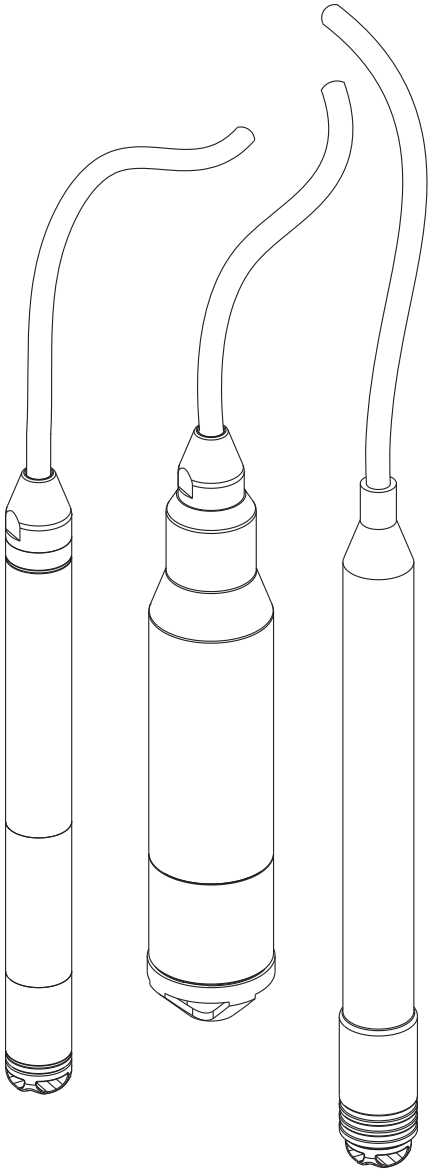
BA00231P/00/EN/13.13
71118684

Operating Instructions
Waterpilot FMX167
Hydrostatic level measurement



Endress+Hauser
People for Process Automation

Table of contents

1 About this document 3
1.1 Symbols 3
1.2 Registered Trademarks 4

2 Basic safety instructions 5
2.1 Designated use 5
2.2 Installation, commissioning and operation 5
2.3 Operational and process safety 5

3 Incoming acceptance and product identification 6
3.1 Incoming acceptance 6
3.2 Product identification 6
3.3 Transport and storage 7
3.4 Scope of delivery 7
3.5 CE mark, Declaration of Conformity 7

4 Mounting 8
4.1 Mounting requirements 8
4.2 Mounting the Waterpilot with a mounting clamp 9
4.3 Mounting with an extension cable mounting screw 10
4.4 Mounting the terminal box 11
4.5 Mounting the TMT181 temperature head transmitter 11
4.6 Post-mounting check 12

5 Electrical connection. 13
5.1 Connecting the device 13
5.2 Measuring unit electrical connection 16
5.3 Post-connection check 16

6 Operability 17

7 Troubleshooting 17
7.1 Troubleshooting specific to Waterpilot FMX167 with optional Pt100 17
7.2 Troubleshooting specific to TMT181 temperature head transmitter 17

8 Maintenance 18
8.1 Exterior cleaning 18

9 Repair 18
9.1 Spare parts 18
9.2 Return 18
9.3 Disposal 18

10 Accessories. 19
10.1 Mounting clamp 19
10.2 Terminal box 19
10.3 Additional weight for FMX167 with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in) 19
10.4 TMT181 temperature head transmitter (4 to 20 mA) 20
10.5 Extension cable mounting screw 20
10.6 Terminals 20
10.7 Cable marking 20
10.8 Cable shortening kit 21
10.9 Testing adapter for Waterpilot with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in) 21

11 Technical data. 21

Index. 22

1 About this document

1.1 Symbols

1.1.1 Safety symbols

Symbol	Meaning
 A0011189-DE	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in seriousor fatal injury.
 A0011190-DE	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in seriousor fatal injury.
 A0011191-DE	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minoror medium injury.
 A0011192-DE	**NOTICE!** This symbol contains information on procedures and other facts which do not result in personalinjury.

1.1.2 Electrical symbols

Symbol	Meaning
A0018335	**Direct current** A terminal to which DC voltage is applied or through which direct current flows.
A0018336	**Alternating currrent** A terminal to which alternating voltage is applied or through which alternating current flows.
 A0018337	**Direct current and alternating current** ▪ A terminal to which alternating voltage or DC voltage is applied. ▪ A terminal through which alternating current or direct current flows.
 A0018338	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system..
 A0018339	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.
 A0011201	**Equipotential connection** A connection that has to be connected to the plant grounding system: This may be a potential equalization line or a star grounding system depending on national or company codes of praxis.

1.1.3 Symbols for certain types of information

Symbol	Meaning
 A0011193	**Tip** Indicates additional information.
 A0015484	**Reference to page** Refers to the corresponding page number.

1.1.4 Symbols in graphics

Symbol	Meaning
1, 2, 3, 4, ...	Item numbers
A, **B**, **C**, **D**, ...	Views
 A0011187	Hazardous area Indicates a hazardous area.
 A0011188	Safe area (non-hazardous area) Indicates a non-hazardous location.

1.1.5 Symbols at the device

Symbol	Meaning
	**Connecting cable immunity to temperature change** Indicates that the connecting cables must be able to withstand temperatures of at least 85 °C (185 °F).

1.2 Registered Trademarks

GORE-TEX®
W.L. Gore & Associates, Inc., USA brand.

TEFLON®
E.I. Du Pont de Nemours & Co., Wilmington, USA brand.

2 Basic safety instructions

2.1 Designated use

The Waterpilot FMX167 is a hydrostatic pressure sensor for measuring the level of fresh water, wastewater and salt water. The temperature is measured simultaneously in the case of sensor versions with a Pt100 resistance thermometer. An optional temperature head transmitter converts the Pt100 signal to a 4 to 20 mA signal.

The manufacturer accepts no liability for damages resulting from incorrect use or use other than that designated.

2.2 Installation, commissioning and operation

The Waterpilot FMX167 and the (optional) TMT181 temperature head transmitter are designed to meet state-of-the-art safety requirements and comply with applicable regulations and EC Directives. If used incorrectly or for applications for which they are not intended, the devices can be a source of application-related danger, e.g. product overflow due to incorrect installation or configuration. For this reason, installation, connection to the electricity supply, commissioning, operation and maintenance of the measuring system must only be carried out by trained, qualified specialists authorized to perform such work by the facility's owner-operator. The specialist staff must have read and understood these Operating Instructions and must follow the instructions they contain. Modifications and repairs to the devices are permissible only if they are expressly allowed in the Operating Instructions. Pay particular attention to the data and information on the nameplate.

2.3 Operational and process safety

Alternative monitoring measures have to be taken while configuring, testing or servicing the device to ensure the operational and process safety.

2.3.1 Hazardous area (optional)

Devices for use in hazardous areas bear an additional marking on the nameplate (→ 6). If using the measuring system in hazardous areas, the appropriate national standards and regulations must be observed. The device is accompanied by separate Ex documentation, which is an integral part of this documentation. The installation regulations, connection values and safety instructions listed in this document must be observed. The documentation number of the related Safety Instructions (XA) is also indicated on the nameplate.

- Ensure that all personnel are suitably qualified.
- Measuring point requirements with regard to measurement and safety must be observed.
- Please refer to the "Ordering information" section of Technical Information TI00351P/00/EN for versions for approvals in the order code.

3 Incoming acceptance and product identification

3.1 Incoming acceptance

- Check the packaging and the contents for damage.
- Check the shipment, make sure nothing is missing and that the scope of supply matches your order.

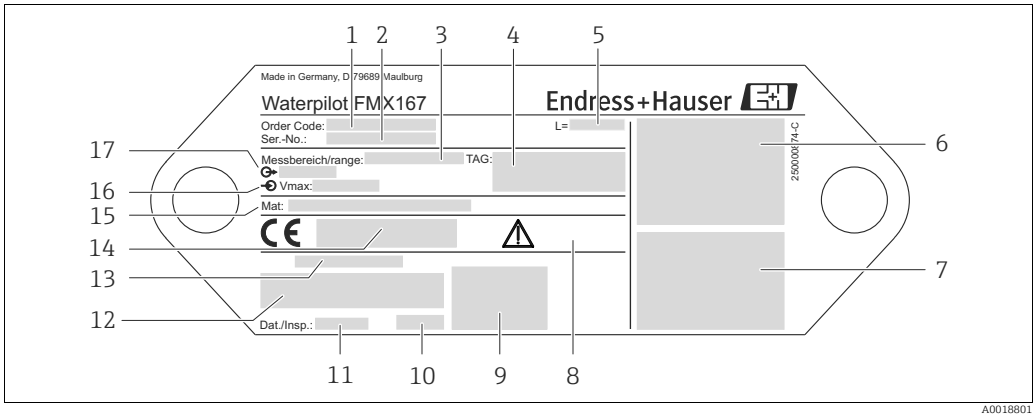
3.2 Product identification

The following options are available for identification of the measuring device:

- Nameplate specifications
- Order code with breakdown of the device features on the delivery note
- Enter serial numbers from nameplates in W@M Device Viewer (www.endress.com/deviceviewer): All information about the measuring device is displayed

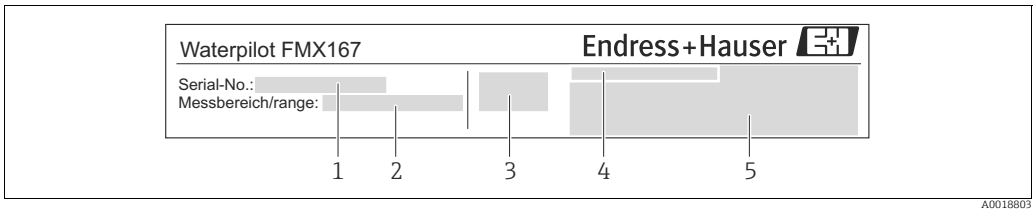
3.2.1 Identifying the measuring device via the nameplate

The nameplate is secured to the extension cable of the FMX167 (→ 8).



1 Order code
See the specifications on the order confirmation for the meanings of the individual letters and digits.
2 Serial number
3 Nominal measuring range
4 TAG (Tagging)
5 Length of the extension cable
6 FMX167 connection diagram
7 Pt100 connection diagram (if the Waterpilot was ordered with Pt100)
8 Observe the information on installation in the Operating Instructions!
9 Approval symbol (optional)
10 Symbol: Observe Safety Instructions, with information on the documentation number, e.g. XA00131P (optional)
11 Test date (optional)
12 Text for approval (optional)
13 Identification number of the notified body for ATEX (optional)
14 Ex symbol (CSA, FM, optional)
15 Wetted materials
16 Supply voltage
17 Output

In addition, the FMX167 with an outer diameter of 22 mm (0.87 in) and 42 mm (1.65 in) also bears the following information:



1 *Serial number*
2 *Nominal measuring range*
3 *CE mark or approval symbol*
4 *Identification number of the notified body for ATEX (optional)*
5 *Text for approval (optional)*

3.2.2 Identifying the measuring device via the order code

Specific device features make up the order code. You can assign these features in the "Ordering information" section of Technical Information TI00351P/00/EN.

3.3 Transport and storage

3.3.1 Transport

NOTICE

Devices or cable may be damaged

- ▶ Comply with the safety instructions, transport conditions for devices over 18kg (39.6lbs) (DIN EN 61010-1).
- ▶ Transport the measuring device to the measuring point in its original packaging.

3.3.2 Storage

The device must be stored in a dry, clean area and protected against damage from impact (EN 837-2).

Storage temperature range:
- FMX167: −40 to +80 °C (−40 to +176 °F)
- TMT181: −40 to +100 °C (−40 to +212 °F)
- Terminal box: −40 to +80 °C (−40 to +176 °F)

3.4 Scope of delivery

The scope of delivery comprises:
- Waterpilot FMX167, optionally with integrated Pt100 resistance thermometer
- Optional accessories (→ 19)

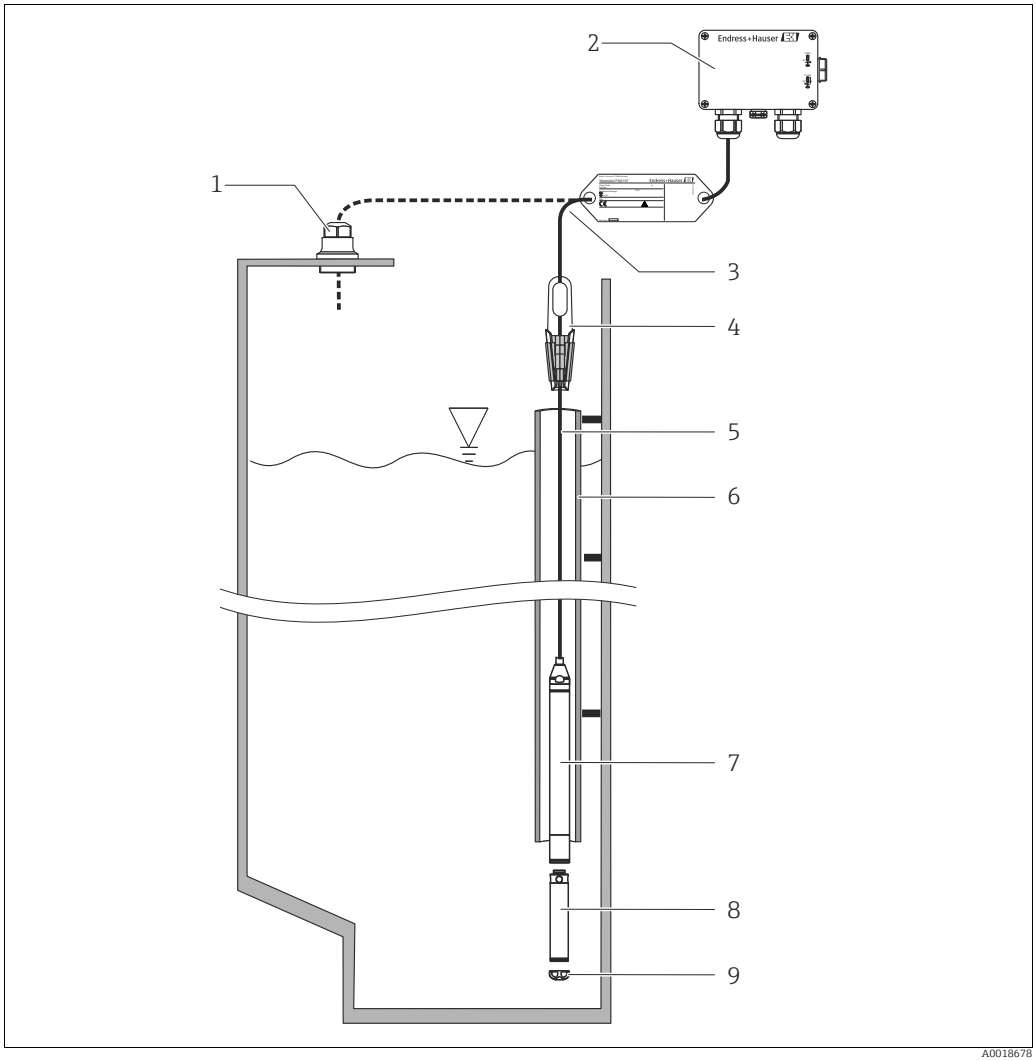
Documentation supplied:
- Operating Instructions BA00231P (this document)
- Calibration report/Final inspection report
- SD00126P drinking water approval (optional)
- Devices suitable for use in hazardous areas: Additional documentation such as Safety Instructions (XA)

3.5 CE mark, Declaration of Conformity

The devices are designed to meet state-of-the-art safety requirements, have been tested and left the factory in a condition in which they are safe to operate. The devices comply with the applicable standards and regulations as listed in the EC Declaration of Conformity and thus comply with the legal requirements of the EC Directives. Endress+Hauser confirms the conformity of the device by affixing to it the CE mark.

4 Mounting

4.1 Mounting requirements



Installation examples, here illustrated with FMX167 with an outer diameter of 22 mm (0.87 in)

1 Extension cable mounting screw (can be ordered as an accessory)
2 Terminal box (can be ordered as an accessory)
3 Extension cable bending radius >120 mm (4.72 in)
4 Mounting clamp (can be ordered as an accessory)
5 Extension cable
6 Guide pipe
7 Waterpilot FMX167
8 Additional weight can be ordered as an accessory for FMX167 with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in)
9 Protection cap

4.1.1 Additional mounting instruction

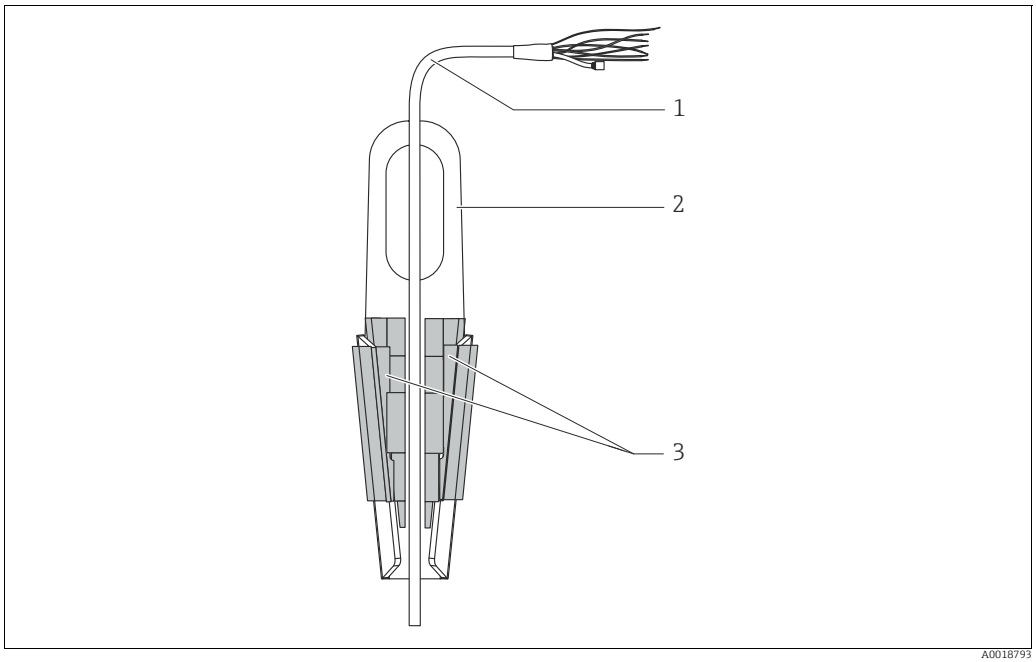
- Cable length
  - Customer-specific length in meters or feet.
  - Limited cable length when performing installation with freely suspended device with extension cable mounting screw or mounting clamp, as well as for FM/CSA approval: max. 300 m (984 ft).
- Sideways movement of the level probe can result in measuring errors. For this reason, install the probe at a point free from flow and turbulence, or use a guide tube. The internal diameter of the guide tube should be at least 1 mm (0.04 in) larger than the outer diameter of the selected FMX167.

- The device is provided with a protection cap to prevent mechanical damage to the measuring cell.
- The cable must end in a dry room or a suitable terminal box. The terminal box from Endress+Hauser provides optimum humidity and climatic protection and is suitable for outdoor installation.
- If the cable is shortened, the filter at the pressure compensation tube has to be reattached. Endress+Hauser offers a cable shortening kit for this purpose, see the documentation SD00552P/00/A6.
- Endress+Hauser recommends using twisted, shielded cables for any further wiring.

4.1.2 Dimensions

For dimensions, please refer to Technical Information TI00351P/00/EN for the Waterpilot, "Mechanical construction" section (→ see also: www.endress.com → Select Country → Download → Media Type: Documentation).

4.2 Mounting the Waterpilot with a mounting clamp

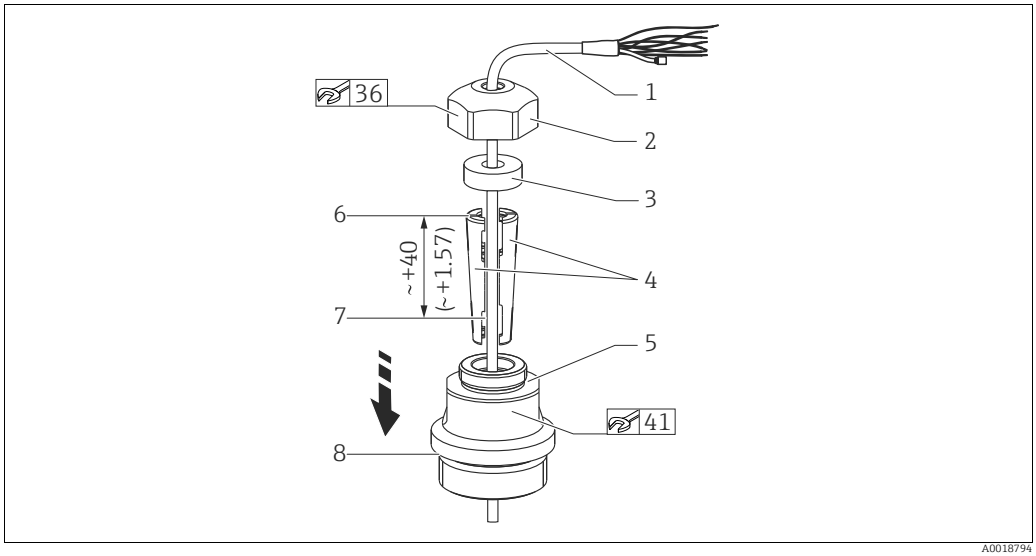


1 Extension cable
2 Mounting clamp
3 Clamping jaws

4.2.1 Mounting the mounting clamp:

1. Mount the mounting clamp (item 2). When selecting the place to fix the unit, take the weight of the extension cable (item 1) and the device into account.
2. Raise the clamping jaws (item 3). Position the extension cable (item 1) between the clamping jaws as illustrated in the graphic.
3. Hold the extension cable in position (item 1) and push the clamping jaws (item 3) back down. Tap the clamping jaws gently from above to fix in place.

4.3 Mounting with an extension cable mounting screw



Illustrated with thread G 1½". Dimensions in mm (in)

1 *Extension cable*
2 *Cover mounting screw*
3 *Sealing ring*
4 *Clamping sleeves*
5 *Mounting screw adapter*
6 *Top edge of clamping sleeve*
7 *Required length of extension cable and probe before assembly*
8 *After assembly, item 7 is located next to the mounting screw with G 1½" thread: height of sealing surface of the adapter or NPT 1½" thread height of thread run-out of adapter*

If you want to lower the level probe to a certain depth, place the top edge of the clamping sleeve 40 mm (1.57 in) higher than the required depth. Then push the extension cable and the clamping sleeve into the adapter as described in Step 6 in the following section.

4.3.1 Mounting extension cable mounting screw with G 1½" or NPT 1½" thread:

1. Mark the desired length of the extension cable on the extension cable.
2. Insert the probe through the measuring aperture and carefully lower on the extension cable. Fix the extension cable to prevent it from slipping.
3. Push the adapter (item 5) over the extension cable and screw it tightly into the measuring aperture.
4. Push the sealing ring (item 3) and cover (item 2) onto the cable from above. Press the sealing ring into the cover.
5. Place the clamping sleeve (item 4) around the extension cable at the mark (item 1) in accordance with step 1.
6. Push the extension cable with the clamping sleeve (item 4) into the adapter (item 5).
7. Push the cover (item 2) and sealing ring (item 3) onto the adapter (item 5) and screw tightly to the adapter.

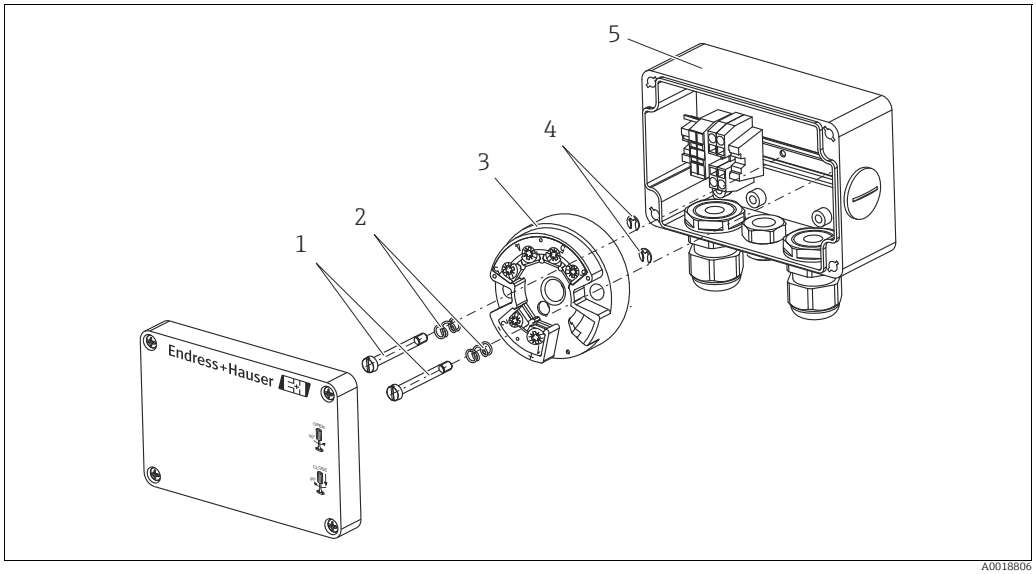
Reverse the sequence of steps to remove the extension cable mounting screw.

⚠ CAUTION
Risk of injury
▶ Application in unpressurized containers only.

4.4 Mounting the terminal box

The optional ˚ is mounted with four screws (M4). For the dimensions of the terminal box, please refer to Technical Information TI00351P/00/EN for the Waterpilot, "Mechanical construction" section (→ see also: www.endress.com → Select Country → Download → Media Type: Documentation).

4.5 Mounting the TMT181 temperature head transmitter



Temperature head transmitter with terminal box

1 Mounting screws
2 Mounting springs
3 TMT181 temperature head transmitter
4 Circlips
5 Terminal box

Only open the terminal box with a screwdriver.

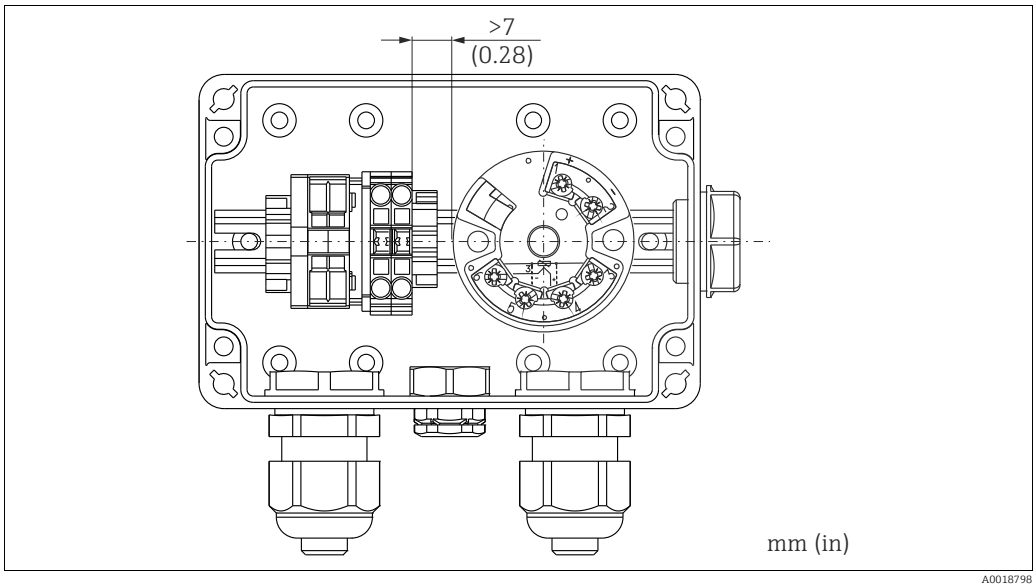
4.5.1 Mounting the temperature head transmitter

1. Guide the mounting screws (item 1) with the mounting springs (item 2) through the guide holes of the temperature head transmitter (item 3).
2. Fix the mounting screws with the circlips (item 4). Circlips, mounting screws and springs are included in the scope of delivery for the temperature head transmitter.
3. Screw the temperature head transmitter into the field housing tightly. (Max. width of screwdriver blade 6 mm (0.24 in))

NOTICE

Prevent damage to the temperature head transmitter.

▶ Do not tighten the mounting screw too tightly.



A0018798

A distance of > 7 mm (> 0.28 in) must be maintained between the terminal strip and the TMT181 temperature head transmitter.

4.6 Post-mounting check

Check that all screws are firmly seated.

5 Electrical connection

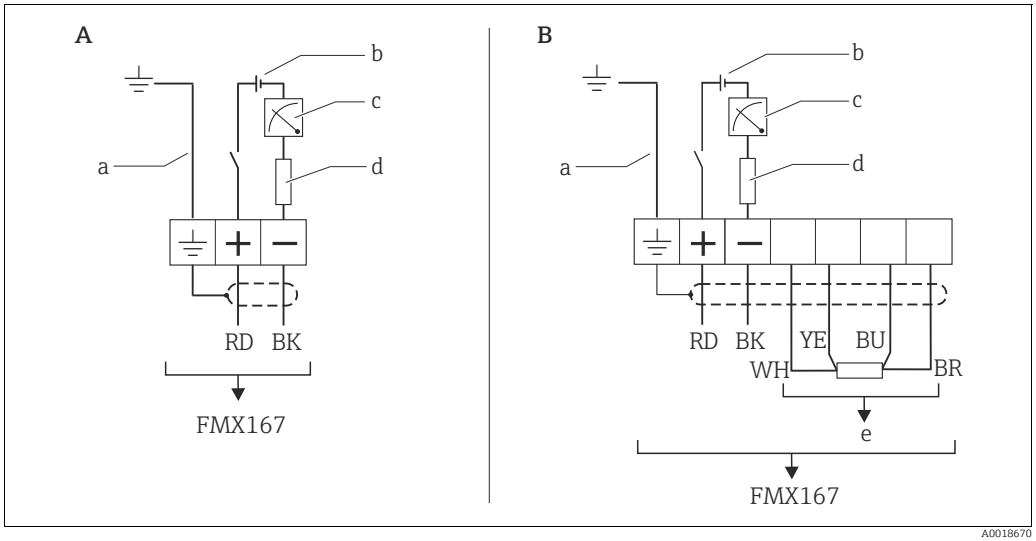
5.1 Connecting the device

⚠ WARNING

Explosion hazard!

- ▶ When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.

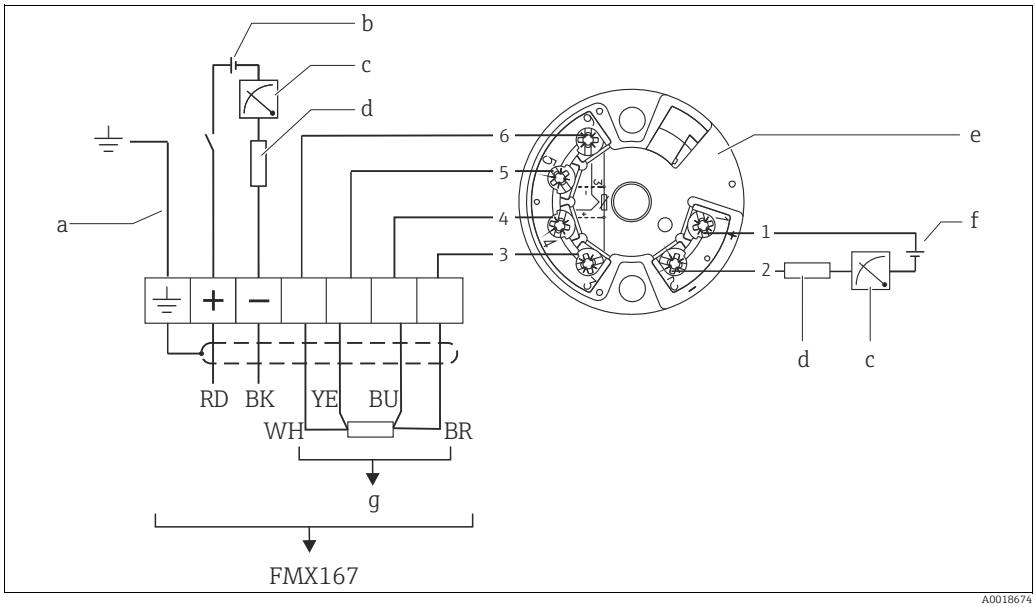
- The supply voltage must match the supply voltage on the nameplate (→ 🖹 6).
- Switch off the supply voltage before connecting the device.
- The cable must end in a dry room or a suitable terminal box. The IP66/IP67 terminal box with a GORE-TEX® from Endress+Hauser is suitable for outdoor installation (→ 🖹 11).
- Connect the device in accordance with the following diagrams. Reverse polarity protection is integrated in both the Waterpilot FMX167 and TMT181 temperature head transmitter. Changing the polarities will not result in the destruction of the devices.
- A suitable circuit breaker should be provided for the device in accordance with IEC/EN 61010.



A Waterpilot FMX167, versions "7" or "3" for Feature 70 "Additional options" in the order code
B Waterpilot FMX167 with Pt100 [1], versions "1" or "4" for feature 70 "Additional options" in the order code

1 Not for FMX167 with outer diameter 29 mm (1.14 in)
2 10 to 30 V DC
3 4 to 20 mA
4 Resistance (R_L)
5 Pt100

[1] Not for use in hazardous areas.



Waterpilot FMX167 with Pt100 and TMT181 (4 to 20 mA)[1], version "5" for feature 70 in the order code

a Not for FMX167 with outer diameter 29 mm (1.14 in)
b 10 to 30 V DC
c 4 to 20 mA
d Resistance (R_L)
e TMT181 temperature head transmitter (4 to 20 mA)
f 8 to 35 V DC
g Pt100

[1] Not for use in hazardous areas.

Wire colors
RD = red, BK = black, WH = white, YE = yellow, BU = blue, BR = brown

5.1.1 Supply voltage

FMX167	FMX167 + Pt100	TMT181 temperature head transmitter
10 to 30 V DC	10 to 30 V DC	8 to 35 V DC

5.1.2 Cable specification

- FMX167 with optional Pt100
  - Commercially available, shielded instrument cable
  - Terminals, FMX167 terminal box: 0.08 to 2.5 mm² (28 to 14 AWG)
- TMT181 temperature head transmitter (optional)
  - Commercially available instrument cable
  - Terminals, FMX167 terminal box: 0.08 to 2.5 mm² (28 to 14 AWG)
  - Transmitter terminals: max. 1.75 mm² (16 AWG)

The extension cables are shielded for versions with outer diameters of 22 mm (0.87 in) or 42 mm (1.65 in).

In the following cases, Endress+Hauser recommends the use of a shielded cable as the cable extension:
- For large distances between the end of the extension cable and the display and/or evaluation unit.
- For large distances between the end of the extension cable and the temperature head transmitter.
- When directly connecting the Pt100 signal to a display and/or evaluation unit.

5.1.3 Power consumption, current consumption

	FMX167	FMX167 + Pt100	TMT181 temperature head transmitter
Power consumption	≤ 0.675 W at 30 V DC	≤ 0.675 W at 30 V DC	≤ 0.875 W at 35 V DC
Current consumption	Max. ≤ 22.5 mA Min. ≥ 3.5 mA	Max. ≤ 22.5 mA Min. ≥ 3.5 mA Pt100: ≤ 0.6 mA	Max. ≤ 25 mA Min. ≥ 3.5 mA

5.1.4 Load

The maximum load resistance depends on the supply voltage (U) and must be determined individually for each current loop. See formulae and diagrams for "FMX167" and "Temperature head transmitter".
The total resistance resulting from the resistances of the connected devices, the connecting cable and, where applicable, the resistance of the extension cable may not exceed the load resistance value.

FMX167

$$R_{Lmax} \leq \frac{U - 10\ V}{0.0225\ A} - 2 \cdot 0.09 \frac{\Omega}{m} \cdot L - R_{add}$$

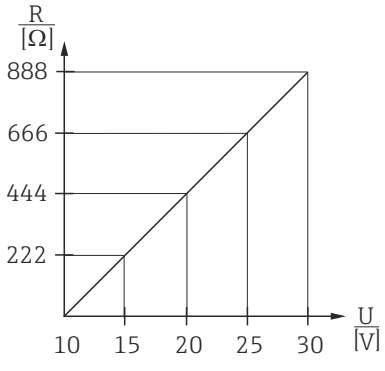
A0018755-EN

Temperature head transmitter

$$R_{Lmax} \leq \frac{U - 8\ V}{0.025\ A} - R_{add}$$

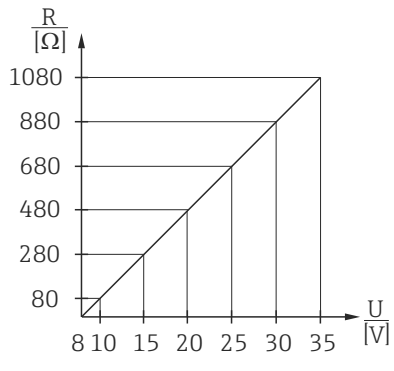
A0018756-EN

R_{Lmax} = *Max. load resistance [Ω]*
R_{add} = *Additional resistances such as resistance of evaluation unit and/or display unit, cable resistance [Ω]*
U = *Supply voltage [V]*
L = *Simple length of extension cable [m] (cable resistance per wire ≤ 0.09 Ω/m)*



A0018667

FMX167 load chart for estimating the load resistance. Additional resistances, such as the resistance of the extension cable, have to be subtracted from the value calculated as shown in the equation.



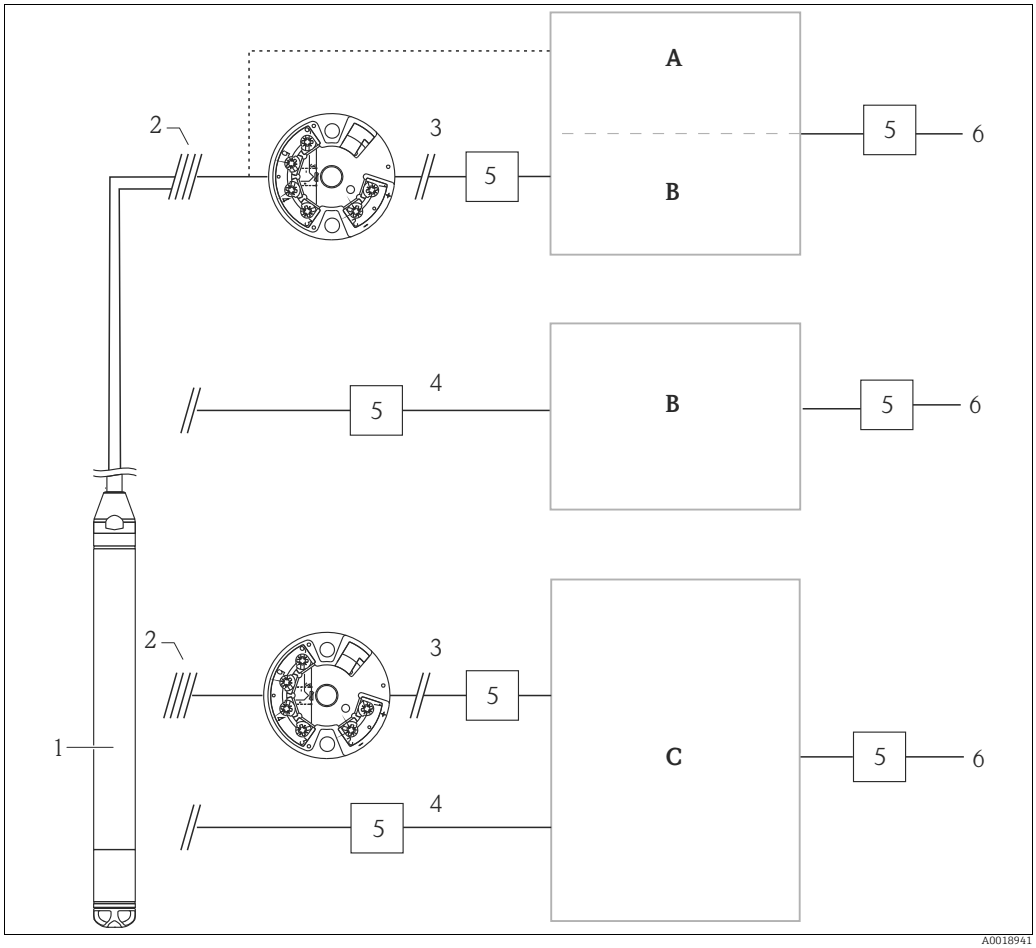
A0018668

Temperature head transmitter load chart for estimating the load resistance. Additional resistances have to be subtracted from the value calculated as shown in the equation.

5.2 Measuring unit electrical connection

5.2.1 Overvoltage protection

To protect the Waterpilot FMX167 and the TMT181 temperature head transmitter from large interference voltage peaks, Endress+Hauser recommends installing external overvoltage protection upstream and downstream of the display and/or evaluation unit as shown in the graphic.
Overvoltage protection in accordance with EN 61000 (500 V symmetrical/1000 V asymmetrical) is integrated in the Waterpilot FMX167 as standard.



A *Power supply, display and evaluation unit with one input for Pt100*
B *Power supply, display and evaluation unit with one input for 4 to 20 mA*
C *Power supply, display and evaluation unit with two inputs for 4 to 20 mA*
1 Waterpilot FMX167
2 Connection for integrated Pt100 temperature sensor in the FMX167
3 4 to 20 mA (Temperature)
4 4 to 20 mA (Level)
5 Overvoltage protection (OP), e.g. HAW from Endress+Hauser (not for use in hazardous areas)
6 Power supply

5.3 Post-connection check

The following checks must be performed after completing electrical connection of the device:
- Does the supply voltage match the specifications on the nameplate?
- Is the device connected as described in Kap. 5.1 "Connecting the device"?
- Are all screws firmly tightened?
- Optional terminal box: are the cable glands leaktight?

6 Operability

Endress+Hauser offers comprehensive measuring point solutions with display and/or evaluation units for the Waterpilot and TMT181 temperature head transmitter.

Please contact your Endress+Hauser sales representative, if you have any other questions. Contact addresses can be found on the Internet: www.endress.com/worldwide.

7 Troubleshooting

7.1 Troubleshooting specific to Waterpilot FMX167 with optional Pt100

Error description	Cause	Remedial action
No measuring signal	4 to 20 mA cable not connected correctly	Connect device in accordance with → 13, Kap. 5.1
	No power supplied via the 4 to 20 mA cable	Check current loop
	Supply voltage too low (min. 10 V DC)	– Check supply voltage. – Overall resistance greater than max. load resistance → 13, Kap. 5.1
	Waterpilot defective	Replace the Waterpilot
Temperature measured value is inaccurate/incorrect (only for Waterpilot FMX167 with Pt100)	Pt100 connected in 2-wire circuit, cable resistance was not compensated for	– Compensate cable resistance – Connect Pt100 as 3-wire or 4-wire circuit

7.2 Troubleshooting specific to TMT181 temperature head transmitter

Error description	Cause	Remedial action
No measuring signal	4 to 20 mA cable not connected correctly	Connect device in accordance with → 13, Kap. 5.1
	No power supplied via the 4 to 20 mA cable	Check current loop
	Supply voltage too low (min. 8 V DC)	– Check supply voltage. – Overall resistance greater than max. load resistance → 13, Kap. 5.1
Error current ≤ 3.6 mA or ≥ 21 mA	Pt100 not connected correctly	Connect device in accordance with → 13, Kap. 5.1
	4 to 20 mA cable not connected correctly	Connect device in accordance with → 13, Kap. 5.1
	Pt100 resistance thermometer defective	Replace the Waterpilot
	Temperature head transmitter defective	Replace the temperature head transmitter
Measured value is inaccurate/incorrect	Pt100 connected in 2-wire circuit, cable resistance was not compensated	– Compensate cable resistance – Connect Pt100 as 3-wire or 4-wire circuit

8 Maintenance

No special maintenance work is required for the Waterpilot and for the optional TMT181 temperature head transmitter.

Terminal box: Keep the pressure compensation tube and GORE-TEX® filter free from contamination.

8.1 Exterior cleaning

Please note the following points when cleaning the devices externally:
- The cleaning agents used should not corrode the housing surface and the seals. Information on this can be found on the nameplate (→ 6).
- Mechanical damage to the process isolating diaphragm or the extension cable must be avoided.
- Only clean the terminal box with water or with a cloth dampened with very diluted ethanol.

9 Repair

9.1 Spare parts

You can order spare parts directly from your Endress+Hauser service organization.

Protection cap for process isolating diaphragm	5 pieces in set	Order number: 52008999	For FMX167 with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in)
	1 piece	Order number: 917755-0000	For FMX167 with an outer diameter of 42 mm (1.65 in)
Pressure compensation kit	Set comprising: 10 Teflon filters 5 cable sleeves for the extension cable	Order number: 52005578	

In the W@M Device Viewer (www.endress.com/deviceviewer) all spare parts for the measuring device, along with the order code, are listed here and can be ordered. If available, users can also download the associated Installation Instructions.

9.2 Return

The measuring device must be returned if repairs or a factory calibration are required, or if the wrong measuring device has been ordered or delivered. According to legal regulations, Endress+Hauser, as an ISO-certified company, is required to follow certain procedures when handling returned products that are in contact with medium. To ensure swift, safe and professional device returns, please read the return procedures and conditions on the Endress+Hauser website at: www.services.endress.com/return-material

9.3 Disposal

When disposing, separate and recycle the device components based on the materials.

10 Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the Waterpilot → see also Technical Information TI00351P/00/EN, "Ordering information" section.

10.1 Mounting clamp

- Endress+Hauser offers a mounting clamp for easy Waterpilot mounting (→ 9).
- Material: 316L (1.4404) and fiberglass reinforced PA (polyamide)
- Order number: 52006151

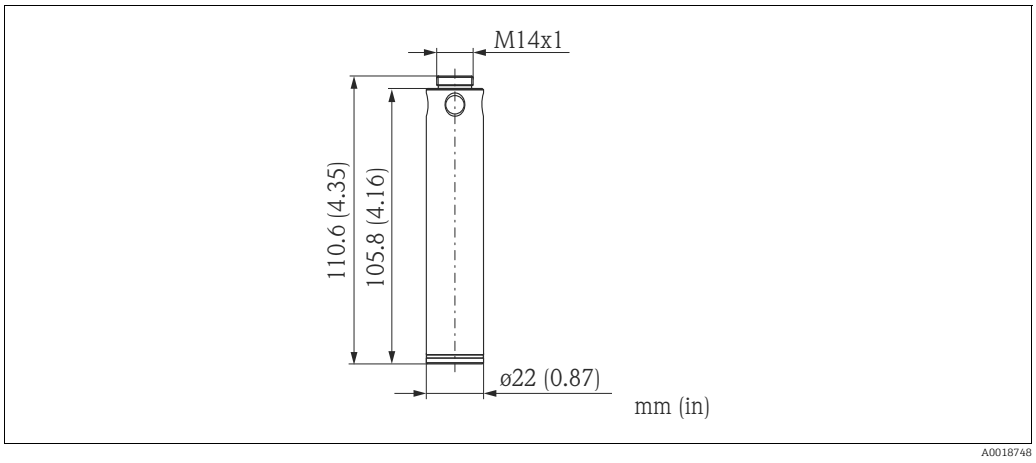
10.2 Terminal box

- Terminal box IP66/IP67 with GORE-TEX®-filter incl. 3 installed terminals.
  The terminal box is also suitable for installing a temperature head transmitter (order number: 52008794) or for four additional terminals (order number: 52008938) (→ 11).
- Order number: 52006152

The terminal box is not intended for the FMX167 with Ex nA explosion protection in the hazardous area. When using the terminal box in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.

10.3 Additional weight for FMX167 with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in)

Endress+Hauser offers additional weights to prevent sideways movement that results in measuring errors, or to make it easier to lower the device in a guide tube.
You can screw several weights together. The weights are then attached directly to the Waterpilot. For the Waterpilot with an outer diameter of 29 mm (1.14 in), version with a plastic insulation, a maximum of 5 weights may be attached.



A0018748

- Material: 316L (1.4435)
- Weight: 300 g (10.581 oz)
- Order number: 52006153

10.4 TMT181 temperature head transmitter (4 to 20 mA)

- 2-wire temperature head transmitter, configured for a measuring range from −20 to +80 °C (−4 to +176 °F). This setting offers a temperature range of 100K which can be easily mapped. Please note that the Pt100 resistance thermometer is designed for a temperature range from −10 to +70 °C (+14 to +158 °F), (→ 11).
- Order number: 52008794

10.5 Extension cable mounting screw

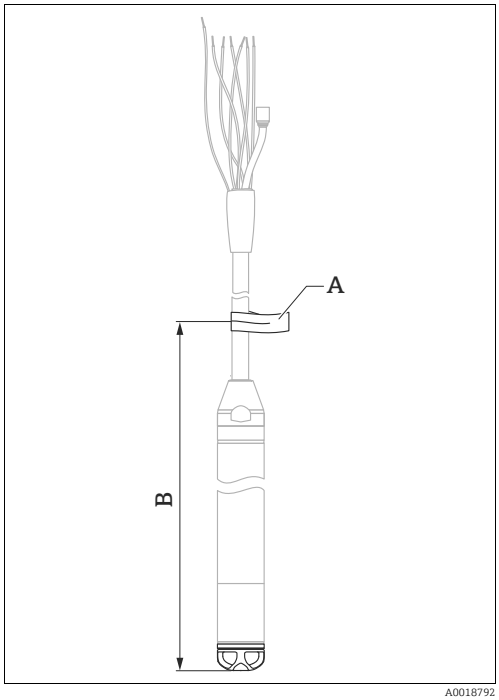
- Endress+Hauser offers extension cable mounting screws to ease FMX167 mounting and to seal the measuring aperture (→ 10).
- Material: 304 (1.4301)
- Order number for extension cable mounting screw:
  - 52008264 (G 1½" A)
  - 52009311 (NPT 1½")

10.6 Terminals

- Four terminals in strip for FMX21 terminal box, suitable for wire cross-sections: 0.08 to 2.5 mm² (28...14 AWG)
- Order number: 52008938

10.7 Cable marking

To make installation easier, Endress+Hauser marks the customer-specific length on the extension cable, see Technical Information TI00351P/00/EN, "Ordering information" section.



A0018792

A *Cable marking*
B *Cable marking tolerance*

- Cable marking tolerance (distance to the lower end of the cable probe):
  Cable length < 5 m (16 ft): ±17.5 mm (0.69 in)
  Cable length > 5 m (16 ft): ±0,2 %
- Material: PET, Adhesive: acrylic
- Immunity to temperature change: −30 to +100 °C (−22 to 212 °F)

NOTICE

The mark is only for installation purposes.

▶ It must be thoroughly removed without trace in the case of devices with drinking water approval. The extension cable must not be damaged in the process.

⚠ WARNING

Explosion hazard!

▶ Not for use in hazardous areas.

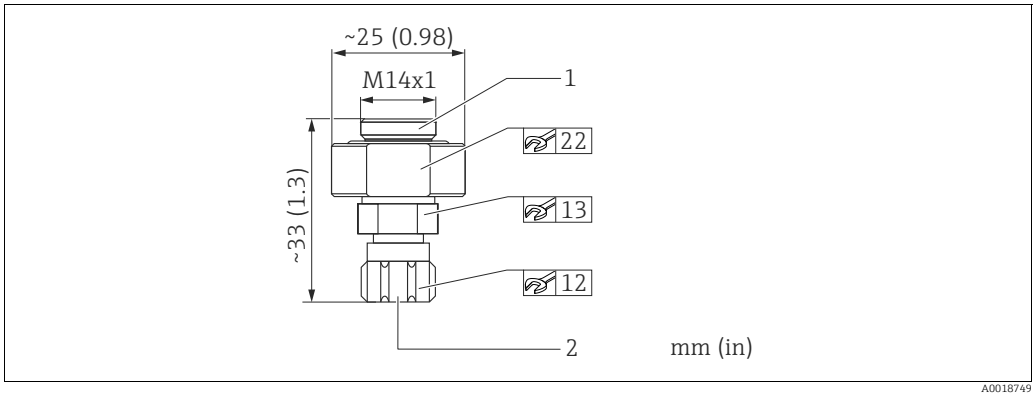
10.8 Cable shortening kit

The cable shortening kit is used to easily and professionally shorten a cable, see Technical Information TI00351P/00/EN, "Ordering information" section, and documentation SD00552P/00/A6.

The cable shortening kit is not designed for devices with FM/CSA approval.

10.9 Testing adapter for Waterpilot with an outer diameter of 22 mm (0.87 in) and 29 mm (1.14 in)

Endress+Hauser offers a testing adapter to ease function-testing of the level probes.



1 Connection suitable for Waterpilot
2 Compressed air hose connection, internal diameter of quick coupling piece 4 mm (0.16 in)

- Observe the maximum pressure for the compressed air hose and the maximum overload for the level probe. (For the maximum overload of the cable probe, see Technical Information TI00351P/00/EN or go to www.endress.com → Select Country → Download → Media Type: Documentation)
- Maximum pressure of the quick coupling piece supplied: 10 bar (145 psi)
- Adapter material: 304 (1.4301)
- Quick coupling piece material: anodized aluminum
- Adapter weight: 39 g (1.376 oz)
- Order number: 52011868

11 Technical data

For the technical data, please refer to Technical Information TI00351P/00/EN (→ see also: www.endress.com → Select Country → Download → Media Type: Documentation).

Index

A
About this document . . . 3
Accessories . . . 19

C
Cable marking . . . 20
Cable shortening kit . . . 21
Cable specification . . . 14
Current consumption . . . 15

E
Electrical connection . . . 13

I
Incoming acceptance and product identification . . . 6

L
Load . . . 15

M
Maintenance and exterior cleaning . . . 18
Mounting . . . 8
Mounting requirements . . . 8
Mounting the extension cable mounting screw . . . 10
Mounting the mounting clamp . . . 9
Mounting the terminal box . . . 11
Mounting the TMT181 temperature head transmitter 11

N
Nameplate for Waterpilot FMX167 . . . 6

O
Overvoltage protection . . . 16

P
Post-connection check . . . 16
Post-mounting check . . . 12
Power consumption . . . 15
Product identification . . . 6

R
Registered Trademarks . . . 4
Return . . . 18

S
Safety instructions . . . 5
Spare parts . . . 18
Supply voltage . . . 14

T
Troubleshooting . . . 17



www.addresses.endress.com

Endress+Hauser

People for Process Automation