

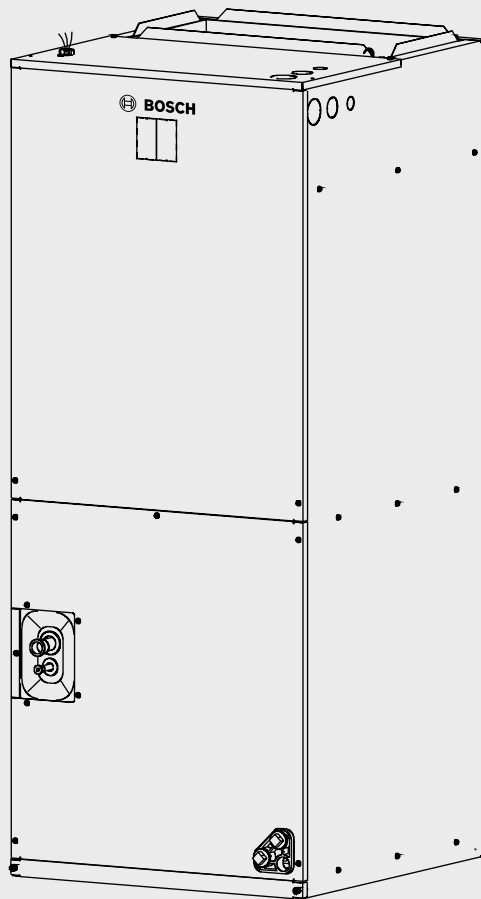


BOSCH

Installation and Operating Instructions

Bosch IDS Heat Pump Light Series Air Handler

2-3-4-5 Ton Capacity | R454B



BTC 762003309 C / 10.2024



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1 Key to Symbols and Safety Instructions

1.1 Key to Symbols


Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.


The following keywords are defined and can be used in this document:

**DANGER**

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

**WARNING**

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.


**CAUTION**

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate injury.

NOTICE







NOTICE is used to address practices not related to personal injury.

Important information



The info symbol indicates important information where there is no risk to people or property.

1.2 Explanation of Symbols Displayed on the Unit

Symbol	
  	WARNING This symbol shows that this appliance used a flammable refrigerant. If the refrigerant is leaked and exposed to an external ignition source, there is a risk of fire.
	WARNING This symbol shows that appliance shall be installed, operated and stored in a room with a floor area not less than the minimum room area.
	CAUTION This symbol shows that the operation manual should be read carefully.
	CAUTION This symbol shows that a service personnel should be handling this equipment with reference to the installation manual.


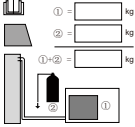

Symbol	
	CAUTION This symbol shows that information is available such as the operating manual or installation manual.
	CAUTION This symbol shows that when addition of charge is required by the manufacturer installation instructions for completing the REFRIGERATING SYSTEM. Recorded the resulting total REFRIGERANT CHARGE for each REFRIGERATING SYSTEM.

Table 1


1.3 Safety

Please read safety precautions before installation


**WARNING**

Improper or dangerous operation!

These instructions are intended as an aid to qualified licensed service personnel for proper installation, adjustment and operation of this unit. Read these instructions thoroughly before attempting installation or operation. Failure to follow these instructions may result in improper installation, adjustment, service or maintenance and possibly resulting in fire, electrical shock, property damage, personal injury or death.




This document is customer property and is to remain with this unit. These instructions do not cover all the different variations of systems nor does it provide for every possible contingency to be met in connection with installation.

**WARNING**


Fire, electrical shock, property damage, personal injury, or death!

All phases of this installation must comply with NATIONAL, STATE AND LOCAL CODES. If additional information is required please contact your local distributor.

**WARNING**

Electrical shock!

Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to deenergize the equipment. Hazardous voltage can cause severe personal injury or death.

**WARNING**

Electrical shock!

If removal of the blower assembly is required, all disconnect switches supplying power to the equipment must be deenergized and locked (if not in sight of unit) so the field power wires can be safely removed from the blower assembly. Failure to do so can cause electrical shock resulting in personal injury or death.



WARNING

Fire, electrical shock, property damage, personal injury, or death!

Because of possible damage to equipment or personal injury, installation, service, and maintenance should be performed by trained, qualified service personnel. Consumer service is recommended only for filter cleaning / replacement. Never operate the unit with the access panels removed.



WARNING

Electrical shock!

The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.



CAUTION

Fire, personal injury, property damage!

The first 6 inches of supply air plenum and ductwork must be constructed of sheet metal as required by NFPA 90B. The supply air plenum or duct must have a solid sheet metal bottom directly under the unit with no openings, registers or flexible air ducts located in it. If flexible supply air ducts are used, they may be located only in the vertical walls of rectangular plenum, a minimum of 6 inches from the solid bottom. Metal plenum or duct may be connected to the combustible floor base, if not, it must be connected to the unit supply duct exposed to the supply air opening from the downflow unit. Exposing combustible (non-metal) material to the supply opening of a downflow unit can cause a fire resulting in property damage, personal injury or death.

NOTICE

Product damage!

Make sure the blower motor support is tight (3-motor mounting bolts - Figure 1). Then check if wheel is tightly secured to motor shaft before operating unit.

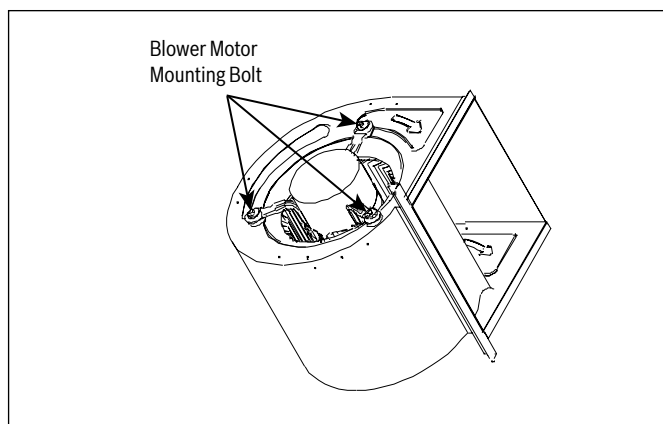


Figure 1



WARNING

Personal injury!

- PROPOSITION 65: This appliance contains fiberglass insulation. Respirable particles of fiberglass are known to State of California to cause cancer.
- All manufacturer products meet current federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.
- California's Proposition 65 requires warnings for products sold in California that contain or produce any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural vapor.
- All "new equipment" shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know "when, or if" products will be sold in the California market.
- You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural vapor used with some of our products.
- Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.
 - Glass Wool (Fiberglass) Insulation
 - Carbon Monoxide (CO)
 - Formaldehyde
 - Benzene
- More details are available on the following websites: OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

**WARNING****Flammable refrigerant!**

Do not use means to accelerate the defrosting process or to clean, other than those recommended by the manufacturer.

The appliance shall be stored in a room that does not have continuously operating ignition sources (for example: open flames, an operating gas appliance or an operating electric heater).

Do not pierce or burn the unit.

Be aware that refrigerants may not contain an odour.

If refrigerant gas leaks during installation, ventilate the area immediately.

Comply with national gas regulations.

NOTICE**Product damage!**

Only use this unit in well-ventilated spaces and ensure that there are no obstructions that could impede the airflow into and out of the unit. Do not use this unit in the following locations:

- Locations with mineral oil.
- Locations with saline atmospheres, such as seaside locations.
- Locations with sulphurous atmospheres, such as near natural hot springs.
- Where high voltage electricity is present, such as in certain industrial locations.
- On vehicles or vessels, such as trucks or ferry boats.
- Where exposure to oily or very humid air may occur, such as kitchens.
- In proximity to sources of electromagnetic radiation, such as high-frequency transmitters or other high strength radiation devices.

**WARNING****Personal injury, product damage!**

This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or persons who lack experience and knowledge, unless they are supervised or have been given instructions concerning the use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

Any person who is involved with working on or opening a refrigerant circuit should hold a current valid certificate from an industry-accredited assessment authority, which authorizes their competence to handle refrigerants safely in accordance with an industry recognized assessment credential.

Servicing shall only be performed as recommended by the equipment manufacturer.

Maintenance and repair requiring the assistance of other skilled personnel shall be carried out under the supervision of a person competent in the use of flammable refrigerants.

Prior to beginning work on systems containing flammable refrigerants, safety checks are necessary to minimize the risk of ignition.

**WARNING****Electric shock, personal injury, product damage!**

Be sure the air conditioner is grounded. In order to avoid electric shock, make sure that the unit is grounded and that the ground wire is not connected to a gas or water pipe, lightning conductor or telephone earth wire.

Do not operate the air conditioner with a wet hands. An electric shock may happen.

Do not touch the heat exchanger fins. These fins are sharp and could cut you.

To avoid oxygen deficiency, ventilate the room sufficiently if equipment with a burner is used together with the air conditioner.

Arrange the drain hose to ensure smooth drainage. Incomplete drainage may cause wetting of the building, furniture, etc.

Never touch the internal parts of the controller.

Do not remove the blower access panel. Some parts inside are dangerous to touch, and machine troubles may occur.

Attention is drawn to the fact that additional transportation regulations may exist with respect to equipment containing flammable gas. The maximum number of pieces of equipment or the configuration of the equipment permitted to be transported together will be determined by the applicable transport regulations.

Signs for similar appliances used in a work area are generally addressed by local regulations and give the minimum requirements for the provision of safety and/or health signs for a work location. All required signs are to be maintained and employers should ensure that employees receive suitable and sufficient instruction and training on the meaning of appropriate safety signs and the actions that need to be taken in connection with these signs.

The effectiveness of signs should not be diminished by too many signs being placed together.

Any pictograms used should be as simple as possible and contain only essential details.

The storage of the appliance should be in accordance with the applicable regulations or instructions, whichever is more stringent.

Storage package protection should be constructed such a way that mechanical damage to the equipment inside the package will not cause a leak of the REFRIGERANT CHARGE.

The maximum number of pieces of equipment permitted to be stored together will be determined by local regulations.

Do not operate the air conditioner when using a room fumigation - type insecticide. Failure to observe this precaution could cause the chemicals to become deposited in the unit, which could endanger the health of those who are hypersensitive to chemicals. It may also cause the refrigerant sensor to alarm.

Do not place appliances which produce open flame in places exposed to the air flow from the unit or under the indoor unit. It may cause incomplete combustion or deformation of the unit due to the heat.

Do not install the air conditioner in a location where flammable gas may leak out. If the gas leaks out and stays around the air conditioner, a fire may occur.

**WARNING****Personal injury!**

The unit must be permanently grounded. Failure to do so may result in electrical shock causing personal injury or death.


WARNING
Personal Injury, flammable refrigerant!

When repairing the refrigerating system, comply with the following precautions prior to conducting work on the system:

- Work shall be undertaken according to controlled procedures to minimize the risk of the presence of flammable gases or vapors while the work is being performed.
- All maintenance staff and others working in the local area shall be instructed on the nature of work being carried out. Work in confined spaces shall be avoided.
- The area shall be checked with an appropriate refrigerant detector prior to and during work, to ensure the technician is aware of potentially toxic or flammable environment. Ensure that the leak detection equipment being used is suitable for use with all applicable refrigerants, i.e., non-sparking, adequately sealed or intrinsically safe.
- If any hot work is to be conducted on the refrigerating equipment or any associated parts, appropriate fire extinguishing equipment shall be available and easily accessible. Have a dry powder or CO2 fire extinguisher adjacent to the charging area.
- When carrying out work in relation to a refrigerating system that involves exposing any pipe work, no sources of ignition shall be used in such a manner that it may lead to the risk of fire or explosion. All possible ignition sources, including cigarette smoking, should be kept sufficiently far away from the site of installation, repair, or removal and disposal of the unit, during which refrigerant can possibly be released into the surrounding space. Prior to beginning work, the area around the equipment is to be surveyed to make sure that there are no flammable hazards or ignition risks. "No Smoking" signs shall be clearly displayed.


WARNING
Personal Injury, flammable refrigerant!

Ensure that the area is in the open or that it is adequately ventilated before opening the system or conducting any hot work. A degree of ventilation shall continue during the period that the work is carried out. The ventilation should safely disperse any released refrigerant and preferably expel it externally into the surroundings.

Where electrical components are being changed, they shall be fit according to their purpose and to the correct specification. At all times the manufacturer's maintenance and service guidelines shall be followed. If in doubt, consult the manufacturer's technical department for assistance. The following checks shall be applied to installations using flammable refrigerants:

- The actual refrigerant charge is in accordance with the room size within which the refrigerant containing parts are installed.
- The ventilation machinery and outlets are operating adequately and are not obstructed.
- If an indirect refrigerating circuit is being used, the secondary circuit shall be checked for the presence of refrigerant.
- Equipment marking must remain visible and legible. Markings and signs that are illegible shall be corrected.


WARNING
Personal Injury, flammable refrigerant!

Refrigerating pipe or components are installed in a position where they are unlikely to be exposed to any substances which may corrode refrigerant containing components, unless the components are constructed of materials that are inherently resistant to corrosion or are suitably protected against corrosion.

Repair and maintenance of electrical components shall include initial safety checks and component inspection procedures. If a fault exists that could compromise safety, then no electrical supply shall be connected to the circuit until the fault has been dealt with.

- That capacitors are discharged: this shall be done in a safe manner to avoid the possibility of sparking.
- That no live electrical components and wiring are exposed while charging, recovering or purging the system.
- That there is continuity of grounding.


WARNING
Flammable refrigerant!

Sealed electrical components shall be replaced.

Intrinsically safe components must be replaced.

Check that cabling will not be subject to wear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. The check shall also take into account the effects of aging or continual vibration from sources such as compressors or fans.

Under no circumstances shall potential sources of ignition be used while searching for or detection of refrigerant leaks. A halide torch (or any other detector using a naked flame) shall not be used.

Electronic leak detectors may be used to detect refrigerant leaks but, in the case of flammable refrigerants, the sensitivity may not be adequate, or may need re-calibration. (Detection equipment shall be calibrated in a refrigerant-free area.) Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant used. Leak detection equipment shall be set at a percentage of the LFL of the refrigerant and shall be calibrated for the refrigerant employed, and the appropriate percentage of gas (25 % maximum) is confirmed.

If a leak is suspected, all naked flames shall be removed/extinguished.

If a leakage of refrigerant which requires brazing is found, all of the refrigerant shall be recovered from the system, or isolated (by means of shut off valves) in a part of the system remote from the leak.

Leak detection fluids are also suitable for use with most refrigerants but the use of detergents containing chlorine shall be avoided as the chlorine may react with the refrigerant and corrode the copper pipe-work.

Examples of leak detection fluids are:

- bubble method,
- fluorescent method agents.

**WARNING****Flammable refrigerant!**

When breaking into the refrigerant circuit to make repairs or for any other purpose conventional procedures shall be used. However, for flammable refrigerants it is important that best practice be followed, since flammability is a consideration. The following procedure shall be adhered to:

- safely remove refrigerant following local and national regulations.
- evacuate.
- purge the circuit with inert gas.
- evacuate.
- continuously flush or purge with inert gas when using flame to open circuit, and,
- open the circuit.

The refrigerant charge shall be recovered into the correct recovery cylinders if venting is not allowed by local and national codes. For appliances containing flammable refrigerants, the system shall be purged with oxygen-free nitrogen to render the appliance safe for flammable refrigerants. This process might need to be repeated several times. Compressed air or oxygen shall not be used for purging refrigerant systems.

For appliances containing flammable refrigerants, refrigerants purging shall be achieved by breaking the vacuum in the system with oxygen-free nitrogen and continuing to fill until the working pressure is achieved, then venting to atmosphere, and finally pulling down to a vacuum. This process shall be repeated until no refrigerant is within the system. When the final oxygen-free nitrogen charge is used, the system shall be vented down to atmospheric pressure to enable work to take place.

The outlet for the vacuum pump shall not be close to any potential ignition sources, and ventilation shall be available.

Ensure that contamination of different refrigerants does not occur when using charging equipment. Hoses or lines shall be as short as possible to minimize the amount of refrigerant they contain.

Cylinders shall be kept upright. Ensure that the refrigeration system is grounded prior to charging the system with refrigerant.

Label the system when charging is complete (if it is not already labeled).

Take extreme care not to overfill the refrigeration system.

**WARNING****Flammable refrigerant!**

Prior to recharging the system, it shall be pressure-tested with the appropriate purging gas. The system shall be leak-tested on completion of charging but prior to commissioning. A follow up leak test shall be carried out prior to leaving the site.

Before carrying out this procedure, it is essential that the technician is completely familiar with the equipment and all its detail. It is recommended that all refrigerants are recovered safely. Prior to the task being carried out, an oil and refrigerant sample shall be taken in case analysis is required prior to re-use of reclaimed refrigerant. It is essential that electrical power is available before the task is commenced.

- a. Become familiar with the equipment and its operation.
- b. Isolate system electrically.
- c. Before attempting the procedure ensure that:
 - mechanical handling equipment is available, if required, for handling refrigerant cylinders.
 - all personal protective equipment is available and being used correctly.
 - the recovery process is supervised at all times by a competent person.
 - recovery equipment and cylinders conform to the appropriate standards.
- d. Pump down refrigerant system, if possible.
- e. If a vacuum is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- f. Make sure that the cylinder is situated on the scales before recovery takes place.
- g. Start the recovery machine and operate it in accordance with the manufacturer's instructions.
- h. Do not overfill cylinders. (No more than 80% volume liquid charge).
- i. Do not exceed the maximum working pressure of the cylinder, even temporarily.
- j. When the cylinders have been filled correctly and the process has been completed, make sure that the cylinders and the equipment are removed from site promptly and all isolation valves on the equipment are closed off.
- k. Recovered refrigerant shall not be charged into another refrigeration system unless it has been cleaned and checked.

Equipment shall be labeled stating that it has been de-commissioned and emptied of refrigerant. The label shall be dated and signed. Ensure that there are labels on the equipment stating the equipment contains flammable refrigerant.

When removing refrigerant from a system, either for servicing or decommissioning, it is recommended that all refrigerants are removed safely.

When transferring refrigerant into cylinders, ensure that only appropriate refrigerant recovery cylinders are employed. Ensure that the correct number of cylinders for holding the total system charge is available. All cylinders to be used are designated for the recovered refrigerant and labelled for that refrigerant (i.e. special cylinders for the recovery of refrigerant). Cylinders shall be complete with pressure-relief valve and associated shut-off valves in good working order. Empty recovery cylinders are evacuated and, if possible, cooled before recovery occurs.


WARNING
Flammable refrigerant!

The recovery equipment shall be in good working order with a set of instructions concerning the equipment that is at hand and shall be suitable for the recovery of the flammable refrigerant. If in doubt, the manufacturer should be consulted. In addition, a set of calibrated weighing scales shall be available and in good working order. Hoses shall be complete with leak-free disconnect couplings and in good condition.

The recovered refrigerant shall be processed according to local legislation in the correct recovery cylinder, and the relevant waste transfer note arranged. Do not mix refrigerants in recovery units and especially not in cylinders.

If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level to make certain that flammable refrigerant does not remain within the lubricant. The compressor body shall not be heated by an open flame or other ignition sources to accelerate this process. When oil is drained from a system, it shall be carried out safely.

Do not use the air conditioner for other purposes. In order to avoid any quality deterioration, do not use the unit for the cooling of precision instruments, food, plants, animals or works of art. Before cleaning, be sure to stop the operation, turn the breaker off or unplug the supply cord. Otherwise, electric shock and injury may occur.

To avoid electric shock or fire, make sure that a leak detector is installed. Never touch the air outlet or the horizontal blades while the swing flap is in operation. Fingers may be caught or the unit may break down.

Never put any objects into the air inlet or outlet. Objects touching the fan at high speed can be dangerous. Never inspect or service the unit by yourself. Ask a qualified service person to perform this task.

Do not dispose of this product as unsorted municipal waste. This waste should be collected separately for special treatment. Do not dispose of electrical appliances as unsorted municipal waste. Use separate collection facilities. Contact your local government for information regarding the connection systems available.

If electrical appliances are disposed of in landfills or dumps, hazardous substances can leak into the groundwater and get into the food chain, hazardous to one's health and well-being.

To prevent refrigerant leak, contact your dealer.

When the system is installed and operates in a small room, it is required to maintain the concentration of the refrigerant below the limit, in case a leak occurs. Otherwise, oxygen in the room may be affected, resulting in a serious accident.

The refrigerant in the air conditioner is safe and normally does not leak.

If the refrigerant leaks into the room and encounters the fire of a burner, a heater or a cooker, a harmful gas could be released.

Turn off any combustible heating devices, ventilate the room, and contact the dealer where the unit was purchased.

Do not use the air conditioner until a service person confirms that the refrigerant leak is repaired.

Keep ventilation openings clear of obstruction.


WARNING
Flammable refrigerant!

The appliance uses R454B refrigerant.



2 General

The unit can be positioned for bottom air return in the upflow position, left and right air return in the horizontal position and top air return in downflow position.

This air handler provides the flexibility for installation in any upflow, downflow or horizontal application. Adjust the motor speed tap through the DIP switch (located on the Air Handler's control board) to select correct air flow according to airflow performance table (Table 15). Please refer to wiring diagram for Dip Switch settings.



WARNING

Fire hazard !

Do not install unit in an area where flammable materials are present due to the risk of an explosion resulting in serious injury or death.



WARNING

Personal injury, product damage!

If the supporting structural members are not strong enough to take the unit's weight, the unit could fall out of place and cause serious injury.

If a return-air duct is not installed, carefully select the place and method of product installation so that air flow into the product will not be blocked.

The unit should be installed in a level position to ensure proper condensation drainage. Up to an additional ¼" rise over the width or depth of the unit is allowed to create additional sloping towards the drain.

Install the indoor and outdoor unit, power supply wiring and connecting wires at least 3.5 ft. away from televisions or radios in order to prevent image interference or noise.

Please refer to Figure 32 for high and low voltage wiring connections.

To ensure the proper installation, select a solid and level site. Ensure enough clearance is maintained for installation and maintenance. Refer to figure 2.

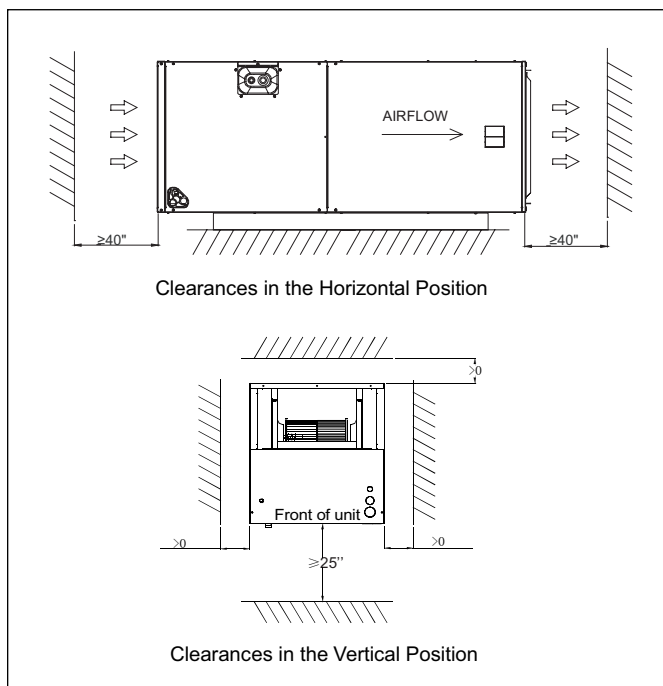


Figure 2 Required clearances

NOTICE

Product damage!

The installed unit must have the required clearances as shown in Figure 2. Failure to follow these instructions may result in equipment damage and/or premature equipment failure.



WARNING

Fire hazard !

Keep flammable material and vapors, such as gasoline, away from the air handler. Failure to follow these instructions can result in death, explosion, or fire.

2.1 Installations in High Humidity Environments

When the unit is installed in a hot and humid place, if the humidity inside the installation space exceeds 86°F and RH 80%, it is recommended to insulate the cabinet exterior. Use glass wool or polyethylene foam as insulation; the thickness should be more than 2 in. and it must fit inside the installation space opening.

Condensation may come from the surface of the insulation. Be sure to use insulation that is designed for use with HVAC Systems. Condensation may be produced on surface during cooling operation. It is also recommended to use auxiliary drain pan and secure the unit firmly to prevent it from falling. See Figures 3, 4, 5, & 6.



Refer to local code requirements for usage of auxiliary drain pans.



WARNING

Fire hazard !

These instructions are exclusively intended for qualified contractors and authorized installers. Work on the refrigerant circuit with flammable refrigerant in safety group A2L may only be carried out by authorized heating contractors. These heating contractors must be trained in accordance with UL 60335-2-40, Annex HH. The certificate of competence from an industry accredited body is required. Work on electrical equipment may only be carried out by a qualified electrician. Before initial commissioning, all safety related points must be checked by the particular certified heating contractors. The system must be commissioned by the system installer or a qualified person authorized by the installer. For installation of the indoor unit, refer to the corresponding installation and operation manual. If an indoor unit is installed in an unventilated area, the area shall be so constructed that should any refrigerant leak, it will not stagnate so as to create a fire or explosion hazard. The appliance shall be stored so as to prevent mechanical damage from occurring. Do not stack combustible materials on the surface of the indoor unit.

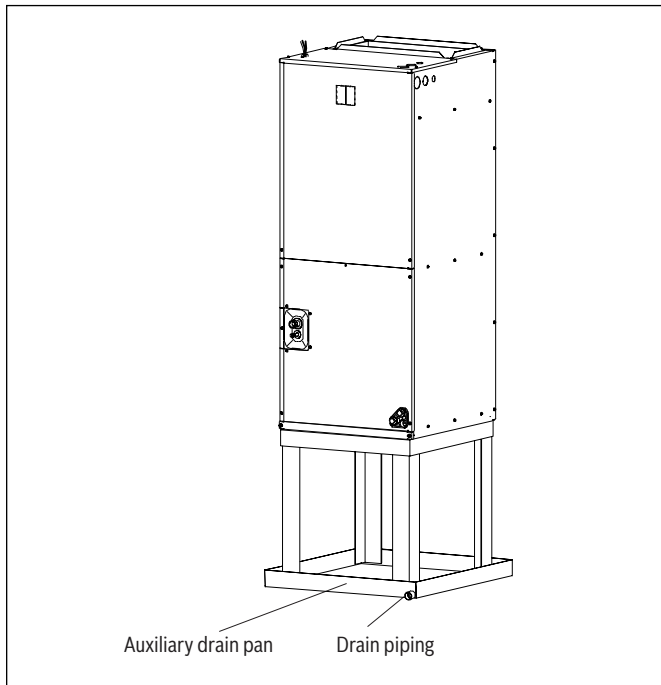


Figure 3 Installed vertical upflow

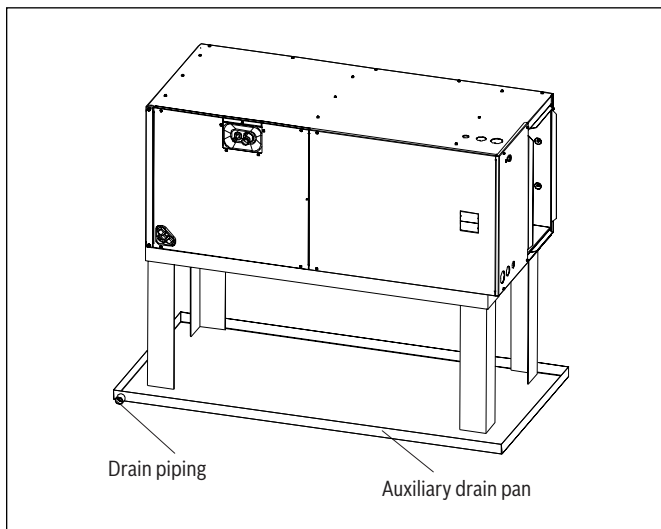


Figure 4 Installed horizontal right

NOTICE

Product damage!

Inner extra drain pan is recommended to be installed for vertical downflow applications installed in high humidity environments. This inner extra drain pan can be ordered using part number 8733980005 for 2,3 ton cabinets, and 8733953539 for 4,5 ton cabinets. Refer to Figure 6.

NOTICE

Product damage!

For high humidity installations which include electric heat strips, it is recommended to install spacing brackets (available to order - part number 8733953246) between the heater and the heater collar to prevent condensation from forming on the collar.

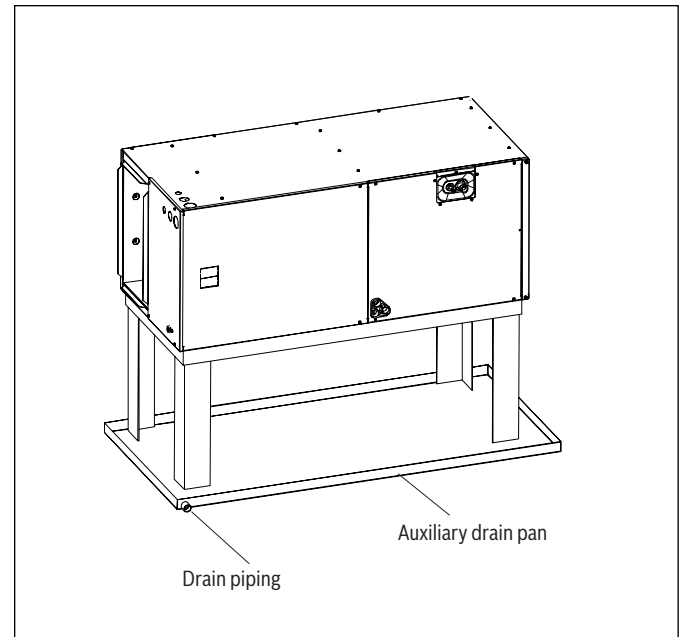


Figure 5 Installed horizontal left

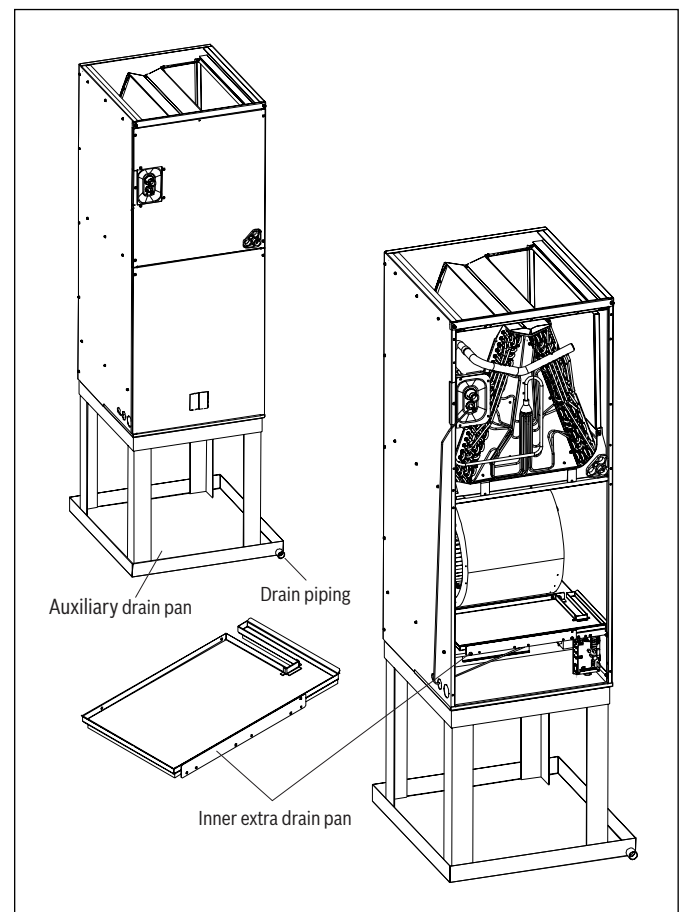


Figure 6 Installed vertical downflow

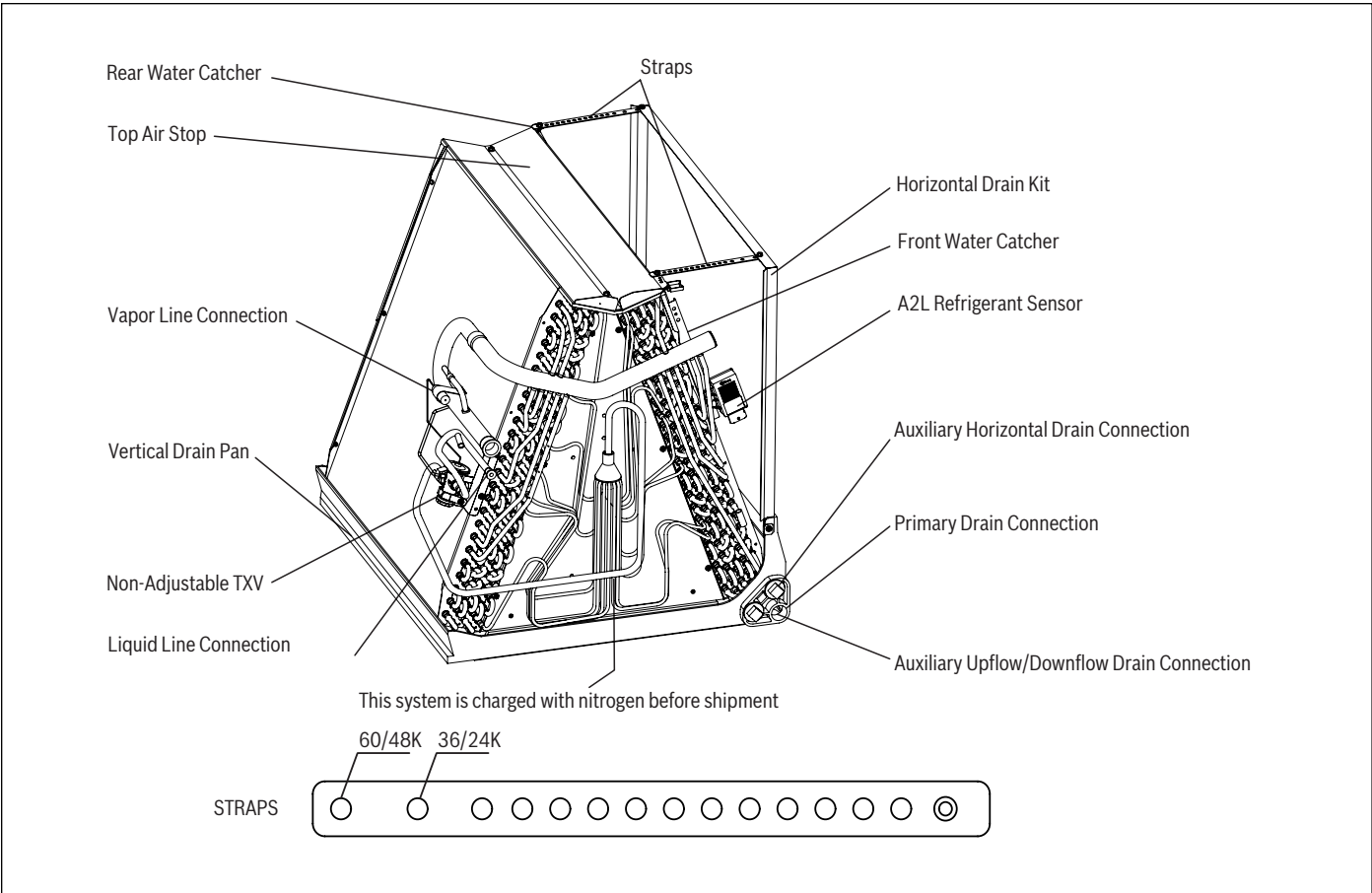


Figure 7 Indoor coil and drain pan set-up

2.2 Unit Dimensions

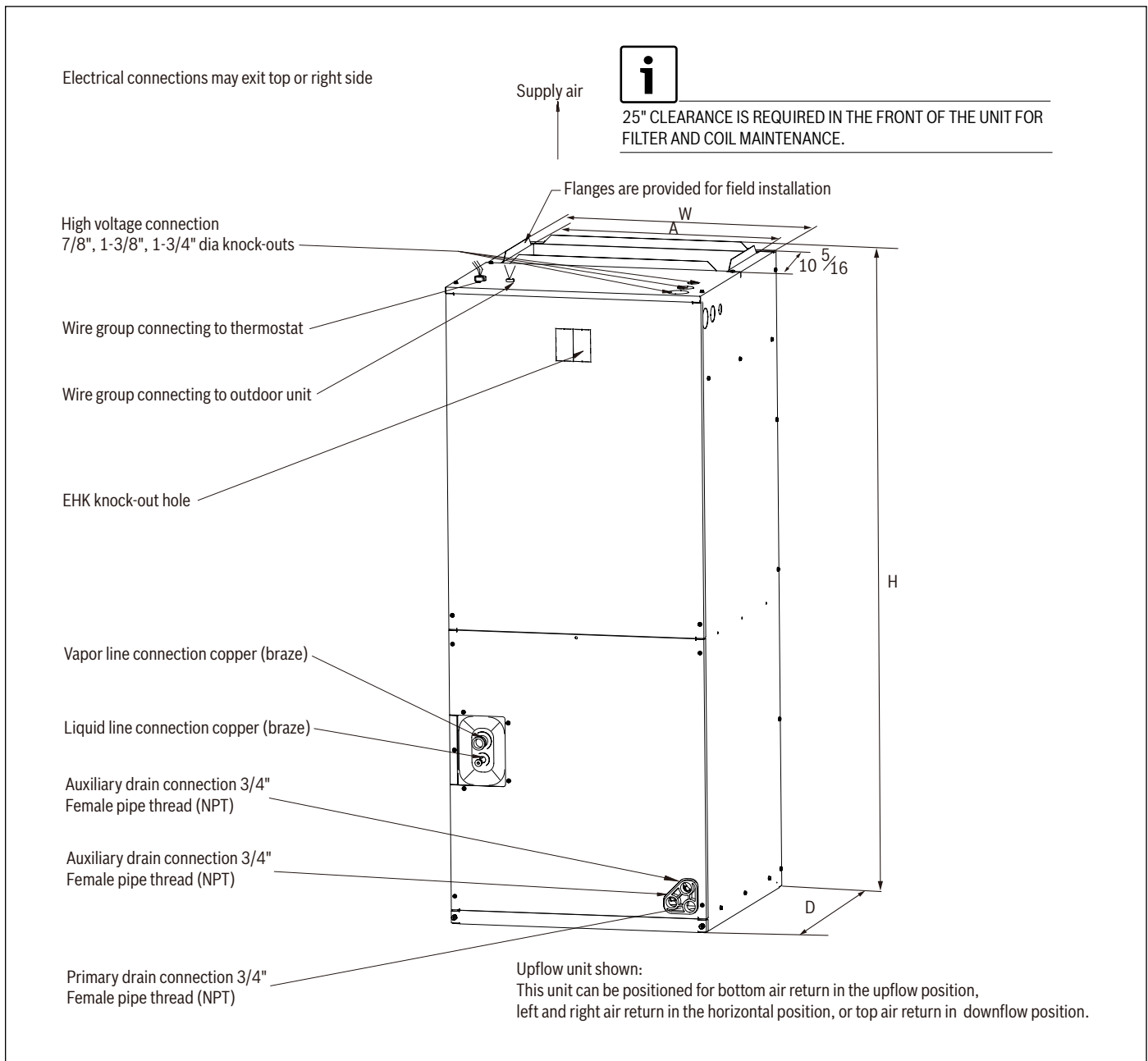


Figure 8

Model Size	Dimensions Inch [mm]				
	Unit Height "H"	Unit Width "W"	Unit Length "D"	Supply Duct "A"	Liquid Line Vapor Line
24	46-1/2 [1180]	19-5/8 [500]	21-5/8 [550]	18 [456]	3/8 3/4 [9.5] [19]
36	46-1/2 [1180]	19-5/8 [500]	21-5/8 [550]	18 [456]	3/8 3/4 [9.5] [19]
48	54-1/2 [1385]	22 [560]	24 [610]	19-1/2 [496]	3/8 7/8 [9.5] [22]
60	54-1/2 [1385]	22 [560]	24 [610]	19-1/2 [496]	3/8 7/8 [9.5] [22]

Table 2

2.3 Components

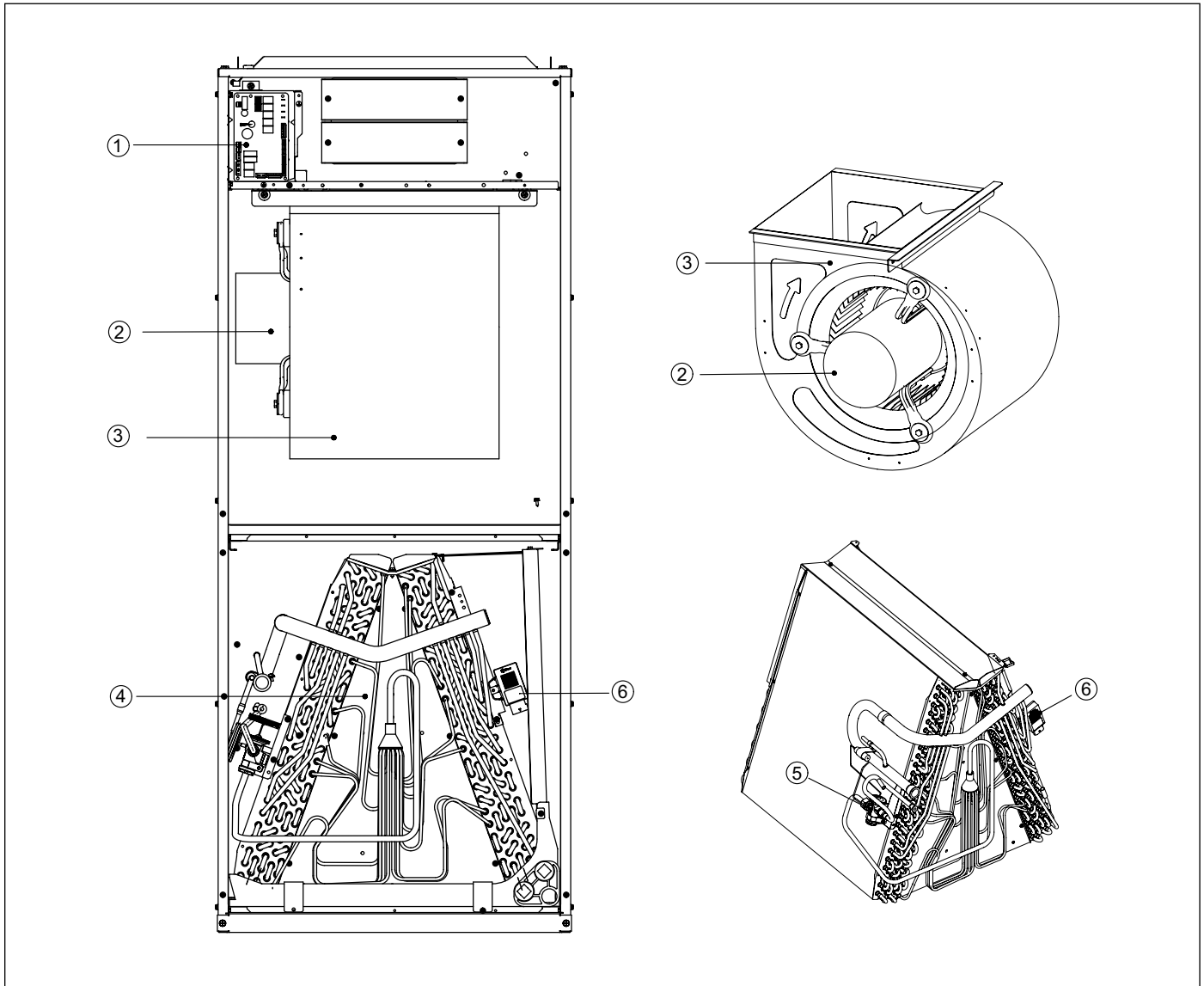


Figure 9

COMPONENT IDENTIFICATION:

1. Main Control Board
2. Motor
3. Blower Housing
4. All Aluminum Coil
5. R454B-TXV
6. A2L Refrigerant Sensor

2.4 A2L Refrigerant Sensor

R454B refrigerant leakage sensor is configured for the indoor unit: To meet different installation scenarios, the refrigerant sensor has two installation positions. Before installing the indoor unit, check whether the refrigerant sensor is correctly installed according to Section 3.



CAUTION

Fire hazard!

The refrigerant leakage sensor can only use the factory model or the specified model indicated in the corresponding manual.

The R454B refrigerant leakage sensor must be used to activate the refrigerant shut-off device, the alarm device, incorporated circulation airflow or other emergency controls, which shall give an electrical signal at a predetermined alarm setpoint in response to leaked refrigerant.

The location of leakage sensors shall be chosen in relation to the different installation scenarios. Please refer to the indoor unit installation manual for specific requirements.

The installation of the refrigerant leakage sensor shall allow access for checking, repair or replacement by an authorized person.

The refrigerant leakage sensor shall be installed so its function can be verified easily.

The refrigerant leakage sensor shall be protected to prevent tampering or unauthorized resetting of the pre-set value.

To be effective, the refrigerant leakage sensor must be electrically powered at all times after installation, other than when servicing.

If the refrigerant leakage sensor detects a refrigerant leak, the fan will be turned on to the maximum, the compressor will stop running. Immediately leave the leak area and notify a professional for handling.

The service life of the refrigerant sensor is 15 years, and it should be replaced after the service life.



WARNING

Fire, explosion, personal injury!

LEAK DETECTION SYSTEM installed on indoor unit. Unit must be powered except for service.

NOTICE

Product damage!

R454B refrigerant leakage sensor is configured for the indoor unit. The operation of fan can be initiated by the R454B refrigerant sensor, which meets the incorporated circulation airflow requirements.

The allowed maximum refrigerant charge (M_{max}) and the required minimum room area (A_{min}) can be determined according to Table 6 and Table 7-9.

3 Applications

3.1 Vertical Upflow

- Vertical Upflow configuration is the factory default on all models (see Figure 3).
- If return air is to be ducted, install duct flush with floor. Use fireproof resilient gasket 1/8 to 1/4 in. thick between the ducts, unit and floor. Set unit on floor over opening.



Torque applied to drain connections should not exceed 15 ft.lbs. For vertical upflow and horizontal right installations, dimensions for refrigerant and drain pipes may be found in Figure 10.

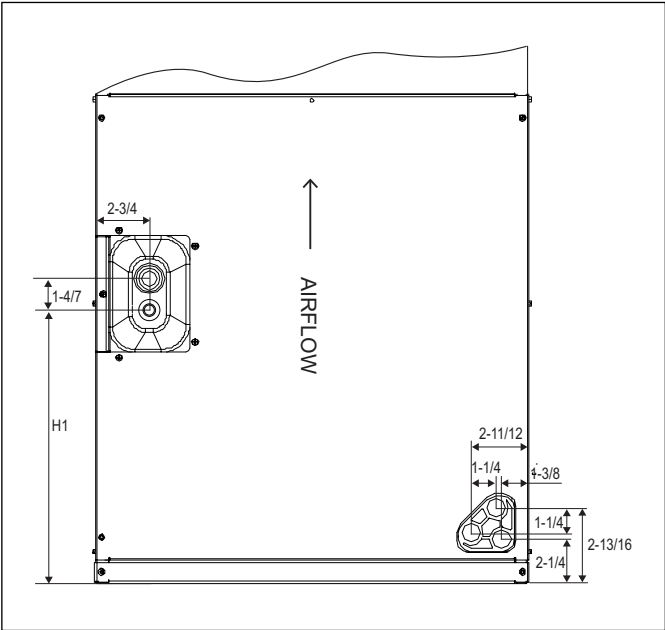


Figure 10 Dimensions For Air Handler (Coil Section)

Model Size	"H1" Inch [mm]
24/36	13-1/5 [335.5]
48/60	13-7/8 [352.8]

Table 3

3.2 Vertical Downflow

Conversion to Vertical Downflow:

A vertical upflow unit may be converted to vertical downflow. Remove the coil access panel, refrigerant leak sensor, and indoor coil and reinstall 180° from original position. See Figure 11.

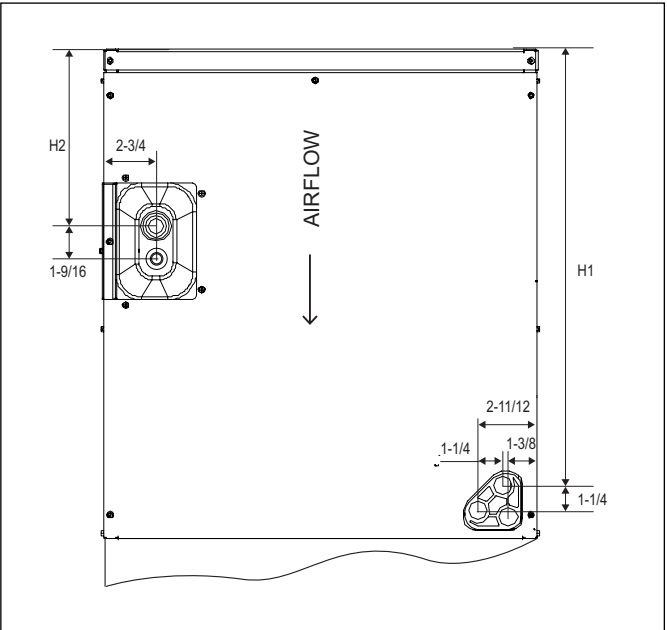


Figure 11 Dimensions for air handler (coil section)

Model Size	"H1" Inch [mm]	"H2" Inch [mm]
24/36	17-2/5 [441.5]	6-2/5 [162.5]
48/60	22-1/6 [563.5]	10-1/2 [267.2]

Table 4

3.3 Horizontal

Horizontal right is the default factory configuration for all models.

Conversion to Horizontal Left:

A vertical upflow unit may be converted to horizontal left by removing indoor coil assembly and the refrigerant leak detection sensor. Reinstall the indoor coil and the refrigerant sensor for left hand air supply. See Figure 12 and 13.

- Rotate the unit 90° into the horizontal left position, with the coil compartment on the right and the blower compartment on the left.
- Remove the coil access panel
- Remove the refrigerant leak detection sensor and indoor coil
- Reinstall the indoor coil 180° from original position. Ensure the retaining channel is fully engaged with the coil rail. See Figures 12 and 13.
- An additional field supplied drain pan kit is recommended when the unit is configured for the horizontal position over a finished ceiling and/or living space.

Steps for Changing Cabinet Orientation to Vertical Downflow OR Horizontal Left Orientation

1. Remove the screws and front panel (Figure 12, Step 1).
2. Remove the A2L refrigerant sensor from the coil (Figure 12, Step 2).
3. Reinstall the A2L refrigerant sensor at the position shown below. (Figure 12, Step 3).
4. Replace the coil in the correct orientation and secure in place. Ensure the flanges on the evaporator coil are engaged with the guide rail inside the cabinet. (Figure 13).

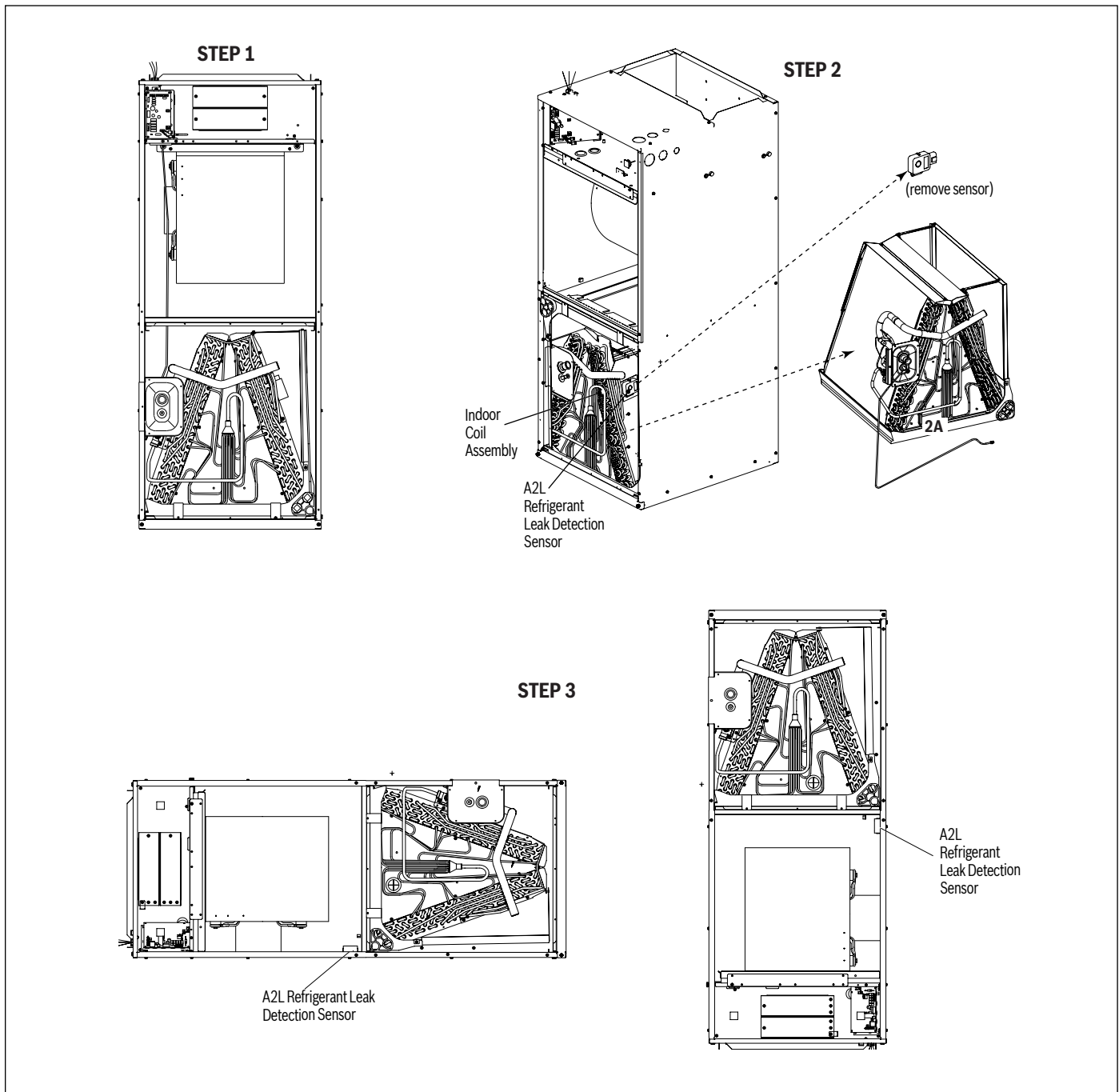


Figure 12 Vertical downflow & horizontal left applications conversion

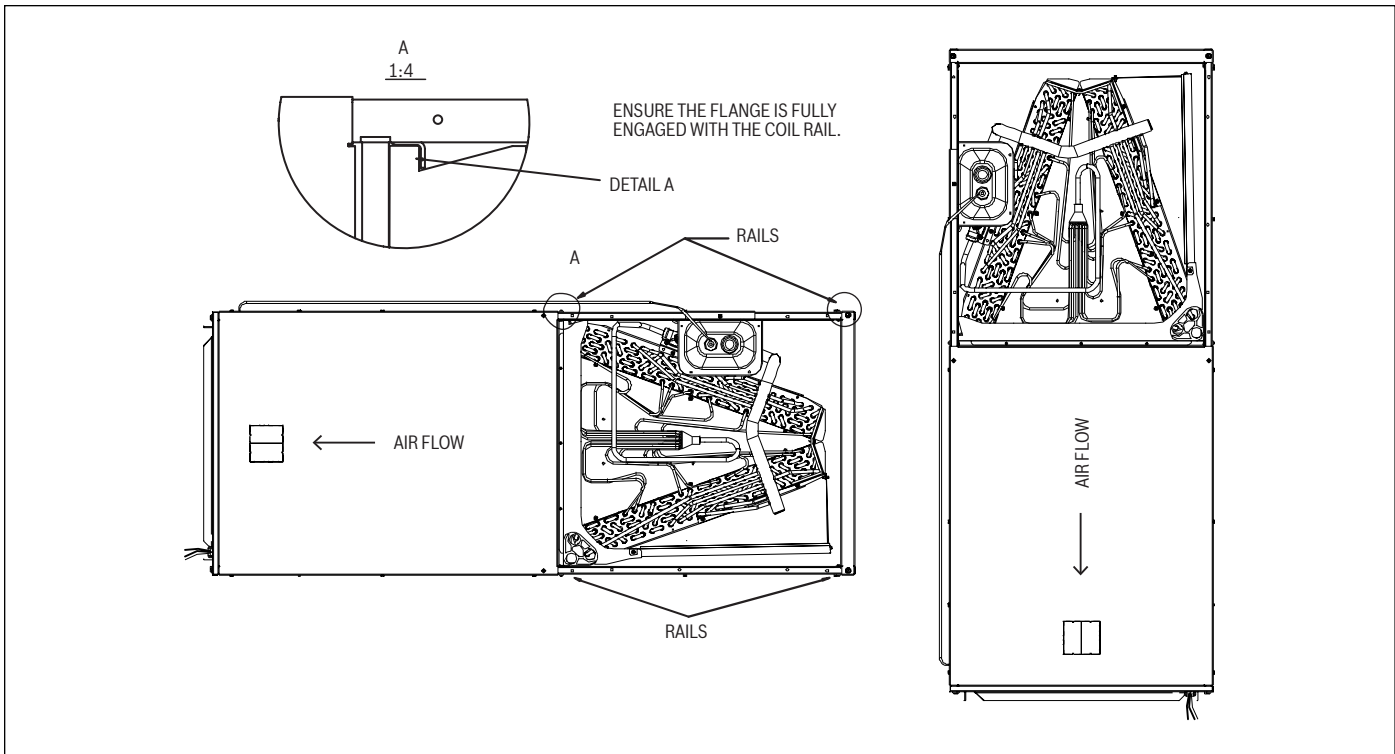


Figure 13 Vertical downflow & horizontal left applications

NOTICE

Product damage!

Horizontal units must be configured for right hand air supply or left hand air supply. Horizontal drain pan must be located under indoor coil. Failure to use the drain pan can result in property damage.

Conversion in Horizontal Direction:

Horizontal right-hand supply can be changed to horizontal left-hand supply by removing the indoor coil and reinstalling 180° from original.

3.4 Installation in an Unconditioned Space

NOTICE

Product damage!

There are two pairs of coil rails in the air handler for upflow and downflow application. If the air handler is installed in an unconditioned space, the two unused coil rails should be removed to minimize air handler surface sweating. The coil rails can be easily removed by unscrewing the 6 mounting screws from both sides of the cabinet.

3.5 Refrigerant Charge and Room Area Limitations

In UL/CSA 60335-2-40, R454B refrigerant is classified as class A2L, which is mildly flammable. Therefore, R454B refrigerant is suitable for systems needing additional refrigerant charge and which will limit the area of the rooms being served by the system.

Similarly, the total amount of refrigerant in the system shall be less than or equal to the allowable maximum refrigerant charge. The allowable maximum refrigerant charge depends on the area of the rooms being served by the system.

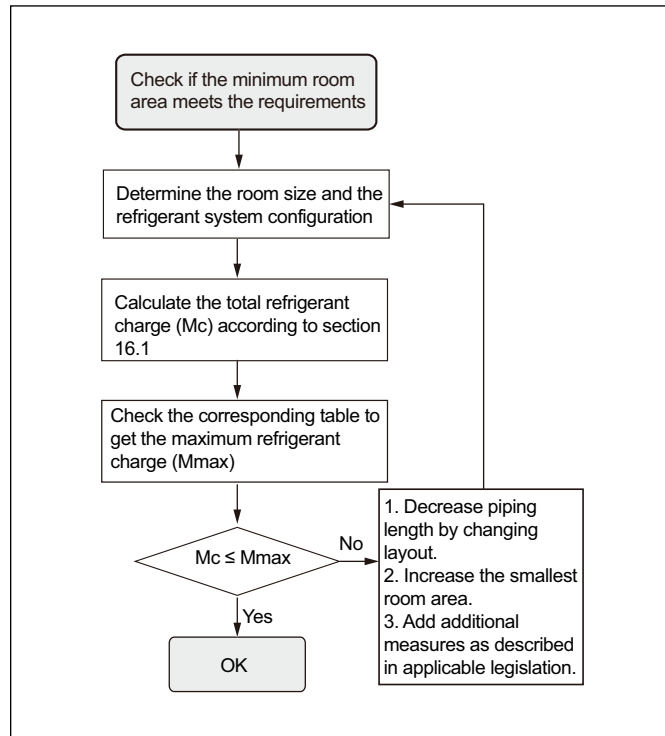


Figure 14



The terms in this section are explained as follows:

- M_c : The actual refrigerant charge in the system.
- A : the actual room area where the appliance is installed.
- A_{min} : The required minimum room area.
- M_{max} : The allowable maximum refrigerant charge in a room.
- Q_{min} : The minimum circulation airflow.
- A_{nmin} : The minimum opening area for connected rooms.
- T_{Amin} : The total area of the conditioned space (For appliances serving one or more rooms with an air duct system).
- T_A : The total area of the conditioned space connected by air ducts.

3.5.1 The Room Area Calculation Requirements



CAUTION

Flammable refrigerant!

The space considered shall be any space which contains refrigerant-containing parts or into which refrigerant could be released.

The room area (A) of the smallest, enclosed, occupied space shall be used in the determination of the refrigerant quantity limits.

For determination of room area (A) when used to calculate the refrigerant charge limit, the following shall apply.

The room area (A) shall be defined as the room area enclosed by the projection to the base of the walls, partitions and doors of the space in which the appliance is installed.

Spaces connected by only drop ceilings, ductwork, or similar connections shall not be considered a single space.

Units mounted higher than 70-55/64 inches and spaces divided by partition walls that are no higher than 62-63/64 inches shall be considered a single space. Rooms on the same floor and connected by an open passageway between the spaces can be considered a single room when determining compliance to A_{min} , if the passageway complies with all of the following.

1. It is a permanent opening.
2. It extends to the floor.
3. It is intended for people to walk through.

The area of the connected rooms, on the same floor, connected by permanent opening in the walls and/or doors between occupied spaces, including gaps between the wall and the floor, can be considered a single room when determining compliance to A_{min} , provided all of the following conditions are met as Figure 15.

Low level opening:

1. The opening shall not be less than A_{nmin} in Table 5.
2. The area of any openings above 11-13/16 inches from the floor shall not be considered in determining compliance with A_{nmin} .
3. At least 50% of the opening area of A_{nmin} shall be below 7-7/8 inches from the floor.
4. The bottom of the opening is not more than 3-15/16 inches from the floor.
5. The opening is a permanent opening that cannot be closed.
6. For openings extending to the floor the height shall not be less than 25/32 inches above the surface of the floor covering.

High level opening:

1. The opening shall not be less than 50% of A_{nmin} in Table 5.
2. The opening is a permanent opening that cannot be closed.
3. The opening shall be at least 59 inches above the floor.
4. The height of the opening is not less than 25/32 inches.

Room size requirement:

1. The room into which refrigerant can leak, plus the connected adjacent room(s) shall have a total area not less than A_{min} . A_{min} is shown in Tables 7-9.
2. The room area in which the unit is installed shall be not less than 20% A_{min} . A_{min} is shown in Tables 7-9.



The requirement for the second opening can be met by drop ceilings, ventilation ducts, or similar arrangements that provide an airflow path between the connected rooms.

The minimum opening for natural ventilation (Anv_{min}) in connected rooms is related to the room area (A), the actual refrigerant charge of refrigerant in the system (M_c), and the allowable MAXIMUM REFRIGERANT CHARGE in the system (M_{max}), Anv_{min} can be determined according to Table 5.

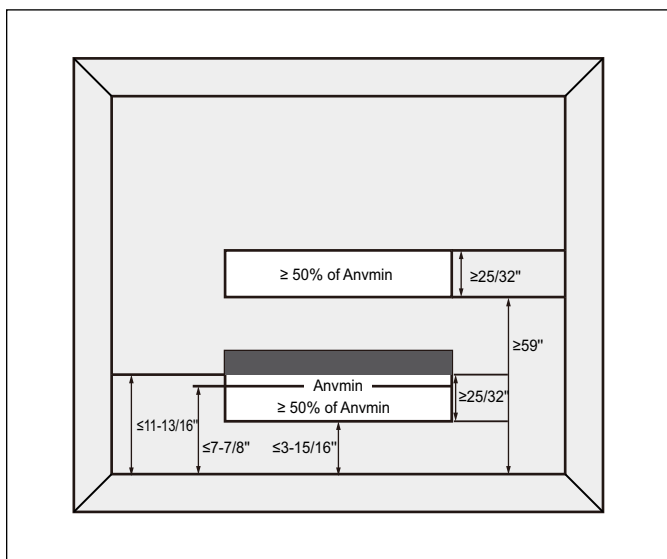


Figure 15

The minimum opening area for connected rooms:

A		m_c		m_{max}		Anv_{min}	
ft ²	m ²	lb-oz	kg	lb-oz	kg	ft ²	m ²
100	9.2	15-8	7	3-5	1.5	2.1	0.19
120	11.1	15-8	7	3-15	1.8	2.0	0.18
140	13.0	15-8	7	4-10	2.1	1.9	0.17
160	14.8	15-8	7	5-5	2.4	1.8	0.16
180	16.7	15-8	7	6-3	2.8	1.7	0.15
200	18.5	15-8	7	6-13	3.1	1.6	0.14
220	20.4	15-8	7	7-8	3.4	1.4	0.13
240	22.2	15-8	7	8-3	3.7	1.3	0.12
260	24.1	15-8	7	8-13	4.0	1.2	0.11
280	26.0	15-8	7	9-8	4.3	1.1	0.10
300	27.8	15-8	7	10-2	4.6	1.0	0.09
320	29.7	15-8	7	11-0	5.0	0.8	0.07
340	31.5	15-8	7	11-11	5.3	0.7	0.06
360	33.4	15-8	7	12-6	5.6	0.6	0.05
380	35.3	15-8	7	13-0	5.9	0.5	0.04
400	37.1	15-8	7	13-11	6.2	0.4	0.03
420	39.0	15-8	7	14-5	6.5	0.3	0.02
440	40.8	15-8	7	15-0	6.8	0.2	0.01
460	42.7	15-8	7	15-14	7.2	0.1	0.00

Table 5

Note: Take the $M_c = 15\text{lb } 8\text{oz}$ as an example.

For appliances serving one or more rooms with an air duct system, The room area calculation shall be determined based on the total area of the conditioned space (TA) connected by ducts taking into consideration that the circulating airflow distributed to all the rooms by the appliance integral indoor fan will mix and dilute the leaking refrigerant before entering any room.

3.5.2 The Allowed Maximum Refrigerant Charge and Required Minimum Room Area

If the fan incorporated to an appliance is continuously operated or operation is initiated by a REFRIGERANT DETECTION SYSTEM with a sufficient CIRCULATION AIRFLOW rate, the allowable maximum refrigerant charge (Mmax) and the required minimum room area (Amin/TAmin) is shown in Table 6 and Tables 7-9 .

The allowable maximum refrigerant charges:

A/TA		m _{max}		A/TA		m _{max}	
ft²	m²	lb-oz	kg	ft²	m²	lb-oz	kg
30	2.7	0-14	0.4	250	23.2	8-10	3.9
40	3.7	1-5	0.6	260	24.1	8-13	4.0
50	4.6	1-9	0.7	270	25.0	9-4	4.2
60	5.5	2-0	0.9	280	26.0	9-8	4.3
70	6.5	2-3	1	290	26.9	9-15	4.5
80	7.4	2-10	1.2	300	27.8	10-2	4.6
90	8.3	3-1	1.4	310	28.7	10-9	4.8
100	9.2	3-5	1.5	320	29.7	11-0	5.0
110	10.2	3-12	1.7	330	30.6	11-4	5.1
120	11.1	3-15	1.8	340	31.5	11-11	5.3
130	12.0	4-7	2.0	350	32.5	11-14	5.4
140	13.0	4-10	2.1	360	33.4	12-6	5.6
150	13.9	5-1	2.3	370	34.3	12-9	5.7
160	14.8	5-5	2.4	380	35.3	13-0	5.9
170	15.7	5-12	2.6	390	36.2	13-7	6.1
180	16.7	6-3	2.8	400	37.1	13-11	6.2
190	17.6	6-6	2.9	410	38.0	14-2	6.4
200	18.5	6-13	3.1	420	39.0	14-5	6.5
210	19.5	7-1	3.2	430	39.9	14-12	6.7
220	20.4	7-8	3.4	440	40.8	15-0	6.8
230	21.3	7-11	3.5	450	41.8	15-7	7.0
240	22.2	8-3	3.7	460	42.7	15-14	7.2

Table 6

The required minimum room area:

m _c		A _{min} /TA _{min}		m _c		A _{min} /TA _{min}	
lb-oz	kg	ft²	m²	lb-oz	kg	ft²	m²
2-2	1.0	64.6	6.0	10-2	4.6	293.9	27.3
2-9	1.2	77.6	7.2	10-9	4.8	306.8	28.5
3-0	1.4	89.4	8.3	11-0	5.0	319.7	29.7
3-7	1.6	102.3	9.5	11-7	5.2	331.6	30.8
3-15	1.8	115.2	10.7	11-14	5.4	344.5	32.0
4-6	2.0	128.1	11.9	12-5	5.6	357.4	33.2
4-13	2.2	141.1	13.1	12-12	5.8	370.3	34.4
5-4	2.4	154.0	14.3	13-3	6.0	383.2	35.6
5-11	2.6	165.8	15.4	13-10	6.2	396.2	36.8
6-2	2.8	178.7	16.6	14-1	6.4	409.1	38.0
6-9	3.0	191.6	17.8	14-8	6.6	420.9	39.1
7-0	3.2	204.6	19.0	14-15	6.8	433.8	40.3
7-7	3.4	217.5	20.2	15-6	7.0	446.8	41.5
7-15	3.6	230.4	21.4	15-14	7.2	459.7	42.7
8-6	3.8	243.3	22.6	16-5	7.4	472.6	43.9
8-13	4.0	255.2	23.7	16-12	7.6	485.5	45.1
9-4	4.2	268.1	24.9	17-3	7.8	497.3	46.2
9-11	4.4	281	26.1				

Table 7

The required minimum room area if installed at an altitude over 2000ft:

Altitude (m)		601-800		801-1000		1001-1200		1201-1400		1401-1600		1601-1800		1801-2000	
Altitude (ft)		1970-2625		2626-3280		3281-3938		3940-4593		4596-5250		5251-5905		5908-6562	
m_c		A_{min}/TA_{min}													
lb-oz	kg	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²
2	0.9	60	5.5	62	5.7	63	5.8	65	6.0	66	6.1	67	6.2	69	6.4
3	1.4	90	8.3	92	8.5	94	8.7	96	8.9	98	9.1	101	9.3	101	9.3
4	1.8	119	11.0	122	11.3	124	11.5	129	11.9	131	12.1	134	12.4	134	12.4
5	2.3	149	13.8	153	14.2	156	14.4	160	14.8	163	15.1	167	15.5	167	15.5
6	2.7	178	16.5	183	17.0	187	17.3	192	17.8	195	18.1	201	18.6	201	18.6
7	3.2	207	19.2	214	19.8	218	20.2	223	20.7	228	21.1	234	21.7	234	21.7
8	3.6	237	22.0	244	22.6	248	23.0	256	23.7	260	24.1	267	24.8	267	24.8
9	4.1	266	24.7	274	25.4	279	25.9	287	26.6	292	27.1	301	27.9	301	27.9
10	4.5	297	27.5	305	28.3	311	28.8	319	29.6	324	30.1	333	30.9	333	30.9
11	5.0	326	30.2	335	31.1	342	31.7	351	32.6	357	33.1	366	34.0	366	34.0
12	5.4	355	32.9	365	33.9	372	34.5	383	35.5	390	36.2	400	37.1	400	37.1
13	5.9	385	35.7	396	36.7	403	37.4	415	38.5	422	39.2	433	40.2	433	40.2
14	6.4	414	38.4	426	39.5	434	40.3	446	41.4	455	42.2	467	43.3	467	43.3
15	6.8	444	41.2	457	42.4	466	43.2	478	44.4	487	45.2	500	46.4	500	46.4
16	7.3	473	43.9	487	45.2	496	46.0	510	47.3	519	48.2	533	49.5	533	49.5
17	7.7	502	46.6	517	48.0	527	48.9	542	50.3	552	51.2	567	52.6	567	52.6
18	8.2	532	49.4	547	50.8	558	51.8	573	53.2	584	54.2	600	55.7	600	55.7
19	8.6	561	52.1	577	53.6	589	54.7	605	56.2	616	57.2	632	58.7	632	58.7
20	9.1	591	54.9	609	56.5	619	57.5	637	59.1	648	60.2	666	61.8	666	61.8

Table 8

Altitude (m)		2001-2200		2201-2400		2401-2600		2601-2800		2801-3000		3001-3200		above 3200	
Altitude (ft)		6565-7218		7221-7874		7877-8530		8533-9186		9190-9843		9846-10500		above 10500	
m_c		A_{min}/TA_{min}													
lb-oz	kg	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²	ft²	m²
2	0.9	72	6.6	60	5.5	62	5.7	63	5.8	65	6.0	66	6.1	67	6.2
3	1.4	101	9.3	90	8.3	92	8.5	94	8.7	96	8.9	98	9.1	101	9.3
4	1.8	134	12.4	119	11.0	122	11.3	124	11.5	129	11.9	131	12.1	134	12.4
5	2.3	167	15.5	149	13.8	153	14.2	156	14.4	160	14.8	163	15.1	167	15.5
6	2.7	201	18.6	178	16.5	183	17.0	187	17.3	192	17.8	195	18.1	201	18.6
7	3.2	234	21.7	207	19.2	214	19.8	218	20.2	223	20.7	228	21.1	234	21.7
8	3.6	267	24.8	237	22.0	244	22.6	248	23.0	256	23.7	260	24.1	267	24.8
9	4.1	301	27.9	266	24.7	274	25.4	279	25.9	287	26.6	292	27.1	301	27.9
10	4.5	333	30.9	297	27.5	305	28.3	311	28.8	319	29.6	324	30.1	333	30.9
11	5.0	366	34.0	326	30.2	335	31.1	342	31.7	351	32.6	357	33.1	366	34.0
12	5.4	400	37.1	355	32.9	365	33.9	372	34.5	383	35.5	390	36.2	400	37.1
13	5.9	433	40.2	385	35.7	396	36.7	403	37.4	415	38.5	422	39.2	433	40.2
14	6.4	467	43.3	414	38.4	426	39.5	434	40.3	446	41.4	455	42.2	467	43.3
15	6.8	500	46.4	444	41.2	457	42.4	466	43.2	478	44.4	487	45.2	500	46.4
16	7.3	533	49.5	473	43.9	487	45.2	496	46.0	510	47.3	519	48.2	533	49.5
17	7.7	567	52.6	502	46.6	517	48.0	527	48.9	542	50.3	552	51.2	567	52.6
18	8.2	600	55.7	532	49.4	547	50.8	558	51.8	573	53.2	584	54.2	600	55.7
19	8.6	632	58.7	561	52.1	577	53.6	589	54.7	605	56.2	616	57.2	632	58.7
20	9.1	666	61.8	591	54.9	609	56.5	619	57.5	637	59.1	648	60.2	666	61.8

Table 9

The minimum circulation airflow:

m_c		Q_{min}		m_c		Q_{min}	
lb-oz	kg	CFM	m³/h	lb-oz	kg	CFM	m³/h
2-2	1.0	116	196	10-2	4.6	530	900
2-9	1.2	139	235	10-9	4.8	553	939
3-0	1.4	162	274	11-0	5.0	576	978
3-7	1.6	185	313	11-7	5.2	599	1017
3-15	1.8	208	352	11-14	5.4	622	1056
4-6	2.0	231	391	12-5	5.6	645	1095
4-13	2.2	253	430	12-12	5.8	668	1134
5-4	2.4	277	470	13-3	6.0	691	1173
5-11	2.6	300	509	13-10	6.2	713	1212
6-2	2.8	323	548	14-1	6.4	736	1251
6-9	3.0	346	587	14-8	6.6	759	1290
7-0	3.2	369	626	14-15	6.8	782	1329
7-7	3.4	392	665	15-6	7.0	806	1369
7-15	3.6	415	704	15-14	7.2	829	1408
8-6	3.8	438	743	16-5	7.4	852	1447
8-13	4.0	461	782	16-12	7.6	875	1486
9-4	4.2	483	821	17-3	7.8	898	1525
9-11	4.4	506	860				

Table 10



CAUTION

Min. room area and airflow required!

The allowable maximum refrigerant charge in Table 6 or the required minimum room area in Table 7-9 is available only if the following conditions are met:

Minimum velocity of 3.28ft/s, which is calculated as the indoor unit airflow divided by the nominal face area of the outlet. And the grill area shall not be deducted.

Minimum airflow rate must meet the corresponding values in Table 10, which is related to the actual refrigerant charge of the system (M_c).

R454B refrigerant leakage sensor is configured.



The maximum refrigerant limit described above applies to unventilated areas. If adding additional measures, such as areas with mechanical ventilation or natural ventilation, The maximum refrigerant charge can be increased or the minimum room area can be reduced.

R454B refrigerant leakage sensor is configured for the indoor unit, meets the incorporated circulation airflow requirements the maximum refrigerant charge or minimum room area can be determined according to Table 6 or Table 7-9.



CAUTION

Min. room area and airflow required!

If the actual room area, air outlet height, and refrigerant charge amount are not reflected in the above table, more severe cases need to be considered according to the data in the tables 5-10.

4 Electrical wiring

Field wiring must comply with the National Electric Code (C.E.C. in Canada) and any applicable local ordinances.



WARNING

Electrical shock!

Disconnect all power to unit before installing or servicing. More than one disconnect switch may be required to deenergize the equipment. Hazardous voltage can cause severe personal injury or death.

4.1 Power Wiring

It is important that proper electrical power is available for connection to the unit being installed. See the unit nameplate, wiring diagram, and electrical data in the installation instructions for more detailed requirements.

- If required, install a branch circuit disconnect of adequate size, located within sight, and readily accessible from the unit.



WARNING

Electrical shock!

The indoor unit air switch cannot be used as a circuit breaker and cannot be operated by users. Maintenance personnel need to disconnect the main switch before operation.



When the Electric Heater is installed, units may be equipped with one or two 30-60 amp. circuit breakers. These breaker(s) protect the internal wiring in the event of a short circuit and serve as a disconnect. Circuit breakers installed within the unit do not provide over-current protection of the supply wiring and therefore may be sized larger than the branch circuit protection.

- Supply circuit power wiring must be 167 °F (75 °C) minimum copper conductors only. See Electrical Data In this section for ampacity, wire size and circuit protector requirements. Supply circuit protection devices may be either fuses or "HACR" type circuit breakers.
- High voltage wiring may be run through knockout holes on the right, left or top of the unit.
- Three 7/8", 1-3/8", 1-3/4" dia. concentric knockouts are provided for running high voltage wiring to the unit.
- High voltage wiring must be connected to the red and black wiring in the control section of the air handler.
- Ensure supply voltage to the unit is not more than 10% over / under rated voltage
- Power wiring is connected to the power terminal block in unit electric cabinet

4.2 Control Wiring

NOTICE

Product damage!

Do not connect the control cables with power on, otherwise it will damage the circuit board.

Do not connect the power cables (high voltage) to the control cables (low voltage), otherwise it will damage the circuit board.

Do not squeeze or pull the unit connection, and make sure the wiring is not in contact with the sharp edges of the sheet metal.

Make sure, after installation, separation of control wiring and power wiring has been maintained.



WARNING

Electrical shock!

Low voltage control connections are made to low voltage pigtails extending from top of air handler. The C,B,Y,W low voltage cables are pre-installed on the main control board (CN14). The connectors of low voltage cables must be connected reliably and protected by insulation. The copper cables must not be exposed. Unused low voltage cables should be insulated, and the copper cables must not be exposed. Avoid sharp edges of the sheet metal for low voltage cables to prevent wear. If the wear is serious, it may lead to short circuit or electric leakage and cause danger. Do not pull the low voltage cables. Power cords and low voltage cables must be separated from each other with a distance of more than 2 inches to prevent interference.



Low voltage control wiring should not be run in conduit with high voltage wiring. Keep distance between the two conduits per local codes.

- Maximum Low Voltage Wiring Length can be seen in Table 11.

Low Voltage Wires Size	Max Length
16 AWG	225 ft.
18 AWG	150 ft.

Table 11

- For low voltage wire connection location, see Figure 8.
- See wiring diagram located on inside of blower access panel of air handler for proper wiring instruction.
- After installation, ensure separation of low voltage and high voltage wiring is maintained.

4.3 Grounding



WARNING

Electrical shock!

The unit must be permanently grounded. Failure to do so can result in electrical shock causing personal injury or death.

- The ground may consist of electrical wire or metal conduit when installed in accordance with existing electrical codes.
- Grounding may also be accomplished by attaching ground wire(s) to ground lug provided in the unit wiring compartment.
- Use of multiple supply circuits require grounding of each circuit to lug provided in unit.
- Ground lug is located on the upper right side of the cabinet.

4.4 Electrical Data

Model	Voltage	Hertz	Minimum Circuit Ampacity	Maximum Circuit Protector
24	208/230	60	1.8	15(A)
36	208/230	60	3.3	15(A)
48	208/230	60	4.3	15(A)
60	208/230	60	5.0	15(A)

Table 12

4.5 Electric Heat Kit MCA/MOP Data

Heat Kit Model	Air Handler Model	(kW) Electric Heat	MIN. Circuit Ampacity		MAX. Fuse or Breaker (HACR) Ampacity		Fan speed		
			240 VAC	208 VAC	240 VAC	208 VAC	Low	Medium	High
EHK-05B	24	5	27.5	24.0	30	25	•	•	•
EHK-08B		7.5	40.5	35.3	45	40	•	•	•
EHK-10B		10	53.5	46.6	60	50	--	•	•
EHK-05B	36	5	28.7	25.2	30	30	•	•	•
EHK-08B		7.5	41.7	36.5	45	40	•	•	•
EHK-10B		10	54.7	47.8	60	50	•	•	•
EHK-15B		15	54.7/26.1	47.8/22.6	60/30	50/25	•	•	•
EHK-20B		20	54.7/52.1	47.8/45.2	60/60	50/50	•	•	•
EHK-05B	48	5	29.5	26.0	30	30	--	--	•
EHK-08B		7.5	42.5	37.3	45	40	--	--	•
EHK-10B		10	55.5	48.6	60	50	--	--	•
EHK-15B		15	55.5/26.1	48.6/22.6	60/30	50/25	--	--	•
EHK-20B		20	55.5/52.1	48.6/45.2	60/60	50/50	--	--	•
EHK-05B	60	5	30.1	26.6	35	30	•	•	•
EHK-08B		7.5	43.1	37.9	45	40	•	•	•
EHK-10B		10	56.1	49.2	60	50	•	•	•
EHK-15B		15	56.1/26.1	49.2/22.6	60/30	50/25	•	•	•
EHK-20B		20	56.1/52.1	49.2/45.2	60/60	50/50	•	•	•

Table 13 Suitable heat kits for AHU multi position installation

- Heat kit suitable for AHU 4-way position installation.
- Ampacities for MCA and Fuse/breaker including the blower motor
- Heat pump systems require a specified airflow. When Electric Heat Kit is installed, each ton of cooling requires between 350 and 450 cubic feet of air per minute (CFM), or 400 CFM nominally.

Heater Kit Accessories

Model	Description	24	36	48	60
EHK05B	5 kW Heat Kit, Double Pole Breaker	•	•	•	•
EHK08B	7.5 kW Heat Kit, Double Pole Breaker	•	•	•	•
EHK10B	10 kW Heat Kit, Double Pole Breaker	•	•	•	•
EHK15B	15 kW Heat Kit, Double Pole Breaker	X	•	•	•
EHK20B	20 kW Heat Kit, Double Pole Breaker	X	•	•	•

Table 14

[• means available, X means not available]

5 Airflow Performance

Airflow performance data is based on cooling performance with a coil and no filter in place. Check the performance table for appropriate unit size selection. External static pressure should stay within the minimum and maximum limits shown in the table below in order to ensure proper operation of both cooling, heating, and electric heating operation.

Air Handler Model Size	Motor Speed		CFM Wet Coil Without Filter and Electric Heat								
			External Static Pressure-Inches W.C. [kPa]								
			0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8
24	Low	Power / W	206	202	202	202	192	186	181	175	175
		CFM	760	702	612	542	473	399	319	230	218
	Medium	Power / W	240	238	234	230	226	221	215	212	199
		CFM	972	921	857	765	693	625	548	518	348
	High	Power / W	312	308	303	297	291	284	277	267	259
		CFM	1134	1086	1032	949	866	793	718	634	555
36	Low	Power / W	323	319	314	307	294	281	268	251	/
		CFM	1091	1048	1001	947	851	764	677	571	/
	Medium	Power / W	368	361	354	348	339	325	312	297	/
		CFM	1335	1286	1230	1172	1103	986	866	752	/
	High	Power / W	473	462	452	442	430	419	399	383	/
		CFM	1526	1467	1403	1335	1259	1181	1030	913	/
48	Low	Power / W	491	472	456	442	430	417	399	351	/
		CFM	1496	1441	1383	1326	1273	1214	1137	872	/
	Medium	Power / W	562	548	535	523	509	497	482	465	410
		CFM	1798	1731	1660	1597	1529	1452	1376	1283	921
	High	Power / W	704	689	673	656	640	624	610	593	570
		CFM	1970	1896	1819	1737	1662	1580	1501	1411	1291
60	Low	Power / W	643	626	610	594	575	555	527	508	466
		CFM	1793	1750	1691	1635	1568	1497	1390	1315	1141
	Medium	Power / W	713	695	680	661	642	623	598	562	542
		CFM	2041	1992	1932	1858	1786	1702	1610	1465	1379
	High	Power / W	818	800	780	762	741	717	692	650	631
			2157	2111	2047	1975	1894	1802	1701	1534	1455

Table 15

Bold outlined areas represent airflow outside of the required 300-450 cfm/ton range.

NOTES:

1. The high stage airflow must be used as the rated airflow for the full load operation of machine.
2. The rated airflow of systems without electric heater kits requires between 300 and 450 cubic feet of air per minute (CFM).
3. The rated airflow of systems with electric heater kits requires between 350 and 450 cubic feet of air per minute (CFM).
4. The air distribution system has the greatest effect on airflow. Therefore, the contractor should use only industry-recognized procedures.
5. Duct design and construction should be carefully done. System performance can be lowered dramatically through poor design or workmanship.
6. Air supplier ducts should be located along the perimeter of the conditioned space and properly sized. Improper location or insufficient air flow may cause drafts or noise in the ductwork.
7. Installers should balance the air distribution system to ensure proper quiet airflow to all rooms in the home. An air velocity meter or airflow hood can be used to balance and verify branch and system airflow (CFM).
8. Please refer to the wiring diagram for the default fan speeds for each model

6 Ductwork

Field ductwork must comply with the National Fire Protection Association NFPA 90A, NFPA 90B and any applicable local ordinance(s).

WARNING

Fire hazard and carbon monoxide !

Do not, under any circumstances, connect return ductwork to any other heat producing device such as fireplace insert, stove, etc. Unauthorized use of such devices may result in fire, carbon monoxide poisoning, explosion, personal injury or property damage.

Sheet metal ductwork run in unconditioned spaces must be insulated and covered with a vapor barrier. Fibrous ductwork may be used if constructed and installed in accordance with SMACNA Construction Standard on Fibrous Glass Ducts. Ductwork must comply with National Fire Protection Association as tested by U/L Standard 181 for Class I Air Ducts. Check local codes for requirements on ductwork and insulation.

- Duct system must be designed within the range of external static pressure the unit is designed to operate against. It is important that the system airflow be adequate. Make sure supply and return ductwork, grills, special filters, accessories, etc. are accounted for in total resistance. See airflow performance tables in Section 5 of this manual.
- Design the duct system in accordance with "ACCA" Manual "D" Design for Residential Winter and Summer Air Conditioning and Equipment Selection. Latest editions are available from: "ACCA" Air Conditioning Contractors of America, 1513 16th Street, N.W., Washington, D.C. 20036. If duct system incorporates flexible air duct, be sure pressure drop information (straight length plus all turns) shown in "ACCA" Manual "D" is accounted for in system.
- Supply plenum should be attached to the 3/4" duct flanges supplied with the unit. Attach flanges around the blower outlet.



If an elbow is included in the plenum close to the unit, it must not be smaller than the dimensions of the supply duct flange on the unit.



The front flange on the return duct (if connected to the blower casing) must not be screwed into the area where the power wiring is located. Drills or sharp screw points can damage insulation on wires located inside unit.

- Secure the supply and return ductwork to the unit flanges, using proper fasteners for the type of duct used and tape the duct-to-unit joint as required to prevent air leaks.



WARNING

Fire, explosion !

If appliances connected via an air duct system to one or more rooms are installed in a room with an area less than shown in section 3.5, that room shall be without continuously operating open flames (e.g. an operating gas appliance) or other potential ignition sources (for e.g. an operating electric heater, hot surfaces). A flame-producing device may be installed in the same space if the device is provided with an effective flame arrest. For appliances connected via an air duct system to one or more rooms, 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 700°C and electric switching devices. For appliances connected via an air duct system to one or more rooms, only auxiliary devices approved by the appliance manufacturer or declared suitable with the refrigerant shall be installed in connecting ductwork.

7 Refrigerant Connections

The suction pipe and liquid pipe of the indoor unit need to be protected and cannot be grabbed when moving the indoor unit.

Keep the coil connections sealed until refrigerant connections are made. Refer to the BOVA Installation, Operation, and Maintenance Manual for details on line sizing, tubing installation, and charging information.

Coil is factory charged with Nitrogen. Evacuate the system before charging with refrigerant.

Install refrigerant lines so that they do not block service access to the front of the unit.

Nitrogen should flow through the refrigerant lines while brazing.

Use a brazing shield to protect the cabinet's paint and a wet rag to protect the rubber grommet and input pipe's piston seal ring from being damaged by torch flames. Use a wet rag or an approved heat paste to protect the TXV sensing bulb during the brazing process. Refer to Figure 16.

After the refrigerant line connections are made, seal the gap around the connections with pressure sensitive gasket.

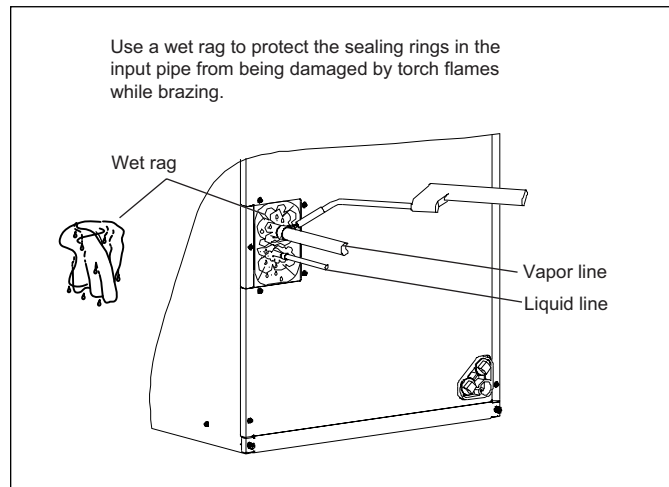


Figure 16

After the brazing work is finished, make sure to check that there is no refrigerant leakage. After checking for vapor leaks, be sure to insulate the pipe connections, refer to Figure 17.

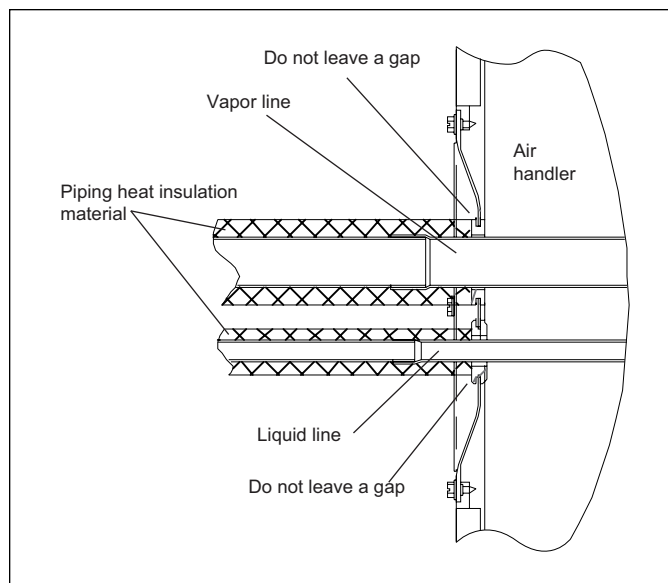


Figure 17

8 Condensate Drain Connection

Consult local codes for specific requirements.

Refer to Figure 18 and the information below for required condensate drain trap installation.

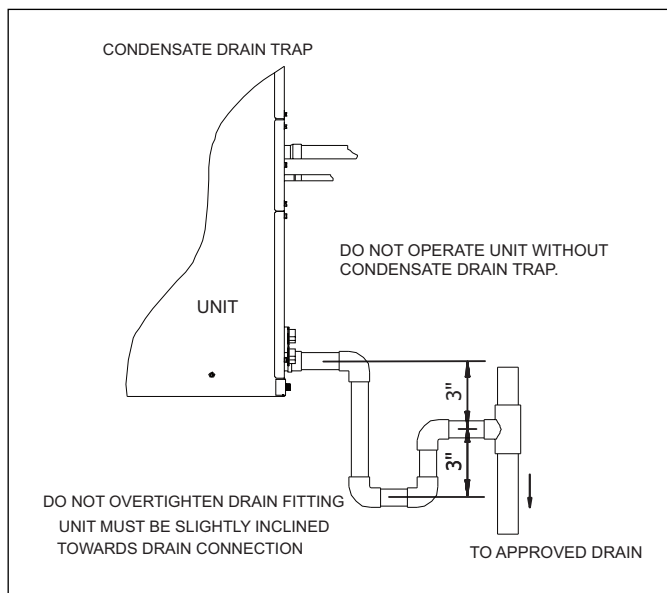


Figure 18



1. When making drain fitting connections to the drain pan, use a thin layer of Teflon paste, silicone or Teflon tape and install by hand tightening.
2. When making drain fitting connections to drain pan, do not overtighten. Over tightening fittings can split pipe connections on the drain pan.

- Ensure drain lines do not block access to front of the unit. Minimum clearance of 24 inches is required for filter, coil or blower removal and service access.
- Make sure unit is leveled or pitched slightly toward primary drain connection so that water will drain completely from the pan. Up to an additional 1/4" rise over the width or depth of the unit is allowed to create additional sloping towards the drain. Unit must be positioned between level and 1/4" rise, sloping toward the drain connections. See figures 19 to 22 for reference.
- Do not reduce drain line size to less than connection size provided on condensate drain pan. Use 3/4" PVC piping for the drain piping connections.
- All horizontal drain lines must be pitched downward away from the unit at a minimum of 1/8" per foot of line to ensure proper drainage.
- Do not connect condensate drain line to a closed or open sewer pipe. Run condensate to an open drain or run line to a safe outdoor area.
- The drain line should be insulated where necessary to prevent sweating and damage due to condensate forming on the outside surface of the line.
- Make provisions for disconnecting and cleaning of the primary drain line should it become necessary. Install a 3 inch trap in the primary drain line as close to the unit as possible. Make sure that the top of the trap is below connection to the drain pan to allow complete drainage of pan (See Figure 18).
- Auxiliary drain line should be run to a place where condensate will be

noticeable. Homeowner should be warned that a problem exists if water should begin running from the auxiliary drain line.

- Plug the unused drain connection with the plugs provided in the parts bag provided with the unit. Use a thin layer of teflon paste, silicone or teflon tape to form a water tight seal.
- Test condensate drain pan and drain line after installation is complete. Pour water into drain pan, enough to fill drain trap and line. Check to ensure drain pan is draining completely, no leaks are found in drain line fittings, and water is draining from the termination of the primary drain line.
- Be sure to insulate the drain piping and drain socket since condensation may cause water leakage.
- Be sure to install a drain tap at the drain outlet since the inside of the unit is at negative pressure relative to atmospheric pressure during operation.

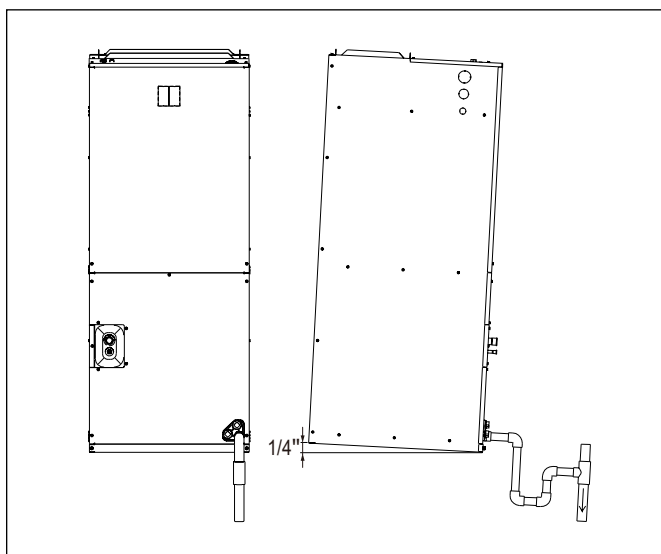


Figure 19 Vertical upflow view

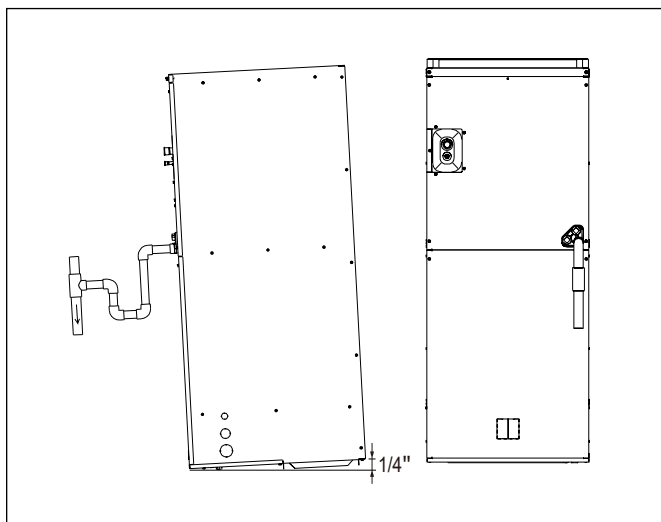


Figure 20 Vertical downflow view

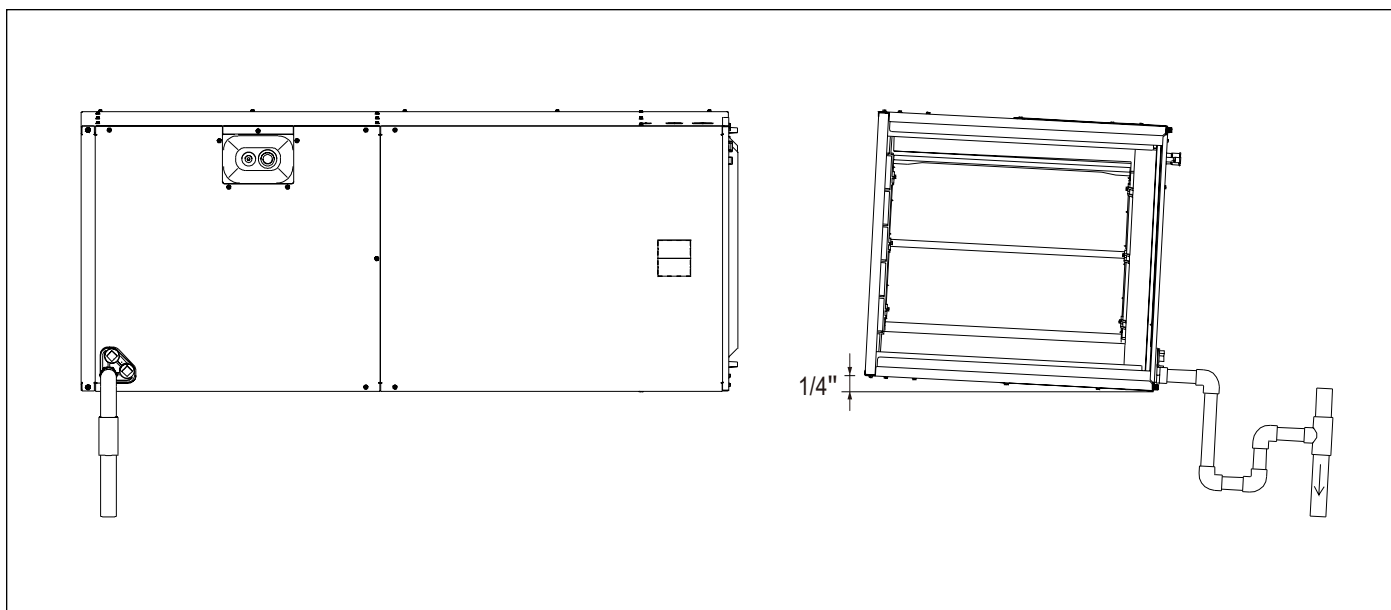


Figure 21 Horizontal right view

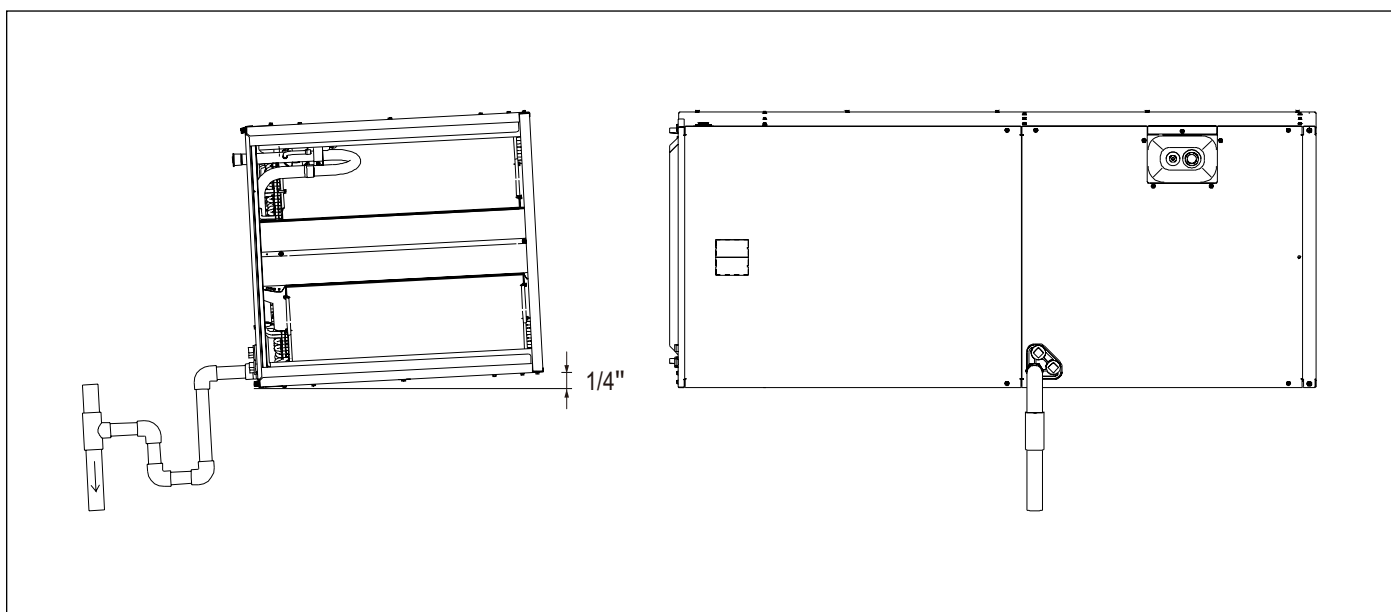


Figure 22 Horizontal left view

9 Air Filter (Not Factory-Installed)

Filters are not included with the unit and must be field supplied.

An external filter or other means of filtration must be properly sized for a maximum of 300 feet/min. air velocity or what is recommended for the type of filter installed.

Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the system's major components, such as motor, elements, heat relays, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. For systems without a return air filter grill, multiple filter grills can be installed at each of the return air openings.

If adding high efficiency filters or electronic air filtration systems, it is very important that the air flow is not reduced. If air flow is reduced the overall performance and efficiency of the unit will be reduced. It is strongly recommended that a professional installation technician is contacted to ensure such filtration systems are installed correctly.



Do not double filter the return air duct system. Do not filter the supply air duct system. This will change the performance of the unit and reduce airflow.



WARNING

Fire hazard!

Do not operate the system without filters. A portion of the dust suspended in the air may temporarily lodge in the duct runs and at the supply registers. Any circulated dust particles could be heated and charred by contact with the air handler elements. This residue could soil ceilings, walls, drapes, carpets and other articles in the house. Soot damage may occur with filters in place, when certain types of candles, oil lamps or standing pilots are burned.

9.1 Filter Installation Dimensions

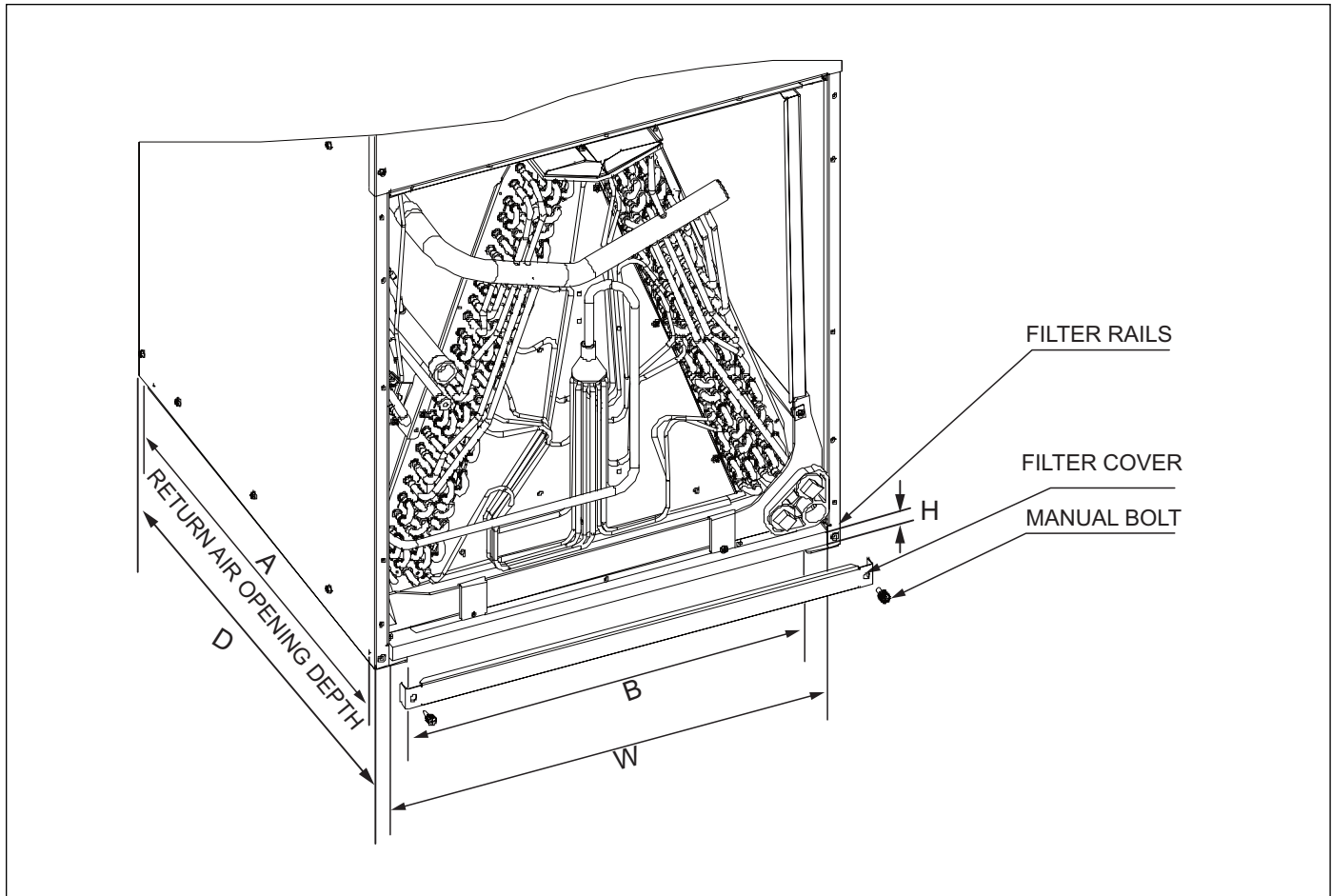


Figure 23 Filter installation



Filters are not included with the unit and must be field supplied.

Dimensional data

Model	Filter Size In. [mm]	"W" In. [mm]	"D" In. [mm]	"H" In. [mm]	Return width "A" In. [mm]	Return length "B" In. [mm]
24/36	18x20 [457x508]	18.3 [466]	21.6 [548]	1 [25.4]	20.8 [528]	16.3 [414]
48/60	20x22 [508x559]	20.7 [526]	23.9 [608]	1 [25.4]	23 [584]	18.8 [478]

Table 16

Air filter removal / installation

- Remove bolts manually, remove air filter cover, see Figure 23.
- Hold the edge of the air filter and pull out.
- Install new filter so that the arrow on the filter is in the same direction as airflow.
- If reusable filter is being used, please clean according to the manufacturer's specification prior to re-installation.

10 Maintenance



For continuing high performance and to minimize possible equipment failure, periodic maintenance must be performed on this equipment.

10.1 Cleaning Precautions



WARNING

Improper or dangerous operation, personal injury!

Any unit repairs must be performed by qualified service personnel only.



WARNING

Electrical shock!

Always turn off your heat pump and disconnect its power supply before cleaning or maintenance.



CAUTION

Personal injury!

When removing filter, do not touch metal parts in the unit. The sharp metal edges can cut you.

NOTICE

Product damage!

Do not use chemicals or chemically treated cloths to clean the unit .

Do not use benzene, paint thinner, polishing powder or other solvents to clean the unit.

Do not operate the system without a filter in place.

10.2 Regular Maintenance

Your heat pump must be inspected regularly by a qualified service technician. Your annual system inspection must include:

1. Inspect the air filter every ninety days or as often as needed. If blocked or obstructed, clean or replace at once.
2. Inspection and/or cleaning of the blower wheel housing and motor.
3. Inspection and cleaning of indoor and outdoor coils as required.
4. Inspection and/or cleaning of the indoor coil drain pan and drain lines, as well as auxiliary drain pan and lines.
5. Check all electrical wiring and connections. Correct as needed, referring to the wiring diagram.

11 Disposal

Components and accessories from the units are not part of ordinary domestic waste.

Complete units , compressors, motors etc. are only to be disposed of via qualified disposal specialists.

This unit uses hydrogen fluorocarbons. Please contact the dealer when you want to dispose of this unit. Law requires that the collection, transportation and disposal of refrigerants must conform with the regulations governing the collection and destruction of hydrofluorocarbons.

12 Wiring Diagrams

**WARNING****Electrical shock!**

Disconnect all power before servicing or installing this unit. Multiple power sources may be present. Failure to do so may cause property damage, personal injury or death.

**DANGER****Electrical shock!**

This unit must be properly grounded and protected by a circuit breaker or fuse.

**WARNING****Electrical shock!**

These units must be wired and installed in accordance with all National and Local Safety Codes.

- To avoid electrical shock, please ensure:
 - The heat pump is properly grounded
 - The main power plug to the heat pump has been joined with the ground wiring (DO NOT ALTER THIS).
- Do not strain the power wiring.

Low-voltage wires include indoor unit connect with outdoor unit and the indoor unit connect with the thermostats.

The wires between the indoor unit and the outdoor unit are classified into two modes: conventional 24VAC non-communicating thermostat control and PQ communication.



PQ communication mode is not available on this model. The BIVA15 can only be wired as conventional 24VAC non-communicating system.



Dashed lines in the following thermostat wiring diagrams refer to optional wiring (wiring for Passive Dehumidification Function and/OR Electric Heat). For thermostat wiring please refer to the Owner's Manual of the thermostat.

12.1 Non-Communicating Set Up

Dip switch configurations for non-communicating mode

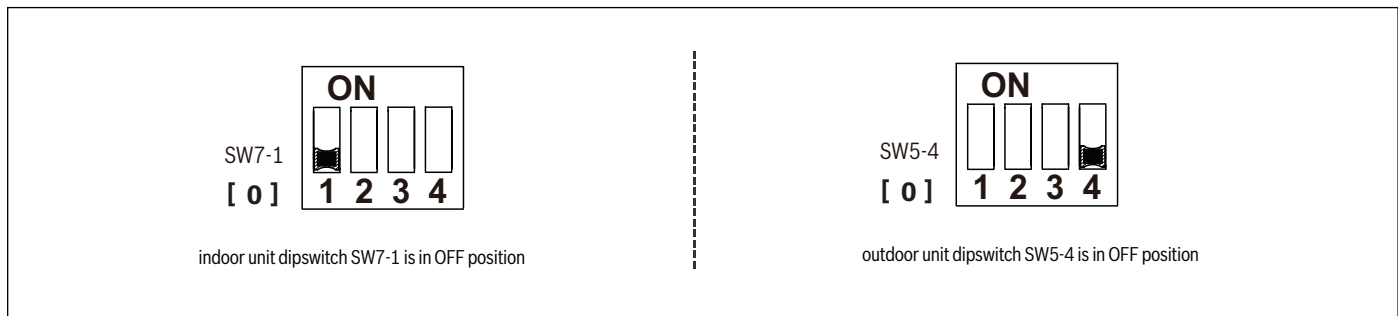


Figure 24



- The factory default mode is conventional 24VAC non-communicating mode.

Low voltage wire connections with outdoor unit, non-communicating

- Peel off the half-stripped wires of the pre-installed wires.
- Connect the conventional 24VAC non-communicating thermostat control wires to the field supplied wires.

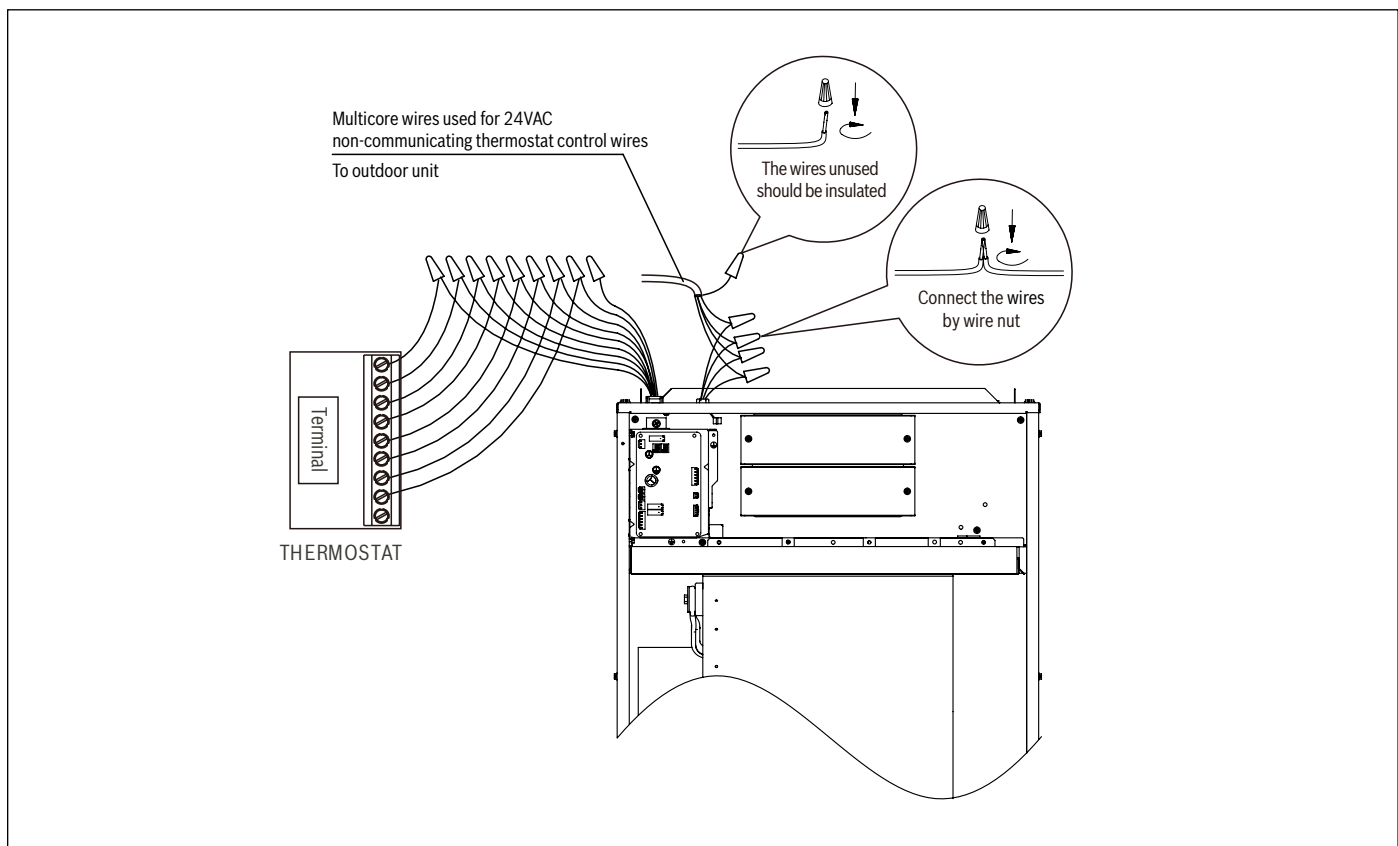


Figure 25 Wires connections diagram

Non-communicating thermostat wiring diagrams

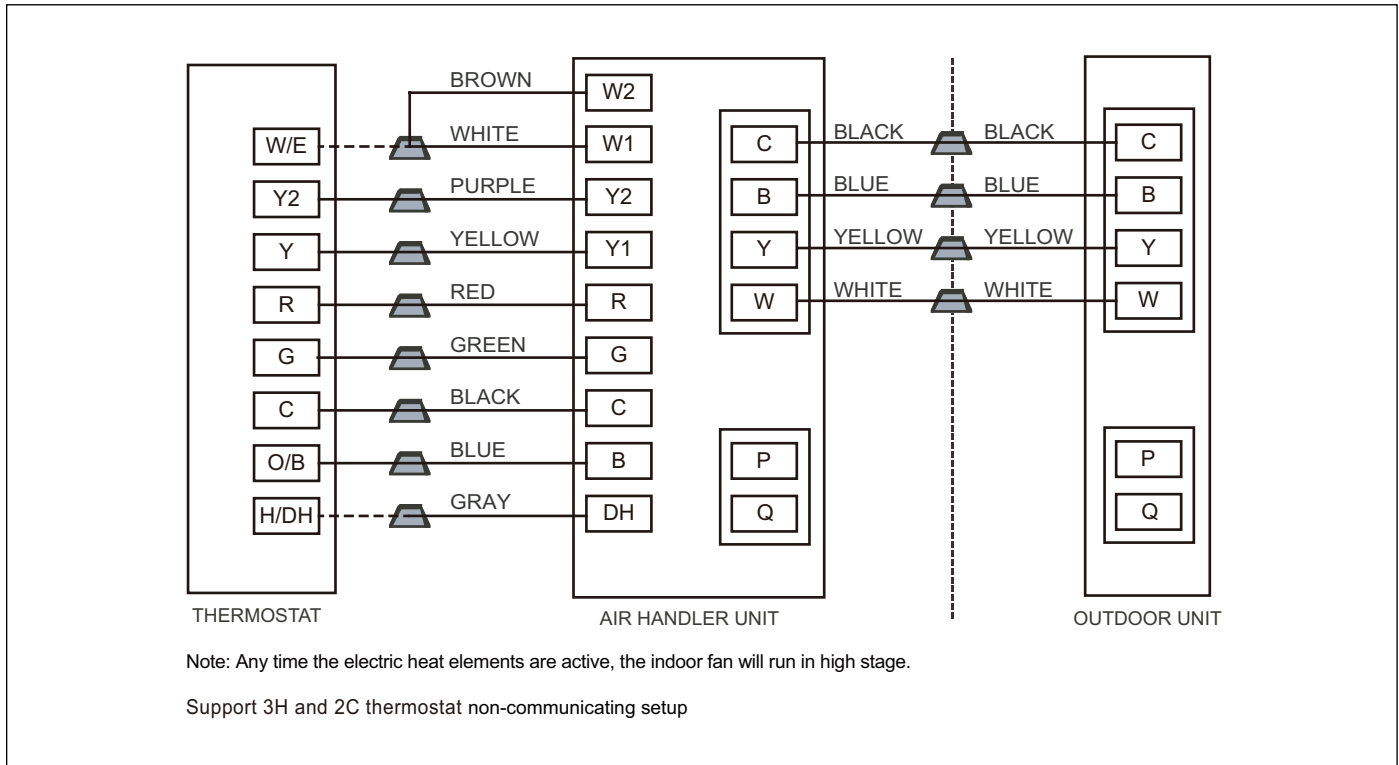


Figure 26 Control wiring for HP systems

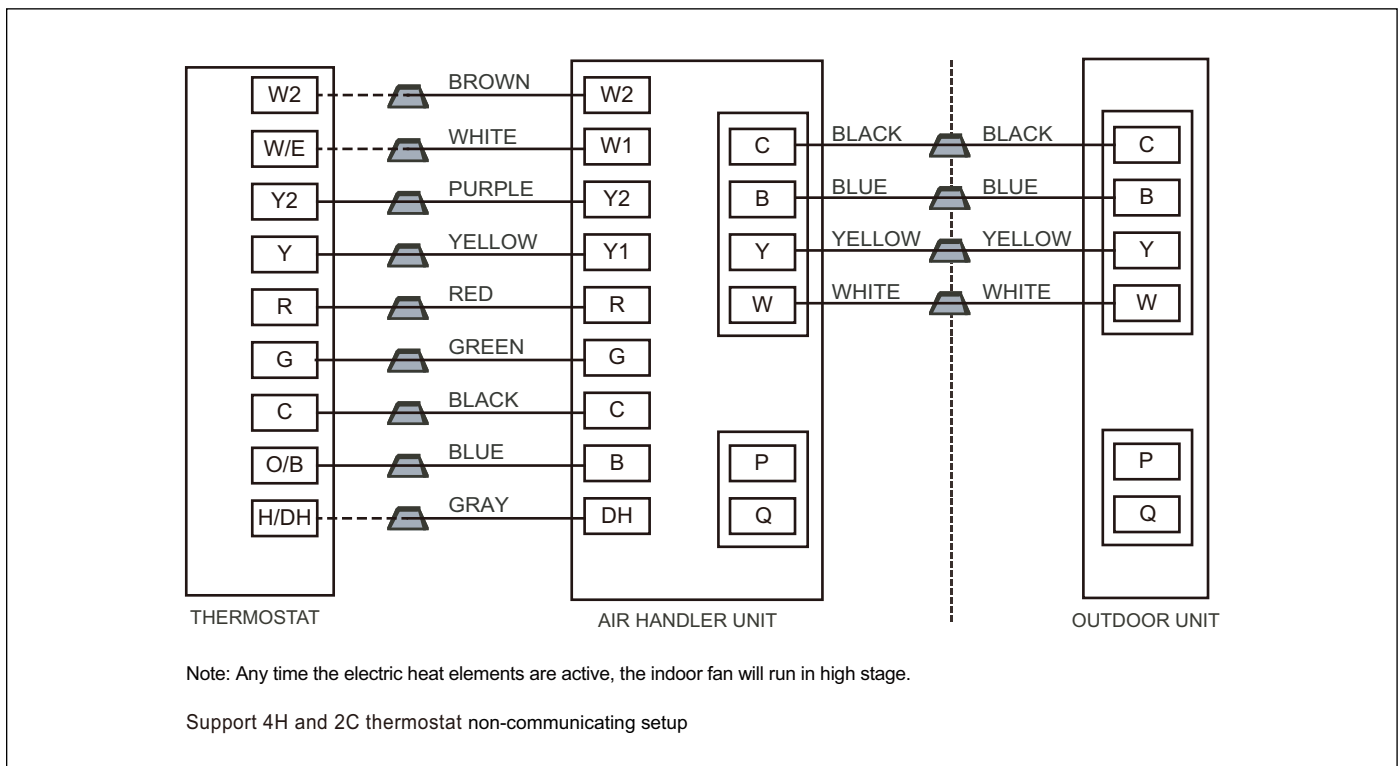
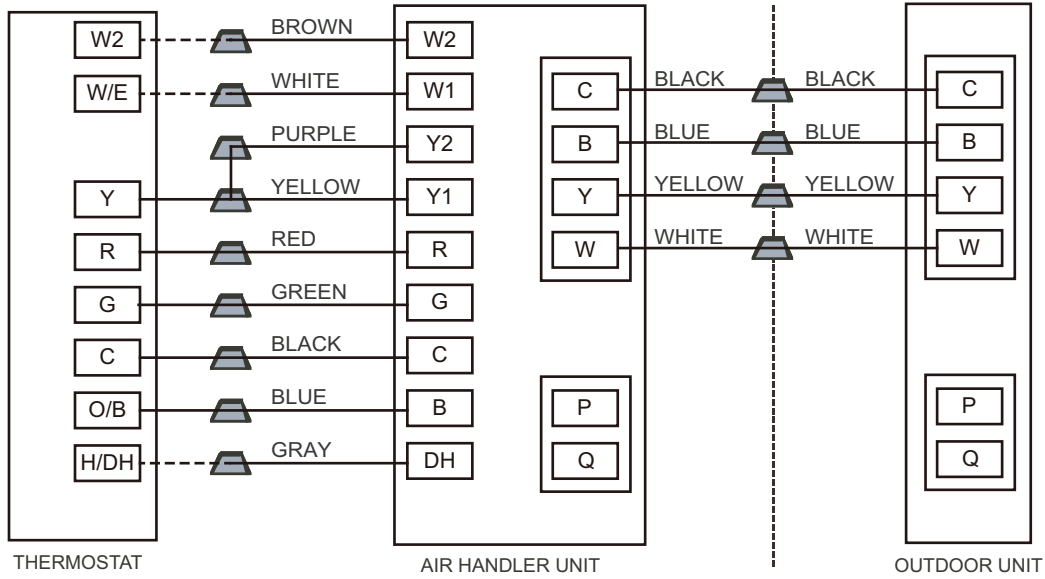


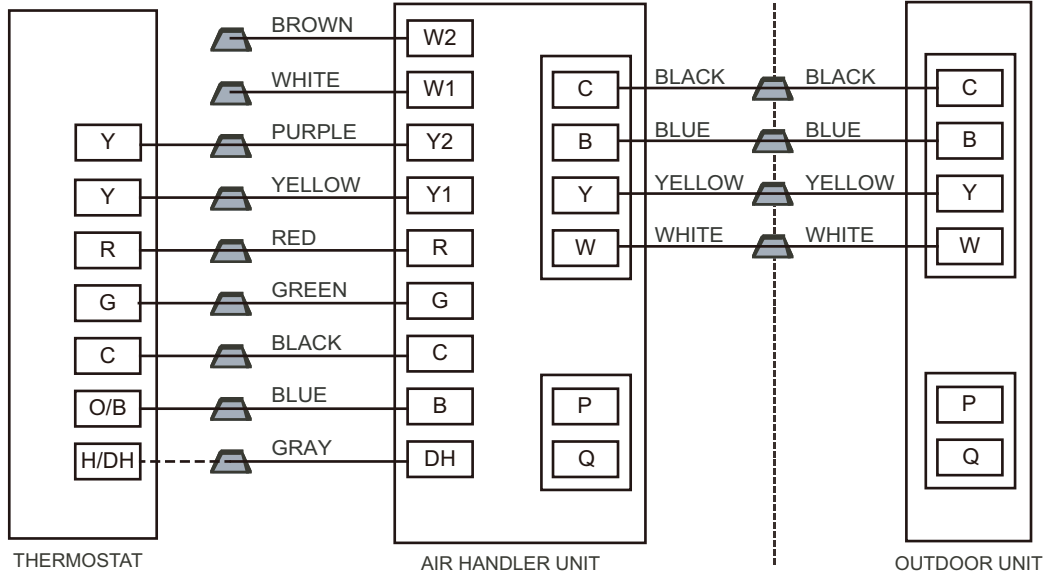
Figure 27 Control wiring for HP systems



Note: Any time the electric heat elements are active, the indoor fan will run in high stage.

Support 3H and 1C thermostat non-communicating setup

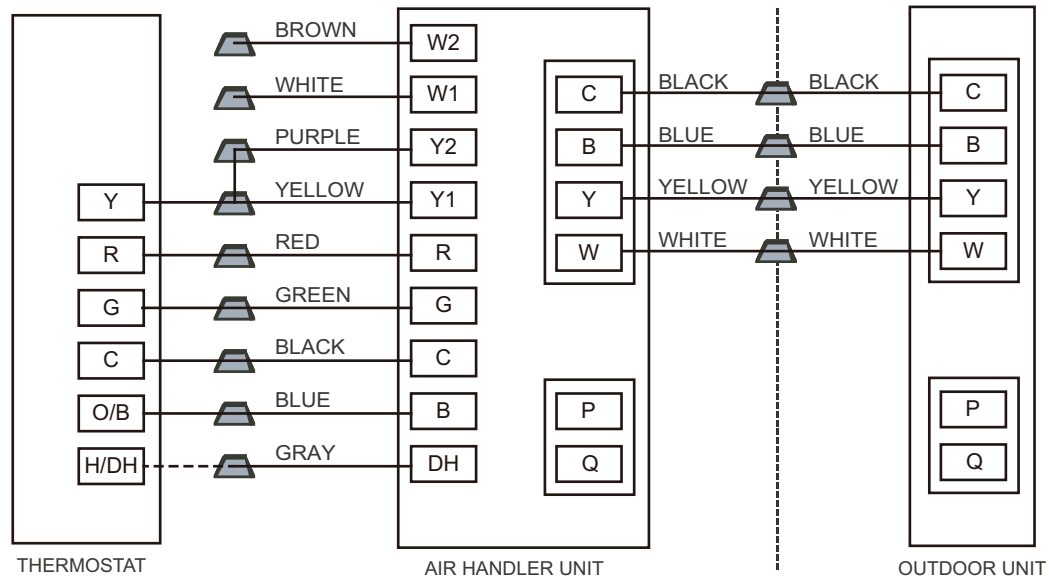
Figure 28 Control wiring for HP systems



Note: Any time the electric heat elements are active, the indoor fan will run in high stage.

Support 2H and 2C thermostat non-communicating setup

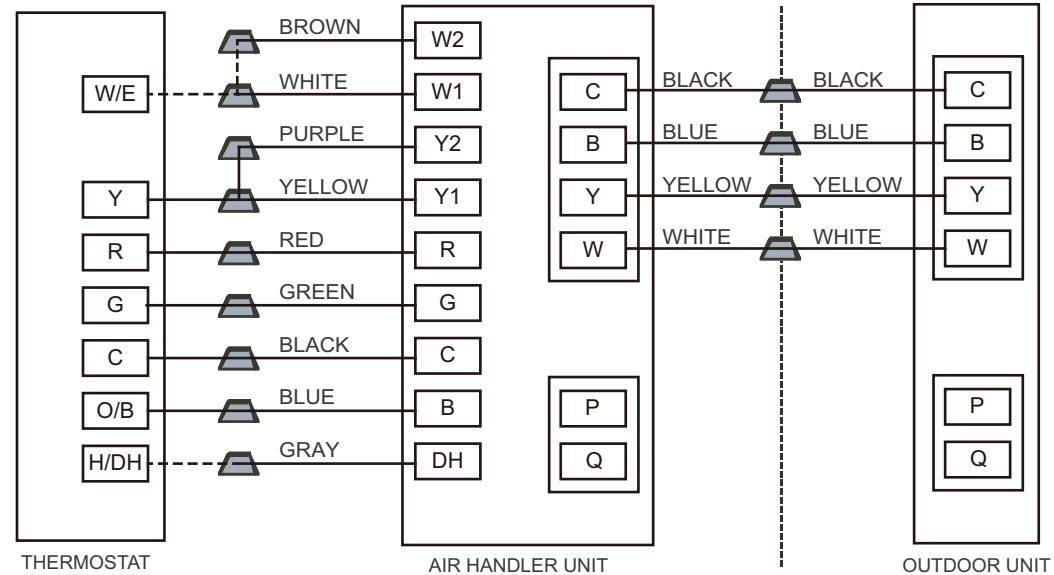
Figure 29 Control wiring for HP systems



Note: Any time the electric heat elements are active, the indoor fan will run in high stage.

Support 1H and 1C thermostat non-communicating setup

Figure 30 Control wiring for HP systems



Note: Any time the electric heat elements are active, the indoor fan will run in high stage.

Support 2H and 1C thermostat non-communicating setup

Figure 31 Control wiring for HP systems

Electric wiring gauge for H/P systems

Model(Btu/h)			24	36	48	60
Power		Phase	Single			
		Voltage/frequency	208/230VAC, 60Hz			
Line Gauge	Input Current Fuse	Indoor unit (A)	15A	15A	15A	15A
	Indoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter (AWG)	14	14	14	14
	Outdoor Unit Power Line	Line Quantity	3	3	3	3
		Line Diameter (AWG)	14	12	10	10
	Outdoor -Indoor Signal Line	Line Quantity	4	4	4	4
		Line Diameter (AWG)	18	18	18	18
	Thermostat Signal Line	Line Quantity	5	5	5	5
		Line Diameter (AWG)	18	18	18	18

Table 17

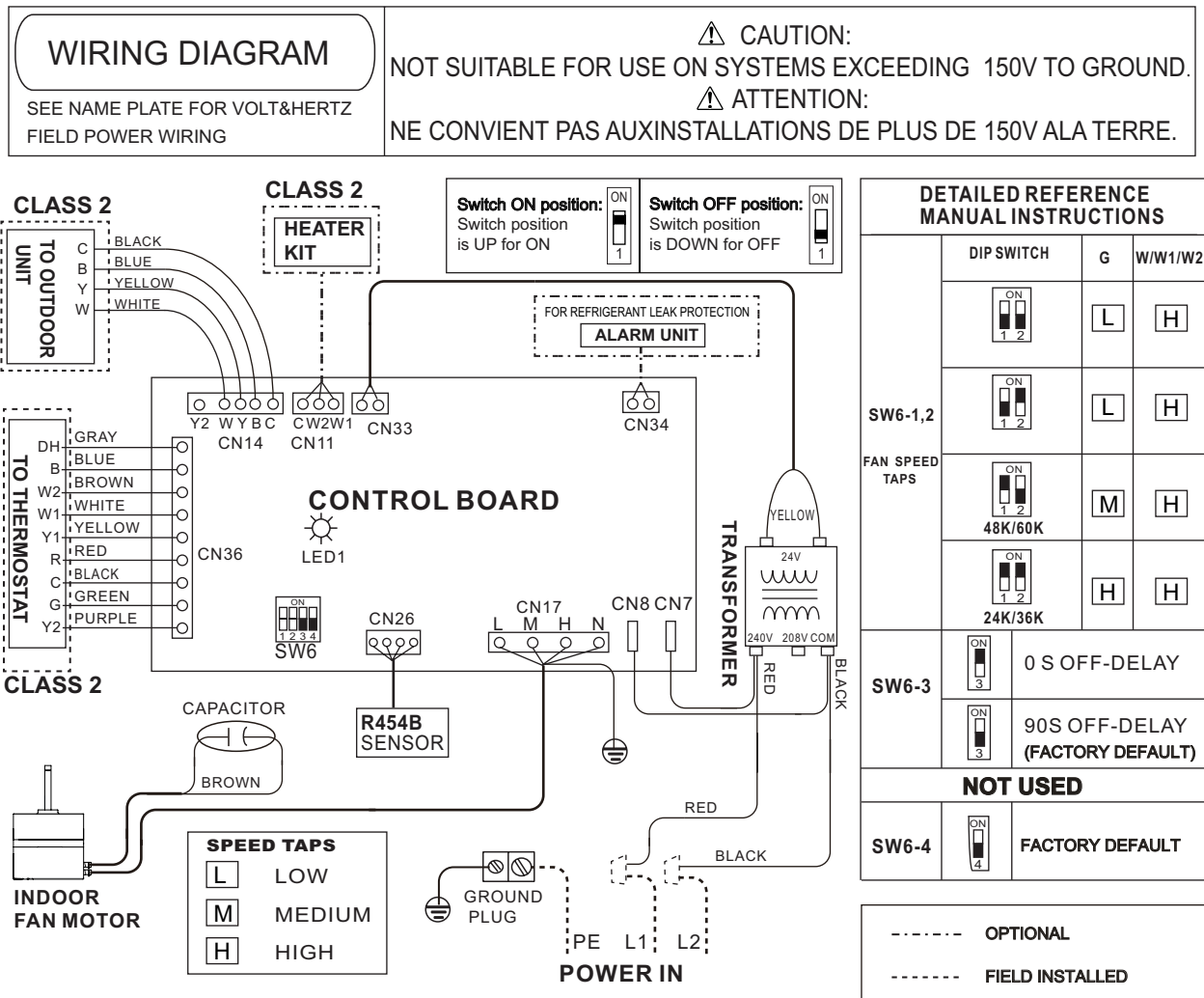


Figure 32 Indoor unit wiring diagram

13 LED Flashing Troubleshooting

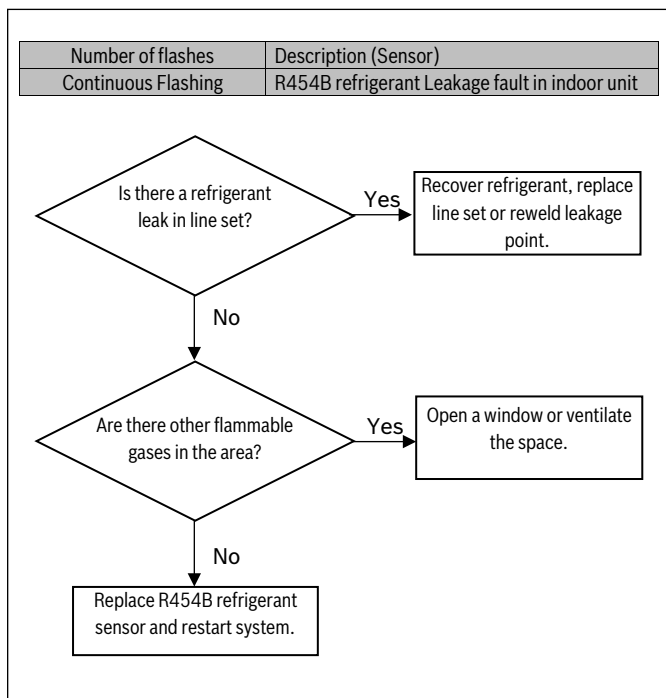


Figure 33

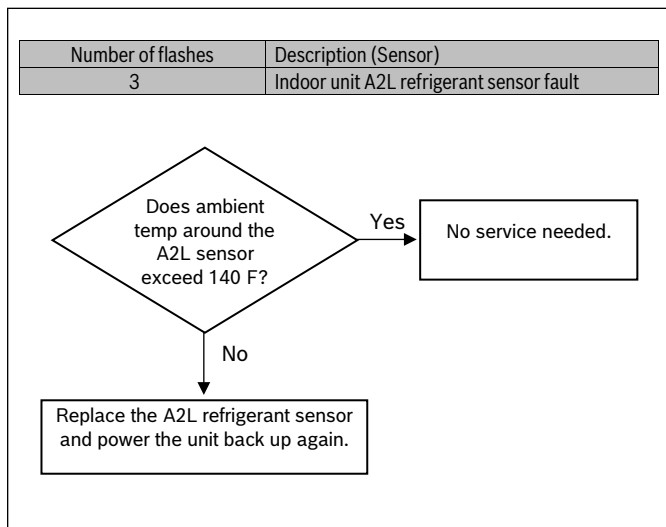


Figure 34

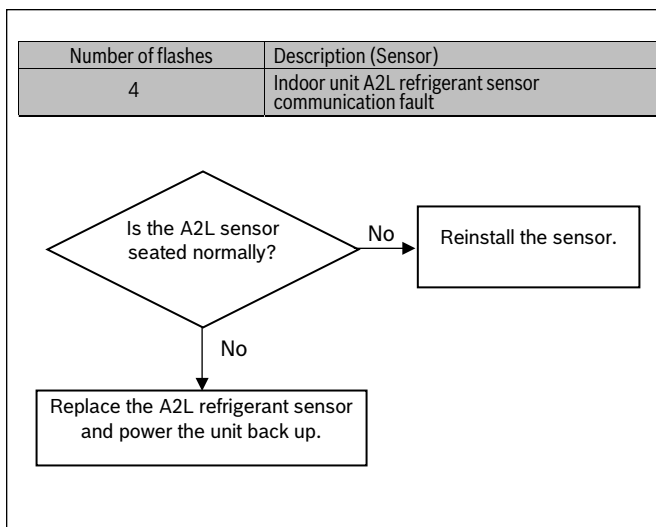


Figure 35

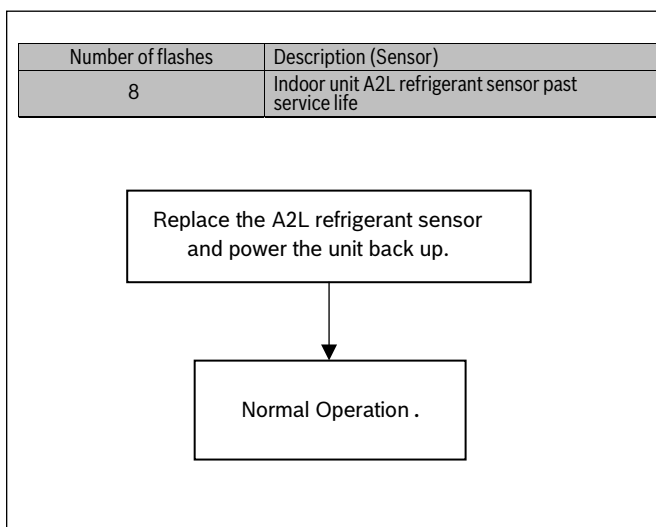


Figure 36

Online Help Resources

Alternatively, please visit our Service & Support webpage to find FAQs, videos, service bulletins, and more; www.boschheatingcooling.com/service or use your cellphone to scan the code below.

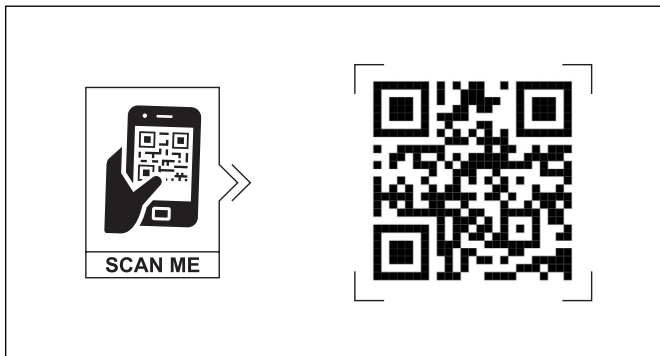


Figure 37

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