

Ductless mini-splits offer efficient cooling and outstanding dehumidification, making them an increasingly popular option in coastal climates

Ductless mini-split air conditioning systems are gaining popularity nationwide and especially in coastal communities. Tom Antolick of BTU Control, an HVAC installer in the seacoast community of Edgartown, Mass., reports that ductless has grown from a small percentage of his business to about 20% in recent years. “They’ve become hugely popular. I now sell 40 to 50 of them per year.” The reasons: They’re quiet, energy efficient, easy to install, and easy to zone. And in an ocean environment where high humidity is the main cause of discomfort in the summer, these units are as practical for dehumidification as for cooling.

TWO IN ONE

Think of a “ductless mini-split” as a sort of hybrid between a central and a window air conditioner. It consists of small outdoor condenser unit and one or more indoor evaporators. The term “mini” refers to the small indoor units, which mount on the wall or ceiling. Each evaporator cools a single room, although some homeowners opt to cool an entire home by installing a number of these units. Refrigerant is piped from the condenser through small-diameter insulated refrigerant lines directly to individual rooms or zones. A fan in the evaporator blows cooled air into the room.

Chilling at Home

by Charles Wardell

Ductless mini-splits have been common for decades in Europe and Japan, where most homes lack the ductwork needed for central air. Worldwide, in fact, there are far more ductless than ducted systems. According to Carrier’s Tom White, these systems debuted in the U.S. in the mid-1980s, primarily in commercial

buildings, but since then they’ve taken a growing share of the residential market. Paul Drosness of Sanyo Fisher estimates that Americans buy about 125,000 ductless systems each year.

While that’s still peanuts compared with the millions of systems sold in other countries, it represents a solid foothold.



"The product is becoming accepted in the U.S., and it really seems to have caught on in the last three years," says Friedrich's T.J. Wheeler. In fact, while the ductless has always been thought of as a retrofit technology, manufacturers and installers report a growing number of these systems going into new homes, especially those with radiant floor heating.

CONS AND PROS

Cost. Ductless systems aren't cheap. The U.S. Department of Energy (DOE) esti-

mates equipment costs of about 30% more than central systems. But the numbers don't tell the whole story.

"Equipment costs may be more expensive," says Mike Smith, a marketing manager at Mitsubishi. "But there are applications where ductwork simply isn't practical." And the DOE numbers don't include the cost of ductwork. "It used to be that ductless systems weren't cost effective," says Jonathan Dunklee, vice president of Dunklee Cooling and Heating, an HVAC contractor in Stonington, Conn. "But the

cost of steel has gone up so much that they're more likely to be now."

Regardless of whether a ductless system makes sense for whole-house cooling, it's still a good spot-cooling system for a couple of rooms. Antolick says that a simple installation of a single condenser/evaporator combination usually costs the customer \$2,400 to \$2,600 installed. A dual-zone system costs about \$3,800 installed, and a tri-zone roughly \$5,000.

Aesthetics can also be a sticking point for some customers. Dunklee's company

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Ductless systems consist of an indoor evaporator and an outdoor condenser. Indoor units can't easily be recessed into walls or boxed into cabinets without constricting airflow.

works on expensive homes on the Connecticut shore. He says that while most people find the indoor evaporator acceptable, he occasionally runs into someone who doesn't want to look at it. Some contractors have tried recessing the units into the ceiling and putting grilles over them, but Dunklee doesn't recommend this. Because the unit draws air in through the face and blows it out the bottom, recessing the unit can only make it less efficient by restricting airflow. A few of his customers have built cabinets around the indoor units, but the cabinet doors have to be opened before turning the unit on.

There's also the issue of how to hide the refrigerant lines that run from the indoor to the outdoor unit. Antolick uses a product called Slim Duct. It's basically a white vinyl channel that houses the lines. Depending on the type and color of the siding, the housing can look obvious, but it's better than copper pipe. Dunklee uses white downspouts, to match those on the rest of the house. (Inside the house, the issues are the same as running plumbing pipe: Both lines run through closets and basements, where they won't be seen.)

But contractors who use mini-splits say their advantages far outweigh any challenges posed by cost or aesthetics. These advantages include:

Easy installation.

Because there's no ductwork, installation is simpler than for central air. The only holes that need to be made in the house are small holes for the refrigerant lines and electrical wires, along with drains to carry condensation from the evaporator to the outside. That makes the mini-split a good choice for sunrooms, garage conversions, and existing homes in which adding ducts would be expensive and disruptive.

Silent operation. Ductless is a good choice for clients who crave quiet. While a ducted system has to be sized just right if you don't want to hear the rush of air through the ceiling grilles, the evaporator on a ductless unit is nearly silent. That makes it a good choice in a bedroom or a media room, where you don't want a lot of background noise. The outdoor condenser is quiet enough to put on a patio.



TRANE

Compare that with a standard 10 SEER central unit, which is rated at 80 db. Lennox makes a super-quiet model that puts out only 69 db. "Mini-splits are even quieter than that," says Antolick.

Simple zoning. Zoning a ducted system can be a complex job. But that's not the case with ductless. Each evaporator is connected to the condenser with a dedicated refrigerant line, and each one comes with a hand-held remote and can be hooked up to its own standard or setback thermostat. Some condensers are designed to serve two or three evaporators.

Precise cooling. Mini-splits are a good choice for a room addition or a small cottage. The smallest central air system has about an 18,000 Btu capacity, which isn't efficient if you have less than 1,000 square feet or so. Mini-splits, by contrast, start as small as 9,000 Btu.

Heating. Some of these systems include a heat-pump mode, so they will warm the house during the cool months. They usually put out enough heat for all but the coldest months in the Northeast, making them perfect for a seasonal beach home. And according to Smith, they will produce more heat at colder outdoor temperatures than a standard heat pump. Mitsubishi's system, for instance, will heat to full capacity down to 47°F, and will put out 70% of its maximum capacity at 17°F. "Mini-splits are a good choice where the design temperature for that region is 32°F

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DUCTLESS MANUFACTURERS

Carrier Corp.
800-227-7437
www.carrier.com

Fujitsu General America
973-575-0380
www.fujitsugeneral.com

Sanyo Fisher Co.
www.sanyohvac.com
800-421-5013

Enviromaster International
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www.enviromaster.com

LG Electronics U.S.A., Inc.
www.lge.com
800-243-0000

Trane
www.trane.com
903-581-3200

Friedrich Air Conditioning Co.
800-541-6645
www.friedrich.com

Mitsubishi Electric & Electronics USA, Inc.
www.mrslim.com
800-433-4822

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or above,” he says. “You can use electric heat for the days or weeks you fall below that temperature.”

Efficiency. In recent years, manufacturers have introduced modulating condenser motors to the U.S. market. Rather than turning on and off to keep temperatures at the thermostat’s set point, the motor varies its speed gradually, letting it maintain precise temperature the same way that the cruise control on a car maintains a constant speed. These units are quieter and use less energy than conventional ones. And because the motor isn’t constantly starting and stopping, there’s less wear and tear.

DRY MODE

One of the most valuable features for coastal climates is the fact that some systems will dehumidify without cooling. They do so by cycling air through the evaporator at a very low fan speed. Mitsubishi’s M-Series has a variable-speed fan that runs continuously at a low level. “It runs all the

time but modulates up and down,” explains Smith. “Built-in microprocessors tell the fan the optimum speed.” In Fujitsu’s system, by comparison, the fan comes on and off intermittently while the evaporator is off, using stored energy in the cold coil to take moisture out of the air. And because the volume of air going across the coil is less, it only lowers temperature a degree or so, according to Fujitsu’s Roy Kuczera. “That’s a lot more efficient than a central unit, which usually needs a reheat coil [to do dehumidification].”

CORROSION RESISTANCE

To those who wonder how well the outdoor unit will stand up to salt air, Friedrich’s Wheeler points out that ductless mini-splits are the cooling system of choice in most of the Pacific Rim. “Those are tough climates, and ductless is all they use.” He names a handful of features designed to prevent corrosion from salt air:

- Most good ductless units have a plastic fan blade instead of the metal one typical of central air systems.

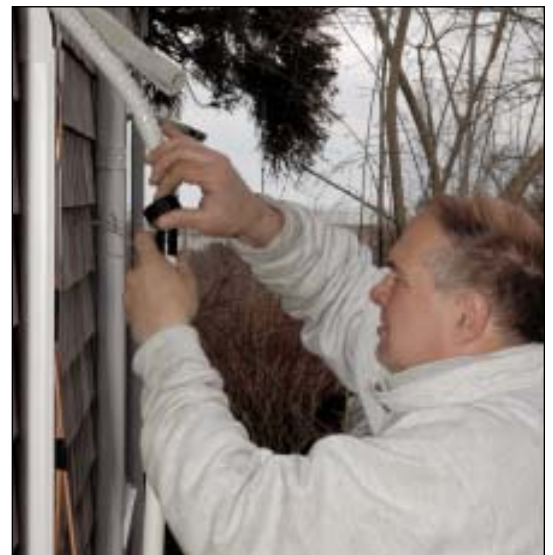
- The condenser motor’s horizontal orientation means the openings on the motor aren’t pointing upward, ready to catch water and debris.
- The condenser motor is small enough that it can be totally enclosed and still kept cool.
- All of the base pans in the outer portion of the unit are painted or powder-coated to protect them from corrosion.

Some manufacturers, like Mitsubishi and Fujitsu, will put a corrosion-resistant coating on the coils as an option, but not everyone thinks it worth the extra expense. “We used to have [a similar coating] but discontinued it,” says Drosness. “I don’t think it’s necessary. I have one account in Bermuda, and I never heard of a unit having to be replaced because of corrosion from salt air.” ~

Charles Wardell writes on construction topics from Vineyard Haven, Mass. All photos by the author except where noted.



Outdoor condenser units can handle up to three zones. Although a mini-split system saves the expense of installing ductwork, the channels carrying the refrigerant lines and condensate drains are quite conspicuous.



A worker joins two lengths of the tubing that will carry condensate away from the house.