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# DUCTLESS FOR RETROFITS

The uncertainty surrounding the global economy has not kept the Canadian construction industry idling. The pace may not be record setting, but the industry has been humming along, and many home and business owners are taking the opportunity to retrofit their existing spaces. When it comes to the systems that will heat and cool these redeveloped or expanded buildings, many are looking beyond traditional HVAC options.

Whether for additions, whole-home cooling or to improve interior comfort for spaces lacking sufficient HVAC, ductless mini-split systems are gaining a foothold for retrofit applications.

The remodeling boom, increasing energy costs and conceptual changes about how to heat and cool interior spaces are the key ingredients that have brought ductless solutions into the mix.

The notion that every room in a home or business must be conditioned to the same temperature – all the time – is a concept that Canadians are challenging more and more, especially as they learn about the benefits of zoned systems.



**Getting inverted** A key contributor to ductless system energy efficiency has been the introduction of “inverter” technology. Though this technology has been in use for more than a decade in Eastern and European countries, it’s a relatively new player in the HVAC sector in Canada. The inverter converts AC power to DC and uses pulse-width modulation to produce variable frequency AC current, modulating the speed of the motor to match the heating or cooling needs of the space being conditioned.

## AUGMENTING EXISTING SYSTEMS



A little over a year ago, one of the contractors we work with, Dave Yates, installed a one-ton ductless system in a residence that had a traditional central HVAC system. When the family built the home, six years

earlier, they were not looking to use the space above the garage, but a change of mind resulted in an urge to finish the space. This led to a mini-split heat pump installation as an HVAC system add-on.

Use of the mini-split would avoid time-consuming, disruptive and expensive central HVAC alterations, and the family could quickly have a system that would condition the interior space, exactly where and when they most wanted it.

The mini-split was installed by Yates and two technicians in three hours. “The room was noticeably cooler within minutes, and water

was streaming steadily through the outside condensate line,” said Yates. “But when the homeowners checked on us toward the end of the job, they couldn’t believe the system was running – both the indoor fan coil and outside condensing unit operate so quietly that you have to strain to hear them.”

While individual specifications will vary by manufacturer and model, the inverter-based ductless system installed in this home can operate in heating mode down to -15°F, and as low as 0°F in cooling mode. This reduces the need for supplemental heating on most winter days.

The unit also offers a dry mode setting, for summertime

dehumidification – without altering room temperatures by more than one degree Fahrenheit.

The family also opted for a wireless remote controller, to make programming for comfort levels a relatively easy process.



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## DUCTLESS FOR COMMERCIAL

Ductless systems are also well-suited for light commercial applications. Multi-zone systems with just one variable-speed outdoor condensing unit can accommodate several indoor units.

Each indoor unit can be turned on or off at will and each will communicate with the outdoor unit separately. The outdoor unit's logic module can alter the delivery of refrigerant as needed to serve each of the air handler's needs. As a result, each indoor unit's remote control can be set at any level.

One of the latest advancements to take the stage in the commercial mini-split market is the introduction of variable refrigerant flow, or "VRF" technology.

With VRF, heat is transferred directly to and from interior spaces by circulating refrigerant between a remote condensing unit and interior evaporators. Wall-mounted ductless or fan coil type compact ducted units with evaporators are located in or near occupied spaces.

Multiple evaporators can be connected to the system allowing for optimal temperature control zoning. Just as with traditional ductless systems, heat is transferred via the refrigerant to an outdoor condensing unit.

These systems can serve a wide range of applications including nursing homes, restaurants, office buildings, schools and churches. The system minimizes the refrigerant path compared to a multizone mini-split by connecting multiple indoor units to a common liquid and suction line. The shorter refrigerant path allows for greater system performance from the same amount of compressor work.

Space temperature control in VRF systems is achieved by modulating the flow of refrigerant to each evaporator using an (EEV) electronic expansion valve. Fan speeds are also variable. The variability of "inverter" operation and zone temperature control leads to improved comfort and energy savings.



### VARIABLE-SPEED VS. ON-OFF TECHNOLOGY

The reality in HVAC is that on-off technology is rapidly losing its appeal, and that can be seen in new furnace technologies, pumps and fans – basically any HVAC equipment that pushes fluids or air around, and mini-splits are part of this emerging trend.



With ductless mini-splits, the indoor units use equipment that systematically changes or modulates to match heat loss and gain. Microprocessor control intelligently guides the function of variable speed system output, the difference, if the system were a car, between punching the gas or feathering it.

A logic module continuously monitors indoor and outdoor temperatures. Sensors feed this information to the control board. If anything goes wrong, a fault code indicates what's going on with the equipment.