

Monitoring of heated wire humidifier hygrometric performances with heater plate temperature

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ABSTRACT

Background

Under-humidification and associated complications may occur with heated humidifiers (HH)^{1, 2}. Hygrometric performances of heated wire humidifiers are reduced by high ambient and high outlet ventilator temperatures. We recently demonstrated that HH performances with MR850 could be evaluated at bedside by the heater plate temperature^{1, 3}.

Objectives

To demonstrate that the relation between humidity delivered by heated wire HH and heater plate temperature were found in another prospective serie of measurements and with another HH.

Methods

On a bench test, we measured heater plate temperature, inlet chamber temperature and delivered humidity with MR850 system and FP950 (Fisher & Paykel). The measurements were performed at different ambient temperatures (from 20 to 30°C), with constant minute ventilation (10 l/min). In each condition, hygrometric measurements with the psychrometric method were performed at steady state.

Results

We performed 69 measurements with the FP950 and 147 measurements with the MR850 at steady state including all conditions. We found a very good correlation between heater plate temperature and absolute humidity delivered with MR850 ($R^2 = 0.92$) (Figure) and with FP950 ($R^2 = 0.83$). Heater plate temperature above 62°C (73/147 measurements) with the MR850 was a very good predictor of absolute humidity delivered above 30 mgH₂O/L (100% of the cases when HP temperature was above 62°C) (Figure). Below 62°C, 18/74 (24%) were above 30 mgH₂O/L. With the MR850, 53% of the measured humidity were below 30 mgH₂O/L with usual settings (37/40), while with the FP950, whatever the tested conditions, even with high ambient temperature, absolute humidity delivered was above 30 mgH₂O/L. With this new generation HH, there is no need to monitor the heater plate temperature.

Conclusion

In this bench study, we have shown a very good correlation between heater plate temperature and humidity delivered with heated wire humidifiers MR850 and FP950, this latter never under-humidified whatever the tested conditions. As previously found, with MR850, heater plate temperature > 62°C was an excellent predictor of adequate humidity delivered.

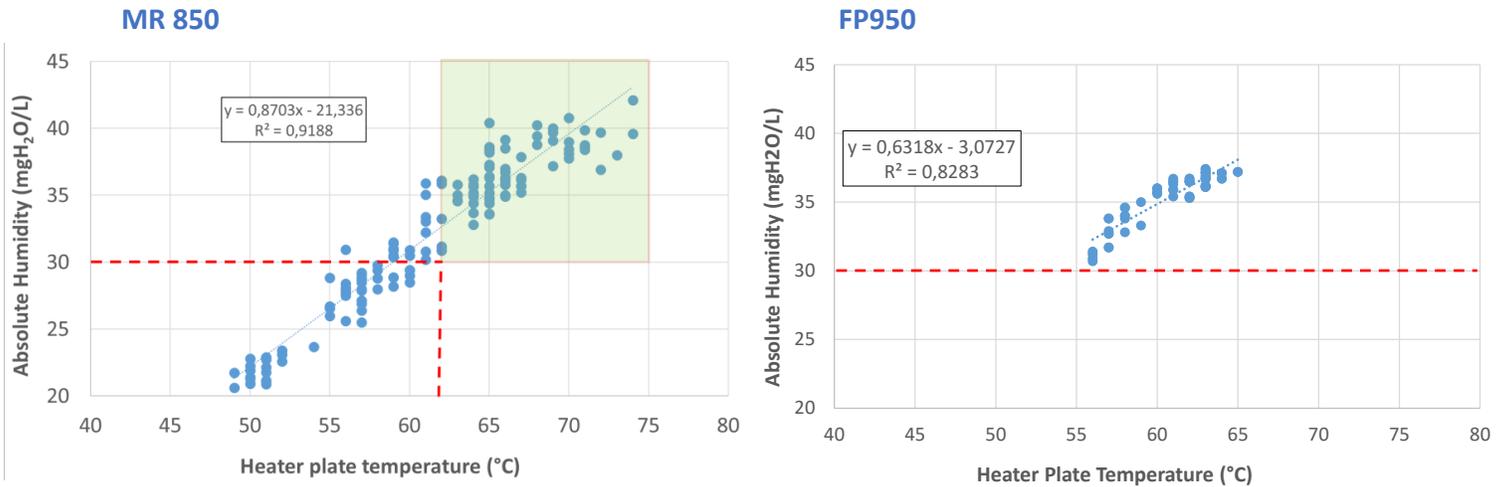


Figure. Relationship between heater plate temperature and absolute humidity delivered by the MR850 (right panel) and FP950 (left panel). When heater plate temperature was above 62°C, absolute humidity delivered was above 30 mgH₂O/L in 100% of the cases.

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