Electromagnetic flowmeter in sandwich version

The documentation is only complete when used in combination with the relevant documentation for the signal converter.
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Safety instructions

Warnings and symbols used

**DANGER!**
This information refers to the immediate danger when working with electricity.

**DANGER!**
These warnings must be observed without fail. Even partial disregard of this warning can lead to serious health problems and even death. There is also the risk of seriously damaging the device or parts of the operator’s plant.

**WARNING!**
Disregarding this safety warning, even if only in part, poses the risk of serious health problems. There is also the risk of damaging the device or parts of the operator’s plant.

**CAUTION!**
Disregarding these instructions can result in damage to the device or to parts of the operator’s plant.

**INFORMATION!**
These instructions contain important information for the handling of the device.

**HANDLING**
- This symbol designates all instructions for actions to be carried out by the operator in the specified sequence.
- **RESULT**
  This symbol refers to all important consequences of the previous actions.

Safety instructions for the operator

**CAUTION!**
Installation, assembly, start-up and maintenance may only be performed by appropriately trained personnel. The regional occupational health and safety directives must always be observed.

**LEGAL NOTICE!**
The responsibility as to the suitability and intended use of this device rests solely with the user. The supplier assumes no responsibility in the event of improper use by the customer. Improper installation and operation may lead to loss of warranty. In addition, the “Terms and Conditions of Sale” apply which form the basis of the purchase contract.

**INFORMATION!**
- Further information can be found on the supplied CD-ROM in the manual, on the data sheet, in special manuals, certificates and on the manufacturer’s website.
- If you need to return the device to the manufacturer or supplier, please fill out the form contained on the CD-ROM and send it with the device. Unfortunately, the manufacturer cannot repair or inspect the device without the completed form.
2 INSTALLATION

2.1 General notes on installation

**INFORMATION!**
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**
Do a check of the packing list to make sure that you have all the elements given in the order.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2.2 Scope of delivery

**INFORMATION!**
Do a check of the packing list to make sure that you have all the elements given in the order.

**INFORMATION!**
Inspect the packaging carefully for damages or signs of rough handling. Report damage to the carrier and to the local office of the manufacturer.

**INFORMATION!**
The remote version will arrive in two cartons. One carton contains the converter and one carton contains the sensor.

![Figure 2-1: Scope of delivery](image-url)

**INFORMATION!**
Assembly materials and tools are not part of the delivery. Use the assembly materials and tools in compliance with the applicable occupational health and safety directives.
2.3 Device description

Electromagnetic flowmeters are designed exclusively to measure the flow and conductivity of electrically conductive, liquid media.

Your measuring device is supplied ready for operation. The factory settings for the operating data have been made in accordance with your order specifications.

**INFORMATION!**
Product specific information and extensive product specification is available using PICK, the Product Information Center KROHNE web-tool.

PICK can be found via the service menu button on the KROHNE.com website.

The POWERFLUX is available in different sizes and constructions;

Options:
- Die cast housing DN 2.5...15
- Welded housing DN25...100

Figure 2-2:
1. Die casted sensor
2. Welded sensor
The following versions are available:

- Sensor and converter (remote version)
- Converter only

In both cases an electrical connection to the measuring sensor is made via field current and signal cable.

2.4 Nameplate measuring sensor [example]
2.5 Storage

- Store the device in a dry and dust-free location.
- Avoid lasting direct exposure to the sun.
- Store the device in its original packaging.
- Storage temperature: -50...+70°C / -58...+158°F

2.6 Transport

**Signal converter**

- No special requirements.

**Flowmeter**

- Do not lift the device by the connection box housing.
- Do not use lifting chains.
- To transport flange devices, use lifting straps. Wrap these around both process connections.

![Image of transport instructions](Figure 2-5: Transport)

2.7 Pre-installation requirements

Make sure that you have all necessary tools available:

- Allen key (4 mm)
- Small screwdriver
- Wrench for cable glands
- Wrench for wall mounting bracket (remote version only)
- Torque wrench for installing flowmeter in pipeline
2.8 General requirements

**INFORMATION!**
The following precautions must be taken to ensure reliable installation.
- Make sure that there is adequate space to the sides.
- Protect the signal converter from direct sunlight and install a sun shade if necessary.
- Signal converters installed in control cabinets require adequate cooling, e.g. by fan or heat exchanger.
- Do not expose the signal converter to intense vibration. The flowmeters are tested for a vibration level in accordance with IEC 68-2-64.

2.8.1 Vibration

![Avoid vibrations](image1)

2.8.2 Magnetic field

![Avoid magnetic fields](image2)
2.9 Installation conditions

2.9.1 Inlet and outlet

Use straight inlet and outlet pipe sections to prevent flow distortion or swirl, caused by bends and T-sections.

![Diagram of recommended inlet and outlet section]

Figure 2-8: Recommended inlet and outlet section

1 Refer to chapter "Bends in 2 or 3 dimensions"
2 ≥ 2 DN

2.9.2 Bends in 2 or 3 dimensions

![Diagram of inlet with 2 and/or 3 dimensional bends upstream of the flowmeter]

Figure 2-9: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter

Inlet length: using bends in 2 dimensions: ≥ 5 DN; when having bends in 3 dimensions: ≥ 10 DN

INFORMATION!

2 Dimensional bends in a vertical plane only, while 3 Dimensional bends both occur in a vertical and horizontal plane.
2.9.3 T-section

Figure 2-10: Distance behind a T-section

≥ 10 DN

2.9.4 Bends

CAUTION!
Avoid draining or partial filling of the flow sensor
2.10 Open feed or discharge

![Diagram of open feed or discharge](image)

Figure 2-11: Installation in front of an open discharge

2.11 Flange deviation

**CAUTION!**

Max. permissible deviation of pipe flange faces:

$L_{\text{max}} - L_{\text{min}} \leq 0.5 \text{ mm} / 0.02"$

![Diagram of flange deviation](image)

Figure 2-12: Flange deviation

1. $L_{\text{max}}$
2. $L_{\text{min}}$

2.12 Control valve

![Diagram of control valve](image)

Figure 2-13: Installation in front of a control valve
2.13 Pump

![Diagram of pump installation]

Figure 2-14: Installation behind a pump

1. Inlet: ≥ 3 DN

2.14 Air venting and vacuum forces

![Diagram of air venting]

Figure 2-15: Air venting

1. ≥ 5 m
2. Air ventilation point

![Diagram of vacuum]

Figure 2-16: Vacuum

1. ≥ 5 m
2.15 Mounting position

- Install flow sensor in line with the pipe axis.
- Pipe flange faces must be parallel to each other.

2.16 Mounting

**CAUTION!**
Please take care to use the proper gasket to prevent damaging the liner of the flowmeter. In general, the use of spiral wound gaskets is not advised, as it could severely damage the liner of the flowmeter.

**WARNING!**
- Please use stainless steel A2 / 6.9 class bolts.
- Make sure the connecting flanges are of type raised face (RF).

### EN 1092-1

<table>
<thead>
<tr>
<th>Nominal size DN [mm]</th>
<th>Pressure rating PN</th>
<th>Max. allowable operating pressure [bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5...80</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>100</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>100</td>
<td>25</td>
<td>25</td>
</tr>
</tbody>
</table>

### ASME B 16.5

<table>
<thead>
<tr>
<th>Nominal size [inch]</th>
<th>Pressure rating [psig]</th>
<th>Max. allowable operating pressure [psig]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10...4&quot;</td>
<td>150</td>
<td>230</td>
</tr>
<tr>
<td>1/10...3&quot;</td>
<td>300</td>
<td>580</td>
</tr>
</tbody>
</table>

**CAUTION!**
- Pressures at 20°C / 68°F.
- For higher temperatures, the pressure and temperature ratings are as per ASME B16.5.
Max. torque:
- Step 1: approx. 50% of max. torque
- Step 2: approx. 80% of max. torque
- Step 3: 100% of max. torque given in tables

EN 1092-1

<table>
<thead>
<tr>
<th>Nominal size DN [mm]</th>
<th>Counter flanges &amp; bolts</th>
<th>Max. allowable torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rating</td>
<td>Size</td>
</tr>
<tr>
<td>2.5...10</td>
<td>PN 40</td>
<td>M12 x 141</td>
</tr>
<tr>
<td>15</td>
<td>PN 40</td>
<td>M12 x 141</td>
</tr>
<tr>
<td>25</td>
<td>PN 40</td>
<td>M12 x 141</td>
</tr>
<tr>
<td>40</td>
<td>PN 40</td>
<td>M16 x 176</td>
</tr>
<tr>
<td>50</td>
<td>PN 40</td>
<td>M16 x 203</td>
</tr>
<tr>
<td>80</td>
<td>PN 40</td>
<td>M16 x 261</td>
</tr>
<tr>
<td>100</td>
<td>PN 16</td>
<td>M16 x 303</td>
</tr>
<tr>
<td>100</td>
<td>PN 25</td>
<td>M20 x 176</td>
</tr>
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</table>

ASME B 16.5

<table>
<thead>
<tr>
<th>Nominal size DN [mm]</th>
<th>Counter flanges &amp; bolts</th>
<th>Max. allowable torque</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rating</td>
<td>Size</td>
</tr>
<tr>
<td>1/10...3/8&quot;</td>
<td>150 lb</td>
<td>1/2&quot;UNC x 142</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>150 lb</td>
<td>1/2&quot;UNC x 142</td>
</tr>
<tr>
<td>1&quot;</td>
<td>150 lb</td>
<td>1/2&quot;UNC x 142</td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>150 lb</td>
<td>1/2&quot;UNC x 174</td>
</tr>
<tr>
<td>2&quot;</td>
<td>150 lb</td>
<td>5/8&quot;UNC x 215</td>
</tr>
<tr>
<td>3&quot;</td>
<td>150 lb</td>
<td>5/8&quot;UNC x 268</td>
</tr>
<tr>
<td>4&quot;</td>
<td>150 lb</td>
<td>5/8&quot;UNC x 318</td>
</tr>
</tbody>
</table>

INFORMATION!
The specified torque values are dependent on variables (temperature, bolt material, gasket material, lubricants, etc.) which are not within the control of the manufacturer. Therefore the values should be regarded as indicative only.
3.1 Safety instructions

**DANGER!**
All work on the electrical connections may only be carried out with the power disconnected. Take note of the voltage data on the nameplate!

**DANGER!**
Observe the national regulations for electrical installations!

**DANGER!**
For devices used in hazardous areas, additional safety notes apply; please refer to the Ex documentation.

**WARNING!**
Observe without fail the local occupational health and safety regulations. Any work done on the electrical components of the measuring device may only be carried out by properly trained specialists.

**INFORMATION!**
Look at the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

3.2 Grounding

**DANGER!**
The device must be grounded in accordance with regulations in order to protect personnel against electric shocks.

---

Figure 3-1: Grounding

1. Metal pipelines, not internally coated. Grounding without grounding rings!
2. Metal pipelines with internal coating and non-conductive pipelines. Grounding with grounding rings!
3 ELECTRICAL CONNECTIONS

Grounding ring number 1 (optional for DN25...150): Thickness: 3 mm / 0.1" (tantalum: 0.5 mm / 0.02")

INFORMATION!
For diameter DN10 and DN15, grounding rings are integrated as standard in the flow sensor construction.

3.3 Virtual reference for IFC 300 (W and F version)

Minimum requirements:
- Size: ≥ DN10
- Electrical conductivity: ≥ 200 µS/cm
- Signal cable: max. 50 m / 164 ft, type DS

INFORMATION!
For the connection diagrams please refer to the documentation of the applicable signal converter.
### 4.1 Dimensions and weights

<table>
<thead>
<tr>
<th>Sensor: remote version DN2.5...15</th>
<th>Sensor: remote version DN25...100</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Diagram" /></td>
<td><img src="image2" alt="Diagram" /></td>
</tr>
<tr>
<td><strong>a</strong> = 88 mm / 3.5&quot;</td>
<td><strong>a</strong> = 88 mm / 3.5&quot;</td>
</tr>
<tr>
<td><strong>b</strong> = 139 mm / 5.5&quot;</td>
<td><strong>b</strong> = 139 mm / 5.5&quot;</td>
</tr>
<tr>
<td><strong>c</strong> = 106 mm / 4.2&quot;</td>
<td><strong>c</strong> = 106 mm / 4.2&quot;</td>
</tr>
<tr>
<td>Total height = H + a</td>
<td>Total height = H + a</td>
</tr>
</tbody>
</table>

1. The value may vary depending on the used cable glands.
INFORMATION!

- All data given in the following tables are based on standard versions of the flow sensor only.
- Note that for other pressure ratings than mentioned, the dimensions may be different.
### TECHNICAL DATA

#### POWERFLUX 5000

<table>
<thead>
<tr>
<th>Nominal size</th>
<th>Dimensions [mm]</th>
<th>Approx. weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>2.5</td>
<td>60</td>
<td>123</td>
</tr>
<tr>
<td>4</td>
<td>60</td>
<td>123</td>
</tr>
<tr>
<td>6</td>
<td>60</td>
<td>123</td>
</tr>
<tr>
<td>10</td>
<td>60</td>
<td>123</td>
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<tr>
<td>15</td>
<td>60</td>
<td>123</td>
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<tr>
<td>25</td>
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<td>40</td>
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<td>103</td>
<td>149</td>
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<tr>
<td>80</td>
<td>153</td>
<td>181</td>
</tr>
<tr>
<td>100</td>
<td>203</td>
<td>206</td>
</tr>
</tbody>
</table>

1. Total fitting length of flowmeter with integrated rings: dimension L + 2 x gasket thickness.
2. Total fitting length of flowmeter without rings: dimension L only.

#### Nominal size

<table>
<thead>
<tr>
<th>ASME</th>
<th>L</th>
<th>H</th>
<th>W</th>
<th>D</th>
<th>Ød1</th>
<th>Ød4</th>
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<tbody>
<tr>
<td>1/10&quot;</td>
<td>2.36</td>
<td>4.84</td>
<td>1.73</td>
<td>-</td>
<td>-</td>
<td>3.53</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>2.36</td>
<td>4.84</td>
<td>1.73</td>
<td>-</td>
<td>-</td>
<td>3.53</td>
</tr>
<tr>
<td>1/4&quot;</td>
<td>2.36</td>
<td>4.84</td>
<td>1.73</td>
<td>-</td>
<td>-</td>
<td>3.53</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>2.36</td>
<td>4.84</td>
<td>1.73</td>
<td>-</td>
<td>-</td>
<td>3.53</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>2.36</td>
<td>4.84</td>
<td>1.73</td>
<td>-</td>
<td>-</td>
<td>3.53</td>
</tr>
<tr>
<td>1&quot;</td>
<td>2.28</td>
<td>4.57</td>
<td>2.68</td>
<td>0.79</td>
<td>1.82</td>
<td>1.81</td>
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<tr>
<td>1-1/2&quot;</td>
<td>3.27</td>
<td>5.16</td>
<td>3.27</td>
<td>1.18</td>
<td>1.54</td>
<td>2.44</td>
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<tr>
<td>2&quot;</td>
<td>4.06</td>
<td>5.87</td>
<td>3.98</td>
<td>1.57</td>
<td>2.81</td>
<td>2.91</td>
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<tr>
<td>3&quot;</td>
<td>6.02</td>
<td>7.13</td>
<td>5.24</td>
<td>2.36</td>
<td>3.15</td>
<td>4.17</td>
</tr>
<tr>
<td>4&quot;</td>
<td>7.99</td>
<td>8.11</td>
<td>6.22</td>
<td>3.15</td>
<td>3.98</td>
<td>5.24</td>
</tr>
</tbody>
</table>

1. Total fitting length of flowmeter with integrated rings: dimension L + 2 x gasket thickness.
2. Total fitting length of flowmeter without rings: dimension L only.
KROHNE – Process instrumentation and measurement solutions

- Flow
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