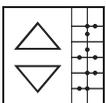
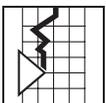
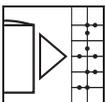


Liquid Level Limit Switch *liquiphant T FTL 20*

Level limit switch for liquids



Applications

The Liquiphant T FTL 20 is a level limit switch for virtually any kind of fluid and is used in tanks, containers and pipelines.

It is used in cleaning and filtering systems and coolant and lubricant tanks for overspill protection or as a pump protector. The FTL 20 is ideal for applications which previously used float switches, conductive, capacitive or optical sensors.

The FTL 20 works in applications which are unsuitable for these measuring methods due to conductivity, changing dielectric, build-up, turbulence, flow or air bubbles.

The FTL 20 is not suitable for hazardous areas, sanitary applications or applications where the fluid temperature is above 212°F (100°C).

Benefits at a glance

- Operational safety, reliability and universal applicability through use of the tuning fork measuring principle
- External test option using test magnet
- On-site indicator using LED display
- Easy to install even at points difficult to access due to compact construction and 1/2" or 3/4" process connection
- Rugged 316L stainless steel housing
- Service-friendly plug-in connections

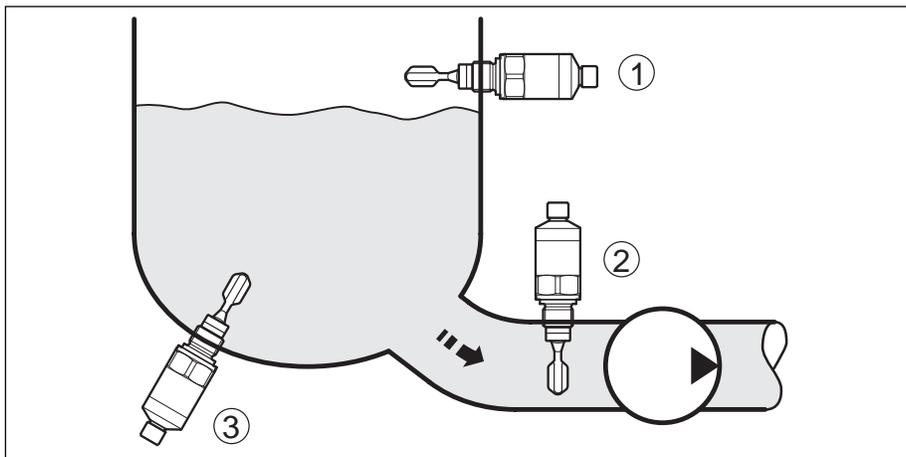
Function and system design

Function

The FTL 20 tuning fork is excited to its resonant frequency by means of a piezoelectric drive. This frequency changes if the tuning fork is covered by a fluid. The FTL 20 electronics monitor the resonant frequency and indicate whether the tuning fork is oscillating in air or whether the forks are covered with fluid.

Installation examples

The FTL 20 can be installed in any position in a tank or pipe. The formation of foam does not impair its function.



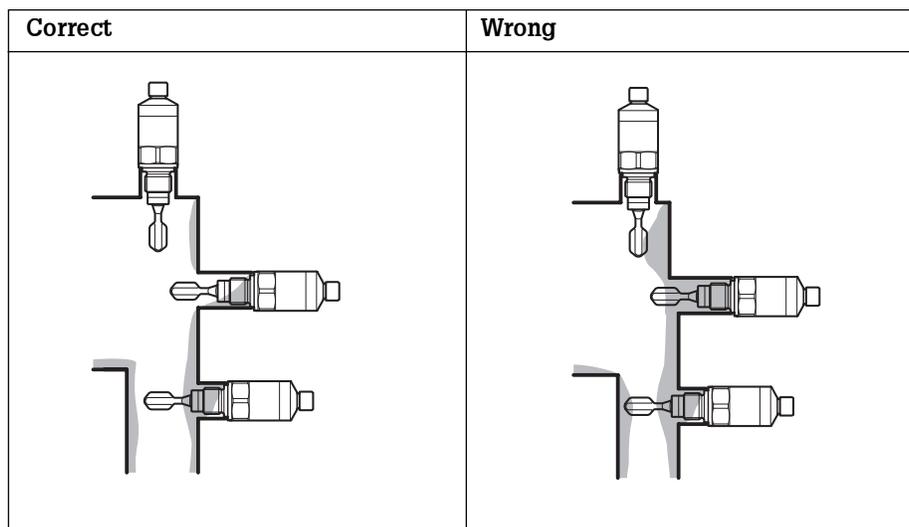
Example ①: Overspill protection or high level detection

Example ②: Dry running protection for pumps

Example ③: Low level detection or dry running protection

Application instructions

The FTL 20 is suitable for any fluid which drips from the fork of the FTL 20 so that the fork can oscillate freely. The fluid may also contain solids which are smaller than 0.20" (5 mm). The Liquiphant even functions when a slight build-up (deposit) has formed on the fork. However, fluids which form heavy build-up may prevent the fork from oscillating freely. When installed in confined spaces or when viscous fluids are used, fluid may not drop off the fork sufficiently. The sensor then incorrectly detects the fork as being covered.



Operating modes for AC and DC-PNP versions

The FTL 20 can be connected in two operating modes. Depending on the operating mode selected (MAX or MIN safety), the FTL 20 will switch off safely in the event of a fault (e.g. if the power supply is interrupted).



MAX - maximum fail-safe mode

- The FTL 20 keeps the electronic switch closed as long as the fluid level is below the fork
- Example application: overspill protection



MIN - Minimum fail-safe mode

- The FTL 20 keeps the electronic switch closed as long as the fork is immersed in fluid
- Example application: empty tank or dry run protection of pumps

The electronic switch opens if the limit is reached, if a fault occurs or in the event of a power failure. For the status of the indicator light, see below.

Indicator signals and faults

The FTL 20 LED indicator is located on the wiring connection side of the unit. The green LED is always lit when unit is powered.

AC and DC-PNP versions with angle plug connector

Indicator light	State / Action
Red LED comes on	Operating mode MAX (overspill protection): Sensor immersed in fluid
	Operating mode MIN (dry pump protection): Sensor is not immersed in fluid
Green LED not ON	Error: no power supply <ul style="list-style-type: none"> • Check connector plug, cable and power supply
Red LED flashing	Error: Overload or short-circuit in load circuit <ul style="list-style-type: none"> • Check and repair short-circuit • Reduce max. load current to below 250 mA
	Error: Internal sensor error or sensor corroded <ul style="list-style-type: none"> • Replace unit

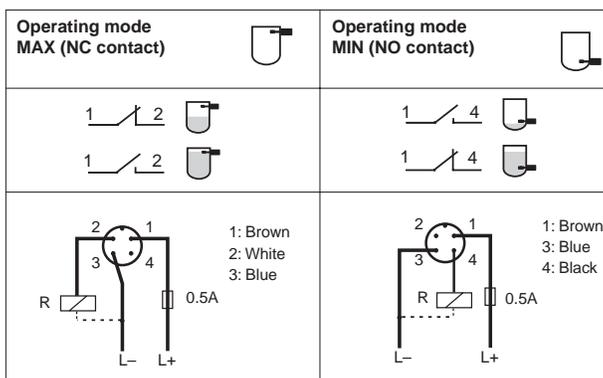
AS-i and DC-PNP versions with M12 x 1 micro connector

Indicator light	State / Action
Yellow LED comes ON	Sensor immersed in fluid
Red LED comes ON AS-i version	Error: Address 0 set or communication error <ul style="list-style-type: none"> • Carry out addressing process • Parameterize slave • Reduce line length, < 328 ft (100 m) total length
Red LED comes ON DC-PNP version	Error: Overload or short-circuit in load circuit <ul style="list-style-type: none"> • Check and repair short circuit • Reduce max. load current to below 250 mA
Green LED not ON	Error: No power supply <ul style="list-style-type: none"> • Check connector plug, cable and power supply
Red LED flashing (2 Hz)	Error: Internal sensor error or sensor corroded <ul style="list-style-type: none"> • Replace unit

DC-PNP connection

Micro connector M12 x 1

Voltage source: Safety extra-low voltage Class 2 circuit



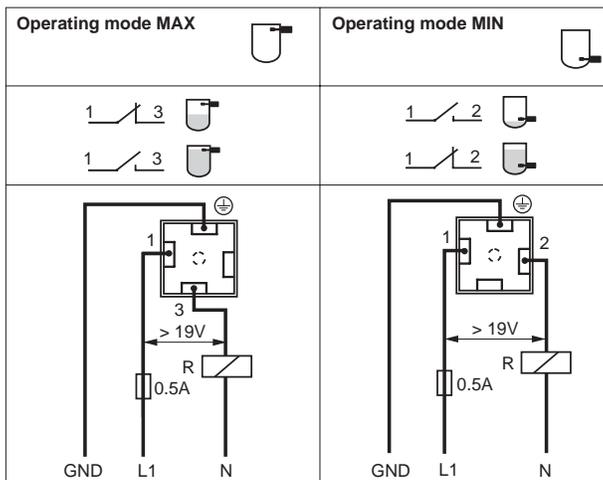
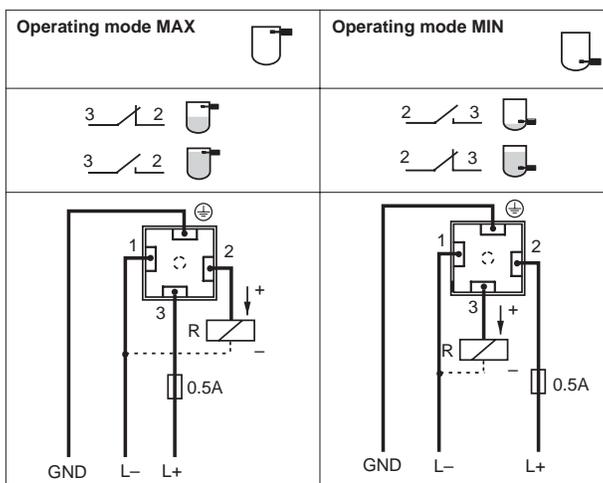
Suitable for dual-output operation:

When both outputs 2 and 4 are wired simultaneously, the NO and NC outputs maintain opposite states in normal operation.

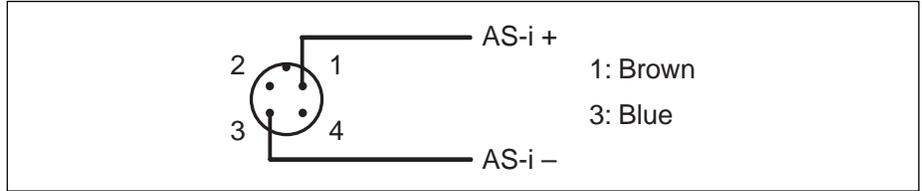
Both electronic switches are open in the event of a fault or if the power supply is interrupted.

In addition to level monitoring, function-dependent sensor monitoring can also take place using dual-output operation.

Angled plug connector



AS-i bus connection



AS-i programming instructions
 AS-i-Profile: S-1.A.E

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 State = OK
D0: 0 Sensor free	D1: 0 State = error
D2 and D3 are not used	

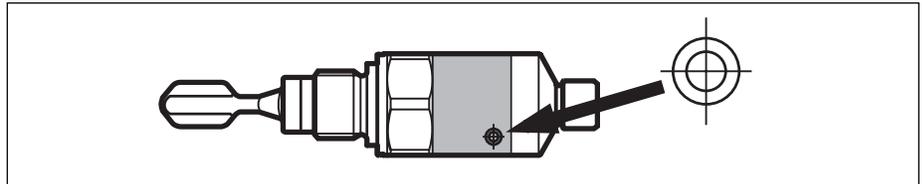
Parameter bits (P0 to P3) are not used.

Test using test magnet 

Function

FTL 20 AC and DC-PNP versions can be tested for function by placing a magnet on the nameplate mark (see graphic below). The current state of the electronic switch will be reversed. The FTL 20 AS-i version is tested in the same fashion. The D0 data bit is inverted.

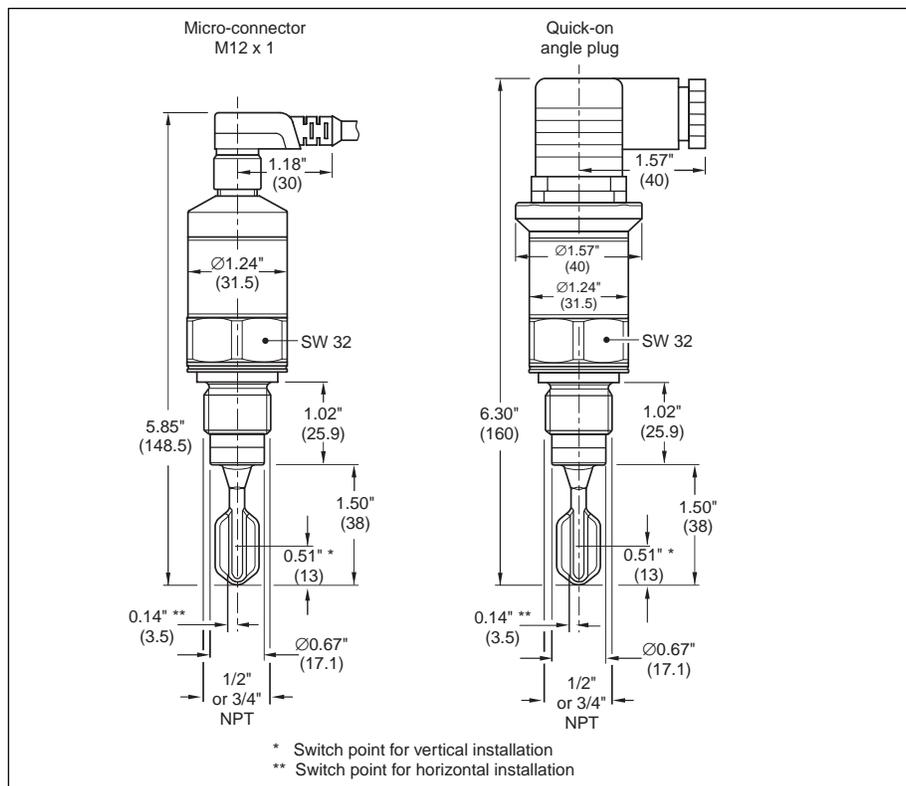
In both versions, the switching state changes.



NOTE: A test magnet is supplied with the instruction manual

Mechanical construction

Dimensions and mounting details



Switch points at: density 1 / 73°F / 0 psig (1 / 23°C / 0 bar)

Materials

Tuning fork, process connection and housing, 316L SS
Wiring connector, PPSU

Process connection

Threaded, 1/2" and 3/4" NPT, G (BSPP - DIN/ISO 228), or R (BSPT - DIN 2999, ISO 7-1) threads

Connection cable

Angle plug, 16 AWG maximum (1.5 mm²), diameter 0.24" to 0.35" (6 to 9 mm)
Angle QUICKON plug, 18 to 22 AWG (0.34 to 0.75 mm²), diameter 0.14" to 0.25" (3.5 to 6.5 mm)
Micro connector M12 x 1, pin assignment as per IEC 60 947-5-2

Power supply

AC version

Supply voltage: 19 to 253 VAC, 50/60 Hz
Connectable load: maximum 250 mA (auto. load verification on connection)
Supply current: maximum 3.8 mA
Connector: 90° angle plug

DC-PNP version

Supply voltage: 10 to 35 VDC
Power supply: safety extra-low voltage, Class 2 circuit
Connectable load: maximum 250 mA (overload proof)
Supply current: maximum 15 mA
Connector: 90° angle plug or micro connector M12 x 1

AS-i-bus

According to AS-i Association specification V.2.1, Slave profile S-1.A.E
Supply voltage: 26.5 to 31.6 V
Connectable load: EN 50295 and IEC 62026-2
Supply current: Maximum 25 mA
Connector: micro connector M12 x 1

Operating conditions

Ambient temperature	-40° to + 158°F (-40° to + 70°C) AS-i-bus, -13° to +158°F (-25° to + 70°C)
Process temperature	-40° to +176°F (-40° to +80°C); -40° to +212°F at ambient temperature up to 122°F (50°C)
Operating pressure	-14.5 psig to +580 psig (-1 to +40 bar)
Fluid density	Minimum 0.7 SGU
Fluid viscosity	Maximum 10,000 cP
Climatic class	IEC 60068 Part 2 - 38 Pattern 2a
Protection per EN 60529	NEMA 4 (IP 65) with angle connector plug NEMA 6 (IP 65 / IP 67) with micro connector M12 x 1
EMV AC and DC-PNP	Interference emission to EN 61326; Electrical Equipment Class B Interference immunity to EN 61326; Annex A (industrial) and NAMUR Recommendation NE 21 (EMC)
EMV AS-i	EN 50295
Storage temperature	-40° to +185°F (-40° to +85°C)

Output

Switch time	Approximately 0.5 seconds on coverage; approximately 1 second after fork becomes uncovered.
Switch hysteresis	Approximately 0.12" (3 mm) for vertical installation Approximately 0.08" (2 mm) for horizontal installation

Certificates and approvals

Along with the Technical Information and Instruction Manuals, the certificates can be obtained free of charge at <http://www.us.endress.com/FTL20>.

CSA + CSA US	Standard	Certificate No.
	CAN/CSA-C22.2 No. 1010.1-92 UL 3121-1 (IEC 601010)	1238461 MC 151079
AS-i version	V.2.1 Slave Profile S-1.A.E.	37101
CE Mark	By attaching the CE Mark, Endress+Hauser confirms that the instrument fulfills all the requirements of the relevant EC directives.	

Accessories

Socket wrench (AF 32) for installing FTL 20 into process connection
Order Number: 52010156
15 ft (5 m) PVC connecting cable with M12 x 1 micro connector
Order Number: 52010285

Ordering information

FTL 20 vibration level limit switch for liquids

FTL 20 - 1 2 3 4

- 1 Certificate
 - 3 General purpose, CSA and CSA US *
- 2 Process connection / material
 - 0 G 1/2" BSPP / 316L SS, DIN/ISO 228
 - 1 G 3/4" BSPP / 316L SS, DIN/ISO 228
 - 2 1/2" NPT / 316L SS
 - 3 3/4" NPT / 316L SS
 - 4 R 1/2" BSPT / 316L SS DIN 2999, ISO 7-1
 - 5 R 3/4" BSPT / 316L SS DIN 2999, ISO 7-1
- 3 Electronics
 - 1 19 to 253 VAC, 2-wire
 - 2 10 to 35 VDC, PNP 3-wire
 - 3 AS-i-Bus
- 4 Electrical connector
 - 0 Angle plug, PG 11, ISO 4400 (AC and DC only)
 - 4 Angle plug, 1/2" NPT, ISO 4400 (AC and DC only)
 - 5 M12 x 1 micro connector (DC and AS-i only)
 - 6 Angle plug with QUICKON connection

* The CSA US Mark signifies that the product has been evaluated to the applicable CSA and ANSI / UL Standards for use in Canada and the US respectively.

For application and selection assistance,
in the U.S. call 888-ENDRESS

For total support of your installed base, 24 hours
a day, in the U.S. call 800-642-8737

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