accQpulse™ Velocity Profiler

Accurate flow measurement in shallow and deep water applications



The accQpulse Velocity Profiler brings unparalleled precision and accuracy to flow rate measurement in many sizes of pipes and open channels. Its unique ability to measure velocity at multiple points makes it suitable for most applications including sites with non-uniform, rapidly changing, near zero, zero, or reverse flow conditions. These applications include: waste water collection systems, billing, combined sewer systems and outfalls, wastewater treatment facilities, irrigation canals, industrial discharges, and stormwater conveyance and outfalls.

With sensor options for both shallow and deep water, the accQpulse Velocity Profiler is the only flexible pulse-doppler flow meter available. The shallow water sensor is used to measure flow in depths up to 48 inches (1.2 m). The deep water sensor is used to measure flow in depths up to 16 feet (4.9 m).

Achieve accurate measurement
By measuring velocity at multiple points, you can record accurate flow measurement.

Eliminate on-site calibration
With detailed information on velocity at multiple points and advanced flow algorithms, there is no need for on-site calibration.

Rely on quality data information
Verify that your data is accurate with diagnostic information and Flowlink software's data quality analysis.

Standard Features

- Pulse Doppler velocity profiling technology
- Tri-redundant velocity sensors and a depth sensor combined in a single, compact housing
- Data quality verification information (signal strength and correlation)
- Chemically resistant polyurethane encapsulated sensor withstands abuse, resists oil and grease fouling, and eliminates the need for frequent cleaning
- Rugged, submersible enclosure meets IP 68 protection rating

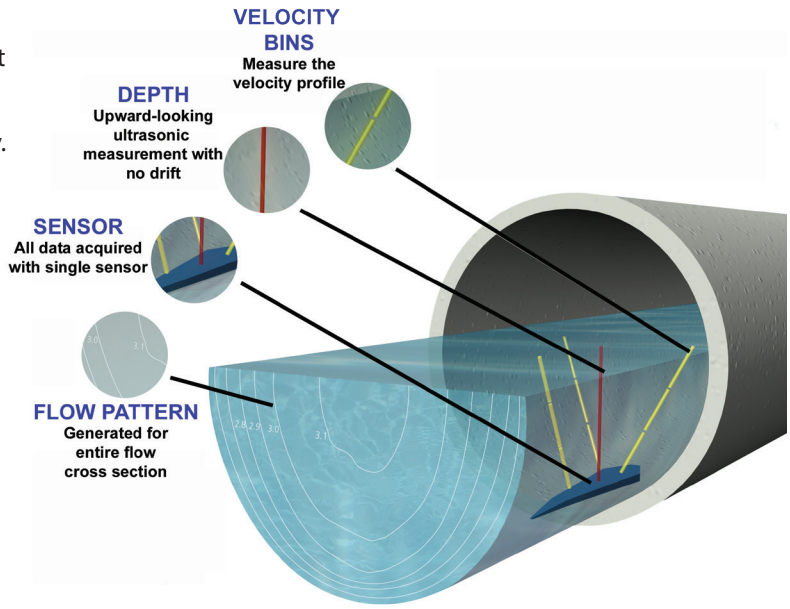
Options

- Secondary pressure sensor for redundant level measurement
- Flow conditioning platform for shallow water sensor
- Sensor fairing for deep water channels where sediment or debris are present
- accQcomm digital/analog interface module for 4-20 mA, RS-232/422, MODBUS, and Ethernet interface
- Remote cell phone communication options
- QBADFM intrinsic safety barrier for hazardous area installation classified as Class I, Div 1, Group C & D
- Flowlink data management software

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Principles of Operation

Three piezoelectric ceramic devices in the sensor emit short acoustic pulses along narrow beams into the flow stream. Each beam points in a different direction to measure velocity. A fourth ceramic device is mounted in the center of the sensor and aimed vertically to measure the depth.



The acoustic signals are echoed back after contacting bubbles or particles. By measuring the difference in frequency between the emitted and returned signals (known as Doppler shift), the velocity in the flow stream can be accurately determined. By "range gating" the returned signals, velocity is measured in multiple, distinct cells called "velocity bins".

As a result, the accQpulse™ provides detailed velocity data in relation to sensor location at multiple points in three different directions within the flow channel. This is used to calculate a true, highly accurate flow.

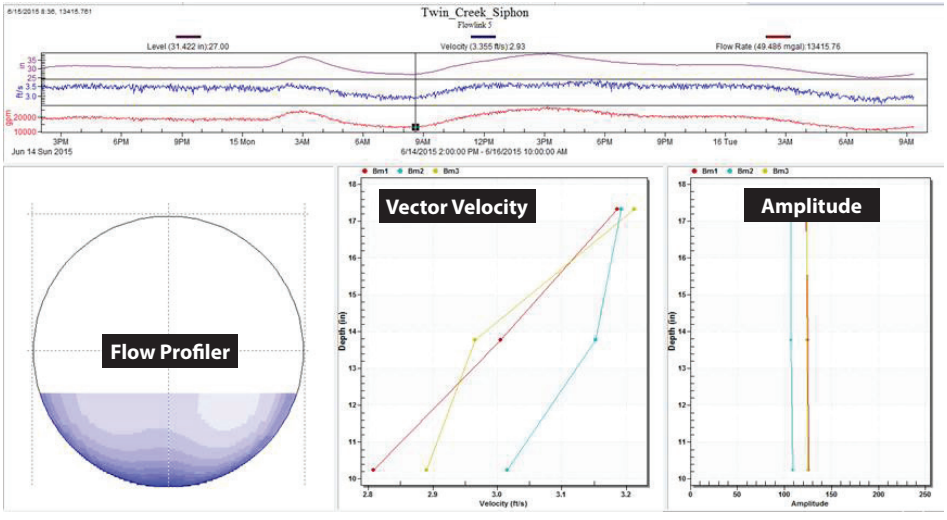
The velocity profiling information reduces the need for in-situ calibration and ensures accurate flow rate measurement over a host of different measurement environments and hydraulic conditions.

Flowlink

Teledyne ISCO designed Flowlink software packages to assist technicians in the field with instrument configuration, installation diagnostics, equipment maintenance, and data collection.

The multi-panel user interface allows accQpulse™ users to verify proper operation of the instrument for accurate flow measurement. Back at the office, Flowlink 5.1 software aggregates the flow data for reports, analysis, and archiving.

When on-site instrumentation is equipped with communication modules, Flowlink software can eliminate costly site visits by remotely monitoring site information and displaying alarm conditions.



Flowlink Software Packages Available:

Flowlink — Desktop or Notebook Stand-alone package

Flowlink Pro — Server based software for maximum efficiency

Flowlink Global — Web User Interface for any data, anywhere, at any time

accQpulse™ Velocity Profiler

Physical	
Electronics Unit	
Operating Temperature	23° F to 104° F (-5° C to 40° C)
Storage Temperature	-13° F to 140° F (-25° C to 60° C)
Packaging	IP 68
Dimensions (HxWxD)	15.6 x 9.4 x 5.9 in. (397 x 240 x 150 mm)
Weight (with batteries)	16.4 lb (7.4 kg)
Data Management	
Data Types	
Q, V, D	Flow, average velocity, depth
Velocity	Velocity profile data (relative to acoustic beam directions) per beam and bin
Amplitude	Amplitude intensity data (relative backscatter intensity) per beam and bin
Data Quality	Profile data quality indicators per beam and bin
Temperature	Transducer temperature output, range 20 to 125º F (-7 to 52º C)
Data Storage and I/O	
Data Storage Capacity	4 MB std. (15,360 measurements with a typical configuration), slate or wrap
Data I/O Interface	RS-232 standard. Multiple industry-standard protocols optional
Data Transfer Rate	Configurable to 115,200 bps
Power	
Internal Battery Voltage	18 VDC nominal
Internal Battery Capacity	26 Ah at 75º F (24º C) - Alkaline battery life 30 weeks at 15 minute sampling interval
External DC	12 - 24 VDC; 10 VDC absolute minimum; 28 VDC absolute maximum
Software	
Flowlink or WinADFM software for setup, operation, data review, and data management.	
QBADFM Intrinsic Safety Barrier and Hazardous Location Sensors	
Classification	Barrier: Class I, Division 1, Groups C and D Sensors: Temperature class T3
Housing	Polycarbonate
Dimensions (HxWxD)	12.7 x 9.4 x 3.5 in (322 x 238 x 88 mm)
Weight	4.6 lbs
Operating and Storage Temperature	-40 to 160° F (-40 to 71° C)
Humidity	90% to none

Options

Digital/Analog Interface Module accQcomm™

The accQcomm™ digital/analog interface module accepts data from up to three accQpulse™ flow meters and provides interfaces such as MODBUS, Ethernet, or analog signal (4-20mA). The module is wall or console mountable and is powered with 12 to 24 VDC.

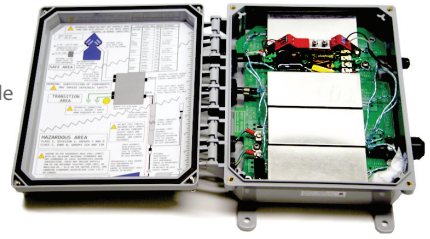


accQcomm™

Hazardous Area Installation

When the accQpulse™ is used with intrinsic safety barrier model QBADFM, it is suitable for the hazardous areas classified as Class I, Div 1, Group C & D.

QBADFM Intrinsic Safety Barrier Module





accQpulse™ Deep Water Sensor

Measurement Performance	
Flow Accuracy	2.0% of reading*
Velocity (maximum)	±20 ft/s (±6 m/s) at depths less than 30 in (0.8 m), ±7 ft/s (±2.1 m/s) in depths from 30 in (0.8 m) to 33 ft (10 m)
Velocity Bin Size	1 to 4 inches (25 to 100 mm)
Vertical Profiling Range	6 inches to 16 feet (152 mm to 4.9 m) Reduce by 20% when using the QBADFM Intrinsic Safety Barrier Module
Water Level	
Measurement Range	3 in to 32 ft (76 mm to 9.8 m)
Level Accuracy	±1% of range (actual measurement) or ±3 mm (whichever is greater)
Acoustic Frequency	
Frequency (Velocity Measurement)	2.4 MHz
Frequency (Level Measurement)	600 kHz
Physical Specifications	
Operating Temperature	23 to 113º F (-5 to 45 ºC)
Housing Material	Polyurethane
Size (H x W x D)	8 x 3.6 x 1.5 in (203 x 91 x 38 mm)
Weight	1.3 lb (0.6 kg)
Sensor Signal Cable	
Material	Polyethylene jacket
Length	49 ft (15 m) or 147 ft length (45 m)

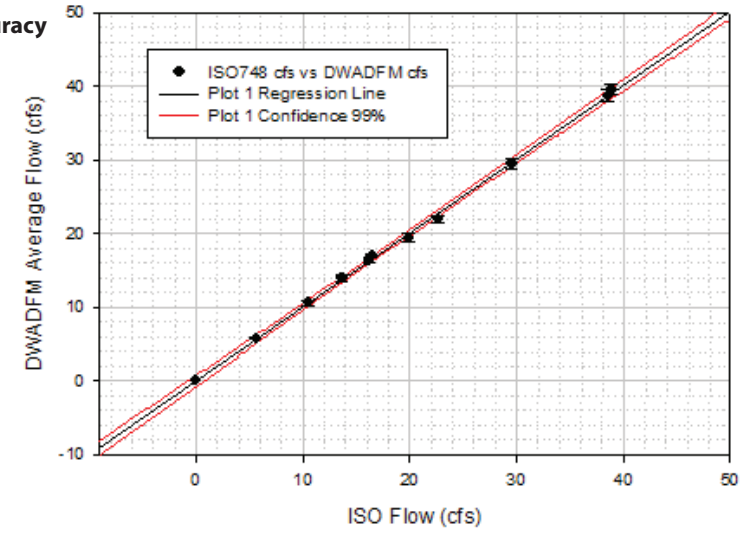


accQpulse™ Shallow Water Sensor

Measurement Performance	
Flow Accuracy	2.0% of reading*
Velocity (maximum)	±30 ft/s (±9 m/s) at depths less than 30 in (0.8m), ±10 ft/s (±3 m/s) in depths from 30 in (0.8 m) to 48 in (1.2 m)
Velocity Bin Size	0.4 in (10 mm)
Vertical Profiling Range	3 to 48 in (76 mm to 1.2 m) Reduce by 20% when using the QBADFM Intrinsic Safety Barrier Module
Water Level	
Measurement Range	3 to 48 in (76 mm to 1.2 m)
Level Accuracy	±1% of range (actual measurement) or ±3 mm (whichever is greater)
Acoustic Frequency	
Frequency (Velocity Measurement)	2.4 MHz
Frequency (Level Measurement)	600 kHz
Physical Specifications	
Operating Temperature	23 to 104º F (-5 to 40 ºC)
Housing Material	Polyurethane
Size (H x W x D)	10.5 x 2.3 x 0.6 in (267 x 57 x 16 mm)
Weight	0.4 lbs (0.2 kg)
Sensor Signal Cable	
Material	Polyethylene jacket
Length	49 ft (15 m) or 147 ft length (45 m)

* Typical at normal flow conditions. Results of verification in an external lab are presented in the following graph.

Flow Accuracy



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