

SHTxx
Humidity & Temperature
Sensmitter

Application Note Dewpoint calculation

1 Introduction

From the relative humidity and temperature the dewpoint temperature can easily be calculated.

2 Revision History

November 18, 2001 C2 URO Revision 0.9 (Preliminary)

3 Theory

Definition of dewpoint:

The temperature that the air must reach for the air to hold the maximum amount of moisture it can. When the temperature cools to the dewpoint, the air becomes saturated and fog, or dew or frost can occur.

The following formula [Berry 45] calculates the dewpoint from relative humidity and temperature. All temperatures are in Celsius.

EW	$= 10^{(0.66077 + 7.5 \cdot T / (237.3 + T))}$	% this is the saturation vapor pressure over water.
EW_{RH}	$= EW \cdot RH / 100$	% multiply with relative humidity
Dp	$= ((0.66077 - \log_{10}(EW_{RH})) \cdot 237.3) / (\log_{10}(EW_{RH}) - 8.16077)$	% this is the dewpoint

Simplified:

$\log EW$	$= (0.66077 + 7.5 \cdot T / (237.3 + T) + (\log_{10}(RH) - 2)$	%
Dp	$= ((0.66077 - \log EW) \cdot 237.3) / (\log EW - 8.16077)$	% this is the dewpoint

Example: RH=10% T=25C -> EW= 23.7465 -> Dewpoint = -8.69°C
 RH=90% T=50C -> EW= 92.4753 -> Dewpoint= 47.89°C

This formula is a commonly used approximation. See Figure 1 for the deviation to the actual value between -40°C and 100°C. A more far more complex calculation is described in [Hardy 98].

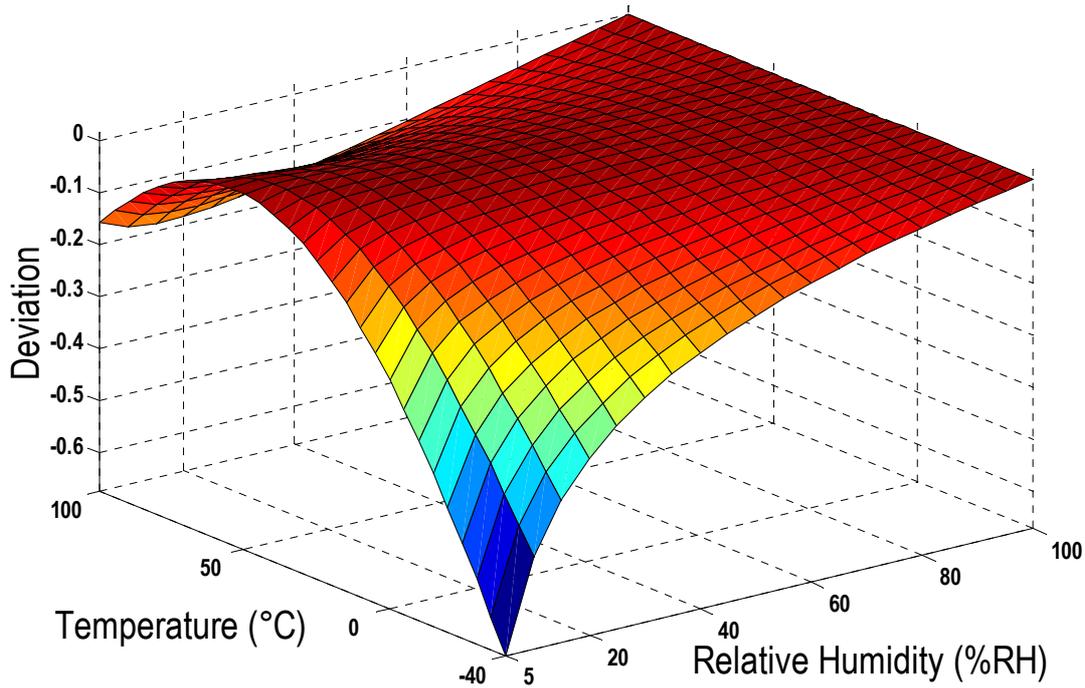


Figure 1: Deviation of simplified formula

4 References

- [Berry 45] F.A.Berry,Jr. Handbook of Meteorology, McGraw-Hill Book Company, 1945, page 343
[Hardy 98] Bob Hardy, Thunder Scientific Corporation, Albuquerque, NM, USA
The proceedings of the Third international Symposium on Humidity & Moisture, Teddington, London, England, April 1998

Headquarters and Sales Office

SENSIRION AG
Eggbühlstr. 14
P.O. Box
CH-8052 Zürich
Switzerland

Phone: + 41 (0)1 306 40 00
Fax: + 41 (0)1 306 40 30
e-mail: info@sensirion.com
<http://www.sensirion.com/>