GE
Measurement & Control

DigitalFlow™ XMT868i

Panametrics Liquid Flow Ultrasonic Transmitter

The DigitalFlow XMT868i liquid flow transmitter is a complete ultrasonic flow metering system for measurement of:

Applications

- Hydrocarbon liquids
- Liquefied natural gas (LNG)
- Crude oil
- Lubricating oils
- Diesel fuel oils
- Solvents
- Water and wastewater
- Hot/chilled water
- Chemicals
- Beverages
- Other liquids

Features

- Economical non-intrusive flow measurement
- Hazardous (classified) location certifications
- Simple set-up and installation
- Suitable for wide range of pipe sizes and materials
- Two-channel/two-path version available

Panametrics Liquid Flow Ultrasonic Transmitter

The DigitalFlow XMT868i ultrasonic flow transmitter combines state-of-the-art flow measurement capability with a low-cost transmitter package that can be installed right at the process measurement point. The XMT868i carries appropriate certification for for installation in hazardous (classified) locations commonly found in petrochemical and chemical processing environments.

The all-digital XMT868i has no moving parts, requires minimal maintenance and provides long-term, drift-free operation. An onboard microprocessor provides exclusive digital signal coding and correlation detection routines, automatic adjustment to changing fluid properties, and dynamically-configured operating software to simplify programming.

Improved Programming Capability

The DigitalFlow XMT868i introduces an infrared six-button keypad to allow safe programming and diagnostics verification in your hazardous (classified) location. There is no need to open the case to use a PC to program and no need for an additional handheld programmer. Just touch the glass of the XMT868i and the IR buttons will sense your touch. If you prefer your PC interface, the DigitalFlow XMT868i maintains its RS232 capability, providing full access to the meter's diagnostics and programming using PanaView™ software. PanaView also provides continuous logging capability.

Dual-Channel Version Reduces Costs and Improves Performance

The optional dual-channel/dual-path model can be user-configured for a variety of applications. It can be set up to measure flow in two separate pipes with one meter to reduce the cost-per-measurement point.

To minimize the effects of flow profile distortions, flow swirl and cross flow, and for maximum accuracy, you can install the two sets of transducers on the same pipe.

DigitalFlow XMT868i shown with clamp-on transducers

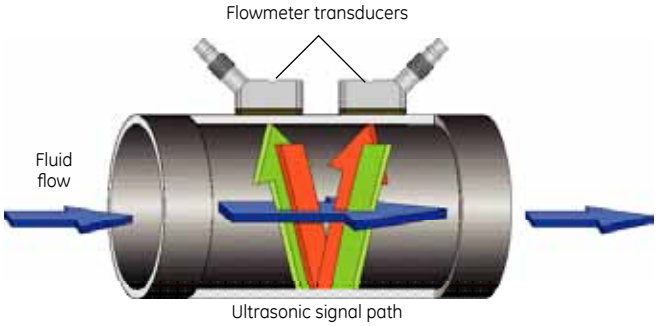
Wetted or Clamp-On Transducers

Ultrasonic flow transducers are classified as either wetted or non-wetted (clamp-on). Clamp-on transducers are clamped onto the outside of the pipe and never come into contact with the process fluid. Wetted transducers are mounted into the pipe or flowcell in direct contact with the process fluid.

Clamp-on transducers offer maximum convenience, flexibility and a low installation cost compared to traditional flow metering technologies. With proper installation, wetted transducers provide maximum accuracy (better than 0.5 percent of reading) in most applications.

The DigitalFlow XMT868i can be used with a variety of wetted solutions including the PanaFlow™ system. The PanaFlow meter system relies on the XMT868i as an integral component to simplify installation. A DigitalFlow XMT868i is easily mounted to the top of a PanaFlow system and is shipped ready to install.

DigitalFlow XMT868i Flow Transmitter Uses Transit-Time Flow Measurement Technique



Transit-time flow measurement technique

In this method, two transducers serve as both ultrasonic signal generators and receivers. When mounted on a pipe, 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 liquid in the pipe is not flowing, the transit-time downstream equals the transit-time upstream. When the liquid is flowing, the transit-time downstream is less than the transit-time upstream.

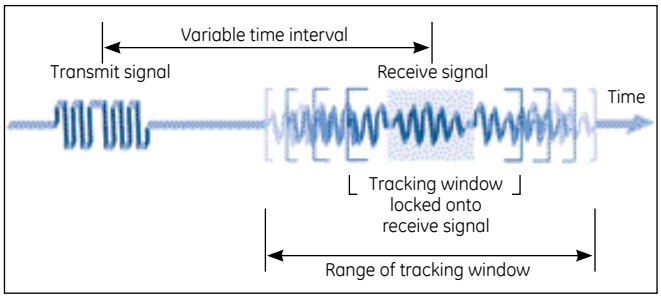
The difference between the downstream and upstream transit times is proportional to the velocity of the flowing liquid, and its sign indicates the direction of flow.

Automatically Adjusts to Changing Fluid Properties

Standard in all DigitalFlow XMT868i transmitters, our unique Automatic Tracking Window™ (ATW™) feature ensures accurate flow measurements even when fluid properties are unknown or changing. Like the seek mode on your car stereo, ATW dynamically sweeps the receiver window whenever the sound speed of the fluid changes. This powerful feature lets you measure flow when the fluid sound speed is unknown, is changing due to large temperature shifts, or when a new liquid starts to flow in a multiproduct pipeline.

ATW works for both clamp-on and wetted transducer applications by searching for a reliable ultrasonic receive signal. It does this by varying the time between the transmit signal and the receive signal window until the receive signal is found. The tracking window automatically sweeps through a range of time intervals based on the minimum and maximum expected sound speeds programmed by the user.

The window moves (tracks) in response to changes in the fluid sound speed. Once the optimal signal is found, ATW locks onto it until another large change in sound speed occurs. When this happens, ATW returns to the seek mode until the optimal signal is found again.



ATW ensures accuracy when fluid conditions change

XMT868i Specifications

Operation and Performance

Fluid Types
Acoustically conductive fluids, including most clean liquids, and many liquids with entrained solids or gas bubbles. Maximum void fraction depends on transducer, interrogation carrier frequency, path length and pipe configuration.

Pipe Sizes
- Clamp-on transducers: 0.5 in to 300 in (12.7 mm to 7.6 m) and larger
- Wetted transducers: 1 in to 200 in (25.4 mm to 5 m) and larger

Pipe Wall Thickness
Up to 3 in (76.2 mm)

Pipe Materials
All metals and most plastics. Consult GE for concrete, composite materials, and highly corroded or lined pipes.

Flow Accuracy (Velocity)
±0.5% of reading (achievable with process calibration)

Typical Clamp-On 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

Typical Wetted Flow Accuracy (Velocity)
±1% of reading

Accuracy depends on pipe size, installation and whether measurement is one-path or two-path.

Repeatability
±0.1% to 0.3% of reading

Range (Bidirectional)
–40 to 40 ft/s (–12.2 to 12.2 m/s)

Rangeability (Overall)
400:1

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

Measurement Parameters
Volumetric flow, totalized flow and flow velocity

Electronics

Flow Measurement
Patented Correlation Transit-Time™ mode

Enclosures
- Standard: Epoxy-coated aluminum weatherproof Type 4X/IP66 Class I, Divison 1, Groups B, C & D; Class II, Groups E, F & G; Class III Flameproof II 2 GD EEx d IIC T5/T6
- Optional: Stainless steel

Dimensions
Standard: Weight 10 lb (4.5 kg), size (h x d) 8.2 in x 6.6 in (208 mm x 168 mm)

Channels
- Standard: One channel
- Optional: Two channels (for two pipes or two-path averaging)

Display
Optional: two-line x 16-character backlit LCD display, configurable to display up to four measurement parameters in sequence

Keypad
Built-in infrared, six-button keypad, for full functionality operation

Power Supplies
- Standard: 90-260 VAC
- Optional: 12 to 28 VDC, ± 5%

Power Consumption
20W maximum

Operating Temperature
-40°F to 140°F (-40°C to +60°C)

Storage Temperature
–67°F to 167°F (–55°C to 75°C)

Standard Inputs/Outputs
Two 0/4 to 20 mA isolated outputs, 600 S maximum load Namur NE043 compliant

Optional Inputs/Outputs
All analog and digital I/O are available in specific combinations. Consult GE for available option cards.
- Two additional 0/4 to 20 mA isolated outputs, 1000 Ω maximum load
- Two 4 to 20 mA isolated inputs, 24-VDC loop power
- Two or four isolated, three-wire RTD (temperature) inputs, –148°F to 662°F (–100°C to 350°C), 100 S platinum
- Two or four pulse or frequency outputs, optically isolated, 3A maximum, 100 VDC maximum, 1W maximum, from DC to 10 kHz maximum
- Alarm relays

Digital Interfaces
- Standard: RS232
- Optional: RS485 (multiuser)
- Optional: HART® protocol
- Optional: Modbus® protocol
- Optional: Foundation Fieldbus®
- Optional: OPC server
- Optional: Ethernet

Data Logging
- Standard: None
- Optional: Memory capacity (linear and/or circular type) to log up to 150,000 flow data points

European Compliance
System complies with EMC Directive 89/336/EEC, 73/23/EEC LVD (Installation Category II, Pollution Degree 2) and transducers comply with PED 97/23/EC for DN<25

Clamp-On Ultrasonic Flow Transducers

Temperature Ranges
- Standard: -40°F to 302°F (-40°C to 150°C)
- Optional: -328°F to 752°F (-200°C to 400°C)

See specific transducer for exact temperature range.

Mountings
Stainless steel chain or strap, welded or magnetic clamping fixtures

Area Classifications
- Standard: General purpose
- Optional: Weatherproof Type 4X/IP66
- Optional: Explosion Proof, Class I, Division 1, Groups B, C & D; Class II, Groups E, F & G; Class III
- Optional: Flameproof II 2 G EEx md IIC T6–T3
- Optional: Submersible

Wetted Ultrasonic Flow Transducers

Temperature Ranges
- Standard: –40°F to 212°F (–40°C to 100°C)
- Optional (overall range): –310°F to 1112°F (–190°C to 600°C)

Pressure Ranges
- Standard: 0 to 3000 psig (1 to 207 bar)
- Optional: Higher pressures on request

Materials
- Standard: Stainless steel
- Optional (for Pan-Adapta® Plugs): Titanium, Hastelloy® alloy, Monel® alloy, duplex, CPVC, PVDF and others

Pan-Adapta plugs allow installation and removal of wetted transducers without interrupting the process or emptying the pipe.

Temperature Ranges
- Standard: –40°F to 212°F (–40°C to 100°C)
- Optional (overall range): –310°F to 1112°F (-190°C to 600°C)

Pressure Ranges
- Standard: 0 psig to 3000 psig (1 bar to 207 bar)
- Optional: Higher pressures on request

Materials
- Standard: Stainless steel
- Optional (for Pan-Adapta® Plugs): Titanium, Hastelloy® alloy, Monel® alloy, duplex, CPVC, PVDF and others

Pan-Adapta plugs allow installation and removal of wetted transducers without interrupting the process or emptying the pipe.

Process Connections
- Standard: 1 in or 3/8 in NPTM
- Optional: RF flanged, socket weld, fuse bond and others

Mountings
Flanged flowcell, hot tap or cold tap

Area Classifications
- Standard: General purpose
- Optional: Weatherproof Type 4/IP65
- Optional: Class I, Division 1, Groups B, C & D; Class II, Groups E, F & G; Class III
- Optional: Flameproof II 2 G EEx d IIC T6
- Optional: Submersible

Transducer Cables

- Standard: One pair of coaxial cables, type RG62 AU, or as specified for transducer type
- Optional: Lengths up to 1000 ft (330 m) maximum

High-Temperature and High-Pressure Ultrasonic Flow Transducers

Bundle Waveguide Technology™ System transducer and holder (see BWT™ System specifications)

Clamp-on extended temperature (C-ET) range transducer system

Energy Measurement

Calculates energy flow rate and totalized energy. Requires optional RTD or analog I/O board.

Temperature Transducers

Loop-powered, three-wire, platinum RTDs; clamp-on and wetted (thermo-well) types are available

Accuracy

±0.15°C with wetted RTDs (matched pairs)

Range

-4°F to 500°F (-20C° to 260°C)

The accuracy of the energy measurement is a combination of the accuracy of the associated flow and temperature measurements. 1% to 2% of reading is typical for calibrated systems. Not all extremes of parameters can be achieved simultaneously.

Additional Options

PanaView™ PC Interface Software

The DigitalFlow XMT868i communicates with a PC through a serial interface and Windows® operating systems. Consult the manual for details on sites, logs and other operations with a PC.

XMT868i Application Notes in Brief

Ultrasonic Flowmeter Saves Money Over Mag Meter

A sewerage/wastewater facility found that installing a GE clamp-on ultrasonic flowmeter offered excellent performance and accuracy and was far less expensive than installing a new mag meter. When comparing cost of a new 30 in (750 mm) mag meter to be installed on their cast iron line to that of a two-path GE meter, the water treatment plant decided that the ultrasonic meter was a bargain. The 30 in (750 mm) mag required the line to be shut down for installation and major piping work needed to be done. It was estimated that it would take several days to get the meter running. The GE meter was easily installed to existing piping without ever shutting down the pipe and installation was complete within a day.

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±0.15°C with wetted RTDs (matched pairs)

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–4°F to 500°F (–20C° to 260°C)

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710°F (376°C) Resid Line? No Problem.

With the DigitalFlow XMT868i combined with the Bundle Wafeguide Technology System from GE, you can measure cryogenic fluids like LNG or the demanding temperatures of coker resid lines that can run hotter than 700°F (371°C). Ultrasonic flowmeters will not cause pressure drop and have no impulse lines to plug, making them a great solution for difficult fluids.
Even though most ultrasonic manufacturers' flowmeters can only handle up to 500°F (260°C), GE's BWT systems have been able to reach up to 1000°F (537°C). The unique design removes the piezoelectric element from the extreme temperatures by using wave guide technology. The transducer can even be swapped out under operating conditions. One customer has installed 16 units, replacing their wedge meters, and has had them operating maintenance free for more than five years.

Bundle Waveguide Technology System

www.ge-mcs.com

920-170C