Application Note

Density Compensated Mass Flow Measurement with Pro-V® Multivariable Vortex Flowmeters

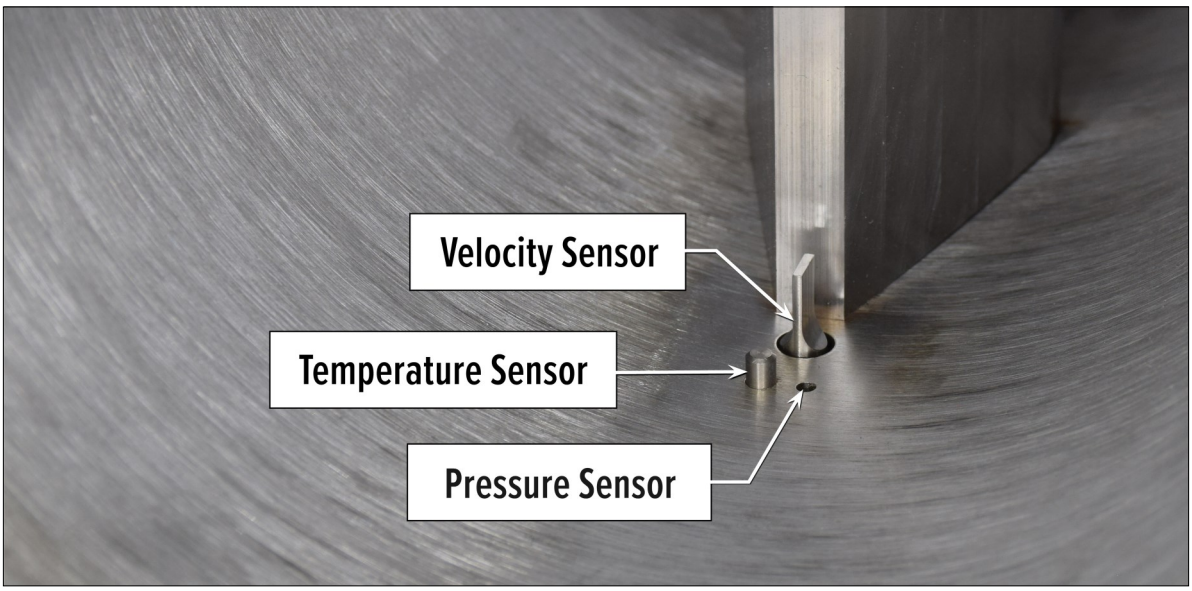
ADVANTAGES

- Accurate mass flow metering, compensating for changes in fluid density
- Reduced installation & maintenance costs
- Fewer devices & less wiring
- Fewer pipe penetrations & potential leak points

Accurate mass flow metering, compensating for changes in fluid density

Compressible fluids such as gases and steam often experience changes in their density. Volumetric flowmeters can't account for these changes and will produce an inaccurate flow measurement. Technologies that measure mass flow directly, such as Coriolis and thermal mass, have difficulties metering compressible fluids such as steam. Therefore, density compensated mass flow metering is a better flow metering method for compressible fluids.

In density compensated mass flow measurement, temperature and pressure measurements are used to calculate fluid density. This fluid density is then combined with volumetric flow rate (derived from velocity) to calculate a mass flow rate. Both vortex and differential pressure flowmeters utilize this method of mass flow metering.



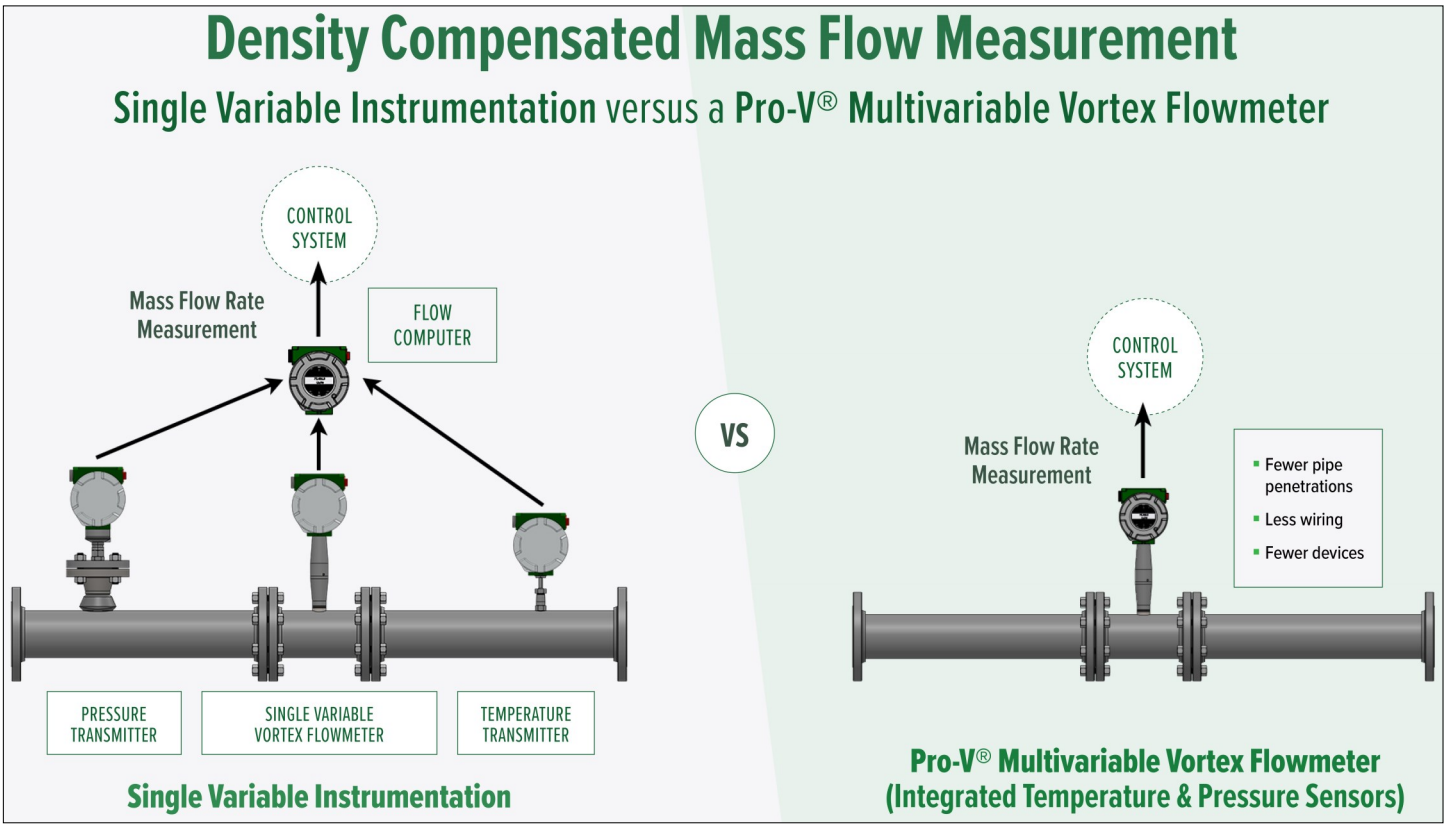
Velocity, temperature, and pressure sensors clustered behind the bluff body of a Pro-V® multivariable vortex flowmeter.

Reduced installation and maintenance costs

Before the advent of multivariable instrumentation, density compensated mass flow measurement would require a total of four separate instruments. A volumetric flowmeter, pressure transmitter, temperature transmitter, and a flow computer to perform the needed computations. All of these separate instruments have to be installed and maintained throughout their useful lives. Installing and maintaining four separate instruments requires an extraordinary amount of work and adds a high degree of complexity to the measurement.

Fewer devices, pipe penetrations, and potential leak points

Multivariable instrumentation groups these sensors into a single instrument. This grouping reduces the number of devices and the amount of wiring required. Multivariable instrumentation also reduces the number of pipe penetrations and potential leak points.



Density compensated mass flow measurement. Single variable instrumentation versus a Pro-V® multivariable vortex flowmeter.

For more information visit

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