

Rosemount 3051S MultiVariable Transmitter

Simplifying mass flow measurement



CHALLENGE

To achieve the most accurate flow measurement, differential pressure, static pressure, and process temperature must be accounted for.

- Measuring only differential pressure can result in >6% error due to density changes.
- Adding static pressure measurement helps reduce error to <3% but temperature still affects mass flow.
- The addition of process temperature can reduce error down to <1%.

Taking each one of these three measurements separately involves complex calculations and multiple devices.

OUR SOLUTION

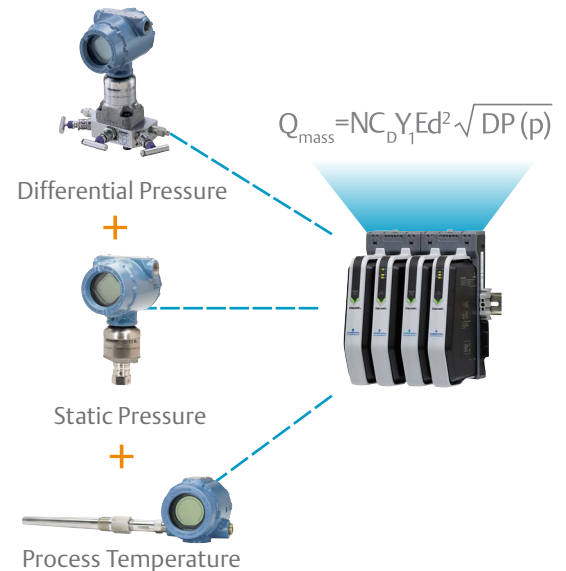
The Rosemount™ 3051S MultiVariable™ Transmitter measures differential pressure, static pressure, and process temperature in a single device while dynamically calculating mass flow 22 times per second within the transmitter.

The transmitter's ability to internally calculate fully compensated mass flow improves accuracy and reduces measurement uncertainty and complexity. This multivariable design also reduces pipe penetrations, impulse piping, and connection systems for additional cost savings.

WHAT IF...

...you could measure differential pressure, static pressure, and process temperature using a single device?

...you could reduce the costs associated with measurement uncertainty?



Key Features

- Delivers mass flow at .65% flow accuracy
- Dynamically corrects for all variables
- Compatible with all fluids, primaries, AGA, ISO, and ASME Standards

For more information visit
[Emerson.com/Rosemount3051SMV](https://www.emerson.com/Rosemount3051SMV)
or contact your local Emerson™ Sales Representative



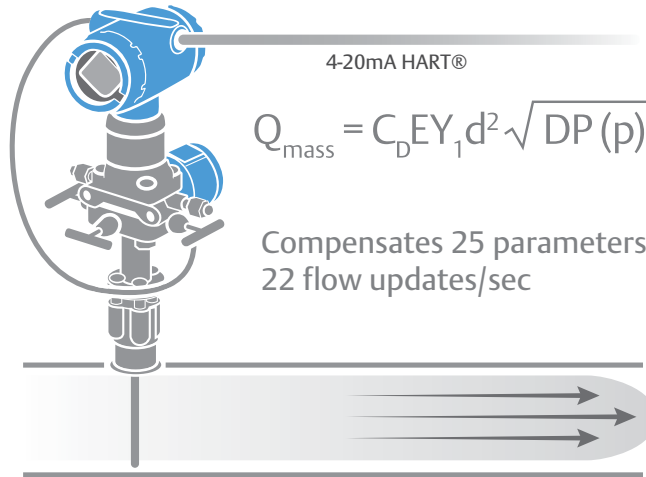
Fully compensated mass flow within the transmitter

ROSEMOUNT 3051SMV MEASURES:

Differential Pressure
Static Pressure
Process Temperature

ENTER:

Process Fluid
Primary Element
Line Size



$$Q_{\text{mass}} = C_D E Y_1 d^2 \sqrt{DP (p)}$$

Compensates 25 parameters,
22 flow updates/sec

ROSEMOUNT 3051SMV CALCULATES:

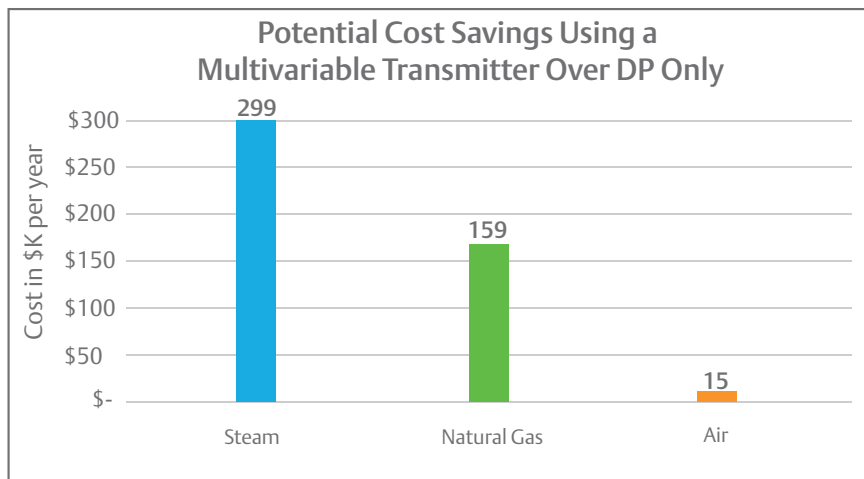
Density Gas Expansion
Velocity Discharge Coefficient
Viscosity Velocity Approach
Beta Ratio Reynolds Number

RECEIVE:

Mass Flow Differential Pressure
Energy Flow Process Temperature
Totalized Flow Volumetric Flow
Static Pressure Compressibility Factor

Reduce Measurement Uncertainty

The Rosemount 3051SMV compensates for pressure and temperature variation, greatly reducing the measurement uncertainty associated with DP only measurement.



Steam: Normal Flow, 13.4 lb/s, 8% pressure change, 5% temperature change, Cost \$10/1,000 lbs
Natural Gas: Normal Flow, 1.8 lb/s, 14% pressure change, 10% temperature change, Cost \$5/1000 ft³
Air: Normal Flow, 1.3 lb/s, 13% pressure change, 11% temperature change, Cost \$.20/1000 ft³

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