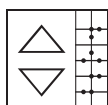
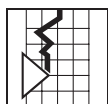
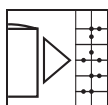
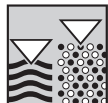


Hydrostatic Level Measurement *Waterpilot FMX 165*

Low-cost and reliable cable probe with ceramic measuring cell

Standard instrument for level measurement in wells and sewage treatment plants



Application Areas

The Waterpilot FMX 165 is a hydrostatic pressure sensor for level measurement of water and wastewater. The FMX 165 has nine permanently calibrated measuring ranges from 1.5 psi to 300 psi (0.1 bar to 20 bar) to ensure use in all standard applications including deep wells, water towers, and sewage treatment plants.

Features and Benefits

With its high electrical and mechanical stability, the Waterpilot FMX 165 fulfills all plant construction standards.

- Ceramic measuring cell - extremely resistant to overload, alternating loads and aggressive media
- Support cable with hard-wearing conical seal of the probe tube and climatic protection in the pressure compensation tube
- Permanent hermetically sealed submersible cable probe
- Potted electronics with 4 to 20 mA output signal and integrated overvoltage protection

Endress + Hauser

The Power of Know How



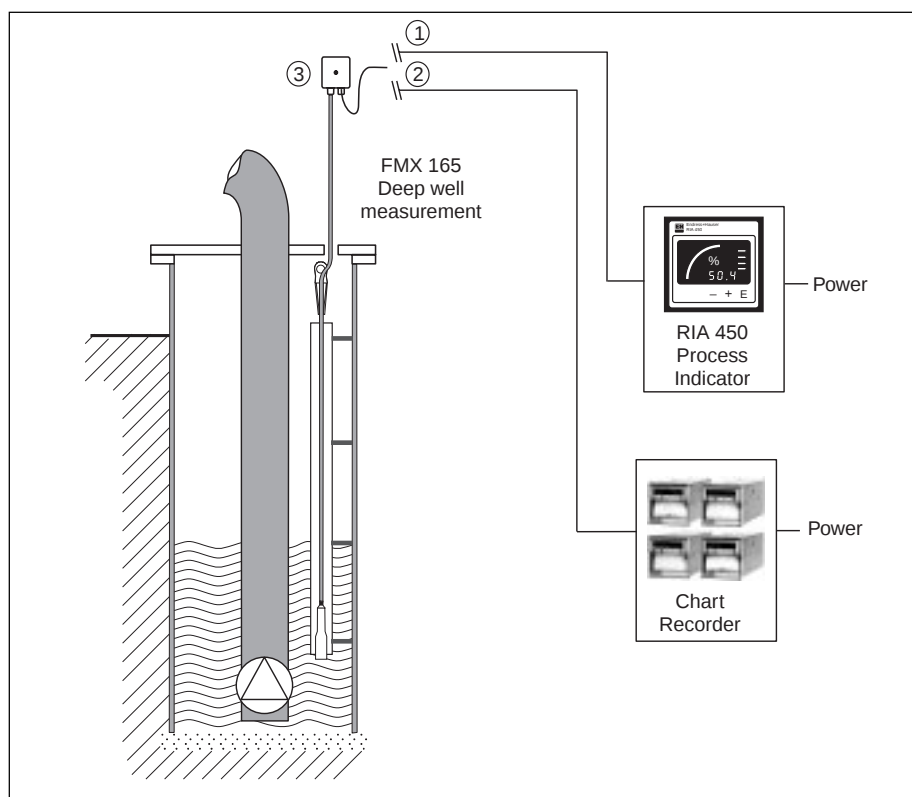
Measuring system

Complete measuring system

The complete measuring system consists of the FMX 165 Waterpilot and a 12 to 30 VDC power supply.

Transmitters:

- ① RIA 450 contactor for the power supply and 2 or 3 point control.
- ② Display and documentation of measurement data with printers and registration units from Endress+Hauser.
- ③ Junction box: Junction box with terminal strip, including three terminals and GORE-TEX® filter, NEMA 4X.



Deep well measurements with the FMX 165 Waterpilot

The FMX 165 can be connected to a junction box, especially if the probe cable is terminated outdoors. The junction box can be ordered as part of the system or as an accessory.



Junction box

Operating Principle

Ceramic measuring cell

The ceramic measuring cell is oil-free, i.e. the process pressure acts directly on the ceramic diaphragm of the FMX 165 and causes it to move by a maximum of 0.001" (0.025 mm). A pressure dependent change in capacitance is measured by the electrodes in the ceramic substrate and the diaphragm.

Ceramic cell advantages:

- Completely safe in vacuum
- Guaranteed overload resistance up to 40 times nominal pressure
- Extremely high chemical resistance

Installation

Mounting Point

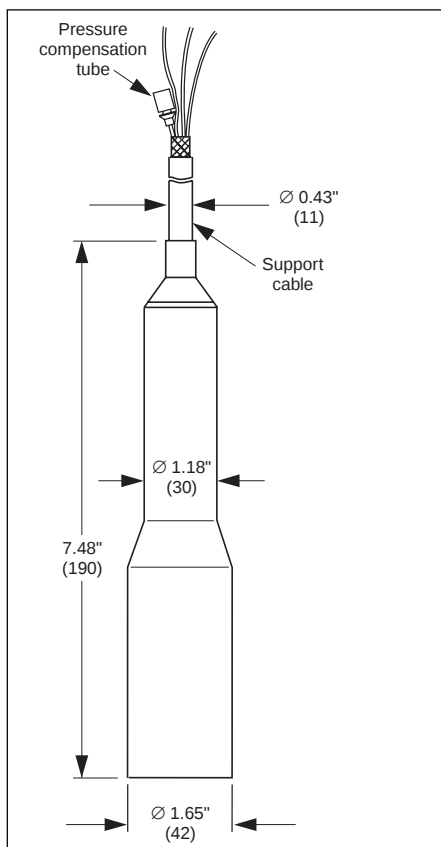
The cable probe should be installed in an area free from flow and turbulence. A guide tube should be used (internal diameter approximately 2.56" (65 mm), in order to prevent the probe from swinging from side to side in adverse conditions.

- Lower the cable probe slowly into the process liquid
- The probe should not touch the shaft or walls of the tube; a plastic guide tube is recommended for very turbulent liquids.
- The connecting box must be mounted outside the shaft with the connection cable leading to the control room.

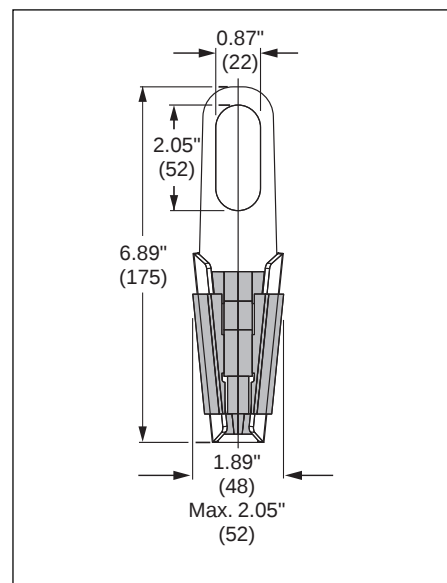
Support cable

- Slip-resistant cable with steel wire braiding and PE insulation
- Maximum length without additional strain relief, 656 feet (200 m)
- Minimum bending radius, 7.87" (200 mm)

Mechanical construction



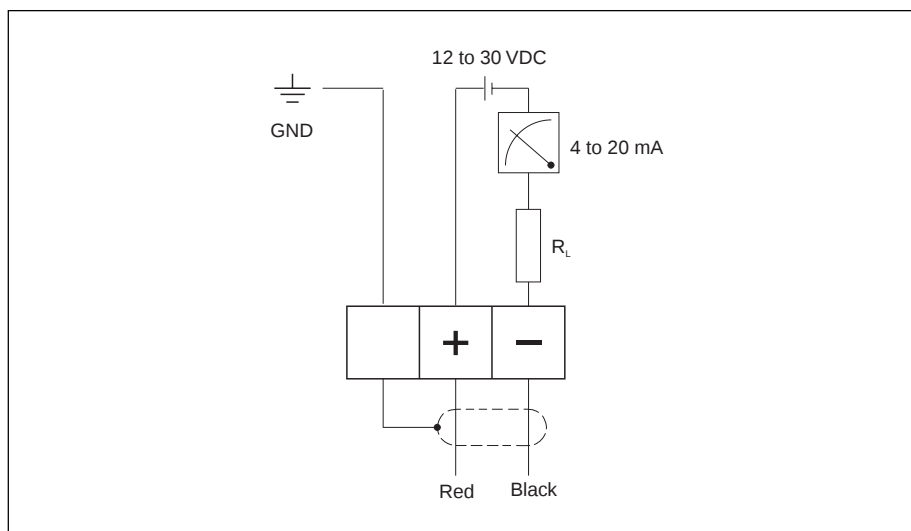
Probe housing



Mounting clamp



Electrical connection

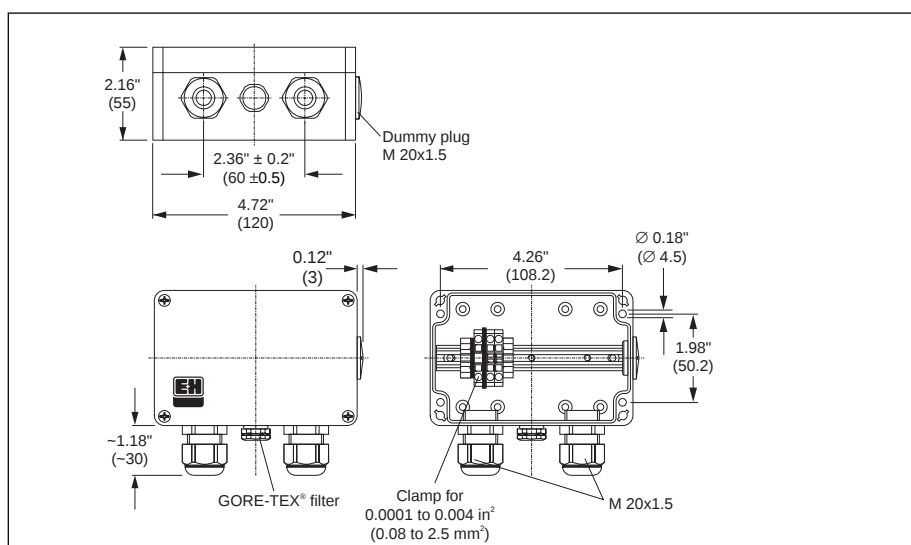


Electrical connection of FMX 165
Shielded instrument cable is recommended

Terminal housing with Gore-Tex® filter

FMX 165 - x G x xx x
FMS 165 - x K x xx x

Terminal housing including three terminals and filter
Terminal housing including three terminals and filter
plus 316L mounting clamp



Junction box

Input

Measured variable	Level by measuring the hydrostatic pressure of a column of liquid
Measuring range	Permanently set from 1.5 to 290 psi (0.1 bar to 20 bar) refer to Ordering Information for individual ranges

Output

Output signal	4 to 20 mA
Evaluating units	Connections to transmitter power units, relay contactors or recorder units
Load	Maximum 900 Ω

Accuracy

Reference conditions	According to DIN 16 086
Conformity error	Including repeatability and hysteresis, $\leq 0.2\%$ full scale (according to limit point method)
Long-term stability	0.1% full scale per year
Thermal variation	Zero signal and output span $\pm 1\%$ of span
Temperature coefficient	Zero signal and output span $\leq 0.15\%/10$ K of span

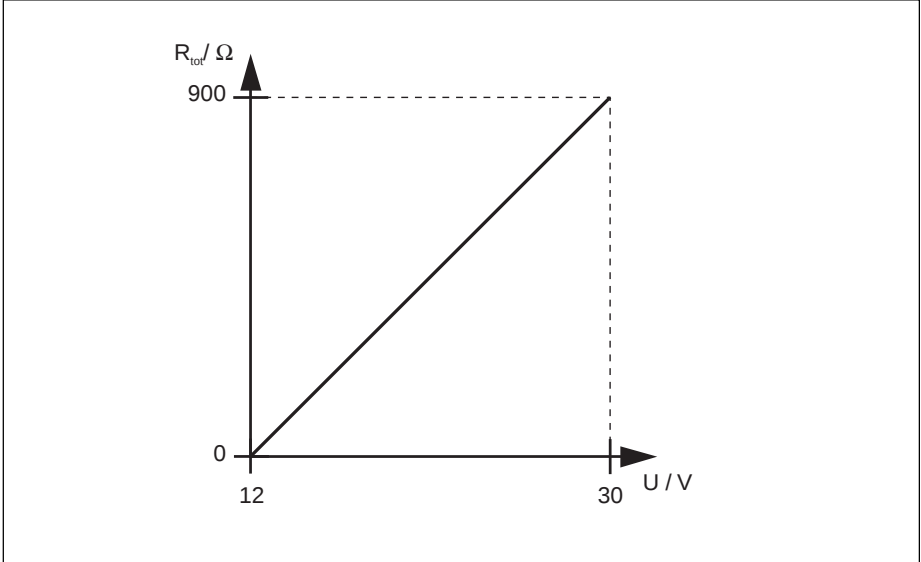
Operating conditions, environment

Operating temperature range	32° to 158°F (0° to 70°C)
Storage temperature	-4° to 176°F (-20° to 80°C)
Ingress protection	Connection box, NEMA 3 (IP 54)
Electromagnetic compatibility	Interference emission to EN 50081-1 Interference immunity to EN 50082-2 and NAMUR industrial standard, with 10 V/m Endress+ Hauser recommends the use of shielded instrument cable.
Process temperature range	32° to 158°F (0° to 70°C)
Process pressure range	Refer to measuring range, page 6

Mechanical construction

Probe housing	316Ti SS
Support cable	Slip-proof cable with steel braiding, insulated with polyethylene (PE), minimum bending radius 7.87" (200 mm) maximum length 656 feet (200 m) without additional strain relief
Seal	Viton
Process diaphragm	Al ₂ O ₃ aluminum oxide ceramic
Mounting accessory	Steel mounting clamp, with galvanized pressed metal jaws
Weight	Probe without supporting cable, 1.1 lb (0.5 kg) Mounting clamp with connection box, 1.1 lb (0.5 kg) Support cable, 0.2 lb per 3 foot (0.1 kg/m)
Measuring cell	Fill fluid - Oil-free, dry sensor
Power supply	Supply voltage12 to 30 VDC
Certificates and approvals	Explosion protectionPTB: EEx ia IIC

FMX 165 load curve



Measuring range

psi (bar)	ft H ₂ O (meters H ₂ O)	Max. overload
0 to 1.5 (0 to 0.1)	0 to 3 (0 to 1)	58 psi (4 bar)
0 to 3 (0 to 0.2)	0 to 6 (0 to 2)	87 psi (6 bar)
0 to 6 (0 to 0.4)	0 to 15 (0 to 4)	87 psi (6 bar)
0 to 9 (0 to 0.6)	0 to 20 (0 to 6)	145 psi (10 bar)
0 to 14.5 (0 to 1)	0 to 30 (0 to 10)	145 psi (10 bar)
0 to 29 (0 to 2)	0 to 60 (0 to 20)	261 psi (18 bar)
0 to 59 (0 to 4)	0 to 150 (0 to 40)	362 psi (20 bar)
0 to 145 (0 to 10)	0 to 300 (0 to 100)	580 psi (40 bar)
0 to 290 (0 to 20)	0 to 600 (0 to 200)	580 psi (40 bar)

Ordering information

FMX 165 Waterpilot

FMX 165 -

1	2	3	4	5

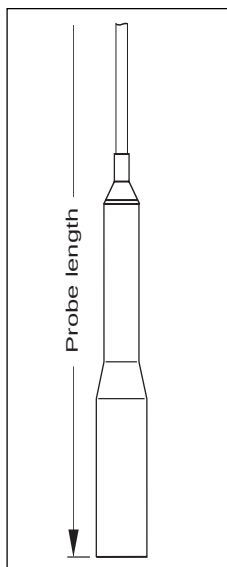
- 1 Certificates
 - A Standard
 - G ATEX II 2G EEx ia IIC T6
 - C ATEX II 3G EEx nA II T6
- 2 Mechanical connection
 - D Extension cable only
 - E Mounting clamp, 316 L SS
 - G Terminal box, NEMA 4X, with filter
 - K Mounting clamp, 316 L SS, with terminal box, NEMA 4X with filter
 - Y Other
- 3 Material of probe housing
 - A 316Ti SS
- 4 Measuring cell and ranges

psi (bar)

 - 01 0 to 1.5 (0 to 0.1)
 - 02 0 to 3 (0 to 0.2)
 - 04 0 to 6 (0 to 0.4)
 - 06 0 to 10 (0 to 0.6)
 - 10 0 to 15 (0 to 1)
 - 20 0 to 30 (0 to 2)
 - 40 0 to 60 (0 to 4)
 - 11 0 to 145 (0 to 10)
 - 22 0 to 300 (0 to 20)
 - 70 Adjust 0 to upper range full scale value in psi (bar)

ft H₂O (mH₂O)

 - A0 0 to 3 (0 to 1)
 - A1 0 to 6 (0 to 2)
 - A2 0 to 15 (0 to 4)
 - A3 0 to 20 (0 to 6)
 - A4 0 to 30 (0 to 10)
 - A5 0 to 60 (0 to 20)
 - A6 0 to 150 (0 to 40)
 - A7 0 to 300 (0 to 100)
 - A8 0 to 600 (0 to 200)
 - AA Adjust 0 to upper range full scale value in ftH₂O (mH₂O)
- 5 Probe cable length
 - A Length in meters, PE cable, can be shortened (state length in meters)
 - B 10 m extension cable, PE, can be shortened
 - C 20 m extension cable, PE, can be shortened
 - E 30 ft extension cable, PE, can be shortened
 - F 60 ft extension cable, PE, can be shortened
 - G Length in feet, PE cable, can be shortened (state length in feet)
 - K 10 m extension cable, FEP, can be shortened
 - L 20 m extension cable, FEP, can be shortened
 - I Length in meters, FEP cable, can be shortened (state length in meters)
 - M 30 ft extension cable, FEP, can be shortened
 - N 60 ft extension cable, FEP, can be shortened
 - P Length in feet, FEP cable, can be shortened (state length in feet)



Probe length as required, measured from tip of probe.

For application and selection assistance,
call 888-ENDRESS

For total support of your installed base,
24 hours a day, call 800-642-8737

Visit us on our web site, www.us.endress.com

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