

## Benefits of going ductless

### Increased Comfort

Ductless systems perform better in distributing warm or cool air to a home, making living areas more comfortable. A single indoor unit can heat and cool a large living space, making these systems are especially well suited to homes with open floor plans.

### Monthly Savings

A ductless heating and cooling system is a highly efficient system that can easily be installed as a new primary heat source for electrically heated homes. Ductless systems heat and cool homes for a fraction of the cost of baseboard and wall heaters.

### Easy, Low-Cost Installation

Ductless systems allow you to retain a room's original aesthetic by not requiring expensive and invasive ductwork. Installation is as simple as mounting indoor and outdoor units, hooking up a refrigerant line through a three-inch opening in the wall or ceiling, and making a few electrical connections. Most installations can be completed in two days.

### Heating & Cooling In One

By installing a ductless system, you can enjoy year round comfort. Ductless systems come standard with air conditioning, offering you an energy efficient cooling solution.

### Rebate & Incentive Opportunities

Many local utilities are working with their customers on upgrading to this more energy efficient alternative. Some utility providers are even offering cash incentives for new ductless system installations, as high as \$1500 when their customers install a new system

## How does it work?

### TWO-WAY HEAT PUMPS

Ductless systems are reversible, 2-way heat pumps that use electricity to transfer heat between outdoor and indoor air by compressing and expanding refrigerant.

### Outdoor Unit

The outdoor unit connects to the indoor-unit by a small bundle of cables, including a refrigerant line. The unit is placed outside of your home on ground level. The cables require only a 3-inch hole in the wall for installation, without expensive or invasive ductwork.

## Indoor Unit

The indoor unit is mounted on a centrally-located wall within your home. Working with your existing heating system, just one ductless system is enough to heat and cool the average sized Northwest home. Keeping your existing heating system in place ensures bedrooms and bathrooms remain at desired temperatures while the centrally-located ductless system provides heating and cooling to your home's main living areas.

## Remote Control

A remote control is included so that you can adjust your settings for maximum efficiency and comfort.

## Where they are used

### Homes with Electric Heat

Ductless systems are ideal for replacing or supplementing inefficient electric baseboard, wall or ceiling units, woodstoves and other space heaters such as propane or kerosene. A cost effective electric heat conversion in a small house might consist of a ductless system serving the main living area, while leaving existing electric baseboards in bedrooms and bathrooms for supplementary heat when needed.

### Remodels & Room Additions

A ductless system can also be a great solution when a room is added onto a house or an attic is converted to living space. Rather than extending the home's existing ductwork or pipes, or adding electric resistance heaters, a ductless system can provide efficient heating and cooling at a lower operational cost.

### New Construction

New home designs can be adapted to take advantage of the many benefits of a ductless heating and cooling system. One or more systems might be installed in various "zones" of the house to simplify installation and minimize refrigerant line length.

## Estimating Costs

### Cost of Installation

The average cost of an installed ductless heating and cooling system with a single indoor heating/cooling zone is between \$3,000 and \$5,000. Additional heating zones and greater heating capacities will increase the cost of the system. Other factors that will affect the cost of an installed system include manufacturer and model, refrigerant line-set length, difficulty of installation, and contractor rates.

### Annual Energy Savings

The Regional Technical Forum's (RTF) provisionally deemed energy savings estimates that a ductless heating and cooling system in a single-family home with zonal electric heat saves 3,500 kWh annually. Using an average cost/kWh in the Northwest (\$0.08), upgrading to a ductless heating and cooling system as a primary heat source **can save approximately \$280 per year**.

## Incentives & Rebates

Many utilities in the Northwest offer customers cash rebates as high as \$1,500 when upgrading an existing electric resistance heating system to a ductless system. Interest-free financing may also be available. Check with your local utility for details.

## Frequently Asked Questions

- Q: What is a ductless heating and cooling system?**
- Q: Do I still need my old heaters?**
- Q: How does a ductless system work?**
- Q: How is the system controlled?**
- Q: What are appropriate applications for a ductless system?**
- Q: Are ductless systems efficient?**
- Q: How long have ductless systems been around?**
- Q: How much does a ductless system cost?**
- Q: What incentives are available for ductless systems?**
- Q: How long will a ductless system last?**
- Q: What kind of maintenance does a ductless system require?**
- Q: How do I know what size of system my house needs?**
- Q: What is a Master Installer?**

### **Q: What is a ductless heating and cooling system?**

A ductless heating and cooling system is a highly efficient zonal heating and cooling system that does not require the use of air ducts. Ductless systems consist of an outdoor compressor unit and one or more indoor air-handling units, called "heads", linked by a dedicated refrigerant line. Indoor heads are typically mounted high on a wall or ceiling covering a 3" hole where the refrigerant line passes through from the outside unit, which is mounted at the base of the house. Each indoor head corresponds with a heating and cooling zone that can be controlled independently.

### **Q: Do I still need my old heaters?**

While a ductless system can be used as a primary heat source, homeowners are encouraged to keep their existing electric heating units as a supplement the Ductless system in case of extreme weather conditions or in hard to reach extremities of the home.

### **Q: How does a ductless system work?**

Ductless systems are reversible, 2-way heat pumps that use electricity to transfer heat between outdoor and indoor air by compressing and expanding refrigerant. Using a refrigerant vapor compression cycle, like a common household refrigerator, ductless systems collect heat from outside the house and deliver it inside on the heating cycle, and vice versa on the cooling cycle. Ductless systems use variable speed compressors with "inverter

technology" (AC to DC) in order to continuously match the heating/cooling load, avoiding the on/off cycling of conventional electric resistance and central heating systems that is commonly associated with uncomfortable temperature variations and high energy consumption.

Ductless Systems consist of several parts:

- An outdoor unit that contains a condensing coil, an inverter-driven variable speed compressor, an expansion valve and a fan to cool the condenser coil.
- An indoor unit that contains an evaporator and a quiet oscillating fan to distribute air into throughout the heating zone.
- A refrigerant line-set that is made of insulated copper tubing and is housed in a conduit alongside a power cable, and a condensation drain.
- A remote control that can be used to set the desired temperature and program in night-time settings.

**Q: How is the system controlled?**

The system is controlled via remote control that changes temperature as well as mode of operation. Wall mounted controls are also available.

**Q: What are appropriate applications for a ductless system?**

Replacing an existing zonal heating system – Ductless systems are ideal for replacing or supplementing inefficient electric baseboard, wall or ceiling units, woodstoves and other space heaters such as propane or kerosene. A cost effective electric heat conversion in a small house might consist of single system serving the main area of the house, while leaving existing electric baseboards in bedrooms and bathrooms.

Room additions – A ductless system can also be implemented when a room is added onto a house or an attic is converted to living space. Rather than extending the home's existing ductwork or pipes, or adding electric resistance heaters, the ductless system can provide efficient heating and cooling.

New construction – New home designs can be adapted to take advantage of a ductless system's many benefits. One or more systems might be installed in various "zones" of the house to simplify installation and minimize refrigerant line length.

**Q: Are ductless systems efficient?**

Yes! Ductless systems operate using 25% to 50% less energy than electric resistance and forced air systems. Three key factors account for the high efficiency of a ductless system:

1. Ductless systems allow the user to control each heating/cooling zone independently, eliminating the costly over-heating and cooling common to central air systems. Why pay to heat or cool rooms that are not currently occupied?
2. While central air systems lose as much as 30% efficiency through air leaks and conduction in the ductwork, ductless systems distribute air directly to each zone, resulting in 25% greater efficiency. Ductless systems use inverter-driven, variable speed compressors that allow the system to maintain constant indoor temperatures by running continuously at higher or lower speeds. Thus, the system can ramp-up or down without great losses in operating efficiency, avoiding the energy intensive on/off cycling common in electric resistance and forced air systems.
3. Modern ductless systems have ultra-high Seasonal Energy Efficiency Ratios (SEER) between 16 and 22, and Heating Seasonal Performance Factors (HSPF) between 8.5 and 11.

**Q: How long have ductless systems been around?**

Ductless heating and cooling systems were developed in Japan in the 1970's and have since become a preferred heating and cooling system throughout Asia and much of Europe. In the United States ductless systems have been used in commercial applications for over 20 years.

**Q: How much does a ductless system cost?**

The average cost of an installed ductless systems with a single indoor heating/cooling zone is between \$3,000 and \$5,000. Additional heating zones and greater heating capacities will increase the cost of the system. Other factors that will affect the cost of an installed system include manufacturer and model, refrigerant line-set length, difficulty of installation, and contractor rates.

**Q: What incentives are available for ductless systems?**

Utility Rebates: most utilities in the Northwest are offering their customers cash rebates as high as \$1,500 when they upgrade their existing electric resistance heating system to a ductless system. Interest-free financing may also be available. Check with your local utility for details.

Federal Tax Credits - Additional Incentives: Federal Tax Credits: tax credits for Consumer Energy Efficiency may be available to taxpayers who purchase a qualified energy-efficient residential ductless systems. The credit is worth 10% of the system cost, including labor costs, up to \$300. [http://www.energystar.gov/index.cfm?c=tax\\_credits.tx\\_index#c3](http://www.energystar.gov/index.cfm?c=tax_credits.tx_index#c3)

Montana - Additional Incentives: the state of Montana's Energy Conservation Installation Credit provides a tax credit for 25% of the cost of a ductless system with a maximum credit of \$500 per individual; up to \$1,000 for a married couple filing jointly. [http://revenue.mt.gov/forindividuals/ind\\_tax\\_incentives/energy\\_related\\_tax\\_relief.mcp](http://revenue.mt.gov/forindividuals/ind_tax_incentives/energy_related_tax_relief.mcp)

Oregon - Additional Incentives: the Oregon Department of Energy has a tax credit available through the Residential Energy Tax Credit (RETC) program. The credit is valued at \$50 per half-ton of rated capacity, with a maximum credit of 25% of the system cost, or \$400, whichever is less. [www.oregon.gov/ENERGY/CONS/RES/tax/HVAC-HP-AC.shtml](http://www.oregon.gov/ENERGY/CONS/RES/tax/HVAC-HP-AC.shtml)

Additional Resources: a database of State Incentives for Renewables & Efficiency can be found at: <http://dsireusa.org/>

**Q: How long will a ductless system last?**

With proper maintenance and care a ductless systems should perform for over 20 years. Many of the systems installed during the 1980's are still functioning well today.

**Q: What kind of maintenance does a ductless system require?**

Ductless systems require basic maintenance to ensure optimum performance. In most cases maintenance is limited to keeping filters and coils clean. These tasks can easily be performed by the home owner.

**Q: How do I know what sized system my house needs?**

Ductless systems are sized to meet the heating and cooling needs of a home's individual zones. There is a great deal of flexibility when it comes to system sizing as one indoor unit can provide between ¾ and 2 ½ tons of heating/cooling depending on its BTU capacity rating. Some common capacities for indoor units are 9k, 12k, 18k, 24k, and 30k BTU. Outdoor units are sized to meet the combined load of all heating/cooling zones. More than one outdoor unit may be necessary for multi-zone systems.

**Q: What is a Master Installer?**

A Master Installer has proven experience with ductless systems and provides thorough customer support. These installers have successfully completed Quality Assurance Inspections, a high level of technical installation training, and agreed to rigorous series of best practices. A ductless system installed by a Master Installer will include attention to equipment performance, appearance and thorough customer education. Click on the following link to search for the Master Installer nearest to you. <http://goingductless.com/consumer/how-to-go-ductless/find-an-installer> **\*\*please make this link live and then erase this request\*\***