



BWT™

Panometrics Bundle Waveguide Technology™ system

Applications

The Bundle Waveguide Technology (BWT) system is a mechanical component of wetted liquid and gas ultrasonic transducer installations for high-temperature and high-pressure flow measurement of:

- Hydrocarbon liquids
- Residual flows
- Natural gas
- Steam
- LNG (liquified natural gas)

Features

- No pressure drop
- Low maintenance
- Measures flow over a wide range of flow rates and pipe sizes
- Measures flow rates in high-temperature and high-pressure gases
- Accurate and drift-free measurements
- Corrosion resistant
- Easy serviceability

 **Panometrics**

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An advanced flow measurement system for difficult applications

The BWT system is field-proven to give accurate, drift-free, obstructionless flow measurement in the most difficult liquid and gas applications.

Expands your measurement capability

The BWT system consists of buffer assemblies and transducers. The buffer assemblies use waveguide bundles to efficiently concentrate a greater amount of the transducer ultrasonic signal into the process. At the same time, the bundles act as buffers to protect the transducers from extreme temperatures to ensure unlimited life. This innovative design greatly expands the range of applications possible.

High-viscosity, high-molecular weight liquids

In liquid applications, either 500 kHz or 1 MHz BWT transducers are used. The ultrasonic signal transmitted through the buffer assemblies is powerful enough to penetrate all liquids, including high-viscosity, high-molecular weight liquids and liquids containing excessive second-phase gas bubbles and solids.

PanaFlow™ meter systems

The BWT system is an integral part of our PanaFlow meter system. Our liquid PanaFlow uses BWT transducers exclusively because of their advanced performance capabilities. Our gas PanaFlow uses BWT technology in extreme temperature services to extend PanaFlow's application capability.



A two-path PanaFlow meter system

Specifications

Transducers

Designation

BWTI

Material

316L stainless steel

Mounting

1 1/4 in. straight UN thread

Connectors

- Standard: BNC
- Optional: Submersible

Temperature

-58°F to 212°F (-50°C to 100°C)

Frequencies

- 200 kHz for gases and steam
- 500 kHz or 1 MHz for liquids, depending on the application

System

Area classifications

- Explosion-proof: Class I, Division 1, Groups C & D
- Flameproof:
 - BWT: Ex II 2 G Ex d IIC T6 Gb KEMA 01ATEX2051 Ex d IIC T6 Gb IECEx KEM 09.0010
 - JB: Ex II 2 G Ex d IIC T6 Gb DEKRA 13ATEX0120X Ex d IIC T6 Gb IECEx DEK 13.0034X

European compliance

Complies with directives 2004/108/EC EMC, 2006/95/EC LVD (Installation category II, pollution degree 2), 94/9/EC ATEX and 97/23/EC PED for DN<25

Pipe sizes

2 in. to 30 in. (50 mm to 750 mm), larger sizes upon request

Velocity ranges

- Gas service: 0.1 to 150 ft/s (0.03 to 46 m/s)
- Liquid service: 0.1 to 40 ft/s (0.03 to 12 m/s)

The maximum flow velocity specification for gases is variable, depending on gas sound speed, ultrasonic path length and gas density (pressure and molecular weight).

For gas flow applications a preamplifier is required. In such system, the supplied preamplifiers may be mounted in the transducer junction boxes.



FTFA extended buffer system (top)/FTFA short buffer system (bottom)

Flanged buffer assemblies

Service

Gases, steam, conductive and non-conductive liquids

Mountings

Lap joint flange, RF, 1.5 inch, 150#, 300#, 600#, 900#, 1500# and 2500# ANSI

Materials

- Standard: 316L stainless steel
- Optional: Titanium (FTFA/FIPA short buffers only), available to meet EN10243.1.B and/or NACE requirements

Gasket materials and torque values

Gasket materials and torque values are determined from the fluid and the process temperature for each specific application.

Pressure

- To maximum allowable flange operating pressure at temperature or 3480 psi (240 bar)
- The minimum pressure for gas service is typically 100 psi (6.9 bar), depending on the fluid density.

FTFA/FIPA short buffers

- Fluid temperature: -310°F to 600°F (-190°C to 315°C)

FTFA/FIPA extended buffers

- Fluid temperature:
 - Liquids: -310°F to 1,112°F (-190°C to 600°C)
 - Gases and steam: -310°F to 842°F (-190°C to 450°C)

Low-density, low-pressure gases use FIPA buffer assembly. No minimum pressure is required for liquid service. Consult Panametrics for individual application specifications.



FSPA short buffer system

Threaded buffer assemblies

Service

Liquids

Mounting

1 in. NPT

Materials

- Standard: 316L stainless steel
- Optional: Titanium

FSPA short buffers

Fluid temperature: -40°F to 212°F (-40°C to 100°C)

FSPA extended buffers

Fluid temperature: -40°F to 600°F (-40°C to 315°C)

Markings



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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FWPA extended buffer system (top)/FWPA short buffer system (bottom)

Socket-weld buffer assemblies

Service

Liquids

Mounting

1 in. socket weld

Material

Standard: 316L stainless steel

FWPA short buffers

Fluid temperature: -40°F to 212°F (-40°C to 100°C)

