

# PanaFlow FLI

## Panametrics 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

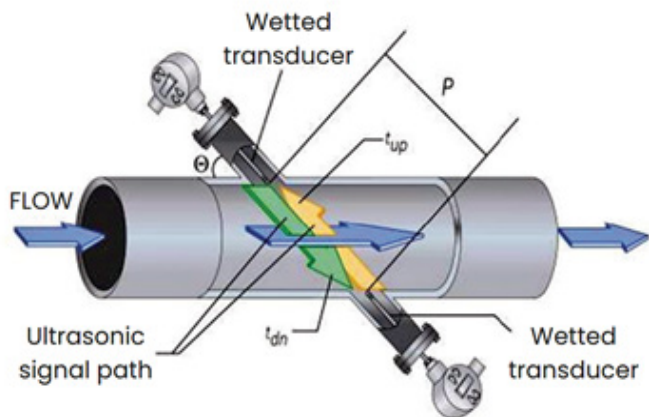
### Features and benefits

- 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.

## Overall operation and performance

### Fluid types

Gases

### Flow measurement

Patented Correlation Transit-Time™ mode

### Meter sizes

3 in to 16 in (80 mm to 600 mm) standard Optional: Different sizes may be available upon request

### Accuracy

±1.5% of reading (flowcell, standard cal)

±1.0% of reading (flowcell, enhanced cal)

±1.5 to ±2.5% of reading (nozzle system)

Velocity of 1.5 m/s (5 ft/s) or greater to Qmax

±0.02m/s (0.075 ft/s) of reading

Velocities of 0.15 to 1/5 m/s (0.5 to 5 ft/s)

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.

### Repeatability

±0.5% of reading

### Measurement Range

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

### Temperature ranges

Normal Temperature (NT): -55°C to 150°C

High Temperature (HT): -50°C to 250°C

### Pressure range

Maximum allowable operating pressure 285 psig (18.63 bar); Retraction at 50 psig (4.46 bar or less)

### Transducer materials

Standard: Titanium

Optional : Monel or Hastelloy alloys or SS316

### Hazardous Area classifications

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 a n integrated XAMP preamplifier may be installed in the certified assembly.

## Insertion Mechanism

### Material

- 1.5" stainless steel NPT threaded mounted with packing gland
- Optional: 1.5" 150# flange adapter

### Temperature Rating

- Stainless steel with Viton: -17°C to 205°C

### Pressure Rating

- MAOP: 285 psig
- Retraction Pressure: <50 psig



T5 Transducer with FI Insertion Mechanism

## Isolation Value

### Insertion Materials

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



## Flowcell (PFLIFC)

### Paths

One or two paths

### Meter Body Sizing

3 in to 16 in (80 mm to 600 mm) standard

### Meter Body Materials

Carbon Steel

Other materials such as stainless steel, hastelloy, and inconel are available upon request

### Meter Body Process Flange

150# (standard schedule)

### Meter Body Design

ASME B31.3 or PED

CRN | In Process

NACE MR0103

## Nozzles (PFLINZ)

### Nozzle Flange

1.5" NPT or 1.5" 150#

### Nozzle Material

Carbon steel or stainless steel

## Temperature & Pressure Sensor (Optional)

Contact Panametrics for details



# Ordering Information – Flowcell System

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	Z	
PFLIFC																		<b>Model</b> PanaFlow FLI System
	1																	<b>Paths</b> One path
	2																	Two path
		03																<b>Meter Body Size</b> 3in (80mm)
		04																4in (100mm)
		06																6in (150mm)
		08																8in (200mm)
		10																10in (250mm)
		12																12in (300mm)
		14																14in (350mm)
		16																16in (400mm)
			150															<b>Meter Body Flange</b> 150# Flange
				CS														<b>Meter Body Material</b> Carbon Steel
				S														Special Material
					STD													<b>Meter Body Schedule</b> Standard Schedule
						A												<b>Meter Body Design</b> ASME B31.3 and NACE MR0103
						C												ASME B31.3, CRN, and NACE MR0103
						P												PED and NACE MR0103
							B											<b>Meter Body Paint</b> Gray High Temp Tmax = 400oC
							C											Standard gray epoxy paint
								0										<b>Documentation</b> No NDE documentation
								1										Standard NDE documentation
									NT									<b>Transducers</b> T5 Normal Temp (Ti)
									HT									T5 High Temp (Ti)
									NTMAX									T5Max Normal Temp (Ti)
									S									Special transducer
										T								<b>Transducer Holder</b> 1.5in NPT SS threaded holder and valve
										F1								1.5in 150SS flange holder and valve
										S								Special material holder and valve
											0							<b>Preamplifier</b> No preamplifier
											2							2X gain preamplifier
											10							10X gain preamplifier
											20							20X gain preamplifier
											40							40X gain preamplifier
													R					<b>Transducer Cables</b> Remote mount cable (select seperately)
																		<b>System Calibration</b> Standard calibration - 1.5%
																		Enhanced calibration - 1%
																		Special calibration
																		<b>Junction Box</b> Explosionproof Aluminum
																		Explosionproof Stainless stl
																		<b>Hazardous Area</b> US/CAN C1 Div1 CD
																		ATEX II 2 G Exd IIC T6...TX Gb
																		IECEX Ex d IIC T6...TX Gb
																		InMetro Certification
																		US/CAN C1 Div1 BCD
																		TAIWAN TS CERTIFICATION
																		RUSSIA EAC CERTIFICATION
																		KOREA KCS CERTIFICATION
																		CHINA NEPSI CERTIFICATION
																		INDIA CCOE CERTIFICATION
																		SOUTH AFRICA CERTIFICATION
																		<b>Pressure/Temperature Transmitter</b> None
																		Special
																		No Special
																		Special
PFLIFC	- 1	- 03	- 150	- CS	- STD	- A	- C	- 0	- NT	- T	- 20	- R	- CAL	- 1	- 1	- 0	- 0	





Panametrics, a Baker Hughes business, provides solutions in the toughest applications and environments for moisture, oxygen, liquid and gas flow measurement.

Experts in flare management, Panametrics technology also reduces flare emissions and optimizes performance.

With a reach that extends across the globe, Panametrics' critical measurement solutions and flare emissions management are enabling customers to drive efficiency and achieve carbon reduction targets across critical industries including: Oil & Gas; Energy; Healthcare; Water and Wastewater; Chemical Processing; Food & Beverage and many others.

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