February 2024

Working with Facilities

To Create a Fuller Picture of Your Collection Environment

By Melissa King and Christopher Cameron

Connecting to Collections Care

Working With Facilities to Create a Fuller Picture of Your Collection Environment

THURSDAY, FEB 29TH, 2024
1.00 PM E.T.

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PRESENTATION OUTLINE

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

Sensors VS Loggers

Thermostat Sensor

Logger

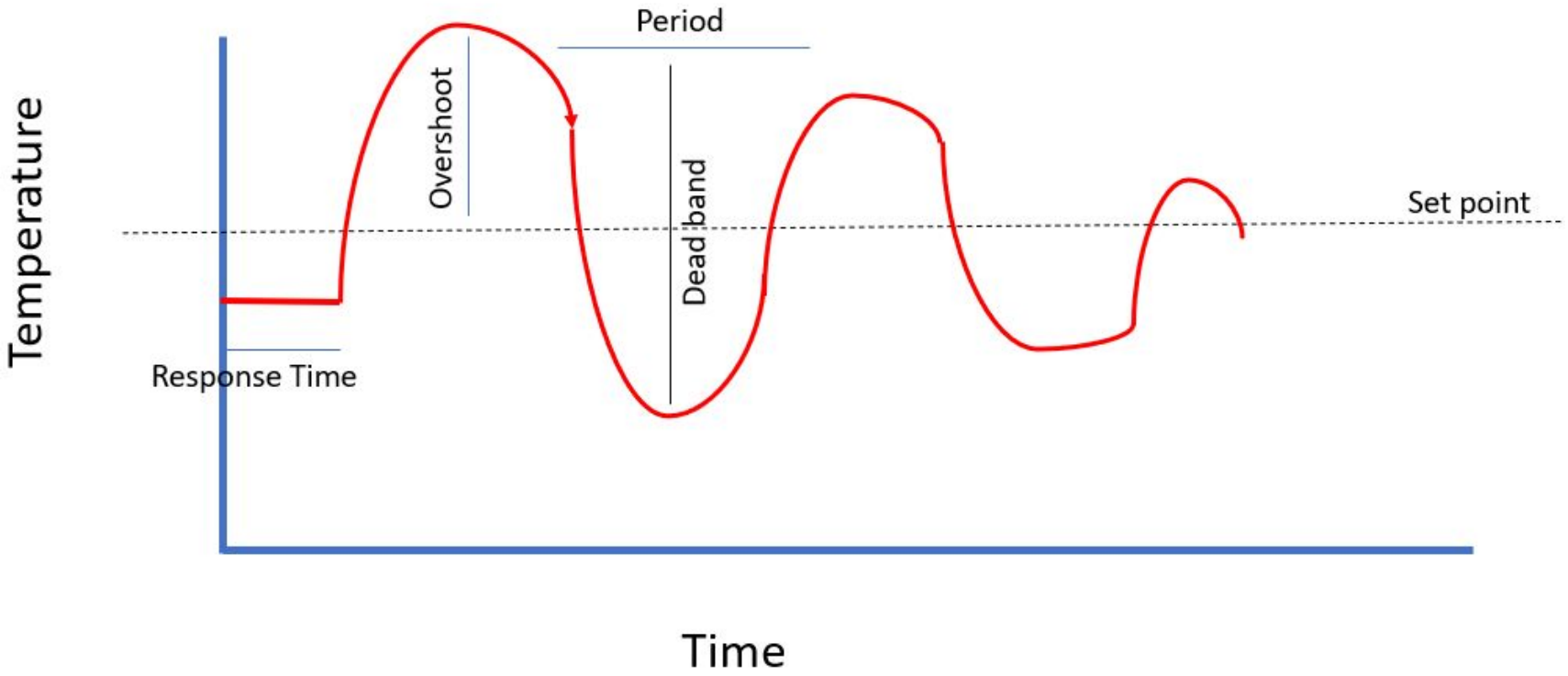
Types of Sensors

Thermostat

Humidistat

Combo

Thermostat definitions



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


Day
Automation
LP1W-11

Sensor Placement

Sensor placement is critical

Be sure that sensors are:

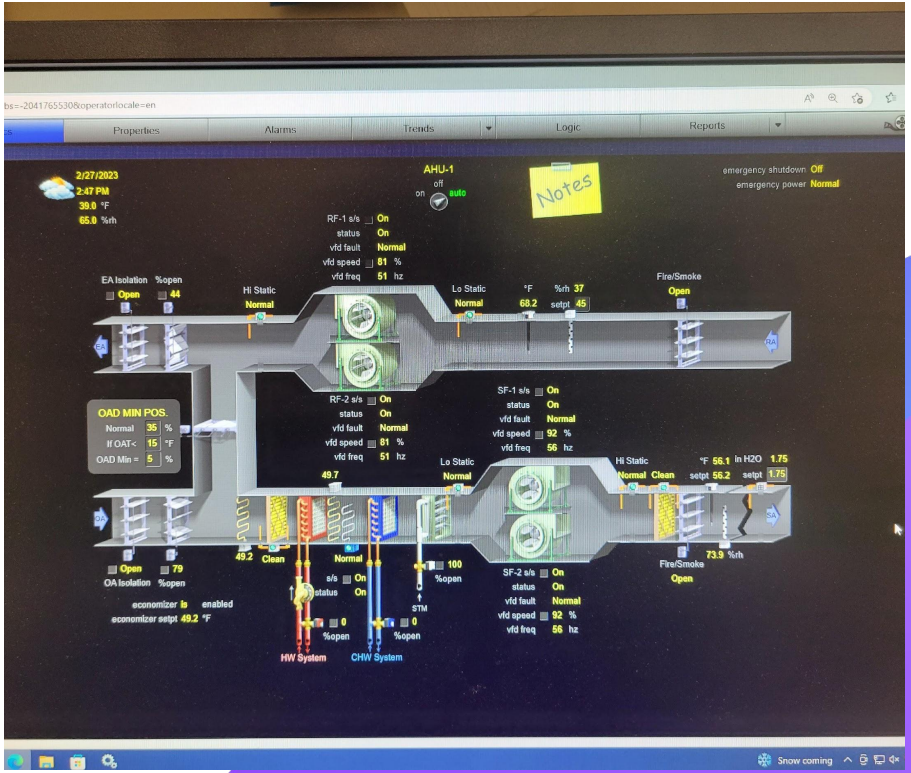
- Not blocked by objects
- Not too close to a window
- In the correct zone served by the AHU
- Not near sources of heat/moisture
- Not directly above a
  - Computer
  - Copier
  - Coffeepot

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…)



The importance of BMS data and sharing info

T Room Sensor

Data Loggers

Supply Diffuser

Return Grille

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

Photo by Sam Clarke on Unsplash

Comparing Two Loggers

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

- ❑ Are they reading from the same location?

Conserv Logger

Govee Logger

A Note on Microclimates

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

Photo by Taylor Vick on Unsplash

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

Standard of error
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?
- ❑ What are their standard of errors?

If the precise relative humidity is 50% then the sensors can read within a range and still be considered accurate!

Standard of error
RH: +/- 2%
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Standard of error
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!

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.

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

Standard of error
RH: +/- 2%
T: +/- 0.2°C
Calibration: 2/2023

Annual Drift: 0.25% per year

Standard of error
RH: +/- 3%
T: +/- 0.3°C
Calibration: 11/2023

Annual Drift: 0.25% per year (guess)

Comparing Two Loggers/Sensors

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

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

Standard of error
RH: +/- 2%
T: +/- 0.2°C
Calibration: 2/2023

Annual Drift: 0.25% per year

(+/- 2.25% RH)

Standard of error
RH: +/- 3%
T: +/- 0.3°C
Calibration: 11/2023

Annual Drift: 0.25% per year (guess)

(+/- 3% RH)

Comparing Two Loggers/Sensors

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

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

Standard of error
RH: +/- 2%
T: +/- 0.2°C
Calibration: 2/2023

Annual Drift: 0.25% per year

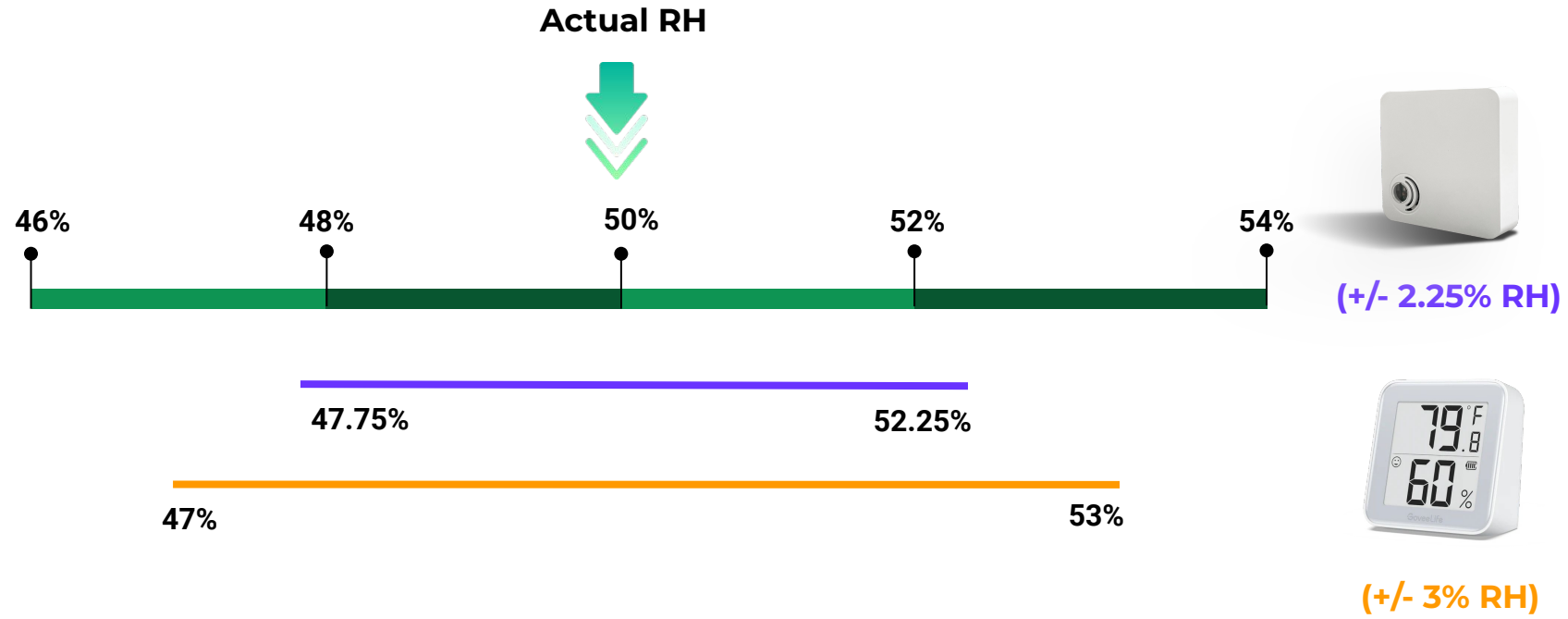
(+/- 2.25% RH)

Standard of error
RH: +/- 3%
T: +/- 0.3°C
Calibration: 11/2023

Annual Drift: 0.25% per year (guess)

(+/- 3% RH)

Comparing Two Loggers/Sensors



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)

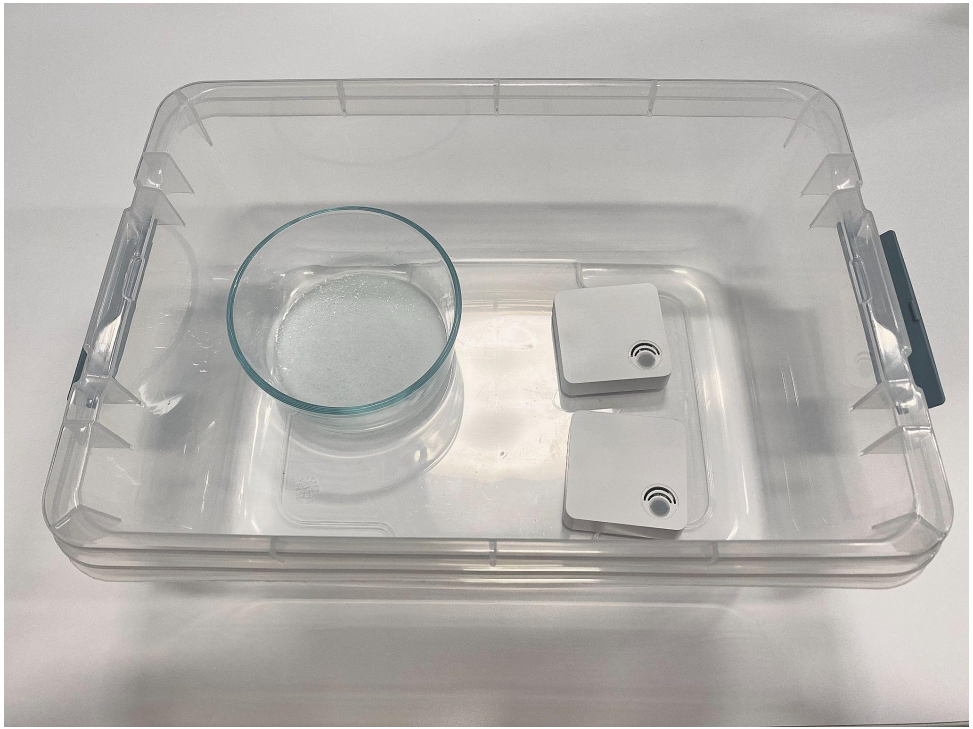
= 5.25% allowable difference

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

https://www.conservation-wiki.com/wiki/Calibration_of_Dataloggers_Using_Saturated_Salt_Solutions

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 or
  - 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.

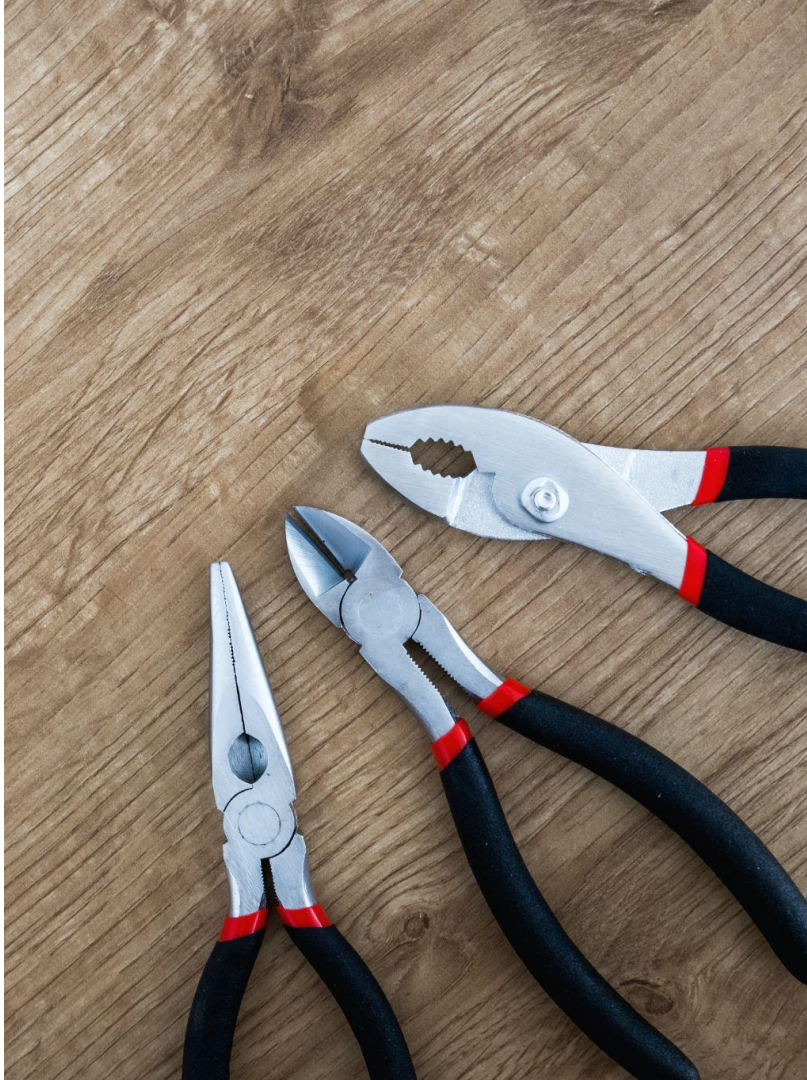
- Improve longevity of the collection
- Facilities will use less energy
- Less conservation of collection materials

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



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