How To Get The Most Efficiency From Your Heat Pump

Being a service technician for many years and someone who cares about your heating and cooling comfort, costs and efficiency I have noticed that there are quite a few people who own a heat pump but who do not operate them to achieve the most efficient operation. I want to share my own thoughts on the use of the heating side of this well engineered piece of equipment. If used properly the savings can be as much as 50% over other sources of heat. The main reason for this is that a heat pump does not actually have to create heat in order to warm your home as is the case with electric or fossil fuels. What is does is to absorb heat that is in the outside air into the refrigerant in the outside coil and transfers that heat into your home. This happens because the temperature of the outside coil must remain at least 10°F below that of the outside air.

This is the basic way that it operates with a few other things that increase comfort. Since the outside coil of the heat pump will get colder and colder as it moves more and more of the cold air that is inside the house to the outside, the coils may begin to frost up due to the moisture in the air. The best way to remove the frost is to then send the heat pump into a reverse cycle. This is the way it operates as an air conditioner. Except in this case the outside fan does not operate in order to defrost the coil faster. During this defrost period there needs to be some way to temper the cold air that is being blown into the house, since your heat pump in defrost mode is basically operating as an air conditioner. This is done by energizing the electric heat strips (or your furnace if your are using that for your backup heat source) that are in the inside air handling unit either in your basement or attic. Some thermostats will indicate that you are operating in auxiliary heat when your heat pump is in defrost mode.

If you have a heat pump it will be supplied with a thermostat that is designed specifically for heat pumps. The heat pump will not produce a blast of high temperature heat the way an oil or a gas furnace will which will be around 110°F to 130°F. The heat from your heat pump will be more in the range of 80°F to 100°F depending on the outside temperature. The lower the outside temperature the less heat that will be available to be absorbed into the refrigerant and transferred to the inside of your home. Most people find that the heat pump provides a much more evenly distributed heat that other forms.

All heat pumps will be equipped with some sort of backup heat; this will most likely be electric heat strips. This is the most expensive heat there is. When it is unable to keep up with the demand for heat, the heat pump will energize these electric heat strips in what is called auxiliary heat. Most all heat pump thermostats will indicate when your auxiliary heat has been energized. What this means is the heat pump will run and add some heat to your home but it will also engage the electric backup heat at the same time. When the heat pump can no longer supply the heat needed to warm the house what happens is that the thermostat will see a 3°F difference between the set point on the thermostat

and the room temperature (the room will be 3°F colder than you have the thermostat set for) the auxiliary heat will energize to help bring the room up to temperature quickly. Then when the difference is 2°F or less the auxiliary heat will disengage and allow the heat pump to take over and get the job done.

The way it will operate the most efficiently is if you do not raise the set temperature more that 2 degrees above the room temperature. I also would recommend that you use a night set back or away set back as low as possible or not at all. The reason being that if you are setting the temperature back lets say from 70°F to 65°F at night or while you are at work, when you set it back up to 70°F the electric backup heat will engage and will be costing you dearly until the room is within 2°F of the thermostat setting. Also realize that when you set your temperature back to a lower setting, everything in your house becomes that temperature. That means the floor, doors, furniture, dishes, cabinets … etc. all become that temperature. And since air travels from hot to cold, the warmer air coming out of your vents go to the items in your home and it takes longer for you to feel the warmth.

On cold days it is not uncommon for your heat pump to run up to 20 hours a day, however this is more efficient and cost effective than running your electric backup heat for 5 hours.

The electric heat strips in your indoor air handler will also be used in case of a catastrophic failure of your outside unit. If you have problems with the compressor or you have a refrigerant leak that does not allow your outside unit to run, your backup heat strips will take over. Some thermostats may call this emergency heat. Which although costly will keep you warm until any necessary repairs can be made. If you notice that your thermostat is indicating that your heat pump system is running in auxiliary or emergency heat for long periods, you should have your system looked at immediately by a competent technician who is knowledgeable about heat pumps.

Now that I have given you the above information, I need to tell you that not all thermostats treat your heat pump the same. The majority act as I have described above. However there are a few that will turn on the backup heat based on time; somewhere around 20 minutes of runtime. So once your thermostat detects that it needs to add heat to the room your system will start up. After 20 minutes or whatever the design time is, the thermostat “thinks” that the heat pump can not keep up with the demand for heat. It will therefore turn on whatever backup heat source that you have (be it oil, gas, or electric). Some of these thermostats will turn off the backup heat when the room temperature is within the 3 degree threshold, some will not. The difficulty lies is finding out which type you have. Unfortunately the manufactures do not tell us how they work. We have to call them to ask.

The best way to control your heat pump and gain the most efficient operation is to install a digital programmable thermostat that has some sort of adaptive recovery. It is called “recovery” because your system is recovering from the temperature that you set it back to. What this does is if you set back

your thermostat to say, 65 degrees at night or when you leave the house, the thermostat will bring on the heat pump sooner so that it will be 70 degrees when you want it to be 70 degrees. This will avoid the backup heat coming on to bring your system up to the temperature that you want it to be at a certain time. In addition to that, I believe that every heat pump should have some way to sense the outdoor temperature. This gives you the ability to "lock out" the electric back up heat from coming on above a certain temperature. So let's say that you set the back up electric heat "lock out" at 25°F, what that means is that other than during defrost, your electric back up heat will not be energized above 25°F. But there is a safety factor build in so that if the temperature drops more than 3°F or so, (check with the manufacturer for the exact amount) the electric heat will come on then prevent you or your pipes from freezing.

Another way to increase the comfort and the feeling of warmth to the inside air is to install a humidifier to your heat pump system. Not only will a humidifier make the air flow from your heat pump feel warmer and increase your comfort level, but it will increase the quality of your interior air. If you encounter static electric in your home during the winter months a humidifier can solve this problem. Air moves from hot to cold and humid to less humid areas. So a humidifier can also help fix hot and cold spots your house. They are worthwhile looking into.

One of the most important things that will ensure that you are getting the most efficient operation from your heat pump is to have a semi-annual maintenance program performed on your equipment. This should be done just before the heating season in September or October and just before the cooling season in April or May of each year. In this way any non optimum condition within the heat pump or its operation can be identified and most likely easily corrected before it causes a catastrophic problem during extreme weather conditions.

I feel that it is important that you understand how your equipment works in order to achieve the most efficiency from it.

I hope that this information has been of some use to you.

Hope This Helps,

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