Measurement made easy
The first choice for all industrial applications

Diagnostics for real-life situations
• To keep your process up and running
• Empty pipe detection and sensor temperature monitoring
• Clear text messages for simplified trouble shooting

On board Health Check
• Flowmeter sensor and transmitter integrity check utilizing fingerprint technology

Noise / Grounding Check
• Verify the installation is correct from day one

Service Interval Monitoring
• Receive timed notifications

Backwards Compatibility
• Protect your Investment in ABB flow metering
• Non-hazardous general purpose applications
ProcessMaster series

ProcessMaster is available in two series – ProcessMaster 610 the good fit for everyday applications and ProcessMaster 630 the first choice for all process industry applications delivering best in class functionality and options.

<table>
<thead>
<tr>
<th>Applicability</th>
<th>FEM610 series Good fit for everyday applications</th>
<th>FEM630 series The first choice for all industrial applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Industry</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Corrosive liquids, acids, bases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Coal slurry, Lime slurry, Cooling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mining</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Abrasive slurries, hydraulic transport</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulp &amp; Paper</td>
<td>Up to 2 % Stock</td>
<td>Up to 4 % Stock</td>
</tr>
<tr>
<td>Stock Flows, Latex, Clay, Liquor, Chemicals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>High pressure applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food &amp; Beverage</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hygienic applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring medium minimum conductivity</td>
<td>20 μS/cm</td>
<td>5 μS/cm</td>
</tr>
<tr>
<td>Measuring medium temperature</td>
<td>-13…266 °F (-25…130 °C)</td>
<td>-13…266 °F (-25…130 °C)</td>
</tr>
<tr>
<td>Pressure</td>
<td>ASME CL 150, 300</td>
<td>ASME CL 150, 300</td>
</tr>
<tr>
<td>Hazardous area</td>
<td>–</td>
<td>Yes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Features</th>
<th>FEM610 series</th>
<th>FEM630 series</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy</td>
<td>0.5 %</td>
<td>0.4 %</td>
</tr>
<tr>
<td>Nominal diameter</td>
<td>1/10” … 4” (DN3 … 100)</td>
<td>1/10” … 4” (DN3 … 100)</td>
</tr>
<tr>
<td>Liner material</td>
<td>ETFE</td>
<td>ETFE</td>
</tr>
<tr>
<td>I/O’s</td>
<td>1 x analog, 2 x digital</td>
<td>1 x analog, 2 x digital, Option for add-in modules</td>
</tr>
<tr>
<td>Communication</td>
<td>High Speed Infrared Port Communication based on HART DTM</td>
<td>HART, PROFIBUS DP, Modbus</td>
</tr>
<tr>
<td>Process diagnostics</td>
<td>Empty pipe, grounding check, ambient temperature check</td>
<td>Empty pipe, Gas bubbles, Electrode Impedance, Conductivity</td>
</tr>
<tr>
<td>Backwards compatibility</td>
<td>–</td>
<td>Yes ¹</td>
</tr>
</tbody>
</table>

¹ For general purpose (non-hazardous) installation areas only.
Overview – models

Flowmeter sensor

<table>
<thead>
<tr>
<th>Model</th>
<th>ProcessMaster FEM611, FEM612</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Integral mount design, remote mount design</td>
</tr>
<tr>
<td>Measuring accuracy for liquids</td>
<td>0.5 % of measured value</td>
</tr>
<tr>
<td>Permissible measuring medium temperature $T_{\text{min}}$</td>
<td>–13 to 266 °F (~25 to 130 °C)</td>
</tr>
<tr>
<td>Minimum conductivity</td>
<td>&gt; 20 µS/cm</td>
</tr>
<tr>
<td>Nominal pressure rating</td>
<td>ASME CL 150, CL 300</td>
</tr>
<tr>
<td>Nominal diameter</td>
<td>1/10&quot; ... 4&quot; (DN3 ... DN100)</td>
</tr>
<tr>
<td>Process connection</td>
<td>Wafer style connection</td>
</tr>
<tr>
<td>Liner material</td>
<td>ETFE</td>
</tr>
<tr>
<td>Electrode material</td>
<td>Hastelloy C®, Platinum-Iridium, Tantalum</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP 65 / IP 67 / Type 4X for remote sensor assembly</td>
</tr>
</tbody>
</table>

Approvals for sensor

CRN (Canadian Reg.Number) | Pending |
Further approvals | At www.abb.com/flow or on request. |

Transmitter

<table>
<thead>
<tr>
<th>Model</th>
<th>FET612</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Integral mount design (see Fig. 1), remote mount design.</td>
</tr>
<tr>
<td>IP rating</td>
<td>IP 65 / IP 67 / Type 4X</td>
</tr>
<tr>
<td>Cable length</td>
<td>Maximum 164 ft (50 m), remote mount design only</td>
</tr>
<tr>
<td>Power supply</td>
<td>100 ... 240 V AC (-15 / +10 %), 24 ... 48 V DC (-10% / +10 %)</td>
</tr>
<tr>
<td>Outputs</td>
<td>Current output: 4 ... 20 mA, active Digital output 1: passive, configurable as pulse, frequency or switch output Digital output 2: passive, configurable as pulse or switch output</td>
</tr>
<tr>
<td>Local display</td>
<td>Configurable graphical display (option)</td>
</tr>
</tbody>
</table>

Approvals for transmitter

Further approvals | At www.abb.com/flow or on request. |
...Overview – models

Measuring principle
Measurements performed by the electromagnetic flowmeter are based on Faraday’s law of induction. A voltage is generated in a conductor when it moves through a magnetic field.

This principle is applied to a conductive fluid in the meter tube through which a magnetic field is generated perpendicular to the flow direction (see Fig. 2). The voltage induced in the fluid is measured by two electrodes located diametrically opposite each other. This signal voltage is proportional to the magnetic induction, the electrode spacing and the average flow velocity. Considering that the magnetic induction and the electrode spacing are constant values, a proportionality exists between the signal voltage $U_1$ and the average flow velocity. From the equation for calculating the volume flowrate, it follows that the signal voltage is linearly proportional to the volume flowrate. The induced voltage is converted by the transmitter to standardized, analog and digital signals.

![Diagram of Electromagnetic Flowmeter Schematic](image)

**Figure 2  Electromagnetic flowmeter schematic**

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Magnet coil</td>
</tr>
<tr>
<td>2</td>
<td>Meter tube in electrode plane</td>
</tr>
<tr>
<td>3</td>
<td>Signal electrode</td>
</tr>
</tbody>
</table>

**Table 1 Legend**

<table>
<thead>
<tr>
<th>$U_1$</th>
<th>$B \times D \times v$</th>
<th>$q_v = \frac{D^2 \times \pi \times v}{4}$</th>
<th>$U_1 = q_v$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$v$</td>
<td>Average flow velocity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$q_v$</td>
<td>Volume flow</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$D$</td>
<td>Electrode spacing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Flowmeter sensor

Measuring accuracy

Reference conditions

<table>
<thead>
<tr>
<th>According to EN 29104</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring medium temperature</td>
<td>20 °C (68 °F) ±2 K</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>20 °C (68 °F) ±2 K</td>
</tr>
<tr>
<td>Power supply</td>
<td>Nominal voltage acc. to name plate U = ±1 %, Frequency f = ±1 %</td>
</tr>
<tr>
<td>Installation condition</td>
<td>• Upstream &gt;10 x DN, straight section • Downstream &gt;5 x DN, straight section</td>
</tr>
<tr>
<td>Warm-up phase</td>
<td>30 min</td>
</tr>
</tbody>
</table>

Measuring error and repeatability

Measuring error

![Graph](image)

Repeatability, response time

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Accuracy ± of measured value in %</td>
</tr>
<tr>
<td>B</td>
<td>Flow velocity v in m/s, Q / Q_{max DN} in %</td>
</tr>
</tbody>
</table>

Table 2  Legend

<table>
<thead>
<tr>
<th>Impulse output</th>
</tr>
</thead>
<tbody>
<tr>
<td>± 0.5% of measured value ± 0.02% Q_{max DN}^{1}</td>
</tr>
</tbody>
</table>

Table 3  Measuring error Pulse output

1. QmaxDN: See table in chapter “Measuring range table” on page 9

Current output

| Same as pulse output plus ±0.1 % of measured value ±0.01 mA |

Table 4  Measuring error Current output
...Flowmeter sensor

Permitted pipe vibration
In accordance with EN 60068-2-6.
Applicable to sensors in remote mount design and sensors in integral mount design.
Maximum deflection: 0.15 mm (0.006 inch) in the 10 ... 58 Hz range
Maximum acceleration: 2 g, in the 58 ... 150 Hz range

IP rating
- IP 65 / IP 67 / Type 4x in accordance with EN 60529

Signal cables
For remote mount design only.
The maximum signal cable length between flowmeter sensor and transmitter 164 ft (50M).
A 5 m (16.4 ft) cable is included in the scope of delivery.
If more than 5 m (16.4 ft) is required, the cable can be ordered separately (Part no. 3KQZ407123U0100).

Temperature data

Storage temperature range
-4 ... 149 °F (-20 ... 65 °C)
The temperature range offered depends on a number of different factors.
These factors include the measuring medium temperature $T_{\text{medium}}$, the ambient temperature $T_{\text{amb}}$, the operating pressure $P_{\text{medium}}$, the liner material and the approvals for the explosion protection.

Maximum permissible cleaning temperature

<table>
<thead>
<tr>
<th>CIP medium</th>
<th>Liner material</th>
<th>Cleaning temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam</td>
<td>ETFE</td>
<td>266 °F (130 °C)</td>
</tr>
<tr>
<td>Cleaning fluid</td>
<td>ETFE</td>
<td>266 °F (130 °C)</td>
</tr>
</tbody>
</table>

- The specified cleaning temperature applies for a maximum ambient temperature of 77 °F (25 °C).
If the ambient temperature is $>$ 77 °F ($>$ 25 °C), the difference to the actual ambient temperature must be subtracted from the maximum cleaning temperature.
- The specified cleaning temperature may be applied for a maximum of 60 minutes.
...Flowmeter sensor

Ambient temperature as a function of measuring medium temperature

Integral design:

Maximum permissible combination of ambient and medium temperatures
(Standard version)

Remote mount design:

Maximum permissible combination of ambient and medium temperatures
(Optional high temperature version)

1 Minimum ambient temperature is 14 °F (-10 °C) with carbon steel mating flanges. Stainless steel mating flanges must be used to reach the -4 °F (-20 °C) temperature.
...Flowmeter sensor

Measuring range table

The flow range end value can be set between $0.02 \times Q_{\text{max DN}}$ and $2 \times Q_{\text{max DN}}$.

<table>
<thead>
<tr>
<th>Nominal diameter DN</th>
<th>Minimum flow range end value $0.02 \times Q_{\text{max DN}}$</th>
<th>$Q_{\text{max DN}}$ $0 \ldots \approx 33$ ft/s or 10 m/s</th>
<th>Maximum flow range end value $2 \times Q_{\text{max DN}}$ $\approx 66$ ft/s or 20 m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/10</td>
<td>0.02 US gal/min (0.08 l/min)</td>
<td>1.06 US gal/min (4 l/min)</td>
<td>2.11 US gal/min (8 l/min)</td>
</tr>
<tr>
<td>5/32</td>
<td>0.04 US gal/min (0.16 l/min)</td>
<td>2.11 US gal/min (8 l/min)</td>
<td>4.23 US gal/min (16 l/min)</td>
</tr>
<tr>
<td>1/4</td>
<td>0.11 US gal/min (0.4 l/min)</td>
<td>5.28 US gal/min (20 l/min)</td>
<td>10.57 US gal/min (40 l/min)</td>
</tr>
<tr>
<td>3/8</td>
<td>0.24 US gal/min (0.9 l/min)</td>
<td>11.9 US gal/min (45 l/min)</td>
<td>23.78 US gal/min (90 l/min)</td>
</tr>
<tr>
<td>1/2</td>
<td>0.53 US gal/min (2 l/min)</td>
<td>26.4 US gal/min (100 l/min)</td>
<td>52.8 US gal/min (200 l/min)</td>
</tr>
<tr>
<td>1</td>
<td>1.06 US gal/min (4 l/min)</td>
<td>52.8 US gal/min (200 l/min)</td>
<td>106 US gal/min (400 l/min)</td>
</tr>
<tr>
<td>1 1/2</td>
<td>3.17 US gal/min (12 l/min)</td>
<td>159 US gal/min (600 l/min)</td>
<td>317 US gal/min (1200 l/min)</td>
</tr>
<tr>
<td>2</td>
<td>5.28 US gal/min (1.2 m$^3$/h)</td>
<td>264 US gal/min (60 m$^3$/h)</td>
<td>528 US gal/min (120 m$^3$/h)</td>
</tr>
<tr>
<td>3</td>
<td>15.9 US gal/min (3.6 m$^3$/h)</td>
<td>793 US gal/min (180 m$^3$/h)</td>
<td>1585 US gal/min (360 m$^3$/h)</td>
</tr>
<tr>
<td>4</td>
<td>21.1 US gal/min (4.8 m$^3$/h)</td>
<td>1057 US gal/min (240 m$^3$/h)</td>
<td>2113 US gal/min (480 m$^3$/h)</td>
</tr>
</tbody>
</table>
...Flowmeter sensor

Process connections
Meters are wafer style and clamp between customer’s pipeline flanges.

Installation length
For further details, refer to chapter "Dimensions" on page 15.

Materials

<table>
<thead>
<tr>
<th>Wetted parts</th>
<th>Standards</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liner material</td>
<td>ETFE</td>
<td></td>
</tr>
</tbody>
</table>

Measurement and grounding electrode for liner material

<table>
<thead>
<tr>
<th>Electrode material</th>
<th>Standard</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrode material</td>
<td>Hastelloy C-4 (2.4610)</td>
<td>Tantalum, Platinum-Iridium</td>
</tr>
<tr>
<td>Grounding ring</td>
<td>Stainless steel</td>
<td>On request</td>
</tr>
</tbody>
</table>

Flowmeter sensor housing

<table>
<thead>
<tr>
<th>Component</th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Cast aluminum, painted, paint coat &gt; 80 µm thick, light gray, RAL 9002</td>
</tr>
<tr>
<td>Terminal Box</td>
<td>Plastic, gray white, RAL 9002</td>
</tr>
<tr>
<td>Meter Tube</td>
<td>304 Stainless steel</td>
</tr>
<tr>
<td>Cable gland</td>
<td>Polyamide, Stainless steel</td>
</tr>
</tbody>
</table>

1. Cable gland with M 20 x 1.5 or NPT thread, to be selected via the order model number
Flowmeter sensor

Installation conditions

General information
The following points must be observed during installation:

- The flow direction must correspond to the marking, if present.
- The maximum torque for all flange screws must be complied with.
- Secure the flange screws and nuts against pipe vibration.
- The devices must be installed without mechanical tension (torsion, bending).
- Install flange devices / wafer-type devices with plane parallel counterflanges and use appropriate gaskets only.
- Only gaskets made from a material that is compatible with the measuring medium and measuring medium temperature may be used.
- Gaskets must not extend into the flow area, since possible turbulence could influence the accuracy of the device.
- The piping may not exert any inadmissible forces or torques on the device.
- Make sure temperature limits are not exceeded operating the device.
- Vacuum shocks in the piping should be avoided to prevent damage to the liners. Vacuum shocks can destroy the device.
- Do not remove the sealing plugs in the cable glands until you are ready to install the electrical cable. Make sure the gaskets for the housing cover are seated correctly. Carefully gasket the cover. Tighten the cover fittings.
- The transmitter with a remote mount design must be installed at a largely vibration-free location.
- Do not expose the transmitter and sensor to direct sunlight. Provide appropriate sun protection as necessary.
- When installing the transmitter in a control cabinet, make sure adequate cooling is provided.

Flow direction

The device measures the flowrate in both directions. Forward flow is the factory setting, as shown in Fig. 4.

Electrode axis

The electrode axis 1 should be horizontal if at all possible or no more than 45° from horizontal as shown in Fig. 5.

Gaskets
The following points must be observed when installing gaskets:

- For achieve the best results, ensure the gaskets fit concentrically with the meter tube
- To ensure that the flow profile is not distorted, the gaskets must not protrude into the piping.
- The use of graphite with the flange or process connection gaskets is prohibited, because an electrically conductive coating may form on the inside of the meter tube.
...Flowmeter sensor

Mounting position

A Vertical installation for measuring abrasive fluids, preferably with flow in upward direction.

B In case of horizontal installation, the Meter tube must always be completely full. Provide for a slight incline of the connection for degassing.

Minimum distance

ProcessMaster FEMxxx

Distance D: ≥ 1.0 m (3.3 ft)

Figure 6 Mounting position

Figure 7 Minimum distance

- In order to prevent the devices from interfering with each other, a minimum distance as shown in Fig. 7 must be maintained between the devices.
- The flowmeter sensor may not be operated in the vicinity of powerful electromagnetic fields, e.g., motors, pumps, transformers, etc. A minimum spacing of approx. 1 m (3.28 ft) should be maintained.
- For installation on or to steel parts (e.g. steel brackets), a minimum spacing of approx. 100 mm (3.94 inch) should be maintained (based on IEC801-2 and IECTC77B).

Inlet and outlet sections

A

Figure 8 In- and outlet section, turn-off component

B

3 x DN 2 x DN

Table 6 Legend

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Double elbow</td>
</tr>
<tr>
<td>2</td>
<td>Turn-off device</td>
</tr>
</tbody>
</table>

The metering principle is independent of the flow profile as long as standing eddies do not extend into the metering section, such as may occur after double elbows, in the event of tangential inflow, or where half-open gate valves are located upstream of the flowmeter sensor.

In such cases, measures must be put in place to normalize the flow profile.

A Do not install fittings, manifolds, valves, etc., directly in front of the flowmeter sensor.

B Inlet and outlet section: Length of straight inlet and outlet section of the flowmeter sensor.

Experience has shown that, in most installations, inlet sections 3 x DN long and outlet sections 2 x DN long are sufficient (DN = nominal diameter of the flowmeter sensor).

For test stands, the reference conditions of 10 x DN inlet section and 5 x DN outlet section must be provided, in accordance with EN 29104 / ISO 9104.

Valves or other turn-off components should be installed in the outlet section. Butterfly valves must be installed so that the valve plate does not extend into the flowmeter sensor.
...Flowmeter sensor

Free inlet or outlet

Grounding
The flowmeter sensor must be connected to ground potential. For technical reasons, this potential should be identical to the potential of the measuring medium. For plastic or insulated lined pipelines, the measuring medium is grounded by installing ground plates. When there are stray potentials present in the pipeline, a ground plate is recommended on both ends of the flowmeter sensor.

Figure 9  Free inlet or outlet

A  Do not install the flowmeter at the highest point or in the draining off side of the pipeline, flowmeter runs empty, air bubbles can form.

B  Provide for a siphon fluid intake for free inlets or outlets so that the pipeline is always full.

Strongly contaminated measuring media

Figure 10  Bypass connection

For strongly contaminated measuring media, a bypass connection according to the figure is recommended so that operation of the system can continue to run without interruption during the mechanical cleaning.
...Flowmeter sensor

Installation in the vicinity of pumps

- Pump
- Damping device
- Shut-off device

Table 7 Legend

Strong vibrations in the pipeline must be damped using flexible damping devices.
The damping devices must be installed beyond the supported flowmeter section and outside of the section between the shut-off devices.
Do not connect flexible damping devices directly to the flowmeter sensor.

Determine the resulting pressure loss when using transition pieces:
1. Calculate the diameter ratio d/D.
2. Determine the flow velocity based on the flow rate nomogram (Fig. 13).
3. Read the pressure drop on the Y-axis in Fig. 13.

Figure 11 Vibration damping

Figure 12 Using reduction pieces

Figure 13 Flow rate nomogram for pressure drop calculations for flange transition piece with α/2 = 8°
### Dimensions

**Flow Sensor Sizes**

1/10" ... 3/8" (DN 3 ... 10)

1/2" ... 4" (DN 15 ... 100)

<table>
<thead>
<tr>
<th>Size Inch / (DN)</th>
<th>D</th>
<th>L</th>
<th>G</th>
<th>Integral mount design</th>
<th>Remote mount design</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2 (15)</td>
<td>1-7/8 (48)</td>
<td>2-5/32 (55)</td>
<td>11-1/2 (292)</td>
<td>10.5 (4.8)</td>
<td>6 (2.7)</td>
</tr>
<tr>
<td>1 (25)</td>
<td>2-5/8 (67)</td>
<td>2-5/32 (55)</td>
<td>12-9/32 (312)</td>
<td>11.5 (5.2)</td>
<td>7 (2.7)</td>
</tr>
<tr>
<td>1-1/2 (40)</td>
<td>3-3/8 (86)</td>
<td>2-3/4 (70)</td>
<td>13 (330)</td>
<td>12.5 (5.7)</td>
<td>7 (3.2)</td>
</tr>
<tr>
<td>2 (50)</td>
<td>4 (102)</td>
<td>3-11/32 (85)</td>
<td>13-5/8 (346)</td>
<td>13.5 (6.1)</td>
<td>9 (4.1)</td>
</tr>
<tr>
<td>3 (80)</td>
<td>5-1/4 (133)</td>
<td>4-23/32 (120)</td>
<td>14-27/32 (377)</td>
<td>17.5 (7.7)</td>
<td>12 (5.5)</td>
</tr>
<tr>
<td>4 (100)</td>
<td>6-1/2 (165)</td>
<td>5-29/32 (150)</td>
<td>16-1/8 (409)</td>
<td>23.5 (10.7)</td>
<td>18 (8.2)</td>
</tr>
</tbody>
</table>
Transmitter

Features
- 4 ... 20 mA current output
- Current output in the event of an alarm can be configured to 21 ... 22.6 mA (NAMUR NE43)
- Measuring range: Can be configured between 0.02 ... 2 x QmaxDN
- Operating mode for flow measurement can be configured
- Programmable digital output. Can be configured as frequency output, pulse output or binary output.
- Empty pipe detection
- Simulation of current and binary output (manual process execution)

1 Requirements for Empty Pipe detector function:
   The conductivity of the fluid must be ≥ 20 µS/cm
   Nominal diameter must be ≥ DN 10

LCD indicator (option)
- High-contrast LCD indicator
- Display of the current flow rate as well as the total flow rate
- Application-specific visualizations which the user can select. Two operator pages can be configured to display multiple values in parallel.
- Plain text fault diagnostics
- Menu-guided parameterization with four buttons
- “Easy Set-up” function for fast commissioning
- Parameterization of the device through the front glass with the housing closed

Isolation of outputs

The current output and the digital outputs are electrically isolated from each other.
...Transmitter

IP rating
In accordance with EN60529: IP 65 / IP 67, NEMA 4X

Vibration
In accordance with EN 60068-2
- In the 10 ... 58 Hz range, max. deflection 0.15 mm (0.006 inch)¹
- In the range of 58 ... 150 Hz, max. acceleration 2 g¹
1) Peak load

Temperature data

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-22 °F ... 140 °F</td>
</tr>
<tr>
<td></td>
<td>(-30 °C ... 60 °C)</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-22 °F ... 158 °F</td>
</tr>
<tr>
<td></td>
<td>(-30 °C ... 70 °C)</td>
</tr>
</tbody>
</table>

NOTICE
When operating below -4 °F (-20 °C), the LCD display can no longer be read. Full functionality is assured at temperatures above -4 °F (-20 °C).

Housing design

<table>
<thead>
<tr>
<th></th>
<th>Integral mount design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Plastic, RAL 9002 (light gray)</td>
</tr>
<tr>
<td>Cable gland¹</td>
<td>Polyamide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Remote mount design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Cast aluminum, painted</td>
</tr>
<tr>
<td>Paint</td>
<td>≥ 80 µm thick, RAL 9002 (gray white)</td>
</tr>
<tr>
<td>Cable gland¹</td>
<td>Polyamide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stainless steel</td>
</tr>
<tr>
<td></td>
<td>3.97 lb (1.8 kg)</td>
</tr>
</tbody>
</table>

1. Cable gland with M 20 x 1.5 or NPT thread, to be selected via the order number.
...Transmitter

![Diagram of Transmitter Dimensions](image)

**Figure 14** Mounting dimensions single-compartment housing

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hole pattern for mounting holes</td>
</tr>
<tr>
<td>2</td>
<td>Female thread (either 1/2&quot; NPT or M20 x 1.5) refer to model coding. With 1/2&quot; NPT there will be a plug instead of the PG cable inlet</td>
</tr>
</tbody>
</table>

*Table 8 Legend*
**Electrical connections**

**Connection diagram**

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Connections for power supply and outputs</td>
</tr>
<tr>
<td>B</td>
<td>Connections for signal cable (remote mount design only)</td>
</tr>
</tbody>
</table>

**Table 9 Legend**

**NOTICE**
For detailed information about grounding the transmitter and the flowmeter sensor, please refer to chapter “Grounding” in the operating instruction.

**Connections for the power supply**

**AC voltage**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Phase</td>
</tr>
<tr>
<td>N</td>
<td>Neutral conductor</td>
</tr>
<tr>
<td>PE / ⬤</td>
<td>Protective earth (PE)</td>
</tr>
</tbody>
</table>

**DC voltage**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE</td>
<td>Not connected</td>
</tr>
<tr>
<td>3</td>
<td>Measurement potential green</td>
</tr>
<tr>
<td>2S</td>
<td>Signal line</td>
</tr>
<tr>
<td>E2</td>
<td>Signal line blue</td>
</tr>
<tr>
<td>E1</td>
<td>Signal line violet</td>
</tr>
<tr>
<td>1S</td>
<td>Shield for E1</td>
</tr>
<tr>
<td>M1</td>
<td>Magnet coil brown</td>
</tr>
<tr>
<td>M2</td>
<td>Magnet coil red</td>
</tr>
<tr>
<td>⬤</td>
<td>Shield</td>
</tr>
<tr>
<td>-</td>
<td>Not connected orange/yellow</td>
</tr>
</tbody>
</table>

**Connections for inputs and outputs**

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>31 / 32</td>
<td>Active current output The current output is &quot;active&quot; mode. The source to drive the 20mA loop is in-built in the transmitter.</td>
</tr>
<tr>
<td>41 / 42</td>
<td>Passive digital output DO1 The output can be configured as a pulse output, frequency output or switch output on site.</td>
</tr>
<tr>
<td>51 / 52</td>
<td>Passive digital output DO2 The output can be configured as a pulse output, frequency output or switch output on site.</td>
</tr>
</tbody>
</table>

**Connecting the signal cable**
Only for remote mount design.

<table>
<thead>
<tr>
<th>Terminal</th>
<th>Function / comments</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE</td>
<td>Not connected</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Measurement potential green</td>
<td></td>
</tr>
<tr>
<td>2S</td>
<td>Signal line</td>
<td>-</td>
</tr>
<tr>
<td>E2</td>
<td>Signal line blue</td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Signal line violet</td>
<td></td>
</tr>
<tr>
<td>1S</td>
<td>Shield for E1</td>
<td>-</td>
</tr>
<tr>
<td>M1</td>
<td>Magnet coil brown</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>Magnet coil red</td>
<td></td>
</tr>
<tr>
<td>⬤</td>
<td>Shield</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>Not connected orange/yellow</td>
<td></td>
</tr>
</tbody>
</table>
...Electrical data connections

**Electrical data for inputs and outputs**

**Power supply L / N, 1+ / 2-**

<table>
<thead>
<tr>
<th>AC power supply</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminals L / N</td>
</tr>
<tr>
<td>Operating voltage</td>
</tr>
<tr>
<td>Power consumption</td>
</tr>
<tr>
<td>Switch-on current</td>
</tr>
</tbody>
</table>

**DC voltage supply**

<table>
<thead>
<tr>
<th>Terminals 1+ / 2-</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
</tr>
<tr>
<td>Ripple</td>
</tr>
<tr>
<td>Power consumption</td>
</tr>
<tr>
<td>Inrush current</td>
</tr>
</tbody>
</table>

**Current output 31 / 32**

Can be configured for outputting mass flow and volume flow.

![Connection example active current output](image)

![Connection example](image)

**Digital output 41 / 42, 51 / 52**

Can be configured as pulse, frequency or binary output.

![Diagram](image)

**NOTICE**

- Terminals 42 / 52 have the same ground potential. Digital outputs 41 / 42 and 51 / 52 are not electrically isolated from each other.
- If you are using a mechanical counter, we recommend setting a pulse width of $\geq 30$ ms and a maximum frequency of $f_{\text{max}} \leq 3$ kHz.

**Pulse / frequency output (passive)**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>41, 42, 51, 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_{\text{max}}$</td>
<td>30 V DC</td>
</tr>
<tr>
<td>$I_{\text{max}}$</td>
<td>25 mA</td>
</tr>
<tr>
<td>$f_{\text{max}}$</td>
<td>10.5 kHz</td>
</tr>
<tr>
<td>Pulse width</td>
<td>0.1 ... 2000 ms</td>
</tr>
</tbody>
</table>

**Binary output, passive**

<table>
<thead>
<tr>
<th>Terminals</th>
<th>41, 42, 51, 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>$U_{\text{max}}$</td>
<td>30 V DC</td>
</tr>
<tr>
<td>$I_{\text{max}}$</td>
<td>25 mA</td>
</tr>
</tbody>
</table>

Switching function Can be configured using software as: System alarm, empty pipe alarm, max. / min. alarm, flow direction signaling, others.
### Ordering information

**ProcessMaster FEM611**  
Electromagnetic Flowmeter system, integral mount

<table>
<thead>
<tr>
<th>ProcessMaster Wafer FEM611</th>
<th>7, 8</th>
<th>9, 10</th>
<th>11</th>
<th>12, 13, 14, 15</th>
<th>16, 17</th>
<th>18, 19</th>
<th>20</th>
<th>21</th>
<th>22</th>
<th>23</th>
<th>...</th>
<th>45, 46</th>
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<tbody>
<tr>
<td>Explosion Protection Certification</td>
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<tr>
<td><strong>Housing Type / Housing Material / Cable Glands</strong></td>
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</tr>
<tr>
<td>Integral / Single compartment / Plastic / M20 x 1.5</td>
<td>V1</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Integral / Single compartment / Plastic / NPT 1/2 in.</td>
<td>V2</td>
<td></td>
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<tr>
<td>DN 3 (1/10 in.)</td>
<td>0003</td>
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<tr>
<td>DN 4 (5/32 in.)</td>
<td>0004</td>
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<tr>
<td>DN 6 (1/4 in.)</td>
<td>0006</td>
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<tr>
<td>DN 10 (3/8 in.)</td>
<td>0010</td>
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<tr>
<td>DN 15 (1/2 in.)</td>
<td>0015</td>
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<tr>
<td>DN 25 (1 in.)</td>
<td>0025</td>
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<tr>
<td>DN 40 (1-1/2 in.)</td>
<td>0040</td>
<td></td>
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<tr>
<td>DN 50 (2 in.)</td>
<td>0050</td>
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<td>DN 80 (3 in.)</td>
<td>0080</td>
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<tr>
<td>DN 100 (4 in.)</td>
<td>0100</td>
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<td>Wafer Style</td>
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<tr>
<td><strong>Liner Material</strong></td>
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<tr>
<td>ETFE</td>
<td>E1</td>
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<td><strong>Process Connection Material</strong></td>
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</tr>
<tr>
<td>Without process connection, without gasket and without mounting bracket</td>
<td>Y</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Electrode Design</strong></td>
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<tr>
<td><strong>Measuring Electrodes Material</strong></td>
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</tr>
<tr>
<td>Hast. C-4 (2.4610)</td>
<td>D</td>
<td></td>
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</tr>
<tr>
<td>Tantalum</td>
<td>G</td>
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<tr>
<td>Platinum-Iridium</td>
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</tr>
<tr>
<td><strong>Grounding Electrode / Full Pipe Detection</strong></td>
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<tr>
<td>No grounding electrode / No full pipe detection</td>
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</tbody>
</table>

Continued on next page
...Ordering information

<table>
<thead>
<tr>
<th>ProcessMaster Wafer FEM611</th>
<th>7,8</th>
<th>...</th>
<th>24</th>
<th>25,26</th>
<th>27</th>
<th>28</th>
<th>29,30</th>
<th>31</th>
<th>32,33</th>
<th>34,35,36</th>
<th>37,38,39</th>
<th>40,41</th>
<th>42,43,44</th>
<th>45,46</th>
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<tbody>
<tr>
<td>Grounding Accessories</td>
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<tr>
<td>Without</td>
<td>A</td>
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</tr>
<tr>
<td>Grounding ring (2)</td>
<td>C</td>
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</tr>
<tr>
<td>Protection Class Transmitter / Protection Class Sensor</td>
<td>Standard / IP 67, Type 4X</td>
<td>70</td>
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<tr>
<td>Power Supply</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>100 ... 240 AC, 24...48 V DC, 50 Hz</td>
<td>F</td>
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</tr>
<tr>
<td>100 ... 240 AC, 24...48 V DC, 60 Hz</td>
<td>G</td>
<td></td>
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Notes for ProcessMaster FEM631

1. 2 points calibration will be done. If more than 2 testpoints are required, please specify 3 or 5 points with option “Number of testpoints”.
2. Meters are wafer style and clamp between customer's pipeline flanges. Mounting hardware kits are available and include: studbolts, nuts, KLINERSIL gaskets and adaptor.
### ...Ordering information

**ProcessMaster FEM612**  
Electromagnetic Flowmeter system, remote mount design

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<table>
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<th>Number of Testpoints</th>
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<td>ANSI 150 Hardware Kit</td>
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Notes for ProcessMaster FEM612

1. 60 Hz (to be specified in case no transmitter is ordered).
2. 2 points calibration will be done. If more than 2 testpoints are required, please specify 3 or 5 points with option "Number of testpoints".
3. Meters are wafer style and clamp between customer's pipeline flanges. Mounting hardware kits are available and include: studbolts, nuts, KLINGERSIL gaskets and adaptor.
# Ordering information

**Remote transmitter FET612**

FET612 Electromagnetic Flowmeter, remote transmitter for ProcessMaster FEM610

<table>
<thead>
<tr>
<th>Remote transmitter FET612</th>
<th>7,8</th>
<th>9,10</th>
<th>11,12</th>
<th>13</th>
<th>14</th>
<th>15,16</th>
<th>17,18</th>
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<tr>
<td><strong>Explosion Protection Certification</strong></td>
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<tr>
<td>Field-mount / Single compartment / Aluminum / 4 x M20 x 1.5</td>
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<tr>
<td>Field-mount / Single compartment / Aluminum / 4 x NPT 1/2 in.</td>
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<td><strong>Protection Class Transmitter / Protection Class Sensor</strong></td>
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<td>100-240 AC, 24...48 V DC, 50 Hz</td>
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<td>100-240 AC, 24...48 V DC, 60 Hz</td>
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<td>Current output (active), 2 Digital Outputs (passive)</td>
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Remote transmitter FET612 Electromagnetic Flowmeter, remote transmitter for ProcessMaster FEM610.
...Ordering information

Accessories

<table>
<thead>
<tr>
<th>Description</th>
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<tbody>
<tr>
<td>Infrared service port adapter FZA100</td>
<td>FZA100</td>
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<tr>
<td>Installation set for NPT 1/2” cable gland. For sealing the cable conduit during outdoor installation.</td>
<td>3KXF081300L0001</td>
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<td>Signal cable</td>
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Notes