**Relative Humidity – WH10/WH20/WH30 Math application**

\*How to Calculate Relative Humidity - Theory

Requirement: Two Analog Inputs, Type: RTD

AI1: To measure dry bulb temperature(Td)

AI2: To measure wet bulb temperature(Tw)

First calculate the saturation vapor pressure (E) for both the dry-bulb (Td) and wetbulb

(Tw) temperatures using the following equations:

Ew(Math1) = 0.61078\*EXP((17.269\*Tw)/(Tw+237.3))\*(Td-Tw)

Ed(Math2) = 0.61078\*EXP((17.269\*Td)/(Td+237.3))\*(Td-Tw)

In the above equations the temperatures units are Celsius and the saturation vapor

pressure units are millibars. The function "EXP" is the exponential and not raising

something to an exponent.

Then calculate actual vapor pressure (Ea) using the following equation:

Ea(Math3) = Ew-0.63\*(Td-Tw)

Relative Humidity is then calculated using the following equation:

RH = (Ea/Ed)\*100

The units of relative humidity are in percent.

Here is an example of the using the equations:

Assume that your dry-bulb temperature (Td) = 40 C and your wet-bulb temperature

(Tw) = 30 C.

Ew = 0.61078\*EXP ((17.269\*Tw)/ (Tw+237.3))\*(Td-Tw)

Ew = 0.61078\*EXP ((17.269\*30)/ (30+237.3))\*(40-30)

Ew = 42.4262 millibars

Ed = 0.61078\*EXP ((17.269\*Td)/ (Td +237.3))\*(Td-Tw)

Ed = 0.61078\*EXP ((17.269 \* 40)/ (40+237.3))\*(40-30)

Ed = 73.7416 millibars

Ea = Ew-0.63\*(Td-Tw)

Ea = 42.4262 - 0.63\*(40-30)

Ea = 36.1262 millibars

RH = (Ea/Ed)\*100

RH = (36.1262/73.7416)\*100

RH = 48.99 %