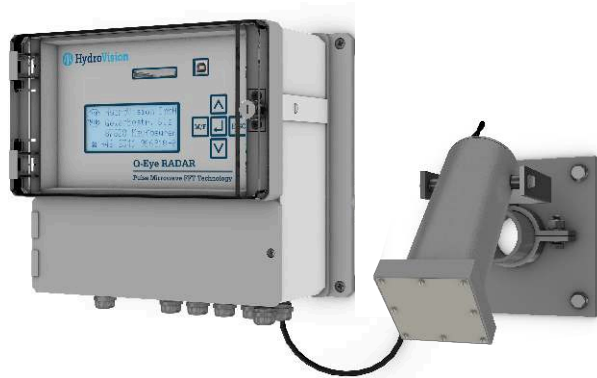


**WE KNOW FLOW**

**QZV**  
ISO 9001  
CERTIFIED

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



## **SYSTEM Q-Eye Radar**

Pulse-Doppler FFT Technology

Non Contact Open Channel  
Flow Measurement System

# Measurement Principle

The **Q-Eye Radar** is a non-contact open channel flow meter. It consists of a radar-based velocity sensor and an ultrasonic-based depth sensor.

## Velocity Sensor

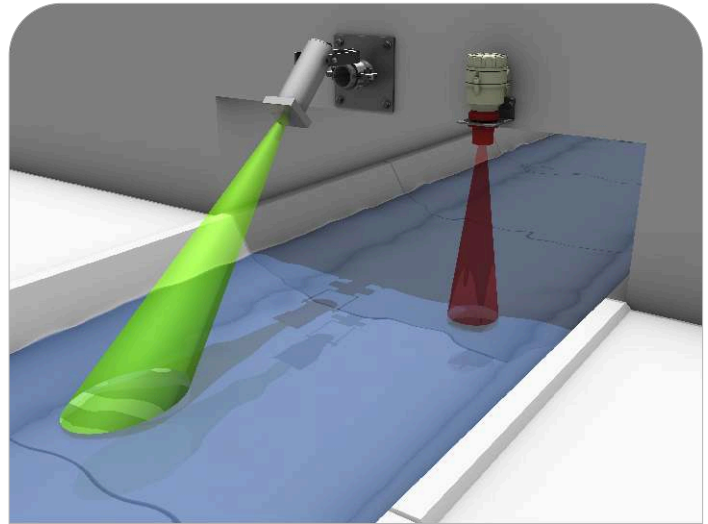
The velocity sensor is operating at the free 24 GHz band frequencies and makes use of the Doppler Effect to produce velocity data about the speed of the moving surface. It does this by beaming a microwave signal to the flow surface at a defined angle and listening for its reflection at particles and disturbances on the surface moving with the flow. The frequency of these returning signals have been shifted by an amount directly proportional to the speed of the moving surface. This frequency shift is measured by means of a Fast-Fourier-Transfer (FFT). The velocity is calculated based on knowledge of the radar frequency, speed of light and average frequency shift.

## Depth Sensor

The ultrasonic depth sensor operates by energizing a piezoelectric transducer with an electronic pulse. This pulse creates a pressure wave that travels to the flow surface where a portion returns to the transducer. The transit-time to the flow surface and back is recorded and the distance calculated by knowing the speed of sound at the site which has been corrected by an embedded temperature sensor.

## Advantages

- Accurate flow measurements
- Easy installation
- No sensor cleaning
- Optional surcharge velocity sensor
- Eliminates maintenance caused by sensor fouling
- No contact of personnel with fluid during installation



## Discharge Calculation

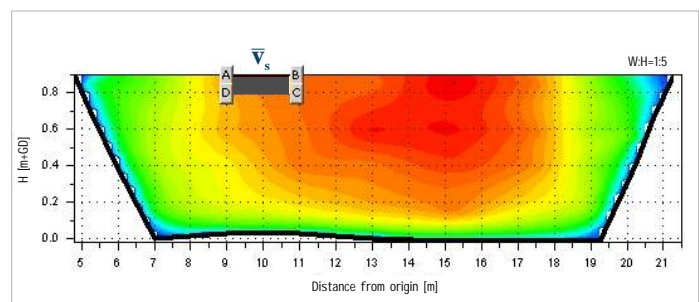
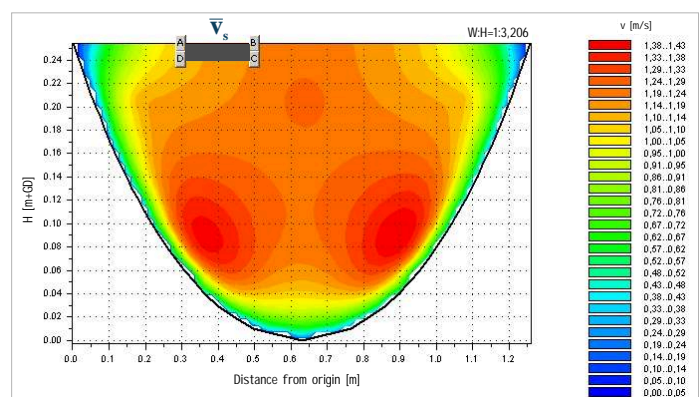
The volumetric flow rate is the volume of fluid which flows through a given cross-section per unit time. It is usually represented by the symbol  $Q$ . Given an area  $A$ , and a fluid flowing through it and where the flow is perpendicular to the area, the volumetric flow rate is:

$$Q = A \bar{v}$$

Since the continuity equation requires the determination of the average velocity of the flow  $\bar{v}$ , the measured surface velocity  $\bar{v}_s$  must be dynamically modified.

$$Q = A(h) \bar{v}_s k(h)$$

HydroVision has developed a **Finite-Difference-Algorithm** that yields an accurate determination of the average velocity from the measurement of the surface velocity at a known point of the flow surface.



# Application & Installation

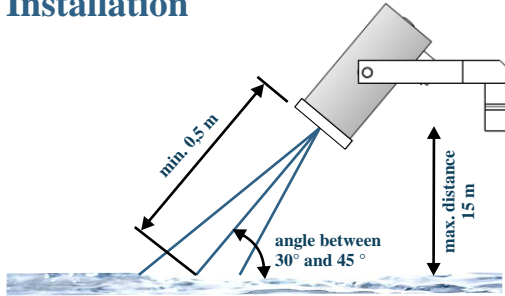
## Q-Eye Applications

The **Q-Eye Radar** is an extremely versatile flow measurement system designed for continuous operation and suitable for measurements of flows not only in rivers and open channels, but also in municipal waste water and storm water sewers.

Compact construction combined with the contact-free measurement principle enables an easy installation and use. The maximum permissible installation height above the surface of the water is 15 m. The minimum distance to the surface of the water in direction of transmission is 0,5 m.



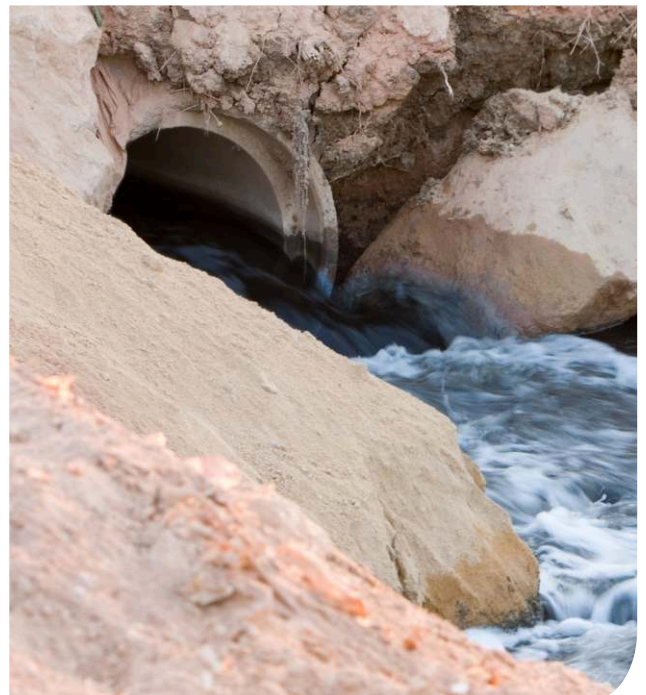
## Installation



## Surcharge Sensors

For some applications, flow conditions change from open channel flow to submerged flow (e.g. in sewers).

Since neither the radar velocity sensor nor the ultrasonic depth sensor provide any useful information when submerged, **Q-Eye Radar** has an optional surcharge velocity sensor (ultrasonic type) and a depth sensor (pressure transducer) which provide continuous measurement of flow data when intermittent surcharged flow conditions are experienced.



Transmitter



Radar Sensor



Ultrasonic Sensor

System	
System	Q-Eye Radar
Data logger	Internal data logger with selectable data and storage interval (CompactFlash)
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	Configuration and signal analysis via PC/Notebook using FlowVision
Power supply	85-264 V <sub>AC</sub> (50/60 Hz) or 12 V <sub>DC</sub>
Power consumption	up to 5 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.)

v-sensor		
Meas. principle	Radar, Doppler-shift (frequency 24 GHz, beamwidth: 11°)	
Velocity range	0,2 m/s to 8,0 m/s (-1ft/s to +26.4 ft/s)	
Operating temp.	-35°C ... +60°C	
Sensor housing	Ø 80 mm, Length: 185 mm; Material: Anodised Natural Aluminium; Weight: 1.5 kg	
Ingress protection	IP 66	
Mounting	Mast-mounting device for 61mm (2") pipe	
h-sensor		
	Type ULC 28	Type ULC 24
Meas. principle	Ultrasonic	Ultrasonic
Measuring range	0.35 to 8m (1.2 to 26 ft.)	0.2 to 4m (0.65 to 13 ft.)
Total beam angle	7°	6°
Frequency	60 kHz	80 kHz
Accuracy *)	+/- (0,2% of measured distance + 0,05% of range)	
Ingress protection	IP 68 Explosion Protection ATEX II G/EEEx ia IIB T6 is available	
Operating temperature	-30°C ... +90°C ( -22 to + 194 °F)	
Mounting	2" BSP / NPT	1 1/2" BSP / NPT
Material	PP, PVDF or PTFE	

\*) under optimum conditions and stabilized transducer temperature

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