



# PanaFlow FLI

## Ultrasonic flow meter for gas

PanaFlow FLI is a robust and reliable ultrasonic flow measurement system for monitoring wide ranging gas flow in challenging conditions. PanaFlow FLI is available in either a flowcell (spoolpiece) or nozzle only design providing flexibility to your existing or new flow requirements.

### Applications Examples

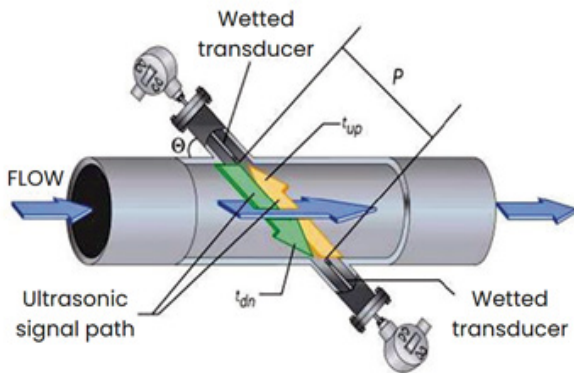
- Fuel gas
- Natural gas
- Vent gas
- Waste gas
- Shale gas
- Coal-seam gas
- Vapor recovery
- Biogas
- Flare gas
- Steam

## Features and benefits

- Trusted ultrasonic technology with no drifting measurements or need for periodic calibration requirements.
- No restriction in the pipe to generate a pressure loss.
- Wide rangeability from 0-100m/s (328 ft/s) monitoring during all process scenarios.
- Robust and field proven legacy Panametrics titanium gas transducers; other materials available based on stream composition.
- New compact insertion mechanism for 24hr/7day continuous operation and access to transducer.
- Advanced diagnostics to understand and track the health and stability of the process.

## Transit Time Flow Measurement

In this method, two transducers serve as both ultrasonic signal generators and receivers. They are in acoustic communication with each other, meaning the second transducer can receive ultrasonic signals transmitted by the first transducer and vice versa.



In operation, each transducer functions as a transmitter, generating a certain number of acoustic pulses, and then as a receiver for an identical number of pulses. The time interval between transmission and reception of the ultrasonic signals is measured in both directions. When the gas in the pipe is not flowing, the transit-time downstream equals the transit-time upstream. However, when the gas is flowing, the transit-time downstream is less than the transit-time upstream. The difference between the downstream and upstream transit times is proportional to the velocity of the flowing gas, and its sign indicates the direction of flow.

## Proven Transducer Design Technology

PanaFlow FLI leverages the field proven T5 and T5Max transducers with numerous gas applications installed around the world. These transducers are tolerant of wet and corrosive gas environment in a superior design to handle the most difficult application while trustfully monitoring your normal or extreme low or high flow conditions.

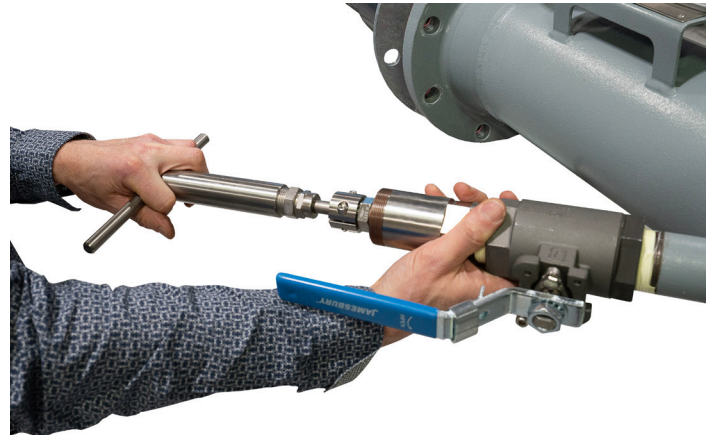


## Best Technology For Difficult Gases

Ultrasonic flow measurement is independent of gas properties and does not interfere with the flow in any way. All metal ultrasonic transducers installed in the pipe send sound pulses upstream and downstream through the gas. Panametrics advanced ultrasonic transmitters use advanced signal processing and correlation detection to calculate the flow rate in challenging conditions such as unsteady or even bidirectional flow, pulsating pressure, varying composition and temperature, harsh environment, and extreme wide-ranging flows.

## Transducer Insertion & Retraction

PanaFlow FLI employs a unique insertion or retraction mechanism allowing access to the transducer at any time for continuous operation 24 hours a day, 7 days a week.



## More Than Just a Flow Measurement

PanaFlow FLI with the appropriate Panametrics transmitter enhances your process understanding.



In biogas application, percent methane is calculated to understand the energy content of the gas. In fuel or waste gas, molecular weight is calculated to understand the energy content of the gas, to detect the location of possible leak sources, and minimize possible steam usage for proper combustion. With all systems, Panametrics uses advanced diagnostics such as sound speed, signal strength, and more to understand and track the health and stability of the process and the ultrasonic flowmeter during normal and extreme flow conditions.

# Technical Specifications

## Overall operation and performance

<b>Fluid types</b>	Gases
<b>Flow measurement</b>	Patented Correlation Transit-Time™ mode
<b>Meter sizes</b>	3 in to 24 in (80 mm to 600 mm) standard Optional: Different sizes may be available upon request
<b>Accuracy</b>	<ul style="list-style-type: none"> <li>±1.5% of reading (flowcell, standard cal)</li> <li>±1.0% of reading (flowcell, enhanced cal)</li> <li>±1.5 to ±2.5% of reading (nozzle system)</li> <li>Velocity of 1.5 m/s (5 ft/s) or greater to Qmax</li> <li>±0.02m/s (0.075 ft/s) of reading</li> <li>Velocities of 0.15 to 1.5 m/s (0.5 to 5 ft/s)</li> </ul> <p>Final installation assumes a fully developed flow profile (typically 20 diameters upstream and 5 diameters downstream of straight pipe run) without CFD analysis. Applications with piping arrangements that induce swirl (e.g., two out-of-plane elbows) may require additional straight run or flow conditioning. Shorter straight runs with CFD possible and consult Panametrics for details.</p>
<b>Repeatability</b>	±0.5% of reading
<b>Measurement Range</b>	0 – 100 m/s (328 ft/s) Based on transmitter selected

## Transmitter Specifications

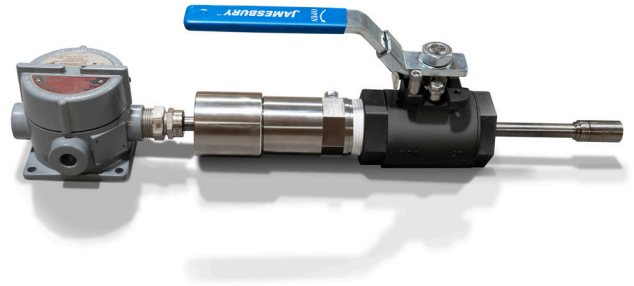
Based on XGM868i, XGS868i, or XGS868 transmitters. Please see datasheets with specifications for each of these transmitters for specifications such as hazardous area location, power requirements, input/output capability, physical dimensions and characteristics.

## Transducer Specifications

<b>Temperature ranges</b>	<ul style="list-style-type: none"> <li>Normal Temperature (NT): -55°C to 150°C</li> <li>High Temperature (HT): -50°C to 250°C</li> <li>Extreme Temperature (XT): -50°C to 300°C</li> </ul>
<b>Pressure range</b>	Maximum allowable operating pressure 285 psig (18.63 bar); Retraction at 50 psig (4.46 bar or less)
<b>Transducer materials</b>	<ul style="list-style-type: none"> <li>Standard: Titanium</li> <li>Monel, Hastelloy, or SS316 available as alternative materials</li> </ul>
<b>Hazardous Area classifications</b>	Explosion-proof Class I, Div. 1, CD Optional: Group B upon request II 2G Ex d IIC T6..T2 Gb, IECEx & ATEX (II 2G) Other certifications available upon request. An integrated XAMP preamplifier may be installed in the certified assembly.

## Insertion Mechanism

<b>Design</b>	<ul style="list-style-type: none"> <li>1.5", 150# insertion mechanism with packing material and O-ring seal</li> <li>1.5" NPT insertion mechanism with packing material and O-ring gland</li> </ul>
<b>Materials</b>	<ul style="list-style-type: none"> <li>Stainless steel</li> <li>Options: super duplex stainless steel, Hastelloy, Inconel (1.5", 150# design only)</li> </ul>
<b>Temperature Rating</b>	<ul style="list-style-type: none"> <li>FKM O-ring: -54°C to 204°C</li> <li>Markez Z1321: -45°C to 250°C</li> <li>Markez Z1400: -15°C to 335°C</li> </ul>
<b>Pressure Rating</b>	<ul style="list-style-type: none"> <li>MAOP: 285 psig</li> <li>Retraction Pressure: &lt;50 psig</li> </ul>



## Isolation Valve

- Insertion Materials**
- 1.5" stainless steel NPT threaded mounted with packing gland
  - Optional steel NPT or flanged mounted, stainless steel mounted.

## Flowcell

- Paths**
- One path (GZ1)
  - Two paths (GZ2)
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- Meter Body Sizing**
- 3 in to 24 in (80 mm to 600 mm) standard
  - Optional: Different sizes may be available upon request
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- Meter Body Materials**
- Carbon steel or stainless steel
  - Other materials such as stainless steel, hastelloy, and Inconel are available upon request
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- Meter Body Process Flange** 150#
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- Meter Body Design** ASME B31.3 or PED  
NACE MR0103

## Nozzles

- Paths** One path (GZNI) (if two paths are required, order quantity two)
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- Nozzle Pipe Sizes:** Angle cut for a 3 in to 24 in (80 mm to 600 mm) pipes  
Tilted diameter configurations only
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- Nozzle Design** 1.5" 150# LWN nozzles
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- Nozzle Material** Carbon steel or stainless steel

## Temperature & Pressure Sensor (Optional)

Contact Panametrics for details







