



## OPTIFLUX 2000 Quick Start

Electromagnetic flow sensor

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

|        |  |    |
|--------|--|----|
| 1      | Safety instructions                                      | 3  |
| <hr/>  |  |    |
| 2      | Installation   | 4  |
| <hr/>  |  |    |
| 2.1    | Scope of delivery.....                                   | 4  |
| 2.2    | Device description .....                                 | 5  |
| 2.3    | Nameplate .....  | 6  |
| 2.4    | Storage .....  | 7  |
| 2.5    | Transport .....  | 7  |
| 2.6    | Pre-installation requirements .....                      | 7  |
| 2.7    | General requirements .....                               | 8  |
| 2.7.1  | Vibration .....  | 8  |
| 2.7.2  | Magnetic field.....                                      | 8  |
| 2.8    | Installation conditions .....                            | 9  |
| 2.8.1  | Inlet and outlet .....                                   | 9  |
| 2.8.2  | Bends in 2 or 3 dimensions.....                          | 9  |
| 2.8.3  | T-section .....  | 10 |
| 2.8.4  | Bends .....  | 10 |
| 2.8.5  | Open feed or discharge.....                              | 11 |
| 2.8.6  | Flange deviation .....                                   | 11 |
| 2.8.7  | Pump .....   | 11 |
| 2.8.8  | Control valve .....                                      | 12 |
| 2.8.9  | Air venting and vacuum forces .....                      | 12 |
| 2.8.10 | Mounting position.....                                   | 13 |
| 2.9    | Mounting .....   | 14 |
| 2.9.1  | Torques and pressures.....                               | 14 |
| 2.10   | Temperatures .....                                       | 17 |
| <hr/>  |  |    |
| 3      | Electrical connections                                   | 18 |
| <hr/>  |  |    |
| 3.1    | Safety instructions.....                                 | 18 |
| 3.2    | Grounding .....  | 18 |
| 3.3    | Virtual reference for IFC 300 (C, W and F version) ..... | 20 |
| 3.4    | Connection diagrams .....                                | 20 |
| <hr/>  |  |    |
| 4      | Technical data   | 21 |
| <hr/>  |  |    |
| 4.1    | Dimensions and weights .....                             | 21 |
| 4.2    | Vacuum load .....  | 25 |
| <hr/>  |  |    |
| 5      | Notes  | 26 |
| <hr/>  |  |    |

## 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.

## 2.1 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

- ① Ordered flowmeter
- ② Product documentation
- ③ Factory calibration report
- ④ CD-ROM with product documentation in available languages
- ⑤ Grounding rings (optional)
- ⑥ Signal cable (remote versions only)



**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

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 following versions are available:

- Compact version (the signal converter is mounted directly on the flow sensor)
- Remote version (a measuring sensor with connection box and a separate signal converter)

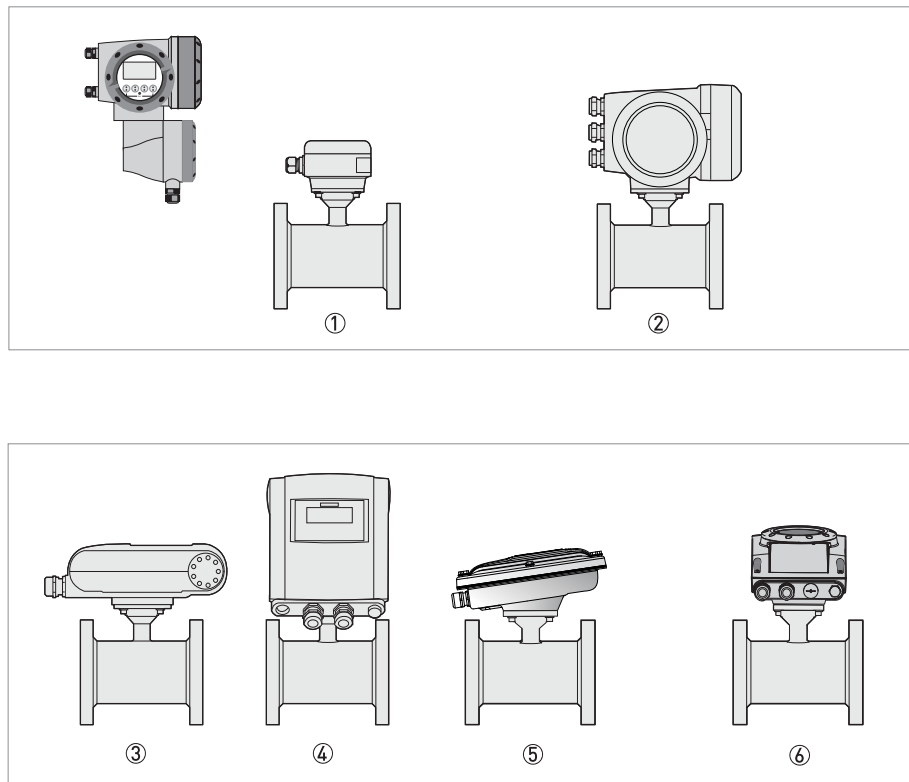


Figure 2-2: Device versions

- ① Remote version
- ② Compact version with signal converter IFC 300
- ③ Compact version with signal converter IFC 100 (0°)
- ④ Compact version with signal converter IFC 100 (45°)
- ⑤ Compact version with signal converter IFC 100 (10°) Stainless steel
- ⑥ Compact version with signal converter IFC 050 (10°)

## 2.3 Nameplate



### INFORMATION!

Check the device nameplate to ensure that the device is delivered according to your order. Additional information (a.o correct supply voltage), can be found in the documentation of the signal converter.

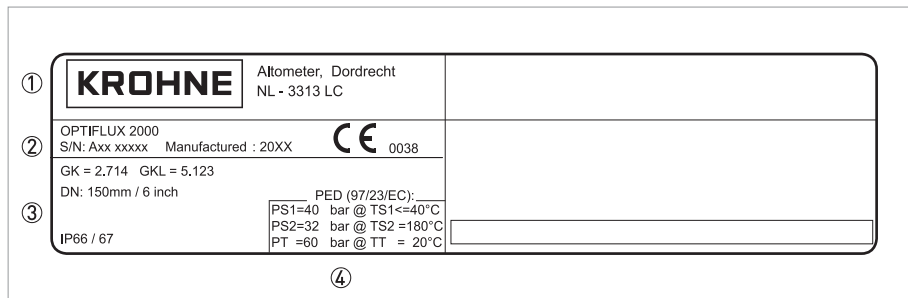


Figure 2-3: Example of nameplate

- 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

## 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.

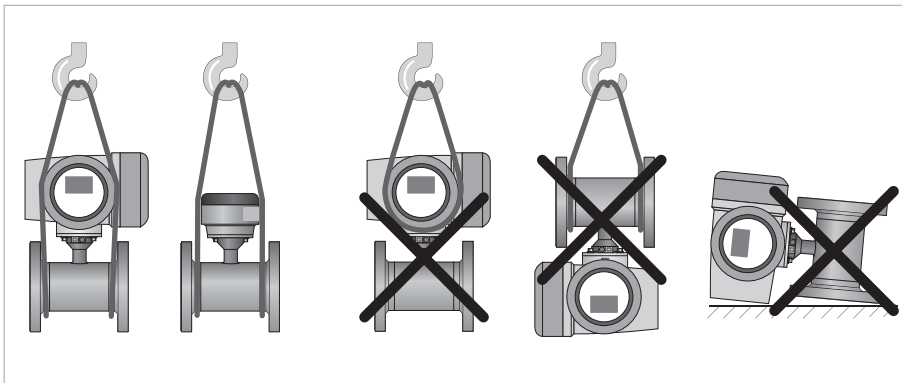


Figure 2-4: Transport

## 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

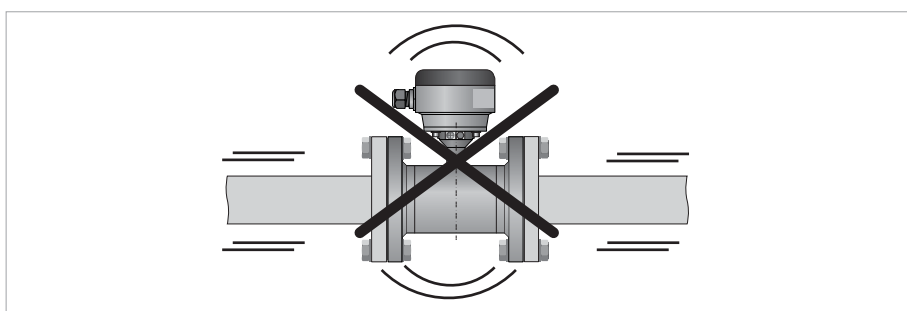


Figure 2-5: Avoid vibrations

### 2.7.2 Magnetic field

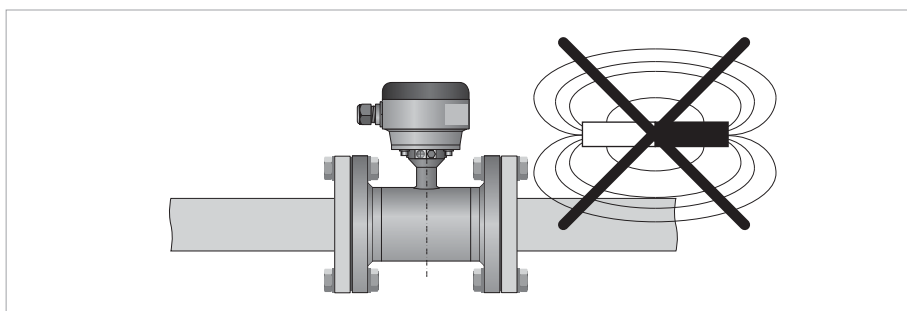


Figure 2-6: Avoid magnetic fields



## 2.8 Installation conditions

### 2.8.1 Inlet and outlet

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

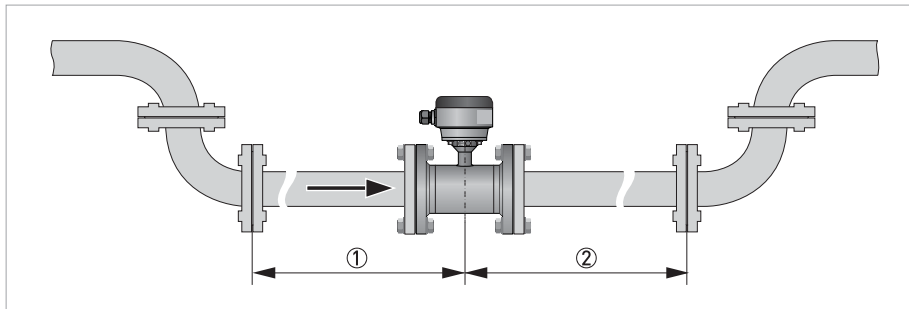


Figure 2-7: Recommended inlet and outlet section

- ① Refer to chapter "Bends in 2 or 3 dimensions"
- ②  $\geq 2$  DN

### 2.8.2 Bends in 2 or 3 dimensions

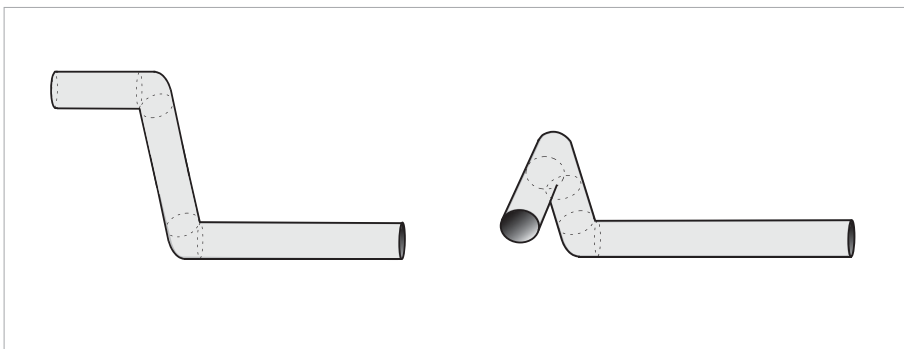


Figure 2-8: Inlet when using 2 and/or 3 dimensional bends upstream of the flowmeter

Inlet length: using bends in 2 dimensions:  $\geq 5$  DN; when having bends in 3 dimensions:  $\geq 10$  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

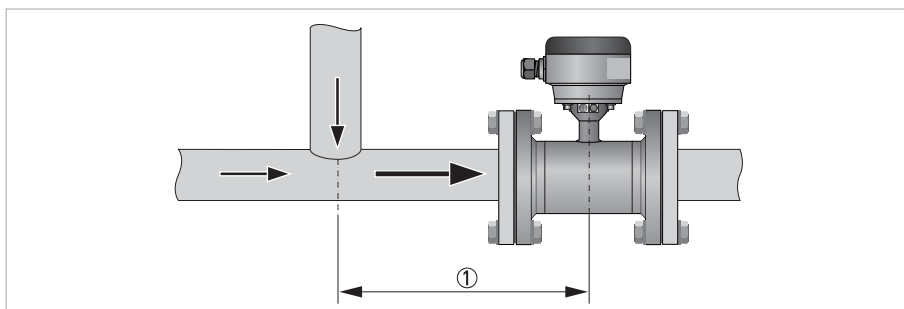


Figure 2-9: Distance behind a T-section

① ≥ 10 DN

2.8.4 Bends

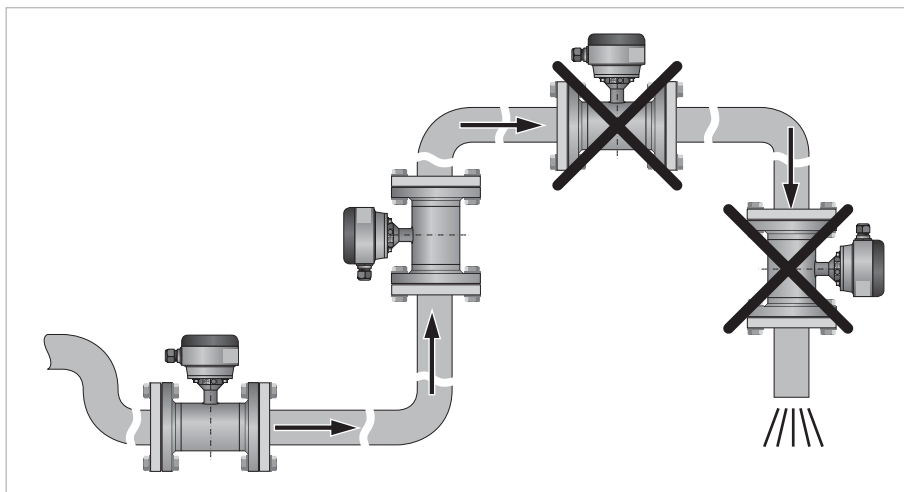


Figure 2-10: Installation in bending pipes

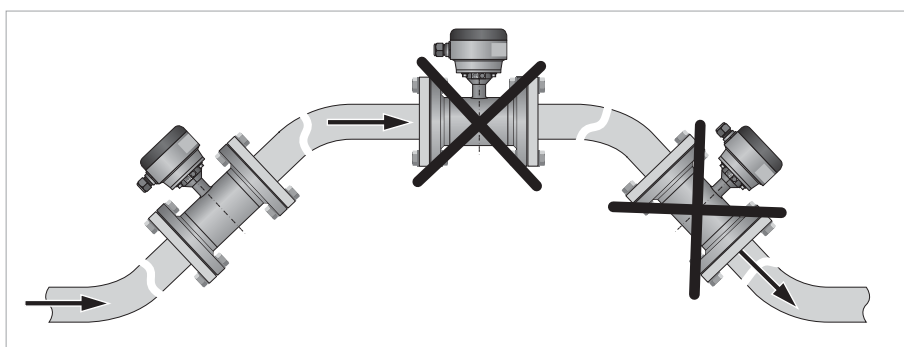


Figure 2-11: Installation in bending pipes



**CAUTION!**  
 Avoid draining or partial filling of the flow sensor

### 2.8.5 Open feed or discharge

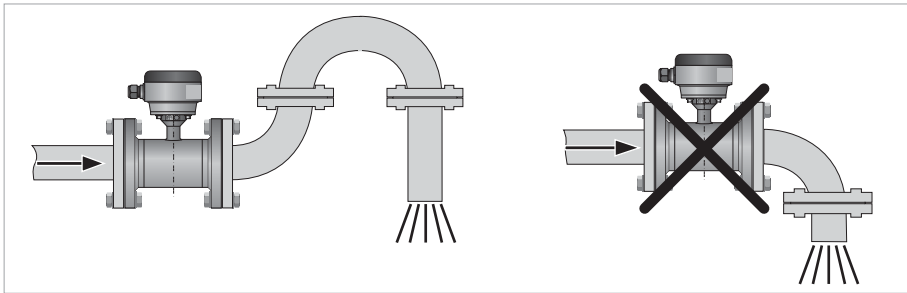


Figure 2-12: Installation in front of an open discharge

### 2.8.6 Flange deviation



**CAUTION!**

Max. permissible deviation of pipe flange faces:

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

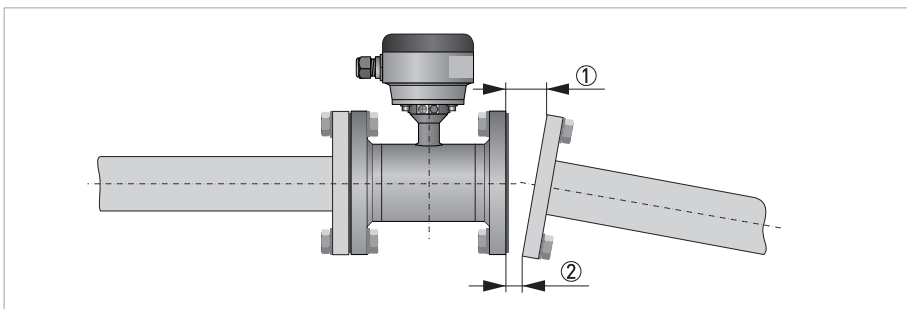


Figure 2-13: Flange deviation

- ①  $L_{max}$
- ②  $L_{min}$

### 2.8.7 Pump

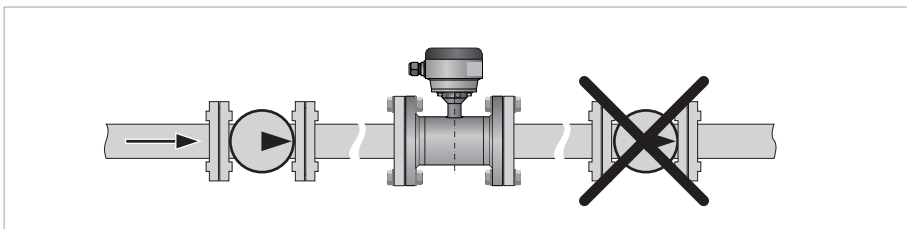


Figure 2-14: Installation behind a pump

2.8.8 Control valve

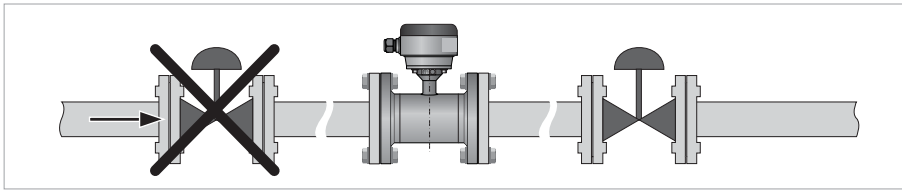


Figure 2-15: Installation in front of a control valve

2.8.9 Air venting and vacuum forces

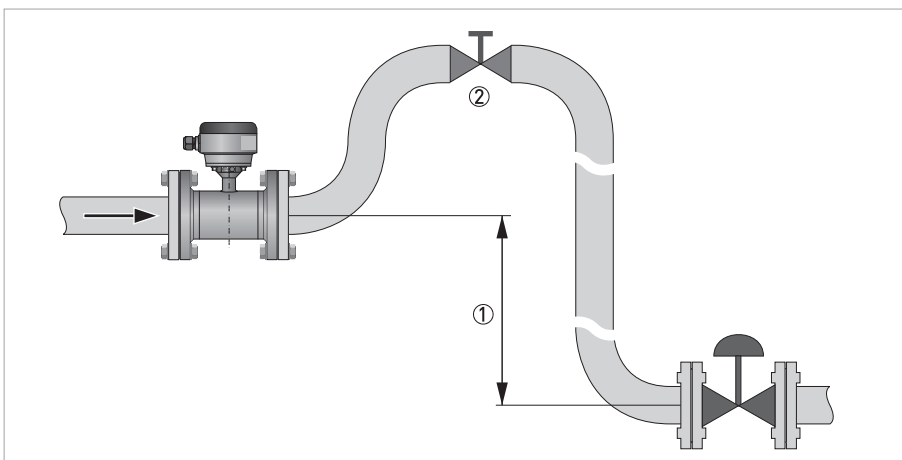


Figure 2-16: Air venting

- ①  $\geq 5$  m / 17 ft
- ② Air ventilation point

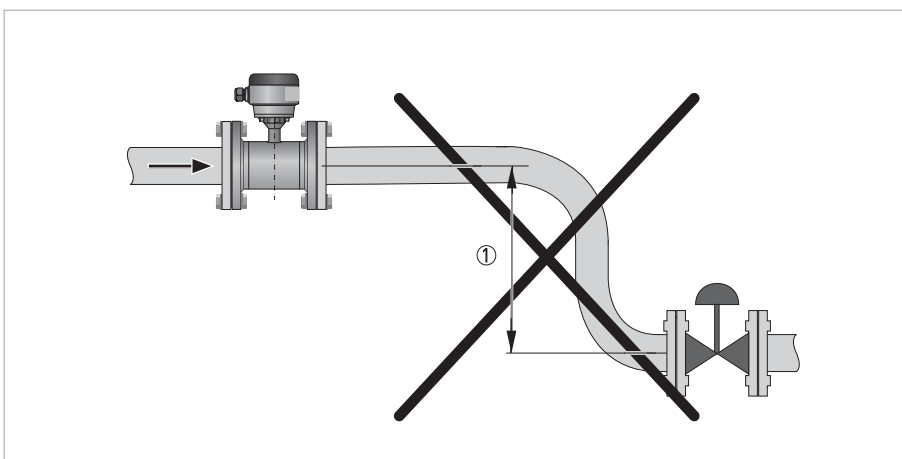


Figure 2-17: Vacuum

- ①  $\geq 5$  m / 17 ft

### 2.8.10 Mounting position

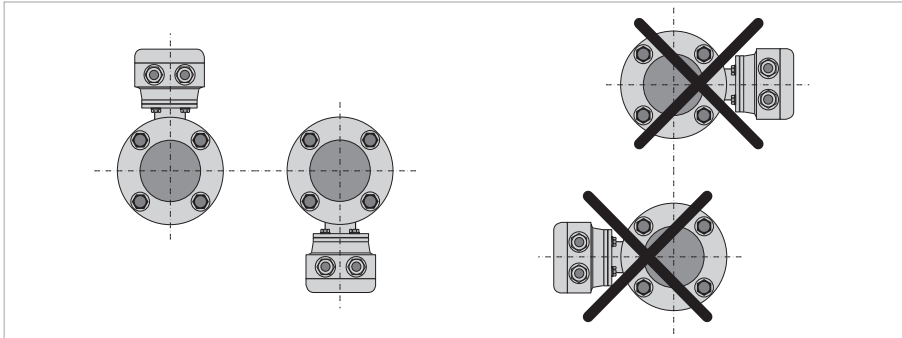


Figure 2-18: Mounting position

- 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

The maximum pressure and torques values for the flowmeter are theoretical and calculated for optimum conditions and use with carbon steel flanges.

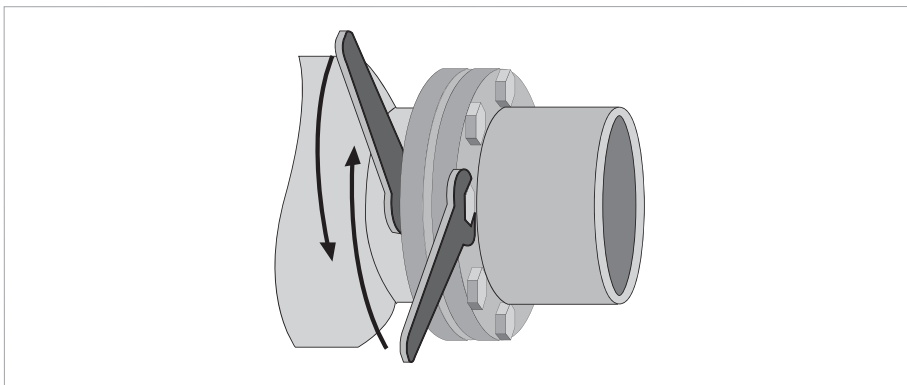


Figure 2-19: Tightening of bolts



#### Tightening of bolts

- Always tighten the bolts uniformly and in diagonally opposite sequence.
- Do not exceed the maximum torque value.
- Step 1: Apply approx. 50% of max. torque given in table.
- Step 2: Apply approx. 80% of max. torque given in table.
- Step 3: Apply 100% of max. torque given in table.

| Nominal size<br>DN [mm] | Pressure<br>rating | Bolts     | Max. torque [Nm] <sup>①</sup> |               |             |
|-------------------------|--------------------|-----------|-------------------------------|---------------|-------------|
|                         |                    |           | Polyolefin                    | Polypropylene | Hard rubber |
| 25                      | PN 40              | 4 x M 12  | -                             | 22            | 11          |
| 32                      | PN 40              | 4 x M 16  | -                             | 37            | 19          |
| 40                      | PN 40              | 4 x M 16  | -                             | 43            | 25          |
| 50                      | PN 40              | 4 x M 16  | -                             | 55            | 31          |
| 65                      | PN 16              | ② x M 16  | -                             | 51            | 42          |
| 65                      | PN 40              | 8 x M 16  | -                             | 38            | 21          |
| 80                      | PN 40              | 8 x M 16  | -                             | 47            | 25          |
| 100                     | PN 16              | 8 x M 16  | -                             | 39            | 30          |
| 125                     | PN 16              | 8 x M 16  | -                             | 53            | 40          |
| 150                     | PN 16              | 8 x M 20  | -                             | 68            | 47          |
| 200                     | PN 10              | 8 x M 20  | 68                            | -             | 68          |
| 200                     | PN 16              | 12 x M 20 | 45                            | -             | 45          |
| 250                     | PN 10              | 12 x M 20 | 65                            | -             | 65          |
| 250                     | PN 16              | 12 x M 24 | 78                            | -             | 78          |
| 300                     | PN 10              | 12 x M 20 | 76                            | -             | 76          |
| 300                     | PN 16              | 12 x M 24 | 105                           | -             | 105         |
| 350                     | PN 10              | 16 x M 20 | 75                            | -             | 75          |
| 400                     | PN 10              | 16 x M 24 | 104                           | -             | 104         |
| 450                     | PN 10              | 20 x M 24 | 93                            | -             | 93          |
| 500                     | PN 10              | 20 x M 24 | 107                           | -             | 107         |
| 600                     | PN 10              | 20 x M 27 | 138                           | -             | 138         |
| 700                     | PN 10              | 24 x M 27 | 163                           | -             | 163         |
| 800                     | PN 10              | 24 x M 30 | 219                           | -             | 219         |
| 900                     | PN 10              | 28 x M 30 | 205                           | -             | 205         |
| 1000                    | PN 10              | 28 x M 33 | 261                           | -             | 261         |

① 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.

② DN65 / PN16 is available with standard 8 bolt holes. On request 4 bolt holes is optional.



**INFORMATION!**

*Other sizes / pressure ratings on request.*

| Nominal size<br>[inch] | Flange class<br>[lb] | Bolts       | Max. torque [lbf.ft] ① |               |             |
|------------------------|----------------------|-------------|------------------------|---------------|-------------|
|                        |                      |             | Polyolefin             | Polypropylene | Hard rubber |
| 1                      | 150                  | 4 x 1/2"    | -                      | 6.7           | 3.2         |
| 1 1/2                  | 150                  | 4 x 1/2"    | -                      | 13            | 9           |
| 2                      | 150                  | 4 x 5/8"    | -                      | 24            | 17          |
| 3                      | 150                  | 4 x 5/8"    | -                      | 43            | 29          |
| 4                      | 150                  | 8 x 5/8"    | -                      | 34            | 23          |
| 6                      | 150                  | 8 x 3/4"    | -                      | 61            | 38          |
| 8                      | 150                  | 8 x 3/4"    | 51                     | -             | 51          |
| 10                     | 150                  | 12 x 7/8"   | 58                     | -             | 58          |
| 12                     | 150                  | 12 x 7/8"   | 77                     | -             | 77          |
| 14                     | 150                  | 12 x 1"     | 69                     | -             | 69          |
| 16                     | 150                  | 16 x 1"     | 67                     | -             | 67          |
| 18                     | 150                  | 16 x 1 1/8" | 105                    | -             | 105         |
| 20                     | 150                  | 20 x 1 1/8" | 94                     | -             | 94          |
| 24                     | 150                  | 20 x 1 1/4" | 133                    | -             | 133         |
| 28                     | 150                  | 28 x 1 1/4" | 119                    | -             | 119         |
| 32                     | 150                  | 28 x 1 1/2" | 191                    | -             | 191         |
| 36                     | 150                  | 32 x 1 1/2" | 198                    | -             | 198         |
| 40                     | 150                  | 36 x 1 1/2" | 198                    | -             | 198         |

① 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.



**INFORMATION!**

*Other sizes / pressure ratings on request.*



**CAUTION!**

- Pressures are applicable at 20° C / 68° F.
- For higher temperatures, the pressure ratings are as per ASME B16.5.



## 2.10 Temperatures



**CAUTION!**

Protect the device from direct sunlight.

| Temperature range                       | Process [°C] |      | Ambient [°C] |      | Process [°F] |      | Ambient [°F] |      |
|---|--------------|------|--------------|------|--------------|------|--------------|------|
|   | min.         | max. | min.         | max. | min.         | max. | min.         | max. |
| <b>Hard rubber / Polyolefin ①</b>       |              |      |              |      |              |      |              |      |
| Separate flow sensor                    | -5           | 80   | -40          | 65   | 23           | 176  | -40          | 149  |
| Compact with IFC 300                    | -5           | 80   | -40          | 65   | 23           | 176  | -40          | 149  |
| Compact with IFC 100                    | -5           | 80   | -40          | 65   | 23           | 176  | -40          | 149  |
| Compact with IFC 100<br>Stainless steel | 5            | 80   | -40          | 60   | 23           | 176  | -40          | 140  |
| Compact with IFC 050                    | -5           | 80   | -40          | 65   | 23           | 176  | -40          | 149  |
| <b>Polypropylene ②</b>                  |              |      |              |      |              |      |              |      |
| Separate flow sensor                    | -5           | 90   | -40          | 65   | 23           | 194  | -40          | 149  |
| Compact with IFC 300                    | -5           | 90   | -40          | 65   | 23           | 194  | -40          | 149  |
| Compact with IFC 100                    | -5           | 90   | -40          | 65   | 23           | 194  | -40          | 149  |
| Compact with IFC 100<br>Stainless steel | -5           | 90   | 40           | 60   | 23           | 194  | -40          | 140  |
| Compact with IFC 050                    | -5           | 90   | -40          | 65   | 23           | 194  | -40          | 149  |

① Polyolefin is only available for DN200...1000

② Polypropylene is only available for DN25...150

### 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.

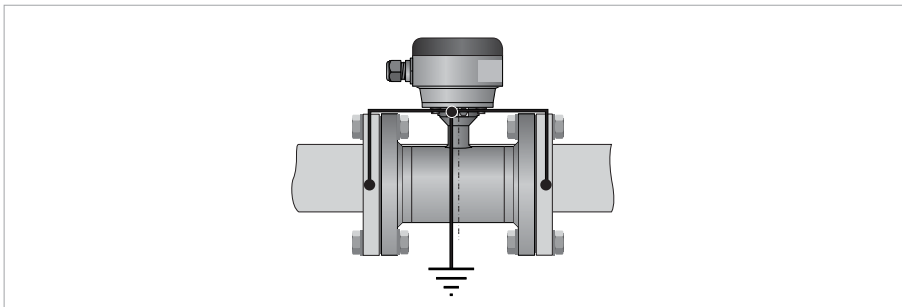


Figure 3-1: Grounding

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

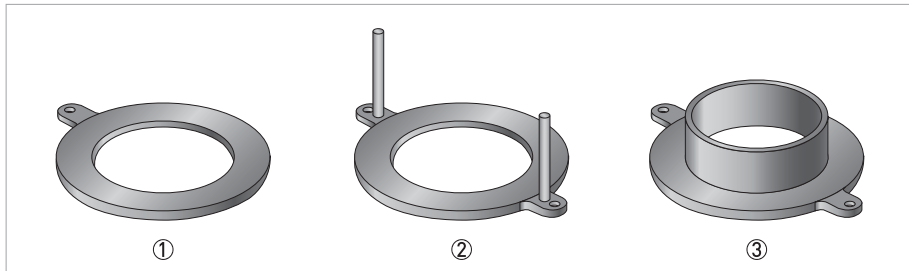


Figure 3-2: Different types of grounding rings

- ① Grounding ring number 1
- ② Grounding ring number 2
- ③ Grounding ring number 3

#### Grounding ring number 1:

- Thickness : 3 mm / 0.1" (tantalum: 0.5 mm / 0.02")

#### Grounding ring number 2:

- Thickness : 3 mm / 0.1"
- Prevents damage to the flanges during transport and installation
- Especially for flow sensors with PTFE liner

#### Grounding ring number 3:

- Thickness : 3 mm / 0.1"
- With cylindrical neck (length 30 mm / 1.25" for DN10...150 / 3/8...6")
- Offers liner protection against abrasive fluids

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

The virtual reference option on the flow converter IFC 300 provides complete isolation of the measurement circuit.

#### Benefits of virtual reference:

- Grounding rings or grounding electrodes can be omitted.
- Safety increases by reducing the number of potential leakage points.
- The installation of the flowmeters is much easier.

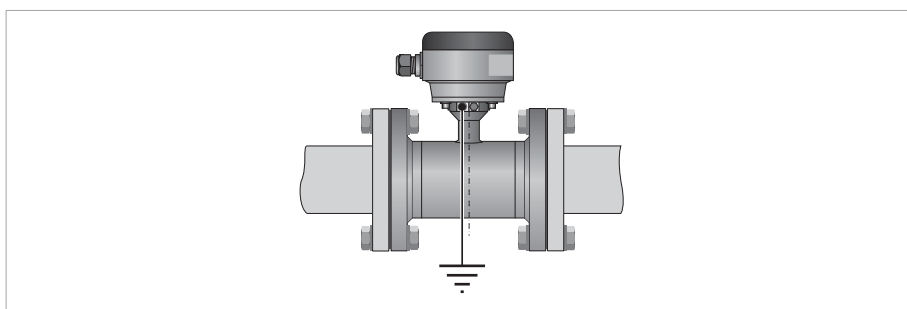


Figure 3-3: Virtual reference

#### Minimum requirements:

- Size:  $\geq$  DN10 / 3/8"
- Electrical conductivity:  $\geq$  200  $\mu$ S/cm
- Signal cable: max. 50 m / 164 ft, type DS

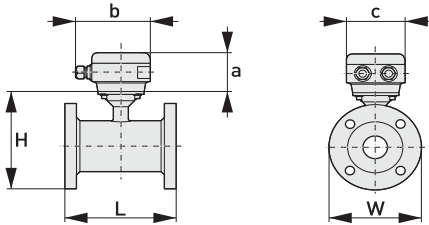
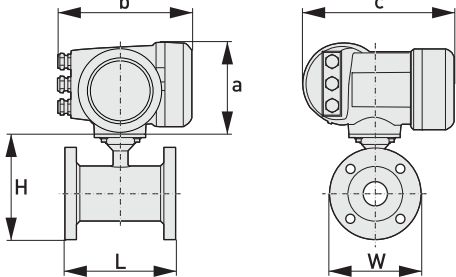
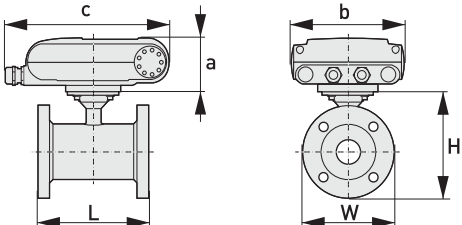
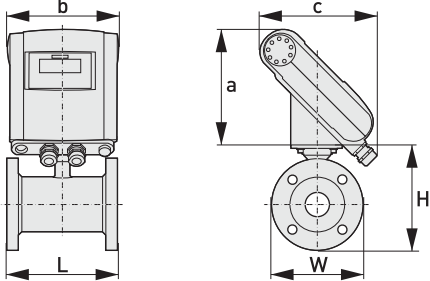
### 3.4 Connection diagrams

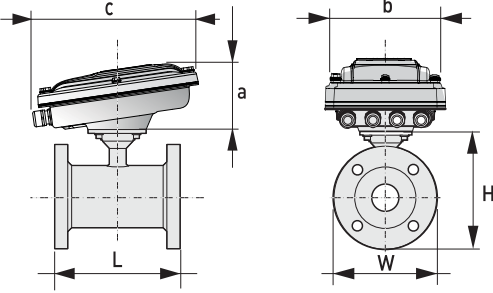
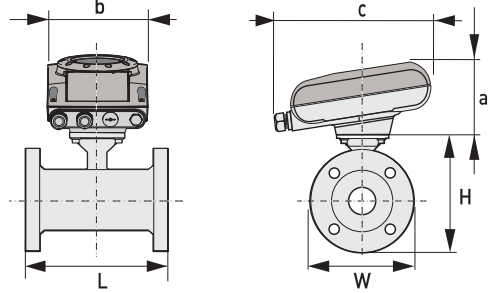


#### **INFORMATION!**

*For the connection diagrams please refer to the documentation of the applicable signal converter.*

## 4.1 Dimensions and weights

|  |  |   |
|--|--|---|
| Remote version                         |     | <p>a = 88 mm / 3.5"</p> <p>b = 139 mm / 5.5" ①</p> <p>c = 106 mm / 4.2"</p> <p>Total height = H + a</p>   |
| Compact version with :<br>IFC 300      |    | <p>a = 155 mm / 6.1"</p> <p>b = 230 mm / 9.1" ①</p> <p>c = 260 mm / 10.2"</p> <p>Total height = H + a</p> |
| Compact version with:<br>IFC 100 (0°)  |  | <p>a = 82 mm / 3.2"</p> <p>b = 161 mm / 6.3"</p> <p>c = 257 mm / 10.1" ①</p> <p>Total height = H + a</p>  |
| Compact version with:<br>IFC 100 (45°) |  | <p>a = 186 mm / 7.3"</p> <p>b = 161 mm / 6.3"</p> <p>c = 184 mm / 7.3" ①</p> <p>Total height = H + a</p>  |

|  |  |  |
|--|--|--|
| <p><b>Compact version<br/>with stainless steel<br/>IFC 100 (10°)</b></p> |  | <p>a = 100 mm / 4"<br/>                 b = 187 mm / 7.36" ①<br/>                 c = 270 mm / 10.63"<br/>                 Total height = H + a</p>    |
| <p><b>Compact version with:<br/>IFC 050 (10°)</b></p>                    |  | <p>a = 101 mm / 3.98"<br/>                 b = 157 mm / 6.18"<br/>                 c = 260 mm / 10.24" ①<br/>                 Total height = H + a</p> |

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.
- 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.

**EN 1092-1**

| Nominal size DN<br>[mm] | Dimensions [mm]    |                         |      |      | Approx.<br>weight<br>[kg] |
|-------------------------|--------------------|-------------------------|------|------|---------------------------|
|                         | Standard<br>length | ISO Insertion<br>length | H    | W    |                           |
| 25                      | 150                | 200                     | 140  | 115  | 5                         |
| 32                      | 150                | 200                     | 157  | 140  | 6                         |
| 40                      | 150                | 200                     | 166  | 150  | 7                         |
| 50                      | 200                | 200                     | 186  | 165  | 11                        |
| 65                      | 200                | 200                     | 200  | 185  | 9                         |
| 80                      | 200                | 200                     | 209  | 200  | 14                        |
| 100                     | 250                | 250                     | 237  | 220  | 15                        |
| 125                     | 250                | 250                     | 266  | 250  | 19                        |
| 150                     | 300                | 300                     | 300  | 285  | 27                        |
| 200                     | 350                | 350                     | 361  | 340  | 34                        |
| 250                     | 400                | 450                     | 408  | 395  | 48                        |
| 300                     | 500                | 500                     | 458  | 445  | 58                        |
| 350                     | 500                | 550                     | 510  | 505  | 78                        |
| 400                     | 600                | 600                     | 568  | 565  | 101                       |
| 450                     | 600                | -                       | 618  | 615  | 111                       |
| 500                     | 600                | -                       | 671  | 670  | 130                       |
| 600                     | 600                | -                       | 781  | 780  | 165                       |
| 700                     | 700                | -                       | 898  | 895  | 248                       |
| 800                     | 800                | -                       | 1012 | 1015 | 331                       |
| 900                     | 900                | -                       | 1114 | 1115 | 430                       |
| 1000                    | 1000               | -                       | 1225 | 1230 | 507                       |
| 1200                    | 1200               | -                       | 1417 | 1405 | 555                       |
| 1400                    | 1400               | -                       | 1619 | 1630 | 765                       |
| 1600                    | 1600               | -                       | 1819 | 1830 | 1035                      |
| 1800                    | 1800               | -                       | 2027 | 2045 | 1470                      |
| 2000                    | 2000               | -                       | 2259 | 2265 | 1860                      |

## ASME B16.5 / 150 lb flanges

| Nominal size<br>[inch] | Dimensions [inch] |       |       | Approx.<br>weight [lb] |
|------------------------|-------------------|-------|-------|------------------------|
|                        | L                 | H     | W     |                        |
| 1"                     | 5.91              | 5.39  | 4.25  | 9                      |
| 1¼"                    | 5.91              | 5.75  | 4.63  | 13                     |
| 1½"                    | 5.91              | 6.10  | 5.00  | 15                     |
| 2"                     | 7.87              | 7.05  | 5.98  | 18                     |
| 2½"                    | 7.87              | 7.72  | 7     | 22                     |
| 3"                     | 7.87              | 8.03  | 7.50  | 26                     |
| 4"                     | 9.84              | 9.49  | 9.00  | 44                     |
| 5"                     | 9.84              | 10.55 | 10.00 | 49                     |
| 6"                     | 11.81             | 11.69 | 11.00 | 64                     |
| 8"                     | 13.78             | 14.25 | 13.50 | 95                     |
| 10"                    | 15.75             | 16.30 | 16.00 | 143                    |
| 12"                    | 19.69             | 18.78 | 19.00 | 207                    |
| 14"                    | 27.56             | 20.67 | 21.00 | 284                    |
| 16"                    | 31.50             | 22.95 | 23.50 | 364                    |
| 18"                    | 31.50             | 24.72 | 25.00 | 410                    |
| 20"                    | 31.50             | 26.97 | 27.50 | 492                    |
| 24"                    | 31.50             | 31.38 | 32.00 | 675                    |

## ASME B16.5 / 300 lb flanges

| Nominal size<br>[inch] | Dimensions [inch] |       |       | Approx.<br>weight [lb] |
|------------------------|-------------------|-------|-------|------------------------|
|                        | L                 | H     | W     |                        |
| 1"                     | 5.91              | 5.71  | 4.87  | 11                     |
| 1¼"                    | 7.87              | 6.30  | 5.25  | 17                     |
| 1½"                    | 7.87              | 6.65  | 6.13  | 20                     |
| 2"                     | 9.84              | 7.32  | 6.50  | 22                     |
| 2½"                    | 9.84              | 7.95  | 7.5   | 25                     |
| 3"                     | 9.84              | 8.43  | 8.25  | 31                     |
| 4"                     | 11.81             | 10.00 | 10.00 | 44                     |
| 6"                     | 12.60             | 12.44 | 12.50 | 73                     |
| 8"                     | 15.75             | 15.04 | 15.00 | 157                    |
| 10"                    | 19.69             | 17.05 | 17.50 | 247                    |
| 12"                    | 23.62             | 20.00 | 20.50 | 375                    |
| 14"                    | 27.56             | 21.65 | 23.00 | 474                    |
| 16"                    | 31.50             | 23.98 | 25.50 | 639                    |
| 20"                    | 31.50             | 28.46 | 30.50 | 937                    |
| 24"                    | 31.50             | 33.39 | 36.00 | 1345                   |



## 4.2 Vacuum load

| Diameter             | Vacuum load in mbar abs. at a process temperature of |      |      |      |
|----------------------|--|------|------|------|
| [mm]                 | 20°C   | 40°C | 60°C | 80°C |
| <b>Hard rubber</b>   |  |      |      |      |
| DN200...300          | 250  | 250  | 400  | 400  |
| DN350...1000         | 500  | 500  | 600  | 600  |
| DN1200...3000        | 600  | 600  | 750  | 750  |
| <b>Polypropylene</b> |  |      |      |      |
| DN25...150           | 250  | 250  | 400  | 400  |
| <b>Polyolefin</b>    |  |      |      |      |
| DN200...1000         | 0  | 0    | 0    | 0    |

| Diameter             | Vacuum load in psia at process temperature of |       |       |       |
|----------------------|---|-------|-------|-------|
| [inch]               | 68°F  | 104°F | 140°F | 176°F |
| <b>Hard rubber</b>   |   |       |       |       |
| 8...12               | 3.6   | 3.6   | 5.8   | 5.8   |
| 14...40              | 7.3   | 7.3   | 8.7   | 8.7   |
| 48...120             | 8.7   | 8.7   | 10.9  | 10.9  |
| <b>Polypropylene</b> |   |       |       |       |
| 1...6                | 3.6   | 3.6   | 5.8   | 5.8   |
| <b>Polyolefin</b>    |   |       |       |       |
| 8...40               | 0   | 0     | 0     | 0     |







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