Rheonik Rhm 015

A practical guide to rheonik rhm 015, covering the reader intent, the relationship to rheonik rhm 015, key evaluation criteria, common risks, and the information the intended project audience should confirm before taking the next step.

Main topic: Main Page
https://www.level-meters.com/

In the landscape of industrial process control, precision in low-flow applications is a critical requirement for sectors ranging from chemical dosing to high-pressure gas research. The Rheonik RHM 015 stands as a specialized Coriolis mass flow meter designed to address these demanding environments. While many industrial facilities rely on level measurement technologies found on the Main Page for bulk inventory management, the integration of high-precision flow meters like the rheonik rhm 015 is essential for achieving accurate mass balance and process efficiency.

This article provides a technical overview of the Rheonik RHM 015, detailing its measurement principles, technical specifications, installation requirements, and the criteria engineers must evaluate before deployment.

Measurement Principles of Coriolis Mass Flow Meters

Before selecting a specific instrument, it is vital to understand the physics governing its operation. The Rheonik RHM 015 operates on the Coriolis principle, which allows for the direct measurement of mass flow, density, and temperature without the need for external compensation.

The Coriolis Effect

Inside the RHM 015, fluid flows through a set of vibrating tubes. These tubes are typically arranged in an "Omega" shape, a signature design of Rheonik. An internal drive coil causes the tubes to oscillate at their resonant frequency. As fluid enters the vibrating tubes, it is forced to take on the vertical velocity of the vibration.

According to Newton’s second law of motion, the fluid exerts a reactive force (the Coriolis force) against the tube walls. This force acts in opposite directions on the inlet and outlet sides of the tube, causing a slight twist or phase shift in the vibration cycle.

Mass Flow Derivation

The magnitude of this phase shift is directly proportional to the mass flow rate of the fluid. High-precision sensors located on the tubes detect this shift, which the associated transmitter then converts into a standardized signal. Because mass is an intrinsic property that does not change with temperature or pressure, the rheonik rhm 015 provides a more stable measurement than volumetric flow meters, which require constant adjustment for fluid density changes.

Technical Specifications and Performance

The RHM 015 is categorized as a low-flow sensor, making it suitable for pilot plants, laboratory environments, and specialized additive injection. It is engineered to handle extreme pressures and various fluid chemistries.

Flow Range and Accuracy

The device is capable of measuring flow rates as low as 0.004 kg/min (4 g/min) and can scale up to approximately 0.6 kg/min (600 g/min), depending on the specific configuration and pressure drop requirements. It typically offers a mass flow accuracy of ±0.10% to ±0.20% for liquids, ensuring high repeatability in sensitive processes.

Material and Pressure Ratings

To accommodate aggressive chemicals and high-pressure hydraulic fluids, the RHM 015 is available in several wetted materials. The standard construction is often 316Ti Stainless Steel, but for more corrosive applications, alloys like Hastelloy C22 or Tantalum are utilized. Pressure ratings can reach up to 900 bar (approx. 13,050 psi) in specialized high-pressure versions, which is significantly higher than standard industrial flow meters.

Feature	Specification (Standard)	High-Pressure/Special Version
Min. Flow Rate	0.004 kg/min	Consult Factory
Max. Flow Rate	0.6 kg/min	Up to 1.2 kg/min (oversized)
Pressure Rating	160 bar (16 MPa)	Up to 900 bar (90 MPa)
Temperature Range	-196°C to +210°C	-196°C to +350°C
Accuracy (Liquid)	±0.15%	±0.10%
Wetted Materials	316Ti Stainless Steel	Hastelloy, Tantalum, Monel

Applications in Industrial Process Control

The rheonik rhm 015 is frequently used in tandem with level measurement instruments to provide a comprehensive view of process dynamics. While level sensors monitor the volume of liquid in a vessel, the RHM 015 monitors the exact mass entering or exiting that vessel.

Chemical Dosing and Injection

In water treatment and chemical manufacturing, additives must be introduced in precise ratios. The RHM 015 ensures that even at very low velocities, the dosage remains consistent. This is particularly important when dealing with high-viscosity catalysts or expensive reagents where over-dosing leads to waste and under-dosing leads to product failure.

High-Pressure Gas Filling

Because the RHM 015 can withstand extreme pressures, it is a preferred choice for hydrogen refueling stations and gas bottling plants. The ability to measure gas mass directly eliminates the errors associated with compressibility factors in traditional gas flow measurement.

Integration with Level Systems

For engineers managing complex tank farms, the data from flow meters is often reconciled with data from radar or ultrasonic level transmitters. If a level meter on the Main Page indicates a volume decrease that does not match the mass flow recorded by the RHM 015, it can signal a leak, a change in fluid density, or a calibration issue in one of the instruments.

Installation Considerations and Best Practices

Proper installation is paramount for maintaining the high accuracy of the rheonik rhm 015. Coriolis meters are sensitive to external mechanical noise and improper fluid conditions.

1. Rigid Mounting: The sensor must be mounted to a solid, vibration-free structure. Because the measurement relies on detecting minute phase shifts in vibrating tubes, any external vibration from pumps or motors can introduce "noise" into the signal.

2. Orientation: For liquid applications, the "Omega" tubes should ideally point downward to prevent the entrapment of gas bubbles. For gas applications, the tubes should point upward to allow any condensed liquids to drain out.

3. Zero-Point Calibration: Upon installation and under full process pressure, a "zero-point" calibration must be performed. This involves stopping the flow completely (using shut-off valves) while the meter is full of fluid and allowing the transmitter to register the "no-flow" state.

4. Straight Run Requirements: Unlike many other flow technologies, Coriolis meters do not strictly require long runs of straight pipe before or after the sensor. However, it is good practice to avoid placing the meter immediately downstream of a high-turbulence source like a control valve.

Evaluation Criteria and Common Risks

When specifying a rheonik rhm 015 for a project, engineers should confirm several factors to avoid operational failures.

Fluid Properties

While Coriolis meters are largely independent of viscosity, extremely high viscosity can lead to a significant pressure drop across the small internal tubes of the RHM 015. Engineers must calculate the expected pressure drop at maximum flow to ensure the process pump can maintain the required flow rate.

Entrained Gas

The presence of gas bubbles in a liquid stream (slug flow) can dampen the vibration of the tubes, leading to measurement errors or a temporary loss of signal. If entrained gas is expected, an air eliminator should be installed upstream, or the process pressure should be increased to keep the gas in solution.

Environmental Factors

Extreme ambient temperatures can affect the electronics of the transmitter. While the RHM 015 sensor is highly resilient, the RHE series transmitter paired with it should be housed in a temperature-controlled environment or equipped with a sunshade if installed outdoors.

Limitations and Frequently Asked Questions (FAQs)

Can the RHM 015 handle fluids with solids?

Coriolis meters can handle slurries, but the RHM 015 has very small internal tube diameters. Any solids must be significantly smaller than the tube bore to prevent clogging. For fluids with large particulates, a different meter series or a filtration system is required.

Is the meter susceptible to electromagnetic interference (EMI)?

Modern Rheonik transmitters are designed with robust shielding; however, high-voltage cables should not be run in the same conduit as the flow meter signal cables to prevent signal degradation.

How does it compare to ultrasonic flow meters?

Ultrasonic meters are typically non-intrusive (clamp-on) and measure velocity. The RHM 015 is an inline sensor that measures mass directly. While ultrasonic meters are easier to install on existing pipes, they generally cannot match the accuracy of the RHM 015 in low-flow, high-pressure applications.

What is the maintenance schedule?

Because there are no moving parts (like rotors or gears) inside the RHM 015, mechanical wear is non-existent. Maintenance is generally limited to periodic zero-point checks and annual calibration verification to ensure the sensor has not suffered from internal erosion or coating.

In summary, the rheonik rhm 015 is a high-performance instrument for specialized low-flow measurement. By understanding the Coriolis principle and adhering to strict installation guidelines, process engineers can achieve laboratory-grade accuracy in industrial environments. For further information on integrating these sensors with broader inventory and level control systems, professionals are encouraged to review the technical resources available on the Main Page.