

GE Sensing

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 in high-temperature, high-pressure gases
- Measures in high-viscosity, high-molecular weight liquids
- Accurate, drift-free measurements
- Corrosion resistant
- Easy serviceability

BWT™ Panametrics Bundle Waveguide Technology™ System

BWT is a Panametrics product. Panametrics has joined other GE high-technology sensing businesses under a new name—GE Industrial, Sensing.



GE Sensing

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

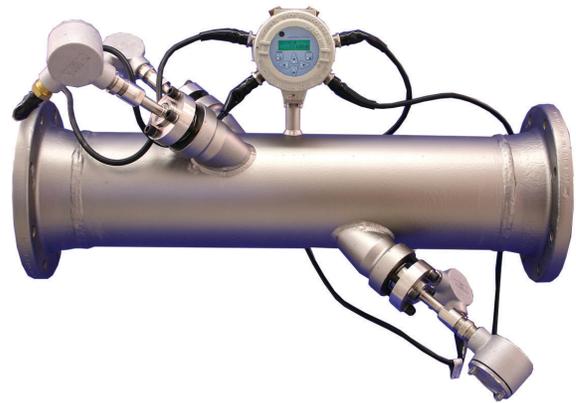
The BWT system consists of buffer assemblies and transducers. The buffer assemblies use waveguide bundles to efficiently concentrate a greater amount of the transducer ultrasonic signal into the process. At the same time, the bundles act as buffers to protect the transducers from extreme temperatures 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

BWT Specifications

Transducers

Designation
BWT1

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

Flanged Buffer Assemblies

Service
Liquids, gases and steam

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

Materials

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

Pressure
To maximum allowable flange operating pressure at temperature or 3480 psi (240 bar)



FTPA extended buffer system (top) and FTPA short buffer system (bottom)

FTPA/FIPA Short Buffers

- Fluid temperature: -310°F to 600°F (-190°C to 315°C)
- Minimum pressure (gas service): typically 100 psi (6.9 bar), depending on fluid density

FTPA/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)
- Minimum pressure (gas service): typically 100 psi (6.9 bar), depending on fluid density

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

Threaded Buffer Assemblies

Service
Liquids

Mounting
1 in NPT

Materials

- Standard: 316L stainless steel
- Optional: Titanium

BWT Specifications

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)



FSPA short buffer system



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

System

Area Classifications

- Explosion-proof: Class I, Division 1, Groups C&D
- Flameproof:
Ⓔ II 2 G EEx d IIC T6 KEMA 01ATEX2045

European Compliance

Complies with EMC Directive 89/336/EEC, 73/23/EEC LVD (Installation Category II, Pollution Degree 2), and PED 97/23/EC for DN<25

Pipe Sizes

2 in to 30 in (50 mm to 760 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).

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)



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