

# 2160

## LaserFlow® Module



The 2160 LaserFlow® Module uses non-contact Laser Doppler Velocity technology and non-contact Ultrasonic Level technology to remotely measure open channel flow. The sensor has advanced technology to measure velocity with a laser beam at single or multiple points below the surface of the wastewater stream.

### *2100 Series modularity with advanced non-contacting laser Doppler technology*

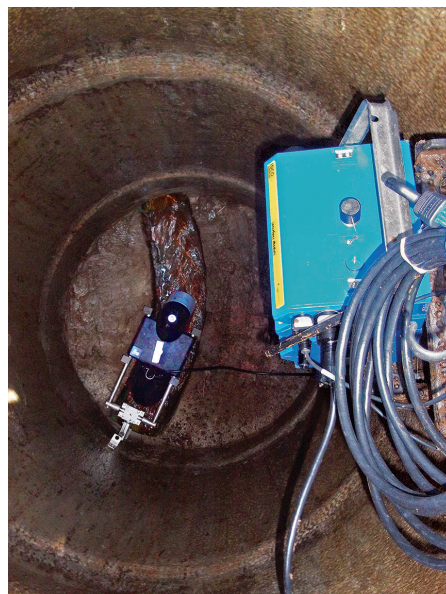
The LaserFlow is ideal for a broad range of wastewater monitoring applications.

During submerged conditions, flow measurement continues without interruption with optional Doppler Ultrasonic Area Velocity technology.

In field use, the 2160 is typically powered either by two alkaline, or Rechargeable Lead-acid batteries, within a 2191 Battery Module. Other power options (including solar) are available.

#### **Flowlink® Data Analysis**

Flowlink Software is a powerful tool for analyzing flow and water quality data. It provides site setup, data retrieval, and comprehensive data analysis, as well as advanced reporting and graphing. See separate data sheets for details on Flowlink and Flowlink Pro software.



*The LaserFlow velocity sensor transmits level and velocity data back to the 2160 module.*

### Applications:

- Permanent and portable flow measurement for CSO, SSO, I&I, SSEs, CMOM, and other sewer monitoring programs
- Wastewater treatment plant influent, process, and effluent flow measurement
- Stormwater conveyance and outfall
- Irrigation canals and channels
- Shallow flow measurement in varying pipe sizes

### Standard Features:

- Rugged, submersible enclosure fulfills IP68 enclosure requirements
- 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
- Modbus output interface

## Specifications – 2160 LaserFlow® Module

<b>Size (H x W x D)</b>	2.9 x 11.3 x 7.5 in.	7.4 x 28.7 x 19.1 cm
<b>Weight Alone</b>	2.0 lbs	0.9 kg
<b>Weight w/ 2191 Battery Module</b>	6.0 lbs	2.7 kg
<b>Material</b>	High-impact polystyrene, Stainless steel	
<b>Enclosure (self-certified)</b>	IP 68	
<b>Power</b>	7.0 to 16.6 VDC, Typical operating current 25 mA at 12 VDC Nominal, 1.0 mA standby	
<b>Typical Battery Life (2160 Module w/2191 Battery Module &amp; LaserFlow Sensor)</b>	Data Storage Interval 15 minutes	Alkaline Batteries <sup>a</sup> 12 weeks
<b>Program Memory</b>	Non-volatile, programmable flash; can be updated using PC without opening enclosure; retains user program after updating	
<b>Number of Modules</b>	Up to 4, field interchangeable	
<b>Maximum Distance Between Remote Modules</b>	3300 ft	1000 m
<b>Wiring Between Modules</b>	Twisted pair for communication, pair for power, gauge dependent on distance	
<b>Total Flow Calculations</b>	Up to 2 independent level-to-area and/or level-to-flow rate conversions, net, positive or negative, based on either flow rate conversion	
<b>Level-to-Area Conversions</b>		
-Channel Shapes	Round, U-shaped, rectangular, trapezoidal, elliptical, with silt correction	
-Data Points	Up to 50 level-area pairs	
<b>Level-to-Flow Rate Conversions</b>		
-Weirs	V-notch, rectangular, Cipolletti, Isco Flow Metering Inserts, Thel-Mar	
-Flumes	Parshall, Palmer-Bowlus, Leopold-Lagco, trapezoidal, H, HS, HL	
-Manning Formula	Round, U-shaped, rectangular, trapezoidal	
-Data Points	Up to 50 level-flow rate pairs	
-Equation	2-term polynomial	
<b>Data Storage Memory</b>	Non-volatile flash; retains stored data during program updates	
-Capacity	798,000 bytes (up to 158,000 readings, equal to over 270 days of level, velocity, flow rate, ultrasonic signal, Doppler frequency, and input voltage readings at 15 minute intervals)	
-Data Types	Combined Flow, Flow Rate, Flow Rate 2, Total Flow, Input Voltage  LaserFlow: Level, Distance, Velocity, Case Temperature, Laser Temperature, X-Axis, Y-Axis, Laser Diode Current, Ultrasonic Signal, Sense Voltage, Air Temperature, Doppler Power, Window Temperature  Optional 350 AV Sensor: Level, Temperature, Velocity, Signal, Spectrum, Spectrum Ratio	
-Storage Mode	Rollover with variable rate data storage	
-Storage Interval	15 or 30 seconds; 1, 2, 5, 15, or 30 minutes; or 1, 2, 4, 12, or 24 hours	
-Bytes Per Reading	5	
<b>Setup and Data Retrieval</b>	Serial connection to IBM PC or compatible computer with Isco Flowlink software	
<b>Baud Rate</b>	38,400	
<b>Temperature Range</b>	-40 ° to 140 °F -40 ° to 60 °C Operating and Storage	

<sup>a</sup> Specification for Eveready Energizer® alkaline lantern batteries, model #529, Teledyne ISCO part #340-2006-02. Eveready Energizer® is a registered trademark of Union Carbide Corporation.

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Teledyne ISCO is continually improving its products and reserves the right to change product specifications, replacement parts, schematics, and instructions without notice.

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