

Technical Information

Waterpilot FMX21

Hydrostatic level measurement



Compact device for level measurement,
communication via HART

Application

The Waterpilot FMX21 is a pressure sensor for hydrostatic level measurement.

Endress+Hauser offers three different versions of the device:

- FMX21 with a stainless steel housing, external diameter of 22 mm (0.87 in): This version is excellently suited to drinking water applications and for use in bore holes and wells with small diameters
- FMX21 with a stainless steel housing, external diameter of 42 mm (1.65 in): Heavy-duty version and easy to clean thanks to flush-mounted process isolating diaphragm, ideally suited to wastewater and wastewater treatment plants
- FMX21 with plastic insulation, external diameter of 29 mm (1.14 in): Robust version for use in salt water and excellently suited to applications on ships (e.g. ballast water tanks)

Your benefits

- High resistance to overload and aggressive media
- High-precision, robust ceramic measuring cell with long-term stability
- Climate proofed sensor thanks to completely potted electronics and 2-filter pressure compensation system
- 4 to 20 mA with superimposed HART 6.0 output signal
- Simultaneous measurement of level and temperature with optionally integrated Pt100 temperature sensor
- Accuracy
 - Standard reference accuracy $\pm 0.2\%$
 - PLATINUM version $\pm 0.1\%$
- Automatic density compensation to increase accuracy
- Usage in drinking water: KTW, NSF, ACS
- Approvals: ATEX, FM, CSA
- Marine approvals: GL, ABS, LR, BV, DNV
- Extensive range of accessories provides complete measuring point solutions

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Document information







Document function	The document contains all the technical data on the device and provides an overview of the accessories and other products that can be ordered for the device.
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Symbols used









Safety symbols

Symbol	Meaning
	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	NOTE! This symbol contains information on procedures and other facts which do not result in personal injury.

Electrical symbols

Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections.		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 practice.

Symbols for certain types of information

Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.
	Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.
	Tip Indicates additional information.
	Reference to documentation
	Reference to page
	Reference to graphic
	Visual inspection

Symbols in graphics

Symbol	Meaning
1, 2, 3 ...	Item numbers
1., 2., 3. ...	Series of steps
A, B, C, ...	Views
A-A, B-B, C-C, ...	Sections

Documentation



The document types listed are available:
In the Downloads area of the Endress+Hauser website: www.endress.com → Downloads

Brief Operating Instructions (KA): getting the 1st measured value quickly

KA01189P:

The Brief Operating Instructions contain all the essential information from incoming acceptance to initial commissioning.

Operating Instructions (BA): your comprehensive reference

BA00380P:

These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.

Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

Directive	Type of protection	Category	Documentation	Option ¹⁾
ATEX	Ex ia IIC	II 2 G	XA00454P	BD
ATEX	Ex nA IIC	II 3 G	XA00485P	BE
IECEX	Ex ia IIC	n/a	XA00455P	IC
CSA C/US	Ex ia IIC	n/a	ZD00232P (960008976)	CE
FM	AEx ia IIC	n/a	ZD00231P (960008975)	FE
NEPSI	Ex ia IIC	n/a	XA00456P	NA
INMETRO	Ex ia IIC	n/a	XA01066P	MA

1) Product Configurator order code for "Approval"






The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Terms and abbreviations

Term/abbreviation	Explanation
XA	Document type "Safety Instructions"
KA	Document type "Brief Operating Instructions"
BA	Document type "Operating Instructions"
SD	Document type "Special Documentation"
TD	Turn down Set span and zero-based span.

Function and system design

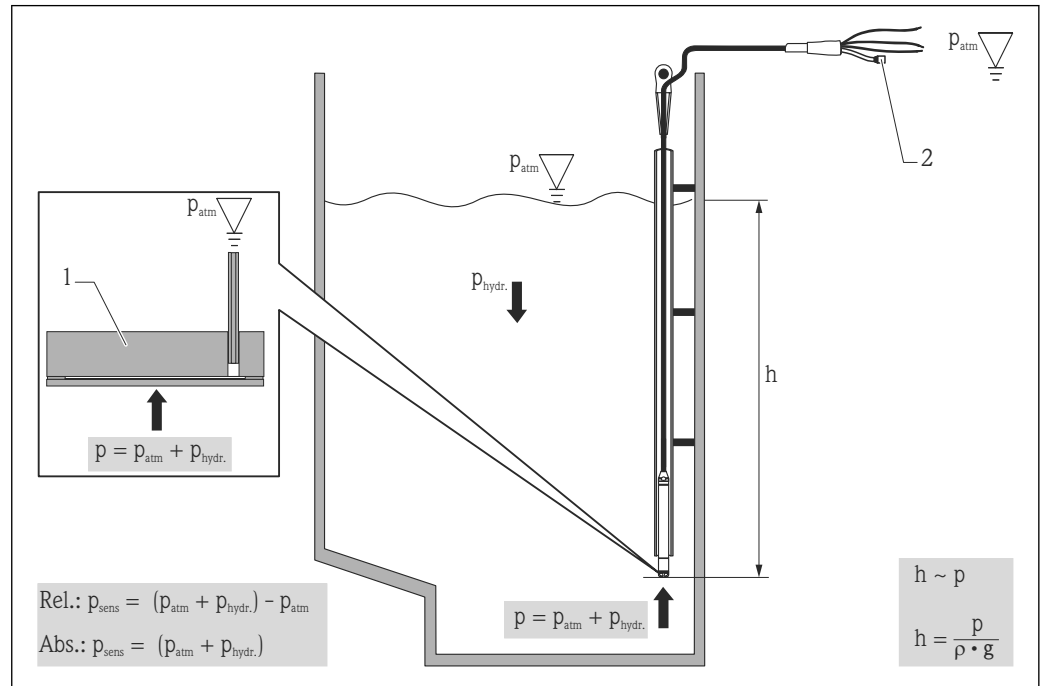
Device version

Outer diameter	22 mm (0.87 in)	42 mm (1.65 in)	max. 29 mm (1.14 in)
	 A0018640	 A0018641	 A0018642
Field of application	Hydrostatic level measurement in deep wells, e.g. drinking water	Hydrostatic level measurement in wastewater	Hydrostatic level measurement in saltwater
	<p>NOTICE The Waterpilot is not suitable for use in biogas plants since the gases can diffuse through the elastomers (seals, extension cable). ▶ For applications involving biogas, Endress+Hauser offers the Deltapilot level measuring device.</p>		
Process connection	<ul style="list-style-type: none"> ■ Suspension clamp ■ Cable mounting screw with G 1½" A or NPT 1½" thread 		
Extension cable	PE, PUR, FEP		
Seals	<ul style="list-style-type: none"> ■ FKM Viton ■ EPDM ¹⁾ 	FKM Viton	<ul style="list-style-type: none"> ■ FKM Viton ■ EPDM ¹⁾
Measuring ranges	<ul style="list-style-type: none"> ■ Relative pressure: 0 to 0.1 bar (0 to 1.5 psi) to 0 to 20 bar (0 to 300 psi) ■ Absolute pressure: 0 to 2 bar (0 to 30 psi) to 0 to 20 bar (0 to 300 psi) 		<ul style="list-style-type: none"> ■ Relative pressure: 0 to 0.1 bar (0 to 1.5 psi) to 0 to 4 bar (0 to 60 psi) ■ Absolute pressure: 0 to 2 bar (0 to 30 psi) to 0 to 4 bar (0 to 60 psi)
	<ul style="list-style-type: none"> ■ Customer-specific measuring ranges; factory-calibrated ■ The following output units can be configured: %, mbar, bar, kPa, MPa, mmH₂O, mH₂O, inH₂O, ftH₂O, psi and numerous level units. 		
Overload	to 40 bar (600 psi)		to 25 bar (375 psi)
Process temperature range	-10 to +70 °C (+14 to +158 °F)		0 to +50 °C (+32 to +122 °F)
Reference accuracy	<ul style="list-style-type: none"> ■ ±0.2 % of the set span ■ Optional: ±0.1 % of set span (PLATINUM version) 		
Supply voltage	10.5 to 35 V DC, Ex: 10.5 to 30 V DC		
Output	4 to 20 mA (can be inverted) with superimposed digital communication protocol HART 6.0, 2-wire		
Options	Drinking water approval	—	
	<ul style="list-style-type: none"> ■ Wide range of approvals, including ATEX, FM, CSA ■ Numerous accessories ■ Integrated Pt100 temperature sensor and TMT182 temperature head transmitter (4 to 20 mA HART) ■ Marine approval 		
Specialties	<ul style="list-style-type: none"> ■ High-precision, robust ceramic measuring cell with long-term stability ■ Automatic density compensation ■ Customer-specific cable marking ■ Absolute pressure measuring cell 		

1) Recommended for drinking water applications, not suitable for use in hazardous areas.

Measuring principle

The ceramic measuring cell is a dry measuring cell i.e. the pressure acts directly on the robust, ceramic process isolating diaphragm of the Waterpilot FMX21. Potential changes in air pressure are guided via a pressure compensation tube through the extension cable to the rear of the ceramic process isolating diaphragm and are compensated for. A pressure-dependent change in capacitance, caused by the movement of the process isolating diaphragm, is measured at the electrodes of the ceramic carrier. The electronics unit then converts this to a signal that is proportional to the pressure and linear to the level.



A0019140

- 1 Ceramic measuring cell
2 Pressure compensation tube
h Height level
p Total pressure = atmospheric pressure + hydrostatic pressure
 ρ Density of the medium
g Acceleration due to gravity
 $p_{hydr.}$ Hydrostatic pressure
 p_{atm} Atmospheric pressure
 p_{sens} Pressure displayed on the sensor

Temperature measurement with optional Pt100 resistance thermometer ¹⁾

For simultaneous measurement of level and temperature, Endress+Hauser offers the Waterpilot FMX21 with an optional 4-wire Pt100 resistance thermometer → 39. The Pt100 is categorized as Accuracy Class B as per DIN EN 60751.

Temperature measurement with optional Pt100 and TMT182 temperature head transmitter ¹⁾

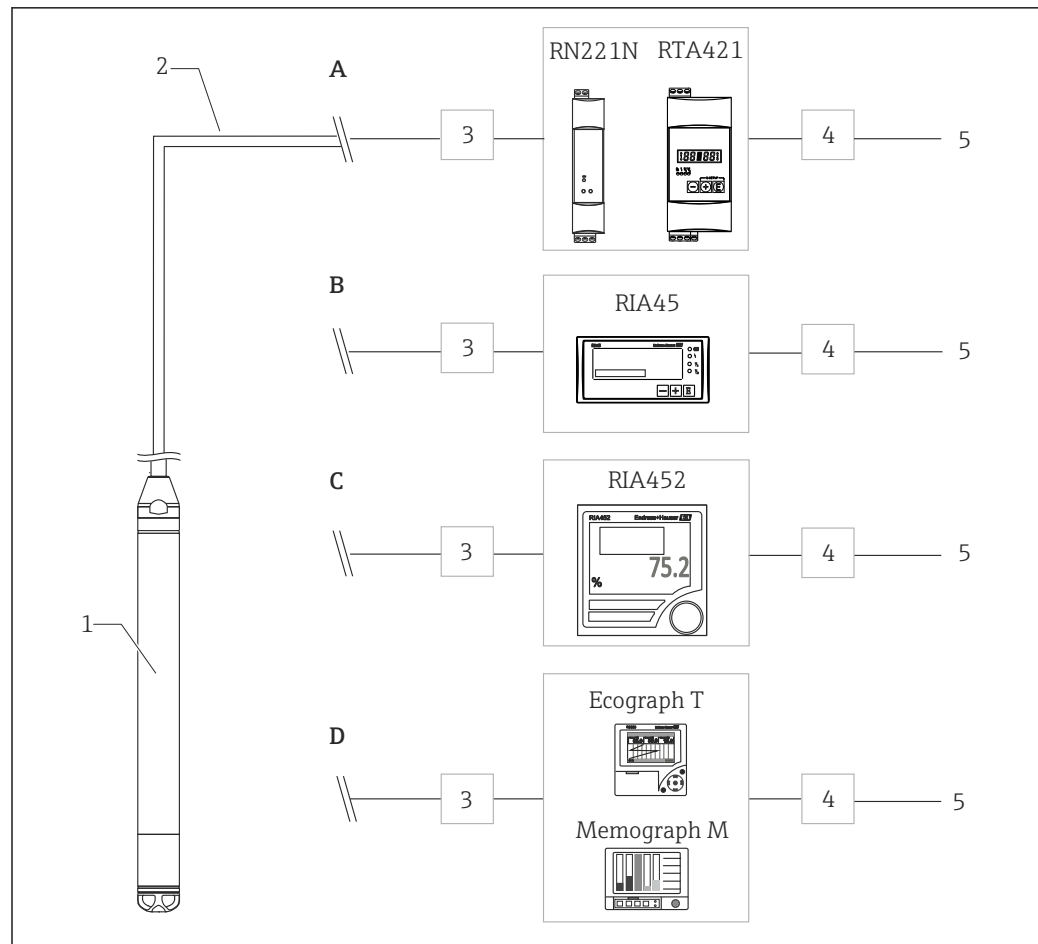
Endress+Hauser also offers the TMT182 temperature head transmitter with HART protocol for converting the temperature signal to an analog, scalable 4 to 20 mA output signal superimposed with HART 6.0. See also: "Density compensation with Pt100 temperature sensor" → 10; "Ordering information" → 37; "Accessories" → 39 as well as Technical Information TI00078R.

Measuring system**Application examples**

As standard, the complete measuring system consists of a Waterpilot FMX21 and a transmitter power supply unit with a supply voltage of 10.5 to 30 V DC (hazardous areas) or 10.5 to 35 V DC (non-hazardous areas).

Possible measuring point solutions with a transmitter and evaluation units from Endress+Hauser:

1) Not for use in hazardous areas.



A0018644

- 1 Waterpilot FMX21 HART
- 2 4 to 20 mA HART
- 3 Overvoltage protection, e.g. HAW from Endress+Hauser (not for use in hazardous areas) on the sensor side for field installation: HAW569; for DIN rail: HAW562/intrinsically safe HAW562Z. Selection in accordance with supply voltage.
- 4 Overvoltage protection, e.g. HAW from Endress+Hauser (not for use in hazardous areas) on the supply side for DIN rail: HAW561 (115/230 V) and HAW561K (24/48 V AC/DC). Selection in accordance with supply voltage.
- 5 Power supply

A

Easy and cost-effective measuring point solution: power supplied to the Waterpilot in hazardous and non-hazardous areas via the RN221N active barrier. Power supply and additional control of two appliances, e.g. pumps, via the RTA421 limit switch with local display.

B

The RIA45 evaluation unit (for panel mounting) provides a power supply system, a local display and two switch outputs.

C

If several pumps are used, the pump service life can be prolonged by alternate switching. With alternating pump control, the pump which was out of service for the longest period of time is switched on. The RIA452 evaluation unit (for panel mounting) offers this option in addition to numerous other functions.

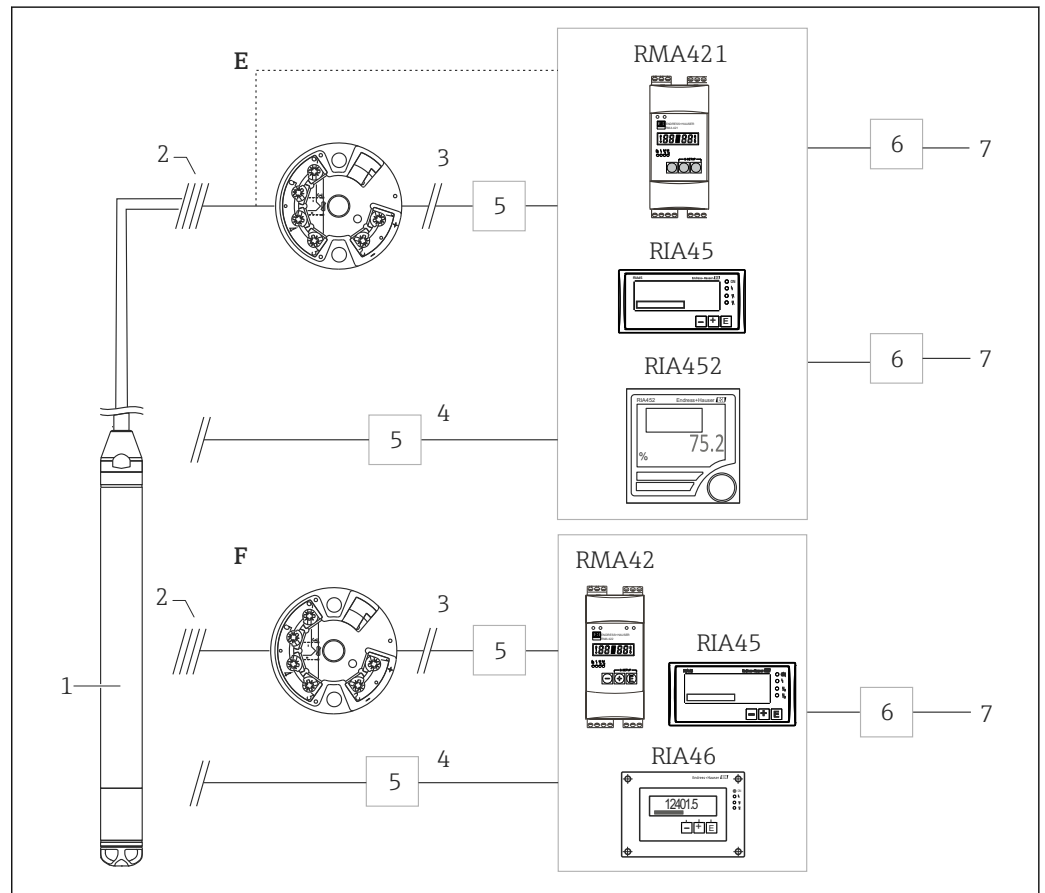
D

State-of-the-art recording technology with graphic display recorders from Endress+Hauser, e.g. Ecograph T, Memograph M: for documentation, monitoring, visualization and archiving purposes.

Application examples with the Pt100

As standard, the complete measuring system consists of a Waterpilot FMX21 and a transmitter power supply unit with a supply voltage of 10.5 to 30 V DC (hazardous areas) or 10.5 to 35 V DC (non-hazardous areas).

Possible measuring point solutions with a transmitter and evaluation units from Endress+Hauser:



A0018645

- 1 Waterpilot FMX21 HART
- 2 Connection for integrated Pt100 in the FMX21
- 3 4 to 20 mA HART (temperature)
- 4 4 to 20 mA HART (level)
- 5 Overvoltage protection, e.g. HAW from Endress+Hauser (not for use in hazardous areas) on the sensor side for field installation: HAW569; for DIN rail: HAW562/intrinsically safe HAW562Z. Selection in accordance with supply voltage.
- 6 Overvoltage protection, e.g. HAW from Endress+Hauser (not for use in hazardous areas) on the supply side for DIN rail: HAW561 (115/230 V) and HAW561K (24/48 V AC/DC). Selection in accordance with supply voltage.
- 7 Power supply

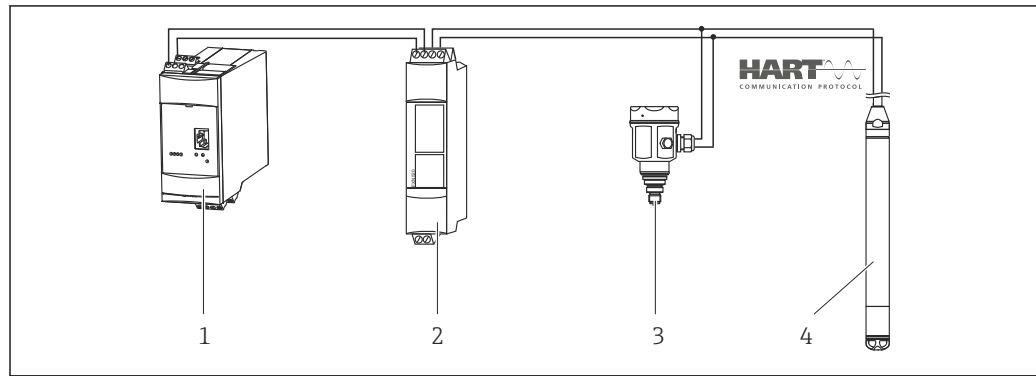
E

If you wish to measure, display and evaluate the temperature as well as the level, e.g. to monitor the temperature in fresh water for the purpose of detecting temperature limits for germ formation, the options available to you include the following: The optionally available TMT182 temperature head transmitter can convert the Pt100 signal to a 4 to 20 mA HART signal and transfer it to any commonly used evaluation unit. The RMA421, RIA45 and RIA452 evaluation units also offer a direct input for the Pt100 signal.

F

If you wish to record and evaluate the level and temperature measured value with one device, use the RMA42, RIA45 and RIA46 evaluation units with two inputs. It is even possible to mathematically link the input signals with this unit. These evaluation units are not HART-compatible.

Level measurement with absolute pressure probe and external pressure signal



A0018757

- 1 *Fieldgate FXA520*
- 2 *Multidrop connector FXN520*
- 3 *Cerabar*
- 4 *Waterpilot FMX21*

It is advisable to use an absolute pressure probe for applications in which condensation can occur. For level measurement using an absolute pressure probe, the measured value is affected by fluctuations in the ambient pressure. To correct the resulting measured error, you can connect an external absolute pressure sensor (e.g. Cerabar) to the HART signal cable, switch the Waterpilot to burst mode and operate the Cerabar in "Electr. Delta P" mode. The external absolute pressure sensor then calculates the difference between the two pressure signals and can thus determine the level precisely. Only one level measured value can be corrected in this way.

i If using intrinsically safe devices, the regulations for interconnecting intrinsically safe circuits as stipulated in IEC60079-14 (proof of intrinsic safety) must be observed.

Density compensation with Pt100 temperature sensor

The Waterpilot FMX21 can correct measured errors that result from fluctuations in the density of the water caused by temperature. Users can choose from the following options:

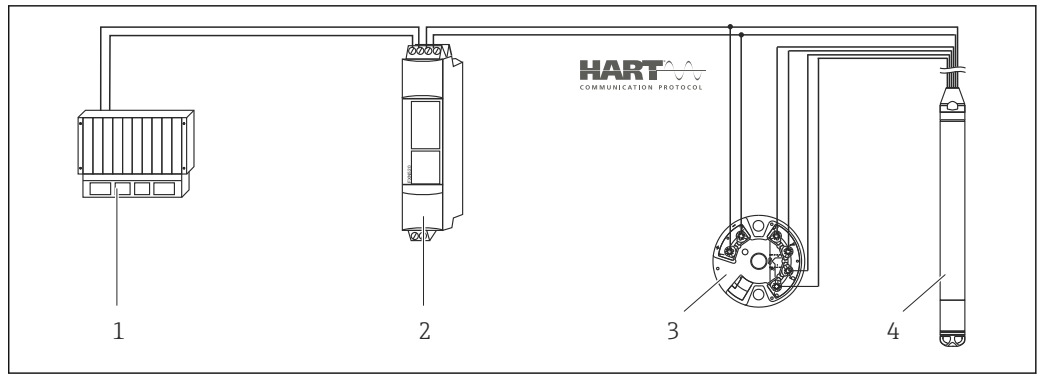
Use the internally measured sensor temperature of the FMX21

The internally measured sensor temperature is calculated in the Waterpilot FMX21 for density compensation. The level signal is thus corrected according to the density characteristic line of the water.

Use the optional internal temperature sensor for density compensation in a suitable HART master (e.g. PLC)

The Waterpilot FMX21 is optionally available with a Pt100 temperature sensor. To convert the Pt100 signal to a 4 to 20 mA HART signal, Endress+Hauser also offers the TMT182 temperature head transmitter.

The temperature and pressure signals are requested by a HART master (e.g. PLC), where a corrected level value can be generated using a stored linearization table or the density function (of a chosen medium).



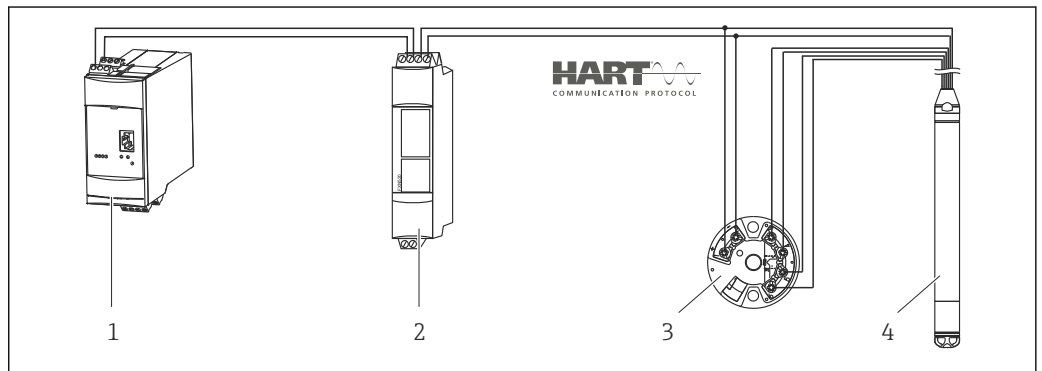
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- 1 HART master, e.g. PLC (programmable logic controller)
- 2 Multidrop connector FXN520
- 3 Temperature head transmitter TMT182
- 4 Waterpilot FMX21

Use an external temperature signal which is transmitted to the FMX21 via HART burst mode.

The Waterpilot FMX21 is optionally available with a Pt100 temperature sensor. In this case, the signal of the Pt100 is analyzed using a HART-compliant (min. HART 5.0) temperature transmitter that supports burst mode. The temperature signal can thus be transmitted to the FMX21. The FMX21 uses this signal for density correction of the level signal.

i The TMT182 temperature head transmitter is not suitable for this configuration.



A0018764

- 1 Fieldgate FXA520
- 2 Multidrop connector FXN520
- 3 Temperature head transmitter TMT182
- 4 Waterpilot FMX21

Without additional compensation due to the anomaly of water, errors of up to 4% may occur at a temperature of 70 °C (158 °F), for example. With density compensation, this error can be decreased to 0.5 % in the entire temperature range from 0 to +70 °C (+32 to +158 °F).

- i** More information can be found in the Technical Information.
- TI00078R: Temperature head transmitter TMT182 (4 to 20 mA HART)
 - TI00369F: Fieldgate FXA520
 - TI00400F: Multidrop connector FXN520

Communication protocol 4 to 20 mA HART with communication protocol

System integration The device can be given a tag name.

Description	Option ¹⁾
Measuring point (TAG)	Z1

1) Product Configurator order code for "Marking"

Input

Measured variable

FMX21 + Pt100 (optional)

- Hydrostatic pressure of a liquid
- Pt100: Temperature

TMT182 temperature head transmitter (optional)

Temperature

Measuring range

- Customer-specific measuring ranges or calibration that has been preset in the factory
- Temperature measurement of -10 to $+70$ °C ($+14$ to $+158$ °F) with Pt100 (optional)

Relative pressure

Sensor measuring range [bar (psi)]	Lowest calibratable span ¹⁾ [bar (psi)]	Vacuum resistance [bar _{abs} (psi _{abs})]	Option ²⁾
0.1 (1.5)	0.01 (0.15)	0.3 (4.5)	1C
0.2 (3.0)	0.02 (0.3)	0.3 (4.5)	1D
0.4 (6.0)	0.04 (1.0)	0	1F
0.6 (9.0)	0.06 (1.0)	0	1G
1.0 (15.0)	0.1 (1.5)	0	1H
2.0 (30.0)	0.2 (3.0)	0	1K
4.0 (60.0)	0.4 (6.0)	0	1M
10.0 (150) ³⁾	1.0 (15)	0	1P
20.0 (300) ³⁾	2.0 (30)	0	1Q

- 1) Recommended maximum turn down: 100:1. Highest turn down that can be preset at the factory: 20:1, higher available on request.
- 2) Product Configurator order code for "Sensor range"
- 3) These measuring ranges are not available for the special version with plastic insulation, external diameter of 29 mm (1.14 in).

Absolute pressure

Sensor measuring range [bar (psi)]	Lowest calibratable span ¹⁾ [bar (psi)]	Vacuum resistance [bar _{abs} (psi _{abs})]	Option ²⁾
2.0 (30.0)	0.2 (3.0)	0	2K
4.0 (60.0)	0.4 (6.0)	0	2M
10.0 (150) ³⁾	1.0 (15)	0	2P
20.0 (300) ³⁾	2.0 (30)	0	2Q

- 1) Recommended maximum turn down: 100:1. Highest turn down that can be preset at the factory: 20:1, higher available on request.
- 2) Product Configurator order code for "Sensor range"
- 3) These measuring ranges are not available for the special version with plastic insulation, external diameter of 29 mm (1.14 in).

Input signal

FMX21 + Pt100 (optional)

- Change in capacitance
- Pt100: Change in resistance

TMT182 temperature head transmitter (optional)

Pt100 resistance signal, 4 wire

Output

Output signal**FMX21 + Pt100 (optional)**

- 4 to 20 mA with superimposed digital communication protocol HART 6.0, 2-wire for hydrostatic pressure measured value. Ordering information: Product Configurator order code for "output", option "2"
- Pt100: temperature-dependent resistance value

TMT182 temperature head transmitter (optional)

4 to 20 mA with superimposed digital communication protocol HART 5.0 for temperature measured value, 2-wire

Signal range

3.8 mA to 20.5 mA

Output signal**FMX21 + Pt100 (optional)**

4 to 20 mA HART.

Options:

- Max. alarm (factory setting 22mA): can be set from 21 to 23 mA
- Hold measured value: last measured value is held
- Min. alarm: 3.6 mA

TMT182 temperature head transmitter (optional)

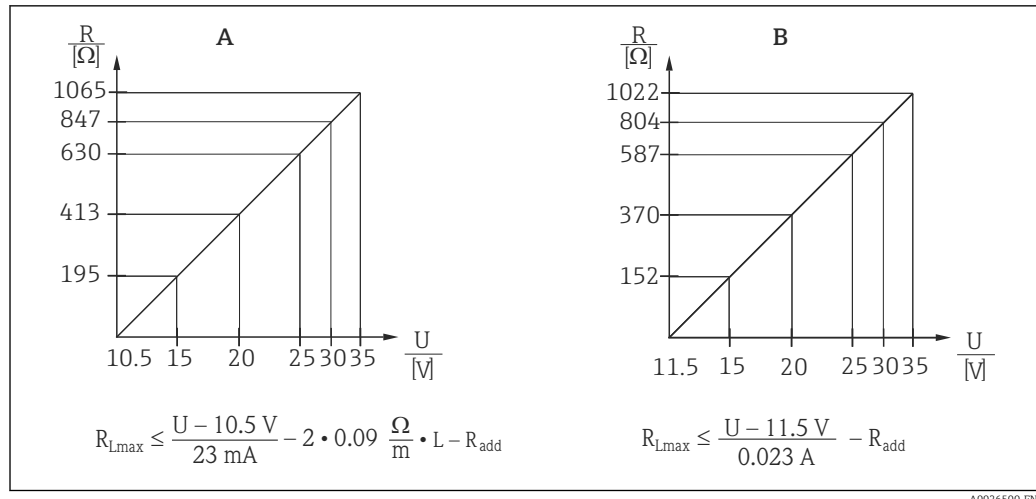
Options:

- Max. alarm ≥ 21.0 mA
 - Min. alarm ≤ 3.6 mA
-

Maximum load

The maximum load resistance depends on the supply voltage (U) and must be determined individually for each current loop, see formula and diagrams for FMX21 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.



A FMX21 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.

B Load diagram for TMT182 temperature head transmitter for estimating the load resistance. Additional resistances must be subtracted from the value calculated as shown in the equation

R_{Lmax} Max. load resistance [Ω]

R_{add} Additional resistances, such as resistance of the evaluation unit and/or display unit, cable resistance [Ω]

U Supply voltage [V]

L Basic length of extension cable [m] (cable resistance per wire 0.09 Ω/m)

- i When using the measuring device in a hazardous area, the relevant national standards and regulations as well as the Safety Instructions or installation or control drawings (XA) must be adhered to.
- When operating via a handheld terminal or via a PC with an operating program, a minimum communication resistance of 250 Ω must be taken into account.

Damping

- Via HART handheld device or PC with operating program: continuous from 0 to 999 s
- Factory setting: 2 s

Protocol-specific data


Manufacturer ID	17 (11 hex)
Device type code	25 (19 hex)
Device revision	01 (01 hex) - SW version 01.00.zz
HART specification	6
DD revision	01
Device description files (DTM, DD)	Information and files under: <ul style="list-style-type: none"> ▪ www.endress.com ▪ www.hartcomm.org
HART load	Min. 250 Ω

<p>HART device variables</p>	<p>The dynamic variables SV, TV and QV may be assigned to any device variable: Standard process values for SV, TV (second and third device variable) are dependent on the measuring mode:</p> <ul style="list-style-type: none"> ■ Meas. ■ Level <p>Standard process value for QV (fourth device variable) is the sensor temperature: Temperature</p> <p>Measured values for PV (first device variable) are dependent on the measuring mode:</p> <ul style="list-style-type: none"> ■ Meas. ■ Level ■ Tank content
<p>Supported functions</p>	<ul style="list-style-type: none"> ■ Burst mode ■ Additional transmitter status ■ Device locking ■ Alternative measuring modes ■ Catch variable ■ Long tag

Power supply

WARNING

Electrical safety is compromised by an incorrect connection!

- ▶ When using the measuring device in a hazardous area, the relevant national standards and guidelines as well as the Safety Instructions (XAs) or installation or control drawings (ZDs) must be adhered to. All data relating to explosion protection can be found in separate documentation which is available on request. This documentation is supplied with the devices as standard
→  5

Supply voltage

FMX21 + Pt100 (optional)

- 10.5 to 35 V (not hazardous areas)
- 10.5 to 30 V (hazardous areas)

TMT182 temperature head transmitter (optional)

11.5 to 35 V DC

Power consumption

FMX21 + Pt100 (optional)

- ≤ 0.805 W at 35 V DC (non-hazardous area)
- ≤ 0.690 W at 30 V DC (hazardous area)

TMT182 temperature head transmitter (optional)

≤ 0.805 W at 35 V DC

Current consumption

FMX21 + Pt100 (optional)

- Max. current consumption: ≤ 23 mA
Min. current consumption: ≥ 3.6 mA
- Pt100: ≤ 0.6 mA

TMT182 temperature head transmitter (optional)

- Max. current consumption: ≤ 23 mA
- Min. current consumption: ≥ 3.5 mA
- Pt100 via temperature head transmitter: ≤ 0.6 mA

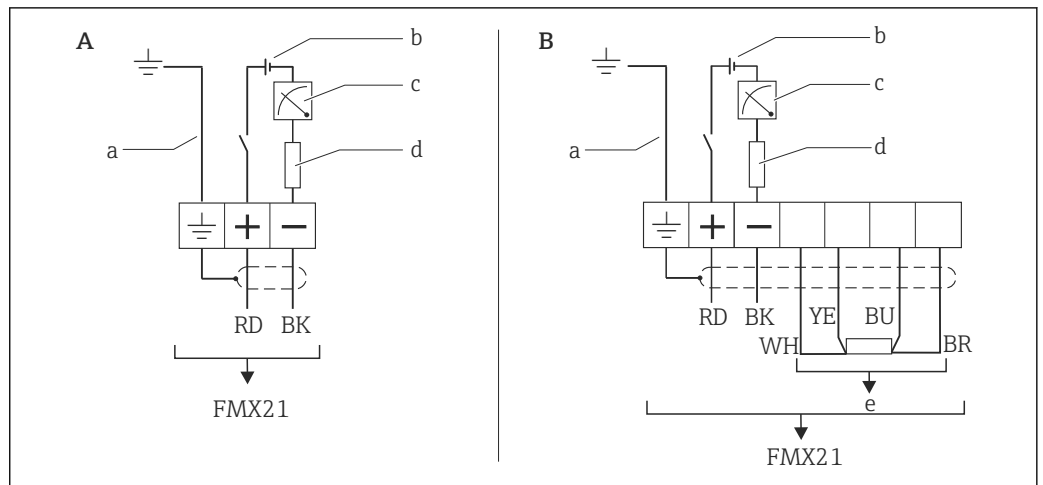
Connecting the device



- Reverse polarity protection is integrated into the Waterpilot FMX21 and the TMT182 temperature head transmitter. Changing the polarities will not result in damage to the devices.
- The cable must end in a dry room or a suitable terminal box. The terminal box (IP66/IP67) with GORE-TEX® filter from Endress+Hauser is suitable for outdoor installation. The terminal box may be ordered as an accessory using the order code for the FMX21, Product Configurator order code for "Accessories enclosed", option "PS".

For electrical connection, the relevant wires of the probe cable are used, and there is the option of using the terminal box (Commubox FXA195) or an active barrier (e.g. RN221N).

Waterpilot with Pt100



A0019441

A Waterpilot FMX21

B Waterpilot FMX21 with Pt100 (not for use in hazardous areas); option "NB", Product Configurator order code for "Accessories"

a Not for the FMX21 with external diameter of 29 mm (1.14 in)

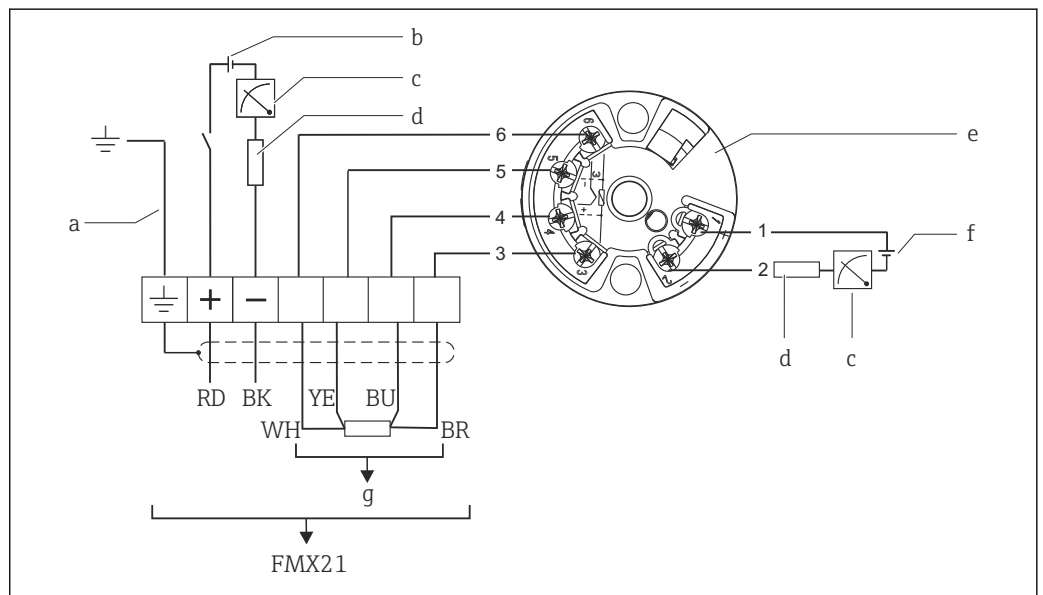
b 10.5 to 30 V DC (hazardous area), 10.5 to 35 V DC

c 4...20 mA

d Resistance (R_I)

e Pt100

Waterpilot with Pt100 and TMT182 temperature head transmitter (4 to 20 mA)



A0018780

a Not for the FMX21 with external diameter of 29 mm (1.14 in)

b 10.5 to 35 V DC

c 4...20 mA

d Resistance (R_I)

e Temperature head transmitter TMT182 (4 to 20 mA) (not for use in hazardous areas)

f 11.5 to 35 V DC

g Pt100

Ordering information: options "NB" and "PT", Product Configurator order code for "Accessories mounted" and "Accessories enclosed"

Wire colors

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

Connection classification as per IEC 61010-1:

- Overvoltage category 1
- Pollution level 1

Connection data

Connection classification as per IEC 61010-1:

- Overvoltage category 1
- Pollution level 1

Connection data in the hazardous area

See relevant XA.

Terminals

- Three terminals as standard in the terminal box
- 4-terminal strip can be ordered as an accessory, order number: 52008938 cable cross-section 0.08 to 2.5 mm² (28 to 14 AWG)



The 4-terminal strip is not designed for use in hazardous areas incl. CSA GP.

Cross-section

- Overall external diameter: 8 mm (0.31 in) ±0.25 mm (0.01 in)
- FMX21: 3 x 0.227 mm² (3 x 26 AWG) + pressure compensation tube with Teflon filter
- FMX21 with Pt100 (optional): 7 x 0.227 mm² (7 x 26 AWG) + pressure compensation tube with Teflon filter
- Pressure compensation tube with Teflon filter: External diameter of 2.5 mm (0.1 in), internal diameter of 1.5 mm (0.06 in)

Cable resistance

per wire: ≤ 0.09 Ω/m

Cable specifications

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



The extension cables are shielded for device versions with external diameters of 22 mm (0.87 in) and 42 mm (1.65 in).

FMX21 + Pt100 (optional)

- Commercially available instrument cable
- Terminals, terminal box: 0.08 to 2.5 mm² (28 to 14 AWG)

TMT182 temperature head transmitter (optional)

- Commercially available instrument cable
- Terminals, terminal box: 0.08 to 2.5 mm² (28 to 14 AWG)
- Transmitter connection: max. 1.75 mm² (15 AWG)

Residual ripple**FMX21 + Pt100 (optional)**

No impact on the 4 to 20 mA signal to ±5 % residual ripple within the permitted voltage range (according to HART Hardware Specification HCF_SPEC-54 (DIN IEC 60381-1))

Temperature head transmitter TMT182 (optional)

$U_{ss} \geq 3 \text{ V}$ at $U \geq 13 \text{ V}$, $f_{max.} = 1 \text{ kHz}$

Performance characteristics

Reference operating conditions	<p>FMX21 + Pt100 (optional)</p> <ul style="list-style-type: none"> ■ As per IEC 60770 ■ Ambient temperature T_U = constant, in the range of +21 to +33 °C (+70 to +91 °F) ■ Humidity φ = constant, in the range of 20 to 80 % rH ■ Ambient pressure p_U = constant, in the range of 860 to 1060 mbar (12.47 to 15.37 psi) ■ Position of measuring cell constant, vertical in the range of $\pm 1^\circ$ ■ Supply voltage constant: 21 V DC to 27 V DC ■ Load with HART: 250 Ω ■ Pt100: DIN EN 60770, T_U = +25 °C (+77 °F) <p>TMT182 temperature head transmitter (optional)</p> <p>Calibration temperature +25 °C (+77 °F) ± 5 K</p>
Reference accuracy	<p>FMX21 + Pt100 (optional)</p> <p>The reference accuracy comprises the non-linearity after limit point configuration, hysteresis and non-reproducibility in accordance IEC 60770.</p> <p>Standard version: Setting ± 0.2 %</p> <ul style="list-style-type: none"> – to TD 5:1: < 0.2 % of set span – from TD 5:1 to TD 20:1 $\pm (0.02 \times TD + 0.1)$ <p>Ordering information: Product Configurator order code for "Reference accuracy", option "G"</p> <p>Platinum version:</p> <ul style="list-style-type: none"> ■ Setting ± 0.1 % (optional) <ul style="list-style-type: none"> – to TD 5:1: < 0.1 % of set span – from TD 5:1 to TD 20:1 $\pm (0.02 \times TD)$ ■ Class B as per DIN EN 60751 Pt100: max. ± 1 K <p>Ordering information: Product Configurator order code for "Reference accuracy" option "D"</p> <p>TMT182 temperature head transmitter (optional)</p> <ul style="list-style-type: none"> ■ ± 0.2 K ■ With Pt100: max. ± 0.9 K
Resolution	<p>Current output: 1 μA</p> <p>Reading cycle</p> <p>HART commands: on average 2 to 3 per second</p>
Long-term stability	<p>FMX21 + Pt100 (optional)</p> <ul style="list-style-type: none"> ■ ≤ 0.1 % of URL/year ■ ≤ 0.25 % of URL/5 years <p>TMT182 temperature head transmitter (optional)</p> <p>≤ 0.1 K per year</p>
Influence of medium temperature	<ul style="list-style-type: none"> ■ Thermal change in the zero output and the output span: 0 to +30 °C (+32 to +86 °F): < $(0.15 + 0.15 \times TD)\%$ –10 to +70 °C (+14 to +158 °F): < $(0.4 + 0.4 \times TD)\%$ ■ Temperature coefficient (T_K) of the zero output and the output span –10 to +70 °C (+14 to +158 °F): 0.1 % / 10 K URL
Warm-up period	<p>FMX21 + Pt100 (optional)</p> <ul style="list-style-type: none"> ■ FMX21: < 6 s ■ Pt100: 20 m

TMT182 temperature head transmitter (optional)

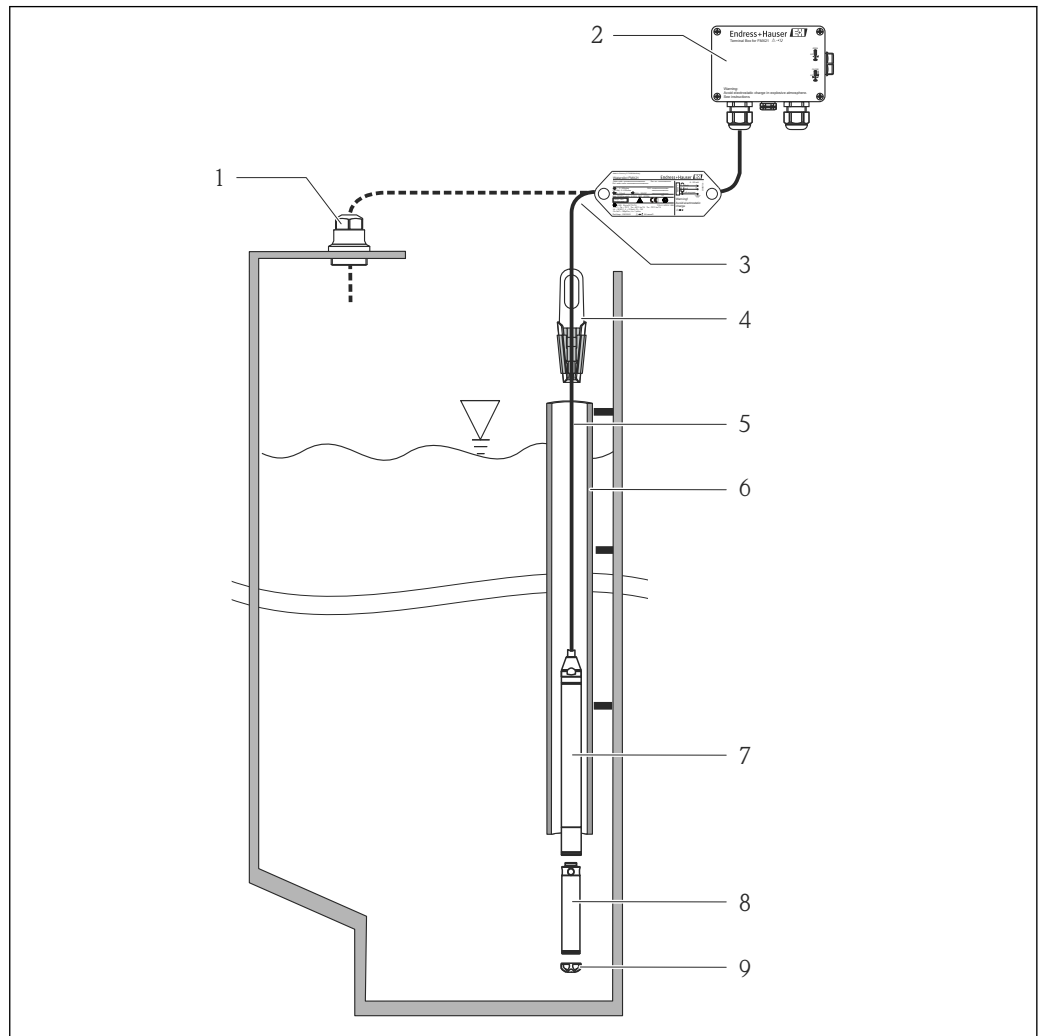
4 s

Response time**FMX21 + Pt100 (optional)**

- FMX21: 400 ms (T90 time), 500 ms (T99 time)
- Pt100: 160 s (T90 time), 300 s (T99 time)

Installation

Installation instructions



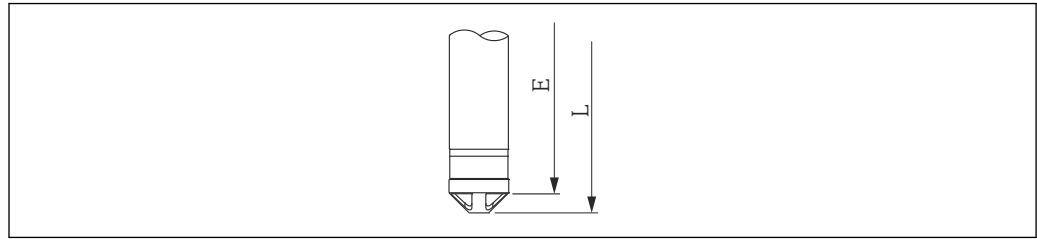
A0018770

- 1 Cable mounting screw can be ordered via the order code or as an accessory → 39
- 2 Terminal box can be ordered via the order code or as an accessory → 39
- 3 Bending radius of extension cable > 120 mm (4.72 in)
- 4 Mounting clamp can be ordered via the order code or as an accessory → 39
- 5 Extension cable, cable length → 22
- 6 Guide tube
- 7 Waterpilot FMX21
- 8 Additional weight can be ordered as an accessory for the FMX21 with external diameter of 22 mm (0.87 in) and 29 mm (1.14 in)
- 9 Protection cap

Additional installation instructions

- 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) greater than the external diameter of the selected FMX21.
- To avoid mechanical damage to the measuring cell, the device is equipped with a protection cap.
- The cable must end in a dry room or a suitable terminal box. The terminal box from Endress +Hauser provides optimum protection from the effects of humidity and weather conditions and is suitable for outdoor installation → 39.
- Cable length tolerance: < 5 m (16 ft): ±17.5 mm (0.69 in); > 5 m (16 ft): ±0.2 %
- If the cable is shortened, the filter at the pressure compensation tube must be reattached. Endress +Hauser offers a cable shortening kit for this purpose → 37 (documentation SD00552P/00/A6).

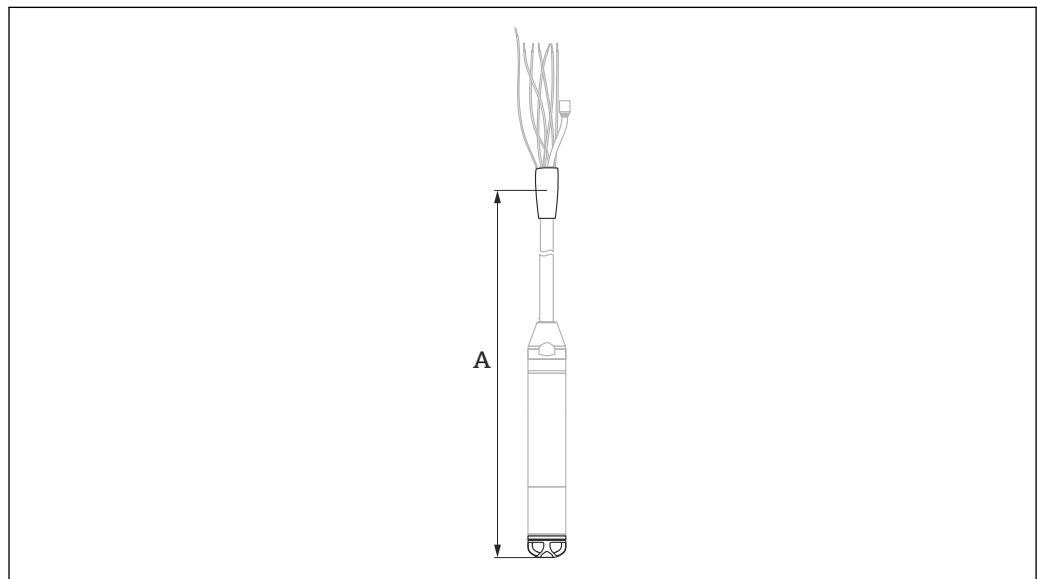
- Endress+Hauser recommends using twisted, shielded cable.
- In shipbuilding applications, measures are required to restrict the spread of fire along cable looms.
- The length of the extension cable depends on the intended level zero point. The height of the protection cap must be taken into consideration when designing the layout of the measuring point. The level zero point (E) corresponds to the position of the process isolating diaphragm. Level zero point = E; tip of probe = L (see the following diagram). For dimensions, see "Mechanical construction" section.



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Cable length

- Pay attention to the "Load"
 - Cable lengths available for order
 - Customer-specific in meters or feet.
 - Limited cable length when performing installation with freely suspended device with cable mounting screw or mounting clamp, as well as for Ex approval: max. 300 m (984 ft).
- i** When using the measuring device in a hazardous area, the relevant national standards and regulations as well as the Safety Instructions or installation or control drawings must be adhered to.



A0020556

A Length of extension cable

Cable	Option ¹⁾
10 m cable, can be shortened, PE	10
20 m cable, can be shortened, PE	11
..... m cable, can be shortened, PE	15
30 ft cable, can be shortened, PE	20
60 ft cable, can be shortened, PE	21
..... ft cable, can be shortened, PE	25
10 m cable, can be shortened, FEP	30
20 m cable, can be shortened, FEP	31

Cable	Option ¹⁾
..... m cable, can be shortened, FEP	35
30 ft cable, can be shortened, FEP	40
60 ft cable, can be shortened, FEP	41
..... ft cable, can be shortened, FEP	45
10 m cable, can be shortened, PUR	50
20 m cable, can be shortened, PUR	51
..... m cable, can be shortened, PUR	55
30 ft cable, can be shortened, PUR	60
60 ft cable, can be shortened, PUR	61
..... ft cable, can be shortened, PUR	65

1) Product Configurator order code for "Probe connection"

Technical data for cable

- Minimum bending radius: 120 mm (4.72 in)
- Tensile strength: max. 950 N (213.56 lbf)
- Cable extraction force (= tensile force required to extract the cable from the probe):
 - PE, FEP: typically ≥ 400 N (89.92 lbf), PUR: typically ≥ 150 N (33.72 lbf)
 - when used in hazardous area: ≥ 100 N (73.75 lbf)
- UV-resistant
- PE: For use in drinking water

Environment

Ambient temperature range	<p>FMX21 + Pt100 (optional)</p> <ul style="list-style-type: none"> ■ With external diameter of 22 mm (0.87 in) and 42 mm (1.65 in): -10 to +70 °C (+14 to +158 °F) (= medium temperature) ■ With external diameter of 29 mm (1.14 in): 0 to +50 °C (+32 to +122 °F) (= medium temperature) <p>Cable</p> <p>(when mounted in a fixed position)</p> <ul style="list-style-type: none"> ■ With PE: -30 to +70 °C (-22 to +158 °F) ■ With FEP: -40 to +70 °C (-40 to +158 °F) ■ With PUR: -40 to +70 °C (-40 to +158 °F) <p>Terminal box</p> <p>-40 to +80 °C (-40 to +176 °F)</p> <p>TMT182 temperature head transmitter (optional)</p> <p>-40 to +85 °C (-40 to +185 °F)</p>
Storage temperature range	<p>FMX21 + Pt100 (optional)</p> <p>-40 to +80 °C (-40 to +176 °F) (= medium temperature)</p> <p>Cable</p> <p>(when mounted in a fixed position)</p> <ul style="list-style-type: none"> ■ With PE: -30 to +70 °C (-22 to +158 °F) ■ With FEP: -30 to +80 °C (-40 to +158 °F) ■ With PUR: -40 to +80 °C (-40 to +176 °F) <p>Terminal box</p> <p>-40 to +80 °C (-40 to +176 °F)</p> <p>TMT182 temperature head transmitter (optional)</p> <p>-40 to +100 °C (-40 to +212 °F)</p>
Degree of protection	<p>FMX21 + Pt100 (optional)</p> <p>IP68, permanently hermetically sealed at 20 bar (290 psi) (~200 m H₂O)</p> <p>Terminal box (optional)</p> <p>IP66, IP67</p> <p>TMT182 temperature head transmitter (optional)</p> <p>IP00, condensation permitted</p>
Installation height as per IEC61010- 1Ed.3	<p>Up to 2 000 m (6 600 ft) above MSL.</p>
Electromagnetic compatibility (EMC)	<p>FMX21 + Pt100 (optional)</p> <ul style="list-style-type: none"> ■ EMC in accordance with all relevant requirements of EN 61326 series. For details, refer to the Declaration of Conformity. ■ Maximum deviation: < 0.5 % of span <p>TMT182 temperature head transmitter (optional)</p> <p>EMC in accordance with all relevant requirements of EN 61326 series. For details, refer to the Declaration of Conformity.</p>

Overvoltage protection

FMX21 + Pt100 (optional)

- Integrated overvoltage protection as per EN 61000-4-5 (500 V symmetrical/1000 V asymmetrical)
- Overvoltage protection ≥ 1.0 kV, external if necessary

TMT182 temperature head transmitter (optional)

Overvoltage protection external if necessary


Process

Medium temperature range**FMX21 + Pt100 (optional)**


- With external diameter of 22 mm (0.87 in) and 42 mm (1.65 in):
-10 to +70 °C (+14 to +158 °F)
- With external diameter of 29 mm (1.14 in):
0 to +50 °C (+32 to +122 °F)

Medium temperature limit**FMX21 + Pt100 (optional)**

With external diameter of 22 mm (0.87 in) and 42 mm (1.65 in):
-20 to +70 °C (-4 to +158 °F)

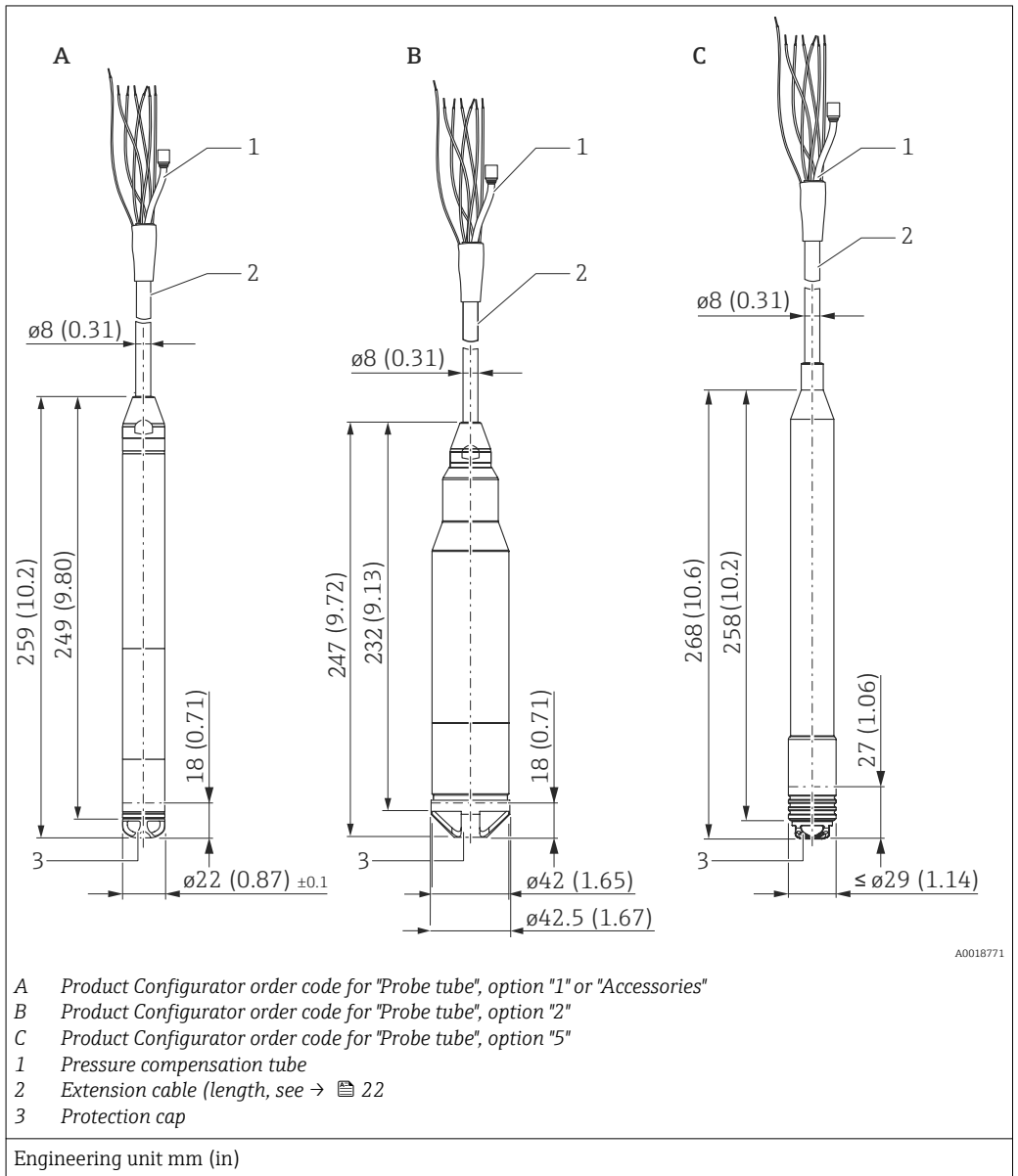
 In hazardous area incl. CSA GP, the medium temperature limit is
-10 to +70 °C (+14 to +158 °F).

With external diameter of 29 mm (1.14 in): 0 to +50 °C (+32 to +122 °F)

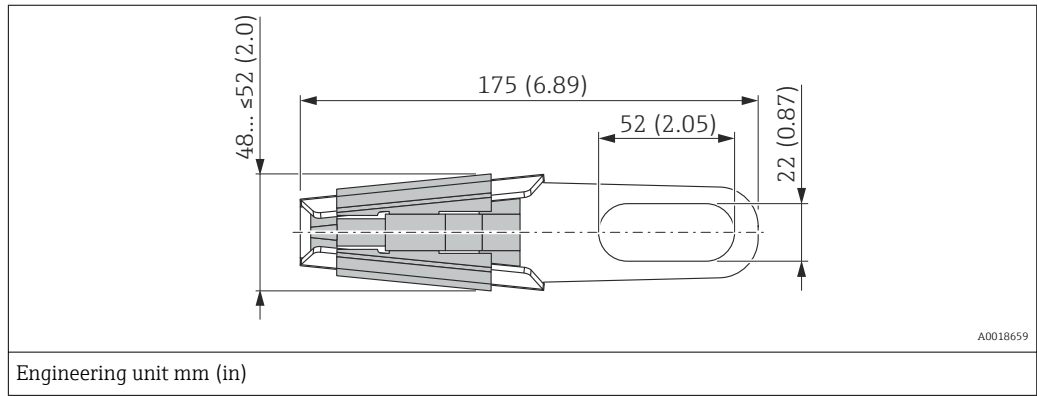
 The FMX21 may be operated in this temperature range. The specification can then be exceeded
e.g. measuring accuracy

Mechanical construction

Dimensions of the level probe

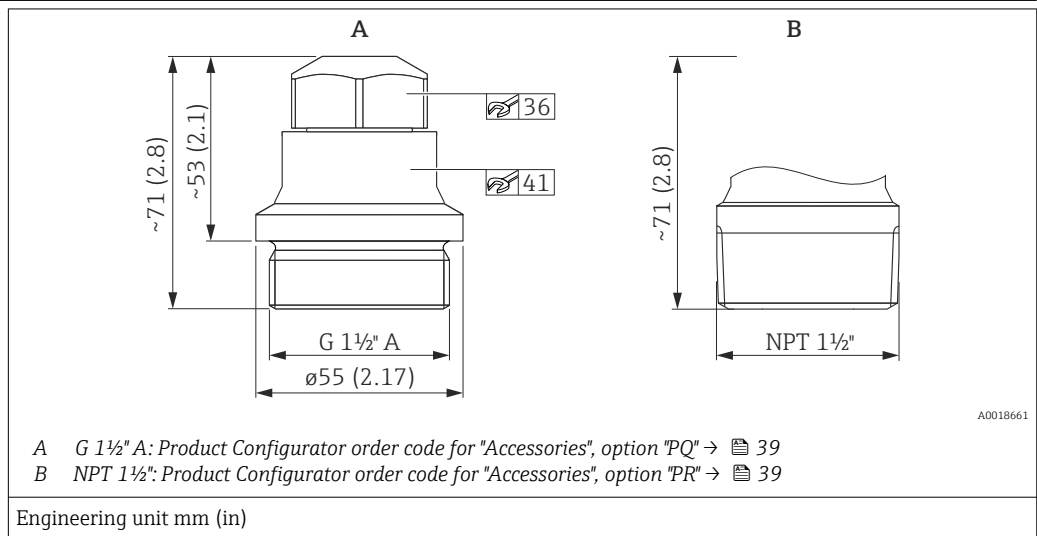


Dimensions of the mounting clamp



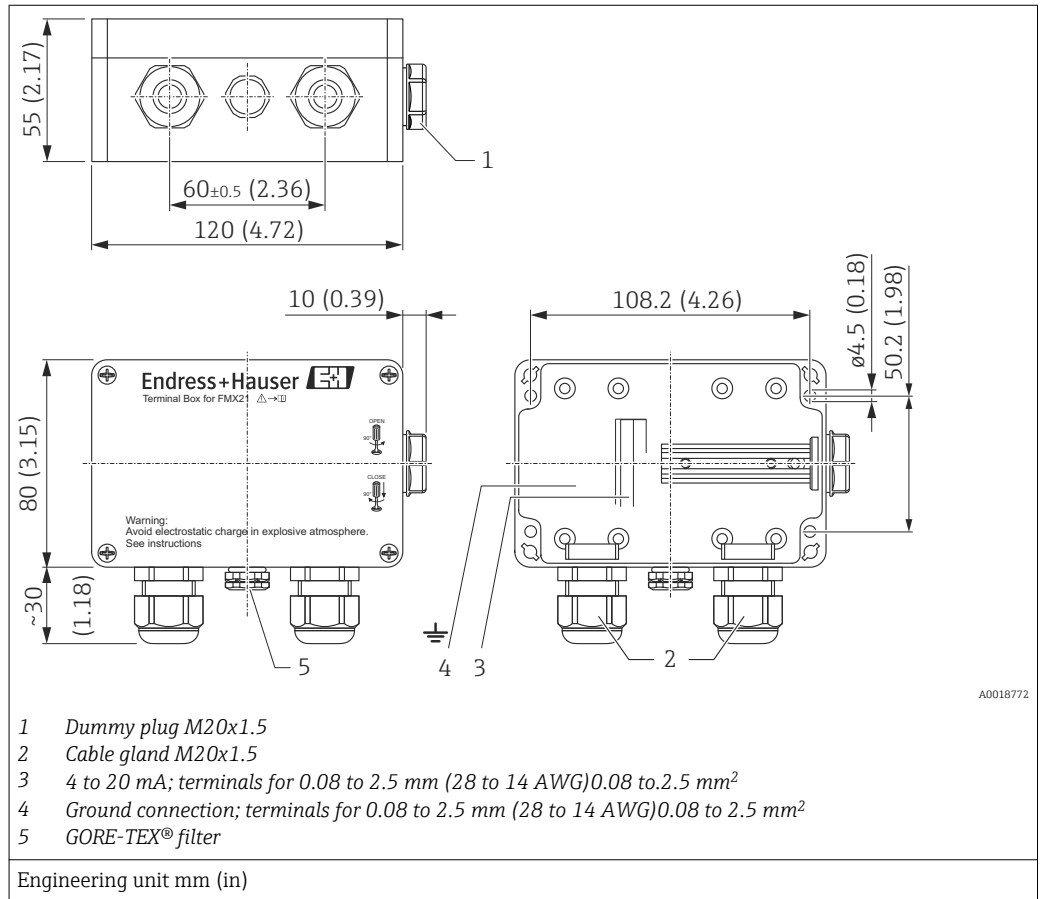
Ordering information: Product Configurator order code for "Accessories", option "PO" → 39

Dimensions of cable mounting screw



Use only in unpressurized vessels.

**Dimensions of terminal box
IP66, IP67 with filter**

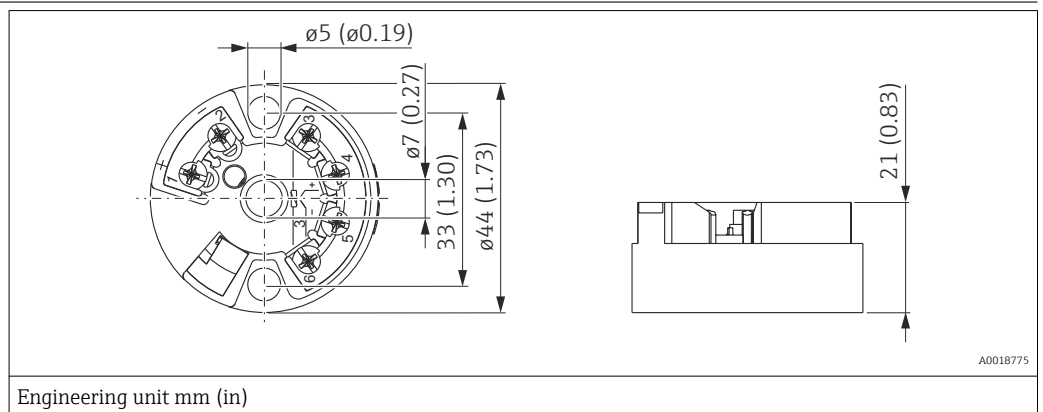


Ordering information: Product Configurator order code for "Accessories enclosed", option "PS" or "PT"
 → 39

If the FMX21 with Pt100 option is supplied without the optional TMT182 temperature head transmitter, a terminal strip is provided with the terminal box for wiring the Pt100.

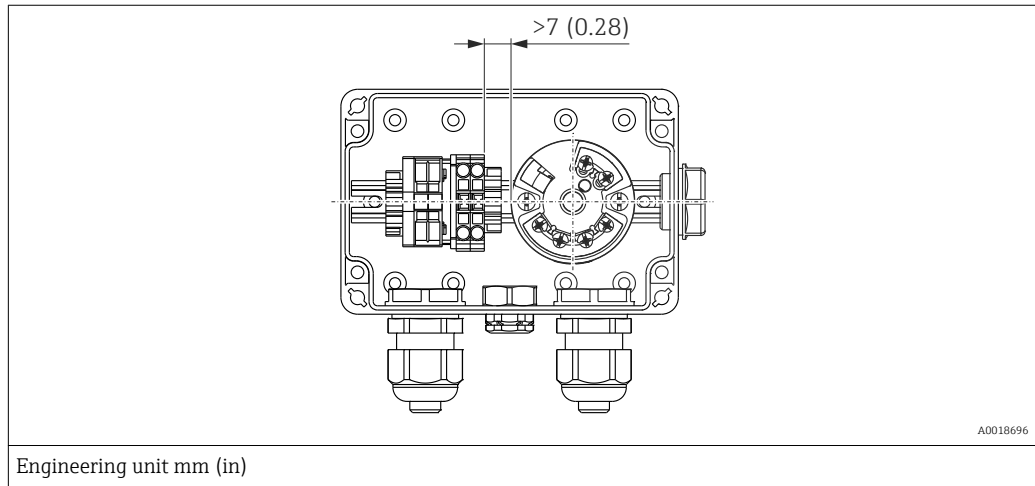
i The 4-terminal strip is not designed for use in hazardous areas incl. CSA GP.

**Dimensions of the TMT182
temperature head
transmitter**



Ordering information: Product Configurator order code for "Accessories enclosed", option "PT"
 → 39

Terminal box with installed TMT182 temperature head transmitter (4 to 20 mA HART)

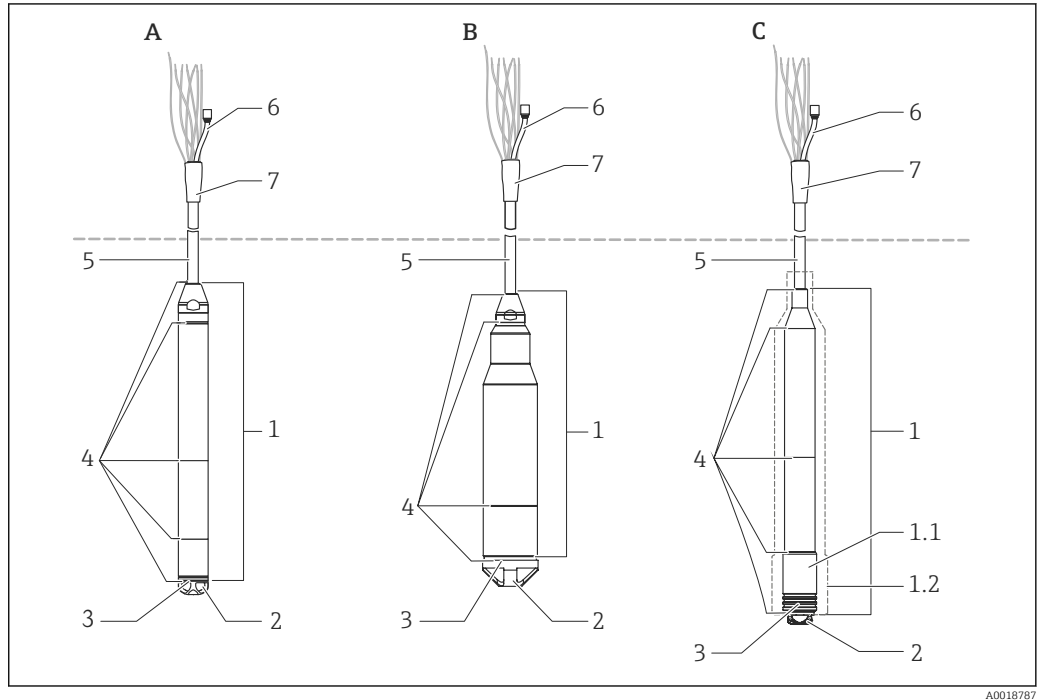


i A distance of > 7 mm (0.28 in) must be maintained between the terminal block and the TMT182 temperature head transmitter.

Weight

Component part		Weight
Level probe, external diameter of 22 mm (0.87 in)		344 g (12.133 oz)
Level probe, external diameter of 42 mm (1.65 in)		1 376 g (48.532 oz)
Level probe, external diameter of 29 mm (1.14 in)		394 g (13.896 oz)
Extension cable	PE	52 g/m (0.035 lbs/1 ft)
	PUR	60 g/m (0.040 lbs/1 ft)
	FEP	108 g/m (0.072 lbs/1 ft)
Suspension clamp		170 g (5.996 oz)
Cable mounting screw G 1½" A		770 g (27.158 oz)
Cable mounting screw NPT 1½"		724 g (25.535 oz)
Terminal box		235 g (8.288 oz)
Temperature head transmitter TMT182		40 g (1.411 oz)
Additional weight		300 g (10.581 oz)
Testing adapter		39 g (1.376 oz)

Materials



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Materials in contact with process

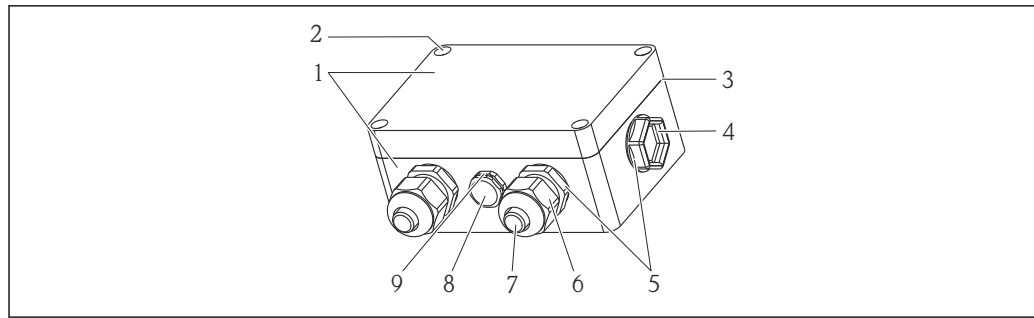
Item number	Component part	Material
1	<ul style="list-style-type: none"> ▪ A: Level probe, external diameter of 22 mm (0.87 in) ▪ B: Level probe, external diameter of 42 mm (1.65 in) ▪ C: Level probe, max. external diameter of 29 mm (1.14 in) 	316L (1.4404/1.4435)
1.1	Sensor sleeve	PPS (Polyphenylene sulfide)
1.2	Heat-shrink tube	Polyolefin and hot melt adhesive
	The heat-shrink tube around the level probe acts as insulation. It prevents electrical contact between the level probe and the tank. Electrochemical corrosion is thus avoided.	
2	Protection cap (order number 71220481) <ul style="list-style-type: none"> ▪ A and C: with external diameter of 22 mm (0.87 in) and 29 mm (1.14 in) ▪ B: Device with external diameter of 42 mm (1.65 in) 	<ul style="list-style-type: none"> ▪ PPO (Polyphenylenoxide) ▪ PFA (Perfluoralkoxy)
3	Process ceramic	Al ₂ O ₃ (Aluminum oxide ceramic)
4	Seal	EPDM ¹⁾ FKM Viton ²⁾
5	Extension cable insulation Additional information	Choose from: <ul style="list-style-type: none"> ▪ PE-LD (Low-density polyethylene) ▪ FEP (Fluorinated ethylene propylene) ▪ PUR (Polyurethane)

- 1) Product Configurator order code for "Seal", option "H"
 2) Product Configurator order code for "Seal", option "A"

Materials not in contact with process

Item number	Component part	Material
6	Pressure compensation tube	PA
7	Heat-shrink tube	Polyolefin

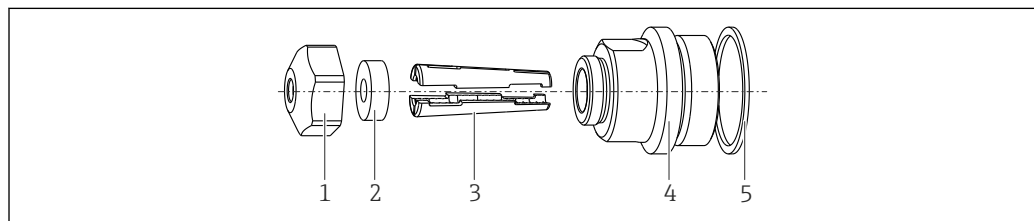
Terminal box (not in contact with process)



A0018917

Item number	Component part	Material
1	Housing	PC
2	Mounting screws (4 x)	A2
3	Seal	CR (Chloroprene rubber)
4	Dummy plug M20x1.5	PBT-GF30
5	Cable gland M20x1.5	PE-HD
6		PA6
7		PA6-GF30
8	Pressure compensation filter	PA6-GF10, ePTFE
9	Pressure compensation filter, O-ring	Silicone (VMQ)

Cable mounting screw (not in contact with process)



A0018918

Item number	Component part	Material
1	Cover for cable mounting screw	304 (1.4301)
2	Sealing ring	NBR
3	Clamping sleeves	PA66-GF35
4	Adapter for cable mounting screw G 1½" A, NPT 1½"	304 (1.4301)
5	Seal ® Only for G 1½" A	EPDM

Extension cable

PE	PUR	FEP
<ul style="list-style-type: none">▪ Abrasion-resistant extension cable with strain-relief members made of high-strength PE fibers▪ Shielded with aluminum-coated film▪ Insulated with polyethylene (PE), black▪ Copper wires, twisted▪ Pressure compensation tube with Teflon filter	<ul style="list-style-type: none">▪ Abrasion-resistant extension cable with strain-relief members made of high-strength PE fibers▪ Shielded with aluminum-coated film▪ Insulated with polyurethane (PUR), black▪ Copper wires, twisted▪ Pressure compensation tube with Teflon filter	<ul style="list-style-type: none">▪ Abrasion-resistant extension cable▪ Shielded with galvanized steel wire netting▪ Insulated with fluorinated ethylene propylene (FEP), black▪ Copper wires, twisted▪ Pressure compensation tube with Teflon filter

Operability

FieldCare

FieldCare is an Endress+Hauser asset management tool based on FDT technology. With FieldCare, you can configure all Endress+Hauser devices as well as devices from other manufacturers that support the FDT standard.

FieldCare supports the following functions:

- Configuration of transmitters in online and offline mode
- Loading and saving device data (upload/download)
- Documentation of the measuring point

Connection options:

- Via Commubox FXA195 and the USB interface of a computer
- Via Fieldgate FXA520

For additional information and free download of FieldCare, see → www.de.endress.com → Downloads → Text Search: FieldCare

Field Xpert SFX

The Field Xpert SFX is an industrial PDA with an integrated 3.5" touchscreen from Endress+Hauser based on Windows Mobile. It offers wireless communication via the optional VIATOR® Bluetooth® modem as a point-to-point connection to a HART device, or via WiFi and Endress+Hauser's Fieldgate FXA520 to one or more HART devices. Field Xpert also works as a stand-alone device for asset management applications. For details, refer to BA00060S/04/EN.


Certificates and approvals


CE mark The device meets the legal requirements of the relevant EC directives. Endress+Hauser confirms that the device has been successfully tested by applying the CE mark.

C-Tick symbol The measuring system complies with EMC requirements of the "Australian Communications and Media Authority (ACMA)".

Ex approvals

- ATEX
- CSA C/US
- FM
- IEC
- NEPSI
- INMETRO

 The approvals apply exclusively to the Waterpilot FMX21 without Pt100 and without TMT182.

- Waterpilot FMX21 is only available for use in hazardous areas with the FKM Viton seal.
- All explosion protection data are given in separate documentation which is available upon request. Ex documentation is included with all Ex devices as standard →  5.

Drinking water approval For FMX21 with an external diameter of 22 mm (0.87 in) with EPDM seal

Description	Option ¹⁾
KTW	LQ
NSF61	LR
ACS	LS

1) Product Configurator order code "Additional ordering information (optional)"

Marine approval For FMX21 with an external diameter of 22 mm (0.87 in) with EPDM seal

Description	Option ¹⁾
GL	LE
ABS	LF
LR	LG
BV	LH
DNV	LI

1) Product Configurator order code for "Additional ordering information (optional)"

Other standards and guidelines The applicable European guidelines and standards can be found in the relevant EU Declarations of Conformity. The following were also applied:

DIN EN 60770 (IEC 60770):

Transmitters for use in industrial process control systems Part 1: Methods for performance evaluation

Methods for evaluating the performance of transmitters LQ for control and regulation in industrial process control systems.

DIN 16086:

Electrical pressure measuring instruments, pressure sensors, pressure transmitters, pressure measuring instruments, concepts, specifications on data sheets

Procedure for writing specifications in data sheets for electrical pressure measuring instruments, pressure sensors and pressure transmitters.

EN 61326:

Electrical equipment for measurement, control and laboratory use – EMC requirements

EN 61010-1 (IEC 61010-1):

Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures

EN 60529:

Degrees of protection provided by enclosures (IP code)

Calibration	Description	Option ¹⁾
	Factory calibration certificate, 5-point	F1

1) Product Configurator order code for "Calibration"

Calibration unit	Description	Option ¹⁾
	Sensor range; %	A
Sensor range; mbar/bar	B	
Sensor range; kPa/MPa	C	
Sensor range; mm/m H ₂ O	D	
Sensor range; in H ₂ O/ft H ₂ O	E	
Sensor range; psi	F	
Customized pressure; see additional specification	J	
Customized level; see additional specification	K	

1) Product Configurator order code for "Calibration; unit"

Service	Description	Option ¹⁾
	Configured min alarm current	IA
Adjusted HART Burst Mode PV	IB	
Adjusted density compensation	IC	
... m cable marking>installation	IR	
... ft cable marking>installation	IS	
Special version	I9	

1) Product Configurator order code for "Service"

Pressure

The following configuration data sheet must be completed and included with the order if option "J: customized pressure" has been selected for order code "090: Calibration; unit" in the product structure.


Pressure unit			
<input type="checkbox"/> mbar	<input type="checkbox"/> mmH ₂ O	<input type="checkbox"/> mmHg	<input type="checkbox"/> Pa
<input type="checkbox"/> bar	<input type="checkbox"/> mH ₂ O		<input type="checkbox"/> kPa
	<input type="checkbox"/> ftH ₂ O		<input type="checkbox"/> MPa
<input type="checkbox"/> psi	<input type="checkbox"/> inH ₂ O	<input type="checkbox"/> kgf/cm ²	

Calibration range / Output		
Lower-range value (LRV):	_____	[pressure engineering unit]
Upper-range value (URV):	_____	[pressure engineering unit]

Damping	
Damping _____ sec	

Accessories

Suspension clamp

- For easy installation of the FMX21, Endress+Hauser offers a mounting clamp →  28.
- Material: 316L (1.4404) and fiber-glass reinforced PA (polyamide)
- Order number: 52006151
- Ordering information: Product Configurator order code for "Accessories enclosed"

Terminal box

- Terminal box IP66/IP67 with GORE-TEX® filter incl. 3 installed terminals The terminal box is also suitable for installing a TMT182 temperature head transmitter or for four additional terminals (order no.: 52008938)
- Order number: 52006152 ordering information: Product Configurator order code for "Accessories enclosed", option "PS"

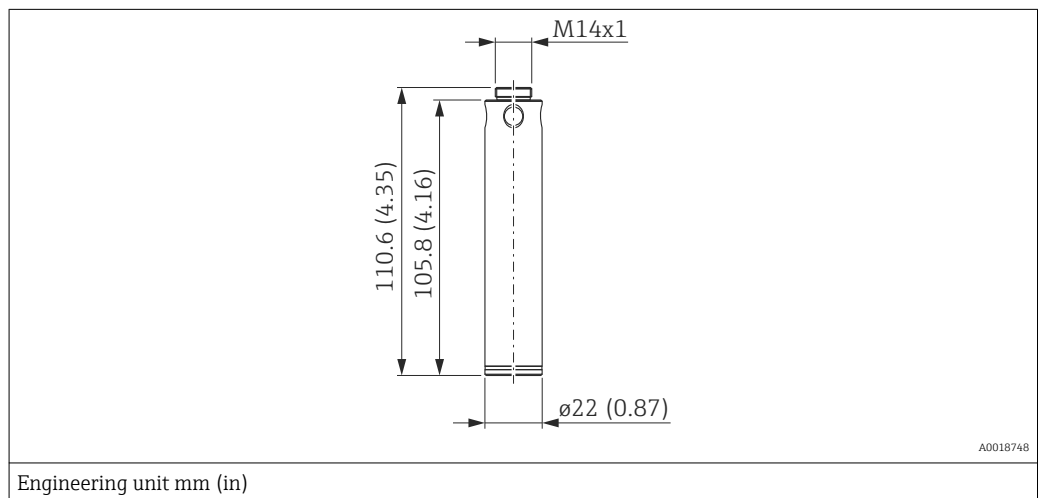


The terminal box is not designed for the FMX21 with type of protection Ex nA in hazardous areas. If the terminal box is used in a hazardous area, the Safety Instructions of the relevant device must be observed, as well as the applicable regulations for explosion protection.

Additional weight

For FMX21 with external diameter of 22 mm (0.87 in) or 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 screwed directly onto the FMX21. For the FMX21 with external diameter of 29 mm (1.14 in), a maximum of 5 weights may be screwed on. In conjunction with the Ex nA approval, a maximum of one additional weight is permitted for the FMX21 with external diameter of 29 mm (1.14 in).
- Material: 316L (1.4435)
- Weight: 300 g (10.581 oz)
- Order number: 52006153 Ordering information: Product Configurator order code for "Accessories enclosed", option "PU"



Temperature head transmitter TMT182 (4 to 20 mA HART)

- Temperature head transmitter 2-wire, configured for a measuring range of -20 to $+80$ °C (-4 to $+158$ °F). This configuration offers a temperature range of 100 K which can be easily mapped. Please note that the Pt100 resistance thermometer is suitable for a temperature range of -10 to $+70$ °C (-14 to $+176$ °F) -10 to $+70$ °C.
- Order no.: 51001023 ordering information: Product Configurator order code for "Accessories enclosed", option "PT"




The TMT182 temperature head transmitter is not designed for use in hazardous areas incl. CSA GP.

Pt-100 resistance thermometer

Ordering information: Product Configurator order code for "Accessories mounted", option "NB"

Cable mounting screws

Endress+Hauser offers a cable mounting screw for easy installation of the FMX21 and to seal the measuring aperture. →  28

- Order number for cable mounting screw:
 - 52008264 (G 1½" A) Ordering information: Product Configurator order code for "Accessories enclosed", option "PQ"
 - 52009311 (NPT 1½") Ordering information: Product Configurator order code for "Accessories enclosed" option "PR"
- Material

Terminals

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

i The 4-terminal strip is not designed for use in hazardous areas incl. CSA GP.

Cable shortening kit

- The cable shortening kit is used to shorten a cable easily and professionally.
- Order number: 71222671, Ordering information: Product Configurator order code for "Accessories enclosed", option "PW" Associated documentation SD00552P/00/A6.

i The cable shortening kit is not designed for the FMX21 with FM/CSA approval.

Cable marking

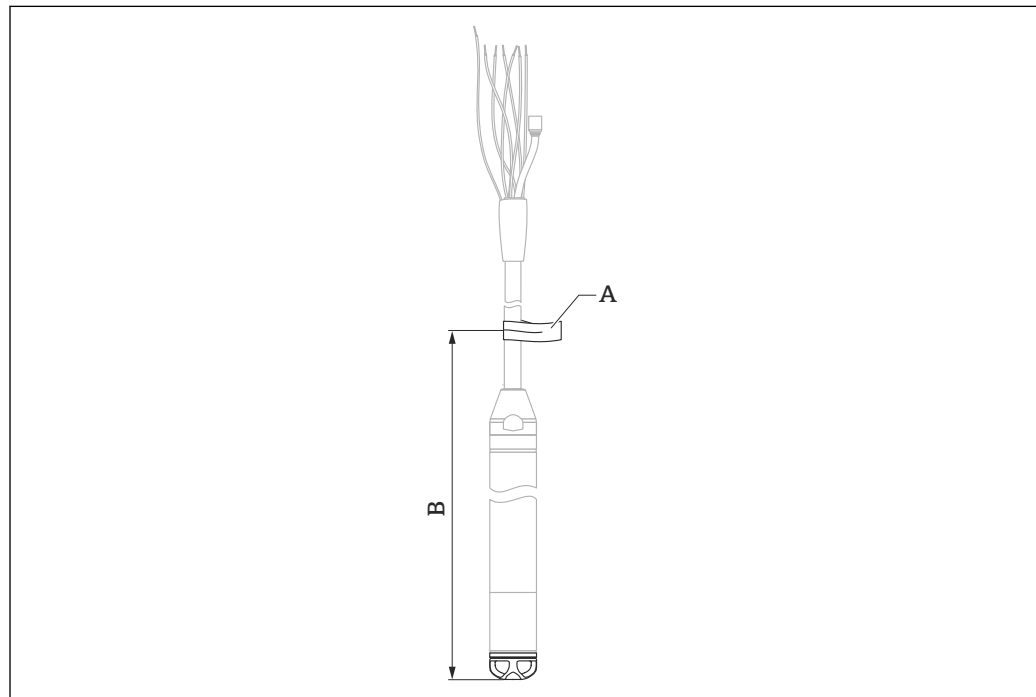
- To make installation easier, Endress+Hauser marks the extension cable if a customer-specific length has been ordered
- Cable marking tolerance (distance to lower end of level probe):
 - Cable length < 5 m (16 ft): ±17.5 mm (0.69 in)
 - Cable length > 5 m (16 ft): ±0.2 %
- Material: PET, stick-on label: acrylic
- Immunity to temperature change: -30 to +100 °C (-22 to +212 °F)

NOTICE

The marking is used exclusively for installation purposes.

- ▶ The mark 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.

i Not for use of the FMX21 in hazardous areas.




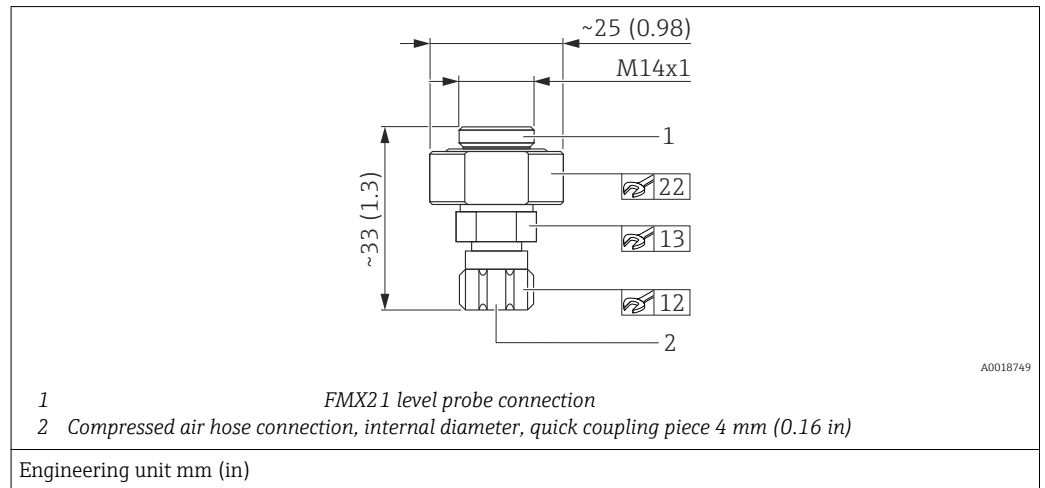
A0018792

- A Cable marking
B Cable marking tolerance

Testing adapter

For FMX21 with external diameter of 22 mm (0.87 in) or 29 mm (1.14 in)

- Endress+Hauser offers a testing adapter to ease function-testing of the level probes.
 - Observe the maximum pressure for compressed air hose and maximum overload for level probe
→  12
 - Maximum pressure for the quick coupling piece provided: 10 bar (145 psi)
 - Adapter material: 304 (1.4301)
 - Material of quick coupling piece: anodized aluminum
 - Weight: 39 g (1.376 oz)
 - Order number 52011868
- Ordering information: Product Configurator order code for "Accessories enclosed", option "PV"



For FMX21 with external diameter of 42 mm (1.65 in)

Order number: 71110310

Supplementary documentation

The following document types are also available in the Downloads area of the Endress+Hauser website: www.endress.com → Downloads

Field of Activities

- Pressure measurement: FA00004P/00/EN
- Recording technology: FA00014R/09/EN
- System components: FA00016K/09/EN

Technical Information

- Waterpilot FMX167 with 4 to 20 mA analog output signal: TI00351P/00/EN
- Deltapilot M: TI00437P/00/EN
- Temperature head transmitter iTEMP HART TMT182: TI00078R/09/EN

Operating Instructions

- Waterpilot FMX21: BA00380P/00/EN
- Cable shortening kit: SD00552P/00/A6
- Field Xpert: BA01211S/04/EN

Brief Operating Instructions

KA01189P/00/EN - Brief Operating Instructions for devices

Safety Instructions (XA)

Depending on the approval, the following Safety Instructions (XA) are supplied with the device. They are an integral part of the Operating Instructions.

Directive	Type of protection	Category	Documentation	Option ¹⁾
ATEX	Ex ia IIC	II 2 G	XA00454P	BD
ATEX	Ex nA IIC	II 3 G	XA00485P	BE
IECEx	Ex ia IIC	n/a	XA00455P	IC
CSA C/US	Ex ia IIC	n/a	ZD00232P (960008976)	CE
FM	AEx ia IIC	n/a	ZD00231P (960008975)	FE
NEPSI	Ex ia IIC	n/a	XA00456P	NA
INMETRO	Ex ia IIC	n/a	XA01066P	MA

1) Product Configurator order code for "Approval"

 The nameplate indicates the Safety Instructions (XA) that are relevant to the device.

Drinking water approval

- SD00289P/00/A3 (NSF)
- SD00319P/00/A3 (KTW)
- SD00320P/00/A3 (ACS)

Registered trademarks

GORE-TEX®

Trademark of W.L. Gore & Associates, Inc., USA.

TEFLON®

Trademark of E.I. Du Pont de Nemours & Co., Wilmington, USA.

HART®

Registered trademark of the HART Communication Foundation, Austin, USA

FieldCare®

Trademark of Endress+Hauser Process Solutions AG.

iTEMP®

Trademark of Endress+Hauser Wetzler GmbH + Co. KG, Nesselwang, D..

Patents

This product is protected by at least one of the following patents. Further patents are pending.

- US 6,427,129 B1 \cong EP 0 892 249 B1
- US 6,703,943 A1
- DE 203 13 744.2 U1



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