Technical
Information
TI 290F/00/en

Operating Instructions
017509-1000

Hydrostatic Level Measurement *waterpilot FMX 165*

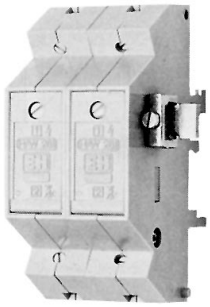
Low-cost and reliable rope probe with ceramic measuring cell Standard instrument for level measurement in wells and sewage treatment plants

Application
Waterpilot FMX 165 is a hydrostatic pressure sensor for level measurement of water and wastewater.
Waterpilot FMX 165 has nine permanently calibrated measuring ranges from 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 fulfils all plant construction standards.
- Ceramic measuring cell – extremely resistant to overload, alternating loads and aggressive media
- Support cable with hard-wearing conical seal on the probe tube and climatic protection in the pressure compensation tube
- Potted electronics with 4…20 mA output signal and integrated overvoltage protection
- Certified for hazardous area EEx ia

Accessories
A mounting clamp and IP 54 connecting box are available as accessories. The measuring cell can also be connected to other units including a transmitter power supply, contactor or plotter, depending on the application.

Accessories
mounting clamp for slip-resistant mounting with IP 54 connecting box

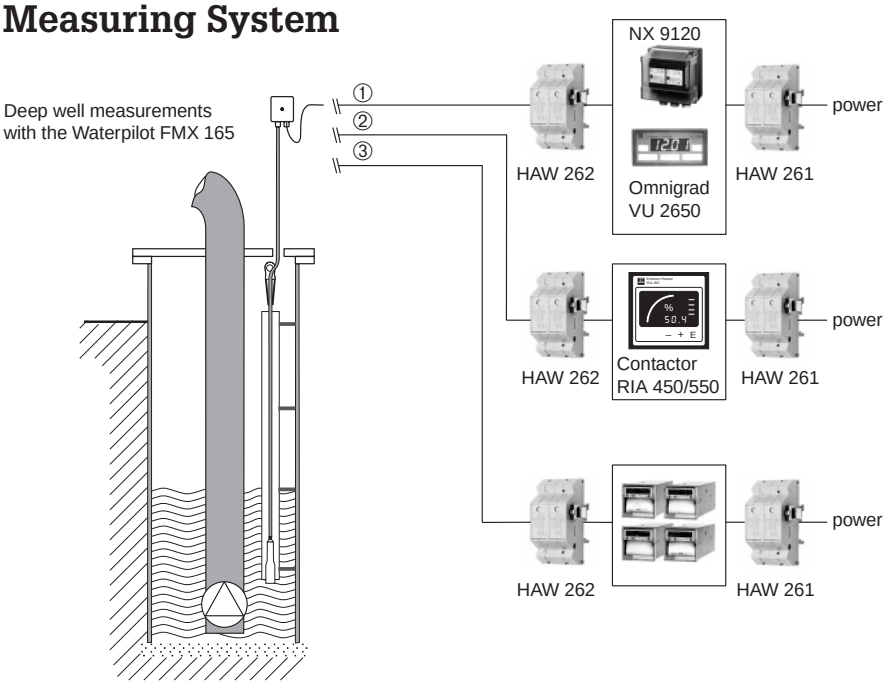


HAW 261/262 external overvoltage protection unit

External Overvoltage Protection
An HAW 262 overvoltage protection provides increased protection from lightning strikes and overvoltages.
The HAW 261 protects the instrument on the power supply side.

Endress+Hauser
The Power of Know How

Measuring System



Complete Measuring System
The complete measuring system consists of the Waterpilot FMX 165 and a 12…30 V power supply.

Transmitters
① NX 9120 transmitter power supply in Minipac format or transmitter power supply with digital display Omnigrad VU 2650 in control cabinet housing

② RIA 450 or 550 contactor for the power supply and 2 or 3 point control

③ Display and documentation of measurement data with printers and registration units from Endress+Hauser

Operating Principle

Ceramic Measuring Cell
The ceramic measuring cell is oil-free, i.e. the process pressure acts directly on the rugged ceramic diaphragm of the Waterpilot FMX 165 and causes it to move by a max. 0.025 mm.
A pressure-dependent change in capacitance is measured by the electrodes in both the ceramic substrate and the diaphragm. The measuring range is determined by the thickness of this ceramic diaphragm.

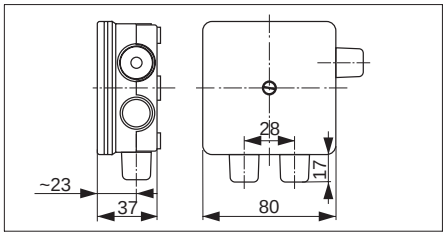
Advantages:
- Completely safe in vacuum
- Guaranteed overload resistance up to 40-times nominal pressure
- Extremely high chemical resistance similar to Hastelloy

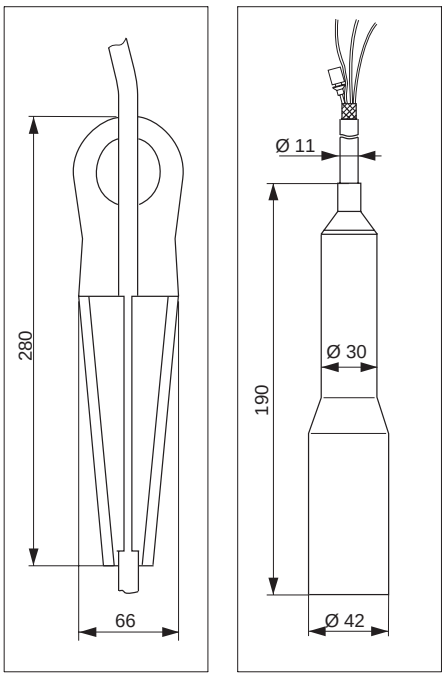
Installation

Mounting Point
The rope probe should be installed in an area free from flow and turbulence . A guide tube should otherwise be used (internal diameter approx. 65 mm), in order to prevent the probe from swinging from side to side.
- Lower the rope probe slowly into the liquid
- The probe should not touch the shaft or walls of the tube; a plastic tube is recommended for very turbulent liquids.
- The connecting box must be mounted outside the shaft with the connecting cable leading to the control room.

Support Cable
- Slip-resistant cable with steel wire braiding and PE insulation
- Max. length without additional strain relief 200 m
- Min. bending radius 200 mm

Dimensions





Dimensions:
- above: connection box
- below left: mounting clamp
- below right: probe housing

Technical Data

General information

Manufacturer	Endress+Hauser
Instrument designation	Waterpilot FMX 165

Application

Level measurement in wells and sewage treatment plants

Function and system design

Measurement principle	Converting hydrostatic pressure of a column of liquid into a level-proportional signal
Modularity	Waterpilot FMX 165 and 12…30 V_{DC} power supply
Construction	Rope probe without mounting accessories or with mounting clamp and connection box IP 54
Signal transmission	4…20 mA (two-wire)

Input

Measured variable	Level by measuring the hydrostatic pressure of a column of liquid
Measuring range	Permanently set from 0.1 bar to 20 bar refer to »Product Structure«

Output

Output signal	4…20 mA
Evaluating units	Connections to transmitter power units, contactors or registration units
Load	Max. 900 Ω

Accuracy

Reference conditions	According to DIN 16 086
Conformity error (including repeatability and hysteresis)	≤ 0.2% FS (acc. to limit point method)
Long-term stability	0.1% FS/year
Thermal variation	Zero signal and output span ±1% of span
Temperature coefficient	Zero signal and output span ≤ 0.15%/10 K of span

Operating conditions

Environment

Operating temperature range	0…70°C
Storage temperature	–20…80°C
Ingress protection	Connection box IP 54
Electromagnetic compatibility	Interference emission to EN50081-1 Interference immunity to EN50082-2 and NAMUR industrial standard, with 10 V/m. We recommend the use of screened instrument cable.

Process medium

Process temperature range	0…70°C
Process pressure range	Approved pressure ranges refer to "Product Structure"

Mechanical construction

Material of wetted parts

Probe housing	1.4571
Support cable	Slip-proof cable with steel braiding, insulated with polyethylene (PE), minimum bending radius 200 mm, length up to 200 m without additional tensioning release
Seal	Viton
Process diaphragm	Al_2O_3 aluminium oxide ceramic
Mounting accessory	Steel mounting clamp, with galvanised pressed metal jaws

Measuring cell

Fill fluid	Oil-free, dry sensor

Power supply

Supply voltage	12…30 V_{DC}

Certificates and approvals

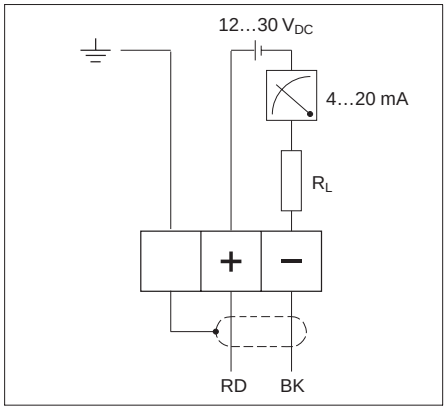
Explosion protection	PTB: EEx ia IIC

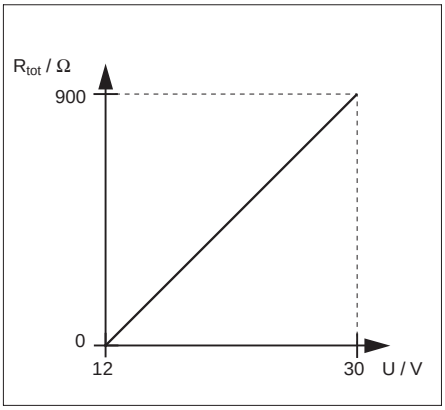
Supplementary documentation

Waterpilot FMX 160 Technical Information: TI 182F/00/en Waterpilot FMX 160/FMX 165 System Information: SI 028F/00/en

Electrical Connection

- left:
  Electrical connection of Waterpilot FMX 165. We recommend the use of screened instrument cable.
- right:
  Load curve of Waterpilot FMX 165

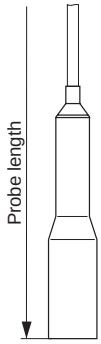




Product Structure

	Weight
Rope probe without support cable	0.5 kg
Mounting clamp with connection box	0.5 kg
Support cable	approx. 0.1 kg / m
Σ	

Probe length on request
Measurement from tip of probe



Waterpilot FMX 165

Certificates
- A Standard
- G EEx ia IIC T6

Mechanical Connection
- D None
- C Galvanised mounting clamp and IP 54 connection box, Pg 11
- Y Others on request

Material of Probe Housing
- A 1.4571

Measuring Cell and Ranges

	bar		mWS	Max. overload	Vacuum
01	0.1 bar	A0	1 mWS	4 bar	–0.3 bar
02	0.2 bar	A1	2 mWS	6 bar	–1 bar
04	0.4 bar	A2	4 mWS	6 bar	–1 bar
06	0.6 bar	A3	6 mWS	10 bar	–1 bar
10	1.0 bar	A4	10 mWS	10 bar	–1 bar
20	2.0 bar	A5	20 mWS	18 bar	–1 bar
40	4.0 bar	A6	40 mWS	25 bar	–1 bar
11	10.0 bar	A7	100 mWS	40 bar	–1 bar
22	20.0 bar	A8	200 mWS	40 bar	–1 bar
70	adjusted to … bar (>0.1 bar) State full-scale value in bar	AA	adjusted to … mWS (>0.1 mWS) State full-scale value in mWS		
99	Other				

Probe length, Cable PE
- B 10 m
- C 20 m
- A Probe length as requested 1…300 m (state in m)

FMX 165 [ ][ ][ ][ ][ ][ ] Product designation [ ] Probe length in m

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