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Persuading Building Owners to Install VRF Zoning Systems

Mitsubishi Electric US Cooling & Heating Division (Mitsubishi Electric) Variable Refrigerant Flow (VRF) zoning systems provide one of the most flexible, costeffective and environmentally friendly options in commercial and residential construction today. Regardless of a building owner's intentions for the building, whether owner-occupied or as an investment, the decision for what mechanical HVAC system to go with is critical to the building's performance and marketable value. The following points cover many benefits of our VRF zoning technology to help the building owner make the right decision.

Energy Efficiency

VRF zoning systems are designed to provide great efficiency benefits because they deliver precise capacity to each zone of a building. Fixed-speed compressors in conventional HVAC systems typically operate at full power. More than 90 percent of the time, however, a zone operates under part-load conditions, resulting in system cycling and poor set-point satisfaction. Mitsubishi Electric VRF zoning systems, with electric INVERTER-driven



compressors, offer full-range variable capacity to deliver exactly the amount of conditioned air needed to match a zone's cooling or heating demand. Working in tandem with system controls and sensors that measure loads for each zone, the compressor seamlessly adjusts speeds to maintain the desired capacity level. This function, along with a mainly ductless design, reduces duct losses. Mitsubishi Electric VRF zoning systems consistently prove 30 to 40 percent more energy efficient than conventional HVAC systems while also meeting ENERGY STAR® requirements and achieving the highest Integrated Energy Efficiency Ratio (IEER) ratings.

Precise Temperature Control and Energy Monitoring Load Diversity

Mitsubishi Electric VRF zoning systems manage different zones inside a building based on diversity of load and usage. As people move about in a building, shifting the load, or the sun moves across the building during the day, the system adjusts the capacity delivered to each zone. In fact, the total applied capacity of the R2-Series system's indoor units can be up to 150% of the capacity of the outdoor unit by taking advantage of simultaneous cooling and heating and load diversity.

Intelligent Sensor Technology

Intelligent indoor unit sensors measure room air temperature at the return or at a remote controller. Advanced linear electronic expansion valve technology ensures delivery of the precise amount of refrigerant needed to meet each zone's load at any given time of day. Some Mitsubishi Electric VRF zoning system indoor units also feature an i-see Sensor[™], which compares air and floor temperatures and then adjusts airflow as needed to optimize the comfort within the indoor space.

Intuitive System Control

Each R2- and Y-Series outdoor unit can cool or heat up to 50 individual zones, maximizing building design options. Networked control options allow for the management of the building's HVAC system down to the indoor unit level schedules and set-points. Capabilities include occupancy sensing, dual temperature set-point and set-back, mode scheduling, ability to integrate third-party equipment, storage of maintenance data and energy-monitoring functions with tenant billing of system energy consumption. For convenience of monitoring and operation, central controllers support interconnection with a networked PC on a local area network. For wider system control, the CITY MULTI Controls Network (CMCN) supports integration with building management systems via our LonWorks® and BACnet® interfaces.

Heat Recovery

Want to maximize the heat energy absorbed from the space instead of rejecting it outdoors? Why not use it rather than waste it? Mitsubishi Electric R2-Series VRF zoning systems offer highly responsive simultaneous cooling and heating performance, something no other two-pipe system can do. Using a Branch Circuit (BC) Controller, the system takes heat energy removed from a zone that's in cooling mode and applies it to another that calls for heat. By bypassing the outdoor unit, the system runs in its marketing & engineered solutions.

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Lower Lifecycle Costs

Depending on the style of the building, VRF zoning systems tend to have fewer components than conventional HVAC systems, reducing equipment costs, complexity and installation time. Compared to other VRF systems, Mitsubishi Electric VRF zoning systems also use fewer refrigerant and electrical connections. Mitsubishi Electric's VRF zoning systems use built-in logic that modifies system behavior to maximize performance. This means greater comfort and longer system life. Many Mitsubishi Electric models come with long-life, washable filters, an additional cost savings over traditional disposable filter replacements. As the needs of the building change, a VRF zoning system can easily be adapted to fit that need, especially with the rotation of commercial office tenants who have specific cooling and heating needs. You can move or add and subtract indoor units easily with minimal interruption to system operation.

Aesthetics

Building owners care a great deal about the curb appeal and interior look of their structures. To aid in maintaining a building's aesthetics, VRF zoning systems minimize disruptions by offering the following components:

- Discreet indoor units: Designed to blend into their environments, multiple styles of compact units can be installed in many different locations, including within the ceiling, high or low on walls, or on the floor. For added flexibility, these units free up valuable interior space and enable increased ceiling height. Sound levels range from 19 dB(A) at low speed to 49 dB(A) at high speed — quieter than a refrigerator.
- Compact outdoor units: Available in air- or water-source models with a wide variety of capacities, these modular systems are easy to install and can be tailored to almost any building design, including placement on a rooftop. Sound levels operate between 24 dB(A) and 65 dB(A).

Ventilation Air

Mitsubishi Electric's special purpose VRF units play an important part in providing the ventilated air to meet building requirements. The award-winning PEFY-AF Dedicated Outdoor Air System comes in two configurations, the CFM and the CFMR. Both configurations offer high-capacity coils that will condition incoming air, making it suitable for distribution to downstream fan coil units. Our Lossnay® fixed-plate energy recovery ventilators (ERVs) can be used to recover waste energy from exhaust air streams and use it to temper ventilation air.

Mitsubishi Electric VRF zoning systems offer a cost-effective and energy-efficient option for a variety of scenarios and building applications. Compared to conventional options, VRF zoning systems offer owners significant operational and comfort benefits that contribute to a higher performing building. These benefits will be appreciated for many years to come as will the extensive support of the preferred brand of VRF zoning technology.

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Interview with an Engineer: MKK Consulting Engineers, Inc.

VRF Zoning Technology Obvious Choice for Historic, Residential Projects

Engineering design and consulting firm MKK Consulting Engineers, Inc. (MKK) has been designing and engineering mechanical, electrical and plumbing systems for new construction, renovations and expansions since 1959. MKK has completed engineering projects in the contiguous U.S., Alaska and Antarctica, as well as an assignment at the summit of 14,000-foot Pikes Peak in Colorado. Mitsubishi Electric US Cooling & Heating Division interviewed Ken Urbanek, associate director of engineering at MKK, about the Greenwood Village, Colo., firm's experience with Mitsubishi Electric CITY MULTI VRF zoning systems.

Mitsubishi Electric US Cooling & Heating Division (ME): Why did you initially specify Mitsubishi Electric VRF [Variable Refrigerant Flow] zoning systems?

Ken Urbanek (KU): After Mitsubishi Electric representatives in the Denver metro area first presented the system to us, it was a couple of years before we found a project we felt it would be suited for. We knew it would have to be a project with a client who was both looking to improve energy efficiency and willing to look at new technology. One of the first was for some barracks at Fort Leonard Wood in Missouri. Not only did VRF supply what the U.S. Corps of Engineers was looking for in its energy-efficiency goals, but it also lent itself to that type of dormitory environment, which had very specific zoning and needed individual temperature controls in each room.

ME: Have you recommended VRF zoning systems for non-residential projects as well?

KU: For a project with the Denver Department of Human Services, we worked on a two-story, 50,000-square-foot office building that was a unique opportunity. The client, an architect, is well known for pushing the envelope when it comes to energy goals.

ME: On that project, you used VRF technology in conjunction with another heating and cooling system.

KU: We used VRF systems for air distribution in all of the building's open office spaces. But for the highcooling loads in the computer and utility rooms, we used an integrated building technology called Under Floor Air Distribution, or UFAD. We had planned to use this UFAD for the whole project, because it lends itself well to the office environment — with a bunch of cubicles everywhere and a diffuser on the floor under each work station so each person can increase or decrease the airflow. The problem with UFAD, though, is that it's relatively neutral air — not super cool or warm — so it's not adaptable to extreme weather conditions. So the guy sitting in a cubicle can make himself comfortable, but someone with an office where sun beats on the windows, even in the winter, will be hot. We placed the VRF system along the building's perimeter, so the heating and cooling in those spaces works independently of the under-floor system.

ME: Can you give us an example of a time when you chose a VRF zoning system instead of an alternative?

KU: We have selected the VRF system instead of geothermal at times. One example: We used VRF at a large maintenance facility for some of the new commuter trains that will be coming to Denver. It's a big, four-story building with a lot of offices on the top floor. We wanted to go for LEED certification, so we looked at geothermal, but there was no space for a loop field, and we could get comparable energy efficiency with the VRF system.



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ME: In what specific applications is a VRF zoning system the obvious choice?

KU: For a retrofit of an existing historical building, the VRF system lends itself well to squeezing equipment into small systems. Same goes for hotel rooms and residential apartments, and for administrative buildings with a lot of offices. We'll start working on a 130-year-old historical building soon, and we're recommending VRF because the system doesn't need a boiler room, and it doesn't need a chiller that needs a lot of maintenance.

ME: What advice would you give to an engineer who is thinking about using VRF zoning technology for the first time?

KU: Two things. First, do your due diligence. Several companies make VRF systems, but not all of their reps have the experience to really educate you about them and help you use them. Mitsubishi Electric has a very thick engineering manual. Find a rep to deal with who knows what that book says. Make sure he knows his stuff. And get to know these systems yourself. ASHRAE's 2012 handbook also devotes a lot of space to VRF systems. It's a great write-up. Second, let that rep help you. At MKK, we take a performance-based specification approach. We lay out where we want the terminals, how many, what the capacity of each one will be and how the refrigerant lines are put together. Then, we do a performance-based assessment with Mitsubishi Electric to make sure we're leading the client in the right direction. That works out well.



White Paper Highlights VRF Zoning Solution for Healthcare Facilities

Mitsubishi Electric Cooling & Heating recently developed a healthcare facilities white paper that describes how energy-efficient VRF zoning systems are ideal for hospitals, hospice, and other healthcare facilities.





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Mitsubishi Electric: The Leader in Most Efficient Ductless Products

Nine heating and cooling systems in Mitsubishi Electric's M-Series have been designated as ENERGY STAR® Most Efficient 2013 products. For each of the past two years, Mitsubishi Electric has had the most qualifying products of any ductless manufacturer.

The following Mitsubishi Electric units qualify for the ENERGY STAR Most Efficient 2013 designation:

- MUY/MSY-GE cooling only: 9,000, 12,000 and 15,000 capacities
- MUZ/MSZ-GE heat pump: 9,000, 12,000 and 15,000 capacities
- MUZ/MSZ-FE heat pump (Hyper-Heating): 9,000, 12,000 and 18,000 capacities

These systems' high performance provides significant annual operating savings for homeowners, offering savings in excess of 37 percent over federal minimum standards for the MUY/MSY-GE (cooling only) systems and 30 percent or more for the MUZ/MSZ-GE (heat pump) and MUZ/MSZ-FE (heat pump —hyper-heat) systems.

According to ENERGY STAR, products certified as Most Efficient "demonstrate efficiency performance that is truly exceptional, inspirational, or leading edge — consistent with the interests of environmentally motivated consumers and early adopters."

For split-system air conditioners to be certified, they must meet or exceed 18 SEER and 12.5 EER. The three qualifying MUY/MSY-GE systems, which range in capacity from 9,000 to 14,000 Btu, have 20.5 to 21 SEER and 12.5 to 13.6 EER ratings.

Qualifying split-system air-source heat pumps must meet or exceed 18 SEER, 12.5 EER and 9.6 HSPF. The three MUZ/MSZ-GE and three MUZ/MSZ-FE qualifying systems range in capacity from 9,000 to 18,000 Btu and have ratings as high as 26 SEER and 15.5 EER.





"Mitsubishi Electric is proud to be recognized two years in a row as a leader in efficient cooling and heating systems that don't require ductwork," says John Clements, senior product marketing manager, Mitsubishi Electric US Cooling & Heating Division. "The 2013 designations show our commitment to offering consumers and contractors the highest performing products on the market."

For more information on the ENERGY STAR Most Efficient 2013 certification, click here.

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2013 AHR Expo Provides Great Exposure and Fresh Perspective

On January 28-30, the 2013 AHR Expo convened at the Dallas Convention Center. The largest event in the HVAC/R industry, the AHR Expo typically draws more than 1,900 exhibitors and more than 30,000 visitors for three days of networking, educational programs and exposure to the latest trends in the industry.

This year, Mitsubishi Electric Cooling & Heating shared a booth with Mitsubishi Electric Automation. The partnership promoted both divisions' products and compatibilities.

"We wanted to exhibit our new product, the 5-ton PUMY

model, as well as showcase our expertise and what really differentiates us from our competitors — not just our products, but our training and service after the sale," said Keith Reihl, commercial regional sales manager for Mitsubishi Electric.



From their vantage point, Mitsubishi Electric reps were able to experience the show from a fresh perspective, allowing them to gain insight into the latest industry trends and to take advantage of some of the more than 100 educational sessions, workshops and product presentations covering everything from industry seminars to ASHRAE certification programs. In addition, the massive exposure to the tens of thousands of attendees provided great feedback for new initiatives and product enhancements to help meet the demands of this constantly growing and changing market.

Next year, the 2014 AHR Expo will move to New York, and Mitsubishi Electric will be there. We look forward to seeing you.



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Mitsubishi Electric Expands Indoor Unit Offerings with Updated Vertical-concealed Air Handler

Mitsubishi Electric Cooling & Heating has enhanced its extensive line of commercial CITY MULTI indoor units with the updated line of PVFY vertical-concealed ducted air handlers. With its slim profile design and option for applying vertically or horizontally, the PVFY line of indoor units is ideal for installations in closets and equipment rooms, where space is limited.

Enhanced features of the PVFY "B" generation indoor unit include:

- Improved static capacities, which allow for more flexibility with installation design (longer duct runs and better air delivery).
- · Additional set of contacts for economizer control.
- Third-party-certified sound power and sound pressure ratings.
- Compatibility with all current and previous CITY MULTI VRF zoning outdoor units.
- Support of dual set-point function.

With all the components, including a linear expansion valve (LEV) and controls, pre-mounted within the cabinet for easy installation, this unit is optimal for use in both retrofit and new building applications. Like the previous PVFY models, the updated air handlers can be incorporated into a full VRF zoning system design with all other Mitsubishi Electric VRF zoning indoor units. For increased flexibility, the PVFY indoor unit also has a side drain pan, allowing it to be installed in a horizontal left position.

The PVFY units feature a blower with three fan speeds for increased occupant comfort. The highefficiency DC motor and forward-curved blower of the PVFY provide quiet and efficient operation, with sound ratings as low as 29 dB(A).

The vertical-concealed PVFY indoor units are just one of many options of Mitsubishi Electric indoor unit styles that will meet almost any building requirement or application: Seven ductless and ducted indoor unit styles include wall-mounted, ceiling-recessed, concealed and suspended, and floor-standing models. Each indoor unit style provides ultimate zoning flexibility and is compatible with all models of Mitsubishi Electric's VRF zoning outdoor units.



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Charles Miltiades Elected President of ASHRAE Atlanta Chapter

Mitsubishi Electric US Cooling & Heating Division announced that Charles Miltiades, senior controls engineer, has been elected president of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Atlanta Chapter for the 2012-2013 term.

Miltiades has been a member of ASHRAE since 2006 and has held numerous positions in the Atlanta Chapter including education chair, research promotion chair and, most recently, treasurer. Miltiades graduated from Georgia Institute of Technology, Atlanta, in 2002 with a bachelor's degree in industrial and systems engineering. He also earned a Master of Business Administration from Kennesaw State University, Kennesaw, Ga., in 2008 and was inducted into the Beta Gamma Sigma business honors fraternity. Miltiades has worked for Mitsubishi Electric for three years and has worked in the HVAC industry for 12 years in both sales and engineering roles.



"Mitsubishi Electric employees have been active members of ASHRAE for more than 30 years. We have staff serving both locally and nationally in ASHRAE leadership positions," said Mark Kuntz, vice president of marketing & engineered solutions, Mitsubishi Electric US Cooling & Heating Division. "Miltiades' election as president of the Atlanta Chapter is an excellent opportunity to continue our involvement in one of the HVAC industry's most important organizations."

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VRF and Wireless Controller Bring Cool Comfort to Texas' Highest-Grossing Restaurant

The 1920s building at 2533 McKinney Avenue has been home to Sfuzzi Uptown since 2010. The name "Sfuzzi" is the "juxtaposition of letters from a famous New York pizzeria menu," says co-owner Robert Colombo, a Long Island native. In Colombo's faux Italian, the name means "having fun while you dine." *The Dallas Morning News* named Sfuzzi Uptown the highest-grossing restaurant in Texas in 2011.



CHALLENGE

When Colombo's firm bought the single-story, 3,000-square-foot former funeral home in 2010, the first thing he did was gut the interior. Replacing the existing 20-ton HVAC system would not be necessary, he reasoned.

Because of the building's age, the only space for air ducts was at the exterior walls. Installing a conventional system throughout the building was out of the question, and Colombo did not want to install air ducts in the exterior walls. The key problem was that Sfuzzi's most important space was the 1,000-square-foot bar area at the heart of the interior. "The stagnant air around the bar was dreadful," Colombo said. "My guests were uncomfortable, which eventually hurt my business."

Colombo searched online for a compact system that would conquer the comfort problem at his restaurant's bar. He discovered the split-ductless systems from Mitsubishi Electric cooling and heating systems. The website indicated that Jack Schmidt, Benchmark HVAC, Inc. in Dallas was his closest Mitsubishi Electric authorized contractor.

SOLUTION

Schmidt told Colombo the Mitsubishi Electric P-Series system was the only one in the industry capable of overcoming Sfuzzi's space limitations. Schmidt confirmed there was just enough room on the rooftop for the two suitcase-sized Mitsubishi Electric PUZ outdoor units needed to do the job. The two indoor units were suitably compact to fit in the ceiling, because they were only 9 inches.

Benchmark installed the system in January 2011. "The linesets penetrated the roof membrane perfectly between the old joists," Schmidt said, "and the ceiling-recessed indoor units slid nicely up into the ceiling." Finding a suitable place for the wall thermostats, however, was a problem; there was no space in the old walls to install the wiring.

Schmidt suggested using the MHK1 Wireless Remote Controller Kit — the first in the HVAC industry to incorporate Honeywell's RedLINK[™] wireless technology. The RedLINK wireless controller operates over radio frequency instead of through infrared waves or control wires. Because the controllers are wireless, and because the room temperature is measured at the indoor unit, they could be placed in a different room than the indoor units. "It was this wireless technology that enabled us to bring the controllers inside [close to the bar], making it easy to adjust the temperature and provide total comfort control in the bar hotspot."

"Guest comfort is the holy grail for hoteliers and restaurateurs," Colombo said. "These wireless controllers made a huge difference in my operation — both for zero installation costs and for the convenience of having them close to the bar. This Mitsubishi Electric technology ... perfectly solved my problems, quieted my customer complaints and helped me toward profitability."

To see the full version of the case study, click here.

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