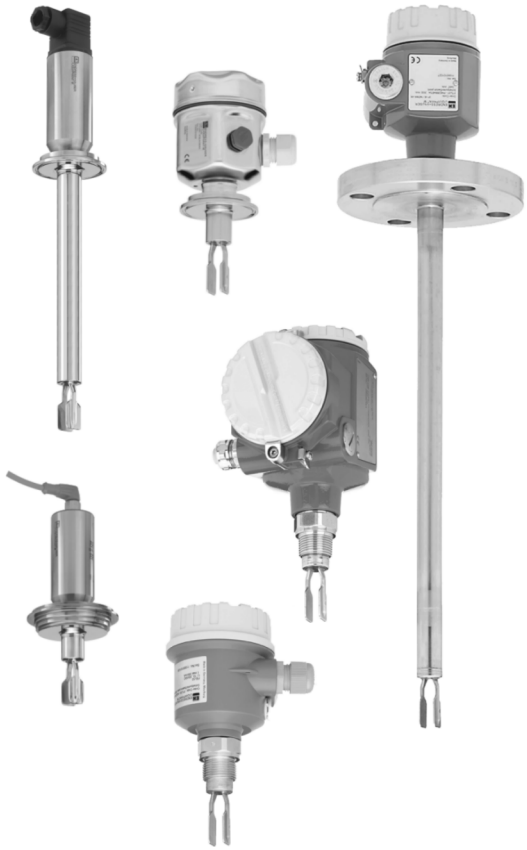
Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Liquiphant M FTL50(H), FTL51(H)

Vibration Limit Switch
Level limit switch for all liquids.
Suitable for use in hazardous areas, food and pharmaceuticals



Application
The Liquiphant M is a level limit switch for use in all liquids
– for process temperatures of –50 °C to 150 °C
– for pressures up to 100 bar
– for viscosity up to 10000 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 function is not affected by flow, turbulence, bubbles, foam, vibration, bulk solids content or build-up.
The Liquiphant is thus the ideal substitute for float switches.

FTL50:
Compact design, ideal for mounting in pipes and for installation in areas difficult to access

FTL51:
With extension pipe up to 3 m
(6 m on request)

FTL50H, FTL51H:
With polished tuning fork and easy-to-clean process connections and housings for food and pharmaceutical applications.

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

EEx ia, EEx de and EEx d protection enable it to be used in hazardous areas.

Your benefits

- Use in safety systems requiring functional safety to SIL2/SIL3 in accordance with IEC 61508/ IEC 61511-1
- Large number of process connections to choose from: universal usage
- Wide variety of electronics, e.g. NAMUR, relay, thyristor, PFM signal output: the right connection for every process control system
- PROFIBUS PA protocol: for commissioning and maintenance
- No calibration: quick, low-cost start-up
- No mechanically moving parts: no maintenance, no wear, long operating life
- Monitoring of fork for damage: guaranteed function
- FDA approved materials (PFA Edlon)

TI328F/00/en

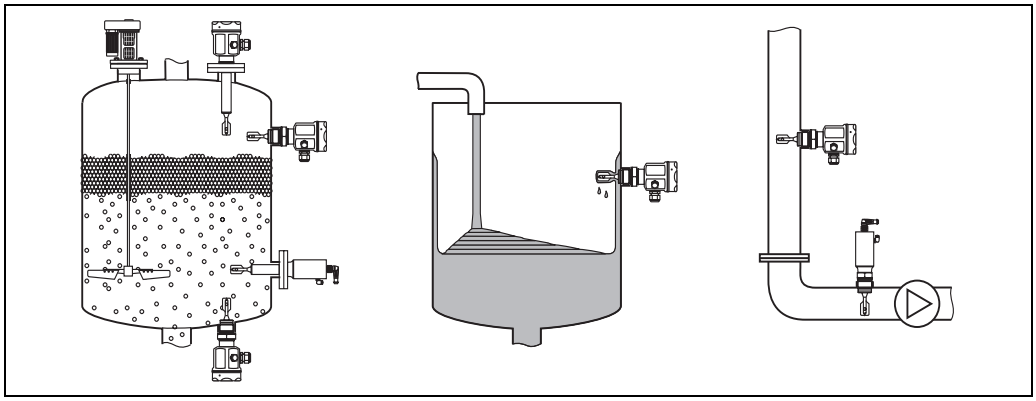
Endress+Hauser
People for Process Automation

Table of contents

Application

Level limit 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

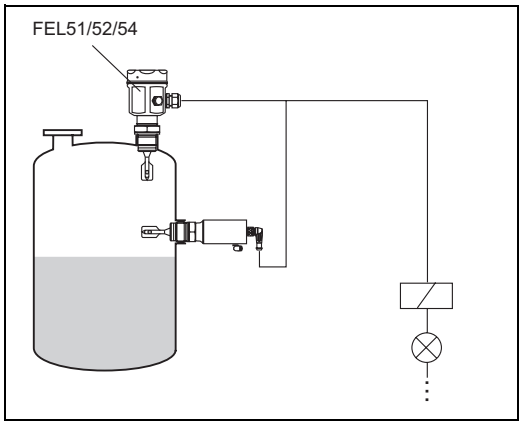
Function and system design

Measuring principle

The sensor's fork vibrates at its intrinsic frequency.
This frequency is reduced when covered with liquid. The change in frequency then activates a limit switch.

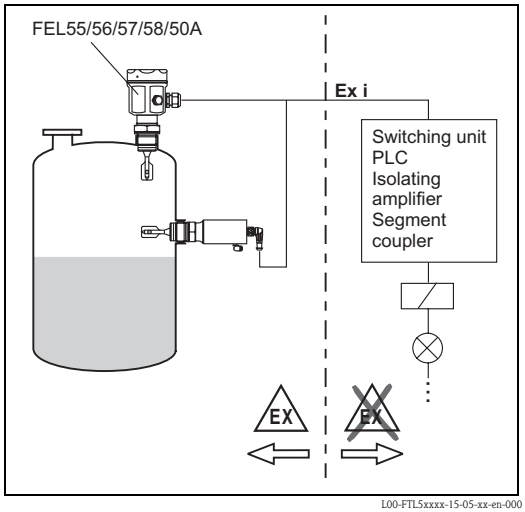
Modularity

Level limit switch
Liquiphant M FTL with electronic versions
FEL51, FEL52, FEL54



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

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



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

Electronic versions for level limit switches

FEL51:
Two-wire AC version;
Switch the load directly into the power supply circuit via the thyristor.

FEL52:
Three-wire DC version;
Switch the load via the transistor (PNP) and separate connection.

FEL54:
Universal current version with relay output;
Switch the loads via 2 floating change-over contacts.

Electronic versions for level sensor

FEL55:
For separate switching unit; signal transmission 16/8 mA along two-wire cabling.

FEL56:
For separate switching unit; signal transmission L-H edge 0.6…1.0 / 2.2…2.8 mA to EN 50227 (NAMUR) along two-wire cabling.

FEL58:
For separate switching unit; signal transmission H-L edge 2.2…3.5 / 0.6…1.0 mA to EN 50227 (NAMUR) along 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.
Cyclical checking 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

Galvanic isolation

FEL51, FEL52, FEL50A:
Between sensor and power supply

FEL54:
Between sensor and power supply and load

FEL55, FEL56, FEL57, FEL58:
See Switching unit connected

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 mmm (up to 6000 mm on request)

Product density

Adjustment on the electronic insert > 0.5 g/cm³ or > 0.7 g/cm³ (other on request)

Electronic insert FEL51 (AC 2-wire)

Power supply

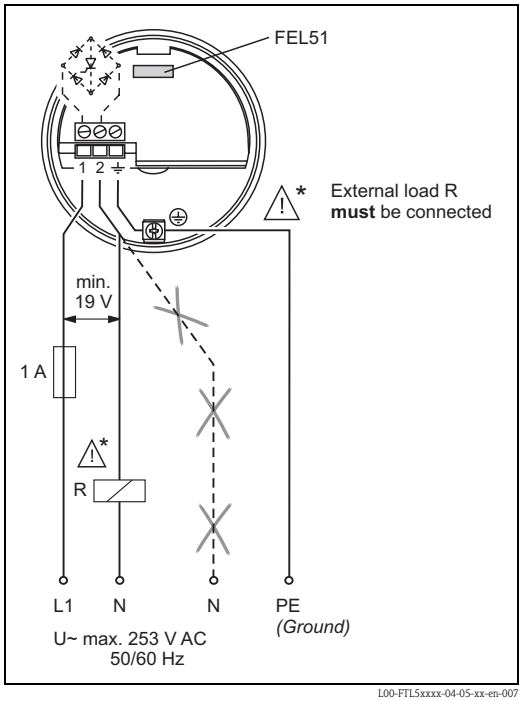
Supply voltage: 19...253 V AC
Power consumption: < 0.83 W
Residual current consumption: < 3.8 mA
Short-circuit protection
FEM51 overvoltage protection: overvoltage category III

Electrical connection

Two-wire AC connection

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-energise with holding power below 3.8 mA. If this is the case, a resistor should be connected parallel to the relay. (RC module available on request).
- 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 inparallel
- For relays with a maximum holding power/rated power < 89 VA at 253 V AC or < 8.4 VA at 24 V AC
- Voltage drop across FEL51 max. 12 V
- Residual current with blocked thyristor 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

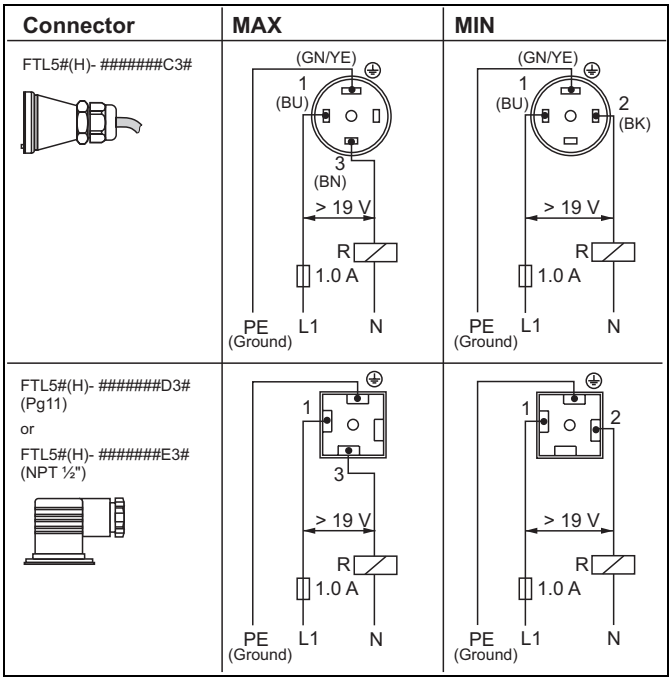
Supply voltage: 19...253 V AC
Power consumption: < 0.83 W
Residual current consumption: < 3.8 mA
Short-circuit protection
FEM51 overvoltage protection: overvoltage category III

Electrical connection

Two-wire AC connection

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-energise with holding power below 3.8 mA. If this is the case, a resistor should be connected parallel to the relay. (RC module available on request).



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

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-001a

Signal on alarm

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

Connectable load

- For relays with a minimum holding power/rated power > 2.5 VA at 253 V AC (10 mA) or > 0.5 VA at 24 V AC (20 mA)
- Relays with a lower holding power/rated power can be operated by means of an RC module connected inparallel
- For relays with a maximum holding power/rated power < 89 VA at 253 V AC or < 8.4 VA at 24 V AC
- Voltage drop across FEL51 max. 12 V
- Residual current with blocked thyristor 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)

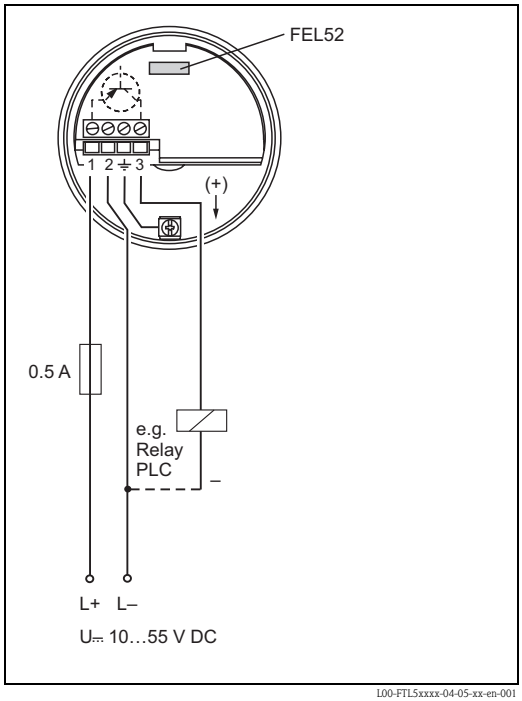
Power supply

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

Electrical connection

Three-wire DC connection

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



L00-FTL5xxxx-04-05-xx-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)
- Capacitive 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)

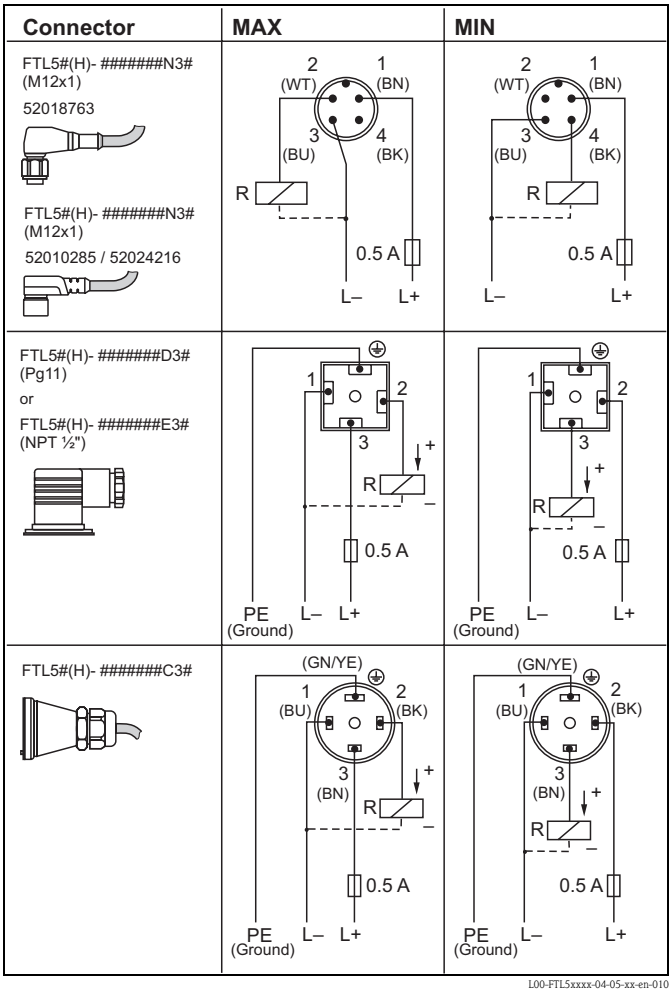
Power supply

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

Electrical connection

Three-wire DC connection

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



L00-FTL5xxxx-04-05-xx-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

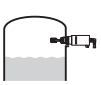
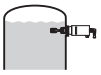
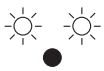
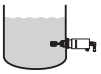
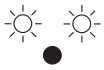
I_L = load current (switched through)

< 100 µA = residual current (blocked)

☼ = lit

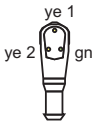
● = unlit

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

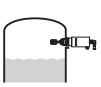
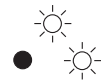
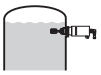
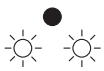
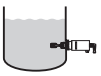
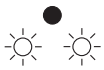
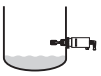
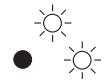
I_L = load current (switched through)

< 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)
- Capacitive 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…253 V AC, 50/60 Hz or 19…55 V DC
Power consumption: max. 1.3 W
Reverse polarity protection
Overvoltage protection FEL54: overvoltage category III

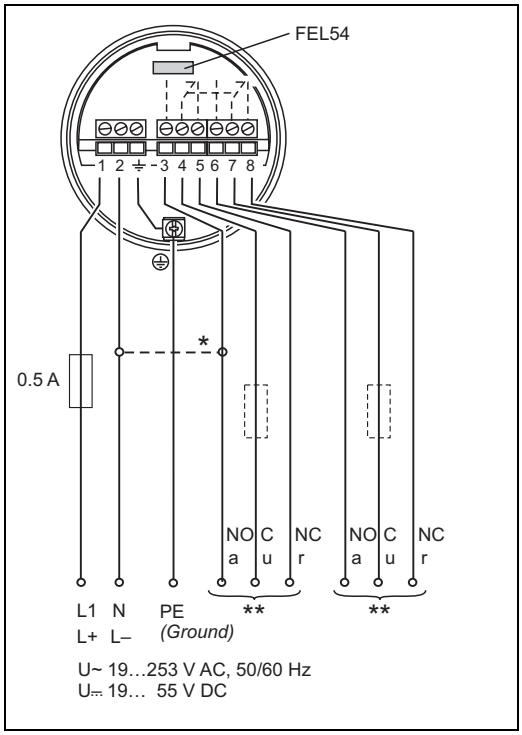
Electrical connection

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.

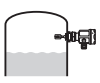
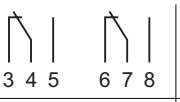
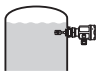
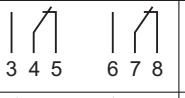
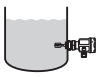
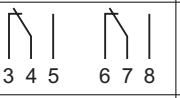
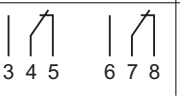


L00-FTL5xxxx-04-05-xx-xx-002

Output signal

= relay energised
= relay de-energised
= 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-energised

Connectable load

- Loads switched via 2 floating change-over contacts (DPDT)
- I~ max. 6 A (EEx d 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 (EEx d 4 A) to 30 V, I⎓ max. 0.2 A to 125 V
- When connecting a low-voltage circuit with double isolation according to IEC 1010 the following applies: total of voltages of relay output and power supply max. 300 V

Electronic insert FEL55 (8/16 mA)

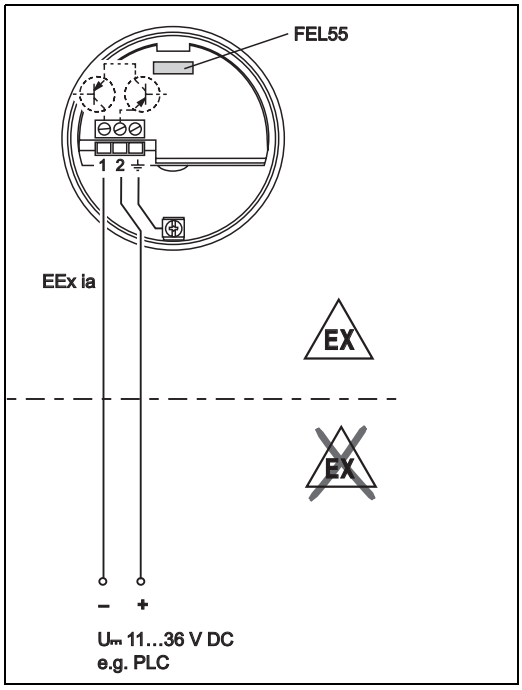
Power supply

Supply voltage: 11...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 (PLC).
AI module 4...20 mA to EN 61131-2.
Output signal jump from high to low current on limit.



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-000

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…36 V DC

Electronic insert FEL56 (NAMUR L-H edge)

Power supply

Power consumption: < 6 mW bei I < 1 mA; < 38 mW bei I = 2,2...4 mA
Connection data interface: IEC 60947-5-6

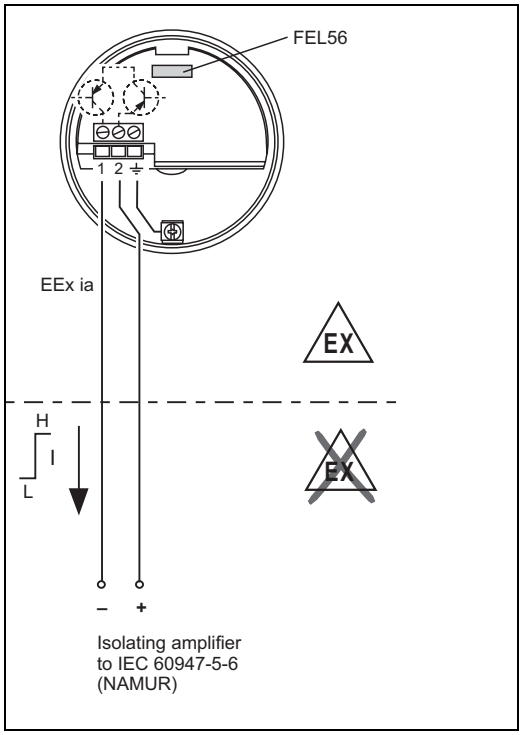
Electrical connection

Two-wire connection for separate switching unit

For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FXN421, FXN422, FTL325N, FTL375N or Commutec SIN100, SIN110 from Endress+Hauser.
Output signal jump from low to *high current on limit*.

(L-H edge)

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



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

Output signal

= lit
= flashes
= unlit

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

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

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 isolating amplifier connected according to IEC 60947-5-6 (NAMUR)

Electronic insert FEL58 (NAMUR H-L edge)

Power supply

Power consumption: < 6 mW bei I < 1 mA; < 38 mW bei I = 2,2...4 mA
Connection data interface: IEC 60947-5-6

Electrical connection

Two-wire connection for separate switching unit

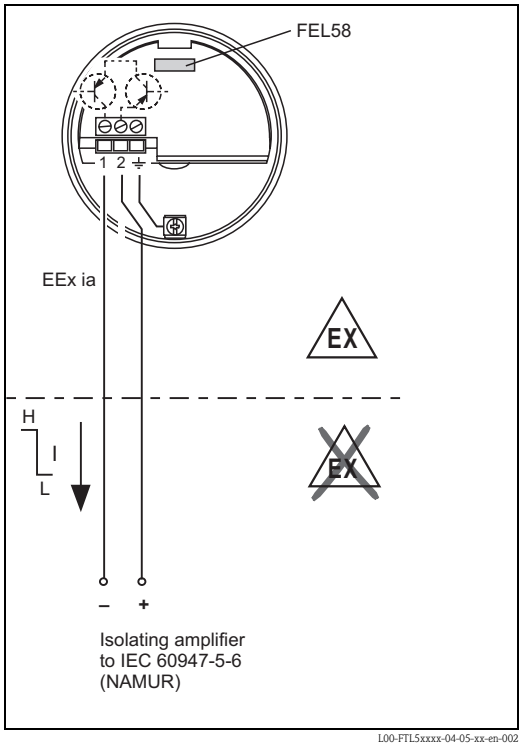
For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FXN421, FXN422, FTL325N, FTL375N or Commutec SIN100, SIN110 from Endress+Hauser.
Output signal jump from high to *low current on limit*.

(H-L edge)

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

Note!
For 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 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 bei I < 1 mA; < 38 mW bei I = 2,2...4 mA
Connection data interface: IEC 60947-5-6

Electrical connection

Two-wire connection for separate switching unit

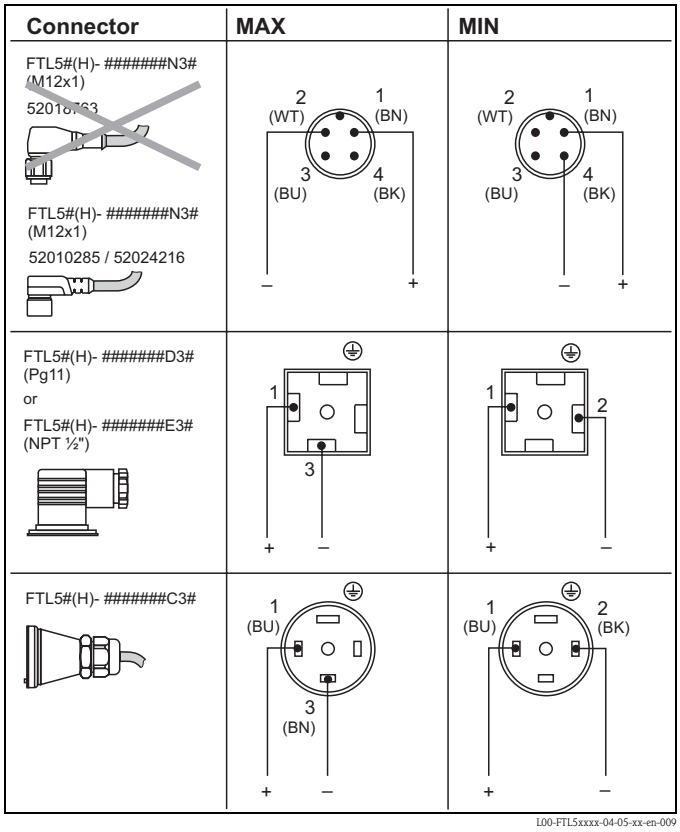
For connecting to isolating amplifiers acc. to NAMUR (IEC 60947-5-6), e.g. FXN421, FXN422, FTL325N, FTL375N or Commutec SIN100, SIN110 from Endress+Hauser. Output signal jump from high to *low current on limit*.

(H-L edge)

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

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

The NAMUR interface has a defined power consumption. Thus, it is not possible to use the M12 connector with integrated LED (52018763).



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

Output signal

= lit

= flashes

= unlit

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

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

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

Signal on alarm

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

Connectable load

- See Technical Data of 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...12,5 V DC
Current consumption: 10...13 mA
Power consumption: < 150 mW
Reverse polarity protection

Electrical connection

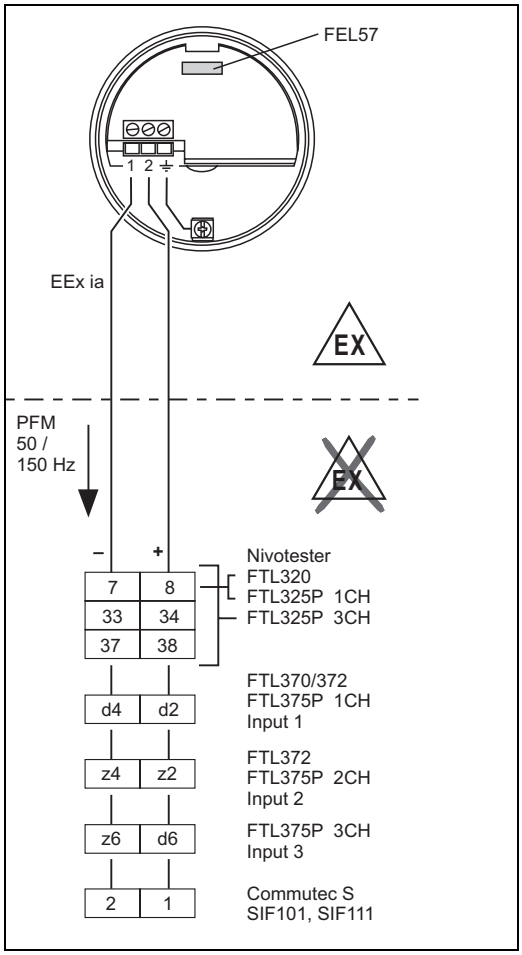
Two-wire connection for separate switching unit

For connecting to switching units
Nivotester FTL320, FTL325P,
FTL370, FTL372, FTL375P
(also with cyclical checking)
Commutec SIF101, SIN111
from Endress+Hauser.
Output signal jump of PFM signal
from high to low frequency
when sensor is covered.
Switching between minimum/maximum
safety in the Nivotester.

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

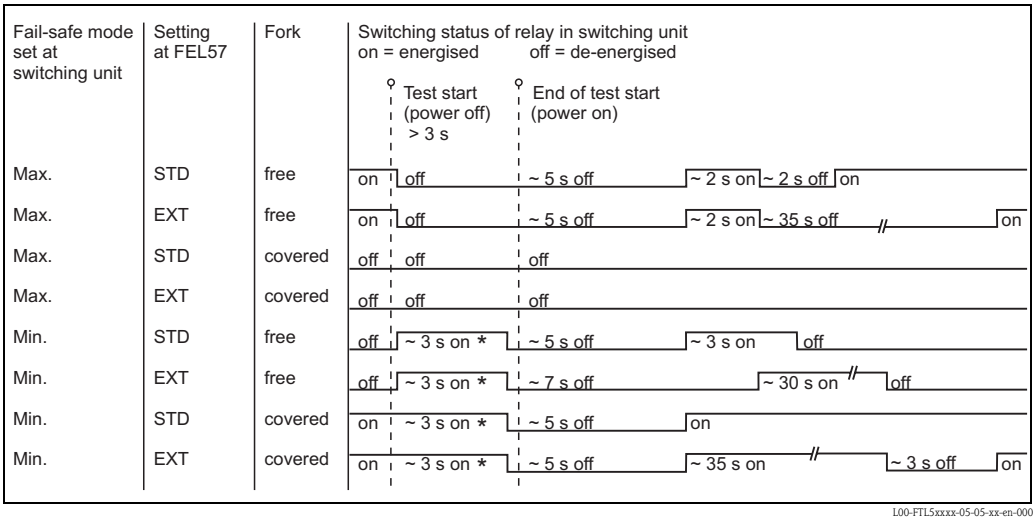
– Standard (STD):
  for low corrosive liquids;
  simulation approx. 8 s
  tuning fork exposed – covered – exposed.
– Extended (EXT):
  for highly corrosive liquids;
  simulation approx. 41 s
  tuning fork exposed – covered – corroded – exposed.

The check is activated and monitored at the switching unit.



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

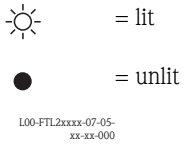
Switching behaviour of the connected device:

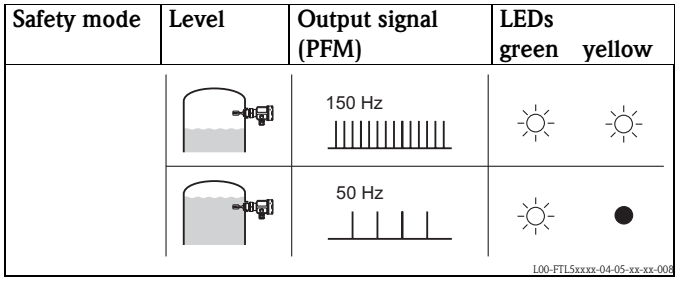


* De-energised on power supply failure

Please note this switching response and function of the plant, especially when replacing a Liquiphant with an EL17Z or FEL37 electronic insert by a Liquiphant M with the 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 unit Nivotester FTL320, FTL325P, FTL370, FTL372, FTL375P or Commutec SIF101, SIF111
- For contact load see the Technical Data of the switching unit

Electronic insert FEL50A (PROFIBUS PA)

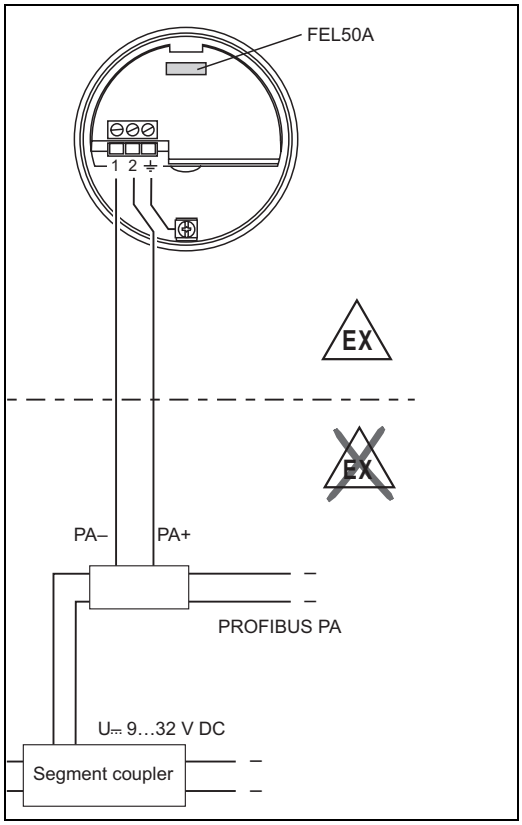
Electrical connection

Two-wire connection for power supply and data transfer

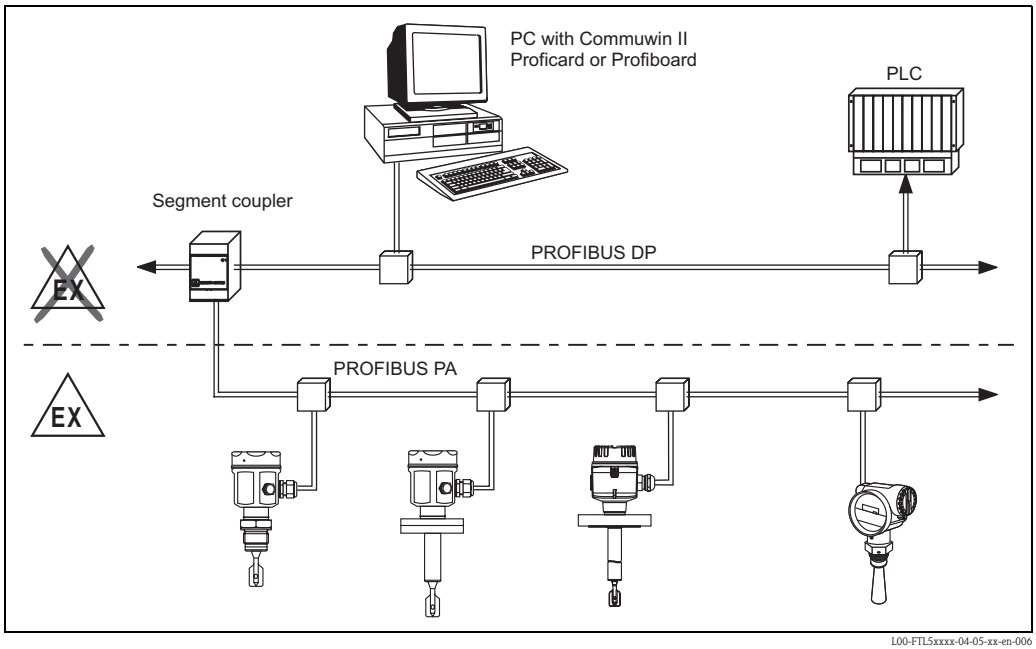
For connecting to PROFIBUS PA

Additional functions:

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



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



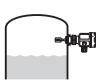
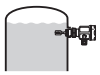
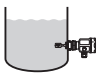
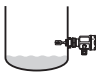
L00-FTL5xxxx-04-05-xx-en-006

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

Connection and function

Connecting cables

- Electronic inserts: cross-section max. 2.5 mm²; strand in ferrule to DIN 46228
- Protective earth in housing: cross-section max. 2.5 mm²
- External equipotential bonding connection on housing: cross-section max. 4 mm²

Fail-safe 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

Max. = 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...60 s

Switch-on behaviour

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

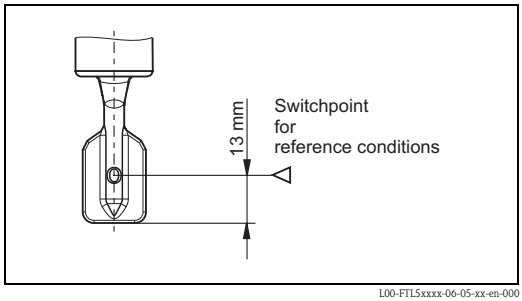
Product density: 1 g/cm³ (water)

Viscosity: 1 mm²/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

Specified by mounting position: max. +/–1 mm

Repeatability

0.1 mm

Hysteresis

Approx. 2 mm

Influence of medium temperature

Max. +1.8…–2.8 mm (–50…+150 °C)

Influence of product density

Max. +4.8…–3.5 mm (0.5…1.5 g/cm³)

Influence of medium pressure

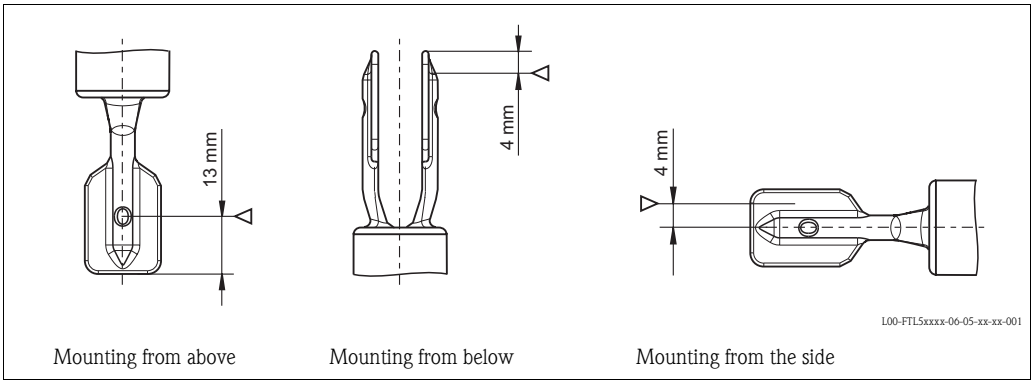
Max. 0…–2.5 mm (–1…64 bar)

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

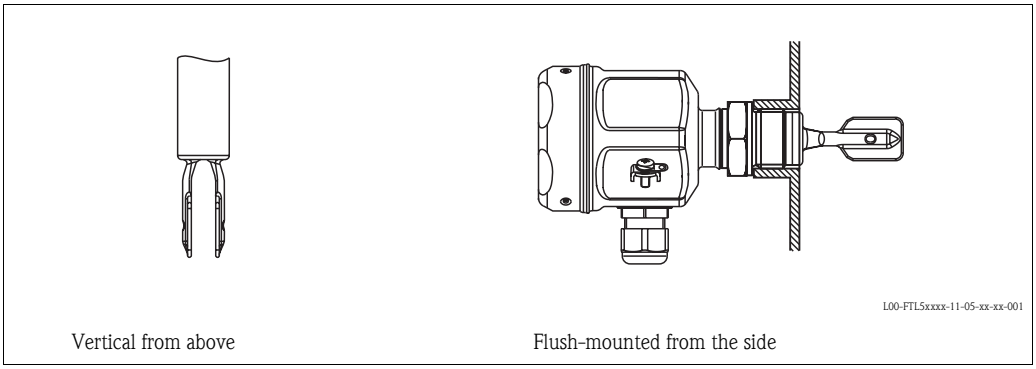
Note!
The switchpoints of the Liquiphant **M** are at other positions to those of the previous version Liquiphant **II**.

Examples of mounting

Examples of mounting with regard to the viscosity ν of the liquid and the amount of build-up

Optimum mounting, without problem even with high viscosity:

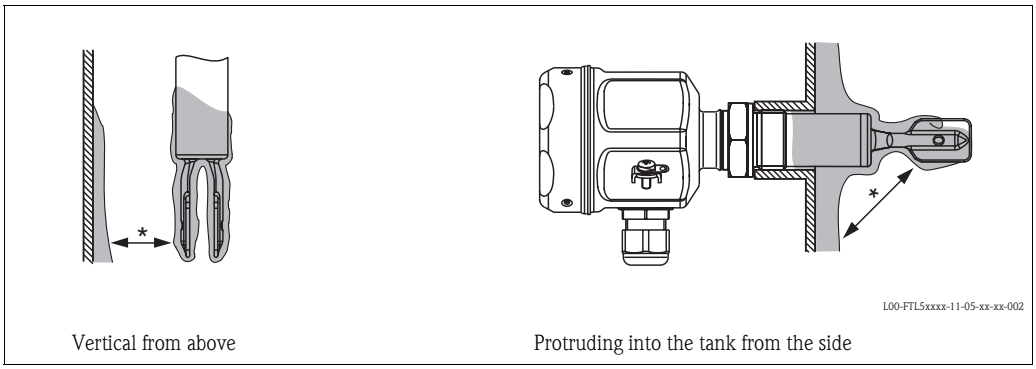
Position the fork so that the narrow edge of the tines is vertical.
This ensures that the liquid can run off easily.



Vertical from above | Flush-mounted from the side

With build-up on the tank walls:

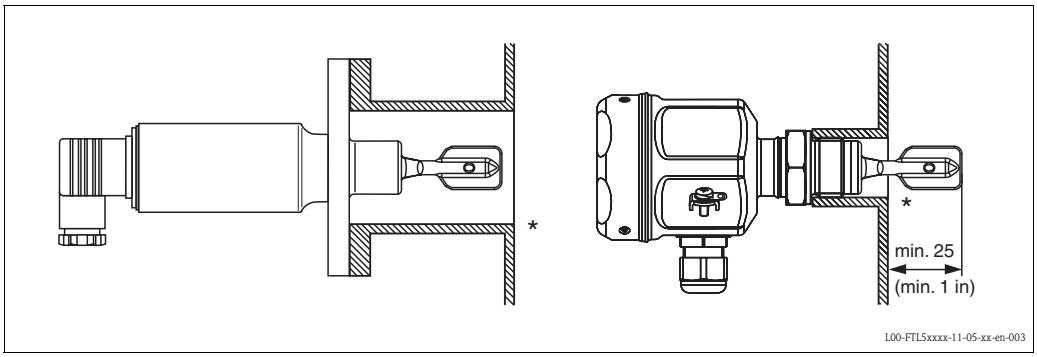
* Ensure that there is sufficient distance between the build-up expected on the tank wall and the fork.



Vertical from above | Protruding into the tank from the side

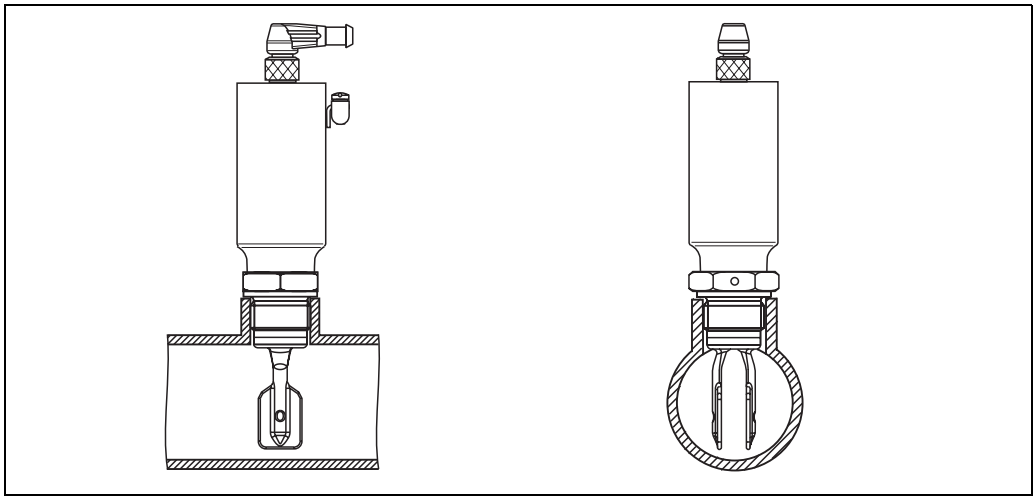
Mounting positions with low viscosity (up to 2000 mm²/s):

* Deburr the nozzle surfaces

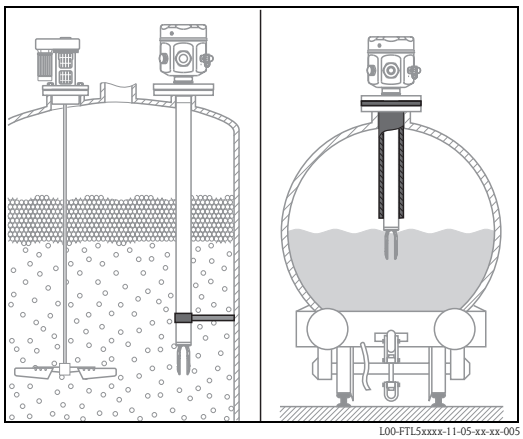


Mounting in piping from 2"

Fluid velocities up to 5 m/s for viscosity 1 mm²/s and density 1 g/cm³.
(Check the function for other operating conditions.)

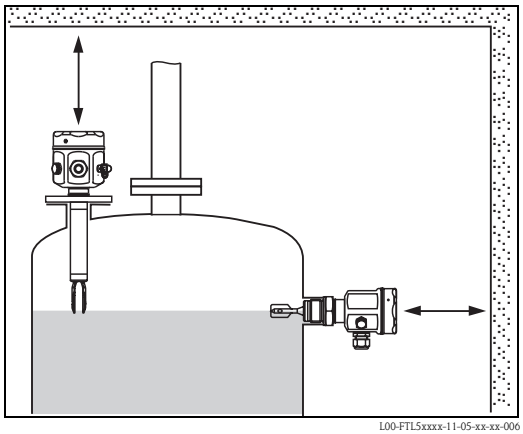


Support the Liquiphant M FTL51(H) in the event of high dynamic loads.



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

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



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

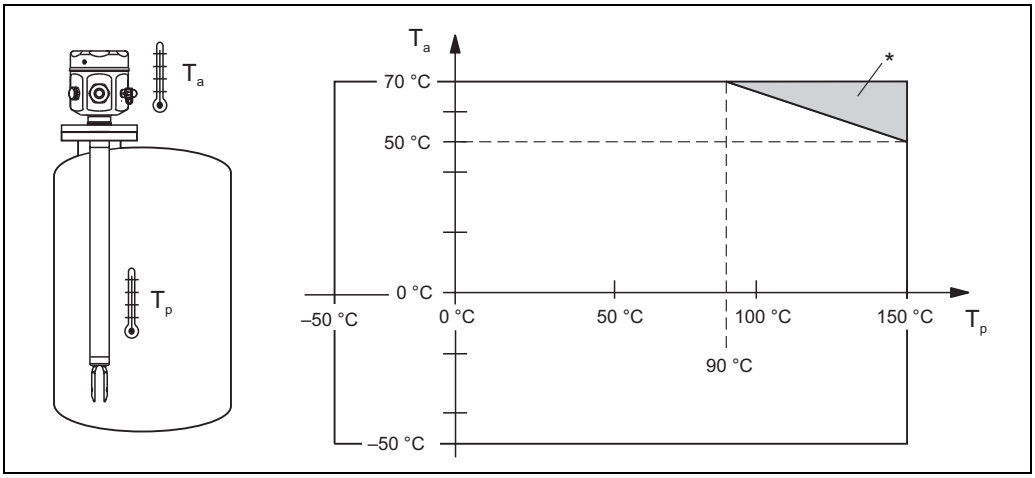
Orientation

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

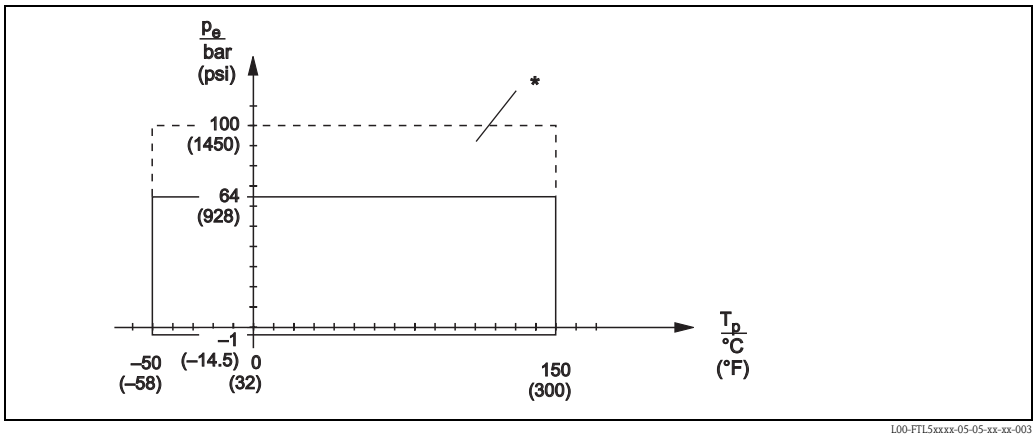
* Additional temperature range for devices with a temperature spacer or flameproof bushing

Ambient temperature limits

–50…+70 °C (function with restricted data)

Storage temperature	–50…+80 °C
Climate class	Climate protection to IEC 68, Part 2-38, Fig. 2a
Degree of protection	■ Polyester, steel and aluminium housings: IP66/IP67 to EN 60529 ■ Aluminium housing (EEx d, EEx de): IP66/IP68 to EN 60529 (1 m, 24 h) ■ Compact housing: – IP65 with valve connector Pg11/NPT ½ – IP66/68 with 5m cable tail – IP66/68 with M12x1 connector (52010285) 316L (metal); – IP69k with connector (52024216), elbowed / L= 5 m, without build-in LEDs – IP69k with connector (52018763), elbowed / L= 5 m, with build-in LEDs
Vibration resistance	To IEC 68, Part 2-6 (10…55 Hz, 0.15 mm, 100 cycles)
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) If the fork tines are joined together on account of build-up, the useful signal is attenuated to such an extent that the original EMC values can no longer be completely observed. (EN 61000-4-3 Electromagnetic fields, EN 61000-4-6 HF coupling)

Medium conditions

Medium temperature range	–50…+150 °C; for exceptions, see "Process connections"
Thermal shock	Max. 120 °C/s
Medium pressure p_e	 L00-FTL5xxxx-05-05-xx-xx-003 * Allowed pressure rating by selecting the "100 bar" option (see "Product structure" code 060) Exceptions see "Process connections"
Test pressure	p_e = 64 bar: max. 100 bar (1.5 times the medium pressure p_e); no function during test pressure Burst pressure of diaphragm 200 bar p_e = 100 bar: max. 150 bar (1.5 times the medium pressure p_e); no function during test pressure Burst pressure of diaphragm 400 bar
State of aggregation	Liquid

Density

0.7 g/cm³ = delivery status

0.5 g/cm³* adjustable over switches

* Density settings for the compact housing on request

Viscosity

Max. 10000 mm²/s

Solids content

Max. ø5 mm

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

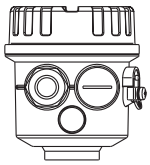
FEL51*:	Two-wire AC connection
FEL52*:	Three-wire DC connection PNP
FEL54:	Universal current connection, 2 relay outputs
FEL55:	Output 16/8 mA for separate switching unit
FEL56:	Output 0.6…1.0 / 2.2…2.8 mA for separate switching unit (NAMUR)
FEL58*:	Output 2.2…3.5 / 0.6…1.0 mA for separate switching unit (NAMUR)
FEL57:	Output 150/50 Hz, PFM, for separate switching unit (Nivotester)
FEL50A:	Digital communication PROFIBUS PA

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

Housing

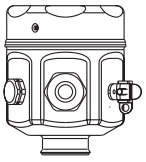
L00-FTL5xxxx-03-05-xx-xx-019

Pipe housing
Compact (316L)



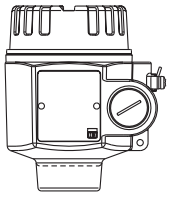
L00-FTL5xxxx-03-05-xx-xx-001

F16
Polyester (PBT)



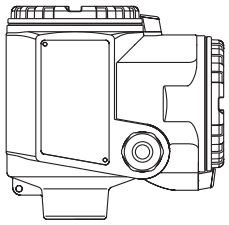
L00-FTL5xxxx-03-05-xx-xx-002

F15
Steel (316L)



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

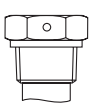
F17/F13
Aluminium
(also for EEx d), coated



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

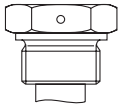
T13
Aluminium with separate connection compartment (also for EEx de and EEx d), coated

Process connections



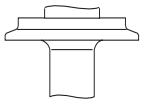
L00-FTL5xxxx-03-05-xx-xx-006

G ¾, DIN ISO 228/I
R ¾, DIN 2999
NPT ¾, ANSI B 1.20.1
(AF 32)



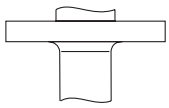
L00-FTL5xxxx-03-05-xx-xx-007

G 1, DIN ISO 228/I
R 1, DIN 2999
NPT 1, ANSI B 1.20.1
(AF 41)



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

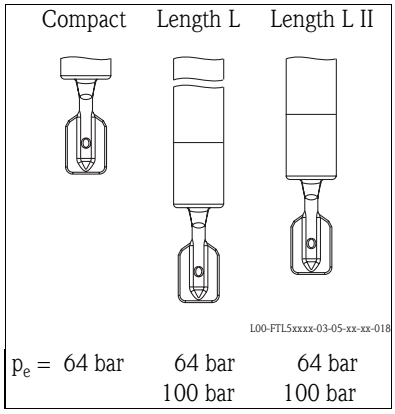
Diverse
hygienic and aseptic connections



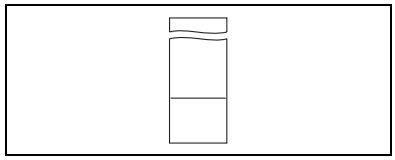
L00-FTL5xxxx-03-05-xx-xx-009

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

Sensors
Compact,
with extension pipe up to 3 m (to 6 m on request)
or special length "L II" (see also page 30)



Bushings
Temperature spacer and flameproof bushing

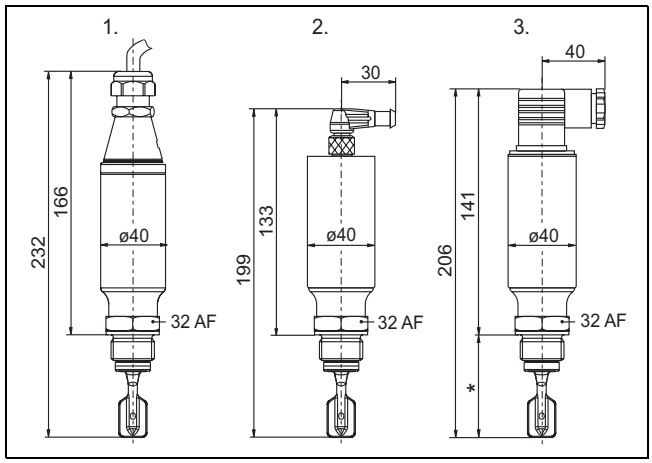


Dimensions
(in mm; 1 mm = 3.94 in)

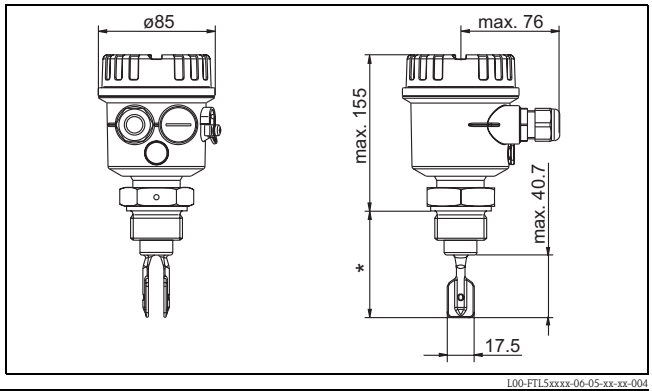
Housing and sensor FTL50(H)

Compact housing

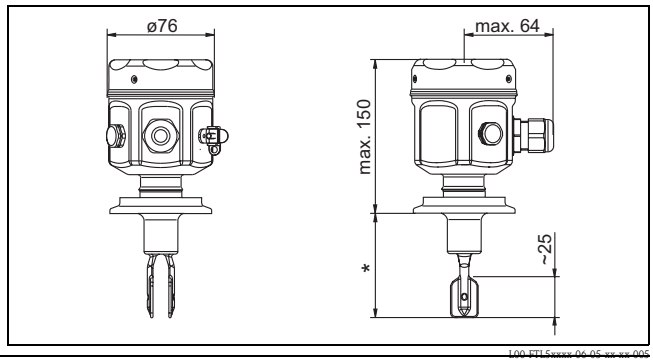
1. 5 m cable
2. M12 connector
3. Pg11/NPT ½ connector



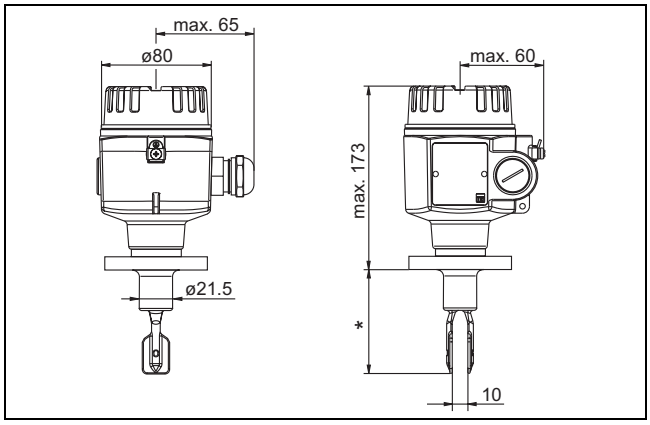
Polyester housing



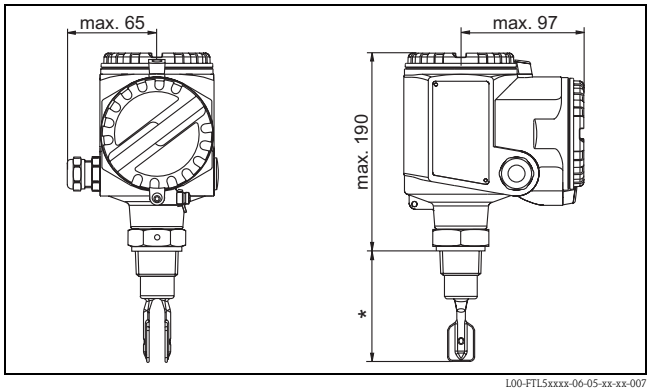
Steel housing



Aluminium housing



Aluminium housing
with separate
connection compartment



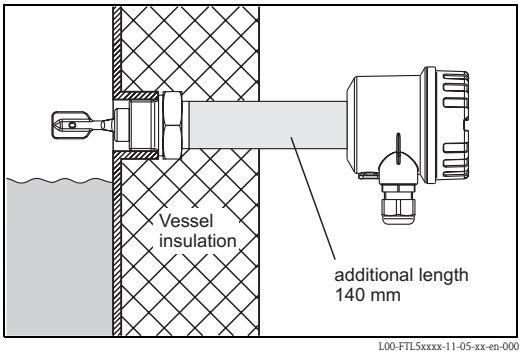
* see "Process connections"

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

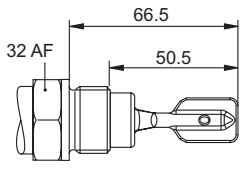
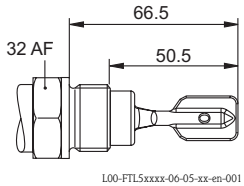
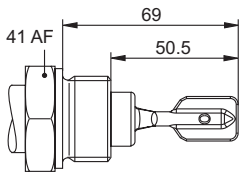
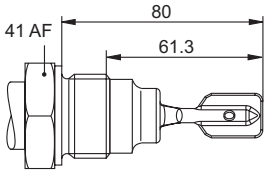
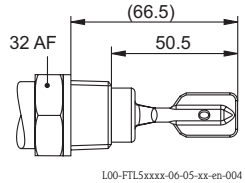
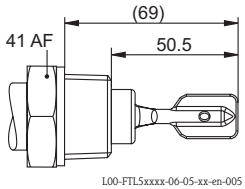
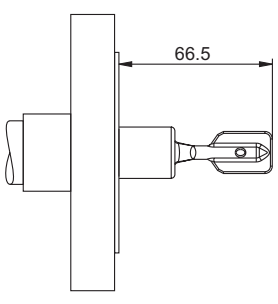
Bushings: temperature spacer, flameproof bushing

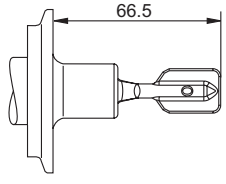
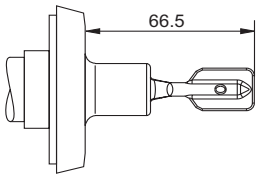
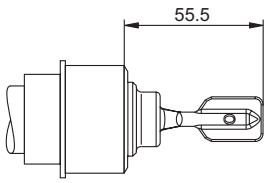
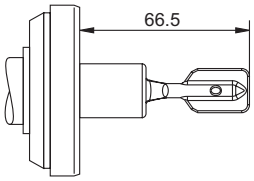
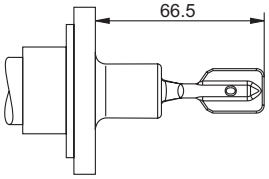
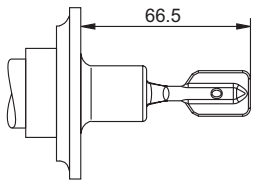
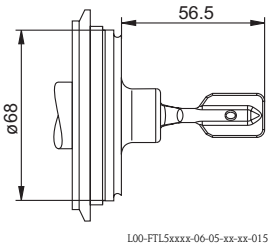
Temperature spacer
Provides sealed insulation
for the vessel and normal ambient
temperatures for the housing.

Flameproof bushing
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.



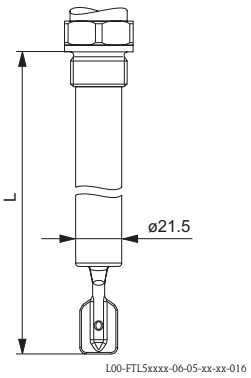
Process connections for FTL50(H) and FTL51(H)

Process connection		Dimensions	Accessories	Pressure Temperature
G ¾ DIN ISO 228/1 with defined thread start With elastomer flat seal to DIN 7603: supplied	GQ2 GQ5			max. 100 bar max. 150 °C
G ¾ DIN ISO 228/1 with defined thread start For flush-mounted installation in welding neck	GQ2 GQ5		**Welding neck** (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 With elastomer flat seal to DIN 7603: supplied	GR2 GR5			max. 100 bar max. 150 °C
G 1 DIN ISO 228/1 with defined thread start With seal surface for flush-mounted installation in welding neck	GW2		**Welding neck** (with defined thread start) with silicone O-ring Endress+Hauser 52001051 In conformity with FDA* See "Accessories"	max. 25 bar max. 150 °C max. 40 bar max. 100 °C
NPT ¾ ANSI B 1.20.1 or **R ¾** DIN 2999	GM2 GM5 GE2 GE5		In conformity with FDA*	max. 100 bar max. 150 °C
NPT 1 ANSI B 1.20.1 or **R 1** DIN 2999	GN2 GN5 GF2 GF5		In conformity with FDA*	max. 100 bar max. 150 °C
Flanges ANSI B 16.5 EN 1092-1 (DIN 2527 B) JIS B2220	A## B## C## F## N## K##		Seal according to design installed on site In conformity with FDA*	See nominal pressure of flange, however max. 100 bar max. 150 °C
* FDA approved materials according to 21 CFR Part 177.1550/2600				

Process connection		Dimensions	Accessories	Pressure Temperature
Tri-Clamp 1 ½" = ø50.5 mm 2" = ø64.0 mm ISO 2852	TC2 TE2	 L00-FTL5xxxx-06-05-xx-xx-009	Clamping ring and front seal installed on site In conformity with FDA*	max. 16 bar max. 120 °C max. 2 bar max. 150 °C
Threaded pipe joint DN 32 DN 40 DN 50 DIN 11851 with screw cap	MA2 MC2 ME2	 L00-FTL5xxxx-06-05-xx-xx-010	Sealing ring with collar, installed on site In conformity with FDA*	DN 32, DN 40: max. 40 bar to 100 °C max. 25 bar to 140 °C DN 50: max. 25 bar max. 140 °C
Flush-mounted for 1" welding neck Factory standard Endress+Hauser with silicone seal and screw cap: supplied	EE2	 L00-FTL5xxxx-06-05-xx-xx-011	**Welding neck** (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 screw cap	HE2	 L00-FTL5xxxx-06-05-xx-xx-012	Sealing ring, installed on site In conformity with FDA*	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 screw cap	UE2	 L00-FTL5xxxx-06-05-xx-xx-014	Sealing ring, installed on site In conformity with FDA*	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 In conformity with FDA*	See specification as per Tuchenhagen VARIVENT-Inline housing but: max. 64 bar max. 150 °C
* FDA approved materials according to 21 CFR Part 177.1550/2600				

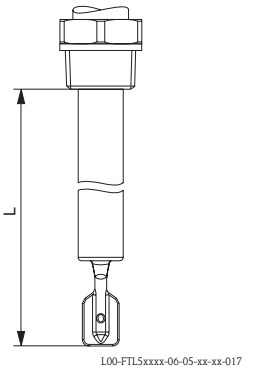
Sensor length L for FTL51 and FTL51H,
depending on process connection

Thread: G ¾
G 1



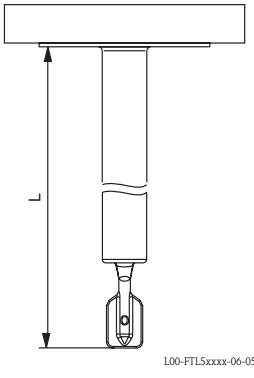
From seal surface of
thread adapter

Thread: NPT ¾
NPT 1
R ¾
R 1



From lower edge of
thread

Flanges and
flange-like process connections



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

Note!
The switchpoints 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:
115 mm for flanges and flange-like process connections
99 mm for threads NPT and R (BSPT)
118 mm for threads G 1 (BSP 1)
115 mm for threads G ¾ (BSP ¾)
104 mm for flush-mounted 1" (Endress+Hauser)

Weights

See "Product structure"

Material

- Wetted parts:
  Process connection and extension pipe: AISI 316L (1.4435) or 2.4610 (AlloyC4)
  Tuning fork: AISI 316L (1.4435) or 2.4610 (AlloyC4)
- Flat seal for process connection G ¾ or G 1: elastomer fibre, asbestos-free
- Polyester housing: PBT-FR
  with PBT-FR cover or with PA12 cover with sight glass,
  Cover seal: EPDM
- Steel housing: AISI 316L,
  Cover seal: silicone
- Aluminium housing: EN-AC-AlSi10Mg, plastic-coated,
  Cover seal: EPDM
- Compact housing: valve connector or M12 connector
- Cable gland: polyamide or brass, nickel-plated
- Temperature spacer: AISI 316L (1.4435)
- Flameproof bushing: AISI 316L (1.4435)

Process connections

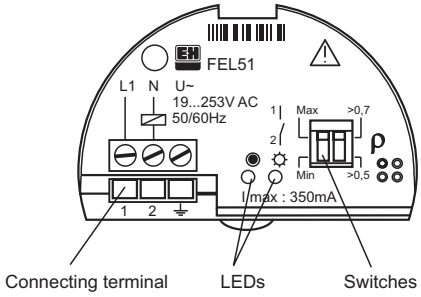
– Parallel thread G ¾, G 1 to DIN ISO 228/I with flat seal to DIN 7603
– Tapered thread R ¾, R 1 to DIN 2999 Part 1
– Tapered thread ¾ -14 NPT, 1 – 11½ NPT to ANSI B 1.20.1
– Flush-mounted with welding neck to factory standard Endress+Hauser (G ¾, G 1)
– Flush-mounted with welding neck to factory standard Endress+Hauser (1"), Sensor can be positioned
– Tri-Clamp 1½", 2" to ISO 2852
– Threaded pipe joint DN 32, 40, 50 to DIN 11851
– Aseptic connection DN 50 to DIN 11864-1 Form A for pipe DIN 11850
– SMS connection 2" (DN 51)
– DRD flange
– Varivent® DN 50 (50/40) to factory standard Tuchenhagen
– Flanges to EN/DIN from DN 25, for standards see "Product structure", to ANSI B 16.5 from 1", to JIS B2220 (RF)

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 sensoror if the electronics are defect



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 defect

With FEL57:

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

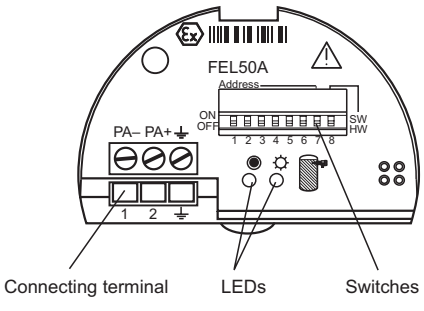
L00-FTL5xxxx-03-05-xx-xx-013

With FEL58:

- 2 switches for safety mode and density change,
- green LED
  – flashes quickly to indicate operational status,
  – flashes slowly to indicate corrosion damage at the sensor or if the electronics are defect,
- 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 defect



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

Compact housings

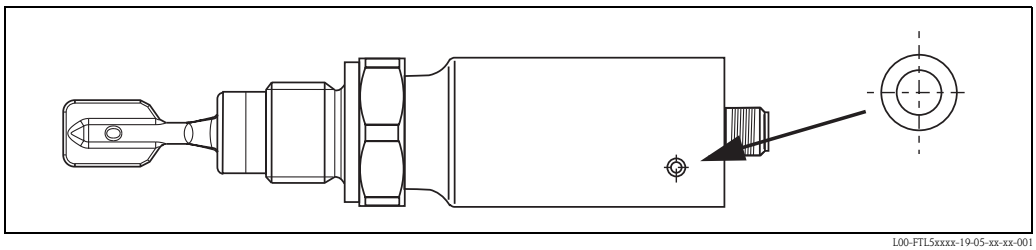
Function test with test magnet

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:

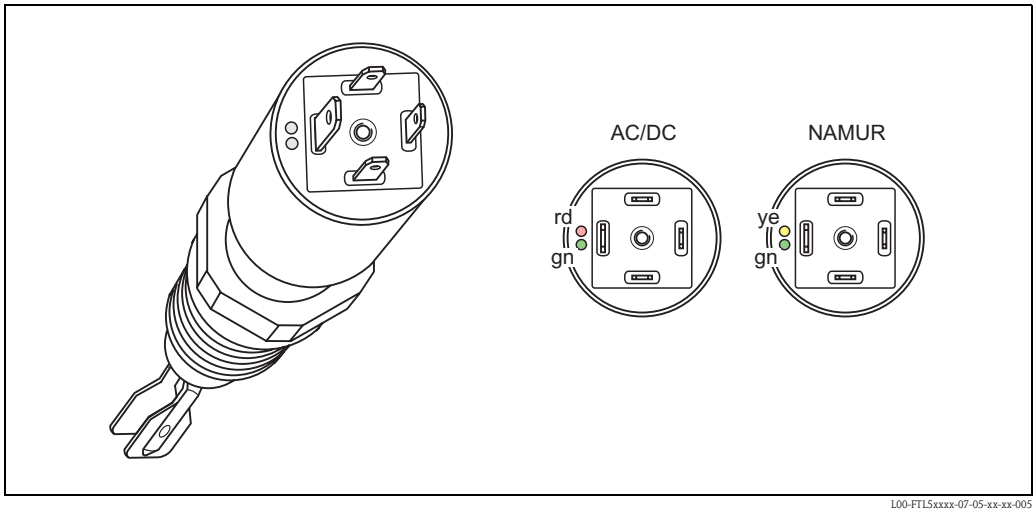


L00-FTL5xxxx-19-05-xx-xx-001

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) light 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.

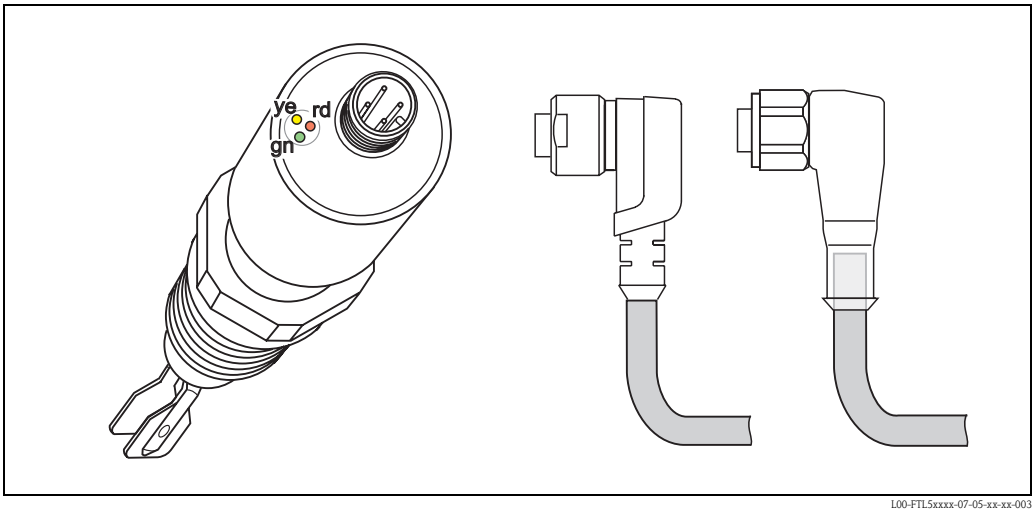
Yellow light (ye) lights up (NAMUR):

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.

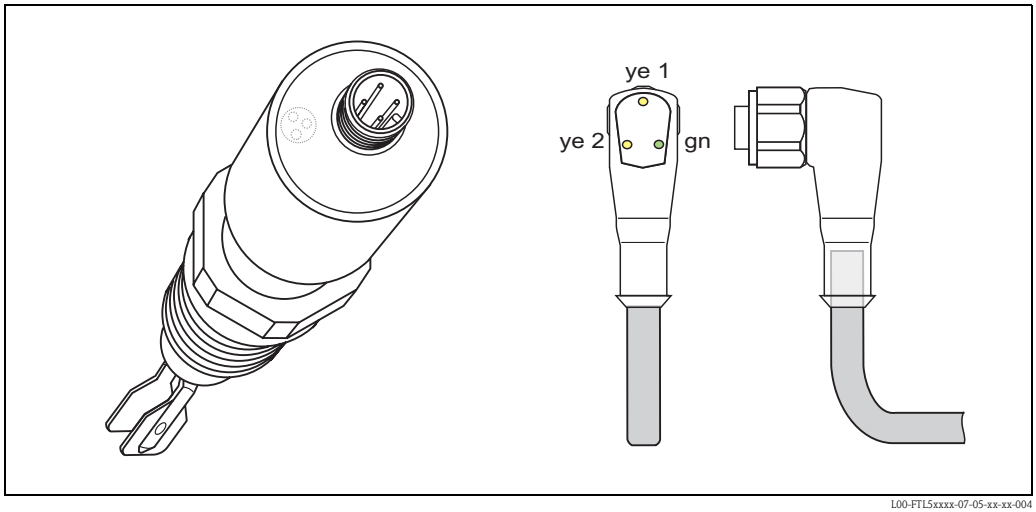
Red light (rd) flashing (DC-PNP):

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

General approvals

For Liquiphant M FTL50H, FTL51H the following approvals are available:

- EHEDG: Certification (from TNO, The Netherlands), Report No. V99.394
- 3A: 3A Certificate (USA), Authorization No. 459

Process connections	Order Code	L00-FTL5xxxx-01-05-xx-xx-001
Flush-mounted G ¾, G1 (with welding neck)	GQ2, GW2	X
Tri-Clamp 2" (special seal from Hyjoin Limited, UK)	TE2	X
Threaded pipe joint	MA2, MC2, ME2	X
Flush-mounted (fork can be positioned)	EE2	X
Aseptic	HE2	X
DRD	PE2	X
SMS	UE2	X
Varivent®	WE2	X

Note!
For CIP (Clean in Place) and SIP (Sterilize in Place) processes the pressure and temperture specifications of the process connections must be observed.

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 HDC.

Other certificates

See "Ordering information"

Combination of housings and electronic inserts

Based on the various certificates, permissible combinations of housings *) and electronic inserts are given in the following table.
*) Abbreviations: Polyester = PBT, Steel 316L = St., Aluminium = Alu
Aluminium housing with separate connection compartment = Alu/sep

Certificate, applications		Housing	Electronic inserts
A	Without any special certificate (for non-hazardous area)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A
D	Overfill protection to WHG (Germany)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A
B	ATEX II 3G EEx nC IIC T6, WHG	PBT, St., Alu, Alu/sep.	FEL54
	ATEX II 3G EEx nC IIC T6, WHG ATEX II 3D T85°C	St., Alu, Alu/sep.	FEL54
C	ATEX II 3G EEx nA II T6, WHG	PBT, St., Alu, Alu/sep.	FEL51/52, FEL55/56/57/58/50A
	ATEX II 3G EEx nA II T6, WHG ATEX II 3D T85°C	St., Alu, Alu/sep.	FEL51/52, FEL55/56/57/58/50A
E	ATEX II 1/2 G, EEx de, WHG	Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A
F	ATEX II 1/2 G, EEx ia IIC T6, WHG	PBT, St., Alu, Alu/sep.	FEL55/56/57/58/50A
	ATEX II 1/2 G, EEx ia IIC T6, WHG ATEX II 1/2 D, T80°C	St., Alu, Alu/sep.	FEL55/56/57/58/50A

Certificate, applications		Housing	Electronic inserts
G	ATEX II 1/2 G, EEx ia IIC T6	PBT, St., Alu, Alu/sep.	FEL55/56/57/58/50A
	ATEX II 1/2 G, EEx ia IIC T6 ATEX II 1/2 D, T80°C	St., Alu, Alu/sep.	FEL55/56/57/58/50A
H	ATEX II 1G, EEx ia IIC T6		FEL55/56/57/58/50A
J	ATEX II 1G, EEx ia IIC T6, WHG		FEL55/56/57/58/50A
I	ATEX II 1/2 G, EEx de	Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A
K	ATEX II 1/2 G, EEx d IIC T6	Alu	FEL51/52/54, FEL55/56/57/58/50A
L	ATEX II 1/2 G, EEx d IIC T6, WHG	Alu	FEL51/52/54, FEL55/56/57/58/50A
P	FM, IS, Cl. I, II, III, Div. 1, Gr. A-G	PBT, St., Alu, Alu/sep. with NPT cable entry	FEL55/56/57/58
Q	FM, XP, Cl. I, II, III, Div. 1, Gr. A-G	Alu with NPT cable entry	FEL51/52/54, FEL55/56/57/58
R	FM, NI, Cl. I, Div. 2, Gr. A-D	St., Alu, Alu/sep. with NPT cable entry	FEL51/52/54, FEL55/56/57/58
		PBT with NPT cable entry	FEL55/56/57/58
U	CSA, General Purpose	St., Alu, Alu/sep. with NPT cable entry	FEL51/52/54, FEL55/56/57/58
		PBT with NPT cable entry	FEL51/52, FEL55/56/57/58
S	CSA, IS, Cl. I, II, III, Div. 1, Gr. A-G	PBT, St., Alu, Alu/sep. with NPT cable entry	FEL55/56/57/58
T	CSA, XP, Cl. I, II, III, Div. 1, Gr. A-G	Alu with NPT cable entry	FEL51/52/54, FEL55/56/57/58
V	TIIS Ex ia IIC T3	PBT, St., Alu	FEL57
W	TIIS Ex d IIB T3	Alu	FEL52/54
Y	Other certificate (for non-hazardous area)	PBT, St., Alu, Alu/sep.	FEL51/52/54, FEL55/56/57/58/50A

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

Note!
Despite the additional Dust-Ex-certificate, the FTL5x(H) is to be used as a liquid limit switch only.

Ordering information

Note!
This overview does not mark options wich are mutually exclusive.

Product structure
Liquiphant M
FTL50
FTL51

Design		Basic weight
FTL50	Compact	0.6 kg
FTL51	With extension pipe	0.6 kg

10	Approval:		
A	Non-hazardous area		
B	ATEX II 3 G	EEx nC II T6	Overfill protection to WHG (Germany)
	ATEX II 3 D	T 85 °C*	
C	ATEX II 3 G	EEx nA II T6	Overfill protection to WHG (Germany)
	ATEX II 3 D	T 85 °C*	
D	Non-hazardous area		Overfill protection to WHG (Germany)
E	ATEX II 1/2 G	EEx de IIC T6	Overfill protection to WHG (Germany)
F	ATEX II 1/2 G	EEx ia IIC T6	Overfill protection to WHG (Germany)
	ATEX II 1/2 D	T 80 °C*	
G	ATEX II 1/2 G	EEx ia IIC T6	
	ATEX II 1/2 D	T 80 °C*	
H	ATEX II 1 G	EEx ia IIC T6	
I	ATEX II 1/2 G	EEx de IIC T6	
J	ATEX II 1 G	EEx ia IIC T6	Overfill protection to WHG (Germany)
K	ATEX II 1/2 G	EEx d IIC T6	
L	ATEX II 1/2 G	EEx d IIC T6	Overfill protection to WHG (Germany)
P	FM	IS, Class I, II, III	Division 1, Group A-G
Q	FM	XP, Class I, II, III	Division 1, Group B-G, for E5 housing Group A-G
R	FM	NI, Class I	Division 2, Group A-D
S	CSA	IS, Class I, II, III	Division 1, Group A-G
T	CSA	XP, Class I, II, III	Division 1, Group A-G
U	CSA	General Purpose	
V	TIIS	Ex ia IIC T3	
W	TIIS	Ex d IIB T3	
X	TIIS	Ex ia IIC T6	
7	TIIS	Ex d IIC T3	
8	TIIS	Ex d IIC T6	
Y	Special version		
	*) not valid for PBT		

20	Process Connection:				Additional weight
	Note! For 100 bar process pressure, please select the appropriate option under "Additional option"				
	GQ2	G ¾	316L	Thread ISO 228	
		Installation > accessory: welding neck			
	GQ5	G ¾	AlloyC4	Thread ISO 228	
	GR2	G 1	316L	Thread ISO 228	0.2 kg
	GR5	G 1	AlloyC4	Thread ISO 228	0.2 kg
	GW2	G 1	316L	Thread ISO 228	0.2 kg
		Installation > accessory: welding neck			
	GM2	NPT ¾	316L	Thread ANSI	
	GM5	NPT ¾	AlloyC4	Thread ANSI	
	GN2	NPT 1	316L	Thread ANSI	0.2 kg
	GN5	NPT 1	AlloyC4	Thread ANSI	0.2 kg
	GE2	R ¾	316L	Thread DIN 2999	
	GE5	R ¾	AlloyC4	Thread DIN 2999	
	GF2	R 1	316L	Thread DIN 2999	0.2 kg
	GF5	R 1	AlloyC4	Thread DIN 2999	0.2 kg
	BA2	DN32 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.2 kg
	BB2	DN32 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.0 kg
	BC2	DN40 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	BD2	DN40 PN25/40 A	316L	Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BE2	DN50 PN6 A	316L	Flange EN 1092-1 (DIN 2527 B)	1.6 kg

20		Process Connection:							*Additional weight*
		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		AlloyC4 >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		AlloyC4 >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		AlloyC4 >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		AlloyC4 >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		AlloyC4 >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		AlloyC4 >316L		Flange EN 1092-1 (DIN 2527)	1.3 kg
		DG2	DN50	PN40 B1		316L		Flange EN 1092-1 (DIN 2526 D)	
		DN2	DN80	PN40 B1		316L		Flange EN 1092-1 (DIN 2526 D)	
		D82	DN25	PN40 B1		316L		Flange EN 1092-1 (DIN 2526 D)	
		FG2	DN50	PN40 C		316L		Flange EN 1092-1 (DIN 2512 F)	2.6 kg
		NG2	DN50	PN40 D		316L		Flange EN 1092-1 (DIN2512 N)	2.9 kg
		AA2	1¼"	150 lbs	RF	316/316L		Flange ANSI B16.5	1.2 kg
		AB2	1¼"	300 lbs	RF	316/316L	(FTL51)	Flange ANSI B16.5	2.0 kg
		AC2	1½"	150 lbs	RF	316/316L		Flange ANSI B16.5	1.5 kg
		AD2	1½"	300 lbs	RF	316/316L	(FTL51)	Flange ANSI B16.5	2.7 kg
		AE2	2"	150 lbs	RF	316/316L		Flange ANSI B16.5	2.4 kg
		AE5	2"	150 lbs	RF	AlloyC4 >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
		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
		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

20	Process Connection:				Additional weight
	KA2	10 K 25	RF 316L	Flange JIS B2220	
	KC2	10 K 40	RF 316L	Flange JIS B2220	
	KE2	10 K 50	RF 316L	Flange JIS B2220	1.7 kg
	KE5	10 K 50	RF AlloyC4 >316L	Flange JIS B2220	1.7 kg
	KL2	10 K 80	RF 316L	Flange JIS B2220	
	KP2	10 K 100	RF 316L	Flange JIS B2220	
	TC2	DN25-38 (1...1½")	316L	ISO 2852 Tri-Clamp	
	TE2	DN40-51 (2")	316L	ISO 2852 Tri-Clamp	0.1 kg
	YY9	Special version			

30	Probe Length; Type:				
	FTL50				
	AA	Compact;		Ra <3.2 µm/80 grit	
	IA	Compact;		temperature spacer	0.6 kg
	QA	Compact;		pressure tight feed through	0.7 kg
	FTL51				
	BB	..... mm;	316L**	Ra <3.2 µm/80 grit	
	BE	..... mm;	AlloyC4**	Ra <3.2 µm/80 grit	
	CB	..... inch;	316L**	Ra <3.2 µm/80 grit	
	CE	..... inch;	AlloyC4**	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*;	AlloyC4	Ra <3.2 µm/80 grit	0.1 kg
	JB	..... mm;	316L**	+ temperature spacer	0.9 kg/m +0.6 kg
	JE	..... mm;	AlloyC4**	+ temperature spacer	0.9 kg/m +0.6 kg
	KB	..... inch;	316L**	+ temperature spacer	2.3 kg/100 in +0.6 kg
	KE	..... inch;	AlloyC4**	+ 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*;	AlloyC4	+ temperature spacer	0.1 kg +0.6 kg
	RB	..... mm;	316L**	+ pressure tight feed through	0.9 kg/m +0.7 kg
	RE	..... mm;	AlloyC4**	+ pressure tight feed through	0.9 kg/m +0.7 kg
	SB	..... inch;	316L**	+ pressure tight feed through	2.3 kg/100 in +0.7 kg
	SE	..... inch;	AlloyC4**	+ pressure tight feed through	2.3 kg/100 in +0.7 kg
	TB	Length: type II*;	316L	+ pressure tight feed through	0.1 kg +0.7 kg
	TE	Length: type II*;	AlloyC4	+ pressure tight feed through	0.1 kg +0.7 kg
	YY	Special version			

*) Replacing instruments: when vertically mounting a Liquiphant **M** FTL51 with length II, the switch point is at the same height as for the Liquiphant **II** FTL360, FTL365, FDL30, FDL35

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

40	Electronics; Output:		
	A	FEL50A	PROFIBUS PA
	1	FEL51*	2-wire, 19...253 V AC
	2	FEL52*	3-wire PNP, 10... 55 V DC
	4	FEL54	relay DPDT, 19...253 V AC, 19...55 V DC
	5	FEL55	8/16 mA, 11... 36 V DC
	6	FEL56	NAMUR (L-H signal)
	7	FEL57	2-wire PFM
	8	FEL58*	NAMUR + test button (H-L signal)
	9	Special version	

*) Also available in compact housing

50	Housing; Cable Entry:				
	C3	Compact 316L	IP66/68;	cable 5 m	
	D3	Compact 316L	IP65;	plug Pg11	ISO 4400

50					**Housing; Cable Entry:**				
					E3	Compact 316L	NEMA4X;	plug NPT ½	ISO 4400	
					N3	Compact 316L	IP66/68;	plug M12	
					E4	F16 Polyester	NEMA4X;	thread NPT ½	
					E5	F13/F17 Alu	NEMA4X;	thread NPT ¾	0.5 kg
					E6	F15 316L	NEMA4X;	thread NPT ½	0.1 kg
					E7	T13 Alu separate connection compartment	coated IP66;	thread NPT ¾	0.9 kg
					F4	F16 Polyester	IP66;	thread G ½	
					F5	F13/F17 Alu	IP66;	thread G ½	0.5 kg
					F6	F15 316L	IP66;	thread G ½	0.1 kg
					F7	T13 Alu separate connection compartment	coated IP66;	thread G ½	0.9 kg
					G4	F16 Polyester	IP66;	gland M20	
					G5	F13/F17 Alu	IP66;	gland M20 (EEx d > thread M20)	0.5 kg
					G6	F15 316L	IP66;	gland M20	0.1 kg
					G7	T13 Alu separate connection compartment	coated IP66;	gland M20 (EEx d > thread M20)	0.9 kg
					N4	F16 Polyester	IP66;	plug M12	
					N5	F13/F17 Alu	IP66;	plug M12	
					N6	F15 316L	IP66;	plug M12	
					Y9	Special version			

60						**Additional Option:**	
						A	Basic version	
						C	EN 10204 - 3.1 material (316L wetted parts) Inspection certificate	
						N	EN 10204 - 3.1 material, NACE MR0175 (316L wetted parts) Inspection certificate	
						P	100 bar process pressure	(FTL51)
						R	100 bar process pressure, EN 10204 - 3.1 material, NACE MR0175 (316L wetted parts) Inspection certificate	(FTL51)
						S	GL/ABS marine certificate (FTL51: max. 1600 mm)	
						Y	Special version	

FTL5# -							Complete product designation

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

Product structure
Liquiphant M
FTL50H
FTL51H

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

10	Approval:			
	A	Non-hazardous area		
	B	ATEX II 3 G ATEX II 3 D	EEx nC II T6 T 85 °C*	Overfill protection to WHG (Germany)
	C	ATEX II 3 G ATEX II 3 D	EEx nA II T6 T 85 °C*	Overfill protection to WHG (Germany)
	D	Non-hazardous area		Overfill protection to WHG (Germany)
	E	ATEX II 1/2 G	EEx de IIC T6	Overfill protection to WHG (Germany)
	F	ATEX II 1/2 G ATEX II 1/2 D	EEx ia IIC T6 T 80 °C*	Overfill protection to WHG (Germany)
	G	ATEX II 1/2 G ATEX II 1/2 D	EEx ia IIC T6 T 80 °C*	
	H	ATEX II 1 G	EEx ia IIC T6	
	I	ATEX II 1/2 G	EEx de IIC T6	
	J	ATEX II 1 G	EEx ia IIC T6	Overfill protection to WHG (Germany)
	K	ATEX II 1/2 G	EEx d IIC T6	
	L	ATEX II 1/2 G	EEx d IIC T6	Overfill protection to WHG (Germany)
	P	FM	IS, Class I, II, III	Division 1, Group A-G
	Q	FM	XP, Class I, II, III	Division 1, Group B-G, for E5 housing Group A-G
	R	FM	NI, Class I	Division 2, Group A-D
	S	CSA	IS, Class I, II, III	Division 1, Group A-G
	T	CSA	XP, Class I, II, III	Division 1, Group A-G
	U	CSA	General Purpose	
	V	TIIS	Ex ia IIC T3	
	W	TIIS	Ex d IIB T3	
	X	TIIS	Ex ia IIC T6	
	7	TIIS	Ex d IIC T3	
	8	TIIS	Ex d IIC T6	
	Y	Special version		
		*) not valid for PBT		

20		Process Connection:					*Additional weight*
	GQ2	G ¾		316L	(FTL50H)	Thread ISO 228	
		Installation > accessory: welding neck					
	GW2	G 1		316L		Thread ISO 228	0.2 kg
		Installation > accessory: welding neck					
	BA2	DN32	PN6 A	316L		Flange EN 1092-1 (DIN 2527 B)	1.2 kg
	BB2	DN32	PN25/40 A	316L		Flange EN 1092-1 (DIN 2527 B)	2.0 kg
	BC2	DN40	PN6 A	316L		Flange EN 1092-1 (DIN 2527 B)	1.4 kg
	BD2	DN40	PN25/40 A	316L		Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BE2	DN50	PN6 A	316L		Flange EN 1092-1 (DIN 2527 B)	1.6 kg
	BG2	DN50	PN25/40 A	316L		Flange EN 1092-1 (DIN 2527 B)	3.2 kg
	BH2	DN65	PN6 A	316L		Flange EN 1092-1 (DIN 2527 B)	2.4 kg
	BK2	DN65	PN25/40 A	316L		Flange EN 1092-1 (DIN 2527 B)	4.3 kg
	BM2	DN80	PN10/16 A	316L		Flange EN 1092-1 (DIN 2527 B)	4.8 kg
	BN2	DN80	PN25/40 A	316L		Flange EN 1092-1 (DIN 2527 B)	5.9 kg
	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

20		Process Connection:					*Additional weight*
		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 > accessory: welding neck				
		HE2	DN50 Tube DIN 11850		316L	DIN 11864-1 A	0.3 kg
		AA2	1¼" 150 lbs	RF	316/316L	Flange ANSI B16.5	1.2 kg
		AC2	1½" 150 lbs	RF	316/316L	Flange ANSI B16.5	1.5 kg
		AE2	2" 150 lbs	RF	316/316L	Flange ANSI B16.5	2.4 kg
		AF2	2" 300 lbs	RF	316/316L	Flange ANSI B16.5	3.2 kg
		AJ2	2½" 300 lbs	RF	316/316L (FTL51H)	Flange ANSI B16.5	4.8 kg
		AL2	3" 150 lbs	RF	316/316L	Flange ANSI B16.5	4.9 kg
		AM2	3" 300 lbs	RF	316/316L (FTL51H)	Flange ANSI B16.5	6.8 kg
		AP2	4" 150 lbs	RF	316/316L	Flange ANSI B16.5	7.0 kg
		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...1½")		316L	ISO 2852 Tri-Clamp	
		TE2	DN40-51 (2")		316L	ISO 2852 Tri-Clamp	0.1 kg
		UE2	SMS 2" PN25		316L		0.2 kg
		WE2	DN65-162 PN10		316L	Varivent N tube	0.5 kg
		YY9	Special version				

30			Probe Length; Type:			
			FTL50H			
		AC	Compact;	Ra <1.5 µm/120 grit		
		AD	Compact;	Ra <0.3 µm/320 grit / A3		
		IC	Compact;	Ra <1.5 µm/120 grit + temperature spacer		0.6 kg
		ID	Compact;	Ra <0.3 µm/320 grit / A3 + temperature spacer		0.6 kg
		QC	Compact;	Ra <1.5 µm/120 grit + pressure tight feed through		0.7 kg
		QD	Compact;	Ra <0.3 µm/320 grit / A3 + pressure tight feed through		0.7 kg
			FTL51H			
		BC	..... mm;	Ra <1.5 µm/120 grit		0.9 kg/m
		BD	..... mm;	Ra <0.3 µm/320 grit / A3		0.9 kg/m
		CC	..... inch;	Ra <1.5 µm/120 grit		2.3 kg/100 in
		CD	..... inch;	Ra <0.3 µm/320 grit / A3		2.3 kg/100 in
		DC	Length: type II*;	Ra <1.5 µm/120 grit		0.1 kg
		DD	Length: type II*;	Ra <0.3 µm/320 grit / A3		0.1 kg
		JC	..... mm;	Ra <1.5 µm/120 grit + temperature spacer		0.9 kg/m +0.6 kg
		JD	..... mm;	Ra <0.3 µm/320 grit + temperature spacer		0.9 kg/m +0.6 kg
		KC	..... inch;	Ra <1.5 µm/120 grit + temperature spacer		2.3 kg/100 in +0.6 kg
		KD	..... inch;	Ra <0.3 µm/320 grit + temperature spacer		2.3 kg/100 in +0.6 kg
		LC	Length: type II*;	Ra <1.5 µm/120 grit + temperature spacer		0.1 kg +0.6 kg
		LD	Length: type II*;	Ra <0.3 µm/320 grit + temperature spacer		0.1 kg +0.6 kg
		RC	..... mm;	Ra <1.5 µm/120 grit + pressure tight feed through		0.9 kg/m +0.7 kg
		RD	..... mm;	Ra <0.3 µm/320 grit + pressure tight feed through		0.9 kg/m +0.7 kg
		SC	..... inch;	Ra <1.5 µm/120 grit + pressure tight feed through		2.3 kg/100 in +0.7 kg
		SD	..... inch;	Ra <0.3 µm/320 grit + pressure tight feed through		2.3 kg/100 in +0.7 kg

30	Probe Length; Type:		
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 instruments: when vertically mounting a Liquiphant **M** FTL51H with length II, the switch point is at the same height as for the Liquiphant **II** FTL360, FTL365, FDL30, FDL35

40	Electronics; Output:		
A	FEL50A	PROFIBUS PA	
1	FEL51*	2-wire,	19...253 V AC
2	FEL52*	3-wire PNP,	10... 55 V DC
4	FEL54	relay DPDT,	19...253 V AC, 19...55 V DC
5	FEL55	8/16 mA,	11... 36 V DC
6	FEL56	NAMUR (L-H signal)	
7	FEL57	2-wire PFM	
8	FEL58*	NAMUR + test button (H-L signal)	
9	Special version		

*) Also available in compact housing

50	Housing; Cable Entry:				
C3	Compact 316L	IP66/68;	cable 5 m		
D3	Compact 316L	IP65;	plug Pg11	ISO 4400	
E3	Compact 316L	NEMA4X;	plug NPT ½	ISO 4400	
N3	Compact 316L	IP66/68;	plug M12		
E4	F16 Polyester	NEMA4X;	thread NPT ½		–0.1 kg
E5	F13/F17 Alu	NEMA4X;	thread NPT ¾		0.4 kg
E6	F15 316L	NEMA4X;	thread NPT ½		
E7	T13 Alu	coated IP66;	thread NPT ¾		0.8 kg
	separate connection compartment				
F4	F16 Polyester	IP66;	thread G ½		–0.1 kg
F5	F13/F17 Alu	IP66;	thread G ½		0.4 kg
F6	F15 316L	IP66;	thread G ½		
F7	T13 Alu	coated IP66;	thread G ½		0.8 kg
	separate connection compartment				
G4	F16 Polyester	IP66;	gland M20		–0.1 kg
G5	F13/F17 Alu	IP66;	gland M20 (EEx d > thread M20)		0.4 kg
G6	F15 316L	IP66;	gland M20		
G7	T13 Alu	coated IP66;	gland M20		0.8 kg
	separate connection compartment		(EEx d > thread M20)		
N4	F16 Polyester	IP66;	plug M12		
N5	F13/F17 Alu	IP66;	plug M12		
N6	F15 316L	IP66;	plug M12		
Y9	Special version				

60	Additional Option:
A	Basic version
B	CoC, EN 10204 - 3.1 material (316L wetted parts) Inspection certificate
C	EN 10204 - 3.1 material (316L wetted parts) Inspection certificate
S	GL/ABS marine certificate (FTL51H: max. 1600 mm)
Y	Special version

FTL5#H -	Complete product designation

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

Accessories

Welding neck G ¾

Order number: 52001052
with 3.1.B material certificate: 52011897
for flush-mounting
a Liquiphant FTL50 or FTL50H
with process connection GQ2

- With defined thread start *
- Sensor cannot be positioned

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

Weight: 0.13 kg

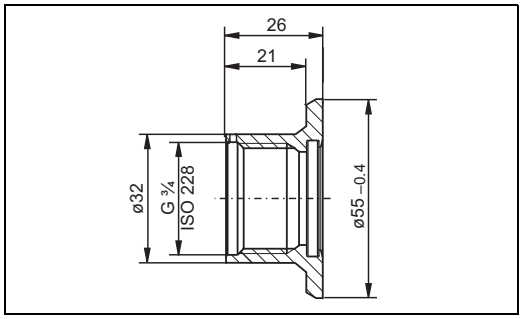
Seal: silicone O-ring
Order number: 52001387

FDA approved materials according to
21 CFR Part 177.1550/2600

Note!
Use only for FTL50/51 and FTL50H/51H!

max. 25 bar / max. 150 °C

max. 40 bar / max. 100 °C



L00-FTL5xxxx-06-05-xx-xx-019

Welding neck G 1

Order number: 52001051
with 3.1.B material certificate: 52011896
for flush-mounting
a Liquiphant M
with process connection GW2

- With defined thread start *
- Sensor cannot be positioned

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

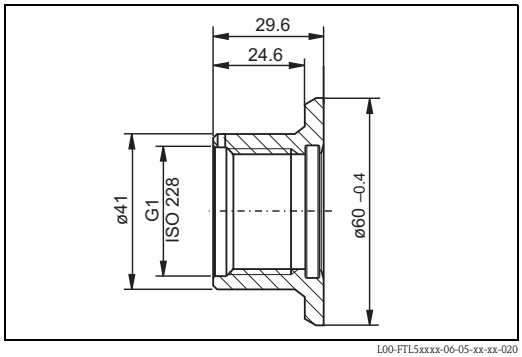
Weight: 0.19 kg

Seal: silicone O-ring
Order number: 52001386

FDA approved materials according to
21 CFR Part 177.1550/2600

max. 25 bar / max. 150 °C

max. 40 bar / max. 100 °C



L00-FTL5xxxx-06-05-xx-xx-020

* The tolerance of the defined thread beginnings between welding boss and sensor amounts to ± 15°.

Welding neck G 1

Order number: 52001221
with 3.1.B material certificate: 52011898
for flush-mounting
a Liquiphant M
with process connection GW2

- Sensor can be positioned

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

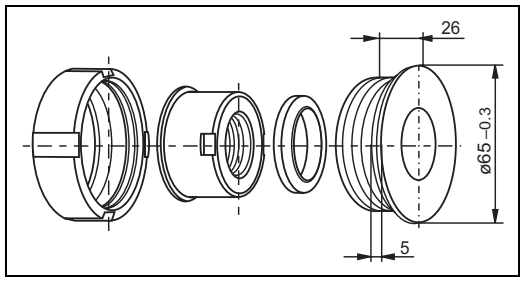
Weight: 0.43 kg

Seal: silicone moulded seal
Order number: 942816-0000

FDA approved materials according to
21 CFR Part 177.1550/2600

max. 25 bar / max. 150 °C

max. 40 bar / max. 100 °C



L00-FTL5xxxx-06-05-xx-xx-021

Welding neck

Order number: 52001047
with 3.1.B material certificate: 52006909
for flush-mounting
a Liquiphant FTL50H, FTL51H
with process connection EE2

- Sensor can be positioned

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

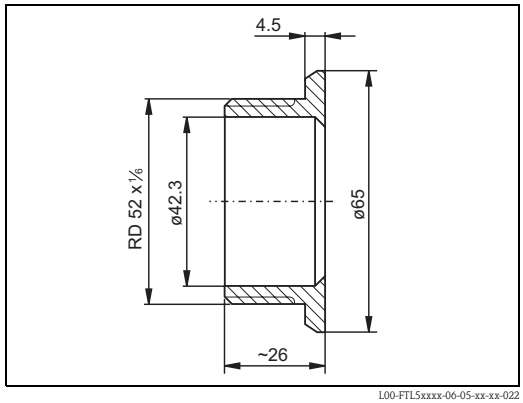
Weight: 0.15 kg

Seal on Liquiphant: silicone moulded seal
Order number: 942816-0000

FDA approved materials according to
21 CFR Part 177.1550/2600

max. 25 bar / max. 150 °C

max. 40 bar / max. 100 °C



L00-FTL5xxxx-06-05-xx-xx-022

DRD welding flange

Order number: 52002041
with 3.1.B material certificate: 52011899
for flush-mounting
a Liquiphant FTL50H, FTL51H
with process connection PE2

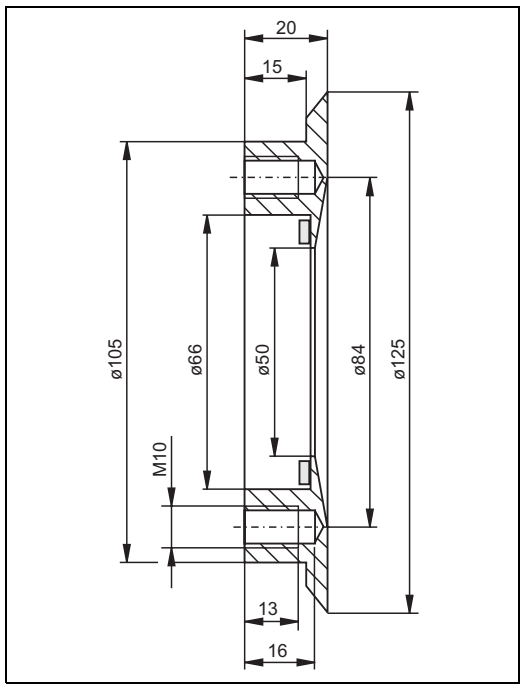
- Sensor can be positioned

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

Weight: 0.9 kg

Seal: PTFE flat seal (FDA listed)
Order number: 916783-0000

FDA approved materials according to
21 CFR Part 177.1550/2600



L00-FTL5xxxx-06-05-xx-xx-023

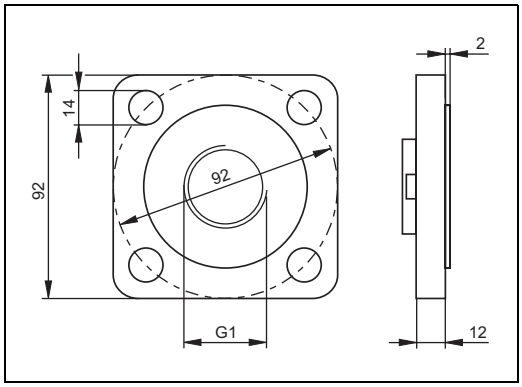
Lap joint flange

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



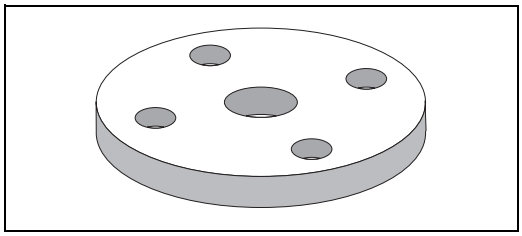
L00-FTL5xxxx-06-05-xx-xx-024

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



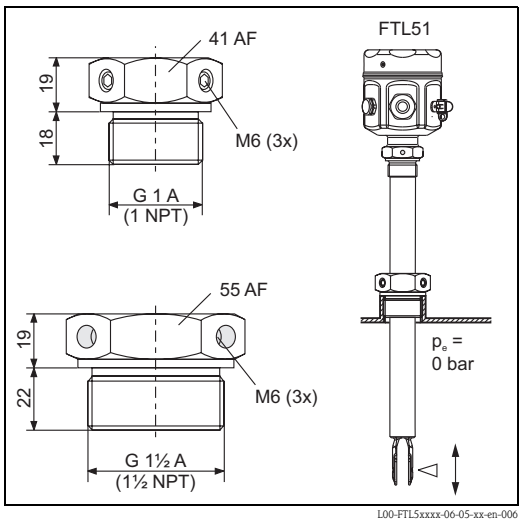
L00-FTL5xxxx-03-05-xx-xx-015

Sliding sleeves for unpressurised operation

for continuous adjustment of the switch point
of a Liquiphant M FTL51

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

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 316L)	52003978	
G 1	DIN ISO 228/I	1.4435 (AISI 316L)	52011888	3.1 material certificate
NPT 1	ANSI B 1.20.1	1.4435 (AISI 316L)	52003979	
NPT 1	ANSI B 1.20.1	1.4435 (AISI 316L)	52011889	3.1 material certificate
G 1½	DIN ISO 228/I	1.4435 (AISI 316L)	52003980	
G 1½	DIN ISO 228/I	1.4435 (AISI 316L)	52011890	3.1 material certificate
NPT 1½	ANSI B 1.20.1	1.4435 (AISI 316L)	52003981	
NPT 1½	ANSI B 1.20.1	1.4435 (AISI 316L)	52011891	3.1 material certificate

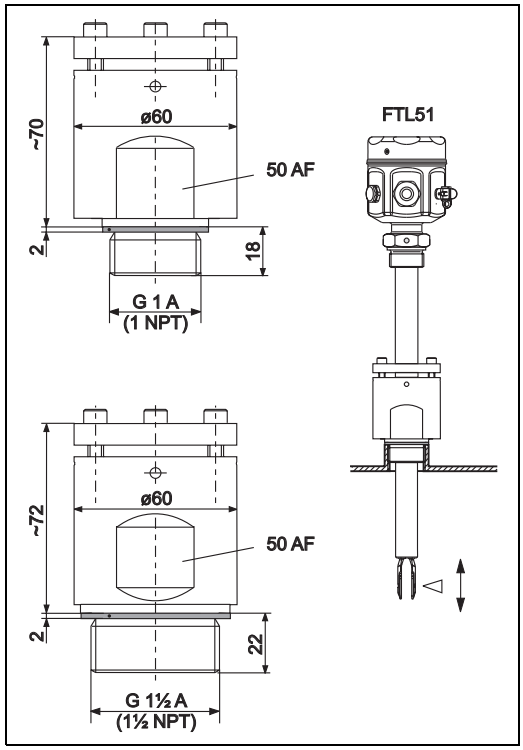
High pressure sliding sleeves

for continuous adjustment of the switch point of a Liquiphant M FTL51

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

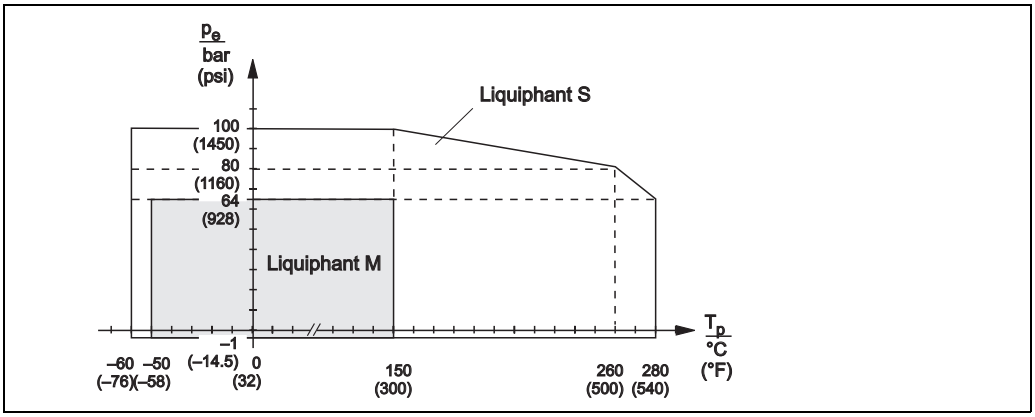
Weight for G 1, NPT 1: 1.13 kg
Weight for G 1½, NPT 1½: 1.32 kg

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 316L)	52003663	
G 1	DIN ISO 228/1	1.4435 (AISI 316L)	52011880	3.1 material certificate
G 1	DIN ISO 228/1	AlloyC4	52003664	
NPT 1	ANSI B 1.20.1	1.4435 (AISI 316L)	52003667	
NPT 1	ANSI B 1.20.1	1.4435 (AISI 316L)	52011881	3.1 material certificate
NPT 1	ANSI B 1.20.1	AlloyC4	52003668	
G 1½	DIN ISO 228/1	1.4435 (AISI 316L)	52003665	
G 1½	DIN ISO 228/1	1.4435 (AISI 316L)	52011882	3.1 material certificate
G 1½	DIN ISO 228/1	AlloyC4	52003666	
NPT 1½	ANSI B 1.20.1	1.4435 (AISI 316L)	52003669	
NPT 1½	ANSI B 1.20.1	1.4435 (AISI 316L)	52011883	3.1 material certificate
NPT 1½	ANSI B 1.20.1	AlloyC4	52003670	



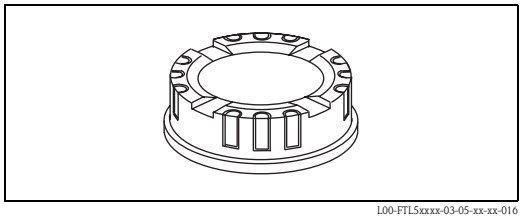
L00-FTL5xxxx-05-05-xx-xx-002

Transparent cover

Order number: 943461-0001
for polyester housing

Material: PA 12

Weight: 0.04 kg



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

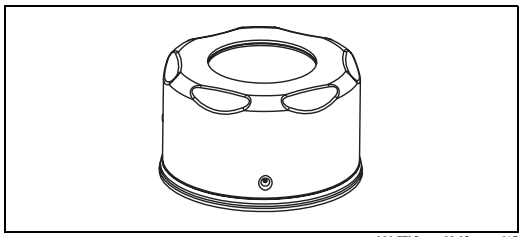
Cover with sight glass

for steel housing

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

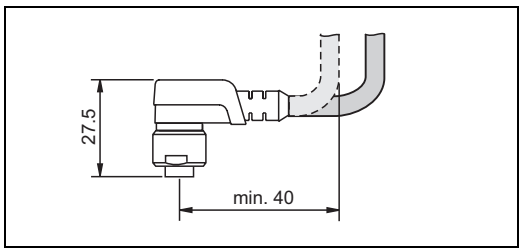
Cable: PVC (grey) 5 m length

Body: PUR (blue)

Coupling nut: Cu Sn/Ni

Protection: IP67

Temperature range: –25...+70 °C



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

Order number: 52024216

4x0,34 M12 socket

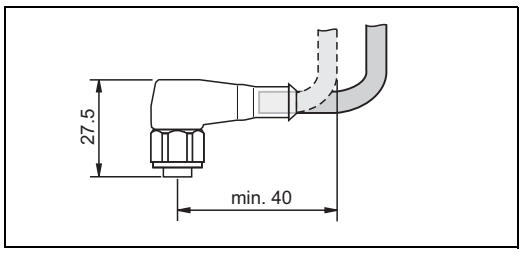
Cable: PVC (orange) 5 m length

Body: PVC (orange)

Coupling nut: 316L

Protection: IP69K (fully locked)

Temperature range: –25...+70 °C



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

Order number: 52018763

4x0,34 M12 socket with integrated LEDs

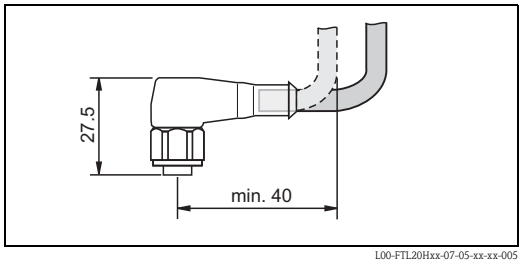
Cable: PVC (orange) 5 m length

Body: PVC (transparent)

Coupling nut: 316L

Protection: IP69K (fully locked)

Temperature range: –25...+70 °C



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

Supplementary Documentation

Note!
This supplementary documentation can be found on our product pages on www.endress.com

Operating Instructions

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

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/en

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

Isolating amplifier FXN421/422, switching units for top-hat rail mounting
for Liquiphant M with electronic insert FEL56, FEL58
TI332F/00/en

Liquiphant M FTL51C, wetted parts with highly corrosion-resistant coating
made of ECTFE, PFA or enamel
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

Functional Safety (SIL)

Liquiphant M/S + Nivotester FTL325P
SD111F/00/en

Liquiphant M/S + Nivotester FTL375P
SD113F/00/en

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

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

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

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

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

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

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

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

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

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

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

Safety Instructions (ATEX)

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

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

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

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

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

System Information

Liquiphant M
SI040F/00/en

International Head Quarter

Endress+Hauser
GmbH+Co. KG
Instruments International
Colmarer Str. 6
79576 Weil am Rhein
Deutschland

Tel. +49 76 21 9 75 02
Fax +49 76 21 9 75 34 5
www.endress.com
info@ii.endress.com

Endress+Hauser

People for Process Automation

TI328F/00/en/03.06
SL/FM+SGML6.0 ProMoDo