Technical Article

Six Top Factors to Consider When Selecting a Flow Meter

By McCrometer

Water utilities rely on accurate and dependable flow measurement for critical process controls. Regulatory agencies also require flow monitoring and reporting, with specific accuracy limits.

Flow metering technology is continually improving, and a variety of meter types and styles are available. Each flow meter application is unique, and flow meter selection should not be based on "low bid." While cost is always important, other factors carry more weight when it comes to selecting a flow meter.

Here are six important considerations for choosing the best flow meter.

1. Understand the Process

Before specifying a meter, it's important to clearly understand the entire process and where the meter fits in that process. Involve plant operators during design to discuss issues of maintenance, calibration, and access. Does flow need to be totaled? Does information need to be transmitted to a supervisory control and data acquisition (SCADA) system or be available on the Web? Knowing who will be using the meter and specifically how it will be used is the starting point.

2. Media Being Measured

The media being measured is one of the most important considerations when choosing a flow meter. Conductivity, temperature, pressure, and viscosity can affect certain types of flow meters. How clean or dirty the water is may also impact the type and style of meter.

So, the next step in choosing a flow meter is to thoroughly understand the characteristics of the flow to be measured. In an existing facility, data on the matrix should be readily available for review. Standard engineering criteria can be used for new facilities if needed.

For example, propeller meters are often used in drinking water systems, especially for measuring well water withdrawal. These velocity meters can measure fluids containing a certain amount of sand, dirt, iron, and other contaminants. However, these meters would not be recommended for raw wastewater containing stringy materials and wipes, which would foul or damage the meter.

On the other hand, electromagnetic "mag" meters are very accurate when measuring conductive materials like water and wastewater. They have no moving parts to corrode or break. Different styles of mag meters are available for specific fluid measurements, including drinking water, wastewater, and sludges.

3. Accuracy, Range, And Certification Requirements

How accurate must the flow measurement be? This depends on the meter's purpose. Flow measured to control chemical feed may need greater accuracy than that used for general tracking of water treated. Flow measurement for billing purposes, such as a water supply authority selling water to a utility, must be extremely accurate.

Regulatory conditions may also apply. Most water and wastewater systems have permit limits for maximum flows and must measure and report daily

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flow totals. Be sure to check all existing permits for flow measurement accuracy requirements.

Measurement range and turndown rates must be considered as well. Engineers often size equipment and pipe for a 20-year growth period, which can lead to problems when current flows are much less than design rates.

Some utilities may require meters to have NSF-61, NSF-372 approvals or ISO 9001certification. Manufacturers may also accredit their calibration laboratories through the National Voluntary Laboratory Accreditation Program (NVLAP). NVLAP provides NIST accreditation to testing and calibration laboratories using management and technical requirements of the international standard ISO/IEC 17025:2005.

4. Meter Location and Installation

Proper location and installation of flow meters are critical for providing accurate measurement. Even the most sophisticated meter will read erroneously if installed improperly. Improper installation occurs most often when trying to "force" a flow meter into an existing plant or network or make it fit in a tight site.

Flow Disturbances

Most flow meters require a specific amount of straight run pipe to prevent flow disturbances. Pipe bends, valves, tees, and reducers can create significant flow measurement errors—up to 50 percent for certain meters. In a new system, straight runs can usually be designed appropriately. However, sufficient straight runs may be difficult to obtain in existing systems or constrained sites. Flow conditioners may help reduce inaccuracies. Also, some meters can measure more accurately than others under these conditions.

Piping

Pipe size, material, and direction are part of the meter selection equation. For instance, downward flow should be avoided when measuring liquid. As noted previously, systems are sometimes overdesigned to accommodate future growth. In most cases, the pipe must be full for accurate measurement.

5. Reporting/Data Recording

What information needs to be monitored and recorded, and how? Some applications require continuous recording of the flow, plus total flow readings. Do operators need event notification, such as high flow or zero flow alarms? Data must often be sent to a SCADA system. In some cases, flow meters are located remotely and need battery-powered devices.

During design, determine what type of output is needed. While 4 to 20 milliamp is most common, some facilities may need MODBUS cards or other instrumentation.

6. Consult With A Technical Partner

Flow meter manufacturers' representatives have a great depth of expertise. They know the right questions to ask and can recommend the best solutions for each unique installation. Use them as a trusted technical partner.

Your technical partner can help to make cost-effective decisions as well. Manufacturers can help by outlining lifecycle costs, including installation, maintenance, and calibration in addition to purchase price.

Most of all, your technical partner can help you choose the right meter up front rather than trying to make the wrong meter work after it's installed.

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