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Q.Sonic® plus

Ultrasonic Flow Meter for Natural Gas Custody Transfer Measurement

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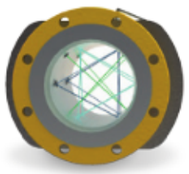
Connections for Safe and Reliable Natural Gas Transfer and Measurement

Today's natural gas industry demands reliable metering technologies for less overall uncertainty. Ultrasonic meter technology can reliably deliver accuracy figures down to 0.1% within the controlled laboratory conditions of a calibration facility. However, operators need to feel confident that the meter will retain accuracy levels when it is installed in the field, and critically, will it continue to measure natural gas accurately after several months or years?

- Six-paths
- Wide pressure and velocity range
- Advanced diagnostics
- Unrivalled repeatability



The Q.Sonic's patented symmetrical layout of four double-reflection swirl paths and two single-reflection paths are key to accurate real-world flow measurement.

The advanced metering technologies of the **ITT Controls** Elster Q.Sonic^{plus} is the next generation of ultrasonic flow meter technology and our response to the industry's demands. The patented design of the Q.Sonic^{plus} eliminates the need for extensive commissioning, installation and health checks and is designed with intelligent healthcare diagnostics, including real-time monitoring and trending of flow profile factors, swirl angles, asymmetry, turbulence and other real-world metering conditions.

The Q.Sonic^{plus} is about what matters most to you every day: measuring your gas flow safely, reliably, accurately and without worries. It is why the Q.Sonic^{plus} is engineering confidence.

Engineering Confidence

Engineered to set the new standard for the industry, the Q.Sonic^{plus} delivers unsurpassed levels of performance, capability and dependability.

The patented six-path technology enables detailed flow profile measurement, superb noise immunity, unrivalled pressure and velocity abilities and advanced diagnostics designed to reinforce confidence and support improved gas balance.

Engineering Ultrasonics

The Heart of the Q.Sonic^{plus}

The heart of an ultrasonic flow meter is based upon three fundamental aspects: strong crisp signals, exacting transit time measurements and the ability to measure the flow profile within the meter.

1. The first element—sending strong signals reliably through gas. State-of-the-art titanium-encapsulated transducers combined with highly efficient impedance matching technology, deliver high-power signals that propagate well in gases.

2. The second element—exacting calculations. The key operating principle of an ultrasonic flow meter is the measurement of time of flight. Advanced, digital signal processing techniques deliver solid signal detection and accurately measure time of flight even in dynamic, real-world conditions of high flow, low pressure, and high turbulence.

3. The third element—detailed flow profile measurement. An ultrasonic flow meter's goal is to accurately measure the volume of gas moving through the meter. As gas flow entering a meter distorts and swirls, the meter's ability to detect and measure the distorted, swirling gas flow becomes the critical factor inhibiting its real-world performance. The patented six-path configuration of the Q.Sonic^{plus} enables the measurement of swirl and asymmetry and results in unsurpassed profile recognition and diagnostics.

Engineering Electronics

Powerful Modular Electronics

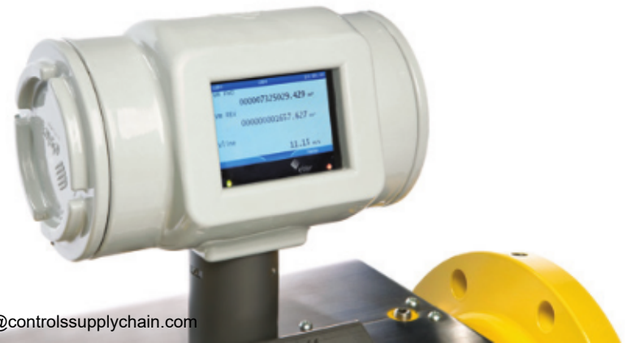
The Q.Sonic^{plus} introduces our new modular hardware and software platform. Featuring an explosion-proof touch screen interface backed by an excess of processing capability, this platform is also used in other **ITT Controls** Elster products such as the enCore FC1 and the GasLab Q2.

Unrivalled Repeatability and Integrity

1. Electronics with high processing power and fast update rates, detect and measure the smallest changes immediately with unrivalled repeatability.
2. The real-time operating system, integral to the Q.Sonic^{plus} is trusted by the aircraft industry as it is regarded as one of the most secure systems in the world.
3. A variety of additional functionalities can be realized by installing the latest applications—"apps" compatible with the Q.Sonic^{plus}

Electronics

- Enhanced update rate
- Unrivalled repeatability
- PTZ volume conversion
- Multi product platform
- Real-time operating system
- Modular system (Apps)
- Flexible connections
- VDSL extender long distance
- One free slot (Hart, FF, IS input)
- Flame proof Ex-d enclosure



Engineering Transducers

Passion for Transducer Ingenuity

ITT Control's newly engineered transducers enable a number of the Q.Sonic^{plus} enhancements:

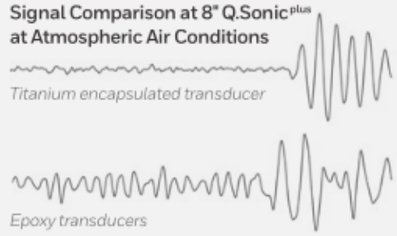
1. Intrinsically safe design enables convenient field service in hazardous areas.
2. Clean and strong signals allow for low pressure, high velocity and challenging applications.
3. Intelligent design and a unique six-path configuration provides greater detailed flow profile measurement in a smaller 3D meter body.
4. Fully encapsulated in high-grade titanium for enhanced corrosion resistance.
5. Simplified construction allows for transducers to be replaced without depressurizing the entire system.

Benefits

- *Titanium-encapsulated*
- *Highly efficient*
- *Auto draining*
- *Corrosion resistant*
- *Intrinsically safe Ex-i*
- *Excellent SNR and shape*

Ultrasonic titanium encapsulated transducer

Signal Comparison at 8" Q.Sonic^{plus} at Atmospheric Air Conditions



Titanium encapsulated transducer

Epoxy transducers

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Engineering Configurations

Path Configurations

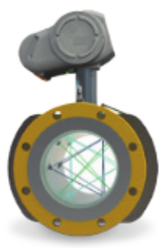
Q.Sonic technology is well-known for its unique arrangement of ultrasonic measurement paths. A patented combination of two double reflection paths (swirl paths) and one to three single reflection paths (axial paths).

Unmatched Profile Recognition and Diagnostics with New Path Layout

The Q.Sonic^{plus} advances its traditional reflection path technology with a new six-path configuration. This patented path configuration enables the measurement of swirl and asymmetry with detail and precision unmatched by other path configurations. The resulting profile recognition and diagnostics enable the meter to maintain custody-transfer accuracy with less-than-ideal flow conditioning.

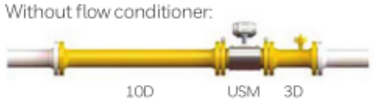
Patented Six-path Layout

- Detailed flow profile measurement
- Proven reflective technology
- Four swirl and two axial paths
- Symmetrical path layout
- Diagnostics



Field Configurations

Without flow conditioner:



The standard Q.Sonic^{plus} configuration consists of a 10D upstream pipe and a 3D downstream section combined with temperature point to meet the legal metrology requirements. Pressure will be connected to the meter body.

With flow conditioner:

To further eliminate risk from the measurement and exceed standard metrology requirements, a flow conditioner can be applied to isolate the Q.Sonic^{plus} from unknown upstream flow disturbances as recommended by AGA9. Optimal results are obtained once the meter is calibrated as one complete package, including the flow conditioner and 10D upstream piping.

Benefits

- *Healthcare*
- *One-click service pack*
- *Touch screen*
- *Turbulence indicator*

Engineering Diagnostics

Advanced Diagnostics at Your Fingertips

The Q.Sonic^{plus} is engineered to deliver vital system measurements accurately and reliably at all times, whether operators are in the office or in the field. The meter's full-color touch screen display and our PC-based diagnostic software, with its featured one-click service pack, place powerful diagnostics at your fingertips. This easy-to-use, explosion-proof graphical interface provides direct access to: diagnostics (including turbulence), parameter changes and a clear overview of measurement data.

SonicExplorer® is a revolutionary software package developed to provide comprehensive, proactive healthcare monitoring of the Q.Sonic^{plus} diagnostics. This software and the meter's internal diagnostics were developed to protect the integrity of large metering transactions and your investment. SonicExplorer detects changes early, before they can develop into serious issues that may impact measurements. Additionally, the long term stability of the ultrasonic meter can be monitored, including: system integrity, calculation of physical properties like velocity of sound, density, superior calorific value and more.

SonicExplorer includes a one-click service pack. Should any doubt arise regarding the performance or health of the Q.Sonic^{plus} the one-click 'Service Pack' feature of SonicExplorer automatically collects all relevant data such as ultrasonic signals, diagnostics and parameterization, and puts it into a single '.zip' file that is ready to send to the factory for detailed analysis.

Engineering Integrated Metering Solutions

Expertise and Applications

Our meters and systems are applied all over the world, in every segment of the natural gas sector—on shore and off shore, conventional and unconventional, across the entire gas value chain.

Functionality

- Fiscal metering
- Custody transfer
- Allocation metering
- Flow control
- Modular system (Apps)

Fluid

- Natural gas
- Industrial gases
- Shale gas
- Gas to liquid
- Coal methane bed
- Deep gas
- Tight gas

Our customer base includes major industries that use natural gas as a fuel or raw material, like power stations, refineries, petrochemical plants and the GTL industry.

Advantages of Our Ultrasonic Gas Flow Meters

- No pressure drop
- Wide turn down ratio 100:1
- Bi-directional flow
- No moving parts
- Very low cost of ownership
- Insensitive to contamination
- Interfaces with major flow computer manufacturing
- Transducer replacement without recalibration
- Designed in the spirit of ISO17089-1

Applications

- LNG industry
- Gas processing plants
- In-plant metering
- Power plants
- Shale gas
- Underground natural gas storage
- Custody transfer measurement
- Measurement and regulation stations
- Gas compressor control

Elster Precision Solutions—Meeting the Demands of Custody Transfer Applications

ITT Controls has been serving industrial customers with instrumentation, control systems and advanced application solutions for more than 100 years. With extensive experience executing large automation projects, and a portfolio of products and services acquired through Elster and ITT Controls —leaders in their respective regulation and measurement technologies—we are a trusted global partner for integrated skids and pre-packaged stations for the oil and gas industry.

Today's gas industry demands operational excellence. Plant operators are under pressure to achieve greater cost efficiency, improve asset integrity, increase uptime and reduce risk. They spend a lot of effort to optimize their entire value chain, respond to increased digitization of operations, and yet remain agile enough to keep pace with rising global demand and constantly changing market conditions.

With ITT Control's Elster Precision Solutions we go beyond metering by providing you the tools to run your operation efficiently. By offering continuous monitoring and evaluation of your metering system and with our extensive knowledge and experience in process control and automation ITT Controls provides multiple benefits including reduced project risk and operational complexity, lower maintenance and operating costs, increased operator effectiveness, and safer more secure operations.

- Deep domain knowledge-based consultancy
- End-to-end solution reduces interfaces and costs
- Seamless product integration
- Automation and metering in one hand
- Truly global player with local presence
- Global professional service organization
- Minimized project execution risk

ISS^{plus} Supervisory Software

SM-RI-2 meter

EnCore FC1 Flow computer

ENCAL 3000 Gas Chromatograph

Total Energy Measurement Systems

Elster Precision Solutions encompasses volume measuring instruments such as rotary displacement, turbine and ultrasonic meters, as well as devices for calculating the quantity of gas via the measured values of pressure and temperature or density (flow computers) and gas analysis systems. In combination, these devices provide all data needed for the billing of natural gas or industrial gases. Honeywell's equipment is available individually or as a complete measuring system for gas metering stations. This includes all measuring, evaluation and data-logging units in ready-wired electrical cabinets providing remote data transfer. The measuring instrument line is supplemented by different software packages for data acquisition and evaluation.

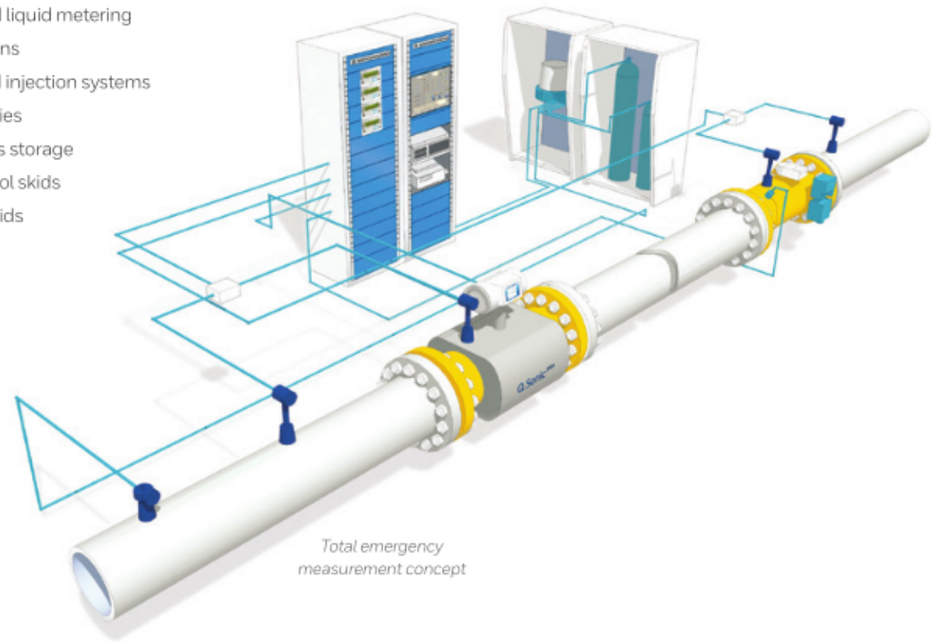
Applications:

- Pressure regulation and metering stations
- Fuel gas conditioning systems
- Border metering stations
- Offshore gas and liquid metering
- CNG filling stations
- Bio methane grid injection systems
- Calibration facilities
- Underground gas storage
- Metering & control skids
- LNG metering skids

Engineering Specifications

Technical Data	
Size	3" to 36"– larger sizes available upon request (DN 80 to DN 900)
Pressure	2 bar (g) (29 psig) to 150 bar (g) (2175 psig)*
Temperature	-40°C to 85°C
Repeatability**	0.05%
Typical Uncertainty**	0.1% (after calibration and linearization)
Noise Suppression	Real-time CMB (Coded Multiple Burst)
Power	24VDC, 10 to 20W
Approvals/Compliant	MID, OIML R137-1, AGA9, ATEX, IECEx, FM, CSA
Ingress Protection	IP66, NEMA 4X
Interfaces	RS232/485, Ethernet, VDSL, USB
Body Materials	LTCS, stainless steel
Electronics Enclosure	Copper-free aluminum, stainless steel

**Minimum pressure depending on size and gas composition*
***Relative to lab*



Total emergency measurement concept