

2150

Area Velocity Flow Module

The 2150 Flow Module uses continuous wave Doppler technology to measure mean velocity. The sensor transmits a continuous ultrasonic wave, then measures the frequency shift of returned echoes reflected by air bubbles or particles in the flow.

Continuous wave Doppler flow meter is ideal for portable flow surveys and permanent installations.

The 2150's "smart" area velocity probe is built on digital electronics, so the analog level is digitized in the sensor itself to overcome electromagnetic interference. The probe is also factory-calibrated for 10-foot (3 meter) span at different temperatures. This built-in calibration eliminates drift in the level signal, providing long-term level stability that reduces recalibration frequency and completely eliminates span recalibration.

In field use, the 2150 is typically powered either by two alkaline, or Teledyne ISCO Rechargeable Lead-acid batteries, within a 2191 Battery Module. Highly efficient power management extends battery life up to 15 months at 15-minute data storage intervals. Other power options (including solar) are available.



Modules may be stacked to customize a system for any site.



Applications:

- Portable and permanent-site AV flow monitoring for inflow and infiltration, capacity assessment, sewer overflow, and other sewer studies
- Measuring shallow flows in small pipes. Our low-profile area velocity sensor minimizes flow stream obstruction and senses velocity in flows down to 1 inch (25 mm) in depth

Standard Features

- Rugged, submersible enclosure meets NEMA 4X, 6P (IP68) environmental specs
- Chemically resistant epoxy-encapsulated sensor withstands abuse, resists oil and grease fouling, and eliminates the need for frequent cleaning
- Replaceable high-capacity internal desiccant cartridge and hydrophobic filter protect sensor reference from water entry and internal moisture
- Pressure transducer vent system automatically compensates for atmospheric pressure changes to maintain accuracy
- The quick-connect sensor can be easily removed and interchanged in the field without requiring recalibration
- Up to four 2100 Series flow modules can be networked by stacking and/or extension cables

2150 Flow Module

Size (HxWxD):	2.9 x 11.3 x 7.5 in (74 x 287 x 191 mm)
Weight:	2.0 lb (0.9 kg)
Materials of Construction:	High-impact polystyrene, stainless steel
Enclosure:	NEMA 4X, 6P (IP68) (self-certified)
Temperature Range:	-40 to 140 °F (-40 to 60 °C) operating & storage
Power Required:	12 VDC nominal (7.0 to 16.6 VDC), 100 mA typical, 1 mA standby
Power Source:	Typically, an 2191 Battery Module, containing 2 alkaline or 2 rechargeable lead-acid batteries. (Other power options are available; ask for details.)
Typical Battery Life:	Using 15-minute data storage interval Energizer® Model 529 alkaline—15 months Rechargeable lead-acid—2.5 months
Program Memory:	Non-volatile programmable flash; can be updated using PC without opening enclosure; retains user program after updating

Built-in Conversions

Flow Rate Conversions:	Up to 2 independent level-to-area conversions and/or level-to-flow rate conversions
Level-to-Area Conversions:	Channel Shapes—round, U-shaped, rectangular, trapezoidal, elliptical, with silt correction; Data Points—Up to 50 level-area points
Level-to-Flow Conversions:	Most common weirs and flumes; Manning Formula; Data Points (up to 50 level-flow points); 2-term polynomial equation
Total Flow Calculations:	Up to 2 independent, net, positive or negative, based on either flow rate conversion

Data Handling and Communications

Data Storage:	Non-volatile flash; retains stored data during program updates. Capacity 395,000 bytes (up to 79,000 readings, equal to over 270 days of level and velocity readings at 15-minute intervals, plus total flow and input voltage readings at 24-hour intervals)
Data Types:	Level, velocity, flow rate 1, flow rate 2, total flow 1, total flow 2, input voltage, temperature
Storage Mode:	Rollover; 5 bytes per reading
Storage Interval:	15 or 30 seconds; 1, 2, 5, 15, or 30 minutes; or 1, 2, 4, 12, or 24 hours. Storage rate variable based on level, velocity, flow rate, total flow, or input voltage
Data Retrieval:	Serial connection to PC or optional 2101 Field Wizard module; optional modules for spread spectrum radio; land-line or cellular modem; 1xRTT. Modbus and 4-20 mA analog available

Software:	Flowlink for setup, data retrieval, editing, analysis, and reporting
Multi-module Networking:	Up to four 2100 Series Flow Modules, stacked and/or remotely connected. Max distance between modules 3300 ft (1000 m)

Serial Communication Speed:	38,400 bps
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2150 Area Velocity Sensor

Size (HxWxD):	0.75 x 1.3 x 6.0 in (19 x 33 x 152 mm)
Cable (L x Dia):	33 ft x 0.37 in (10 m x 9 mm) standard. Custom lengths available on request
Weight:	2.2 lbs (1 kg) (including cable)
Materials of Construction:	Sensor—Epoxy, chlorinated polyvinyl chloride (CPVC), stainless steel Cable—Polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC)
Operating Temperature:	32 ° to 140 °F (0 ° to 60 °C)
Level Measurement:	<u>Method</u> — Submerged pressure transducer mounted in the flow stream <u>Transducer Type</u> — Differential linear integrated circuit pressure transducer <u>Range (standard)</u> — 0.033 to 10 ft (0.010 to 3.05 m); (optional) up to 30 ft (9.15 m) <u>Maximum Allowable Level</u> — 34 ft (10.5 m) <u>Accuracy</u> — ±0.01 ft from 0.033 to 10 ft, (±0.003 m from 0.01 to 3.05 m.) <u>Long-Term Stability</u> — ±0.023 ft/yr (±0.007 m/yr) <u>Compensated Range</u> — -32 ° to 122 °F (0 ° to 50 °C)
Velocity Measurement:	<u>Method</u> — Doppler ultrasonic, frequency 500 kHz <u>Typical Minimum Depth</u> — 0.08 ft (25 mm) <u>Range</u> — -5 to +20 ft/s (-1.5 to +6.1 m/s) <u>Accuracy</u> (in water with uniform velocity profile, speed of sound = 4850 ft/s, for indicated velocity range)— ±0.1 ft/s from -5 to 5 ft/s (±0.03 m/s from -1.5 to +1.5 m/s) ±2% of reading from 5 to 20 ft/s (1.5 to 6.1 m/s)
Temperature Measurement:	Accuracy ±3.6 °F (±2 °C)

2150 Ordering Information

Contact your Teledyne ISCO representative for complete ordering details and information on other 2100 Series Modules.

2150 with AV sensor, 2191 Battery Module, and Handle	68-2050-002
2150 Module with AV sensor (only)	68-2050-001
Flowlink® 5 Software	68-2540-200
Energizer® Model 529 Alkaline Lantern Battery (2 required).....	340-2006-02
Rechargeable Lead-acid Battery (2 required)	60-2004-041
Charger for Lead-acid Batteries (holds 2 batteries)	60-2004-040

REPRESENTED BY:
ECLYNCH
& ASSOCIATES
The Water Monitoring People

Phone: 1-800-333-2252
Fax: 228-452-2563
info@cclynch.com
www.cclynch.com

