Датчики уровня Liquiphant FTL330H, Liquiphant FTL330L

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Limit Switch
liquiphant FTL 330 L

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

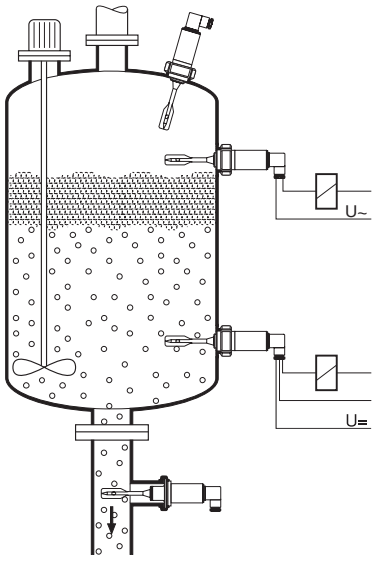
Application

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.

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.

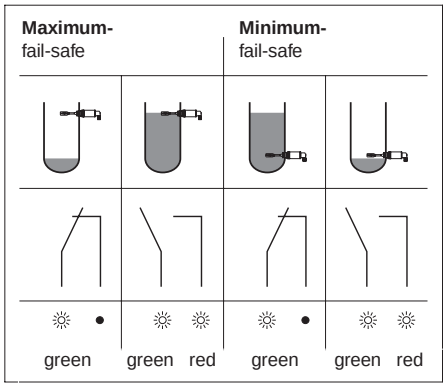
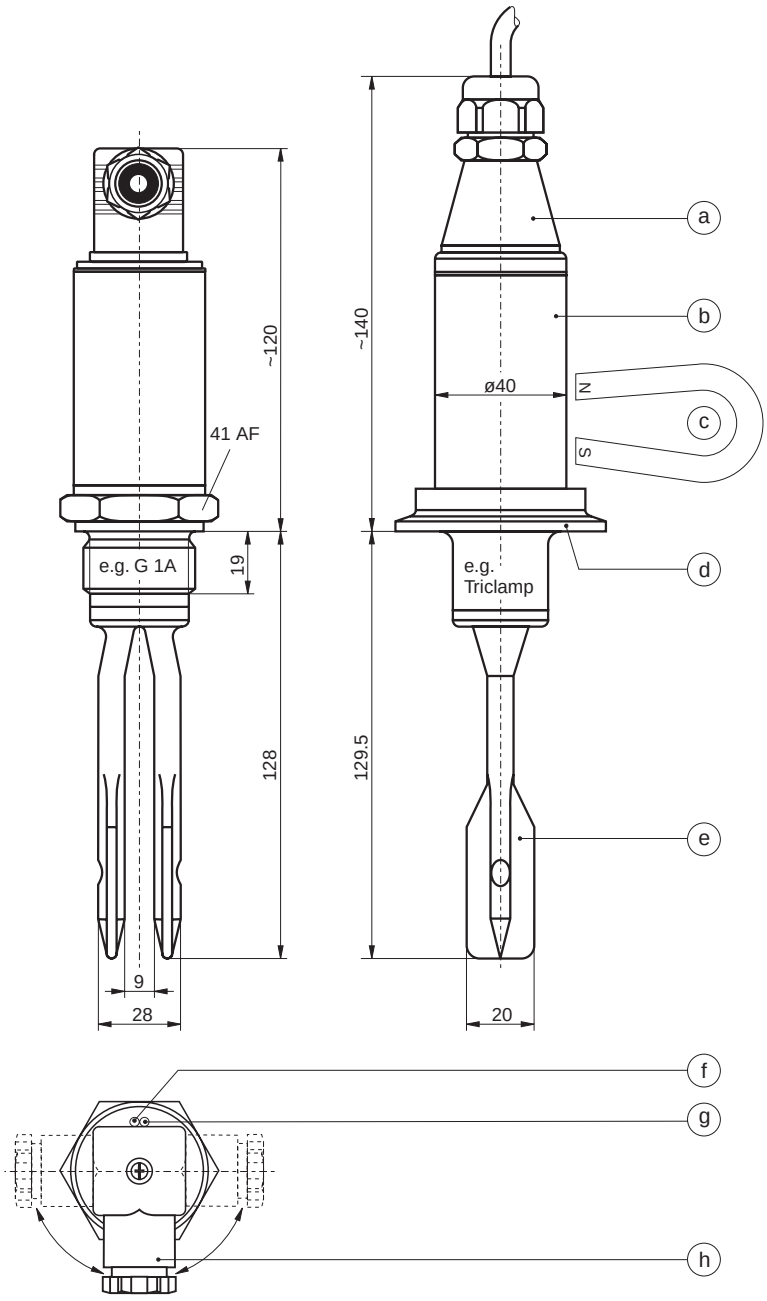


Diagram showing function of the **electronic** switch and LEDs



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"

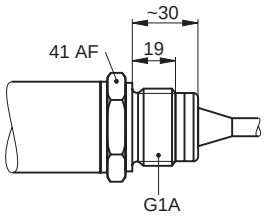
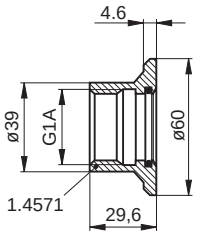
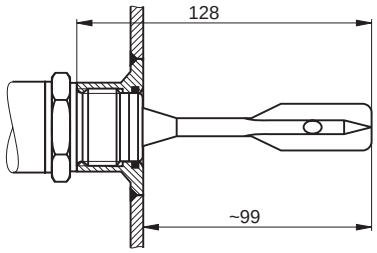
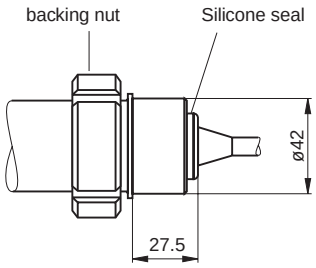
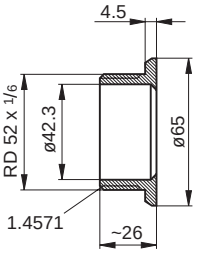
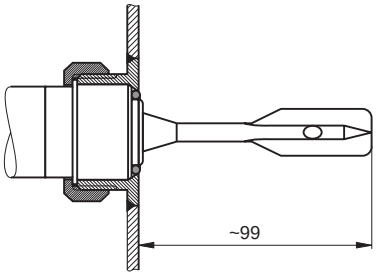
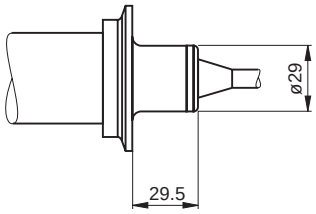
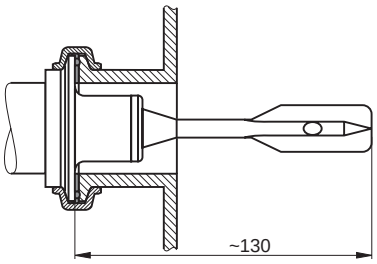
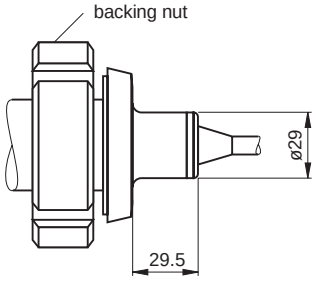
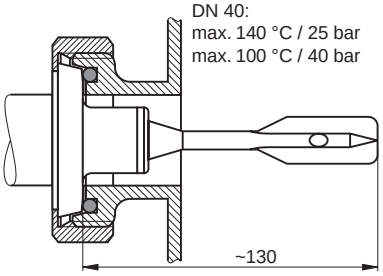
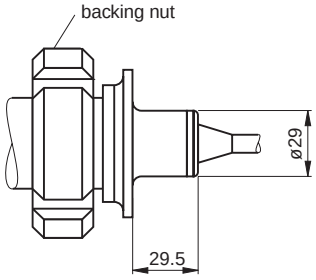
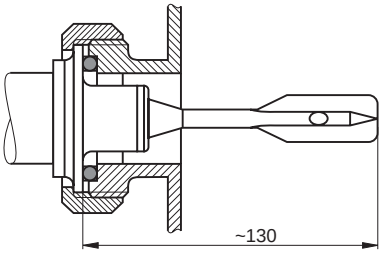
g) Red LED to indicate switching mode "circuit open"

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

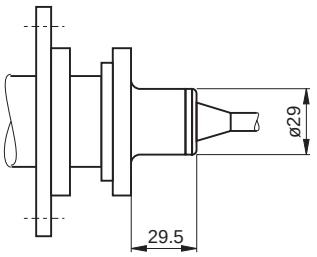
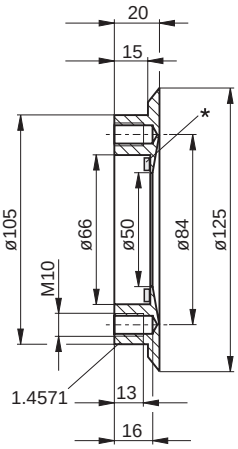
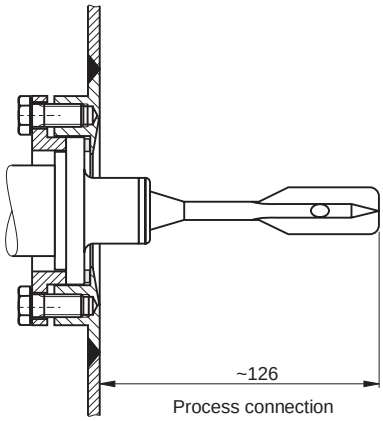
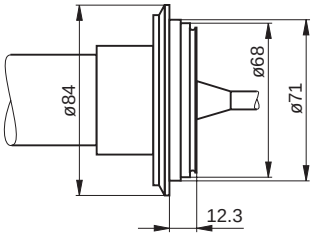
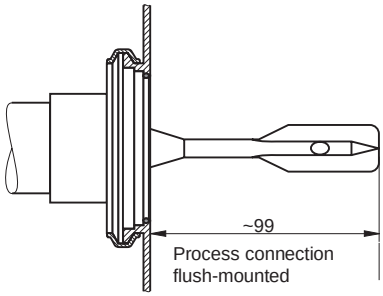
Dimensions in mm
100 mm = 3.94 in
1 in = 25.4 mm

Process Connections, Specifications

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

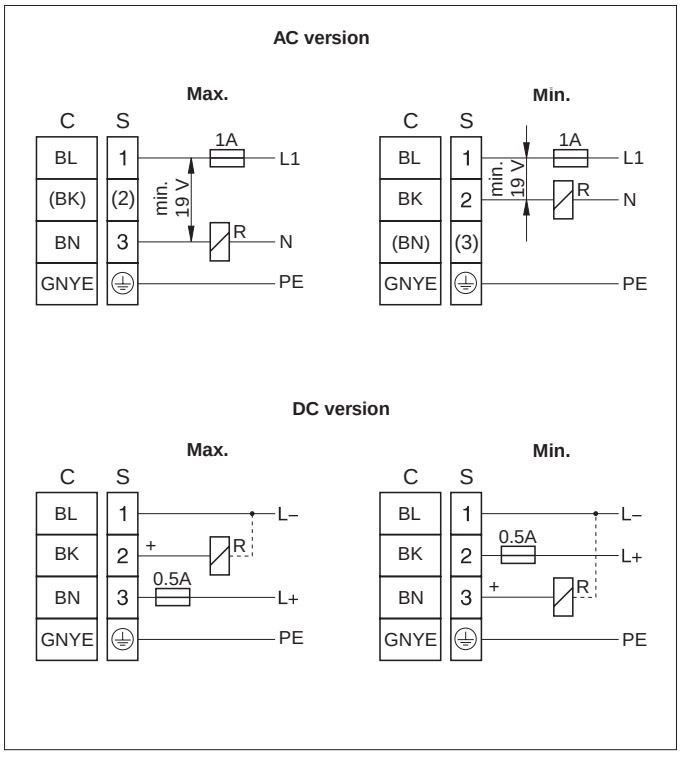
	Scope of supply	Mounting accessories	Final assembly
Process connection G = G 1 A		 **Weld-in socket** (fork orientation fixed) with FPM O-ring -+Hauser-	 Process connection flush-mounted max. 150 °C / 25 bar max. 100 °C / 40 bar
Process connection F = flush-mounted connection E+H		 **Weld-in adapter** (fork orientation variable) -+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* 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 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 • 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

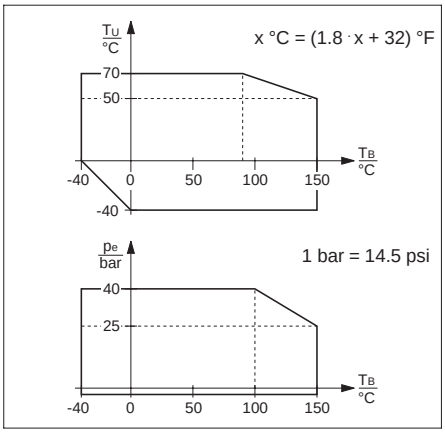
1 Two-wire AC connection 19 ... 253 V
2 Three-wire DC connection 10 ... 55 V (PNP)

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

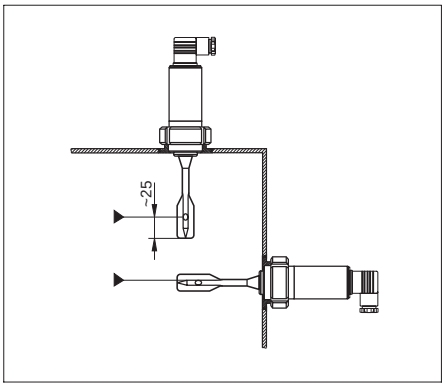
1 kg = 2.2 lbs



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

Product Structure

Level Limit Switch
liquiphant FTL 330 H

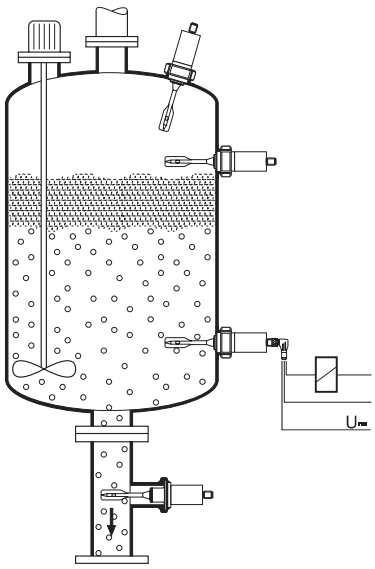
Vibration limit switch for liquid foodstuffs and pharmaceuticals Compact design with welded housing in stainless steel

Application
The Liquiphant is a limit switch for liquids in storage tanks, agitators and piping where especially high standards in hygiene are demanded both internally and externally.

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
- Stainless steel housing, welded, with M 12x1 round plug connector, ingress protection IP 66/68: always water-tight even when submerged for many hours or after intensive cleaning
- Small slender design: low space requirement, easy mounting in places with limited access
- Large selection of process connections: easy to install in existing plants
- Switching status and external testing: simple control

Measuring system
The Liquiphant FTL 330 H compact limit switch: programmable logic controllers (PLC), contactors or magnetic valves can be directly connected



Function
Dimensions
Product Structure
Connection

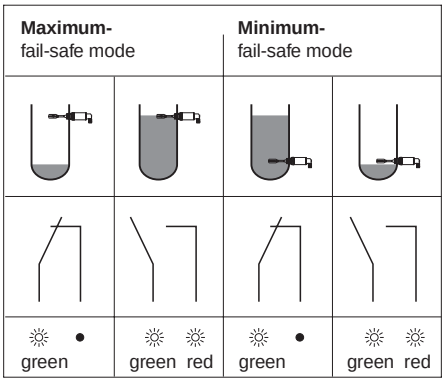
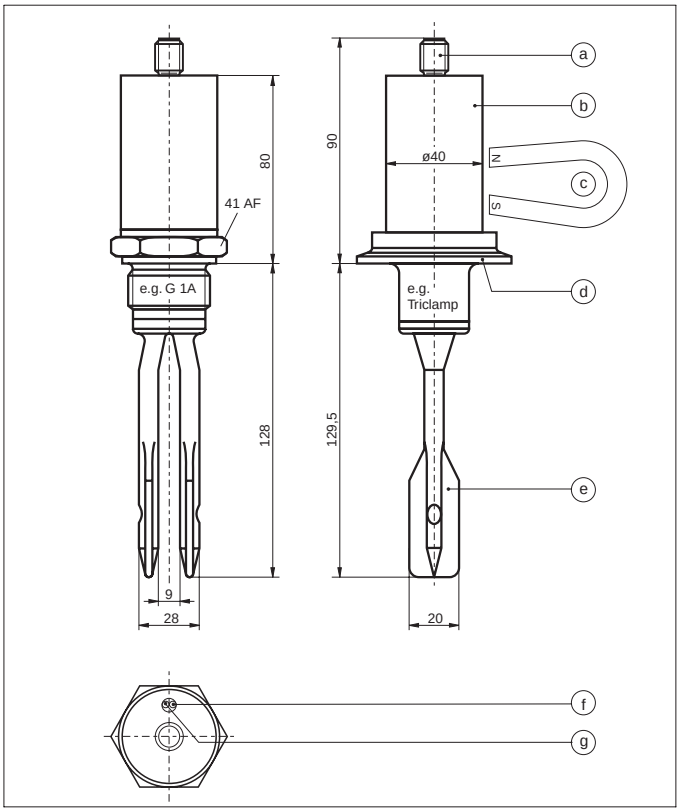


Diagram showing function of the switching transistor and LEDs

The symmetrical vibrating fork is excited to its resonance frequency which changes when the fork is submerged in liquid. The change is registered by the electronics, which actuate an electronic switch at the PNP output.

The Liquiphant FTL 330 H can be operated in both minimum and fail-safe mode, i.e. the switching transistor blocks on reaching the limit value, in cases of fault or a loss of power.



a) Electrical connection with M 12x1 round plug connection (IP 66/68).

b) Welded housing in stainless steel

c) A magnet (directly on the housing) enables the switching function to be checked from outside the unit

d) Process connection versions, all in stainless steel
see Page 3

e) Vibrating fork in solid stainless steel

f) Red LED to indicate switching "circuit open"

g) Green LED "stand-by"

100 mm = 3.94 in

FTL 330 H **Level limit switch** Product Structure

Certificate **Weigth**

R Standard

Process Connection

1	Threaded boss 1 - 11½ NPT (tapered)	0,23 kg
G	Threaded boss G 1 A (parallel)*	0,23 kg
F	Flush-mounted for weld-in adapter*	0,50 kg
U	Tri-clamp 1½"	0,22 kg
T	Tri-clamp 2"	0,31 kg
M	Sanitary thread DN 50	0,73 kg

* see accessories

Sensor Surface

A Standard finish (with process connection 1, G only)
B Polished, surface finish < 1.5 µm
S Highly polished, surface finish < 0.5 µm (with process connections F, U, T, M only)

Electronics

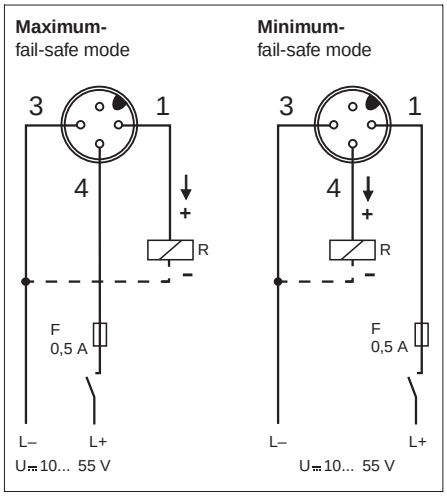
2 Three-wire DC connection (PNP) 10 ... 55 V Switching delay 0.5 / 1.0 s
3 Three-wire DC connection (PNP) 10 ... 55 V Switching delay 0.5 / 0.5 s

Version

0 Standard
9 Others

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

1 kg = 2.2 lbs



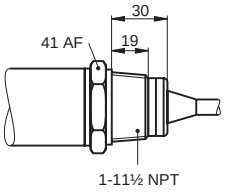
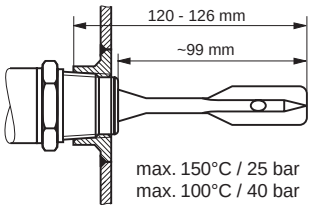
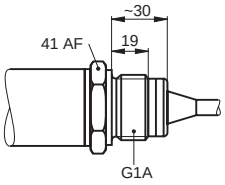
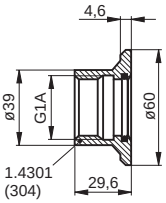
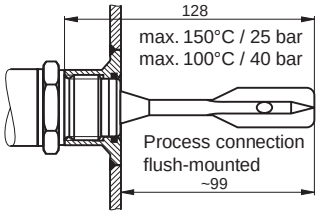
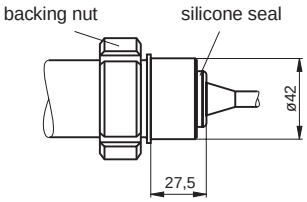
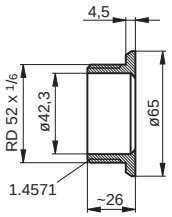
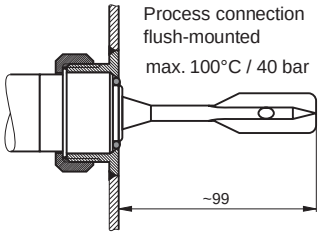
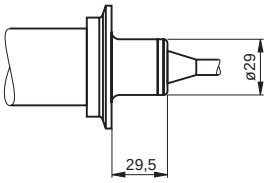
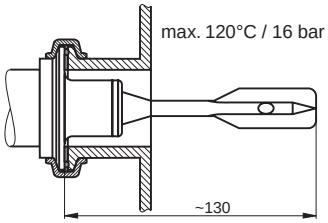
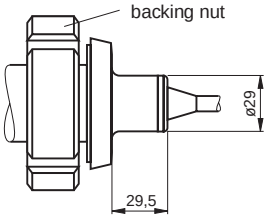
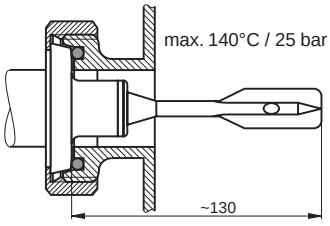
Electrical connection depending on fail-safe mode

Seen on the pins of the round plug connector

R = external load, e.g. PLC or contactor

No ground connection; protection with indirect contact according to EN 60204-1 and EN 61010-1

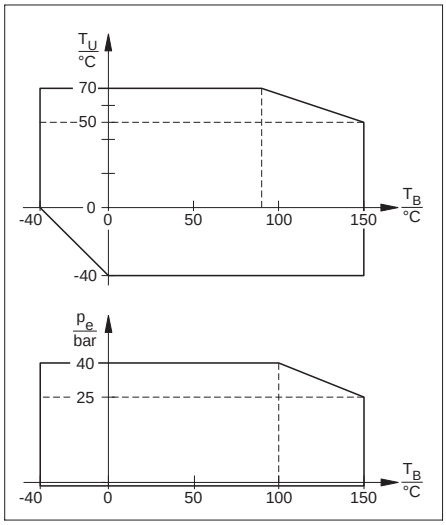
Process Connections, Specifications

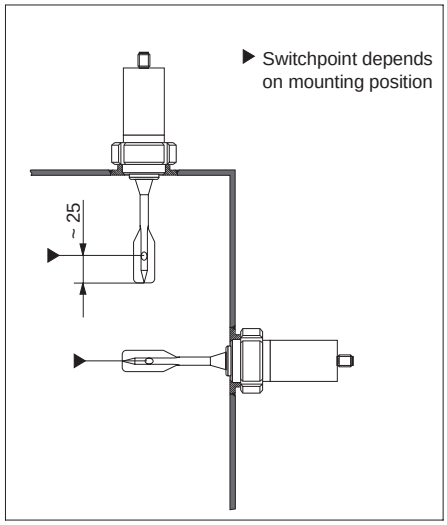
Version	Scope of supply	Mounting accessories	Final assembly
Process connection 1 **= 1 - 11½ NPT**		**Weld-in socket** with tapered internal thread 1 - 11½ NPT - supplied by customer -	
Process connection G **= G 1 A** a) Mounting accessories: Weld-in socket (without fork orientation) with FPM O-ring (Viton) Order No. 917969-1000		a) 	
Process connection F **= flush-mounted connection** **E+H** b) Mounting accessories: Weld-in adapter (fork orientation variable) Order No. 942329-0001		b) 	
Process connection U **= Tri-clamp 1½ "** **Process connection T** **= Tri-clamp 2 "**		**Tension ring** (clamp) and **front seal** -supplied by customer-	
Process connection M **= sanitary thread DN 50**		**Sealing ring** with collar -supplied by customer-	

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!

100 mm = 3.94 in, x°C = (1.8x + 32)°F, 1 bar = 14.5 psi, 1.4571 = AISI 316 Ti

Technical Data





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

x°C = (1.8x + 32)°F

1 bar = 14.5 psi

Technical Data

Output

Power supply	DC voltage 10 ... 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 (cyclical 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)
Fail-safe mode	Minimum- or Maximum fail-safe, depending on load connection
Signal failure	Output open
Switching time	Approx. 0.5 s when covered, approx. 1.0 s when free or Approx. 0.5 s when covered, approx. 0.5 s when free
Hysteresis	Approx. 4 mm with vertical mounting

Process conditions

Orientation	As required
Ambient temperature	–40°C ... + 70°C (–40°F … +160°F), see also graphs on Page 3
Temperature of product	–40°C ... +150°C (–40°F … +300°F), see also graphs on Page 3
Operating pressure p_e	–1 bar ... +40 bar (–14.5 psi … +580 psi), see also graphs on Page 3
Storage temperature	–40°C ... + 85°C (–40°F … +185°F)
Climatic protection	Climatic protection to IEC 68, Part 2-38, Fig. 2a
Ingress protection	IP 66/68 (24 h, 1.5 m) to EN 60529 (when using the appropriate plug!)
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)
Density ρ of product	min. 0.7 g/cm^3
Viscosity ν of product	up to 10000 mm^2/s (up to 10000 cSt)

Mechanical construction

Design	Compact unit
Dimensions	see dimensional sketch on Page 2 and process connections on Page 3
Materials	Process connection and vibrating fork: stainless steel 1.4571 (AISI 316 Ti) Housing: stainless steel 1.4404 (AISI 316 L), completely welded Round plug connector: 1.4571 (AISI 316 Ti) Sight glass for LEDs: glass
Process connections	– Tapered thread 1 - 11½ NPT to ANSI 1.20.1 – 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 E Sanitary thread DN 50 to DIN 11851
Electrical connection	M 12x1 round plug connector, 4-pole (without ground connection) □

Ordering

Product structure	See product structure on Page 2
Accessories	– Weld-in socket without fork orientation for process connection G: Order No. 917 969-1000 – Weld-in adapter with fork orientation for process connection F: Order No. 942 329-0001 – Socket spanner 41 AF for process connection G: Order No. 942 667-0000 – Test magnet: Order No. 016 920-0000 – Plug with cable: – e.g. from Binder: Series 763 – from Lumberg: RKT, RKWT – from Amphenol: C 164 P compact
Supplementary documentation	System Information “Vibration” SI 007F/00/en

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