HVAC Guide Specifications
Ductless Mini-splits PUZ/Y

Section 238126.13 – Mini-Split Systems
Capacity Range: 1.0 to 3.5 Tons Nominal – Heat Pump and Cooling Only

Mitsubishi Model Number: PUZ-ANH/KA7 Heat Pump Series Outdoor Units with Selected Indoor Units:**
PCA Ceiling Suspended Type
PEAD Ducted Type
PKA Wall Mounted Type
PLA Ceiling Cassette Type
PVA Ducted Air Handler

Part 1 – General

1.1 System Description

The Heat Pump/Cooling Only system shall be a Mitsubishi Electric split system with Variable Speed Inverter Compressor technology. The system shall consist of a horizontal discharge, single phase outdoor unit, a matched capacity indoor section that shall be equipped with a wired wall-mounted, wireless wall-mounted, wireless handheld, or other remote controller.

1.2 Outdoor Unit Capacity

Outdoor Units		
Model Numbers	**Cooling (Btu/h)**	**Heating* (Btu/h)**
PUZ(Y)-A12NKA7(-BS)	12,000	14,000
PUZ(Y)-A18NKA7(-BS)	18,000	19,000
PUZ(Y)-A24NHA7(-BS)	24,000	26,000
PUZ(Y)-A30NHA7(-BS)	30,000	32,000
PUZ(Y)-A36NKA7(-BS)	36,000	38,000
PUZ(Y)-A42NKA7(-BS)	42,000	45,000

*Not applicable to PUY models

Quality Assurance

- **A.** The units shall be tested by a Nationally Recognized Testing Laboratory (NRTL) and shall bear the ETL label.
- **B.** All wiring shall be in accordance with the National Electrical Code (N.E.C.) and local codes as required.
- **C.** The units shall be rated in accordance with Air-conditioning, Heating, and Refrigeration Institute's (AHRI) Standard 210/240 and bear the ARI Certification label.
- **D.** The units shall be manufactured in a facility registered to ISO 9001 and ISO 14001, which is a set of standards applying to environmental protection set by the International Standard Organization (ISO).
- **E.** A dry air holding charge shall be provided in the indoor section.
- **F.** The outdoor unit shall be pre-charged with R-410A refrigerant for 70 feet (21 meters) of refrigerant tubing; PUZ(Y)-A36/42NKA7 for 100 feet (30 meters) of refrigerant tubing
- **G.** System efficiency shall meet or exceed SEER / HSPF values below:

Indoor unit	SEER	HSPF*
PLA-A12EA7	27	12.8
PLA-A18EA7	24.6	11

PLA-A24EA7	24.2	11.2
PLA-A30EA7	22.8	11.6
PLA-A36EA7	21.8	10.4
PLA-A42EA7	21	9.3
PEAD-A12AA7	21.1	10.2
PEAD-A18AA7	19.9	10.2
PEAD-A24AA7	19.6	10.8
PEAD-A30AA7	19.1	10.8
PEAD-A36AA7	19.1	9.9
PEAD-A42AA7	16.1	10
PCA-A24KA7	21.2	10.8
PCA-A30KA7	19.6	10
PCA-A36KA7	19.1	10.2
PCA-A42KA7	17.6	10.2
PKA-A12HA7	20.8	10.2
PKA-A18HA7	18.5	10.2
PKA-A24KA7	21.4	11
PKA-A30KA7	19.8	9.9
PKA-A36KA7	18.8	9.2
PVA-A12AA7	21.4	10.3
PVA-A18AA7	20.2	10.4
PVA-A24AA7	20.5	9.3
PVA-A30AA7	19	10
PVA-A36AA7	19.3	9.5
PVA-A42AA7	18	9.3
PLA-A12EA7	27	12.8
PLA-A18EA7	24.6	11
PLA-A24EA7	24.2	11.2
PLA-A30EA7	22.8	11.6
PLA-A36EA7	21.8	10.4
PLA-A42EA7	21	9.3
PEAD-A12AA7	21.1	10.2
PEAD-A18AA7	19.9	10.2
PEAD-A24AA7	19.6	10.8
PEAD-A30AA7	19.1	10.8
PEAD-A36AA7	19.1	9.9
PEAD-A42AA7	16.1	10
PCA-A24KA7	21.2	10.8
PCA-A30KA7	19.6	10
PCA-A36KA7	19.1	10.2
PCA-A42KA7	17.6	10.2
PKA-A12HA7	20.8	10.2
PKA-A18HA7	18.5	10.2
PKA-A24KA7	21.4	11
PKA-A30KA7	19.8	9.9
PKA-A36KA7	18.8	9.2
PVA-A12AA7	21.4	10.3

PVA-A18AA7	20.2	10.4
PVA-A24AA7	20.5	9.3
PVA-A30AA7	19	10
PVA-A36AA7	19.3	9.5
PVA-A42AA7	18	9.3

*Not applicable to PUY models

1.3 Delivery, Storage and Handling

A. Unit shall be stored and handled according to the manufacturer's recommendations.

B. The controller shall be shipped separately and shall be able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

Part 2 – Warranty

2.1 The units shall have a manufacturer's parts and defects warranty for a period five (5) year from date of installation. The compressor shall have a warranty of seven (7) years from date of installation. If, during this period, any part should fail to function properly due to defects in workmanship or material, it shall be replaced or repaired at the discretion of the manufacturer. This warranty does not include labor.

2.2 Manufacturer shall have over thirty (30) years of continuous experience in the U.S. market.

Part 3 Outdoor Unit Design:

3.1 General

- The outdoor unit shall be compatible with the five different types of indoor units (PCA - ceiling suspending, PEAD – horizontal ducted, PKA - wall mounted, PLA - ceiling cassette, PVA – ducted air handler). The connected indoor unit shall be of the same capacity as the outdoor unit. *Option: Indoor unit Twinning is allowed as described in 3.02 below.*
    - Models PUZ(Y)-A24NHA7 and PUZ(Y)-A36NKA7 shall have the option to connect to two, one-half capacity, indoor units (PKA, PEAD, PLA and/or PVA type), within the same confined space, to improve air distribution (total combined indoor unit capacity shall be equal to that of the outdoor unit).
- The outdoor unit shall be equipped with an electronic control board that interfaces with the indoor unit to perform all necessary operation functions.
- The outdoor unit shall be capable of cooling operation down to ambient temperature of 0°F for heat pump systems and -20°F (-29°C) for cooling only systems without additional low ambient controls (optional wind baffle shall be required).
- The outdoor unit shall be able to operate with a maximum height difference of 100 feet (30 meters) between indoor and outdoor units.
- System shall operate at up to a maximum refrigerant tubing length as per table below between indoor and outdoor units without the need for line size changes, traps or additional oil:

PUZ-A12NKA7	100 ft (30m)
PUZ-A18NKA7	
PUZ-A24NHA7	165 ft (50m)
PUZ-A30NHA7	
PUZ-A36NKA7	
PUZ-A42NKA7	
PUY-A12NKA7	165ft (50m)
PUY-A18NKA7	
PUY-A24NHA7	225 ft (69m)
PUY-A30NHA7	
PUY-A36NKA7	
PUY-A42NKA7	

- Models PUZ(Y)-A12/18/24/30NH/KA7 shall be pre-charged for a maximum of 70 feet (21 meters) of refrigerant tubing – PUZ(Y)-A36/42NKA7 for 100 feet (30 meters).
- The outdoor unit shall be completely factory assembled, piped, and wired. Each unit must be test run at the factory.
- Outdoor unit sound level shall not exceed:

Outdoor Unit Sound Level		
Model Numbers	**Cooling**	**Heating**
PUZ(Y)-A12NKA7	44 dB(A)	46 dB(A)
PUZ(Y)-A18NKA7	44 dB(A)	46 dB(A)
PUZ(Y)-A24NHA7	47 dB(A)	48 dB(A)
PUZ(Y)-A30NHA7	47 dB(A)	48 dB(A)
PUZ(Y)-A36NKA7	52 dB(A)	53 dB(A)
PUZ(Y)-A42NKA7	52 dB(A)	53 dB(A)

3.2 Cabinet

3.2.1 The casing shall be constructed from galvanized steel plate, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection and have a Munsell 3Y 7.8/1.1 finish.
3.2.2 Mounting feet shall be provided and shall be welded to the base of the cabinet and be of sufficient size to afford reliable equipment mount and stability.
3.2.3 Easy access shall be afforded to all serviceable parts by means of removable panel sections.
3.2.4 The fan grill shall be of ABS plastic.
3.2.5 Cabinet mounting and construction shall be sufficient to withstand 155 MPH wind speed conditions for use in Hurricane condition areas. Mounting, base support, and other installation to meet Hurricane Code Conditions shall be by others.

3.3 Fan

3.3.1 Models PUZ(Y)-A12/18/24/30NH/KA7 shall be furnished with a single DC fan motor. Model PUZ(Y)-A36/42NH/KA7 shall have two (2) DC fan motors.
3.3.2 The fan blade(s) shall be of aerodynamic design for quiet operation, and the fan motor bearings shall be permanently lubricated.
3.3.3 The outdoor unit shall have horizontal discharge airflow. The fan shall be mounted in front of the coil, pulling air across it from the rear and dispelling it through the front. The fan shall be provided with a raised guard to prevent external contact with moving parts.

3.4 Coil

3.4.1 The L shaped condenser coil shall be of copper tubing with flat aluminum fins to reduce debris build up and allow maximum airflow. The coil shall be protected with an integral metal guard.
3.4.2 Refrigerant flow from the condenser shall be controlled by means of an electronic linear expansion valve (LEV) metering device. The LEV shall be control by a microprocessor controlled step motor.
3.4.3 All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ACR Type, meeting ASTM B280 requirements, individually insulated in twin-tube, flexible, closed-cell, CFC-free (ozone depletion potential of zero), elastomeric material for the insulation of refrigerant pipes and tubes with thermal conductivity equal to or better than 0.27 BTU-inch/hour per Sq Ft / °F, a water vapor transmission equal to or better than 0.08 Perm-inch and superior fire ratings such that insulation will not contribute significantly to fire and up to 1" thick insulation shall have a - Flame-Spread Index of less than 25 and a Smoke-development Index of less than 50 as tested by ASTM E 84 and CAN / ULC S-102.

3.5 Compressor

3.5.1 The compressor for models PUZ(Y)-A12/18/24/30/36/42NH/KA7 shall be a DC twin-rotor rotary compressor with Variable Speed Inverter Drive Technology.

3.5.2 The compressor shall be driven by inverter circuit to control compressor speed. The compressor speed shall dynamically vary to match the room load for significantly increasing the efficiency of the system which shall result in significant energy savings.
3.5.3 To prevent liquid from accumulating in the compressor during the off cycle, a minimal amount of current shall be automatically, intermittently applied to the compressor motor windings to maintain sufficient heat to vaporize any refrigerant. No crankcase heater is to be used.
3.5.4 The outdoor unit shall have an accumulator and high pressure safety switch. The compressor shall be mounted to avoid the transmission of vibration.

3.6 Electrical
3.6.1 The electrical power of the unit shall be 208volts or 230 volts, single phase, 60 hertz. The unit shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.
3.6.2 Power for the indoor unit shall be supplied from the outdoor unit via Mitsubishi Electric A-Control using three (3) fourteen (14/16) gauge AWG conductors plus ground wire connecting the units.
3.6.3 The outdoor unit shall be controlled by the microprocessor located in the indoor unit.
The control signal between the indoor unit and the outdoor unit shall be pulse signal 24 volts DC.
3.6.4 The unit shall have Pulse Amplitude Modulation circuit to utilize 98% of input power supply.

3.7 Operating Range:

Operating Range		Indoor Air Intake Temperature	Outdoor Air Intake Temperature
Cooling	Maximum	D.B. 90°F (32°C) W.B. 73°F (23°C)	D.B. 115°F (46°C)
	Minimum	D.B. 66°F (19°C) W.B. 59°F (15°C)	D.B. PUZ: 0°F (-18°C)* / PUY: -20°F (-29°C)*
Heating**	Maximum	D.B. 82°F (28°C)	D.B. 70°F (21.1°C) W.B. 59°F (15°C)
	Minimum	D.B. 50°F (10°C)	D.B. 12°F/-4°F

* Requires wind baffle – without wind baffle: D.B. 23°F (-5°C)
** Does not apply to PUY models

3.7.1 Unit shall be able to provide 100% cooling capacity when operating at PUZ: 0°F (-18°C)* / PUY: -20°F outdoor air temperature when a wind baffle is used.

Part 4 - Indoor Unit Selection and Specification

4.1 PCA Ceiling Suspended Type

4.1.1 General:

- The Ceiling Suspended type indoor unit shall be factory assembled, wired and tested. Contained within the unit shall be all factory wiring and internal piping, control circuit board and fan motor.
- The unit, in conjunction with the remote controller, shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be purged with dry air before shipment from the factory.

4.1.2 Cabinet:

- The casing shall be ABS plastic and have a Munsell 6.4Y 8.9/0.4 white finish. Cabinet shall be designed for suspension mounting from above and horizontal operation. Indoor unit shall have removable mounting brackets. A mounting template with suspension bolt locations shall be furnished with indoor unit. Mounting bolts or threaded rod of 3/8" diameter shall be used to suspend unit and unit shall not require direct contact with ceiling or panel for proper operation. Mounting support shall be of sufficient strength and design to support full weight of indoor unit.
- The rear cabinet panel shall have knock-out provisions for a field installed filtered 4-5/16 diameter ventilation air intake connection.

4.1.3 Fan:

- The indoor unit fan shall have multiple high performance, double inlet, forward curve sirocco fans driven by a single motor.

- The fans shall be statically and dynamically balanced and run on a motor with permanently lubricated bearings.
- The indoor fan shall consist of four (4) speeds: Low, M1, M2, and Hi plus AUTO fan setting. The fan shall have a selectable Auto fan setting that will adjust the fan speed based on the difference between controller set-point and sensed space temperature.

Vane:

- There shall be a motorized horizontal vane to automatically direct air flow in a horizontal and downward direction for uniform air distribution. The horizontal vane shall provide a choice of five (5) vertical airflow patterns selected by remote control: 100% horizontal flow, 80% horizontal flow (plus 20% downward airflow), 60% horizontal airflow (plus 40% downward airflow), 40% horizontal airflow (plus 60% downward airflow), and swing.
- The horizontal vane shall significantly decrease downward air resistance for lower sound levels, and shall close the outlet port when operation is stopped. There shall also be a set of vertical vanes to provide horizontal swing airflow movement selected by remote control.

4.1.4 Filter:

- Return air shall be filtered by means of an easily removable, washable filter. [*An optional MERV 8 filter shall be furnished*]

4.1.5 Coil:

- The evaporator coil shall be of nonferrous construction with pre-coated aluminum strake fins on copper tubing. The multi-angled heat exchanger shall have a modified fin shape that reduces air resistance for a smoother, quieter airflow. All tube joints shall be brazed with PhosCopper or silver alloy. The coils shall be pressure tested at the factory. A condensate pan and drain shall be provided under the coil. An optional drain pan level switch (DPLS2), designed to connect to the control board, shall be provided if required, and installed on the condensate pan to prevent condensate from overflowing. [*An optional drain lift mechanism, capable of lifting condensate 23-5/8"(600mm) above the drain pan, shall be provided*]

4.1.6 Electrical:

- The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts.
- The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system. For A-Control, a three (3) conductor AWG-14/16 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

4.2 Wall Mounted Type

4.2.1. General:

- The wall-mounted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, and a test run switch. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory.

4.2.2 Cabinet:

- All casings, regardless of model size, shall have the same white finish
- Multi directional drain and refrigerant piping offering four (4) directions for refrigerant piping and two (2) directions for draining are required.
- There shall be a separate back plate which secures the unit firmly to the wall.

4.2.3. Fan:

- The indoor fan shall be statically and dynamically balanced to run on a single motor with permanently lubricated bearings.
- A manual adjustable guide vane shall be provided with the ability to change the airflow from side to side (left to right).
- A motorized air sweep louver shall provide an automatic change in airflow by directing the air up and down to provide uniform air distribution.

4.2.3 Filter:

- Return air shall be filtered by means of an easily removable, washable filter.

4.2.5 Coil:

- The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
- The coils shall be pressure tested at the factory.

4.2.6 Electrical:

- The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system. For A-Control, a three (3) conductor AWG-14/16 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

4.3 4-Way Ceiling- Cassette With Grille

4.3.1 General:

- The ceiling-cassette indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, an auto restart function, an emergency operation function, a test run switch, and the ability to adjust airflow patterns for different ceiling heights. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

4.3.2. Cabinet:

- The cabinet panel shall have provisions for a field installed filtered outside air intake.
  Branch ducting shall be allowed from cabinet.
  Four-way grille shall be fixed to bottom of cabinet allowing two, three or four-way blow.
  The grille vane angles shall be individually adjustable from a wired remote controller to customize the airflow pattern for the conditioned space

4.3.3 Fan:

- The indoor fan shall be an assembly with a statically and dynamically balanced turbo fan direct driven by a single motor with permanently lubricated bearings.
- The indoor unit shall include an AUTO fan setting capable of maximizing energy efficiency by adjusting the fan speed based on the difference between controller set-point and space temperature. - - The indoor fan shall be capable of five (5) speed settings, Low, Mid1, Mid2, High and Auto.
- The indoor unit shall have an adjustable air outlet system offering 4-way airflow, 3-way airflow, or 2-way airflow.
- The indoor unit fan logic must include multiple setting that can be changed to provide optimum airflow based on ceiling height and number of outlets used.
- The indoor unit vanes shall have 5 fixed positions and a swing feature that shall be capable of automatically swinging the vanes up and down for uniform air distribution.

- The vanes shall have an Auto-Wave selectable option in the heating mode that shall randomly cycle the vanes up and down to evenly heat the space.
- Grille shall include a factory-installed "3D i-see" sensor, to work in conjunction with indoor unit control sequence to prevent unnecessary cooling or heating in unoccupied areas of the zone without decreasing comfort levels. Sensor must detect occupancy (not simply motion) and location of occupants by measuring size & temperature of objects within a 39' detecting diameter (based on 8.8ft mounting height) with 1,856 or more measuring points.

4.3.4 Filter:

- Return air shall be filtered by means of a long-life washable filter

4.3.5 Coil:

- The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
- The coils shall be pressure tested at the factory.
- The unit shall be provided with an integral condensate lift mechanism that will be able to raise drain water 33 inches above the condensate pan.

4.3.6 Electrical:

- The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system.
- For A-Control, a three (3) conductor AWG-14/16 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

4.4 Medium Static Ceiling-Concealed Horizontal Ducted Indoor Unit

4.4.1 General:

- The ceiling-concealed ducted indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, electronic modulating linear expansion device, control circuit board and fan motor.
- The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function.
- Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in plenums in accordance with UL1995 ed 4.

4.4.2 Cabinet:

- The unit shall be ceiling-concealed, ducted—with a 2-position, field adjustable return and a fixed horizontal discharge supply.

4.4.3 Fan:

- Indoor unit shall feature multiple external static pressure settings ranging from 0.14 to 0.60 in. WG.
- The indoor unit fan shall be an assembly with statically and dynamically balanced Sirocco fan(s) direct driven by a single motor with permanently lubricated bearings.
- The indoor fan shall consist of three (3) speeds, High, Mid, and Low plus the Auto-Fan function

4.4.4 Filter:

- Return air shall be filtered by means of a standard factory installed return air filter.
- Optional return filter box (rear or bottom placement) with high-efficiency filter as noted on equipment schedule.
    - Optional Filter Frame and Filter:

- Filter frame shall be constructed of 20 gauge G-60 galvanized steel. Knurled thumb screws on access door allow filter replacement. Foam gasket provides air-tight connection to indoor unit and access door. Filter frame shall be configurable for rear or bottom return
- Filter shall be rated MERV 13 when tested in accordance with ANSI/ASHRAE 52.2 Standard Rated Class 2 under U.L. Standard 900.

4.4.5 Coil:

- The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
- The coils shall be pressure tested at the factory.
- Coil shall be provided with a sloped drain pan. Units without sloped drain pans which must be installed cockeyed to ensure proper drainage are not allowed.
- The unit shall be provided with an integral condensate lift mechanism able to raise drain water 27 inches above the condensate pan.

4.4.6 Electrical:

- The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system.
- For A-Control, a three (3) conductor AWG-14/16 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

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4.5 Multi-position Air Handler

4.5.1 General:

- The multi-position indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function. Indoor unit and refrigerant pipes shall be charged with dehydrated air before shipment from the factory. The unit shall be suitable for use in air handling spaces in accordance with Section 18.2 of UL 1995 4th Edition, be tested in accordance with ANSI/ASHRAE 193 and have less than 1% air leakage at maximum airflow setting.

4.5.2 Cabinet:

- The cabinet shall include a fixed bottom return, a fixed vertical discharge supply and be pre-painted, pre-insulated, 22 gauge galvanized steel or utilize black ZAM steel.

4.5.3 Fan:

- The indoor unit fan shall be an assembly with a single, statically and dynamically balanced direct drive fan with a high efficiency DC motor with permanently lubricated bearings.
- The fan shall have 3-speeds with the capability to operate between 0.3-0.8 In.WG selectable.

4.5.4 Filter:

- The unit shall have a 1” filter rack with a reusable filter.

4.5.5 Coil:

- The indoor coil shall be of nonferrous construction with smooth plate fins on copper tubing. The tubing shall have inner grooves for high efficiency heat exchange. All tube joints shall be brazed with phos-copper or silver alloy.
- The coils shall be pressure tested at the factory.

4.5.6 Electrical:

- The electrical power of the unit shall be 208 volts or 230 volts, 1 phase, 60 hertz. The system shall be capable of satisfactory operation within voltage limits of 198 volts to 253 volts. The power to the indoor unit shall be supplied from the outdoor unit, using the Mitsubishi Electric A-Control system.
- For A-Control, a three (3) conductor AWG-14/16 wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units.

Part 5 - System Control

5.1 System Control:

- The control system shall consist of a minimum of two (2) microprocessors, one on each indoor and outdoor unit, interconnected by a single non-polar two-wire cable. The microprocessor located in the indoor unit shall have the capability of monitoring return air temperature and indoor coil temperature, receiving and processing commands from a wireless or wired controller, providing emergency operation and controlling the outdoor unit. The control signal between the indoor and outdoor unit shall be pulse signal 24 volts DC. Indoor units shall have the ability to control supplemental heat via connector CN24 and a 12 VDC output.

5.1.1 For A-Control, a three (3) conductor 14 gauge AWG wire with ground shall provide power feed and bi-directional control transmission between the outdoor and indoor units. . If code requires a disconnect mounted near the indoor unit, a TAZ-MS303 3-Pole Disconnect shall be used – all three conductors must be interrupted.

5.1.2 The system shall be capable of automatic restart when power is restored after power interruption. The system shall have self-diagnostics ability, including total hours of compressor run time. Diagnostics codes for indoor and outdoor units shall be displayed on the wired controller panel.

5.1.3 The indoor unit control board shall have auxiliary control contact connectors to provide:

Function / Model	PCA	PEA / PEAD	PKA	PLA
CN-2L – Lossnay Control	X	X	X	X
CN-24(152) Back-up Heat	X	X	X	X
CN-32 – Remote Switch	X	X	X	X
CN-51 – Central Control	X	X	X	X
CN-105 – IP Terminal	X	X	X	X

X = Included

5.2 Remote Controllers

- All remote controllers need to be ordered separately from the unit.

5.2.1 Wireless, wall mounted remote controller kit (MHK1)

- The Wireless, wall mounted remote controller kit (MHK1) shall consist of a wireless, wall mounted controller (MRCH1), a wireless receiver (MIFH1) and a cable (MRC1) to connect the receiver to the indoor unit. The controller shall be white in color with a light-green LCD display and a backlight feature. The MRCH1 shall consist of four Function buttons below the display, and Increase/Decrease Set Temperature buttons and a Hold button to the right of the display. The controller shall have a built-in temperature sensor and a battery holder, using two AA alkaline batteries. Temperature shall be displayed in either Fahrenheit (°F) or Celsius (°C), and temperature changes shall be by increments of 1°F (0.5°C).
- The MHK1 uses Honeywell RedLINK™ technology, and the wireless receiver is specially designed for Mitsubishi units. Linking to the wireless network shall be done from the receiver and from the remote controller. There shall not be any interference with other wireless devices or neighboring RedLINK™ products. Communication shall be automatically restored after power resumes and after batteries are replaced.
- The basic functions are:

Wireless, Wall Mounted Remote Controller Kit (MHK1)	
Item	**Description**
Number of Units Controllable	1 unit
ON/OFF	Run and stop operation
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat.
Temperature Setting (Range and modes depend on connected unit model)	Controller general setpoint temperature range: Cool/Dry: 50°F-99°F Heat: 40°F-90°F Auto: 50°F-90°F Controller temperature range when connected to the PCA/PUZ system: Cool/Dry: 67°F-87°F Heat: 63°F-83°F Auto: 67°F-83°F
Fan Speed Setting (Range and modes depend on connected unit model)	Hi/Mid-2/Mid-1/Low/Auto
Air Flow Direction Setting (Air flow direction settings depend on the unit model)	Air flow direction angles 100%-80%-60%-40%, Swing.
Dual Setpoint Control	Separate heating and cooling setpoints. Adjustable deadband from 2ºF to 8ºF. Automatically adjusts setpoints to ensure deadband. System changeover with dual setpoints.
Scheduling	5-2 and 5-1-1 schedules Separate Heat/Cool schedules Allows operation in AUTO with Scheduling setbacks and dual setpoint Simple temperature setting can be done up to 4 times one day in the week. The time can be set by the 15-minute interval. Remote controller shall be programmable as either a residential controller, which will offer residential scheduling options only; or as a commercial controller, which will offer commercial scheduling options only.
Optimal Start	Set occupied time and desired set temperature Remote controller learns when to start warm up or cool down so that space is at set temperature at start of occupied time
Operating Conditions Display	Setpoint and room temperature. Default sensing is at the remote controller. Installer setting to select at return air sensor. Automatically switches to return air sensor if communication to remote controller is lost Outdoor temperature and humidity (Requires optional air sensor MOS1)
Additional Functions	Hold Function Temporary Schedule Override Reset to factory default

Wireless, Wall Mounted Remote Controller Kit (MHK1)	
Item	**Description**
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed
Auto Lock Out Function	Setting/releasing of simplified locking for remote control settings can be performed. • Locking of all settings • Locking of ON/OFF setting • Locking of system setting (Heat, Cool, Off, Auto, etc.) • Locking of fan setting • Locking of temperature setting • Locking of Clock/Day/Schedule

- Two optional devices can be used with the MHK1 controller kit. These are, an outdoor air sensor (MOS1), which allows the display of the outdoor temperature and humidity, and a portable central controller (MCCH1), which can control up to 16 zones with On/Off, set temperature, heat/cool mode selection and auto-off timer.

5.2.2 Wired MA Remote Controller (PAR-33MAA)

- The Backlit Wired MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group).
- The Backlit Wired MA Remote Controller shall only be used in same group with Wireless MA Remote Controllers (PAR-FL32MA-E / PAR-FA32MA-E) or with other Backlit Wired MA Remote Controllers (PAR-33MAA), with up to two remote controllers per group.

Wired MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat. Operation modes vary depending on the air conditioner unit. Auto mode is available for the R2/WR2-Series only.	Each Group	Each Group
Temperature Setting	Sets the temperature from 67°F – 87°F depending on operation mode and indoor unit. Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Vane, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing a button lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display “test run”).	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group
Schedule	Set up to 8 operations per day, 7 days per week. Operations include time on/off, mode and room temperature set point.	Each Group	Each Group

5.2.3. Wireless Remote Controller Kit (PAR-SL93B-E)

- The Wireless Remote Controller Kit (PAR-SL93B-E) shall consist of a hand held wireless remote controller and a wireless receiver. The controller shall perform input functions necessary to operate the system.
- The wireless receiver shall be plug and fit compatible with the indoor unit.
- The controller shall have a Power On/Off switch, Mode Selector – Cool, Dry, Heat, Auto, and Powerful Modes - Temperature Setting, Timer Control, Fan Speed Select and Horizontal and Vertical Vane control selector.
- The indoor unit shall perform Self-diagnostic Function and Check Mode switching. Temperature changes shall be in 1ºF (0.5ºC) increments with a setting range of 61 to 88ºF (16 to 31ºC).

5.2.4 Simple MA Remote Controller (PAC-YT53CRAU):

- The Backlit Simple MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group).

- The Backlit Simple MA Remote Controller shall only be used in same group with Wireless MA Remote Controllers (PAR-FL32MA-E / PAR-FA32MA-E) or with other Backlit Simple MA Remote Controllers (PAC-YT53CRAU), with up to two remote controllers per group.

Simple MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation Mode	Switches between Cool/Drying/Auto/Fan/Heat/Setback. Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.	Each Group	Each Group
Temperature Setting	Sets the temperature from 40°F – 95°F depending on operation mode and indoor unit. Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing the button lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display “test run”).	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group

5.2.5 Touch MA Remote Controller (PAR-CT01MAU-SB):

- The Backlit Touch MA Remote Controller shall be capable of controlling up to 16 indoor units (defined as 1 group).
- The Backlit Touch MA Remote Controller shall only be used in same group with Wireless MA Remote Controllers (PAR-FL32MA-E / PAR-FA32MA-E), with other Backlit Simple MA Remote Controllers (PAC-YT53CRAU), or with other Backlit Touch MA Controllers (PAR-CT01MAU-SB) with up to two remote controllers per group.

Touch MA Remote Controller			
Item	**Description**	**Operation**	**Display**
ON/OFF	Run and stop operation for a single group	Each Group	Each Group
Operation	Switches between Cool/Drying/Auto/Fan/Heat/Setback.	Each Group	Each Group

Mode	Operation modes vary depending on the air conditioner unit. Auto and Setback mode are available for the R2/WR2-Series only.		
Temperature Setting	Sets the temperature from 32°F – 104°F depending on operation mode and indoor unit. Separate COOL and HEAT mode set points available depending on central controller and connected mechanical equipment.	Each Group	Each Group
Fan Speed Setting	Available fan speed settings depending on indoor unit.	Each Group	Each Group
Air Flow Direction Setting	Air flow direction settings vary depending on the indoor unit model.	Each Group	Each Group
Permit / Prohibit Local Operation	Individually prohibit operation of each local remote control function (Start/Stop, Change operation mode, Set temperature, Reset filter). *1: Centrally Controlled is displayed on the remote controller for prohibited functions.	N/A	Each Group *1
Display Indoor Unit Intake Temp	Measures and displays the intake temperature of the indoor unit when the indoor unit is operating.	N/A	Each Group
Display Backlight	Pressing the screen lights up a backlight. The light automatically turns off after a certain period of time. (The brightness settings can be selected from Bright, Dark, and Light off.)	N/A	Each Unit
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed	N/A	Each Unit
Test Run	Operates air conditioner units in test run mode. *2 The display for test run mode will be the same as for normal start/stop (does not display “test run”).	Each Group	Each Group *2
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system that has one LOSSNAY unit.	Each Group	N/A
Set Temperature Range Limit	Set temperature range limit for cooling, heating, or auto mode.	Each Group	Each Group
Display Color Change	Controller can allow for the user to change the color of the text and/or background.	Each Controller	N/A

5.2.6 IT Extender (PAC-WHS01IE-E):

- The IT Extender is increases the distance of data traveling by the CN105 connection from 3 feet to 50 feet.
- The IT Extender can only be used on one indoor unit.

IT Extender			
Item	**Description**	**Operation**	**Display**
Operation Mode	Transmits data from controller to indoor unit.	Each Group	Each Group

5.2.7 Wireless Temperature & Humidity Sensor for kumo Cloud (PAC-USWHS003-TH-1:

- The Wireless Sensor transmits Temperature and Humidity information to the indoor unit.
- Can be used in place of thermostat if requested.
- Uses Bluetooth Low Energy with a range of 33ft (10m). Has a 1 year battery life with push notifications associated with any errors.

Wireless Temperature & Humidity Sensor for kumo Cloud			
Item	**Description**	**Operation**	**Display**
Operation Mode	Transmits data from controller to indoor unit.	Each Group	Each Group
Discover	Allows the Wireless sensor to be connected to the kumo cloud	Each Group	Each Group

Mode	app. A series of beeps indicates that the wireless sensor is in discover mode.		
Push Notifications	Can send the user information through the kumo cloud app. Includes error messages, filter replacement information, and battery change notifications.	Each Group	Each Group

5.2.8 kumo Station (PAC-WHS01HC-E)

- 4-Channel equipment controller with Outside Air Temperature monitoring
- Manages and stages heat pump and supplemental heat.
- Able to be integrated through kumo cloud.

kumo Station			
Item	**Description**	**Operation**	**Display**
Operation Mode	Transmits data from controller to indoor unit.	Each Group	Each Group
Discover Mode	Allows the Wireless sensor to be connected to the kumo cloud app. A series of beeps indicates that the wireless sensor is in discover mode.	Each Group	Each Group
Push Notifications	Can send the user information through the kumo cloud app. Includes error messages, filter replacement information, and battery change notifications.	Each Group	Each Group

5.2.9 Honeywell Outdoor Air Temperature Sensor (PN C7089U1006)

- Sensor able to detect ambient temperature and humidity.
- Integrates directly with kumo station to control system changeover.

Honeywell Outdoor Air Temperature Sensor (PN C7089U1006)			
Item	**Description**	**Operation**	**Display**
Operation Mode	Transmits data from sensor to kumo Station.	Each Group	Each Group

5.2.10 The microprocessor located in the indoor unit shall have the capability of sensing return air temperature and indoor coil temperature, receiving and processing commands from the wireless or a wired controller, providing emergency operation and controlling the outdoor unit.

5.2.11 Indoor units shall be equipped with an optional "i-see® Sensor" kit, providing i-See® Sensor technology providing uniform temperature detection and automatically response to adjust the set temperature to provide uniform comfort from floor to ceiling.