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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1.1 Intended use

**CAUTION!**
Responsibility for the use of the measuring devices with regard to suitability, intended use and corrosion resistance of the used materials against the measured fluid lies solely with the operator.

**INFORMATION!**
The manufacturer is not liable for any damage resulting from improper use or use for other than the intended purpose.

The electromagnetic flowmeter is designed exclusively to measure the flow of electrically conductive, liquid media.

**WARNING!**
If the device is not used according to the operating conditions (refer to chapter Technical data), the intended protection could be affected.

1.2 Certification

The manufacturer certifies successful testing of the product by applying the CE marking.

This device fulfils the statutory requirements of the relevant EU directives.
For full information of the EU directives and standards and the approved certifications, please refer to the CE declaration or the website of the manufacturer.
1.3 Safety instructions from the manufacturer

1.3.1 Copyright and data protection

The contents of this document have been created with great care. Nevertheless, we provide no guarantee that the contents are correct, complete or up-to-date.

The contents and works in this document are subject to copyright. Contributions from third parties are identified as such. Reproduction, processing, dissemination and any type of use beyond what is permitted under copyright requires written authorisation from the respective author and/or the manufacturer.

The manufacturer tries always to observe the copyrights of others, and to draw on works created in-house or works in the public domain.

The collection of personal data (such as names, street addresses or e-mail addresses) in the manufacturer’s documents is always on a voluntary basis whenever possible. Whenever feasible, it is always possible to make use of the offerings and services without providing any personal data.

We draw your attention to the fact that data transmission over the Internet (e.g. when communicating by e-mail) may involve gaps in security. It is not possible to protect such data completely against access by third parties.

We hereby expressly prohibit the use of the contact data published as part of our duty to publish an imprint for the purpose of sending us any advertising or informational materials that we have not expressly requested.

1.3.2 Disclaimer

The manufacturer will not be liable for any damage of any kind by using its product, including, but not limited to direct, indirect or incidental and consequential damages.

This disclaimer does not apply in case the manufacturer has acted on purpose or with gross negligence. In the event any applicable law does not allow such limitations on implied warranties or the exclusion of limitation of certain damages, you may, if such law applies to you, not be subject to some or all of the above disclaimer, exclusions or limitations.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer reserves the right to alter the content of its documents, including this disclaimer in any way, at any time, for any reason, without prior notification, and will not be liable in any way for possible consequences of such changes.
1.3.3 Product liability and warranty

The operator shall bear responsibility for the suitability of the device for the specific purpose. The manufacturer accepts no liability for the consequences of misuse by the operator. Improper installation or operation of the devices (systems) will cause the warranty to be void. The respective “Standard Terms and Conditions” which form the basis for the sales contract shall also apply.

1.3.4 Information concerning the documentation

To prevent any injury to the user or damage to the device it is essential that you read the information in this document and observe applicable national standards, safety requirements and accident prevention regulations.

If this document is not in your native language and if you have any problems understanding the text, we advise you to contact your local office for assistance. The manufacturer can not accept responsibility for any damage or injury caused by misunderstanding of the information in this document.

This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device. Special considerations and precautions are also described in the document, which appear in the form of icons as shown below.
1.3.5 Warnings and symbols used

Safety warnings are indicated by the following symbols.

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

**DANGER!**
This warning refers to the immediate danger of burns caused by heat or hot surfaces.

**DANGER!**
This warning refers to the immediate danger when using this device in a hazardous atmosphere.

**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.

**LEGAL NOTICE!**
This note contains information on statutory directives and standards.

**• 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.

1.4 Safety instructions for the operator

**WARNING!**
In general, devices from the manufacturer may only be installed, commissioned, operated and maintained by properly trained and authorized personnel. This document is provided to help you establish operating conditions, which will permit safe and efficient use of this device.
2.1 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)

1. Ordered flowmeter
2. AFC 030 signal converter (in separate box)
3. Product documentation
4. Factory calibration report
5. Mounting material (steel bushings). Optional; studs and bolts.
6. Grounding rings (optional)
7. Signal cable (depends on version)

**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.
2.2 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**

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.

2.3 Nameplate measuring sensor (example)

![Figure 2-4: Example nameplate sensor](image)

- Name and address of the manufacture
- Type designation and CE sign with number of notified body
- Calibration / GK / Size and protection class data
- PED data
3.1 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.

3.2 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

3.3 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.

Figure 3-1: Transport
3.4 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

3.5 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.

3.5.1 Vibration

Figure 3-2: Avoid vibrations

3.5.2 Magnetic field

Figure 3-3: Avoid magnetic fields
3.6 Installation conditions

3.6.1 Inlet and outlet

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

![Figure 3-4: Recommended inlet and outlet section](image)

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

3.6.2 Bends in 2 or 3 dimensions

![Figure 3-5: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter](image)

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.
3.6.3 T-section

![Figure 3-6: Distance behind a T-section](image)

\[ \theta \geq 10 \text{ DN} \]

3.6.4 Bends

![Diagram of bends]

**CAUTION!**

Avoid draining or partial filling of the flow sensor
3.7 Open feed or discharge

Figure 3-7: Installation in front of an open discharge

3.8 Flange deviation

CAUTION!
Max. permissible deviation of pipe flange faces:
\[ L_{\text{max}} - L_{\text{min}} \leq 0.5 \text{ mm} / 0.02" \]

Figure 3-8: Flange deviation
1. \( L_{\text{max}} \)
2. \( L_{\text{min}} \)

3.9 Control valve

Figure 3-9: Installation in front of a control valve
3.10 Pump

Figure 3-10: Installation behind a pump
① Inlet: ≥ 3 DN

3.11 Air venting and vacuum forces

Figure 3-11: Air venting
① ≥ 5 m
② Air ventilation point

Figure 3-12: Vacuum
① ≥ 5 m
3.12 Mounting position

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

3.13.1 Torques and pressure

**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</th>
<th>Max. allowable operating pressure [bar]</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5...80</td>
<td>PN 40</td>
<td>40</td>
</tr>
<tr>
<td>100</td>
<td>PN 16</td>
<td>16</td>
</tr>
<tr>
<td>100</td>
<td>PN 25</td>
<td>25</td>
</tr>
</tbody>
</table>

**ASME B 16.5**

<table>
<thead>
<tr>
<th>Nominal size [inch]</th>
<th>Pressure rating</th>
<th>Max. allowable operating pressure [psig]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10...4”</td>
<td>150 lb</td>
<td>230</td>
</tr>
<tr>
<td>1/10...3”</td>
<td>300 lb</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>
</tbody>
</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.
4.1 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.

4.2 Grounding

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

![Figure 4-1: Grounding](image)

1. Metal pipelines, not internally coated. Grounding without grounding rings!
2. Metal pipelines with internal coating and non-conductive pipelines. Grounding with grounding rings!
4.3 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.
5.1 Spare parts availability

The manufacturer adheres to the basic principle that functionally adequate spare parts for each device or each important accessory part will be kept available for a period of 3 years after delivery of the last production run for the device.

This regulation only applies to spare parts which are subject to wear and tear under normal operating conditions.

5.2 Availability of services

The manufacturer offers a range of services to support the customer after expiration of the warranty. These include repair, maintenance, technical support and training.

INFORMATION!
For more precise information, please contact your local sales office.

5.3 Returning the device to the manufacturer

5.3.1 General information

This device has been carefully manufactured and tested. If installed and operated in accordance with these operating instructions, it will rarely present any problems.

CAUTION!
Should you nevertheless need to return a device for inspection or repair, please pay strict attention to the following points:

• Due to statutory regulations on environmental protection and safeguarding the health and safety of the personnel, the manufacturer may only handle, test and repair returned devices that have been in contact with products without risk to personnel and environment.

• This means that the manufacturer can only service this device if it is accompanied by the following certificate [see next section] confirming that the device is safe to handle.

CAUTION!
If the device has been operated with toxic, caustic, radioactive, flammable or water-endangering products, you are kindly requested:

• to check and ensure, if necessary by rinsing or neutralising, that all cavities are free from such dangerous substances,

• to enclose a certificate with the device confirming that is safe to handle and stating the product used.
5.3.2 Form (for copying) to accompany a returned device

**CAUTION!**
To avoid any risk for our service personnel, this form has to be accessible from outside of the packaging with the returned device.

<table>
<thead>
<tr>
<th>Company:</th>
<th>Address:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department:</td>
<td>Name:</td>
</tr>
<tr>
<td>Tel. no.:</td>
<td>Fax no. and/or Email address:</td>
</tr>
<tr>
<td>Manufacturer’s order no. or serial no.:</td>
<td></td>
</tr>
</tbody>
</table>

The device has been operated with the following medium:

<table>
<thead>
<tr>
<th>This medium is:</th>
</tr>
</thead>
<tbody>
<tr>
<td>radioactive</td>
</tr>
<tr>
<td>water-hazardous</td>
</tr>
<tr>
<td>toxic</td>
</tr>
<tr>
<td>caustic</td>
</tr>
<tr>
<td>flammable</td>
</tr>
</tbody>
</table>

We checked that all cavities in the device are free from such substances.
We have flushed out and neutralized all cavities in the device.

We hereby confirm that there is no risk to persons or the environment through any residual media contained in the device when it is returned.

<table>
<thead>
<tr>
<th>Date:</th>
<th>Signature:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stamp:</td>
<td></td>
</tr>
</tbody>
</table>

5.4 Disposal

**CAUTION!**
Disposal must be carried out in accordance with legislation applicable in your country.

**Separate collection of WEEE (Waste Electrical and Electronic Equipment) in the European Union:**

According to the directive 2012/19/EU, the monitoring and control instruments marked with the WEEE symbol and reaching their end-of-life **must not be disposed of with other waste.**
The user must dispose of the WEEE to a designated collection point for the recycling of WEEE or send them back to our local organisation or authorised representative.
6.1 Measuring principle

An electrically conductive fluid flows inside an electrically insulated pipe through a magnetic field. This magnetic field is generated by a current, flowing through a pair of field coils. Inside of the fluid, a voltage \( U \) is generated:

\[
U = v \cdot k \cdot B \cdot D
\]

in which:
- \( v \) = mean flow velocity
- \( k \) = factor correcting for geometry
- \( B \) = magnetic field strength
- \( D \) = inner diameter of flowmeter

The signal voltage \( U \) is picked off by electrodes and is proportional to the mean flow velocity \( v \) and thus the flow rate \( Q \). A signal converter is used to amplify the signal voltage, filter it and convert it into signals for totalizing, recording and output processing.

Figure 6-1: Measuring principle

1. Field coils
2. Magnetic field
3. Electrodes
4. Induced voltage (proportional to flow velocity)
6.2 Technical data

**INFORMATION!**
- The following data is provided for general applications. If you require data that is more relevant to your specific application, please contact us or your local sales office.
- Additional information (certificates, special tools, software,...) and complete product documentation can be downloaded free of charge from the website [Downloadcenter].

### Measuring system

<table>
<thead>
<tr>
<th>Measuring principle</th>
<th>Faraday's law</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application range</td>
<td>Electrically conductive fluids</td>
</tr>
<tr>
<td><strong>Measured value</strong></td>
<td></td>
</tr>
<tr>
<td>Primary measured value</td>
<td>Flow velocity</td>
</tr>
</tbody>
</table>

### Design

<table>
<thead>
<tr>
<th>Modular construction</th>
<th>The measurement system consists of a flow sensor and a signal converter. It is only available as separate version.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flow sensor</td>
<td>POWERFLUX 5000 sandwich version with optimized flow tube</td>
</tr>
<tr>
<td>Remote version</td>
<td>With AFC 030 in wall (W) mount version: POWERFLUX 5030 W In field (F) version with IFC 300 : POWERFLUX 5300 F</td>
</tr>
<tr>
<td>Nominal diameter</td>
<td>DN2.5...100 / 1/10...4&quot;</td>
</tr>
</tbody>
</table>

### Measuring accuracy

<table>
<thead>
<tr>
<th>Maximum measuring error</th>
<th>With IFC 300</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; DN10 / 3/8&quot; : 0.3% of the measured value + 2 mm/s</td>
<td></td>
</tr>
<tr>
<td>DN10...100 / 3/8...4&quot; : 0.15% of the measured value + 1 mm/s</td>
<td></td>
</tr>
<tr>
<td>With AFC 030</td>
<td></td>
</tr>
<tr>
<td>1% of the measured value + 2.5 mm/s</td>
<td></td>
</tr>
</tbody>
</table>

The maximum measuring error depends on the installation conditions.

For detailed information refer to Measurement accuracy on page 30

<table>
<thead>
<tr>
<th>Repeatability</th>
<th>±0.5% of measured value, minimum 1 mm/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calibration</td>
<td><strong>Standard:</strong> 2 point calibration by direct volume comparison. <strong>Optional:</strong> special calibration on request.</td>
</tr>
</tbody>
</table>
### Operating conditions

<table>
<thead>
<tr>
<th>Temperature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Process temperature</td>
<td>Remote version: -40...+180°C / -40...+356°F</td>
</tr>
<tr>
<td></td>
<td>Size DN 2.5...15: -20...+180°C / -4...+356°F</td>
</tr>
<tr>
<td>Maximum temperature change [shock]</td>
<td>DN2.5...25: &lt; 3 K/s</td>
</tr>
<tr>
<td></td>
<td>DN40...100: &lt; 0.2 K/s</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>-40...+65°C / -40...+149°F</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>-50...+70°C / -58...+158°F</td>
</tr>
<tr>
<td>Measurement range</td>
<td>With AFC 030: 0...+12 m/s / 0...+40 ft/s</td>
</tr>
<tr>
<td></td>
<td>With IFC 300: -12...+12 m/s / -40...+40 ft/s</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pressure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient</td>
<td>Atmospheric</td>
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<table>
<thead>
<tr>
<th>Nominal flange pressure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EN 1092-1</td>
<td>Standard:</td>
</tr>
<tr>
<td></td>
<td>DN100: PN 16</td>
</tr>
<tr>
<td></td>
<td>DN2.5...80: PN 40</td>
</tr>
<tr>
<td></td>
<td>Option:</td>
</tr>
<tr>
<td></td>
<td>DN100: PN 25</td>
</tr>
<tr>
<td>ASME B16.5</td>
<td>Standard:</td>
</tr>
<tr>
<td></td>
<td>1/10...4&quot;: 150 lb</td>
</tr>
<tr>
<td></td>
<td>Option:</td>
</tr>
<tr>
<td></td>
<td>1/10...4&quot;: 300 lb</td>
</tr>
<tr>
<td>Vacuum load</td>
<td>0 mbar / 0 psi</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical properties</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical condition</td>
<td>Liquids</td>
</tr>
<tr>
<td>Electrical conductivity</td>
<td>Non water:</td>
</tr>
<tr>
<td></td>
<td>DN25...100: ≥ 1 μS/cm</td>
</tr>
<tr>
<td></td>
<td>DN4...15: ≥ 5 μS/cm</td>
</tr>
<tr>
<td></td>
<td>DN2.5: ≥ 10 μS/cm</td>
</tr>
<tr>
<td>Water</td>
<td>DN2.5...100: ≥ 20 μS/cm</td>
</tr>
<tr>
<td>Permissible gas content (volume)</td>
<td>≤ 5%</td>
</tr>
</tbody>
</table>


### Installation conditions

| Installation | Take care that flow sensor always fully filled.  
For detailed information refer to Installation on page 12. |
|-------------|------------------------------------------------------|
| Flow direction | With AFC 030: Forward.  
With IFC 300: Forward and reverse.  
Arrow on flow sensor indicates positive flow direction. |
| Inlet run | ≥ 5 DN [without disturbing flow, after a single 90° bend]  
≥ 10 DN [after a double bend = 2 x 90°] |
| Outlet run | ≥ 2 DN |
| Dimensions and weights | For detailed information refer to Installation conditions on page 14. |

### Materials

| Sensor housing | DN2.5...15: stainless steel 1.4408  
DN25...100: stainless steel 1.4301 |
| Measuring tube | Ceramic |
| Connection box | **Standard**: Stainless steel [316] |
| Grounding rings | **Standard**: Stainless steel  
Other materials on request. |
| Mounting materials | **Standard**: stainless steel centering bushing  
**Option**: stud bolts and nuts in stainless steel or galvanized steel |
| Gaskets | Graphite [Rivatherm]  
Details and other materials: contact our product support. |
| Measuring electrodes | DN2.5...25: Cermet  
DN40...100: Platinum |

### Process connections

| EN 1092-1 | **Standard**:  
DN100: PN 16  
DN2.5...80: PN 40  
**Option**:  
DN100: PN 25 |
| ASME | **Standard**:  
1/10...4": 150 lb  
**Option**:  
1/10...4": 300 lb |
| JIS | DN2.5...100: 10...20 K |
Electrical connections

<table>
<thead>
<tr>
<th>Type A (DS and DS-L)</th>
<th>In combination with the IFC 300 and AFC 030 signal converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard cable, double shielded. For detailed information refer to the documentation of the relevant signal converter.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type B (BTS)</th>
<th>In combination with the IFC 300 signal converter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optional cable, triple shielded. For detailed information refer to the documentation of the relevant signal converter.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>I/O</th>
<th>For full details of I/O options, including data streams and protocols, see the technical data sheet of the relevant signal converter.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Others</th>
<th>For detailed information of the connection cables of the AFC 030 see the manual of the signal converter.</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Optionally cable</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal cable</td>
<td>Multi conductor cable, spiral corrugated, double shielded with copper flame retardant outer shield (acc. IEC 60332-3-23 Cat. B) type L45551.</td>
</tr>
</tbody>
</table>

| Min. bending radius allowed | For all cables, minimal bending radius \( r = 10 \times \varnothing \) (outer diameter cable). |

Approvals and certifications

**CE**
This device fulfills the statutory requirements of the EU directives. The manufacturer certifies successful testing of the product by applying the CE mark.

For full information of the EU directive & standards and the approved certifications; see the CE declaration or the manufacturer website.

<table>
<thead>
<tr>
<th>Nuclear approvals</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC</td>
<td>IEC 61000-4</td>
</tr>
<tr>
<td>Radiation</td>
<td>TID 1E+08 Rad</td>
</tr>
<tr>
<td>Vibration</td>
<td>EN 60068-2-6</td>
</tr>
<tr>
<td>Seismic</td>
<td>IEC 60980 - 1989 ( [300 \text{ m/s}^2] )</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other approvals and standards</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Shock test</td>
<td>IEC 68-2-27</td>
</tr>
<tr>
<td></td>
<td>30 g for 18 ms</td>
</tr>
<tr>
<td>Vibration test</td>
<td>IEC 68-2-64</td>
</tr>
<tr>
<td></td>
<td>( f = 20 - 2000 \text{ Hz}, \text{ rms} = 4.5 g, t = 30 \text{ min.} )</td>
</tr>
</tbody>
</table>
6.3 Measurement accuracy

Every electromagnetic flowmeter is calibrated by direct volume comparison. The wet calibration validates the performance of the flowmeter under reference conditions against accuracy limits.

The accuracy limits of electromagnetic flowmeters are typically the result of the combined effect of linearity, zero point stability and calibration uncertainty.

Reference conditions
- Medium: water
- Temperature: +5...35°C / +41...95°F
- Operating pressure: 0.1...5 barg / 1.5...72.5 psig
- Inlet section: ≥ 5 DN
- Outlet section: ≥ 2 DN

![Figure 6-2: X [m/s] : flow velocity
Y [%]: deviation from the actual measured value (mv) Accuracy with signal converter IFC 300](image)

<table>
<thead>
<tr>
<th>Flow sensor diameter</th>
<th>Accuracy</th>
<th>Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>DN10...100 / 3/8...4”</td>
<td>0.15% + 1 mm/s</td>
<td>1</td>
</tr>
<tr>
<td>&lt; DN10 / 3/8”</td>
<td>0.3% + 2 mm/s</td>
<td>2</td>
</tr>
</tbody>
</table>
AFC 030 accuracy

\[ Y \% : \text{deviation from the actual measured value (mv)} \]

\[ X \text{ [m/s]} : \text{flow velocity} \]

1. Minimal accuracy 1% of measured value + 2.5 mm/s

6.4 Dimensions and weights

<table>
<thead>
<tr>
<th>Sensor: remote version DN2.5...15</th>
<th>a = 88 mm / 3.5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b = 139 mm / 5.5&quot; ⚫</td>
</tr>
<tr>
<td></td>
<td>c = 106 mm / 4.2&quot;</td>
</tr>
<tr>
<td>Total height = H + a</td>
<td></td>
</tr>
</tbody>
</table>

Sensor: remote version DN25...100

<table>
<thead>
<tr>
<th>a = 88 mm / 3.5&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>b = 139 mm / 5.5&quot; ⚫</td>
</tr>
<tr>
<td>c = 106 mm / 4.2&quot;</td>
</tr>
<tr>
<td>Total height = H + a</td>
</tr>
</tbody>
</table>

1. The value may vary depending on the used cable glands.
Figure 6-4: Construction details DN2.5...15
① Gasket
② Grounding ring

Figure 6-5: Construction details DN25...100
① Situation without grounding rings
② Gasket

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.
### Nominal size

<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 ①</td>
<td>123</td>
</tr>
<tr>
<td>4</td>
<td>60 ①</td>
<td>123</td>
</tr>
<tr>
<td>6</td>
<td>60 ①</td>
<td>123</td>
</tr>
<tr>
<td>10</td>
<td>60 ①</td>
<td>123</td>
</tr>
<tr>
<td>15</td>
<td>60 ①</td>
<td>123</td>
</tr>
<tr>
<td>25</td>
<td>58 ②</td>
<td>116</td>
</tr>
<tr>
<td>40</td>
<td>83 ②</td>
<td>131</td>
</tr>
<tr>
<td>50</td>
<td>103 ②</td>
<td>149</td>
</tr>
<tr>
<td>80</td>
<td>153 ②</td>
<td>181</td>
</tr>
<tr>
<td>100</td>
<td>203 ②</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>Nominal size</th>
<th>Dimensions [inches]</th>
<th>Approx. weight [lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASME</td>
<td>L</td>
<td>H</td>
</tr>
<tr>
<td>1/10&quot;</td>
<td>2.36 ①</td>
<td>4.84</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>2.36 ①</td>
<td>4.84</td>
</tr>
<tr>
<td>¼&quot;</td>
<td>2.36 ①</td>
<td>4.84</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>2.36 ①</td>
<td>4.84</td>
</tr>
<tr>
<td>½&quot;</td>
<td>2.36 ①</td>
<td>4.84</td>
</tr>
<tr>
<td>1&quot;</td>
<td>2.28 ②</td>
<td>4.57</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>3.27 ②</td>
<td>5.16</td>
</tr>
<tr>
<td>2&quot;</td>
<td>4.06 ②</td>
<td>5.87</td>
</tr>
<tr>
<td>3&quot;</td>
<td>6.02 ②</td>
<td>7.13</td>
</tr>
<tr>
<td>4&quot;</td>
<td>7.99 ②</td>
<td>8.11</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
- Level
- Temperature
- Pressure
- Process Analysis
- Services

Head Office KROHNE Messtechnik GmbH
Ludwig-Krohne-Str. 5
47058 Duisburg (Germany)
Tel.: +49 203 301 0
Fax: +49 203 301 10389
info@krohne.com

The current list of all KROHNE contacts and addresses can be found at:
www.krohne.com