

Residential Thermostats: A Quick Guide for Contractors

Home performance contractors encounter a variety of thermostats in homes, and need to understand when, why, and how to replace or upgrade them.

THERMOSTAT TYPES

Single operation

These simple thermostats turn single-stage heating or cooling equipment on or off, based on the indoor setpoint temperature, and the temperature of the room in which the temperature sensor is located. The oldest and most common type uses a mercury thermometer. In California, it is illegal to sell, install, or dispose of mercury thermostats as solid waste. For more info on state laws visit: <http://www.thermostat-recycle.org/statelaws>

A few manufacturers (including Honeywell, White-Rodgers, and Cadet) make single operation, non-programmable thermostats. However, California law requires that permitted heating or cooling equipment installations use programmable thermostats. Therefore, non-programmable thermostats can only be installed in maintenance situations that do not require a permit, such as replacing a mercury thermostat.

Programmable

Also called setback thermostats, these digital devices are intended to save energy by allowing users to schedule times of the day and week that space conditioning is automatically reduced because occupants are away or sleeping. However, the federal ENERGY STAR program discontinued its programmable thermostat labelling program after field studies consistently reported that energy savings did not actually accrue from these devices because the user interfaces are too difficult for people to navigate intuitively.

WiFi

WiFi internet-connected thermostats enable the use of multiple temperature sensors (in different rooms) and remote access via a mobile device. Their interfaces tend to be more user-friendly than standard programmable thermostats, and also provide more information and options, such as weather forecasts and maintenance alerts. They should also be able to respond to demand response signals from the local utility.

Current leading manufacturers of wireless thermostats include Ecobee, Nest, and Honeywell. Some are called “smart” because they “learn” to adjust their settings based on outdoor temperature and occupancy schedules. The trend

is for wireless thermostats to offer increasing interactivity with other wireless home applications, such as lighting and security systems.

INSTALLATION AND OPERATION

Thermostats and temperature sensors should be installed on an interior wall, away from obvious sources of heat or drafts. Caulk or otherwise seal the hole behind the thermostat through which the thermostat wiring runs, so the thermostat senses temperature in the room, and is not affected by conditions inside the wall or other spaces.

Thermostats do not control the speed at which a furnace, air conditioner, or heat pump operates. Residents should understand that adjusting the thermostat to an extreme temperature does not make the equipment heat or cool the home faster.

In homes with zoned space conditioning systems, each zone requires its own thermostat.

CALIFORNIA CODE REQUIREMENTS

With few exceptions, California requires setback thermostats for “(a)ll unitary heating or cooling systems, including heat pumps, not controlled by a central energy management control system (EMCS).” Thermostats must be able to schedule at least four temperature periods within 24 hours.

Any of the same HVAC alterations that trigger duct sealing will also trigger the requirement to upgrade existing thermostats to setback thermostats.

In addition to the above requirements, the 2013 Joint Appendix JA5 provides technical specifications for “Occupant Controlled Smart Thermostats,” or OCSTs, which may be required in some special situations. For details, see: 2013 Building Energy Efficiency Standards §110.2(b) for heat pumps, §110.2(c), and the 2013 Joint Appendix 5 (JA5) – *Technical Specifications for Occupant Controlled Smart Thermostats*.

FOR MORE INFORMATION

For more information about energy efficiency incentives available through SMUD, visit: <http://hpp.smud.org/> or email Jim Mills at: james.mills@smud.org

For more information about zoning HVAC system: <http://www.energyvanguard.com/>
<http://www.energy.ca.gov>