Application Note 1036:
Applying MXZ-C Multi-Zone Systems

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The following recommendations are intended to provide the best design practices when applying the MXZ-C systems.

MXZ-C systems are a great choice for many applications but may not be the best choice for all applications. If your design has conditions that make using an MXZ-C system questionable, please consider using one or more of our other 1 to 1 systems to suit your needs. If you have any questions or concerns, please consult with your local Mitsubishi Electric Trane HVAC US (METUS) Representative for assistance.

Load Calculations

Heating and cooling systems in homes are commonly oversized which increases installation costs, wastes energy, and reduces comfort and moisture control. The best method for zoned systems is room-by-room load calculations to assure the proper indoor unit size is selected. Properly sized equipment will last longer, provide greater comfort, and save the homeowner money. This will in turn provides the homeowner with a higher level of satisfaction with the equipment and the installing contractor.

Properly sizing equipment is not just isolated to residential applications. Commercial buildings will also benefit from the proper sizing of equipment. Make sure load calculations follow the methodology approved in the Air Conditioning Contractors of America (ACCA) Manual J (or equivalent).

Proper Equipment Selection

Outdoor Units

Select outdoor units first using the proper load calculation done for the structure. The outdoor unit should not be selected based on how many indoor units are desired. If the outdoor unit is oversized to accommodate a certain number of indoor units for each of the zones, overheating, humidity issues, and higher than expected energy usage can occur. If the proper size outdoor unit doesn't provide enough indoor units/zones, the best option may be to combine some zones as needed with a ducted unit. If there are only 2 or 3 small zones to condition, combining them and using a one to one system may be a better choice.

Indoor Units

Proper indoor unit sizing and selection is probably the most important part of applying an MXZ- C system. Too often the indoor units are used because a homeowner wants to have their own control without regard for oversizing. If an indoor unit nominal capacity is more than 50% higher than the maximum heating or cooling load in a space, it will be oversized and humidity, overheating and higher than expected system energy usage can occur. This space should not have its own indoor unit.

If the space heating or cooling load is less than 50% of the smallest capacity indoor unit available, the space should be combined with another to more closely match the capacity of an indoor unit. Perhaps a small ducted indoor unit is the best choice for the combined spaces.

Airflow is another important factor when applying indoor units with any system. When selecting a location to mount an indoor unit, pay special attention to the surrounding walls, furniture, etc. If there are obstructions in the space, short-circuiting of the airflow can occur, causing the indoor unit to cycle ON and OFF, providing uneven temperatures in the space and higher than expected energy usage. In many cases, the mounting location and/or the indoor unit type should be chosen to provide the best circulation in the space. Always refer to the airflow temperature distribution data when selecting indoor unit styles.

For best humidity control, the homeowner should be instructed to set the indoor unit fan speed to LOW or the minimum speed required to handle the load in the space. This will provide the best humidity control in cooling and the least short cycling in heating.

MSZ - Wall Mount

Capacity Range: 6,000 – 24,000 Btu/h Clg. 7,200 – 27,600 Btu/h Htg.

The MSZ wall mount indoor units may be the easiest to install in a home, but as with any of the indoor units, oversizing can cause overheating, humidity issues and higher than expected energy use. These indoor units discharge the air out horizontally in cooling and downward in heating. Because of the downward airflow direction in heating, the floor area in front of the unit should be unobstructed or recirculation may occur. Check the airflow pattern for the model you are using. Maybe another type of indoor unit would be best for the application.

SEZ – Horizontal-ducted

Capacity Range: 8,100 –17,200 Btu/h Clg. 10,900 – 21,600 Btu/h Htg.

The SEZ ducted units may provide the best solution in zoning applications where spaces have too small a load for individual indoor units. They have a low static pressure (.20 in. W.G. max.), but would work well with 2 or 3 short runs to handle some small zones. This better matches the load requirements compared to using 2 or 3 separate indoor units in the small zones. This will help prevent overheating, humidity issues and higher than expected energy usage. Make sure the new or existing ductwork is sized to match the indoor unit's static capabilities.

PEAD – Horizontal-ducted

Capacity Range: 9,000 – 36,000 Btu/h Clg. 11,400 – 38,000 Btu/h Htg.

Like the SEZ models above, these would also be a good solution to combine smaller zones. These models have higher static pressure (up to a maximum of 0.60 in. W.G.). This will allow them to handle more small zones, longer duct runs and more efficient filtration options. Make sure the new or existing ductwork is sized to match the indoor unit's static capabilities.

SVZ - Multi-position Air Handler

Capacity Range: 12,000 – 36,000 Btu/h Clg. 13,500 – 40,000 Btu/h Htg.

The SVZ multi-position indoor units provide all of the benefits of the PEAD ducted units. Plus they have higher static pressure capabilities (.80 in. W.G. max), come in higher capacities to condition larger zones and can easily be used with higher efficiency filtering products and humidifiers. They also have optional electric heat kits available where supplemental heat may be needed. Make sure the new or existing ductwork is sized to match the indoor unit's static capabilities.

MFZ - Floor Mounted

Capacity Range: 9,000 – 17,000 Btu/h Clg. 11,000 – 21,000 Btu/h Htg.

The MFZ floor mount indoor unit like the wall mount can be used when it meets the load requirements within the capacity range without oversizing. This will help prevent overheating, humidity issues and higher than expected energy usage. The nature of the floor mount design requires an unobstructed area in front so that the proper return air can be maintained. The discharge is either one way or two way depending on user preference. Since the unit can blow out of the top with 1 outlet flow selected, this unit can work in rooms where others may not.

MLZ – Ceiling Cassette (1-way)

Capacity Range: 9,000 – 17,000 Btu/h Clg. 11,000 – 21,000 Btu/h Htg.

The MLZ indoor unit has become a popular unit because of its architectural appeal. This indoor unit not only has the visual appeal but its ceiling mounting installation provides a solution if other indoor units will not have unobstructed airflow. As with all models, proper sizing is important.

SLZ – Ceiling Cassette (4-way)

Capacity Ranges: 8,400 – 17,700 Btu/h Clg. 10,900 – 18,100 Btu/h Htg.

The SLZ indoor units also have good architectural appeal for those that don't want a wall mount unit. These units provide a good option since they can be mounted in the center of the ceiling so short cycling of the airflow will not normally occur. These units require access to the electrical panel on the side of the unit. If the unit is installed in a hard ceiling access to the unit from above is necessary or a service access panel must be install into the ceiling next to the unit.

Underperformance Due to Equipment Misapplication

Rooms Overheating

Overheating of a space can occur when the indoor unit is oversized. On a call for heat, the indoor unit will cycle ON and quickly heat the space. When the space temperature is satisfied, the indoor unit refrigerant flow will reduce to a very low bleed rate if other indoor units are calling for heat. The fan remains on even when the zone is satisfied. This low bleed rate and residual heat in the coil can overheat the space. The severity of this will depend on how oversized the indoor unit is.

This low refrigerant bleed rate is common for all multi-zone heat pumps to prevent large amounts of liquid refrigerant from migrating to the indoor units that are OFF, causing the system to operate low on charge. Suggestions on overcoming this additional heat can be found in the control options below.

Poor Humidity Control

One of the main reasons a structure can have humidity control issues is a short air conditioner run cycle. Oversized indoor units will quickly cool the space and cycle OFF. If an indoor unit is selected with a nominal capacity 50% greater than the design cooling load conditions, humidity control issues will most likely occur. Zoning a structure just based on giving someone their own indoor unit without regard for the load is probably the biggest cause of humidity issues.

Higher Than Expected Energy Usage

All split ductless systems, single or multi-zone, operate most efficiently when the outdoor unit is modulating smoothly to meet the heating or cooling load of the structure. Design or installation conditions that create a situation where indoor units cycle ON and OFF will, in turn, cause the outdoor unit power input to go up and down. This produces energy spikes which in turn are the reason for higher energy use. Following the design recommendations in this application guide will minimize energy spikes thus providing the most efficient operation.

Passive Structures

Passive structures can pose a unique challenge because of the minimal heating and cooling loads. In many cases, room or zone heating and cooling loads can be as small as 500 – 1000 Btu/h or less. The key is to select, install and operate the equipment so it doesn't short cycle. The best passive building energy usage will occur when the system can modulate and operate for extended periods of time. Short cycling can also cause humidity control issues in humid climates. The following guidelines should be used when selecting and installing equipment in these buildings.

a. Properly size the equipment based on an accurate load calculation.
b. Do not use multiple indoor units if their capacity in each area will exceed the load in that space. In other words, one indoor unit mounted in a central location, that matches the structure heating and cooling loads will be better than two indoor units mounted in separate locations that are larger capacity than needed.
c. In many cases, a 1 to 1 indoor/outdoor system may be a better choice than a multi-zone MXZ-C system or splitting the needed indoor zones with two smaller systems that better match the total.
d. High-efficiency transfer fans are better to distribute the heating and cooling from one central location than having two oversized indoor units mounted in separate areas. Transfer fans work best when their inlet is installed as close to the operating indoor unit space as possible.
e. Consider a ducted indoor unit with a duct outlet for each main area. Often, only 2 or 3 outlets are needed for an entire house. Consider oversizing the minimal ductwork to save on fan energy.
f. Instruct the homeowner to operate the indoor unit fan on manual speed settings according to the capacity required. With the minimal loads in passive structures, a low or medium fan speed will usually work for most of the seasons. Also, lower fan speeds will help reduce short cycling during low load seasons and allow the indoor unit to remove more humidity in the cooling season.

Control Options

All indoor units come from the factory sensing the space temperature at the return air on the unit. If the mounting location of the indoor unit will cause air short-circuiting to occur, the unit will short cycle ON and OFF before conditioning the entire space. If there are limited options on the mounting location of the indoor unit and air circulation will be less than ideal, consider using a remote wall controller or remote sensor. Mount the controller or sensor in a location a distance from the indoor unit. This will help to minimize short cycling of the indoor unit in both heating and cooling operation. Contact your Mitsubishi Electric Trane HVAC US (METUS) Representative for recommendations in doing so.

Another reason to use a remote temperature control is to help with an overheating situation that may occur with an oversized indoor unit. The indoor units are designed to operate the fan at all times the unit is ON even if the space is satisfied and the unit goes to thermal OFF. They operate like this because the room temperature sensing is done at the return air inlet of the indoor unit. If any indoor unit in the system is actively operating in the heating mode, the system will bleed hot gas through all of the indoor units even if they are in thermal OFF mode. Because of this, and the fan running all of the time, a small amount of heat is discharged to all spaces continuously even if they are in the thermal OFF zones. This operation, while normal, can cause overheating in some zones.

This situation can be improved by setting up the indoor unit so the fan shuts OFF when that space is satisfied and the indoor unit goes to thermal OFF. This will also require the temperature sensing be done remotely from the indoor unit. Contact your Mitsubishi Electric Trane HVAC US (METUS) Representative for recommendations in doing so.