Section 238126.13 – Mini-Split Systems

Capacity Range: 0.75 to 2.0 Ton Nominal

Mitsubishi Model Number: MSZ-FH /MUZ-FH (wall-mount) inverter heat pump series.

Part 1 – General

1.01 System Description

A. The heat pump air conditioning system shall be a Mitsubishi Electric MSZ-FH split system series. The system shall consist of a slim silhouette, compact, wall mounted indoor fan coil section with wireless remote controller and a slim silhouette horizontal discharge outdoor unit which shall be of an inverter driven heat pump design.

B. Indoor unit model numbers may be MSZ-FH06NA, MSZ-FH09NA, MSZ-FH12NA, MSZ-FH15NA, and MSZ-FH18NA2. Outdoor unit model numbers will be MUZ-FH06NAH, MUZ-FH09NAH-1, MUZ-FH12NAH-1, MUZ-FH15NAH, and MUZ-FH18NAH2 for single-zone (1:1) systems

1.02 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 Canadian Electrical Code (C.E.C.).
C. The units shall be rated in accordance with Air-conditioning, Heating, and Refrigeration Institute's (AHRI) Standard 240 and bear the AHRI 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. System efficiency shall meet or exceed 21 SEER to 33.1 SEER when part of a 1:1 (indoor/outdoor) system.
G. Delivery, Storage and Handling
    1. Unit shall be stored and handled according to the manufacturer's recommendations.
    2. The hand held wireless controller shall be shipped inside the carton with the indoor unit and able to withstand 105°F storage temperatures and 95% relative humidity without adverse effect.

Part 2 – Warranty

2.01 The units shall have a manufacturer's parts and defects warranty for a period five (5) years from date of installation. The compressor shall have a warranty of seven (7) years from the same 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.

2.02 Manufacturer shall have over 30 years of continuous experience in the Canadian market.

Part 3 – Performance

3.01 Each system shall perform in accordance with the ratings shown in the table below.

3.02 Performance shall be based on 80°F DB, 67°F WB (27°C DB, 19°C WB) for the indoor unit and 95°F DB, 75°F WB (35°C DB, 23.9°C WB) for the outdoor unit.

3.03 Single-Zone One-to-One Product Table – Heating and Cooling

Outdoor unit model			MUZ-FH06NAH	MUZ-FH09NAH	MUZ-FH12NAH	MUZ-FH15NAH	MUZ-FH18NAH2
Capacity Rated (Minimum~Maximum)	Cooling 1	Btu/h	6,000 (1,700 ~ 9,000)	9,000 (1,700 ~ 12,000)	12,000 (2,500 ~ 13,600)	15,000 (6,450 ~ 19,000)	17,200 (6,450 ~ 21,000)
	Heating 47 1	Btu/h	8,700 (1,600 ~ 14,000)	10,900 (1,600 ~ 18,000)	13,600 (3,700 ~ 21,000)	18,000 (5,150 ~ 24,000)	20,300 (5,150 ~ 30,000)
Capacity Rated (Maximum)	Heating 17 2	Btu/h	5,900 (10,700)	6,700 (12,200)	8,000(13,600)	11,000 (18,000)	13,700 (20,300)
Power consumption Rated (Minimum~Maximum)	Cooling 1	W	315 (100 ~ 560)	560 (100 ~ 1,000)	870 (170 ~ 1,150)	1,200 (410 ~ 2,200)	1,375 (410 ~ 2,220)
	Heating 47 1	W	545 (110 ~ 1,270)	710 (110 ~ 1,470)	950 (280 ~ 2,300)	1,300 (430 ~ 3,360)	1,720 (430 ~ 3,390)
Power consumption Rated (Maximum)	Heating 17 2	W	500 (1,000)	600 (1,440)	720 (1,900)	1,020 (2,480)	1,320 (2,800)
EER 1 [SEER] 3	Cooling		19.1 [33.1]	16.1 [30.5]	13.8 [26.1]	12.5 [22.0]	12.5 [21.0]
HSPF IV 4	Heating		**NA:** 13.5	**NA:** 13.5	**NA:** 12.5	**NA:** 12.0	**NA2:** 12.0
			NAH: 12.5	**NAH:** 12.5	**NAH:** 11.5	**NAH:** 11.0	**NAH2:** 11.0
COP	Heating 1		4.68	4.50	4.20	4.06	3.46
Defrost method			Reverse cycle				

NOTE: Test conditions are based on AHRI 210/240.

1: Rating conditions (Cooling) — Indoor: 80°FDB, 67°FWB, Outdoor: 95°FDB, (75°FWB)
(Heating) — Indoor: 70°FDB, 60°FWB, Outdoor: 47°FDB, 43°FWB

2: (Heating) — Indoor: 70°FDB, 60°FWB, Outdoor: 17°FDB, 15°FWB

Operating Range		Indoor Air Intake Temperature	Outdoor Air Intake Temperature
Cooling	Maximum	D.B. 90°F (32.2°C) W.B. 73°F (22.7°C)	D.B. 115°F (46.1°C)
	Minimum	D.B. 67°F (19.4°C) W.B. 57°F (13.8°C)	D.B. 14°F (-10°C)
Heating	Maximum	D.B. 80°F (26.7°C) W.B. 67°F (19.4°C)	D.B. 75°F (23.8°C) W.B. 65°F (18.3°C)
	Minimum	D.B. 70°F (21.1°C) W.B. 60°F (15.6°C)	D.B. -13°F (25°C) W.B. -14°F (25.5°C)

Part 4 – Products

4.01: Indoor Unit

A. General:

The indoor unit shall be factory assembled, wired and run tested. Contained within the unit shall be all factory wiring, piping, control circuit board, fan and fan motor. The unit shall have a self-diagnostic function, 3-minute time delay mechanism, and an auto restart function after power interruption. Indoor unit shall be purged with dry air before shipment from factory.

B. Unit Cabinet:

1. The casing shall have a smooth front, white finish – Munsell 1.0Y 9.2/0.2.
2. Multi directional drain connection and refrigerant piping, offering three (3) direction pipe alignments for all refrigerant piping and two (2) direction pipe alignments for condensate draining shall be standard.
3. There shall be a separate, metal installation-plate that secures the indoor unit firmly to the wall. The installation-plate shall be securely attached to the wall using appropriate anchor method.

Installing contractor shall determine the best method and be responsible for proper mounting of the installation plate to the wall.

C. Fan:
1. The indoor unit fan shall be an assembly with a line-flow fan direct driven by a single motor.
2. The fan shall be statically and dynamically balanced and be powered by a motor with permanently lubricated bearing.
3. Dual manual adjustable guide vanes shall be provided with the ability to change the airflow from side to side (left to right) and independently up and down.
4. An integral, motorized, multi-position, horizontal air sweep flow louver shall provide for uniform air distribution, up and down. Five (5) positions plus Auto and Swing shall be provided, controlled from the remote controller for left and right vanes.
5. The indoor fan shall operate at one of five (5) speeds: Super High, High, Medium, Low, and Quiet plus Auto Fan Mode for models up to 18,000 BTU/h. All speeds shall be selected from the remote controller.
6. Indoor unit sound level shall not exceed:

Model / Speed		Super High	High	Medium	Low	Quiet
MSZ-FH06NA	Cooling	40 dB(A)	36 dB(A)	29 dB(A)	23 dB(A)	20 dB(A)
	Heating	40 dB(A)	36 dB(A)	29 dB(A)	23 dB(A)	20 dB(A)
MSZ-FH09NA	Cooling	40 dB(A)	36 dB(A)	29 dB(A)	23 dB(A)	20 dB(A)
	Heating	40 dB(A)	36 dB(A)	29 dB(A)	23 dB(A)	20 dB(A)
MSZ-FH12NA	Cooling	41 dB(A)	36 dB(A)	29 dB(A)	24 dB(A)	21 dB(A)
	Heating	42 dB(A)	36 dB(A)	29 dB(A)	24 dB(A)	21 dB(A)
MSZ-FH15NA	Cooling	44 dB(A)	39 dB(A)	35 dB(A)	31 dB(A)	27 dB(A)
	Heating	44 dB(A)	39 dB(A)	34 dB(A)	29 dB(A)	25 dB(A)
MSZ-FH18NA2	Cooling	47 dB(A)	39 dB(A)	35 dB(A)	31 dB(A)	27 dB(A)
	Heating	46 dB(A)	39 dB(A)	34 dB(A)	29 dB(A)	25 dB(A)

D. Filter:
1. Return air shall be filtered by means of easily removed, washable, Nano Platinum filter, Deodorizing-filter and an Anti-allergy enzyme filter – blue, pleated type.

E. Coil:
1. The indoor unit coil shall be of nonferrous construction with smooth plate fins on copper tubing.
2. The tubing shall have inner groves for high efficiency heat exchange.
3. All tube joints shall be brazed with phoscopper or silver alloy.
4. The coils shall be pressure tested at the factory.
5. A sloped, corrosion resistant condensate pan with drain shall be provided under the coil.

F. Electrical:
1. The unit electrical power shall be 208-230 volts, 1-phase, 60 hertz.
2. The system shall be equipped with A-Control – a system directing that the indoor unit be powered directly from the outdoor unit using a 3-wire, 14 ga. AWG connections plus ground.
3. The indoor unit shall have an output signal on connector CN24 for external supplemental electrical heat elements.

4.02**: Control**

A. General:

1. The unit shall have a wireless hand held remote controller to perform input functions necessary to operate the system.
2. The wireless hand held controller shall have a Power On/Off switch, Mode Selector – Auto, Cool, Heat, Dry Modes - Temperature Setting, Timer Control with Clock, Fan Speed Select and LEFT and RIGHT Vane / Airflow Direction selector. Controller shall have a programmable Smart Set button for pre-selected Temperature, Fan Speed, and Vane position settings.
3. The indoor unit shall perform Self-diagnostic Function and Check Mode switching.
4. Temperature changes shall be by 1ºF increments with a range of 61 - 88ºF (16-31ºC).
5. 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.
6. The system shall be capable of automatically restarting and operating at the previously selected conditions when the power is restored after power interruption.
7. The indoor unit shall have the option of either a wireless or wired wall mounted remote controller to be ordered separately:
   a. 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 set point temperature range: Cool/Dry: 50°F-99°F Controller temperature range when connected to the MSZ-FH/MUZ-FH system: Cool/Dry: 61°F-88°F
Fan Speed Setting (Range and modes depend on connected unit model)	Hi/Mid-2/Mid-1/Low/Auto

Wireless, Wall Mounted Remote Controller Kit (MHK1)	
Item	**Description**
Air Flow Direction Setting (Air flow direction settings depend on the unit model)	Air flow direction angles 100%-80%-60%-40%, Swing.
Dual Set point Control	Separate heating and cooling set points. Adjustable dead band from 2ºF to 8ºF. Automatically adjusts set points to ensure dead band. System changeover with dual set points.
Scheduling	5-2 and 5-1-1 schedules Separate Heat/Cool schedules Allows operation in AUTO with Scheduling setbacks and dual set point 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	Set point 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
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.

b. Wired Remote Controller (PAR-33MAA)
The Wired Remote Controller PAR-33MAA shall require a MAC-333IF-E MA Series Terminal Interface for communications. Interface will be mounted at the indoor unit. A two (2) conductor, stranded, 22 AWG twisted pair, jacketed, cable shall connect the MAC-333IF-E to the PAR-33MAA wall controller. Connection shall not be polarity sensitive and controller wire shall not exceed thirty-three (33) feet (10M) length.
The wired remote controller shall be approximately 5" x 5" in size and white in color with a light-green LCD display. The PAR-33MAA shall support a selection from multiple languages (Spanish, Russian, Swedish, English, Portuguese, Italian, or French) for display information. There shall be a built-in weekly timer with up to 8 pattern settings per day. The controller shall consist of an On/Off button, Increase/Decrease Set Temperature buttons, a Cool/Auto/Fan/Dry mode selector, a Timer Menu button, a Timer On/Off button, Set Time buttons, a Fan Speed selector, a Ventilation button, a Test Run button, and a Check Mode button. The controller shall have a built-in temperature sensor. 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 PAR-33MAA shall have the capability of controlling up to a maximum of 16 systems, as a group with the same mode and set-point for all, at a maximum developed control cable distance of 1,500 feet (500 meters).
The basic functions are:

Wired Remote Controller (PAR-33MAA)	
Item	**Description**
Number of Units Controllable	16 units as 1 group
ON/OFF	Run and stop operation
Operation Mode	Switches between Cool/Dry/Auto/Fan/Heat.
Temperature Setting (Range and modes depend on connected unit model)	Sets the set point temperature in the following range 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.
Weekly Scheduler	ON/OFF/Temperature setting can be done up to 8 times one day in the week. The time can be set by the 1-minute interval.

Wired Remote Controller (PAR-33MAA)	
Item	**Description**
Operating Conditions Display	Set point and room temperature. Sensing can be done at the remote controller or the indoor unit depending on the controller setting Liquid, discharge, indoor and outdoor pipe temperatures
Error	When an error is currently occurring on an air conditioner unit, the afflicted unit and the error code are displayed
Ventilation Equipment	Up to 16 indoor units can be connected to an interlocked system
Auto Lock Out Function	Setting/releasing of simplified locking for remote control buttons can be performed. • Locking of all buttons • Locking of all buttons except ON/OFF button

8. The indoor units shall be capable of working with single-zone or MXZ multi-zone outdoor units

4.03: **Outdoor Units**

General:

The MUZ-FH Series outdoor units are specifically designed to work with the MSZ-FH indoor units. The outdoor units must have a thermally fused powder coated finish. The outdoor unit shall be completely factory assembled, piped and wired. Each unit shall be run tested at the factory.

A. Unit Cabinet:

1. The casing shall be fabricated of galvanized steel, bonderized, finished with an electrostatically applied, thermally fused acrylic or polyester powder coating for corrosion protection. Assembly hardware shall be cadmium plated for weather resistance.
2. Cabinet color shall be Munsell 3Y 7.8/1.1.
3. Two (2) mild steel mounting feet, traverse mounted across the cabinet base pan, welded mount, providing four (4) slotted mounting holes shall be furnished. Assembly shall withstand lateral wind gust up to 155 MPH to meet applicable weather codes.

B. Fan:

1. The unit shall be furnished with a direct drive propeller type fan.
2. The outdoor unit fan motor shall be a direct current (DC) motor and have permanently lubricated bearings.
3. The fan motor shall be mounted for quiet operation.
4. The fan shall be provided with a raised guard to prevent contact with moving parts.
5. The outdoor unit shall have horizontal discharge airflow.
6. Outdoor unit sound level shall not exceed:

Model	Cooling	Heating
MUZ-FH06NAH	47 dB(A)	48 dB(A)
MSZ-FH09NAH	48 dB(A)	49 dB(A)
MSZ-FH12NAH	49 dB(A)	51 dB(A)
MSZ-FH15NAH	51 dB(A)	55 dB(A)
MSZ-FH18NAH2	52 dB(A)	55 dB(A)

C. Coil:

1. The outdoor unit coil shall be of nonferrous construction with lanced or corrugated plate fins on copper tubing.
2. The coil shall be protected with an integral metal guard.
3. Refrigerant flow from the outdoor unit shall be regulated by means of an electronically controlled, precision, linear expansion valve.
4. Outdoor unit shall be pre-charged with sufficient R-410a refrigerant for up to twenty five (25) feet of refrigerant piping for capacities up to 18,000 BTU/h.
5. All refrigerant lines between outdoor and indoor units shall be of annealed, refrigeration grade copper tubing, ARC 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.
6. All refrigerant connections between outdoor and indoor units shall be flare type using flare connectors for R410 refrigerant.

D. Compressor:

1. The compressor shall be a high performance, hermetic, inverter driven, variable speed, dual rotary type manufactured by Mitsubishi Electric Corporation.
2. The compressor motor shall be direct current (DC) type equipped with a factory supplied and installed inverter drive package.
3. The outdoor unit shall be equipped with an accumulator.
4. The compressor will be equipped with internal thermal overload protection.
5. The outdoor unit must have the ability to operate over the full capacity range with a maximum height difference of 40 feet and have refrigerant tubing length of 65 feet for capacities up to 12,000 BTU/h and a maximum height difference of 50 feet and have refrigerant tubing length of 100 feet for capacities 15,000 and 18,000 BTU/h between indoor and outdoor units.
6. There shall be no need for line size changes. Filters, sight glasses, and traps shall not be used, and no additional refrigerant oil shall be required.
7. The compressor shall be mounted so as to avoid the transmission of vibration.

E. Electrical:

1. The outdoor unit electrical power supply shall be 208/230 volts, 1-phase, 60 hertz.
2. The unit shall be capable of satisfactory operation within voltage limits of 187 volts to 253 volts.
3. The outdoor unit shall be controlled by microprocessors located in the indoor unit and outdoor unit. A 12 to 24 volt DC data stream shall communicate between the indoor and outdoor units providing all necessary information for full function control.