Session Objectives

1. Performance Testing
2. Testing Strategies and Component Failure
3. Trending and Data Collection
4. Q&A
A quality-oriented process for achieving, verifying, & documenting that the performance of a project meets defined objectives and criteria (OPR).

ASHRAE Guideline 0-2005
“Systematic process of assuring by verification and documentation, from the design phase to a minimum of one year after construction, that all facility systems perform interactively in accordance with the design documentation and intent, and in accordance with the owner’s operational needs, including preparation of operation personnel”.
Systems To Be Commissioned
Planning BAS Performance

- Planning
- Investigate
- Recommendations
- Implementation
- Documentation
Performance testing

FOCUS ON...
• Verify BAS specifications and shop drawings match the installed systems
• Test critical components for accuracy using calibrated instruments
• Set up trends for desired expectations and verifications
Review Trends and report on items of concerns
• For example, is it necessary to see a 0.2 F change in temperature when the precision of a sensor is 2%?
• Data points may be displayed in a different colour than other points on the GUI or other symptoms such as trying to command a point and the changes do not take effect and result in an error
• Loop Tuning is not complete
• Alarm log investigation
• Operator Overide
Control loop tuning is a process which will require a period of operation and monitoring. This process should be established prior to project turnover and not during the post-occupancy period. Components requiring this functionality are as follows but not limited to: sensors (supply air temperature, supply air static pressure), heating and cooling valves and dampers. The characteristics of each of these components will respond differently due to variations such as thermal capacities, sensitivities and ranges of motion. Another method used for this application is an adaptive tuning controller. This feature will continuously adapt itself to its environment relieving the need for manual tuning. However this method still requires some manual intervention. This application requires the user to ensure that the correct input variable parameters have been selected during the setup. For example, a filter for a mixed air temperature sensor will be different than a supply air temperature sensor. Another common problem with this feature is when the PID module is re-enabled under a wide range of operating conditions. For example, the PID loop will adjust itself to maintain a space temperature by introducing outside air via a damper actuator. The outside air temperature can change dramatically especially during the shoulder season. For effected systems it is recommended to toggle the tuning reset variable to allow the algorithm to re-establish its operating parameters. With the use of historical trending data, we can analyze it and identify whether there are inefficiencies such as cycling, hunting or overshooting. Seasonal conditions will have a significant impact on the response from the BAS. This explains why it is critical that seasonal testing and a warranty period review should be included in the commissioning scope.
Commissioning
Poor Loop Tuning
Commissioning
Proper Loop Tuning
BAS Commissioning
Critical Testing and Failures
Commissioning

Critical Testing Differences

• Use of High Performance sensors and actuators
• 100 % Testing of all systems
• Redundancy testing of paralleled systems
• Running the facility with paralleled systems
• Stricter reporting on IOC Items and findings
• More Owner / Design engineers dialog
• Final Sequence Documentation
High Performance Hardware

Commissioning

VAISALA

HMT330 Series Humidity and Temperature Transmitters for Demanding Humidity Measurement

Features/Benefits
- Robust and engineered for demanding applications
- Full 0…100% RH measurement range
- ±0.5% RH accuracy over the full measurement range
- Pressure tolerance up to 105% depending on model
- 4th generation patented Humicap® sensor for superior accuracy and stability
- Graphical display and keypad
- Multi-language user interface
- Excellent performance in harsh environments
- High thermal stability
- Corrosion-resistant IP65/IP66 housing
- NIST traceable calibration (certificates included)
- Valve outputs: RS232/485, Modbus, CANopen
- MODBUS protocol support
- ENC/LF2452
- MODBUS slave readable

Overview

The HMT330 transmitter family offers reliable performance in a wide range of demanding industrial humidity measurement applications.

Repeatability and Accuracy

The HMT330 series incorporates Vaishal’s 40 years of experience in industrial humidity measurement. The updated fourth generation Humicap® sensor provides accurate and stable measurement even in environments with high humidity or chemical contaminants.

Chemical Purge Minimizes Effects of Contaminants

The chemical purging minimizes the effects of contaminants. The transmitter is equipped with a high-grade purging system to maintain accuracy and stability during calibration intervals.

The chemical purging removes humidity and maintains the sensor’s chemical properties. The function can be activated remotely or programmed to occur at set intervals.

Contact Information

VAISALA

www.vaismala.com
High Performance Hardware Commissioning
Damper or Valve Actuators
Room Sensors or Calibration
Controller Failure
Interfaces not Programmed
Bac Net Points not Mapped Correctly
Network Slow or Fails when multiple actions are required
Specifications Corrected
BAS documentation updated
System Reliability Checks
Permanent Trends Active
Alarm Log Cleared
Final Commissioning Report
Analytical Review of:

- Energy bills, (E, W, N. gas & fuel consumptions)
- Mechanical & electrical drawings & specifications
- BAS; graphics, sequence of operation & schedules
- Lighting controls & schedules
- Review Trending Results
- Similar Facility Consumptions Comparisons
Converting Data to Insight

Enterprise Dashboard Application

Reporting

Analysis

Optimization

Utility spend – roll up by meter, building, tenant, and portfolio.

“What are my energy costs and how do they compare?”
Commissioning

Redundant Systems

- Checking redundant systems types:
- Duplex systems could include double controllers or Networks
- Redundant systems could also be manual controls at the control panels level. Electronic or Pneumatic
- Duplex Network Failure Testing
- Controller Failure Testing
- In rare cases there could be duplex sensors
What is New In the BAS Industry

It is here already!!!!
Role Based Enterprise Portfolio Management

Enterprise Framework
ZigBee Alliance and ASHRAE worked together to create a wireless BAS standard.

**Standards Based**

- IEEE 802.15.4
- ZigBee® technology
- ASHRAE BACnet
Mobile Access Portals

- **Device List**
  - RTU-02: Smart Equipment RTU
  - RTU-03: York Rooftop Unit
  - RTU-07: Smart Equipment RTU
  - RTU-23: Smart Equipment Rooftop
  - RTU-29: York Rooftop Unit

- **Status**
  - **Unit Status**: Cooling
  - **Outdoor** Temperature: 93°
  - **Supply** Temperature: 62°
  - **Space** Temperature: 72°

- **Alarms**
  - Critical High Pressure Lockout
  - Occupied Cooling

- **Setpoint**
  - **Supply Setpoint**: 62.3°F
Installation Planning Discussion
Redundant Planning
Thank You