

Advantages include:

- Widely used for water flow applications
- Accuracy about 3%

Limitations:

- Compensation usually needed for the acoustic velocity in the beam path

1. Noise

Principle of Operation: Noise increases with flow rate.

Advantages include:

- Suitable for low cost flow switches, leak detectors, and boundary layer acoustic monitors to detect the transition from laminar to turbulent flow

Limitations:

- Not accurate for flow measurements
- Highly non-linear
- Sensitive to errors caused by ambient vibration or sound

1.1.1 Mass Flowmeters

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The continuing need for more accurate flow measurements in mass-related processes (chemical reactions, heat transfer, etc.) has resulted in the development of mass flowmeters. Various designs are available, but the most commonly used for liquid flow applications is the Coriolis meter. Its operation is based on the natural phenomenon called the Coriolis force, hence the name.

A. Coriolis Mass Flowmeter

Coriolis meters come in many shapes and sizes, but all function basically the same way. Each coriolis meter consists of one or more flow tubes. As fluid enters a vibrating coriolis tube, the particles accelerate (due to the vibration) exerting a force on the inlet side of the tube. As fluid leaves the vibrating coriolis tube, the particles decelerate and exert a force in the opposite direction from the inlet. The resulting forces angularly deflect the tube(s) an amount that is inversely proportional to the mass flow rate within the tube. The angular deflection is optically measured. Coriolis mass flow measurement is not affected by changing process conditions.

The Coriolis meter is insensitive to operating conditions of viscosity, density, type of fluid, and slurries.