



Level



Pressure



Flow



Temperature

Liquid  
Analysis

Registration

Systems  
Components

Services



Solutions

## Technical Information

# Proline Prosonic Flow 92F

## Ultrasonic Flow Measuring System 2-Wire loop powered inline flowmeter



### Application

The flowmeter is ideally suited for applications in process control and utility measurement in practically all sectors of industry such as the chemical and petrochemical industry, energy production and district heating.

- Loop powered transmitter (2-Wire)
- Accuracy up to  $\pm 0.3\%$
- Fluid temperatures up to 200 °C (392 °F)
- Process pressures up to 40 bar (ASME Cl. 300)
- Galvanically isolated pulse output available

Approvals for hazardous area:

- ATEX, FM, CSA, TIIS, IECEx, NEPSI

Connection to common process control systems:

- HART, PROFIBUS PA, FOUNDATION Fieldbus

Relevant safety aspects:

- Pressure Equipment Directive (PED)
- Process sealing according to ISA 12.27.01

### Your benefits

The Prosonic Flow 92F is a calibrated meter capable of measuring flow of conductive and especially non-conductive liquids such as solvents, hydrocarbons and non-conductive water.

The **Proline transmitter concept** comprises of:

- Diagnostic ability and data back-up capability for increased process quality
- Permanent self-monitoring and diagnosis of transmitter and sensor

The **Proline Prosonic Flow sensors** comprises:

- Available as a 2, 3 or 4 beam version
- Innovative 3 and 4 fourbeam design facilitates a reduced requirement for upstream pipework ( $\leq 5$  pipe diameter)
- Calibration traceable to international standards
- No pressure drop
- Maintenance free due to no moving parts



## Table of contents

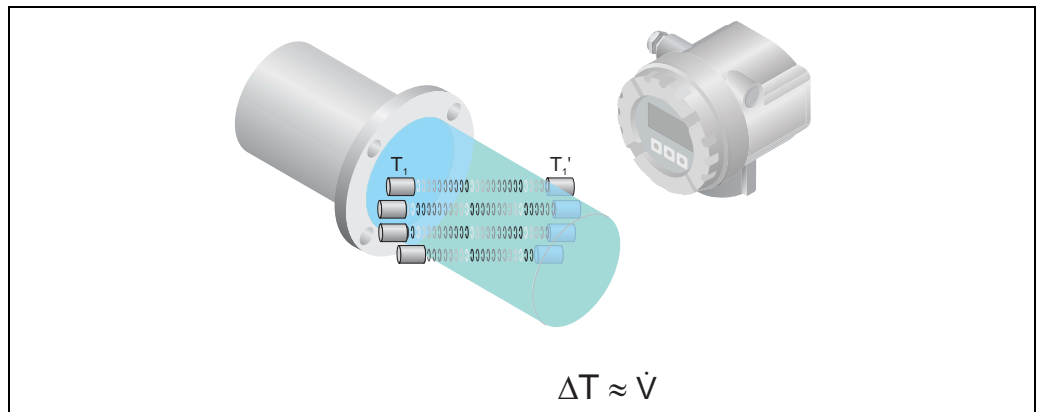
|   |           |   |           |
|---|-----------|---|-----------|
| <b>Function and system design</b> .....         | <b>3</b>  | Operating elements (HART) .....         | 18        |
| Measuring principle .....                       | 3         | Remote operation .....                  | 18        |
| Measuring system .....                          | 3         |   |           |
| <b>Input</b> .....                              | <b>4</b>  | <b>Certificates and approvals</b> ..... | <b>18</b> |
| Measured variable .....                         | 4         | CE mark .....                           | 18        |
| Measuring range .....                           | 4         | C-tick .....                            | 19        |
|   |           | Ex approval .....                       | 19        |
| <b>Output</b> .....                             | <b>4</b>  | Certification PROFIBUS PA .....         | 19        |
| Outputs in general .....                        | 4         | FOUNDATION Fieldbus certification ..... | 19        |
| Output signal .....                             | 5         | Other standards and guidelines .....    | 19        |
| Signal on alarm .....                           | 5         | Pressure Equipment Directive .....      | 19        |
| Load .....                                      | 6         |   |           |
| Low flow cutoff .....                           | 6         | <b>Ordering information</b> .....       | <b>20</b> |
| Galvanic isolation .....                        | 6         |   |           |
|   |           | <b>Accessories</b> .....                | <b>20</b> |
| <b>Power supply</b> .....                       | <b>7</b>  | <b>Documentation</b> .....              | <b>20</b> |
| Electrical connection measuring unit .....      | 7         |   |           |
| Terminal assignment .....                       | 7         | <b>Registered trademarks</b> .....      | <b>20</b> |
| Electrical connection remote version .....      | 7         |   |           |
| Supply voltage .....                            | 8         |   |           |
| Cable entries .....                             | 8         |   |           |
| Remote version cable specifications .....       | 8         |   |           |
| Power supply failure .....                      | 8         |   |           |
|   |           |   |           |
| <b>Performance characteristics</b> .....        | <b>9</b>  |   |           |
| Reference calibration conditions .....          | 9         |   |           |
| Maximum measured error .....                    | 9         |   |           |
| Repeatability .....                             | 9         |   |           |
|   |           |   |           |
| <b>Operating conditions: Installation</b> ..... | <b>9</b>  |   |           |
| Installation instructions .....                 | 9         |   |           |
| Inlet and outlet runs .....                     | 11        |   |           |
|   |           |   |           |
| <b>Operating conditions: Environment</b> .....  | <b>12</b> |   |           |
| Ambient temperature range .....                 | 12        |   |           |
| Storage temperature .....                       | 12        |   |           |
| Degree of protection .....                      | 12        |   |           |
| Shock resistance .....                          | 12        |   |           |
| Vibration resistance .....                      | 12        |   |           |
| Electromagnetic compatibility (EMC) .....       | 12        |   |           |
|   |           |   |           |
| <b>Operating conditions: Process</b> .....      | <b>13</b> |   |           |
| Fluid temperature range .....                   | 13        |   |           |
| Medium pressure range (nominal pressure) .....  | 13        |   |           |
| Pressure loss .....                             | 13        |   |           |
|   |           |   |           |
| <b>Mechanical construction</b> .....            | <b>13</b> |   |           |
| Design, dimensions, weights .....               | 13        |   |           |
| Weight .....                                    | 16        |   |           |
| Material .....                                  | 16        |   |           |
| Material load diagram .....                     | 17        |   |           |
|   |           |   |           |
| <b>Human interface</b> .....                    | <b>18</b> |   |           |
| Display elements .....                          | 18        |   |           |

## Function and system design

### Measuring principle

A Prosonic Flow inline flowmeter measures the flow rate of the passing fluid by using sensor pairs located on opposite sides of the meter body and at an angle so that one of the sensors in the pair is slightly downstream. The flow signal is established by alternating an acoustic signal between the sensor pairs and measuring the time of flight of each transmission. Then utilizing the fact that sound travels faster with the flow versus against the flow, this differential time ( $\Delta T$ ) can be used to determine the fluids velocity between the sensors.

The volume flow rate is established by combining all the flow velocities determined by the sensor pairs with the cross sectional area of the meter body and extensive knowledge about fluid flow dynamics. The design of the sensors and their position ensures that only a short straight run of pipe upstream of the meter is required after typical flow obstructions such as bends in one or two planes. Advance digital signal processing facilitates constant validation of the flow measurement reducing susceptibility to multiphase flow conditions and increases the reliability of the measurement.



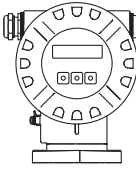
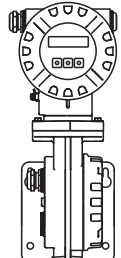
a0006215

### Measuring system

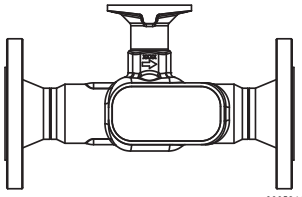
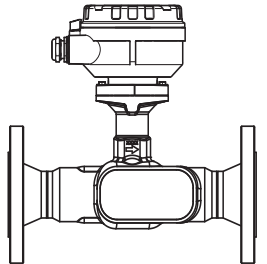
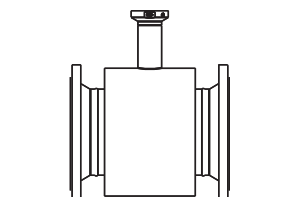
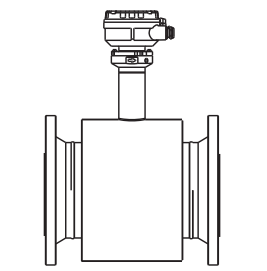
The measuring system consists of a transmitter and a sensor. Two versions are available:

- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

#### Transmitter

| Prosonic Flow 92   | Prosonic Flow 92 remote version  |   |
|--|--|---|
|  <p style="text-align: right; font-size: small;">a0005962</p> |  <p style="text-align: right; font-size: small;">a0005963</p> | <ul style="list-style-type: none"> <li>■ Two line liquid crystal display</li> <li>■ Operation with push buttons</li> <li>■ 2-Wire loop powered</li> <li>■ Optional explosion proof housing</li> </ul> |

**Sensor**

|   |   |  |
|---|---|--|
| <p><b>F</b></p>  <p>a0005966</p> | <p><b>F (remote Version)</b></p>  <p>a0005967</p> | <ul style="list-style-type: none"> <li>■ Nominal diameters DN 25 to 100 (1 to 4")</li> <li>■ Process sensor for fluid temperatures up to 150 °C /302 °F (optional 200 °C /392 °F)</li> <li>■ Tube material: stainless steel</li> <li>■ Process pressures up to 40 bar</li> </ul> <p>Remote version:</p> <ul style="list-style-type: none"> <li>■ IP67 housing (Optional IP68)</li> <li>■ Standard remote cable length of 10 and 30 m (30 and 90 ft)</li> <li>■ Optional remote cable length up to a maximum 50 m (150 ft)</li> </ul>                 |
| <p><b>F</b></p>  <p>a0014351</p> | <p><b>F (remote Version)</b></p>  <p>a0014352</p> | <ul style="list-style-type: none"> <li>■ Nominal diameters DN 150 to 300 (6 to 12")</li> <li>■ Process sensor for fluid temperatures up to 150 °C /302 °F (optional 200 °C /392 °F)</li> <li>■ Tube material: stainless steel, carbon steel</li> <li>■ Process pressures up to 40 bar</li> </ul> <p>Remote version:</p> <ul style="list-style-type: none"> <li>■ IP67 housing (Optional IP68)</li> <li>■ Standard remote cable length of 10 and 30 m (30 and 90 ft)</li> <li>■ Optional remote cable length up to a maximum 50 m (150 ft)</li> </ul> |

**Input**

**Measured variable** Flow velocity (transit time difference proportional to flow velocity)

**Measuring range** Typically  $v = -10$  to 10 m/s with the specified accuracy

| Nominal diameter |      | Range for full scale values (liquids) $m_{\min(F)} \dots m_{\max(F)}$ |                    |
|------------------|------|---|--------------------|
| mm               | inch | SI-Unit   | US-Unit            |
| 25               | 1"   | 0 to 300 dm <sup>3</sup> /min   | 0 to 80 gal/min    |
| 40               | 1½"  | 0 to 750 dm <sup>3</sup> /min   | 0 to 200 gal/min   |
| 50               | 2"   | 0 to 1100 dm <sup>3</sup> /min  | 0 to 300 gal/min   |
| 80               | 3"   | 0 to 3000 dm <sup>3</sup> /min  | 0 to 800 gal/min   |
| 100              | 4"   | 0 to 4700 dm <sup>3</sup> /min  | 0 to 1250 gal/min  |
| 150              | 6"   | 0 to 10 m <sup>3</sup> /min   | 0 to 2800 gal/min  |
| 200              | 8"   | 0 to 20 m <sup>3</sup> /min   | 0 to 5280 gal/min  |
| 250              | 10"  | 0 to 30 m <sup>3</sup> /min   | 0 to 7930 gal/min  |
| 300              | 12"  | 0 to 40 m <sup>3</sup> /min   | 0 to 10570 gal/min |

**Output**

**Outputs in general** The following measured variables can generally be output via the outputs:

|                      | Current output | Freq. output | Pulse output | Status output |
|----------------------|----------------|--------------|--------------|---------------|
| Volume flow          | X              | X            | X            | Limit value   |
| Calculated Mass flow | X              | X            | X            | Limit value   |
| Sound velocity       | X              | X            | –            | Limit value   |
| Flow velocity        | X              | X            | –            | Limit value   |
| Signal strength      | X              | X            | –            | Limit value   |

**Output signal**

**Current output:**

Current output:

- 4 to 20 mA with HART
- Full scale value and time constant (0 to 100 s) can be set

**Pulse/status output/Frequency output:**

Open collector, passive, galvanically isolated

- Non-Ex, Ex d - version:  
 $U_{\max} = 35 \text{ V}$ , with 15 mA current limiting,  $R_i = 500$
- Ex i version:  
 $U_{\max} = 30 \text{ V}$ , with 15 mA current limiting,  $R_i = 500$

The pulse/status output can be configured as:

- Pulse output:
  - Pulse value and pulse polarity can be selected,
  - Pulse width can be configured (0.005 to 2s)
  - Pulse frequency max. 100 Hz
- Status output:  
Can be configured for diagnosis code messages or flow limit values
- Frequency output:  
End frequency 0 to 1000 Hz ( $f_{\max} = 1250 \text{ Hz}$ )

**PROFIBUS PA interface**

- PROFIBUS PA in accordance with IEC 61158 (MBP), galvanically isolated
- Profile Version 3.01
- Data transmission rate: 31.25 kBaud
- Current consumption: 16 mA
- Permitted supply voltage: 9 to 32 V; 0.5 W
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Signal coding: Manchester II
- Bus address can be configured via miniature switches at the device or operating program

**FOUNDATION Fieldbus interface:**

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Data transmission rate: 31.25 kBit/s
- Current consumption: 16 mA
- Permitted supply voltage: 9 to 32 V
- Error current FDE (Fault Disconnection Electronic): 0 mA
- Bus connection with integrated reverse polarity protection
- Signal encoding: Manchester II
- ITK Version 5.0
- Function blocks: 4 × Analog Input, 1 × Analog Output, 1 × Digital Input, 1 × Digital Output, 1 × PID
- Output data: Volume flow, Sound velocity, Flow velocity, Signal strength, Totalizers 1 to 2
- Input data: Positive zero return (ON/OFF), Zero point adjustment, Reset totalizer
- Link Master (LM) function is supported

---

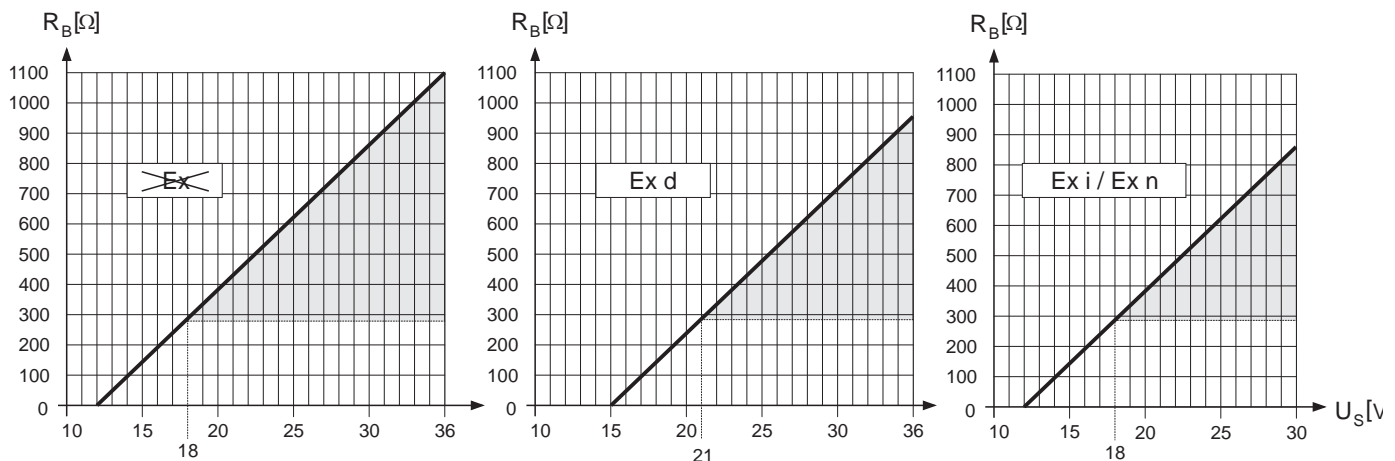
**Signal on alarm**

*Current output:*

Failsafe mode selectable (e.g. in accordance with NAMUR Recommendation NE 43)

*Status output:*

"Non conductive" in the event of fault or power supply failure.

**Load**

a0001921

*Behavior of load and supply voltage*

*The area marked in gray indicates the permissible load (with HART: min. 250.)*

*The load is calculated as follows:*

$$R_B = \frac{(U_S - U_{kl})}{(I_{max} - 10^{-3})} = \frac{(U_S - U_{kl})}{0.022}$$

$R_B$  Load, load resistance

$U_S$  Supply voltage:

- Non-Ex = 12 to 35 V DC
- Ex d = 15 to 35 V DC
- Ex i = 12 to 30 V DC

$U_{kl}$  Terminal voltage:

- Non-Ex = min. 12 V DC
- Ex d = min. 15 V DC
- Ex i = min. 12 V DC

$I_{max}$  Output current (22.6 mA)

**Low flow cutoff**

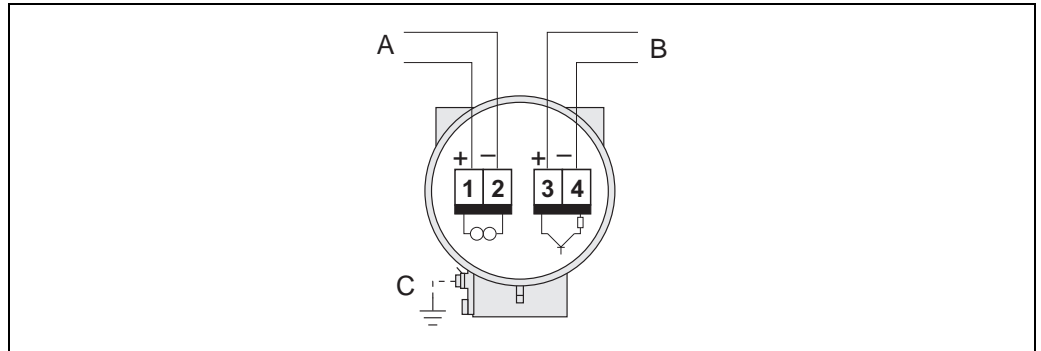
Switch points for low flow cutoff can be selected as required.

**Galvanic isolation**

All circuits for inputs, outputs, and power supply are galvanically isolated from each other.

## Power supply

### Electrical connection measuring unit



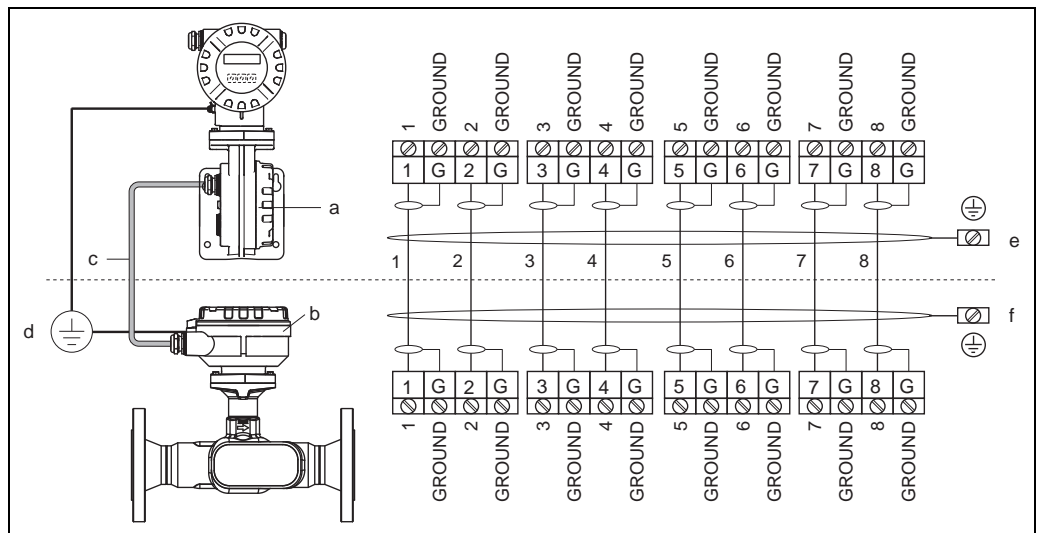
- A – HART: power supply, current output  
– PROFIBUS PA: 1 = PA+, 2 = PA–  
– FOUNDATION Fieldbus: 1 = FF+, 2 = FF–
- B Optional frequency output (not for PROFIBUS PA, FOUNDATION Fieldbus), can also be operated as Pulse or status output
- C Ground terminal (relevant for remote version)

A0010962

### Terminal assignment

| Order version | Terminal No. (inputs/outputs) |     |                                      |   |
|---------------|-------------------------------|-----|--------------------------------------|---|
|               | 1                             | 2   | 3                                    | 4 |
| 92***_*****W  | HART current output           |     | –                                    |   |
| 92***_*****A  | HART current output           |     | Pulse/status output/frequency output |   |
| 92F*_*****H   | PA+                           | PA– | –                                    |   |
| 92F*_*****K   | FF+                           | FF– | –                                    |   |

### Electrical connection remote version



A0005764

#### Connecting the remote version

- a Cover of the connection compartment (transmitter)
- b Cover of the connection compartment (sensor)
- c Connecting cable (signal cable)
- d Identical potential matching for sensor and transmitter
- e Connect the shielding to the ground terminal in the transmitter housing and keep it as short as possible
- f Connect the shielding to the ground terminal in the connection housing

---

**Supply voltage****HART:**

Non-Ex: 12 to 35 V DC (with HART: 18 to 35 V DC)  
Ex i: 12 to 30 V DC (with HART 18 to 30 V DC)  
Ex d: 15 to 35 V DC (with HART: 21 to 35 V DC)

**PROFIBUS PA and FOUNDATION Fieldbus:**

- Non-Ex: 9 to 32 V DC
  - Ex i/IS and Ex n: 9 to 30 V DC
  - Ex d/XP: 9 to 35 V DC
  - Current consumption → PROFIBUS PA: 16 mA, FOUNDATION Fieldbus: 16 mA
- 

**Cable entries**

*Power supply and signal cables (inputs/outputs):*

- Cable entry M20 × 1.5
  - Thread for cable entries, 1/2" NPT, G 1/2" (not for threaded version)
  - Optional processing sealing according ISA 12.27.01
- 

**Remote version cable specifications**

- Use a connecting cable with a continuous service temperature range of at least: -40 °C / -40 °F (permitted max. ambient temperature plus 10 °C / 18 °F)
  - The cables are available with a fixed length of 10 m and 30 m and optionally available with variable lengths ranging from 1 m (3.3 ft) to max. 50 m (164 ft).
- 

**Power supply failure**

- Totalizer stops at the last value determined (can be configured).
- All settings are kept in the HISTO-RAM, T-DAT.
- Diagnosis code messages (incl. value of operated hours counter) are stored.



## Performance characteristics

### Reference calibration conditions

*Error limits following ISO/DIN 11631:*

- 20 to 30 °C (68 to 86 °F); 2 to 4 bar
- Calibration systems as per national norms
- Zero point calibrated under operating conditions

### Maximum measured error

#### DN 25 to DN 300 (1 to 12")

|                                   |                    |
|-----------------------------------|--------------------|
| 0.5 to 10 m/s (1.6 ft to 33 ft/s) | ±0.5% of reading * |
|-----------------------------------|--------------------|

#### Optional for DN 80 to DN 300 (3 to 12")

|                                   |                    |
|-----------------------------------|--------------------|
| 0.5 to 10 m/s (1.6 ft to 33 ft/s) | ±0.3% of reading * |
|-----------------------------------|--------------------|

\* For a Reynolds number > 10000

### Repeatability

±0.2% of reading

## Operating conditions: Installation

Note the following points:

- No special measures such as supports are necessary. External forces are absorbed by the construction of the instrument.
- The flowmeter flanges must be coplanar with connecting flanges and free from tension.
- The maximum permitted ambient temperatures (→ 12) and fluid temperatures (→ 13) must be observed.
- Pay particular attention to the notes on orientation and piping insulation on the following pages.
- The correct operation of the measuring system is not influenced by pipe vibrations.

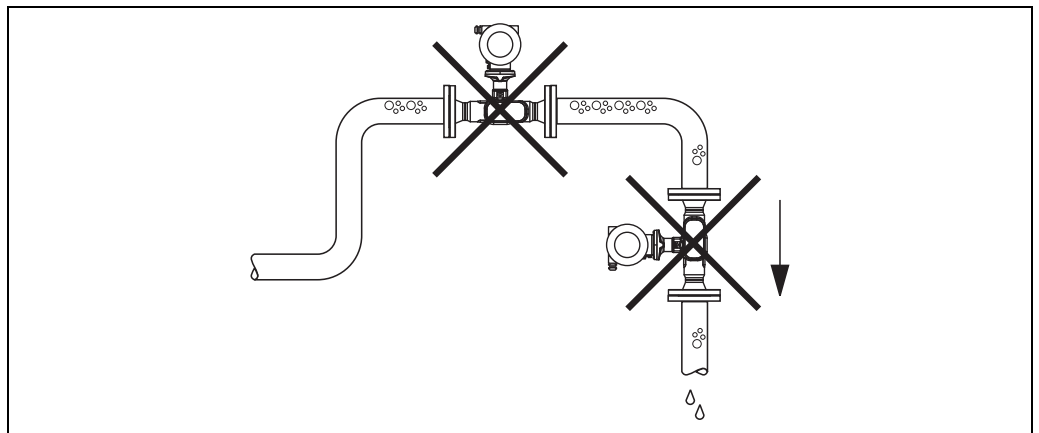
### Installation instructions

#### Mounting location

Entrained air or gas bubbles in the measuring tube can result in an increase in measuring errors or loss of measurement.

**Avoid** the following mounting locations in the pipe:

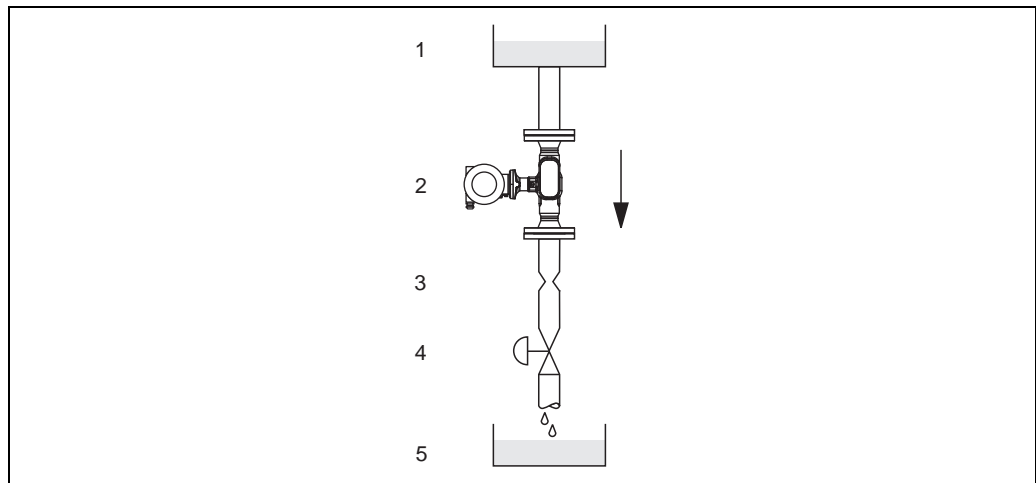
- Highest point of a pipeline. Risk of air accumulating.
- Directly upstream from a free pipe outlet in a vertical pipeline.



Mounting location

a0000081

Notwithstanding the above, the installation proposal below permits installation in an open vertical pipeline. Pipe restrictions or the use of an orifice with a smaller cross section than the nominal diameter prevent the sensor running empty while measurement is in progress.

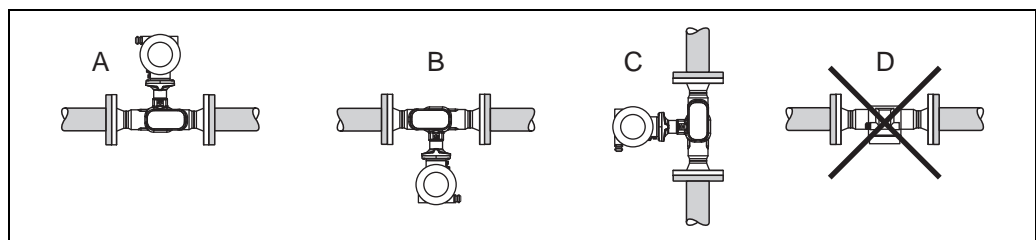


*Installation in a down pipe (e.g. for batching applications)*

*1 = Supply tank , 2 = Sensor, 3 = Orifice plate, pipe restriction , 4 = Valve, 5 = Batching tank*

### Orientation

Make sure that the direction of the arrow on the nameplate of the sensor matches the direction of flow (direction of fluid flow through the pipe).



*Orientations A, B and C recommended, orientation D only recommended under certain circumstances*

### Heating

Some fluids require heat to be transferred at the sensor. Heating can be electrical, such as electrical heat tracing or by heat jacketing, the meter.

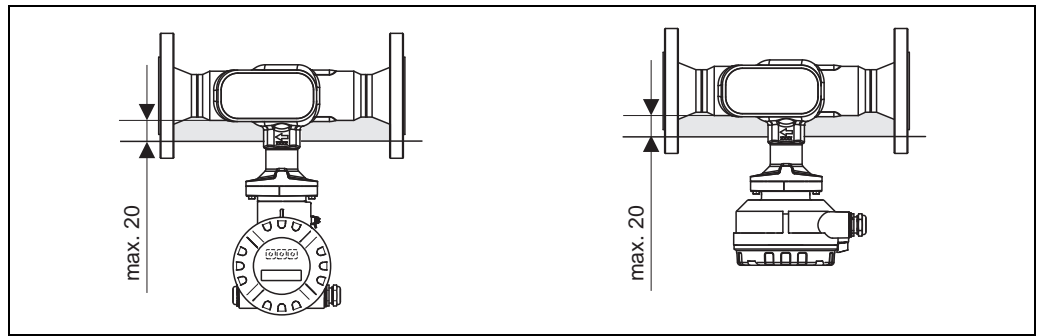


#### Caution!

- Risk of electronics overheating! Consequently, make sure that the adapter between the sensor and transmitter and the connection housing of the remote version always remain free of insulating material. Note that the orientation of the meter could significantly reduce the temperature at the electronics.
- If using an electric trace heating system whose heating is regulated via phase angle control or pulse packages, influence on the measured values cannot be ruled out due to magnetic fields (i.e. for values that are greater than the values approved by the EN standard (sine 30 A/m)). In such instances, it is necessary to magnetically shield the sensor

**Thermal insulation**

Some fluids require suitable measures to avoid heat transfer at the sensor. A wide range of materials can be used to provide the required thermal insulation.



A maximum insulation thickness of 20 mm must be observed in the area of the electronics/neck..

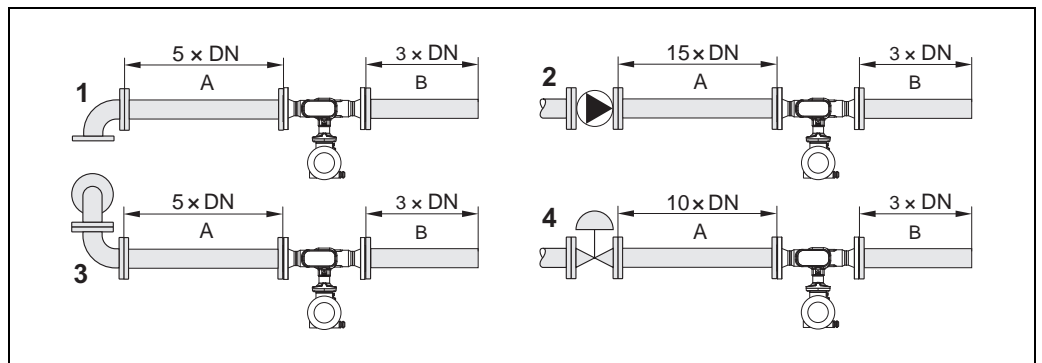
If the device is installed horizontally (with transmitter head pointing upwards), an insulation thickness of min. 10 mm is recommended to reduce convection. The maximum insulation thickness of 20 mm must not be exceeded.

**Limiting flow**

Information on limiting flow is provided under "Measuring range" in the technical data section.

**Inlet and outlet runs**

If possible, install the sensor well clear of fittings such as valves, T-pieces, elbows, etc. As a minimum, the inlet and outlet runs shown below must be observed to achieve the specified accuracy of the device. The longest inlet run shown must be observed if two or more flow disturbances are present.



Minimum inlet and outlet runs with various flow obstructions (values given for 3 and 4 path versions)

A = Inlet run, B = Outlet run, 1 = 90° elbow or T-piece, 2 = Pump, 3 = 2 x 90° elbow, out of plane, 4 = Control valve

## Operating conditions: Environment

### Ambient temperature range

#### Compact version

- Standard: -40 to +60 °C (-40 to 140 °F)
  - EEx-d / EEx-i version: -40 to +60 °C (-40 to 140 °F)
- Display can be read between -20 to +70 °C (-4 to 158 °F)

#### Remote version

- Sensor:
    - Standard: -40 to +80 °C (-40 to 176 °F)
    - EEx-d / EEx-i version: -40 to +80 °C (-40 to 176 °F)
  - Transmitter:
    - Standard: -40 to +60 °C (-40 to 140 °F)
    - EEx-i version: -40 to +60 °C (-40 to 140 °F)
    - EEx-d version: -40 to +60 °C (-40 to 140 °F)
- Display can be read between -20 to +70 °C (-40 to 158 °F)



#### Note!

When mounting outside, protect from direct sunlight with a protective cover (order number 543199), especially in warmer climates with high ambient temperatures.

### Storage temperature

Standard: -40 to +80 °C (-40 to 176 °F)  
EEx-d / EEx-i version: -40 to +80 °C (-40 to 176 °F)

### Degree of protection

- Transmitter Prosonic Flow 92: IP67 (NEMA 4X)
- Sensor Prosonic Flow F Inline: IP67 (NEMA 4X)
- Optional: IP 68 (NEMA 6P)



#### Note!

The Prosonic Flow 92 F can be supplied with IP 68 rating (permanent immersion in water to a depth of 3 meters /98 ft). In this case the transmitter must be installed remote from the sensor.

### Shock resistance

In accordance with IEC 68-2-31

### Vibration resistance

Acceleration up to 1 g, 10 to 150 Hz, following IEC 68-2-6

### Electromagnetic compatibility (EMC)

To IEC/EN 61326 and NAMUR recommendation NE 21

## Operating conditions: Process

### Fluid temperature range

| Size Range | DN 25 to 100<br>(1 to 4")        | DN 150 to 300<br>(6 to 12")      |                                   |                                  |
|------------|----------------------------------|----------------------------------|-----------------------------------|----------------------------------|
| Standard   | ASME & AD2000                    | ASME & AD2000                    | ASME                              | AD2000                           |
| Version    | Stainless Steel                  | Stainless Steel                  | Carbon Steel                      | Carbon Steel                     |
| Standard   | -40 to 150 °C<br>(-40 to 302 °F) | -40 to 150 °C<br>(-40 to 302 °F) | -29 to 130 °C*<br>(-84 to 266 °F) | -10 to 130 °C<br>(-14 to 266 °F) |
| Optional   | -40 to 200 °C<br>(-40 to 392 °F) | -40 to 200 °C<br>(-40 to 392 °F) | -29 to 200 °C*<br>(-20 to 392 °F) | -10 to 200 °C<br>(-14 to 392 °F) |

\*For PED device minimum temperature is -10 °C (14 °F)

### Medium pressure range (nominal pressure)

EN PN 16 to 40 / ASME CI 150, CI 300 / JIS 10K, 20K

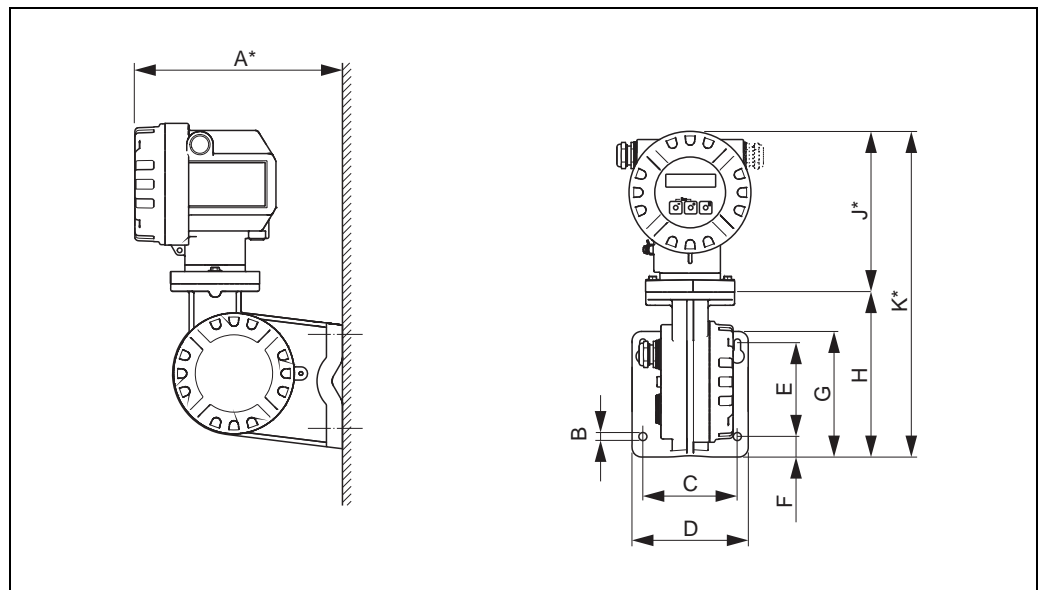
### Pressure loss

Pressure loss is negligible if the sensor is installed in a pipe of the same nominal diameter.

## Mechanical construction

### Design, dimensions, weights

### Dimensions of transmitter, remote version



A0003594

| A              | B                 | C              | D              | E              | F              | G              | H              | J              | K              |
|----------------|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| [mm]<br>(inch) | [mm]<br>(inch)    | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) | [mm]<br>(inch) |
| 232<br>9.13    | ∅ 8.6 (M8)<br>0.3 | 100<br>3.9     | 123<br>4.8     | 100<br>3.9     | 23<br>0.9      | 144<br>5,7     | 170<br>6.7     | 170<br>6.7     | 340<br>13.4    |

\* The following dimensions differ depending on the version:

- The dimension 232 mm (9.13 inch) changes to 226 mm (8.9 inch) in the blind version (without local operation).
- The dimension 170 mm (6.9 inch) changes to 183 mm (7.2 inch) in the Ex d/XP version.
- The dimension 340 mm (13.4 inch) changes to 353 mm (13.9 inch) in the Ex d/XP version.



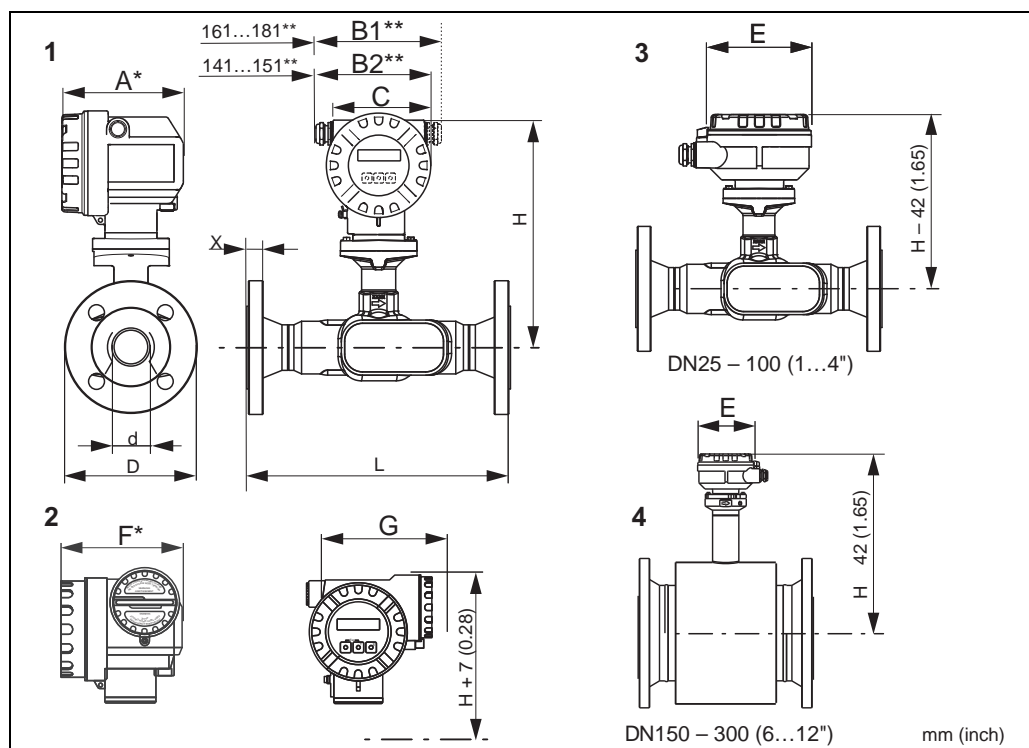
Note!

The transmitter housing has one cable gland or cable entry. Measuring devices with a pulse, frequency or status output have two cable glands or cable entries (devices with TIIS approval only have one cable gland).

### Dimensions of Prosonic Flow 92F

Flanged version to:

- EN 1092-1 (DIN 2501), Ra = 6.3 to 12.5 µm  
 Raised face to: EN 1092-1 Form B1 (DIN 2526 Form C), PN 10 to 40, Ra = 6.3 to 12.5 µm
- ASME B16.5, Class 150 to 300, Ra = 125 to 250 µin
- AARH/Ra = 125 to 250 µin
- JIS B2220, 10 to 40K, Ra = 125 to 250 µin



- 1 Standard- and Ex -i version
- 2 Ex d version (Transmitter)
- 3 Remote version DN 25 to 100 (1 to 4")
- 4 Remote version DN 150 to 300 (6 to 12")

### Dimensions of Prosonic Flow 92F

|      | A    | B1**        | B2**        | C    | E    | F*   | G    |
|------|------|-------------|-------------|------|------|------|------|
| mm   | 149  | -           | -           | 121  | 105  | 151  | 161  |
| inch | 5.87 | 6.34...7.13 | 5.55...5.94 | 4.76 | 4.13 | 5.94 | 6.34 |

\* The following dimensions change as follows in the blind version (without local operation):  
 - Standard, and Ex i version: the dimension 149 mm (5.87 inch) changes to 142 mm (5.60 inch) in the blind version.  
 - Ex d version: the dimension 151 mm (5.94 inch) changes to 144 mm (5.67 inch) in the blind version.  
 \*\* The dimension depends on the cable gland used.



Note!

The weight data refer to the compact version.

The weight of the remote version is approx. 0.9 kg (1.98 lbs) greater.

*Flange according to EN 1092-1*

| DN  | Pressure rating | d [mm] | D [mm] | H [mm] | L [mm]* | X [mm]* | Weight [kg] |
|-----|-----------------|--------|--------|--------|---------|---------|-------------|
| 25  | PN 40           | 28.5   | 115.0  | 284.5  | 300     | 18      | 10          |
| 40  | PN 40           | 43.1   | 150.0  | 287.0  | 315     | 18      | 12          |
| 50  | PN 40           | 54.5   | 165.0  | 291.5  | 325     | 20      | 14          |
| 80  | PN 40           | 82.5   | 200.0  | 310.5  | 390     | 24      | 24          |
| 100 | PN 16           | 107.1  | 220.0  | 323.5  | 460     | 20      | 32          |
|     | PN 40           | 107.1  | 235.0  |        |         | 24      | 35          |
| 150 | PN 16           | 159.3  | 285.0  | 439.2  | 400     | 23      | 33.0        |
|     | PN 40           | 159.3  | 300.0  |        | 400     | 33      | 53.9        |
| 200 | PN 16           | 207.3  | 340.0  | 464.6  | 400     | 25      | 44.2        |
|     | PN 40           | 206.5  | 375.0  |        | 400     | 41      | 92.0        |
| 250 | PN 16           | 260.4  | 405.0  | 491.6  | 400     | 28      | 62.7        |
|     | PN 40           | 258.8  | 450.0  |        | 450     | 47      | 130.9       |
| 300 | PN 16           | 309.7  | 460.0  | 517.0  | 500     | 32      | 82.1        |
|     | PN 40           | 307.9  | 515.0  |        | 500     | 55      | 174.3       |

\*including raised face

*Flange according to ASME B16.5 (SI-Units)*

| Size | Pressure rating | d [mm]  | D [mm] | H [mm] | L [mm]* | X [mm]* | Weight [kg] |       |
|------|-----------------|---------|--------|--------|---------|---------|-------------|-------|
| 25   | Schedule 40     | Cl. 150 | 26.7   | 107.9  | 284.5   | 300     | 15.7        | 9     |
|      |                 | Cl. 300 | 26.7   | 123.8  |         |         | 19.1        | 10    |
|      | Schedule 80     | Cl. 150 | 24.3   | 107.9  |         |         | 15.7        | 9     |
|      |                 | Cl. 300 | 24.3   | 123.8  |         |         | 19.1        | 10    |
| 40   | Schedule 40     | Cl. 150 | 40.9   | 127.0  | 287.0   | 315     | 17.5        | 11    |
|      |                 | Cl. 300 | 40.9   | 155.6  |         |         | 20.6        | 13    |
|      | Schedule 80     | Cl. 150 | 38.1   | 127.0  |         |         | 17.5        | 11    |
|      |                 | Cl. 300 | 38.1   | 155.6  |         |         | 20.6        | 13    |
| 50   | Schedule 40     | Cl. 150 | 52.6   | 152.4  | 291.5   | 325     | 19.1        | 13    |
|      |                 | Cl. 300 | 52.6   | 165.0  |         |         | 22.4        | 14    |
|      | Schedule 80     | Cl. 150 | 49.2   | 152.4  |         |         | 19.1        | 13    |
|      |                 | Cl. 300 | 49.2   | 165.0  |         |         | 22.4        | 15    |
| 80   | Schedule 40     | Cl. 150 | 78.0   | 190.5  | 310.5   | 390     | 23.9        | 24    |
|      |                 | Cl. 300 | 78.0   | 210.0  |         |         | 28.4        | 28    |
|      | Schedule 80     | Cl. 150 | 73.7   | 190.5  |         |         | 23.9        | 25    |
|      |                 | Cl. 300 | 73.7   | 210.0  |         |         | 28.4        | 28    |
| 100  | Schedule 40     | Cl. 150 | 102.4  | 228.6  | 330.0   | 460     | 24.4        | 36    |
|      |                 | Cl. 300 | 102.4  | 254.0  |         |         | 31.8        | 44    |
|      | Schedule 80     | Cl. 150 | 97.0   | 228.6  |         |         | 24.4        | 36    |
|      |                 | Cl. 300 | 97.0   | 254.0  |         |         | 31.8        | 44    |
| 150  | Schedule 40     | Cl. 150 | 154.1  | 279.4  | 439.2   | 400     | 25.4        | 38.9  |
|      |                 | Cl. 300 | 154.1  | 317.5  |         | 450     | 36.7        | 56.5  |
| 200  | Schedule 40     | Cl. 150 | 202.7  | 342.9  | 464.6   | 400     | 28.4        | 57.6  |
|      |                 | Cl. 300 | 202.7  | 381.0  |         | 450     | 41.1        | 82.6  |
| 250  | Schedule 40     | Cl. 150 | 254.5  | 406.4  | 491.6   | 450     | 30.2        | 79.9  |
|      |                 | Cl. 300 | 254.5  | 444.5  |         | 500     | 47.8        | 118.3 |
| 300  | Schedule 40     | Cl. 150 | 303.2  | 482.5  | 517.0   | 500     | 31.8        | 113.5 |
|      |                 | Cl. 300 | 303.2  | 520.7  |         | 550     | 50.8        | 164.5 |

\*including raised face

## Flange according to ASME B16.5 (US-Units)

| DN  | Druckstufe  |         | d [inch] | D [inch] | H [inch] | L [inch]* | X [inch]* | Gewicht [lbs] |
|-----|-------------|---------|----------|----------|----------|-----------|-----------|---------------|
| 1"  | Schedule 40 | Cl. 150 | 1.05     | 4.25     | 11.2     | 11.8      | 0.62      | 19.9          |
|     |             | Cl. 300 | 1.05     | 4.87     |          |           | 0.75      | 22.1          |
|     | Schedule 80 | Cl. 150 | 0.96     | 4.25     |          |           | 0.62      | 19.9          |
|     |             | Cl. 300 | 0.96     | 4.87     |          |           | 0.75      | 22.1          |
| 1½" | Schedule 40 | Cl. 150 | 1.61     | 5.00     | 11.3     | 12.4      | 17.5      | 24.3          |
|     |             | Cl. 300 | 1.61     | 6.13     |          |           | 0.81      | 28.7          |
|     | Schedule 80 | Cl. 150 | 1.50     | 5.00     |          |           | 17.5      | 24.3          |
|     |             | Cl. 300 | 1.50     | 6.13     |          |           | 0.81      | 28.7          |
| 2"  | Schedule 40 | Cl. 150 | 2.07     | 6.00     | 11.5     | 12.8      | 0.75      | 28.7          |
|     |             | Cl. 300 | 2.07     | 6.50     |          |           | 0.88      | 14.0          |
|     | Schedule 80 | Cl. 150 | 1.94     | 6.00     |          |           | 0.75      | 28.7          |
|     |             | Cl. 300 | 1.94     | 6.50     |          |           | 0.88      | 33.1          |
| 3"  | Schedule 40 | Cl. 150 | 3.07     | 7.50     | 12.2     | 15.40     | 0.94      | 52.9          |
|     |             | Cl. 300 | 3.07     | 8.27     |          |           | 1.12      | 61.8          |
|     | Schedule 80 | Cl. 150 | 2.90     | 7.50     |          |           | 0.94      | 55.1          |
|     |             | Cl. 300 | 2.90     | 8.27     |          |           | 1.12      | 61.8          |
| 4"  | Schedule 40 | Cl. 150 | 4.03     | 9.00     | 13.0     | 18.1      | 0.96      | 79.4          |
|     |             | Cl. 300 | 4.03     | 10.0     |          |           | 1.25      | 97.0          |
|     | Schedule 80 | Cl. 150 | 3.82     | 9.00     |          |           | 0.96      | 79.4          |
|     |             | Cl. 300 | 3.82     | 10.0     |          |           | 1.25      | 79.4          |
| 6"  | Schedule 40 | Cl. 150 | 6.07     | 11.0     | 17.3     | 15.8      | 1.00      | 85.8          |
|     |             | Cl. 300 | 6.07     | 12.5     |          | 17.7      | 1.44      | 124.6         |
| 8"  | Schedule 40 | Cl. 150 | 7.98     | 13.5     | 18.3     | 15.8      | 1.12      | 127.0         |
|     |             | Cl. 300 | 7.98     | 15.0     |          | 17.7      | 1.62      | 182.1         |
| 10" | Schedule 40 | Cl. 150 | 10.0     | 16.0     | 19.4     | 17.7      | 1.19      | 176.1         |
|     |             | Cl. 300 | 10.0     | 17.5     |          | 19.7      | 1.88      | 260.8         |
| 12" | Schedule 40 | Cl. 150 | 11.9     | 19.0     | 20.4     | 19.7      | 1.25      | 250.2         |
|     |             | Cl. 300 | 11.9     | 20.5     |          | 21.7      | 2.00      | 362.7         |

\*including raised face

## Flange according to JIS B2220

| DN  | Pressure rating |     | d [mm] | D [mm] | H [mm] | L [mm] | X [mm] | Weight [kg] |
|-----|-----------------|-----|--------|--------|--------|--------|--------|-------------|
| 25  | Schedule 40     | 20K | 27.2   | 125.0  | 284.5  | 300    | 16     | 10          |
|     | Schedule 80     | 20K | 24.3   | 125.0  |        |        | 16     |             |
| 40  | Schedule 40     | 20K | 41.2   | 140.0  | 287.0  | 315    | 18     | 12          |
|     | Schedule 80     | 20K | 38.1   | 140.0  |        |        | 18     |             |
| 50  | Schedule 40     | 10K | 52.7   | 155.0  | 291.5  | 325    | 16     | 13          |
|     |                 | 20K | 52.7   | 155.0  |        |        | 18     |             |
|     | Schedule 80     | 10K | 49.2   | 155.0  |        |        | 16     |             |
|     |                 | 20K | 49.2   | 155.0  |        |        | 18     |             |
| 80  | Schedule 40     | 10K | 78.1   | 185.0  | 310.5  | 390    | 18     | 24          |
|     |                 | 20K | 78.1   | 200.0  |        |        | 22     | 28          |
|     | Schedule 80     | 10K | 73.7   | 185.0  |        |        | 18     | 25          |
|     |                 | 20K | 73.7   | 200.0  |        |        | 22     | 28          |
| 100 | Schedule 40     | 10K | 102.3  | 210.0  | 323.5  | 460    | 18     | 36          |
|     |                 | 20K | 102.3  | 225.0  |        |        | 24     | 44          |
|     | Schedule 80     | 10K | 97.0   | 210.0  |        |        | 18     | 36          |
|     |                 | 20K | 97.0   | 225.0  |        |        | 24     | 44          |

## Weight

See dimension tables → 14 ff.

## Material

## Transmitter housing and connection housing, sensor (remote version):

Compact housing: powder coated die cast aluminium

|            | DN25 to 100       | DN150 to 300        |                 |                 |
|------------|-------------------|---------------------|-----------------|-----------------|
| Standard   | ASME & AD2000     | ASME & AD2000       | ASME            | AD2000          |
| Meter body | A351-CF3M         | 1.4404+TP316+TP316L | A106 Grd. B     | A106 Grd. B     |
| Sensor     | 1.4404+316L+316   | 1.4462              | 1.4462          | 1.4462          |
|            |                   | 1.4404+316L+316     | 1.4404+316L+316 | 1.4404+316L+316 |
| Flanges    | 1.4404+F316+F316L | 1.4404+F316+F316L   | A105+1.0432     | 1.0426          |

Designed for NACE MR0175/ISO 15156 and NACE MR0103

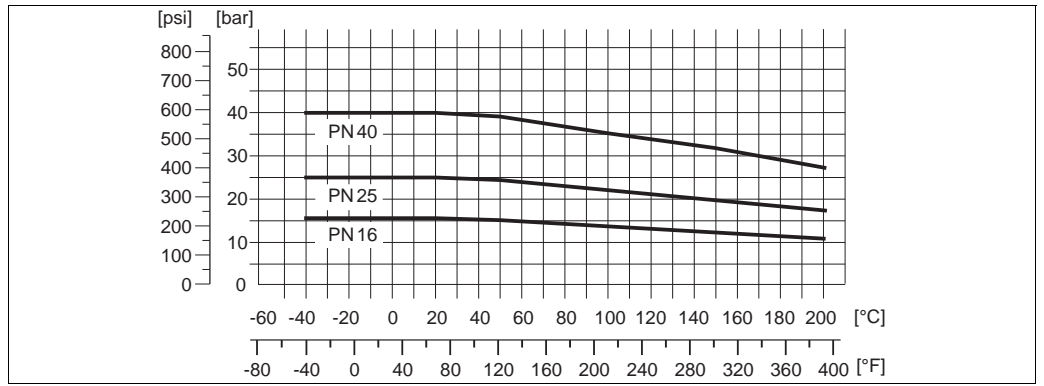
It is the equipment user's responsibility to select the materials suitable for the intended services.

**Carbon steel with outer protective painting to 130 °C (266 °F) or optional 200 °C (392 °F)**



Material load diagram

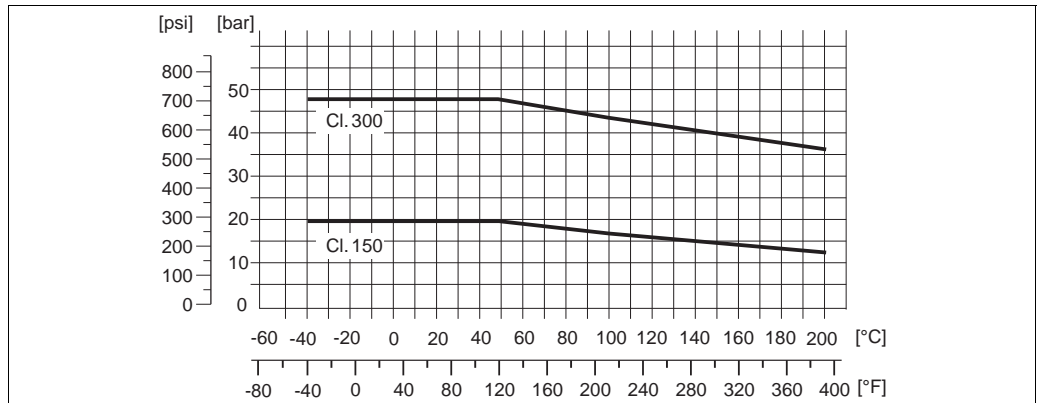
Pressure-temperature curve to EN 1092-1, stainless steel



A0010911

Pressure-temperature curve to ASME B16.5, stainless steel

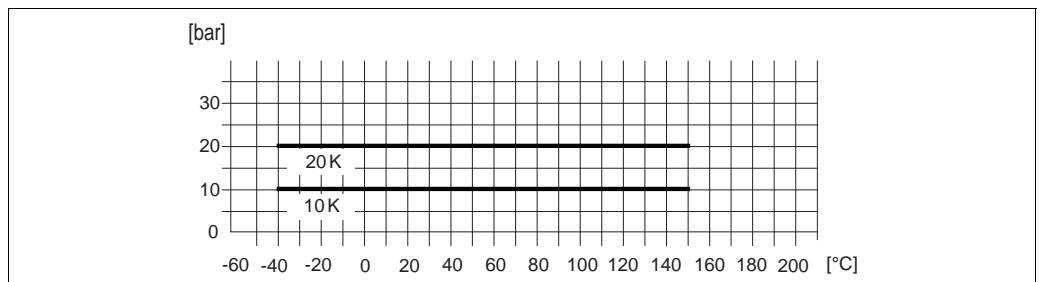
Class 150 to 300



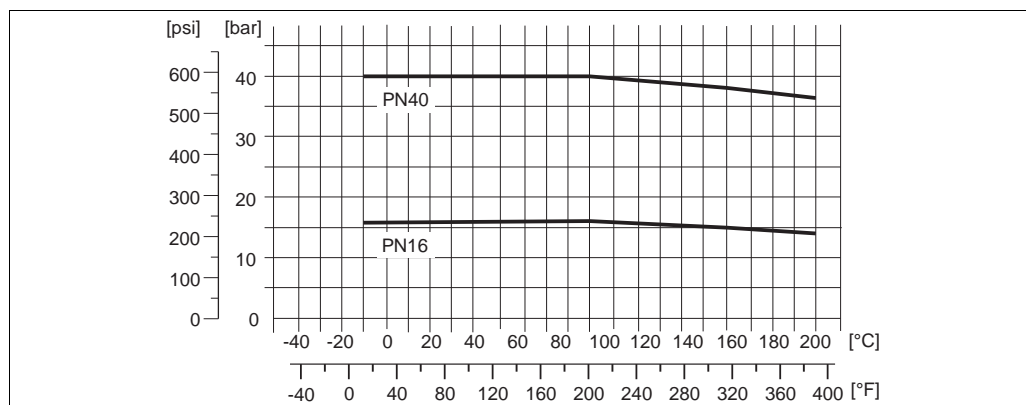
A0010909

Pressure-temperature curve to JIS B2220, stainless steel

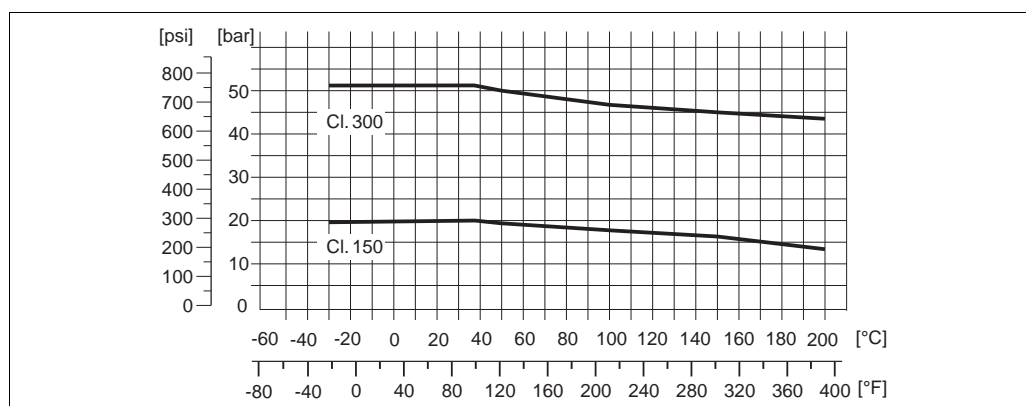
10 to 40 K



A0010910

**Pressure-temperature curve to EN 1092-1, carbon steel**

A0014656

**Pressure-temperature curve to ASME B16.5, carbon steel**

A0014674

## Human interface

**Display elements**

- Liquid crystal display: double spaced with 16 characters per line
- Selectable display of different measured values and status variables
- At ambient temperatures below  $-20\text{ °C}$  ( $-4\text{ °F}$ ) the readability of the display may be impaired.

**Operating elements (HART)**

- Local operation with three keys (-, +, E)
- Application specific Quick Setup menus for straightforward commissioning
- Operating elements accessible also in Ex-zones

**Remote operation**

Remote operation possible via:

- HART
- PROFIBUS PA
- FOUNDATION Fieldbus
- FieldCare

## Certificates and approvals

**CE mark**

The device is in conformity with the statutory requirements of the EC Directives. Endress+Hauser confirms successful testing of the device by affixing the CE mark.

|  |   |
|--|---|
| <b>C-tick</b>                            | The measuring system meets the EMC requirements of the Australian Communications and Media Authority (ACMA).  |
| <b>Ex approval</b>                       | Information about currently available Ex versions (ATEX, FM, CSA) can be supplied by your Endress+Hauser sales organization. All explosion protection data are given in a separate documentation which is available upon request.   |
| <b>Certification PROFIBUS PA</b>         | <p>The flowmeter has successfully passed all test procedures and is certified and registered by the PNO (PROFIBUS User Organization). The device thus meets all the requirements of the specifications following:</p> <ul style="list-style-type: none"> <li>■ Certified to PROFIBUS PA Profile Version 3.0 (device certification number: on request)</li> <li>■ The device can also be operated with certified devices of other manufacturers (interoperability)</li> </ul>  |
| <b>FOUNDATION Fieldbus certification</b> | <p>The flowmeter has passed all the test procedures implemented and has been certified and registered by the Fieldbus Foundation. The flowmeter thus meets all the requirements of the specifications listed below:</p> <ul style="list-style-type: none"> <li>■ Certified to FOUNDATION Fieldbus specification</li> <li>■ The flowmeter meets all the specifications of the FOUNDATION Fieldbus-H1.</li> <li>■ Interoperability Test Kit (ITK), revision status 5.0:<br/>The device can also be operated in conjunction with other-make certified devices</li> <li>■ Physical Layer Conformance Test of the Fieldbus Foundation</li> </ul>   |
| <b>Other standards and guidelines</b>    | <ul style="list-style-type: none"> <li>■ EN 60529<br/>Degrees of protection by housing (IP code).</li> <li>■ EN 61010-1<br/>Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.</li> <li>■ IEC/EN 61326<br/>"Emission in accordance with Class A requirements".<br/>Electromagnetic compatibility (EMC- requirements).</li> <li>■ NAMUR NE 21<br/>Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment.</li> <li>■ NAMUR NE 43<br/>Standardization of the signal level for the breakdown information of digital transmitters with analogue output signal.</li> <li>■ NAMUR NE 53<br/>Software of field devices and signal processing devices with digital electronics.</li> <li>■ ASME/ISA-S.61010-1(82.02.01) CSA-C22.2 No. 1010.1 ASME/UL 61010-1<br/>Safety requirements for Electrical Equipment for Measurement and Control and Laboratory Use.<br/>Pollution degree 2</li> <li>■ NACE Standard MR0103<br/>Standard Material Requirements - Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments</li> <li>■ NACE Standard MR0175<br/>Standard Material Requirements - Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment</li> </ul> |
| <b>Pressure Equipment Directive</b>      | <p>The measuring devices can be ordered with or without PED (Pressure Equipment Directive). If a device with PED is required, this must be ordered explicitly. For devices with nominal diameters less than or equal to DN 25 (1"), this is neither possible nor necessary.</p> <ul style="list-style-type: none"> <li>■ With the identification PED/G1/III on the sensor nameplate, Endress+Hauser confirms conformity with the "Basic safety requirements" of Appendix I of the Pressure Equipment Directive 97/23/EC.</li> <li>■ Devices with this identification (with PED) are suitable for the following types of fluid: <ul style="list-style-type: none"> <li>- Fluids of Group 1 and 2 with a steam pressure of greater or less than 0.5 bar (7.3 psi)</li> <li>- Unstable gases</li> </ul> </li> <li>■ Devices without this identification (without PED) are designed and manufactured according to good engineering practice. They correspond to the requirements of Art. 3, Section 3 of the Pressure Equipment Directive 97/23/EC. Their application is illustrated in Diagrams 6 to 9 in Appendix II of the Pressure Equipment Directive 97/23/EC.</li> </ul>   |

---

## Ordering information

The Endress+Hauser service organization can provide detailed ordering information and information on the order codes on request.

## Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the transmitter and the sensor.

## Documentation

- Flow measuring technology (FA005D/06)
- Supplementary documentation on Ex-ratings: ATEX, FM, CSA
- Operating Instructions Prosonic Flow 92 (BA00121D/06)
- Operating Instructions Prosonic Flow 92 PROFIBUS PA (BA00122D/06)

## Registered trademarks

HART®

Registered trademark of HART Communication Foundation, Austin, USA

PROFIBUS®

Registered trademark of the PROFIBUS User Organization, Karlsruhe, Germany

FOUNDATION™ Fieldbus

Registered trademark of the Fieldbus FOUNDATION, Austin, USA

HistoROM™ T-DAT®, FieldCare®, Fieldcheck®, FieldXpert™, Applicator®

Registered or registration-pending trademarks of Endress+Hauser Flowtec AG, Reinach, CH

### Instruments International

Endress+Hauser  
Instruments International AG  
Kaegenstrasse 2  
4153 Reinach  
Switzerland

Tel. +41 61 715 81 00  
Fax +41 61 715 25 00  
www.endress.com  
info@ii.endress.com

**Endress+Hauser** 

People for Process Automation