



Instrumentation
White Paper

Selection Criteria for Flowmeters



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Introduction

Flow measurement is a critical aspect of many industrial processes, ranging from chemical processing to water management. Selecting the appropriate flowmeter for a specific application is essential to ensure accurate and reliable measurement.

This white paper aims to provide guidance on the selection criteria for flowmeters, considering factors such as flow rate range, fluid type, pressure and temperature conditions, accuracy requirements, installation constraints, and maintenance considerations.

Precision in Motion

Introducing TRITON Flowmeters

NWI Instrumentation are committed to supplying TRITON Flowmeter solutions for a wide range of applications and industries.

Our range of flow meters caters to various applications including agricultural irrigation, chemical processing, and high-pressure environments. Whether you need flow meters for measuring milk, water, beer brewing, fuel, or wastewater, we have the right solution for you.



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1 Factors to Consider

1. Flow Rate Range

The flow rate range of the process fluid is one of the primary considerations when selecting a flowmeter. Flowmeters are typically designed to operate within a specific range of flow rates, and choosing one that matches the expected flow rates of the application is crucial for accurate measurement.

2. Fluid Type

The type of fluid being measured plays a significant role in selecting the appropriate flowmeter. Different flowmeter technologies are suitable for various fluid types, such as liquids, gases, slurries, or corrosive chemicals. Compatibility with the fluid's properties, such as viscosity, conductivity, and chemical composition, must be taken into account.

3. Pressure and Temperature Conditions

Operating pressure and temperature conditions can impact the performance and lifespan of a flowmeter. It's essential to select a flowmeter that can withstand the pressure and temperature extremes of the application without compromising accuracy or reliability.

4. Accuracy Requirements

The required level of accuracy for flow measurement varies depending on the application. Some processes require precise measurement for regulatory compliance or quality control purposes, while others may tolerate lower accuracy levels. It's crucial to assess the accuracy requirements of the application and select a flowmeter capable of meeting those requirements.



5. Installation Constraints

Considerations such as available space, orientation, and mounting options can influence the selection of a flowmeter. Some flowmeter technologies may require specific installation conditions to operate effectively, while others offer more flexibility in installation.

6. Maintenance Considerations

Maintenance requirements, including calibration, cleaning, and servicing, should be factored into the selection process. Choose a flowmeter that is easy to maintain and service to minimise downtime and ensure long-term reliability.



Coriolis Mass Flowmeters

Ideally suited for applications requiring highly accurate measurement of mass flow rates, especially for fluids with varying densities, viscosities, and corrosive properties.



Electromagnetic 'Mag' Flowmeters

Electromagnetic flowmeters, often referred to as "Mag" flowmeters, are sophisticated instruments designed for measuring the flow rate of conductive fluids, such as water, wastewater, and various other liquids containing ions or charged particles.



Ultrasonic Flowmeters

Non-intrusive and suitable for a wide range of fluids, including clean liquids and gases. One of the primary advantages of ultrasonic flowmeters is that they do not require direct contact with the fluid being measured.



Vortex Flowmeters

Suitable for measuring both liquids and gases, with high accuracy and minimal pressure loss. These flowmeters operate on the principle of the von Kármán effect, where alternating vortices are generated as a fluid passes by a bluff body inserted into the flow stream.

2 Types of Flowmeters

There are various types of flowmeters available, each with its own advantages and limitations. Here are some common types of flowmeters and their typical applications:

Key Features to look for in a Flowmeter

Measurement Principle: Different flowmeter technologies utilise various principles, each principle has its own advantages and limitations, and selecting the right one depends on factors such as fluid type, flow range, accuracy requirements, and environmental conditions.

Communication and Output Options: Look for flowmeters with communication and output options that facilitate integration with your control system or data acquisition system. Common communication protocols include analog outputs (4-20 mA, 0-10 V), digital outputs (RS-485, Modbus, Profibus), and wireless connectivity (Bluetooth, Wi-Fi).

Rangeability: Rangeability, also known as turndown ratio, refers to the ratio between the maximum and minimum flow rates that a flowmeter can accurately measure.



3 Industry Applications

Here are some industries and their typical applications for flowmeters, along with recommendations for the best-suited flowmeter types:

Oil and Gas Industry:

- **Applications:** Measurement of crude oil, natural gas, refined petroleum products, and various process fluids such as water, steam, and chemicals.
- **Recommended Flowmeter:** Coriolis mass flowmeters are commonly used in custody transfer applications for accurate measurement of oil and gas flow rates. Differential pressure flowmeters, ultrasonic flowmeters, and turbine flowmeters are also widely used for various applications in upstream, midstream, and downstream operations.

Chemical Processing Industry:

- **Applications:** Monitoring flow rates of chemicals, solvents, acids, and other process fluids in chemical reactors, pipelines, and storage tanks.
- **Recommended Flowmeter:** Electromagnetic flowmeters are well-suited for measuring the flow of conductive liquids in corrosive chemical environments. Coriolis mass flowmeters and ultrasonic flowmeters are also suitable for high-precision measurement of fluid flow in chemical processing applications.

Water and Wastewater Treatment:

- **Applications:** Monitoring water flow rates in treatment plants, distribution networks, and wastewater collection systems.
- **Recommended Flowmeter:** Electromagnetic flowmeters are commonly used for measuring the flow of conductive fluids such as water and wastewater, offering high accuracy and minimal maintenance requirements. Ultrasonic flowmeters and differential pressure flowmeters are also suitable for water and wastewater applications.

Food and Beverage Industry:

- **Applications:** Measuring flow rates of ingredients, beverages, and cleaning fluids in food processing and bottling plants.
- **Recommended Flowmeter:** Positive displacement flowmeters are often used for measuring viscous fluids such as syrups, oils, and sauces in food production. Electromagnetic flowmeters are suitable for measuring the flow of beverages and other liquid ingredients with high accuracy and sanitary requirements.

Pharmaceutical Industry:

- **Applications:** Monitoring flow rates of chemicals, solvents, and pharmaceutical formulations in production processes and laboratory applications.
- **Recommended Flowmeter:** Ultrasonic flowmeters and Coriolis mass flowmeters are commonly used in the pharmaceutical industry for accurate measurement of fluid flow in sterile and critical process applications. Electromagnetic flowmeters may also be suitable for non-intrusive measurement of conductive liquids.

Power Generation:

- **Applications:** Measuring flow rates of water, steam, and cooling fluids in power plants and thermal systems.
- **Recommended Flowmeter:** Ultrasonic flowmeters and electromagnetic flowmeters are often used for measuring the flow of water and other fluids in power generation applications. Differential pressure flowmeters and vortex flowmeters may also be suitable for steam flow measurement.

The NWI logo consists of the letters 'NWI' in a bold, blue, sans-serif font, centered within a white square. The background of the entire advertisement is a blue-tinted photograph of industrial machinery, including pipes, valves, and a prominent pressure gauge with a red frame and a white face. The gauge has a scale from 0 to 4 and technical specifications: 'V: 0.5-5 m³/h', 'D: 100 mm', and 'P: 1.6 MPa'. The letters 'RP' are visible on the gauge's face. The bottom of the image features a decorative pattern of white diagonal lines.

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1300 669 162