Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Proline Prowirl 72F, 72W, 73F, 73W

Vortex flow measuring system
Reliable flow measurement of gas, steam and liquids



Application
For the universal measurement of the volume flow of gases, steam and liquids.
The mass flow of steam, water (as per IAPWS-IF97 ASME), natural gas (as per AGA NX-19/AGA8-DC92 detailed method/AGA8 Gross Method 1/SGERG-88), compressed air, other gases and liquids can also be calculated with the aid of integrated temperature measurement and by reading in external pressure values (Prowirl 73).

Maximum range of applications thanks to:
- Fluid temperature range from –200 to +400 °C (–328 to +752 °F)
- Pressure ratings up to PN 250/Class 1500
- Sensor with integrated (optional) diameter reduction by one line size (R Style) or two line sizes (S Style)
- Dualsens version (optional) for redundant measurements with two sensors and electronics

Approvals for:
- ATEX, FM, CSA, TIIS, NEPSI, IEC
- HART, PROFIBUS PA, FOUNDATION Fieldbus
- Pressure Equipment Directive, SIL 2

Your benefits
The robust **Prowirl sensor**, tried and tested in over 200 000 applications, offers:
- High resistance to vibrations, temperature shocks, contaminated fluids and water hammer
- No maintenance, no moving parts, no zero-point drift ("lifetime" calibration)
- Software initial settings save time and costs

Additional possibilities:
- Complete saturated steam or liquid-mass measuring point in one single device
- Calculation of the mass flow from the measured variables volume flow and temperature in the integrated flow computer
- External pressure value read-in for superheated steam and gas applications
- External temperature value read-in for delta heat measurement

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Endress+Hauser
People for Process Automation

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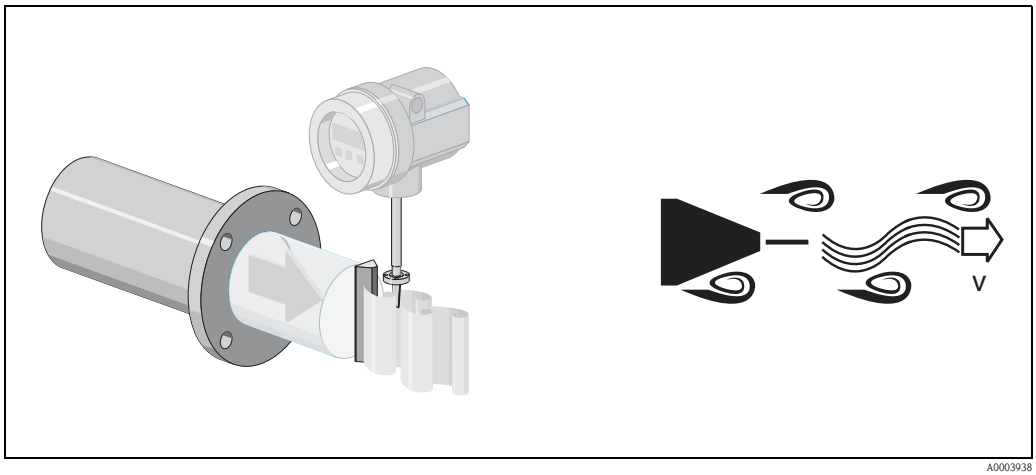
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Function and system design

Measuring principle

Vortex meters work on the principle of the Kármán vortex street. When fluid flows past a bluff body, vortices are alternately formed on both sides with opposite directions of rotation. These vortices each generate a local low pressure. The pressure fluctuations are recorded by the sensor and converted to electrical pulses. The vortices develop very regularly within the permitted application limits of the device. Therefore, the frequency of vortex shedding is proportional to the volume flow.



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The calibration factor (K-factor) is used as the proportional constant:

$$\text{K-Factor} = \frac{\text{Pulses}}{\text{Unit Volume } [\text{dm}^3]}$$

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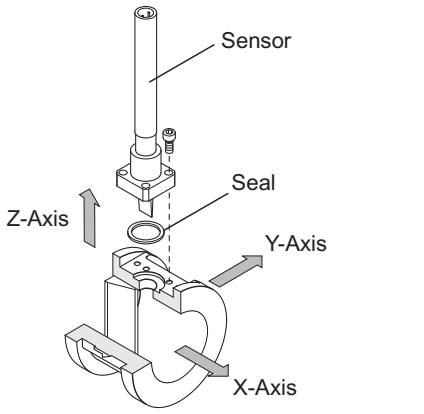
- Within the application limits of the device, the K-factor only depends on the geometry of the device. It is independent of the fluid velocity and the fluid properties viscosity and density. In this way, the K-factor is also independent of the type of matter that is to be measured, regardless of whether this is steam, gas or liquid.
- The primary measuring signal is already digital (frequency signal) and linear to the flow.
  After production, the K-factor is determined in the factory by means of calibration and is not subject to long-term or zero-point drift.
- The device does not contain any moving parts and does not require maintenance.

The capacitive sensor

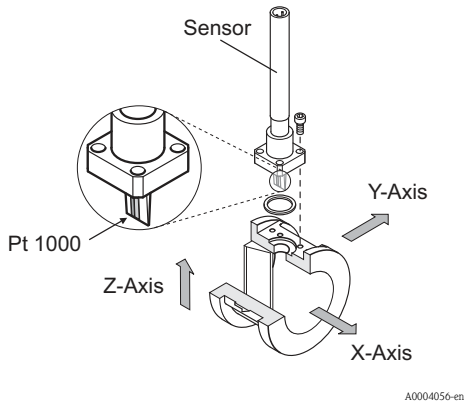
The sensor of a vortex flowmeter has a major influence on the performance, robustness and reliability of the whole measuring system.

The robust DSC sensor – with an integrated temperature measurement (Pt 1000) with Prowirl 73 – is burst-tested and vibration and temperature-shock-tested (temperature shocks of 150 K/s). The Prowirl uses the tried-and-tested capacitive measuring technology of Endress+Hauser applied in over 200 000 measuring points worldwide.

The DSC (differential switched capacitance) sensor patented by Endress+Hauser has complete mechanical balancing. It only reacts to the measured variable (vortex), not to vibrations. Even in the event of pipe vibrations, the smallest of flows can be reliably measured at low density thanks to the unimpaired sensitivity of the sensor. Thus, the wide turndown is also maintained even in the event of harsh operating conditions. Vibrations up to 1 g, in frequencies up to 500 Hz in every axis (X, Y, Z), do not affect the flow measurement. Due to its design, the capacitive sensor is also particularly mechanically resistant to temperature shocks and water hammers in steam lines.



DSC sensor, Prowirl 72



DSC sensor, Prowirl 73 with integrated temperature sensor (Pt 1000)

"Lifetime" calibration

Experience has shown that recalibrated Prowirl devices exhibit a very high degree of stability compared to their original calibration: The recalibration values were all within the original measuring accuracy specifications of the devices.
Various tests and simulation procedures carried out on devices by filing away the edges of Prowirl's bluff body found that there was no negative impact on the accuracy up to a rounding diameter of 1 mm (0.04").

Generally the following statements are true:
- Experience has shown that if the fluid is non-abrasive and non-corrosive (e.g. most water and steam applications), the meter's edges will never show rounding at the edges that is 1 mm (0.04") or more.
- If the rounding of the meter's edges is always 1 mm (0.04") or less, the meter will never show a calibration shift that is out of the meter's original specifications.
- Typically, the bluff body's edges exhibit a small rounding that is less than 1 mm (0.04"). The meter, however, is calibrated with this rounded edge. Therefore, the meter will stay within the tolerance specifications as long as the additional wear and tear of the edge does not exceed an additional 1 mm (0.04").

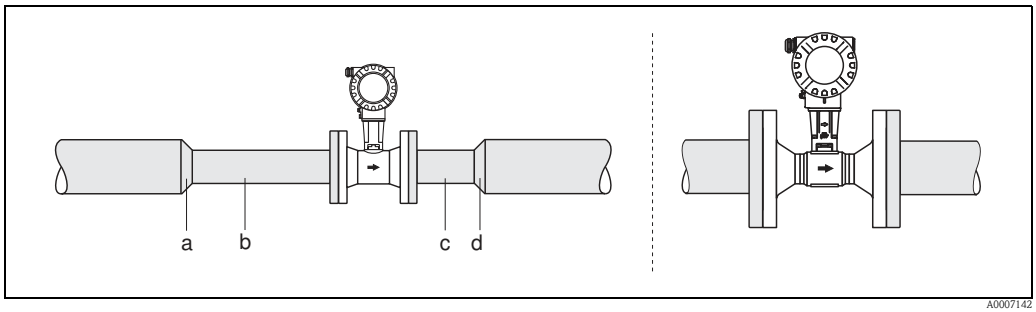
Thus, the Prowirl product line offers calibration for life if the measuring device is used in non-abrasive and non-corrosive fluids.

Sensor with integrated nominal diameter reduction

In many applications, the nominal diameter of the customer's pipe does not correspond to the nominal diameter that is optimum for a vortex meter as the flow velocity is too low for vortex formation after the bluff body. This is expressed in a signal loss in the lower flow range. To reduce the nominal diameter by one or two steps, and thus increase the flow velocity, it is common practice nowadays to fit such measuring points with the following adapters:

- Reducer (a)
- Straight pipe segment (b) as the inlet run (min. 15 × DN) in front of the vortex meter
- Straight pipe segment (c) as the outlet run (min. 5 × DN) after the vortex meter
- Expansion (d)

Endress+Hauser is now offering the Prowirl 72/73 vortex meter with integrated nominal diameter reduction for such applications.



Left: Traditional means for reducing pipeline section
Right: Nominal diameter reduction by using Prowirl with integrated line size reduction

Nomenclature for Prowirl vortex meters (flanged devices) with integrated nominal diameter reduction:
- Prowirl 72F/73F "R Style": single reduction of line size, e.g. from DN 80 (3") to DN 50 (2")
- Prowirl 72F/73F "S Style": double reduction of line size, e.g. from DN 80 (3") to DN 40 (1½")
  (S = "super" reduced)

These models offer the following benefits:
- Cost and time saving as the adapter pieces with inlet and outlet runs are completely replaced by one single device (additional inlet and outlet runs to be considered → 25)
- Measuring range extended for lower flow rates
- Lower risk (of incorrect measuring device layout) in the planning phase as R Style and S Style measuring devices have the same lengths as standard flanged devices. Each device type can be used alternatively without making complicated changes to the layout.
- Accuracy specifications identical to those for standard devices

Temperature measurement (Prowirl 73)

In addition to the volume flow, the Prowirl 73 also measures the fluid temperature. The temperature is measured by means of a temperature sensor Pt 1000 which is located in the paddle of the DSC sensor, i.e. directly in the fluid (→ 4).

Flow computer (Prowirl 73)

The electronics of the Prowirl 73 have an integral flow computer. With the aid of this flow computer other process variables can be calculated from the primary measured variables (volume flow and temperature), e.g.:
- The mass flow and heat flow of saturated steam and water in accordance with IAPWS-IF97/ASME
- The mass flow and heat flow of superheated steam (at constant pressure or pressure read in via HART/ PROFIBUS PA/FOUNDATION Fieldbus) in accordance with IAPWS-IF97/ASME
- The mass flow and corrected volume flow of gases (at constant pressure or pressure read in via HART/ PROFIBUS PA/FOUNDATION Fieldbus), e.g. compressed air and natural gas AGA NX-19, AGA8-DC92, ISO12213-2, AGA8 Gross Method 1 and SGERG-88 (see below). Additional gases can be programmed using the real gas equation.

In the case of 4 to 20mA HART devices, the following gases are preprogrammed:

Ammonia	Helium 4	Nitrogen
Argon	Hydrogen (normal)	Oxygen
Butane	Hydrogen chloride	Propane
Carbon dioxide	Hydrogen sulfide	Xenon
Chlorine	Krypton	Mixtures of up to 8 components of these gases
Ethane	Methane	
Ethylene (ethene)	Neon	

The heat flow (energy) of these gases is calculated as per ISO 6976 - based on the net calorific value or gross calorific value.

- Optional with PROFIBUS PA and FOUNDATION Fieldbus: natural gas AGA NX-19 (corrected volume flow and mass flow);
  Optional for 4 to 20 mA HART: natural gas AGA NX-19, AGA8-DC92, ISO 12213-2, AGA8 Gross Method 1, SGERG-88 (corrected volume flow, mass flow, heat flow).
  For natural gas AGA NX-19, AGA8 Gross Method 1 and SGERG-88, the gross calorific value or the net calorific value can be entered to calculate the heat flow (energy). For AGA8-DC92 and ISO 12213-2, the data for the gross calorific value and net calorific value are stored in the device according ISO 6976.
- The mass flow of any liquid (linear equation). The gross calorific value or the net calorific value can be entered to calculate the heat flow (energy).
- Delta heat between saturated steam and condensate (second temperature value read in via HART) in accordance with IAPWS-IF97/ASME.
- Delta heat between warm water and cold water (second temperature value read in via HART) in accordance with IAPWS-IF97/ASME.
- In saturated steam measurements, the pressure of the steam can also be calculated from the measured temperature and output in accordance with IAPWS-IF97/ASME.

The mass flow is calculated as the product of (volume flow × operating density). In the case of saturated steam, water and other liquids, the operating density is a function of the temperature. In the case of superheated steam and all other gases, the operating density is a function of the temperature and pressure.
The corrected volume flow is calculated as the product of (volume flow × operating density), divided by the reference density. In the case of water and other liquids, the operating density is a function of the temperature. In the case of all other gases, the operating density is a function of the temperature and pressure.
The heat flow is calculated as the product of (volume flow × operating density × specific enthalpy). In the case of saturated steam and water, the operating density is a function of the temperature. In the case of superheated steam, natural gas NX-19, natural gas AGA8-DC92, natural gas ISO 12213-2, natural gas AGA8 Gross Method 1 and natural gas SGERG-88, the operating density is a function of the temperature and pressure.

Diagnostic functions (Prowirl 73)

Extensive diagnostic options, such as retracing fluid and ambient temperatures, extreme flows etc., are also optionally available for the measuring device.

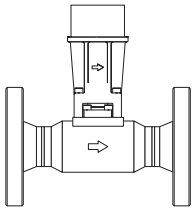
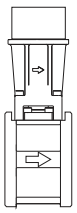
Measuring system

The measuring system comprises a sensor and a transmitter. Two versions are available:
- Compact version: sensor and transmitter form a mechanical unit.
- Remote version: sensor is mounted separate from the transmitter (up to max. 30 m / 98 ft).

Transmitter

Prowirl 72  A0009906	■ Two-line liquid crystal display ■ Configuration using pushbuttons ■ Quick Setup for rapid commissioning ■ Volume flow and calculated variables (mass flow or corrected volume flow)
Prowirl 73  A0009906	■ Two-line liquid crystal display ■ Configuration using pushbuttons ■ Quick Setup for rapid commissioning ■ Volume flow and temperature as well as calculated variables (mass flow, heat flow or corrected volume flow)

Sensor

F  A0009921	■ Flanged version ■ Range of nominal diameters DN 15 to 300 (½ to 12") ■ Material of measuring tube: e.g. – Stainless steel, A351-CF3M – Alloy C-22 (only for Prowirl 72)
W  A0009922	■ Wafer version (flangeless version) ■ Range of nominal diameters DN 15 to 150 (½ to 6") ■ Material of measuring tube: e.g. stainless steel, A351-CF3M

Input

Measured variable

Prowirl 72

- Volumetric flow (volume flow) is proportional to the frequency of vortex shedding after the bluff body.
- The following can be output as the output variable:
  - Volume flow
  - Mass flow or corrected volume flow (if process conditions are constant)

Prowirl 73

- Volumetric flow (volume flow) is proportional to the frequency of vortex shedding after the bluff body.
- The temperature can be output directly and is used to calculate the mass flow for example.
- The following can be output as the output variable:
  - The measured process variables volume flow and temperature
  - The calculated process variables mass flow, heat flow or corrected volume flow

Measuring range

The measuring range depends on the fluid and the nominal diameter.

Start of measuring range

Depends on the density and the Reynolds number (Re_{min} = 4000, Re_{linear} = 20 000).
The Reynolds number is dimensionless and is the ratio of inertial forces to viscous forces of the fluid. It is used for characterizing the flow. The Reynolds number is calculated as follows:

$$Re = \frac{4 \cdot Q\,[m^3/s] \cdot \rho\,[kg/m^3]}{\pi \cdot di\,[m] \cdot \mu\,[Pa{\cdot}s]} \qquad Re = \frac{4 \cdot Q\,[ft^3/s] \cdot \rho\,[lb/ft^3]}{\pi \cdot di\,[ft] \cdot \mu\,[0.001\ cP]}$$

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Re = Reynolds number; Q = flow; di = internal diameter; μ = dynamic viscosity, ρ = density

$$\text{DN } 15\ldots25 \rightarrow v_{min.}{}^{*} = \frac{6}{\sqrt{\rho\,[kg/m^3]}}\,[m/s] \qquad \text{DN } 40\ldots300 \rightarrow v_{min.}{}^{*} = \frac{7}{\sqrt{\rho\,[kg/m^3]}}\,[m/s]$$

$$½\ldots1" \rightarrow v_{min.}{}^{*} = \frac{4.92}{\sqrt{\rho\,[lb/ft^3]}}\,[ft/s] \qquad 1½\ldots12" \rightarrow v_{min.}{}^{*} = \frac{5.74}{\sqrt{\rho\,[lb/ft^3]}}\,[ft/s]$$

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** with amplification 5*

Full scale value

Liquids: v_{max} = 9 m/s (30 ft/s)
Gas/steam: see table

Nominal diameter	v_{max}
Standard version: DN 15 (½") R Style: DN 25 (1") > DN 15 (½") S Style: DN 40 (1½") >> DN 15 (½")	46 m/s (151 ft/s) or Mach 0.3 (depending on which value is smaller)
Standard version: DN 25 (1"), DN 40 (1½") R Style: – DN 40 (1½") > DN 25 (1") – DN 50 (2") > DN 40 (1½") S Style: – DN 80 (3") >> DN 40 (1½")	75 m/s (246 ft/s) or Mach 0.3 (depending on which value is smaller)
Standard version: DN 50 to 300 (2 to 12") R Style: – DN 80 (3") > DN 50 (2") – Nominal diameters larger than DN 80 (3") S Style: – DN 100 (4") >> DN 50 (2") – Nominal diameters larger than DN 100 (4")	120 m/s (394 ft/s) or Mach 0.3 (depending on which value is smaller) Calibrated range: up to 75 m/s (246 ft/s)

Note!
By using the selection and planning program "Applicator", you can determine the exact values for the fluid you use. You can obtain the Applicator from your Endress+Hauser sales center or on the Internet under www.endress.com.

K-factor range

The table is used for orientation purposes. The range in which the K-factor can be is indicated for individual nominal diameters and designs.

Nominal diameter		K-factor range (pulses/dm³)	
DIN/JIS	ANSI	72F / 73F	72W / 73W
DN 15	½"	390 to 450	245 to 280
DN 25	1"	70 to 85	48 to 55
DN 40	1½"	18 to 22	14 to 17
DN 50	2"	8 to 11	6 to 8
DN 80	3"	2.5 to 3.2	1.9 to 2.4
DN 100	4"	1.1 to 1.4	0.9 to 1.1
DN 150	6"	0.3 to 0.4	0.27 to 0.32
DN 200	8"	0.1266 to 0.1400	–
DN 250	10"	0.0677 to 0.0748	–
DN 300	12"	0.0364 to 0.0402	–

Measuring range for gases [m³/h or Nm³/h]

In the case of gases, the start of the measuring range depends on the density. With ideal gases, the density [ρ] or corrected density [ρ_N] can be calculated using the following formulae:

$$\rho\ [kg/m^3] = \frac{\rho_N\ [kg/Nm^3] \cdot P\ [bar\ abs] \cdot 273.15\ [K]}{T\ [K] \cdot 1.013\ [bar\ abs]} \qquad \rho_N\ [kg/Nm^3] = \frac{\rho\ [kg/m^3] \cdot T\ [K] \cdot 1.013\ [bar\ abs]}{P\ [bar\ abs] \cdot 273.15\ [K]}$$

$$\rho\ [lb/ft^3] = \frac{\rho_N\ [lb/SCF] \cdot P\ [psia] \cdot 530\ [°R]}{T\ [°F + 460] \cdot 14.7\ [psia]} \qquad \rho_N\ [lb/SCF] = \frac{\rho\ [lb/ft^3] \cdot T\ [°F + 460] \cdot 14.7\ [psia]}{P\ [psia] \cdot 530\ [°R]}$$

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The following formulae can be used to calculate the volume [Q] or corrected volume [Q_N] in the case of ideal gases:

$$Q\ [m^3/h] = \frac{Q_N\ [Nm^3/h] \cdot T\ [K] \cdot 1.013\ [bar\ abs]}{P\ [bar\ abs] \cdot 273.15\ [K]} \qquad Q_N\ [Nm^3/h] = \frac{Q\ [m^3/h] \cdot P\ [bar\ abs] \cdot 273.15\ [K]}{T\ [K] \cdot 1.013\ [bar\ abs]}$$

$$Q\ [ft^3/h] = \frac{Q_N\ [SCF/h] \cdot T\ [°F + 460] \cdot 14.7\ [psia]}{P\ [psia] \cdot 530\ [°R]} \qquad Q_N\ [SCF/h] = \frac{Q\ [ft^3/h] \cdot P\ [psia] \cdot 530\ [°R]}{T\ [°F + 460] \cdot 14.7\ [psia]}$$

A0003941

T = Operating temperature, P = operating pressure

Input signal

HART input functionality (Prowirl 73)

Prowirl 73 (4 to 20 mA HART) is able to read in an external pressure, temperature or density value. The following order options are required for this purpose:

- Prowirl 73: output/input → option W (4–20 mA HART) or A (4–20 mA HART + frequency)
- 2 × active barrier RN221N–x1 (for x: A = for non-hazardous areas, B = ATEX, C = FM, D = CSA)
- If reading in pressure: 1 × Cerabar M or Cerabar S in burst mode (Activated burst mode must be noted with the order of the Cerabar M or S. Otherwise the burst mode must be activated locally either with FieldCare or with a HART handheld (FieldXpert).)

When this functionality is used, the following signals can be made available to the control system, e.g. in an application with superheated steam:
- Pressure as 4 to 20 mA signal
- Temperature
- Mass flow

Pressure input (PROFIBUS PA, FOUNDATION Fieldbus)

An external pressure value function block can be read in with Prowirl 73 (bus version). The following order options are required for this purpose:

PROFIBUS PA:
- Prowirl 73 → output/input → option H (PROFIBUS PA)
- Cerabar M → electronics/display → option P or R; → ceramic sensor → option 2F, 2H, 2M, 2P or 2S
  Cerabar S Evolution → output/operation → option M, N or O; → d:sensor range → option 2C, 2E, 2F, 2H, 2K, 2M, 2P or 2S

FOUNDATION Fieldbus (FF):
- Prowirl 73 → output/input → option K (FOUNDATION Fieldbus)
- Cerabar S Evolution → output/operation → option P, Q or R; → d:sensor range → option 2C, 2E, 2F, 2H, 2K, 2M, 2P or 2S

Output

Prowirl 72
By means of the outputs in the 4 to 20 mA/HART version of Prowirl 72, the volume flow and, if process conditions are constant, the calculated mass flow and corrected volume flow can be output via the current output and optionally via the pulse output or as a limit value via the status output.

Prowirl 73
By means of the outputs in the 4 to 20 mA/HART version of Prowirl 73, the following measured variables can generally be output:

	4 to 20 mA HART measuring devices				PROFIBUS - PA (4 AI Blocks)	FOUNDATION Fieldbus FF (7 AI Blocks)
	Current output	**Frequency output (only for output option A)**	**Pulse output (only for output option A)**	**Status output (only for output option A)**		
Saturated steam	■ Volume flow/mass flow/heat flow ■ Temperature ■ Saturation steam pressure	■ Volume flow/mass flow/heat flow ■ Temperature ■ Saturation steam pressure	■ Volume ■ Mass ■ Heat	■ Volume flow/mass flow/heat flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ Calculated saturated steam pressure limit value	■ Volume flow/mass flow/heat flow ■ Temperature ■ Saturation steam pressure ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature	■ Volume flow/mass flow/heat flow ■ Temperature ■ Saturation steam pressure ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature
Superheated steam	■ Volume flow/mass flow/heat flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat	■ Volume flow/mass flow/heat flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	■ Volume flow/mass flow/heat flow ■ Temperature ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature	■ Volume flow/mass flow/heat flow ■ Temperature ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature
Water	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ Specific enthalpy ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature

	4 to 20 mA HART measuring devices				PROFIBUS - PA (4 AI Blocks)	FOUNDATION Fieldbus FF (7 AI Blocks)
	Current output	**Frequency output (only for output option A)**	**Pulse output (only for output option A)**	**Status output (only for output option A)**		
Compressed air	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Compressibility ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Compressibility ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature
Ar, NH3, C4H10, CO2, CO, Cl2, C2H6, C2H4, He 4, H2 (normal), HCl, H2S, Kr, CH4, Ne, N2, O2, C3H8, Xe*	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use real gas equation	No data → Use real gas equation
Mixtures of up to 8 of the components above	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use real gas equation	No data → Use real gas equation
Real gas equation	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Corrected volume	■ Volume flow/mass flow/corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: electronics temperature	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: electronics temperature

* Argon, ammonia, butane, carbon dioxide, carbon monoxide, chlorine, ethane, ethylene (ethene), helium 4, hydrogen (normal), hydrogen chloride, hydrogen sulfide, krypton, methane, neon, nitrogen, oxygen, propane, xenon

	4 to 20 mA HART measuring devices				PROFIBUS - PA (4 AI Blocks)	FOUNDATION Fieldbus FF (7 AI Blocks)
	Current output	**Frequency output (only for output option A)**	**Pulse output (only for output option A)**	**Status output (only for output option A)**		
Natural gas AGA NX-19	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Supercompressibility ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Supercompressibility ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: – Reynolds number – Electronics temperature
Natural gas AGA8-DC92 detailed method	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use natural gas AGA NX-19 or real gas equation	No data → Use natural gas AGA NX-19 or real gas equation
Natural gas ISO 12213-2	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use natural gas AGA NX-19 or real gas equation	No data → Use natural gas AGA NX-19 or real gas equation
Natural gas AGA8 Gross Method 1	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use natural gas AGA NX-19 or real gas equation	No data → Use natural gas AGA NX-19 or real gas equation

* Argon, ammonia, butane, carbon dioxide, carbon monoxide, chlorine, ethane, ethylene (ethene), helium 4, hydrogen (normal), hydrogen chloride, hydrogen sulfide, krypton, methane, neon, nitrogen, oxygen, propane, xenon

	4 to 20 mA HART measuring devices				PROFIBUS - PA (4 AI Blocks)	FOUNDATION Fieldbus FF (7 AI Blocks)
	Current output	**Frequency output (only for output option A)**	**Pulse output (only for output option A)**	**Status output (only for output option A)**		
Natural gas SGERG-88	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External pressure (if it can be read in)	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External pressure limit value (if it can be read in)	No data → Use natural gas AGA NX-19 or real gas equation	No data → Use natural gas AGA NX-19 or real gas equation
User-defined liquid	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: electronics temperature	■ Volume flow/mass flow/corrected volume flow ■ Temperature ■ Frequency ■ Flow velocity ■ Totalizer ■ Optional: electronics temperature
Water delta heat application	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External temperature	■ Volume flow/mass flow/heat flow/ corrected volume flow ■ Temperature ■ External temperature	■ Volume ■ Mass ■ Heat ■ Corrected volume	■ Volume flow/mass flow/heat flow/ corrected volume flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External temperature limit value	No data	No data
Saturated steam delta heat application	■ Volume flow/mass flow/heat flow ■ Temperature ■ External temperature	■ Volume flow/mass flow/heat flow ■ Temperature ■ External temperature	■ Volume ■ Mass ■ Heat	■ Volume flow/mass flow/heat flow limit value ■ Temperature limit value ■ Totalizer limit value ■ Velocity limit value ■ External temperature limit value	No data	No data
* Argon, ammonia, butane, carbon dioxide, carbon monoxide, chlorine, ethane, ethylene (ethene), helium 4, hydrogen (normal), hydrogen chloride, hydrogen sulfide, krypton, methane, neon, nitrogen, oxygen, propane, xenon						

If configured, the following calculated measured variables can also be displayed via the local display in Prowirl 73:
- Density
- Specific enthalpy
- Saturation steam pressure (for saturated steam)
- Z-factor
- Flow velocity

Output signal

Prowirl 72

Current output:

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

Pulse/status output:

- Open collector, passive, galvanically isolated
  - Non-Ex, Ex d/XP version: U_{max} = 36 V, with 15 mA current limiting, R_i = 500 Ω
  - Ex i/IS and Ex n version: U_{max} = 30 V, with 15 mA current limiting, R_i = 500 Ω

The pulse/status output can be configured as:

- Pulse output:
  - Pulse value and polarity can be selected
  - Pulse width can be configured (0.005 to 2 s)
  - Pulse frequency max. 100 Hz
- Status output:
  Can be configured for error messages or flow limit values
- Vortex frequency:
  - Direct output of unscaled vortex pulses 0.5 to 2850 Hz
    (e.g. for connecting to an RMC621 flow computer)
  - Pulse ratio 1:1
- PFM signal (pulse/frequency modulation):
  With external connection via flow computer RMC621 or RMS621

PROFIBUS PA interface:

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Current consumption = 16 mA
- Error current FDE (fault disconnection electronic) = 0 mA
- Data transmission rate: supported baudrate = 31.25 kBit/s
- Signal encoding = Manchester II
- Function blocks: 1 × Analog Input, 1 × totalizer
- Output data: volume flow, calculated mass flow, corrected volume flow, totalizer
- Input data: positive zero return (ON/OFF), totalizer control
- Bus address can be set at the device via DIP switches

FOUNDATION Fieldbus interface:

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Current consumption = 16 mA
- Error current FDE (fault disconnection electronic) = 0 mA
- Data transmission rate: supported baudrate = 31.25 kBit/s
- Signal encoding = Manchester II
- Function blocks: 2 × Analog Input, 1 × Discrete Output
- Output data: volume flow, calculated mass flow, corrected volume flow, totalizer
- Input data: positive zero return (ON/OFF), totalizer reset
- Link Master (LM) functionality is supported

Prowirl 73

Current output:

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

Frequency output, pulse/status output:

- Frequency output (optional): open collector, passive, galvanically isolated
  - Non-Ex, Ex d/XP version: U_{max} = 36 V, with 15 mA current limiting, R_i = 500 Ω
  - Ex i/IS and Ex n version: U_{max} = 30 V, with 15 mA current limiting, R_i = 500 Ω

The pulse/status output can be configured as:
- Frequency output:
  - End frequency 0 to 1000 Hz (fmax = 1250 Hz)
- Pulse output:
  - Pulse value and polarity can be selected
  - Pulse width can be configured (0.005 to 2 s)
  - Pulse frequency max. 100 Hz
- Status output:
  Can be configured for error messages or flow values, temperature values, pressure limit values
- Vortex frequency:
  - Direct output of unscaled vortex pulses 0.5 to 2850 Hz
    (e.g. for connecting to an RMC621 flow computer)
  - Pulse ratio 1:1

PROFIBUS PA interface:

- PROFIBUS PA in accordance with EN 50170 Volume 2, IEC 61158-2 (MBP), galvanically isolated
- Current consumption = 16 mA
- Error current FDE (fault disconnection electronic) = 0 mA
- Data transmission rate: supported baudrate = 31.25 kBit/s
- Signal encoding = Manchester II
- Function blocks: 4 × Analog Input, 2 × totalizer
- Output data: volume flow, mass flow, corrected volume flow, heat flow, temperature, density, specific enthalpy, calculated steam pressure (saturated steam), operating Z-factor, vortex frequency, electronics temperature, Reynolds number, velocity, totalizer
- Input data: positive zero return (ON/OFF), totalizer control, absolute pressure, display value
- Bus address can be set at the device via DIP switches

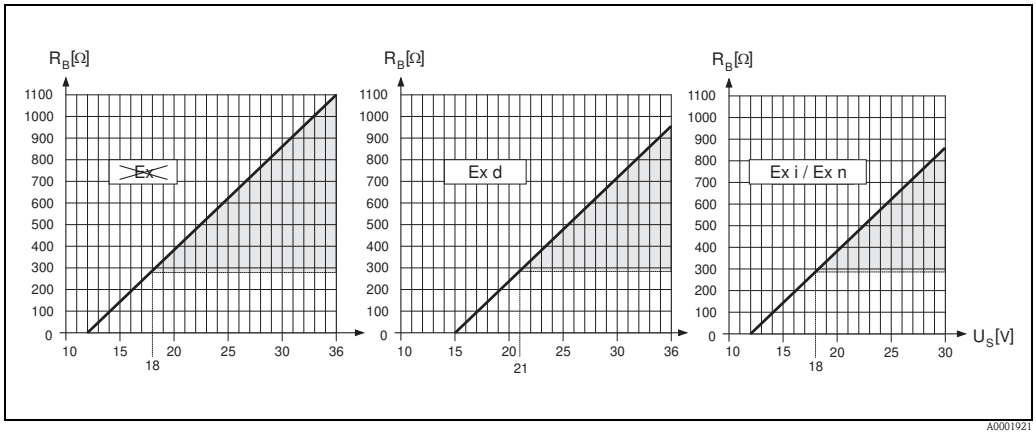
FOUNDATION Fieldbus interface:

- FOUNDATION Fieldbus H1, IEC 61158-2, galvanically isolated
- Current consumption = 16 mA
- Error current FDE (fault disconnection electronic) = 0 mA
- Data transmission rate: supported baudrate = 31.25 kBit/s
- Signal encoding = Manchester II
- Function blocks: 6 × Analog Input, 1 × Discrete Output, 1 × Analog Output
- Output data: volume flow, mass flow, corrected volume flow, heat flow, temperature, density, specific enthalpy, calculated steam pressure (saturated steam), operating Z-factor, vortex frequency, electronics temperature, Reynolds number, velocity, totalizer 1 + 2
- Input data: positive zero return (ON/OFF), totalizer reset, absolute pressure
- Link Master (LM) functionality is supported

Signal on alarm

- Current output: error response can be selected (e.g. in accordance with NAMUR Recommendation NE 43)
- Pulse output: error response can be selected
- Status output: "not conducting" in event of fault

Load



The area shaded gray refers to the permitted load (for HART: min. 250 Ω)
The load is calculated as follows:

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

R_B Load, load resistance
U_S Supply voltage: non-Ex = 12 to 36 V DC; Ex d /XP= 15 to 36 V DC; Ex i /IS and Ex n = 12 to 30 V DC
U_{KI} Terminal voltage: non-Ex = min. 12 V DC; Ex d/XP = min. 15 V DC; Ex i/IS and Ex n = min. 12 V DC
I_{max} Output current (22.6 mA)

Low flow cut off

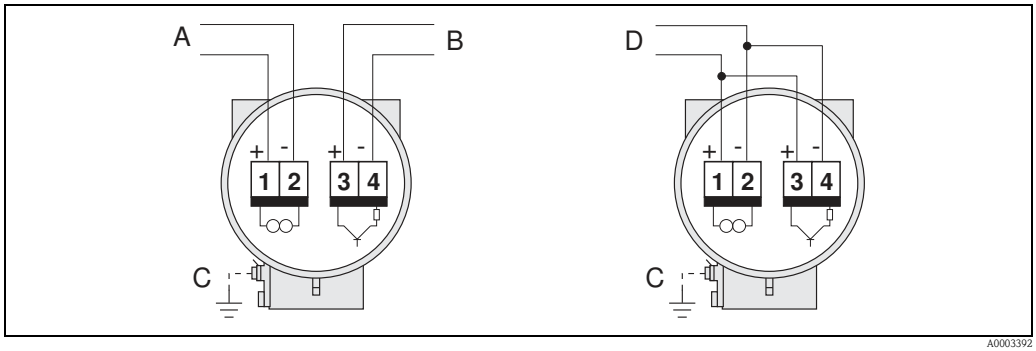
Switch points for low flow cut off can be selected as required.

Galvanic isolation

All electrical connections are galvanically isolated from one another.

Power supply

Electrical connection



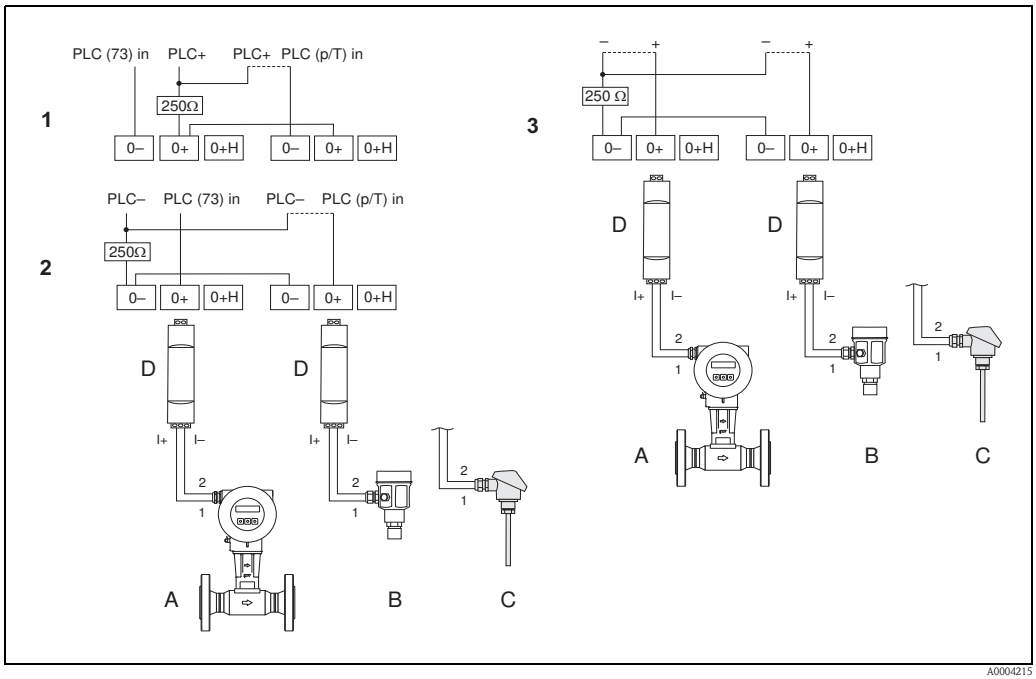
A – HART: power supply, current output
– PROFIBUS PA: 1 = PA+, 2 = PA–
– FOUNDATION Fieldbus: 1 = FF+, 2 = FF–

B Optional pulse output (not for PROFIBUS PA and FOUNDATION Fieldbus), can also be operated as:
– Status output
– Only Prowirl 73: frequency output
– Only Prowirl 73: as a PFM output (pulse/frequency modulation) together with an RMC621 or RMS621 flow computer

C Ground terminal (relevant for remote version)

D Only Prowirl 72: PFM (pulse/frequency modulation) wiring for connecting to flow computer RMC621 or RMS621

Wiring HART input



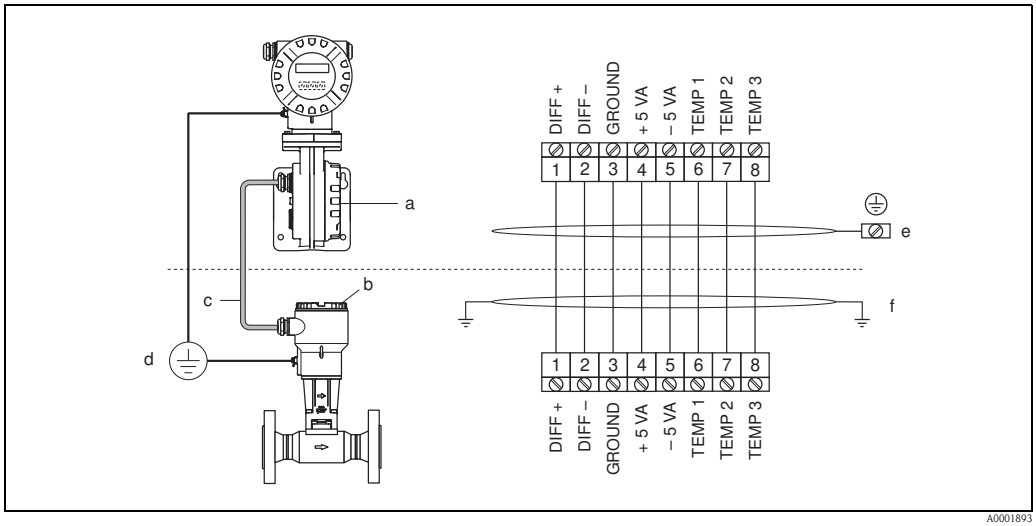
1 Connection diagram for PLC with common "plus"
Dotted line = alternative wiring when only the signal of the Prowirl 73 is fed to the PLC.

2 Connection diagram for PLC with common "minus"
Dotted line = alternative wiring when only the signal of the Prowirl 73 is fed to the PLC.

3 Connection diagram without PLC
Dotted line = wiring without connection to external components (e.g. recorder, displays, Fieldgate, etc.)

A = Prowirl 73, B = pressure sensor (Cerabar M), C = temperature sensor (Omnigrad TR10) or other external measuring devices (HART-enabled and burst-enabled), D = active barrier RN221N

Wiring remote version



Connecting the remote version

a = Connection compartment cover (transmitter)
b = Connection compartment cover (sensor)
c = Connecting cable (signal cable)
d = Identical potential matching for sensor and transmitter
e = Connect shielding to ground terminal in transmitter housing and keep as short as possible
f = Connect shielding to cable strain relief clamp in connection housing

Wire colors (color code according to DIN 47100):
Terminal number: 1 = white; 2 = brown; 3 = green; 4 = yellow, 5 = gray; 6 = pink; 7 = blue; 8 = red

Optionally available with armored signal cable. Been suitable for static laying and flexible applications with free movement without tensile load and without obligatory guidance. For layings in dry and damp areas, in the soil as well as in the external area.

Supply voltage

HART:

- Non-Ex: 12 to 36 V DC (with HART: 18 to 36 V DC)
- Ex i/IS and Ex n: 12 to 30 V DC (with HART: 18 to 30 V DC)
- Ex d/XP: 15 to 36 V DC (with HART: 21 to 36 V DC)

PROFIBUS PA and FOUNDATION Fieldbus:

- Non-Ex: 9 to 32 V DC
- Ex i/IS and Ex n: 9 to 24 V DC
- Ex d/XP: 9 to 32 V DC
- Current consumption → PROFIBUS PA: 16 mA, FOUNDATION Fieldbus: 16 mA

Cable entries

Power supply and signal cables (outputs):
- Cable entry M20 × 1.5 (6 to 12 mm / 0.24 to 0.47")
- Cable entry M20 × 1.5 for armored signal cable (9.5 to 16 mm / 0.37 to 0.63")
- Thread for cable entry: ½" NPT, G ½", G ½" Shimada
- Fieldbus connector

Cable specifications

Permitted temperature range:
- Standard cable: –40 °C (–40 °F) to maximum permissible ambient temperature plus 10 °C (18 °F)
- Armored cable: –30 to +70 °C (–22 to +158 °F)

Power supply failure

- Totalizer stops at the last value determined.
- All settings are kept in the EEPROM.
- Error messages (incl. value of operated hours counter) are stored.

Performance characteristics

Reference operating conditions

Error limits following ISO/DIN 11631:
- +20 to +30 °C (+68 to +86 °F)
- 2 to 4 bar (29 to 58 psi)
- Calibration rig traceable to national calibration standards
- Calibration with the process connection corresponding to the standard in question

Maximum measured error

Prowirl 72

- Liquid:
  < 0.75% o.r. for Re > 20000
  < 0.75% o.f.s for Re between 4000 and 20000
- Gas/steam:
  < 1% o.r. for Re > 20000 and v < 75 m/s (246 ft/s)
  < 1% o.f.s for Re between 4000 and 20000

o.r. = of reading, o.f.s = of full scale value, Re = Reynolds number

Prowirl 73

- Volume flow (liquid):
  < 0.75% o.r. for Re > 20000
  < 0.75% o.f.s for Re between 4000 and 20000
- Volume flow (gas/steam):
  < 1% o.r. for Re > 20000 and v < 75 m/s (246 ft/s)
  < 1% o.f.s for Re between 4000 and 20000
- Temperature:
  < 1°C / 1.8 °F (T > 100 °C / 212 °F, saturated steam and for liquids at ambient temperature);
  < 1% o.r. [K] (gas)
  Rise time 50% (agitated under water, following IEC 60751): 8 s
- Mass flow (saturated steam):
  – For flow velocities 20 to 50 m/s (66 to 164 ft/s), T > 150 °C / 302 °F (423 K)
    < 1.7% o.r. (2% o.r. for remote version) for Re > 20000
    < 1.7% o.f.s (2% o.f.s for remote version) for Re between 4000 and 20000
  – For flow velocities 10 to 70 m/s (33 to 230 ft/s), T > 140 °C / 284 °F (413 K)
    < 2% o.r. (2.3% o.r. for remote version) for Re > 20000
    < 2% o.f.s (2.3% o.f.s for remote version) for Re between 4000 and 20000
- Mass flow of superheated steam and gas (air, natural gas AGA NX-19, AGA8-DC92, ISO 12213-2, AGA8 Gross Method 1, SGERG-88, preprogrammed gases – does not apply to the real gas equation):

  ✎ Note!
  A Cerabar S device has to be used for the measuring errors listed below. The measured error used to calculate the error in the measured pressure is 0.15%.

  < 1.7% o.r. (2.0% o.r. for remote version) for Re > 20000 and process pressure < 40 bar abs (580 psi abs)
  < 1.7% o.f.s. (2.0% for remote version) for Re between 4000 and 20000 and process pressure < 40 bar abs (580 psi abs)
  < 2.6% o.r. (2.9% o.r. for remote version) for Re > 20000 and process pressure < 120 bar abs (1740 psi abs)
  < 2.6% o.f.s. (2.9% o.r. for remote version) for Re between 4000 and 20000 and process pressure < 120 bar abs (1740 psi abs)
- Mass flow (water):
  < 0.85% o.r. (1.15% o.r. for remote version) for Re > 20000
  < 0.85% o.f.s (1.15% o.f.s for remote version) for Re between 4000 and 20000
- Mass flow (customer-defined liquids):
  To specify the system accuracy, Endress+Hauser requires information on the type of liquid and its operating temperature, or information in tabular form on the dependency between the liquid density and temperature. Example: Acetone is to be measured at fluid temperatures between 70 and 90 °C (158 and 194 °F). The parameters TEMPERATURE VALUE (here 80 °C / 176 °F), DENSITY VALUE (here 720.00 kg/m^3) and EXPANSION COEFFICIENT (here 18.0298 × 10E-4 1/°C) have to be entered in the transmitter for this purpose. The overall system uncertainty, which is smaller than 0.9% for the example cited above, is made up of the following measuring uncertainties: Uncertainty of volume flow measurement, uncertainty of temperature measurement, uncertainty of the density-temperature correlation used (incl. the resulting uncertainty of density).

- Mass flow (other fluids):
  Depends on the pressure value specified in the device functions and the fluid selected.
  An individual error observation must be carried out.

o.r. = of reading, o.f.s = of full scale value, Re = Reynolds number

Diameter mismatch correction

Both Prowirl 72 and 73 can correct shifts in the calibration factor, e.g. caused by a change in the diameter between the device flange (e.g. ANSI, 2", Sched. 80) and the mating pipe (ANSI, 2", Sched. 40). The diameter mismatch should only be corrected within the limit values listed below, for which test measurements have also been performed.

Flange connection:
- DN 15 (½"): ±20% of the internal diameter
- DN 25 (1"): ±15% of the internal diameter
- DN 40 (1½"): ±12% of the internal diameter
- DN ≥ 50 (2"): ±10% of the internal diameter

Wafer:
- DN 15 (½"): ±15% of the internal diameter
- DN 25 (1"): ±12% of the internal diameter
- DN 40 (1½"): ±9% of the internal diameter
- DN ≥ 50 (2"): ±8% of the internal diameter

If the standard internal diameter of the process connection ordered for the measuring device and the internal diameter of the mating pipe differ, an additional measuring uncertainty must be added for every 1 mm diameter deviation.

Repeatability

±0.25% o.r. (of reading)

Reaction time/step response time

If all the configurable functions for filter times (flow damping, display damping, current output time constant, frequency output time constant, status output time constant) are set to 0, a reaction time/step response time of 200 ms must be reckoned with for vortex frequencies as of 10 Hz. For other settings, a reaction time/step response time of 100 ms must always be added to the total filter reaction time for vortex frequencies as of 10 Hz.

Influence of ambient temperature

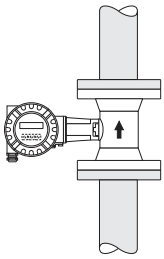
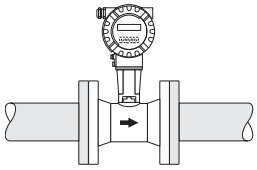
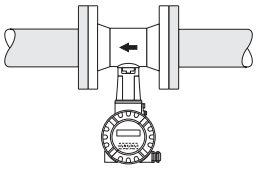
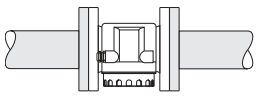
Current output (additional error, in reference to the span of 16 mA):
- Zero point (4 mA):
  Average Tk: 0.05%/10K, max. 0.6% over the entire temperature range –40 to +80 °C (–40 to 176 °F)
- Span (20 mA):
  Average Tk: 0.05%/10K, max. 0.6% over the entire temperature range –40 to +80 °C (–40 to 176 °F)

Digital outputs (pulse output, PFM, HART, frequency output; Prowirl 73 only)
Due to the digital measuring signal (vortex pulse) and further digital processing, there is no interface-related error from changing ambient temperature.

Operating conditions: installation

Installation instructions

Vortex meters require a fully developed flow profile as a prerequisite for correct volume flow measurement. 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).
The device can generally be installed in any position in the piping. However, note the following points:

Orientation		High fluid temperature (TM) ≥ 200 °C (392 °F)	Low fluid temperature (TM)
Fig. A: Vertical orientation	 A0009522	Recommended (①)	Recommended (①)
Fig. B: Horizontal orientation Transmitter head up	 A0009523	Not permitted for Prowirl 73 W DN 100 (4")/DN 150 (6") (②)	Recommended (③)
Fig. C: Horizontal orientation Transmitter head down	 A0009524	Recommended (④)	
Fig. D: Horizontal orientation Transmitter head at front with display pointing downwards	 A0009525	Recommended (④)	Recommended (③)

① In the case of liquids, there should be upward flow in vertical pipes to avoid partial pipe filling (see Fig. A).

Caution!
Disruption in flow measurement!
To guarantee the flow measurement of liquids, the measuring tube must always be completely full in pipes with vertical downward flow.

② Caution!
Danger of electronics overheating!
If fluid temperature is ≥ 200 °C (392 °F), orientation B is not permitted for the wafer version (Prowirl 73 W) with nominal diameters DN 100 (4") and DN 150 (6").

In order to ensure that the maximum permissible ambient temperature for the transmitter is not exceeded (→ 27), we recommend the following orientations:

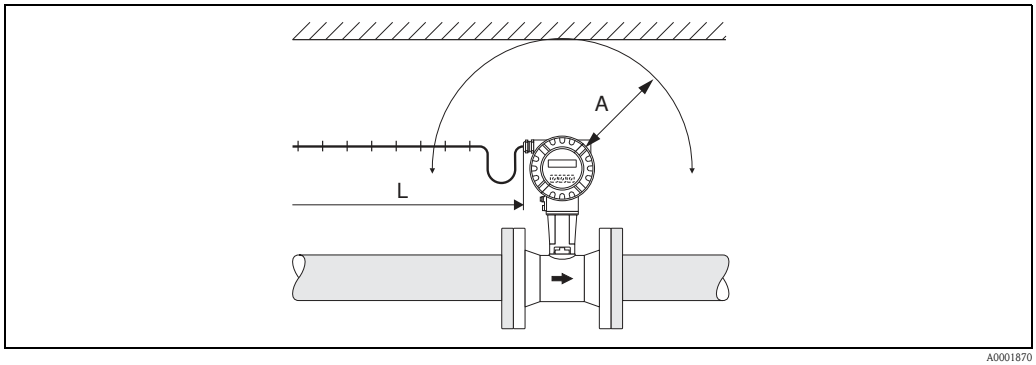
③ Select orientation C or D for hot fluids (e.g. steam or fluid temperature (TM) ≥ 200 °C (392 °F)

④ Select orientation B or D for very cold fluids (e.g. liquid nitrogen)

Minimum spacing and cable length

To ensure problem-free access to the measuring device for service purposes, we recommend you observe the following dimensions:

- Minimum spacing (A) in all directions = 100 mm (3.94")
- Necessary cable length (L): L + 150 mm (5.91")



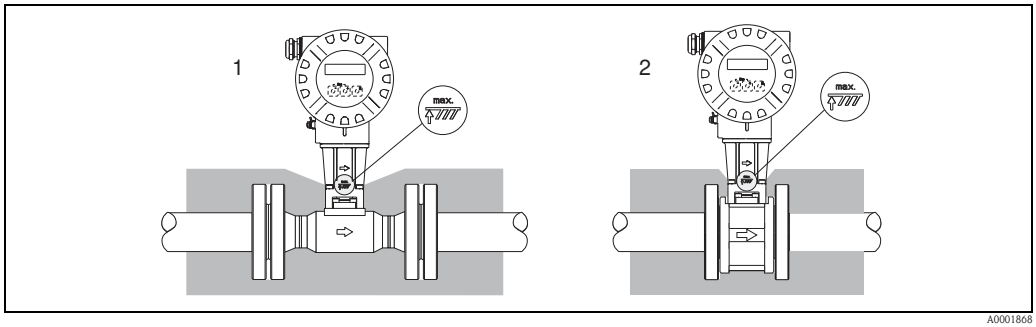
A0001870

Rotating the electronics housing and the display

The electronics housing can be rotated continuously 360° on the housing support. The display unit can be rotated in 45° stages. This means you can read off the display comfortably in all orientations.

Piping insulation

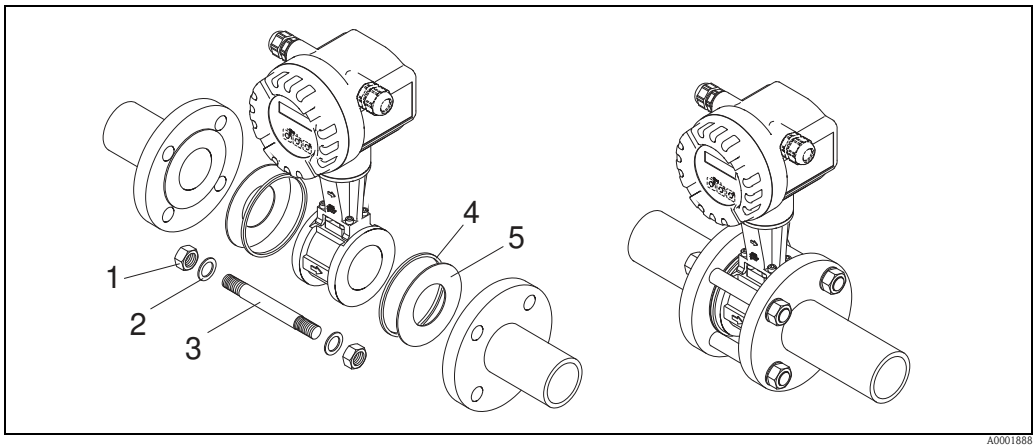
When insulating, please ensure that a sufficiently large area of the housing support is exposed.
The uncovered part serves as a radiator and protects the electronics from overheating (or undercooling).
The maximum insulation height permitted is illustrated in the diagrams. These apply equally to both the compact version and the sensor in the remote version.



1 = Flanged version
2 = Wafer version

Wafer version mounting set

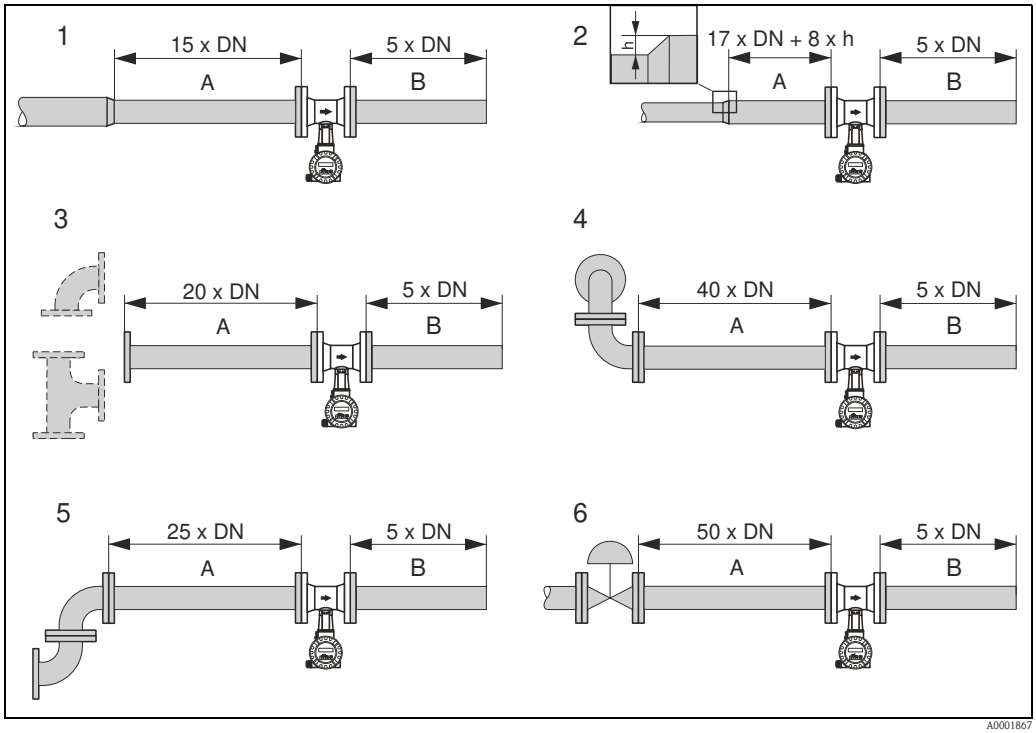
The centering rings supplied are used to mount and center the wafer-style devices. A mounting set consisting of tie rods, seals, nuts and washers can be ordered separately.



Mounting wafer version
1 = Nut
2 = Washer
3 = Tie rod
4 = Centering ring (is supplied with the device)
5 = Seal

Inlet and outlet run

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.



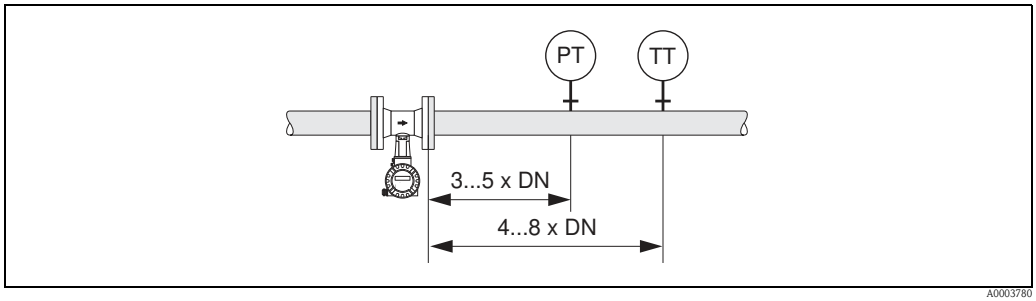
Minimum inlet and outlet runs with various flow obstructions

A = Inlet run
B = Outlet run
h = Difference in expansion
1 = Reduction
2 = Extension
3 = 90° elbow or T-piece
4 = 2 × 90° elbow, 3-dimensional
5 = 2 × 90° elbow
6 = Control valve

Note!
A specially designed perforated plate flow conditioner can be installed if it is not possible to observe the inlet runs required (→ 🖹 26).

Outlet runs with pressure and temperature measuring points

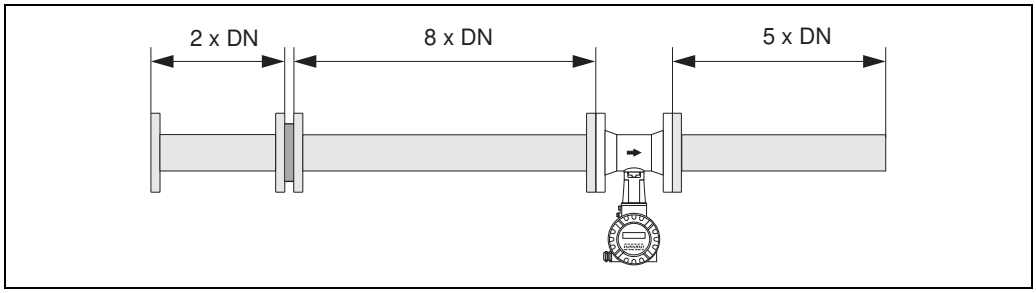
If pressure and temperature measuring points are installed after the device, please ensure there is a large enough distance between the device and the measuring point so there are no negative effects on vortex formation in the sensor.



PT = Pressure measuring point
TT = Temperature measuring point

Perforated plate flow conditioner

A specially designed perforated plate flow conditioner, available from Endress+Hauser, can be installed if it is not possible to observe the inlet runs required. The flow conditioner is fitted between two piping flanges and centered with the mounting bolts. Generally, this reduces the inlet run required to 10 × DN with complete accuracy.



The pressure loss for flow conditioners is calculated as follows:
Δp [mbar] = 0.0085 · ρ [kg/m³] · v² [m/s]

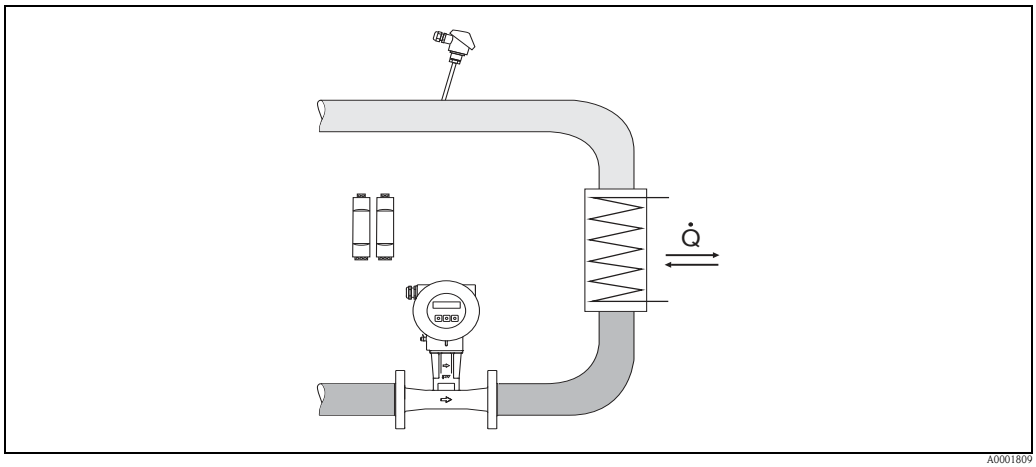
Example with steam
p = 10 bar abs
t = 240 °C → ρ = 4.39 kg/m³
v = 40 m/s
$\Delta p = 0.0085 \cdot 4.39 \cdot 40^2 = 59.7$ mbar

Example with H_2O condensate (80 °C)
ρ = 965 kg/m³
v = 2.5 m/s
$\Delta p = 0.0085 \cdot 965 \cdot 2.5^2 = 51.3$ mbar

ρ : density of the process medium
v : average flow velocity

Installation for delta heat measurement (Prowirl 73 HART)

- The second temperature measurement takes place by means of a separate sensor and is read in via HART.
- Prowirl 73 generally has to be installed on the steam side for saturated steam delta heat measurement.
- For water-delta heat measurement, Prowirl 73 can be installed on both the cold side and the warm side.
- The inlet and outlet runs specified above must be observed.



Layout for delta heat measurement of saturated steam and water

Operating conditions: environment

Ambient temperature range

- Compact version:
  - Standard: –40 to +70 °C (–40 to +158 °F)
  - EEx-d/XP version: –40 to +60 °C (–40 to +140 °F)
  - ATEX II 1/2 GD version/dust ignition-proof: –20 to +55 °C (–4 to +131 °F)
  - Display can be read between –20 and +70 °C (–4 and +158 °F)
- Remote version sensor:
  - Standard:–40 to +85 °C (–40 to +185 °F)
  - with armored cable: –30 to +70 °C (–22 to +158 °F)
  - ATEX II 1/2 GD version/dust ignition-proof: –20 to +55 °C (–4 to +131 °F)
- Remote version transmitter:
  - Standard: –40 to +80 °C (–40 to +176 °F)
  - with armored cable: –30 to +70 °C (–22 to +158 °F)
  - EEx-d/XP version: –40 to +60 °C (–40 to +140 °F)
  - ATEX II 1/2 GD version/dust ignition-proof: –20 to +55 °C (–4 to +131 °F)
  - Display can be read between –20 and +70 °C (–4 and +158 °F)
  - Version up to –50 °C (–58 °F) (on request)

When mounting outside, protect from direct sunlight with a protective cover (order number 543199-0001), especially in warmer climates with high ambient temperatures.

Storage temperature

- Standard: –40 to +80 °C (–40 to +176 °F)
- ATEX II 1/2 GD version/dust ignition-proof: –20 to +55 °C (–4 to +131 °F)
- Version up to –52 °C (–62 °F) (on request)

Degree of protection

IP 67 (NEMA 4X) in accordance with EN 60529

Vibration resistance

Acceleration up to 1 g (at factory setting of the gain), 10 to 500 Hz, following IEC 60068-2-6

Electromagnetic compatibility (EMC)

to IEC/EN 61326 and NAMUR Recommendation NE 21

Operating conditions: process

Medium temperature range

Prowirl 72

DSC sensor (differential switched capacitor; capacitive sensor)	
DSC standard sensor	–40 to +260 °C (–40 to +500 °F)
DSC high/low temperature sensor	–200 to +400 °C (–328 to +752 °F)
DSC sensor Inconel (PN 63 to 160, Class 600, JIS 40K)	–200 to +400 °C (–328 to +752 °F)
DSC sensor titanium Gr. 5 (PN 250, Class 900 to 1500 and butt-weld version)	–50 to +400 °C (–58 to +752 °F)
DSC sensor Alloy C-22	–200 to +400 °C (–328 to +752 °F)

Seals	
Graphite	–200 to +400 °C (–328 to +752 °F)
Viton	–15 to +175 °C (+5 to +347 °F)
Kalrez	–20 to +275 °C (–4 to +527 °F)
Gylon (PTFE)	–200 to +260 °C (–328 to +500 °F)

Sensor	
Stainless steel	–200 to +400 °C (–328 to +752 °F)
Alloy C-22	–40 to +260 °C (–40 to +500 °F)
Special version for high fluid temperatures (on request)	–200 to +450 °C (–328 to +842 °F) –200 to +440 °C (–328 to +824 °F), Ex version

Prowirl 73

DSC sensor (differential switched capacitor; capacitive sensor)	
DSC standard sensor	–200 to +400 °C (–328 to +752 °F)
DSC sensor Inconel (PN 63 to 160, Class 600, JIS 40K)	–200 to +400 °C (–328 to +752 °F)

Seals	
Graphite	–200 to +400 °C (–328 to +752 °F)
Viton	–15 to +175 °C (+5 to +347 °F)
Kalrez	–20 to +275 °C (–4 to +527 °F)
Gylon (PTFE)	–200 to +260 °C (–328 to +500 °F)

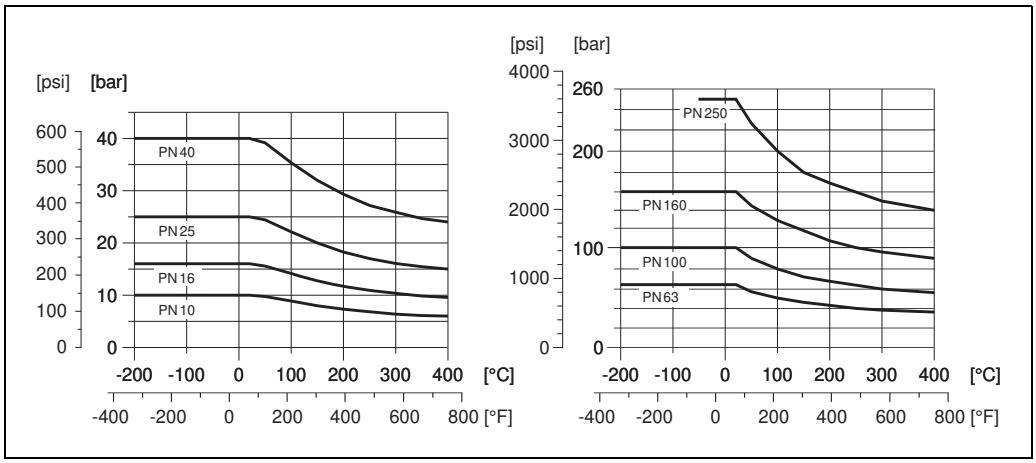
Sensor	
Stainless steel	–200 to +400 °C (–328 to +752 °F)
Special version for high fluid temperatures (on request)	–200 to +450 °C (–328 to +842 °F) –200 to +440 °C (–328 to +824 °F), Ex version

Medium pressure

Prowirl 72

Pressure-temperature curve to EN (DIN), stainless steel

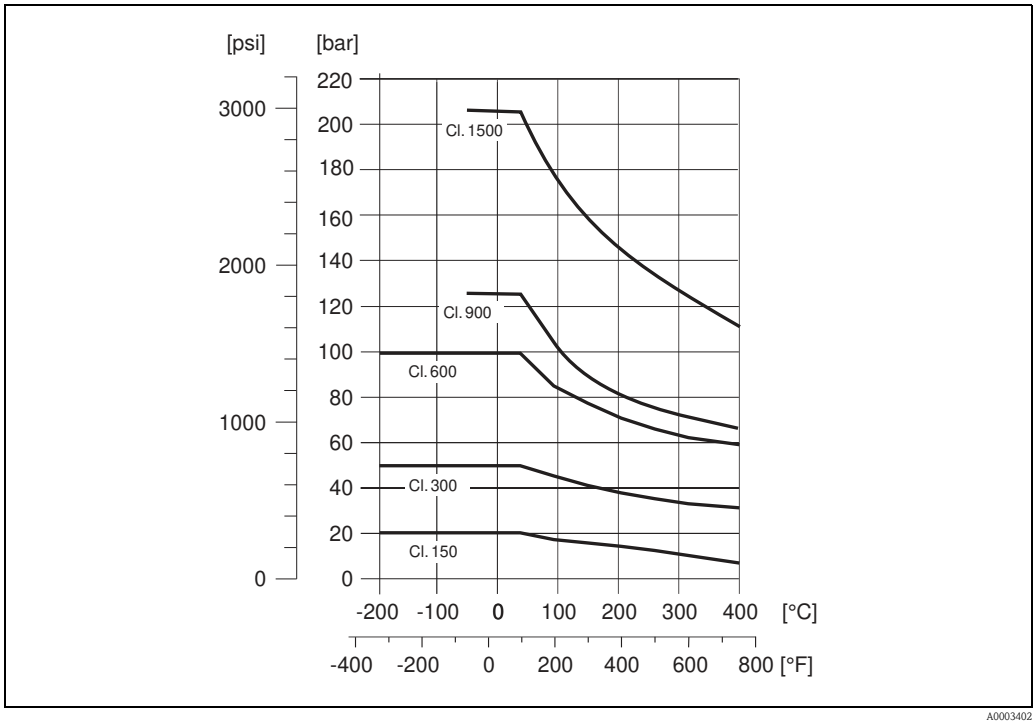
PN 10 to 40 → Prowirl 72W and 72F
PN 63 to 250 → Prowirl 72F



A0003238

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

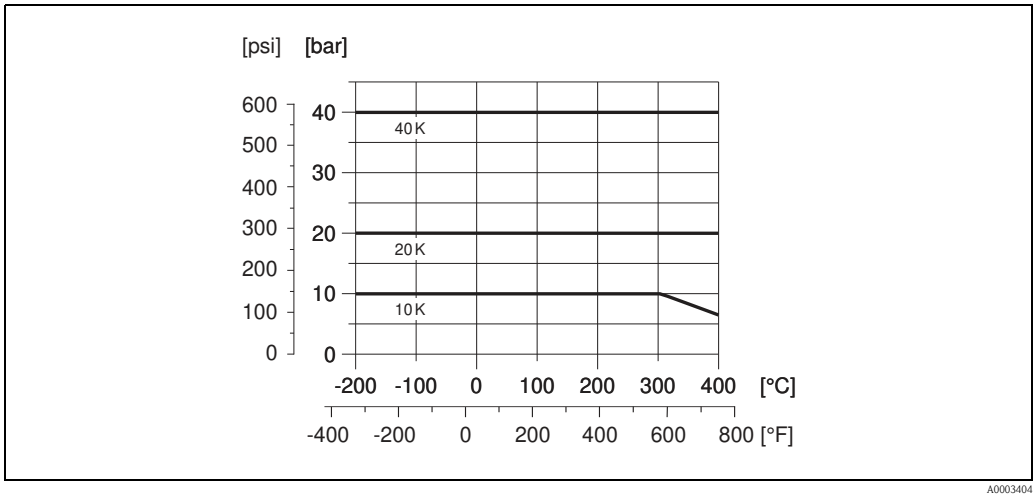
Class 150 to 300 → Prowirl 72W and 72F
Class 600 to 1500 → Prowirl 72F



A0003402

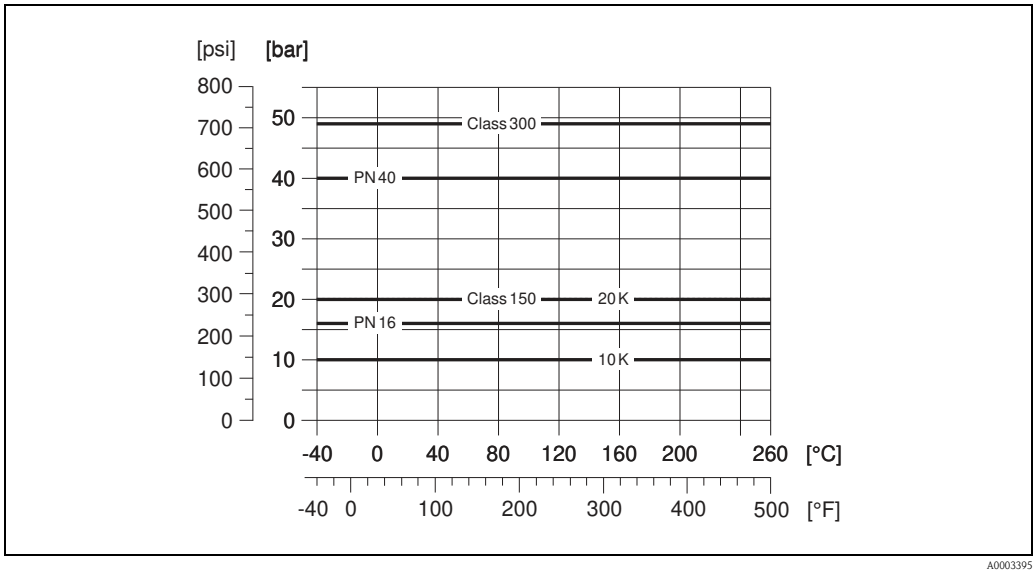
Pressure-temperature curve to JIS B2220, stainless steel:

10 to 20K → Prowirl 72W and 72F
40K → Prowirl 72F



Pressure-temperature curve to EN (DIN), ANSI B16.5 and JIS B2220, Alloy C-22

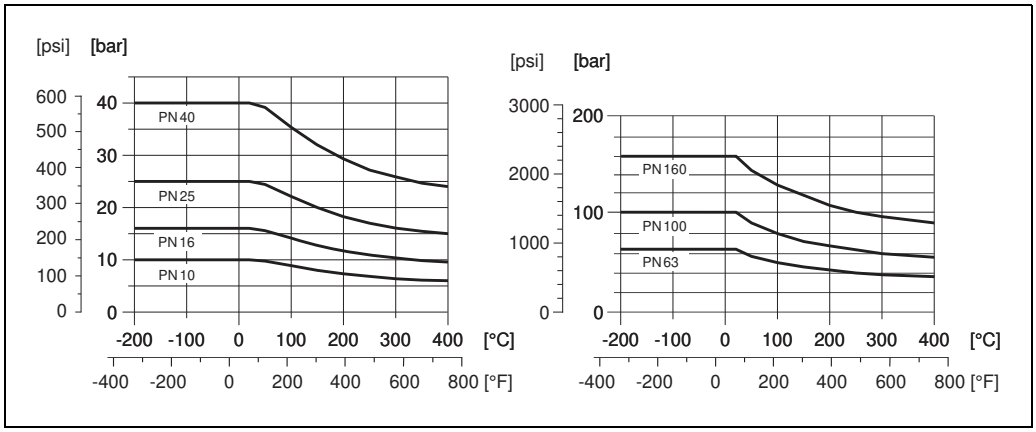
PN 16 to 40, Class 150 to 300, 10 to 20K → Prowirl 72F



Prowirl 73

Pressure-temperature curve to EN (DIN), stainless steel

PN 10 to 40 → Prowirl 73W and 73F
PN 63 to 160 → Prowirl 73F

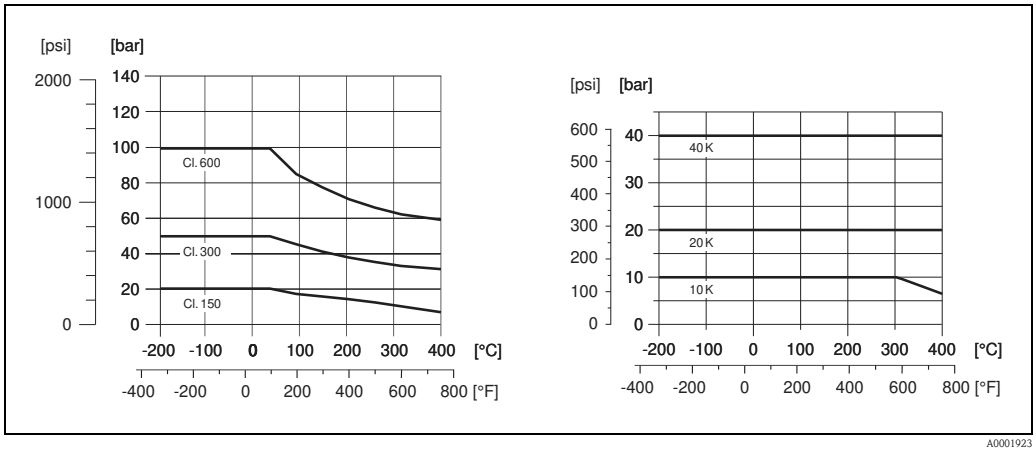


A0007085

Pressure-temperature curve to ANSI B16.5 and JIS B2220, stainless steel

ANSI B16.5:
Class 150 to 300 → Prowirl 73W and 73F
Class 600 → Prowirl 73F

JIS B2220:
10 to 20K → Prowirl 73W and 73F
40K → Prowirl 73F



A0001923

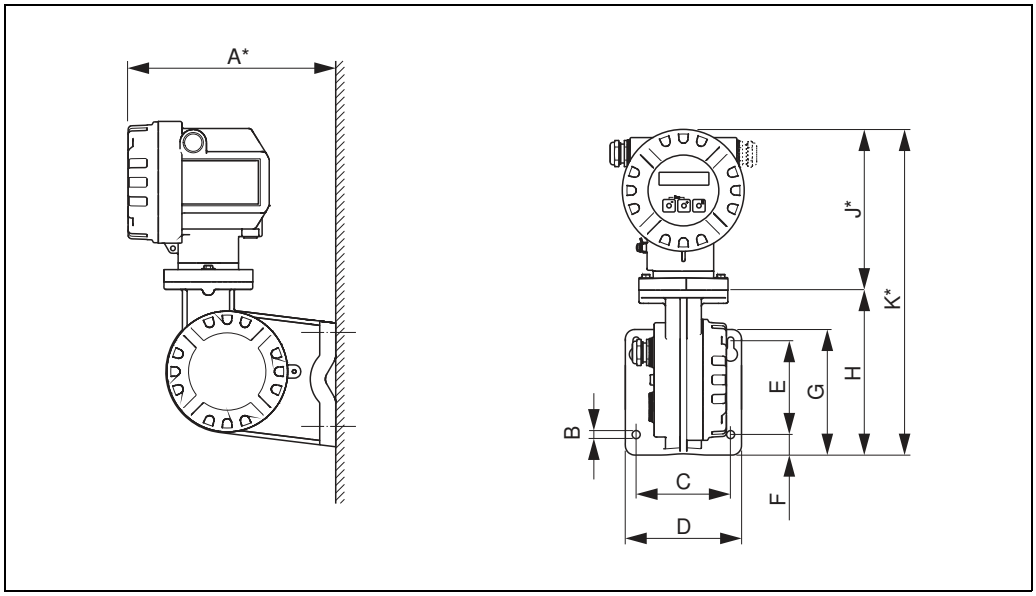
Pressure loss

The pressure loss can be determined with the aid of the Applicator. The Applicator is software for selecting and planning flowmeters. The software is available both via the Internet (www.applicator.com) and on a CD-ROM for local PC installation.

Mechanical construction

Design, dimensions

Dimensions of transmitter, remote version



A0003594

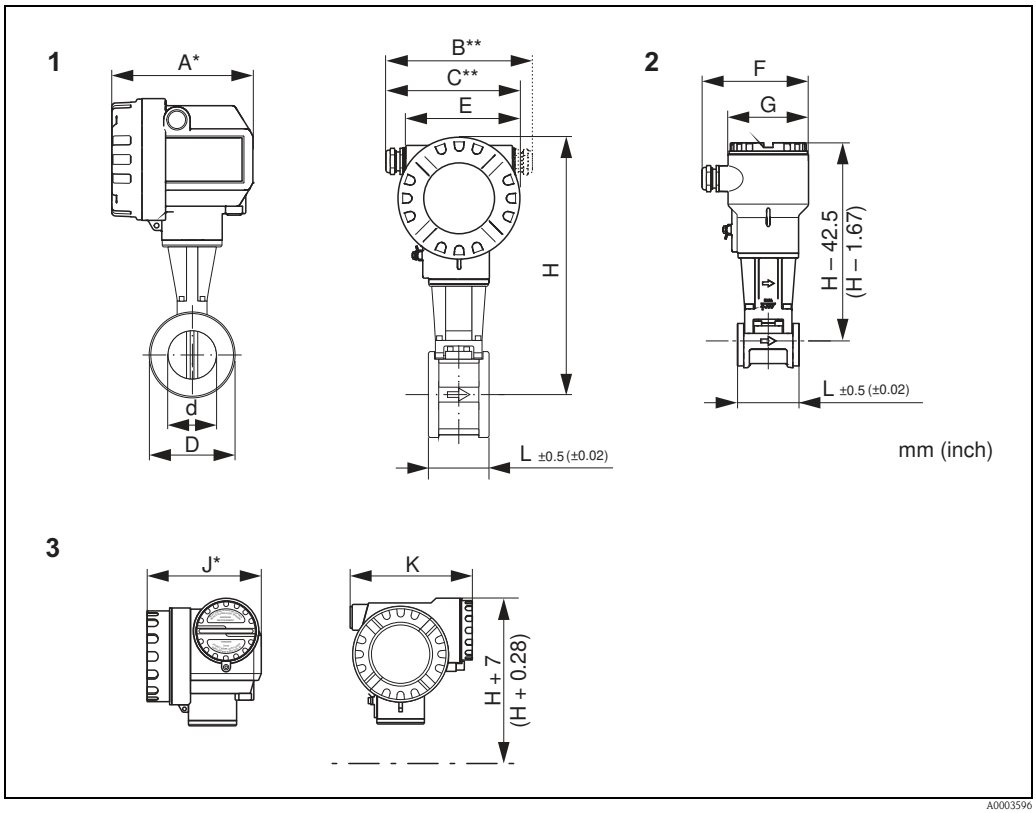
A mm (inch)	B mm (inch)	C mm (inch)	D mm (inch)	E mm (inch)	F mm (inch)	G mm (inch)	H mm (inch)	J mm (inch)	K mm (inch)
220 (8.66)	∅ 8.6 (M8) (∅ 0.34 (M8))	100 (3.94)	130 (5.12)	100 (3.94)	21 (0,83)	144 (5.67)	170 (6.69)	170 (6.69)	340 (13.39)

* The following dimensions differ depending on the version:
– The dimension 220 mm (8.66") changes to 214 mm (8.43") in the blind version (without local operation).
– The dimension 170 mm (6.69") changes to 183 mm (7.20") in the Ex d/XP version.
– The dimension 340 mm (13.39") changes to 353 mm (13.90") 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 wafer versions
Prowirl 72W, 73W

Wafer version for flanges to:
- EN 1092-1 (DIN 2501), PN 10 to 40
- ANSI B16.5, Class 150 to 300, Sch. 40
- JIS B2220, 10 to 20K, Sch. 40



1 = Standard as well as Ex i/IS and Ex n version
2 = Remote version
3 = Ex d version (transmitter)

A mm (inch)	B mm (inch)	C mm (inch)	E mm (inch)	F mm (inch)	G mm (inch)	J mm (inch)	K mm (inch)
149 (5.87)	161 to 181 (6.34 to 7.13)	141 to 151 (5.55 to 5.94)	121 (4.76)	105 (4.13)	95 (3.74)	151 (5.94)	157 (6.18)

* The dimensions change as follows in the blind version (without local operation):
– Standard, Ex i/IS and Ex n version: The dimension 149 mm (5.87") changes to 142 mm (5.59") in the blind version.
– Ex d/XP version: The dimension 151 mm (5.94") changes to 144 mm (5.67") in the blind version.
** The dimension depends on the cable gland used.

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).

DN		d	D	H[1]	L	Weight[2]
DIN/JIS	ANSI	mm (inch)	mm (inch)	mm (inch)	mm (inch)	kg (lbs)
15	½"	16.5 (0.65)	45.0 (1.77)	247 (9.73)	65 (2.56)	3.0 (6.62)
25	1"	27.6 (1.09)	64.0 (2.52)	257 (10.1)	65 (2.56)	3.2 (7.06)
40	1½"	42.0 (1.65)	82.0 (3.23)	265 (10.4)	65 (2.56)	3.8 (8.38)
50	2"	53.5 (2.11)	92.0 (3.62)	272 (10.7)	65 (2.56)	4.1 (9.04)
80	3"	80.3 (3.16)	127.0 (5.00)	286 (11.3)	65 (2.56)	5.5 (12.13)
100 (DIN)	–	104.8 (4.13)	157.2 (6.19)	299 (11.8)	65 (2.56)	6.5 (14.33)
100 (JIS)	4"	102.3 (4.03)	157.2 (6.19)	299 (11.8)	65 (2.56)	6.5 (14.33)
150	6"	156.8 (6.18)	215.9 (8.51)	325 (12.8)	65 (2.56)	9.0 (19.85)

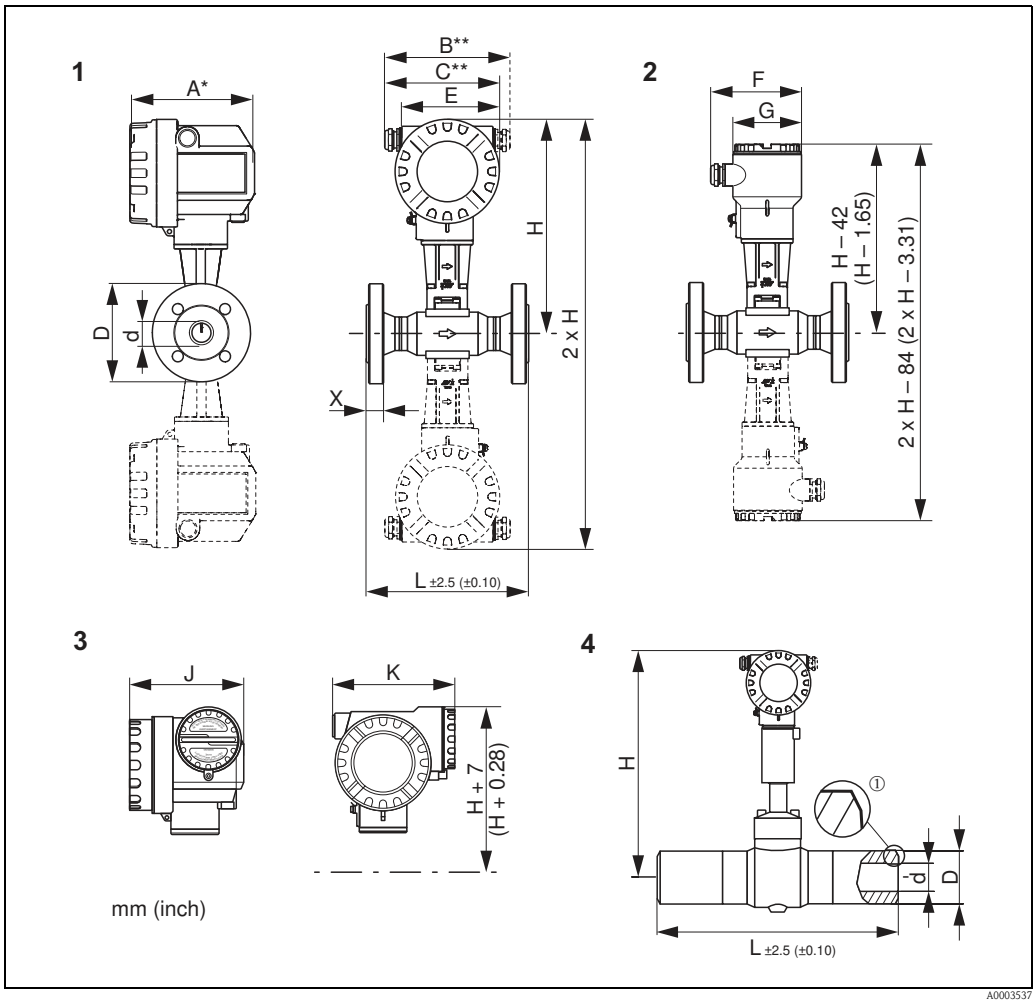
[1] The dimension H increases by 29 mm (1.14") for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (version with extended temperature range).

[2] The weight data refer to the compact version. The weight increases by 0.5 kg (1.1 lbs) for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (version with extended temperature range).

Dimensions of flanged versions (standard devices)
Prowirl 72F, 73F

Flange connection dimensions in accordance with flange standard:
- 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, optional with groove to EN 1091-1 Form D (DIN 2512 Form N)
  - EN 1092-1 Form B2 (DIN 2526 Form E), PN 63 to 100, Ra = 1.6 to 3.2 µm[1) 2)]
  - DIN 2526 Form E, PN 160 to 250[3)], Ra = 1.6 to 3.2 µm[1)]
- ANSI B16.5, Class 150 to 1500[1) 2)], Ra = 125 to 250 µin[2)]
- JIS B2220, 10 to 40K[1)], Ra = 125 to 250 µin

[1)] Prowirl 73F: PN 63 to 160, Class 600 and 40K
[2)] Prowirl 73F: only Class 150 to 600
[3)] Prowirl 73F: only PN 160



1 = Standard, Ex i and Ex n version ; d: connection pipe internal diameter
2 = Remote version
3 = Ex d /XP version (transmitter)
4 = Butt-weld version (only available for Prowirl 72)

① Groove type 22 in accordance with DIN 2559
Dotted line: Dualsens version

A mm (inch)	B mm (inch)	C mm (inch)	E mm (inch)	F mm (inch)	G mm (inch)	J mm (inch)	K mm (inch)
149 (5.87)	161 to 181 (6.34 to 7.13)	141 to 151 (5.55 to 5.94)	121 (4.76)	113 (4.45)	85 (3.35)	151 (5.94)	161 (6.34)

* The dimensions below change as follows in the blind version (without local operation):
– Standard, Ex i/IS and Ex n version: The dimension 149 mm (5.87") changes to 142 mm (5.59") in the blind version.
– Ex d/XP version: The dimension 151 mm (5.94") changes to 144 mm (5.67") in the blind version.
** The dimension depends on the cable gland used.

✎ 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).

Flanged versions (standard devices) to EN 1092-1 (DIN 2501)
Prowirl 72F, 73F

DN	Pressure rating	d [mm]	D [mm]	H[2)] [mm]	L [mm]	X [mm]	Weight[3)] [kg]
15[4)]	PN 40	17.3	95.0	248	200	16	5
	PN 160	17.3	105.0	288	200	23	7
	PN 250[1)]	16.1	130.0	310	248	26	15
	Butt-weld[1)]	16.1	23.4	310	248	–	9
25[4)]	PN 40	28.5	115.0	255	200	18	7
	PN 100	28.5	140.0	295	200	27	11
	PN 160	27.9	140.0	295	200	27	11
	PN 250[1)]	26.5	150.0	310	248	28	16
	Butt-weld[1)]	24.3	35.6	310	248	–	9
40	PN 40	43.1	150.0	263	200	18	9
	PN 100	42.5	170.0	303	200	31	15
	PN 160	41.1	170.0	303	200	31	15
	PN 250[1) 4)]	38.1	185.0	315	278	34	21
	Butt-weld[1) 4)]	38.1	48.3	315	278	–	9
50	PN 40	54.5	165.0	270	200	20	11
	PN 63	54.5	180.0	310	200	33	17
	PN 100	53.9	195.0	310	200	33	19
	PN 160	52.3	195.0	310	200	33	19
	PN 250[1) 4)]	47.7	200.0	306	288	38	23
	Butt-weld[1) 4)]	47.7	60.3	306	288	–	9
80	PN 40	82.5	200.0	283	200	24	16
	PN 63	81.7	215.0	323	200	39	24
	PN 100	80.9	230.0	323	200	39	27
	PN 160	76.3	230.0	323	200	39	27
	PN 250[1) 4)]	79.6	255.0	311	325	46	41
	Butt-weld[1) 4)]	79.6	101.6	311	325	–	13
100	PN 16	107.1	220.0	295	250	20	18
	PN 40	107.1	235.0	295	250	24	21
	PN 63	106.3	250.0	335	250	49	39
	PN 100	104.3	265.0	335	250	49	42
	PN 160	98.3	265.0	335	250	49	42
	PN 250[1) 4)]	98.6	300.0	323	394	54	64
	Butt-weld[1) 4)]	98.6	127.0	323	394	–	21
150	PN 16	159.3	285.0	319	300	22	30
	PN 40	159.3	300.0	319	300	28	37
	PN 63	157.1	345.0	359	300	64	86
	PN 100	154.1	355.0	359	300	64	88
	PN 160	146.3	355.0	359	300	64	88
	PN 250[1) 4)]	142.8	390.0	339	566	68	152
	Butt-weld[1) 4)]	142.8	177.8	339	566	–	53

Flanged versions (standard devices) to EN 1092-1 (DIN 2501)
Prowirl 72F, 73F

DN	Pressure rating	d [mm]	D [mm]	H[2] [mm]	L [mm]	X [mm]	Weight[3] [kg]
200	PN 10	207.3	340.0	348	300	42	63
	PN 16	207.3	340.0	348	300	42	62
	PN 25	206.5	360.0	348	300	42	68
	PN 40	206.5	375.0	348	300	42	72
250	PN 10	260.4	395	375	380	48	88
	PN 16	260.4	405	375	380	48	92
	PN 25	258.8	425	375	380	48	100
	PN 40	258.8	450	375	380	48	111
300[4]	PN 10	309.7	445	398	450	51	121
	PN 16	309.7	460	398	450	51	129
	PN 25	307.9	485	398	450	51	140
	PN 40	307.9	515	398	450	51	158

1) In contrast to the other versions, devices have a sensor in the bluff body. Only available for 72F.
2) The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).
3) The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.
4) Not available as Dualsens version.

Flanged versions (standard devices) to ANSI B16.5
Prowirl 72F, 73F

DN	Pressure rating		d mm (inch)	D mm (inch)	H[2] mm (inch)	L mm (inch)	X mm (inch)	Weight[3] kg (lbs)
½" [4]	Schedule 40	Cl. 150	15.7 (0.62)	88.9 (3.50)	248 (9.77)	200 (7.88)	11.2 (0.44)	5 (11)
		Cl. 300	15.7 (0.62)	95.0 (3.74)	248 (9.77)	200 (7.88)	14.2 (0.56)	5 (11)
	Schedule 80	Cl. 150	13.9 (0.55)	88.9 (3.50)	248 (9.77)	200 (7.88)	11.2 (0.44)	5 (11)
		Cl. 300	13.9 (0.55)	95.0 (3.74)	248 (9.77)	200 (7.88)	14.2 (0.56)	5 (11)
		Cl. 600	13.9 (0.55)	95.3 (3.75)	288 (11.35)	200 (7.88)	23 (0.91)	6 (13)
		Cl. 1500[1]	14.0 (0.55)	120.6 (4.75)	310 (12.21)	262 (10.32)	22.3 (0.88)	13 (29)
		Butt-weld[1]	14.0 (0.55)	21.3 (0.84)	310 (12.21)	248 (9.77)	– (–)	9 (20)
1" [4]	Schedule 40	Cl. 150	26.7 (1.05)	107.9 (4.25)	255 (10.05)	200 (7.88)	15.7 (0.62)	6 (13)
		Cl. 300	26.7 (1.05)	123.8 (4.88)	255 (10.05)	200 (7.88)	19.1 (0.75)	7 (15)
	Schedule 80	Cl. 150	24.3 (0.96)	107.9 (4.25)	255 (10.05)	200 (7.88)	15.7 (0.62)	6 (13)
		Cl. 300	24.3 (0.96)	123.8 (4.88)	255 (10.05)	200 (7.88)	19.1 (0.75)	7 (15)
		Cl. 600	24.3 (0.96)	124.0 (4.89)	295 (11.62)	200 (7.88)	27 (1.06)	9 (20)
		Cl. 1500[1]	24.3 (0.96)	149.3 (5.88)	310 (12.21)	287.7 (11.34)	28.4 (1.12)	17 (37)
		Butt-weld[1]	24.3 (0.96)	33.4 (1.32)	310 (12.21)	248 (9.77)	– (–)	9 (20)

Flanged versions (standard devices) to ANSI B16.5 Prowirl 72F, 73F								
DN	Pressure rating		d mm (inch)	D mm (inch)	H[2)] mm (inch)	L mm (inch)	X mm (inch)	Weight[3)] kg (lbs)
1½"	Schedule 40	Cl. 150	40.9 (1.61)	127.0 (5.00)	263 (10.36)	200 (7.88)	17.5 (0.69)	8 (18)
		Cl. 300	40.9 (1.61)	155.6 (6.13)	263 (10.36)	200 (7.88)	20.6 (0.81)	10 (22)
	Schedule 80	Cl. 150	38.1 (1.50)	127.0 (5.00)	263 (10.36)	200 (7.88)	17.5 (0.69)	8 (18)
		Cl. 300	38.1 (1.50)	155.6 (6.13)	263 (10.36)	200 (7.88)	20.6 (0.81)	10 (22)
		Cl. 600	38.1 (1.50)	155.4 (6.12)	303 (11.94)	200 (7.88)	31 (1.22)	13 (29)
		Cl. 1500[1) 4)]	38.1 (1.50)	177.8 (7.01)	315 (12.41)	305.8 (12.05)	31.7 (1.25)	20 (44)
		Butt-weld[1) 4)]	38.1 (1.50)	48.3 (1.90)	315 (12.41)	278 (10.95)	– (–)	9 (20)
2"	Schedule 40	Cl. 150	52.6 (2.07)	152.4 (6.00)	270 (10.64)	200 (7.88)	19.1 (0.75)	10 (22)
		Cl. 300	52.6 (2.07)	165.0 (6.50)	270 (10.64)	200 (7.88)	22.4 (0.88)	12 (26)
	Schedule 80	Cl. 150	49.2 (1.94)	152.4 (6.00)	270 (10.64)	200 (7.88)	19.1 (0.75)	10 (22)
		Cl. 300	49.2 (1.94)	165.0 (6.50)	270 (10.64)	200 (7.88)	22.4 (0.88)	12 (26)
		Cl. 600	49.2 (1.94)	165.1 (6.50)	310 (12.21)	200 (7.88)	33 (1.30)	14 (31)
		Cl. 1500[1) 4)]	49.3 (1.94)	215.9 (8.51)	306 (12.06)	344 (13.55)	38.1 (1.50)	30 (66)
		Butt-weld[1) 4)]	47.7 (1.88)	60.3 (2.38)	306 (12.06)	288 (11.35)	– (–)	9 (20)
3"	Schedule 40	Cl. 150	78.0 (3.07)	190.5 (7.51)	283 (11.15)	200 (7.88)	23.9 (0.94)	15 (33.08)
		Cl. 300	78.0 (3.07)	210.0 (8.27)	283 (11.15)	200 (7.88)	28.4 (1.12)	19 (41.90)
	Schedule 80	Cl. 150	73.7 (2.90)	190.5 (7.51)	283 (11.15)	200 (7.88)	23.9 (0.94)	15 (33.08)
		Cl. 300	73.7 (2.90)	210.0 (8.27)	283 (11.15)	200 (7.88)	28.4 (1.12)	19 (41.90)
		Cl. 600	73.7 (2.90)	209.6 (8.26)	323 (12.73)	200 (7.88)	39 (1.54)	22 (48.51)
		Cl. 900[1) 4)]	73.7 (2.90)	241.3 (9.51)	311 (12.25)	349 (13.75)	38.1 (1.50)	37 (81.59)
		Cl. 1500[1) 4)]	73.7 (2.90)	266.7 (10.51)	311 (12.25)	380.4 (14.99)	47.7 (1.88)	49 (108.05)
		Butt-weld[1) 4)]	73.7 (2.90)	95.7 (3.77)	311 (12.25)	325 (12.81)	– (–)	13 (28.67)
4"	Schedule 40	Cl. 150	102.4 (4.03)	228.6 (9.01)	295 (11.62)	250 (9.85)	24.5 (0.97)	22 (48.51)
		Cl. 300	102.4 (4.03)	254.0 (10.01)	295 (11.62)	250 (9.85)	31.8 (1.25)	30 (66.15)
	Schedule 80	Cl. 150	97.0 (3.82)	228.6 (9.01)	295 (11.62)	250 (9.85)	24.5 (0.97)	22 (48.51)
		Cl. 300	97.0 (3.82)	254.0 (10.01)	295 (11.62)	250 (9.85)	31.8 (1.25)	30 (66.15)
		Cl. 600	97.0 (3.82)	273.1 (10.76)	335 (13.20)	250 (9.85)	49 (1.93)	43 (94.82)
		Cl. 900[1) 4)]	97.3 (3.83)	292.1 (11.51)	323 (12.73)	408 (16.08)	44.4 (1.75)	57 (125.69)
		Cl. 1500[1) 4)]	97.3 (3.83)	311.1 (12.26)	323 (12.73)	427 (16.82)	53.8 (2.12)	71 (156.56)
		Butt-weld[1) 4)]	97.3 (3.83)	125.7 (4.95)	323 (12.73)	394 (15.52)	– (–)	21 (46.31)

Flanged versions (standard devices) to ANSI B16.5
Prowirl 72F, 73F

DN	Pressure rating		d mm (inch)	D mm (inch)	H[2] mm (inch)	L mm (inch)	X mm (inch)	Weight[3] kg (lbs)
6"	Schedule 40	Cl. 150	154.2 (6.08)	279.4 (11.01)	319 (12.57)	300 (11.82)	25.4 (1.00)	34 (74.97)
		Cl. 300	154.2 (6.08)	317.5 (12.51)	319 (12.57)	300 (11.82)	36.6 (1.44)	50 (110.25)
	Schedule 80	Cl. 150	146.3 (5.76)	279.4 (11.01)	319 (12.57)	300 (11.82)	25.4 (1.00)	34 (74.97)
		Cl. 300	146.3 (5.76)	317.5 (12.51)	319 (12.57)	300 (11.82)	36.6 (1.44)	50 (110.25)
		Cl. 600	146.3 (5.76)	355.6 (14.01)	359 (14.14)	300 (11.82)	64 (2.52)	87 (191.84)
		Cl. 900[1) 4)]	131.8 (5.19)	381.0 (15.01)	339 (13.36)	538 (21.20)	55.6 (2.19)	131 (288.86)
		Cl. 1500[1) 4)]	146.3 (5.76)	393.7 (15.51)	339 (13.36)	602 (23.72)	82.5 (3.25)	173 (381.47)
		Butt-weld[1) 4)]	146.3 (5.76)	168.3 (6.63)	339 (13.36)	566 (22.30)	– (–)	53 (116.87)
8"	Schedule 40	Cl. 150	202.7 (7.99)	342.9 (13.51)	348 (13.71)	300 (11.82)	42 (1.65)	64 (141.12)
		Cl. 300	202.7 (7.99)	381.0 (15.01)	348 (13.71)	300 (11.82)	42 (1.65)	76 (167.58)
10"	Schedule 40	Cl. 150	254.5 (10.03)	406.4 (16.01)	375 (14.78)	380 (14.97)	48 (1.89)	92 (202.86)
		Cl. 300	254.5 (10.03)	444.5 (17.51)	375 (14.78)	380 (14.97)	48 (1.89)	109 (240.35)
12" [4)]	Schedule 40	Cl. 150	304.8 (12.01)	482.6 (19.01)	398 (15.68)	450 (17.73)	60 (2.36)	143 (315.32)
		Cl. 300	304.8 (12.01)	520.7 (20.52)	398 (15.68)	450 (17.73)	60 (2.36)	162 (357.21)

[1)] In contrast to the other versions, devices have a sensor in the bluff body. Only available for 72F.
[2)] The dimension H increases by 29 mm (1.14") for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).
[3)] The weight data refer to the compact version. The weight increases by 0.5 kg (1.1 lbs) for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K). The weight increases by 6 kg (13.2 lbs) for the Dualsens version.
[4)] Not available as a Dualsens version.

Flanged versions (standard devices) to JIS B2220 Prowirl 72F, 73F								
DN	Pressure rating		d [mm]	D [mm]	H[1] [mm]	L [mm]	X [mm]	Weight[2] [kg]
15[3]	Schedule 40	20K	16.1	95	248	200	14	5
	Schedule 80	20K	13.9	95	248	200	14	5
	Schedule 80	40K	13.9	115	288	200	23	8
25[3]	Schedule 40	20K	27.2	125	255	200	16	7
	Schedule 80	20K	24.3	125	255	200	16	7
	Schedule 80	40K	24.3	130	295	200	27	10
40	Schedule 40	20K	41.2	140	263	200	18	9
	Schedule 80	20K	38.1	140	263	200	18	9
	Schedule 80	40K	38.1	160	303	200	31	14
50	Schedule 40	10K	52.7	155	270	200	16	10
	Schedule 40	20K	52.7	155	270	200	18	10
	Schedule 80	10K	49.2	155	270	200	16	10
	Schedule 80	20K	49.2	155	270	200	18	10
	Schedule 80	40K	49.2	165	310	200	33	15
80	Schedule 40	10K	78.1	185	283	200	18	14
	Schedule 40	20K	78.1	200	283	200	22	15
	Schedule 80	10K	73.7	185	283	200	18	14
	Schedule 80	20K	73.7	200	283	200	22	15
	Schedule 80	40K	73.7	210	323	200	39	24
100	Schedule 40	10K	102.3	210	295	250	18	18
	Schedule 40	20K	102.3	225	295	250	24	21
	Schedule 80	10K	97.0	210	295	250	18	18
	Schedule 80	20K	97.0	225	295	250	24	22
	Schedule 80	40K	97.0	240	335	250	49	36
150	Schedule 40	10K	151.0	280	319	300	22	33
	Schedule 40	20K	151.0	305	319	300	28	40
	Schedule 80	10K	146.3	280	319	300	22	33
	Schedule 80	20K	146.3	305	319	300	28	40
	Schedule 80	40K	146.6	325	359	300	64	77
200	Schedule 40	10K	202.7	330	348	300	42	58
	Schedule 40	20K	202.7	350	348	300	42	64
250	Schedule 40	10K	254.5	400	375	380	48	90
	Schedule 40	20K	254.5	430	375	380	48	104
300[3]	Schedule 40	10K	304.8	445	398	450	51	119
	Schedule 40	20K	304.8	480	398	450	51	134

[1] The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).

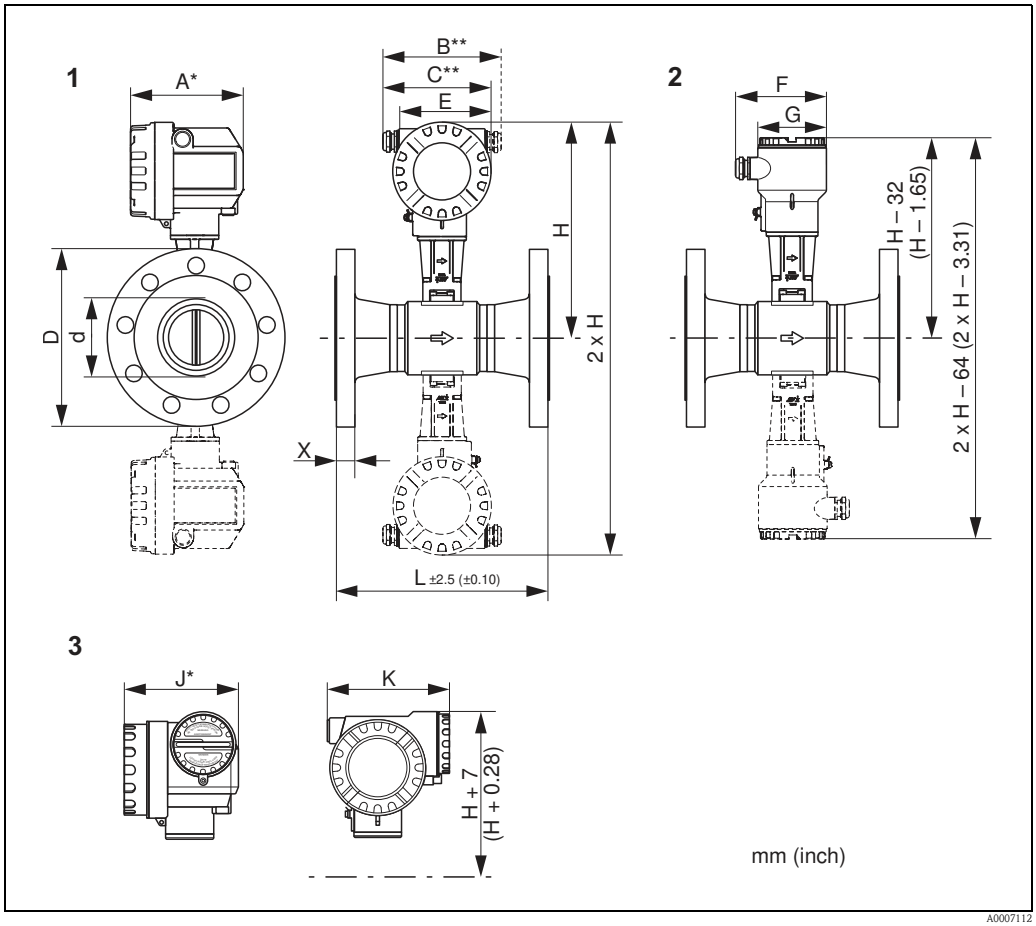
[2] The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.

[3] Not available as Dualsens version.

Dimensions of flanged versions "R Style" (single reduction of line size)
Prowirl 72F, 73F

Versions with integrated line size reduction (hydraulically effective cross-section smaller than connection nominal diameter) offering improved measurement in the lower flow range.

Flange connection dimensions in accordance with flange standard:
- 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,
  optional with groove to EN 1091-1 Form D (DIN 2512 Form N)
- ANSI B16.5, Class 150 to 300, Ra = 125 to 250 µin
- JIS B2220, 10 to 20K, Ra = 125 to 250 µin



1 = Standard, Ex i and Ex n version ; d: connection pipe internal diameter
2 = Remote version
3 = Ex d /XP version (transmitter)

Dotted line: Dualsens version

A mm (inch)	B mm (inch)	C mm (inch)	E mm (inch)	F mm (inch)	G mm (inch)	J mm (inch)	K mm (inch)
149 (5.87)	161 to 181 (6.34 to 7.13)	141 to 151 (5.55 to 5.94)	121 (4.76)	113 (4.45)	85 (3.35)	151 (5.94)	161 (6.34)

* The dimensions below change as follows in the blind version (without local operation):
– Standard, Ex i/IS and Ex n version: The dimension 149 mm (5.87") changes to 142 mm (5.59") in the blind version.
– Ex d/XP version: The dimension 151 mm (5.94") changes to 144 mm (5.67") in the blind version.
** The dimension depends on the cable gland used.

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).

Flanged versions (R Style) to EN 1092-1 (DIN 2501)
Prowirl 72F, 73F

DN	Inner diameter	Pressure rating	d [mm]	D [mm]	H[1] [mm]	L [mm]	X [mm]	Weight[2] [kg]
25[3]	15	PN 40	22.0	115	248	200	18.0	6
40[3]	25	PN 40	30.0	150	255	200	21.0	10
50	40	PN 40	45.0	165	263	200	22.0	12
80	50	PN 40	56.5	200	270	200	25.0	16
100	80	PN 16	87.0	220	283	250	22.0	20
		PN 40	87.0	235	283	250	26.5	23
150	100	PN 16	112.0	285	295	300	25.0	36
		PN 40	112.0	300	295	300	31.0	42
200	150	PN 10	146.3	340	319	300	24.0	48
		PN 16	146.3	340	319	300	24.0	48
		PN 25	146.3	360	319	300	30.0	55
		PN 40	146.3	375	319	300	36.5	63

[1] The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).
[2] The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.
[3] Not available as Dualsens version.

Flanged versions (R Style) to ANSI B16.5
Prowirl 72F, 73F

DN	Internal diameter	Pressure rating		d mm (inch)	D mm (inch)	H[1] mm (inch)	L mm (inch)	X mm (inch)	Weight[2] kg (lbs)
1" [3]	½"	Sched. 40	Cl. 150	22.0 (0.87)	108.0 (4.26)	248 (9.77)	200 (7.88)	18 (0.71)	6 (13.23)
		Sched. 40	Cl. 300	22.0 (0.87)	124.0 (4.89)	248 (9.77)	200 (7.88)	22.0 (0.87)	8 (17.64)
		Sched. 80	Cl. 150	22.0 (0.87)	108.0 (4.26)	248 (9.77)	200 (7.88)	18.5 (0.73)	6 (13.23)
		Sched. 80	Cl. 300	22.0 (0.87)	124.0 (4.89)	248 (9.77)	200 (7.88)	22.0 (0.87)	8 (17.64)
1½" [3]	1"	Sched. 40	Cl. 150	30.0 (1.18)	127.0 (5.00)	255 (10.0)	200 (7.88)	18.0 (0.71)	7 (15.44)
		Sched. 40	Cl. 300	30.0 (1.18)	155.4 (6.12)	255 (10.0)	200 (7.88)	25.0 (0.99)	10 (22)
		Sched. 80	Cl. 150	30.0 (1.18)	127.0 (5.00)	255 (10.0)	200 (7.88)	18.0 (0.71)	7 (15.44)
		Sched. 80	Cl. 300	30.0 (1.18)	155.4 (6.12)	255 (10.0)	200 (7.88)	25.0 (0.99)	10 (22.05)

Flanged versions (R Style) to ANSI B16.5 Prowirl 72F, 73F									
DN	Internal diame-ter	Pressure rating		d mm (inch)	D mm (inch)	H[1)] mm (inch)	L mm (inch)	X mm (inch)	Weight[2)] kg (lbs)
2"	1½"	Sched. 40	Cl. 150	45.0 (1.77)	152.4 (6.00)	263 (10.36)	200 (7.88)	20.0 (0.79)	10 (22.05)
		Sched. 40	Cl. 300	45.0 (1.77)	165.1 (6.50)	263 (10.36)	200 (7.88)	25.0 (0.99)	12 (26.46)
		Sched. 80	Cl. 150	45.0 (1.77)	152.4 (6.00)	263 (10.36)	200 (7.88)	20.0 (0.79)	10 (22.05)
		Sched. 80	Cl. 300	45.0 (1.77)	165.1 (6.50)	263 (10.36)	200 (7.88)	25.0 (0.99)	12 (26.46)
3"	2"	Sched. 40	Cl. 150	56.5 (2.22)	190.5 (7.50)	270 (10.6)	200 (7.87)	23.9 (0.94)	15 (33.08)
		Sched. 40	Cl. 300	56.5 (2.22)	209.6 (8.25)	270 (10.6)	200 (7.88)	28.9 (1.14)	22 (48.51)
		Sched. 80	Cl. 150	56.5 (2.22)	190.5 (7.50)	270 (10.6)	200 (7.87)	23.9 (0.94)	15 (33.08)
		Sched. 80	Cl. 300	56.5 (2.22)	209.6 (8.25)	270 (10.6)	200 (7.87)	28.9 (1.14)	22 (49)
4"	3"	Sched. 40	Cl. 150	87.0 (3.43)	228.6 (9.00)	283 (11.1)	250 (9.84)	24.5 (0.96)	22 (48.51)
		Sched. 40	Cl. 300	87.0 (3.43)	254.0 (10.0)	283 (11.1)	250 (9.84)	31.8 (1.25)	31 (68.36)
		Sched. 80	Cl. 150	87.0 (3.43)	228.6 (9.00)	283 (11.1)	250 (9.84)	24.5 (0.96)	22 (48.51)
		Sched. 80	Cl. 300	87.0 (3.43)	254.0 (10.0)	283 (11.1)	250 (9.84)	31.8 (1.25)	31 (68.36)
6"	4"	Sched. 40	Cl. 150	112.0 (4.41)	279.4 (11.0)	295 (11.6)	300 (11.8)	25.5 (1.00)	38 (83.79)
		Sched. 40	Cl. 300	112.0 (4.41)	317.5 (11.8)	295 (11.6)	300 (11.8)	38.5 (1.52)	55 (121)
		Sched. 80	Cl. 150	112.0 (4.41)	279.4 (11.0)	295 (11.6)	300 (11.8)	26.0 (1.02)	38 (83.79)
		Sched. 80	Cl. 300	112.0 (4.41)	317.5 (11.8)	295 (11.6)	300 (11.8)	39.0 (1.54)	55 (121.28)
8"	6"	Sched. 40	Cl. 150	146.3 (5.76)	342.9 (13.5)	319 (12.6)	300 (11.8)	28.4 (1.12)	55 (121.28)
		Sched. 40	Cl. 300	146.3 (5.76)	381 (15.0)	319 (12.6)	300 (11.8)	41.1 (1.62)	75 (165.38)

[1)] The dimension H increases by 29 mm (1.14") for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).

[2)] The weight data refer to the compact version. The weight increases by 0.5 kg (1.1 lbs) for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K). The weight increases by 6 kg (13.23 lbs) for the Dualsens version.

[3)] Not available as a Dualsens version.

Flanged versions (R Style) to JIS B2220 Prowirl 72F, 73F									
DN	Inner diameter	Pressure rating		d [mm]	D [mm]	H[1] [mm]	L [mm]	X [mm]	Weight[2] [kg]
25[3]	15	Sched. 40	20K	22.0	125	248	200	18.5	7
		Sched. 80	20K	22.0	125	248	200	18.5	7
40[3]	25	Sched. 40	20K	30.0	140	255	200	18.5	8
		Sched. 80	20K	30.0	140	255	200	19.0	8
50	40	Sched. 40	10K	45.0	155	263	200	20.0	10
		Sched. 40	20K	45.0	155	263	200	22.0	10
		Sched. 80	10K	45.0	155	263	200	20.0	10
		Sched. 80	20K	45.0	155	263	200	22.0	10
80	50	Sched. 40	10K	56.5	185	270	200	22.0	13
		Sched. 40	20K	56.5	200	270	200	26.5	16
		Sched. 80	10K	56.5	185	270	200	22.0	13
		Sched. 80	20K	56.5	200	270	200	27.0	16
100	80	Sched. 40	10K	87.0	210	283	250	22.0	17
		Sched. 40	20K	87.0	225	283	250	25.5	20
		Sched. 80	10K	87.0	210	283	250	22.0	17
		Sched. 80	20K	87.0	225	283	250	26.0	20
150	100	Sched. 40	10K	112.0	280	295	300	31.0	36
		Sched. 40	20K	112.0	305	295	300	37.5	46
		Sched. 80	10K	112.0	280	295	300	31.5	36
		Sched. 80	20K	112.0	305	295	300	37.5	46
200	150	Sched. 40	10K	146.3	330	319	300	26.5	45
		Sched. 40	20K	146.3	350	319	300	31	53

[1] The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).

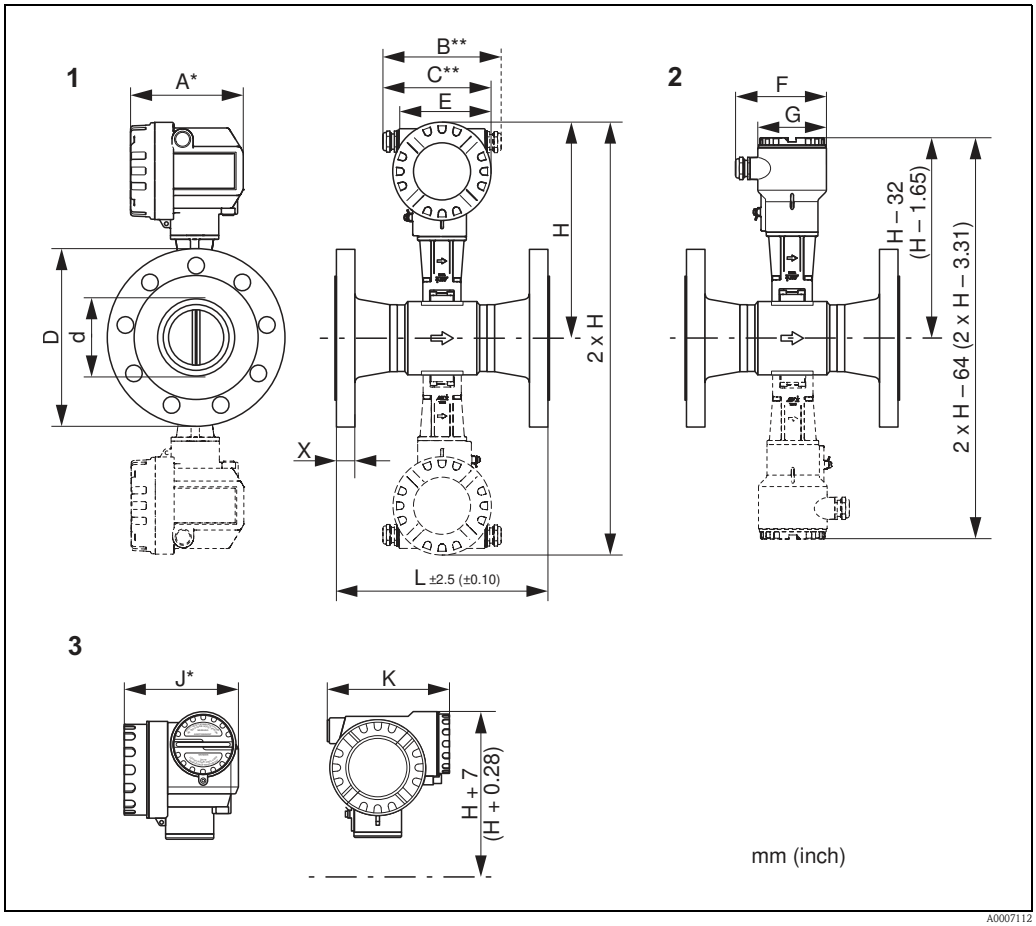
[2] The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.

[3] Not available as Dualsens version.

Dimensions of flanged versions "S Style" (double reduction of line size)
Prowirl 72F, 73F

Versions with integrated line size reduction (hydraulically effective cross-section smaller than connection nominal diameter) offering improved measurement in the lower flow range.

Flange connection dimensions in accordance with flange standard:
- 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,
  optional with groove to EN 1091-1 Form D (DIN 2512 Form N)
- ANSI B16.5, Class 150 to 300, Ra = 125 to 250 µin
- JIS B2220, 10 to 20K, Ra = 125 to 250 µin



1 = Standard, Ex i and Ex n version ; d: connection pipe internal diameter
2 = Remote version
3 = Ex d/XP version (transmitter)

Dotted line: Dualsens version

A [mm] (inch)	B [mm] (inch)	C [mm] (inch)	E [mm] (inch)	F [mm] (inch)	G [mm] (inch)	J [mm] (inch)	K [mm] (inch)
149 (5.87)	161 to 181 (6.34 to 7.13)	141 to 151 (5.55 to 5.94)	121 (4.76)	113 (4.45)	85 (3.35)	151 (5.94)	161 (6.34)

* The dimensions below change as follows in the blind version (without local operation):
– Standard, Ex i/IS and Ex n version: The dimension 149 mm (5.87") changes to 142 mm (5.59") in the blind version.
– Ex d/XP version: The dimension151 mm (5.94") changes to 144 mm (5.67") in the blind version.
** The dimension depends on the cable gland used.

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).

Flanged versions (S Style) to EN 1092-1 (DIN 2501)
Prowirl 72F, 73F

DN	Inner diameter	Pressure rating	d [mm]	D [mm]	H[1] [mm]	L [mm]	X [mm]	Weight[2] [kg]
40	15	PN 40	22	150	248	200	21.0	9
50[3]	25	PN 40	30	165	255	200	21.0	11
80	40	PN 40	45	200	263	200	25.5	16
100	50	PN 16	62	220	270	250	24.0	19
		PN 40	62	235	270	250	27.5	22
150	80	PN 16	92	285	283	300	25.0	32
		PN 40	92	300	283	300	32.0	42
200	100	PN 10	112	340	295	300	26.0	48
		PN 16	112	340	295	300	27.0	48
		PN 25	112	360	295	300	33.5	59
		PN 40	112	375	295	300	38.5	69
250	150	PN 10	202.7	395	319	380	24	64
		PN 16	202.7	405	319	380	27	66.5
		PN 25	202.7	425	319	380	32	79
		PN 40	202.7	450	319	380	39	103

[1] The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).
[2] The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.
[3] Not available as Dualsens version.

Flanged versions (S Style) to ANSI B16.5
Prowirl 72F, 73F

DN	Internal diame-ter	Pressure rating		d mm (inch)	D mm (inch)	H[1] mm (inch)	L mm (inch)	X mm (inch)	Weight[2] kg (lbs)
1½" [3]	½"	Sched. 40	Cl. 150	22 (0.87)	127.0 (5.00)	248 (9.76)	200 (7.87)	19.0 (0.75)	8 (17.64)
		Sched. 40	Cl. 300	22 (0.87)	155.4 (6.12)	248 (9.76)	200 (7.87)	27.0 (1.06)	11 (24.26)
		Sched. 80	Cl. 150	22 (0.87)	127.0 (5.00)	248 (9.76)	200 (7.87)	19.5 (0.77)	8 (17.64)
		Sched. 80	Cl. 300	22 (0.87)	155.4 (6.12)	248 (9.76)	200 (7.87)	27.0 (1.06)	11 (24.26))
2" [3]	1"	Sched. 40	Cl. 150	30 (1.18)	152.4 (6.00)	255 (10.0)	200 (7.87)	21.0 (0.83)	10 (22.05)
		Sched. 40	Cl. 300	30 (1.18)	165.1 (6.50)	255 (10.0)	200 (7.87)	26.0 (1.02)	13 (28.67)
		Sched. 80	Cl. 150	30 (1.18)	152.4 (6.00)	255 (10.0)	200 (7.87)	21.0 (0.83)	10 (22.05)
		Sched. 80	Cl. 300	30 (1.18)	165.1 (6.50)	255 (10.0)	200 (7.87)	26.0 (1.02)	13 (28.67)
3"	1½"	Sched. 40	Cl. 150	45 (1.77)	190.5 (7.50)	263 (10.4)	200 (7.87)	25.0 (0.98)	17 (37.49)
		Sched. 40	Cl. 300	45 (1.77)	209.6 (8.25)	263 (10.4)	200 (7.87)	37.9 (1.49)	22 (48.51)
		Sched. 80	Cl. 150	45 (1.77)	190.5 (7.50)	263 (10.4)	200 (7.87)	25.0 (0.98)	17 (37.49)
		Sched. 80	Cl. 300	45 (1.77)	209.6 (8.25)	263 (10.4)	200 (7.87)	37.9 (1.49)	22 (48.51)
4"	2"	Sched. 40	Cl. 150	62 (2.44)	228.6 (9.00)	270 (10.6)	250 (9.84)	26.5 (1.04)	23 (50.72)
		Sched. 40	Cl. 300	62 (2.44)	254.0 (10.00)	270 (10.6)	250 (9.84)	31.8 (1.25)	31 (68.36)
		Sched. 80	Cl. 150	62 (2.44)	228.6 (9.00)	270 (10.6)	250 (9.84)	26.5 (1.04)	23 (50.72)
		Sched. 80	Cl. 300	62 (2.44)	254.0 (10.0)	270 (10.63)	250 (9.84)	31.8 (1.25)	31 (68.36)
6"	3"	Sched. 40	Cl. 150	92 (3.62)	279.4 (11.0)	283 (11.1)	300 (11.8)	26.5 (1.04)	40 (88.20)
		Sched. 40	Cl. 300	92 (3.62)	317.5 (12.5)	283 (11.1)	300 (11.8)	41.5 (1.63)	60 (132.30)
		Sched. 80	Cl. 150	92 (3.62)	279.4 (11.0)	283 (11.1)	300 (11.8)	27.0 (1.06)	40 (88.20)
		Sched. 80	Cl. 300	92 (3.62)	317.5 (12.5)	283 (11.1)	300 (11.8)	42.0 (1.65)	60 (132.30)
8"	4"	Sched. 40	Cl. 150	112 (4.41)	342.9 (13.5)	295 (11.6)	300 (11.8)	28.4 (1.12)	61 (134.51)
		Sched. 40	Cl. 300	112 (4.41)	381.0 (15.0)	295 (11.6)	300 (11.8)	47.5 (1.87)	92 (202.86)
10"	6"	Sched. 40	Cl. 150	202.7 (7.98)	406.4 (16)	319 (12.6)	380 (15.0)	31.4 (1.24)	91 (200.66)
		Sched. 40	Cl. 300	202.7 (7.98)	444.5 (17.5)	319 (12.6)	380 (15.0)	46.9 (1.85)	129 (284.45)

[1] The dimension H increases by 29 mm (1.14") for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).

[2] The weight data refer to the compact version. The weight increases by 0.5 kg (1.1 lbs) for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K). The weight increases by 6 kg (13.23 lbs) for the Dualsens version.

[3] Not available as a Dualsens version.

Flanged versions (S Style) to JIS B2220 Prowirl 72F, 73F									
DN	Inner dia-meter	Pressure rating		d [mm]	D [mm]	H[1] [mm]	L [mm]	X [mm]	Weight[2] [kg]
40[3]	15	Sched. 40	20K	22	140	248	200	20.5	8
		Sched. 80	20K	22	140	248	200	20.5	8
50[3]	25	Sched. 40	10K	30	155	255	200	20.5	9
		Sched. 40	20K	30	155	255	200	21.0	11
		Sched. 80	10K	30	155	255	200	20.5	9
		Sched. 80	20K	30	155	255	200	21.0	11
80	40	Sched. 40	10K	45	185	263	200	22.0	13
		Sched. 40	20K	45	200	263	200	25.5	17
		Sched. 80	10K	45	185	263	200	22.0	13
		Sched. 80	20K	45	200	263	200	25.5	17
100	50	Sched. 40	10K	62	210	270	250	25.5	17
		Sched. 40	20K	62	225	270	250	29.0	21
		Sched. 80	10K	62	210	270	250	26.0	17
		Sched. 80	20K	62	225	270	250	29.5	21
150	80	Sched. 40	10K	92	280	283	300	31.0	34
		Sched. 40	20K	92	305	283	300	38.5	45
		Sched. 80	10K	92	280	283	300	31.5	34
		Sched. 80	20K	92	305	283	300	39.0	45
200	100	Sched. 40	10K	112	330	295	300	33.5	50
		Sched. 40	20K	112	350	295	300	43.5	67
250	150	Sched. 40	10K	202.7	400	319	380	30.5	73
		Sched. 40	20K	202.7	430	319	380	37	95

[1] The dimension H increases by 29 mm for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure ratings up to PN 40, Cl. 300, 20K).

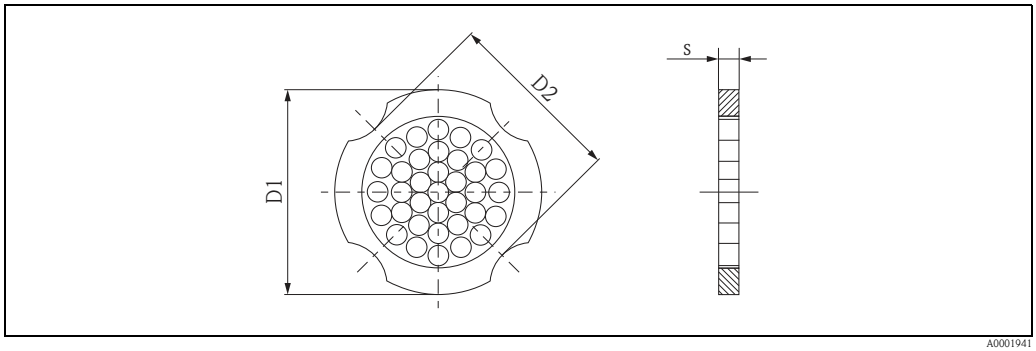
[2] The weight data refer to the compact version. The weight increases by 0.5 kg for Prowirl 72 (high-temperature version and for the version with a DSC sensor made of Alloy C-22) and for Prowirl 73 (pressure rating up to PN 40, Cl. 300, 20K). The weight is increased by 6 kg for the Dualsens version.

[3] Not available as Dualsens version.

Dimensions of flow conditioner to EN (DIN)/ANSI/JIS (accessory)

Dimensions to:
- EN 1092-1 (DIN 2501)
- ANSI B16.5
- JIS B2220

Material 1.4404 (316/316L), in compliance with NACE MR0175-2003 and MR0103-2003.



D1: The flow conditioner is fitted at the external diameter between the bolts.
D2: The flow conditioner is fitted at the indentations between the bolts.

Flow conditioner to EN (DIN)					
DN	Pressure rating	Centering diameter [mm]	D1/D2 *	s [mm]	Weight [kg]
15	PN 10 to 40 PN 63	54.3 64.3	D2 D1	2.0	0.04 0.05
25	PN 10 to 40 PN 63	74.3 85.3	D1 D1	3.5	0.12 0.15
40	PN 10 to 40 PN 63	95.3 106.3	D1 D1	5.3	0.3 0.4
50	PN 10 to 40 PN 63	110.0 116.3	D2 D1	6.8	0.5 0.6
80	PN 10 to 40 PN 63	145.3 151.3	D2 D1	10.1	1.4
100	PN 10/16 PN 25/40 PN 63	165.3 171.3 176.5	D2 D1 D2	13.3	2.4
150	PN 10/16 PN 25/40 PN 63	221.0 227.0 252.0	D2 D2 D1	20.0	6.3 7.8 7.8
200	PN 10 PN 16 PN 25 PN 40	274.0 274.0 280.0 294.0	D1 D2 D1 D2	26.3	11.5 12.3 12.3 15.9
250	PN 10/16 PN 25 PN 40	330.0 340.0 355.0	D2 D1 D2	33.0	25.7 25.7 27.5
300	PN 10/16 PN 25 PN 40	380.0 404.0 420.0	D2 D1 D1	39.6	36.4 36.4 44.7

* D1 → The flow conditioner is fitted at the external diameter between the bolts.
D2 → The flow conditioner is fitted at the indentations between the bolts.

Flow conditioner to ANSI						
DN		Pressure rating	Centering diameter mm (inch)	D1 / D2 *	s mm (inch)	Weight kg (lbs)
15	½"	Cl. 150 Cl. 300	50.1 (1.97) 56.5 (2.22)	D1 D1	2.0 (0.08)	0.03 (0.07) 0.04 (0.09)
25	1"	Cl. 150 Cl. 300	69.2 (2.72) 74.3 (2.93)	D2 D1	3.5 (0.14)	0.12 (0.26)
40	1½"	Cl. 150 Cl. 300	88.2 (3.47) 97.7 (3.85)	D2 D2	5.3 (0.21)	0.3 (0.66)
50	2"	Cl. 150 Cl. 300	106.6 (4.20) 113.0 (4.45)	D2 D1	6.8 (0.27)	0.5 (1.1)
80	3"	Cl. 150 Cl. 300	138.4 (5.45) 151.3 (5.96)	D1 D1	10.1 (0.40)	1.2 (2.6) 1.4 (3.1)
100	4"	Cl. 150 Cl. 300	176.5 (6.95) 182,6 (7.19)	D2 D1	13.3 (0.52)	2.7 (6.0)
150	6"	Cl. 150 Cl. 300	223.9 (8.81) 252.0 (9.92)	D1 D1	20.0 (0.79)	6.3 (14) 7.8 (17)
200	8"	Cl. 150 Cl. 300	274.0 (10.8) 309.0 (12.2)	D2 D1	26.3 (1.04)	12.3 (27) 15.8 (35)
250	10"	Cl. 150 Cl. 300	340.0 (13.4) 363.0 (14.3)	D1 D1	33.0 (1.30)	25.7 (57) 27.5 (61)
300	12"	Cl. 150 Cl. 300	404.0 (15.9) 402.0 (15.8)	D1 D1	39.6 (1.56)	36.4 (80) 44.6 (98)

* D1 → The flow conditioner is fitted at the external diameter between the bolts.
D2 → The flow conditioner is fitted at the indentations between the bolts.

Flow conditioner to JIS					
DN	Pressure rating	Centering diameter [mm]	D1/D2 *	s [mm]	Weight [kg]
15	10K	60.3	D2	2.0	0.06
	20K	60.3	D2	2.0	0.06
	40K	66.3	D1	2.0	0.06
25	10K	76.3	D2	3.5	0.14
	20K	76.3	D2	3.5	0.14
	40K	81.3	D1	3.5	0.14
40	10K	91.3	D2	5.3	0.31
	20K	91.3	D2	5.3	0.31
	40K	102.3	D1	5.3	0.31
50	10K	106.6	D2	6.8	0.47
	20K	106.6	D2	6.8	0.47
	40K	116.3	D1	6.8	0.5
80	10K	136.3	D2	10.1	1.1
	20K	142.3	D1	10.1	1.1
	40K	151.3	D1	10.1	1.3
100	10K	161.3	D2	13.3	1.8
	20K	167.3	D1	13.3	1.8
	40K	175.3	D1	13.3	2.1
150	10K	221.0	D2	20.0	4.5
	20K	240.0	D1	20.0	5.5
	40K	252.0	D1	20.0	6.2
200	10K	271.0	D2	26.3	9.2
	20K	284.0	D1	26.3	9.2
250	10K	330.0	D2	33.0	15.8
	20K	355.0	D2	33.0	19.1
300	10K	380.0	D2	39.6	26.5
	20K	404.0	D1	39.6	26.5

* D1 → The flow conditioner is fitted at the external diameter between the bolts.
D2 → The flow conditioner is fitted at the indentations between the bolts.

Weight

- Weight of Prowirl 72W, 73W → 📄 33 ff.
- Weight of Prowirl 72F, 73F → 📄 35 ff.
- Weight of flow conditioner to EN (DIN)/ANSI/JIS → 📄 49 ff.

Material

Transmitter housing

- Powder-coated die-cast aluminum AlSi10Mg
  - In accordance with EN 1706/EN AC-43400 (EEx d/XP version: cast aluminum EN 1706/EN AC-43000)

Sensor

Flanged version
- Pressure ratings up to PN 40, Class 300, 20K:
  - Stainless steel, A351-CF3M (1.4408), in compliance with AD2000 (temperature range –10 to +400 °C/ +14 to +752 °F) as well as in compliance with NACE MR0175-2003 and MR0103-2003
  - Alloy C-22, 2.4602, (A494-CX2MW/N26022), in compliance with NACE MR0175-2003 and MR0103-2003 (only for Prowirl 72)
- Pressure ratings up to PN 160, Class 600, 40K:
  - Stainless steel, A351-CF3M (1.4408), in compliance with AD2000 (temperature range –10 to +400 °C/ +14 to +752 °F) as well as in compliance with NACE MR0175-2003 and MR0103-2003
- Pressure ratings PN 250, Class 900 to 1500 and butt-weld version (only for Prowirl 72):
  - Stainless steel, 316Ti/316L (1.4571), NACE available on request

Wafer version
- Pressure ratings up to PN 40, Class 300, 20K:
  - Stainless steel, A351-CF3M (1.4408), in compliance with AD2000 (temperature range –10 to +400 °C/ +14 to +752 °F) as well as in compliance with NACE MR0175-2003 and MR0103-2003

Flanges

- EN (DIN)
  - Stainless steel, A351-CF3M (1.4404), in compliance with NACE MR0175-2003 and MR0103-2003
  - DN 15 to 150 with pressure ratings to PN 40 and all devices with integrated diameter reduction (R Style, S Style): construction with weld-on flanges made of 1.4404 (AISI 316L).
    All nominal diameters PN 63 to 160 as well as nominal diameters DN 200 to 300 to PN 40: fully cast construction A351-CF3M (1.4408), in compliance with NACE MR0175-2003 and MR0103-2003
  - Pressure rating PN 250 (only for Prowirl 72) 1.4571 (316Ti, UNS S31635),
    in compliance with NACE MR0175-2003 and MR0103-2003 available on request
- ANSI and JIS
  - Stainless steel, A351-CF3M, in compliance with NACE MR0175-2003 and MR0103-2003
  - ½ to 6" with pressure ratings to Class 300 and DN 15 to 150 with pressure ratings to 20K and all devices with integrated diameter reduction (R Style, S Style): construction with weld-on flanges made of 316/ 316L, in compliance with NACE MR0175-2003 and MR0103-2003.
    All nominal diameters Class 600, 40K as well as nominal diameters DN 200 to 300 to Class 300, 20K: fully cast construction A351-CF3M, in compliance with NACE MR0175-2003 and MR0103-2003
  - Pressure ratings Class 900 to 1500: 316/316L, in compliance with NACE MR0175-2003 and MR0103-2003 available on request
- Alloy C-22 version (EN/DIN/ANSI/JIS)
  - Alloy C-22, 2.4602, (A494-CX2MW/N26022), in compliance with NACE MR0175-2003 and MR0103-2003

DSC sensor (differential switched capacitor)

- Wetted parts (marked as "wet" on the DSC sensor flange):
  - Standard for pressure ratings up to PN 40, Class 300, JIS 40K:
    Stainless steel 1.4435 (316/316L), in compliance with NACE MR0175-2003 and MR0103-2003
  - Pressure ratings PN 63 to 160, Class 600, 40K:
    Inconel 718 (2.4668/N07718, according to B637), in compliance with NACE MR0175-2003 and MR0103-2003
  - Pressure ratings PN 250, Class 900 to 1500 and butt-weld version (only for Prowirl 72):
    titanium Gr. 5 (B-348; UNS R50250; 3.7165)
  - Alloy C-22 sensor (only for Prowirl 72):
    Alloy C-22, 2.4602/N 06022; in compliance with NACE MR0175-2003 and MR0103-2003

Non-wetted parts

- Stainless steel 1.4301 (304)

Support

- Stainless steel, 1.4308 (CF8)
- Pressure ratings PN 250, Class 900 to 1500 and butt-weld version (only for Prowirl 72): 1.4305 (303)

Seals

- Graphite
  - Pressure rating PN 10 to 40, Class 150 to 300, JIS 10 to 20K: Sigraflex Folie Z
    (BAM-tested for oxygen applications)
  - Pressure rating PN 63 to 160, Class 600, JIS 40K: Sigraflex Hochdruck™ with stainless steel sheet reinforcement made of 316(L)
    (BAM-tested for oxygen applications, "high quality in terms of TA Luft (German Clean Air Act)"
  - Pressure rating PN 250, Class 900 to 1500: Grafoil with perforated stainless steel reinforcement made of 316
- Viton
- Kalrez 6375
- Gylon (PTFE) 3504 (BAM-tested for oxygen applications, "high quality in terms of TA Luft (German Clean Air Act)"

Human interface

Display elements

Liquid crystal display, double-spaced, plain text display, 16 characters per line
Display can be configured individually, e.g. for measured variables and status values, totalizers

Operating elements (HART)

Local operation with three keys ⊞, ⊟, ⊡)
Quick Setup for quick commissioning
Operating elements accessible also in Ex-zones

Remote operation

Operation via:
- HART
- PROFIBUS PA
- FOUNDATION Fieldbus
- FieldCare (software package from Endress+Hauser for complete configuration, commissioning and diagnosis)

Certificates and approvals

CE mark

The measuring system described in these Operating Instructions complies with the legal requirements of the EU Directives. Endress+Hauser confirms this by affixing the CE mark to it and by issuing the CE Declaration of Conformity.

C-tick mark

The measuring system meets the EMC requirements of the "Australian Communications and Media Authority (ACMA)".

Ex-approval

- Ex i/IS and Ex n:
  - ATEX/CENELEC
    II1/2G, EEx ia IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II1/2GD, EEx ia IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II1G, EEx ia IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II2G, EEx ia IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II3G, EEx nA IIC T1 to T6 X (T1 to T4 X for PROFIBUS PA and FOUNDATION Fieldbus)
  - FM
    Class I/II/III Div. 1/2, Group A to G; Class I Zone 0, Group IIC
  - CSA
    Class I/II/III Div. 1/2, Group A to G; Class I Zone 0, Group IIC
    Class II Div. 1, Group E to G
    Class III
  - NEPSI
    Ex ia IIC
    Ex nA
- Ex d/XP:
  - ATEX/CENELEC
    II1/2G, EEx d [ia] IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II1/2GD, EEx ia IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
    II2G, EEx d [ia] IIC T1 to T6 (T1 to T4 for PROFIBUS PA and FOUNDATION Fieldbus)
  - FM
    Class I/II/III Div. 1, Groups A to G
  - CSA
    Class I/II/III Div. 1, Groups A to G
    Class II Div. 1, Groups E to G
    Class III
  - TIIS
    Ex d [ia] IIC T1
    Ex d [ia] IIC T4

More information on the Ex-approvals can be found in the separate Ex-documentation.

Pressure measuring device approval

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.

- 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.
- Devices with this identification (with PED) are suitable for the following types of fluid:
  – Fluids of Group 1 and 2 with a steam pressure greater than or smaller and equal to 0.5 bar (7.3 psi)
  – Unstable gases
- 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.

Certification FOUNDATION Fieldbus

The flowmeter has successfully passed all test procedures and is certified and registered by the Fieldbus FOUNDATION. The device thus meets all the requirements of the following specifications:

- Certified to FOUNDATION Fieldbus Specification
- The device meets all the specifications of the FOUNDATION Fieldbus-H1.
- Interoperability Test Kit (ITK), revision status 4.5 (device certification number available on request): The device can also be operated with certified devices of other manufacturers.
- Physical Layer Conformance Test of the Fieldbus FOUNDATION

Certification PROFIBUS PA

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 following specifications:

- Certified to PROFIBUS PA Profile Version 3.0 (device certification number: on request)
- The device can also be operated with certified devices of other manufacturers (interoperability)

Other standards and guidelines

- EN 60529
  Degrees of protection by housing (IP code)

- EN 61010-1
  Safety requirements for electrical equipment for measurement, control and laboratory use

- IEC/EN 61326
  Electromagnetic compatibility (EMC requirements)

- NAMUR NE 21
  Electromagnetic compatibility (EMC) of industrial process and laboratory control equipment

- NAMUR NE 43
  Standardization of the signal level for the breakdown information of digital transmitters with analog output signal

- NAMUR NE 53
  Software of field devices and signal-processing devices with digital electronics

- NACE Standard MR0103-2003
  Standard Material Requirements – Materials Resistant to Sulfide Stress Cracking in Corrosive Petroleum Refining Environments

- NACE Standard MR0175-2003
  Standard Material Requirements – Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment

- VDI 2643
  Measurement of fluid flow by means of vortex flowmeters.

- ANSI/ISA-S82.01
  Safety Standard for Electrical and Electronic Test, Measuring, Controlling and Related Equipment – General Requirements. Pollution degree 2, Installation Category II

- CAN/CSA-C22.2 No. 1010.1-92
  Safety Standard for Electrical Equipment for Measurement and Control and Laboratory Use. Pollution degree 2, Installation Category II

- The International Association for the Properties of Water and Steam – Release on the IAPWS Industrial Formulation 1997 for the Thermodynamic Properties of Water and Steam
- ASME International Steam Tables for Industrial Use (2000)
- American Gas Association (1962)
  A.G.A. Manual for the Determination of Supercompressibility Factors for Natural Gas – PAR Research Project NX-19.
- American Gas Association Transmission Measurement Committee Report No. 8 (AGA8), November 1992. American Petroleum Institute MPMS Chapter 14.2: *Compressibility and Supercompressibility for Natural Gas and Other Hydrocarbon Gases.*
- ISO 12213 Natural gas (2006) - Calculation of compression factor
  – Part 2: Calculation using molar composition analysis (ISO 12213-2)
  – Part 3: Calculation using physical properties (ISO 12213-2)
- GERG Groupe Européen des Recherches Gazières (1991): Technical Monograph TM 5 – Standard GERG Virial Equation for Field Use. Simplification of the input data requirements for the GERG Virial Equation – an alternative means of compressibility factor calculation for natural gases and similar mixtures. Publishing house of Verein Deutscher Ingenieure (Association of German Engineers), Düsseldorf.
- ISO 6976-1995: Natural gas — Calculation of calorific values, density, relative density and Wobbe index from composition.
- Gas Processors Association GPA Standard 2172-96
- American Petroleum Institute API MPMS 14.5 (1996). Calculation of Gross Heating Value, Relative Density and Compressibility Factor for Natural Gas Mixtures from Compositional Analysis.

Functional safety

Prowirl 72: SIL 2 in accordance with IEC 61508/IEC 61511-1
Prowirl 73: SIL 1

Following the link **http://www.endress.com/sil** you will find an overview of all Endress+Hauser devices for SIL applications including parameters like SFF, MTBF, PFD_{avg} etc.

Ordering information

Ordering information and detailed information on the order code can be obtained from your Endress+Hauser Service Organization.

Additional ordering information for Prowirl 72

Prowirl 72 can also be ordered as a preconfigured unit. For this purpose, the following information is needed when ordering:
- Operating language
- Process temperature
- Type of fluid: liquid or gas/steam
- 20-mA value: measured value at which a current of 20 mA should be set.
  Time constant and failsafe mode (min. current, max. current, etc.)
- Also pulse value, pulse duration, output signal and failsafe mode if the measuring device has a pulse output.
- Average operating density incl. unit if the flow is to be output in mass units.
- Operating and reference density of the fluid including the unit if the flow is to be output in corrected volume units.
- Assignment of the first and second line on the local display and desired unit for the totalizer.

The measuring device can be reset to the delivery state indicated in the order at any time.

Additional ordering information for Prowirl 73

Prowirl 73 can also be ordered as a preconfigured unit. For this purpose, the following information is needed when ordering:
- Operating language
- Type of fluid: saturated steam, superheated steam, water, compressed air, natural gas AGA NX-19, AGA8-DC92, ISO12213-2, AGA8 Gross Method 1, SGERG-88 (optional), gas or gas mixture, customer-defined liquid, gas volume, liquid volume, water delta heat (only for 4 to 20 mA HART), saturated steam delta heat (only for 4 to 20 mA HART).
- Average operating pressure (in bar absolute) or whether the pressure should be read into Prowirl 73 from an external sensor (possible for superheated steam, compressed air, natural gas AGA NX-19, AGA8-DC92, ISO12213-2, AGA8 Gross Method 1, SGERG-88, gas or gas mixture).
- Average ambient pressure (in bar absolute) if the pressure is read into Prowirl 73 from an external pressure sensor.
- Reference pressure and temperature if corrected volume units are selected as an output.
- For applications with natural gas AGA NX-19, mol-% nitrogen and mol-% carbon dioxide are also required; for applications with natural gas AGA8 Gross Method 1 and SGERG-88, mol-% hydrogen and mol-% carbon dioxide are required. Additionally to the mol-% the AGA NX-19, the AGA8 Gross Method 1 as well as the SGERG-88 need the indication of the relative density (relative density = ratio of the density of natural gas to that of air at reference operating conditions).
- For customer-defined liquid applications, the average operating temperature, the density the fluid has at this temperature and the linear expansion coefficient of the fluid are also required. These values can also be calculated by Endress+Hauser if the customer specifies the fluid and operating temperature or if the dependency between the fluid density and the temperature is made available in tabular form.
- 4-mA value: measured value (e.g. 50 kg/h) at which a current of 4 mA should be output, incl. unit.
- 20-mA value: measured value (e.g. 1000 kg/h) at which a current of 20 mA should be output, incl. unit, time constant and failsafe mode (min. current, max. current, etc.)
- Pulse value incl. unit (if the measuring device has a pulse output), pulse duration, output signal and failsafe mode.
- Assignment of the first and second line on the local display and desired unit for the totalizer. In addition, you can also tell us what fault values apply for temperature and pressure, where applicable.
- Optional: configuration of the extended diagnostic functions, e.g. maximum/minimum temperature, maximum flow velocity, etc.

The measuring device can be reset to the delivery state indicated in the order at any time.

Product structure for flanged devices "R Style" and "S Style" (with diameter reduction)

R Style		Single reduction of line size (>)
7*F	**RF** -**********	DN 25 (1") > DN 15 (½")
	RG -**********	DN 40 (1½") > DN 25 (1")
	RJ -**********	DN 50 (2") > DN 40 (1½")
	RK -**********	DN 80 (3") > DN 50 (2")
	RM-**********	DN 100 (4") > DN 80 (3")
	RN -**********	DN 150 (6") > DN 100 (4")
	RR-**********	DN 200 (8") > DN 150 (6")
S Style		Double reduction of line size (>>)
7*F	**SF** -**********	DN 40 (1½") >> DN 15 (½")
	SG -**********	DN 50 (2") >> DN 25 (1")
	SJ -**********	DN 80 (3") >> DN 40 (1½")
	SK -**********	DN 100 (4") >> DN 50 (2")
	SM-**********	DN 150 (6") >> DN 80 (3")
	SN -**********	DN 200 (8") >> DN 100 (4")
	SR -********	DN 250 (10") >> DN 150 (6")

Accessories

Various accessories, which can be ordered separately from Endress+Hauser, are available for the transmitter and the sensor. Detailed information on the order code in question can be obtained from your Endress+Hauser representative.

Device-specific accessories

Accessory	Description	Order code
Transmitter Proline Prowirl 72/73	Transmitter for replacement or for stock. Use the order code to define the following specifications: ■ Approvals – Degree of protection/version – Cable entry – Display/operation – Software ■ Outputs/inputs	72XXX - XXXXX ******* 73XXX - XXXXX *******

Measuring principle-specific accessories

Accessory	Description	Order code
Mounting kit for Prowirl 72/73W	Mounting kit for wafer comprising: ■ Threaded studs ■ Nuts incl. washers ■ Flange seals	DKW** - ***
Mounting kit for transmitter	Mounting kit for remote version, suitable for pipe and wall mounting.	DK6WM - B
Memograph M graphic display recorder	The Memograph M graphic display recorder provides information on all the relevant process variables. Measured values are recorded correctly, limit values are monitored and measuring points analyzed. The data are stored in the 256 MB internal memory and also on a DSD card or USB stick. Memograph M boasts a modular design, intuitive operation and a comprehensive security concept. The ReadWin® 2000 PC software is part of the standard package and is used for configuring, visualizing and archiving the data captured. The mathematics channels which are optionally available enable continuous monitoring of specific energy consumption, boiler efficiency and other parameters which are important for efficient energy management.	RSG40 - **********
Flow conditioner	To reduce the inlet run downstream of flow disturbances.	DK7ST - ***
Pressure transmitter Cerabar T	Cerabar T is used to measure the absolute and gauge pressure of gases, steams and liquids (compensation with RMC621 for example).	PMC131 - **** PMP131 - ****
Pressure transmitter Cerabar M	Cerabar M is used to measure the absolute and gauge pressure of gases, steams and liquids. ■ Can also be used for reading external pressure values into Prowirl 73 via the burst mode. ■ Can also be ordered with ready-activated burst mode (special product with version 9=TSPSC2821). ■ Can also be used for reading external pressure values into Prowirl 73 via PROFIBUS PA (only absolute pressure).	PMC41 - ********** PMP41 - ********** PM*4* - ******H/J9***
Pressure transmitter Cerabar S	Cerabar S is used to measure the absolute and gauge pressure of gases, steams and liquids. ■ Can also be used for reading external pressure values into Prowirl 73 via the burst mode. ■ Can also be ordered with ready-activated burst mode (special product with version 9=TSPSC2822). ■ Can also be used for reading external pressure values into Prowirl 73 via PROFIBUS PA or FOUNDATION Fieldbus (only absolute pressure).	PMC71 - ********** PMP71 - ********** PM*7* - *A/B/C********9
RTD temperature Omnigrad TR10	Multipurpose temperature sensor, mineral-insulated insert with thermowell, terminal head and extension neck. Together with a HART-compatible transmitter, it can be used for to read the temperature into Prowirl 73 in the burst mode.	TR10 - *******R/T**** THT1-L**

Accessory	Description	Order code
Active barrier RN221N	Active barrier with power supply for safe separation of 4 to 20 mA standard signal circuits: ■ Galvanic isolation of 4 to 20 mA circuits ■ Elimination of ground loops ■ Power supply of two-wire transmitters ■ Can be used in Ex area (ATEX, FM, CSA, TIIS) ■ HART input-compatible (e.g. for reading in an external pressure value) Note! If RN221N - *3 is used for the HART input, this results in an error message for Prowirl 73 and can not be used for pressure compensation.	RN221N - *1
Process display RIA250	Multifunctional 1-channel display unit: ■ Universal input ■ Transmitter power supply ■ Limit relay ■ Analog output	RIA250 - ******
Process display RIA251	Digital display unit for looping into 4 to 20 mA current loop; can be used in Ex area (ATEX, FM, CSA).	RIA251 - **
Field display RIA261	Digital field display unit for looping into 4 to 20 mA current loop; can be used in Ex area (ATEX, FM, CSA).	RIA261 - ***
Process transmitter RMA422	Multifunctional 1-2 channel top-hat rail device with intrinsically safe current inputs and transmitter power supply, limit value monitoring, mathematic functions (e.g. difference ascertain) and 1-2 analog outputs. Optional: intrinsically safe inputs, can be used in Ex area (ATEX). Possible applications: leak detection, delta heat (between two Prowirl measuring points), totalizing (of flows in two pipes) etc.	RMA422 - *******
Overvoltage protection HAW562Z	Overvoltage protection for restricting overvoltage in signal lines and components.	51003575
Overvoltage protection HAW569	Overvoltage protection for restricting overvoltage for direct mounting to Prowirl 73 and other devices.	HAW569 - **1A
Heat computer RMS621	Steam and heat computer for industrial energy balancing of steam and water. Calculation of the following applications: ■ Steam mass ■ Steam heat quantity ■ Net steam heat quantity ■ Steam delta heat ■ Water heat quantity ■ Water delta heat Simultaneous calculation of up to three applications per device.	RMS621-*********
Energy Manager RMC621	Universal Energy Manager for gas, liquids, steam and water. Calculation of volumetric flow and mass flow, standard volume, heat flow and energy.	RMC621 - **********
Application Manager RMM621	Electronic recording, display, balancing, control, saving, event and alarm monitoring of analog and digital input signals. Values and states determined are output by means of analog and digital output signals. Remote transmission of alarms, input values and calculated values using a PSTN or GSM modem.	RMM621 - **********
Conversion kits	Several conversion kits are available, e.g.: ■ Conversion of Prowirl 77 to Prowirl 72 or 73 ■ Conversion of a compact version to a remote version	DK7UP - **
Weather protection cover	Protective hood against direct sunshine.	543199-0001

Communication-specific accessories

Accessory	Description	Order code
HART Communicator Field Xpert handheld terminal	Handheld terminal for remote configuration and for obtaining measured values via the current output HART (4 to 20 mA) and FOUNDATION Fieldbus (FF). Contact your Endress+Hauser representative for more information.	SFX100 - *******
Fieldgate FXA320	Gateway for remote interrogation of HART sensors and actuators via Web browser: ■ 2-channel, analog input (4 to 20 mA) ■ 4 binary inputs with event counter function and frequency measurement ■ Communication via modem, Ethernet or GSM ■ Visualization via Internet/Intranet in Web browser and/or WAP cellular phone ■ Limit value monitoring with alarms sent by e-mail or SMS ■ Synchronized time-stamping of all measured values	FXA320 - *****
Fieldgate FXA520	Gateway for remote interrogation of HART sensors and actuators via Web browser: ■ Web server for remote monitoring of up to 30 measuring points ■ Intrinsically safe version [EEx ia]IIC for applications in Ex area ■ Communication via modem, Ethernet or GSM ■ Visualization via Internet/Intranet in Web browser and/or WAP cellular phone ■ Limit value monitoring with alarms sent by e-mail or SMS ■ Synchronized time-stamping of all measured values ■ Remote diagnosis and remote configuration of connected HART devices ✎ Note! If Fieldgate FXA520 is used for the HART input, this results in an error message for Prowirl 73 and is not recommended.	FXA520 - ****
Fieldgate FXA720	Gateway for remote interrogation of PROFIBUS sensors and actuators via Web browser: – Web server for remote monitoring of up to 30 measuring points – Intrinsically safe version [EEx ia]IIC for applications in Ex area – Communication via modem, Ethernet or GSM – Visualization via Internet/Intranet in Web browser and/or WAP cellular phone – Limit value monitoring with alarms sent by e-mail or SMS – Synchronized time-stamping of all measured values – Remote diagnosis and remote configuration of connected HART devices	FXA720 - ****

Service-specific accessories

Accessory	Description	Order code
Applicator	Software for selecting and planning flowmeters. The Applicator can be downloaded from the Internet or ordered on CD-ROM for installation on a local PC. Contact your Endress+Hauser representative for more information.	DXA80 - *
Fieldcheck	Tester/simulator for testing flowmeters in the field. When used in conjunction with the "FieldCare" software package, test results can be imported into a database, printed out and used for official certification. Contact your Endress+Hauser representative for more information.	50098801
FieldCare	FieldCare is Endress+Hauser's FDT-based plant asset management tool. It can configure all intelligent field units in your system and helps you manage them. By using the status information, it is also a simple but effective way of checking their status and condition.	See the product page on the Endress+Hauser Web site: www.endress.com
FXA193	Service interface from the measuring device to the PC for operation via FieldCare.	FXA193 – *

Documentation

- Operating Instructions Proline Prowirl 72
- Operating Instructions Proline Prowirl 72 PROFIBUS PA
- Operating Instructions Proline Prowirl 72 FOUNDATION Fieldbus
- Operating Instructions Proline Prowirl 73
- Operating Instructions Proline Prowirl 73 PROFIBUS PA
- Operating Instructions Proline Prowirl 73 FOUNDATION Fieldbus
- Related Ex-documentation: ATEX, FM, CSA, etc.
- Supplementary documentation on "Information on the Pressure Equipment Directive"

Registered trademarks

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