

# Technical Information

## Liquipoint FTW33

Conductive measuring technology



### Point level switch for liquids

#### Application

The Liquipoint FTW33 is a point level switch for liquids. It is intended for use in pipes and in storage, mixing and process vessels with or without an agitator. Developed and built for the food industry, the FTW33 meets all international hygiene requirements.

It is particularly suited to applications where flush-mounting is necessary.

The Liquipoint FTW33 can be used in process temperatures up to 100 °C (212 °F) with no limits and in cleaning and sterilization processes to 150 °C (302 °F) for 60 minutes.

The Liquipoint FTW33 can also be used for detecting the foam that commonly occurs within the food industry.

#### Your benefits

- Flush-mounted, pigging of pipes still possible
- For liquids with an electrical conductivity >1 µS/cm or a dielectric constant >20
- Individual adjustment to each medium not necessary
- Buildup compensation ensures reliable switching
- Easy installation thanks to compact design - even in tight conditions or where access is restricted
- Broad range of process connections for installation in new and existing plants
- Robust stainless steel housing, available with M12x1 connector with IP69K type of protection (optional)
- LED display for on-site function check
- Can be cleaned and sterilized in place (CIP/SIP)
- 3A and EHEDG certificates





## Table of contents

<b>Document information</b> .....	<b>3</b>	<b>Operability</b> .....	<b>9</b>
Document conventions .....	3	Light signals .....	9
<b>Function and system design</b> .....	<b>4</b>	Extended function range .....	9
Measuring principle .....	4	Testing with the switching magnet .....	9
Measuring system .....	4	<b>Certificates and approvals</b> .....	<b>10</b>
<b>Input</b> .....	<b>4</b>	CE mark .....	10
Measured variable .....	4	Hygienic compatibility .....	10
Measuring range .....	4	Inspection certificates .....	10
<b>Output</b> .....	<b>4</b>	<b>Ordering information</b> .....	<b>10</b>
DC-PNP switching output .....	4	Product Configurator .....	10
<b>Power supply</b> .....	<b>5</b>	<b>Accessories</b> .....	<b>11</b>
Supply voltage .....	5	Process adapter .....	11
Power consumption .....	5	Weld-in adapter .....	11
Current consumption .....	5	DIN11851 thread adapter nut .....	11
Electrical connection .....	5	Cable, plug-in jack .....	11
Cable specification .....	5	<b>Documentation</b> .....	<b>12</b>
Overvoltage protection .....	5	Operating Instructions .....	12
<b>Performance characteristics</b> .....	<b>5</b>	Technical Information .....	12
Reference operating conditions .....	5	Derating curve .....	12
Measured error .....	5	Supplementary documentation .....	12
Hysteresis .....	6		
Non-repeatability .....	6		
Switching delay .....	6		
Switch-on delay .....	6		
<b>Installation</b> .....	<b>6</b>		
Orientation .....	6		
Length of connecting cable .....	6		
<b>Environment</b> .....	<b>6</b>		
Ambient temperature range .....	6		
Storage temperature .....	6		
Climate class .....	6		
Altitude .....	6		
Degree of protection .....	6		
Shock resistance .....	6		
Vibration resistance .....	6		
Cleaning .....	6		
Electromagnetic compatibility .....	7		
Reverse polarity protection .....	7		
<b>Process</b> .....	<b>7</b>		
Process temperature range .....	7		
Process pressure range .....	7		
State of aggregation .....	7		
Function range .....	7		
<b>Mechanical construction</b> .....	<b>8</b>		
Weight .....	8		
Materials .....	8		






## Document information

### Document conventions

### Safety instructions

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

### Symbols for certain types of information

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

### Symbols for graphics

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

## Function and system design

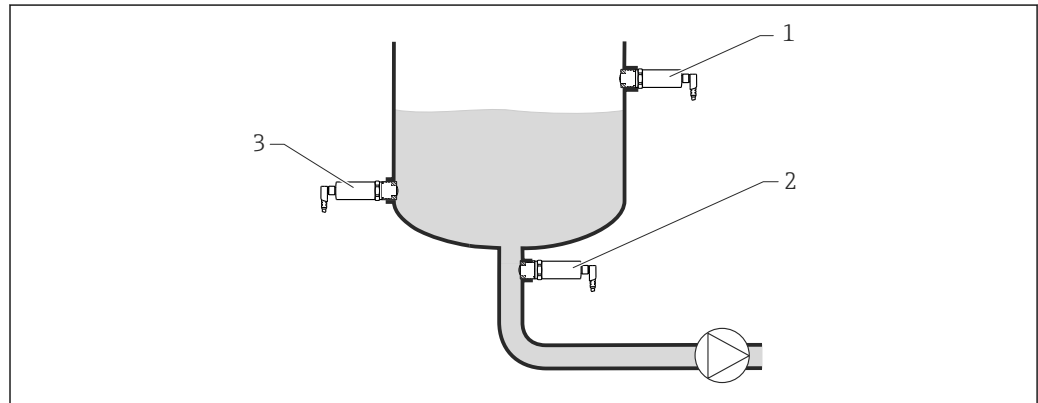
### Measuring principle

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  $\text{mS}/\text{cm}$  or a dielectric constant  $> 20$ .

## Output

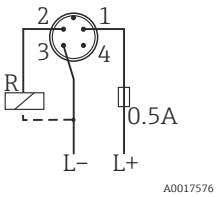
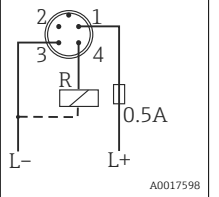
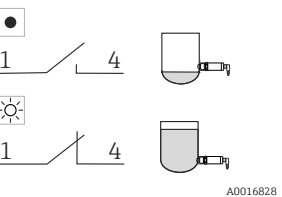
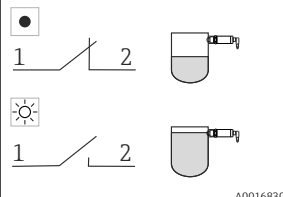
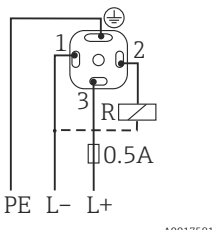
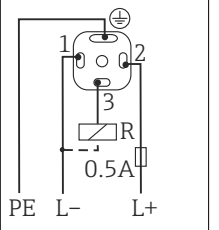
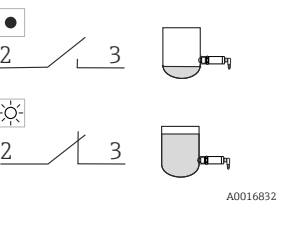
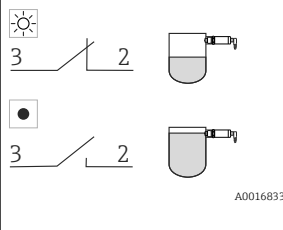
### DC-PNP switching output

- 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:  $< 100\text{ }\mu\text{A}$

Power supply

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

Electrical connection	<p><b>M12 connector</b></p> <p>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).</p> <p>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.</p>
-----------------------	---

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

Cable specification	For valve connector: < 1.5 mm <sup>2</sup> (16 AWG) and ø3.5 to 6.5 mm (0.14 to 0.26 in)
Overvoltage protection	Overvoltage category II

Performance characteristics

Reference operating conditions	<p>Horizontal orientation:</p> <ul style="list-style-type: none"><li>■ Ambient temperature: 20 °C (68 °F) ±5 °C</li><li>■ Medium temperature: 20 °C (68 °F) ±5 °C</li><li>■ Process pressure: 1 bar (14.5 psi)</li><li>■ Medium: water</li><li>■ Conductivity: approx. 200 µS/cm</li></ul>
Measured error	±1 mm (0.04 in) in accordance with DIN 61298-2

Hysteresis	±1 mm (0.04 in)
------------	-----------------

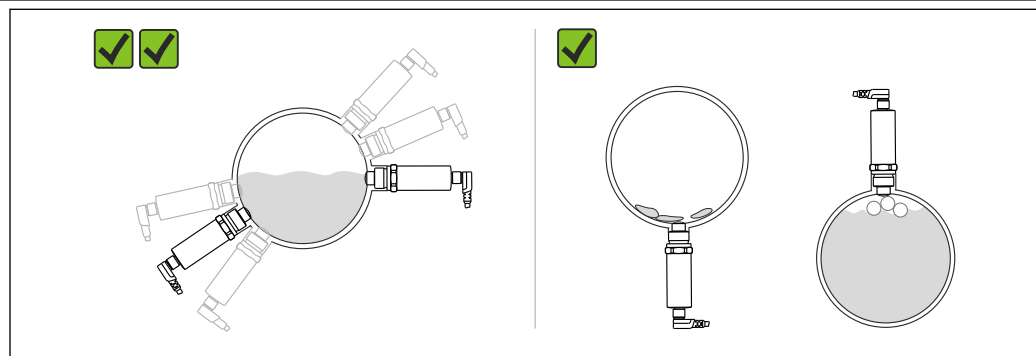
Non-repeatability	±0.5 mm (0.02 in) in accordance with DIN 61298-2
-------------------	--

Switching delay	<ul style="list-style-type: none"> <li>■ 0.5 s when sensor is covered; 1.0 s (when sensor is free)</li> <li>■ Optional: 0.3 s; 1.5 s or 5 s (when sensor is covered and free)</li> </ul>
-----------------	--

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
----------------------------	---

## 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"> <li>■ IP65 with valve connector</li> <li>■ IP65/67 with M12x1 connector, plastic</li> <li>■ IP66/68/69K (NEMA4X/6P) with M12x1 connector, metal</li> </ul>
----------------------	---

Shock resistance	DIN EN 60068-2-27/IEC 68-2-27: 30 g, 18 ms
------------------	--

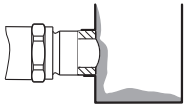
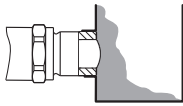
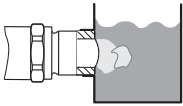

Vibration resistance	As per EN 60068-2-64/IEC 68-2-64: 20 to 2 000 Hz; 0.01 g <sup>2</sup> /Hz; 3 x 100 min
----------------------	--

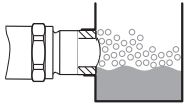
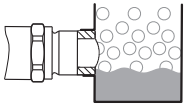

Cleaning	Resistant to typical cleaning agents from the outside. Passed Ecolab test.
----------	--

<b>Electromagnetic compatibility</b>	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.
<b>Reverse polarity protection</b>	Integrated

## Process

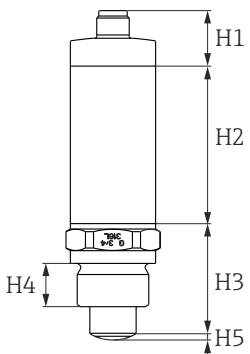
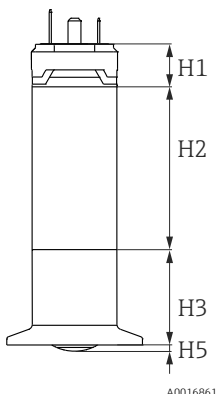
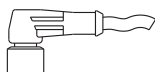
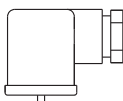












<b>Process temperature range</b>	-20 to +100 °C (-4 to +212 °F) ■ For 1 hour: +150 °C (+302 °F) ■ For 1 hour for M24 process adapter with EPDM process seal: +130 °C (+266 °F)
<b>Process pressure range</b>	-1 to +25 bar (-14.5 to +362.5 psi)
<b>State of aggregation</b>	Liquid
<b>Function range</b>	In 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  A0016835	Heavy buildup  A0016836	Surface drying  A0016837
<b>Standard</b> Use for MIN/MAX safety For light buildup at sensor	✓	—	✓
<b>Extended function range*</b> 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  A0016838	Coarsely pored  A0016839
<b>Standard</b> Use for MIN/MAX safety: foam detection (overflow protection) by sensor	Sensor signal "covered" if foam present	Sensor signal "free" if foam present
<b>Extended function range</b> 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								
<div></div> <div></div> <div>A0016861</div>	M12 connector				Valve connector				
	 <div>A0016840</div>				 <div>A0016842</div>				
	Housing cover								
		M12 plastic		M12 metal		Plastic valve connector			
		 <div>A0016846</div>		 <div>A0016845</div>		 <div>A0016847</div>			
	H1	21 (0.83)		21 (0.83)		16 (0.63)			
	Housing								
		 <div>A0016848</div>							
	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
		 <div>A0016849</div>	 <div>A0016850</div>	 <div>A0016851</div>	 <div>A0016852</div>	 <div>A0016853</div>	 <div>A0016776</div>	 <div>A0016854</div>	 <div>A0016855</div>
	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"> <li>■ M12 metal: 316L (1.4404)</li> <li>■ M12 plastic: PPSU</li> <li>■ Valve connector, plastic: PPSU</li> <li>■ Design ring: PBT/PC</li> </ul>
Metallic surface in contact with process: Ra ≤0.76 µm (30 µin)	
Seals: <ul style="list-style-type: none"> <li>■ For process adapter with M24 thread: EPDM</li> <li>■ For weld-in adapter with G ¾", G 1": VMQ</li> </ul>	Nameplate: <ul style="list-style-type: none"> <li>■ Plastic foil (attached to housing)</li> <li>■ Lasered (on housing, M12 metal (IP69K))</li> </ul>

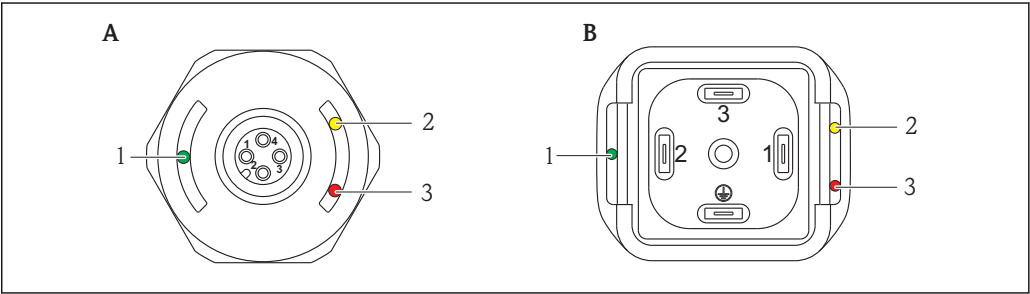


**i** Endress+Hauser supplies DIN/EN process connections with threaded connection in stainless steel in accordance with AISI 316L (DIN/EN material number 1.4404 or 1.4435). With regard to their stability-temperature property, the materials 1.4404 and 1.4435 are grouped together under 13EO in EN 1092-1,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



74-xx

A0019569



A0019572



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:

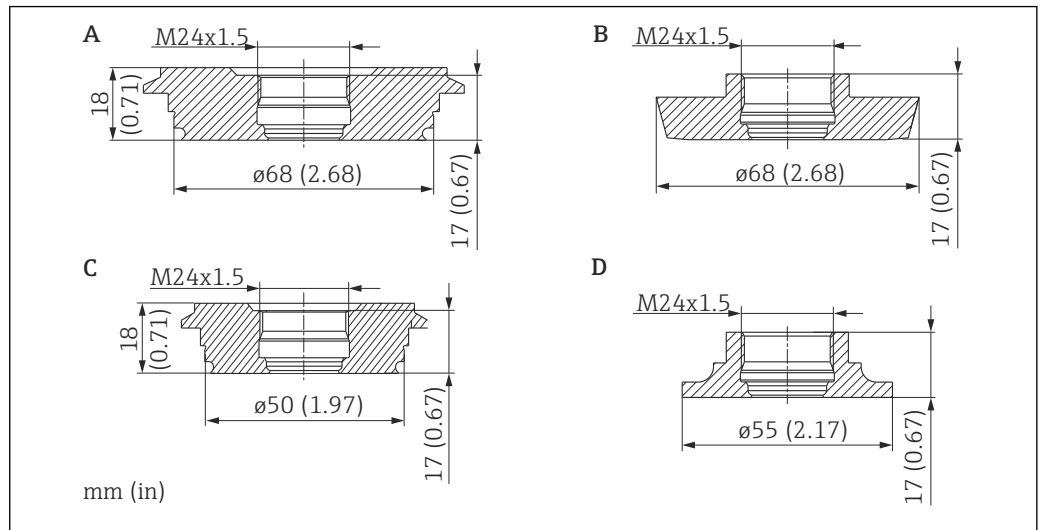
- In the Product Configurator on the Endress+Hauser website: [www.endress.com](http://www.endress.com) → Select country → Instruments → Select device → Product page function: Configure this product
- From your Endress+Hauser Sales Center: [www.endress.com/worldwide](http://www.endress.com/worldwide)
- 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



A0016863

- 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)

A0019577

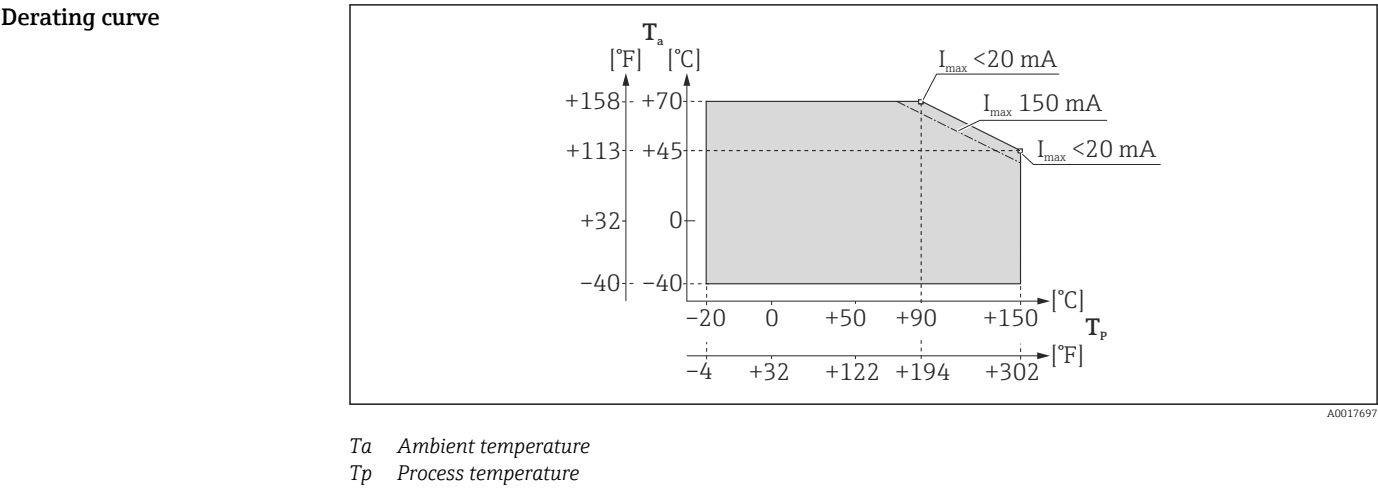
Degree of protection	IP67	IP69K (fully locked)	IP67	IP69K (fully locked)
Temperature range	-25 to +70 °C (-13 to +158 °F)			

Documentation

 The following document types are also available in the Download Area of the Endress+Hauser web site: [www.endress.com](http://www.endress.com) → Download

**Operating Instructions**      Liquipoint FTW33 → BA00418F/00/A6

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



**Supplementary documentation**

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



[www.addresses.endress.com](http://www.addresses.endress.com)