Electromagnetic flowmeter in flanged version

The documentation is only complete when used in combination with the relevant documentation for the signal converter.
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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.
2.1 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)

<table>
<thead>
<tr>
<th></th>
<th>Ordered flowmeter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Product documentation</td>
</tr>
<tr>
<td>3</td>
<td>Factory calibration report</td>
</tr>
<tr>
<td>4</td>
<td>CD-ROM with product documentation in available languages</td>
</tr>
<tr>
<td>5</td>
<td>Grounding rings (optional)</td>
</tr>
<tr>
<td>6</td>
<td>Signal cable (remote versions only)</td>
</tr>
</tbody>
</table>

**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.

**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 following versions are available:

- Compact version (the signal converter is mounted directly on the measuring sensor)
- Remote version (electrical connection to the measuring sensor via field current and signal cable)

![Diagram showing different versions of the flowmeter](image_url)

1. Remote version
2. Compact version with IFC 300 signal converter
3. Compact version with IFC 100 [0°] signal converter
4. Compact version with IFC 100 [45°] signal converter
5. Compact version with stainless steel IFC 100 [10°] signal converter
2.3 Nameplates (examples)

**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.

1. Name and address of the manufacturer
2. Type designation of the flowmeter and CE sign with number(s) of notified body / bodies
3. Calibration data
4. PED data

```
KROHNE Altenrhein, Dordrecht NL - 3313 LC
```

```
OPTIFLUX 5000 FL S/N: xxxx Manufactured: 28XX
```

```
Q1 = 2.714 Q2 = 5.123
DN 80mm / 3 inch
```

```
P50: 0 bar @ T51 = +50°C
P52: 32 bar @ T52 = +80°C
I1 = 65 bar @ T1 = 20°C
```

2.4 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
2.5 Transport

Signal converter
- No special requirements.

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

![Figure 2-2: Transport](image)

2.6 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
2.7 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.

2.7.1 Vibration

![Avoid vibrations](image1)

Figure 2-3: Avoid vibrations

2.7.2 Magnetic field

![Avoid magnetic fields](image2)

Figure 2-4: Avoid magnetic fields
2.8 Installation conditions

2.8.1 Inlet and outlet

Figure 2-5: Recommended inlet and outlet

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

INFORMATION!
Sensors of type VN02 up to DN10:
The inlet and outlet sections are enclosed inside the sensor.

2.8.2 Bends in 2 or 3 dimensions

Figure 2-6: 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 occur in a vertical plane only, while 3 Dimensional bends occur in both vertical and horizontal plane.
2.8.3 T-section

Figure 2-7: Distance behind a T-section

\( t \geq 10 \text{ DN} \)

2.8.4 Bends

Figure 2-8: Installation in bending pipes

Figure 2-9: Installation in bending pipes

**CAUTION!**

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

Figure 2-10: Installation in front of an open discharge

2.8.6 Flange deviation

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

Figure 2-11: Flange deviation

1. \( L_{\text{max}} \)
2. \( L_{\text{min}} \)

2.8.7 Pump

Figure 2-12: Installation behind a pump
2.8.8 Control valve

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

2.8.9 Air venting and vacuum forces

Figure 2-14: Air venting
1 ≥ 5 m / 17 ft
2 Air ventilation point

Figure 2-15: Vacuum
1 ≥ 5 m / 17 ft
2.8.10 Mounting position

- Install flow sensor in line with the pipe axis.
- Pipe flange faces must be parallel to each other.
2.9 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.

2.9.1 Torques and pressures

Tighten the bolts in fixed order, see picture:

- Step 1: by hand
- Step 2: approx. 10% of max. torque
- Step 3: approx. 25% of max. torque
- Step 4: approx. 50% of max. torque
- Step 5: approx. 80% of max. torque
- Step 6: 100% of max. torque given in table

**INFORMATION!**
Diameters DN80 to DN300 have more bolts than the drawing in the picture above shows. Please continue in the same sequence to tighten the other bolts.

**CAUTION!**
With the instrument, 4 PTFE gaskets are delivered (2 to be used with installation, 2 as spare). There are no other gaskets required.
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.

The torque values in the following tables are based 8.8 bolts and a friction coefficient 0.14.

### EN 1092-1

<table>
<thead>
<tr>
<th>Nominal size DN [mm]</th>
<th>Pressure rating</th>
<th>Bolts</th>
<th>Recommended torque [Nm]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>15</td>
<td>PN 40</td>
<td>4 x M 12</td>
<td>50</td>
</tr>
<tr>
<td>25</td>
<td>PN 40</td>
<td>4 x M 12</td>
<td>50</td>
</tr>
<tr>
<td>40</td>
<td>PN 40</td>
<td>4 x M 16</td>
<td>100</td>
</tr>
<tr>
<td>50</td>
<td>PN 40</td>
<td>4 x M 16</td>
<td>100</td>
</tr>
<tr>
<td>80</td>
<td>PN 40</td>
<td>8 x M 16</td>
<td>100</td>
</tr>
<tr>
<td>100</td>
<td>PN 16</td>
<td>8 x M 16</td>
<td>100</td>
</tr>
<tr>
<td>150</td>
<td>PN 16</td>
<td>8 x M 20</td>
<td>200</td>
</tr>
<tr>
<td>200</td>
<td>PN 10</td>
<td>8 x M 20</td>
<td>200</td>
</tr>
<tr>
<td>250</td>
<td>PN 10</td>
<td>12 x M 20</td>
<td>250</td>
</tr>
<tr>
<td>300</td>
<td>PN 10</td>
<td>12 x M 20</td>
<td>250</td>
</tr>
</tbody>
</table>

### ASME B 16.5

<table>
<thead>
<tr>
<th>Nominal size [inch]</th>
<th>Flange class [lb]</th>
<th>Bolts</th>
<th>Recommended torque [ftlb]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Min.</td>
</tr>
<tr>
<td>1/2</td>
<td>300</td>
<td>4 x 1/2&quot;</td>
<td>40</td>
</tr>
<tr>
<td>1</td>
<td>150 / 300</td>
<td>4 x 1/2&quot;</td>
<td>40</td>
</tr>
<tr>
<td>1 1/2</td>
<td>150 / 300</td>
<td>4 x 1/2&quot;</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>150 / 300</td>
<td>4 x 5/8&quot;</td>
<td>80</td>
</tr>
<tr>
<td>3</td>
<td>150 / 300</td>
<td>4 x 5/8&quot;</td>
<td>100</td>
</tr>
<tr>
<td>4</td>
<td>150</td>
<td>8 x 5/8&quot;</td>
<td>100</td>
</tr>
<tr>
<td>6</td>
<td>150</td>
<td>8 x 3/4&quot;</td>
<td>150</td>
</tr>
<tr>
<td>8</td>
<td>150</td>
<td>8 x 3/4&quot;</td>
<td>200</td>
</tr>
<tr>
<td>10</td>
<td>150</td>
<td>12 x 7/8&quot;</td>
<td>250</td>
</tr>
<tr>
<td>12</td>
<td>150</td>
<td>12 x 7/8&quot;</td>
<td>300</td>
</tr>
</tbody>
</table>
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](image)

1. Metal pipelines, not internally coated. Grounding without grounding rings.

**INFORMATION!**
Grounding can be omitted with Virtual Reference (option on IFC 300 converter). For detailed information refer to Virtual reference for IFC 300 (C, W and F version) on page 17.
3.3 Virtual reference for IFC 300 (C, W and F version)

Minimum requirements:
- Size: ≥ DN10 / 3/8"
- Electrical conductivity: ≥ 200 μS/cm
- Signal cable: max. 50 m / 164 ft, type DS

3.4 Connection diagrams

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

<table>
<thead>
<tr>
<th>Version</th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>Total height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remote version</td>
<td>88 mm / 3.5”</td>
<td>139 mm / 5.5”</td>
<td>106 mm / 4.2”</td>
<td>H + a</td>
</tr>
<tr>
<td>Compact version with: IFC 300</td>
<td>155 mm / 6.1”</td>
<td>230 mm / 9.1”</td>
<td>260 mm / 10.2”</td>
<td>H + a</td>
</tr>
<tr>
<td>Compact version with: IFC 100 (0°)</td>
<td>82 mm / 3.2”</td>
<td>161 mm / 6.3”</td>
<td>257 mm / 10.1”</td>
<td>H + a</td>
</tr>
<tr>
<td>Compact version with: IFC 100 (45°)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--</td>
<td>--</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a = 186 mm / 7.3”</td>
<td>b = 161 mm / 6.3”</td>
<td>c = 184 mm / 2.7”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total height = H + a</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compact version with stainless steel IFC 100 (10°)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a = 100 mm / 4”</td>
<td>b = 187 mm / 7.36”</td>
<td>c = 270 mm / 10.63”</td>
</tr>
<tr>
<td>Total height = H + a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compact version with: IFC 050 (10°)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a = 100 mm / 4”</td>
<td>b = 157 mm / 6.18”</td>
<td>c = 260 mm / 10.24”</td>
</tr>
<tr>
<td>Total height = H + a</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1 The value may vary depending on the used cable glands.
Figure 4-1: Construction details

1. Detail ceramics / flange / gaskets, see options in following illustration
2. Length tolerances [see table on following pages]
3. Gasket area

Figure 4-2: Details of gasket options

1. PTFE (white) sealing ring
2. Filled (blue) PTFE sealing ring
3. DN150...300 / 6...12"; optional spacer ring with gasket

INFORMATION!

- All data given in the following tables are based on standard versions of the flow sensor only.
- Especially for smaller nominal sizes of the flow sensor, the signal converter can be bigger than the flow sensor.
- Note that for other pressure ratings than mentioned, the dimensions may be different.
- For full information on signal converter dimensions see relevant documentation.
### Technical Data

**EN 1092-1**

<table>
<thead>
<tr>
<th>Size</th>
<th>Dimensions [mm]</th>
<th>Approx. weight [kg]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DN</td>
<td>L + *</td>
</tr>
<tr>
<td>15</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>25</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>40</td>
<td>150</td>
<td>A</td>
</tr>
<tr>
<td>50</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>80</td>
<td>200</td>
<td>A</td>
</tr>
<tr>
<td>100</td>
<td>250</td>
<td>A</td>
</tr>
<tr>
<td>150</td>
<td>250</td>
<td>B</td>
</tr>
<tr>
<td>200</td>
<td>300</td>
<td>B</td>
</tr>
<tr>
<td>250</td>
<td>350</td>
<td>B</td>
</tr>
<tr>
<td>300</td>
<td>450</td>
<td>B</td>
</tr>
</tbody>
</table>

**INFORMATION!**

- **L + *:**
  - Add approximately 2 x 7.5 mm to L when using spacer rings (option for DN150...300)
  - Add approximately 2 x 1.45 mm to L when using filled blue PTFE gaskets (optional)

**INFORMATION!**

**Tolerances A & B**

- **A = +0.8 / -0.4 mm (+0.031 / -0.016 inches)**
- **B = +0.5 / -1.0 mm (+0.02 / -0.04 inches)**
## ASME B 16.5 150 lb

<table>
<thead>
<tr>
<th>Size</th>
<th>Dimensions [inches]</th>
<th>Approx. weight [lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>L + * tolerance</td>
<td>H</td>
</tr>
<tr>
<td>1&quot;</td>
<td>5.91 A</td>
<td>5.47</td>
</tr>
<tr>
<td>1½&quot;</td>
<td>5.91 A</td>
<td>6.18</td>
</tr>
<tr>
<td>2&quot;</td>
<td>7.87 A</td>
<td>6.89</td>
</tr>
<tr>
<td>3&quot;</td>
<td>7.87 A</td>
<td>8.39</td>
</tr>
<tr>
<td>4&quot;</td>
<td>9.84 A</td>
<td>9.65</td>
</tr>
<tr>
<td>6&quot;</td>
<td>9.84 B</td>
<td>13.98</td>
</tr>
<tr>
<td>8&quot;</td>
<td>11.81 B</td>
<td>15.59</td>
</tr>
<tr>
<td>10&quot;</td>
<td>13.78 B</td>
<td>18.03</td>
</tr>
<tr>
<td>12&quot;</td>
<td>17.72 B</td>
<td>19.41</td>
</tr>
</tbody>
</table>

**INFORMATION!**
- Add approximately 2 x 0.3” to L when using spacer rings (option for 6”...12”)
- Add approximately 2 x 0.055” to L when using filled blue PTFE gaskets (optional)

## ASME B 16.5 300 lb

<table>
<thead>
<tr>
<th>Size</th>
<th>Dimensions [inches]</th>
<th>Approx. weight [lb]</th>
</tr>
</thead>
<tbody>
<tr>
<td>inch</td>
<td>L + * tolerance</td>
<td>H</td>
</tr>
<tr>
<td>½&quot;</td>
<td>5.91 A</td>
<td>5.0</td>
</tr>
<tr>
<td>1&quot;</td>
<td>5.91 A</td>
<td>5.91</td>
</tr>
<tr>
<td>2&quot;</td>
<td>7.87 A</td>
<td>7.20</td>
</tr>
<tr>
<td>3&quot;</td>
<td>7.87 A</td>
<td>8.86</td>
</tr>
</tbody>
</table>

**INFORMATION!**
- **Tolerances A & B**
  - A = +0.8/-0.4 mm (+0.031/-0.016 inches)
  - B = +0.5/-1.0 mm (+0.02/-0.04 inches)

**CAUTION!**
- Pressures at 20°C / 68°F.
- For higher temperatures, the pressure and temperature ratings are as per ASME B16.5.
KROHNE – Process instrumentation and measurement solutions

- Flow
- Level
- Temperature
- Pressure
- Process Analysis
- Services

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