

Accurate Flow Measurement of Liquid Chemicals with Honeywell Smart Multivariable Transmitters

Specialty Liquids in the Chemical Industry



Problem: Chemical plants use propriety chemicals whose flow must be measured accurately, but without disclosing the exact formula to suppliers.

In today's modern chemical plants, the difference between profit and loss may be measured by how effectively the chemical plant can protect vital information on its processes. Regardless of the need to protect proprietary information, there is a need to control processes to ensure the production of usable product.

In one example, a chemical plant needed to measure the flow rate of a proprietary liquid but was only willing to disclose basic information such as density and viscosity as a function of temperature. Other basic information such as chemical reactivity was disclosed only so far as it was necessary to permit the selection of materials of construction for piping and other plant equipment.

The piping used to carry the process liquid was ½ inch ID with a normal flow of 0.4 kg/min. Density and viscosity information as well as pressure and temperature were available. The customer needed assistance in providing the total flow measurement solution including the selection of the proper size orifice for the application.

Solution: The Honeywell Smart Multivariable Transmitter with Integral Orifice Assembly.

The Smart Multivariable Transmitter (SMV3000) provides measurement of differential pressure across a primary flow element such as an orifice, a process (static) pressure measurement and a process temperature using either an RTD, or thermocouple detector. As the fourth process variable, the SMV3000 provides a flow measurement based on the three process variables of differential pressure, static pressure and process temperature.

To meet the multifaceted needs of the chemical industry, the SMV3000 has a variety of flow units available for the flow process variable including cubic feet per minute (CFM) for volumetric readings and kilograms per minute (Kg/min) for mass flow measurements.

As a special service to customers, Honeywell offers extensive applications assistance in the selection and sizing of primary flow elements. Honeywell has orifice sizing programs available to help the customer select the orifice which matches his application. Further, the data from the orifice sizing can be used directly to program the SMV3000 for the specific application.

One of the most useful Honeywell offerings is the integral orifice assembly that allows a wide variety of low flow applications to be easily and rapidly handled. Using the Integral Orifice Assembly, six different orifice sizes can be selected for use in a single housing. The available orifice sizes are 0.02, 0.035, 0.0635, 0.113, 0.196, and 0.339 inch bores.

For the above example, the 0.035 inch bore size was chosen using the Honeywell orifice sizing program. For a flow of 0.3 kg/min, at 40 degrees C and 100 psig, the differential pressure was 249 inches at 60 degrees F. This value is well within the maximum span of the SMA125 which is 0-400 inches of water. The correction for density changes with temperature is accomplished within the Smart Configuration Toolkit (SCT) through the generation of a special data chart used during the calibration process.

Benefits

Installation of the SMA125 with an integral orifice assembly provides:

- Two pipe intrusions for all three process variable measurements with consequent savings in installation cost.

- Rapid, and effective configuration of the SMA125 using the SCT. For specialty liquids using dynamic compensation, the customer provides density and viscosity data on his liquid which is used by the SCT to develop accurate compensation for these process liquid characteristics.
- Accurate measurement of the process flow through compensation for pressure and temperature variations.
- Significant dollar savings through the use of a single transmitter to provide three process variable measurements plus calculated flow.
- Digital integration of the SMA125 to the Honeywell TPS provides the security of digital integration plus a wide range of diagnostic and configuration capabilities from the control room.

Other Uses of the SMV3000 with Primary Flow Elements

The SMV3000 can be used to measure the flow of virtually any liquid, gas or slurry for which a primary flow element exists to provide differential pressure measurement. Examples for the chemical industry include gas (nitrogen, hydrogen, steam and natural gas), and liquid flows (acids, bases, solvents, monomers, polymers).

More Information

For more information on Smart Multivariable Transmitters, visit www.honeywellprocess.com, or contact your Honeywell account manager.

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