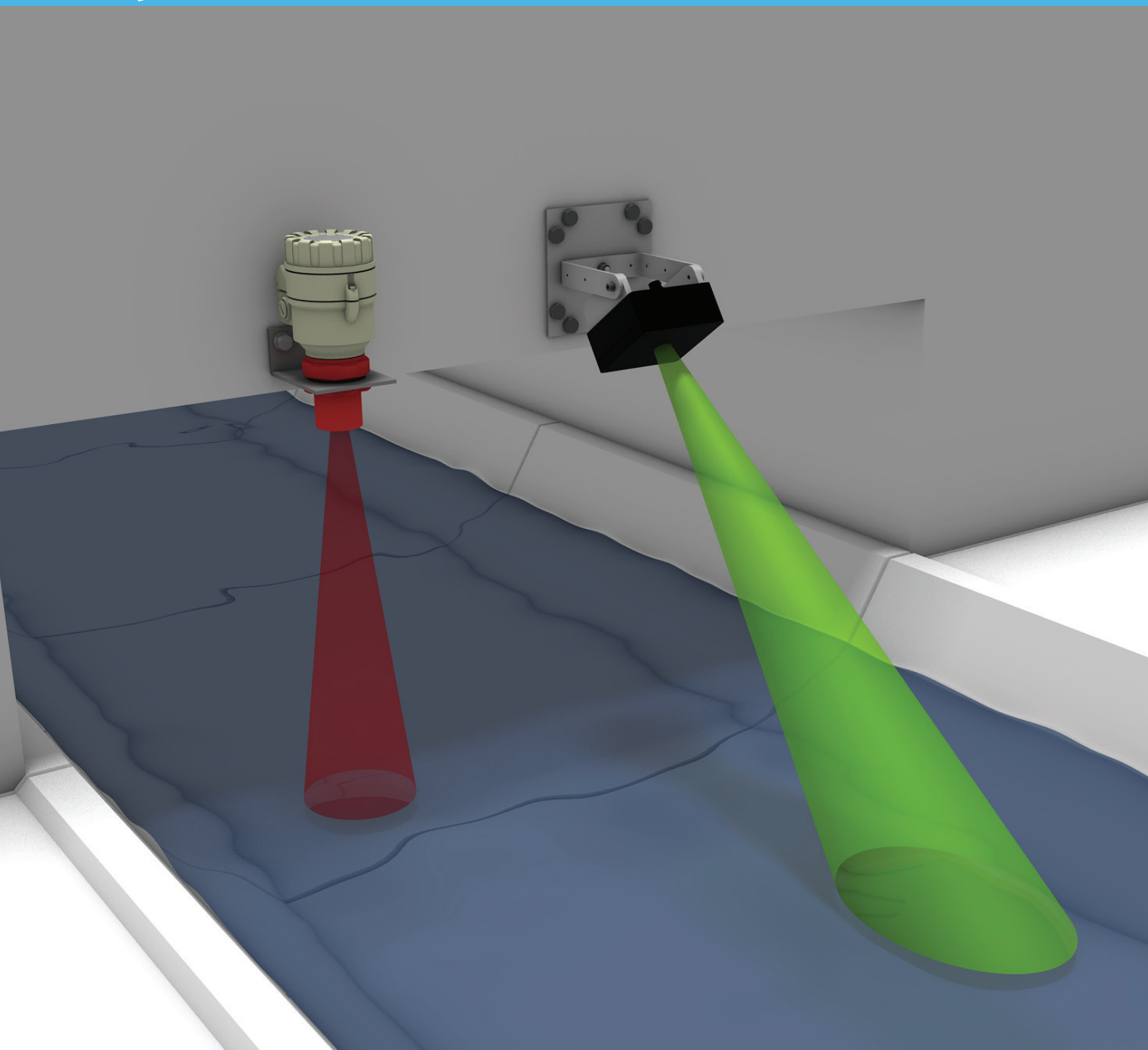
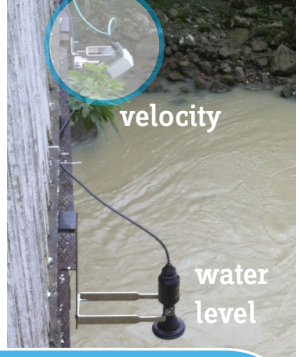
HydroVision

# Non Contact
# Open Channel
# Flow Measurement System

## Q-Eye RADAR






# Q-Eye Radar

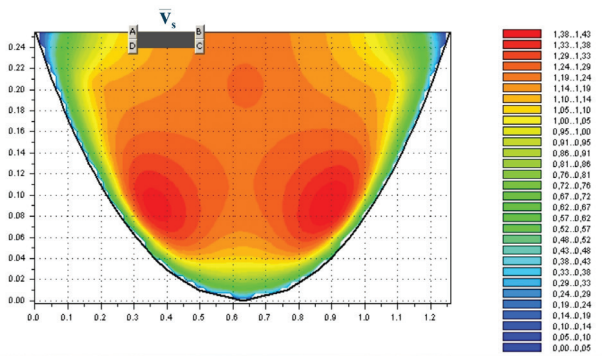
## Application

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

The system is 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.

In some applications it is an advantage to have a non-contact measurement. When combining both **Radar** and **Water level** transmitter, they provide a revolutionary approach to open channel and sewer flow monitoring. Combined are pulse wave radar velocity sensing technology with ultrasonic or radar pulse echo level sensing to remotely measure open channel flows.

The velocities present on the surface are typically within 10% of the average velocity.
HydroVision has developed a **Finite-Difference-Algorithm** that yields to an accurate determination of the average velocity from the measurement of the surface velocity at a know point of the flow surface.




## Advantages

» Accurate flow measurements
» Easy installation
» No need to stop flow
» Bi-directional velocity measurements
» No need of periodical cleaning as required by submerged type sensors (e.g. caused by fouling)
» Integrated inclination sensor
» Optional surcharge water level sensor
» No contact of personnel with fluid during installation

## Inclination Sensor

The Radar sensor comes with an integrated **inclination** sensor which after each measurement automatically checks its own position. It measures the inclination so that installation errors or any unwanted repositioning of the sensor are detected and can be corrected. This eliminates measurement errors.

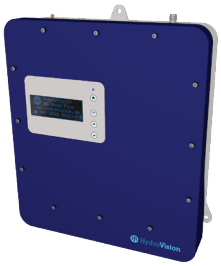
## Surcharge Conditions

Thanks to the optional surcharge depth sensor, the system can also be used in situations where flow changes from open channel flow to surcharged conditions (e.g. in sewers).

## Installation

The maximum permissible installation height above the surface of the water is 30 m (98 ft.). The minimum distance to the surface of the water in direction of transmission is 0,5 m (19.2 in).

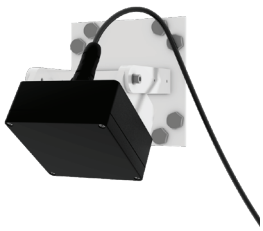
# Technical Information



## Q-Eye Radar

Transmitter

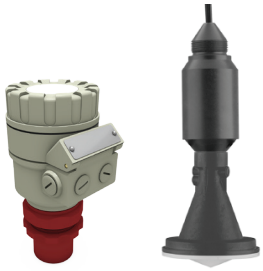
Q-Eye Radar is a major improvement in open channel flow measurement. It's the latest entry in the HydroVision family of high accuracy metering products. This flow computer incorporates all of the required algorithms and software to ensure accuracy and repeatability. The IP65 (NEMA 4X) compact flow display computer has a 4x20 alphanumeric LCD display and a 4 buttom keypad. All configuration data and measured and calculated data are stored in an up to 2GB Micro-SD card. It controls the measurements, calculates the flow rate and provides freely programmable current outputs, status alarm, frequency outputs and totalizer readings.
The unit can be mounted up to 100 m (330 feet) far away from the velocity and water level sensor. The unit is available with AC and DC power supply options.



## Velocity Sensor

S30a

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-Transformation (FFT). The velocity is calculated based on knowledge of the radar frequency, speed of light and average frequency shift.



## Water Level Sensors

Compact ultrasonic level transmitter and radar sensor

The **ultrasonic level sensor** operates by energizing a piezo-electric 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.
Alternatively, the system can be equipped with an additional radar water level sensor.

## Surcharge Sensor

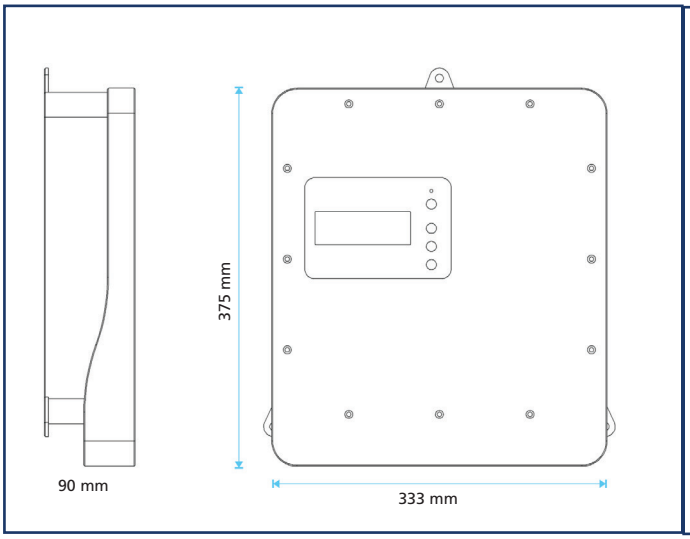
Pressure transducer

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

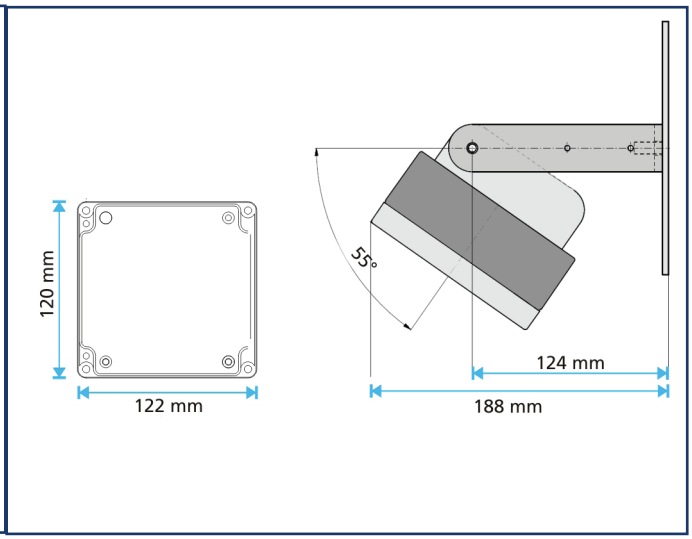
Since neither the radar velocity sensor nor the ultrasonic depth sensor provide any useful information when submerged, Q-Eye Radar has an optional depth sensor (**pressure transducer**) which provides continuous measurement of flow data when the sewer is flowing full and gravity-flow no longer prevails.

# Technical Data

### Transmitter




### Radar Sensor S30a / Mounting Frame




## Q-Eye Radar

| Specifications Sensor | |
|---|---|
| Frequency: | 24 GHz |
| Beamwidth: | 10° at -3dB |
| Range: | **S30a:** ± 0,3 m/s (0,98 ft/s) to ± 15 m/s (50 ft/s) |
| Resolution: | 1 mm/s; min. wave height 3mm |
| V-Sensor: | bi-directional |

| Specifications Transmitter | |
|---|---|
| Display: | 4 lines, 20 characters |
| Keyboard: | 4 keys |
| Datalogger: | 2GB MicroSD Card |
| Communication: | RS-485, Modbus, WLAN, GPRS Ethernet 10 / 100 Mbps |
| Inputs: | max. 4 x 4-20 mA. 2x digital |
| Outputs: | max. 2 x 4-20 mA |
| Power Supply: | 85-260 $V_{AC}$ (48-60 Hz) or 9-36 $V_{DC}$ |
| Protection Class: | IP 65 |
| Enclosure: | ABS, wall mounted |

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## Ultrasonic Level

| Specifications | WLU3902 | WLU3802 | WLU3702 |
|---|---|---|---|
| Frequency: | 80 kHz | 80 kHz | 60 kHz |
| Range: | 0,2 - 4 m/s (0.65 - 13 ft.) | 0,25 - 6 m/s (0.82 - 19.68 ft.) | 0,35 - 8 m/s (1.2 - 26 ft.) |
| Accuracy *): | ± (0,2% of measured distance + 0,05% of range) | | |
| Beam Angle: | 6° | 5° | 7° |
| Sensor Material: | PP, PVDF or PTFE | | |
| Housing Material: | Plastic / Aluminum | | |
| Operating Temperature: | -30°C ... +90°C ( -22 to + 194 °F) | | |
| Power Supply: | 24 $V_{DC}$ | | |
| Mounting: | $1^1/_2$" BSP/NPT | 2" BSP/NPT | 2" BSP/NPT |
| Protection Class: | Sensor: IP 68 / Housing: IP 67 | | |
| Approval: | ATEX (Option, II G/EEx ia IIB T6) | | |
| Electrical Connection: | Standard version: 2x M20x1.5 plastic cable gland; Cable: Ø 6...12 mm<br>Ex version: 2x M20x1.5 metal cable gland; Cable: Ø 7...13 mm<br>Wire cross section: 0.5...1.5 $mm^2$ | | |

Further details and drawings of Ultrasonic Level please refer to separate brochure.
*) under optimum conditions and stabilized transducer temperature

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