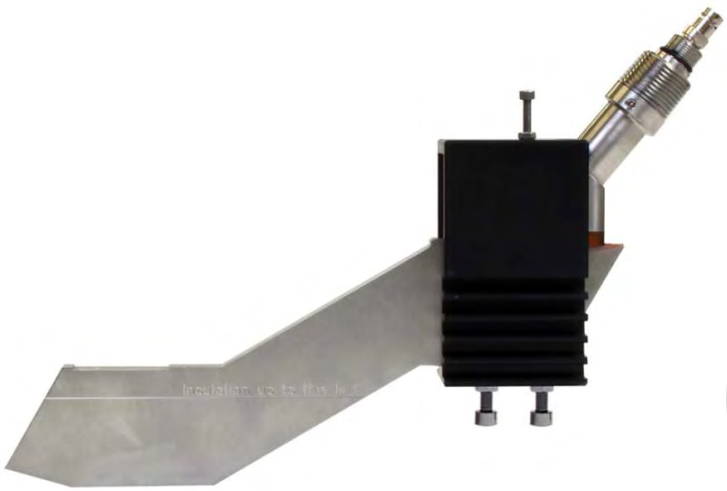


C-ET

Panametrics clamp-on waveguide transducer system

Applications

The clamp-on extended temperature (C-ET) range transducer system provides liquid flow measurement in very low- or very high-temperature applications. It represents Panametrics' latest generation of non-contact, demanding measurement transducers and capitalizes on more than 20 years of experience from the OKS transducer system.

The C-ET system is designed to isolate the transducer from the extreme process conditions, allowing it to measure high temperature hydrocarbon liquids, superheated water, heat transfer oils and cryogenic liquids. In addition, the C-ET system retains all of the characteristics that make ultrasonic technology best for critical process measurements under harsh conditions.

Applications include:

- Refineries—coker, crude distillation, vacuum distillation, crackers, hydrotreaters, visbreakers
- Powerplants—boiler feed
- Cryogenic

Features and benefits

- Waveguide technology allows measurements at extremely high process temperatures (400°C/750°F) and extremely low process temperatures (-200°C/-328°F)
- Clamp-on—no process shutdown to install
- No penetration into the pipe—no risk of leaks, no restriction to cause clogging
- No pressure drop
- Bi-directional measurement
- No drifting or periodic calibration
- Little to no maintenance
- Low flow measurement (down to 0.03 m/s or 0.1 ft/s)

Panametrics
a Baker Hughes business

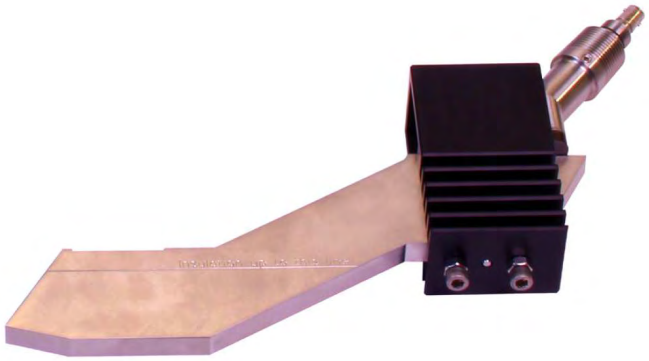
Waveguide technology handles tough flow measurement applications

The C-ET clamp-on transducer system is designed for extremely high and extremely low process temperature applications in liquid flow measurement. The C-ET waveguide transducer system overcomes the problems of traditional clamp-on methods at high temperatures, extending the range of measurement up to 400°C (750°F). In addition, the C-ET transducer can be used for very low cryogenic temperature applications to −328°F (−200°C).

Designed for use with Panametrics DigitalFlow™ ultrasonic flow meters, the C-ET clamp-on transducer consists of an ultrasonic transducer mounted on top of a waveguide or steel buffer. The waveguide removes the transducer from the application process temperature extremes, allowing it to be used where measurements were previously not possible.

The C-ET design

The C-ET system utilizes a solid waveguide that resembles a thin ice hockey stick, along with our C-RS transducers. The robust design is an improvement to the original OKS buffer system released in the 1980s. It maximizes the signal-to-noise ratio for a more accurate flow measurement and maximizes the heat exchange away from the C-RS transducer. With ultrasonic operating frequencies of 0.5 and 1 MHz, the C-ET waveguide transducer system can be used on a variety of liquids, from superheated water and hot, heavy hydrocarbons, to cryogenic liquefied natural gas. The waveguide will keep the piezoelectric element considerably within its operating temperature, thus ensuring an indefinite life for the transducer.



C-ET sensor

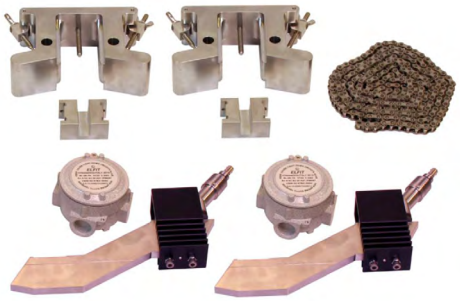
Installation options—choices for all applications

The C-ET transducer system can be used not only in a variety of applications, but can also be installed in numerous convenient ways.

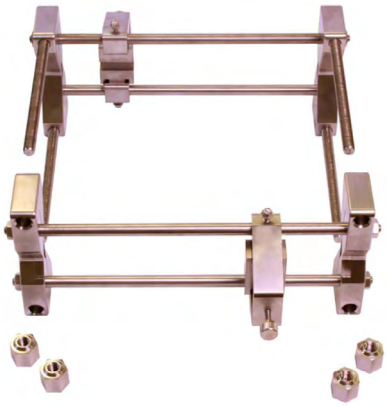
For smaller sized pipes, use the Panametrics stainless steel V-style clamping fixture to accurately align the transducers. For larger sized pipes, the PI-style stainless chain fixture is used to provide a flexible mounting solution. With either fixture, a solid couplant is used to mount transducers to the pipe, minimizing future maintenance.

Advanced technology C-ET waveguide systems

When combined with any of the DigitalFlow™ ultrasonic flow meters, the C-ET transducer system takes advantage of Panametrics' patented Correlation Transit-Time™ technique and advanced digital-signal processing. The C-ET transducer system and DigitalFlow flow meters provide the proven technology and accuracy that have made Panametrics a leader in innovative instrumentation technology.



Chaining option



Clamping option

C-ET specifications

Operation and performance

Pipe sizes

3 to 24 in (80 to 600 mm) NB and larger

Pipe wall thickness

Up to 3 in (80 mm)

Flow accuracy (velocity)

- Pipe ID>6 in (150 mm): ±1% to 2% of reading
- Pipe ID<6 in (150 mm): ±2% to 5% of reading

Accuracy depends on pipe size and whether measurement is one-path or two-path. Accuracy to ±0.5% of reading may be achievable with process calibration.

Specifications assume a fully developed flow profile (typically 10 diameters upstream and 5 diameters downstream of straight pipe run) and flow velocity greater than 0.3 m/s (1 ft/s).

Clamp-on ultrasonic flow transducers

Temperature range

Process: –200°C to 400°C (-328°F to 750°F)
Ambient: -40°C to 75°C (-40°F to 167°F)

Materials

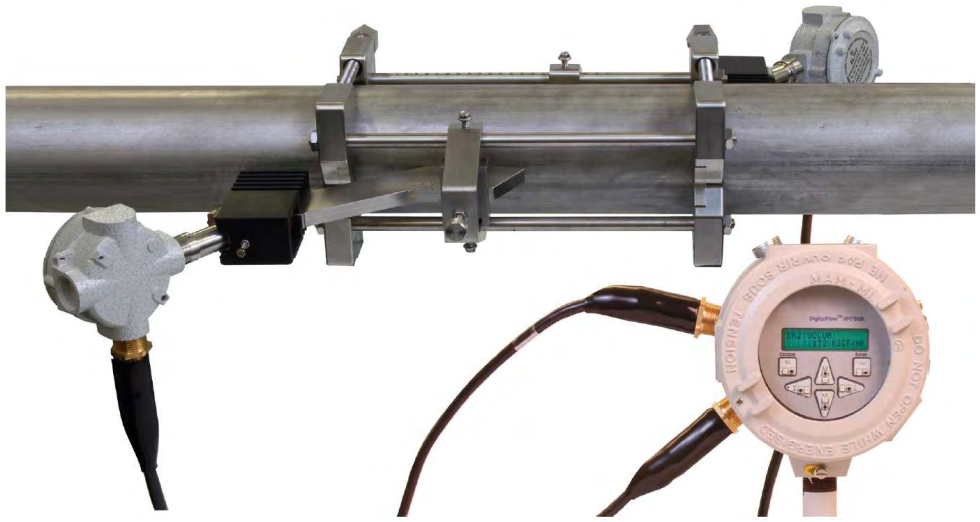
Fixture: stainless steel
Waveguide: stainless steel
Transducer: stainless steel and plastic
Transducer holder: coated aluminum

Certifications (integral C-RS transducer)

- CSA certified (Class 1, Div. 1, Groups B, C, and D)
- ATEX certified (II 2 GD Eex md IIC T6 T=80°C)

Ordering information

X-	X-	X-	X-	X	X-	X-	
C-ET							Pair of high performance clamp-on transducers for extreme temperature applications consisting of C-RS transducers, waveguide, mounting fixture, and couplant. Maximum operating process temperature of -200°C to 400°C (-328°F to 752°F)
	05						0.5 MHz frequency C-RS transducers
	10						1 MHz frequency C-RS transducers
		00					No junction box
		AX					CSA certified, epoxy coated aluminum, junction box (Class 1, Div. 1, Groups B, C and D)
		EX					ATEX certified, epoxy coated aluminum, junction box (II 2 GD Eex md IIC T6 T=80°C)
		EXSS					ATEX certified, stainless steel, junction box (II 2GD Eex md IIC T6 T=80°C)
			V4				V4 bracket clamping fixture for pipes from 3-4 in (80 to 100 mm)
			V8				V8 bracket clamping fixture for pipes from 4-8 in (100 to 200 mm)
			V12				V12 bracket clamping fixture for pipes from 8-12 in (200 to 300 mm)
			PIC				PIC chain clamping fixture for pipes from 8-24 in (200 to 600 mm)
				<>			<> Pipe Size
				IN			Pipe outer diameter in
				MM			Pipe outer diameter - mill
					12		Couplant #12 (Temperature range t-20 o 400°C)
					13		Couplant #13 (Temperature range -200 to 100°C)
					14		Couplant #14 (Temperature range t-20 o 400°C)
					15		Couplant #15 (Temperature range t-20 o 400°C)
						0	Standard product
						S	Special
-	-	-	-	-	-	-	



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.

Join the conversation and follow us on LinkedIN
linkedin.com/company/panametricscompany

Baker Hughes

BHCS38766 (01/2021)

panametrics.com