Potential saving of energy by accurate measuring of humidity

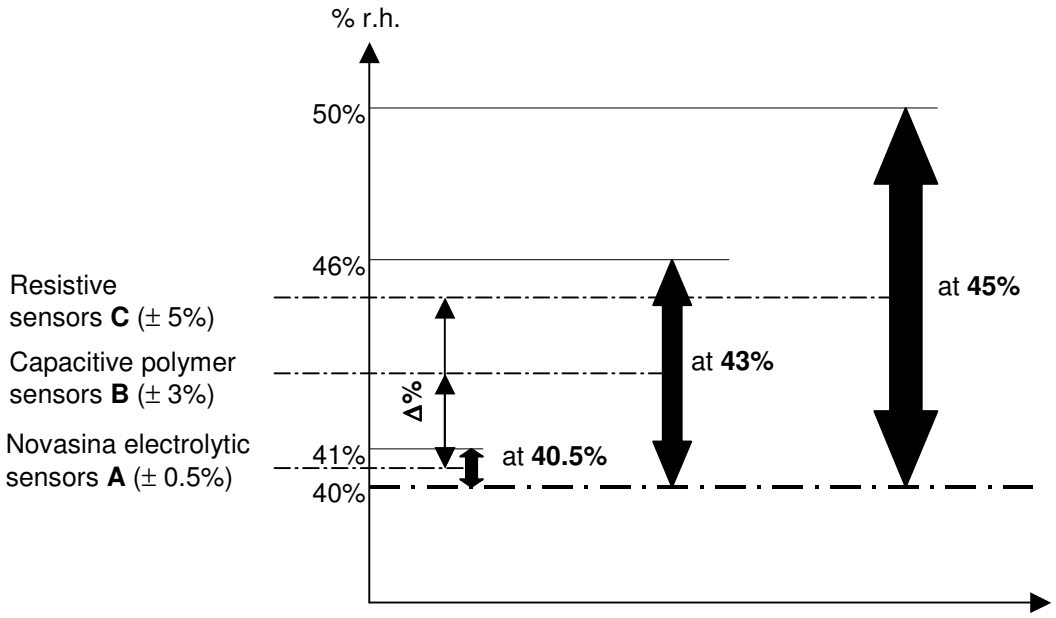
Nowadays most users measure the humidity in the buildings still with humidity sensors of a relatively low precision. “The accuracy in this application is not relevant”, is usually the argument. But most of them forget the relatively high energy consumption of the humidification process. By means of a calculation example we would point out the enormous potential saving of energy by more accurately measuring humidity. The result of this calculation shows clearly, that the pay-back time for the additional cost of a more accurate humidity measuring system will be very short, due to the energy and water savings.

Calculation example:

Humidification of an office building with a air flow of 50'000 m^3/h at room temperature of 22°C in a typical European climate.

The calculation shows the savings by using a humidity sensor with an accuracy of ±0.5% r.h. (sensor **A**, e.g. Hygrodat) compared to a sensor with an accuracy of ±3% r.h. (sensor **B**) and ±5% r.h. (sensor **C**). The humidification is adjusted on a minimal acceptable humidity level of (40% r.h.). This means, that the lowest tolerance level will be targeted. Any other possible sources of error in the control system are excluded in these calculations.

Adjustment of humidification



The resut of the annual additional cost of an accuracy deviation e.g. of **2.5% r.h**. and with an air flow of **50'000 m3/h** in a typical European climate is approx. **CHF 14'865.- (EUR 9'910.-, $ 13'209.-, £ 8'808.-)** depends on the local cost of energy and water. (calculation see overleaf)

Novasina AG, Neuheimstrasse 12, 8853 Lachen, Switzerland
Telephone +41-55-642 67 67, Fax +41-55-642 67 70, e-mail: info@novasina.ch, www.novasina.com

ECMK Process Solutions GmbH 1220 Wien, Bellegardegasse 23 Top 2 | www.ecmk.solution
Tel +43 1 260 58 27 | office@ecmk.solutions

Calculation: -> variable fields

Item	description	curr.	factor	comparison Sensor A with B	Sensor A with C
Air flow				50'000 m3/h	50'000 m3/h
Temperature				22°C	22°C
Adjustment sensor A	NOVASINA Electrolytical sensors			40.5% r.h.	40.5% r.h.
Adjustment sensor B	Capacitive polymer sensors			43% r.h.	
Adjustment sensor C	Resistive sensors				45% r.h.
Difference				**2.5% r.h.**	**4.5% r.h.**
Mixing ratio	Water content of air			0.41 g/kg	0.73 g/kg
Period of humidifying	October - April (252 h/month)		12 mos.	3024 h/year	3024 h/year
Amount of humidifying	kg of water/year			71'638 kg/year	129'015 kg/year
Energy	1kg steam requires 0.75kW to generate of			53'728 kW/year	96'761 kW/year
Water	Additional consumption of water			59.7 m3/year	107.5 m3/year
Additional costs of energy	Average price of 1 kW current =	CHF	0.27		
	Total additional costs of energy per year			14'507.-	26'126.-
	Average price of 1 kW current =	EUR	0.18		
	Total additional costs of energy per year			9'671.-	17'417.-
	Average price of 1 kW current =	USD	0.24		
	Total additional costs of energy per year			12'895.-	23'223.-
	Average price of 1 kW current =	GBP	0.16		
	Total additional costs of energy per year			8'597.-	15'482.-
Additional costs of water	Average price of 1 m^3 osmosis water =	CHF	6.00		
	Total additional costs of water per year			358.-	645.-
	Average price of 1 m^3 osmosis water =	EUR	4.00		
	Total additional costs of energy per year			239.-	430.-
	Average price of 1 m^3 osmosis water =	USD	5.26		
	Total additional costs of energy per year			314.-	566.-
	Average price of 1 m^3 osmosis water =	GBP	3.55		
	Total additional costs of energy per year			212.-	382.-
Total additional costs	Additional costs of energy and water	**CHF**		**14'865.-**	**26'771.-**
	Additional costs of energy and water	**EUR**		**9'910.-**	**17'847.-**
	Additional costs of energy and water	**USD**		**13'209.-**	**23'788.-**
	Additional costs of energy and water	**GBP**		**8'808.-**	**15'863.-**