

# LaserFlow® Ex

## Intrinsically Safe, Non-Contact Subsurface Velocity Sensor

The LaserFlow® Ex velocity sensor remotely measures flow in open channels with non-contact Laser Doppler Velocity technology and non-contact Ultrasonic Level technology. The sensor uses these advanced methods to measure velocity with a laser beam at single or multiple points below the surface of the wastewater stream. The sensor can be installed in hazardous areas defined as Class I, Div 1 or Zone 0.

### The only non-contact flow measurement device to read below the surface.

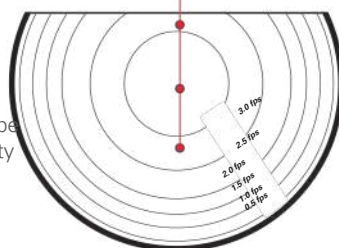
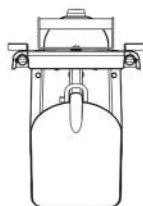
The sensor uses an ultrasonic level sensor to measure the level and determines a sub-surface point to measure velocity. The sensor then focuses its laser beam at this point and measures the velocity from the frequency shift (doppler shift) of the returned light.

The LaserFlow Ex is ideal for a broad range of wastewater monitoring applications. With Teledyne ISCO's TIENet™ Barrier, it is compatible with both the Teledyne ISCO Signature® Flowmeter and the 2160 LaserFlow Module, depending on the type of installation.

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

With its specially designed mounting bracket in place, the LaserFlow Ex can be deployed and removed from street level. This avoids the risk and expense of confined space entry. A variety of communication options enable programming and data retrieval from a remote location. Information about data quality can be recorded and transmitted with the flow data.

Additionally, built-in diagnostic tools simplify installation, maintenance, and advanced communication options reduce site visits.



The LaserFlow device can be programmed to take velocity measurements at single or multiple points below the water's surface.



## LaserFlow®


### Applications:

- Hazardous Area Installations
- Flow measurement for CSO, SSO, I&I, SSEs, CMOM, and other sewer monitoring programs
- Wastewater treatment plant influent, process, and effluent flow measurement
- Industrial process and discharge flow measurement
- Shallow flow measurement in varying pipe sizes

### Standard Features:

- Intrinsically Safe Class I, Div 1, Zone 0
- Non-contact velocity and level measurement
- Single or multiple point measurement below the liquid surface
- Rugged, submersible enclosure with IP68 ingress protection
- Zero deadband from measurement point in non-contact level and velocity measurements
- Quality readings without manual profiling

## LaserFlow® Ex Sensor

Size (H x W x D):	18.0 x 9.5 x 23.5 in (45.7 x 24.1 x 59.7 cm)
Weight :	24.8 lbs (11.25 kg)
Materials:	Conductive Carbon Filled ABS, SST, Conductive Kynar <sup>®</sup> , Anodized Aluminum, UV Rated PVC
Cable Lengths:	32.8 or 75.5 ft (10 or 23 m) <sup>b</sup>
Enclosure:	IP68
Certifications:	Class I, Division 1, Groups C-D, T4 Exia Class I, Zone 0, AEx ia op is IIB T4 Ga  II 1 G Ex ia op is IIB T4 Ga IECEX ia op is IIB T4 Ga
Laser Class:	Class 3R
Temperature Range:	Operating: 14 to 140 °F (-10 to 60 °C) Storage: -40 to 140 °F (-40 to 60 °C)
Power Required:	Input voltage: 8 to 26 VDC 16 VDC Nominal
Flow Accuracy:	±4% of readingc
Communication Protocol:	TIENet™

## Velocity

Technology:	Non-Contact, Subsurface Laser Doppler Velocity (patented)
Measurement Range:	0 to 15 ft/s (0 to 4.6 m/s)
Maximum distance from liquid surface to bottom of sensor:	10 ft (3 m)
Minimum depth:	0.5 in (1.27 cm) <sup>c</sup>
Accuracy:	±0.5% of reading 0.1 ft/s (±0.03 m/s)
Minimum Velocity:	0.5 ft/s (0.15 m/s)

## Level

Technology:	Non-Contact Ultrasonic
Measurement Range:	0 to 10 ft (0 to 3 m) from measurement point
Accuracy	0.02 ft (±0.006 m) at $\Delta < 1$ ft level change
@ 72 °F (22 °C)	0.04 ft (±0.012 m) at $\Delta < 1$ ft level change
Temperature	± 0.0002 x D (m) per degree C
Coefficient within ± 0.00011 x D (ft) per degree F	compensated range: (D = Distance from transducer to liquid surface)
Beam Angle:	10° (5° from center line)
Ultrasonic Signal:	50 KHz
Deadband:	Zero deadband from bottom of LaserFlow sensor


## Options and Accessories

- Redundant measurement with simultaneous Ultrasonic Level Sensing
- Permanent mounting hardware
- Sensor retrieval arm enables installation/removal without confined space entry

Remote ultrasonic level sensor options for drop manhole and outfall applications

## Optional Surcharge Measurement:

### TIENet™ 350 Ex Area Velocity Sensor

Probe Size (H x W x L):	0.75 x 1.3 x 6.0 in (19 x 33 x 152 mm)
Materials:	Sensor: Epoxy, chlorinated CPVC, SST Cable: UV-Rated PVC
Certifications:	CE EN61326 (Pending) Class I, Division 1, Groups C-D, T4 Exia Class I, Zone 0, AEx ia IIB T4 Ga  II 1 G Ex ia IIB T4 Ga Ex ia IIB T4 Ga IECEx

Temperature Range: -20 to 158 °F (0 to 70 °C)

## Velocity

Technology:	Submerged Continuous Wave Doppler
Ultrasonic:	Measurement
Range:	-5 to 20 ft/s (-1.5 to 6.1 m/s)
Velocity Measurement:	Bidirectional
Accuracy:	±0.1 ft/s (±0.03 m/s) from -5 to 5 ft/s ±2% of reading from 5 to 20 ft/s, Uniform velocity profile
Minimum Depth:	0.08 ft (25 mm)
Frequency:	500 kHz

## Level

Technology:	Submerged Differential Linear Pressure Transducer
Measurement Range:	0.033 to 10 ft (0.01 to 3.05 m)
Accuracy:	± 0.10% of full scale
Maximum Depth:	34 ft (10.5 m)
Stability:	±0.023 ft/yr (±0.007 m/yr)

TIENet™ Barrier device provides safe electrical connections that allow the sensor to be installed in Intrinsically Safe areas.



IP66 enclosure for TIENet™ Barrier device.



<sup>a</sup> Kynar<sup>®</sup> is a registered trademark of Arkema, Inc.

<sup>b</sup> Custom cable lengths also available.

<sup>c</sup> Under normal flow conditions, the TIENet™ 310 ultrasonic level sensor varies,

depending on the type of mounting hardware.