# Venturi Flow Meter with Magnehelic® Gage - Flow Correction Equations

**The stocked venturi flow meter is built with a gauge calibrated to read the correct SCFM flow rate when operating in a process at 68 DegF, 14.7 psia (standard temperature and pressure). If the flow meter is operating in a process line with different operating pressure and temperature then the operator will have to apply correction factor to the SCFM reading on the gauge to obtain the accurate ACFM measurement in the pipe. It is important to note that this conversion is not simply a SCFM to ACFM conversion. Instead the equation provided below must be used to accommodate for the new differential pressure vs flow profile at the actual operating temperature and pressure.**

Converting measured flow on a calibrated gauge to the actual flow:

$$F_{actual} = F_{calibrated}\sqrt{\frac{P_{actual}(T_{calibrated} + 460)}{P_{calibrated}(T_{actual} + 460)}}$$

Where:

$F_{actual}$: Actual ACFM flow rate in the pipe at the operating temperature a pressure.

$F_{calibrated}$: The SCFM flow rate measured directly off the gauge when operating.

$P_{calibrated}$: 14.7psia – standard pressure for which the gauges are calibr at.

$T_{calibrated}$: 68 degrees Fahrenheit – standard temperature for which ga are calibrated at.

$P_{actual}$: The actual operating pressure of the process in psia.

$T_{actual}$: The actual operating temperature of the process in deg F.

For example:

The stocked flowmeter was calibrated at 14.7 psia and 68 degrees Fahrenheit. now being deployed in a process operating under vaccum at 10" Hg and 100 deg Fahrenheit. The current reading on the gauge is shown to be 100 SCFM. To deter the actual flow rate:

$F_{calibrated}$: 100 SCFM.

$P_{calibrated}$: 14.7psia

$T_{calibrated}$: 68 degrees Fahrenheit

$P_{actual}$: 10" Hg(g) = $14.7psia - (10"Hg \times 0.491\frac{psi}{"Hg})$

=9.79 psia.

$T_{actual}$: 100 degrees Fahrenheit

$$F_{actual} = F_{calibrated}\sqrt{\frac{P_{actual}(T_{calibrated} + 460)}{P_{calibrated}(T_{actual} + 460)}}$$

$$F_{actual} = 100\sqrt{\frac{9.79(68 + 460)}{14.7(100 + 460)}}$$

$$F_{actual} = 79.2\,ACFM$$

---

To convert the ACFM values calculated above to the equivalent actual SCFM mass flow, the following equation can be used:

$$F_{scfm} = F_{acfm}\frac{P_{actual}(460 + T_{standard})}{P_{standard}(460 + T_{actual})}$$

$$F_{scfm} = 79.2 \times \frac{9.79 \times (460 + 68)}{14.7 \times (460 + 100)}$$

$$F_{scfm} = 79.2 \times 0.71\,SCFM = 49.7SCFM$$