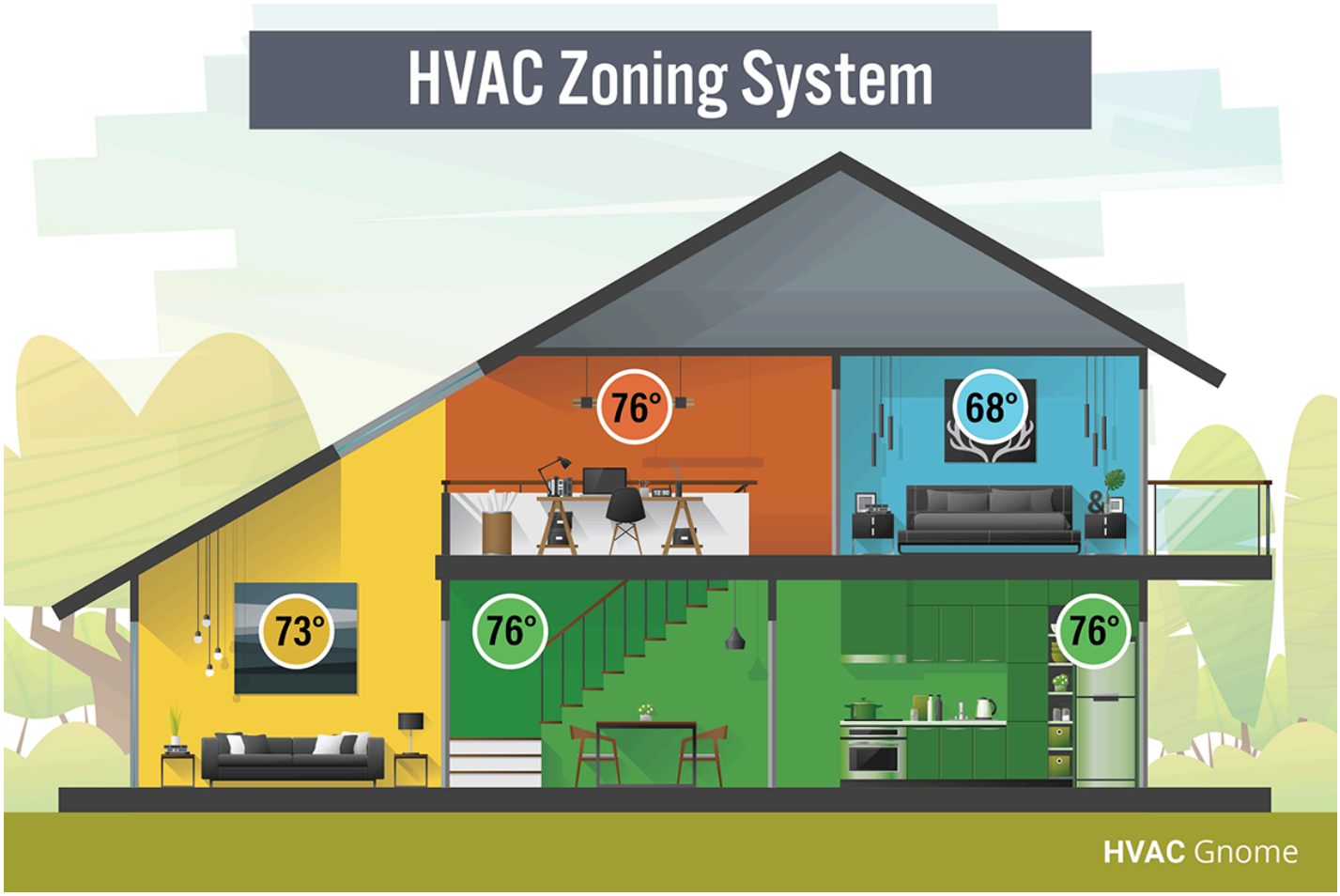
HVAC Gnome

What Is an HVAC Zoning System?

by Jeffery Keusseyan | Published: December 8, 2023

HVAC



How often do you and your loved ones fight over the TV remote? The exact same arguments can occur from having one thermostat to control the entire home's temperature. Though you can't have two or three remotes simultaneously controlling the TV, you can have multiple thermostats controlling the temperature in different parts of the house. This is what's called a zoned system, but what *is* an HVAC Zoning System?

An HVAC zoning system is a supplemental system that improves your central HVAC unit's efficiency and performance. It allows you to divide your home into two or three zones, install a thermostat in each one, and adjust the temperature accordingly.

We'll go through the main components of zoned HVAC systems, detailed steps of how they work, their benefits, and when you should consider installing one.

In this article:

What Is an HVAC Zoning System?

An HVAC zoning system allows you to create customized temperature zones throughout your home. Each zone, which can contain one or more rooms, is controlled by its own thermostat.

This heating and cooling system is made up of a series of dampers located within the ductwork. The dampers can open or close to control the flow of hot or cool air.

The best way to highlight its main role is with some basic examples. If you're an early riser, an HVAC zoning system can let you heat up those chilly mornings in the downstairs zone while the upstairs zone remains cool for sleeping household members. Or, when

everyone is spending their day downstairs, you can save energy by only heating or cooling the downstairs zone–– no need to waste energy on the empty upstairs zone.

The number of zones your home needs is best determined by HVAC pros upon inspection. They could recommend one thermostat for each floor, or split your home into different sections with its own thermostat (zone). Four zones are ideal for a typical two-story home with two bedrooms.

Overall, a zoning system gives you more control over your comfort, helps reduce energy use, and increases the efficiency of the central HVAC unit.

Main Components of an HVAC Zoning System

Though you have control over each thermostat, you're not the one who's really in charge of the central unit's operations. Excluding the central HVAC unit, let's take a closer look at the main components controlling the HVAC zoning system.

Thermostat

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This is just your typical thermostat, required for any heating or cooling system. Only this time, there's more than one installed. When establishing this system in your home, the thermostats will not be directly connected to the central HVAC unit. Instead, they'll report straight to the central zoning panel.

Zoning Control Panel

This is the key component that's really in charge of the zoning system. One might consider it the brains of the entire operation. The zoning control panel is an electronic board that reads all of the thermostats' signals and decides whether a particular zone

needs cooling or heating. In other words, it receives temperature data and instructs dampers to open or close, depending on their particular zone.

Dampers

Dampers are not to be confused with vents installed in the walls or floors of your home. They are movable plates located near the opening of the air distribution box (aka plenum), controlling the amount of air distributed throughout your home. Dampers come in various shapes and sizes, mainly depending on the ductwork system.

Dampers can be controlled in two ways:

- **Manual**: These dampers need to be adjusted using the valves outside the ducts. You'll need to manually move valves up or down to open or close the dampers.
- **Automatic**: They use a motor to open or close the valves and plates. Automatic dampers are able to self-regulate when the temperature changes. They can also be controlled remotely, which makes them more convenient than the manual ones.

Zone Sensors

Zone sensors monitor the temperature and humidity levels in each zone. Essentially, they can detect if a room is too hot or too cold, thus sending a signal to the control panel to adjust airflow.

How HVAC Zoning Works

Now that you've learned about the main components, we can move on to the steps of how an HVAC zoning system works.

Step 1: Zone Identification

Before getting to the main components' activation, you'll need to identify different zones within your home. They could reach up to four, depending on your home's size. Zone identification is very important to facilitate the zoning control panel's operation.

Step 2: Thermostat Switches On

Each zone is equipped with one thermostat, which will continually monitor the temperature. Once it deviates from your desired setpoint, the thermostat in that particular zone will send a signal to the control panel.

Step 3: Control Panel Is Activated

The zoning control panel receives input (signal) from one or more thermostat. It will process the received information to determine the best action. If a thermostat is calling for heat, the control panel will keep the zone's damper open and close ones not calling for heat. Following this, it will activate the furnace or heat pump and supply air to that calling zone.

Step 4: Dampers Will Adjust

The zoning control panel signals the dampers in a relevant zone to open if it needs conditioning, or close if it's already at a desired temperature. This is why automatic dampers are highly practical, as you won't have to adjust them yourself.

Step 5: Airflow Control

Airflow control prevents any stain or unnecessary pressure on the central HVAC unit. Ideally, your zoning system would have bypass dampers to allow excess air to leave closed ducts.

When to Install a Zoning System

HVAC zoning systems are not an absolute household necessity, so don't be surprised to find many homes without one. However, there are occasions in which a zoning system is highly recommended, especially to provide more efficient heating and cooling.

Multi-Level Home

If you paid attention in science class, then you'll know that heat rises. In a 2- or 3-story home, it can often feel hotter upstairs than downstairs. A zoned HVAC system will be a great addition to such a home that experiences temperature fluctuations. It will allow you to set different temperatures for each level, and keep every family member comfortable in their respective rooms.

Home With High Ceilings

Similar to multi-level homes, heat rises and can even escape through the attic, especially when it's not insulated. You'll be left shivering at the ground level. A zoned heating and cooling system can frequently raise temperatures to a desired and comfortable level. It would be smart to create a separate zone for rooms with high ceilings to keep heat from rising and getting trapped.

Large Glass Windows

Sunlight can play a huge role in determining your room temperature. Picture or bay windows allow an increased amount of sunlight to enter your home and raise room temperatures. To keep this from happening, you can make rooms with several large windows their own zone. The central unit will adjust that zone's temperature without affecting your entire house.

Empty Rooms

Unoccupied rooms, which can be for guests or storage, do not require regular heating or cooling like other areas of your home. With an HVAC zoning system, you can control temperatures in those rooms only when being used, or when guests actually arrive. You'll be able to keep them comfy throughout their entire stay.

Temperature Fluctuations

Even if none of the above cases apply to your home, it may still experience temperature fluctuations or imbalances. This could be a sign of an aging HVAC unit. But if it's not, then controlling the entire home's temperature with one thermostat doesn't seem to be working.

A zoned HVAC unit can fix this problem, and maintain consistent temperatures throughout the home.

Benefits of an HVAC Zoning System

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If you decide on setting up zones to take control of your home's heating and cooling needs, you'll reap the following benefits:

Increased Energy Savings

Heating and cooling an entire home requires a lot of time and high energy consumption, both contributing to high utility bills. A zoned HVAC unit allows you to change temperatures in a particular zone, without the release of hot or cold air in other rooms.

This prevents your central air system from overworking and overheating, leading to less energy consumption. With fewer energy wasted, you'll keep more green in your wallet.

HVAC System Longevity

As mentioned above, your HVAC unit won't have to work so hard to maintain a consistent home temperature. This may improve your unit's longevity and reduce costly maintenance in the long run.

Increased Customization and Convenience

If you're heading out for the day, or taking a long weekend trip, you can adjust the thermostat to work a lot less and save energy. If you install smart or programmable thermostats in each zone, this makes temperature control a lot more convenient and efficient. Some thermostat models even allow you to make adjustments via a mobile app.

Improve Indoor Air Quality

By controlling the airflow with a zoned HVAC, you'll keep the air inside your home fresh and healthy. Segregating your home into zones will also reduce circulation of dust, dirt, and other debris. Healthwise, it will also reduce respiratory problems and serious skin conditions.

Combine Different HVAC Systems

Zoned HVACs allow you to combine heating and cooling units under a single control panel. Streamlining the two systems can reduce maintenance and regular upkeep. Most importantly, each zone will have its own temperature for an enjoyable and comfortable room.

Overall Home Comfort

Everybody in the home will be happy with having control over each room's temperature. No one will argue about the number displayed on the sole thermostat, nor will a family

member complain about the lack of hot or cool air. Each zone will have its own thermostat for maximum comfort.

Cost of HVAC Zoning Systems

Hiring technicians to set up an HVAC zoning system will cost you between **$2,400 and $9,400** on average.

The cost can vary greatly depending on your home size, type of HVAC system already installed, and the complexity of installation. Setting up a zoned HVAC with control panels is not a DIY project and requires HVAC professionals.

How to Maintain an HVAC Zoning System

There are some DIY-friendly maintenance tasks that an HVAC zoning system requires, just like a heat pump or furnace would. Here's how to keep your zoned HVAC in good condition:

- Change air filters every 30 to 90 days to maintain clean airflow
- Check on the thermostat's batteries and controller to ensure accuracy and functionality
- Finally, schedule a professional maintenance service. It's smart to get a tune-up or inspection at least once a year.

FAQ About HVAC Zoning Systems

What are the pros and cons of manual vs. automatic dampers?

Despite all the modern technology, you may prefer keeping things old-school and adjusting the dampers yourself. If not, you can let the control panel do all the opening and closing. Here are the pros and cons of each type of damper:

Manual Pros:

- Cheaper to install than automatic dampers
- Don’t require regular maintenance
- Not prone to electrical malfunctions

Manual Cons:

- You cannot open or close them remotely
- Frequent adjusting required to get the proper airflow. All that practice could be time-consuming

Automatic Pros:

- Can be operated remotely, no physical effort required
- Better and more accurate level of temperature control
- Higher comfort levels

Automatic Cons:

- Higher cost than manual dampers
- Costly maintenance requirements
- Additional ductwork may be required to install them, which is more money spent on labor

How can you measure the size of each HVAC zone?

Setting up a zoning system requires HVAC experts, so you won’t need to confuse yourself with all the math. But if you’re as curious as we are, each zone’s ductwork has to have a similar CFM (cubic feet per minute) measurement. CFM measures the cubic feet of airflow through the central HVAC unit. Let’s say your home requires 3 different zones, then each should have a ductwork to equipment capacity of approximately 35%.

Contractors will often use special calculating tools or softwares to get the most accurate measurements for your home.

What are some of the drawbacks of HVAC zoning systems?

We made them sound almost too perfect, but zoned HVACs have flaws just like any other system. Here are some of them:

- Costly and complex installation
- Expensive repairs due to problems with the thermostat, dampers, and control panel
- Large home with multiple zones may still require high energy consumption

What are some HVAC zoning alternatives?

An HVAC zoning system's dampers and ductwork are part of a central HVAC system. If your home doesn't have central air, here are some HVAC zoning alternatives:

- **Ductless mini-splits:** Like central systems, ductless mini-splits have an outdoor compressor and indoor air handling unit. You can have as many as four indoor air handlers connected to one outdoor unit, with a thermostat controlling each indoor unit. They are easy to install, but have high upfront and operational costs.
- **Window units:** These are small, efficient cooling devices that don't require permanent installation. They're simply mounted on windows. Window units cannot cool an entire home, but are perfect for individual rooms.
- **Portable AC units:** If you don't want blocked windows, portable AC units are the ideal choice. The installation kit allows for an easy, quick set-up. Most models will come with wheels, so you can move it around different rooms that need cooling.

Stop Fighting Over Control of the Thermostat

That's right, no more arguments over the interior temperature. With different thermostats across different rooms, each family member can make their own adjustments. Additionally, HVAC zoning systems can reduce your home's energy consumption and costs.

It's mostly about individual comfort. You get to heat up the living room when watching a movie, while someone else enjoys a cooler atmosphere upstairs. The basement, attic, storage room, and other empty parts of the house can also have its own thermostat.

To install a new zoning system or add another thermostat to an existing one, we can connect you to a local HVAC professional to get the job done. HVAC zoning systems are not DIY-friendly, so it's best to rely on trained experts to set up the right amount of zones for your home.

Main Image Credit: Infographic by Juan Rodriguez

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Jeffery Keusseyan is a writer with a knack for research and handiperson skills. He enjoys writing about home improvement projects and efficient ways to maintain your home exterior.

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