

Homeowner Information on Thermostats

In our modern reality of smart phones and wireless connectivity, we don't think too much about some of the more "low-tech" electronic gadgets in our homes. A great example is the home thermostat, a staple of the American household that tirelessly controls the comfort of millions of families from the coldest winter morning to the hottest summer afternoon.

Tips and Tricks

We all know what a thermostat is, so let's take some time to talk about how they work and some of the strategies and misconceptions associated with their functionality.

You can easily save a significant amount of energy and money in the winter by setting the thermostat just a few degrees lower. Many choose to keep their thermostat at 70 or 75 degrees, but did you know that the human body actually reacts best to sleeping at a cooler temperature? 65 degrees is the sweet spot, not only for your body, but also the earth and your wallet. In the summer, you can follow the same strategy with central air conditioning by keeping your house warmer than normal when you're away, then lowering the thermostat setting to 78 degrees when you're in the house and want to stay cool. At night, you may still want to keep it at 65.

A common misconception about thermostats is that a furnace will work harder than normal to bring an area back to a comfortable temperature if a thermostat is set lower, resulting in reduced savings. In reality, the fuel required to reheat an area to your comfort is roughly equal to the fuel saved as the temperature drops to that lower setting. You'll actually save some money between the time the temperature stabilizes and the next time heat is needed. The longer your house remains at the lower temperature, the more energy you save.

Another misconception is that the higher you raise a thermostat, the more heat the furnace will put out, or that the house will warm up faster if the thermostat is initially raised above your preferred setting. Furnaces actually put out the

same amount of heat no matter how high the thermostat is set. In the winter, significant savings can be achieved by reducing your thermostat's temperature for as little as a few hours per day. Or, if the thermostat is turned back 10 to 15 degrees for 8 hours, it can save around 5 to 15% per year on a heating bill. If it is done every night, you'll see savings of as much as 1% (depending on the severity of the weather outside) for each degree you scale back.

The Benefits of Automatic Temperature Adjustment

You may notice that there's a certain amount of inconvenience associated with constant thermostat adjustment. Utilizing an automatic setback or programmable thermostat is a great way to maximize your energy savings without sacrificing comfort. While you might forget to turn down the heat before you leave for work in the morning, a programmable thermostat won't. In fact, programmable thermostats can pay for themselves in reduced energy costs within just four years.

The newest generation of residential thermostat technology may be a bit different than the one you grew up with as they're based on microprocessors and thermistor sensors. Most will perform one or more of the following energy control functions:

- Storing and repeating multiple daily settings which can be manually overrode without affecting the rest of the daily or weekly program
- Storage of six or more temperature settings per day
- Automatic heating or air conditioning adjustment based on outside temperature change
- Liquid crystal or LED displays
- Back-up battery packs that eliminate the need to reprogram if there is a power failure

As you can see, new programmable thermostats can be automated to efficiently and unobtrusively accommodate a wide variety of lifestyles.



Types of Automatic and Programmable Thermostats

There are five basic types of automatic and programmable thermostats, most of which range in price from \$30 to \$100, with a couple of exceptions:

- Electromechanical (EM) thermostats are usually the easiest devices to operate. They will typically have manual controls such as movable tabs to set a rotary timer and sliding levers for night and day temperature settings. These work with most conventional heating and cooling systems, except for heat pumps. EM controls have limited flexibility and can usually only store a single setting per day. These are best suited for people with regular schedules.
- Digital thermostats are identified by their LED or LCD digital readouts. They offer the widest range of features and flexibility and can be used with most heating and cooling systems. These provide precise temperature control and permit custom scheduling. Remember, you won't save energy if you don't set the controls or if they are set incorrectly, so make sure to get to know the functionality of your digital thermostat.
- Hybrid systems combine the technology of digital thermostats with manual slides and knobs to simplify use and maintain flexibility. Hybrid models are available for most systems, including heat pumps.
- Occupancy thermostats maintain the setback temperature until a button is pressed for additional heating or cooling. They do not rely on the time of day. The ensuing preset "comfort period" will last from 30 minutes to 12 hours, depending on how you choose to set it. Then, the temperature returns to the setback level. These units offer the ultimate in simplicity, but lack flexibility. Occupancy thermostats are best suited for spaces that

remain unoccupied for significant periods of time, such as an office building.

- Light sensing heat thermostats rely on the lighting level preset by the owner to activate heating systems. When lighting is reduced, a photocell inside the thermostat senses unoccupied conditions and allows space temperatures to fall 10 degrees below the occupied temperature setting. When lighting levels increase to normal, temperatures automatically adjust to regular "comfort" conditions. These units do not require batteries or programming and will reset themselves after power failures. Light sensing thermostats are designed primarily for stores and offices where occupancy determines lighting, and therefore heating requirements.

Choosing a Programmable Thermostat

You should learn as much as you can before selecting a programmable thermostat. When shopping for a new unit, bring information with you about your current unit, including the brand and model number.

Here are some great questions to ask before buying a thermostat:

1. Does the unit's clock draw its power from the heating systems' electrical control circuit rather than a battery? If so, is the clock disrupted when the furnace cycles on and off? (Battery-operated back-up thermostats are preferred by many homeowners.)
2. Is the thermostat compatible with the electrical wiring found in your current unit?
3. Is installation a simple matter, or should you hire an electrician or heating, ventilation, and air conditioning (HVAC) contractor?
4. How precise is the thermostat?
5. Are the programming instructions easily accessible and easy to understand? (Some thermostats have the instructions printed right on them while others have a separate instruction booklet.)

Most automatic and programmable thermostats completely replace existing units, making them preferable to many homeowners. However, some devices can be placed over existing thermostats and are mechanically controlled to

permit automatic setbacks. These units are usually powered by batteries, which eliminate the need for electrical wiring. They tend to be easy to program, and because they run on batteries, their clocks are not affected by power outages.

Before you buy a programmable thermostat, chart your weekly habits including wake up and departure times, return times, and bedtimes, with the temperatures you or your family find most comfortable. This will help you decide what type of thermostat will best serve your needs.

Other Considerations

The location of your thermostat can affect its performance and efficiency. Read the manufacturer's installation instructions to prevent "ghost readings" or unnecessary furnace or air conditioner cycling. Place thermostats away from direct sunlight, drafts, doorways, skylights and windows. Also, make sure your thermostat is located for convenient programming.

Some modern heating and cooling systems require special controls. Heat pumps are the most common and usually require special setback thermostats. These thermostats will typically use special algorithms to minimize the use of backup electric resistance heat systems.

Electric resistance systems, such as electric baseboard heating, also require thermostats capable of directly controlling 120 volt or 240 volt line-voltage circuits. Only a few companies manufacture line voltage setback thermostats.

A Simpler Way to Control Your Environment

The best thermostat for you will depend on your lifestyle and comfort level in varying temperatures. While automatic and programmable thermostats save energy, a manual unit can be equally effective if you diligently regulate its setting and don't mind a chilly house on winter mornings. If you decide to choose an automatic thermostat, you can set it to raise the temperature before you wake up which may spare you some discomfort. It will also perform consistently and dependably to keep your house at comfortable temperatures during the summer heat.