

Air Conditioners / Climatiseurs

PVA-AA12, 18, 24, 30, 36, 42, 48, & 60NL

INSTALLATION MANUAL

FOR INSTALLER

For use with R454B

For safe and correct use, please read this installation manual thoroughly before installing the air-conditioner unit.

ENGLISH

MANUEL D'INSTALLATION

POUR L'INSTALLATEUR

A utiliser avec le R454B

Veuillez lire le manuel d'installation en entier avant d'installer ce climatiseur pour éviter tout accident et vous assurer d'une utilisation correcte.

FRANÇAIS



Table of Contents

PVA-AA12, 18, 24, 30, 36, 42, 48, & 60NL	7
1. Dimensions	7
2. Inspect shipment	8
3. Safety precautions	8
3.1. Symbols used in the text	8
3.2. Before installation and electric work	9
3.3. Before getting started	10
3.4. Precautions for devices that use refrigerant	11
3.5. Before getting installed (or moved)-electrical work	11
3.6. Before starting the test run	12
4. Refrigerant R454B	12
4.1. Precautions for devices that use R454B	13
4.2. Installation of R454B system	14
4.2.1. Safety checks for systems using R454B	15
4.2.2. Minimum floor and conditioned space area requirements	16
4.3. Handling and service of R454B system	21
4.3.1. Removal and evacuation of refrigerant R454B	21
4.3.2. Purging the system with R454B	22
4.3.3. Charging R454B system	22
4.3.4. Recovery of R454B	23
4.4. Description and testing of leak mitigation functions	23
4.4.1. Testing procedure	23
4.5. Decommissioning of R454B system	24
4.6. Disposal of R454B	24
5. Indoor unit accessories	25
5.1. Accessory bag contents	25
5.2. Approved electric heater kits	25
6. Selecting an installation site	26
6.1. Site considerations	26
6.2. Suspended horizontal mounting	26
7. Combining indoor units with outdoor units	26
8. Installing the unit	27
9. Duct connection	27
10. Mount positions	28
10.1. Vertical installations	28
10.1.1. Side return	28
10.2. Horizontal right installations	29
10.3. Horizontal left installations	32
10.4. Downflow installations	39
10.5. Service note: servicing and replacing the refrigerant leak sensor	42
11. Air filter	42
12. Refrigerant piping work	43
12.1. Insulation	44
12.2. Piping size	45
13. Drain connections	45
14. Electrical wiring	47
14.1. Remote controllers	48
14.1.1. Control box diagram	49
14.2. Connecting line voltage	50

14.2.1. Electrical characteristics, function table	52
14.3. Condensate overflow safety switch connection (CN4F)	54
14.4. Changing blower external static pressure	55
14.5. ERV (Energy Recovery Ventilation)	56
14.6. Humidifier	57
15. Test run	58
15.1. Before test run	58
15.2. Test run	58
15.3. Self-check	58
15.4. Auto restart function	60
16. Appendix A: Quick Reference Worksheet for R454B	61
17. Appendix B - High altitude applications - capacity reduction factors	65

Table des matières

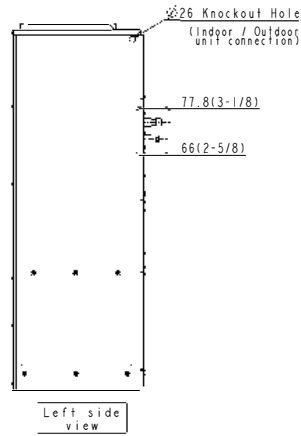
PVA-AA12, 18, 24, 30, 36, 42, 48, & 60NL	67
1. Dimensions	67
2. Inspection du matériel livré	68
3. Mesures de sécurité	68
3.1. Symboles utilisés dans le texte	68
3.2. Avant l'installation et les travaux électriques	69
3.3. Avant de commencer	70
3.4. Précautions pour les dispositifs qui utilisent un frigorigène	71
3.5. Avant l'installation (déplacement) – travaux électriques	72
3.6. Avant de commencer l'essai	73
4. Réfrigérant R454B	73
4.1. Précautions pour les dispositifs qui utilisent du frigorigène R454B	74
4.2. Installation du système R454B	76
4.2.1. Contrôles de sécurité pour les systèmes utilisant le R454B	77
4.2.2. Exigences minimales en matière de surface de plancher et d'espace conditionné	78
4.3. Manipulation et entretien du système R454B	83
4.3.1. Retrait et évacuation du réfrigérant R454B	83
4.3.2. Purge du système avec R454B	84
4.3.3. Chargement du système R454B	84
4.3.4. Restauration du R454B	85
4.4. Description et essai des fonctions de réduction des fuites	85
4.4.1. Procédure d'essai	86
4.5. Mise hors service du système R454B	86
4.6. Mise au rebut du R454B	87
5. Accessoires de l'appareil intérieur	88
5.1. Contenu du sac d'accessoires	88
5.2. Les trousse de chauffage électrique approuvées	88
6. Sélection de l'emplacement d'installation	89
6.1. Facteurs à prendre en compte concernant le site	89
6.2. Montage horizontal suspendu	89
7. Combinaison des appareils intérieurs et extérieurs	90
8. Installation de l'appareil	90
9. Raccordement des conduits	90
10. Positions de montage	91

10.1. Installations verticales	91
10.1.1. Retour latéral	91
10.2. Installation horizontale droite	92
10.3. Installations horizontales à gauche	95
10.4. Installation à flux descendant	103
10.5. Note de service : Intervention et remplacement du capteur de fuite de frigorigène	106
11. Filtre à air	106
12. Travaux de tuyauterie de frigorigène	107
12.1. Isolation	109
12.2. Taille des tuyaux	109
13. Raccordements de vidange	109
14. Câblage électrique	111
14.1. Contrôleurs à distance	112
14.1.1. Schéma du boîtier de commande	113
14.2. Raccordement de la tension d'alimentation	114
14.2.1. Caractéristiques électriques, tableau des fonctions	116
14.3. Connexion de l'interrupteur antidébordement du condensat (CN4F)	118
14.4. Modification de la pression statique extérieure de la soufflante	119
14.5. Ventilation de récupération d'énergie (ERV)	121
14.6. Humidificateur	122
15. Essai de fonctionnement	123
15.1. Avant l'essai de fonctionnement	123
15.2. Essai de fonctionnement	123
15.3. Autotest	124
15.4. Fonction d'autoredémarrage	125
16. Annexe A: Feuille de travail de référence rapide (exigence minimale de surface)	126
17. Annexe B - Applications en haute altitude - facteurs de réduction de la capacité	130

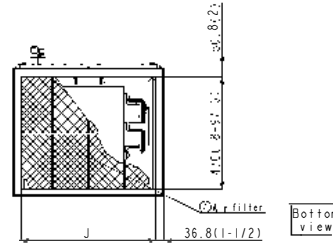
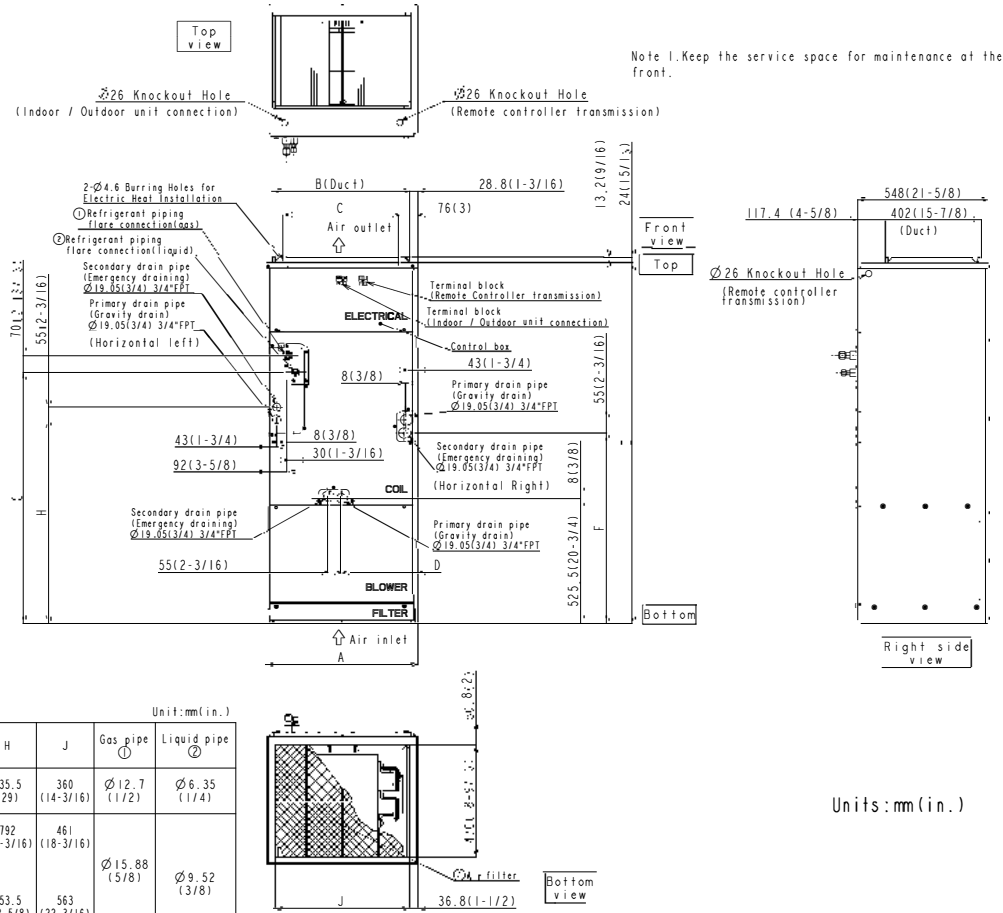
1. Dimensions

ENGLISH

Model Code	① Nominal Filter size	Duct Connection
12	508.6X406.4X25.4 (20X16X1)	376X402 (14-13/16X15-7/8)
18		
24	508X508X25.4 (20X20X1)	477X402 (18-13/16X15-7/8)
30		
36	508X609.6X25.4 (20X24X1)	579X402 (22-13/16X15-7/8)
42		
48		
60		



Model Code	Unit:mm(in.)										Gas pipe ①	Liquid pipe ②
	A	B	C	D	E	F	G	H	J			
12	432 (17)	376 (14-13/16)	281 (11-1/8)	224 (8-7/8)	1275 (50-1/4)	680 (26-13/16)	823 (32-7/16)	735.5 (29)	360 (14-3/16)		$\varnothing 12.7$ (1/2)	$\varnothing 6.35$ (1/4)
18												
24	534 (21)	477 (18-13/16)	382.6 (15-1/8)	266.5 (10-1/2)	1378 (54-1/4)	737 (29-1/16)	953.5 (37-9/16)	792 (31-3/16)	461 (18-3/16)			
30												
36											$\varnothing 15.88$ (5/8)	$\varnothing 9.52$ (3/8)
42	635 (25)	579 (22-13/16)	484.6 (19-1/8)	317.5 (12-1/2)	1511 (59-1/2)	798.5 (31-7/16)	1053 (41-1/2)	853.5 (33-5/8)	563 (22-3/16)			
48												
60											$\varnothing 19.05$ (3/4)	



Units:mm(in.)

2. Inspect shipment

These air handlers are completely factory assembled, and all components are performance tested. Each unit consists of a blower assembly, refrigerant coil, and controls in an insulated, galvanized steel factory enclosure. Knockouts are provided for electrical wiring entrance. Check the unit rating plate to confirm specifications are as ordered. Upon receipt

of equipment, carefully inspect it for possible damage. Take special care to examine the unit if the carton is damaged. If damage is found, it should be noted on the carrier's freight bill. Damage claims should be filed with the carrier immediately. Claims of shortages should be filed with the seller within 5 days.

3. Safety precautions

3.1. Symbols used in the text



WARNING

Describes precautions that should be observed to prevent danger of injury or death to the user.



CAUTION

Describes precautions that should be observed to prevent damage to the unit.



FLAMMABLE REFRIGERANT WARNING

This unit uses a flammable refrigerant. If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.



: Indicates a part which must be grounded.

Meaning of symbols displayed on unit			
	Refrigerant Safety Group A2L	Warning! (Risk of fire)	<u>This unit uses a flammable refrigerant.</u> If refrigerant leaks and comes in contact with fire or heating part, it will create harmful gas and there is risk of fire.
	Read the OPERATING INSTRUCTIONS carefully before operation.		
	Service personnel are required to carefully read the OPERATING INSTRUCTIONS and INSTALLATION MANUAL before operation.		

Meaning of symbols displayed on unit



Further information is available in the OPERATING INSTRUCTIONS, INSTALLATION MANUAL, and the like.

3.2. Before installation and electric work



WARNING

- Carefully read the labels affixed to the main unit.
- The unit must be installed by an authorized Dealer or properly trained technician.
 - Improper installation by the user may result in water leakage, electric shock, or fire.
- Install the air unit in a place that can withstand its weight.
 - Inadequate strength may cause the unit to fall down, resulting in injuries.
- Use the specified cables for wiring. Secure the connections so that the outside force of the cable is not applied to the terminals.
 - Inadequate connection and fastening may generate heat and cause a fire. Provide strain relief to wiring.
- Prepare for typhoons, hurricanes, earthquakes, etc., and install the unit at the specified place.
 - Improper installation may cause the unit to topple and result in injury.
- If the air conditioner must be repaired, consult the dealer.
 - If the unit is repaired improperly, water leakage, electric shock, or fire may result.
- Do not touch the heat exchanger fins.
 - Improper handling may result in injury.
- When handling the product, always wear protective equipment.
 - E.g.: Gloves, full arm protection, and safety glasses.
 - Improper handling may result in injury.
- Install the air conditioner according to this Installation Manual.
 - If the unit is installed improperly, water leakage, electric shock, or fire may result.
- Have all electric work done by a licensed electrician according the “National Electrical code and local Electrical codes” and “Interior Wire

Regulations” and the instructions given in this manual and always use a special circuit.

- If the power source capacity is inadequate or electric work is performed improperly, electric shock and fire may result.
- Keep the electric parts away from water.
 - It might result in electric shock, catching fire or smoke.
- When cleaning the Heat Exchanger and Drain Pan, ensure the Control Box, Motor and LEV remain dry, water proof covering.
- When installing and moving the air conditioner to another site, do not charge it with a refrigerant different from the refrigerant specified on the unit.
 - If a different refrigerant or air is mixed with the original refrigerant, the refrigerant cycle may malfunction and the unit may be damaged.
- When moving and reinstalling the air conditioner, consult the dealer or an authorized technician.
 - If the air conditioner is installed improperly, water leakage, electric shock, or fire may result.
- Do not reconstruct or change the settings of the protection devices.
 - If the pressure switch, thermal switch, or other protection devices are shorted and operated forcibly, or parts other than those specified by Mitsubishi Electric are used, fire or explosion may result.
- Do not use a leak detection additive.
- Always use an air cleaner, humidifier, electric heater, and other accessories specified by Mitsubishi Electric.
 - Ask an authorized technician to install the accessories. Improper installation by the user may result in water leakage, electric shock, or fire.
- Securely install the outdoor unit terminal cover (panel).

- If the terminal cover (panel) is not installed properly, dust or water may enter the outdoor unit and fire or electric shock may result.
- Supervise children near or around the appliance to ensure they do not play with or on the appliance.
 - Do not install this indoor unit in a location accessible to the general public.
- Pay special attention to the location the unit is installed in. Refrigerant is heavier than air so locations such as basements or crawlspaces where refrigerant can accumulate can become dangerous.
- The appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use

of the appliance by a person responsible for their safety.

- If the supply cord is damaged, it must be replaced by the manufacturer, its service agent or similarly qualified persons to avoid a hazard.
- Do not use refrigerant other than the type indicated on the unit nameplate.
 - Doing so may cause the unit or pipes to burst, or result in explosion of fire during use, during repair, or at the time of disposal of the unit.
 - It may also be in violation of applicable laws.
 - MITSUBISHI ELECTRIC CORPORATION cannot be held responsible for malfunctions or accidents resulting from wrong type of refrigerant used.

3.3. Before getting started



FLAMMABLE REFRIGERANT WARNING

- Ensure all pipework, including piping material, when routing, during installation, operation, and service are protected from physical damage.
- The requirements contained within this manual are based on UL 60335-2-40 which is an appliance safety standard. During installation in the field, it is important to follow all applicable national and local codes and standards, such as ASHRAE 15, ASHRAE 15.2, IAPMO, Uniform Mechanical Code, ICC International Mechanical Code, or CSA B52.
 - Failure to comply with industry best practices and local regulations can result in a non-compliant installation.
- Ensure all field joints are accessible for inspection prior to being covered or enclosed.
- Verify all field pipework pressure tested with an inert gas after field pipe joining, and then vacuum tested prior to refrigerant charging.
- The installation location of the indoor unit must meet the minimum floor area as shown in **Appendix A**, depending on the planned system total refrigerant charge.
 - Do not discharge refrigerant into the atmosphere.



CAUTION

- Do not install the unit where combustible gas may leak.
 - If the gas leaks and accumulates around the unit, an explosion may result.
- Do not use the air conditioner in special environments.
 - Oil, steam, sulfuric smoke, etc. can significantly reduce the performance of the air conditioner or damage its parts.
- When installing the unit in a hospital, communication station, or similar place, provide sufficient protection against noise.
 - The INVERTER equipment, private power generator, high-frequency medical equipment, or radio communication equipment may cause the air conditioner to operate erroneously, or fail to operate. On the other hand, the air conditioner may affect such equipment by creating noise that disturbs medical treatment of image broadcasting.
- Do not install the unit on a structure that may cause leakage.
 - When the room humidity exceeds 80% or when the drain pipe is clogged, condensation may drip from the indoor unit. Perform collective drainage work together with the outdoor unit, as required.

- When the ambient dew point temperature exceeds 75 °F (24 °C), dew condensation may

occur on the unit surface. Perform appropriate treatment to avoid dew condensation.

3.4. Precautions for devices that use refrigerant



CAUTION

- Use refrigerant piping made of C1220 (Cu-DHP) phosphorus deoxidized copper as specified in the JIS H3300 "Copper and copper alloy seamless pipes and tubes". In addition, be sure that the inner and outer surfaces of the pipes are clean and free of hazardous sulfur, oxides, dust/dirt, shaving particles, oils, moisture, or any other contaminants.
 - Contaminants on the inside of the refrigerant piping may cause the refrigerant residual oil to deteriorate.
 - Ensure brazing rods have a melting point above 800 °F (427 °C) in use with flammable refrigerants.
- Store the piping to be used during installation indoors and keep both ends of the piping sealed until just before brazing. (Store elbows and other joints in a plastic bag.)
 - If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.
- Use liquid refrigerant to fill the system.
 - If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.

- Always charge refrigerant in a liquid state.
 - Charging refrigerant in the gaseous state will change the composition of the refrigerant and lead to a performance drop.
- Use a vacuum pump with a reverse flow check valve.
 - The vacuum pump oil may flow back into the refrigerant cycle and cause the system's oil to deteriorate.
- Do not use the following tools that are used with other refrigerants.
 - Gauge manifold, charge hose, gas leak detector, reverse flow check valve, refrigerant charge base, vacuum gauge, refrigerant recovery equipment.
 - If the other refrigerants and refrigeration oil are mixed in, the refrigerant may deteriorate.
 - If water is mixed in, the refrigeration oil may deteriorate.
 - Refrigerant does not contain any chlorine, gas leak detectors for conventional refrigerant will not react to it.
 - Do not use a charging cylinder. May cause the refrigerant to deteriorate.
- Be especially careful when managing the tools.
 - If dust, dirt, or water gets in the refrigeration system, the refrigerant may deteriorate.

3.5. Before getting installed (or moved)-electrical work



CAUTION

- Ground the unit.
 - Do not connect the ground wire to gas or water pipes, lightning rods, or telephone ground lines. Improper grounding may result in electric shock.
- Install the power cable so that tension is not applied to the cable.
 - Tension may cause the cable to break and generate heat and cause a fire.
- Install a leak circuit breaker as required.

- If a leak circuit breaker is not installed, electric shock may result. Use power line cables of sufficient current carrying capacity and rating. Cables that are too small may leak, generate heat, and cause a fire.
- Use power line cables of sufficient current carrying capacity and rating.
 - Cables that are too small may leak, generate heat, and cause a fire.
- Use only a circuit breaker and fuse of the specified capacity.
 - A fuse or circuit breaker of a larger capacity or a steel or copper wire may result in a general unit failure or fire.

- Do not wash the air conditioner units.
 - Washing them may cause an electric shock.
- Be careful that the installation base is not damaged by long use.
 - If the damage is left uncorrected, the unit may fall and cause personal injury or property damage.
- Install the drain piping according to this Installation Manual to ensure proper drainage. Wrap thermal insulation around the pipes to prevent condensation.
 - Improper drain piping may cause water leakage and damage to furniture and other possessions.
- Be very careful about product transportation.
 - If the product weighs more than 20 kg [44 lb], then more than one person should carry the product.
- Some products use PP bands for packaging. Do not use any PP bands for a means of transportation; it is dangerous.
- Do not touch the heat exchanger fins. Doing so may cut your fingers.
- Safely dispose of the packing materials.
 - Packing materials, such as nails and other metal or wooden parts, may cause stabs or other injuries.
 - Tear apart and throw away plastic packaging bags so that children will not play with them. If children play with a plastic bag which was not torn apart, they face the risk of suffocation.

3.6. Before starting the test run



CAUTION

- Turn on the power at least 12 hours before starting operation.
 - Starting operation immediately after turning on the main power switch can result in severe damage to internal parts. Keep the power switch turned on during the operational season.
- Do not touch the switches with wet fingers.
 - Touching a switch with wet fingers can cause electric shock.
- Do not touch the refrigerant pipes during and immediately after operation.
 - During and immediately after operation, the refrigerant pipes may be hot or may be cold,
- depending on the condition of the refrigerant flowing through the refrigerant piping, compressor, and other refrigerant cycle parts. Your hands may suffer burns or frostbite if you touch the refrigerant pipes.
- Do not operate the air conditioner with the panels and guards removed.
 - Rotating, hot, or high-voltage parts can cause injuries.
- Do not turn off the power immediately after stopping operation.
 - Always wait at least five minutes before turning off the power. Otherwise, water leakage and trouble may occur.

4. Refrigerant R454B



FLAMMABLE REFRIGERANT WARNING

- Refrigerant is FLAMMABLE and may cause INJURY, DEATH, or significant DAMAGE to equipment if improperly handled.
 - Carefully read all labels affixed to the unit.

- Carefully read and follow all safety precautions for the unit.
- Verify any person performing work near where flammable refrigerant is used is properly informed prior to work commencing of the risks and safety precautions associated with flammable refrigerant and the nature of the work being done.

4.1. Precautions for devices that use R454B



FLAMMABLE REFRIGERANT WARNING

- **IGNITION SOURCES:** Verify the following safety precautions are followed to prevent refrigerant ignition and ensure proper operation without equipment damage, injury, or death.
 - Verify equipment is installed in a room that does not contain continuously operating ignition sources (for example: open flames, an operating gas appliance, or an operating electric heater).
 - Verify equipment is installed in a room large enough to properly accommodate the release of the full system charge.
 - Ensure actual system refrigerant charge is in accordance with the room sizes A_{min} and T_{Amin} , found in **Appendix A** of this manual.
 - Improper room sizes can lead to dangerously high concentrations of refrigerant vapor.
 - Ensure appropriate fire extinguishing equipment (dry powder or CO₂ fire extinguisher) is available and adjacent to worksite whenever any hot work is required on the refrigerating equipment or any associated parts.
 - **DO NOT** use ignition methods, such as a halide torch, to detect refrigeration leaks. Electronic leak detectors may be used as long as they pose no risk as potential ignition source.
 - Verify the electronic refrigerant leak sensor is calibrated to the refrigerant used and appropriate percent of gas is confirmed.
 - When installing field pipe joint connections, avoid locations with possible ignition sources such as UV lights, electric heaters, gas appliances, pilot flames, brushed motors and similar devices.

- Ensure the worksite is free from faulty equipment and appliances that could be a potential ignition source.
 - Failure to do so may result in ignition risk due to outdated and unsafe equipment.
- Place “No Smoking” signs in the worksite.
- Markings and labels on the equipment must remain legible. Correct all labels or service markings that are illegible. Labels and service markings contain information that is critical to the next service technician



FLAMMABLE REFRIGERANT WARNING

- **VENTILATION:** Be aware that refrigerants may not contain an odor. If the refrigerant gas comes into contact with a flame, poisonous gases will be released.
 - Limit or avoid work in confined spaces. Prior to installation, verify service connections and field joints are placed in ventilated and easily accessible areas.
 - Do not perform any hot work without proper ventilation in the work space.
 - Confirm that all ventilation outlets and machinery are not obstructed, and are operating adequately.
 - Failure to provide constant ventilation allows for the concentration of refrigerant vapor in the work area.
 - If refrigerant gas leaks during installation work, ventilate the room.
 - If the refrigerant gas comes into contact with a flame, poisonous gases will be released.

**FLAMMABLE REFRIGERANT WARNING**

- **LEAK DETECTION:** Check the work area for any potential toxic or flammable gases using an appropriate refrigerant detector prior to, during, and after work is complete.
 - If a leak is suspected, immediately remove/extinguish all naked flames.
 - Ensure all refrigerant is recovered and system is isolated prior to making repairs. For PAA connections, use flare connection as the equipment as designed for. Mitsubishi Electric US, Inc. is not responsible for improper brazing connections done by the installer.
 - Instructions for the removal of refrigerant can be found in *Handling and service of R454B* chapter of this manual.
 - Hazardous vapors may exist in mechanical rooms. Use appropriate leak detection equipment (non-sparking) that is adequately sealed and intrinsically safe.
 - Ensure leak detection equipment set at a percentage of the LFL (lower flammability limit) of the refrigerant employed, and the appropriate percentage of gas (25% maximum) is confirmed.
 - Recover refrigerant via the outdoor unit service ports only. Do not vent refrigerant. Always follow the decommissioning procedure.
 - Do not pierce or burn.

**CAUTION**

- Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.
 - Some chemicals and cleaning products may be incompatible with the coil materials, and may corrode the coil.
- Verify leak detection fluids do not contain chlorine.
 - Leak detection fluids that contain chlorine may react with refrigerant and corrode pipe-work.
- Confirm that refrigerant piping and other components are installed in a position/location that is unlikely to be exposed to corrosive materials.
 - Corrosion can reduce the longevity of the product, and possibly lead to a hazardous refrigerant leak.
- When it is necessary to replace electrical components, the new components must be fit for the purpose and to the correct specification. Always follow guidelines in the installation and service manuals, and if in doubt, consult with the manufacturer's technical department for assistance.
 - Improperly sourced parts may lead to reduced functionality and product life.

4.2. Installation of R454B system**FLAMMABLE REFRIGERANT WARNING**

- Ensure proper protection from physical damage during installation, operation, and service when performing pipework or handling piping material.
- Verify pipe work performed in compliance with national and local regulations and standards.
- Ensure all field joints in pipe work are inspected prior to covering and enclosing.
 - Verify all field pipe joints are properly pressure tested with inert gas.
 - Verify all field pipe joints are vacuum tested prior to refrigerant charging.
 - Verify all indoor field-made joints are tightness tested with 0.25 times the **MAXIMUM ALLOWABLE PRESSURE**, with **NO LEAK DETECTED**.



FLAMMABLE REFRIGERANT WARNING

Auxiliary devices which may be a POTENTIAL IGNITION SOURCE shall not be installed in the duct work. Examples of such POTENTIAL IGNITION SOURCES are hot surfaces with a temperature exceeding 1292 °F (700 °C) and electric switching devices.



IMPORTANT

Approved electric heater kits manufactured for Mitsubishi Electric US, Inc. includes electric heat kits manufactured for Mitsubishi Electric US, Inc. that are allowed for use with the listed air handlers. These tables are found in the chapter *Indoor unit accessories* found in the Installation manual.



FLAMMABLE REFRIGERANT WARNING

LEAK DETECTION SYSTEM INSTALLED. This air handler is equipped with a refrigerant leak detection system.

See service manual for service and replacement instructions.

- Unit must remain ON, except for service, installation, or inspection.
- Loss of power to the refrigerant leak sensor mounted in the indoor unit will result in an inability to detect a refrigerant leak. This may cause a fire. Refrigerant leak sensor lifetime is 15 years.
- Only replace refrigerant leak sensor devices with sensors approved for use by Mitsubishi Electric US, Inc.
- Do not install equipment in a configuration where false ceilings or drop ceilings are used as a return air plenum.

4.2.1. Safety checks for systems using R454B

1. Complete prior to installation

- Verify the REFRIGERANT CHARGE is in accordance with the room size, found in the charts below in *Minimum floor and minimum conditioned space area*, where refrigerant containing parts are installed.
- Verify ventilation openings are not obstructed and the required ventilation is present.



IMPORTANT

Alarm-triggered mechanical ventilation is not supported at this time.

- Verify markings and signs for the equipment are visible and legible. Correct all illegible markings and signs.
- Verify refrigeration pipe and components are installed in a position where they are unlikely to be exposed to any substance which may corrode refrigerant containing components, unless the components are constructed of materials which are inherently resistant to being corroded or are suitably protected against being so corroded.
- Verify common household chemicals and appliances are properly stored away from the return vents and air handler
 - Vapors and gases from chemicals such as propane, butane, methane, insecticides,

aerosol or cleaning sprays, and paint or small smoke producing appliances may falsely trigger the leak detection system and impede the proper function of the unit.

2. Checks to electrical devices

Repair and maintenance of electrical components include initial safety checks and component inspection procedures.

- Verify capacitors are discharged in a safe manner to avoid possibility of sparking.
- Verify there are no live electrical components.
- Ensure wiring is not exposed while charging, recovering, or purging the system.
- Verify continuity of earth bonding.
- If a fault exists that could compromise safety, do not connect electrical supply to the circuit until fault is repaired.
- If the fault cannot be corrected immediately but it is necessary to continue operation, an adequate temporary solution shall be used. Report any malfunction or faulty equipment/operation to the owner of the equipment so all parties are aware.

3. During repairs to sealed components

- Verify all electrical power supplies are disconnected from the equipment being worked upon prior to any removal of sealed covers, etc. If it is absolutely necessary to have an electrical supply to equipment during service, then permanently operating leak detection must be installed at the most critical point to warn of a potentially hazardous situation.
- Verify the casing is not altered in any manner that affects protection.
 - Verify no visible physical damage to cables exists.
 - Verify connections are not excessive.
 - Verify terminals are installed according to specification.
 - Verify there is no damage to seals.

– Verify gland fitting are installed properly and according to specifications.

- Ensure equipment properly secured.
- Ensure seals or sealing materials are not degraded and operating properly.
- Verify all replacement parts in accordance with the manufacturer specifications.

4. Intrinsically safe components can only be replaced but never repaired

- Do not apply any permanent inductive or capacitance loads to the circuit without ensuring it will not exceed the permissible voltage and current permitted for the equipment in use. Intrinsically safe components are the only type of components that may be worked on while live in the presence of a flammable atmosphere.
- Ensure test apparatus meets correct rating specification.
- Replace components only with parts specified by the manufacturer. Other parts may result in the ignition of refrigerant in the atmosphere from a leak.



NOTE

The use of silicon sealant can inhibit the effectiveness of some types of leak detection equipment.

Intrinsically safe components do not have to be isolated prior to working on them.

5. Cabling

- Verify cabling is installed in a location that avoids wear, corrosion, excessive pressure, vibration, sharp edges, or any other adverse environmental effects.
- Check the cables for effects of aging or continual vibration from sources such as compressors or fans.

4.2.2. Minimum floor and conditioned space area requirements

For safe and acceptable installation, there are a number of requirements that must be met to ensure that in the event of a refrigerant leak, refrigerant vapors do not have the opportunity to collect and create a hazardous concentration levels of refrigerant vapors.

These requirements are in relation to the following categories:

- Area of the conditioned space (**T_{Amin}**)
- Area of the indoor unit installation space (**A_{min}**)

- Installation height of the indoor unit, measured from the floor to the bottom of the air handler (h_a)
- Opening conditions for connected rooms and natural ventilation (**Anv**).
- Ducting and damper configurations

For all installations, the following guidelines must be followed:

- Residential installations and ductwork should be designed to comply with ACCA's Manual D (ANSI / ACCA 1 Manual D 2016, Residential Duct Systems).
 - Failure to comply with industry best practices can result in poor performance, including unbalanced heating / cooling / airflow.
- When zone dampers are used, they must be configured such that they will open fully during a refrigerant leak error.
 - Pre-existing zone dampers that do not meet this requirement must be permanently opened fully and disabled.
- Manual dampers must not be completely closed during or after installation. Balancing is acceptable.
 - Closing dampers can reduce the conditioned space area beyond intended acceptable limits.
- Vent registers, grilles, and covers must not completely obstruct air flow from any vent.
 - A blocked vent can reduce the conditioned space area beyond intended acceptable limits.
- At least one room (not including the indoor unit installation room) must have a dedicated return duct.
 - Spaces without return ducts have a risk of refrigerant accumulation during a leak event.
- The height of the ceiling in the indoor unit installation room must be at least 2.2 m (7 ft - 2.7 in).
 - Area calculations have been calculated using this assumption.
- The area of the indoor unit installation room must be at least 20% of the total area of **Amin**.
- Rooms adjacent to the indoor unit installation room can be considered part of the **Amin** area for the purpose of contributing to **Amin** area when the following conditions are met:
 - The rooms are on the same floor.
 - The rooms are connected by a permanent opening that cannot be closed, with an area greater than **Anv** that is below 300 mm (11.8 in)

from the floor, at least 50% of which is below 200 mm (7.8 in) from the floor.

- The rooms are connected by a second permanent opening that cannot be closed, with an area greater than 50% of **Anv** that is above 1.5 m (4 ft - 11.1 in).
- Natural ventilation requirements can be satisfied by use of ventilation ducting, passive through-wall ducts, drop ceilings, louvered doors, door undercuts, space between wall and floor, etc.
 - For openings which extend to the floor, the minimum height is 20 mm (0.8 in) above the top of the floor covering (i.e. tiles and carpet pile).
- Enhanced tightness refrigeration systems (ETRS) are approved for fixed **Anv** requirements.
 - Almost every combination of Mitsubishi Electric US, Inc. indoor unit / outdoor unit are considered an enhanced tightness refrigeration system (ETRS).

! IMPORTANT

SVZ-AP12NL indoor unit (IDU) with **SUZ-AA12NL** outdoor unit (ODU) is the only non-ETRS combination.

For ETRS-compliant systems, the value for:

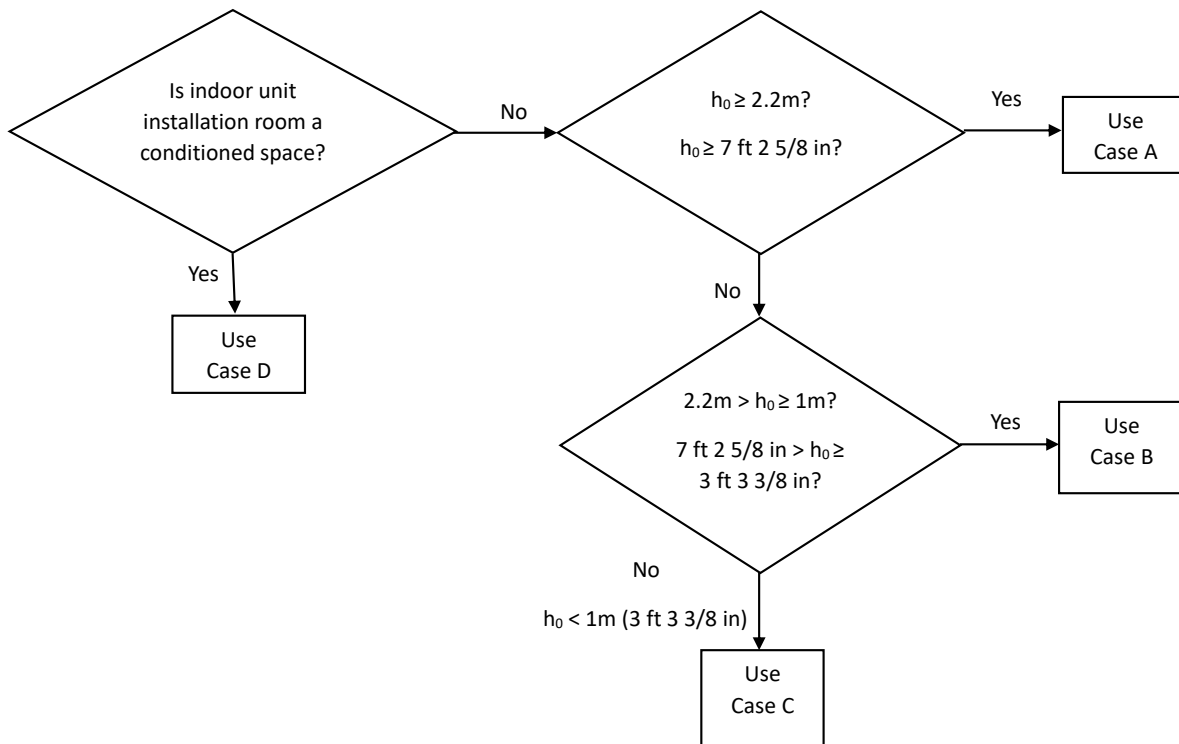
$$A_{nvETRS} \geq 114cm^2 \text{ or } 22in^2$$

- For Non-ETRS-compliant systems, the minimum opening size can be determined from the following equation:

$$A_{nv} = 0.0317 \times \left(m_c - 0.337 \times \left(\sqrt{A} \right) \right) \times \sqrt{0.563 \times \sqrt{A}}$$

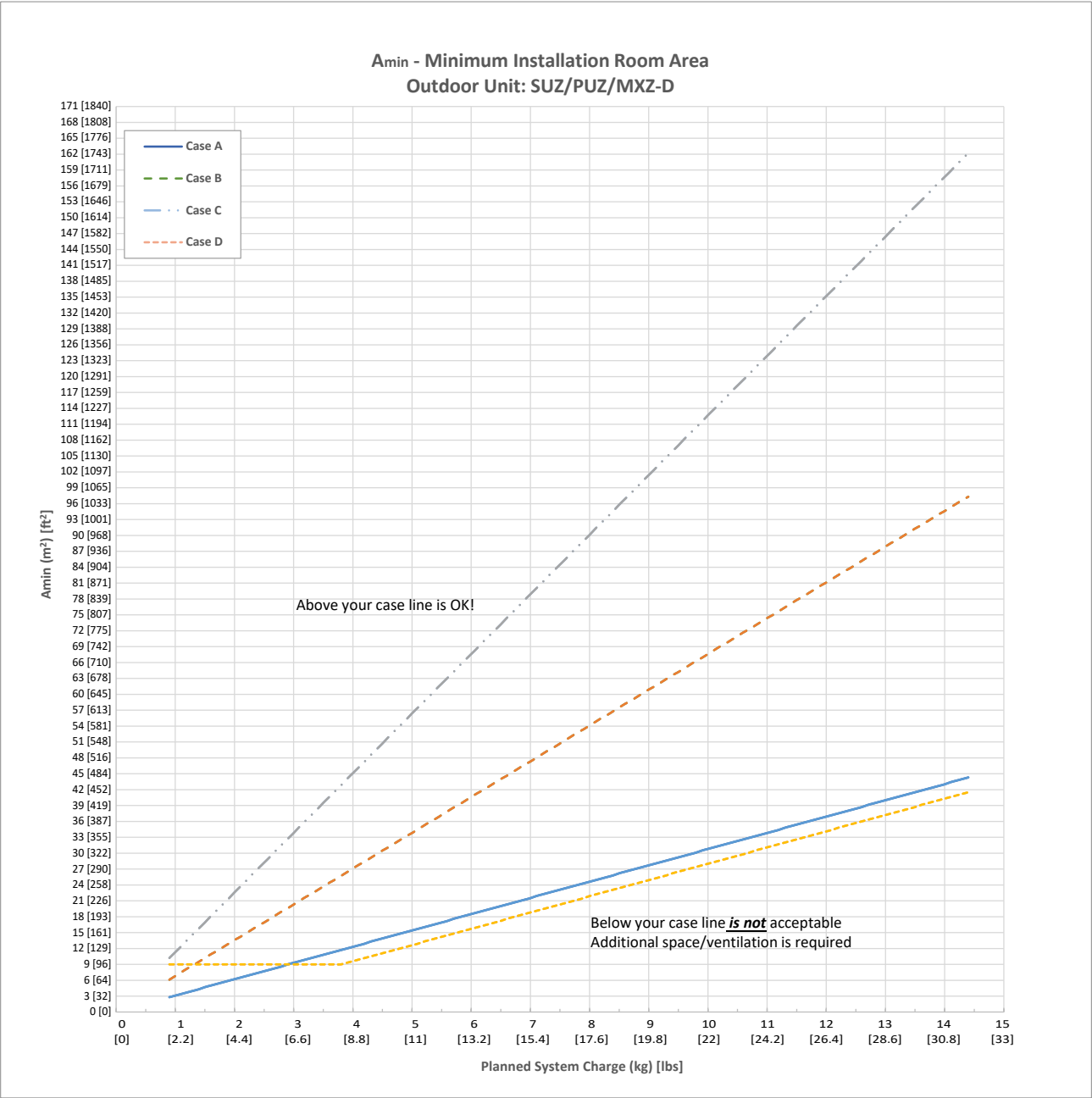
- Where **A** is the area of the installation room in square meters, and **m_c** is the planned total system charge in kilograms.
- Use the tables on the following pages to determine **Amin** and **T_{Amin}** requirements.
 1. Match the chart title to the outdoor unit being paired with the air handler.
 2. Use the following flow chart to determine which case line is correct for your application.
 3. Confirm the planned system charge, **m_c**, and trace up to the correct case line.
 4. Trace left from the intersection with the correct case line to determine **Amin** and **T_{Amin}**.

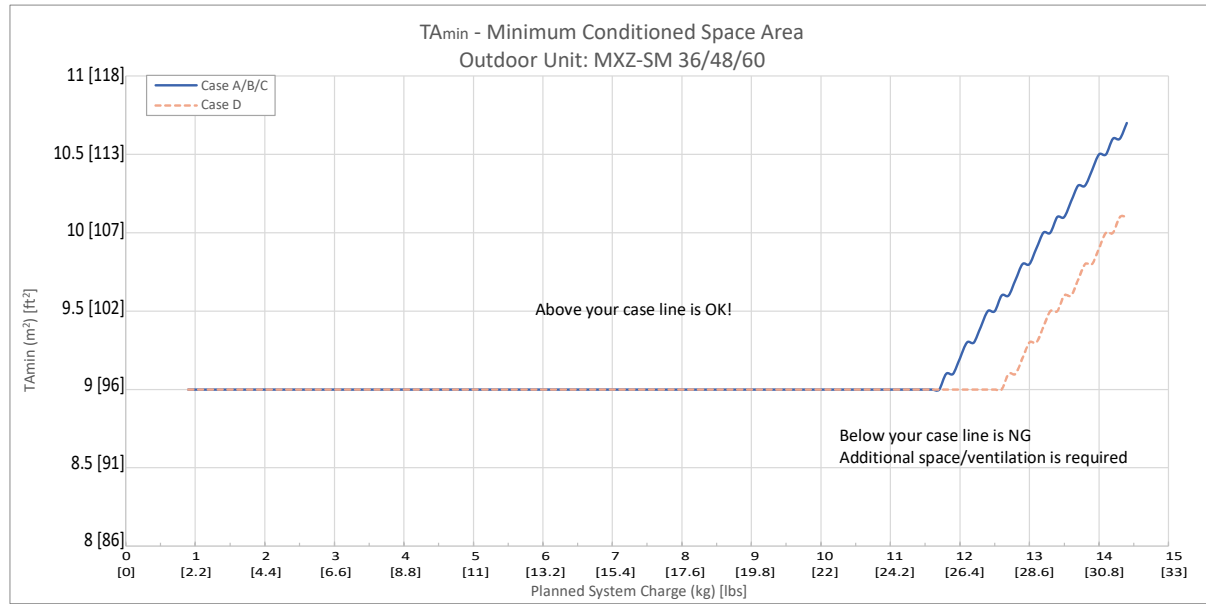
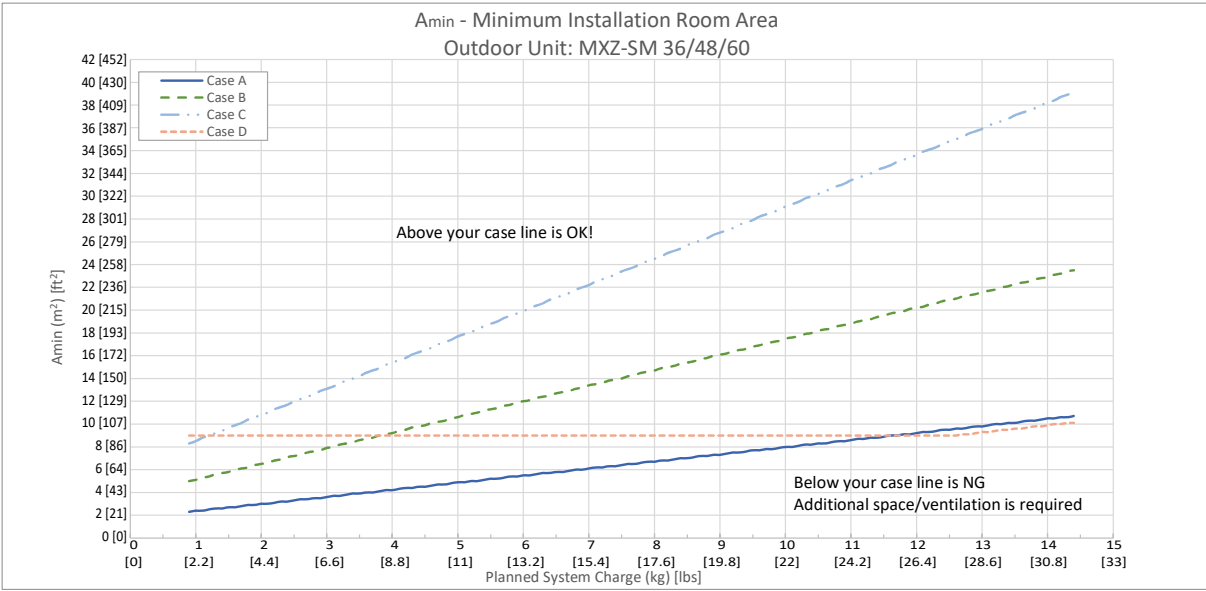
5. This information is available in **Appendix A** at the end of this manual.

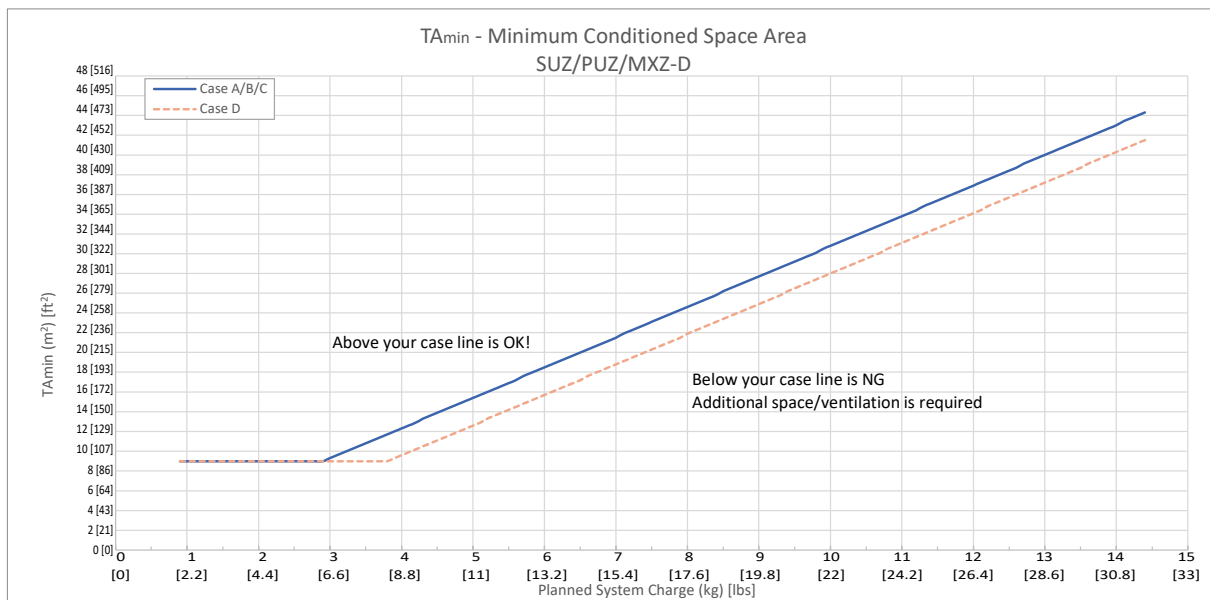
**NOTE**

For systems certified as ETRS the following ventilation requirement can be substituted:

$$A_{nvETRS} \geq 114\text{cm}^2 \text{ or } 22\text{in}^2$$







4.3. Handling and service of R454B system



FLAMMABLE REFRIGERANT WARNING

- Follow all national and local regulations and policies regarding refrigerant removal, evacuation, and recovery processes.
- Follow all safety precautions and procedures found in the installation and service manuals.
- Flammable refrigerant systems may only be purged with oxygen-free nitrogen.
 - Never use compressed air or oxygen for purging flammable refrigerant systems.
- Do not place vacuum pump air outlet near potential ignition sources.
- Verify proper ventilation available.

4.3.1. Removal and evacuation of refrigerant R454B



FLAMMABLE REFRIGERANT WARNING

- Verify vacuum pump outlet is secured away from potential ignition sources.
- Verify proper ventilation is available.

1. Safely remove refrigerant following local and national regulations.
2. Evacuate
3. Purge the circuit with inert gas.
4. Evacuate
5. Continuously flush or purge with inert gas when using a flame to solder or de-solder.
6. Open the circuit
7. Recover the refrigerant charge into the correct recovery cylinders if venting is not allowed by local and national codes.

4.3.2. Purging the system with R454B



NOTE

This process might need to be repeated several times.

1. Break the system vacuum with oxygen-free nitrogen.
2. Continue to fill until the working pressure is achieved.
3. Vent to atmosphere.
4. Evacuate the system.
5. Repeat steps until no refrigerant remains in the system, then fill a final time with oxygen-free nitrogen.
6. When purge is complete, vent the system down to atmospheric pressure to enable work to take place.

4.3.3. Charging R454B system

In addition to conventional charging procedures and safety precautions described in the installation and service manuals, read and follow the following precautions:



FLAMMABLE REFRIGERANT WARNING

- Do not allow contamination of different refrigerants to occur when using charging equipment.
- Keep hoses or lines as short as possible to minimize the amount of refrigerant contained in them.
- Keep all cylinders in an appropriate position according to the instructions.
- Ensure that the refrigerating system is properly grounded prior to charging the system with refrigerant.
- Label the system when charging is complete (if not already).
- DO NOT OVERFILL the refrigerant system.
- Pressure test the system prior to re-charging with appropriate purging gas.
- Leak test the system at completion of charge, prior to commissioning, and before leaving the worksite.

4.3.4. Recovery of R454B



FLAMMABLE REFRIGERANT WARNING

- Do not mix refrigerants in recovery units and especially not in cylinders.
- Never heat the compressor body with an open flame or any other ignition sources to accelerate the process.

Verify the following prior to recovering refrigerant from the system:

- Verify that only the proper cylinders required for flammable refrigerant recovery are used and that they are properly labeled.
 - If in doubt, contact manufacturer for consultation.
- Verify the correct number of cylinders needed for total system charge are available.
- Verify cylinders are in good working order with necessary pressure relief and shut-off valves.
- Verify recovery cylinders are empty, properly evacuated, and cooled before recovery.
- Verify calibrated weighing scales are available and in good working order.
- Verify hoses are complete with leak-free disconnect coupling and in good condition.
- Ensure all recovered refrigerant is processed in accordance with local legislation, in proper recovery cylinder, and with appropriate transfer note arranged.
- If compressors or compressor oils are to be removed, verify they are evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant.
- Verify oil drained from the system is carried out safely.

4.4. Description and testing of leak mitigation functions



NOTE

The refrigerant leak detection system can be tested to verify that leak mitigation actions are functional. These actions serve to slow the leak rate and to disperse any concentrated refrigerant in the ducting.

For systems paired with an MXZ-SM Smart Multi outdoor unit, the unit has a safety-shutoff-valve installed that will close upon a leak detection and the compressor will run for several minutes to collect the refrigerant in the accumulator, then shut off.

The indoor unit fan motor activates to provide circulation airflow.

This process puts stress on system components, so testing should occur only when required, such as during system commissioning, or when advised by Mitsubishi Electric US, Inc. service personnel, or when required by local codes and regulations.

For systems paired with any other outdoor unit (SUZ/PUZ/MXZ *not Smart Multi), leak mitigation actions include automatic cutoff of the outdoor unit compressor and activating the fan motor of the indoor unit for circulation airflow.

4.4.1. Testing procedure

1. Confirm that the system is powered on and in normal operation.
2. Unplug the refrigerant leak sensor cable from the indoor unit control board at the plug connector labeled CNSA.

3. The mitigation actions will be triggered and will continue until the unit is powered off.
4. Power off the system.
5. Reconnect the refrigerant leak sensor cable.
6. Restore power and return the system to normal operation.



FLAMMABLE REFRIGERANT WARNING

The fan will automatically start when refrigerant leak is detected by refrigerant leak sensor. Keep a safe distance from the fan to avoid injury.

4.5. Decommissioning of R454B system



NOTE

LABELING: All equipment that is decommissioned and emptied of refrigerant must have a label stating **FLAMMABLE REFRIGERANT** with the date and signature affixed to the equipment.

Prior to decommissioning, verify the following safety checks:

- Follow all safety precautions and procedures.
- Take oil and refrigerant samples in case analysis is required prior to re-use of recovered refrigerant.
- Verify proper power is available necessary to fully execute procedure.
- Ensure the recovery process is supervised at all times by a trained professional.
- Verify mechanical handling equipment is available, if required, for handling refrigerant cylinders.
- Ensure all personal protective equipment is available and being used correctly.
- Verify recovery equipment and cylinders conform to the appropriate standards.

Follow the steps listed in this procedure to properly decommission the system:

1. Isolate system electrically.
2. Pump down refrigerant system, if possible.
3. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.

4. Verify cylinder is situated on the scales before recovery takes place.
5. Start the recovery machine and operate in accordance with instructions.
 - Do not overfill cylinders (no more than 80 % volume liquid charge).
 - Do not exceed the maximum working pressure of the cylinder, even temporarily.
6. Once cylinders are properly filled and the process complete:
 - Promptly remove the cylinders and the equipment from site.
 - Verify all isolation valves on the equipment are closed.



NOTE

Do not re-use recovered refrigerant in another refrigerant system unless it has been cleaned in accordance with procedure and regulation.

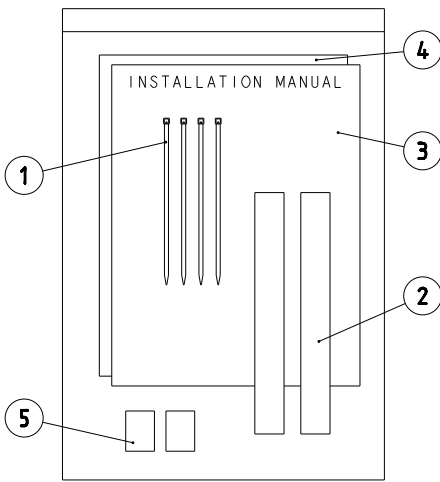
4.6. Disposal of R454B

Recover the refrigerant and recycle it.

If recycling is not possible then it should be incinerated by a licensed facility.

5. Indoor unit accessories

5.1. Accessory bag contents

Part No.		Qty	
1	Plastic tie	4	
2	Plastic tube	2	
3	Installation manual	1	
4	Operation manual	1	
5	Drain pan seal	2	

5.2. Approved electric heater kits

Table 1. Approved for use with PVA-AA12, 18, 24, 30, 36, 42, 48, 60NL and R454B refrigerant.

Model code	EH03/05-MPA-S(B)	EH08-MPA-S(B)	EH03/05/08/10-MPA-M(B)	EH10-MPA-L(B)	EH15/17-MPAS-L(B)	EH19-MPAS-L(B)
12	x					
18	x	x				
24			x			
30			x			
36				x		
42, 48				x	x	
60				x	x	x

6. Selecting an installation site

6.1. Site considerations

- Avoid locations exposed to outside air.
- Select a location free of obstructions to the airflow in and out of the unit.
- Avoid locations exposed to steam or vapor.
- Avoid locations where combustible gas may leak, settle, or be generated.
- Avoid installation near machines emitting high-frequency waves (high frequency welders, etc.).
- Avoid locations where the airflow is directed at a fire alarm sensor. (Hot air could trigger the alarm during operation.)
- Avoid places where acidic solutions are frequently used.
- Avoid places where sulfur-based or other sprays are commonly used.
- When the air handler is installed in the horizontal position please install a drain pan under entire cabinet.
- Install sufficient thermal insulation to prevent condensation from forming on the outlet and inlet ducts.



IMPORTANT

If propane, butane, methane, or other gas appliances, insecticides or other sprays, smoke-producing appliances, paints, or chemicals are used near the unit, the refrigerant leak sensor inside the indoor unit may detect and display a refrigerant leak error, making operation impossible.

6.2. Suspended horizontal mounting

This product does not contain mounting brackets for installation by means of suspension. There are numerous difficulties that an installer would need to address before installing the product by suspension including, but not limited to, confirming a sufficiently strong base attached to a building structure of adequate strength to support this product considering:

- Weight of the product
- Weight and load of ducts and piping
- Weight of the auxiliary drain pan
- Earthquakes and other possible external forces in and around the installation environment.

Support brackets must run the length of the unit and be of sufficient strength to support the weight of the unit and connected ductwork. Vibration isolation is recommended for horizontal installations.

Please note, Mitsubishi Electric US, Inc. and its affiliates are not responsible for any damage to household/building goods/property, bodily injury, or death resulting from this suspended product falling due to reasons including, but not limited to insufficient strength, improper installation, or deterioration over time of the suspension devices.

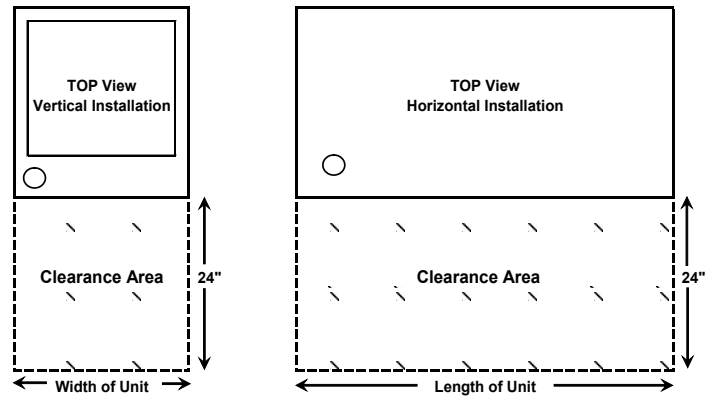
7. Combining indoor units with outdoor units

For combining indoor units with outdoor units, refer to the outdoor unit's Installation Manual.

8. Installing the unit

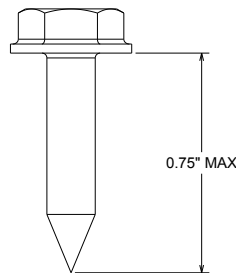
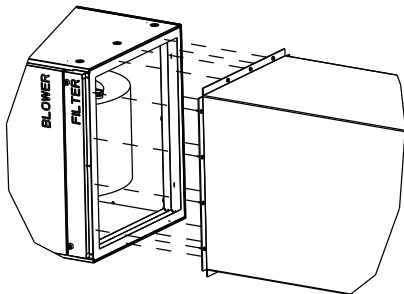
The air handler can be installed in a vertical or horizontal (right and left) configuration as shown in steps included in the chapter *Mount positions* sub-sections: *Vertical installations*, *Horizontal right installations*, and *Horizontal left installations*. The units are designed for "0" zero clearance to combustibles. 24 in. (610 mm) is required for service access to the front of the unit (see Installation clearance). Regardless of mounting configuration, the air handler must be mounted level to facilitate proper condensate drainage.

Installation clearance



ENGLISH

9. Duct connection



- See the outline drawing for the size of the duct connection.
- Use flanged ducts for connections to return.
- Do not use sheet metal screws longer than 0.75" to secure any ductwork to the air handler.

10. Mount positions

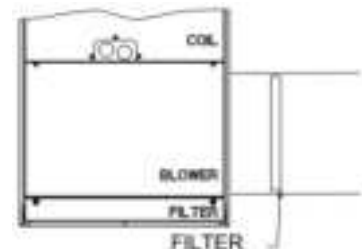
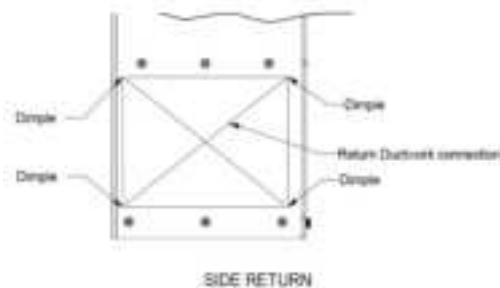
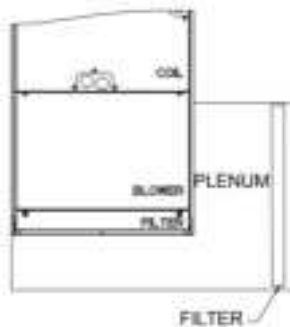
10.1. Vertical installations

The air handler must be supported on the bottom only and set on a solid floor with a return plenum below or field supplied supporting frame or plenum. Securely attach the air handler to the floor or a supporting frame or plenum.



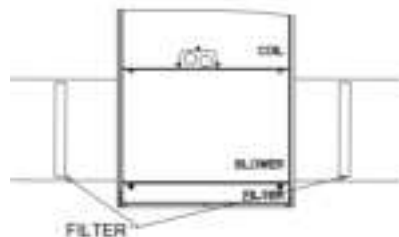
10.1.1. Side return

A single Side return can be used for model code 12 and 18 only. Dual side returns or additional plenum below the unit must be used on all other models to ensure proper air flow. If the side return is used, **it is the responsibility of the installer to ensure the ducts are properly sized and sealed to the cabinet.** When cutting a hole into the side of the cabinet, follow the instructions provided below to avoid damaging any internal structure or wiring.



↑
Single side return (for 12, 18 only) seal bottom of air handler add filter

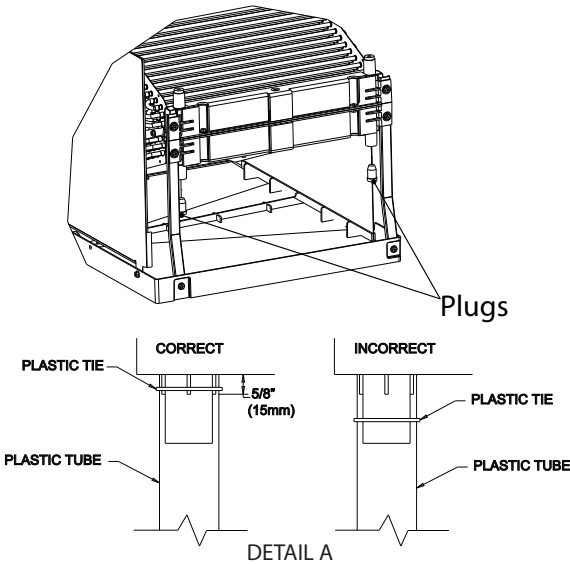
Dual side return seal bottom of air handler add 2 filters →



10.2. Horizontal right installations

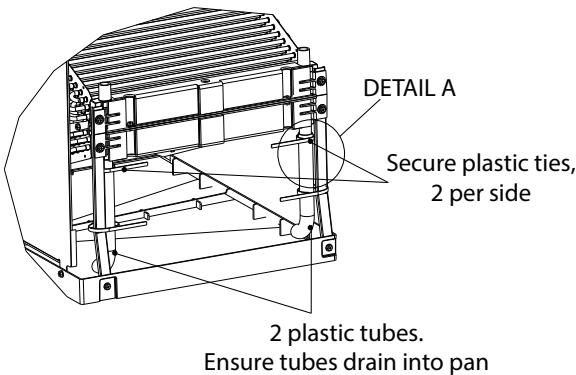
Refer to chapter: *Mount positions* sub-section: *Horizontal left installations* Step. 1 through 4b & 12, for removing the entire coil assembly from the air handler cabinet. This will require removing the Filter, Blower, and Coil Panels along with the bracket(s) that secures the coil assembly. Be sure to disconnect the waterproof thermistor and refrigerant leak sensor connections in order to remove the coil from the cabinet.

Once the coil is removed, the two clear plastic tubes included in the accessory bag will need to be attached to the top drain pan. First, remove the lower rubber plugs in the top drain pan. Next, install the clear plastic tubes which are included in the accessory bag. Ensure the plastic tubes drain into the pan. Also, be sure the clear plastic tubes do not have any restriction. Cutting of the plastic tube is required, please refer to the table below for length. Finally, secure the clear plastic tubes to the top drain pan per Detail A and to the metal brackets supporting the coil to the top drain pan with the provided plastic ties as shown.



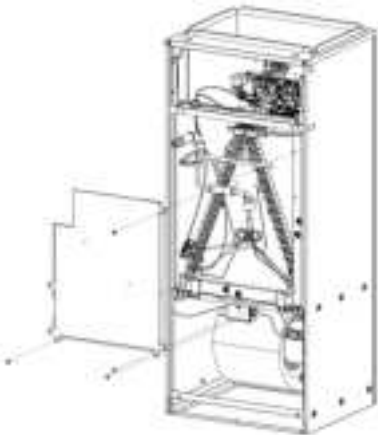
Model code	Tube Length
12, 18	4.9 in. (125 mm)
24, 30	6.9 in. (175 mm)
36, 42, 48, 60	8.9 in. (225 mm) ¹

¹Tube length provided

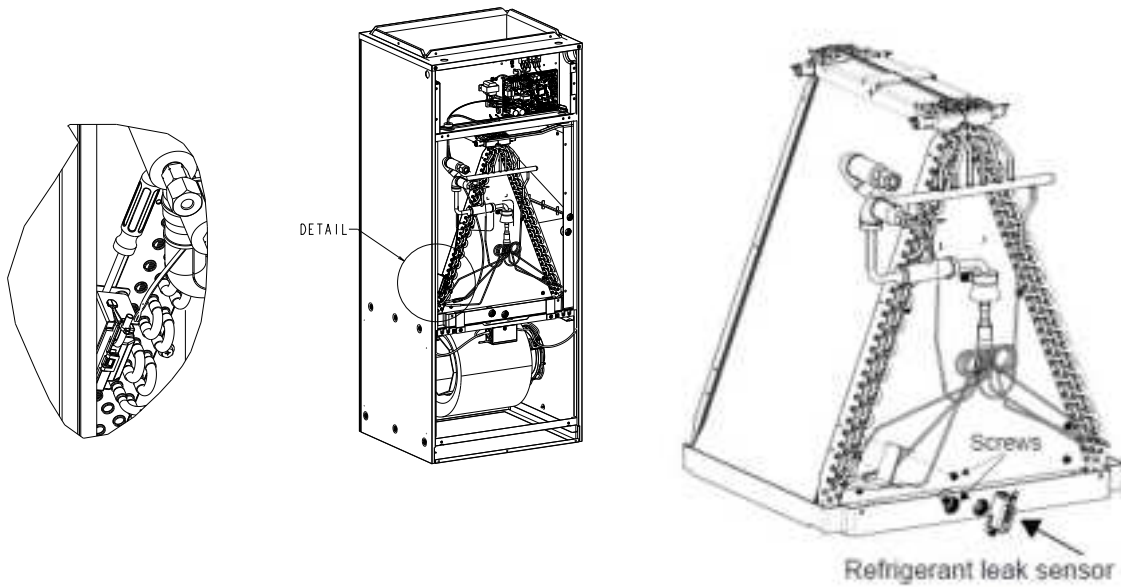


Reinstall the coil assembly along with bracket(s) that secure(s) it. Failure to reinstall the brackets will result in capacity loss and condensation formation inside the cabinet.

Refrigerant leak sensor placement instructions



Step. 1 Remove the screws (4) and remove the front plate from the coil assembly.

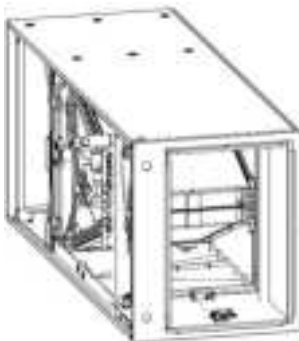
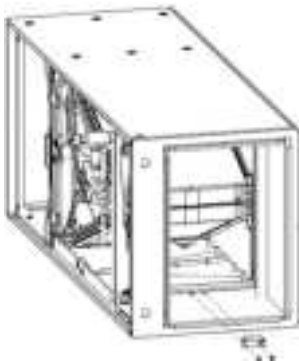


Step. 2 Remove the refrigerant leak sensor from the sensor bracket, then remove the (2) screws shown in the image to remove the bracket from the end plate of the coil assembly. Careful not to discard the sensor bracket and screws, this will be used in a later step.

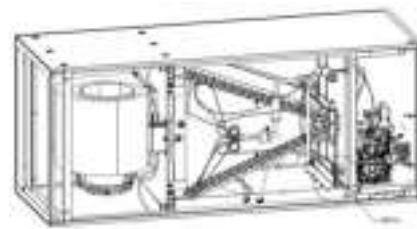


TIP

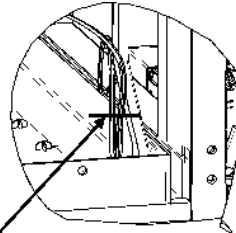
- If there is difficulty removing the refrigerant leak sensor / housing assembly from the vertical flow bracket, insert a screwdriver between the sensor housing assembly and the bracket as shown in the detailed area above.
- Gently apply pressure against the back of the sensor housing assembly to release it from the bracket.
- Once it has released, remove the bracket by hand.



Step. 3 Using the removed screws from **Step. 2**, install the refrigerant leak sensor bracket using the pre-drilled holes on the cabinet shelf as shown. Ensure the orientation matches the image. Insert the sensor into the bracket.



DETAIL ↗



ZIP-TIE HERE

Step. 4 In order to prevent water from running down the refrigerant leak sensor cable outside of the drain pan, a Drip Loop **MUST** be installed to direct water into the drain pan. Do this by using a zip-tie to secure the sensor cable to the support bracket, creating a loop in the cable to allow water to properly flow into the drain pan.



Step. 5 Reattach the front plate with the (4) screws.

Step. 6 Refer to chapter *Mount positions*, subsection *Horizontal left installations* instructions, Step. 1- 4b & 12 - in reverse (12 c. → 12 b. → 12 a.), to secure the coil and reassemble the panels.

**NOTE**

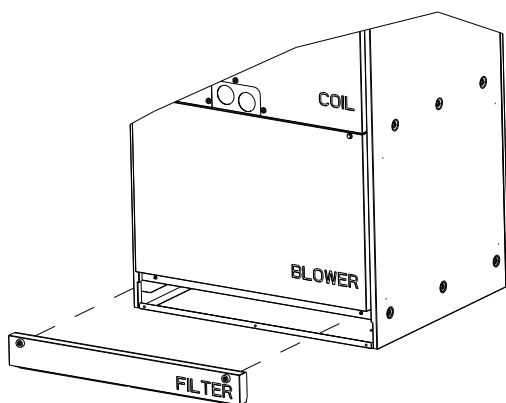
For Horizontal installation an auxiliary drain pan must be installed.

**IMPORTANT****Horizontal Right Installation**

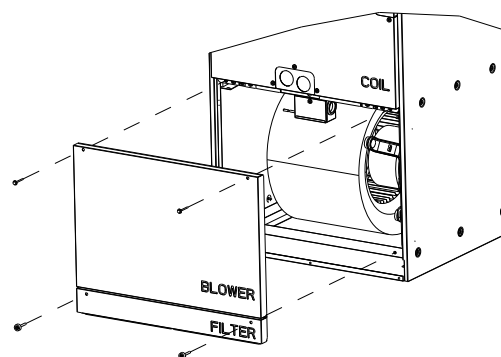
Fan assembly rotation not required

10.3. Horizontal left installations

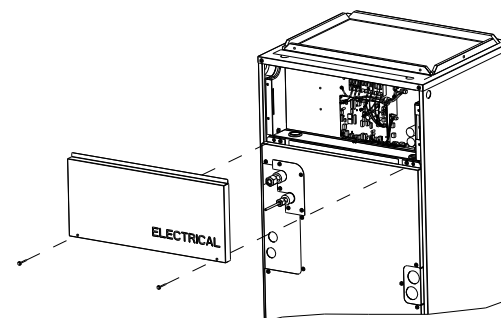
For horizontal left installation the drain pan will need to be moved to the opposite side of the coil. This can be done by moving the two brackets and drain pan to the left of the coil. This way, the condensate that formed on the coil will fall in the drain pan. Also, the appropriate knockouts for the drains will need to be removed once the drain pan is in its correct position. In addition to relocating the side drain pan, the fan assembly will also need to be removed rotated 180° and reinstalled. The motor has to be closest to the ground. The two clear plastic tubes included in the accessory bag will also need to be attached to the top drain pan. See instructions below.

Directions for rotating fan for horizontal left installation:

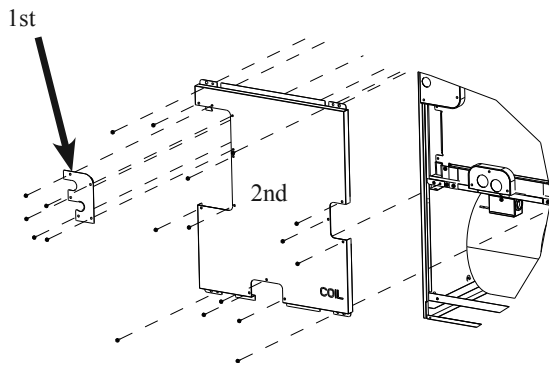
Step. 1 Remove the panel marked "FILTER".



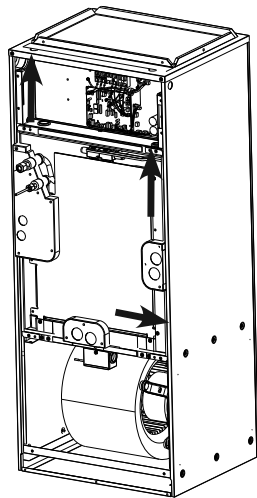
Step. 2 Remove the panel marked "BLOWER".



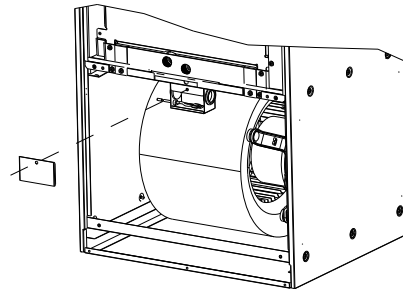
Step. 3 Remove the panel marked "ELECTRICAL".



Step. 4a Remove the screws securing the (3) panels to the COIL panel shown in the image above. Remove the “1st” panel and “2nd” panel marked “COIL”.



Step. 4b Next, remove the smaller panels covering the drain holes and refrigerant lines by first sliding in the direction marked above.

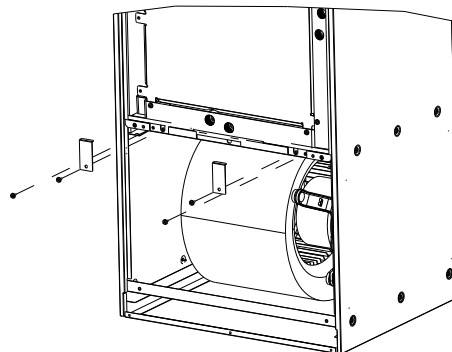


Step. 5 Remove the electrical enclosure cover mounted on the fan assembly. Disconnect the motor connector along with the connector for the return air thermistor. Remove all of the harnesses from the electrical enclosure leaving only the return air thermistor attached to the electrical enclosure.

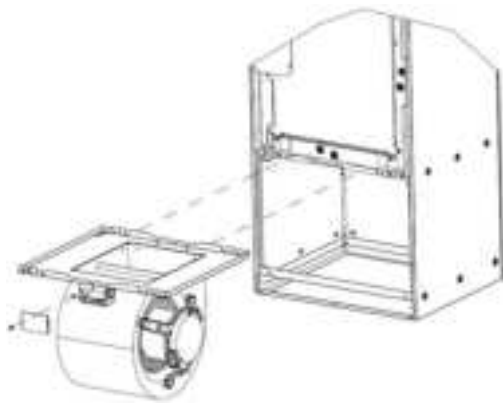


NOTE

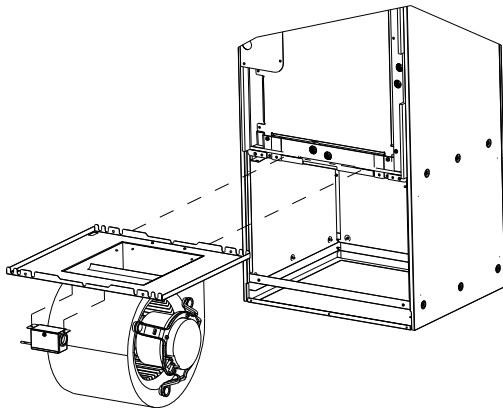
For model code 60, only remove the (2) coil bracket screws, and skip steps 6 through 11.



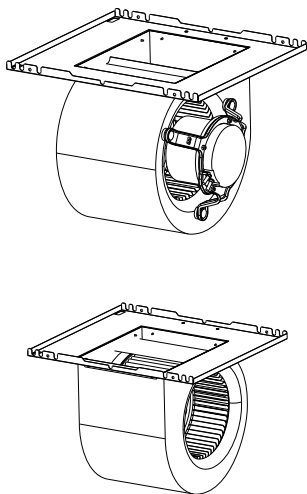
Step. 6 Remove the (4) screws indicated in the image along with the brackets that secure the coil.



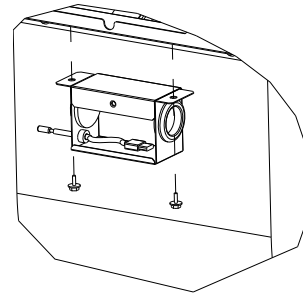
Step. 7 Slide the entire fan assembly out from the cabinet.



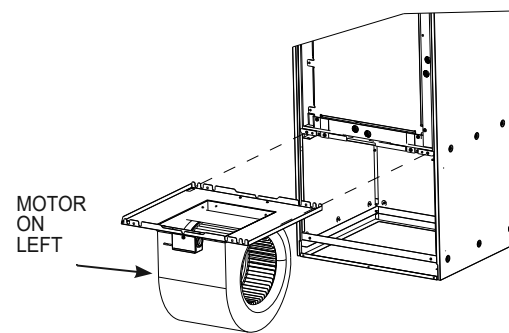
Step. 8 Remove the electrical enclosure from the fan assembly.



Step. 9 Rotate the blower assembly 180°. The motor should now be on the opposite side.



Step. 10 Reinstall the enclosure for the return air temperature sensor on the blower assembly on the opposite side from its original location.



Step. 11 Reinsert the blower assembly with the motor now on the left into the air handler cabinet and reuse the (2) screws that secured the fan assembly in position. Reroute the (2) connectors for the motor back into the enclosure and reconnect.



NOTE

The wiring harness might have to be removed from the plastic retainers mounted to the motor bracket in order to have sufficient length to reach the electrical enclosure mounted to the fan assembly. Ensure wiring harness is secure so it cannot be pulled into the fan. Reroute the return air thermistor connector back into the electrical enclosure and reconnect.