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Document information

Document conventions

Safety instructions

Symbol	Meaning
 <small>A0011189-EN</small>	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
 <small>A0011190-EN</small>	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
 <small>A0011191-EN</small>	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
 <small>A0011192-EN</small>	NOTICE! This symbol contains information on procedures and other facts which do not result in personal injury.

Symbols for certain types of information

Symbol	Meaning
 <small>A0011182</small>	Permitted Indicates procedures, processes or actions that are permitted.
 <small>A0011183</small>	Preferred Indicates procedures, processes or actions that are preferred.
 <small>A0011193</small>	Tip Indicates additional information.
 <small>A0015483</small>	Reference to documentation Refers to the corresponding device documentation.
 <small>A0011195</small>	Reference to page Refers to the corresponding page number.

Symbols for graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
A, B, C, ...	Views

Function and system design

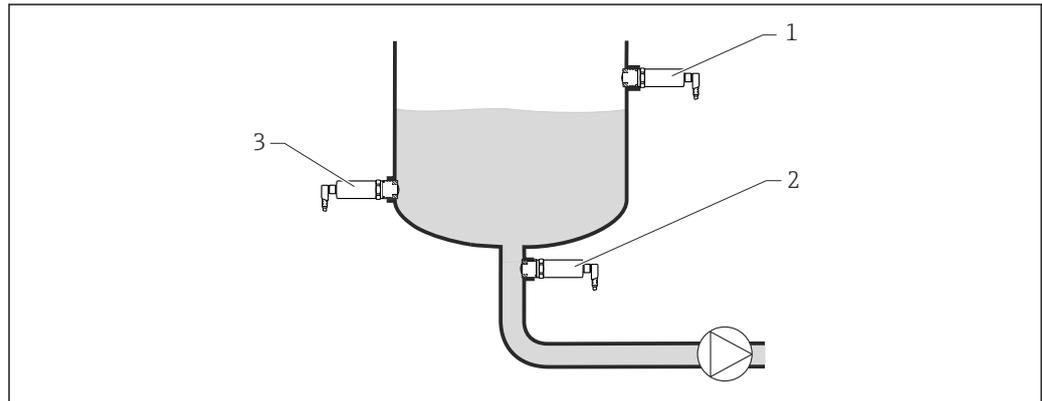
Measuring principle

A low, galvanically isolated AC voltage is applied at the electrode in contact with the process. If conductive liquid comes in contact with the electrode, a measurable current flows and the Liquipoint FTW33 switches. Active buildup compensation ensures reliable switching of the device even if material buildup occurs.

Measuring system

The measuring system consists of a Liquipoint FTW33 point level switch, e.g. for connection to programmable logic controllers (PLC).

Applications:



A0016816

- 1 Overfill protection or upper level detection (MAX)
- 2 Pump dry running protection (MIN)
- 3 Lower level detection (MIN)

Input

Measured variable

Conductivity at the electrode in contact with the process

Measuring range

Electrical conductivity of approx. 1 $\mu\text{S}/\text{cm}$ to approx. 100 mS/cm or a dielectric constant > 20 .

Output

DC-PNP switching output

- Function: positive voltage signal at the switching output of the electronics
- Switching behavior: ON/OFF
- Connectable load: 200 mA (short-circuit proof)
- Safety switching: MIN or MAX point level
 - The electrical switch opens if the point level is reached or if faults or a power outage occur.
 - MAX: e.g. as overfill protection
 - The device keeps the electrical switch closed as long as the level is below the sensor.
 - MIN: e.g. for dry running protection in pumps
 - The device keeps the electrical switch closed as long as the sensor is immersed in liquid.
- Residual voltage: $< 3\text{ V}$
- Residual current: $< 100\ \mu\text{A}$

Power supply

Supply voltage	10 to 30 V DC
Power consumption	< 825 mW (with load)
Current consumption	< 15 mA

Electrical connection **M12 connector**

Supply point: hazardous contact voltage or Class 2 Circuit (North America). The device must be operated with a fine-wire fuse 500 mA (slow-blow).

Suitable for use in non-equivalent operation: when both outputs are connected, the MIN and MAX outputs adopt opposite states when the device is operating fault-free. Both electronic switches are open if a fault or cable open circuit occurs. As well as level monitoring, functional monitoring of the sensor is thus also possible by means of two-channel analysis.

Connector (PIN assignment)		MIN mode (NO Contact)	MAX mode (NC contact)
MAX	MIN	Yellow LED (gn): <input type="checkbox"/> Not lit <input checked="" type="checkbox"/> Lit	
M12 connector			
A0017576	A0017598	A0016828	A0016830
Valve connector			
A0017581	A0017599	A0016832	A0016833
<ul style="list-style-type: none"> ▪ I max. 200 mA ▪ U = 10 - 30 V ▪ R = external load ▪ PE = ground 			

Cable specification	For valve connector: < 1.5 mm ² (16 AWG) and ϕ 3.5 to 6.5 mm (0.14 to 0.26 in)
Overvoltage protection	Overvoltage category II

Performance characteristics

Reference operating conditions

Horizontal orientation:

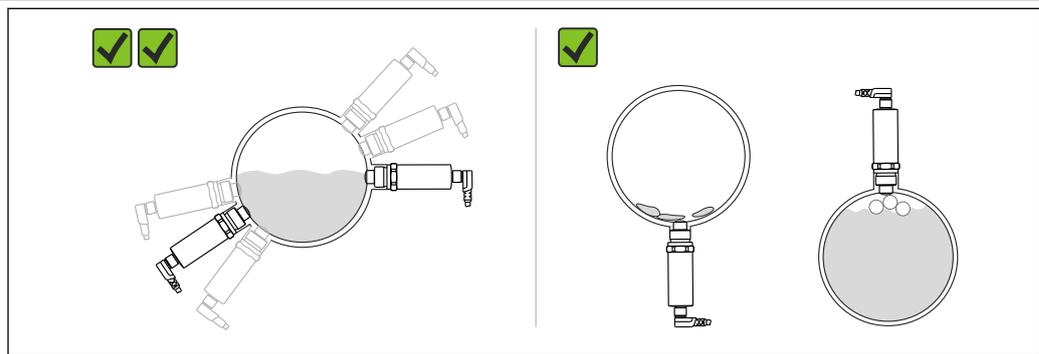
- Ambient temperature: 20 °C (68 °F) \pm 5 °C
- Medium temperature: 20 °C (68 °F) \pm 5 °C
- Process pressure: 1 bar (14.5 psi)
- Medium: water
- Conductivity: approx. 200 μ S/cm

Measured error	\pm 1 mm (0.04 in) in accordance with DIN 61298-2
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Hysteresis	±1 mm (0.04 in)
Non-repeatability	±0.5 mm (0.02 in) in accordance with DIN 61298-2
Switching delay	<ul style="list-style-type: none"> ■ 0.5 s when sensor is covered; 1.0 s (when sensor is free) ■ Optional: 0.3 s; 1.5 s or 5 s (when sensor is covered and free)
Switch-on delay	< 1 s (no defined switching status before this)

Installation

Orientation



A0016834

NOTICE

Vertical orientation can affect the measurement.

It can be influenced by the fact that the sensor is not completely covered with liquid or by air bubbles at the sensor.

- ▶ Ideally, the device should be fitted horizontally or diagonally into a tank or pipe.

Length of connecting cable	Max. 25 Ω/wire, total capacity < 100 nF
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Environment

Ambient temperature range	-40 to +70 °C (-40 to +158 °F) see also the derating table (→ 12)
Storage temperature	-40 to +85 °C (-40 to +185 °F)
Climate class	DIN EN 60068-2-38/IEC 68-2-38: test Z/AD
Altitude	Up to 2 000 m (6 600 ft) above sea level
Degree of protection	<ul style="list-style-type: none"> ■ IP65 with valve connector ■ IP65/67 with M12x1 connector, plastic ■ IP66/68/69K (NEMA4X/6P) with M12x1 connector, metal
Shock resistance	DIN EN 60068-2-27/IEC 68-2-27: 30 g, 18 ms
Vibration resistance	As per EN 60068-2-64/IEC 68-2-64: 20 to 2 000 Hz; 0.01 g ² /Hz; 3 x 100 min
Cleaning	Resistant to typical cleaning agents from the outside. Passed Ecolab test.

Electromagnetic compatibility Electromagnetic compatibility in accordance with all of the relevant requirements outlined in the EN 61326 series and NAMUR Recommendation EMC (NE 21). Details are provided in the Declaration of Conformity.

Reverse polarity protection Integrated

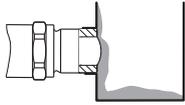
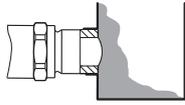
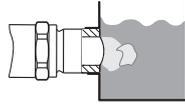
Process

Process temperature range -20 to +100 °C (-4 to +212 °F)
 ■ For 1 hour: +150 °C (+302 °F)
 ■ For 1 hour for M24 process adapter with EPDM process seal: +130 °C (+266 °F)

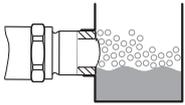
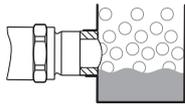
Process pressure range -1 to +25 bar (-14.5 to +362.5 psi)

State of aggregation Liquid

Function range In addition to the standard version, the Liquipoint FTW33 is also available with an extended function range (in order code: feature 570, "HE" option).
 The operator can switch between the standard and extended functions (→  9). This means the device can be perfectly integrated into the relevant process.

Device version	Process conditions (adhesive and viscous media)		
	Light buildup	Heavy buildup	Surface drying
	 A0016835	 A0016836	 A0016837
Standard Use for MIN/MAX safety For light buildup at sensor	✓	—	✓
Extended function range* Use for MIN safety For heavy buildup at sensor	✓	✓	✓

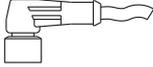
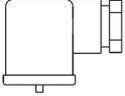
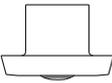
 * Surface drying or insulating layers at the sensor can affect measuring sensitivity and must therefore be avoided or removed.

Device version	Process conditions (foaming media)	
	Fine-pored	Coarsely pored
	 A0016838	 A0016839
Standard Use for MIN/MAX safety: foam detection (overflow protection) by sensor	Sensor signal "covered" if foam present	Sensor signal "free" if foam present
Extended function range Use for MIN safety: foam suppression (dry running and pump protection) by sensor	Sensor signal "free" if foam present	Sensor signal "free" if foam present

 Very coarsely-pored foam cannot be detected by the sensor.

Mechanical construction

Dimensions in mm (in)

Sensor	Electrical connection							
	M12 connector				Valve connector			
								
	A0016840				A0016842			
	Housing cover							
	M12 plastic		M12 metal		Plastic valve connector			
								
	A0016846		A0016845		A0016847			
	H1	21 (0.83)		21 (0.83)		16 (0.63)		
	Housing							
					A0016848			
H2	58 (2.28)							
Process connections								
Clamp		Milk pipe		Thread				
DN25-38 1...1½"	DN40 2"	DN25 PN40	DN40 PN40	G ¾"	G 1"	M24x1.5	G ½" Hygiene adapter	
								
A0016849	A0016850	A0016851	A0016852	A0016853	A0016776	A0016854	A0016855	
H3	36 (1.42)			41 (1.61)	43 (1.69)	41 (1.61)	50 (1.97)	
H4	-			16 (0.63)	19 (0.75)	13 (0.51)	15 (0.59)	
H5	2 (0.08)							

Weight Approx.300 g (10.58 oz)

Materials Material specifications in accordance with AISI and DIN EN.

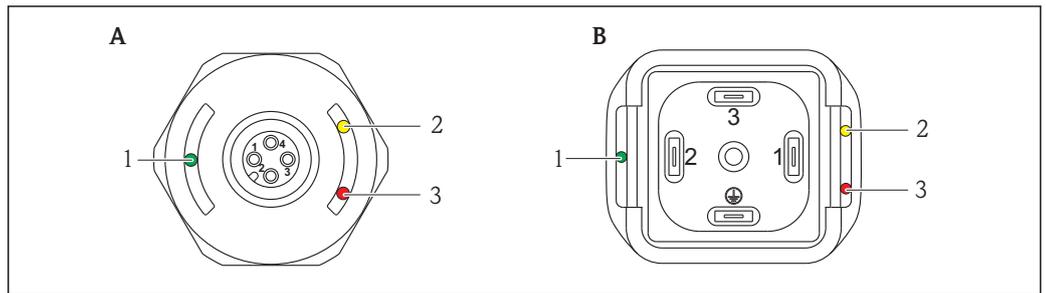
Materials in contact with process	Materials not in contact with process
Sensor: 316L (1.4404)	Housing: 316L (1.4404)
Sensor insulation: PEEK  The material PEEK meets the requirements of EU 1935/2004	Housing covers: <ul style="list-style-type: none"> ■ M12 metal: 316L (1.4404) ■ M12 plastic: PPSU ■ Valve connector, plastic: PPSU ■ Design ring: PBT/PC
Metallic surface in contact with process: Ra ≤0.76 µm (30 µin)	
Seals: <ul style="list-style-type: none"> ■ For process adapter with M24 thread: EPDM ■ For weld-in adapter with G ¾", G 1": VMQ 	Nameplate: <ul style="list-style-type: none"> ■ Plastic foil (attached to housing) ■ Lasered (on housing, M12 metal (IP69K))

i Endress+Hauser supplies DIN/EN process connections with threaded connection in stainless steel in accordance with AISI 316L (DIN/EN material number 1.4404 or 14435). With regard to their stability-temperature property, the materials 1.4404 and 1.4435 are grouped together under 13EO in EN 1092-1, Tab. 18. The chemical composition of the two materials can be identical.

Operability

Light signals

i The light emitting diodes (LEDs) are only available for device versions with a plastic connector cap.



A0016856

A M12 connector
B Valve connector

1	Green LED (gn)	LED is lit: the device is operational
2	Yellow LED (ye)	Indicates the switching state (see also MIN/MAX mode (→ 5))
3	Red LED (rd)	Warning or malfunction

Extended function range

The extended function range can be ordered via feature 570, option "HE" in the order code. This version allows the operator to change between the extended and standard functions (→ 7).

i A switching magnet is part of the scope of delivery for this device version. For information, see the nameplate.

When the operating voltage is applied, the switching magnet is held against the marking on the nameplate:

- After approx. 15 s, the device switches to the required function range (switch between extended and standard).
- If the switching magnet remains at the marking for longer (approx. 35 s), the as-delivered state (extended) is set.
- If the extended function range is active, this is signaled by the green LED flashing for 5 seconds (1.5 Hz) after the operating voltage has been applied.

Testing with the switching magnet

i This function is only available in devices with an extended function range. A switching magnet is part of the scope of delivery.

The switching state of the device is reversed if the switching magnet is held against the marking on the nameplate during operation.

Certificates and approvals

CE mark

The measuring system is in conformity with the statutory requirements of the applicable EC Directives. These are listed in the corresponding EC Declaration of Conformity along with the standards applied.

Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

Hygienic compatibility

The Liquipoint FTW33 was developed for use in hygienic processes. Materials in contact with the process meet FDA requirements as well as 3A Sanitary Standard No. 74. The 3A symbol is attached to the device by Endress+Hauser to confirm this.

The following certificates can be ordered with the device (optional):

- 3A
- EHEDG



The seamless connections can be cleaned of all residue using any of the typical cleaning methods within this industry.

Inspection certificates

The following documents can be ordered with the device (optional):

- Acceptance test certificate as per EN 10204-3.1
- Test report of surface roughness ISO4287/Ra
- Final inspection report

Ordering information

Product Configurator



Product Configurator - the tool for individual product configuration

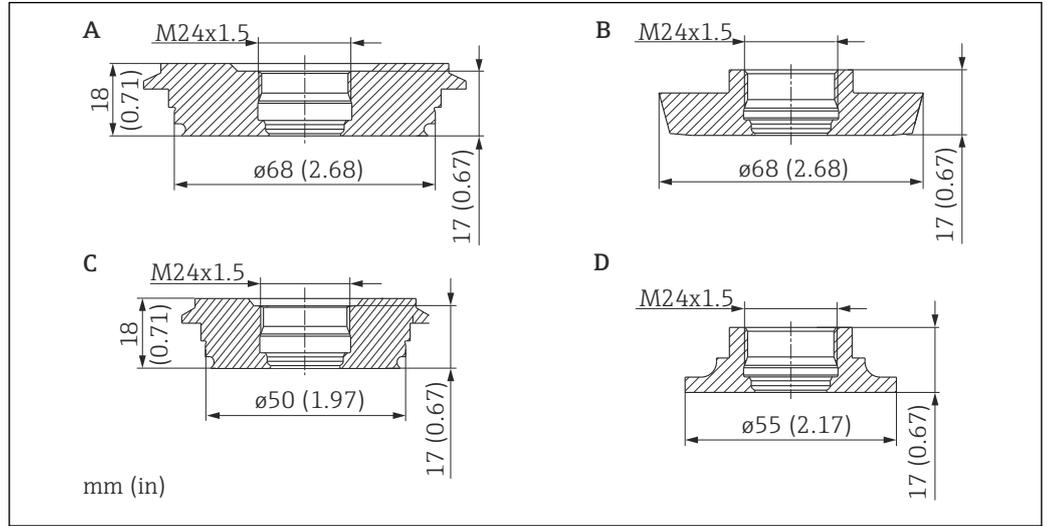
Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: www.endress.com/worldwide
- Up-to-the-minute configuration data
- Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
- Automatic verification of exclusion criteria
- Automatic creation of the order code and its breakdown in PDF or Excel output format
- Ability to order directly in the Endress+Hauser Online Shop

Accessories

 The adapters are supplied with or without acceptance test certificate EN 10204-3.1 and can also be ordered with the device (optional).

Process adapter



- A Varivent N, 316L (1.4435)
- B DIN11851 DN50, 316L (1.4435)
- C Varivent F, 316L (1.4435)
- D SMS 1 1/2", 316L (1.4435)

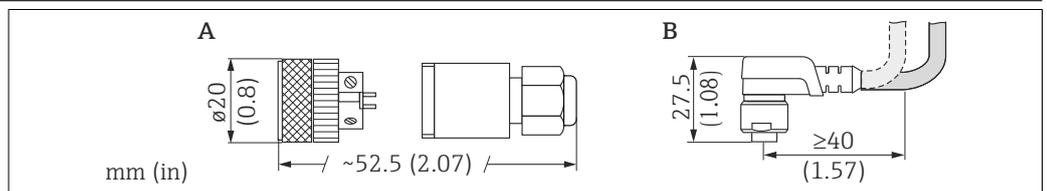
Weld-in adapter

G 3/4"	G 1"	M24
d=50, d=29	d=60, d=53	d=65
Material: 316L (1.4435)		
 Please refer to the supplementary documentation for further information (→  12)		

DIN11851 thread adapter nut

For process connections:		
Milk pipe DN50	Milk pipe DN40	Milk pipe DN25
F50	F40	F25
Material: 304 (1.4307)		

Cable, plug-in jack



Designation	A: M12x1 socket	B: 4 x 0.34 M12 socket		B: 4 x 0.34 M12 socket with integrated LEDs
Order number	52006263	52024216	52010285	52018763
Cable	-	PVC (orange)5 m (16 ft)	PVC (gray)5 m (16 ft)	PVC (orange)5 m (16 ft)
Handle	PBT	PVC (orange)	PUR (blue)	PVC (transparent)
Thread adapter nut	Cu Sn/Ni	316L (1.4435)	Cu Sn/Ni	316L (1.4435)

Degree of protection	IP67	IP69K (fully locked)	IP67	IP69K (fully locked)
Temperature range	-25 to +70 °C (-13 to +158 °F)			

Documentation



The following document types are also available in the Download Area of the Endress+Hauser web site: www.endress.com → Download

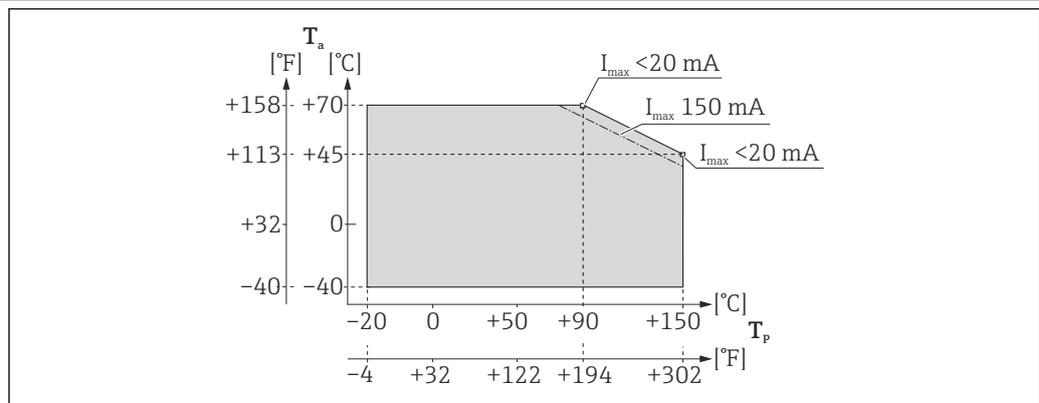
Operating Instructions

Liquipoint FTW33 → BA00418F/00/A6

Technical Information

Weld-in adapter (overview) → TI00426F/00/EN

Derating curve



A0017697

T_a Ambient temperature

T_p Process temperature

Supplementary documentation

- Weld-in adapter G 1", G ¾" → SD00352F/00/A6
- Weld-in adapter M24 → BA00361F/00/A6



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