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So Many Paths to Choose From

Transit-time ultrasonic flowmeters rely on ultrasonic transducers to send a signal or "beam" at an angle from one side of a pipe to the other. Often this signal is reflected back to the sending side of the pipe. The flowmeter calculates flowrate by comparing the difference between the "transit time" of the signal when it travels with the flowstream and when it travels against the flowstream.

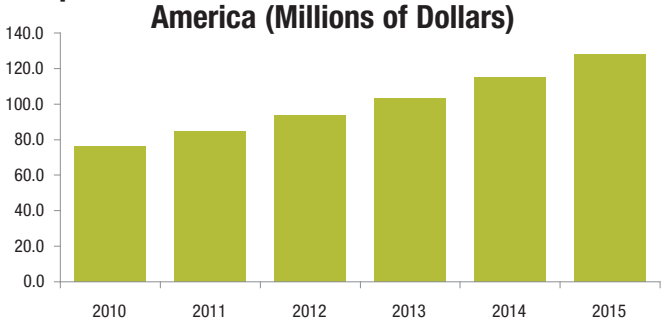
Transit time ultrasonic flowmeters are distinguished according to the number of "paths" they have. A path is simply the path or track of the ultrasonic pulse as it travels across the pipe and back again. Many ultrasonic flowmeters are single- or dual-path, meaning they send either one or two signals across a pipe and back. Typically there are two transducers for each path; one is a sender and one is a receiver.

In the past 10 years, there has been a lot of research and development work on multipath ultrasonic meters. These ultrasonic meters have three or more paths. The benefit of having multiple paths is that flow is measured at more points in the flowstream. This enhances the accuracy of the measurement. In 1998, the American Gas Association (AGA, *aga.org*) approved the use of ultrasonic flowmeters for custody transfer of natural gas. Since that time, suppliers have researched multipath meters and brought out many new products.

The main suppliers of ultrasonic flowmeters for custody transfer of natural gas include Emerson Daniel, Elster-Instromet, Sick, and FMC Technologies. More recently, KROHNE (*krohne.com*) has also released the Altosonic V12, a 12-chord meter for custody transfer of gas applications. Since that time, Cameron (*cameron.com*), which has traditionally had petroleum liquid applications, has released the LEFM 380Ci, an eight-path ultrasonic meter for natural gas applications.

Most ultrasonic multipath meters for custody transfer of natural gas have four, five, or six paths. However, in May 2011, Elster Instromet (*elster-instromet.com*) announced a new ultrasonic gas meter that has six paths and sixteen chords. The additional number of chords enables the flowmeter to take into account flow profile and turbulence, and provides additional diagnostic capabilities.

Shipments of Ultrasonic Gas Flowmeters in North America (Millions of Dollars)



Source: Module A: An Analysis of the Regional Gas Flowmeter and Natural Gas Markets, Published by Flow Research in September 2011

Ultrasonic multipath flowmeters are also used to measure the custody transfer of petroleum liquids. Two companies that are prominent for these applications are Caldon (now a division of Cameron) and Faure Herman (now a division of IDEX Corporation, *faureherman.com*). Caldon used to have ultrasonic meters designed primarily for the nuclear industry. However, in recent years, the company has expanded its application range to include the oil and gas industry. Caldon has two-path, four-path, and eight path meters for liquid applications. The company was acquired by Cameron in January 2006. Caldon's flowmeters ca among the most expensive ultrasonic meters made.

Faure Herman, which is based in France, is well known for its helical blade turbine flowmeters. However, it also offers what it calls an 18-path ultrasonic flowmeter for custody transfer of liquids. In addition to custody transfer, Faure Herman's ultrasonic flowmeter is designed for process applications. Faure Herman was acquired by IDEX Corporation in February 2007.

KROHNE is another company that has made its mark in custody transfer of liquids, with its ALTOSONIC V and ALTOSONIC III offerings.

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