Working with Facilities
To Create a Fuller Picture of Your Collection Environment

By Melissa King and Christopher Cameron
PRESENTATION OUTLINE

- Overview of types of sensors, loggers, BAS
- Case Study
- Comparing two loggers
- Working with Facilities
- Questions!
Sensors VS Loggers

Thermostat Sensor

Logger
Types of Sensors

Thermostat

Humidistat

Combo
Thermostat definitions

- **Temperature**
- **Response Time**
- **Overshoot**
- **Period**
- **Dead band**
- **Set point**

**Time**
Calibration?

- When were your wall sensors last calibrated?
  - When I received my HVAC certification - 5-7 years (13 years ago)
  - When I received my CEM Certification – 3-5 Year (2 years ago)
  - According to recent Johnson Controls information 1-3 years

- Most locations do not calibrate their sensors often
  - The medical labs that I once managed had sensors that were 12 years old that were not calibrated
  - I have seen some that were over 20 years old with no calibration

- If you question a wall sensor, place a brand new data logger near the sensor for a week to verify accuracy
Sensor Placement

Sensor placement is critical

Be sure that sensors are:

- Not blocked by objects
- Not too close to a window
- In the correct zone served by the AHU
- Not near sources of heat/moisture
- Not directly above a
  - Computer
  - Copier
  - Coffeepot
What is a BMS?

Building Management System (BMS)
Energy Management System (EMS)

- The computer that controls the mechanical system
- Some can trend data, which can be used as:
  - Additional monitoring points or
  - To compare what the system thinks (sensor) to what is really happening (logger)
- Building Automated System (BAS)
  - Controls multiple aspects of a facility (security, lighting, HVAC...)

![Diagram of BMS system](image_url)
The importance of BMS data and sharing info
The mold outbreak occurred at the circle. The BMS saw trouble, the loggers did not see it.
A Note on Consensus with Facilities Staff

- They're a crucial preservation partner
- Get to know them!
- Learn how the environment is controlled
- Reviewing their data and yours creates a fuller picture of the environment
Comparing Two Loggers

Here is a checklist to review so that you can compare apples to apples.

- Are they reading from the same location?
A Note on Microclimates

- Airflow
- Heat source
- Moisture source
- Windows/perimeter walls
- Proximity to supply ducts
- Height of the space

Building sensors are not necessarily the best reflection of what objects are experiencing!
Comparing Two Loggers/Sensors

Here is a checklist to review so that you can compare apples to apples.

- Are they reading from the same location?
- What are their standard of errors?

**Standard of error**

- RH: +/- 2%
- T: +/- 0.2°C

- RH: +/- 3%
- T: +/- 0.3°C
Comparing Two Loggers/Sensors

Here is a checklist to review so that you can compare apples to apples.

- Are they reading from the same location?
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If the precise relative humidity is 50% then the sensors can read within a range and still be considered accurate!

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**Standard of error**
- RH: +/- 2%
- T: +/- 0.2°C

**48-52% RH**

**Standard of error**
- RH: +/- 3%
- T: +/- 0.3°C

**47-53% RH**
Comparing Two Loggers/Sensors

Here is a checklist to review so that you can compare apples to apples.

- Are they reading from the same location?
- What are their standard of errors?
- When were they last calibrated? And what is their annual drift?

**Standard of error**

<table>
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<th>Logger 2</th>
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**Calibration**

- Logger 1: 2/2023
- Logger 2: 11/2023

**Annual Drift**

- Logger 1: 0.25% per year
- Logger 2: 0.25% per year (guess)
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(+/- 2.25% RH)  (+/- 3% RH)
Comparing Two Loggers/Sensors

Actual RH

46% 48% 50% 52% 54%

(+/- 2.25% RH)

47.75% 52.25%

47% 53%

(+/- 3% RH)
Comparing Two Loggers/Sensors

Standard of Error for Logger A
+ Standard of Error for Logger B

Total allowable difference between logger readings

(+/- 2.25% RH)
(+/- 3% RH)

= 5.25% allowable difference
Comparing Two Loggers/Sensors

What happens if they’re not aligned?
Which logger/sensor is correct?

1. Bring in a third sensor (and go through the same process)
2. Saturated salt chamber
Saturated Salt Chamber

NaCl (table salt) has a constant at 75% RH

Bringing the Data Together

- See if you can get a “CSV” export from the BMS
- Collection-specific data visualization software often allows you to import and store this data
  - Conserv (free to use for non-Conserv sensors)
  - eClimate Notebook
BMS trending

- Some BMS systems can trend data, which can be used as:
  - Additional monitoring points
  - To compare what the system thinks (sensor) to what is really happening (logger)
- The Temp and RH points from the BMS software can be imported into data monitoring software.
Create an environmental management team

Team members with diverse backgrounds and expertise

Examples:
- Facilities
- Collections
- Administration
- Contractors
- Any staff member who is interested in participating
How to get facilities buy in

Extend an olive branch, buy doughnuts, give a tour, ask for a tour, show important items.

Mutually beneficial results.
- Improve longevity of the collection
- Facilities will use less energy
- Less conservation of collection materials

Collaborate, Collaborate, Collaborate!!!!!!!
There is strength in numbers.
When working with facilities

- Keep communication short and concise
- Set up monthly meetings, keep them brief
- Walk-through the spaces regularly together

- Preventive maintenance is important.
  - Usually the first thing cut
  - Proactive facility management can catch issues early
  - Support keeping PMs in the budget
Questions?

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