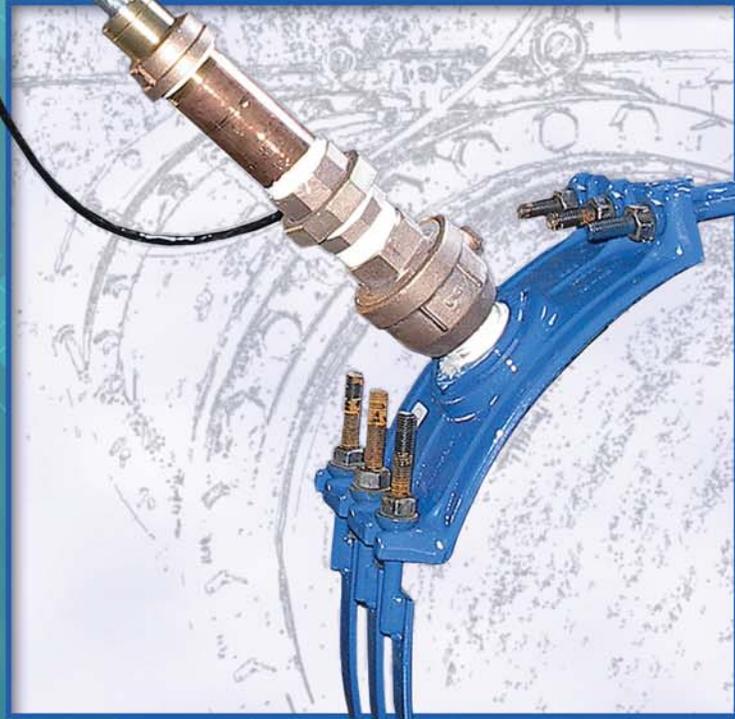


ISCO[®] HotTap[™]



Pulse Doppler Insertion Flow Meter

True In-situ Velocity Profiling

- High accuracy in full pipes
- Installs easily in active pipes
- Ideal for difficult hydraulic conditions
- Never needs calibration



TELEDYNE ISCO
A Teledyne Technologies Company

Isco HotTap™

Pulse Doppler Insertion Flow Meter

Superior technology for insertion-type flow monitoring

The Isco HotTap™ is a velocity profiling flow meter which utilizes Teledyne Isco's unique pulse Doppler technology to accurately measure flow in closed pipes made of virtually any material.

The Isco HotTap is an economical, easy-to-install meter ideal for new and replacement installations. With no need to shut down or bypass active lines, the Isco HotTap eliminates downtime and service interruptions.

Pulse Doppler technology delivers highly accurate real-flow data even in difficult hydraulic conditions often found in force mains, siphons, process lines, and other full-pipe applications.



Benefits of Isco HotTap

Use with any pipe

Works effectively with any pipe wall thickness or material, including concrete, metal, and PVC.

Install virtually anywhere

Can be installed near bends, pumps, and T-joints and still yield dependable data. It eliminates the need for lengthy upstream and downstream straight-line runs, as typically required for conventional flow meters.

Installs easily without dewatering

Simply insert into an industry standard two-inch tap through the pipe wall. The Isco HotTap can be installed or removed without draining the line, so line operation continues uninterrupted. Easy removal without disruption of flow eliminates the need for expensive bypass construction.

No calibration required

The time and expense to perform on-site calibration are eliminated. Pulse Doppler technology uses actual, not estimated, instantaneous velocity measurements from hundreds of points within the flow section.

See an actual flow profile

Unlike other insertion meters that only collect data from a limited, localized area of the flow stream, the Isco Hot Tap takes velocity measurements in four different directions, at multiple depths throughout the full pipe, which enables you to see a true flow profile.

Minimize maintenance and eliminate downtime

The sensor mounts nearly flush with the inner pipe wall so that debris fouling rarely occurs. The entire instrument can be easily removed with no disruption to pipeline flow.

Pulse Doppler: The most accurate, reliable velocity profiling technology

The Isco Hot Tap is capable of taking individual velocity measurements at up to a hundred points spread across the metering section of a closed pipe. The resulting traceable accuracy of individual data points is unmatched by other flow meters that merely measure velocity at a localized area of flow, or take an average over a large cross section.

Confirm and analyze specific data

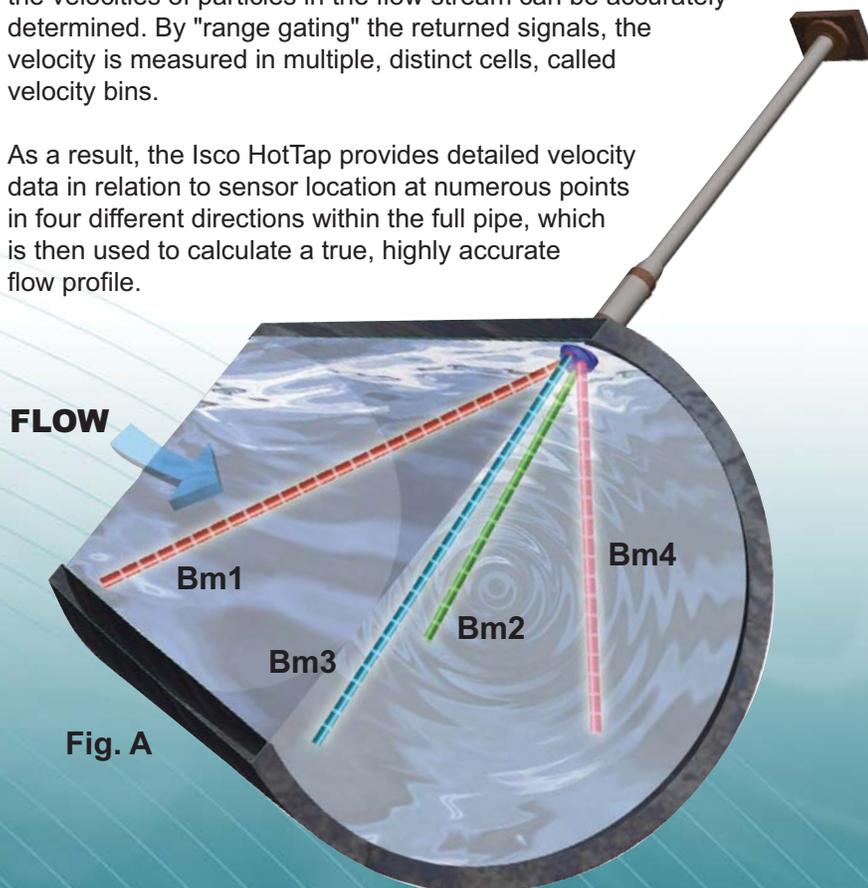
Our data management software allows you to review actual raw data, not just flow rate averages. This means you can quickly diagnose blockage in signal paths, sensor misalignment, or other problems causing functional errors.

What makes it so effective?

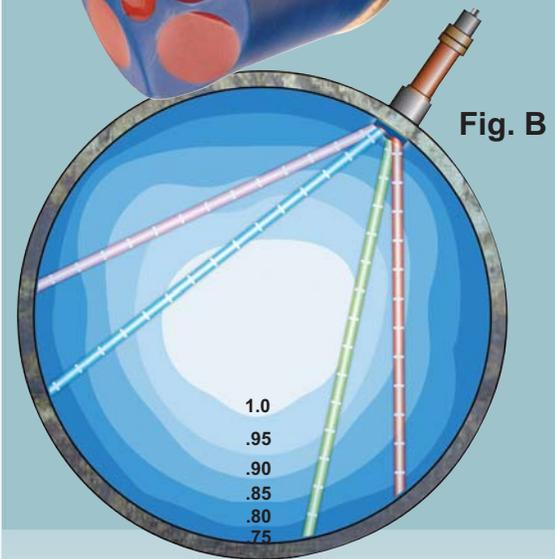
The Isco Hot Tap sensor is comprised of four ceramic crystals which transmit and receive acoustic signals. These crystals emit sound pulses (see Bm1 - Bm4 in Fig. A) into the flow stream. The sound waves are echoed back when they contact particles or air bubbles.

By measuring the difference in frequency between the emitted and returned signals (known as Doppler Shift), the velocities of particles in the flow stream can be accurately determined. By "range gating" the returned signals, the velocity is measured in multiple, distinct cells, called velocity bins.

As a result, the Isco HotTap provides detailed velocity data in relation to sensor location at numerous points in four different directions within the full pipe, which is then used to calculate a true, highly accurate flow profile.

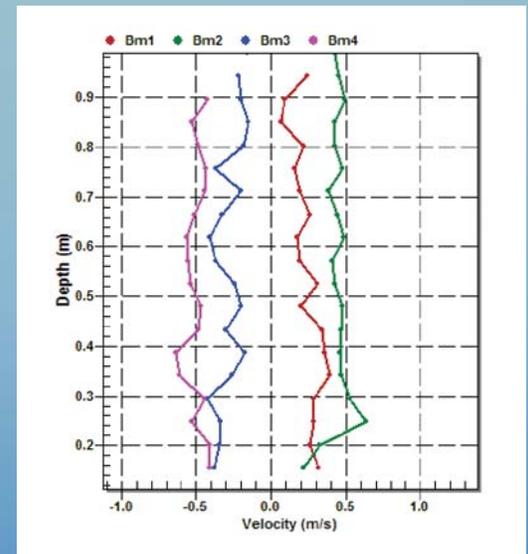


Isco HotTap sensor



Velocity beams are range-gated, creating individual "bins" to collect data at numerous points throughout the metering section.

This process assures that varying velocities within the flow (Fig. B) are accurately measured.



The chart above shows the individual data collected from each beam (Bm1, Bm2, Bm3, Bm4).

Each data point represents a discrete velocity measurement from an individual "bin" along the pulse Doppler beam.

Isco HotTap is ideal for closed pipes in virtually all cases

Wastewater treatment facilities

- Influent measurement
- Real-time process control
- Effluent measurement
- Regulatory reporting
- Pump stations

Industrial process and discharges

- Process optimization
- Discharge measurement
- Regulatory reporting

Wastewater collection systems

- Infiltration and inflow (I&I) studies
- Capacity assessment
- Hydraulic model calibration
- Custody transfer (billing) networks
- Event notification
- Long-term trend analysis

Combined sewer systems and outfalls

- Data for long-term control plans (LTCPs)
- Point discharge measurement
- Characterize combined sewer overflow (CSO) impacts
- Real-time control

Stormwater conveyance and outfalls

Perfect for active line installation

The unique Isco HotTap sensor assembly is designed for insertion into full, operating pipes. There is no need to dewater active pipes, making the Isco HotTap is ideal for new and replacement flow meter locations. Lines remain fully operational during installation, eliminating downtime and service interruptions.



Failed in-line meters can even be left in place, as long as they do not interfere with normal pipeline operation. This eliminates expensive bypass and re-routing costs.

The Isco HotTap allows for fast, convenient installation, even in confined areas such as this below-grade vault.

Cost-effective solution for large pipes

With many in-line meters, the cost goes up dramatically as pipe diameter increases. Thanks to pulse Doppler technology, the cost of an Isco HotTap solution does not rise as pipe diameter increases. This can potentially result in cost savings totaling tens of thousands of dollars.

This photo shows the simplicity of an Isco HotTap replacement for a failed venturi meter.

The Isco HotTap continues to provide accurate readings despite its location near a bend with only a minimal straight run.



Case-In-Point

Wastewater Treatment Plant
Savannah, Georgia

Problem:

- Inaccurate flow readings in the plant's 42-inch influent line, due to scaling and deterioration of venturi meter's internal flow tubes
- Strap-on transit time meter failed to give accurate readings

Challenges:

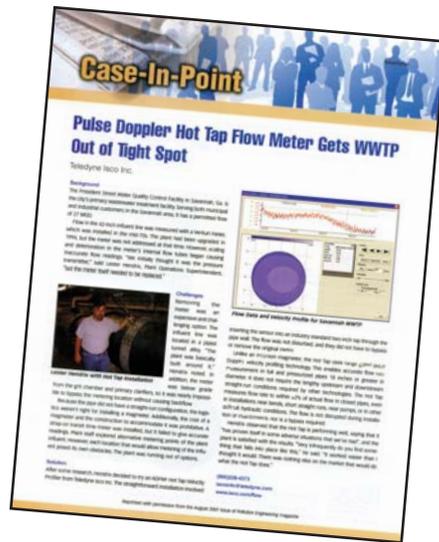
- No room for bypass due to piped tunnel alley location
- No straight run configuration available for magmeter use
- Meter was below grade, and bypass would mean backflow

Solution: Isco HotTap!

To find out how the Isco HotTap insertion flow meter was used to help Savannah WWTP "get out of a tight spot" contact us at iscoinfo@teledyne.com.

"There is nothing else on the market that would do what the Isco HotTap does. It's proven itself, even in adverse situations."

Lester Hendrix
Plant Operations Superintendent
Savannah, Georgia



This case study appeared in the August 2007 issue of *Pollution Engineering Magazine*.

Customer Comments

"Compared to the other technologies we have installed, maintenance on the cleaning of the sensors has been reduced 90% with the Isco HotTap."

Wastewater Collection System,
Force Main
Hampton Roads, Virginia

"We were upgrading our pump station and did not want to incur the high costs of bypassing, while installing a mag meter. We were able to install an Isco HotTap meter without taking down the pump station."

Wastewater Lift Station
Indianapolis, Indiana

"We could not economically pump around to replace the existing venturi meter. The Isco HotTap was the only solution."

Wastewater Treatment Plant
Savannah, Georgia

Examples of Isco HotTap at work

- | | |
|-----------------------|---|
| Austin, TX..... | 30" Wastewater, force main.
Installed November 2000 |
| Indianapolis, IN..... | 30" Wastewater, lift station.
Installed September 2005 |
| Wayne County, MI..... | 48" & 54" Wastewater, billing
meter. Installed November 2005 |
| Savannah, GA | 42" Wastewater, plant influent.
Installed June 2007 |

Installation is simple, without the need for pipe re-routing or calibration .



How do I access my data?

Data is retrieved via Isco Flowlink 5.1 software, and may be output in other forms using the two Isco instruments shown here.



accQcomm®

- Three serial inputs, RS232 or RS422
- Selectable output providing the sum or average of data from three different instruments
- Modbus or Ethernet interface for digital data access
- Up to four opto-isolated 4–20 mA analog outputs
- Eight optically isolated relay outputs



2105 Interface Module

A powerful tool for interfacing different monitoring and recording instruments. In addition to Isco pulse Doppler flow meters, several other Isco or non-Isco devices with SDI-12 or modbus outputs can be connected at once.

- System integration — rain gauge, SDI-12 input, modbus input, sampler
- Cell phone communication (CDMA, 1xRTT, GSM, or GPRS)

Note: An optional instrument console can be pre-configured to your specs for virtual “plug-and-play” installation.

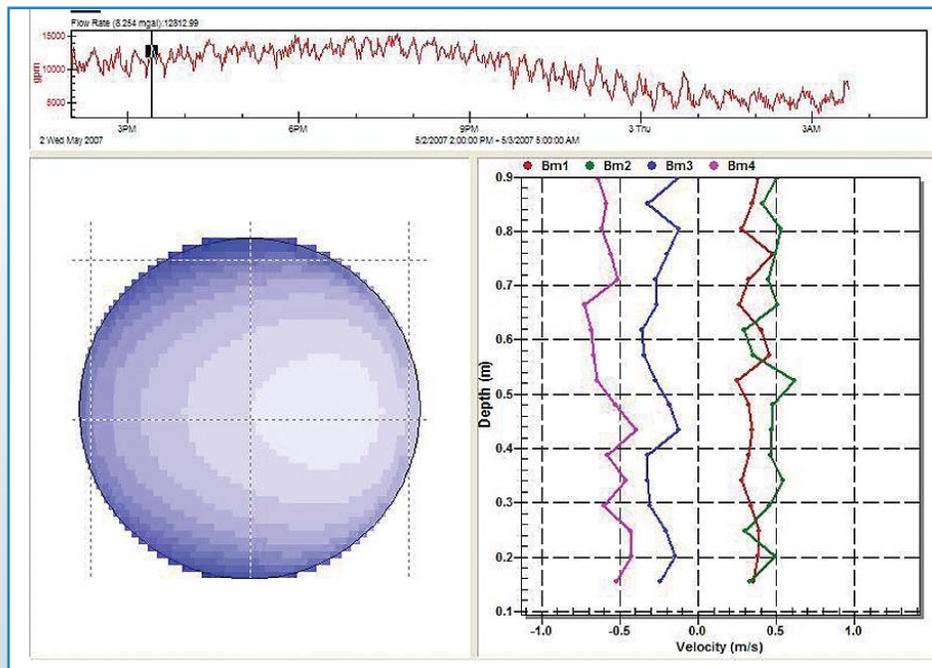
How do I view and analyze data?

Teledyne Isco's Flowlink® data management software provides advanced analysis, editing, and reporting capabilities for data from the Isco HotTap and all other Isco flow meter products.

Stored data can be organized based on monitoring projects or geographic location. Flowlink software also imports data in CSV format.

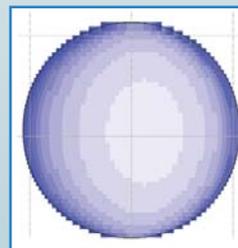
You can display simple graphs with a single mouse click, or conduct very sophisticated analyses of your data.

The result is traceable confirmation of data accuracy.

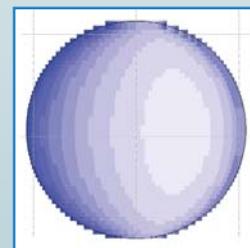


In the Flowlink screen above, a complete flow profile is clearly visible, and the accompanying chart provides velocity information at different depths.

Ongoing profile changes (right) can be viewed continuously for virtually real-time information.



1 minute later



3 minutes later

Isco pulse Doppler flow meters for open channels

Your first choice for metering sites with non-uniform, rapidly-changing, backwatered, near zero, zero, or reverse flow conditions.



ADFAM[®] Pro20

For large open channels and pipes with depth of flow from 12 to 180 inches (0.3 to 4.5 meters).

For more information, request Isco Product Data Sheet #L-2133

accQmin[®]

For shallow water and small pipes/channels from 6 to 48 inches (0.2 to 1.2 meters) depth of flow.

For more information, request Isco Product Data Sheet #L-2134



Applications

- Wastewater collection systems
- Combined sewer systems and outfalls
- Irrigation canals and channels
- Industrial process and discharges
- Stormwater conveyance and outfalls

Did you know?

Over 25 years ago, Teledyne RD Instruments developed the industry's first Acoustic Doppler Current Profiler (AKA "pulse Doppler"), a revolutionary device capable of measuring the speed and direction of underwater current at up to 128 individual points throughout the flow.

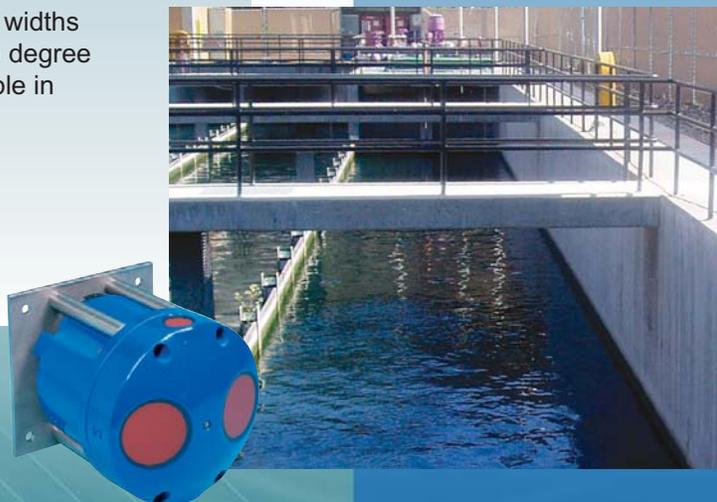
Through the years, this field-proven technology has been used to create a wide array of current profiling, wave measurement, and navigation products for all environments, from shallow streams to deep ocean rigs. Pulse Doppler technology is now considered an essential tool for oceanography, estuary, river, and stream flow current measurement worldwide.

H-ADFAM[®]

Velocity profiling measurement for channel widths of 10 feet (3.0 meters) or more, providing a degree of flow rate accuracy previously unobtainable in wide-channel applications.

Note: Minimum depth requirements may apply.

For more information about H-ADFAM, request Isco Product Data Sheet #L-2135



Specifications

Isco HotTap Pulse Doppler Insertion Flow Meter

Measurement Performance	
Flow Accuracy:	2% of reading in typical conditions
Bin Velocity	
Maximum Velocity:	±30.0 ft/s (± 9 m/s)
Velocity Bin Size:	2 to 12 inches (50 to 300 mm) user selectable
Profiling Range:	9 to 108 in (230 mm to 2.7m) nominal, for particle concentrations of 50-1000 mg/liter
Pipe sizes:*	15 to 108 inches (380 mm to 2.7 m)
Accuracy: (above 1.0 ft/s)	1.0% of reading ± 0.01 ft/s (3.0 mm/s)
Acoustic Frequency	
Frequency:	1.23 MHz
Physical	
Electronics unit	
Electronic Unit Configurations:	Cylindrical canister or wall-mount box
Operating Temperature:	-15 to 140° F (-26 to 60° C)
Storage Temperature:	-65 to 160° F (-54 to 71° C)
Packaging:	NEMA 6P (IP 68) for canister NEMA 4X for box
Dimensions:	Canister - 28.5x10 in. (724 x 254 mm) Box - 17.5x14.8x6.7 in (445x375x170 mm)
Weight:	Canister Housing 36 lbs (16 kg) Box Housing 24 lbs (11 kg)
Isco HotTap Insertion Sensor	
Operating Temperature:	23 to 95° F (-5 to 35° C)
Housing Material:	Plastic transducer assembly on corrosion resistant stainless steel stem
Static Pressure:	50 psi nominal
Dimensions:	1.375 in (35 mm) diameter with standard stem length of 24 in (610 mm); fits 2 in (50 mm) standard tap. Note: longer stem lengths available; consult factory
Weight (including 50 ft cable):	15 lbs (6.8 kg)
Sensor Signal Cable	
Operating Temperature:	-40 to 140° F (-40 to 60° C)
Material:	Polyethylene jacket
Length:	50 ft (15 m) std. 100 ft (30m) optional Note: Greater lengths available; consult factory
Minimum Bend Radius:	6 in (150 mm)
Outer Diameter:	0.5 in (13 mm) nominal

Data Management	
Isco HotTap Data Types	
Q, V, D:	Discharge, average velocity, depth
Velocity:	Velocity profile data (relative to acoustic beam directions) per beam and bin
Echo Intensity:	Echo intensity data (relative backscatter intensity) per beam and bin
Data Quality:	Profile data quality indicators (Correlation magnitude, % - Good) per beam and bin
Temperature:	Transducer temperature output range 20 to 140° F (-7 to 60° C)
Sound Speed:	One output for speed of sound data
Leader:	Output of general leader information (time, data, record number, etc.)
Data Storage and I/O	
Data Storage Capacity:	30 MB std. (40,000 to 200,000 measurements)
Data I/O Interface:	RS-232 standard. Multiple industry-standard analog and digital protocols optionally available
Data Transfer Rate:	Configurable to 57,600 bps
Power	
Internal Battery Voltage:	24 VDC nominal
Internal Battery Capacity:	26 Ah at 75° F (24° C) – Alkaline. Battery life 22 weeks at 15 minute sampling interval
External DC:	12 - 36 VDC; 10 VDC absolute minimum; 36 VDC absolute maximum
Software	
Isco Flowlink® 5.1 for data retrieval and analysis.	

*Note: For pipe less than 18" diameter, site must be qualified by your Isco representative.

Ordering Information	
Teledyne Isco's Hot Tap is sold as a system. Other options, not listed here, are available. Contact Isco or your authorized Isco Representative for details.	
HotTap sensor w/49 ft (15m) cable, and electronics in a NEMA 4X box	68-7200-005
As above with 98 ft (30m) cable	68-7200-010
HotTap sensor w/49 ft (15 m) cable, and electronics in a NEMA 6P (IP68) canister housing	68-7210-005
As above with 98 ft (30m) cable	68-7210-010
RS232 Communication Cable, 10 ft (3m). Connects accQmin, Box, or Canister with Amp connectors to PC with 9-pin serial port connector	60-7004-057
As above for Canister with Crown connector	60-7004-027



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