Application Note – Working with Thermal-based Mass Flow Controller Gas Correction Factors

The gas correction factor (GCF) is used to indicate the ratio of flow rates of different gases for a given output voltage from a mass flow controller (MFC). The basis gas is nitrogen (N\textsubscript{2}) which, by convention, has GCF\textsubscript{N\textsubscript{2}} = 1.

To calculate the mass flow of a gas for a MFC that is calibrated for a different gas, take the GCF of the gas being used and divide that by the GCF of the gas that the MFC was calibrated for.

Example:

A MFC is calibrated for Argon (GCF\textsubscript{Ar} = 1.39) and the gas of interest is CO\textsubscript{2} (GCF\textsubscript{CO\textsubscript{2}} = 0.70). The resulting effective GCF would be GCF\textsubscript{CO\textsubscript{2}} / GCF\textsubscript{Ar} = 0.70 / 1.39 = 0.50.

For a set point of 100 standard cubic centimeters per minute (sccm), the MFC calibrated for Ar will actually be flowing 100 sccm x 0.5 = 50 sccm of CO\textsubscript{2}. If the gas were actually Argon, the mass flow would be 100 sccm. If the gas were N\textsubscript{2}, the gas flow would be,

\[
= 100 \text{ sccm} \times (\text{GCF}\textsubscript{N\textsubscript{2}} / \text{GCF}\textsubscript{Ar}) = 100 \text{ sccm} \times (1.0 / 1.39) = 72 \text{ sccm}
\]

Note:

1. When using the GCF, the accuracy of the flow reading may vary by +/-5%.
2. The repeatability remains within +/-0.2% FS.

Mass flow controller gas correction factors for common gases are available at

http://www.mksinst.com/docs/ur/MFCGasCorrection.aspx