

# **Practical Aspects of Measuring Humidity in Commercial Buildings**



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# **Key Issues (For Commercial Installations)**

- **The sensor's operating principle and its "Factory Accuracy" are usually *less* important than:**
- **Site-dependent variables**
  - **Economic & health consequences of accurate measurement**
  - **Location which most needs controlled humidity**
  - **Cycling range, speed and frequency (Sensor placement)**
  - **Contaminant load**
  - **Frequency of calibration**
- **Sensor characteristics**
  - **Installed and field-calibrated cost**
  - **Cost and ease of recalibration (in-place)**
  - **Repeatability**
  - **Response time**

# Health & Economic Consequences

- Most humidity-related health consequences are caused by condensation, and require long-term exposure to at-risk population: Hospitals & Nursing Homes
- “Soft” economic consequences = No-choice occupancies: Schools, Office Buildings
- “Less-soft” consequences = Patron-choice occupancies: Restaurants, Retail Clothing
- “Hard” economic consequences = Energy cost for humidity control
  - Museums
  - Hospitals
  - Supermarkets
  - Ice arenas

# The Location That Needs Control

- **Copier room vs. patient rooms**
  - High temperature means low rh – copier room does not reflect the rh in patients' rooms
- **Ice arena wall vs. ice surface**
  - Ice needs constant dew point, wall rh varies widely with temperature
- **Supply air duct vs. inside the museum**
  - Artifacts need constant rh, but local heat loads cause rh fluctuations

# Cycling Range, Speed & Frequency

- **Incoming outdoor air vs. return air**
  - **Outdoors – 10 to 100% rh , *frequent condensation***
  - **Return air – 20 to 60% rh, no condensation**
- **Inside wall vs. near the door**
  - **Internal wall temp more stable**
  - **Door openings lead to fast changes**
- **Near humidifier or dehumidifier**
  - **Fast changes, wide range as components turn on and off**

# Contaminant Load

- **Outdoor air vs. indoor air**
  - Outdoor air carries much particulate and gaseous contamination
- **Upstream vs. downstream of filters**
- **Near pollutant source**
  - Kitchen wall pass-through
  - Above heated therapy pool

# Frequency of Calibration

- **Does the sensor report the correct humidity?**
  - Now vs. at the factory
  - Now vs. six years ago after installation
- **Can it actually be calibrated at all?**
  - Does the sensor allow adjustment?
  - Can the sensor be reached by a technician?
  - The reality of people
    - Anybody assigned to it?
    - Do they know they are assigned?
    - Do they know how to calibrate?
    - Do they actually do it? How often?

# Summary:

## Tough vs. Easy Measurements

- **Tough (Expensive to do accurately)**
  - Outdoor air
  - RH above 80% or below 20%
  - Supply air RH
  - More accurate than  $\pm 2\%$  RH
- **Easier (Less expensive to do accurately)**
  - Indoor air away from heat sources
  - RH between 40 and 60%
  - Return air
  - $\pm 5\%$  RH or wider (between 40 and 60%)
- **Out of the Question**
  - Accurate measurement without a calibrated sensor
  - Accurate measurement without regular recalibration