Andreas Jost

Subject: FW: humidity sensor
Attachments: Datenblatt_EE08-used-Microgate.pdf; RRFT-A-Fuehlersysteme.pdf; HMP110-Datasheet-B210852EN.PDF; BA_EE08_e.pdf; EE10_eng_tds.pdf

Calculation of Due point based on Relative Humidity and Temperature

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DewPoint

	Name	Data type	Offset	Default value	Comment
1	Input				
2	RH	Real			
3	T	Real			
4	Output				
5	Dew_Temp	Real			
6	InOut				
7	<Add new>				
8	Temp				
9	V	Real	0.0		
10	Constant				
11	a1	Real		7.5	kmol*K
12	b1	Real		237.3	K
13	a2	Real		7.6	kmol*K
14	b2	Real		240.7	K
15	To	Real		-273.15	°C
16	Return				
17	DewPoint	Void			

```
// calc due point based on RH in % and temperature in °C  based on OSCAT library example
IF (#RH > 0.0 AND #T > 0) THEN
   //#V := LOG(#RH * 0.01 * EXP10((#a * #T) / (#b + #T)));
   // EXP10  =  EXP(basis* ln(power);--> EXP((#a * #T) / (#b + #T) ln(10));
   // Log10(x) = ln(x)/ln(10)
   #V := LN_REAL(#RH * 0.01 * EXP_REAL(((#a1 * #T) / (#b1 + #T)) * LN_REAL(10))) / LN(10);
   #Dew_Temp := #b1 * #V / (#a1 - #V);

ELSIF (#RH > 0.0 AND #T < 0) THEN
      #V := LN_REAL(#RH * 0.01 * EXP_REAL(((#a2 * #T) / (#b2 + #T)) * LN_REAL(10))) / LN(10);
      #Dew_Temp := #b2 * #V / (#a2 - #V);

    //   #V := LN_REAL(#RH * 0.01 * EXP_REAL(((#a1 * #T) / (#b1 + #T)) * LN_REAL(10))) / LN(10);
      // #Dew_Temp := #b1 * #V / (#a1 - #V);
ELSE
   #Dew_Temp :=#To;
END_IF;

(*
version 1.6 13. mar. 2009
programmer  hugo
tested by      oscat
this function calculates the dew point for air given the temperature and relative humidity.
dew_temp(60,0.25) = 16.7 °C.
```

which means the dew point for air with 25° and 60% RH is at 16.7 °C.
old code was rewritten for better performance

```
   SDD := 6.1078*EXPT(10,(a*T)/(b+T));
   DD := RH/100 * SDD;
   V := LOG(DD/6.1078);
   dew_temp := b*V/(a-v);
*)
(*
```

Referenz OSCAT library
Bezeichnungen:
r = relative Luftfeuchte
T = Temperatur in °C
TK = Temperatur in Kelvin (TK = T + 273.15)
TD = Taupunkttemperatur in °C
DD = Dampfdruck in hPa
SDD = Sättigungsdampfdruck in hPa
Parameter:
a = 7.5, b = 237.3 für T >= 0
a = 7.6, b = 240.7 für T < 0 über Wasser (Taupunkt)
a = 9.5, b = 265.5 für T < 0 über Eis (Frostpunkt)
R* = 8314.3 J/(kmol*K) (universelle Gaskonstante)
mw = 18.016 kg (Molekulargewicht des Wasserdampfes)
AF = absolute Feuchte in g Wasserdampf pro m3 Luft
Formeln:

1. SDD(T) = 6.1078 * 10^((a*T)/(b+T))
2. DD(r,T) = r/100 * SDD(T)
3. r(T,TD) = 100 * SDD(TD) / SDD(T)
4. TD(r,T) = b*v/(a-v) mit v(r,T) = log10(DD(r,T)/6.1078)
5. AF(r,TK) = 10

*)

-----Original Message-----
From: Julian Ziegleder <ziegleder@mpe.mpg.de>
Sent: 21 June 2021 10:05
To: Andreas Jost <ajost@eso.org>
Subject: humidity sensor

Hallo Andreas,

Gibts eigentlich einen bevorzugten Sensor für Luftfeuchtigkeit, speziell im Cabinet? Davon wird es doch wahrscheinlich hunderte im ganzen Teleskop geben.

Gruß,
Julian

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