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.

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
### 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

### LaserFlow® Ex Sensor

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

### 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)
- 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 @ 72 °F (22 °C): 0.02 ft (±0.006 m) at <1 ft level change
- Temperature compensated range: ±0.0002 x D (m) per degree C
- Coefficient within compensated range: ±0.00011 x D (ft) per degree F
- Beam Angle: 10° (5° from center line)
- Ultrasonic Signal: 50 KHz
- Deadband: Zero deadband from bottom of LaserFlow sensor

### Optional Surcharge Measurement:

**TIENet™ 350 Ex Area Velocity Sensor**

<table>
<thead>
<tr>
<th>Probe Size (H x W x L):</th>
<th>0.75 x 1.3 x 6.0 in (19 x 33 x 152 mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials:</td>
<td>Sensor: Epoxy, chlorinated CPVC, SST</td>
</tr>
<tr>
<td></td>
<td>Cable: UV-Rated PVC</td>
</tr>
<tr>
<td>Certifications:</td>
<td>CE EN61326</td>
</tr>
<tr>
<td></td>
<td>(Pending) Class I, Division 1, Groups C-D, T4 Exia</td>
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<tr>
<td></td>
<td>IECEx ia op is IIB T4 Ga</td>
</tr>
<tr>
<td>Temperature Range:</td>
<td>32 to 158 °F (0 to 70 °C)</td>
</tr>
</tbody>
</table>

### 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

### 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)

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* Kynar® is a registered trademark of Arkema, Inc.
* Custom cable lengths also available.
* Under normal flow conditions.
* Deadband for remote TIENet™ 310 ultrasonic level sensor varies, depending on the type of mounting hardware.