Technical
Information
TI 245F/00/en

Limit Switch
liquiphant FTL 330 L

Vibration limit switch for liquid foodstuffs Compact design with water-proof stainless steel housing





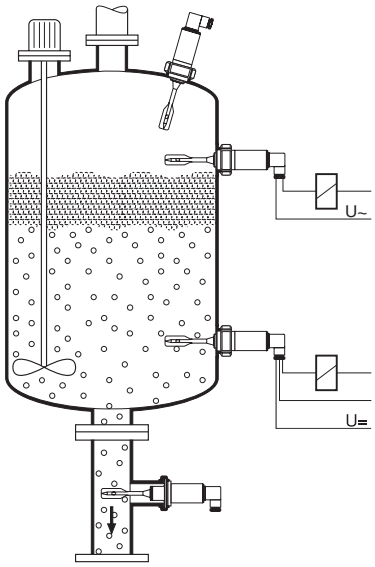




Application
The Liquiphant is a universal limit switch for level detection of liquid foodstuffs in storage tanks, process tanks, and piping.

It can also be used in systems where other measuring principles cannot be used: e.g. for pastes, build-up, turbulence, liquid flow, gas bubbles and rapid temperature variations when cleaning.

Features and Benefits
- Small, slender design: low space requirement, easy mounting in places with limited access
- Large selection of sanitary process connections: easy to install in existing plants
- Stainless steel housing: rugged
- Switching status and external testing: simple control
- Ingress protection IP 68: always water-tight even when submerged



Measuring System
The Liquiphant FTL 330 L is a compact limit switch to which contactors, magnetic valves and programmable logic controllers (PLC) can be directly connected.

Endress+Hauser
The Power of Know How

Function and Dimensions

The symmetrical vibrating fork is excited to its resonant frequency which changes when the fork is submerged in liquid. The change is registered by the electronics, which actuate an electronic switch.
The Liquiphant FTL 330 L can be operated in both minimum and maximum fail-safe mode, i.e. the electronic switch opens on reaching the limit value, in cases of fault or a loss of power.

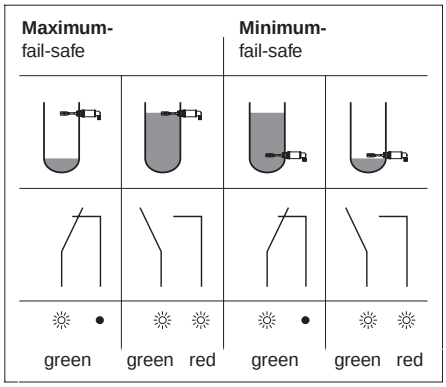
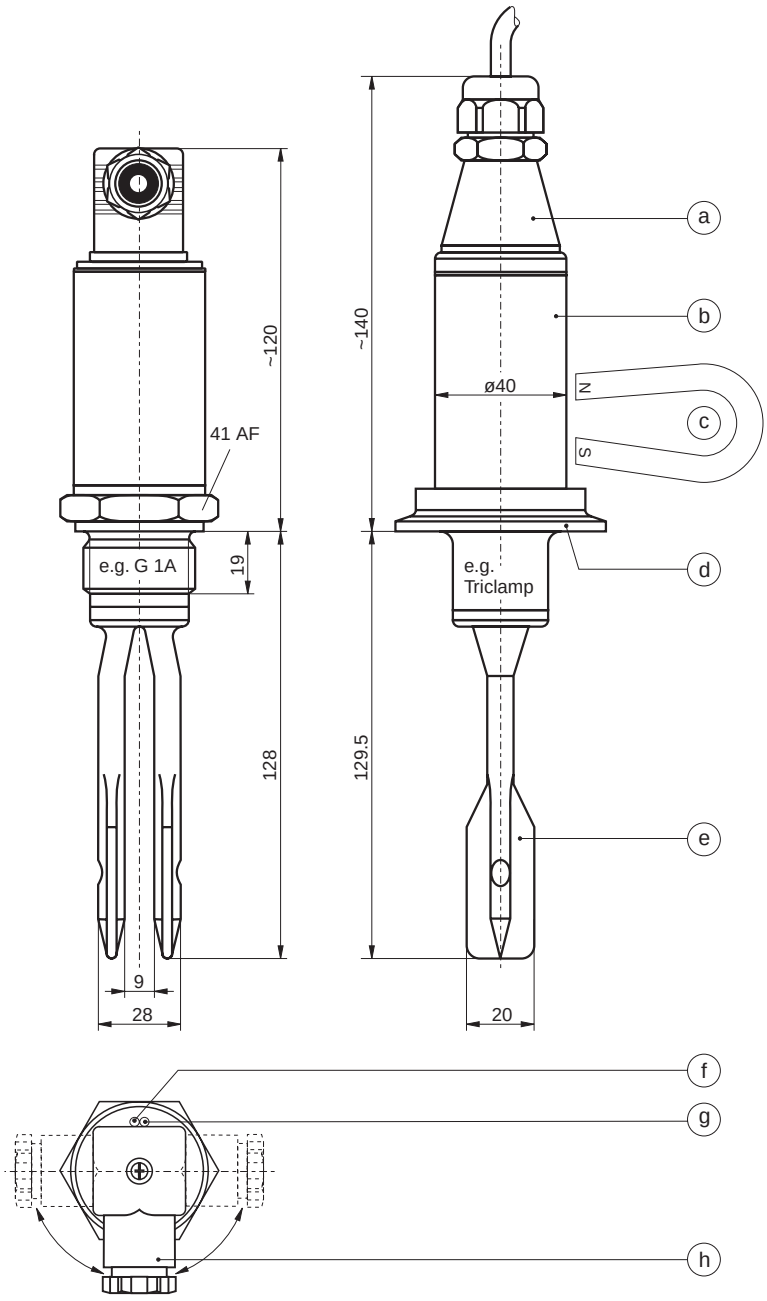


Diagram showing function of the **electronic** switch and LEDs



a) Electrical connection with a standard plug and with cable gland Pg 11 (IP 65 / 67) or permanently attached cable (IP 68).
The fail-safe mode is determined by the way the connection is wired.

b) The stainless steel housing protects the potted electronics

c) The switching function can be checked externally by placing a magnet on the housing

d) Process connection versions:
- G 1 A thread
- For flush-mounted connection with weld-in adapter (see accessories)
- Triclamp 1½",
- Triclamp 2"
- DN 40 sanitary thread
- DN 50 sanitary thread
- DN 51 SMS
- DN 65 DRD flange
- DN 50 (50/40) Varivent

All connections are in stainless steel with polished wetted parts

e) Vibrating fork in solid stainless steel, polished

f) Green LED "operating mode"

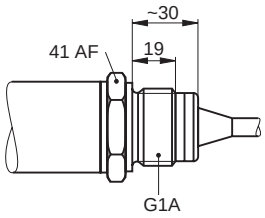
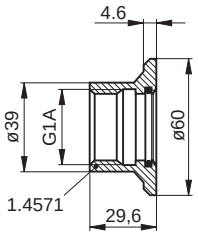
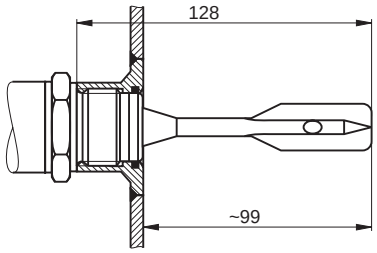
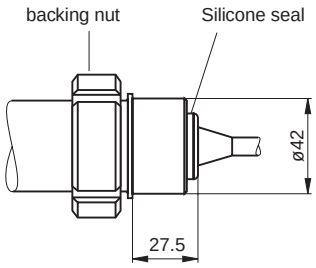
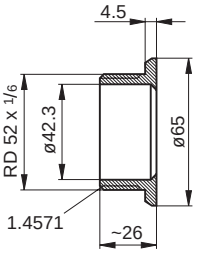
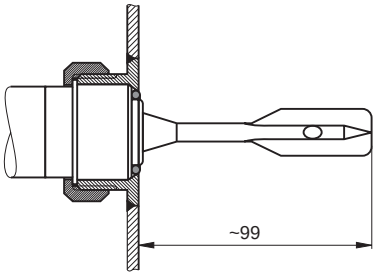
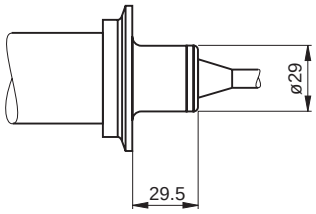
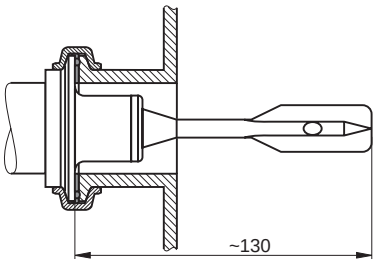
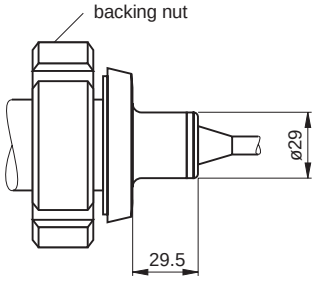
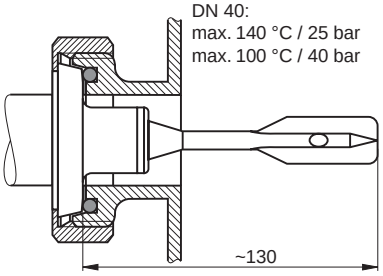
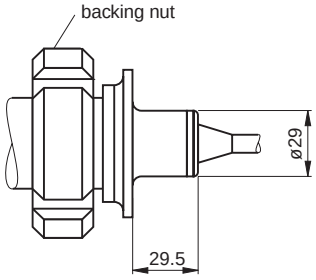
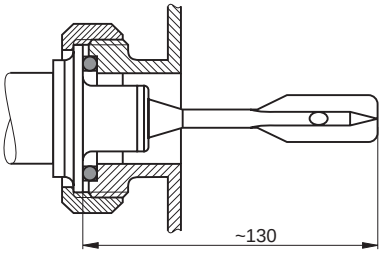
g) Red LED to indicate switching mode "circuit open"

h) The plug housing can also be fitted offset by ± 90°

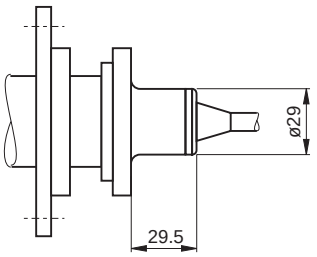
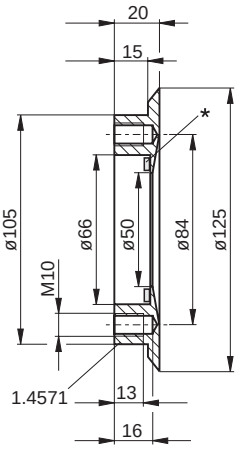
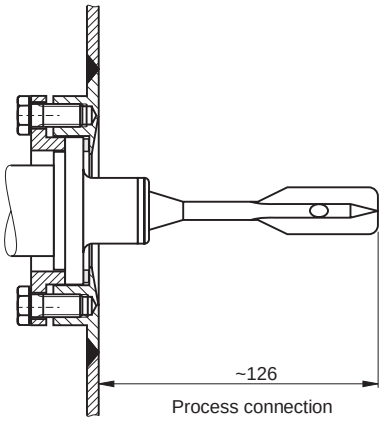
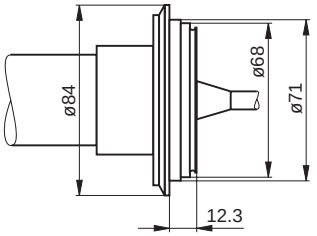
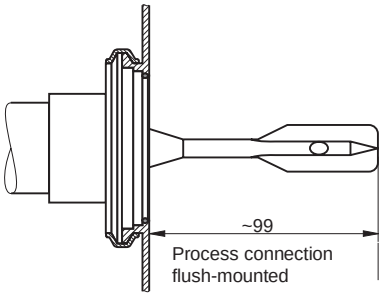
Dimensions in mm
100 mm = 3.94 in
1 in = 25.4 mm

Process Connections, Specifications

x °C = (1.8 x + 32) °F
1 bar = 14.5 psi

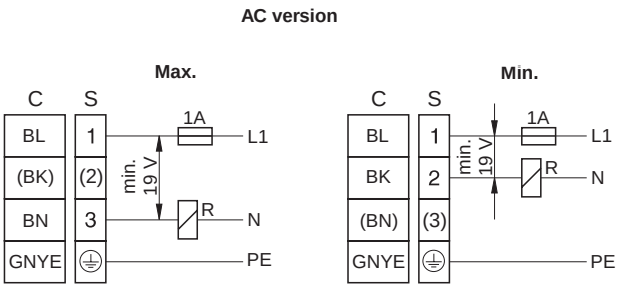
	Scope of supply	Mounting accessories	Final assembly
Process connection G = G 1 A		 **Weld-in socket** (fork orientation fixed) with FPM O-ring -Endress+Hauser-	 Process connection flush-mounted max. 150 °C / 25 bar max. 100 °C / 40 bar
Process connection F = flush-mounted connection E+H		 **Weld-in adapter** (fork orientation variable) -Endress+Hauser-	 Process connection flush-mounted max. 100 °C / 40 bar
Process connection U = Triclamp 1 ½" **Process connection T = Triclamp 2"**		**Tension ring (clamp) and front seal** -supplied by customer-	 max. 120 °C / 16 bar
Process connection P = sanitary thread DN 40 **Prozess connection M = sanitary thread DN 50**		**Sealing ring** with collar -supplied by customer-	DN 40: max. 140 °C / 25 bar max. 100 °C / 40 bar  DN 50: max. 140 °C / 25 bar
Process connection S = SMS, DN 51 (2")		**Sealing ring** -supplied by customer-	 max. 140 °C / 25 bar

x °C = (1.8 x + 32) °F
1 bar = 14.5 psi

	Scope of supply	Mounting accessories	Final assembly
Process connection D = DRD, DN 65 (2")	Pressure flange, 4 bore holes ø11.5 reference circle ø84 	 **Weld-in flange** with PTFE sealing ring* -Endress+Hauser- or -supplied by customer-	 Process connection flush-mounted max. 150 °C / 25 bar max. 100 °C / 40 bar
Process connection V = Varivent®, DN 50 (50/40)		**Tension ring (clamp) and O-ring seal** -supplied by customer-	 Process connection flush-mounted max. 120 °C / 10 bar

The specified limits for temperature and pressure apply in each case to the limit switch with special process connection.
Also note the limits for the seal and clamping ring used!

Electrical Connection



Electrical connection depending on version and fail-safe mode

Max. = maximum fail-safe

Min. = minimum fail-safe

C = cable connection

BU = blue
BK = black
BN = brown
GNYE = green/yellow

S = plug connection

R = external load

AC Version

A load must always be connected in series with the Liquiphant!
Note the voltage drop across the Liquiphant in closed mode (max. 12 V) and residual current in open mode (max. 3.8 mA). For low line voltages, a minimum voltage of 19 V is required for the Liquiphant to switch correctly.

DC Version

Recommended when used with programmable logic controllers (PLC). Positive signal at the switching output of the Liquiphant (PNP).

The fail-safe mode is determined by the way the connection is wired.

Technical Data

Output
AC version

Power supply	Voltage at terminals: 19 ... 253 V, 50 / 60 Hz, current consumption (stand-by) max. 4 mA
Connectable load (load switched via thyristor directly into the power supply circuit)	Short-term (40 ms) max. 1.5 A, max. 375 VA at 253 V or max. 36 VA at 24 V (no short-circuit protection) Continuous max. 87 VA at 253 V, max. 8.4 VA at 24 V min. 2.5 VA at 253 V (10 mA), min. 0.5 VA at 24 V (20 mA) Voltage drop across FTL 330 L max. 12 V Residual current max. 4 mA with open thyristor

Output
DC version (PNP)

Power supply	0 ... 55 V, ripple max. 1.7 V, 0 ... 400 Hz, current consumption max. 15 mA, reverse polarity protection
Connectable load (load switched via PNP transistor)	Short-term (1 s) max. 1 A, max. 55 V (overload and short-circuit protection) continuous max. 350 mA max., 0.5 µF at 55 V, max. 1.0 µF at 24 V Residual voltage < 3 V (with closed transistor) Residual current < 100 µA (with open transistor)

Output General Information

Fail-safe mode	Minimum or maximum fail-safe mode, depending on load connection
Signal failure	Output open
Switching time	Approx. 0.5 s when covered, approx. 1.0 s when free
Hysteresis	Approx. 4 mm with vertical mounting

Process conditions

Orientation	As required
Ambient temperature	– 40 °C ... +70 °C, see also graphs on Page 6
Temperature of product	– 40 °C ... +150 °C, see also graphs on Page 6
Operating pressure p_e	– 1 bar ... +40 bar, see also graphs on Page 6
Storage temperature	– 40 °C ... +85 °C
Climatic protection	Climatic protection to IEC 68, Part 2-38, Fig. 2a
Ingress protection to EN 60 529	With plug (cable gland Pg 11) IP 65 / 67, with cable IP 68 (24 h, 1.5 m)
Electromagnetic compatibility	By attaching the CE mark, Endress+Hauser confirms that the Liquiphant FTL 330 L fulfils all legal requirements of EC directives. Interference immunity to EN 50082-2 (field strength 10 V/m), Interference emission to EN 50081-1
Density ρ of product	min. 0.7 g/cm^3
Viscosity ν of product	up to 10000 mm^2/s

Mechanical construction

Design	Compact unit
Dimensions	See dimensional sketch on Page 2 and process connections on Pages 3 and 4
Materials	Process connection and vibrating fork: stainless steel 1.4571 (AISI 316 Ti) Housing: stainless steel 1.4404 (AISI 316 L); Housing cover: PPSU Plug: PA, Plug seal: EPDM Cable insulation: PUR; Cable gland: PPSU, PA with silicone seal
Process connections	• Parallel thread G 1 A to DIN ISO 228/I with flat seal 33x39 to DIN 7603 • Flush-mounted version for weld-in adapter to Endress+Hauser in-house standards • Triclamp 1½ “, 2" to ISO 2852 • Sanitary thread DN 40, DN 50 to DIN 11851 • SMS connection DN 51 (2") • DRD flange DN 65 • Varivent® , DN 50 (50/40), to Tuchenhagen standards
Electrical connection	4-pole plug connection to DIN 43650-A, ISO 4400 with cable gland Pg 11 for cable diameters 6 to 9 mm, max. cross section 1.5 mm^2 or 5 m permanently attached cable, 4 x 0.75 mm^2

Ordering

Product structure	See product structure on Page 6
Accessories	• Weld-in socket with fixed fork orientation for process connection G: Order No. 917969-1000 • Weld-in adapter with variable fork orientation for process connection F: Order No. 942329-0001 • Weld-in flange with positioning of fork for process connection D: Order No. 916743-0000 • Socket spanner 41 AF for process connection G: Order No. 942667-0000 • Test magnet: Order No. 016 920-0000
Supplementary documentation	System Information “Liquiphant” SI 007F/00/e

FTL 330 L **Limit switch**

Certificate **Basic weight**

R Standard
C CSA General purpose

Process Connection

G	G 1 A thread (parallel)*	0.26 kg
F	Flush-mounted for weld-in adapter*	0.53 kg
U	Triclamp 1½"	0.25 kg
T	Triclamp 2"	0.34 kg
P	Sanitary thread DN 40	0.56 kg
M	Sanitary thread DN 50	0.76 kg
S	SMS connection DN 51 (2")	0.66 kg
D	DRD flange DN 65	0.74 kg
V	Varivent® DN 50	0.89 kg
Y	Others	

* see accessories

Sensor Surfaces **Additional weight**

B Surface finish <1.5 µm
S Surface finish < 0.5 µm

Electronics

1 Two-wire AC connection 19 ... 253 V
2 Three-wire DC connection 10 ... 55 V (PNP)

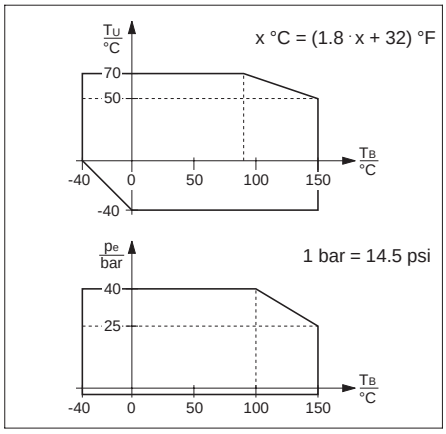
Version

S	With plug connection, IP 65 / 67 (cable gland Pg 11)	
C	With 5 m cable, IP 68	0.30 kg
Y	Others	

FTL 330 L- [ ][ ][ ][ ][ ][ ] Full product designation

1 kg = 2.2 lbs

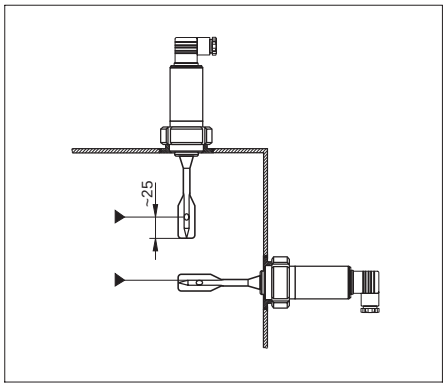
Product Structure



Top graph:
Limit values for ambient temperature T_U at housing are dependent on the operating temperature T_B in the tank.

Bottom graph:
Limit values for operating pressure p_e are dependent on the operating temperature T_B in the tank.

See also process connections, specifications



▶ Switchpoint is dependent on orientation

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