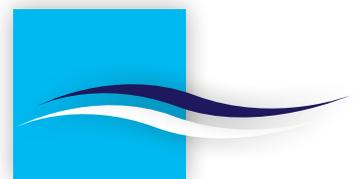
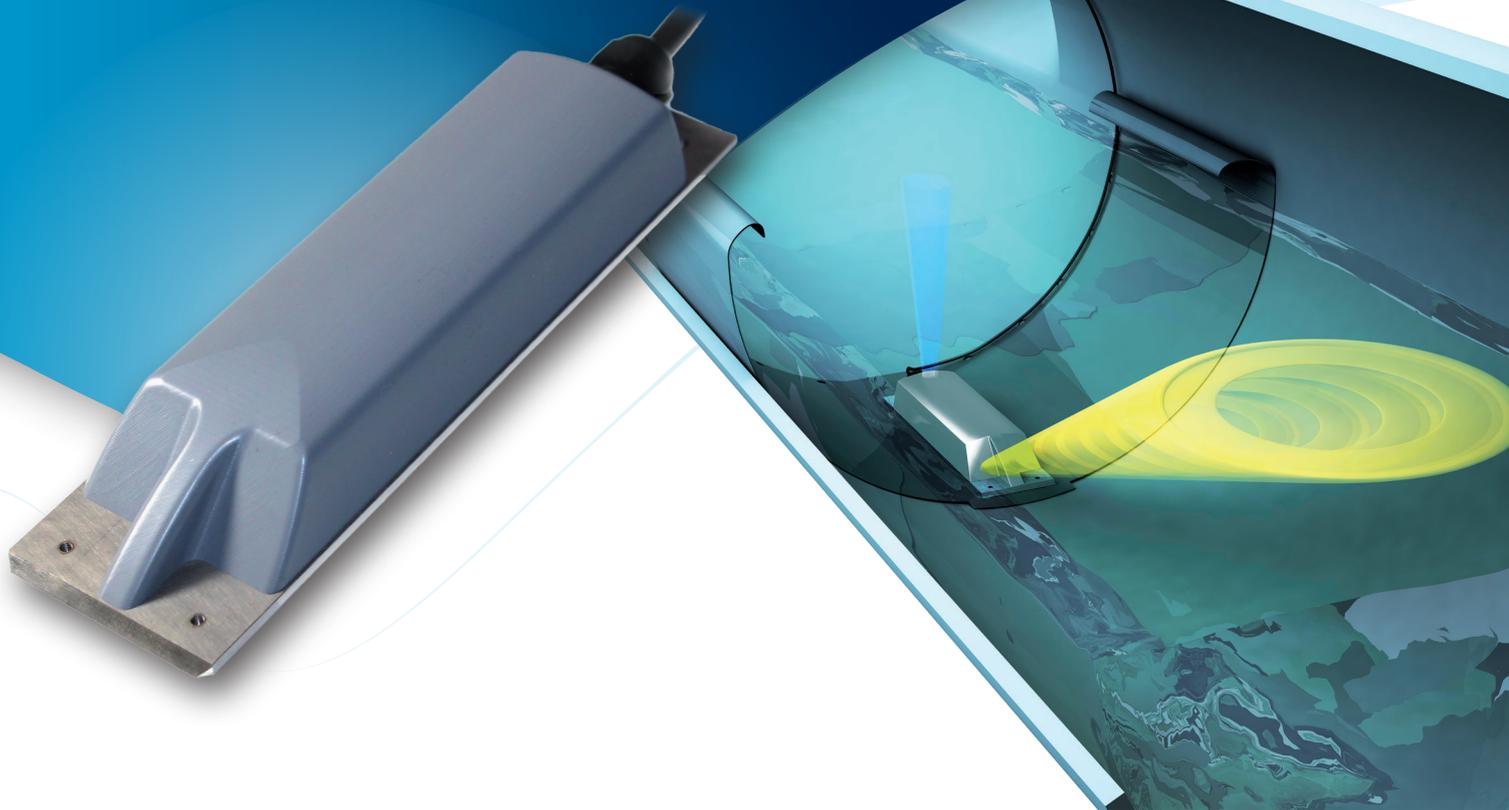


BELUGA™

ULTRASONIC AREA/VELOCITY FLOW METER

**POWERFUL
DIGITAL ACOUSTIC
FLOW SENSOR!**



FLOW-TRONIC DA NV

BELUGA™

ULTRASONIC AREA/VELOCITY FLOW METER

How does it work?

The BELUGA™ sensor measures the velocity of the flow in partially filled pipes and surcharged pipes. It uses the Doppler Effect to measure the individual velocities of the flow stream.

FLOW-TRONIC is using a **CONTINUOUS WAVE (CW)** digital Doppler with **SPECTRAL ANALYSIS**.

The BELUGA™ is sending out a continuous acoustic signal at a frequency of 1 MHz. The separate receiver is located in the same sensor housing and samples thousands of frequency signals for one measurement.

The result of each of those frequencies gives the complete spectrum with individual energy levels. By reading the spectrum from the returned frequencies, the BELUGA™ sensor analyses the **VELOCITY DISTRIBUTION** of the flow.

This new technology **DOES NOT SUFFER FROM DEAD ZONE NOR BLANK DISTANCE** in which no velocity measurements can be taken, such as encountered by pulsed acoustic transducers looking at velocities in windows within the wetted cross section, but measures water velocities as soon as water raises over half an inch.

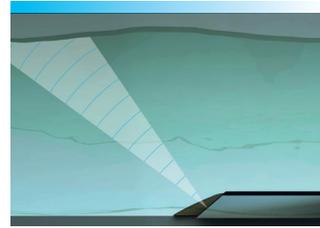
The depth from water is measured by an associated level sensor.

The two measurements are used to calculate the flow rate using the Continuity equation:

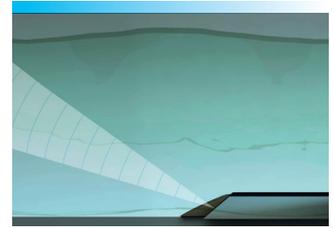
$$Q = v \times A$$

The BELUGA™ converts the measured velocity to average velocity by analysing the velocity distribution within the measured spectrum using a powerful DSP processor technology. The spectral analysis does not require theoretical modules nor site calibration.

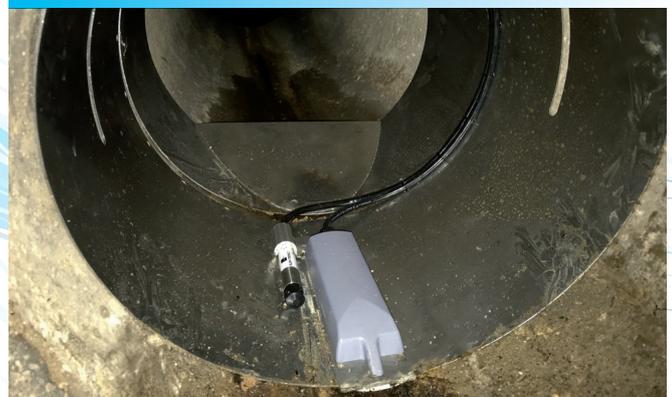
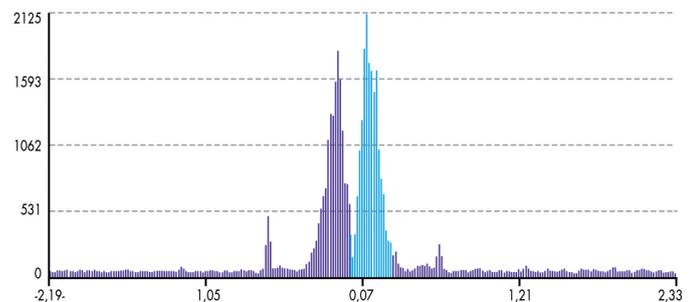
Then the water level and pipe size are converted into fluid area. Multiplication of fluid area by average velocity produces a volumetric flow rate.



BELUGA™ 45°



BELUGA™ 20°



Technical specifications

General

| | |
|-------------------------|--|
| Size (HxWxL) | 7.48" x 1.89" x 1.10" |
| Weight | 0.57 lb (without cable, level sensor and mounting accessories) |
| Materials | Enclosure: HIGH IMPACT PVC-C Cable: Polyurethane jacketed |
| Cable Lengths | 33, 66, 99 or length as needed up to 984 ft |
| Protection | IP68/NEMA 6P |
| Certifications | CE |
| Temperature Range | Operating: -4° to +122°F Storage: -22° to +140°F |
| Supply Voltage Required | 4 to 26 VDC (max. 130 mA at 12 VDC) or supplied by IFQ MONITOR™ or IFQ LOGGER™ |
| Power Consumption | Sleep: 60 mA at 12 VDC Measuring: 120 mA at 12 VDC |
| Outputs (optional) | One 4-20 mA for validated velocity (vQP) or validated velocity including median filter (vQPMF) |
| Communication | RS-485 communication port with Modbus ASCII slave communication protocol |

Flow Measurement Method

Conversion from measured velocity to average velocity based on integrated spectral analysis of the velocity distribution in the cross-sectional area. Conversion of water level and pipe size to fluid area. Multiplication of fluid area by average velocity to obtain the flow rate.

Velocity Measurement

| | |
|-------------------|---|
| Method | Ultrasonic Doppler |
| Frequency | 1 MHz |
| Measurement Range | -6.56 ft/s to +19.68 ft/s |
| Measurement | Bi-directional |
| Accuracy | Better than 1% + zero stability (according to hydraulic and installation conditions compliance) |
| Zero Stability | ±0.03 ft/s |
| Resolution | 0.003 ft/s |

Water Temperature Measurement

| | |
|-------------------|-----------------------------|
| Method | Internal temperature sensor |
| Measurement Range | -40°F to +176°F |

Optional Combined Level Measurement (Ultrasonic)

| | |
|-------------------|---|
| Method | Non-Contact Ultrasonic Pulsed Echo with temperature compensation |
| Measurement Range | 0 to 5.74 ft (with RAV-0002/ULS-02) 0 to 18.86 ft (with RAV-0006/ULS-06) |
| Accuracy | ±0.3% of reading (with RAV-0002/ULS-02) ±0.2% of reading (with RAV-0006/ULS-06) Includes non-linearity + hysteresis |
| Temperature Error | Max. 0,04 %/K |
| Resolution | 0.003 ft |

Optional Combined Level Measurement (Radar)

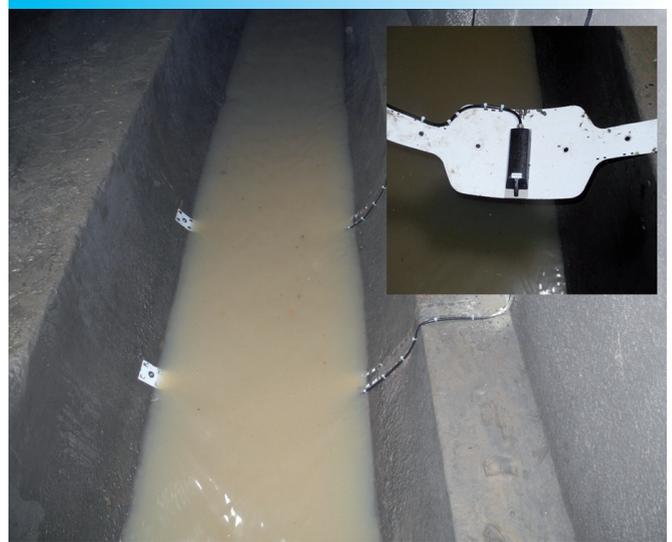
| | |
|------------|--------------------------|
| Method | Non-Contact Pulsed Radar |
| Range | 0 to 49.21 ft |
| Accuracy | ±0.006 ft of reading |
| Resolution | 0.003 ft |

Optional Separate Level Measurement

| | |
|--------|---------------------------------|
| Method | Any 4-20 mA loop powered sensor |
|--------|---------------------------------|

Main benefits

- Accurate flow measurement
- Full digital sensor
- Bi-directional velocity measurement (-6.56 ft/s to +19.68 ft/s)
- Portable or stationary version available
- Easy installation without modification of the channel thanks to adapted mounting accessories
- Robust IP68/NEMA 6P enclosure
- Resistant to fouling, corrosion and abrasion
- Velocity distribution analysis using spectral analysis
- For channels from 6" to 98"
- Easy integration with SCADA, PLC or telemetry systems: the flow rate is calculated into the BELUGA™ sensor
- Integrated water temperature measurement



Applications

Sewer/Channel Networks Monitoring

- Sewer systems evaluation
- Capacity study
- Combined sewer overflow (CSO) studies
- Infiltration studies
- By pass/overflow
- Billing/custody transfer

Industry

- Plant effluent
- Process waste water



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