



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services

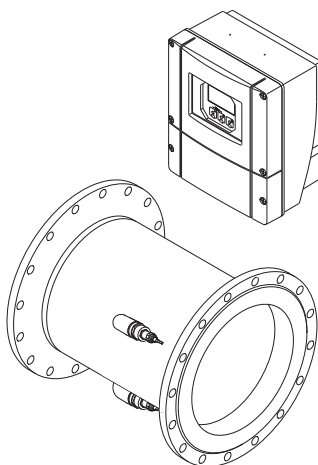


Solutions

Brief Operating Instructions

Proline Prosonic Flow 93C

Ultrasonic flow measuring system



These Brief Operating Instructions are **not** intended to replace the Operating Instructions provided in the scope of supply. Detailed information is provided in the Operating Instructions and the additional documentation on the CD-ROM supplied.

The complete device documentation consists of:

- These Brief Operating Instructions
- Depending on the device version:
 - Operating Instructions and the Description of Device Functions
 - Approvals and safety certificates
 - Special safety instructions in accordance with the approvals for the device (e.g. explosion protection, pressure equipment directive, etc.)
 - Additional device-specific information

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1 Safety instructions




1.1 Designated use

- The measuring device described in these Operating Instructions is to be used only for measuring the flow rate of liquids in closed pipes, e.g.:
 - Acids, alkalis, paints, oils
 - Liquid gas
 - Ultrapure water with low conductivity, water, wastewater
- As well as measuring the volume flow, the sound velocity of the fluid is also always measured. Different fluids can be distinguished or the fluid quality can be monitored.
- Any use other than that described here compromises the safety of persons and the entire measuring system and is, therefore, not permitted.
- The manufacturer is not liable for damage caused by improper or non-designated use.

1.2 Installation, commissioning and operation

- The measuring device must be installed, connected, commissioned, and maintained only by qualified and authorized specialists (depending on the task, e.g., an electrical technician, skilled welder) in full compliance with the instructions in these Brief Operating Instructions, the applicable norms, legal regulations and certificates (depending on the application).
- The specialists must have read and understood these Brief Operating Instructions and must follow the instructions they contain. If you are unclear on anything in these Brief Operating Instructions, you must read the Operating Instructions (on the CD-ROM). The Operating Instructions provide detailed information on the measuring device.
- The measuring device may only be modified if such work is expressly permitted in the Operating Instructions (on the CD-ROM).
- Repairs may only be performed if a genuine spare parts kit is available and this repair work is expressly permitted.
- If performing welding work on the piping, the welding unit may not be grounded by means of the measuring device.

1.3 Operational safety

- The measuring device is designed to meet state-of-the-art safety requirements, has been tested, and left the factory in a condition in which it is safe to operate. Relevant regulations and standards have been observed.
- The manufacturer reserves the right to modify technical data without prior notice. Your Endress+Hauser distributor will supply you with current information and updates to these Operating Instructions.
- The information on the warning notices, nameplates and connection diagrams affixed to the device must be observed. These contain important data on the permitted operating conditions, the range of application of the device and information on the materials used.
- If the device is not used at atmospheric temperatures, compliance with the relevant marginal conditions as specified in the device documentation supplied (on CD-ROM) is mandatory.
- Observe the technical data on the nameplate.
- The device must be wired as specified in the wiring and connection diagrams. Interconnections must be permitted.
- All parts of the measuring device have to be included in the potential equalization of the facility.
- Cables, tested cable glands, and tested dummy plugs have to be suitable for the prevailing operating conditions (operating temperature range, process conditions). Close any unused housing openings with tested dummy plugs.
- When hot fluids pass through the measuring tube, the surface temperature of the housing increases. In the case of the sensor, in particular, users should expect temperatures that can be close to the fluid temperature. If the temperature of the fluid is high, implement sufficient measures to prevent burning or scalding.
- Hazardous area
Devices for use in potentially explosive atmospheres are marked accordingly on the nameplate. When used in potentially explosive atmospheres, observe the corresponding national standards. The Ex documentation on the CD-ROM is an integral part of the overall device documentation.
Observe all of the installation instructions, connection data, and safety instructions presented in it. The symbol on the title page indicates the approval and certification body ( Europe,  USA,  Canada). The documentation number of the Ex documentation is specified on the nameplate (XA***D/./..).
- Endress+Hauser will be happy to assist in clarifying any questions on approvals, their application and implementation.

1.4 Safety conventions



Warning!

"Warning" indicates an action or procedure which, if not performed correctly, can result in injury or a safety hazard. Comply strictly with the instructions and proceed with care.



Caution!

"Caution" indicates an action or procedure which, if not performed correctly, can result in incorrect operation or destruction of the device. Comply strictly with the instructions.



Note!

"Note" indicates an action or procedure which, if not performed correctly, can have an indirect effect on operation or trigger an unexpected response on the part of the device.

2 Installation


2.1 Installation conditions

2.1.1 Dimensions

For the dimensions of the measuring device, see the associated Technical Information on the CD-ROM.

2.1.2 Mounting location

Correct flow measurement is possible only if the pipe is full.
It is preferable to install the sensors in a riser.

 Note!

Entrained air or gas bubbles in the measuring tube can result in an increase in measuring errors.
For this reason, **avoid** the following mounting locations:

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

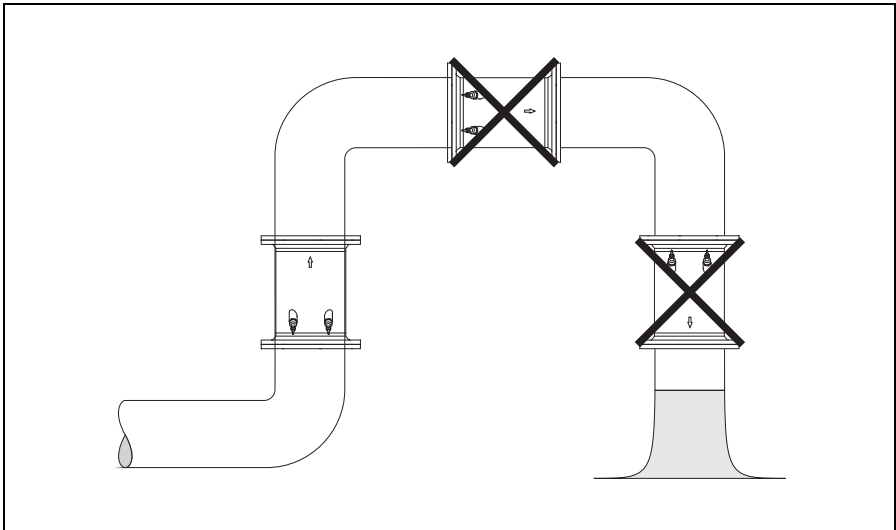


Fig. 1: Mounting location (side view)

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Partially filled pipe

Partially filled pipes with a gradient necessitate a drain-type configuration.



Caution!

Risk of solids accumulating! Do not install the sensor at the lowest point in the drain. It is advisable to install a cleaning valve.

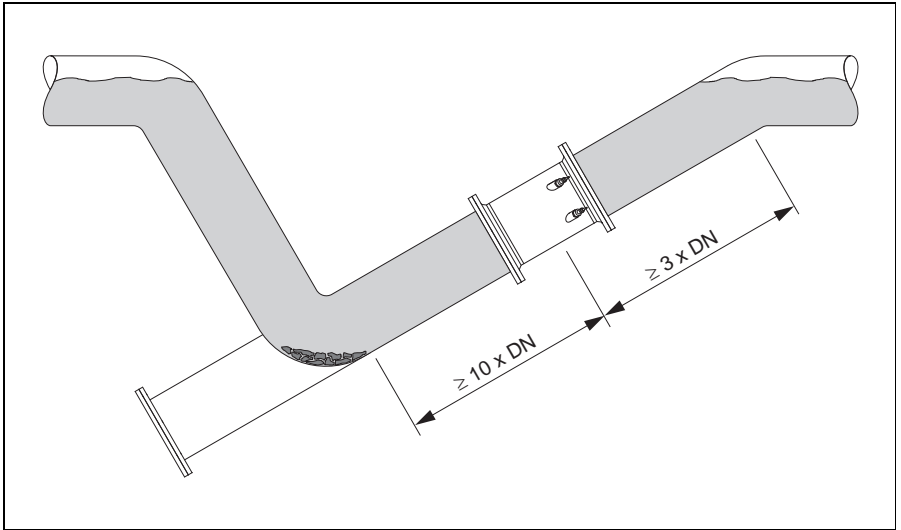
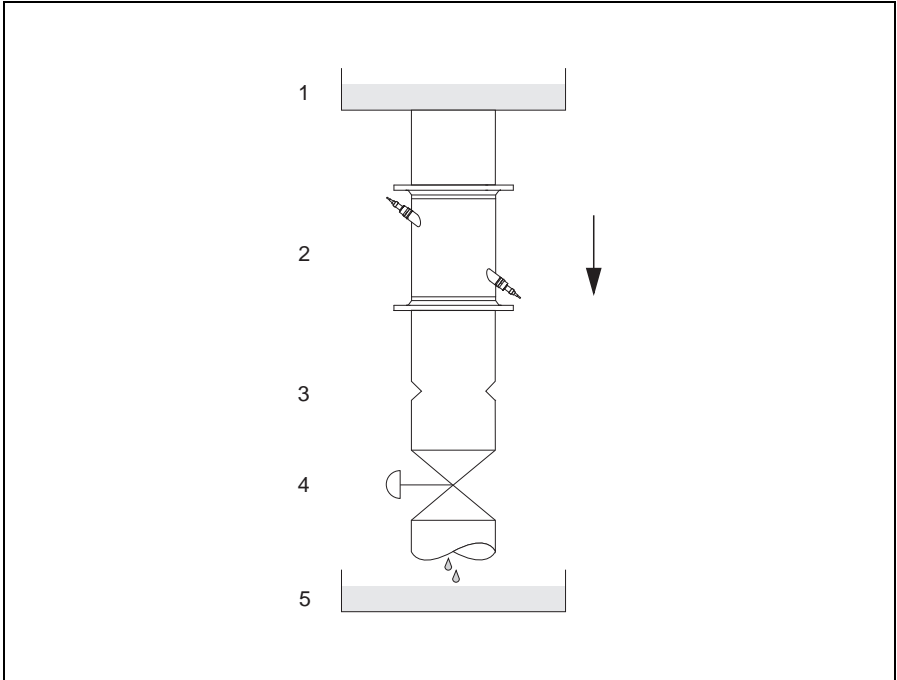


Fig. 2: Installation in partially filled pipe

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2.1.3 Down pipes

Notwithstanding the foregoing, the installation suggested below permits installation in an open down pipe. Pipe restrictions or the use of an orifice plate with a smaller cross-section than the nominal diameter prevent the pipe from running empty while measurement is in progress.



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Fig. 3: Installation in a down pipe

- 1 Supply tank
- 2 Measuring sensors
- 3 Orifice plate, pipe restriction
- 4 Valve
- 5 Batching tank

2.1.4 Orientation

Vertical

Recommended orientation with upward direction of flow (View A). With this orientation, entrained solids will sink and gases will rise away from the sensor when the fluid is stagnant. The piping can be completely drained and protected against solids buildup.

Horizontal

In the recommended installation range in a horizontal installation position (View B), gas and air collections at the pipe cover and problematic deposits at the bottom of the pipe have a smaller influence on measurement.

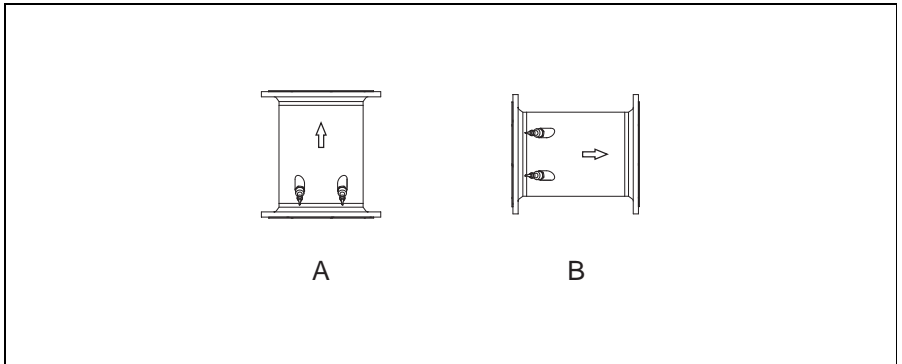


Fig. 4: Orientation (side view)

A Recommended orientation with upward direction of flow

B Recommended installation range with horizontal orientation

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2.1.5 Inlet and outlet runs

If possible, install the sensor well clear of assemblies such as valves, T-pieces, elbows, etc. The longest inlet and outlet run must be taken into consideration if two or more flow obstructions are present. The following inlet and outlet runs are recommended to comply with measuring accuracy specifications:

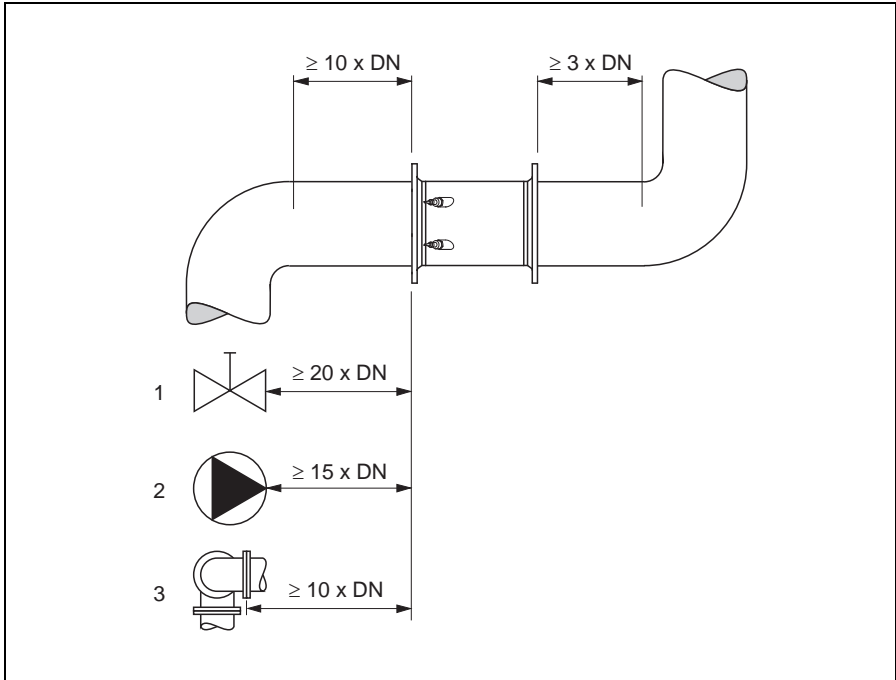


Fig. 5: Inlet and outlet runs (side view)

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- 1 Valve (2/3 open)
- 2 Pump
- 3 Two pipe bends in different directions

2.1.6 Vibrations

Secure the piping and the sensor if vibration is severe. Information relating to the permitted shock and vibration resistance → associated Technical Information on CD-ROM.

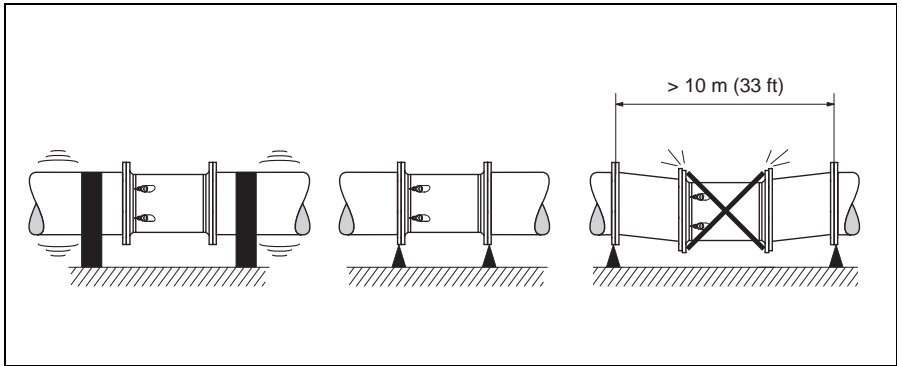


Fig. 6: Measures to prevent device vibrations

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2.1.7 Foundations, supports

For all nominal diameter mount the sensor on a foundation of adequate load-bearing strength.

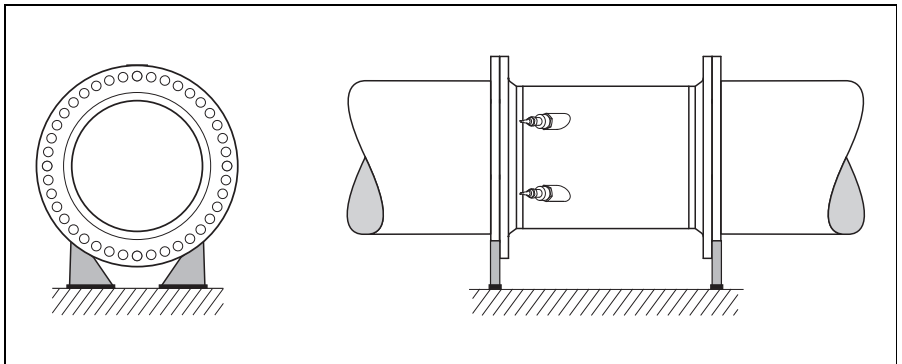


Fig. 7: Correct support for large nominal diameters

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2.1.8 Adapters

The sensor can also be installed in a pipe with a larger nominal diameter using appropriate adapters in accordance with (E) DIN EN 545 (double-flange adapters). The resulting increase in flow velocity improves accuracy if the fluid flows very slowly.

The chart below can be used to determine the drop in pressure caused by reducers and expanders:

☞ Caution!

The chart only applies to liquids with a viscosity similar to that of water.

1. Determine the diameter ratio d/D .
2. From the chart, determine the pressure loss as a function of the flow velocity (after the reduction) and the d/D ratio.

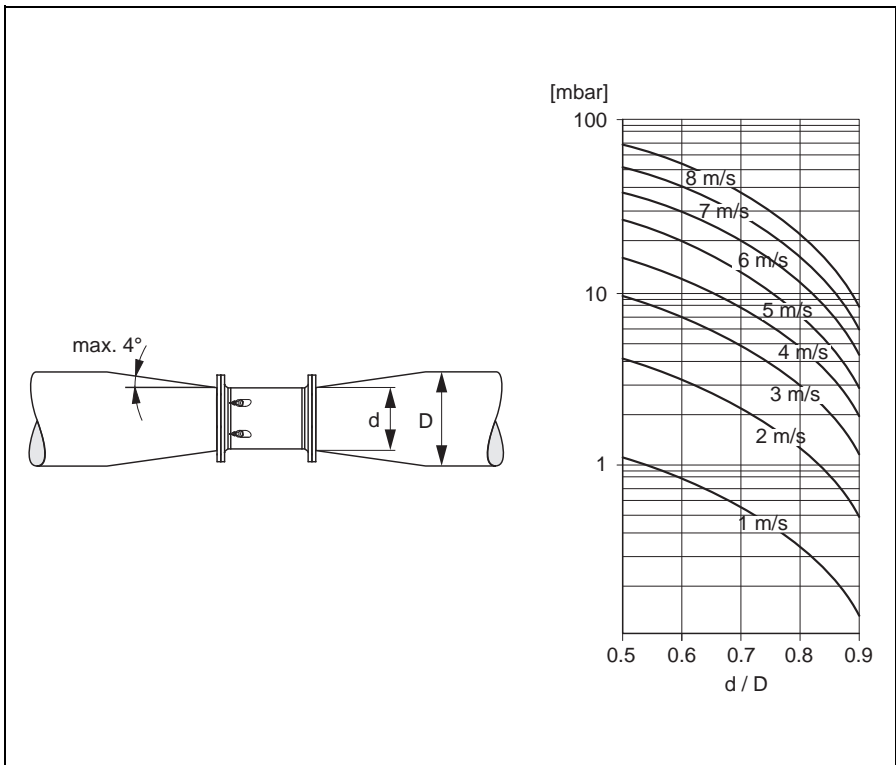


Fig. 8: Pressure loss caused by adapters (side view)

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2.1.9 Nominal diameter and flow rate

The pipe diameter and the flow rate determine the nominal diameter of the sensor. The optimal flow velocity is between 2 to 3 m/s.

The flow velocity (v), moreover, has to be matched to the physical properties of the fluid:

v < 2 m/s: for abrasive fluids such as potter's clay, lime milk, ore slurry etc.

v > 2 m/s: for fluids that tend to cause buildup, such as wastewater sludge etc.



Note!

Flow velocity can be increased, if necessary, by reducing the nominal diameter of the sensor.

| Flow characteristics of Prosonic Flow C (SI units) | | | |
|--|--------|--|---|
| Nominal diameter | | Recommended flow rate Min./max. full scale value (v ~ 0.3 or 10 m/s) | Factory setting Creepage (v ~ 0.04 m/s) |
| [mm] | [inch] | | |
| 300 | 12" | 80...2700 m ³ /h | 10 m ³ /h |
| 350 | 14" | 100...3300 m ³ /h | 15 m ³ /h |
| 400 | 16" | 130...4400 m ³ /h | 20 m ³ /h |
| 450 | 18" | 160...5600 m ³ /h | 20 m ³ /h |
| 500 | 20" | 200...6900 m ³ /h | 30 m ³ /h |
| 600 | 24" | 300...9900 m ³ /h | 40 m ³ /h |
| 700 | 28" | 410...13600 m ³ /h | 55 m ³ /h |
| – | 30" | 470...15900 m ³ /h | 65 m ³ /h |
| 800 | 32" | 540...17900 m ³ /h | 75 m ³ /h |
| 900 | 36" | 680...22500 m ³ /h | 90 m ³ /h |
| 1000 | 40" | 850...25000 m ³ /h | 115 m ³ /h |
| – | 42" | 950...27000 m ³ /h | 125 m ³ /h |
| 1200 | 48" | 1250...30000 m ³ /h | 160 m ³ /h |
| – | 54" | 1550...32000 m ³ /h | 205 m ³ /h |
| 1400 | – | 1650...35000 m ³ /h | 220 m ³ /h |
| – | 60" | 1950...37000 m ³ /h | 255 m ³ /h |
| 1600 | – | 2200...40000 m ³ /h | 285 m ³ /h |
| – | 66" | 2500...40000 m ³ /h | 305 m ³ /h |
| 1800 | 72" | 2800...45000 m ³ /h | 360 m ³ /h |
| 2000 | 78" | 3400...50000 m ³ /h | 450 m ³ /h |

| Flow characteristics of Prosonic Flow C (US units) | | | |
|--|-------|--|---|
| Nominal diameter | | Recommended flow rate Min./max. full scale value (v ~ 0.3 or 10 m/s) | Factory setting Creepage (v ~ 0.04 m/s) |
| [inch] | [mm] | | |
| 12" | 300 | 350...11900 gal/min | 45 gal/min |
| 14" | 350 | 440...14500 gal/min | 65 gal/min |
| 16" | 400 | 570...19400 gal/min | 90 gal/min |
| 18" | 450 | 700...24700 gal/min | 90 gal/min |
| 20" | 500 | 880...30400 gal/min | 130 gal/min |
| 24" | 600 | 1320...43600 gal/min | 175 gal/min |
| 28" | 700 | 1800...59900 gal/min | 240 gal/min |
| 30" | – | 2070...70000 gal/min | 275 gal/min |
| 32" | 800 | 2380...78800 gal/min | 325 gal/min |
| 36" | 900 | 2990...99000 gal/min | 400 gal/min |
| 40" | 1000 | 3740...110000 gal/min | 500 gal/min |
| 42" | – | 4180...118900 gal/min | 550 gal/min |
| 48" | 1200 | 5500...132100 gal/min | 700 gal/min |
| 54" | – | 9.8...203 Mgal/d | 1.3 Mgal/d |
| – | 14000 | 10.5...222 Mgal/d | 1.4 Mgal/d |
| 60" | – | 12.4...235 Mgal/d | 1.6 Mgal/d |
| – | 16000 | 13.9...254 Mgal/d | 1.8 Mgal/d |
| 66" | – | 14.6...254 Mgal/d | 1.9 Mgal/d |
| 72" | 1800 | 17.7...285 Mgal/d | 2.3 Mgal/d |
| 78" | 2000 | 21.6...317 Mgal/d | 2.9 Mgal/d |

2.1.10 Length of connecting cable

Shielded cables are available in the following lengths:

- 5 m (16.4 ft)
- 10 m (32.8 ft)
- 15 m (49.2 ft)
- 30 m (98.4 ft)



Caution!

Route the cables well clear of electrical machines and switching elements.

2.2 Installation

2.2.1 Installing the Prosonic Flow C measuring tube

The sensor is mounted between the pipe flanges.



Caution!

It is essential that you observe the necessary screw tightening torques on → 15 ff.

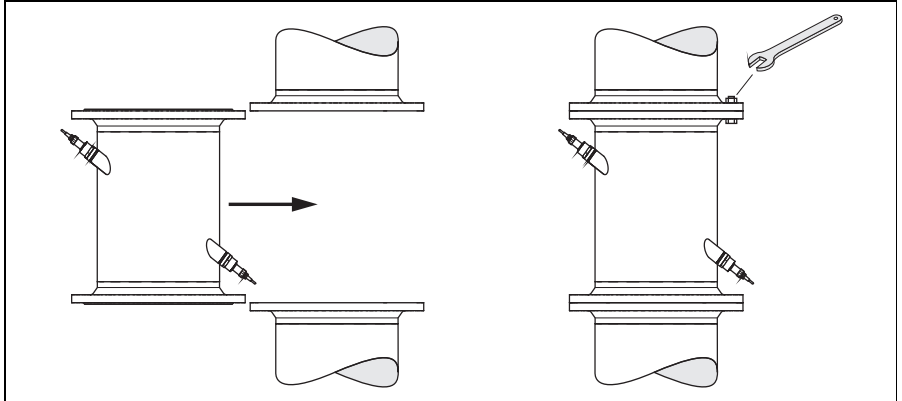


Fig. 9: Mounting the measuring tube

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Note!

Bolts, nuts, seals, etc. are not included in the scope of supply and must be supplied by the customer.

Seals

- For EN (DIN) flanges, use only gaskets of the type "Compressed fiber with adhesive" in accordance with EN (DIN) 1514.
- Observe all of the gasket manufacturer's specifications.
- Mounted seals should not project into the pipe cross-section.

Tightening torque

- The specified tightening torques apply:
 - Only for lubricated threads
 - Only for pipes that are free of tensile stress
- The specified tightening torques for flanges in accordance with EN (DIN) 1092 (→ 16) are valid only when using gaskets of the type "Compressed fiber with adhesive" in accordance with EN (DIN) 1514. Observe all of the gasket manufacturer's specifications.
- The screws must be tightened uniformly in a diagonally opposite sequence.
- Overtightened screws can deform the sealing surface or damage the seal.

DIN pressure ratings

| Prosonic Flow C | | | | |
|--------------------------|------------------------------|-----------|------------------------|----------|
| Nominal diameter [mm] | DIN pressure rating [bar] | Screws | Max. tightening torque | |
| | | | [Nm] | [lbf ft] |
| 300 | PN 10 | 12 × M 20 | 94 | 69 |
| 300 | PN 16 | 12 × M 24 | 134 | 99 |
| 350 | PN 10 | 16 × M 20 | 112 | 83 |
| 350 | PN 16 | 16 × M 24 | 152 | 112 |
| 400 | PN 10 | 16 × M 24 | 151 | 111 |
| 400 | PN 16 | 16 × M 27 | 193 | 142 |
| 450 | PN 10 | 20 × M 24 | 153 | 113 |
| 450 | PN 16 | 20 × M 27 | 198 | 146 |
| 500 | PN 10 | 20 × M 24 | 155 | 114 |
| 500 | PN 16 | 20 × M 30 | 275 | 203 |
| 600 | PN 10 | 20 × M 27 | 206 | 152 |
| 600 | PN 16 | 20 × M 33 | 415 | 306 |
| 700 | PN 10 | 24 × M 27 | 246 | 181 |
| 700 | PN 16 | 24 × M 33 | 278 | 205 |
| 800 | PN 10 | 24 × M 30 | 331 | 244 |
| 800 | PN 16 | 24 × M 36 | 369 | 272 |
| 900 | PN 10 | 28 × M 30 | 316 | 233 |
| 900 | PN 16 | 28 × M 36 | 353 | 260 |
| 1000 | PN 10 | 28 × M 33 | 402 | 297 |
| 1000 | PN 16 | 28 × M 39 | 502 | 370 |
| 1200 | PN 6 | 32 × M 30 | 319 | 235 |
| 1200 | PN 10 | 32 × M 36 | 564 | 416 |
| 1200 | PN 16 | 32 × M 45 | 701 | 517 |
| 1400 | PN 6 | 36 × M 33 | 430 | 317 |
| 1400 | PN 10 | 36 × M 39 | 654 | 482 |
| 1400 | PN 16 | 36 × M 45 | 729 | 538 |
| 1600 | PN 6 | 40 × M 33 | 440 | 325 |
| 1600 | PN 10 | 40 × M 45 | 946 | 698 |
| 1600 | PN 16 | 40 × M 52 | 1007 | 743 |
| 1800 | PN 6 | 44 × M 36 | 547 | 403 |
| 1800 | PN 10 | 44 × M 45 | 961 | 709 |
| 1800 | PN 16 | 44 × M 52 | 1108 | 817 |

| Prosonic Flow C | | | | | |
|------------------|--|---------------------|-----------|------------------------|----------|
| Nominal diameter | | DIN pressure rating | Screws | Max. tightening torque | |
| [mm] | | | | [Nm] | [lbf ft] |
| 2000 | | PN 6 | 48 × M 39 | 629 | 464 |
| 2000 | | PN 10 | 48 × M 45 | 1047 | 772 |
| 2000 | | PN 16 | 48 × M 56 | 1324 | 977 |

AWWA pressure ratings

| Prosonic Flow C | | | | | |
|------------------|--------|----------------------|--------------|------------------------|----------|
| Nominal diameter | | AWWA pressure rating | Screws | Max. tightening torque | |
| [mm] | [inch] | | | [Nm] | [lbf ft] |
| 700 | 28" | Class D | 28 × 1 1/4 " | 247 | 182 |
| – | 30" | Class D | 28 × 1 1/4 " | 287 | 212 |
| 800 | 32" | Class D | 28 × 1 1/4 " | 394 | 291 |
| 900 | 36" | Class D | 32 × 1 1/2 " | 419 | 309 |
| 1000 | 40" | Class D | 36 × 1 1/2 " | 420 | 310 |
| – | 42" | Class D | 36 × 1 1/2 " | 528 | 389 |
| 1200 | 48" | Class D | 44 × 1 1/2 " | 552 | 407 |
| – | 54" | Class D | 44 × 1 3/4 " | 730 | 538 |
| – | 60" | Class D | 52 × 1 3/4 " | 758 | 559 |
| – | 66" | Class D | 52 × 1 3/4 " | 946 | 698 |
| 1800 | 72" | Class D | 60 × 1 3/4 " | 975 | 719 |
| – | 78" | Class D | 64 × 2" | 853 | 629 |

ANSI pressure ratings

| Prosonic Flow C | | | | | |
|------------------|--------|----------------------|--------------|------------------------|------|
| Nominal diameter | | ANSI pressure rating | Screws | Max. tightening torque | |
| [mm] | [inch] | | | [lbs] | [Nm] |
| 300 | 12" | Class 150 | 12 × 7/8 " | 133 | 98 |
| 350 | 14" | Class 150 | 12 × 1 " | 135 | 100 |
| 400 | 16" | Class 150 | 16 × 1" | 128 | 94 |
| – | 18" | Class 150 | 16 × 1 1/8 " | 204 | 150 |
| 500 | 20" | Class 150 | 20 × 1 1/8 " | 183 | 135 |
| 600 | 24" | Class 150 | 20 × 1 1/4 " | 268 | 198 |

2.3 Installing and removing the W sensors

The active part of the flowrate measuring sensor W can be replaced without interrupting the process.

1. Unscrew the sensor connector (1) from the sensor neck (2) and pull it out.
2. Unscrew the sensor neck (2) from the sensor holder (5). Note that you must reckon with a certain amount of resistance.



Note!

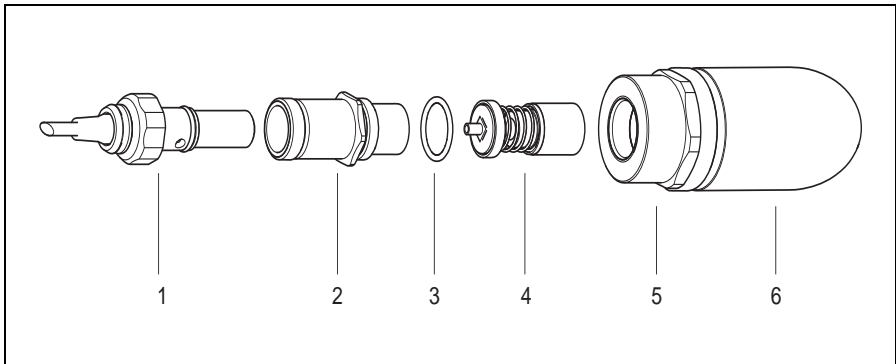
When performing these assembly and disassembly tasks, hold the sensor holder (5) in place with a wrench (AF 36)! For safety reasons, the sensor holder (5) and the sensor nozzle (6) are screwed together by a left thread.

3. Pull out the sensor neck.
4. Pull the sensor element (4) out of the sensor holder (5) and replace it with a new one.
5. Check whether the O-ring (3) is intact and replace it with a new one if necessary.
6. Installation is the reverse of the removal procedure.



Warning!

Risk of accidents! During operation, do not unscrew the sensor holder (5) from the sensor nozzle (6) of the Prosonic Flow C measuring tube as to do so may cause medium to leak!



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Fig. 10: Flow measuring sensor W: installation/removal

- | | |
|---|--|
| 1 | Sensor connector |
| 2 | Sensor neck |
| 3 | O-ring |
| 4 | Sensor element |
| 5 | Sensor holder |
| 6 | Sensor support in measuring pipe Prosonic Flow C |

2.4 Installing the wall-mount housing

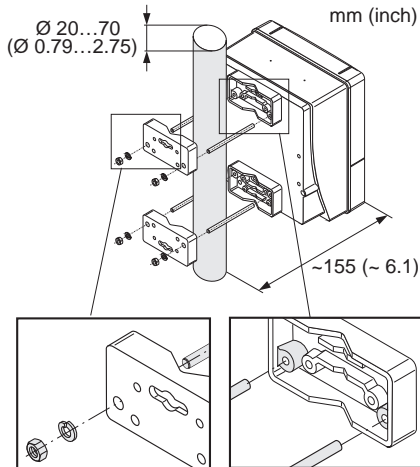
There are various ways of installing the wall-mount housing:

- Direct wall mounting
- Pipe mounting (with separate mounting kit, accessories) →  19
- Panel mounting (with separate mounting kit, accessories) →  20

 Caution!

- Make sure that the permitted operating temperature range of -20 to $+60$ °C (-4 to $+140$ °F), optionally -40 to $+60$ °C (-40 to $+140$ °F) is not exceeded at the mounting location. Install the device in a shady location. Avoid direct sunlight.
- Always install the wall-mount housing in such a way that the cable entries are pointing down.

2.4.1 Pipe mounting



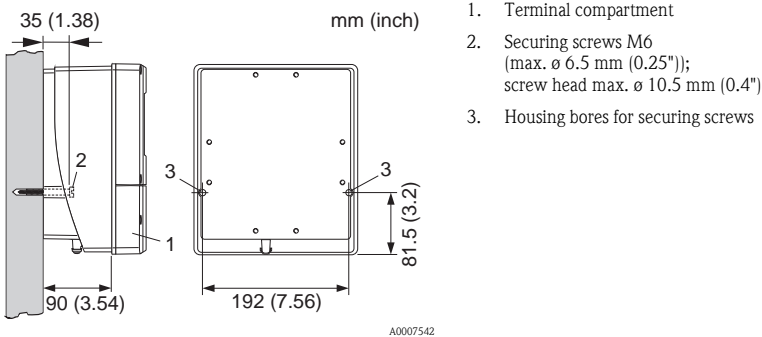
Caution!

Danger of overheating!

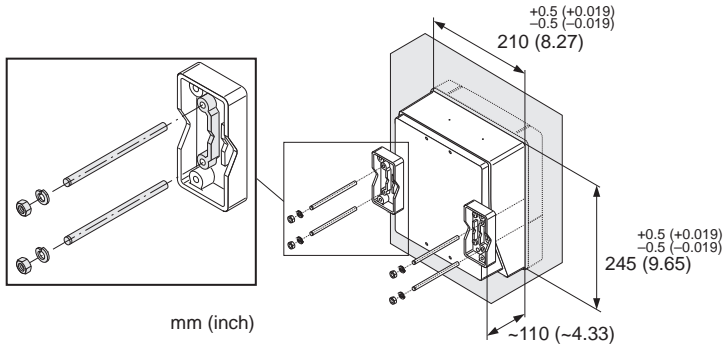
If the device is mounted to a warm pipe, make sure that the housing temperature does not exceed $+60$ °C ($+140$ °F), which is the maximum permissible temperature.

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2.4.2 Direct wall mounting



2.4.3 Panel mounting



2.5 Post-installation check

- Are cables or the device damaged (visual inspection)?
- Does the device correspond to specifications at the measuring point, including process temperature and pressure, ambient temperature, minimum fluid conductivity, measuring range, etc.?
- Are the measuring point number and labeling correct (visual inspection)?
- Have the inlet and outlet runs been observed?
- Is the measuring device protected against moisture and direct sunlight?

3 Wiring



Warning!


Risk of electric shock. Components carry dangerous voltages.

- Never mount or wire the measuring device while it is connected to the power supply.
- Before connecting the power supply, check the safety devices.
- Securely route the power supply and signal cables.
- Tightly close cable entries and covers.



Caution!

Risk of damage to electronic components!

- Connecting the power supply (done at a later time →  24)
- Connecting the signal cables → in accordance with the connection data in the Operating Instructions or the Ex documentation on CD-ROM.

Additionally for devices with fieldbus communication



Caution!

Risk of damage to electronic components!

- Observe the cable specification of the fieldbus cable → Operating Instructions on CD-ROM.
- Keep the lengths of stripped and twisted cable shield as short as possible.
- Shielding and grounding signal lines → Operating Instructions on CD-ROM.
- For use in facilities without potential equalization → Operating Instructions on CD-ROM.

Additional for Ex-certified devices



Warning!

When wiring Ex-certified devices, observe all safety instructions, connection diagrams, technical data, etc. of the associated Ex documentation → Ex documentation on CD-ROM.

3.1 Sensor/transmitter connecting cable

3.1.1 Cable specification for connecting cable

Only use the connecting cables supplied by Endress+Hauser.

3.1.2 Connecting the connecting cable



Warning!

- Risk of electric shock. Switch off the power supply before opening the device. Do not install or wire the device while it is connected to the power supply. Failure to comply with this precaution can result in irreparable damage to the electronics.
- Risk of electric shock. Connect the protective ground to the terminal on the housing before the power supply is applied.



Note!

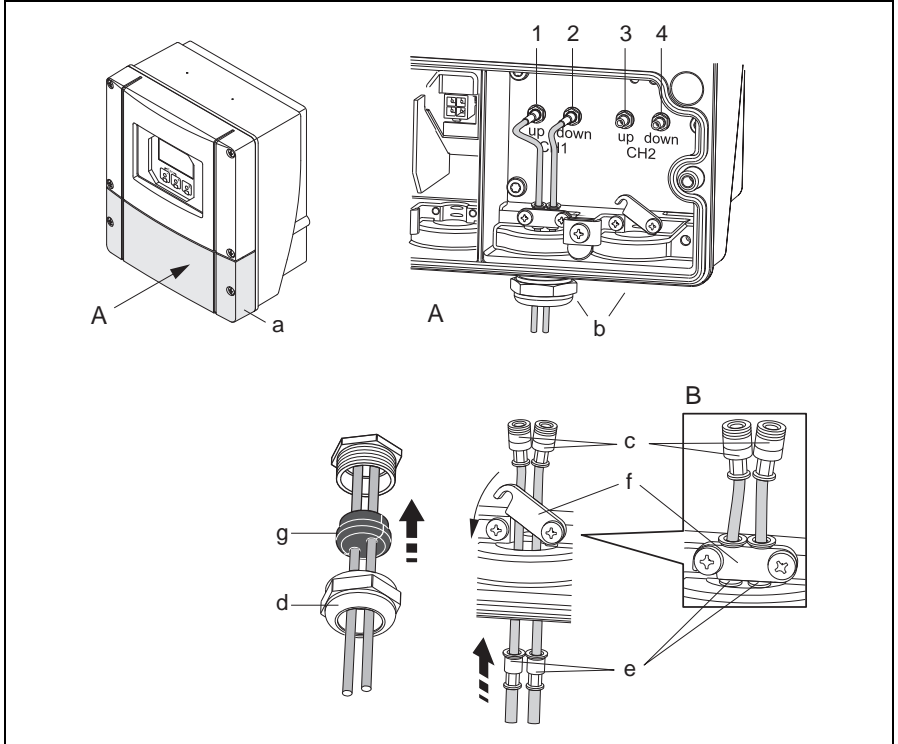
To ensure correct measuring results, route the cable well clear of electrical machines and switching elements.

1. Remove the cover (a) of the connection compartment.
2. Remove the dummy cover from the cable entry (b).
3. Route the two connecting cables (c) of channel 1 through the cable gland (d).
4. Route the two connecting cables of channel 1 through the cable entry (b) and into the connection compartment of the transmitter.
5. Place the cable retaining sleeves (e) of the two connecting cables at the ground contact terminals (f) (Detail B).
6. Twist down the ground contact terminals (f) so that the two cable retaining sleeves (e) are firmly seated.
7. Screw the ground contact terminals (f) tight.
8. Connect the connecting cable:
 - Channel 1 upstream = 1
 - Channel 1 downstream = 2
 - Channel 2 upstream = 3
 - Channel 3 downstream = 4
9. Spread the rubber seal (g) along the side slit with a suitable tool (e.g. a large screwdriver) and fix both connecting cables into place.
10. Push the rubber seal (g) up into the cable entry (b).
11. Tighten the cable gland (d).
12. Fit the cover (a) on the connection compartment and screw it on.



Note!

The connection compartment does not have to be assembled if the transmitter is wired (power supply and signal cable) directly afterwards.



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Fig. 11: Connecting the sensor/transmitter connecting cable

A View A

B Detail B

1 Sensor cable connector, channel 1 upstream

2 Sensor cable connector, channel 1 downstream

3 Sensor cable connector, channel 2 upstream

4 Sensor cable connector, channel 2 downstream

a Connection compartment cover

b Cable entries (with a cable gland for two connecting cables per cable entry)

c Connecting cables

d Cable gland

e Cable retaining sleeves

f Ground contact terminals

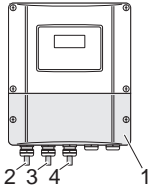
g Rubber seal

3.1.3 Operation in areas with strong electrical interference

The measuring system complies with the general safety requirements in accordance with EN 61010, the EMC requirements of IEC/EN 61326 "Emission as per Class A requirements" and NAMUR Recommendation NE 21.

3.2 Connecting the transmitter

Carry out the wiring using the affixed terminal/wiring diagram.



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Connecting the transmitter:

- 1 Connection compartment cover
(Connection diagram on the inside)
- 2 Power supply cable
- 3 Signal cable
- 4 Fieldbus cable

3.3 Protective ground connection


The sensor must be connected to the facility's protective ground.

Pay attention to the grounding concept of the facility.

3.4 Degree of protection


3.4.1 Transmitter (wall-mount housing)

The measuring device meets all the requirements for IP 67.

 **Caution!**
The screws on the sensor housing should not be opened as to do so would invalidate the degree of protection guaranteed by Endress+Hauser.

Compliance with the following points is mandatory following installation in the field or servicing, in order to ensure that IP 67 protection is maintained:

- The housing seals must be clean and undamaged when inserted into their grooves. The seals must be dried, cleaned or replaced if necessary.
- The threaded fasteners and screw covers must be firmly tightened.
- The cables used for connection must be of the specified outside diameter (see the cable entries on the CD-ROM).
- The cable entries must be firmly tightened.
- Remove all unused cable entries and insert plugs instead.
- Do not remove the grommet from the cable entry.

 **Note!**
The sensors are also optionally available with IP 68 protection.

3.4.2 Flowrate measuring sensors Prosonic Flow W

The flowrate measuring sensors W meet all the requirements of IP 68. Compliance with the following points is mandatory following installation in the field or servicing, in order to ensure that IP 68 protection is maintained:

- Only use cables supplied by Endress+Hauser with the corresponding sensor connectors.
- The sensor connector seals (1), (2) must be clean, dry and undamaged when inserted in the seal groove. Replace the seals if necessary.
- Insert the cable connectors in such a way that they do not jam. Then tighten them as far as they can be tightened.

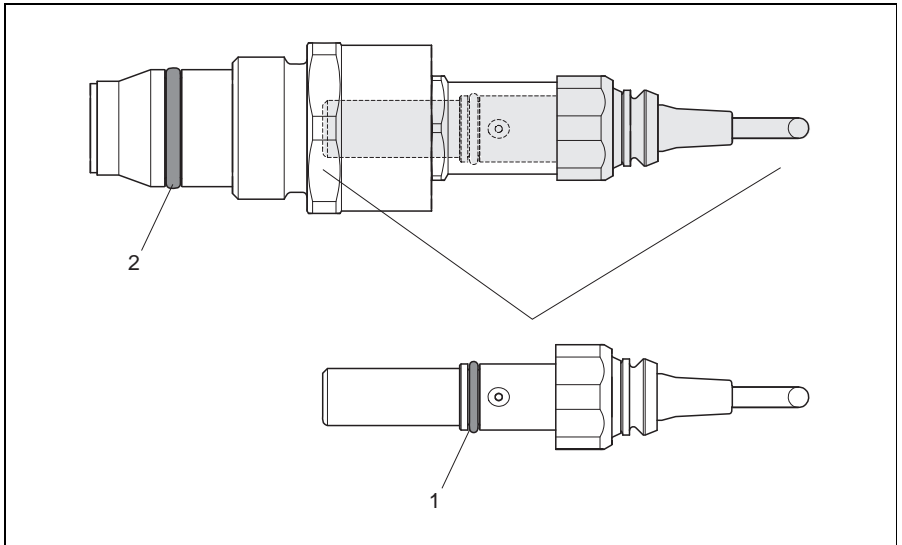


Fig. 12: Mounting instructions for sensor connectors with IP 68 protection

A0008741

- 1 Sensor connector seal; degree of protection IP 68 relevant
- 2 Seal of sensor holder; prevents medium leaking out of the measuring tube

3.5 Post-connection check

- Are cables or the device damaged (visual inspection)?
- Does the supply voltage match the specifications on the nameplate?
- Do the cables comply with the specifications?
- Do the cables have adequate strain relief and are they securely routed?
- Is the cable type route completely isolated? Without loops and crossovers?
- Are all screw terminals firmly tightened?
- Are all cable entries installed, firmly tightened and correctly sealed?
- Is the cable run routed in loops as a "water trap"?
- Are all housing covers installed and well tightened?

Additionally for devices with fieldbus communication

- Are all the connecting components (T-boxes, junction boxes, connectors, etc.) connected with each other correctly?
- Has each fieldbus segment been terminated at both ends with a bus terminator?
- Does the max. length of the fieldbus line match the specification?
- Does the max. length of the spurs match the specification?
- Is the fieldbus cable fully shielded and correctly grounded?

4 Hardware and software settings

For devices with communication type PROFIBUS DP or FOUNDATION Fieldbus, various hardware and software settings are possible or required (e.g. setting the device address). A description of the possible settings and the exact procedure with the various communication types → associated Operating Instructions for each on CD.

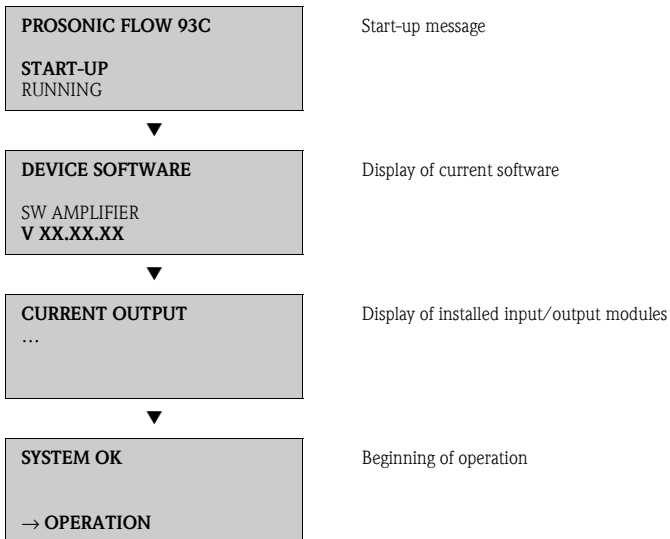
5 Commissioning

5.1 Switching on the measuring device

After completion of the mounting (successful post-installation check), wiring (successful post-connection check), and, where necessary, the necessary hardware setting, the permitted power supply (see nameplate) for the device can be switched on.

After switching on the power supply, the device performs a series of switch-on and self-checks. During this procedure, the following messages can appear on the onsite display:

Display examples:



The measuring device starts operating as soon as the startup procedure is complete. Various measured values and/or status variables appear on the display.



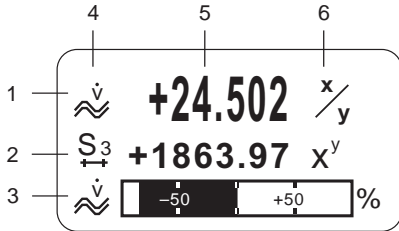
Note!

If an error occurs during startup, this is indicated by an error message.

The most frequently occurring error messages when commissioning a device are described in the Troubleshooting chapter → [31](#).

5.2 Operation

5.2.1 Display elements

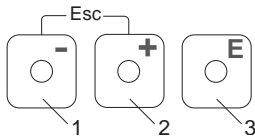


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Display lines/fields

1. Main line for primary measured values
2. Additional line for additional measured variables/status variables
3. Information line for bar graph display for example
4. Info icons, e.g. volume flow
5. Current measured values
6. Engineering units/time units

5.2.2 Operating elements



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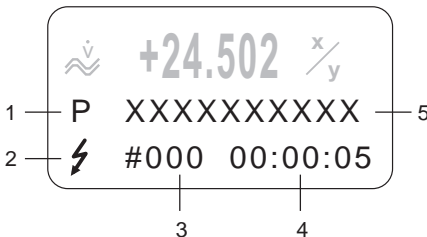
Operating keys

1. (-) Minus key for entering, selecting
2. (+) Plus key for entering, selecting
3. Enter key for calling the function matrix, saving

When the +/- keys are pressed simultaneously (Esc):

- Exit the function matrix step-by-step:
- > 3 sec. = cancel data input and return to the measured value display

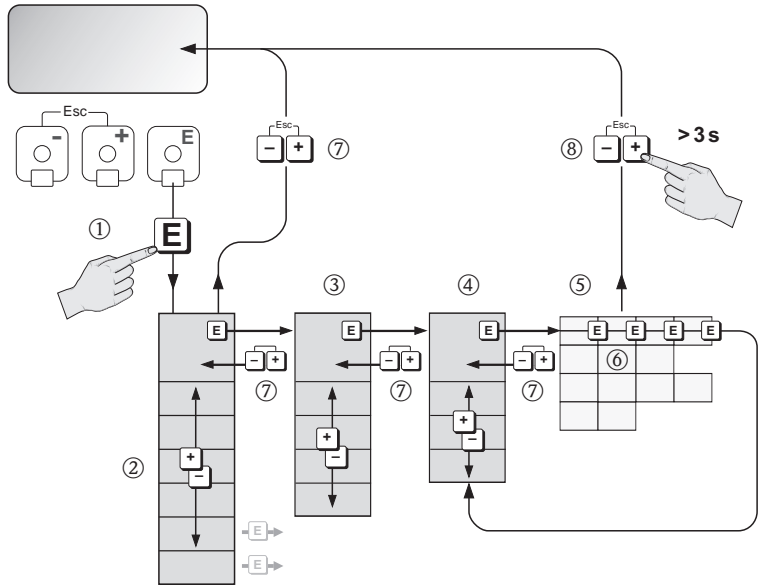
5.2.3 Displaying error messages



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1. Type of error:
P = Process error, S = System error
2. Error message type:
f = Fault message, ! = Notice message
3. Error number
4. Duration of the last error that occurred:
Hours: Minutes: Seconds
5. Error designation
List of all error messages, see associated Operating Instructions on the CD-ROM

5.3 Navigating within the function matrix















A0007665

1. → Enter the function matrix (starting with measured value display)
2. → Select the Block (e.g. USER INTERFACE)
 → Confirm selection
3. → Select the group (e.g. CONTROL)
 → Confirm selection
4. → Select the function group (e.g. BASIC CONFIGURATION)
 → Confirm selection
5. → Select function (e.g. LANGUAGE)
6. → Enter code **93** (only for the first time you access the function matrix)
 → Confirm entry

 → Change function/selection (e.g. ENGLISH)
 → Confirm selection
7. → Return to measured value display step by step
8. > 3 s → Return immediately to measured value display

5.4 Calling the Commissioning Quick Setup

All the functions needed for commissioning are called up automatically with the Quick Setup. The functions can be changed and adapted to suit the individual processes.

1.  → Enter the function matrix (starting with measured value display)
2.  → Select the group QUICK SETUP
 → Confirm selection
3. QUICK SETUP COMMISSIONING function appears.
4. Intermediate step if configuration is blocked:
 → Enter the code **93** (confirm each with ) and thus enable configuration
5.  → Go to Commissioning Quick Setup
6.  → Select YES
 → Confirm selection
7.  → Start Commissioning Quick Setup
8. Configure the individual functions/settings:
 - Via -key, select option or enter number
 - Via -key, confirm entry and go to next function
 - Via -key, return to Setup Commissioning function (settings already made are retained)



Note!

Observe the following when performing the Quick Setup:

- Configuration selection: Select the ACTUAL SETTING option
- Unit selection: This is not offered again for selection after configuring a unit
- Output selection: This is not offered again for selection after configuring an output
- Automatic configuration of the display: select YES
 - Main line = volume flow
 - Additional line = totalizer 1
 - Information line = operating/system condition
- If asked whether additional Quick Setups should be executed: select NO.

All the available functions of the measuring device and their configuration options as well as additional Quick Setups, if available, are described in detail in the "Description of Device Functions" Operating Instructions. The related Operating Instructions can be found on the CD-ROM.

The measuring device is ready for operation on completion of the Quick Setup.

5.5 Troubleshooting

A complete description of all the error messages is provided in the Operating Instructions on the CD-ROM.



Note!

The output signals (e.g. pulse, frequency) of the measuring device must correspond to the higher-order controller.

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