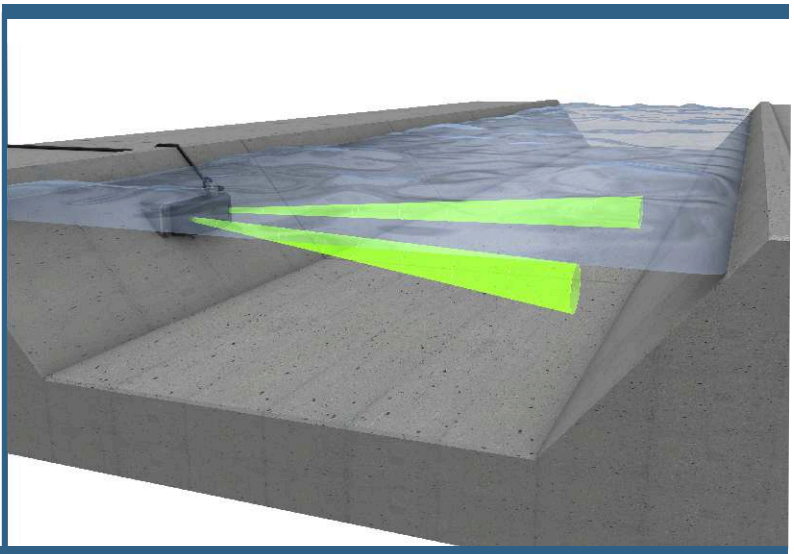
WE **KNOW** FLOW



QZV
ISO 9001
CERTIFIED

HydroVision applies a quality management system according to DIN EN ISO 9001:2008

AquaProfiler™

Acoustic Flow Profiler
Stationary or Mobile System

HydroVision
Acoustic Flow Meters

Acoustic Flow Profiler

Flow Monitoring

AquaProfiler™ makes monitoring flow in natural streams, concrete lined channels and pipes very easy. It is able to measure flow in harsh environments and difficult (less than ideal hydraulic) conditions very accurately. This lightweight and compact system uses HydroVision's proven Acoustic Profiling Technology, in a single transducer assembly, to measure the flow, velocity and water level. The system is designed to measure both, the vector and the magnitude (using twin velocity beams) of individual velocity cells (up to 128) to account for velocity variations within the flow and obtain the flow profile. A third vertical acoustic beam is used to measure water level and combined with the velocity profile, calculates flow most accurately.

The velocity data from the two profiles are entered into an algorithm to determine a mathematical description of the flow velocities throughout the cross-section of the flow. The result determines flow velocities at all points throughout the flow. These results are integrated over the cross-sectional to determine the flow. The key benefit to this approach is that the system will operate accurately under different hydraulic conditions. This eliminates the need of site-specific calibrations.

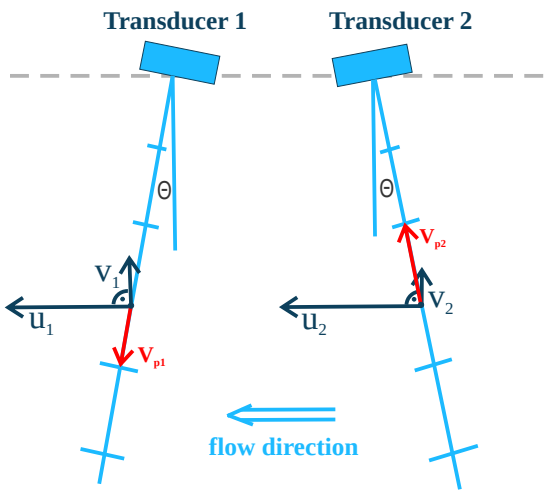
Typical Applications:

- ☑ Pipes - partially and full-filled
- ☑ Open channels
- ☑ Irrigation channels
- ☑ Natural streams and canals
- ☑ Hydro power plants (low heads, short intake)

Transmitter
Type MC
for stationary
system

Rugged
Tablet PC
incl. Software
AquaProfiler

Flow Computation



$$V_{p1} = -u_1 - \sin\Theta + v_1 * \cos\Theta$$
$$V_{p2} = u_2 * \sin\Theta + v_2 - \cos\Theta$$

$$U = \frac{v_{p1} + v_{p2}}{2 * \sin\Theta}$$

One transducer measures one velocity profile vector projection into transducer axis.

To receive a complete 2D measurement in a point, at least two transducers are necessary.

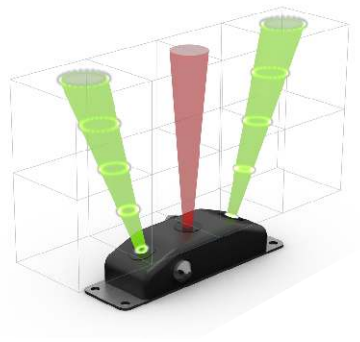
Features

- ☑ Operates in depths from 0.1 to 4 / 10 meters
- ☑ 1-beam or 2-beam acoustic pulse velocity profiler
- ☑ Submerged ultrasonic water level measurement
- ☑ Automatically adjusts for optimal performance with changing water level
- ☑ Up to 128 velocity cells, with minimum cell size of 1 cm (0.39 in.)
- ☑ Bi-directional velocity measurement
- ☑ Velocity profiling gives detailed information about the velocity distribution and hydraulic conditions
- ☑ No site calibration required. Flow data are accurate under varying flow conditions (backwater, surcharging, variable flow conditions, varying roughness, pipe bends or intercepting flows etc.)

- ☑ Stationary as mouse-type or insertion sensor
- ☑ Mobile as rod-mounted sensor

Principle of Operation

Principle of Operation

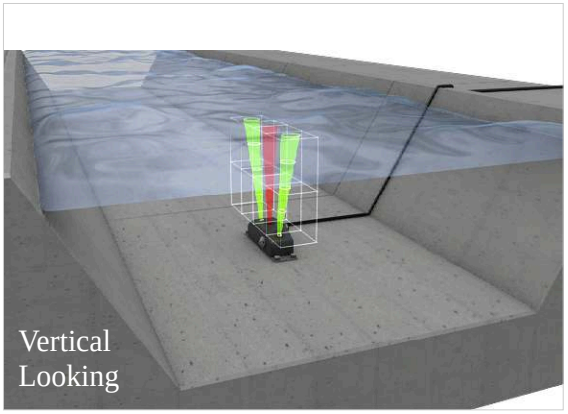


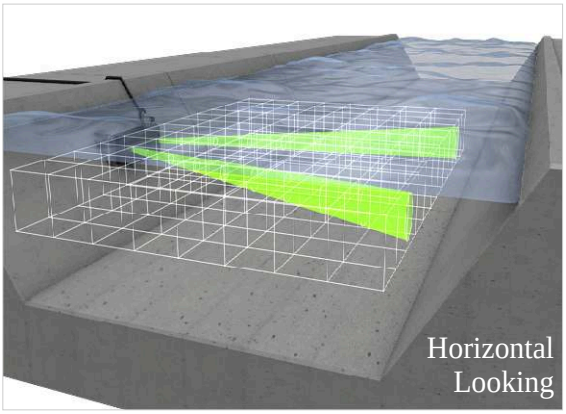
An ultrasonic transducer transmits two short pulses of ultrasound which travel along the measurement axis and then switches over to receiver mode. When the ultrasonic pulses hit a small particle or air bubble in the medium, part of the ultrasonic energy scatters on the particle and echoes back. The echoes reach the transducer after a time delay. If the scattering particle is moving with a non-zero velocity into the acoustic axis of the transducer, a time delay between the two echoed signals takes place, and the measured time delay is analyzed by correlation technique for the velocity of the particle or air bubble.

The **AquaProfiler™** measures the position and velocity of the particle, and hence establishes the fluid flow component in the given space point. The basic feature of the Acoustic Flow Profiler is the ability to establish the velocity in many separate space points along the measurement axis and develop the flow profile.

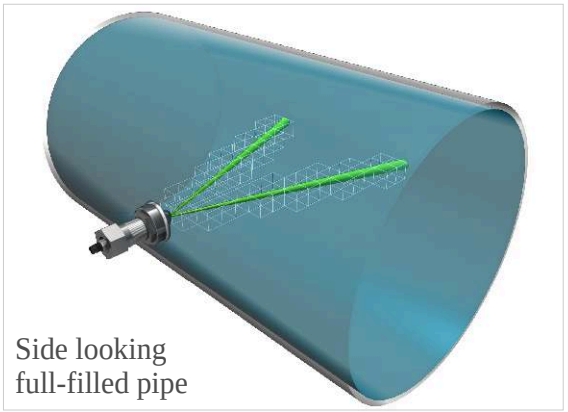
Each acoustic beam measures velocity at multiple points within the water column. The measured velocity data within each cell are very precise. This distribution of accurate velocity measurements is then used to determine the flow pattern over the entire cross-section of flow.
Since the flow pattern and measured velocity distribution are dependent on each other, the **AquaProfiler™'**s advanced flow algorithms automatically adapt to changing hydraulic conditions within the channel. This removes the need for in-situ calibration and ensures accurate flow rate measurement over a host of different measurement environments and hydraulic conditions.

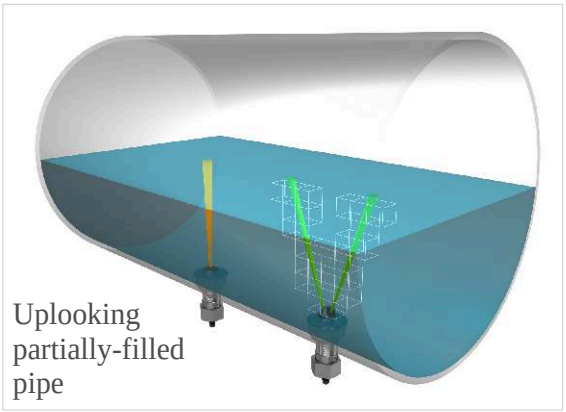
Vertical & Horizontal Applications (**Mouse Type**)





Applications (**Insertion Type**)





Technical Data

Transmitter

System	AquaProfiler™ transmitter MC
Data logger	Removable Compact Flash card with selectable data and storage interval
Display	20 character, 4 line alphanumeric, backlit LCD
Interface	1*RS232
Inputs	4 x 0/4 to 20 mA
Outputs	2 x 0/4 to 20 mA 2 x Relay, 1 x Pulse
Programming	via keypad
Power supply	85-264 V_{AC} (50/60 Hz) or 12 V_{DC}
Power consumption	< 10 Watt depending on system configuration and operation mode
Ambient conditions	Operating temperature: -20°C to +70°C (0°F to 158°F), 95% relative humidity
Enclosure	Wall enclosure aluminium IP65 (NEMA 4x) W*H*D: 265*241*104 mm (10.4*9.5*4,1 in.)

Profiling sensor

Type	**Short**	**Medium**	**Long**	**X-Long**
Velocity beams	1 or 2	1 or 2	1 or 2	1 or 2
Frequency	1 MHz	500 kHz	2 MHz	600 kHz
Number of cells	up to 18 cells	up to 128 cells	up to 64 cells	up to 64 cells
Range	0,04 to 1,5m	0,01 to 3m	0,25 to 20m	0,5 to 120m
typ. max. V-Application Depth	2m	4m	10m	-
typ. max. H-Application Width	2m	5m	30m	150m
Water level (hydrostatic)	0 to 4 m accuracy: 0,1 % FS other ranges on request	0 to 4 m accuracy: 0,1 % FS other ranges on request	0 to 10 m accuracy: 0,1 % FS other ranges on request	0 to 10 m accuracy: 0,1 % FS other ranges on request
Protection	submersible	submersible	submersible	submersible
Cable length	max. 80 m (262.5 ft)	Type MP: max. 10m (32 ft) Type MA: max. 200m (656 ft)	max. 200 m (656 ft)	max. 200 m (656 ft)
Approval	ATEX/FM	ATEX/FM	ATEX/FM	ATEX/FM

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