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Technical Information

# Proline Prosonic Flow 92F

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

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

- Loop powered transmitter (2-Wire)
- Accuracy up to ±0.3% (optional)
- Fluid temperatures up to 150 °C
- Process pressures up to 40 bar
- Galvanically isolated pulse output available

Approvals for hazardous area:
- ATEX, FM, CSA

Connection to common process control systems:
- HART, PROFIBUS PA

Relevant safety aspects:
- Pressure Equipment Directive (PED)

**Your benefits**
The calibrated Inline version Prosonic Flow 92F is for measuring flow of conductive and especially non-conductive liquids such as solvents and hydrocarbons.

The **Proline transmitter concept** comprises of:
- Modular device and operating concept resulting in a higher degree of efficiency
- Diagnostic ability and data back-up capability for increased process quality
- Permanent self-monitoring and diagnosis of transmitter and sensor

The **Proline Prosonic Flow sensors** comprises:
- Available as a 2, 3 or 4 beam version
- New innovative loop powered fourbeam design facilitates a reduced requirement for upstream pipework (≤ 5 pipe diameter)
- Calibration traceable to international standards
- No pressure drop
- Maintenance free due to no moving parts

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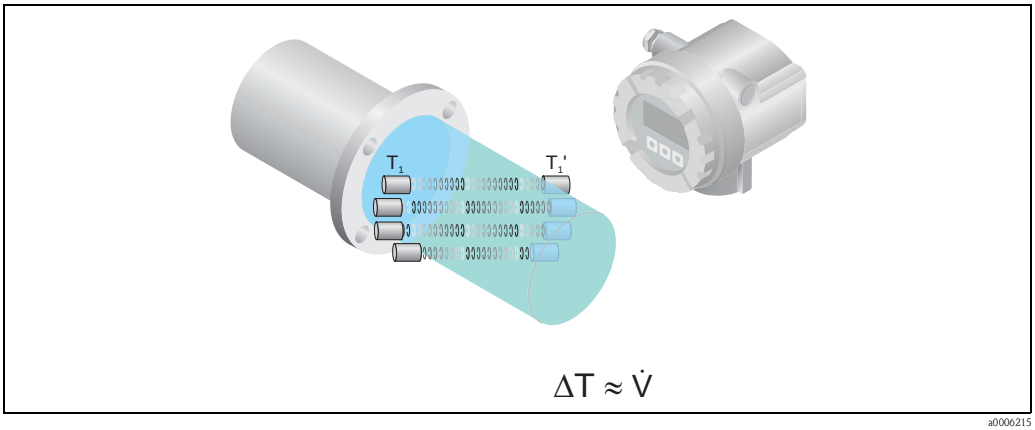
# Function and system design

## Measuring principle

A Prosonic Flow inline flowmeter measures the flow rate of the passing fluid by using sensor pairs located on opposite sides of the meter body and at an angle so that one of the sensors in the pair is slightly downstream. The flow signal is established by alternating an acoustic signal between the sensor pairs and measuring the time of flight of each transmission. Then utilizing the fact that sound travels faster with the flow versus against the flow, this differential time ($\Delta$ T) can be used to determine the fluids velocity between the sensors.
The volume flow rate is established by combining all the flow velocities determined by the sensor pairs with the cross sectional area of the meter body and extensive knowledge about fluid flow dynamics. The design of the sensors and their position ensures that only a short straight run of pipe upstream of the meter is required after typical flow obstructions such as bends in one or two planes. Advance digital signal processing facilitates constant validation of the flow measurement reducing susceptibility to multiphase flow conditions and increases the reliability of the measurement.



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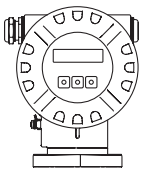
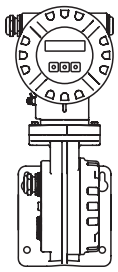
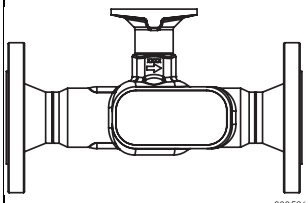
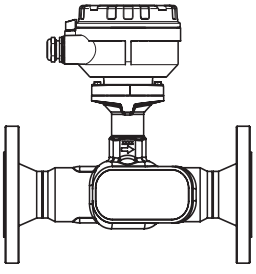
## Measuring system

The measuring system consists of a transmitter and a sensor. Two versions are available:
- Compact version: transmitter and sensor form a mechanical unit
- Remote version: transmitter and sensor are mounted physically separate from one another

### Transmitter

| Prosonic Flow 92 | Prosonic Flow 92 remote version | |
|---|---|---|
|  a0005962 |  a0005963 | ■ Two line liquid crystal display<br>■ Operation with push buttons (only HART version)<br>■ 2-Wire loop powered<br>■ Optional explosion proof housing |

### Sensor

| F | F (remote Version) | |
|---|---|---|
|  a0005966 |  a0005967 | ■ Universal sensor for fluid temperatures up to 150°C<br>■ Nominal diameters DN 25 to 150, 1"…6"<br>■ Tube material: stainless steel<br>■ Process pressures up to 40 bar<br>Remote version:<br>■ Optional IP68 housing<br>■ Standard remote cable length of 10 and 30 meters<br>■ Optional remote cable length made to order up to a maximum 50 meters |

# Input

**Measured variable**

Flow velocity (transit time difference proportional to flow velocity)

**Measuring range**

Typically v = –10 to 10 m/s with the specified accuracy

| Nominal diameters | Range for full scale values (liquids) $m_{min(F)}$ to $m_{max(F)}$ |
|---|---|
| 25 | 0 to 300 $dm^3$/min |
| 40 | 0 to 700 $dm^3$/min |
| 50 | 0 to 1100 $dm^3$/min |
| 80 | 0 to 3000 $dm^3$/min |
| 100 | 0 to 4700 $dm^3$/min |
| 150 | 0 to 600 $m^3$/h |

# Output

**Outputs in general**

The following measured variables can generally be output via the outputs:

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

**Output signal**

**Current output:**

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

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

Open collector, passive, galvanically isolated
- Non-Ex, Ex d - version:
  Umax = 35 V, with 15 mA current limiting, Ri = 500
- Ex i version:
  Umax = 30 V, with 15 mA current limiting, Ri = 500

The pulse/status output can be configured as:
- Pulse output:
  – Pulse value and pulse polarity can be selected,
  – Pulse width can be configured (0.005 to 2s)
  – Pulse frequency max. 100 Hz
- Status output:
  Can be configured for diagnosis code messages or flow limit values
- Frequency output:
  End frequency 0 to 1000 Hz (fmax = 1250 Hz)

**PROFIBUS PA interface**

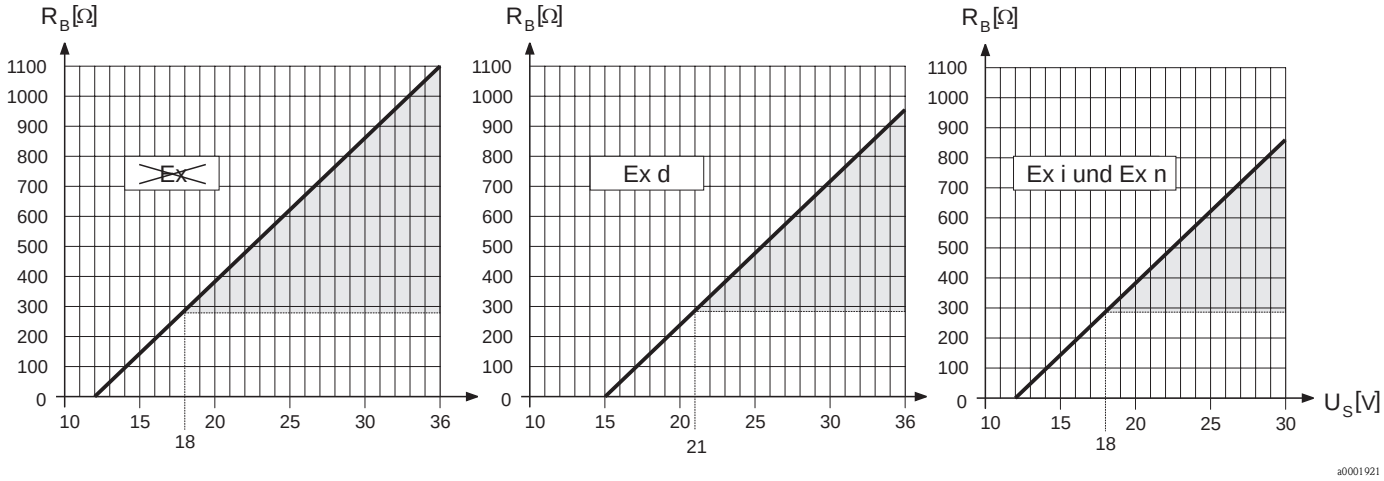
- PROFIBUS PA in accordance with IEC 61158 (MBP), galvanically isolated
- Profile Version 3.01
- Data transmission rate: 31.25 kBaud
- Current consumption: 16 mA
- Permitted supply voltage: 9 to 32 V; 0.5 W
- Bus connection with integrated reverse polarity protection
- Error current FDE (Fault Disconnection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

**Signal on alarm**

*Current output:*
Failsafe mode selectable (e.g. in accordance with NAMUR Recommendation NE 43)

*Status output:*
"Non conductive" in the event of fault or power supply failure.

**Load**




*Behavior of load and supply voltage*

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

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

$R_B$ *Load, load resistance*
$U_S$ *Supply voltage:*
- *Non-Ex = 12 to 35 V DC*
- *Ex d = 15 to 35 V DC*
- *Ex i = 12 to 30 V DC*

$U_{KL}$ *Terminal voltage:*
- *Non-Ex = min. 12 V DC*
- *Ex d = min. 15 V DC*
- *Ex i = min. 12 V DC*

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

**Low flow cutoff**

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

**Galvanic isolation**

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

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