

An Example Calibration/Calculation of LI-COR LI-6262 co2.ec and h2o.ec:

Used at the Niwot Ridge AmeriFlux tower
 Contact: Sean Burns (sean.burns@colorado.edu)

July 2003 Coefficients: To= 40.27 + 273.15 ToH= 40.32 + 273.15
 (LI-6262, sn IRG3-368) A= 0.137854 AH= 6.1402 x 10⁻³
 (Factory Calibration) B= 1.29799 x 10⁻⁵ BH= 2.98828 x 10⁻⁶
 C= 4.95653 x 10⁻⁹ CH= -2.50046 x 10⁻¹¹
 D= -4.96846 x 10⁻¹³
 E= 3.26813 x 10⁻¹⁷ T.ec= 273.15 + (50/4096)T.ec.mV
 Po= 101.3 kPa P.ec= 59.123 + 0.0152 P.ec.mV

("Field" Calibration, Offset= CO2 zero (mV) H.offset = H2O zero (mV)
 every 4 hours) S= CO2 span coefficient, span gas= ≈400 ppm (typical)

note: Offset, H.offset, and S are derived from field calibrations every 4 hours

Water Vapor (h2o.ec) Equation (do first):

$$x = (\text{h2o.ec.mV} - \text{H.offset}) \left(\frac{P_o}{P.ec} \right)^{0.9} \quad (1)$$

$$\text{h2o.ec} = \left(\frac{T}{T_oH} \right) (AHx + BHx^2 + CHx^3) \equiv \text{mmol mol}^{-1} \quad (2)$$

Carbon Dioxide (co2.ec) Equation:

Pressure Broadening Term:

$$\Omega = 1 + \left(\frac{0.5 \cdot \text{h2o.ec}}{1000} \right) \quad (3)$$

then,

$$x = \left(\frac{P_o \cdot S}{P.ec \cdot \Omega} \right) (\text{co2.ec.mV} - \text{Offset}) \quad (4)$$

$$[CO_2]^* = \left(\Omega \frac{T.ec}{T_o} \right) (Ax + Bx^2 + Cx^3 + Dx^4 + Ex^5) \equiv \text{ppm} \quad (5)$$

Final dilution correction:

$$[CO_2]_{\text{final}} = [CO_2]^* \left(1 - \frac{\text{h2o.ec}}{1000} \right)^{-1} \quad (6)$$