
Building Automation System BAS Sensor Calibration Verification

1.0 Maintenance Objective & Frequency

The objective of this procedure is to verify and calibrate Building Automation System (BAS) sensors including temperature, humidity, differential pressure, and CO2 sensors. Accurate sensor readings are critical for maintaining occupant comfort, optimizing HVAC energy consumption, and ensuring proper operation of control loops. This PM prevents drift-induced inefficiencies, false alarms, and equipment short-cycling.

Frequency: Annually or per OEM recommendation (typically 12 months). Additional verification recommended after any major HVAC retrofit or controller replacement.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect power to the specific BAS controller or sensor module at the local panel. Apply personal lock and tag.
- **HVAC System Isolation:** If accessing duct-mounted sensors, ensure the associated air handler or fan is locked out to prevent sudden airflow or moving parts exposure.
- **Confined Space:** If sensors are located in plenums or mechanical rooms, follow confined space entry procedures as per local regulations.
- **PPE:** Safety glasses, insulated gloves, and hard hat when working in mechanical rooms. Use a face mask if handling fiberglass duct insulation.

3.0 Required Tools, Parts & Lubricants

- Calibrated reference thermometer (NIST-traceable, $\pm 0.1^{\circ}\text{C}$ accuracy)
- Calibrated hygrometer (NIST-traceable, $\pm 2\%$ RH accuracy)
- Differential pressure manometer (0-2.5 inWC range, $\pm 0.5\%$ FS)
- CO2 calibration gas (500 ppm, 1000 ppm, 2000 ppm cylinders with regulator)
- Laptop with BAS vendor software (e.g., Siemens Desigo, Johnson Controls Metasys, Honeywell WEBs) and appropriate communication cable
- Small flathead screwdriver (for terminal blocks)
- Isopropyl alcohol wipes (for cleaning sensor elements)
- Replacement sensor (if calibration fails and sensor is non-adjustable)

4.0 Step-by-Step Maintenance Procedure

1. Log into the BAS workstation and navigate to the sensor point list. Record the current live readings for the sensor(s) under test. Note any alarm history or out-of-range values.
2. Perform LOTO on the local controller or sensor power supply. Verify zero energy state using a multimeter at the sensor terminals.

3. Physically locate the sensor. For duct-mounted sensors, remove the access cover. For room sensors, gently pry the cover off using a trim tool. Inspect for dust, corrosion, or physical damage. Clean the sensing element with an isopropyl alcohol wipe and allow to dry.
4. Reconnect power to the sensor only (not the entire HVAC system). Wait 5 minutes for the sensor to stabilize. Using the BAS software, read the current value from the sensor output.
5. Place the calibrated reference thermometer and hygrometer directly adjacent to the sensor probe (within 2 inches). For duct sensors, insert the reference probe through a nearby test port. Allow 10 minutes for thermal equilibrium.
6. Record the reference temperature and humidity readings. Compare to the BAS sensor reading. Acceptable tolerance: Temperature $\pm 0.5^{\circ}\text{C}$, Humidity $\pm 5\%$ RH. If within tolerance, proceed to pressure sensor check. If out of tolerance, proceed to calibration adjustment.
7. For differential pressure sensors: Connect the calibrated manometer in parallel with the sensor using T-fittings and silicone tubing. Apply a known static pressure using a hand pump. Record the manometer reading and the BAS sensor reading. Acceptable tolerance: $\pm 2\%$ of full scale. Adjust zero and span potentiometers on the sensor if available, or update offset in the BAS controller.
8. For CO₂ sensors: Attach the calibration gas regulator to the sensor's calibration port. Flow 1000 ppm gas at 0.5 L/min for 3 minutes. Record the BAS reading. Acceptable tolerance: ± 50 ppm. If out of tolerance, perform a two-point calibration using 500 ppm and 2000 ppm gas, adjusting the sensor's trim pots or using the BAS software calibration function.
9. If the sensor has no field-adjustable calibration (e.g., some digital MEMS sensors), and the reading is out of tolerance, replace the sensor with an OEM-approved unit. Record the new sensor serial number and update the BAS point database.
10. After calibration or replacement, remove all test equipment. Reinstall sensor covers and duct access panels. Remove LOTO and restore normal power to the controller and HVAC system.

5.0 Verification & Return to Service

1. In the BAS software, monitor the sensor reading for 15 minutes. Verify it tracks smoothly with adjacent sensors and responds to environmental changes (e.g., open a door to see temperature drift).
2. Check that the control loop (e.g., VAV damper, chiller valve) responds correctly to the sensor input. For example, if temperature rises, the cooling valve should open proportionally.
3. Clear any alarms associated with the sensor. Generate a calibration certificate from the BAS software or manually record the pre- and post-calibration values, reference instrument IDs, and technician name.
4. Sign off on the PM work order in ServiceGrid, attaching the calibration certificate and noting any replacement parts used. Update the sensor calibration due date to 12 months from today.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.