KMC Room Sensors and Thermostats

KMC Controls manufactures a variety of pneumatic, analog electronic, and digital room sensors and thermostats. Some sense only temperature, while others also add humidity and even CO₂ sensing. This document covers general principles for mounting and maintenance of room (temperature, humidity, motion, and CO₂) sensors.

KMC also sells other kinds of sensors (e.g., duct, air flow, smoke, carbon monoxide, pressure) that are not covered by this document.

For additional general information about sensors, see the following information on the KMC web site.

- Sensor and Thermostat Selection Fundamentals White Paper
- Sensor and Thermostat Selection Guide
- How Hot Do You Feel? (Humidity Effects, Sensing, and Control)
- (CO₂) Demand Control Ventilation Benefits for Your Building White Paper
Mounting Height

Traditionally, thermostats and room temperature sensors have been mounted approximately 60 inches (152 cm) from the floor. This has been considered an effective height to measure the room temperature and to allow a person to adjust a setpoint while standing.

However, for thermostats (and sensors with adjustable setpoint controls), the Americans with Disabilities Act (ADA) has rules to ensure that public lodging spaces and facilities remain accessible to the disabled. (They do not apply to private homes that rent fewer than five rooms.) To ensure that people in wheelchairs can reach and adjust the setpoint without assistance, ADA rules specify thermostat placement to be no higher than 48 inches (121 cm) above the floor (assuming no other obstructions are below it).

BEFORE running conduit and installing a thermostat, check the specific details of any applicable compliance requirements!
Handling Precautions

For **digital and electronic** sensors, thermostats, and controllers, take reasonable precautions to prevent electrostatic discharges to the devices when installing, servicing, or operating them. Discharge accumulated static electricity by touching one's hand to a securely grounded object before working with each device.

Temperature/Humidity/CO₂ Sensing

For effective sensing, the thermostat or sensor must be mounted in a location enabling it to sense the general room environment. It must **NOT** be:

- Mounted on an exterior wall. See *Reducing Temperature Sensing Errors on page 4.*
- Mounted on or near a large thermal mass (e.g., concrete block wall). See *Reducing Temperature Sensing Errors on page 4.*
- Blocked from normal air circulation by obstructions.
- Exposed to heat sources (e.g., lights, computers, copiers, or coffee makers) or to sunlight (at any time of the day).
- Exposed to drafts from windows, doorways, diffusers, or returns.
- Exposed to air flow through the conduit (e.g., from leaks in plenum ducts) or other holes into the wall cavity. See *Reducing Temperature Sensing Errors on page 4.*

The above factors primarily affect temperature sensing, but they may also affect accurate humidity and CO₂ sensing as well.
Reducing Temperature Sensing Errors

- Air movement between the conditioned space and the conduit and/or wall cavity can skew sensor readings. Apply sealant inside the conduit and other holes to block air leakage. See Mounting Components and Height on page 2.
- Mounting on an exterior wall will allow varying outside conditions to affect the sensor’s readings. Mounting on or near a large interior thermal mass (e.g., concrete block wall) can slow the sensor’s response to room air temperature changes. These mounting areas should be avoided, but a foam gasket (e.g., HPO-1161 or HPO-9002) mounted behind the backplate may help insulate the sensor from a less-than-optimal wall surface. See (HPO-9002) Foam Gasket on (AppStat) Backplate on page 4, Mounting Components and Height on page 2, and the accessories available for the applicable product.

NOTE: A foam gasket may also help block air leakage from the wall cavity.

(HPO-9002) Foam Gasket on (AppStat) Backplate

- After the sensor has been operating for at least 30 minutes, calibrate the controller input or thermostat for maximum accuracy within its environment. See the relevant product calibration procedure to provide the optimal offset.
Motion Sensing

For motion sensing models, mount the sensor on a wall that will have an unobstructed view of the typical traffic in the coverage area. When choosing a location, the sensor must **NOT** be:

- Behind curtains or other obstructions.
- In locations exposed to direct sunlight or heat sources.
- Near a heating or cooling inlet or outlet.

**Typical Motion Sensing Coverage**

Situations that would need additional remote motion sensors (third party, purchased separately) to be connected to the controller include:

- Areas with obstructions that block sensor coverage.
- Areas too large for adequate coverage by the sensor/thermostat’s single built-in sensor.

**NOTE:** Using remote sensors requires custom programming in controllers. For more information about using integrated and remote motion sensors in a FlexStat, see the [FlexStat Application Guide](#).

For KMC motion sensors, the effective detection range is approximately 33 feet (10 meters). Factors that may reduce the range may include the following items.

- The difference between the surface temperature of the object and the background temperature of the room is too small.
- Object movement in a direct line toward the sensor.
- Very slow or very fast object movement.
- Obstructions in the sensing area (see **Typical Motion Sensor Pattern on page 6**).

False detections may be triggered by any of the following conditions.

- The temperature inside the detection range suddenly changes because of the entry of cold or warm air from an air-conditioning or heating unit.
- The sensor being directly exposed to sunlight, an incandescent light, or other source of far-infrared rays.
- Small animal movement.
Troubleshooting (Location)

Inaccurate sensing may be caused by one of a variety of electrical or configuration issues. See the installation and/or application guide of the sensor for those factors.

To correct or compensate for sensing problems caused by mounting issues:

• Reposition the sensor or the surrounding obstructions.
• Insulate the sensor from air leakage and heating/cooling sources. See Mounting Components and Height on page 2 and Reducing Temperature Sensing Errors on page 4.
• Adjust the sensor calibration to offset the environmental issues.
Maintenance

For **temperature and humidity** sensing, remove dust as necessary from the ventilation holes in the top and bottom of the case.

For the **case or display**, clean with a soft, damp cloth (and mild soap if necessary).

To maintain maximum sensitivity of the built-in **motion sensor**, occasionally wipe dust or dirt off the lens—but do not use any fluid on the sensor.

**CO₂ sensors** designed for **continuous occupation** applications, such as in the BAC-14xxxx FlexStats, require periodic calibration with gas to maintain long-term accuracy. See the CO₂ calibration section in the **FlexStat Application Guide** for more information.

**NOTE:** BAC-13xxxx FlexStats and most other KMC CO₂ sensors are designed to operate in areas where CO₂ levels **periodically fall to outside levels during unoccupied periods**. Such models self-calibrate over time, and calibrating them with gas may not be necessary or even feasible.
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Support

Additional resources for product specifications, installation, configuration, application, operation, programming, upgrading and much more are available on the KMC Controls web site (www.kmccontrols.com). To see all available files, log-in to the KMC Partners site.