AND ASSOCIATED COMPANIES

Thermo 146i – Choosing a Gas Concentration

The standard 146i calibrator consists of a 0 – 100 sccm gas flow controller and a 0 – 10 slpm zero air flow controller. To determine the value of the high concentration gas you need, we recommend using the 50% rule. First determine the range of the analyzer you want to calibrate – for example, for an SO2 analyzer, it might be 1 ppm full scale. Take 50% of that, which would be 0.5 ppm. You want the calibrator to generate that value with the gas flow controller set to 50%, which would be 50 sccm, and the zero air flow controller set to 50%, which would be 5 slpm, or 5000 sccm. The dilution ratio would be 5000/50, or 100:1. You multiply the desired concentration, 0.5 ppm, by that ratio, so 100 x 0.5 ppm = 50 ppm. That is the value of gas you need to purchase. If you are using a blended cylinder, you calculate each gas the same way.

Calculating the high gas concentration this way allows you to generate audit/calibration points of 80, 40, 20 and 10% without changing the zero air dilution flow (recommended for best linearity) and still keep the gas flow above 10% (not recommended to go below 10%). It also allows the maximum flexibility in gas generation. If you run the gas flow at 10 sccm and the zero air flow at 10 slpm, you get a 1000:1 dilution ratio. If you run the gas flow at 100 sccm and the zero air flow at 1 slpm, you get a dilution ratio of only 10:1.

If you are only calibrating a single gas analyzer at a time, and you wish to conserve the zero air used (which would be the case if you were using zero air from a cylinder) then do the same calculation but with a lower flow. For example, if you want to generate the same 0.5 ppm point using 50% gas flow of 50 sccm, but with a zero air dilution of just 1 slpm (1000 sccm), you would have a dilution ratio of 1000/50, or 20:1. The concentration of the cylinder you need to purchase would be 20 x 0.5 ppm = 10 ppm. Similarly, for 2000 zero air flow, the concentration would need to be 2000/50 (40:1) x 0.5 ppm = 20 ppm.