

Mini-Split Heat Pump Systems: A Quick Guide for Homeowners

A **Home Performance Program upgrade** makes your home more comfortable while helping reduce your energy bills. An upgrade prevents air and energy leaks and ensures that heating and cooling equipment is efficient, that ducts are free of leaks, and that your water heater and other home appliances are working efficiently. Installing the correct HVAC equipment and ensuring ducts are sealed and insulated helps achieve energy savings and comfort.

This quick guide explains the basics of mini-split heating and cooling systems. Some of the information in this guide is adapted from *HVAC: A Guide for Contractors to Share with Homeowners*, published by the U.S. Department of Energy.

WHAT IS A MINI-SPLIT SYSTEM?

A mini-split heat pump is a type of Heating, Ventilation, and Air Conditioning (HVAC) system that consists of an outdoor unit and one or more wall- or ceiling-mounted indoor units. The outdoor unit includes a compressor/condenser that compresses and expands refrigerant fluid. The indoor unit includes an air handler that blows heated or cooled air into your home.



The indoor unit of a mini-split system is low-profile and operates without ducts. (Source: www.energystar.gov)

The outdoor and indoor units are connected by a conduit that transfers refrigerant between the units.

In the summer, a mini-split heat pump extracts heat from the indoor air and moves it to the outside. In the winter, the process is reversed, and heat from the outdoor air is extracted and moved to the inside. Even in the winter, “cold” outdoor air contains enough thermal energy to provide heat to the home.

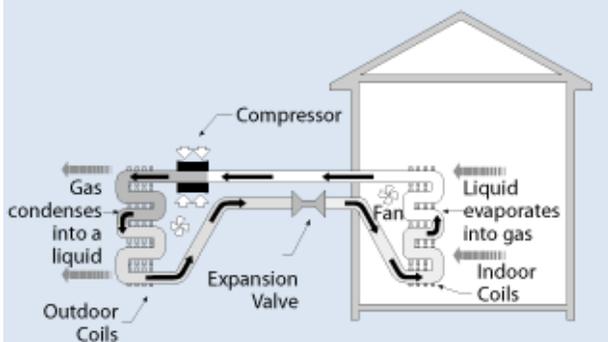
The main difference between a mini-split system and a conventional HVAC is that the mini-split system does not use ducts to distribute conditioned air throughout the home. Instead, heated or cooled air is blown directly into the rooms containing the mini-split indoor units.

How is the efficiency of a mini-split measured?

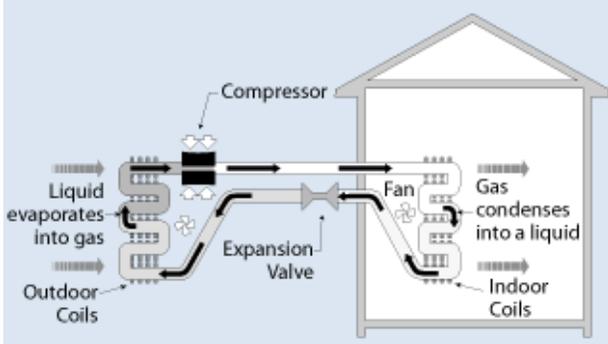
Cooling system efficiency is measured in Seasonal Energy Efficiency Ratio (SEER) and Energy Efficiency Ratio (EER). SEER measures the equipment efficiency during the cooling season, while EER measures the equipment’s instantaneous efficiency.

While some mini-splits provide only cooling, the SMUD Home Performance Program currently requires that rebated mini-splits include a heating component. The heating efficiency of a mini-pump heat pump is measured in Heating Seasonable Performance Factor (HSPF).

A split-system heat pump cooling cycle



A split-system heat pump heating cycle



During the summer, a heat pump uses compression and expansion to extract hot air from your home and release the heat outdoors (top). During the winter, that process is reversed (bottom). (Source: www.energy.gov)

For SEER, EER, and HSPF, higher numbers indicate greater efficiency. The SMUD Home Performance Program provides rebates for mini-split systems with a minimum 15 SEER, 12.5 EER, and 8.5 HSPF.



The outdoor unit of a mini-split heat pump can be mounted to the wall (above) or placed on the ground. (Source: Gary Cziko)

ADVANTAGES

A Mini-Split System Can Save Money

Heating and cooling costs the average U.S. homeowner about \$1,000 a year, nearly half the home's total energy bill. Replacing your system with a highly efficient mini-split system could cut your heating and cooling costs by 30 percent.

Comfort and Control

With conventional heating and cooling systems, you generally have one thermostat to control the temperature of your entire home. With mini-split systems, you can have control over the temperature of each zone or room in your home. Rather than heating and cooling the entire home, you can condition the air in only the occupied rooms of the home.

No Duct Work Needed

In houses with traditional forced-air heating and cooling systems, ducts are used to distribute conditioned air throughout the house. In California, about 30 percent of the air that moves through the duct system is lost through leaks and holes in the ducts and poor connections between the ducts and the heating/cooling equipment. Installing a mini-split system can eliminate those duct losses and the costs

associated with them, as well as increase your comfort.

DISADVANTAGES

Cost of a Mini-Split System

The primary disadvantage of mini-split systems is their cost. These systems cost about \$1,500 to \$2,000 per ton (12,000 BTU per hour) of cooling capacity. This cost is about 30 percent more than central air conditioning systems (not including ductwork) and may cost twice as much as window AC units of similar capacity, depending on the manufacturer.

Sizing the mini-split system to the actual heating/cooling load of your home (known as *right-sizing*) is an important step to ensure its efficiency, durability, and cost savings. Your contractor must correctly size each indoor unit and judge the best location for its installation. (An oversized system will cost more to buy and operate.)

Aesthetics

Some people find the mini-split wall unit unattractive and prefer a duct system over the mini-split system.

THE SMUD HOME PERFORMANCE PROGRAM

How do I choose a qualified contractor?

SMUD provides a list of Home Performance Program contractors at smud.org. All contractors on this list are qualified to earn energy upgrade rebates for your home.

What rebates available for mini-split systems?

SMUD Home Performance Program offers a \$250 rebate for each indoor head installed (maximum of four heads).

FOR MORE INFORMATION

For more information about energy efficiency incentives available through SMUD, visit <http://smud.org/> or contact james.mills@smud.org or 888-742-SMUD (7683).

Contractors:
Staple your business card here