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### 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, motion, and/or CO<sub>2</sub> sensing. **This document covers general principles for mounting and maintenance of room (temperature, humidity, motion, and CO<sub>2</sub>) 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](#)

## 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.

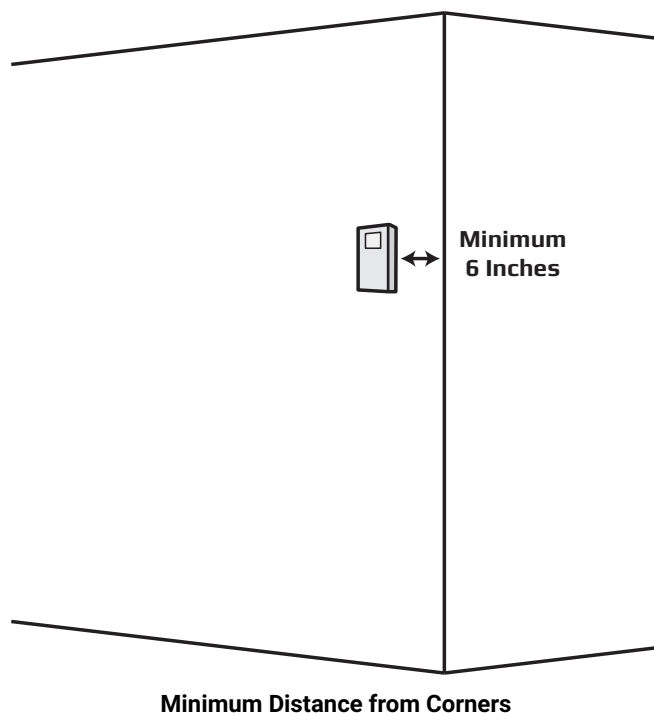


## Mounting for Optimal Temperature Sensing

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

- Blocked from normal air circulation by obstructions (e.g., behind curtains or cubicle walls).
- Exposed to artificial 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 6](#).
- Mounted on an exterior wall. See [Reducing Temperature Sensing Errors on page 6](#).
- Mounted on or near a large thermal mass (e.g., a concrete block wall). See [Reducing Temperature Sensing Errors on page 6](#).
- Mounted in or near a corner. See [Minimum Distance from Corners on page 2](#).

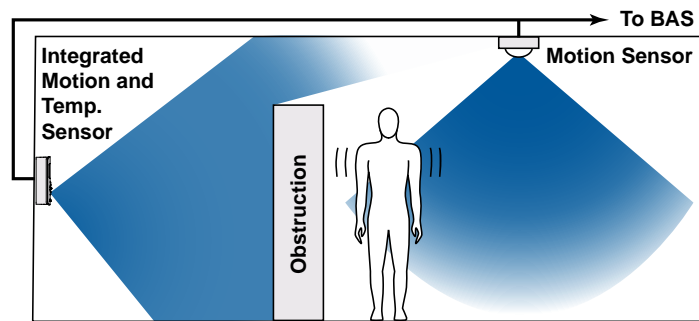
**NOTE:** The above factors primarily affect temperature sensing, but some also affect accurate **humidity and CO<sub>2</sub>** sensing as well.



## Mounting for Optimal 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**. Some of the issues that affect temperature sensors also affect motion sensors. See [Mounting for Optimal Temperature Sensing on page 2](#). When choosing a location, the motion 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.

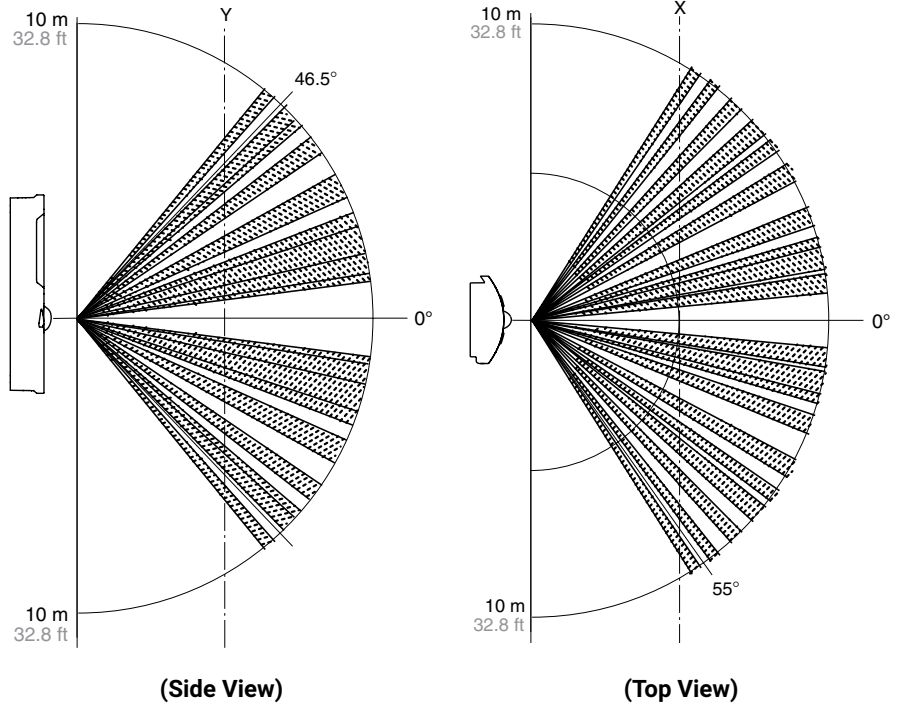
**NOTE:** Using remote sensors requires custom programming in most controllers. For information about using integrated and selectable remote motion sensors in a FlexStat, see the [FlexStat Application Guide](#).

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.

- Too small of difference between the surface temperature of the object and the background temperature of the room.
- Object movement in a direct line toward the sensor.
- Very slow or very fast object movement.
- Obstructions in the (horizontal or vertical) sensing area. See [Typical Motion Sensor Pattern on page 4](#).

**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 infrared rays.
- Small animal movement.



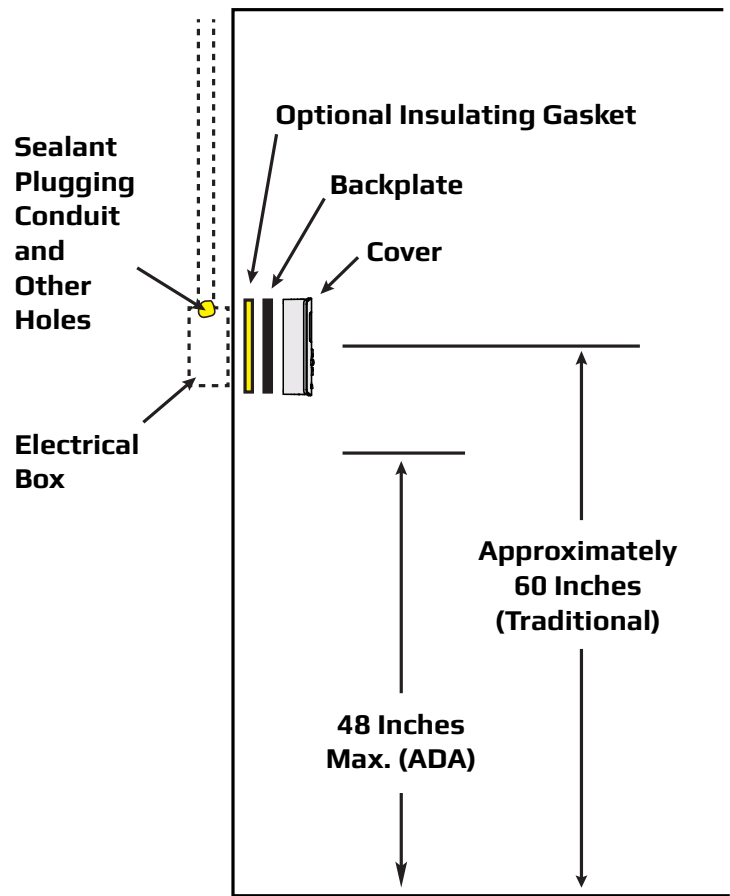
**Typical Motion Sensor Pattern**

## 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!**



Mounting Components and Height

## Troubleshooting (Location)

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

- Reposition the sensor or the surrounding obstructions. See [Mounting for Optimal Temperature Sensing on page 2](#) and [Mounting for Optimal Motion Sensing on page 3](#).
- Insulate the sensor from air leakage and heating/cooling sources. See [Reducing Temperature Sensing Errors on page 6](#) and [Mounting Components and Height on page 5](#).
- Adjust the sensor calibration to offset the environmental issues. See the instructions for the sensor and/or configuration software.

Inaccurate sensing may also 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.

## 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 5](#).
- 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 a \(NetSensor\) Backplate on page 6](#), [Mounting Components and Height on page 5](#), 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 a (NetSensor) Backplate

**NOTE:** The notch in the HPO-9002 gasket should match the location of the notch in the STE-9000 series NetSensor case. (AppStats, on the other hand, do not have a notch in the case.)

- After reducing environmental issues as much as possible, **calibrate** the sensor (controller or thermostat input) for maximum accuracy within its environment. See the relevant product calibration procedure to provide the optimal offset. (Wait until the sensor has been operating for at least half an hour before calibrating it.)

## Maintenance

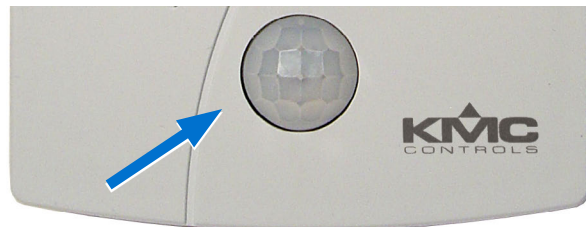
To maintain accurate **temperature and humidity** sensing, remove dust as necessary from the ventilation holes in the top and bottom of the case.

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



**Clean Case Holes and Surface**

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.



**Clean Motion Sensor**

**CO<sub>2</sub> 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 CO<sub>2</sub> calibration section in the [FlexStat Application Guide](#) for more information.

**NOTE:** BAC-13xxxx FlexStats and most other KMC CO<sub>2</sub> sensors are designed to operate in areas where CO<sub>2</sub> 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](http://www.kmccontrols.com)). To see all available files, log-in to the KMC Partners site.

