

# Operational Principles



## Sonix™ Ultrasonic Gas Meter

Sonix is nothing short of a transformation in gas metering. Unlike mechanical diaphragm meters, the Sonix digital design completely eliminates moving parts, relying instead on the proven technology of ultrasonics to measure gas flow. The digital design provides a host of additional advantages. It creates a platform for extensive diagnostic capabilities and highly accurate temperature correction. Its compact size drastically reduces installation and labor costs and space requirements. A true expression of the principle that “less is more,” Sonix’s compact size and simple, no-moving parts design offers unprecedented levels of accuracy, reliability, and performance available in no other gas meter all backed by a full 15 year warranty, the best in the industry.

## Operational Overview

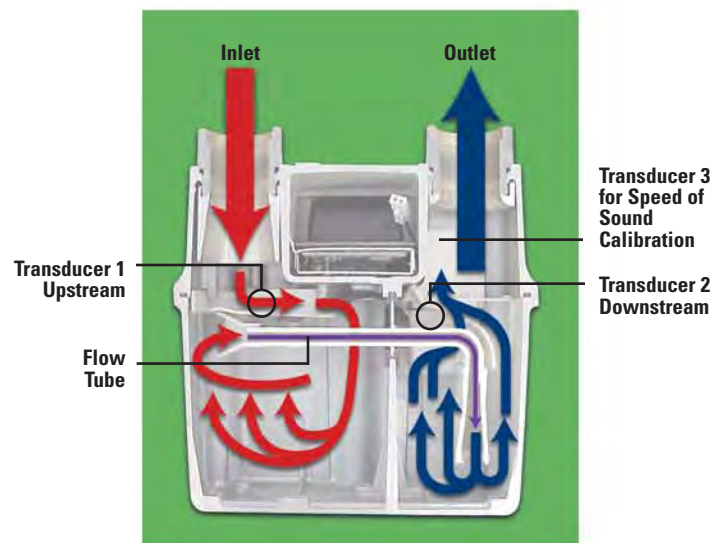
The gas flows into the inlet area and passes through the flow tube to the outlet area. As this takes place, transducers positioned in the inlet and outlet areas transmit ultrasonic signals back and forth. While one transducer is sending a signal, the other is acting as the receiver. Since sound travels faster with the flow of gas than against it, the transducers and associated electronics simply measure the difference in time it takes for an ultrasonic signal to travel with the gas flow compared to the time it takes to travel against the gas flow. The electronics use this difference to calculate the velocity of the gas. Once the velocity of the gas is determined, the electronics calculate the volume of gas by multiplying the velocity of the gas by the cross-sectional area of the flow tube. This technology is known as “time of flight”; that is, the time it takes the signal to travel from one transducer to the other. This measurement is resolved to within 1.5 nanoseconds.

## Transducer Operation

The transducer is the device that transmits and receives the ultrasonic signals. It consists of five components: piezoelectric crystal, quarter wave plate, electrical leads, backing material and cap. Sonix uses three transducers; the third transducer provides the speed-of-sound calculation.

## Speed-of-Sound Transducer

The third transducer is situated in a remote speed-of-sound (SOS) box that equals the length of the flow tube. The calculation is obtained by two passes of an ultrasonic pulse reflecting off the three walls creating a continuous diagnostic measurement. With the calculated SOS from the third transducer, an accurate reference point is maintained to verify the acceptable operation of the meter throughout the full operating range (flow and temperature) of the meter. This patented design is unique only to Sonix gas meters.



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