



**Measurement of Flow and Heat
Quantity in Liquid-Carrying Pipes**
precise | simple | non-intrusive | maintenance-free



UFM Ultrasonic
Flowmeters
Fixed & Portable



QSTAR | UFM Contactless flow measurement for liquids

QStar Ultrasonic Flowmeters (UFM) are available in two models: a portable for mobile sampling measurements and a fixed for measuring tasks over an extended period of time for continuous measurements in fixed installations.

Both units use the proven and highly precise ultrasonic transit time difference method. By employing the latest digital signal processors, these robust measurement flowmeters are extremely accurate and drift-free.

Saves installation and operating costs

Clamp-on technology allows for ultrasonic transducers to be installed in a matter of minutes. No need to cut

or penetrate pipes. Together with the elimination of process interruptions, QStar UFMs are the key to optimizing operating costs. The contactless measurement is virtually:

- 100% leak-proof
- 100% pressure-resistant
- 100% drift-free
- 100% wear-free and thus maintenance-free
- 100% free of pressure loss and thus energy-saving

With the Quick Setup option, setting meter parameters takes less than one minute. Online help makes the manual unnecessary for most tasks.

The single-user interface shared by UFMs eliminates the learning curve for anyone already familiar with one of the QStar flowmeters. All menu items and displays are in plain text on the large backlit display. Cryptic abbreviations are unnecessary on the graphics-capable QVGA display. The user-friendly eight key menu enables quick and easy operation.

QStar Fixed



QStar Portable



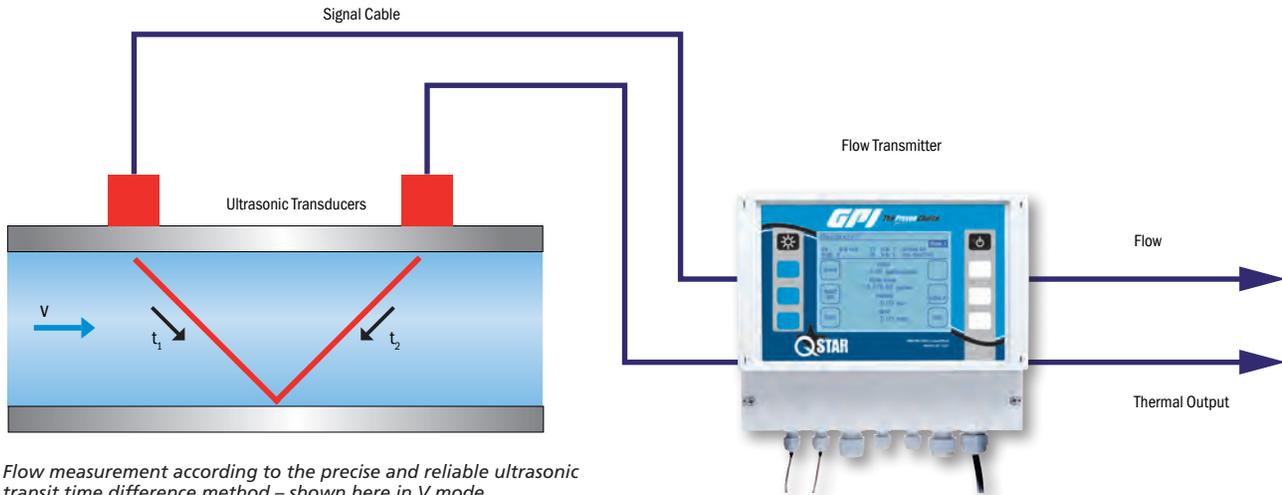
Large QVGA display, simple to use

The display and usage concept are identical for the portable and fixed QStar UFM. This simplifies the operation of both flowmeters and provides the user with a complete overview of the measuring point.



Fast, secure transducer installation thanks to GPI's "Quickmount" technology

Precise and reliable flow measurement



Flow measurement according to the precise and reliable ultrasonic transit time difference method – shown here in V mode

QStar flowmeters operate according to the high-precision ultrasonic transit time difference method. The two ultrasonic transducers are mounted externally on the pipe and connected to the processing electronics.

The ultrasonic transducers operate alternately as transmitters and receivers and transmit ultrasonic signals to one another, whereby the respective signal transit times of the outgoing and return signal (t_1 , t_2) are measured.

The flowmeter measures the transit time difference of the ultrasonic signals

t_1 and t_2 that run with and against the direction of flow. These signals are accelerated (t_1) or delayed (t_2) by the flow of fluid. The resulting difference in the two signal transit times is proportional to the flow velocity and, together with the pipe geometry, is used to precisely calculate the flow.

The use of multiple processors working in parallel means that QStar achieves an extremely high measurement rate. Signal processing takes place in high-performance DSPs which are extremely precise and operate at very high resolution.

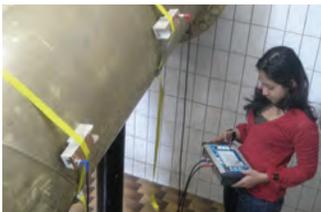
This enables the flowmeter to achieve internal resolution of under 0.03 ft/s flow velocity. And since the transit time measurement is purely digital, the measurement electronics are virtually drift and calibration-free.

In this method, the flowrate is measured many times over, typically from 50-150 times per second. The high number of measurements and the use of modern digital signal processing makes the QStar highly reliable under challenging processing conditions.



Since the ultrasonic transducer does not come into contact with the fluid, the measurement is:

- 100% contamination-free
- 100% hygienically safe



This is particularly advantageous for quantity measurement of food and pharmaceutical products, and simplifies volume measurement of toxic or environmentally harmful liquids. With QStar UFM's there are no additional sealing surfaces or dead volumes!



QSTAR | UFM High-performance for difficult applications

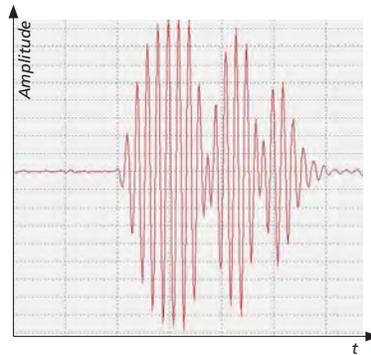
Stable and reliable measurement under extremely difficult conditions

Ultrasonic signals are disturbed by a variety of variables including electromagnetic radiation, the presence of gas or solids, and machine noise. In conventional flowmeters, in order to detect the ultrasonic signals to be evaluated within this “ambient noise” the signal amplitude must be several times that of the noise. An intelligent analysis method was developed for QStar that detects the ultrasonic signals when the amplitude of the noise is several times more than that of the signal amplitude. The advantage for QStar users: absolutely reliable and stable measurements, even in extremely unfavorable conditions.

This enables measurements even under conditions where high particle and gas loads are present – an impossible task for conventional flowmeters.

Verified signal quality ensures reliable measurement

QStar’s integrated oscilloscope function checks and verifies signal quality. This allows graphical signal display and the quick and easy verification of signal quality.



AFC technology for high accuracy under changing process conditions

Encoded signals: Typical signal packet with two 180° phase shifts for reliable signal recognition.

Cross-correlation process tackles the toughest measurement tasks.

To ensure reliable measuring results even under difficult measuring conditions, GPI developed modern and powerful signal processing algorithms. For reliable detection, QStar employs encoded signal packets (bursts) - similar to the GPS satellite navigation system.

The built-in phase shifts and clearly defined number of oscillations, prior to being sent the bursts receive a unique identity, like a fingerprint, prior to being sent. On the receiving end, the digital signal processor (DSP) employs a cross-correlation method to uniquely

determine the time (maximum correlation) at which the transmission signal matches a stored reference signal.

This allows the signal reception times required to calculate the transit time to be determined very precisely. This also permits the clear identification of the desired signals in the event of high noise levels and/or low signal amplitude (e.g. high particle content in the fluid) by means of cross-correlation. The result: reliable and accurate measurements even under difficult conditions.

Automatic Fluid Control (AFC)

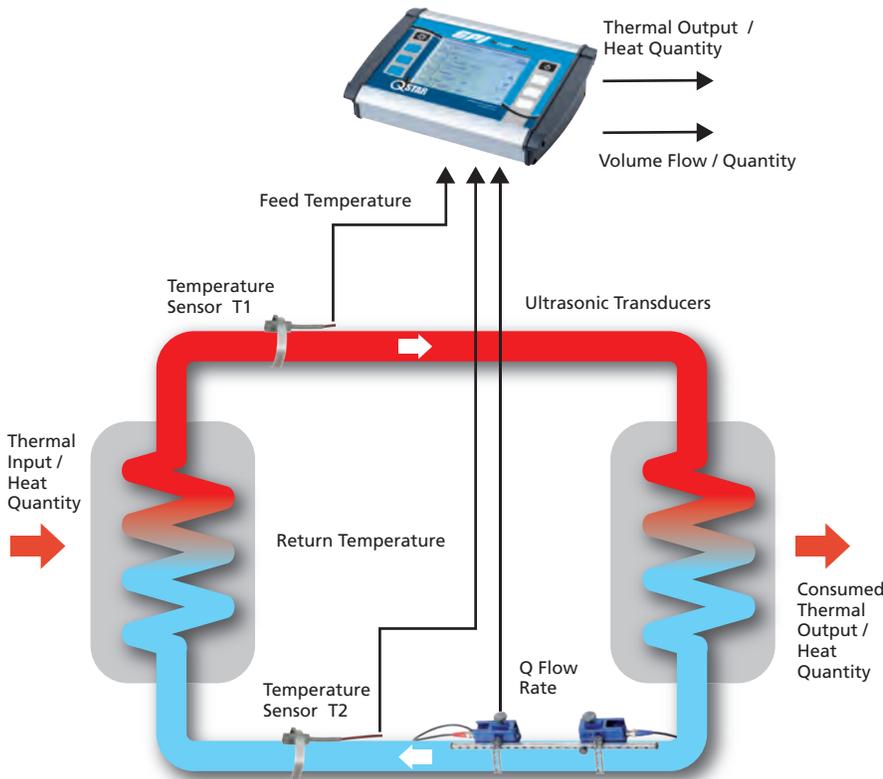
Ultrasonic meters are dependent on the acoustic velocity of the relevant fluid, which varies with the composition and temperature. This is not a problem with proper setup of parameters. However, many conventional flowmeters are programmed for water with a temperature of 68° F. If the temperature changes to 122° F, the transducers would basically have to be repositioned. In everyday measurement practice this would be impractical, and is rarely done. The result is a loss of accuracy.

QStar compensates for this effect by means of AFC technology and newly developed, high-performance algorithms. The advantage is that the transducers need not be repositioned and accuracy is virtually unaffected by typical process fluctuations.

The result is high measurement accuracy even under changing conditions, in temperature or fluid composition.



Integrated heat quantity measurement



QStar is compatible with the most common pipe sizes (1/2" - 240"). QStar UFM includes an integrated heat quantity measuring function. Together with the clamp-on temperature (optional) and ultrasonic transducers, heat and cooling quantities can be recorded and documented with reliability and accuracy.

Rising energy prices and legal requirements regarding environmental protection and plant efficiency necessitate the ongoing optimization of energy flows. Rising energy prices and legal requirements regarding en-

vironmental protection and plant efficiency requires the ongoing optimization of energy flows. Assessing the energy performance of heat flows is important in a variety of applications: Power Stations, Waste and Water management and Building Services Engineering.

QStar's integrated thermal energy measuring function enables rapid and convenient recording of heat flows. External temperature sensors (optional) placed on the feed and return flow are used to measure the temperature difference. QStar measures the volume flow and calculates the heat flow, taking into account the specific heat coefficient of the fluid. The temperature sensors can be matched in pairs on the flowmeter in order to increase measurement accuracy. All this takes place without penetrating the piping system. Temperature and flow sensors are simply clamped onto the pipe from the outside.



QStar's Thermal Energy Metering

Typical applications include:

Power Stations

- Circulating water/service water
- District heating networks
- Pump protection
- Condensate, feed water and light oil measurement

Water and Waste Water Management

- Sewage treatment plant
- Drinking water networks, verification of water meters
- Pump protection
- Distribution and consumption metering
- Leak detection

Building Services Engineering

- Hot and cold water
- Cooling systems and air-conditioning units
- Hydraulic compensation
- Pump control and setup
- Optimization of heating systems

Chemicals and Petrochemicals

- Crude and light oil
- Industrial and Waste Water
- Aggressive and toxic fluid
- Measurement of heat carriers, (thermal oils)

Food and Beverage Industry

- Hygienic, reliable measurement of fluid
- Dosage measurements
- Cleaning solutions
- Water
- Beverages

AND technology ensures outstanding signal quality

Anti-Noise Deflector (AND) Technology

With the aid of AND technology, the ultrasonic waves are guided and coupled so unwanted echoes and signal dispersion is avoided, reducing noise and making energy available in the form of useful signal energy.

QStar's Anti-Noise Deflector delivers a signal yield several multiples greater than conventional flowmeters.

QStar's transducers are suitable for applications up to 300° F. This enables many high-temperature applications, such as district heating networks to be realized cost-effectively without special transducers.

Fast, secure transducer mounting

Mounting with the mounting rail is simple. Using the pre-defined hole matrix makes positioning the ultrasonic transducers on pipes a quick, secure and precise affair. This also avoids failed installation.



Transducer Installation: Quick and Easy

Selection of Ultrasonic Transducers for Transit Time Measurement

Type	Temperature	Inner Diameter
QStar Portable: QMP-F21 	-40 - 300° F	3/8" - 4 1/4"
QStar Fixed permanently installed: QMF-F21 		
QStar Portable: QMP-F10 	-40 - 300° F	1 1/4" - 16"
QStar Fixed permanently installed: QMF-F10 		
QStar Portable: QMP-F05 	-40 - 176° F (300)° F	8" - 200"
QStar Fixed permanently installed: QMF-F05 		

All ultrasonic transducers for permanent installation, degree of protection: IP68

Thermal energy metering

QStar ultrasonic transducers – optimum metering performance for your application

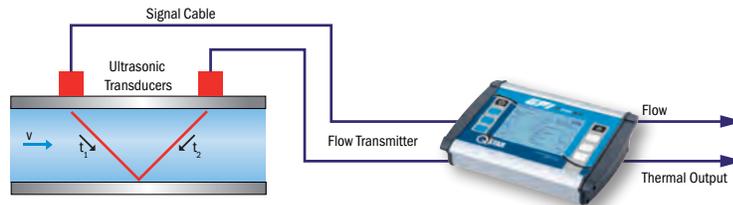
QStar’s ultrasonic transducers are optimized for maximum signal yield and outstanding metering performance. QStar’s three ultrasonic transducer types can be used for most flow applications. All ultrasonic transducers are clamped onto the pipe externally and delivered with practical installation material. Installation is a matter of minutes – with no need to penetrate or open pipe. Your process does not have to be interrupted.

Depending on the application and amount of space available, the sensors can be attached to your piping in the Z, V and W mode.

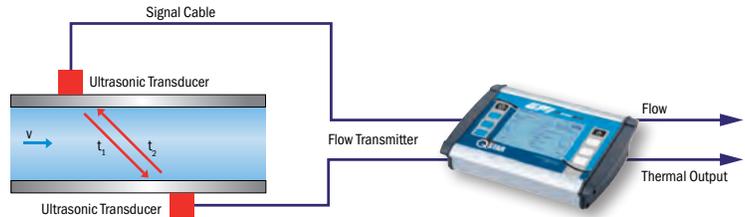
Unique benefits of QStar UFM:

- Quickstart guide makes installation fast and easy.
- Setup is completed in less than five minutes!
- User-friendly menu is displayed on large, backlit LCD screen.
- Parameters Calculator (Proprietary)
Available via USB drive, Smartphone web app and online.
Calculates flowrate accurately based on pipe size and velocity.
Includes Reynolds number calculation
- GPI Toll-Free Technical Support Available 8-5 p.m. CST Monday through Friday
- Heat Resistant (up to 300° F) Transducers Included
- Integrated Heat Quantity Measurement Capabilities (Standard)
- Heat measurement inputs
- Pre-programmed software
- Three sets of Transducers cover ½” to 240” Pipe Sizes

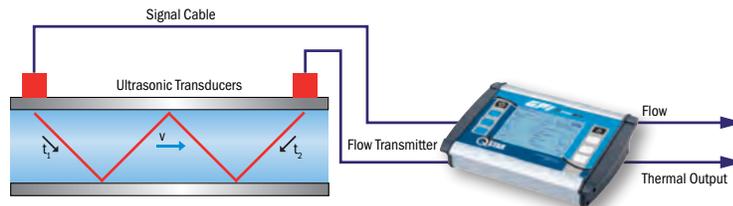
Best value based on features and cost!



Mounting in V mode: standard mode



Mounting in Z mode: typical for large pipes



Mounting in W mode: typical for small pipes



Wall thickness gauge

The QStar wall thickness gauge provides precise and easy measurements of the thickness of pipes and components.

Carrying case included

The portable QStar UFM comes in a robust practical carrying case complete with flow transmitter, ultrasonic transducers, installation material, signal cable, coupling grease, SD memory card and power supply.

(20 x 16 x 16 inches)



QSTAR | UFM Transducer Specifications



Measurement	
Principle:	Ultrasonic transit time difference with AFC technology
Values Measured:	Flow, flow speed, heat flow
Totalizers:	Heat quantity, volume
Measurement Range:	+/- 98 ft/s
Signal Damping:	0 - 100 sec (adjustable)
Diagnostic Functions:	Acoustic velocity, signal strength, SNR, signal quality, amplitude, energy Oscilloscope function allows graphical display and analysis of signals.

Measurement Accuracy		
Inner Diameter Ø	Range	Deviation
.39 - .98 inches	6.56-98.42 ft/s	2.5% of reading
	0-6.56 ft/s	± 0.16 ft/s
.98-1.97 inches	6.56-98.42 ft/s	1.5% of reading
	0-6.56 f/s	± 0.10 ft/s
1.97-11.81 inches	6.56-98.42 ft/s	1% of reading
	0-6.56 f/s	± 0.07 ft/s
11.81-236.22 inches	3.28-98.42 ft/s	1% of reading
	0-3.28 ft/s	± 0.03 ft/s
Repeatability for the vast majority of applications is <0.2%		

	QStar Portable	QStar Fixed
Operation:	Intuitive via 8 main keys (Soft Keys), plain text display	
Languages:	English, Spanish and French	
Units:	Metric / US	
Outputs:	2x 4-20 mA, 1x Relay, 1x MicroUSB 1x Pulse	2x 4-20 mA, 1x Pulse, 1x MicroUSB 1x Relay, RS232 (opt.)
Inputs:	2x PT100	
Integrated Data Logger:	2 GB	N/A
Data Logged:	Measurement and totalizers	N/A
Data Format:	Text format, can be directly exported into standard office programs	N/A
Memory Cycle:	Adjustable, 1 second to 24 hours	N/A
Power Supply:	Integrated rechargeable battery and 110V AC adapter Battery Duration: Approx. 5 hours	85-264VAC, 18-36VDC (opt.) Power Consumption: 10 W
Protection Class:	IP40	IP65, Ex/ATEX
Housing:	Aluminium, PVC	PVC, wall-mounted
Dimensions (LxWxD):	10.4 x 7.5 x 2.7 in.	10.2 x 9.4 x 4.7 in.
Operating Temperature:	-4° F to 140° F	
Transducer Temperature:	-40° F to 300° F	
Weight:	3.3 lbs	2.9 lbs
Display:	QVGA (320x240), black and white, adjustable backlighting	
Carrying Case :	20 x 16 x 16 in.	N/A



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