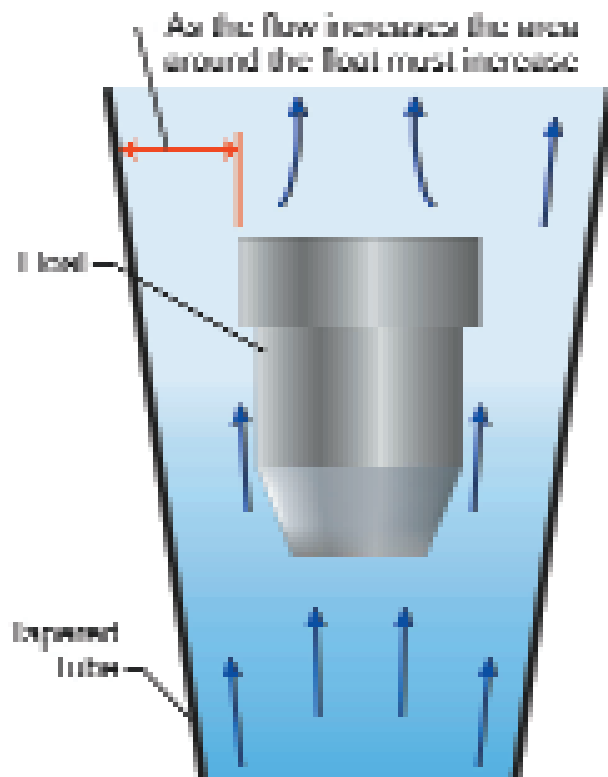


Variable Area Flowmeters

for Use in Water Treatment Systems

Figure 1. How It Works

Here is a simple explanation of how the type of flowmeter discussed in this article works.



Just because sophisticated “high-tech” instruments are available, it does not mean they are always the best choice for your flow measurement needs. Simple flowmeters can offer many advantages over more costly and technical types.

In recent years, variable area flowmeters have become very competitively priced. Because this type of flowmeter offers excellent value, more and more manufacturers of water treatment systems are including them as part of their standard equipment package.

Applications for variable area flowmeters can include

- Water and Wastewater, Treatment Equipment,
- Pollution Monitoring and Control Equipment including fume scrubbers,
- RO Water Systems,
- Filtration Systems,
- Commercial Aquariums,
- Chemical Processing Equipment,
- Nutrient Feed Systems and Crop Irrigation Systems, and
- Film Processing Equipment.

Two examples of how flowmeters are used include ultrafiltration equipment and ultrapure water systems.

The makers of ultrafiltration equipment (reverse osmosis systems) use them to measure output through the membrane and also to measure reject. The meters play a critical role in helping to monitor the efficiency of the system. Flowmeters offer an advantage over pressure gauges in filtration systems because they measure actual flow; as the filter becomes saturated (full), the flow rate drops. Just a glance at the flowmeter tells the operator if the filter needs cleaning, if the replacement of cartridges is required or if there may be another problem such as a tear in the filter material or a broken pipe.

Tip: Check compatibility of the flowmeters’ materials of construction with the fluid to be measured. Be certain to check chemical compatibility.

Flowmeters are used both in the manufacturing and management of deionized water. Ultrapure water is used extensively in the manufacture of printed circuitry, particularly the cleansing of computer chips.

Although flowmeters may seem to be a modern invention, basic types were evident as far back as the early Roman era. They often were used for measuring water flow to households. The mathematical foundations of flow theory were evolved during the 17th century. Flow rate is a product of the velocity of a fluid and volume.

Variable area flowmeters use a tapered tube design to measure fluid flow. The meter (see Figure 1) is composed of a vertically tapered tube through which the fluid to be measured is passed from the smaller end up to the larger. As the fluid flows through the tube, it forces an indicator (float) upward. The clearance space (area) between the float and tube increases as the float approaches the top of the meter. This increasing area requires a larger amount of fluid to force the float higher. By varying the taper of the tube, mass of the float and

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About the Author

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length of the tube, different flow ranges can be calibrated.

The variable area flowmeter must obviously be plumbed into a piping system the correct way with the narrow part of the taper at the bottom. Usually printed on or next to the tube are the flow increments (scale). The flow rate can be read by matching the increments on the tube with the edge of the float.

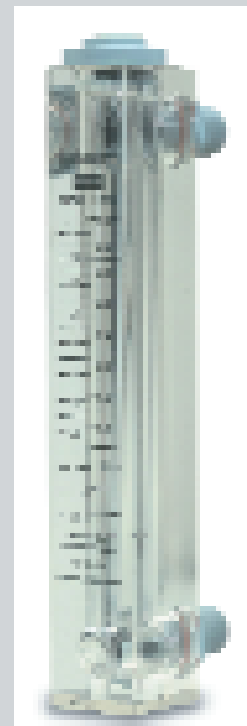
Accuracy and repeatability are terms often used to describe flowmeters. Without a good working knowledge of what these terms really mean, you can easily over or under buy a flowmeter. In plain terms, accuracy really means error. Avoid being misled by all the different code or terminologies used in the flow industry. Flowmeter manufacturers may simply say 2 percent accurate to which you should ask, "2 percent of indicated flow or 2 percent of full scale?" For example, if your scale reads one to

10 gpm and the float currently reads 5 gpm, you have to ask is it accurate within 2 percent of the indicated flow of 5 gpm or the full scale of 10 gpm. These two seemingly similar accuracies are very different and could be costing you extra money. Repeatability is different than accuracy and, in many cases, more important to industry. Repeatability is the meter's ability to reproduce flow rates consistently under the same conditions. Repeatability is paramount in the processing industry where tracking flow changes is so important.

Specific gravity or weight of the liquid affects meter reliability and accuracy. Viscosity, the degree to which a fluid resists flow under applied force, also affects accuracy, as do elevated temperatures.

Today, there are many types of flowmeters: variable area, positive displacement, ultrasonic and mass

Figure 2. Flowmeter Styles



Panel Mount Unit



Inline Unit



**Panel Mount Unit
With Flow
Adjustment**



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flowmeters to name a few. Each type has its own special features. There is no universal or perfect flowmeter appropriate for all industries. The right flowmeter for the job is the one that will perform adequately in that application and at a reasonable expense. The variable area flowmeter offers many advantages over some more costly and technical types, making it a good choice for many flow

measurement applications. Seek assistance from your supplier to ensure you select the right flowmeter for your particular application.

Finally, it is of ultimate importance to check compatibility of the flowmeters' materials of construction with the fluid to be measured. Be certain to check chemical compatibility. Do not rely solely on compatibility charts, do your

own testing. Many flowmeter manufacturers are willing to provide material sample kits. While variable area flowmeters offer good value and are easy to install and use, they may not be suitable for all flow measurement applications. The water processing and wastewater treatment industries usually will select meters designed for use with water. These meters may not be suitable for use with other liquids. **WQP**

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HIGHLIGHTS

Hallett Diagnostic Tool



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