

THE COMMERCIAL HVAC EQUIPMENT EXPERT SINCE 1999

Engineering Manual

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(580)762-4114 2101 HALL BLVD PONCA CITY, OK





CUSTOM MECHANICAL EQUIPMENT THE COMMERCIAL HVAC **EXPERT SINCE 1999**

PRODUCT NAME Penthouse Multizone MANUFACTURER Custom Mechanical Equipment 2101 Hall Blvd Ponca City, OK 74601 (580) 762-4114 **WARRANTY AGENT Lennox Industries. Inc.** 2100 Lake Park Blvd Richardson, TX 75080 (972) 497-5000 **PRODUCTION HISTORY First unit produced in 1989 PRODUCT DESCRIPTION Application: Heating Ventilation** and Air Conditioning Appliance TYPE Year-round Rooftop Multizone Unit **ELECTRICAL 208-230/3/60, 460/3/60, 575/3/60 CAPABILITIES 3 - 45 Tons of Cooling**



















CME has an ongoing comittment to quality; therefore,

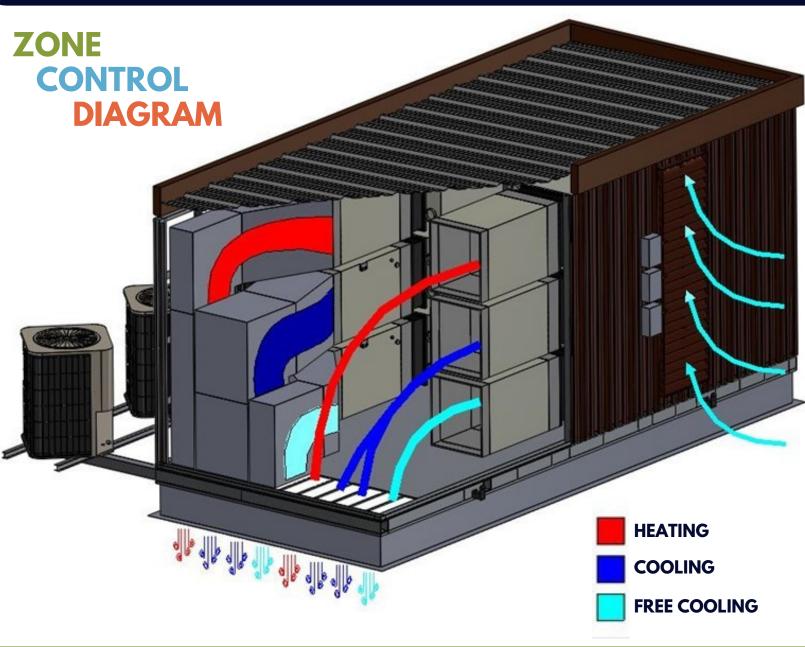


CUSTOM MECHANICAL

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PENTHOUSE MULTIZONE OVERVIEW

CONFIGURATION

Every Penthouse Multizone is individually designed and built to match each application's specific demands. Each Penthouse contains multiple split systems designed for highly efficient, reliable performance in commercial buildings. Multiple economizers, fans, cooling coils, and heating sections condition independent zones without the complexity, lack of redundancy, and energy waste found in other zoning systems. The result is exception occupant comfort, low operational costs, and the most energy-efficient multizone available.

INDEPENDENT EFFICIENT SYSTEMS

96% AFUE Gas Heating (Two Stage) 3 Phase Power 11.0-12.5 EER 12.0-16.0 SEER 1 Phase Power 12.0 - 14.0 EER 19.0 - 22.5 SEER

Multiple speed DC inverted fan motors; Modulating Economizers; Individual Zone Control; Energy Management Options

VENTILATION CODES & CONTROLS

Meets ANSI/ASHRAE 62.1-2004 ventilation requirements with proper application. Ventilation control includes individual economizer ventilation, dual minimum position settings per AHU, CO2 demand ventilation, space occupancy sensors, and dedicated outdoor air units.

FLEXIBILITY

Each unit is custom-built to meet design requirements with 1 to 19 control zones, 3 to 45 tons of cooling, and 44 to 954 MBH of heating output. Each zone is capable of having a range from 700 CFM to 6,000 CFM. Unit base and duct connections are built to match existing or new roof curbs. Heating is available in natural gas, electric, hot water, heat pump, and dual fuel. Cooling is available in direct expansion and chilled water.

DDC CONTROLS

The controller used will be a 32-bit micro-processor based and graphically programmable to control each unit with 96 input/output (I/O) points. Up to 48 universal inputs (individually jumper-selectable to select either a dry contact, thermistor, 0-20mA, 0-5 VDC, 0-10 VDC, or TRD with 12-bit resolution on all analog inputs). Up to 24 digital outputs, relayed outputs with individual LED indication and individual HOA switches. Up to 24 analog outputs (0-10 VDC or 0-20 mA).

The controller will have an on-board, jumper-selectable EIA-232 or EIA-485 open protocol port that supports the following communication protocols: BACnet (models supported: IP, MS/TP, PTP, and ARCnet), Modbus (models supported: RTU and ASCH), N2 Bus, and Lon Works.



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Existing Problem

PMZ3 Solution

HIGH ENERGY COSTS

Cooling and heating efficiencies have increased significantly over the past 15 years. Traditional multizones and VAV systems cool and heat simultaneously, resulting in significant energy waste. Many of today's manufacturers continue to lag behind the advances of the past 15 years.

DRAFTS, HOT/COLD SPOTS, STALE AIR

Most buildings are plaqued with a variety of comfort complaints and most HVAC systems lack the flexibility to meet today's diverse heating. cooling, and ventilation requirements. With traditional systems, a single component failure can disable a large part of your facility.

HIGH MAINTENANCE COSTS

Today's commercial HVAC market focuses too much on "engineering economics" and too little on the end-user. The drive for the lowest initial cost has produced excessive long-term operating costs. Complicated system controls require continual maintenance, limit the field of qualified service technicians, and often rely heavily on individual components.

LONG LEAD TIMES

Most manufacturers need two to four months to deliver their equipment after the submittal process. This delays the job several months after funding is obtained.

INSTALLATION DIFFICULTIES

Most retrofit units need adapter curbs and many need extensive duct modifications. Most equipment is shipped via common freight, leaving the contractor responsible for tracking the delivery. During this process, getting competent assistance is virtually impossible.

HIGHLY EFFICIENT EOUIPMENT

The PMZ3 Slashes energy costs with proven, highly efficient equipment not available in today's commonly used systems. With independent cooling, heating, and ventilation, we avoid inherent complexity and inefficiencies of other multizone and central station systems.

OCCUPANT COMFORT
With independent heating and cooling systems, the PMZ3 distributes hot and cold air where needed. With multiple economizers, the PMZ3 directs ventilation air to each zone without "reheat". The independent supply fans automatically adjust with the system pressure changes and minimize drafts by reducing airflow when possible.

SIMPLE MAINTENANCE

The PMZ3 is simple to maintain. Scroll compressors and standard operating controls allow for fewer parts to maintain, thus fewer parts to fail. The conditioned penthouse protects the equipment and helps technicians complete their work quickly and thoroughly. If a component fails, a small fraction of your facility will be affected while repairs are completed quickly and inexpensively.

SHORT LEAD TIMES

The Standard lead-time for a PMZ3 is approximately four to six weeks. An emergency replacement unit can be built, delivered, and operational in as little as two weeks.

EASY INSTALLATION

The PMZ is easy to install. In retrofits, each unit is built to match existing conditions. All accessory materials are transported with units and shipping is closely monitored to assure on-time delivery. A CME project manager will be onsite on the day of install to provide expertise and oversee the start-up.

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STRUCTURE

The Penthouse Multizone is aluminum construction with high ribbed steel, bubble wrap R-9 insulation, and colorfast steel siding and trim. Our PMZ2 is assembled in our shop and comes to you as a once-piece design with the exception of the condensers. All components will be factory-installed, wired, and plumbed inside the penthouse. Coils will be complete with factory insulated cabinets, corrosion-resistant drain pan, and expansion valve kits.

HEATING

Heating will be high efficiency two-stage condensing type, utilizing outside air for combustion. Units shall be certified with AGA laboratories and the ratings certified by GAMA, tested according to DOE test procedures, and FTC labeling regulations. Unit shall be available for use with LPG/propane as an option. The units shall be Lennox EL296UH090XV60C with 88,000 Btuh Input/85,000 Btuh Output on high fire, 57,000 Btuh Input/55,000 Btuh Output on low fire, or EL296UH110XV60C with 110,000 Btuh Input/106,000 Btuh Output on high fire and 72,000 Btuh Input/70,000 Btuh Output on low fire, with AFUE of 96%. Gas line with a single point outside 11/4" connection.

FURNACE BLOWERS

Will have variable speed drive motors. The variable-speed motor will maintain a specified air volume throughout the static pressure range. Change in blower speeds will be accomplished by changing the setpoint in the control system. When in ventilation mode, furnaces run at low-speed settings. When heating, cooling or economizing, the fans run at high speed.

CHILL WATER COILS

Evaporator coils will be constructed of copper tubes and aluminum fins and shall be leak tested at 450 to 500 psig. Coils to be complete with factory insulated cabinets, corrosion resistant drain pans and expansion valves.

HOT WATER HEATING COILS

Hot water heating coils will have control valves with single point connection. DX Cooling Coils to be complete with factory insulated cabinets, corrosion-resistant drain pan, and installed expansion valves.

CONDENSING UNITS

Condensing units will be Lennox single stage or two stage with R-410a refrigerant, air-cooled type with scroll compressors with resilient mounts. Coils will be copper-aluminum construction, pressure tested at 450 to 500 psig.

ECONOMIZER SECTIONS

Economizers shall be provided for each furnace, consisting of gasketed low leakage return and outside air dampers in a steel housing with 2" pleated filters. Damper position shall be controlled by an air sensor and solid-state outside the air enthalpy sensor. The minimum position is factory set and adjustable via the controls.

DUCT SYSTEM

The PMZ3 unit will have a factory-installed internal duct system. Individual zone heads will be sized and located for connection to the existing zone systems. The common or ducted return air opening will have a protective grate.

LOW VOLTAGE

A low voltage control center will be factory installed in the unit to allow connections of low voltage thermostat wires.

ELECTRICAL

The PMZ3 is available in single or three phase, 208 - 575 voltage. Each unit has a main fused disconnect with single or three phase motor saver.

Standard Features

VARIABLE SPEED BLOWER

A commercial, variable-speed blower provides soft-start capability and programmable airflow settings, statically and dynamically balanced. Selected airflow is maintained throughout the static pressure range. Adaptive blower control technology optimizes dehumidification sequence and simplifies unit air balancing. Simple user adjustment to dial in airflow with no dip switch settings, the blower is mounted on a slide-out frame for easy service.

EL296 SERIES TWO-STAGE HEATING

A Sure-Light integrated control board contains all controls for reliable, trouble-free performance. The limited lifetime warranty coverage on a heat exchanger is ten years in all non-residential applications.

HIGH EFFICIENCY DX COOLING

Nominal condensing unit capacities range from 3 to 5 tons, all units will include Copeland Compliant Scroll compressors for reliability with EER's ranging from 11.0 - 14.0.

ECONOMIZERS

Factory-wired enthalpy, dry bulb, or CO2 based economizers with low-leak dampers and common pressure relief dampers provide "free cooling".

INSULATED PENTHOUSE STRUCTURE

The entire PMZ3 is a welded aluminum structure covered with foil-backed, R-9 insulation and Kynar coated steel siding.

CUSTOM FABRICATION

Each unit is custom-designed to meet the needs of your specific project, our products are designed to match existing roof curbs or we can fabricate a new curb, ducting, and zone control requirements.

SMOKE DETECTOR

Each unit has a smoke detector that is factory installed and wired in the return air section, contacts are provided for remote interface.

INTEGRATED UNIT CONTROL

Our PMZ contains all the necessary controls and relays to operate the unit, optimized through ongoing research, testing, and end-user input. An integrated unit control system maintains unit at the leading edge of equipment performance, regardless of means of interface. Options include: stand-alone, third party integration (BacNet, Johnson N2, LonWorks, or ModBus) and thermostat control (hardwire).

LENNOX WARRANTIES

A standard one-year limited warranty covers the entire unit. Extended warranties are included to cover the heat exchanger (ten years), refrigerant compressor (five years), ignition control (one year), and blower motor (one year),

INSTALLATION EASE

Internal wiring and piping are factory installed with single-point gas, electrical, and condensate connections. ACCU electrical, refrigerant, and control connections are extended to the penthouse exterior for easy hookup.

FACTORY AUTHORIZED STARTUP

A factory-authorized project manager will arrive on-site the day of the unit installation and provide start-up assistance and training.

COORDINATED FREIGHT

All shipments are scheduled through a local shipping company that has 24/7 access to the location of the truck carrying your equipment which helps ensure on-time arrival.

PRIMARY DISCONNECT

There is an external disconnect that is factorymounted and ready to receive incoming power wiring.

SERVICE LIGHTS/OUTLET

There are service lights provided in both the furnace and return sections, there is also a GFCI service outlet located in the return section.

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MODIFICATIONS FOR USE WITH GAS, ELECTRIC, HOT WATER HEATING & DUAL FUEL

PIPING PACKAGE TO EXTEND REFRIGERANT PIPING TO ACCU'S IN STANDARD LOCATIONS

CURB RISER & ZONE HEAD EXTENSIONS TO ELEVATE PMZ OFF THE ROOF

ZONE THERMOSTATS AVAILABLE FOR SIMPLE AND RELIABLE TEMPERATURE CONTROL

AUTOMATIC VENTILATION CONTROL
WITH A CO2 SENSOR THAT IS FACTORY INSTALLED
OR A MOTION DETECTOR FOR EACH ZONE
FIELD INSTALLED

TITLE 24 COMPLIANT FDD ECONOMIZERS

HEAT ONLY UNIT
AVAILABLE
WITH OR WITHOUT
FUTURE COOLING COILS,
PIPING, & WIRING



A STEEL CURB MOUNTING FRAME & NAILING STRIP

HUMIDITY CONTROL TO AUTOMATICALLY REDUCE BLOWER SPEED & INCREASE HUMIDITY REMOVAL

CHILLED WATER COOLING
INTERNAL PIPING, CONTROL VALVES, & BALANCE VALVES
ARE FACTORY INSTALLED FOR CHILLED WATER OR GLYCOL COOLING

ENTHALPY ECONOMIZERS AVAILABLE WITH DRY-BULB CHANGE OVER IN LIEU OF ENTHALPY SENSING

SMOKE DETECTORS CAN BE FACTORY INSTALLED & WIRED IN EACH SUPPLY AIR TREAM

BLOWER CAPACITY FROM RETURN PLENUM DEHUMIDIFICATION SYSTEM

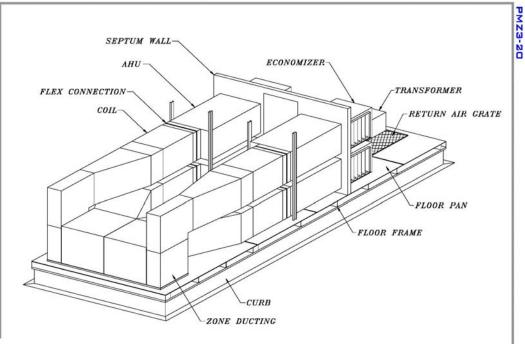
700 CFM TO 6,000 CFM PER ZONE EACH ZONE CAN BE INDEPENDENTLY HEATED & COOLED WITHOUT THE USE OF REHEAT

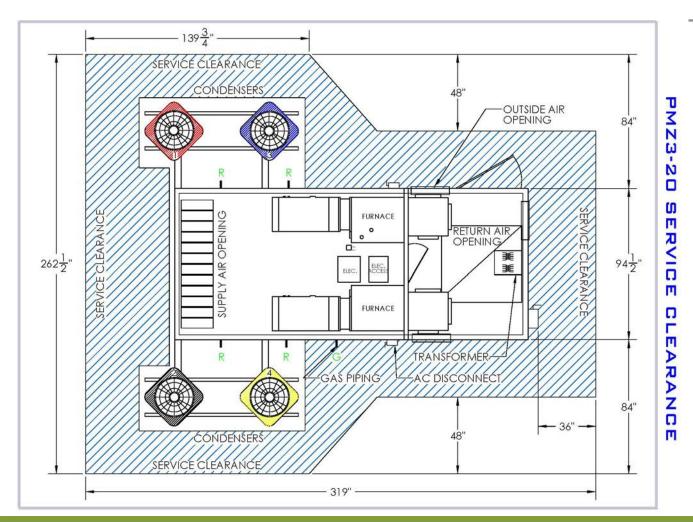
FACTORY INSTALLED DUCT CONNECTIONS ARE AVAILABLE FOR HORIZONTAL

PRESSURE SWITCH 7,500 FT UNITS

ORIFICE KIT & PRESSURE SWITCH 7,501 - 10,000 FT

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UNIT DATA TSA SAMPLE 208V

SERIAL # PMZ3-20-2021XX-01

UNIT#	MODEL#	TOTAL CFM	OA CFM (25%)	VOLTAGE	PHASE	MCA	МОСР
01	20YG41 XX	8,000	2,000	208	3РН	109	125

NATURAL GAS HEATING

GAS PRESSURE

High Fire		Low Fire		AFUE	
Input	Output	Input	Output	96.0%	4.5in W.C. min
352,000	340,000	228,000	220,000	70.0 %	10.5in W.C. max

DX Cooling

Total MBH	Sensible MBH	EAT DB/WB	LAT DB	EER	SEER
240.0	189.6	80/67	53	11.0	13.0

RTU Dimensions & Weight

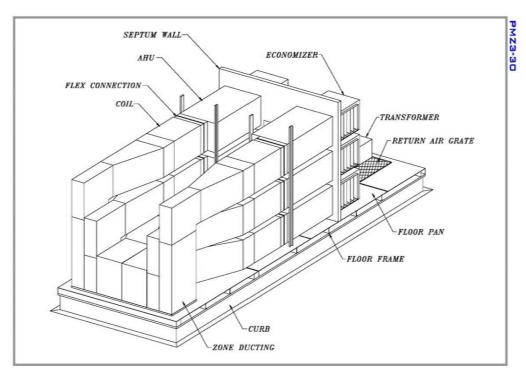
Length · 221				
Width ∙ 95				
Height · 75				
Unit Weight	Condenser Weight			
3,992 872				
Total Weight 4,867				

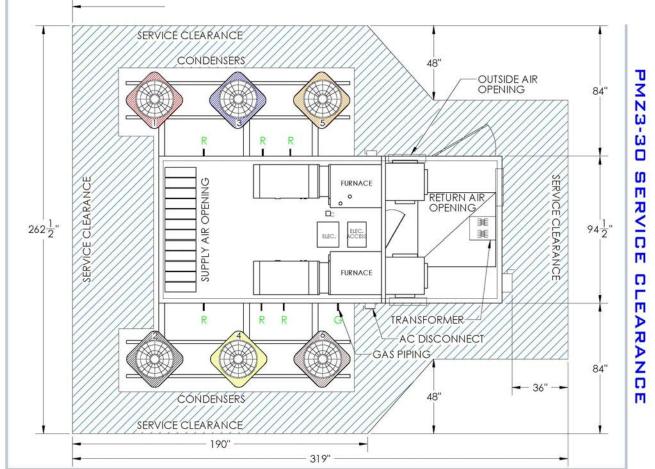
Notes

Refrigeration piping stubs to the unit exterior (3/8 X 11/8)

•Gas distribution piping with
exterior connection (1 1/4 in OD)
• Condensate piping with single floor
connection (1.5 in. FTP)
• Certified in accordance with USE
certification program which is based on ARI Standard
210/240 with 25 ft. of
connecting refrigerant lines.
• Cooling Ratings: 95°F outdoor
air temperature and 80°F db/67°F wb
entering indoor coil air.







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30 TON

UNIT DATA SSB SAMPLE 460V

SERIAL # PMZ3-30-2021XX-01

UNIT#	MODEL#	TOTAL CFM	OA CFM (25%)	VOLTAGE	PHASE	MCA	МОСР
01	30GG42 XX	12,000	3,000	460	ЗРН	73	80

NATURAL GAS HEATING

GAS PRESSURE

High Fire		Low Fire		AFUE	
Input	Output	Input	Output	96.0%	4.5in W.C. min
528,000	510,000	342,000	330,000		10.5in W.C. max

DX Cooling

Stage	Total MBH	Sensible MBH	DB/WB	LAT DB	EER	SEER
1	270	216.0	80/67	53	11.5	15.0
2	369	274	80/67	54	11.5	15.0

RTU Dimensions & Weight

Length • 221 Width • 95 Height • 75 Unit Weight Weight 4,916 Total Weight 6,908

Notes

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·Gas distribution piping with

exterior connection (1 1/4 in OD)

· Condensate piping with single floor

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air temperature and 80°F db/67°F wb

entering indoor coil air.

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SEQUENCE OF OPERATION

The integrated unit controller contains all necessary controls and relays to operate all PMZ3 functions. The system changes blower speeds, enables heating & cooling, provides minimum ventilation, and disables equipment for night setback operation and emergency shutdown. Independent zone temperature control is regulated by individual thermistors.

·VENTILATION MODE·

Once power is supplied to the unit, each blower is enabled at its ventilation blower speed, and each economizer is driven to its minimum position. These both can be adjusted inside the unit via BACview.

·HEATING MODE·

When a zone heating call is received, the corresponding heating section is enabled and ramped to high speed, once the heating demand is met the blower returns to ventilation mode.

.COOLING MODE.

Zone cooling calls ramp to high speed when called as well, the outdoor air sensor (enthalpy or dry bulb) for that zone is also enabled. If conditions permit, the mixed air temperature control modulates the economizer dampers to maintain a fixed mixed air temperature. The corresponding condensing unit provides mechanical cooling when conditions do not permit, once cooling demand is met blower returns to ventilation mode.

·NIGHT SETBACK·

In all unoccupied periods, the unit is idle with all outdoor air dampers closed, when there is a call for heating or cooling the PMZ3 is enabled as described above with the exception that the outdoor air dampers will remain closed. Once demand is met the unit returns back to idle mode and the setpoints that govern heating or cooling are adjusted for night setback.

SEQUENCE OF OPERATION

The integrated unit controller contains all necessary controls and relays to operate all PMZ3 functions. The system changes blower speeds, enables heating & cooling, provides minimum ventilation, and disables equipment for night setback operation and emergency shutdown. Independent zone temperature control is regulated by individual thermistors.

The PMZ3 contains a variable speed direct drive blower that is statically and dynamically balanced. The adaptive blower control technology simplifies unit air balancing. Blower control via the BACview makes for simple user adjustment.

The PMZ3 operates in a stand-alone mode and is factory pre-programmed for BACNET/IP integration. We do offer various other control integrations.

When the CO2 reading reaches the setpoint the economizer opens to increase fresh outdoor air, once levels return to the acceptable range the outside air dampers return to the programmed ventilation position.

If the space/humidity reading reaches the setpoint the blower speed is reduced to achieve a 50°F discharge setpoint. The dehumidification percentage can be adjusted from the keypad display.

Exhaust fans are staged based on the unit total percentage of outside air. The staging percentages are adjustable.

> 20 TON/SINGLE STAGE/3059CFM PER STAGE 30 TON/TWO STAGE/3059CFM PER STAGE **40 TON/THREE STAGE/3059CFM PER STAGE**

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CONTRACTOR RESPONSIBILITIES

- Adequate crane and rigging will be required for removal of old equipment and placement of new equipment. A spreader bar is advised, and transportation to remove old equipment.
- Completely remove and detach old unit & all other attachments.
- Prepare existing supply duct and apply supplied curb gasket.
- Connection of primary, secondary, and control wiring: Connect existing building primary wiring to single point terminal on PMZ (fused disconnect included with PMZ).
- *Re-sizing the existing building circuit fuse may be necessary*
- Copper wire is mandatory at the PMZ junction box. Connect condenser primary and control wiring to disconnects and terminations on the PMZ exterior. Whips and field wire are supplied. Identify and connect control wiring from room sensors to terminal inside PMZ (PLC). Room sensors are supplied and require 2 conductor cables, 3 for full functionality, and can generally utilize the existing wire, splicing often required. Replacement of existing building sensor wiring by the contractor may become mandatory. Additional wire and conduit for connections are not provided.
- Route PMZ single point condensate drain to appropriate building drain.
- •Connect and evacuate refrigerant piping and devices between condensers and connections on the exterior of PMZ. Condensers 5 ton and smaller are pre-charged with refrigerant adequate for fifteen feet of piping. Refrigerant piping is included with condensers placed in standard, cantilevered locations only.
- *Field refrigerant piping modifications/additions may be required, additional fittings and refrigerant are not supplied by CME. Piping not included for remote condensers*
- Arrange to have the electrical main power connected and energized ASAP to establish blower and control operation.
- Complete the single point gas connection from the building and confirm gas supply pressure, gas piping internal to the PMZ must be leak-checked after delivery by installing contractor.
- Supply air delivery must be field adjusted to satisfy each zone requirement, make sure each zone sensor is traced and connected to the proper terminal in the PMZ control panel.
- Contractor should be prepared to supply sheet metal, electrical materials, and other materials since conditions of the old unit are unknown.
- CME is not responsible for additional charges due to extended install time. Off loading of the truck must be done within 2 hours of arrival or additional fees will incur.

PURCHASINGINFORMATION

All of our products are custom-built for each customer. Prior to fabrication our engineering team will send a submittal confirming all equipment and job-relevant information, the submittal must be signed and returned before production can begin. Any changes after the submittal is signed will require a change order. We require a 50% payment to begin production unless you work with an approved sales partner.

Once a signed quote, signed submittals, and 50% down (if required) have been received your equipment will then be released for production. At this time your PMZ sales rep will be able to give you an estimated delivery date. Please note delivery dates are subject to change due to material delays. When your product is 2-3 weeks from completion your CME sales representative will reach out to confirm a delivery date and time.

When a PMZ3 is being set on the roof a CME project manager will come to the site to assist with the unit placement, observe the set, and train the appropriate personnel on the equipment and controls. The CME project manager is not responsible for the mechanical start-up. Often times the actual powering and firing of some or all condensers and furnaces take place after the project manager has completed his tasks and left the site. If the scope of the PM cannot be completed due to project delays, additional charges will apply for a return visit.



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