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

Technical Information

Liquiphant T FTL20H

Level limit switch
Level limit switch for liquids in the foodstuff industry, compact design, housing made of corrosion-resistant stainless steel

Application

The Liquiphant T FTL20H is a level limit switch for liquids in storage tanks, agitators and pipes which have to meet particularly high hygiene standards internally and externally.

It is used in particular in areas where other measurement methods would probably fail: e.g. in the event of viscosity, build-up, turbulences, flows, air bubbles, rash temperature change when cleaning.

The Liquiphant T FTL20H is a hygiene version for fluid temperatures up to 150 °C.

Your benefits

- E.g. Stainless steel housing with round connector M 12x1, degree of protection IP69K, always air-tight even in the event of hour-long overflooding and intensive cleaning
- External test option using test magnet
- On-site function control using external LED display
- Large selection of process connections for hassle-free installation in existing systems
- Easy to install even at points difficult to access due to compact design
- Rugged stainless steel housing (316L)
- CIP and SIP cleanability ensured
- EHEDG certification

TI379F/00/en

Endress+Hauser

People for Process Automation

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Function and system design

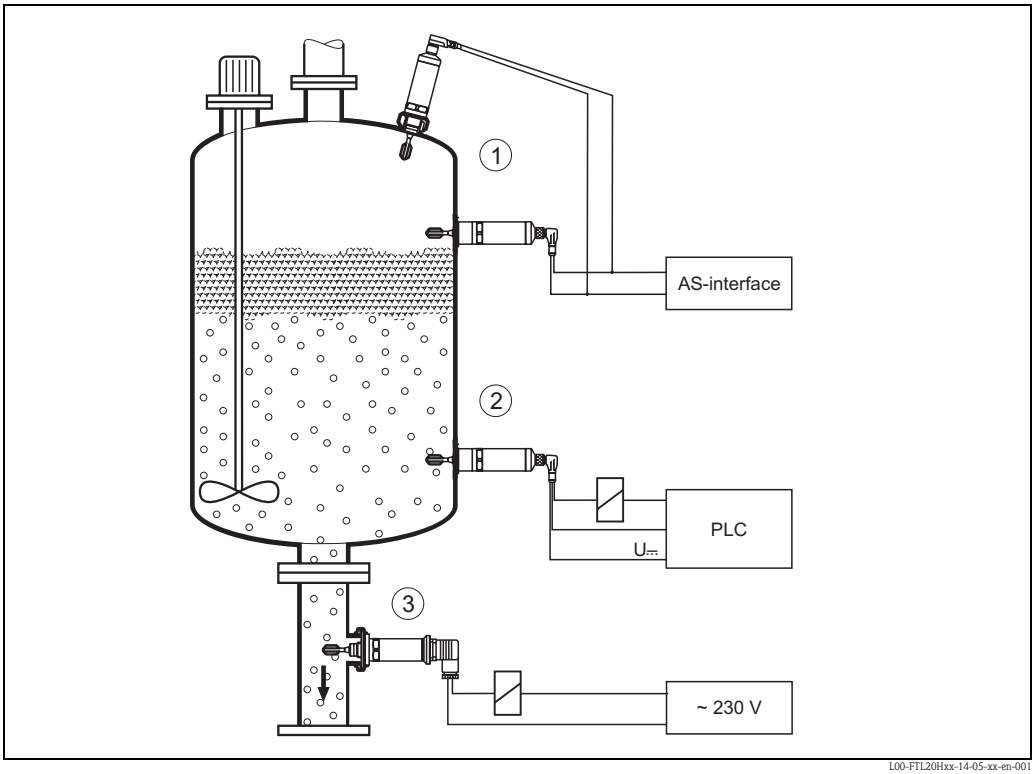
Measuring principle

The tuning fork of the FTL20H is brought to its resonance frequency by means of a piezoelectric drive. If the tuning fork is covered by liquid, this frequency changes. The electronics of the FTL20H monitor the resonance frequency and indicate whether the tuning fork is freely vibrating or is covered by liquid.

Measuring system

The measuring system comprises:

- Liquiphant T FTL20H limit switch
- Progammable logic control (PLC), miniature contactor, solenoid valve or AS-i bus



Example 1): Overfill protection or top level detection
Example 2): Lower level detection or dry running protection
Example 3): Dry running protection for pump

Input

Measured variable

Density

Measuring range

> 0.7 g/cm³

other density settings on request, e.g. 0.5 g/cm³

Output

Switching outputs

	DC-PNP valve connector	DC-PNP M 12x1	AC 2-wire	AS-i
Function	Positive voltage signal at the switch output of the electronics (PNP)		Switching the power supply line	Switching the D0 bit
Switch behaviour	ON/OFF			0 / 1 (free / covered)
Relay switching capacity	250 mA			D0 bit
Fail-safe mode	MIN/MAX (see below)			D1 bit D1: 0 error
Switching delay	approx. 0.5 s on coverage / approx. 1.0 s on tuning fork becoming uncovered other switching time on request			
Switching threshold	with vertical orientation: 13.0 mm from top of fork with horizontal orientation: 3.5 mm from fork centre			
Hysteresis	3 ±0.5 mm			

Operating modes for variants AC and DC-PNP

The FTL20H can be connected in two operating modes. By choosing the suitable operating mode (MAX or MIN safety), you ensure that the FTL20H switches safely even in the event of a fault (e.g. if the power supply line is disconnected).

MAX - maximum safety

- The FTL20H keeps the electronic switch closed as long as the liquid level is below the fork.
- Example of an application: overfill protection

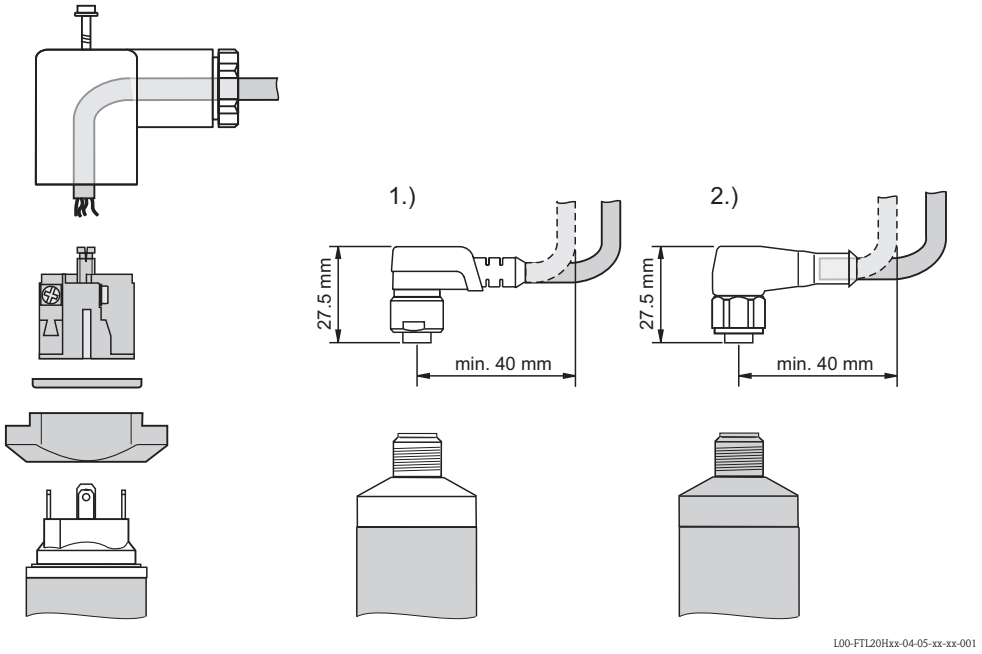
MIN - minimum safety

- The FTL20H keeps the electronic switch closed as long as the fork is immersed in liquid.
- Example of an application: dry running protection for pumps

The electronic switch opens if the limit is reached, if a fault occurs or the power fails.

Power supply

Cable entry



Pg 11 / ½ NPT
QUICKON

M 12x1
Plastic

M 12x1
Metal

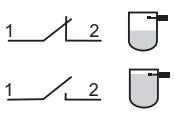
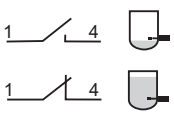
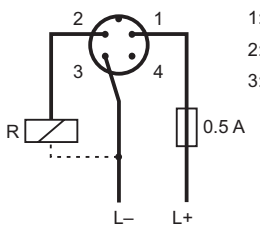
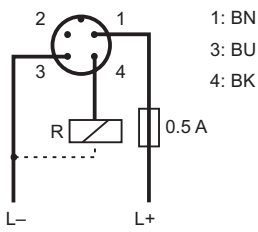
Accessories
1.) 4 x 0.34 M 12 elbowed (order number: 52010285)
2.) 4 x 0.34 + female angled connector M 12 with built-in LEDs (order number: 52018763)

Electrical connection

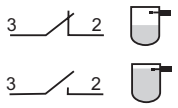
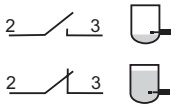
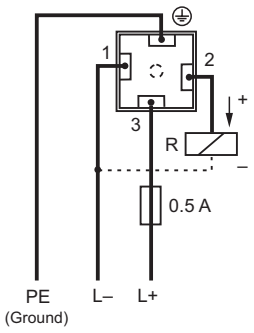
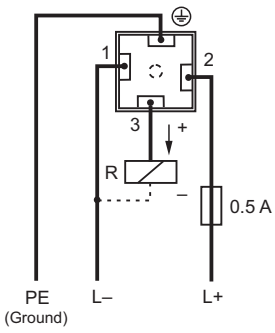
Variant DC-PNP (direct current) M 12x1 connector

Voltage source: shock-protected voltage or Class 2 circuit (North America)

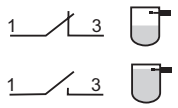
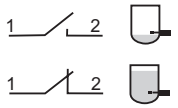
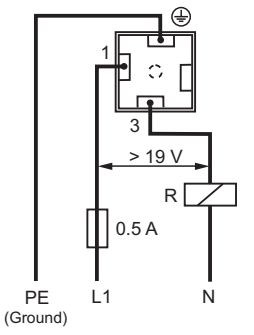
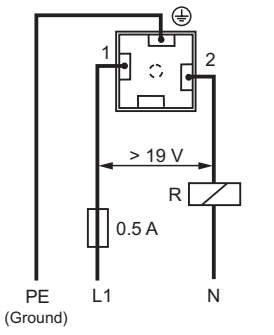
Suitable for use in non-equivalent operation:
When both outputs are connected, the MIN and MAX outputs take on opposite states in trouble-free operation. In the event of an alarm condition or a line break, both electronic switches are open. In addition to level monitoring, function-dependent sensor monitoring can also be performed with the aid of 2-channel evaluation.

Operating mode MAX (NC contact)	**Operating mode MIN (NO contact)**
	
	

Variant DC-PNP (direct current) valve connector

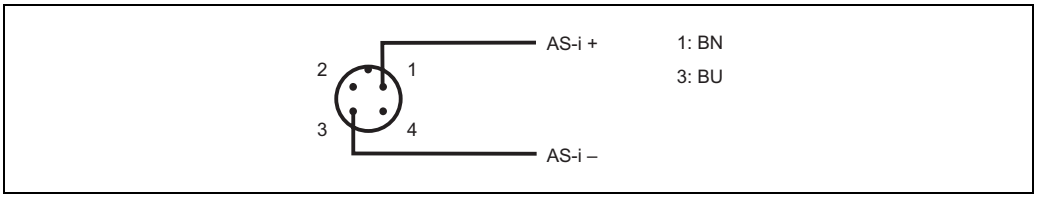
Operating mode MAX (NC contact)	Operating mode MIN (NO contact)
 L00-FTL20xxx-04-05-xx-xx-004	 L00-FTL20xxx-04-05-xx-xx-005
 L00-FTL20xxx-04-05-xx-xx-011	 L00-FTL20xxx-04-05-xx-xx-012

Variant AC (alternating current) valve connector

Operating mode MAX	Operating mode MIN
 L00-FTL20xxx-04-05-xx-xx-006	 L00-FTL20xxx-04-05-xx-xx-007
 L00-FTL20xxx-04-05-xx-xx-013	 L00-FTL20xxx-04-05-xx-xx-014

Note!
Approved for relays with a holding power/rated power >2.5 VA (253 V) or > 0.5 VA (24 V).
Relays with lower holding power/rated power can be operated via a parallel-connected RC-element (option).

Connect AS-i bus



L00-FTL20xxx-04-05-xx-xx-008

Programming instructions for the AS-i

AS-i profile: S-3.A.1

The address is defaulted to 0 (HEX). It is changeable via the bus master or programming unit.

Data bit:

D0:1 Sensor covered	D1:1 Status = O.K.
D0:0 Sensor free	D1:0 Status = error
D2 and D3 are not used.	

Parameter bits (P0...P3) are not used.

Electrical connection	**DC-PNP valve connector**	**DC-PNP M 12x1**	**AC 2 wire**	**AS-i**
Supply voltage	10...35 V DC	10...35 V DC	19...253 V AC	24.5...31 V DC
Cable entry	Pg 11 / ½ NPT	M 12x1	Pg 11 / ½ NPT	M 12x1
Cable specification	Max 1.5 mm^2 and ø 3.5...6.5	IEC 60947-5-2	Max 1.5 mm^2 and ø 3.5...6.5	IEC 62026-2
Power consumption	< 825 mW	< 825 mW	< 810 mW	< 825 mW
Current consumption	< 15 mA	< 15 mA	< 3.8 mA	< 25 mA
Residual ripple	5 Vss at 0...400 Hz	5 Vss at 0...400 Hz	–	–

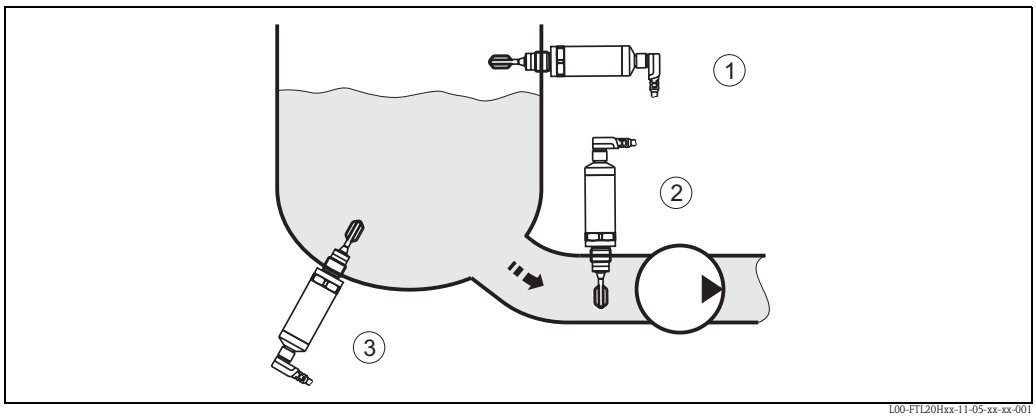
Performance characteristics

Switching delay	0.5 s when covering 1.0 s when becoming free other switching time on request
Reference operating conditions	Ambient temperature: 23 °C Process pressure: 1 bar Medium: water Medium density: 1 Medium temperature: 23 °C Installation from above /vertical Density setting: > 0.7
Measured value resolution	< 0.5 mm
Measuring frequency	Approx. 1100 Hz in air
Maximum measured error	13.0 ±1 mm
Repeatability	±0.5 mm
Hysteresis	3.0 ±0.5 mm
Settling time	< 2 s
Influence of ambient temperature	Negligible
Influence of medium temperature	-29.6×10^{-3} mm/°C
Influence of medium pressure	-55.2×10^{-3} mm/bar

Operating conditions: Installation instructions

Orientation

The Liquiphant T FTL20H can be installed in any position in a container or pipe. The formation of foam does not impair its function.



L00-FTL20Hxx-11-05-xx-xx-001

Example 1): Overfill protection or top level detection
Example 2): Dry running protection for pump
Example 3): Lower level detection

Connecting cable	Up to 1000 m with AC/DC-PNP, AS-i to IEC 62026-2

Operating conditions: Environment

Ambient temperature range	–40...+70 °C –25...+70 °C (AS-i)
Ambient temperature limits	■ Derating from 90.0 °C process temperature: Reduction to max. 50.0 °C ambient ■ Derating from 90.0 °C process temperature: Reduction to max. 150 mA relay switching capacity
Storage temperature	–40...+85 °C
Degree of protection	■ IP65 with valve connector ■ IP66/67 with M 12x1 connector PPSU (plastic) ■ IP66/68 with M 12x1 connector 316L (metal); IP69K with accessory 52018763 (signalling via connector with LEDs)
Shock resistance	to EN 60068-2-27 (30 g)
Vibration resistance	to EN 60068-2-64
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). AS-interface to EN 50295.
Overvoltage protection	Overvoltage category III

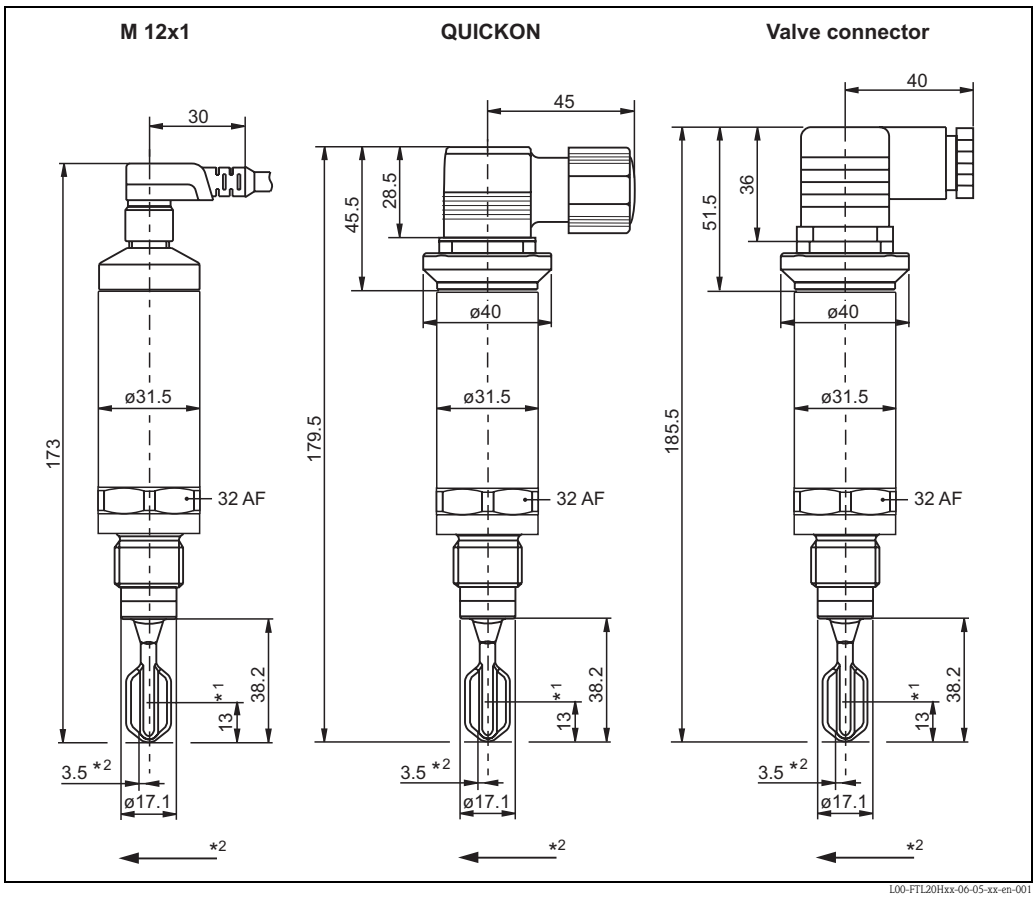
Operating conditions: Process

Medium temperature range	–40...+150 °C
Process pressure	40 bar
State of aggregation	Liquid
Density	> 0.7 g/cm^3 (other density setting on request)
Viscosity	1...10000 cst
Gas content	Stagnant mineral water
Solids content ø	< 5 mm

Mechanical construction

Note!
All dimensions in mm

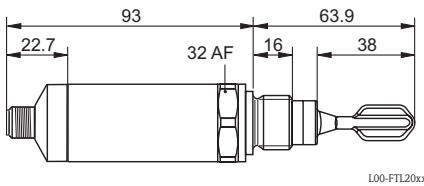
Design, dimensions

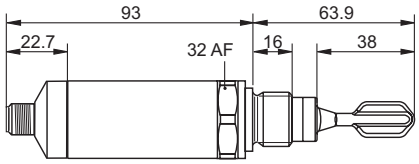
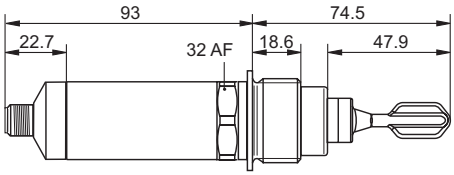
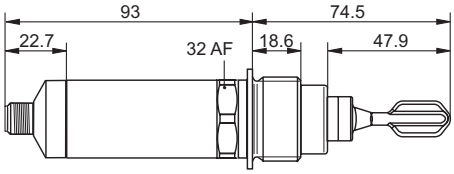
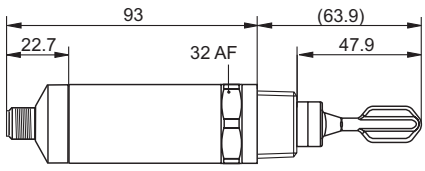
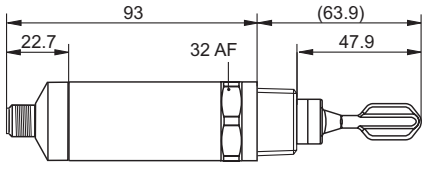


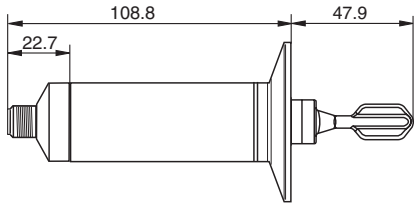
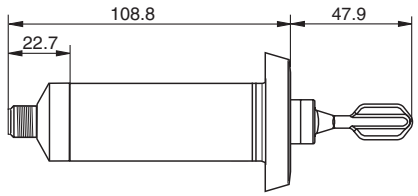
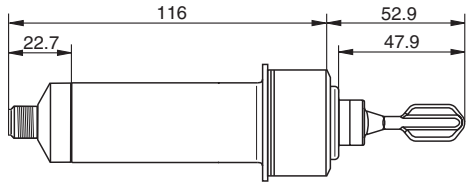
**1 Switch point with vertical installation*
**2 Switch point with horizontal installation; the level increases in the direction of the arrow*

Switch points at: density 1 / 23 °C / 0 bar

Process connections

Process connection / Dimensions	Accessories (optional)	Pressure Temperature
G ½ A, G ¾ A DIN ISO 228/I  		Max. 40 bar Max. 150 °C

Process connection / Dimensions	Accessories (optional)	Pressure Temperature
G ¾ A DIN ISO 228/I for flush-mounted installation in welding boss EHEDG with welding boss 52018765  L00-FTL20xxx-06-05-xx-en-003	**Welding boss** (without tuning fork alignment) with silicone O-ring Endress+Hauser 52018765 FDA-listed materials as per 21 CFR Part 175-178	Max. 25 bar Max. 150 °C Max. 40 bar Max. 100 °C
G 1 A DIN ISO 228/1  L00-FTL20xxx-06-05-xx-en-004		Max. 40 bar Max. 150 °C
G 1 A DIN ISO 228/I with sealing surface for flush-mounted installation in welding boss EHEDG with welding boss 52001051  L00-FTL20xxx-06-05-xx-en-004	**Welding boss** (without tuning fork alignment) with silicone O-ring Endress+Hauser 52001051 FDA-listed materials as per 21 CFR Part 175-178	Max. 25 bar Max. 150 °C Max. 40 bar Max. 100 °C
½ NPT ANSI B 1.20.1 **R ½** DIN 2999  L00-FTL20xxx-06-05-xx-en-005		Max. 40 bar Max. 150 °C
¾ NPT ANSI B 1.20.1 **R ¾** DIN 2999  L00-FTL20xxx-06-05-xx-en-005		Max. 40 bar Max. 150 °C

Process connection / Dimensions	Accessories (optional)	Pressure Temperature
Triclamp 1½" = ø50.5 mm 2" = ø64.0 mm ISO 2852 EHEDG only with 2" version and special seal *  L00-FTL20xxx-06-05-xx-xx-008	Clamping ring and front seal * Seal from manufacturer Hyjoin Limited, UK	Max. 16 bar Max. 120 °C Max. 2 bar Max. 150 °C
Threaded pipe joint DN 25 DN 32 DN 40 DIN 11851 With thread adapter nut  L00-FTL20xxx-06-05-xx-xx-009	Sealing ring with collar	DN 25, DN 32, DN 40: Max. 40 bar up to 100 °C Max. 25 bar up to 140 °C DN 50: Max. 25 bar Max. 140 °C
Flush-mounted for welding neck 1" Works standard Endress+Hauser with silicone seal (included) and coupling nut (accessory 52021715) EHEDG  L00-FTL20xxx-06-05-xx-xx-010	**Welding neck** (tuning fork can be aligned) Endress+Hauser 52001047 FDA-listed materials as per 21 CFR Part 175-178	Max. 40 bar Max. 100 °C Max. 25 bar Max. 150 °C

Weight	Approx. 300 g
Materials	Sensor and housing made of 316L, surface quality Ra < 1.5 µm
Housing	Pipe housing
Terminals	Valve connector, QUICKON, M 12x1

Human interface

Function test with test magnet

Variants AC and DC-PNP:

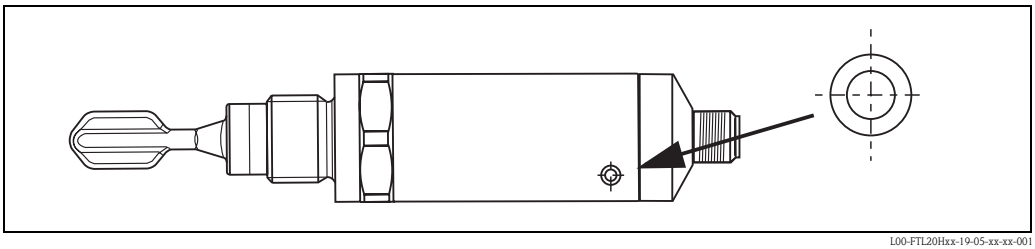
On testing, the current state of the electronic switch is reversed.

Variant AS-interface:

On testing, D0 is inverted.

Performing test

Hold the test magnet against the mark on the nameplate:

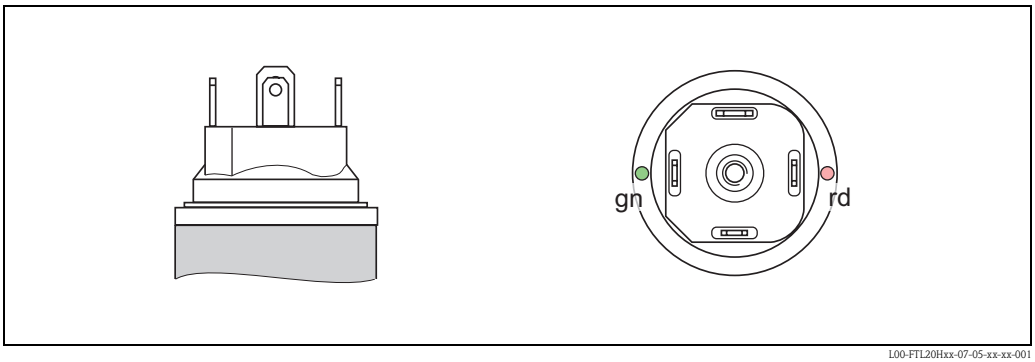


L00-FTL20Hxx-19-05-xx-xx-001

The switching state changes.

Light signals

Variants AC and DC-PNP with valve connector/QUICKON



L00-FTL20Hxx-07-05-xx-xx-001

Green light (gn) lighting:

FTL20H is connected to the power supply and is operational.

Red light (rd) lighting:

Mode of operation MAX (overfill protection): sensor is immersed in liquid.

Mode of operation MIN (dry running protection): sensor is immersed in liquid.

Green light (gn) does not come on

Error:
No power supply.

– Check plug, cable and power supply

Red light (rd) flashing:

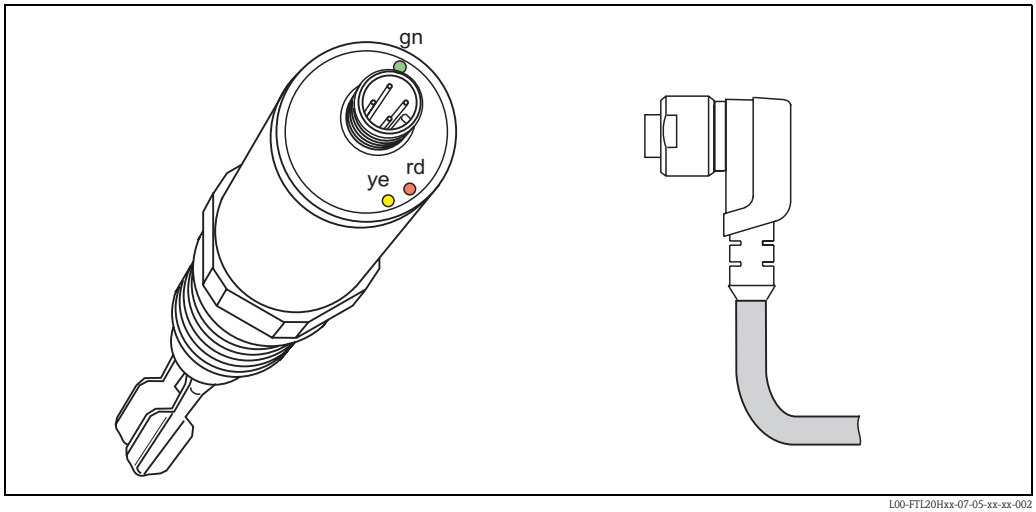
Error:
Overload or short-circuit in load circuit.

– Rectify the short-circuit
– Reduce maximum load current to below 250 mA

Error:
Internal sensor error or sensor corroded.

– Replace device

Variant AS-interface and DC-PNP with M 12x1 circular connector PPSU



L00-FTL20Hxx-07-05-xx-xx-002

Green light (gn) lighting:

FTL20H is connected to the power supply and is operational.

Yellow light (ye) lighting:

Sensor is immersed in liquid.

Red light (rd) lighting with AS-interface:

Error:
Address 0 set or communication error.

– Carry out addressing process
– Parameterise slave
– Or reduce line length (< 100 m total length)

Red light (rd) lighting with DC-PNP

Error:
Overload or short-circuit in load circuit.

– Rectify the short-circuit
– Reduce maximum load current to below 250 mA

Green light (gn) does not come on

Error:
No power supply.

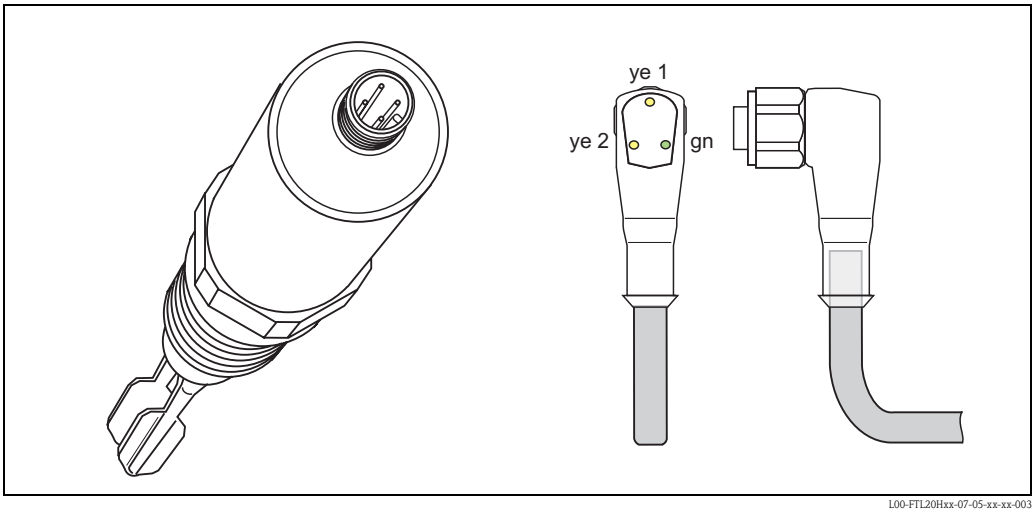
– Check plug, cable and power supply

Red light (rd) flashing (2 Hz):

Error:
Internal sensor error or sensor corroded.

– Replace device

Variant DC-PNP with M 12x1 circular connector 316L



Green light (gn) lighting:

FTL20H is connected to the power supply and is operational.

Yellow light (ye 1) lighting:

The sensor is **not** covered by liquid.

Yellow light (ye 2) lighting:

The sensor is covered by liquid.

Green light (gn) does not come on

Error:
No power supply.

– Check plug, cable and power supply

Green light (gn) lighting, both yellow lights (ye 1+2) does not come on

Error:
short-circuit in load circuit.

– Rectify the short-circuit

Error:
Internal sensor error or sensor corroded.

– Replace device

Certificates and approvals

Note!
The specified certificates and approvals are available on www.endress.com/ftl20.

CE approval

The device is in conformity with the statutory requirements of the EC Directives.
Endress+Hauser confirms successful testing of the device by affixing the CE mark.

Sanitary compatibility

EHEDG (see process connections, Page 11),
Approval number: 3119/03/0445

Overfill protection

WHG and leakage

Marine approval

German Lloyd (GL),
Approval number: 42855-02HH

Other standards and guidelines

AS-i profile S-3.A.1 as per EN 50295 (limit switch)

Ordering information

Liquiphant T FTL20H

10	**Certificate ***							
	0	Variant for non-hazardous areas,			WHG, leakage detection			
	3	CSA General Purpose,			CSA US			
	9	Special version						
20		**Process connection, material**						
		GCJ	Thread ISO228	G ½ A,	316L			
		GDJ	Thread ISO228	G ¾ A,	316L			
		GEJ	Thread ISO228	G 1 A,	316L	installation in accessory: welding neck		
		RCJ	Thread ANSI	½" NPT,	316L			
		RDJ	Thread ANSI	¾" NPT,	316L			
		RRJ	Thread DIN2999	R ½,	316L			
		RSJ	Thread DIN2999	R ¾,	316L			
		UPJ	Flush-mounted,		316L	installation in accessory: welding neck 1" 52001047		
		TCJ	ISO2852	DN 25-38 (1...1-½"),	316L	Tri-Clamp connection		
		TDJ	ISO2852	DN 40-51 (2"),	316L	Tri-Clamp connection		
		MNJ	DIN11851	DN 25 PN 40,	316L	Hygienic connection		
		MPJ	DIN11851	DN 32 PN 40,	316L	Hygienic connection		
		MQJ	DIN11851	DN 40 PN 40,	316L	Hygienic connection		
		YY9	Special version					
30			**Electronics**					
			1	19...253 V AC, 2-wire				
			2	10... 35 V DC, PNP 3-wire				
			3	AS-i bus				
			9	Special version				
40				**Additional equipment**				
				B	Valve connector	Pg 11,	ISO4400,	150 °C, IP65
				C	Valve connector	NPT ½",	ISO4400,	150 °C, IP65
				D	Connector	M 12x1,	PPSU,	150 °C, IP66/67
				E	Valve connector with QUICKON connection, insulation displacement connection,			150 °C, IP65
				F	Connector	M 12x1,	316L,	150 °C, I66/68/69K
				Y	Special version			
FTL20H					Order code			

* The specified certificates and approvals are available on www.endress.com/ftl20.

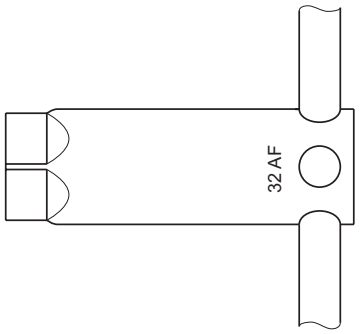
Accessories

Note!
All dimensions in mm

Socket wrench

Order number: 52010156

Socket wrench AF 32



L00-FTL20xxx-00-05-xx-en-001

Welding boss G ¾

Order number: 52018765

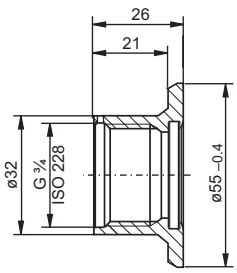
- For flush-mounted installation and sealing
- Sensor cannot be aligned

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

Weight: 0.13 kg

Seal: silicone O-ring
Order number: 52019735

FDA-listed materials as per 21 CFR Part 175-178



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

max. 25 bar
max. 150 °C

max. 40 bar
max. 100 °C

Welding boss G 1

Order number: 52001051

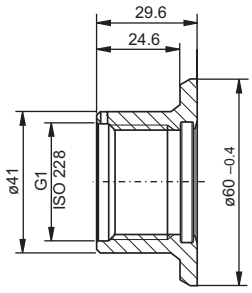
- For flush-mounted installation and sealing
- Sensor cannot be aligned

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

Weight: 0.19 kg

Seal: silicone O-ring
Order number: 52001386

FDA-listed materials as per 21 CFR Part 175-178



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

max. 25 bar
max. 150 °C

max. 40 bar
max. 100 °C

Welding neck

Order number: 52001047
With 3.1.B material certificate: 52006909
for flush-mounted installation and sealing
of a Liquiphant FTL50H, FTL20H
with process connection EE2, UPJ

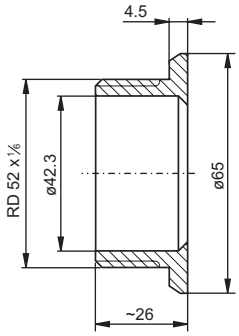
- Sensor can be aligned

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

Weight: 0.15 kg

Seal on Liquiphant
Order number: 942816-0000

FDA-listed materials as per
21 CFR Part 175-178



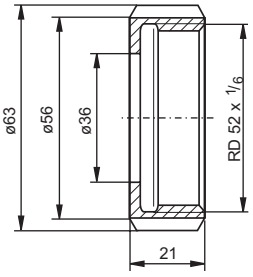
L00-FTL5xxxx-06-05-xx-xx-022

Coupling nut

Order number: 52021715
for connection UPJ or
welding neck 52001047

DIN 11851-F25-1.4301

Weight: 0.17 kg



L00-FTL20Hxx-06-05-xx-xx-007

Cable

Order number: 52010285

4 x 0,34 M 12 socket

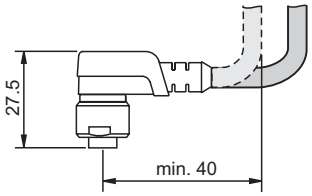
Cable: PVC (grey) 5 m length

Body: PUR (blue)

Coupling nut: Cu Sn/Ni

Protection: IP67

Temperature range: –25 °C to +70 °C



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

Order number: 52018763

4 x 0,34 M 12 socket with integrated LEDs

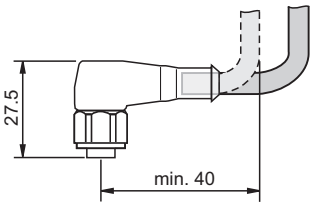
Cable: PVC (orange) 5 m length

Body: PVC (transparent)

Coupling nut: 316L

Protection: IP69K (fully locked)

Temperature range: –25 °C to +70 °C



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

Supplementary documentation

Operating Instructions

- FTL20H
  KA214F/00
  Order number: 52019486
- Welding boss G ¾
  KA219F/00
  Order number: 52020163

Certificates

- Liquiphant FTL20, FTL20H
  Allgemeine bauaufsichtliche Zulassung Z-65.11-311
  ZE247F/00
- Liquiphant FTL20, FTL20H (Leckage)
  Allgemeine bauaufsichtliche Zulassung Z-65.40-312
  ZE248F/00
- Liquiphant FTL20, FTL20H
  Number of the Certification Document 37102
  ZE249F/00
- Liquiphant FTL20, FTL20H
  Certificate of Compliance No. 1238461
  ZE250F/00

Note!
The specified certificates and approvals are available on www.endress.com/ftl20.

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