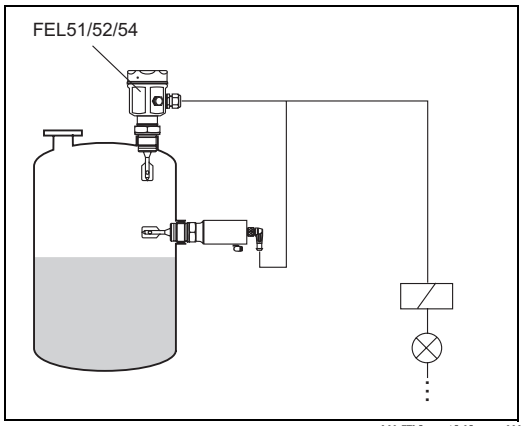
Function and system design

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



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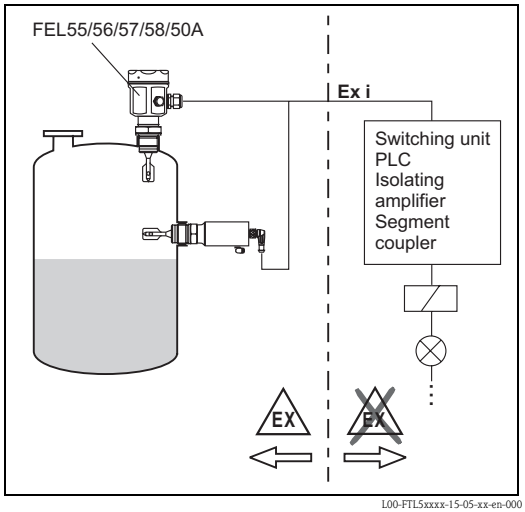
Point level switch
Liquiphant M FTL with electronic versions
FEL55, FEL56, FEL57, FEL58
for connecting to a separate switching unit
or an isolating amplifier FEL50A
for connecting to a PROFIBUS PA segment



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

Electronic versions	FEL51: Two-wire AC version; Switches the load directly into the power supply circuit via an electronic switch. FEL52: Three-wire DC version; Switches the load via the transistor (PNP) and separate connection. FEL54: Universal current version with relay output; Switches the loads via 2 floating change-over contacts. FEL55: For separate switching unit; signal transmission 16/8 mA on two-wire cabling. 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. 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. FEL57: For separate switching unit; PFM signal transmission; Current pulses superposed on the power supply along the two-wire cabling. Proof test from the switching unit without changing levels. FEL50A: For connecting to PROFIBUS PA; Cyclic and acyclic data exchange acc. to PROFIBUS-PA Profile 3.0 Discrete Input
Electronics for continuous density measurement	FEL50D: For connecting to Density Computer FML621
Galvanic isolation	FEL51, FEL52, FEL50A: Between sensor and power supply FEL54: Between sensor and power supply and load FEL55, FEL56, FEL57, FEL58, FEL50D: See connected switching unit
Design	FTL50: Compact FTL51: With extension pipe FTL50H: Compact, with polished tuning fork and hygienic process connections FTL51H: With extension pipe, polished tuning fork and hygienic process connections

Input

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

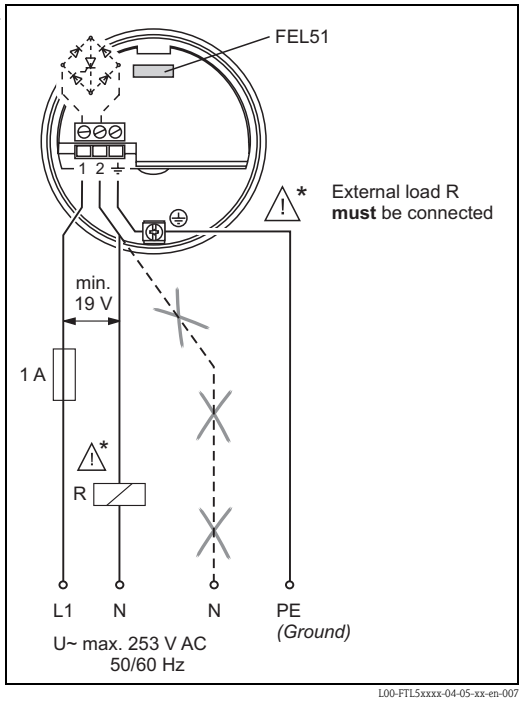
Electrical connection

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 part number: 71107226
- When selecting the relay, pay attention to the holding power / rated power (see "Connectable load")



L00-FTL5xxxx-04-05-xx-en-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	LEDs 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

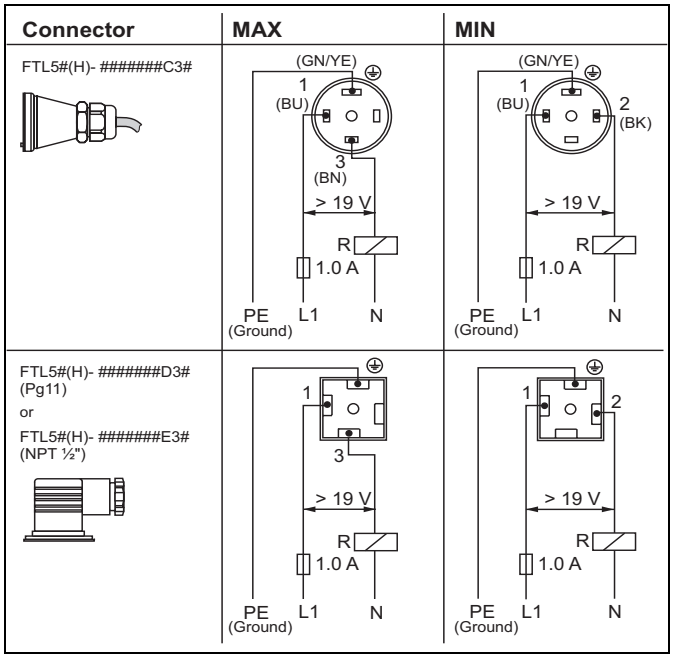
Electrical connection

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 (e.g. RC module: part number 71107226).

Output signal

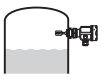
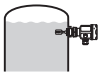
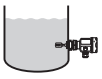
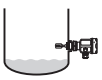
I_L = load current (switched through)

< 3.8 mA = residual current (blocked)

☼ = lit

● = unlit

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

Safety mode	Level	Output signal	LEDs green	LEDs 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-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 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)

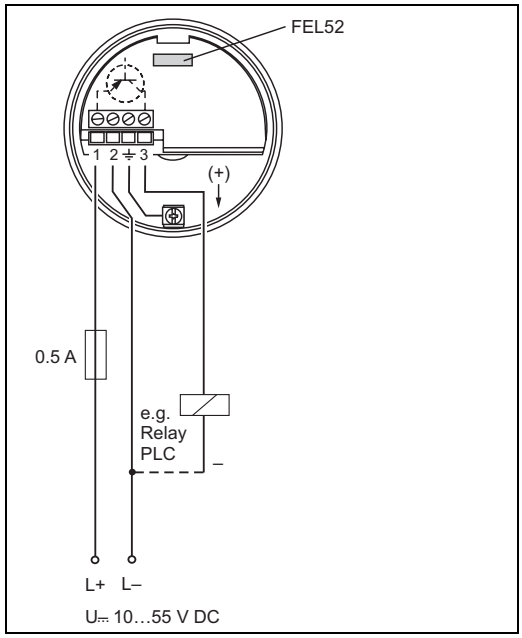
Power supply

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 point level.



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

Output signal

I_L = load current (switched through)

< 100 µA = residual current (blocked)

☼ = lit

● = unlit

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

Safety mode	Level	Output signal	LEDs green	LEDs red
Max.		L+ 1 → I_L → + 3	☼	●
		1 - - - < 100 µA - - - → 3	☼	☼
Min.		L+ 1 → I_L → + 3	☼	●
		1 - - - < 100 µA - - - → 3	☼	☼

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

Signal on alarm

Output signal on power failure or in the event of damaged sensor: < 100 µA

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 µA (with transistor blocked).
- Capacitance load max. 0.5 µF at 55 V, max. 1.0 µF at 24 V
- Residual voltage < 3 V (with transistor switched through);

Electronics FEL52 (DC PNP, in compact housing)

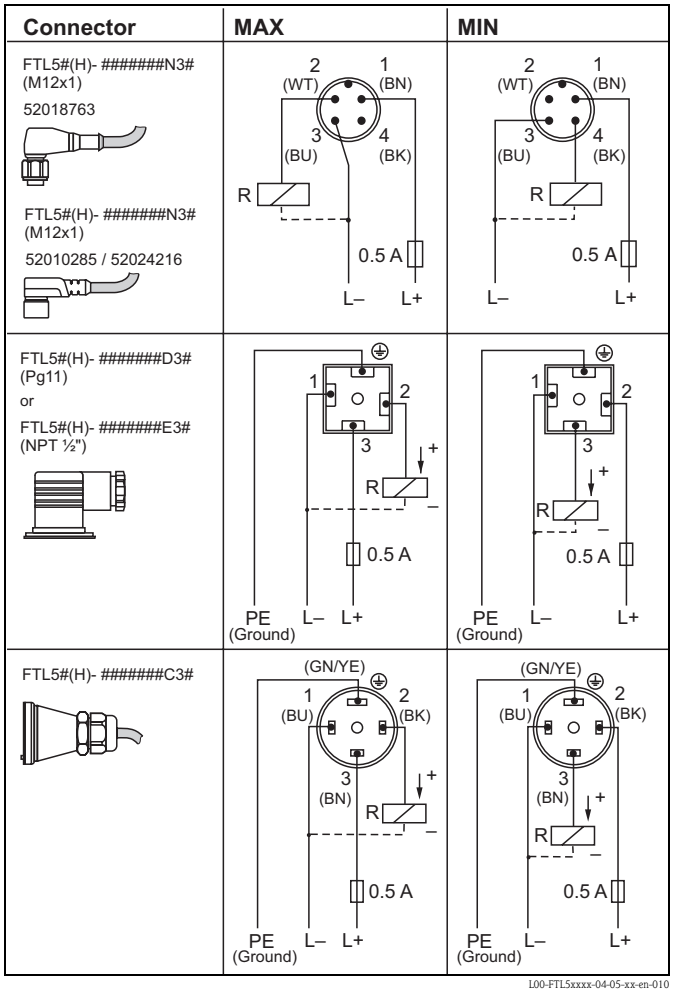
Power supply

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 point level.



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

Output signal

With valve connector or cable tail

I_L = load current (switched through)

< 100 µA = residual current (blocked)

☼ = lit

● = unlit

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

Safety mode	Level	Output signal	LEDs green	LEDs red
Max.		L+ 3 → I_L → + 2	☼	●
		L+ 3 - - < 100 µA → + 2	☼	☼
Min.		L+ 2 → I_L → + 3	☼	●
		L+ 2 - - < 100 µA → + 3	☼	☼

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

With M12x1 connector 52010285 / 52024216 (without LEDs)

L00-FTL5xxxx-16-05-xx-xx-002

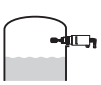
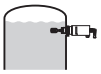
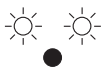
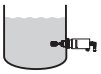
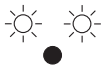
I_L = load current (switched through)

< 100 µA = residual current (blocked)

☼ = lit

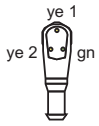
● = unlit

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

Safety mode	Level	Output signal	LEDs
Max.		L+ 1 — I_L → 2	
		L+ 1 - - < 100 µA → 2	
Min.		L+ 1 — I_L → 4	
		L+ 1 - - < 100 µA → 4	

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

With M12x1 connector 52018763 (with LEDs)



L00-FTL5xxxx-16-05-xx-xx-001

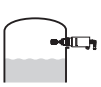
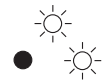
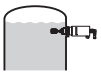
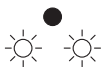
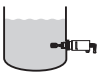
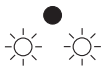
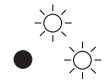
I_L = load current (switched through)

< 100 µA = residual current (blocked)

☼ = lit

● = unlit

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

Safety mode	Level	Output signal	LEDs
Max.		L+ 1 — I_L → 2	
		L+ 1 - - < 100 µA → 2	
Min.		L+ 1 — I_L → 4	
		L+ 1 - - < 100 µA → 4	

L00-FTL5xxxx-04-05-xx-xx-011

Signal on alarm

Output signal on power failure or in the event of damaged sensor: < 100 µA

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 µA (with transistor blocked).
- Capacitance load max. 0.5 µF at 55 V, max. 1.0 µF at 24 V
- Residual voltage < 3 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

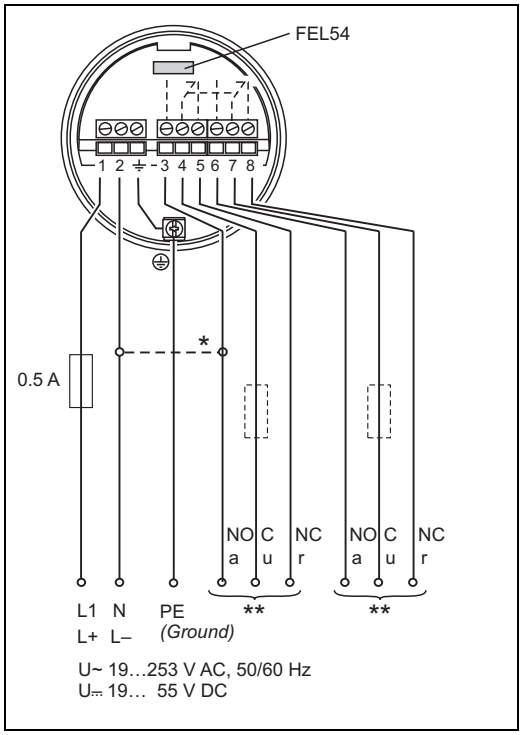
Universal current connection with relay output

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"

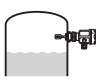
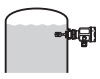
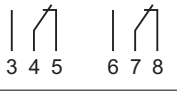
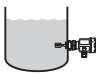


L00-FTL5xxxx-04-05-xx-xx-002

Output signal

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

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

Safety mode	Level	Output signal	LEDs green	LEDs 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-005

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.
- The electronic insert FEL52 DC-PNP is preferred for low DC load currents (e.g. when connecting to a PLC)
- Relay contact material: silver/nickel AgNi 90/10

Electronic insert FEL55 (8/16 mA)

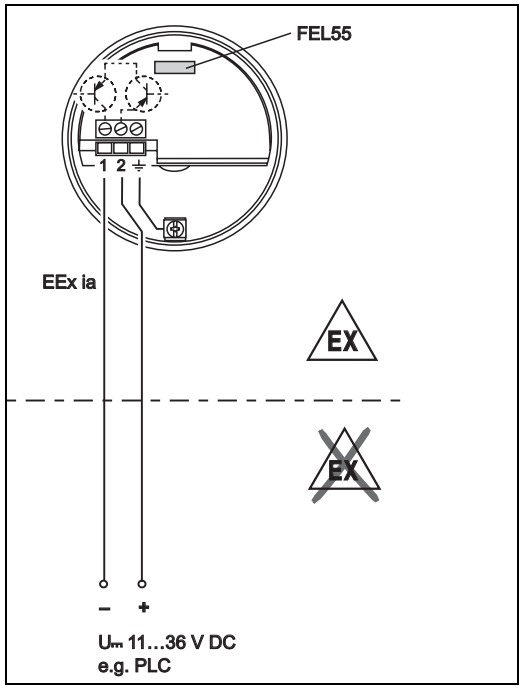
Power supply

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 point level.



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

Output signal

~ 16 mA = 16 mA ± 5 %

~ 8 mA = 8 mA ± 6 %

☼ = lit

● = unlit

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

Safety mode	Level	Output signal	LEDs green	LEDs red
Max.		+ 2 ~16 mA 1	☼	●
		+ 2 ~8 mA 1	☼	☼
Min.		+ 2 ~16 mA 1	☼	●
		+ 2 ~8 mA 1	☼	☼

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

Signal on alarm

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

Connectable load

- R = (U - 11 V) : 16.8 mA
- U = connection voltage: 11 to 36 V DC

Example:
PLC with 250 Ω with 2-wire version

250 Ω = (U – 11V) / 16.8 mA
4.2 [Ω/A] = U – 11 V
U = 15.2 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

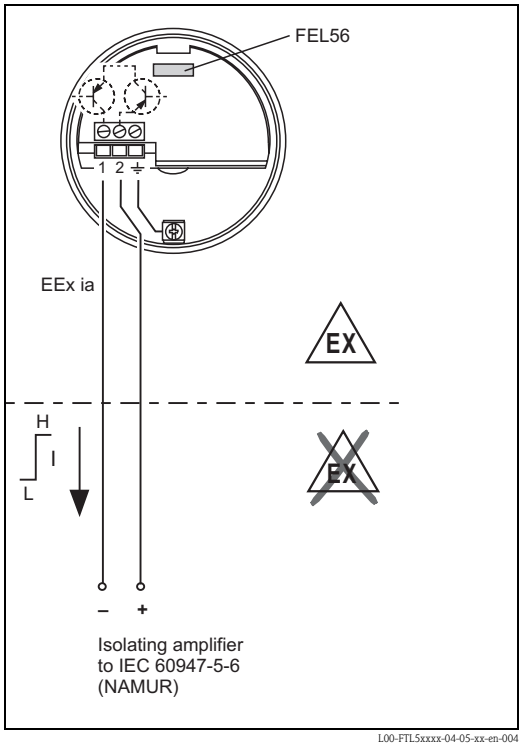
Electrical connection

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 point level.

(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	LEDs red
Max.		+ 2 — 0.6 … 1.0 mA → 1	☼	●
		+ 2 — 2.2 … 2.8 mA → 1	☼	☼
Min.		+ 2 — 0.6 … 1.0 mA → 1	☼	●
		+ 2 — 2.2 … 2.8 mA → 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

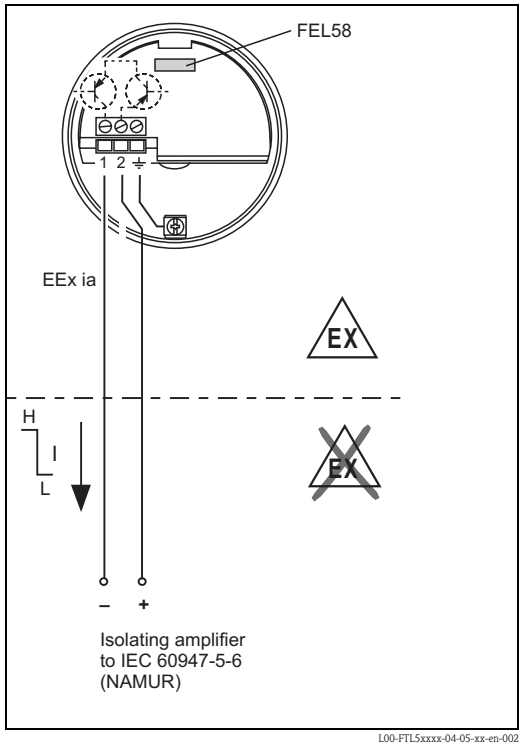
For connecting to isolating amplifiers
acc. to NAMUR (IEC 60947-5-6),
e.g. FTL325N, FTL375N from Endress+Hauser.
Output signal jump from high to
to low current on point level.

(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

= lit
= flashes
= unlit

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

Safety mode	Level	Output signal	LEDs green	LEDs yellow
Max.		+ 2 → 1 : 2.2 … 3.5 mA	☼	☼
		+ 2 → 1 : 0.6 … 1.0 mA	◔	●
Min.		+ 2 → 1 : 2.2 … 3.5 mA	☼	☼
		+ 2 → 1 : 0.6 … 1.0 mA	◔	●

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

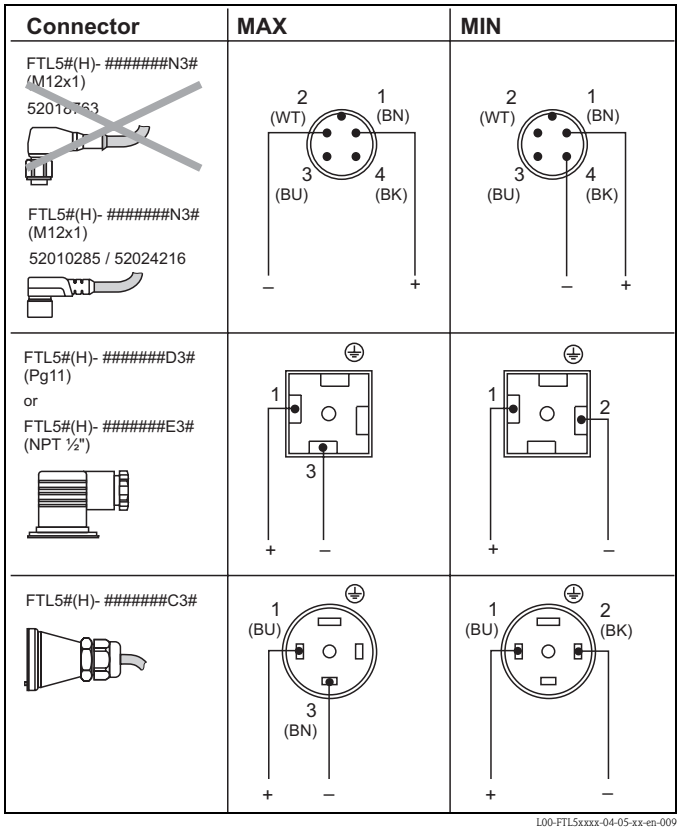
For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FTL325N, FTL375N from Endress+Hauser.
Output signal jump from high to low current on point level.

(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)



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

Output signal

Safety mode	Level	Output signal	LEDs green	LEDs yellow
Max.		+ 1 → – 3, 2.2… 3.5 mA	☼	☼
		+ 1 → – 3, 0.6… 1.0 mA	☼	●
Min.		+ 1 → – 2, 2.2… 3.5 mA	☼	☼
		+ 1 → – 2, 0.6… 1.0 mA	☼	●

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

☼ = lit
☼ = flashes
● = unlit

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

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

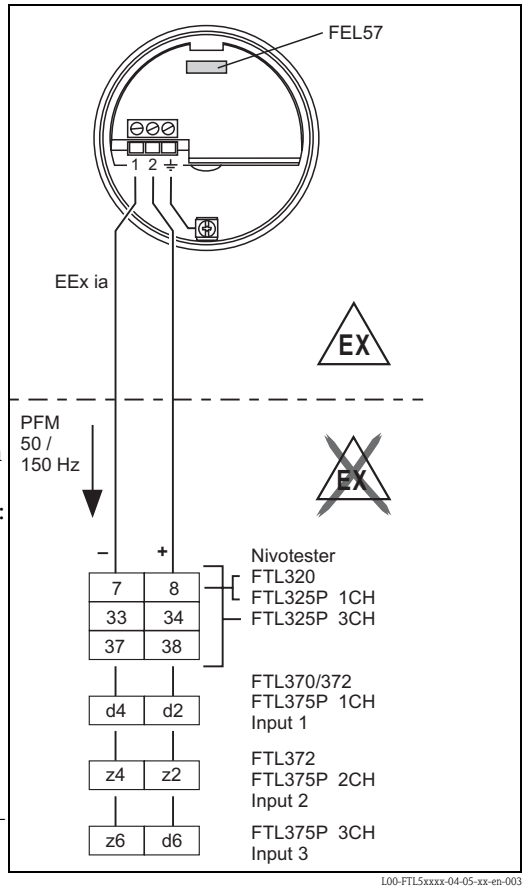
Electrical connection

Two-wire connection for separate switching unit

For connecting to Nivotester switching units FTL320, FTL325P, FTL370, FTL372, FTL375P (also with proof test) 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 “proof test”:
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 the proof test.
– **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 the proof test.

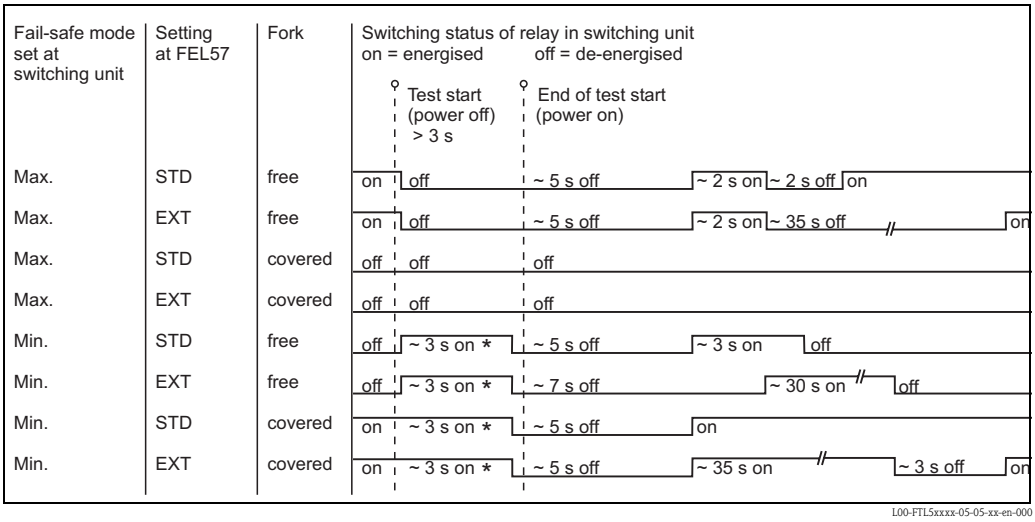


The check is activated and monitored at the switching unit.

The twin-core connecting cable (instrument cable) with a cable resistance of max. 25 Ω per core is connected to the screw terminals (conductor cross-sections 0.5 to 2.5 mm) in the connection compartment. Protective circuits against reverse polarity, HF influences and overvoltage peaks are installed.
Maximum line length up to 1000 m.

A shielded connecting cable is recommended in the event of strong electromagnetic interference. Here the shielding must be connected to the sensor and the power supply.

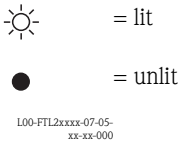
Switching behavior of the connected device:

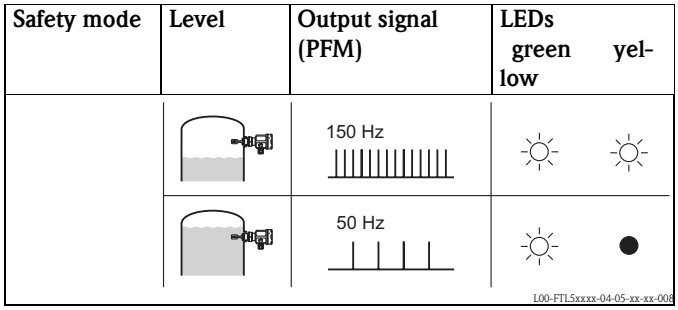


* De-energized on power supply failure

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





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)

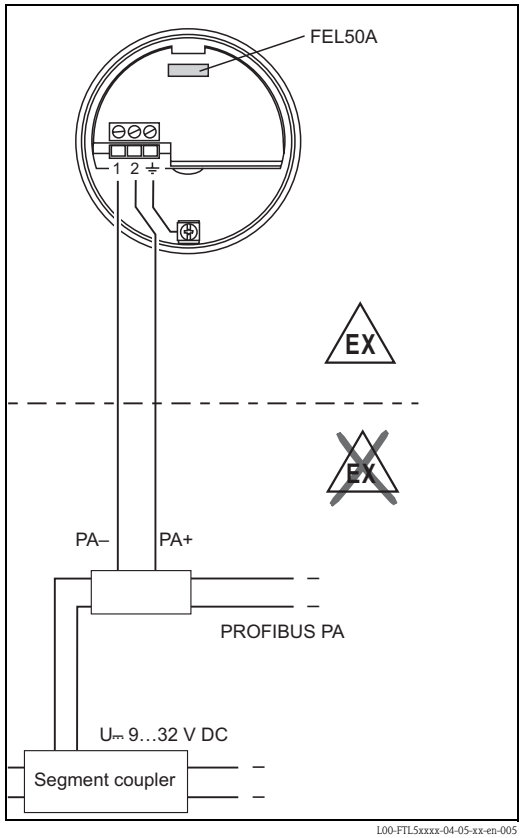
Electrical connection

Two-wire connection for power supply and data transfer

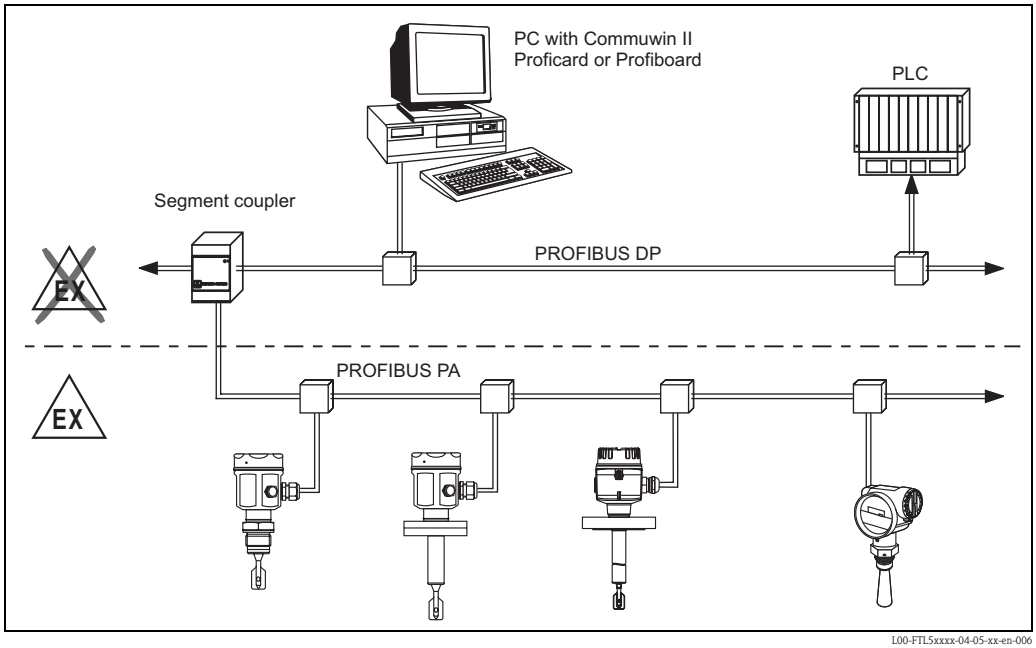
For connecting to PROFIBUS PA

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



L00-FTL5xxxx-04-05-xx-en-005



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

Output signal

☼ = lit

● = unlit

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

Setting	Level	LEDs green	LEDs yellow	FEL50A
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-009

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 µS

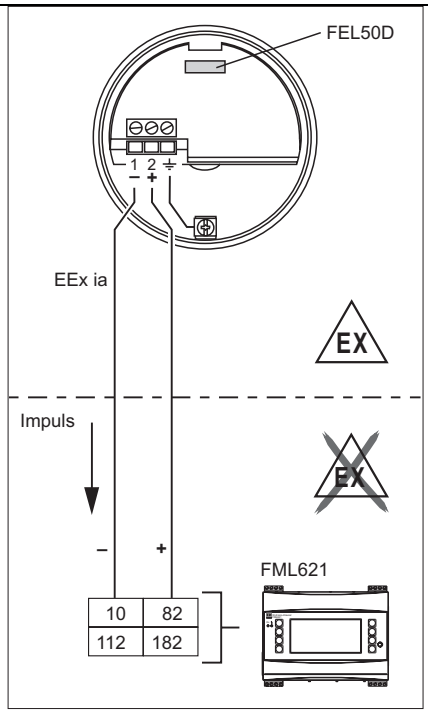
Electrical connection

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.



TI420Fen004

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 an 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 option, 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.

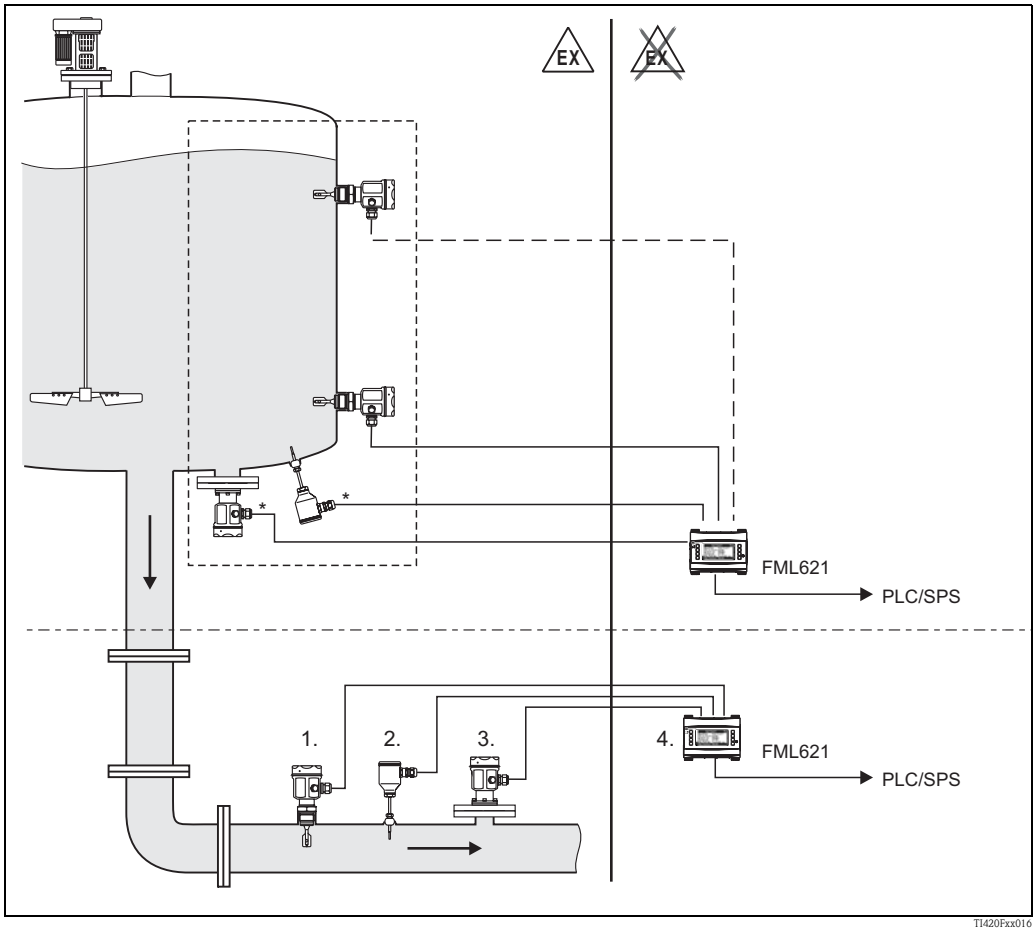
Special adjustment (see ordering information for additional option, special adjustment, density H_2O (K) or special adjustment, density H_2O with 3.1 certificate (L))
- Here, three fork parameters are determined to describe the sensor characteristics, indicated in the adjustment report and provided with 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!
More information on Liquiphant M Density is available in Technical Information TI420F. This can be downloaded from 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

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

Connecting cables

- Electronic inserts:
  cross-section max. 2.5 mm^2; strand in ferrule to DIN 46228
- Protective earth in housing: cross-section max. 2.5 mm^2
- External equipotential bonding connection on housing: cross-section max. 4 mm^2

Safety mode

Minimum/maximum residual current safety selectable on electronic insert.
(with FEL57 on Nivotester only)

Max. = maximum safety:
The output switches to the power fail response when the fork is covered
For use with overfill protection for example

Min. = minimum safety:
The output switches to the power fail response when the fork is exposed
For use with dry running protection for example

Switching time

When fork is covered: approx. 0.5 s
When fork is exposed: approx. 1.0 s
(Other switching times on request.)

Additionally configurable for PROFIBUS PA: 0.5 to 60 s

Switch-on behavior

When switching on the power supply, the output assumes the alarm signal.
After max. 3 s it assumes the correct switching mode (exception: FEL57)

Performance characteristics

Reference operating conditions

Ambient temperature: 23 °C

Medium temperature: 23 °C

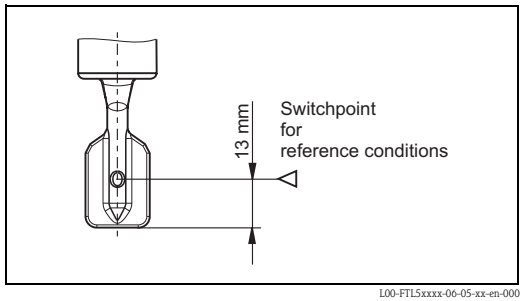
Medium density: 1 g/cm^3 (water)

Viscosity: 1 mm^2/s

Medium pressure p_e: 0 bar

Sensor mounting: vertical from above

Density switch: to > 0.7



L00-FTL5xxxx-06-05-xx-en-000

Maximum measured error

Max. +/–1 mm (at reference operating conditions)

Repeatability

0.1 mm

Hysteresis

Approx. 2 mm

Influence of medium temperature

Max. +1.8 to –2.8 mm (–50 to +150 °C)

Influence of medium density

Max. +4.8 to –3.5 mm (0.5 to 1.5 g/cm^3)

Influence of medium pressure

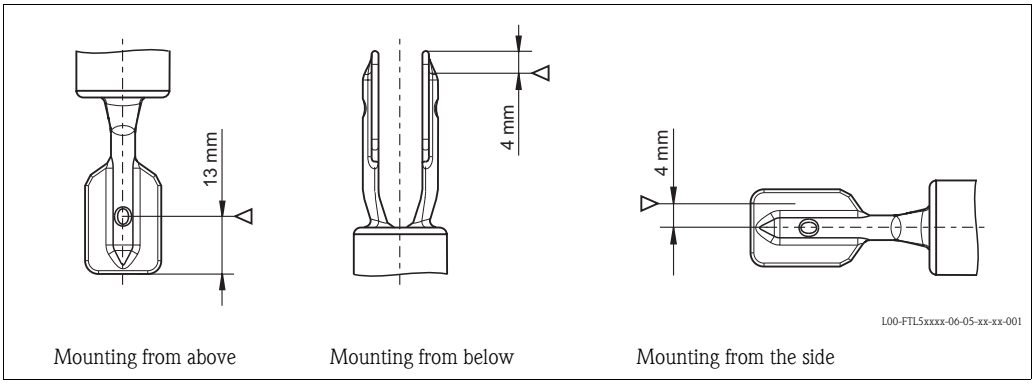
Max. 0 to –2.5 mm (–1 to 64 bar)

Operating conditions

Installation

Installation instructions

Switch points ▷ on the sensor depend on the mounting position, with reference to water, Density 1 g/cm³, 23 °C, p_e 0 bar.



Mounting from above | Mounting from below | Mounting from the side

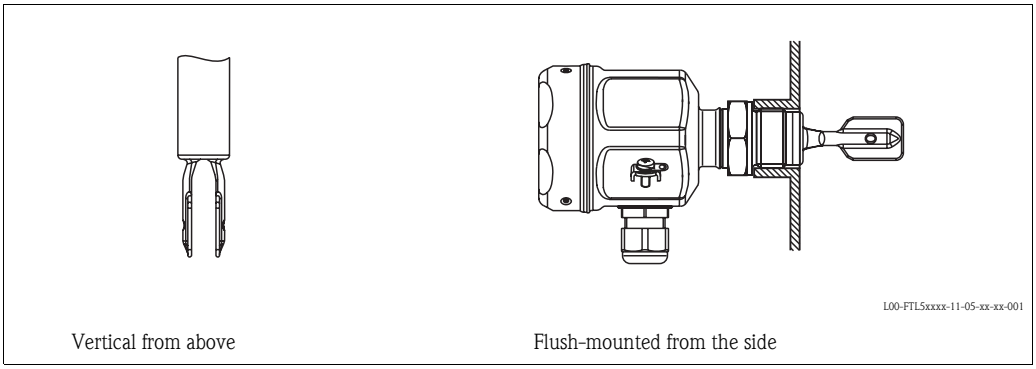
Note!
The switch points of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

Examples of mounting

Examples of mounting with regard to the viscosity ν of the liquid and the tendency to form buildup

Optimum mounting, without problem even with high viscosity:

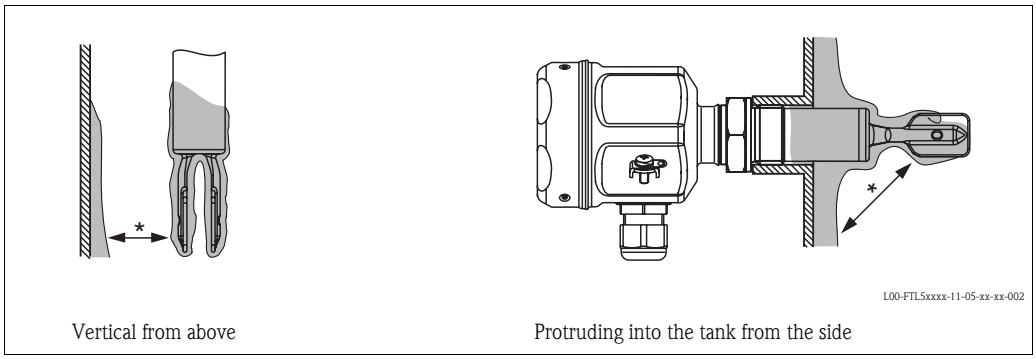
Position the fork so that the narrow edge of the tines is vertical to ensure that the liquid can run off easily.



Vertical from above | Flush-mounted from the side

With buildup on the tank walls:

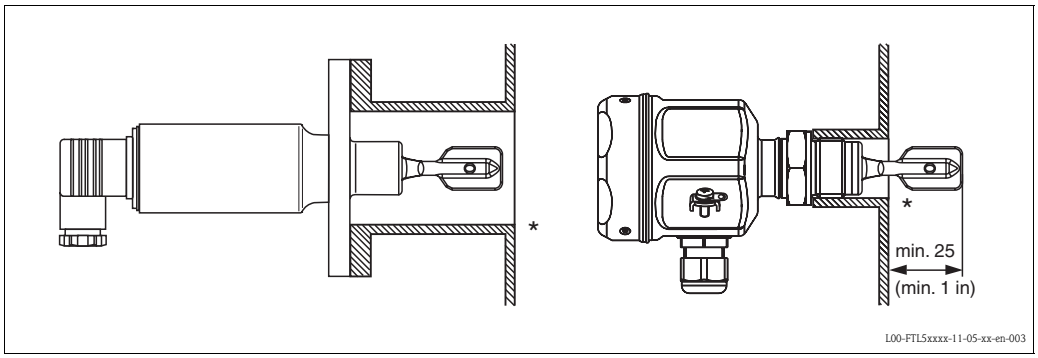
* Ensure that there is sufficient distance between the buildup expected on the tank wall and the fork.



Vertical from above | Protruding into the tank from the side

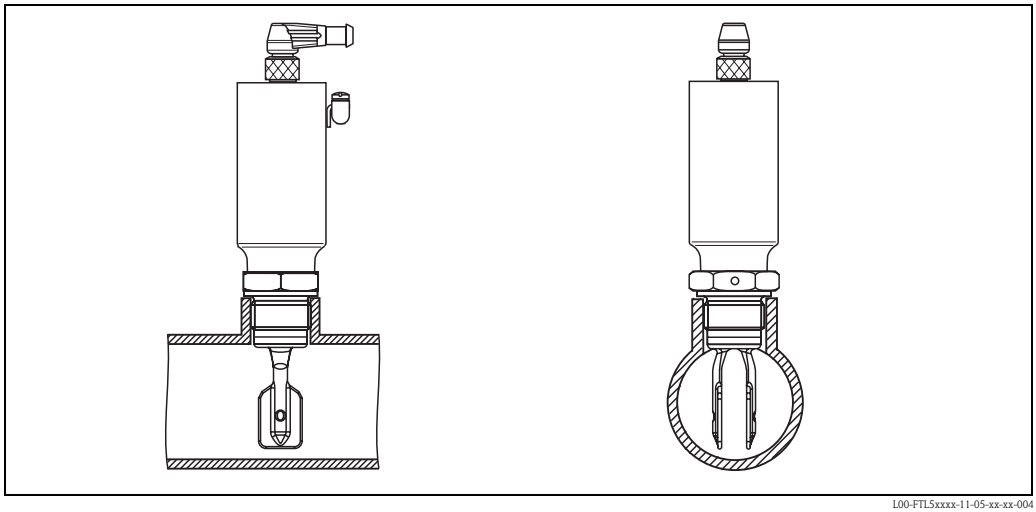
Mounting positions with low viscosity (up to 2000 mm^2/s):

* Deburr the nozzle surfaces

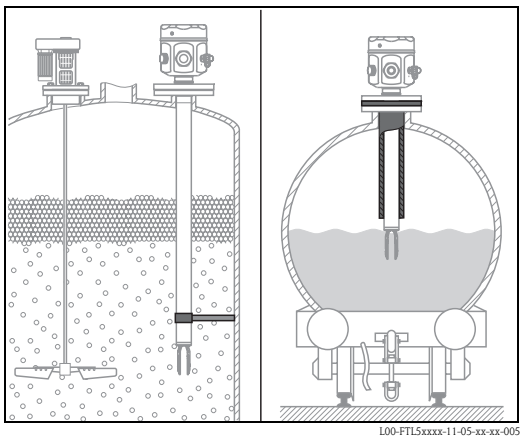


Mounting in piping from 2"

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

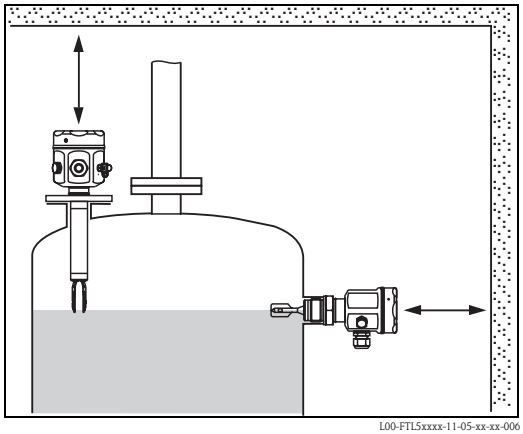


Support the Liquiphant M FTL51(H) in the event of severe dynamic load.



L00-FTL5xxxx-11-05-xx-xx-005

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



L00-FTL5xxxx-11-05-xx-xx-006

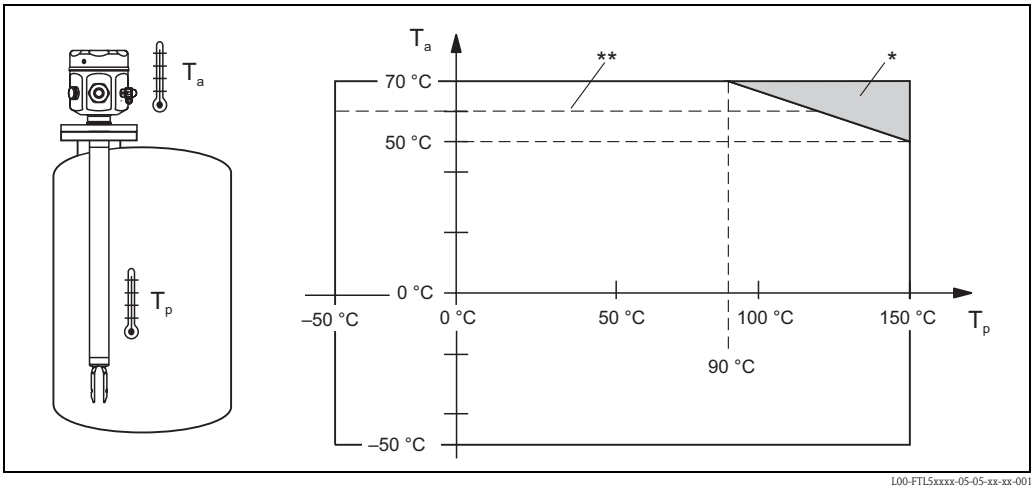
Orientation

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:



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

* Additional temperature range for devices with a temperature spacer or pressure-tight feedthrough.
** Maximum ambient temperature with FEL50D/FEL50A in hazardous areas.

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	NEMA type**
Compact housing with valve connector Pf11/NPT ½	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	–	–	4X
Stainless steel housing F15	–	X	X	–	–	4X
Aluminum housing F17	–	X	X	–	–	4X
Aluminum housing F13	–	X	–	X***	–	4X/6P
Stainless steel housing F27	–	X	–	X	–	4X/6P
Aluminum housing T13 with separate connection compartment (Ex d)	–	X	–	X***	–	4X/6P

* As per EN60529
** As per NEMA 250
*** Only with M20 cable entry or G1/2 thread

Vibration resistance

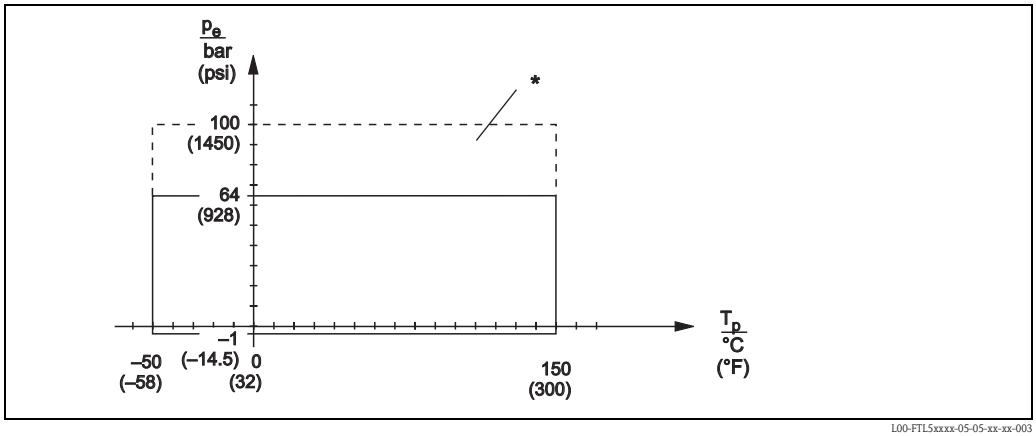
To IEC 68, Part 2-6 (10 to 55 Hz, 0.15 mm, 100 cycles)
In the event of increased vibrations, we recommend the additional option feature "060" version "P" 100 bar process pressure.

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 pressure p_e



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

* Allowed pressure rating when the "100 bar" option is selected (see "Product structure FTL51", feature 060, → 40ff.). See "Process connections" → 30 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.

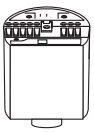
Test pressure	p_e = 64 bar: Max. 100 bar (1.5 times the medium pressure p_e); no function during test pressure Sensor burst pressure 200 bar p_e = 100 bar: Max. 150 bar (1.5 times the medium pressure p_e); no function during test pressure Sensor burst pressure 400 bar
Medium temperature	–50 to +150 °C; see "Process connections" for exceptions
Thermal shock	Max. 120 °C/s
State of aggregation	Liquid
Density	0.7 g/cm^3 = delivery status 0.5 g/cm^3* can be adjusted via switches * Density settings for the compact housing on request
Viscosity	Max. 10000 mm^2/s
Solids content	Max. ø5 mm
Lateral loading capacity	≤ 75 Nm

Mechanical construction

Design

Summary of all electrical and mechanical versions

Plug-in electronic inserts to mount in the housing

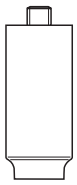


L00-FTL5xxxx-03-05-xx-xx-000

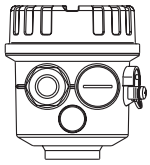
FEL51*:	Two-wire AC connection
FEL52*:	Three-wire DC connection PNP
FEL54:	Universal current connection, 2 relay outputs
FEL55:	Output 16/8 mA for separate switching unit
FEL56:	Output 0.6 to 1.0 / 2.2 to 2.8 mA for separate switching unit (NAMUR)
FEL58*:	Output 2.2 to 3.5 / 0.6 to 1.0 mA for separate 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

* Electronics also available as compact housing. The electronics cannot be exchanged!

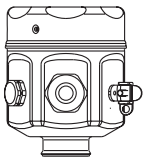
Housing


L00-FTL5xxxx-03-05-xx-xx-019

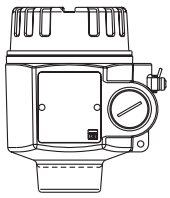
Compact
Pipe housing
(316L)


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

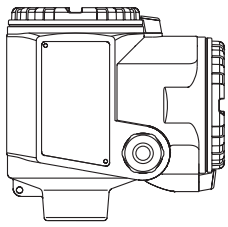
F16
Polyester (PBT)


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

F15
Stainless steel
(316L)

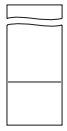

L00-FTL5xxxx-03-05-xx-xx-003

F17/F13
Aluminum
(also for Ex d),
coated
F27
Stainless steel
(316L)


L00-FTL5xxxx-03-05-xx-xx-004

T13
Aluminum with separate
connection compartment
(also Ex de and Ex d),
coated

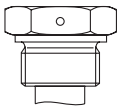
Bushings (optional)
Temperature spacer and pressure-tight feedthrough


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

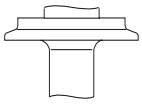
Process connections


L00-FTL5xxxx-03-05-xx-xx-006

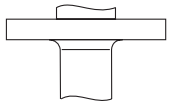
G ¾, DIN ISO 228/I
R ¾, EN10226
NPT ¾, ANSI B 1.20.1
(AF 32)


L00-FTL5xxxx-03-05-xx-xx-007

G 1, DIN ISO 228/I
R 1, EN10226
NPT 1, ANSI B 1.20.1
(AF 41)

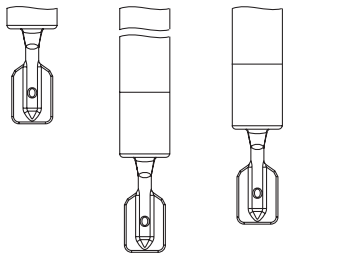

L00-FTL5xxxx-03-05-xx-xx-008

Diverse
hygienic and
aseptic
connections


L00-FTL5xxxx-03-05-xx-xx-009

Flanges to DIN, ANSI,
JIS
from DN 25 / 1"

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


L00-FTL5xxxx-03-05-xx-xx-018

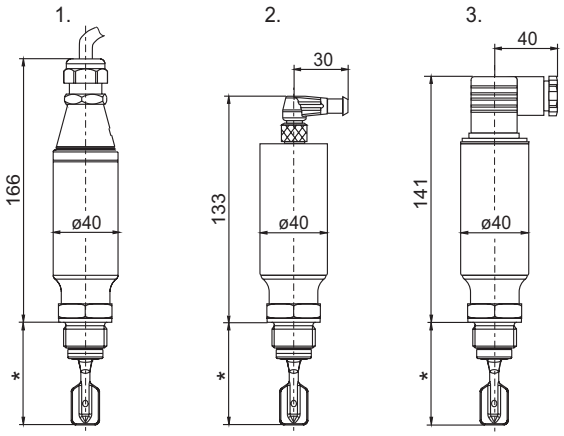
	Compact	Length L	Length L II
p_e =	64 bar	64 bar 100 bar	64 bar 100 bar

Dimensions

Dimensions in mm!

Housing and sensor FTL50(H)

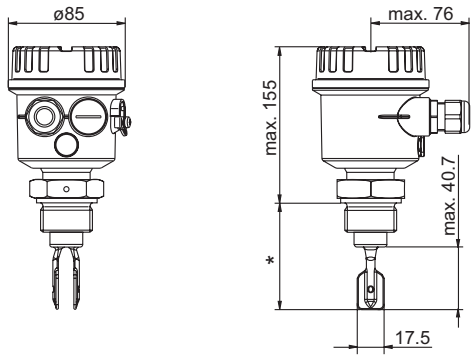
Compact housing, primarily for hygiene applications



1. 5 m cable
2. M12 connector
3. Pg11/NPT ½ connector

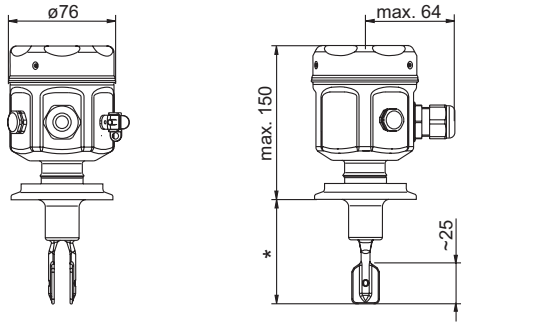
L00-FTL5xxxx-06-05-xx-xx-085

Polyester housing F16



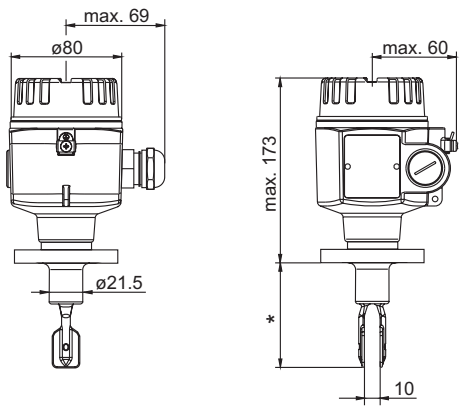
L00-FTL5xxxx-06-05-xx-xx-004

F15 stainless steel housing primarily for hygiene applications



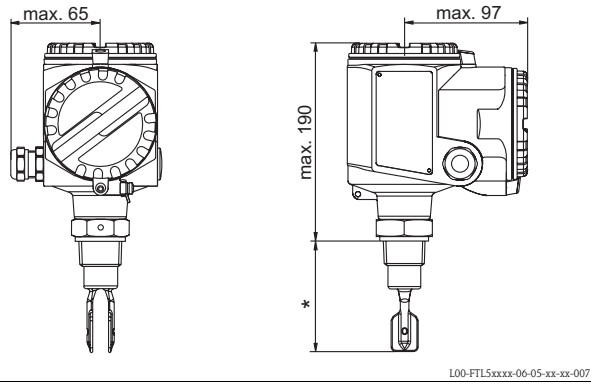
L00-FTL5xxxx-06-05-xx-xx-005

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"

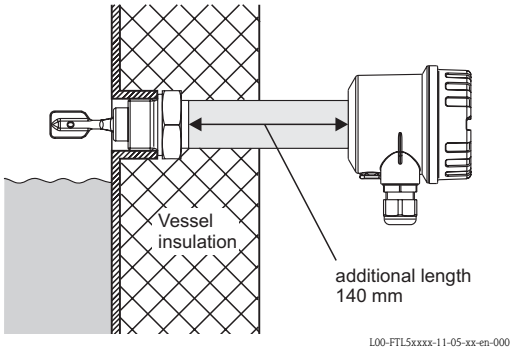
Note!
The switch points of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

Bushings: temperature spacer, pressure-tight feedthrough

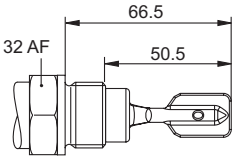
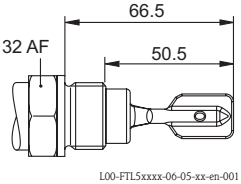
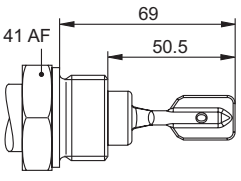
Temperature spacer
Provides sealed insulation
for the vessel and normal ambient
temperatures for the housing.

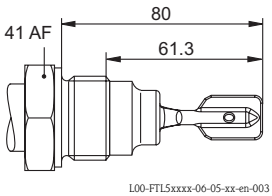
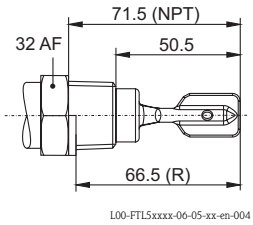
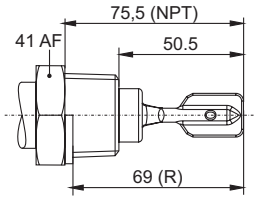
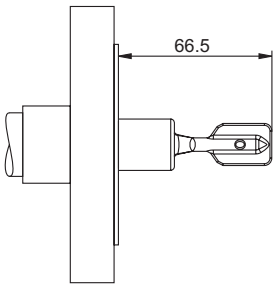
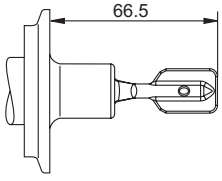
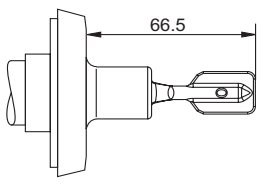
Pressure-tight feedthrough
Protects the housing from pressures
up to 100 bar if the sensor is damaged.

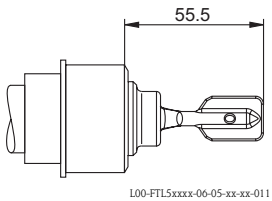
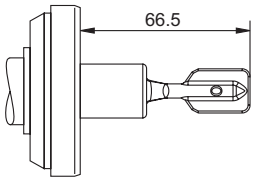
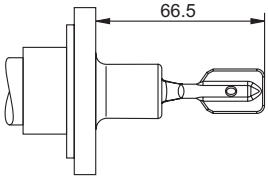
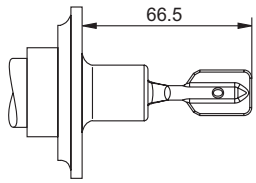
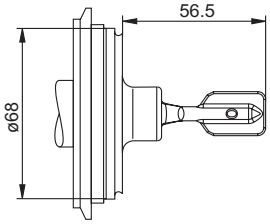
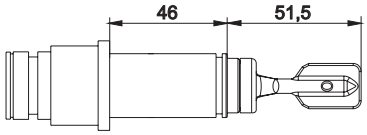
Provides sealed insulation
for the vessel and normal ambient
temperatures for the housing.



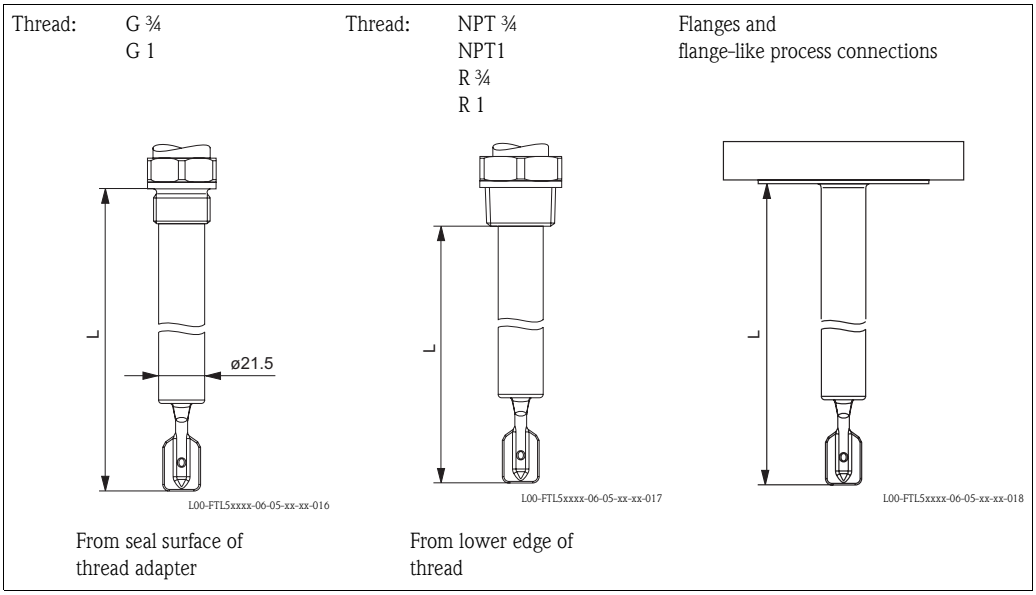
Process connections for FTL50 (H) and FTL51(H)

Process connection		Dimensions	Accessories	Pressure Temperature
G ¾ DIN ISO 228/1 with defined thread start; Flat seal to DIN 7603: supplied	GQ2 GQ5 GQ6			Max. 100 bar (only FTL51) Max. 150 °C
G ¾ DIN ISO 228/1 with defined thread start For flush-mounted installation in weld-in adapter	GQ2 GQ5 GQ6		**Weld-in adapter** (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
G 1 DIN ISO 228/1 Flat seal to DIN 7603: supplied	GR2 GR5 GR6			Max. 100 bar (only FTL51) Max. 150 °C
* FDA-compliant material in accordance with 21 CFR Part 177.1550/2600				

Process connection		Dimensions	Accessories	Pressure Temperature
G 1 DIN ISO 228/1 with defined thread start With seal surface for flush-mounted installation in weld-in adapter	GW2		**Weld-in adapter** (with defined thread start) with silicone O-ring Endress+Hauser 52001051 See "Accessories"	Max. 25 bar Max. 150 °C Max. 40 bar Max. 100 °C
NPT ¾ ANSI B 1.20.1 or **R ¾** DIN 2999	GM2 GM5 GM6 GE2 GE5 GE6			Max. 100 bar (only FTL51) Max. 150 °C
NPT1 ANSI B 1.20.1 or **R 1** DIN 2999	GN2 GN5 GN6 GF2 GF5 GF6			Max. 100 bar (only FTL51) Max. 150 °C
Flanges 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	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.			
Tri-Clamp 1 ½" = ø50.5 mm 2" = ø64.0 mm ISO 2852	TC2 TE2		Clamping ring and front seal installed on site	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.			
Threaded pipe joint DN 32 DN 40 DN 50 DIN 11851 With thread adapter nut	MA2 MC2 ME2		Sealing ring with collar, installed on site	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-compliant material in accordance with 21 CFR Part 177.1550/2600				

Process connection		Dimensions	Accessories	Pressure Temperature
Flush-mounted for weld-in adapter Factory standard Endress+Hauser with silicone seal and thread adapter nut: supplied	EE2	 L00-FTL5xxxx-06-05-xx-xx-011	**Weld-in adapter** (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
Aseptic 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	Max. 25 bar Max. 140 °C
DRD 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
SMS 2" (DN 51) with thread adapter nut	UE2	 L00-FTL5xxxx-06-05-xx-xx-014	Sealing ring, installed on site	Max. 25 bar Max. 140 °C
Varivent 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	See specification as per Tuchenhagen VARIVENT-Inline housing, however: Max. 25 bar Max. 150 °C
Ingold fitting DN 25 Fitting length 46 mm Thread adapter nut G 1 ¼ With EPDM O-ring seal (FDA-compliant, USP-Class VI)	TT2	 L00-FTL5xxxx-06-05-xx-xx-104		Max. 16 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



Customized length L:
148 mm to 3000 mm (6 to 115
in); special version (TSP) on request up to 6000 mm (235 in)
Length tolerances L: < 1 m (–5 mm), 1 to 3 m (–10 mm)

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 ¾ (BSP ¾)
L = 104 mm for flush-mounted 1" (Endress+Hauser)

Weights

See "Product structure"

Materials and surfaces

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)
- Flanges: 316L (1.4435 or 1.4404)
- Flange plating: AlloyC4, AlloyC22
- Flat seal for process connection G ¾ or G 1: elastomer fiber, asbestos-free

Surface roughness

Choice of surface roughness (version → probe length → type):

- Ra < 1.5 µm (mechanically polished)
- Ra < 0.3 µm (mechanically polished)

Note!
The surface is electropolished if the additional option "B" (CoC - ASME BPE) is selected in addition to a surface roughness quality Ra < 0.3 µm. The surface roughness is then: Ra < 0.38 µm. With this combination the wetted parts are made of 316L (1.4435) in accordance with BN2 (delta ferrite content < 1 %).

Parts with no process contact

- Tuning fork/housing seal: EPDM
- Temperature spacer: 316 L (1.4435)
- Pressure-tight feedthrough: 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 (→ 📄 40 ordering information): nickel-plated brass
  - Housing F27: polyamide PA, with approval "B" or "C" 316L (1.4435)
  - 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 compensation 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)

Process connections

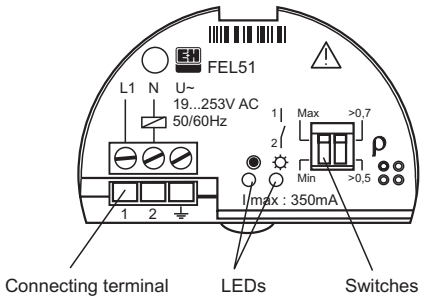
- Parallel thread G ¾, G 1 to DIN ISO 228/I with flat seal to DIN 7603
- Tapered thread R ¾, R 1 to EN10226
- Tapered thread ¾ -14 NPT, 1 - 11½ NPT to ANSI B 1.20.1
- Flush-mounted installation with weld-in adapter to factory standard Endress+Hauser (G ¾, G 1)
- Flush-mounted installation with weld-in adapter 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



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

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 proof test,
- 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

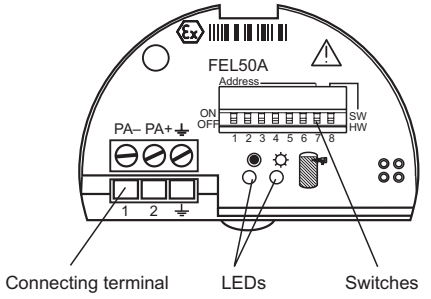
L00-FTL5xxxx-03-05-xx-xx-013

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:

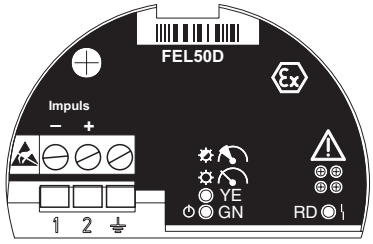
- 8 switches for configuring the device address
- green LED to indicate operational status, pulsing to indicate communication;
- yellow LED to indicate the switching status, flashes in the event of corrosion damage on sensor or if the electronics are defective



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

With FEL50D:

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



TI328Fxx004

Compact housing

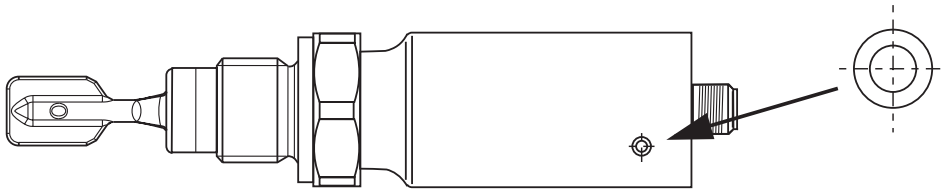
Function test with test magnet

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:

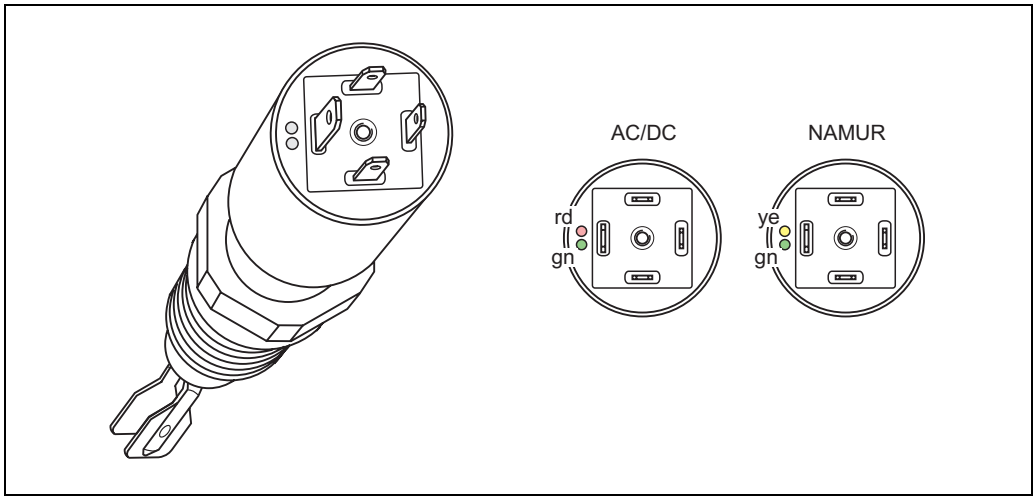


L00-FTL5xxxx-19-05-xx-xx-001

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

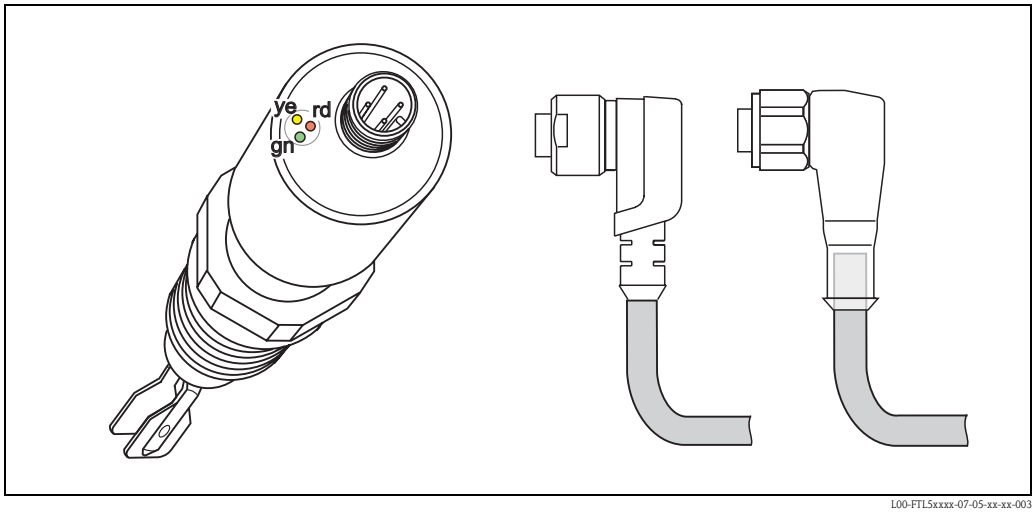
Yellow light (ye) lights up (NAMUR):

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

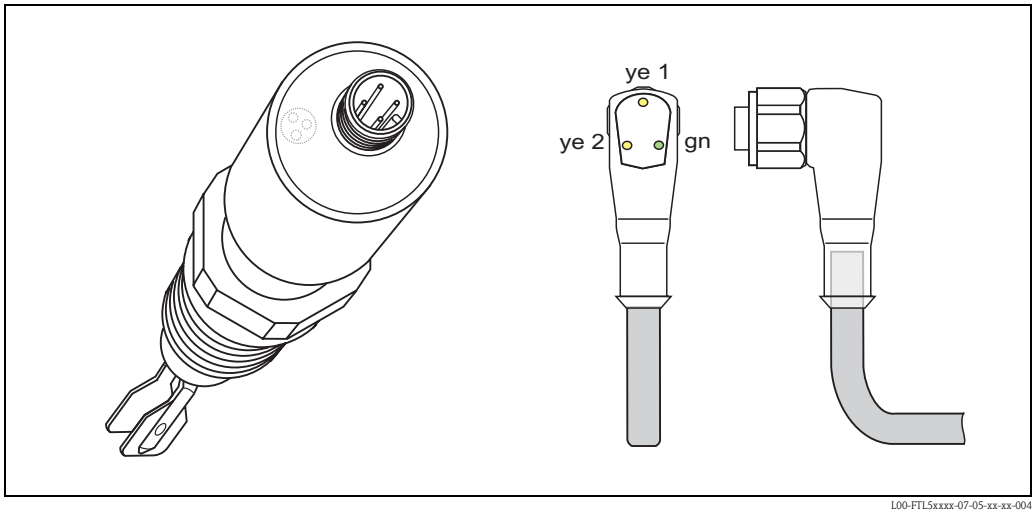
Red light (rd) flashing (DC-PNP):

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 (overfill 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 (overfill 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

CE mark

The measuring system meets the legal requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.
Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

C-tick mark

The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".

General approvals

The following approvals are available for Liquiphant M FTL50H, FTL51H:

- 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. (Order code: additional option = B)

Process connections	**Order code**	EHEDG + 3A		**ASME BPE + CoC**	
				Ra (µm)	
				< 0.38	< 1.5
Thread ISO228 G3/4, 316L, installation Thread ISO228 G1, 316L, installation Accessories: weld-in adapter	GQ2 GW2	X	X	–	X
Tri-Clamp ISO2852 DN25-38 (1 to 1-1/2"), 316L Tri-Clamp ISO2852 DN40-51 (2"), 316L	TE2 TC2	X	X	X	X
DIN11851 DN32 PN25 slotted nut, 316L DIN11851 DN40 PN25 slotted nut, 316L DIN11851 DN50 PN25 slotted nut, 316L	MA2 MC2 ME2	X	X	X	X
Flush-mounted, 316L, installation Accessories, weld-in adapter	EE2	X	X	X	X
DIN11864-1 A DN50 pipe DIN11850, Slotted nut, 316L	HE2	X	X	X	X
DRD 65mm, 316L	PE2	X	–	–	X
SMS 2" PN25, 316L	UE2	X	X	X	X
Varivent N pipe DN65-162 PN10, 316L	WE2	X	X	X	X
Ingold fitting 25x46mm, 316L	TT2	–	–	X	–

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.

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.
- Surfaces with ASME-BPE option: Ra < 0.38 µm (< 15 µin) electropolished and passivated or Ra < 1.5 µm (59 µin) mechanically polished.

CRN approval

Versions with a CRN approval (Canadian Registration Number) are marked with a "*" in ordering information feature 20 "process connection" (s. Seite 40 ff.). CRN-approved devices are fitted with a separate plate bearing the registration number 0F10525.5C.

Process sealing according to ANSI/ISA 12.27.01

Process connected Endress+Hauser instruments listed and marked “single seal” or “dual seal” according to ANSI/ISA 12.27.01 do not require an additional means of gas-tight sealing in the installation. (Process Sealing per NEC 501, 505, CEC Part I Sec.18).

Product	Type	Max. process pressure	Marking	Listing
Liquiphant M	FTL50-S/T##... FTL50-P/Q/R##...	64 bar	Single Seal	CSA/FM
	FTL51-S/T##... FTL51-P/Q/R##...	64/100 bar	Single Seal	CSA/FM
	FTL50H-S/T##... FTL50H-P/Q/R##...	64 bar	Single Seal	CSA/FM
	FTL51H-S/T##... FTL51H-P/Q/R##...	64 bar	Single Seal	CSA/FM

Other certificates

- Material certificate as per EN 10204/3.1 for all wetted parts NACE, AD2000
- Leak-detection system in conjunction with WHG approval
  Approval number: Z–65.40–446
  (See also "Ordering information" s. Seite 40 ff.)
- 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“ (→ 27ff.) and "Ordering information“ (→ 40ff.) sections.

Use in hazardous zones

Pay particular attention to the information provided in the documentation: Safety Instructions, Control Drawings etc. → 55

ASME B 31.3

Design and materials in accordance with ASME B31.3 The welding seals are through-penetration welded and comply with ASME Boiler and Pressure Vessel Code Section IX and EN ISO 15614-1.

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

10	Approval:
A	Non-hazardous area
B	ATEX/NEPSI II 3G Ex nC IIC T6, WHG
C	ATEX/NEPSI II 3 G
D	Non-hazardous area, WHG
E	ATEX II 1/2G Ex de IIC T6, WHG
F	ATEX II 1/2GD Ex ia IIC T6, WHG/IECEx
G	ATEX II 1/2GD Ex ia IIC T6/IECEx Zone0/1
H	ATEX II 1G Ex ia IIC T6
I	ATEX II 1/2G Ex de IIC T6/IECEx Zone0/1
J	ATEX II 1G Ex ia IIC T6, WHG
K	ATEX II 1/2G Ex d IIC T6/IECEx Zone0/1
L	ATEX II 1/2G Ex d IIC T6, WHG
M	NEPSI Ex ia IIC T6
N	NEPSI Ex d IIC T6
P	FM IS Cl.I,II,III Div.1 Gr.A-G, Zone 0,1,2,20,21,22
Q	FM XP Cl.I,II,III Div.1 Gr.A-G, Zone 1,2,21,22
R	FM NI Cl.I Div.2 Gr.A-D, Zone 0,1,2,20,21,22
S	CSA C/US IS Cl I,II,III Div.1 Gr.A-G
T	CSA C/US XP Cl I,II,III Div.1 Gr.A-G
U	CSA C/US General Purpose
V	TIIS Ex ia IIC T3
W	TIIS Ex d IIB T3
7	TIIS Ex d IIC T3
8	TIIS Ex d IIC T6
Y	Special version, TSP-No. to be spec.

20	Process connection:				Additional weight
	Note! For a process pressure of 100 bar, please select the appropriate option under "Additional option"				
GQ2	G ¾		316L	Thread ISO 228	
	Installation > accessories: weld-in adapter				
GQ5	G ¾		Alloy C4	Thread ISO 228	
GQ6	G ¾		AlloyC22	Thread ISO 228	
GR2	G 1		316L	Thread ISO 228	0.2 kg
GR5	G 1		Alloy C4	Thread ISO 228	0.2 kg
GR6	G 1		AlloyC22	Thread ISO 228	0.2 kg
GW2*	G 1		316L	Thread ISO 228	0.2 kg
	Installation > accessories: weld-in adapter				
GM2*	NPT ¾		316L	Thread ANSI	
GM5*	NPT ¾		Alloy C4	Thread ANSI	
GM6	NPT ¾		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 ¾		316L	Thread EN10226	
GE5	R ¾		Alloy C4	Thread EN10226	
GE6	R ¾		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

20		Process connection:						*Additional weight*
		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
		BQ2	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
		CQ2	DN100	PN10/16 B1	316L		Flange EN 1092-1 (DIN 2527 C)	5.3 kg
		CQ5	DN100	PN10/16	Alloy C4 >316L		Flange EN 1092-1 (DIN 2527)	5.3 kg
		CQ6	DN100	PN10/16 B1	AlloyC22 >316L		Flange EN 1092-1 (DIN 2527)	5.3 kg
		C12	DN80	PN100 B2	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)	
		EG2	DN50	PN25/40 E	316L		Flange EN 1092-1	2.6 kg
		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

20		Process connection:						*Additional weight*
		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 A		RF	316L	Flange JIS B2220	
		KC2	10 K 40 A		RF	316L	Flange JIS B2220	
		KE2	10 K 50 A		RF	316L	Flange JIS B2220	1.7 kg
		KE5	10 K 50 A		RF	Alloy C4 >316L	Flange JIS B2220	1.7 kg
		KE6	10 K 50 A		RF	AlloyC22 >316L	Flange JIS B2220	1.7 kg
		KL2	10 K 80 A		RF	316L	Flange JIS B2220	
		KP2	10 K 100 A		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.					

30			Probe length; Type:			
			FTL50			
		AA	Compact;		Ra <3.2 µm/80 grit	
		IA	Compact;		Temperature spacer	0.6 kg
		QA	Compact;		Pressure-tight feedthrough	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
		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 feedthrough	0.9 kg/m +0.7 kg
		RE	..... mm;	Alloy**	+ Pressure-tight feedthrough	0.9 kg/m +0.7 kg
		SB	..... inch;	316L**	+ Pressure-tight feedthrough	2.3 kg/100 in +0.7 kg
		SE	..... inch;	Alloy**	+ Pressure-tight feedthrough	2.3 kg/100 in +0.7 kg
		TB	Length: type II*;	316L	+ Pressure-tight feedthrough	0.1 kg +0.7 kg
		TE	Length: type II*;	Alloy	+ Pressure-tight feedthrough	0.1 kg +0.7 kg
		YY	Special version			

30 Probe length; Type:

*) Replacing devices: when vertically mounting a Liquiphant **M** FTL51 with length II, the switch point is at the same height as for a Liquiphant **II** FTL360, FTL365, FDL30, FDL35.
See also Seite 33 "L II" depends on process connection.

**) Order 3001 to 6000 mm (116 to 235 in) via yy

40 Electronics; output:

A	FEL50A	PROFIBUS PA	
D	FEL50D	Density/concentration without WHG approval (Germany)	
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	NEMA 4X/6P;	Thread NPT ¾		
E3	Compact 316L Hygiene	NEMA4X;	Plug NPT ½	ISO4400	
N3	Compact 316L Hygiene	IP66/68;	M12 connector		
E4	F16 Polyester	NEMA4X;	Thread NPT ½		
E5	F13 Alu F17 Alu	NEMA4X/6P; NEMA4X	Thread NPT ¾		0.5 kg
E6	F15 316L Hygiene	NEMA4X;	Thread NPT ½		0.1 kg
E7	T13 Alu	NEMA4X/6P;	Thread NPT ¾		0.9 kg
	Separate connection compartment				
F1	F27 316L	IP66/68	Thread G1/2		
F4	F16 Polyester	IP66/67;	Thread G ½		
F5	F13 Alu F17 Alu	IP66/68; IP66/67;	Thread G ½		0.5 kg
F6	F15 316L Hygiene	IP66/67;	Thread G ½		0.1 kg
F7	T13 Alu	coated IP66/68; thread G ½			0.9 kg
	Separate connection compartment				
G1	F27 316L	IP66/68;	M20 threaded joint		
	Ex d > M20 thread				
G4	F16 Polyester	IP66/67;	M20 threaded joint		
G5	F13 Alu F17 Alu	IP66/68; IP66/67;	M20 threaded joint		0.5 kg
			Ex d > thread M20		
G6	F15 316L Hygiene	IP66/67;	M20 threaded joint		0.1 kg
G7	T13 Alu	coated IP66/68;	M20 threaded joint		0.9 kg
	Separate connection compartment		Ex d > thread M20		
N4	F16 Polyester	IP66/67;	M12 connector		
N5	F13 Alu F17 Alu	IP66/68; IP66/67;	M12 connector		
N6	F15 316L Hygiene	IP66/67;	M12 connector		
Y9	Special version				

60 Additional option

A	Basic version
B	Free from paint-wetting impairment substances, max 2000mm
C	EN 10204 - 3.1 material (316L wetted) inspection certificate
D	EN10204-3.1 AD2000 material, wetted, apart from cast parts, inspection certificate
K	Special adjustment, density H20
L	Special adjustment, density H20, EN10204-3.1, material (wetted), inspection certificate
N	EN 10204 - 3.1 material, NACE MR0175 (316L wetted) Inspection certificate
P	100 bar process pressure (FTL51)

60						Additional option	
						R	100 bar process pressure, EN 10204 - 3.1 material, NACE MR0175 (316L wetted) (FTL51) Inspection certificate
						S	GL/ABS marine approval (FTL51: max. 1600 mm)
						Y	Special version

580							Test, certificate:	
							KD	Helium leak test, internal procedure, inspection certificate
							KE	Pressure test, internal procedure, inspection certificate
							KG	PMI test (XRF), internal procedure, wetted metal parts, EN10204-3.1 inspection certificate
							KP	Dye penetration test AD2000-HP5-3(PT), wetted/pressurized metal parts, inspection certificate
							KQ	Dye penetration test ISO23277-1 (PT), wetted/pressurized metal parts, inspection certificate
							KR	Dye penetration test ASME VIII-1 (PT), wetted/pressurized metal parts, inspection certificate
							KS	Welding documentation, wetted/pressurized seams
							KV	Declaration of Conformity ASME B31.3
							K9	Special version, TSP-No. to be spec.

FTL5x -							Complete product designation

.Note!
The basic weight includes the compact sensor, thread adapter G ¾, electronic insert, polyester housing

Liquiphant M FTL50H, FTL51H product structure

Design		*Basic weight*
FTL50H	Compact	0.7 kg
FTL51H	With extension pipe	0.7 kg

10	Approval:
	A Non-hazardous area
	B ATEX/NEPSI II 3G Ex nC IIC T6, WHG
	C ATEX/NEPSI II 3 G
	D Non-hazardous area, WHG
	E ATEX II 1/2G Ex de IIC T6, WHG
	F ATEX II 1/2GD Ex ia IIC T6, WHG/IECEx
	G ATEX II 1/2GD Ex ia IIC T6/IECEx Zone0/1
	H ATEX II 1G Ex ia IIC T6
	I ATEX II 1/2G Ex de IIC T6/IECEx Zone0/1
	J ATEX II 1G Ex ia IIC T6, WHG
	K ATEX II 1/2G Ex d IIC T6/IECEx Zone0/1
	L ATEX II 1/2G Ex d IIC T6, WHG
	M NEPSI Ex ia IIC T6
	N NEPSI Ex d IIC T6
	P FM IS Cl.I,II,III Div.1 Gr.A-G, Zone 0,1,2,20,21,22
	Q FM XP Cl.I,II,III Div.1 Gr.A-G, Zone 1,2,21,22
	R FM NI Cl.I Div.2 Gr.A-D, Zone 0,1,2,20,21,22
	S CSA C/US IS Cl I,II,III Div.1 Gr.A-G
	T CSA C/US XP Cl I,II,III Div.1 Gr.A-G
	U CSA C/US General Purpose
	V TIIS Ex ia IIC T3
	W TIIS Ex d IIB T3
	7 TIIS Ex d IIC T3
	8 TIIS Ex d IIC T6
	Y Special version, TSP-No. to be spec.

20		Process connection:					*Additional weight*
	GQ2	G ¾		316L	(FTL50H)	Thread ISO 228	
		Installation > accessories: weld-in adapter					
	GW2*	G 1		316L		Thread ISO 228	0.2 kg
		Installation > accessories: weld-in adapter					
	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

20		Process connection:						*Additional weight*
		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
		BQ2	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
		CN2	DN80	PN25/40 B1		316L	Flange EN 1092-1 (DIN 2527 C)	5.9 kg
		CQ2	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: weld-in adapter					
		HE2	DN50	Pipe DIN 11850 slotted nut		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
		AQ2*	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					

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 feedthrough	0.7 kg
		QD	Compact;	Ra <0.3 µm/320 grit / A3 + pressure-tight feedthrough	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

30	Probe length; Type:		
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 feedthrough	0.9 kg/m +0.7 kg
RD	..... mm;	Ra <0.3 µm/320 grit + Pressure-tight feedthrough	0.9 kg/m +0.7 kg
SC	..... inch;	Ra <1.5 µm/120 grit + Pressure-tight feedthrough	2.3 kg/100 in +0.7 kg
SD	..... inch;	Ra <0.3 µm/320 grit + Pressure-tight feedthrough	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
TD	Length: type II*;	Ra <0.3 µm/320 grit + Pressure-tight feed through,	0.1 kg +0.7 kg
YY	Special version		

*) Replacing devices: when vertically mounting a Liquiphant **M** FTL51H with length II, the switch point is at the same height as for a Liquiphant **II** FTL360, FTL365, FDL30, FDL35.
See also Seite 33 "L II" depends on process connection.

40	Electronics; output:		
A	FEL50A	PROFIBUS PA	
D	FEL50D	Density/concentration without WHG approval (Germany)	
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	
E3	Compact 316L Hygiene	NEMA4X;	Plug NPT ½	ISO4400	
N3	Compact 316L Hygiene	IP66/68;	M12 connector		
E4	F16 Polyester	NEMA4X;	Thread NPT ½		
E5	F13 Alu F17 Alu	NEMA4X/6P; NEMA4X	Thread NPT ¾		0.5 kg
E6	F15 316L Hygiene	NEMA4X;	Thread NPT ½		0.1 kg
E7	T13 Alu	NEMA4X/6P;	Thread NPT ¾		0.9 kg
	Separate connection compartment				
F4	F16 Polyester	IP66/67;	Thread G ½		
F5	F13 Alu F17 Alu	IP66/68; IP66/67;	Thread G ½		0.5 kg
F6	F15 316L Hygiene	IP66/67;	Thread G ½		0.1 kg
F7	T13 Alu	coated IP66/68; thread G ½			0.9 kg
	Separate connection compartment				
	Ex d > M20 thread				
G4	F16 Polyester	IP66/67;	M20 threaded joint		
G5	F13 Alu F17 Alu	IP66/68; IP66/67;	M20 threaded joint		0.5 kg
			Ex d > thread M20		
G6	F15 316L Hygiene	IP66/67;	M20 threaded joint		0.1 kg

50					**Housing; cable entry:**				
					G7	T13 Alu	coated IP66/68;	M20 threaded joint	0.9 kg
						Separate connection compartment		Ex d > thread M20	
					N4	F16 Polyester	IP66/67;	M12 connector	
					N5	F13 Alu F17 Alu	IP66/68; IP66/67;	M12 connector	
					N6	F15 316L Hygiene	IP66/67;	M12 connector	
					Y9	Special version			

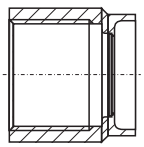
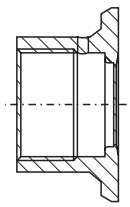
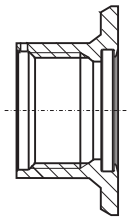
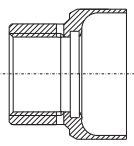
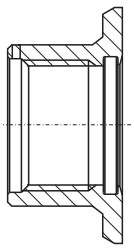
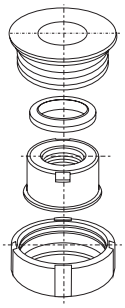
60						**Additional option**	
						A	Basic version
						B	CoC-ASME BPE, EN10204-3.1 material (316L wetted) Inspection certificate
						C	EN 10204 - 3.1 material (316L wetted), Inspection certificate
						D	EN10204-3.1 AD2000 material, wetted, apart from cast parts, inspection certificate
						K	Special adjustment, density H2O
						L	Special adjustment, density H2O, EN10204-3.1 (316L wetted) inspection certificate
						S	GL/ABS marine approval (FTL51H: max. 1600 mm)
						Y	Special version
FTL5#H -							Complete product designation

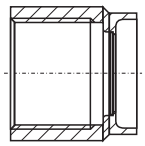
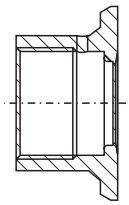
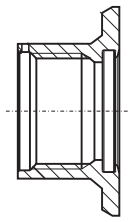
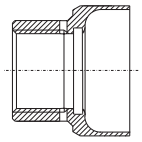
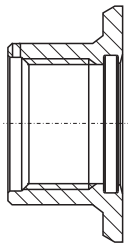
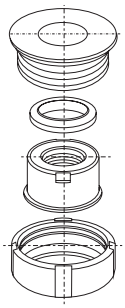
Note!
Basic weight = compact sensor, thread adapter G ¾, electronic insert, stainless steel housing

Accessories

Note!
- All dimensions in mm!
- For more detailed information on weld-in adapters, please refer to TI426F/00.
- The tolerance of the defined thread start between the weld-in adapter and sensor is ± 15°.

Weld-in adapter **Overview**

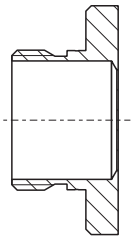
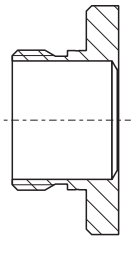
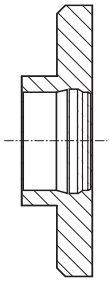
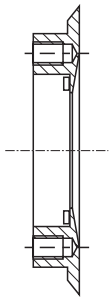
	 a0008246	 a0008251	 a0008256	 a0011924	 a0008248	 a0008253
	G¾, d=29 without flange	**G¾, d=50 with flange**	**G¾, d=55 with flange**	**G1, d=53 without flange**	**G1, d=60 with flange**	**G1 can be positioned**
Material roughness µm (µin)	316L 1.5 (59.1)	316L 0.8 (31.5)	316L 0.8 (31.5)	316L 0.8 (31.5)	316L 0.8 (31.5)	316L 0.8 (31.5)
Without inspection certificate EN10204-3.1 material	–	–	52001052	–	52001051 [1]	52001221 [2]
With inspection certificate EN10204-3.1 material	52028295	52018765	52011897	71093129 [1]	52011896 [1]	52011898 [2]
Seal (set of 5)	Silicone O-ring 52021717 [3]	Silicone O-ring 52021717 [3]	Silicone O-ring 520144733)	Silicone O-ring 520144723)	Silicone O-ring 520144723)	Silicone profile gasket 520144243)
Weld-in dummy	–	–	MVT2L0692	MVT2L0691	MVT2L0691	M40167

		 a0008246	 a0008251	 a0008256	 a0011924	 a0008248	 a0008253
		G¾, d=29 without flange	**G¾, d=50 with flange**	**G¾, d=55 with flange**	**G1, d=53 without flange**	**G1, d=60 with flange**	**G1 can be positioned**
Liquiphant M	Feature	**Version**					
FTL50	020			GQ2			
FTL5x					GW2	GW2	GW2
FTL50H				GQ2			
FTL5xH					GW2	GW2	GW2

1) This weld-in adapter replaces the weld-in adapter with the order number 917969-1000.

2) This weld-in adapter replaces the weld-in adapter with the order number 215159-0000.

3) A seal is included in the delivery.

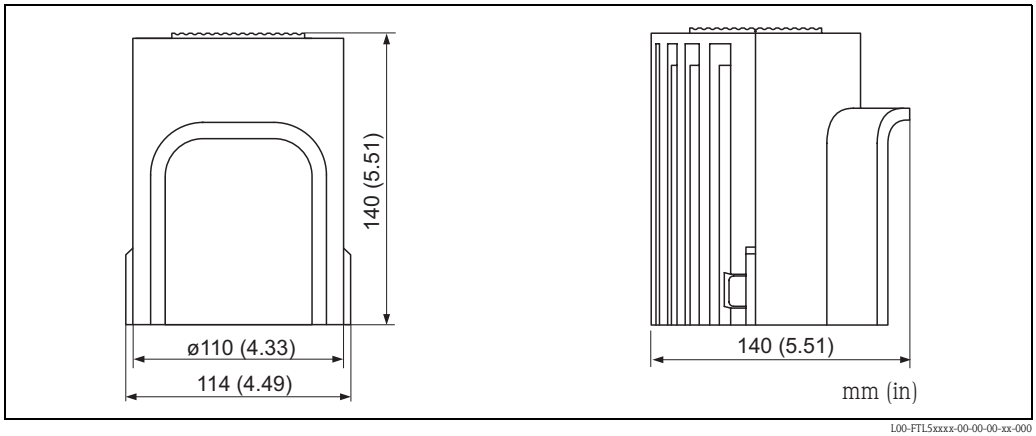
		 a0008252	 a0008245	 a0008245	 a0008552	 a0008254
		RD52	**Uni D85**	**Uni D65**	**M24 D65**	**DRD DN50 (65 mm) (welding flange)**
Material roughness µm (µin), process side		316L 0.8 (31.5)	316L 3.2 (126)	316L 0.8 (31.5)	316L 0.8 (31.5)	316L/304 0.8 (31.5)
Without inspection certificate EN10204-3.1 material		52001047 [1]	52006262	214880-0002	71041381	52002041/ 916743-0000
With inspection certificate EN10204-3.1 material		52006909 [1]	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	–	–
Device	Feature	**Version**				
Liquiphant M						
FTL5xH	020	EE2				PE2

1) This weld-in adapter replaces the weld-in adapter with the order number 942329-0001.

.Note!
All the weld-in adapters available are described in document TI426F.
www.endress.com it Country it Download it Advanced it Documentation code it TI426F.

Weather protection cover

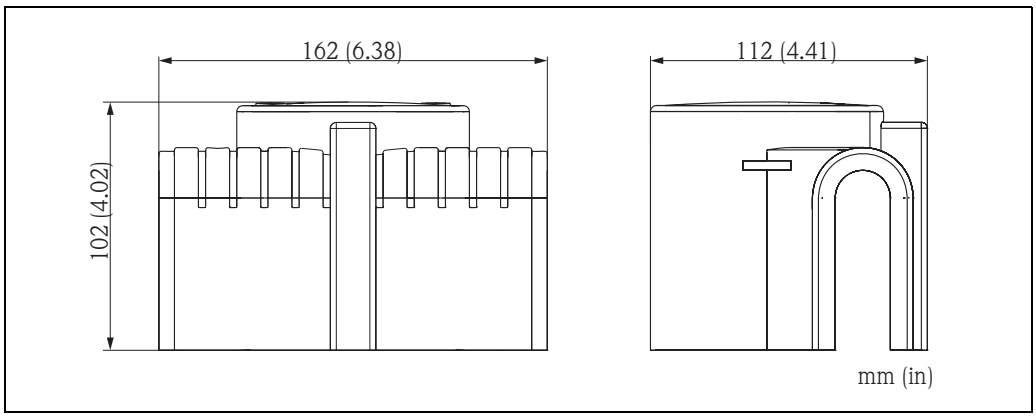
For F16 and F18 housing



L00-FTL5xxxx-00-00-00-xx-000

Material	Order No.	Weight	Operating temperatures
PBT, gray	71127760	240 g (8.46 oz)	-50 °C to +150 °C (-58 °F to +302 °F)

For F13, F17 and F27 housing



L00-FTLxxxxx-04-00-00-xx-001

Material	Order No.	Weight
PA6, gray	71040497	300 g (10.58 oz)

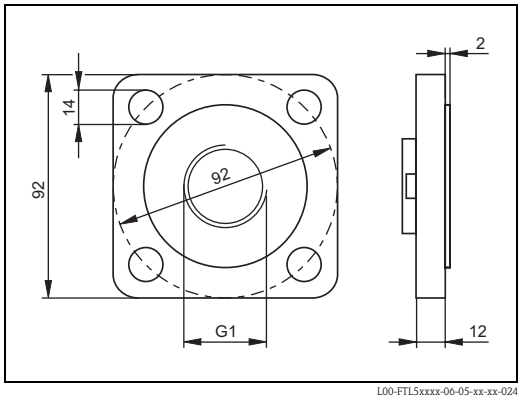
Lap joint flange

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



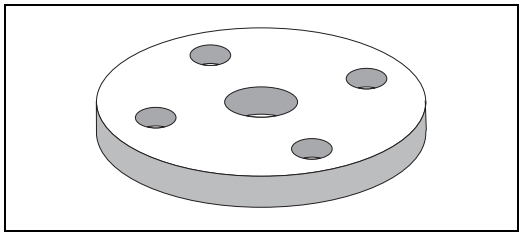
L00-FTL5xxxx-06-05-xx-xx-024

Lap joint flanges

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



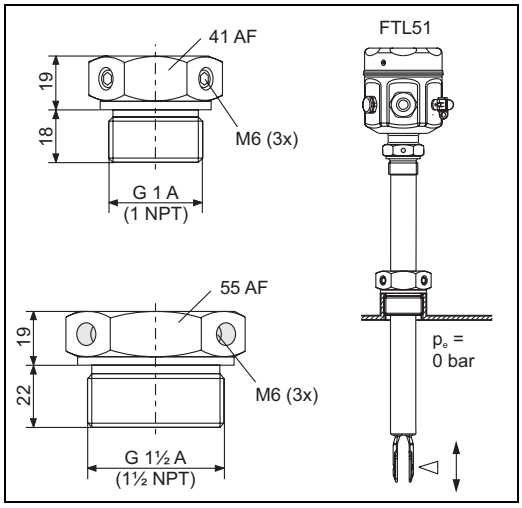
L00-FTL5xxxx-03-05-xx-xx-015

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/I	1.4435 (AISI 316 L)	52003978	
G 1	DIN ISO 228/I	1.4435 (AISI 316 L)	52011888	With 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	With inspection certificate EN 10204 – 3.1 material
G 1½	DIN ISO 228/I	1.4435 (AISI 316 L)	52003980	
G 1½	DIN ISO 228/I	1.4435 (AISI 316 L)	52011890	With inspection certificate EN 10204 – 3.1 material
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003981	
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011891	With inspection certificate EN 10204 – 3.1 material

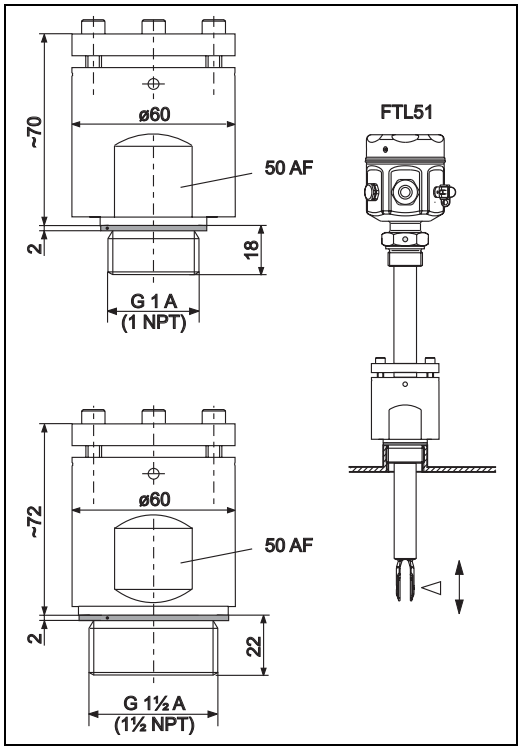
High pressure sliding sleeves

For continuous adjustment of the switch point of a Liquiphant M FTL51.
Also for use in hazardous areas. For further information → 📄 55ff. (ATEX, NEPSI).

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

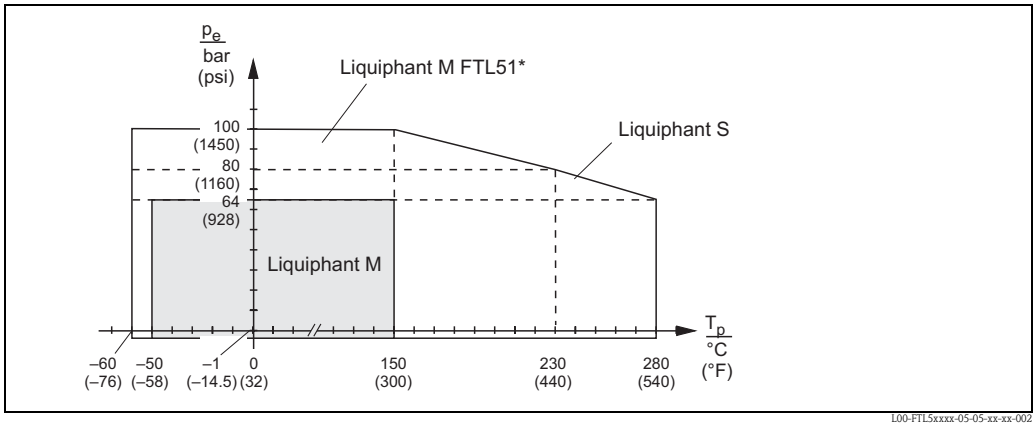
Weight for G 1, NPT 1: 1.13 kg
Weight for G 1½, NPT 1½: 1.32 kg

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	With inspection certificate EN 10204 - 3.1 material
G 1	DIN ISO 228/1	Alloy C4	52003664	
G 1	DIN ISO 228/1	AlloyC22	71118691	With inspection certificate EN 10204 - 3.1 material
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003667	
NPT1	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011881	With inspection certificate EN 10204 - 3.1 material
NPT1	ANSI B 1.20.1	Alloy C4	52003668	
NPT1	ANSI B 1.20.1	AlloyC22	71118694	With inspection certificate EN 10204 - 3.1 material
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52003665	
G 1½	DIN ISO 228/1	1.4435 (AISI 316 L)	52011882	With inspection certificate EN 10204 - 3.1 material
G 1½	DIN ISO 228/1	Alloy C4	52003666	
G 1½	DIN ISO 228/1	AlloyC22	71118693	With inspection certificate EN 10204 - 3.1 material
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52003669	
NPT1½	ANSI B 1.20.1	1.4435 (AISI 316 L)	52011883	With inspection certificate EN 10204 - 3.1 material
NPT1½	ANSI B 1.20.1	Alloy C4	52003670	
NPT1½	ANSI B 1.20.1	AlloyC22	71118695	With inspection certificate EN 10204 - 3.1 material



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

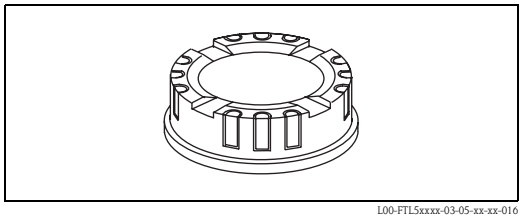
** FTL51 with high-pressure sliding sleeve (100 bar). See "Additional option" Seite 40 ff. option "P" or "R".l*

Cover with sight glass

Order number: 943461-0001
for polyester housing F16

Material: PA 12

Weight: 0.04 kg



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

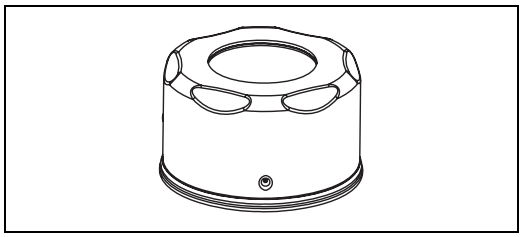
Cover with sight glass

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

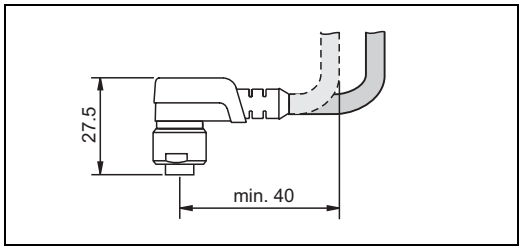
Cable: PVC (gray) 5 m

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

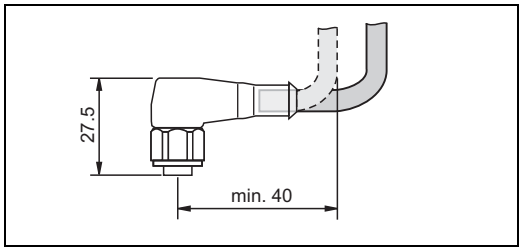
Cable: PVC (orange) 5 m

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

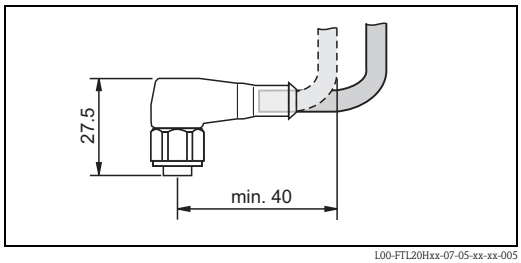
Cable: PVC (orange) 5 m

Body: PVC (transparent)

Thread adapter nut: 316L

Degree of protection: IP69K (fully locked)

Temperature range: –25 to +70 °C



Documentation

Note!
You can find supplementary documentation on the product pages at 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

Weld-in adapter,
TI426F/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

Safety Instructions (ATEX)

CE ⟨Ex⟩ II 1/2 G, Ex d IIC/B
(KEMA 99 ATEX 1157)
XA031F/00/a3

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

CE ⟨Ex⟩ II 1 G, Ex ia IIC/B
(KEMA 99 ATEX 5172 X)
XA064F/00/a3

CE ⟨Ex⟩ II 1/2 G, Ex de IIC/B
(KEMA 00 ATEX 2035)
XA108F/00/a3

CE ⟨Ex⟩ II 3 G, Ex nA/nC II
(EG 01 007–a)
XA182F/00/a3

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

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
System information	Liquiphant M SI040F/00/en

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People for Process Automation

TI328F/00/en/14.12
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SL/FM+SGML6.0 ProMoDo

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