Highly accurate flow measurement for pressurized pipes
Application

Flow measurements are very often mandatory in the area of water supply and industry. Quite frequently the pipe systems are complex and contain valves and pumps. Additionally, there are space constraints, leading to difficulties in installing flowmeters at a recommended „optimum“ location, which is defined by a minimum distance upstream or downstream of known disturbances like an elbow or pump where a fully developed velocity profile is present. ReVision is able to increase your profitability with exceptional repeatability and linearity throughout the flow range. Due to the patented velocity profile compensation no flow straightener is needed and no on-site calibration is required.

ReVision is used for highly accurate flow measurements in water distribution networks and hydro power plants. The system is based on the well established acoustic transit-time principle. The digital signal processing allows detection of even the smallest time differences, i.e. even the smallest amounts are being determined accurately. Common installation effects e.g. after an 90° elbow are taken into account by patented corrections of the disturbed velocity profiles. No more need for the famous long straight runs in front of and after the flowmeter. Installation of a flow straightener is no longer necessary saving you time and money.

Advantages

» Highly accurate flow measurements
» No on-site calibration needed
» No flow straightener needed
» Patented velocity profile correction
» certified by independent test centers
» fully integrated metering solution

Specifications

Acoustic Paths: 1 - 10 (20 transducers) arranged in max. 5 planes, crossed
Flow: bi-directional
Accuracy: up to < ± 0,15 %
Range: 0 to ± 20 m/s
Repeatability: < ± 0,02 %
Zero Stability: < 1 mm/s
Pressure Range: PN6, PN10, PN16
Communication: RS-485, MODBUS, WLAN, GSM/GPRS, Ethernet 10/100 Mbps
Inputs: max. 4 x 4-20 mA, 2 x digital
Outputs: max. 4 x 4-20 mA, 2 x Pulse, 4x Relay
Power Supply: 85-260 V AC (48-60 Hz) or 9-36 V DC
Enclosure: ABS, wall mounted
Concept

Space constraints and/or appropriate application configurations lead to complex industrial pipe flows which contain elbows, tees and/or other disturbing and non-uniform elements. This leads to difficulties in installing flow meters at a recommended “optimum” location, which is defined by a minimum distance upstream or downstream of known disturbances like an elbow or pump where a fully developed velocity profile is present. Even with multiple flow sensors, there may still be a significant error which is known as the profile factor.

During commissioning, the installation condition is entered into the device (e.g. 2 DN after a 90° elbow). During the following measuring operation, the various measuring planes capture the disturbed velocity profile. Finally, the integration of the volume flow is supported by numerically simulated weighting factors that are based on the parameterized installation conditions. The high measuring accuracy has been certified by independent test centers.

Flow meters are also sensitive to velocity profiles where there is a large rotational component (swirl). Swirl is normally generated by two or more out of plane changes in flow direction (e.g. one elbow/tee that goes from vertical to horizontal followed by an elbow/tee that changes the direction of flow in the horizontal plane). Swirl is present to some extent in almost every application and can generate significant transverse velocity components plus it takes a long distance to dissipate. If the swirl is not centred, it can cause significant errors. Thanks to the predetermined conduit configuration parameters and correction factors, the flow meter measurement accuracy is kept when asymmetric profiles and swirls are present in the pipe.

Clamp-On Transducer

When combining the ReVision with clamp-on transducers, the flow measurement becomes non-intrusive and easy from the outside of the pipe. The transducers are installed with little technical effort and without process interruption on the pipeline. The special construction of the transducer mounting allows for removal of the transducers without changing the position of the mounting itself.
### Technical Data

#### Wetted sensors

<table>
<thead>
<tr>
<th></th>
<th>FT-S</th>
<th>FT-M</th>
<th>FT-L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency:</td>
<td>1 MHz</td>
<td>1 MHz</td>
<td>120 kHz / 1 MHz</td>
</tr>
<tr>
<td>Beam Width:</td>
<td>5° (-3dB)</td>
<td>10° (-3dB)</td>
<td>10° (-3dB)</td>
</tr>
<tr>
<td>Configuration:</td>
<td>IEC41 / ASMEPTC 18</td>
<td>n.a</td>
<td>IEC41 / ASMEPTC 18</td>
</tr>
<tr>
<td>Pipe Diameter:</td>
<td>0,1 m to 2 m</td>
<td>0,1 m to 4 m</td>
<td>0,3 m to 10 m (120° kHz) / 0,3 m to 5 m (1 MHz)</td>
</tr>
<tr>
<td>Mounting:</td>
<td>welding socket or thread</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure Rate:</td>
<td>20 bar *)</td>
<td>20 bar *)</td>
<td>60 bar *)</td>
</tr>
<tr>
<td>Material:</td>
<td>stainless steel</td>
<td>stainless steel, brass</td>
<td>stainless steel</td>
</tr>
<tr>
<td>Cable:</td>
<td>twisted pair with shield</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temp.:</td>
<td>0° to 40°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions:</td>
<td>Ø 1” Length: 293 mm</td>
<td>Ø 1 1/2” Length: 407 mm</td>
<td>Ø 1 1/2” Length: 186 mm</td>
</tr>
</tbody>
</table>

#### Mounting

- **FT-S**: incl. fixing device ball valve and welding socket
- **FT-M**: to be used in combination with 1 1/2” ball valve and NPT inner thread

- Designed to allow removal of the entire transducer for repair, replacement or cleaning without the need to dewater the pipe.
- Removal of the transducer for repair, replacement or cleaning by means of a special jacking tool.

- Pipe needs to be dewatered only for the time of initial installation.

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**HydroVision GmbH**

Gewerbestraße 46f
87600 Kaufbeuren
Germany

Tel. +49 - 8341 - 9662180
Fax +49 - 8341 - 9666030
info@hydروvision.de
www.hydrovision.de

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