

Third Edition

ISCO[®]

2100 Series Flow Modules



TELEDYNE ISCO
A Teledyne Technologies Company

"The Future of Flow!"™

Isco 2100 Series Flow Modules

For decades...

water and wastewater flow monitoring has required storing, handling, and maintaining cumbersome, single-purpose equipment. Gathering all but the most basic data meant having to coordinate instruments from different manufacturers, each with varying design and technology. Once collected, comprehensive analysis and reporting was often difficult, if not impossible — except through time-consuming manual editing that seldom provided concise results that could be reported using easy-to-understand graphics.

Isco has developed...

the industry's first and only line of flow monitoring instruments that eliminates all the inherent drawbacks of previous designs, while delivering a new level of data collecting and reporting capability that is literally changing the face of flow monitoring around the globe.

"The Future of Flow!"

If your work involves any or all of the applications below, our 2100 Series Flow Modules will give you unmatched power and versatility - along with data handling and reporting features that are unmatched in the industry.

- ▶ Capacity Assessment
- ▶ Inflow and Infiltration Studies
- ▶ Sewer Overflow Studies
- ▶ Sanitary Sewer Evaluation
- ▶ Open channel flow measurement, with or without a primary device

Contents

Choosing the right technology

Area velocity and ultrasonic methods - How they work Pg. 2

Isco 2100 Series Features

A breakthrough in flow meter technology..... Pg. 3

Isco 2100 Series Flow Modules

2110 Ultrasonic Flow Module Pg. 5

2150 Area Velocity System Pg. 5

2150EX Area Velocity System Pg. 6

2194EX Network Interface Module Pg. 6

2151 and 2151P Intrinsically Safe Area Velocity Module Pg. 6

Remote Communication Choices

2103 Land-line Phone Modem Module Pg. 7

2103c/2103G Cellular Phone Modems Pg. 7

2108 Analog Output Module Pg. 8

Modbus Pg. 8

Internet Pg. 8

System Interfacing

2105 Interface Module Pg. 9

On-site Data Retrieval

Isco Flowlink® Software Pg. 10

Isco Field Wizard™ Pg. 10

2102 Communication Module Pg. 10

2100 Series Accessories Back Cover

Choosing the right technology

To provide you with the most appropriate method to monitor flow in differing applications, Isco has developed outstanding instruments based on separate technologies. Both our 2150 Area Velocity Module and our 2110 Ultrasonic Flow Module are compatible with auxiliary 2100 Series accessories, as well as our exclusive Flowlink® software.

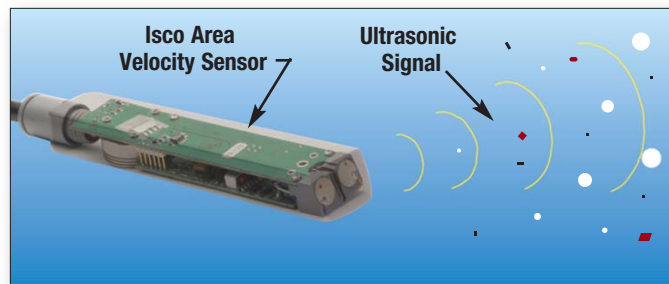
Whichever you choose, industry-leading quality, superior performance, and lasting durability are assured.

Area Velocity Method

The area velocity method is best suited where weirs and flumes are not practical, and where submerged, full-pipe, surcharged, and reverse-flow conditions may occur.

Isco Area Velocity Flow Modules use continuous-wave Doppler technology to measure mean velocity. The sensor continuously transmits an ultrasonic signal, and measures the frequency shift of the returned signal reflected by air bubbles and particles in the flow.

A differential pressure transducer in the sensor measures liquid depth to determine flow area. Flow rate is then calculated by multiplying the area of the flow stream by its average velocity.

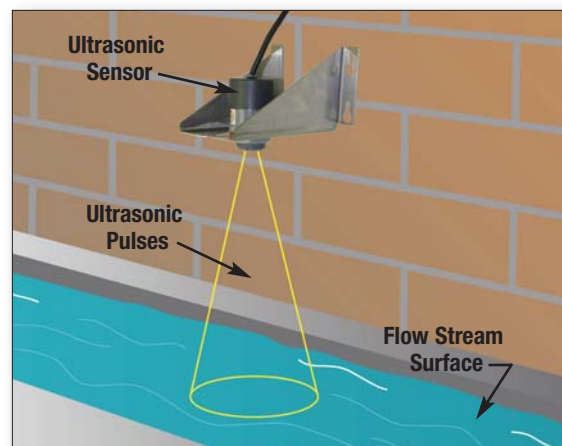


Ultrasonic Method

The ultrasonic method is preferred for non-contact flow measurement in streams containing harsh chemicals, grease, or suspended solids.

The sensor, mounted above the flow stream, transmits sound pulses that reflect off the liquid surface. The elapsed time between transmitted and returned signals determines liquid level.

Flow rate is then calculated using one of the meter's built-in flow conversions, or a user-defined level-to-flow relationship.



Isco 2100 Series Features

A breakthrough in flow meter technology

- ▶ NEMA 4X, 6P, (IP68) enclosure
- ▶ No wire harness
- ▶ Power-efficient digital electronics allow up to 15 months of battery life
- ▶ 38.4-baud communication

Superior sensor design

- ▶ Microprocessor-based digital Area Velocity and Ultrasonic sensors
- ▶ Field interchangeable
- ▶ Built-in temperature compensation
- ▶ Digital communication between sensor and module eliminates RF interference
- ▶ Chemical-resistant outer coverings

Powerful extras

- ▶ Secured, roll-over data storage in non-volatile "flash memory"
- ▶ Variable-rate data storage can automatically switch when conditions vary
- ▶ Record and store input voltage information
- ▶ Built-in flow conversion for the specified primary device or natural stream boundary

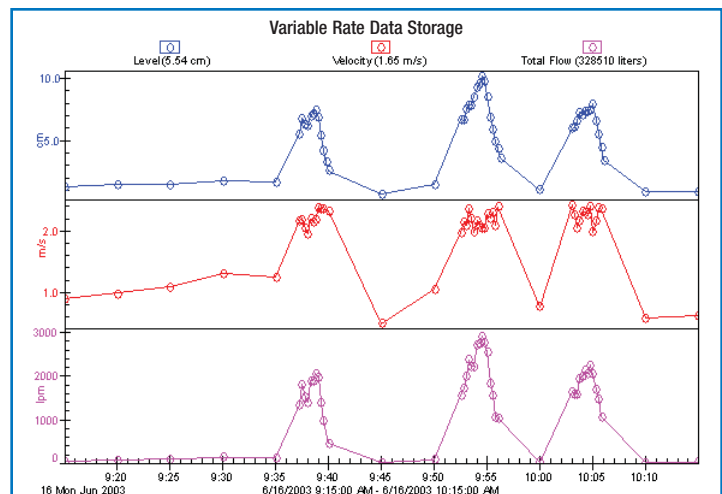
2100 Series Flow Modules use all-digital electronics for maximum performance and durability.



Choice of two ultrasonic sensors: for small pipes or channels up to 72" level range, and large pipes or channels up to 144" level range.



Isco's low-profile Area Velocity Sensor is only 5/8-inch high and measures velocity in as little as one inch of water.



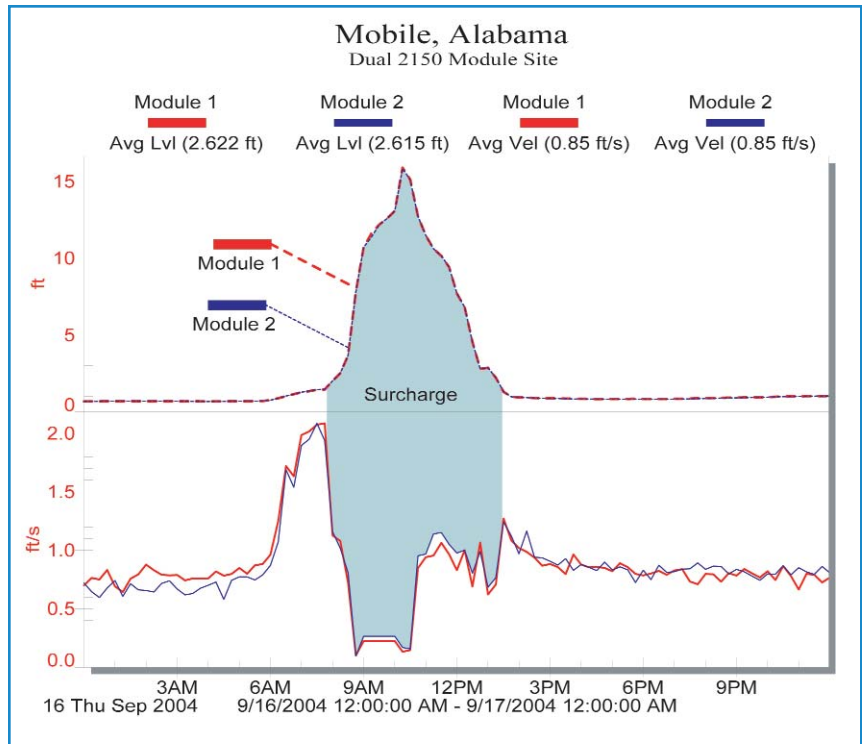
Variable-rate data storage can automatically switch when conditions vary, providing maximum information while saving power and memory. In the example above, the 5-minute storage rate changes to 30 seconds when the level rises to 1.5 inches, capturing important information that would have been missed without this unique feature.

Field-proven Performance



Sustained performance under the most demanding conditions.

Under surcharge, conventional meters often become useless until they are cleaned and recalibrated. Actual data taken during Hurricane Ivan shows that two 2150 AV modules stacked together delivered accurate readings during surcharge. And — they stayed on the job afterward without needing time-consuming service.

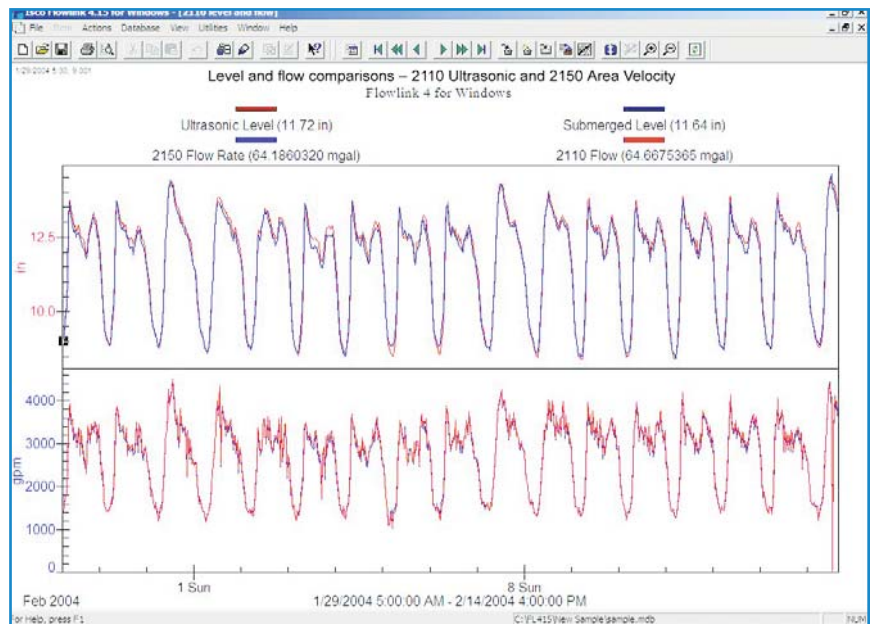


Innovative and Versatile



The perfect pair for redundant level measurement.

Redundant measurements may be necessary to fulfill project requirements, or simply a desirable way to reinforce confidence in data accuracy. Combining the unique assets of our AV and Ultrasonic modules provides solid confirmation of flow data from one source.



Above, the top panel shows how closely the 2110's ultrasonic level reading (red) tracked with the level reading of an Isco 2150 area velocity sensor (blue), indicating both instruments were providing accurate readings. The lower panel shows the same degree of proximity with flow readings.

Isco 2100 Series Flow Modules



Compact, Modular Design

Stack up the flow monitoring power

— with as many as four 2100 Series Flow Modules on a single battery module! Mix and match modules to build a compact, integrated flow system.

- ▶ Monitor multiple flow streams from just one stack
- ▶ Set up and retrieve data from all modules on the same stack, or networked together with a single connection
- ▶ Use multiple battery modules in one stack for extended service life

2110 Ultrasonic Flow System

- ▶ Rugged sensor with digital electronics
- ▶ Deflector-style sensor eliminates deadband in small pipes
- ▶ Stationary mounts available for floor, suspension, wall, or in-pipe use

Note: For complete 2110 operating specifications, request Isco Product Data Sheet L-2125.



2150 Area Velocity System

- ▶ Microprocessor-based digital probe ensures calibration stability (preventing level drift)
- ▶ No need for span calibration
- ▶ One-point calibration in the field
- ▶ No temperature drift
- ▶ Low-profile probe measures velocity in as little as one inch of flow depth
- ▶ Automatic correction for silt level
- ▶ Automatic gain control for varying flow conditions
- ▶ Sensor is unaffected by the “draw-down effect”

Note: For complete 2150 operating specifications, request Isco Product Data Sheet L-2115.



2150EX Area Velocity System

ATEX Group II, Category 1G & 2G, Area Velocity Module
for use in Hazardous Zones 0, 1, and 2
CSA Class1, Div.1, Groups C&D Intrinsically Safe

All the outstanding features found in our 2150 area velocity module,
in an intrinsically safe package.

- ▶ Ex 1G EEx ia II B T4 (-40° C to +60° C)
- ▶ Conductive ABS enclosures with stainless steel connections
- ▶ Meets U.S., Canadian, and European intrinsic safety standards
- ▶ Expandable system with intrinsically safe isolators
- ▶ Rechargeable or single-use battery options

*Note: For complete 2150EX information,
request Isco Product Data Sheet L-2204.*



2194EX Network Interface Module

The 2194EX Module uses a built-in barrier to allow interfacing
between a 2150EX located within a hazardous environment, and
an external power supply and/or other Isco 2100 Series modules
in safe locations.

- ▶ Ideal for permanent installations with AC or DC power supply
- ▶ Provides interface to all 2100 Series communication modules
- ▶ Allows data retrieval without manhole entry



2151 and 2151P Area Velocity Systems

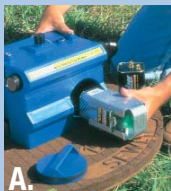
CSA Class 1, Div.1, Groups C&D Intrinsically Safe

- ▶ Meets U.S. and Canadian intrinsic safety standards
- ▶ Expandable system with intrinsically safe isolators
- ▶ Standard or wall-mount styles

*Note: For complete information, request Isco Product
Data Sheet L-2109 (2151) or L-2117 (2151P).*



The 2151P, shown above, is designed
for installation with permanent
AC or DC power supply.



Simple to set up — Easy to use!

- A. Two alkaline lantern batteries deliver up to 15 months of power.
- B. High-capacity desiccant cartridge prevents moisture build-up.
- C. Quick-disconnect input makes setup or sensor changes a snap.

Remote Communication Choices

Two-way communication with down-hole flow modules from the comfort of your office.

Realize substantial savings in time and manpower with your choice of the following systems.

Isco 2103 Land-line Phone Modem Module

Dial up flow data with your desktop phone.

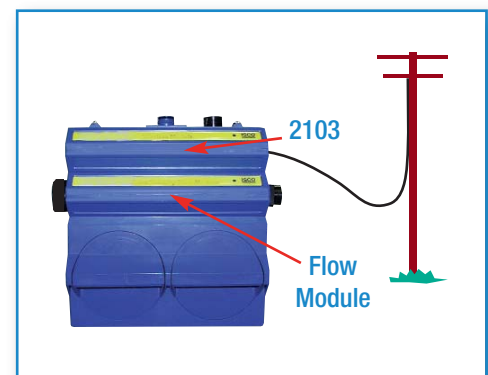
Minimize the need for expensive on-site visits and confined space entry.

The 2103 Modem Module provides reliable, two-way dial-up communication between down-hole 2100 Series Flow Modules and your desktop computer, equipped with Isco Flowlink software.

A dial-out feature enables the system to transmit a text message alarm to your digital cell phone or pager.

- ▶ System configuration and data retrieval
- ▶ Schedule automatic downloading using Isco Flowlink
- ▶ Error correction protocols compensate for excessive line noise
- ▶ Automatic dial-out alarms

Note: For complete 2103 Modem Module information, request Isco Product Data Sheet L-2110.



Isco 2103c/2103g Cellular Phone Modem

Gather data with cell phone speed and convenience.

All the features of the 2103 Modem with the convenience of cell phone access.

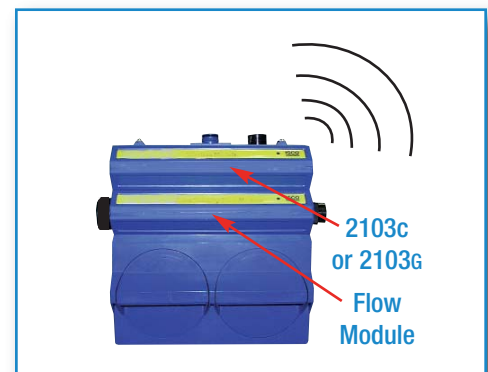
The 2103c and 2103g Modem Modules allow remote two-way dial-up communication with 2100 Series instruments via cell phone modem and your desktop computer, equipped with Isco Flowlink software.

Send packaged data from the field to your server, via internet, at set intervals with cost-effective 1XRTT/GPRS service.

A dial-out feature enables the system to transmit a text message alarm to your digital cell phone or pager.

- ▶ CDMA or GSM cellular technology
- ▶ Push data by 1XRTT or GPRS
- ▶ External, in-street (buriable), manhole cover, and other antenna options
- ▶ Automatic wake-up schedule for efficient power management

Note: For complete 2103c Modem Module information, request Isco Product Data Sheet L-2128.



Isco 2108 Analog Output Module

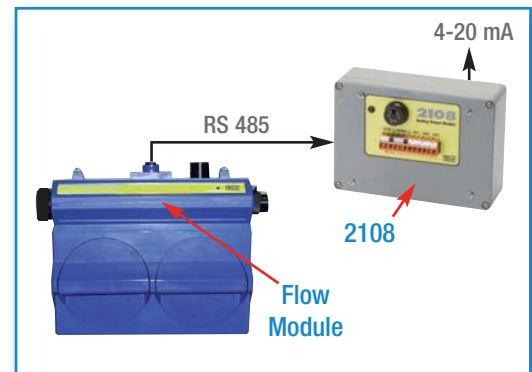
4-20 mA signals for monitoring and control.

The 2108 Analog Output Module provides current outputs for use with any Isco 2100 Series Area Velocity Module, and for Ultrasonic Flow Modules.

This allows easy interface with SCADA/DCS or other secondary instrument systems.

- ▶ As with any 2100 Series Module, the 2108 may be cable-connected up to 3,000 feet from other modules
- ▶ DIN rail mountable
- ▶ Three independent, isolated 4-20 mA outputs per module
- ▶ Outputs are freely programmable for any parameter measured by Isco flow modules
- ▶ Retrieve data from instruments using Flowlink software

Note: For complete 2108 Module information, request Isco Product Data Sheet L-2118.

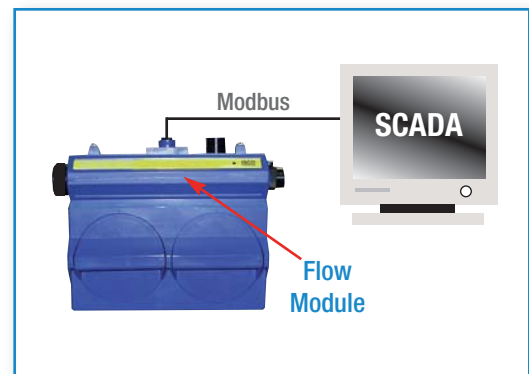


Modbus

Serial Output

The 2100 Series provides digital RS-232 modbus output. It can be used to interface with external communication modules, SCADA systems, or other devices.

- ▶ ASCII protocol
- ▶ Polling via direct-connect or modem
- ▶ Modified serial output for user-supplied data collection platform
- ▶ Process control

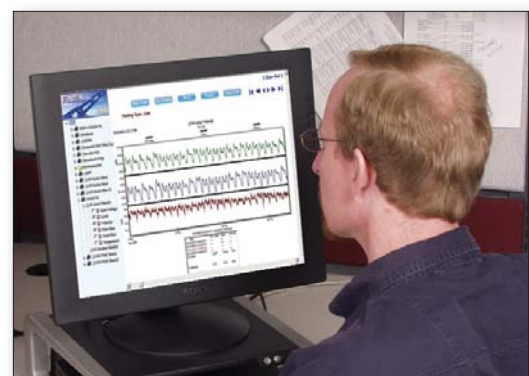


Internet

“Real-time” data from the field.

Access data online whenever you want — and from wherever you are.

- ▶ View data in line graph or scatter plot form
- ▶ Export data directly from the web page to your desktop
- ▶ Site or parameter selection, timescale, and zooming — each with just a single click.



System Interfacing

Isco 2105 Interface Module

Advanced interface and communication solution.

Our 2105 Interface Module can integrate multiple field instruments and provide a common platform for logging and remote communication. Isco 2100 Series flow modules, Isco's pulse-Doppler flowmeters, and Isco rain gauges are directly compatible. It can also be used with non-Isco instruments that have SDI-12 or Modbus output. Additional inputs (4-20 mA, etc.) are possible using readily available aftermarket converters.

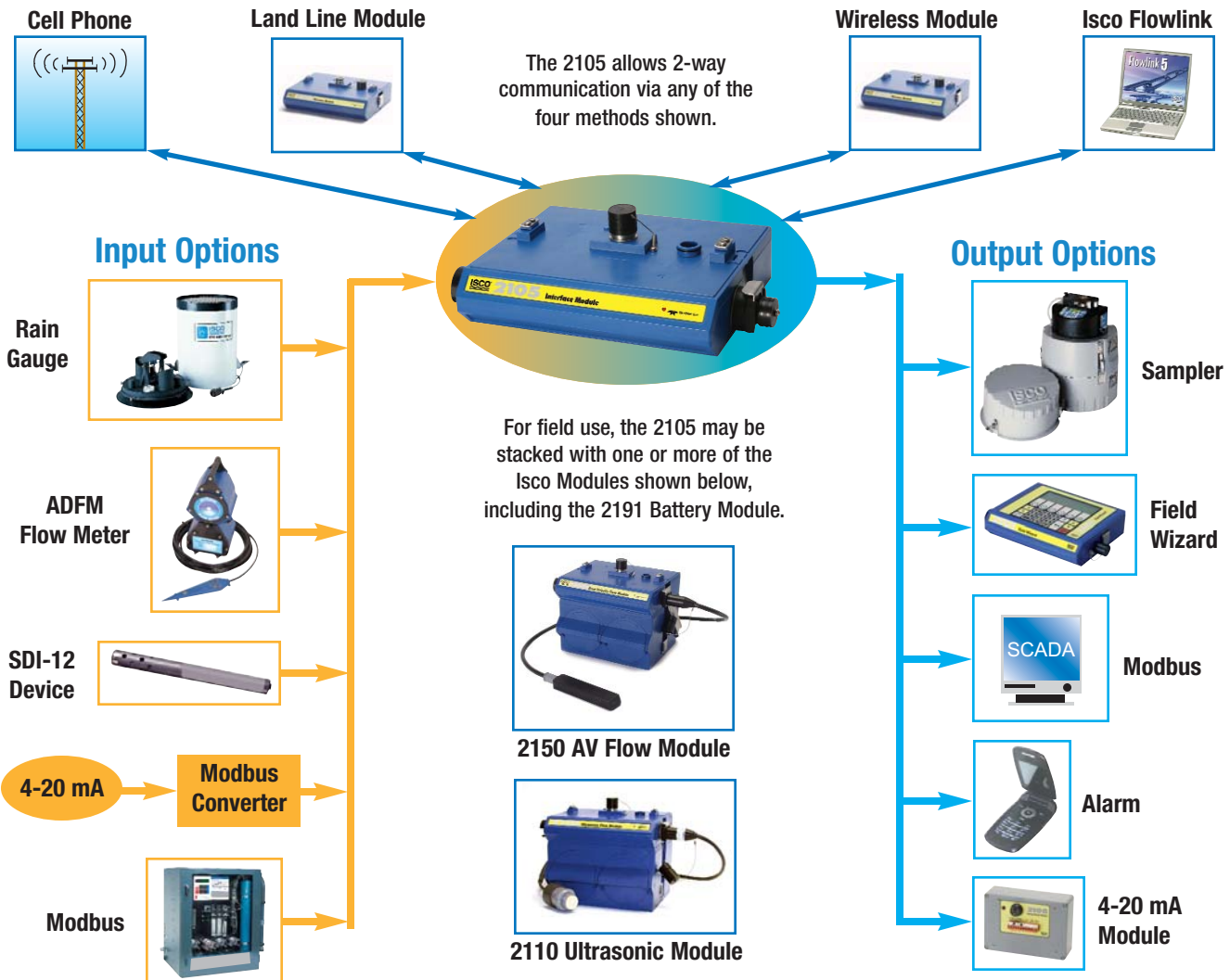
The 2105 will monitor the recorded data and take intelligent action such as sampler enabling and multiple alarm generation based on user-defined conditions.

CDMA, 1XRTT, GSM, or GPRS communication is possible with our built-in cell phone options. Data can also be accessed online via a web page.



The 2105 system shown here interfaces a rain gauge, flow meters, automatic sampling, and a multi-parameter sonde.

Note: For complete 2105 Interface Module information, request Isco Product Data Sheet L-2145.



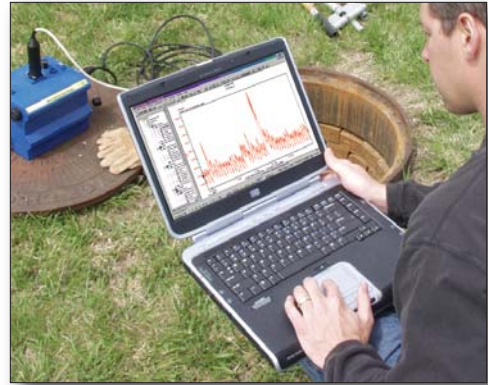
On-site Data Retrieval

Isco Flowlink® Software

The industry's premier flow data management software.

- ▶ Download and process data on site
- ▶ Unmatched data management capability
- ▶ Variety of data downloading and handling options
- ▶ Advanced data editing and analysis capability
- ▶ Powerful reporting and presentation choices

Note: For complete Flowlink information, request Isco Product Data Sheets L-2127, L-2129, and L-2132



Isco Field Wizard™

A durable, weatherproof module for on-site data retrieval.

Don't risk damage to your fragile notebook PC.

This robust module provides on-site display of current readings, information about stored data, diagnostics, and more.

Interrogate all 2100 Series Flow Modules in the stack at one time, and store more than 14 days' data from up to 20 modules!

- ▶ Rugged NEMA 4X, 6P (IP 68) enclosure
- ▶ Large easy-to-read keypad
- ▶ Efficient data retrieval, system configuration, and level calibration
- ▶ Quickly transfer data to a PC running Isco Flowlink Software

Note: For complete Field Wizard information, request Isco Product Data Sheet L-2103.



Isco 2102 Communication Module

Eliminate constant manhole entry with safe, convenient drive-up data retrieval.

Connect with your Isco 2100 Series Flow Modules from the safety and convenience of your vehicle.

- ▶ Robust digital spread-spectrum radio signal
- ▶ "Plug and Play" setup - no interfacing needed
- ▶ Low power consumption
- ▶ Data retrieval, system configuration, and level calibration

Note: For complete 2102 Module information, request Isco Product Data Sheet L-2102.



2100 Series Accessories

Antennas



Spread-spectrum
Directional



External Cellular
with magnetic base



In-street Cellular (buried)



Manhole Cover Mounted

Isco Power Products



Rechargeable Batteries
(lead-acid)



Charger Adaptor for
lead-acid batteries



120 VAC / 12VDC
Power Converter



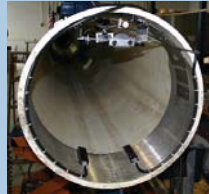
2196EX Battery Module with rechargeable
lead-acid batteries for use in hazardous areas

Sensor Mounts

Area Velocity



Auger Bracket
(for stream beds)

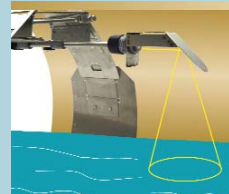


Isco Scissor (shown)
or Spring Ring

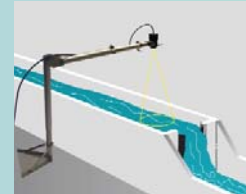
Ultrasonic



Wall-mount Bracket



In-pipe Assembly
(requires Isco Scissor Ring assy.)

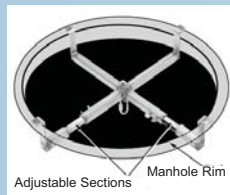


Floor Stand

Related Isco Products



Isco Street Level
Installation Tool



Isco ProHanger
(instrument suspension device)



Isco 4501
Pump Station Monitor



Isco Flowlink® Data
Management Software



Teledyne Isco, Inc.

4700 Superior St.
Lincoln, NE 68504 USA
Phone: (402) 464-0231
USA & Canada: (800) 228-4373
Fax: (402) 465-3022
e-mail: iscoinfo@teledyne.com



Certified
ISO 9001

