



Literature Assembly

911-0597

Contains the following:

2100-034(G)	User's Guide
2100-479	Servicing Procedures
2100-578(O)	IZ Series Heat Pump Manual
2110-590(W)	Replacement Parts Manual
7960-420	Warranty Form



USER'S APPLICATION GUIDE AND TECHNICAL PRODUCT OVERVIEW

Manual: 2100-034G
Supersedes: 2100-034F
Date: 12-17-20

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Bryan, Ohio 43506
www.bardhvac.com



BARDHVAC.COM

Climate Control Solutions

General Information

The User's Application Guide covers a wide range of heating and cooling products manufactured by Bard Manufacturing Company. It is intended to be a general guide for care and operation of typical systems and covers the most important features you should be aware of and are responsible for as the user of the equipment.

Because our product offerings are so varied and can be equipped with many features and options, it is not possible to cover all aspects of what your specific system may be configured for. Some systems may be quite simple in features to provide basic cooling and possibly heating, while other systems may also incorporate various ventilation technologies, dehumidification circuits and many different internal controls as well as room temperature controls. Therefore, you should request a detailed operation sequence and explanation of any special features from your installer and/or service company and also have them instruct you as to any routine maintenance procedures you are responsible for.

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The User's Application Guide and Technical Product Overview covers the following products:



WALL MOUNT
Air Conditioners
and Heat Pumps



I-TEC®
Air Conditioners
and Heat Pumps



Q-TEC™
Air Conditioners
and Heat Pumps

The User's Application Guide and Technical Product Overview covers the following topics:

- Documentation provided by Bard for proper use of your new product.
- Unit installation guidelines.
- Routine unit maintenance.
- Unit operation.
- Unit troubleshooting.

Please use this guide as a general overview regarding unit application, maintenance and troubleshooting. Refer to product installation instructions and supplemental documentation provided with the unit or go to www.bardhvac.com for detailed individual product information.

Documentation

There are two sources of valuable information for your new Bard product:

- Documentation provided with your unit, normally located inside the unit control panel during shipping. This information should be saved once the unit is installed for future maintenance reference or to answer questions about equipment after installation.
- Documentation provided on the internet at www.bardhvac.com. This may be accessed from a desktop computer at the office, a laptop or an internet-capable cell phone at the worksite. Up-to-date documentation is available, along with specification sheets and other valuable resources regarding your new Bard product.

Unit Literature Assembly – Documentation Provided with Your Unit

Bard products are shipped with documentation that when used by a technician with cooling and heating knowledge, can ensure that your product is installed safely, performs optimally and achieves the longest life cycle possible.

Shipped literature includes the following:

- User Manual (this document)
- Installation Instructions
- Replacement Parts Manual
- Wiring Diagrams
- Warranty Information

Installation plays a key part in unit functionality, performance and safety. Product securing and placement, duct design and supply/return location, electrical routing and condensate and defrost drainage all play key roles in making sure a unit will perform per the design specifications.

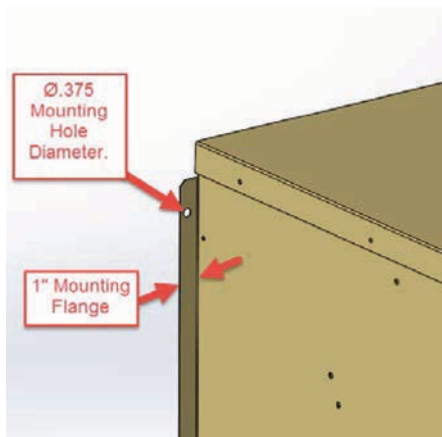
WALL MOUNT Products – Mounting the Product on a Wall Surface



Outdoor products are normally mounted to an exterior wall surface, including brick, cement block, metal or wood construction. These products are labeled as “WALL MOUNT” units. **Before installation begins, the wall surface should be inspected by a construction professional to ensure it will support the weight of the unit and accessory items.** Approximate weights are available from the product specification sheet, and a safety factor should be designed into the installation. Typical fasteners to attach the unit to the wall using the integrated mounting flanges on both sides of the unit include tap cons, bolts, studs and other fastening devices. The selection of the fasteners to be used needs to be reviewed by a construction professional and decided upon based on the wall construction and fastener strength required. It is important to follow all guidelines and procedures covered in the installation instructions manual provided for the product.

Built-In Mounting Flange Detail:

Outdoor WALL MOUNT products include a mounting flange that is part of the cabinet construction. Ø.375" holes are provided for unit mounting unless specified otherwise in installation instructions.



Specification Sheets:

Unit specification sheets provided at www.bardhvac.com include basic unit weights and dimensions (see example below). Ventilation options and other accessories must be added into the total weight of the unit.

Specification Sheet Example

w/Filter (Kated-Wet Coil)	
Filter Sizes (inches) STD.	16x25x1
Basic Unit Weight-LBS.	318
Barometric Fresh Air Damper	3.5
Blank-Off Plate	1.0
Motorized Fresh Air Damper	10.0
Commercial Room Ventilator	69.0
Economizer	69.0
Energy Recovery Ventilator	50.0

WALL MOUNT Products – Clearances for Outdoor Condenser Fan Airflow

Unit placement and avoidance of obstructions outside the structure are very critical to unit performance. **Avoid installing the unit in areas that will obstruct outdoor condenser fan airflow or create “pockets” of heated air being exhausted from the condenser coil.** Solid construction fences should not be placed directly in front of the unit without provisions for condenser airflow. Solid exterior walls need to be spaced as far away from units as possible to avoid pockets of heated air causing condenser air recirculation.

Solid barriers located too close to the face or side surfaces (condenser fan inlet and outlet) of the WALL MOUNT can both impede airflow and force heated air to short circuit (be returned) from the condenser outlet to the condenser inlet. Either condition will effectively raise the condensing temperature and pressure reducing cooling capacity and efficiency. In extreme cases, the unit may fail to operate due to high refrigerant pressures inside the unit, and compressor and/or fan motor failure may occur. Clearances given in installation instructions ensure components can be serviced and maintenance can be performed when needed.

National and local electrical codes must be reviewed before unit installation.

Always use common sense when installing products, follow unit clearances given in the installation instructions and contact local Bard distributors when additional knowledge is needed regarding unit clearances for proper unit functionality.

WALL MOUNT Products – Clearances for Indoor Supply and Return Airflow

The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects in the structure within 24" of the return (unit air intake) grille. Avoid placing objects directly in the path of the supply (conditioned) air grille. This will inhibit the “throw” of the supply air throughout the structure and reduce the cooling and/or heating ability of the unit; in extreme cases, this may cause evaporator coil freezing issues. Supply air must be able to freely circulate conditioned air throughout the structure. Adjustment of supply grille deflectors is often necessary to ensure proper room circulation.

Ducted applications should not exceed the rated duct static pressures given in the unit specification sheets. Special requirements for duct construction and distances to combustible materials need to be followed per the installation instructions when electric heating is used.

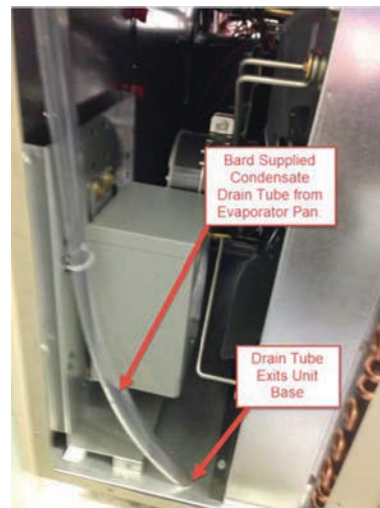
WALL MOUNT Products – Condensate and Defrost Drainage

Condensate drainage for air conditioning units needs to be planned before installation. Your new Bard WALL MOUNT product includes provisions to allow condensate water to exit the bottom of the unit. If condensate water is to be routed away from the unit, adequate drain sizing needs to be provided to allow proper drainage for condensate water generation. During normal air conditioning operation, large amounts of condensate water is generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and drained to either a drainage system (indoor products) or outside the unit cabinet (outdoor products). Evaporator drain traps are not necessary for any of our wall mounted outdoor products, and the use of “standing water” U-shaped traps may be prone to freezing in certain climate zones.

Defrost water drainage from heat pump units needs to be planned before installation. During seasons requiring heating operation, the unit will need to warm the condenser coil to remove frost build-up (defrost). **Outdoor heat pump products include holes in the unit base under the condenser coil for proper water drainage when in the heating defrost cycle. Avoid placing the unit on a pad or blocking the base drainage holes under the condenser coil without proper allowances (6" recommended) for water drainage due to damage caused by freezing conditions.** Without proper drainage, defrost water may freeze causing ice build up and damage the lower portion of the condenser coil.

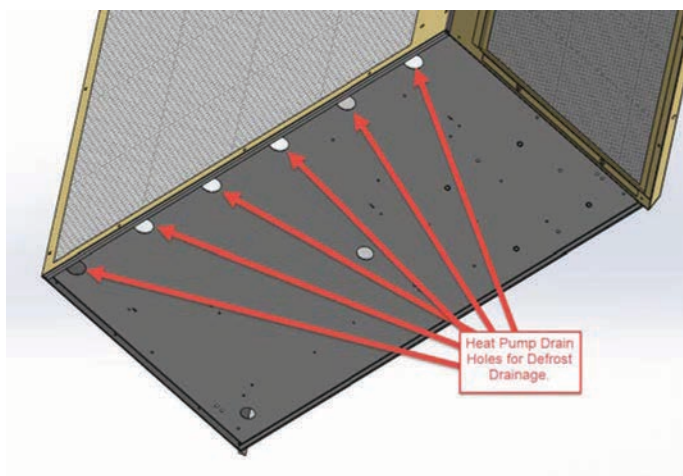
Condensate Water Drainage:

Unit condensate water exits the base of the unit during cooling operation.



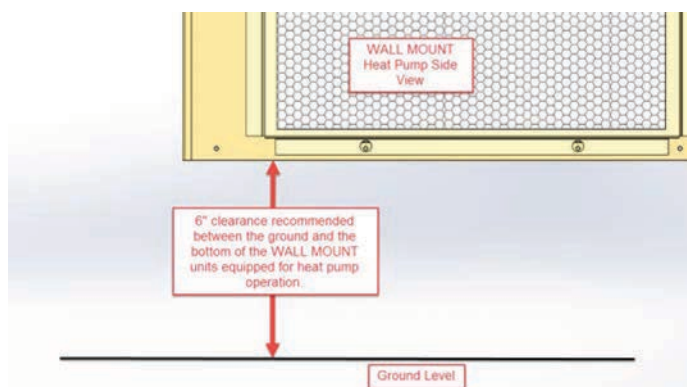
Defrost Water Drainage:

Holes are provided in the front of the unit base for heat pump condensate water drainage.



Defrost Water Drainage:

6" clearance is recommended under WALL MOUNT Heat Pump products to allow proper defrost water drainage.



I-TEC and Q-TEC Products – Installing the Product Inside a Room



I-TEC



Q-TEC

Indoor products are normally supported by the floor surface and are adjacent to an interior wall surface, including brick, cement block, metal or wood construction. These products are normally labeled as “I-TEC” or “Q-TEC” units. **Before installation begins, the floor surface should be inspected by a construction professional to ensure it will support the weight of the unit and accessory items.** Approximate weights are available from the product specification sheet, and a safety factor should be designed into the installation.

A sheet metal sleeve is normally installed in the wall allowing vent and condenser fan air to enter and exit the unit. Different sleeve depths are available for installation into various wall depths. Typical fasteners to attach the sleeve to the outside surface of the wall include tap cons and other fastening devices. The I-TEC or Q-TEC unit is then slid up to the wall surface and connected to the sleeve using screws. Trim kits are available to enclose gaps between the wall surface and the unit. A louver grille is used to cover the external wall opening and fasteners used during sleeve installation.

Wall Sleeve:

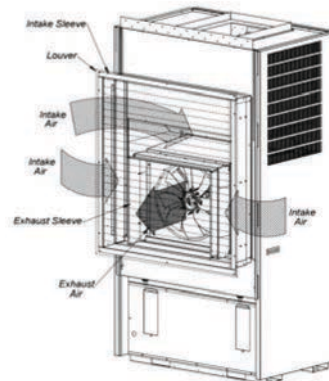
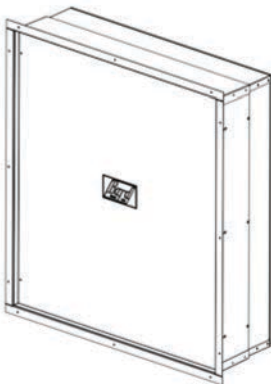
Wall sleeves allow for outdoor air to enter and exit the unit inside the room.

Air Paths:

Air paths through the unit allow for cooling operation and fresh air to enter the structure (I-TEC shown).

Louver Installation:

Outdoor louvers provide an esthetically pleasing look to the installation and cover the unit opening (I-TEC shown).



I-TEC and Q-TEC Products – Clearances for Outdoor Condenser Fan Airflow

Solid barriers located too close to the face of the outdoor louver of the I-TEC or Q-TEC can both impede airflow and force heated air to short circuit (be returned) from the condenser outlet to the condenser inlet. Either condition will effectively raise the condensing temperature and pressure reducing cooling capacity and efficiency. In extreme cases, the unit may fail to operate due to high refrigerant pressures inside the unit, and compressor and/or fan motor failure may occur. It is recommended to allow 15' (457.2 cm) in front of unit louver for proper condenser airflow. Always use common sense when installing products, follow unit clearances given in the installation instructions and contact local Bard distributors when additional knowledge is needed regarding unit clearances for proper unit functionality.

I-TEC and Q-TEC Products – Clearances for Indoor Supply and Return Airflow

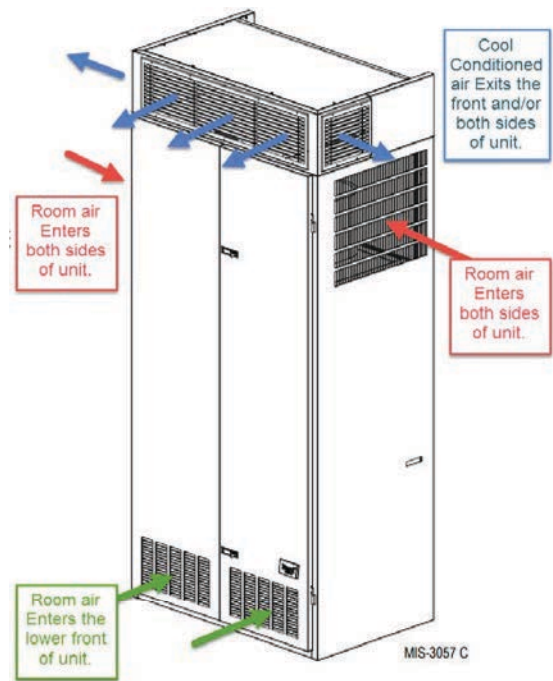
The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects inside the room within 24" of the return (unit air intake) louvers or grille. Avoid placing objects directly in the path of the supply (conditioned) air grilles. This will inhibit the “throw” of the supply air throughout the structure and reduce the cooling and/or heating ability of the unit and in extreme cases may cause evaporator coil freezing issues. Ducted applications should not exceed the rated duct static pressures given in the unit specification sheets. Special requirements for duct construction and distances to combustible materials need to be followed per the unit installation instructions when electric heating is used.

I-TEC Air Path

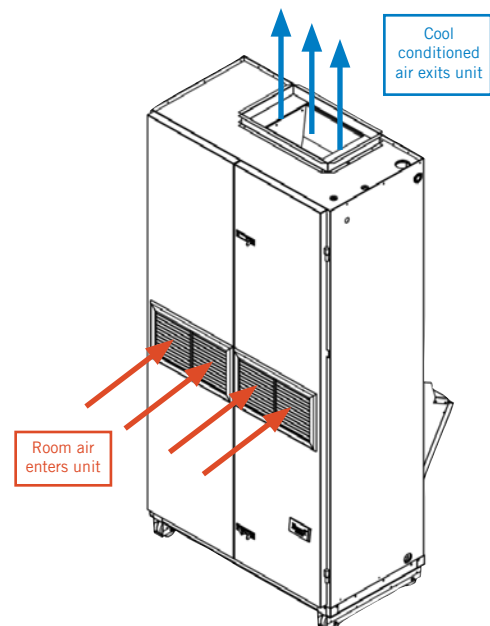
The I-TEC product has been engineered for extremely quiet unit operation and has multiple air paths for air entering and exiting the unit. Room air enters the upper sides to be conditioned (cooled) inside the unit and exits the unit top. The unit will either be ducted to supply registers or have a supply air plenum box installed. A supply air plenum box allows quiet operation without ducting the air leaving the unit. Room air also enters the bottom of both front doors during ventilation operation.

Q-TEC Air Path

The Q-TEC product has been engineered for efficient, economical unit operation and has a mid-mounted front grille for air entering the unit. The unit will either be ducted to supply registers or have a supply air plenum box installed. A supply air plenum box allows quiet operation without ducting the air leaving the unit.



Typical I-TEC Installation



Typical Q-TEC Installation

The I-TEC and Q-TEC product installation instructions contain additional information regarding unit air paths and required clearances. This information may be accessed at www.bardhvac.com.

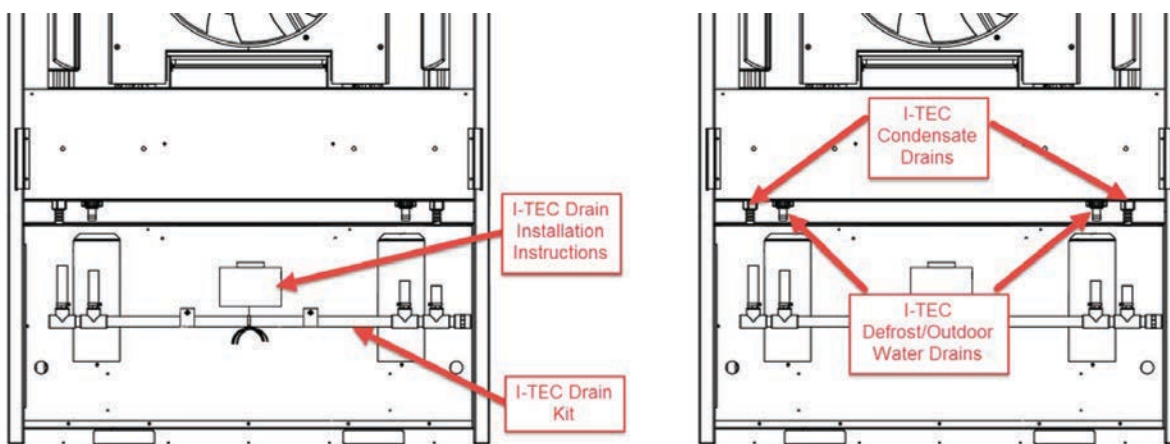
I-TEC and Q-TEC Products – Condensate Drainage

Condensate drainage for Bard indoor cooling units is a very important part of unit installation. During normal air conditioning operation, large amounts of condensate water are generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and needs to be drained to an external drainage system. Your new Bard product includes provisions to allow condensate water to exit the unit and fittings will need to be field supplied to connect the unit drain to the building. Adequate drain sizing needs to be provided to allow proper drainage for condensate water generation and restriction in drain lines should be avoided. Evaporator drain traps are not necessary unless required by local codes.

Defrost water for heat pump operation and outdoor water entering the condenser area also needs to be drained out of the unit. The I-TEC product uses a combined defrost and outdoor water drainage system. The Q-TEC has a combined defrost and evaporator drain connection unless an optional in-wall drain box is used. Outdoor water exits the Q-TEC through the wall sleeve. Follow all instructions provided in the unit installation instructions regarding drain connections and sleeve installation to avoid water leakage inside the building or structure.

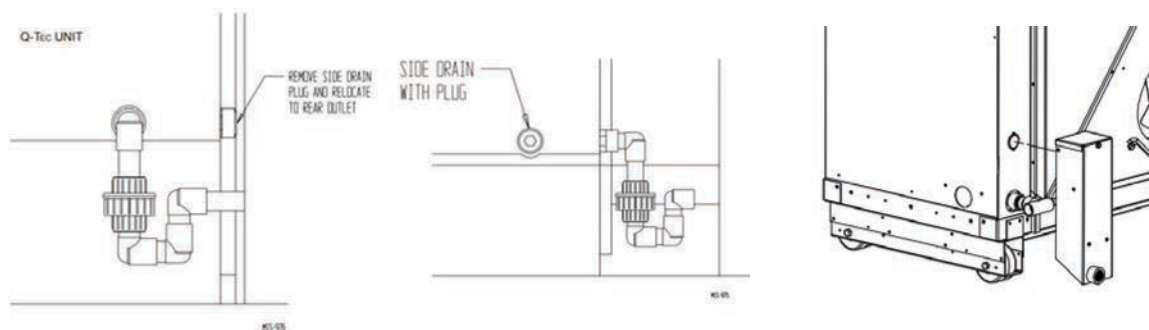
I-TEC Drain System:

The I-TEC drainage system consists of a manifold drain kit that combines all drains behind the unit to allow connection to the building system.



Q-TEC Drain System:

The Q-TEC drainage system consists of a lower right side or lower right rear connection fitting. An optional in-wall drain box may also be purchased as an accessory that allows separate evaporator and defrost water drainage.



Lower Right Side Drain

Lower Right Rear Drain

Optional In-Wall Drain Box

All Products – Power Supply Verification

It is very important to follow all electrical and mechanical safety guidelines and instructions provided in the product installation instructions. Failure to do so may result in death, injury or product damage.

A proper power supply to your new Bard unit is very important. Be sure to verify the following with a multi-meter or other power measuring device before applying power to your Bard product.

Field-Supplied Voltage

Electrical voltage ratings and proper voltage operating ranges are provided in the unit specification sheets and installation instructions. It is important that power supplied to the unit stay in the specified operating voltage range. Voltage above or below the minimum operating value given could result in improper unit startup, unit shutdown, low unit performance, improper thermostat and unit controller operation, compressor damage and premature failure of functional parts. As a general guideline, it is always best if the power source for the unit supplies the nominal electrical rating value given in the specification sheets, installation instructions and unit serial plate for the product being used. To do so will provide the best unit performance possible from your new Bard product.

Single and Three Phase Power

Bard products are available in single and three phase power options. It is important to connect the proper phase listed on the unit serial plate. Three phase power is often used to reduce energy usage, and units rated for 3 phase operation are equipped with a phase monitor safety device. The phase monitor will not allow unit operation with improper phase connection and a red LED light on the monitor indicates phase wiring issues. Connecting 3 phase power to a single phase unit will result in component damage and improper unit operation. Connecting single phase power to a 3 phase unit will also result in component damage and improper unit operation.

Hertz (Frequency)

Bard products are available in 50hz and 60hz power options. It is important to connect power with the proper hz value listed on the unit serial plate. 60hz power is often used in the United States and Canada and units rated for 50hz operation are normally for international sales outside of this area. Connecting 50hz power to a 60hz unit not rated for 50hz operation may result in component damage and improper unit operation. Some equipment may be rated for 50/60hz operation. Review the unit specifications and installation instructions for further information regarding the power requirements of the unit.

The product installation instructions and unit specification sheets contain additional information regarding unit electrical data. This information may be accessed at www.bardhvac.com.

Unit Maintenance

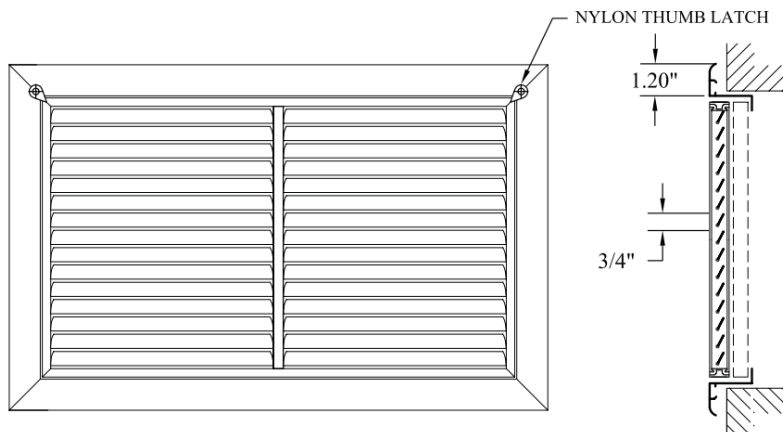
All Products – Filters and Filter Servicing

All Bard products contain air filters that must be cleaned or replaced on a regular basis.

Keeping air filter(s) clean is the single most important responsibility of the user of the equipment. Each type of system must be equipped with an air filter(s) in the indoor circulating air system to clean the air, keep the system itself clean for peak efficiency and capacity and prolong the useful life of the equipment. DO NOT operate the system without the proper air filters. Filters should be inspected at least monthly and replaced or cleaned (depending on type) as needed. The useful life of an air filter can vary widely depending upon application and use of the equipment, and it is critical to monitor filter condition and establish an acceptable maintenance schedule. Failure to do so will increase operating and repair costs, decrease capacity and efficiency and shorten the service life of the equipment. A common symptom of a dirty filter in the cooling mode is a freeze-up of the indoor coil. The air filters used may be a disposable (throwaway) type or may be a cleanable type that can be thoroughly cleaned, rinsed and reused many times. It is important to make sure that the correct filter size and type for your system is always used. If there is any question as to acceptable filter size or type, review the installation instructions for the specific equipment involved, if available. Otherwise, consult with your installing dealer or service company. Most equipment can have the filters inspected and serviced by the user with no problems. In some instances, because of equipment design or specific installation conditions, it may be necessary to have this procedure done by a qualified service company. Have your installer or service company show you where the filter(s) are and demonstrate the service procedure or make arrangements for them to provide this service on an as-needed basis.

Outdoor Unit Wall Mount Room Air Filters

Wall mount filters are normally accessed from the outside of the building. Bard does offer a return air grille with a filter frame built-in for indoor filter access. The return air filter grille is not acceptable as the only source of filtration if vent options are installed in the wall mount unit.



Return Air Filter Grille:

Bard offers the RFG return air filter grille, which may be used in applications where outdoor air is not brought into the structure through vent options. If vent options are used, the filter tray inside the Bard Wall Mount unit must be used.

The product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

WALL MOUNT Products – Filters and Filter Servicing

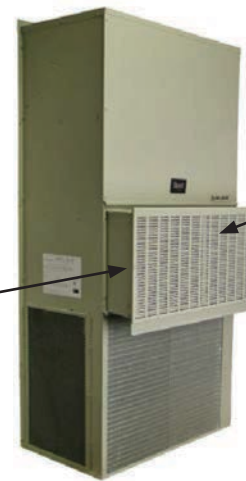
The built-in filter tray and room air filters in the wall mount are located in the middle of the cabinet below the indoor blowers. Units with vent options will have a washable screen behind the vent intake panel.



Filter Door:

The unit room air filter is located behind this panel for units without a vent hood.

Vent Intake Panel



Vent Intake Panel

Vent Hood Door:

The unit indoor filter is located behind this panel for units with a vent hood. The hood contains a washable pre-filter that needs to be cleaned regularly.

Filter Door:
The unit room air filter is located behind this panel.



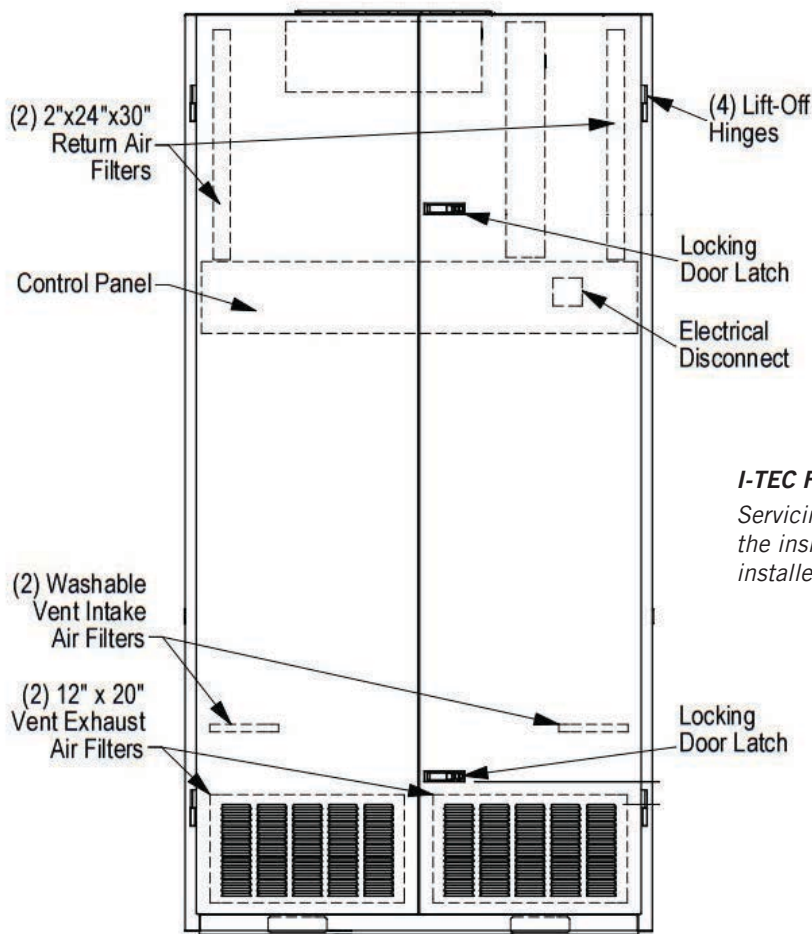
I-TEC Indoor Products – Filters and Filter Servicing

The I-TEC indoor air conditioners and heat pumps have multiple filters that must be maintained and inspected when servicing the unit. Filters play an important part in proper unit operation and prevent dirt and dust buildup inside the I-TEC and the room the unit is installed in. To access the unit filters, open the front hinged doors by unlocking the door latches. The doors fold outward and are on hinges with lift-off pins. Use care when opening doors. If doors are lifted off of the hinge pins, use care as the dense insulation used for sound reduction causes the doors to be heavy.

The upper section of the unit contains two 2" x 24" x 30" throwaway filters as standard with every unit. MERV ratings of the filter are available up to MERV13. These filters filter the air used for cooling inside the classroom or structure and should be changed regularly.

If the unit has an air intake vent option installed, two 1" x 12" x 20" filters are located in the lower section of the front doors behind the louvers. These filters help keep the vent option clean and operating properly.

Two washable filters are also installed in the air intake vent option. These should be inspected during servicing and cleaned when necessary. The washable filters are used to remove dirt and dust from outdoor air that is entering the vent area. If at any time these filters are damaged, they must be replaced with Bard-approved filters.



I-TEC Filter Locations:

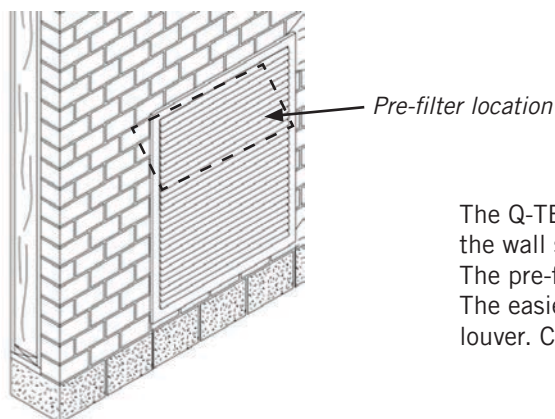
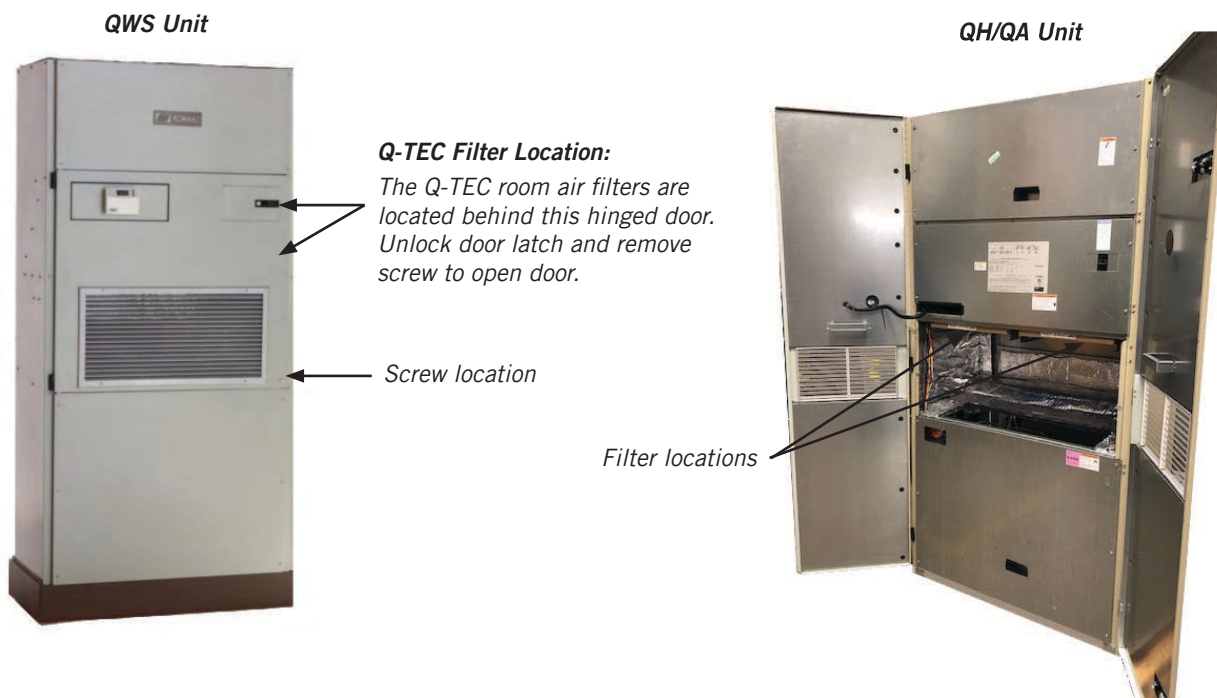
Servicing the filters in your unit will help keep the inside of the unit clean and also the area it is installed in.

The I-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

Q-TEC Indoor Products – Filters and Filter Servicing

The Q-TEC indoor air conditioners and heat pumps have two room air filters that must be replaced when servicing the unit. Filters play an important part in proper unit operation and prevent dirt and dust buildup inside the Q-TEC and the room the unit is installed in. To access the unit filters, open the front hinged door by unlocking the door latch. The door folds outward and is on hinges with lift-off pins. Use care when opening doors. If the door is lifted off of the hinge pins, use care as the insulation and louver grille cause the door to be heavy.

The upper section of the Q-TEC contains two 1" throwaway filters standard with every unit. These filters filter the air used for cooling inside the classroom or structure and should be changed regularly.



The Q-TEC will have a permanent pre-filter installed inside the wall sleeve if air intake vent options are inside the unit. The pre-filter must be inspected and cleaned when necessary. The easiest way to remove the pre-filter is through the outdoor louver. Clean the pre-filter with soapy water.

The Q-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

All Products – Coil Cleaning

The outdoor coil must be kept clean and free of any airborne debris, which can accumulate over time. Large volumes of air are circulated over the coil, and airborne debris such as lint, dust, materials shed from trees, paper or other types of airborne material that can become airborne can collect on the entering coil surface. The outdoor coil must dissipate heat during the cooling mode and for a heat pump, also absorb heat during the heating mode. If the coil is dirty and matted with debris, the airflow across the coil will be reduced causing poor performance, increased operating run time and associated utility bills and in extreme conditions can shorten the useful life of the equipment.

Depending on the specific equipment involved, the surface that can accumulate debris can be on the opposite side that is exposed to view when standing in front of the machine. Closely review the machine when operating to see which direction or path the airflow takes as it moves through the machine. If the air inlet side of the coil is hidden, try to observe the back (hidden) side by looking into the side grilles, using a flashlight if necessary. While the user of the equipment needs to be aware of the potential of clogging of the outdoor coil surface, actual cleaning of the outdoor coil should not be attempted under most circumstances. If the user should attempt this procedure on their own, never do so without first having the installing dealer or service company instruct you in the proper procedure and technique.

WARNING: Do not open or enter the equipment without first turning off the electrical service disconnect. Failure to do so can result in personal injury due to moving parts and/or electric shock hazard resulting in death.

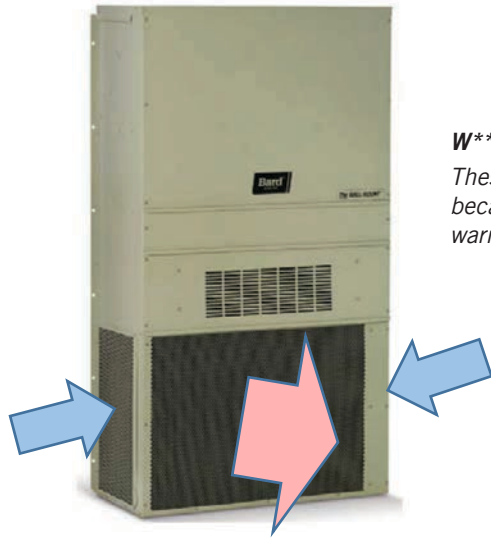
Other conditions that can cause reduction of airflow across the outdoor coil are flowers, shrubbery or other growth too near the outdoor coil air inlet and outlet openings. These living things, especially as they mature and grow, will be just as effective in blocking the airflow and create the same problems as will stacking things against the equipment. These conditions can be easily managed and controlled by the user, as they do not require actually entering into the equipment enclosure, which should only be done by qualified service technicians.

Equipment Corrosion Protection

1. Avoid having any lawn sprinkler spray directly on the equipment, especially if from a brackish water source.
2. In coastal areas or corrosive environments, locate equipment as far away from the corrosion source as feasible. Units exposed directly to salt spray should be coated by a secondary protective coating operation to reduce corrosion on copper tubing, fasteners, motors and other metal parts. Coils should be ordered with a corrosion protective coating. Contact Bard for coating options.
3. Frequent cleaning and waxing of the cabinet using a good automobile polish will help extend its original appearance and protect painted surfaces.

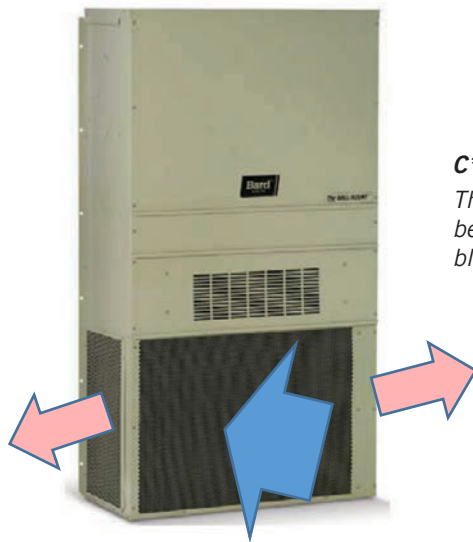
The product installation instructions contain additional information regarding unit coil cleaning. This information may be accessed at www.bardhvac.com.

All Products – Condenser Airflow



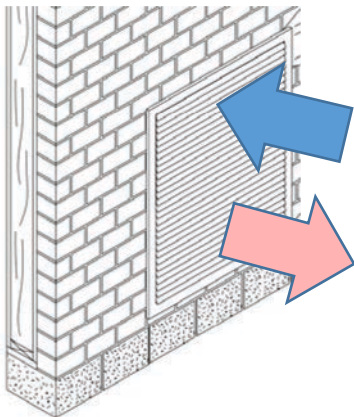
W**A, W**H, T**H, T**S, W*RV Wall Mount Units:

These units are called “blow through condenser airflow” units because they draw cool outdoor air from the sides and blow the warm condenser air exiting the coil through the front grille.



C**H Wall Mount Units:

These units are called “draw through condenser airflow” units because they draw cool outdoor air in the front through the coil and blow the exiting warm condenser air through the unit sides.



I-TEC and Q-TEC Units:

These units draw the cool outdoor air through the top section of the wall louver and exhaust the warmer condenser air out of the lower section of the louver. I-TEC units also draw a small amount of air through the outer right and left side of the louver.

Unit Operation

Air-to-Air Cooling Products (Air Conditioners)

The cooling mode operates similar to a refrigerator, removing heat from inside the conditioned space and rejecting it outside of the space being controlled. There are three main parts of the system:

1. The evaporator (indoor) coil where cold refrigerant absorbs heat from the air, which circulates from the conditioned space through the machine and is returned to the space at a lower temperature and with some of the humidity (moisture) removed. The moisture exits through a condensate drain system. A motor/blower assembly moves the indoor air through the system.
2. The compressor, which is a sealed pump that moves the refrigerant through the system.
3. The condenser (outdoor) coil where the heat that was absorbed from the indoor space is discharged to the outdoor environment. A motor/fan system moves the outdoor air across the condenser coil. A properly sized air conditioner cannot cool a structure off rapidly and instead will pull down the temperature slowly. It also will remove a certain amount of moisture (humidity) from the circulating airstream in the process. It may take several hours to pull down a hot, moist building or structure on initial startup or anytime the system has been turned off for a long period of time. It is generally best to set the thermostat at a comfortable temperature and let it control the system as needed, rather than turning it on and off.

Moisture (humidity) removal with a conventional air conditioner (cooling) unit, or heat pump when operating in the cooling mode, is not directly controlled and is a by-product of the unit operating to control temperature in response to the temperature (thermostat) control device. **Oversized equipment can easily control temperature but will have short run-times, thus reducing its ability to remove moisture from the circulating air stream.**

There are also many additional influences that can affect humidity levels within the conditioned space such as laundry appliances, cooking, showers, exhaust fans and any other items that can generate moisture or affect its removal from the space. Therefore, while operation of the air conditioning or heat pump system in the cooling mode will remove some amount of moisture as it reduces the air temperature, precise humidity regulation in the conditioned space cannot be assured and additional equipment such as a dedicated dehumidifier may be required.

Air-to-Air Cooling and Heating Products (Heat Pumps)

A heat pump is a refrigerant-based system that has additional components and controls that both heats and cools using a compressor for both modes of operation. Most heat pumps will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as-needed basis. This operation is entirely automatic and is controlled by the indoor thermostat and possibly also an outdoor thermostat.

Cooling Mode

The cooling mode of a heat pump is exactly the same as that described for an air conditioner in the above section.

Heating Mode

The system operates in reverse cycle, meaning that it absorbs and moves heat from the outdoors and transfers it indoors to be rejected into the circulating air stream. Even though it seems cold to humans, there is usable heat that can be extracted efficiently from the outdoor air down to 0°F, although the colder the air is there is less heat to extract and the operating efficiency is diminished.

Defrost Cycle

When operating in the heating mode, the outdoor coil will be colder than the outdoor air that is forced over it by the fan system. When the outdoor air temperature is above approximately 40°F, moisture can accumulate on the coil and it will drain down and out the base of the unit. As the air temperature gets below approximately 40°F, the coil temperature will start to drop below 32°F, and frost or ice will begin to form on the coil.

An automatic defrost system keeps track of system run time when the outdoor coil temperature is in the freezing zone and will initiate a defrost cycle at the appropriate time. The unit continues to operate during the defrost cycle, but the outdoor fan motor will stop and the reversing valve will shift positions to flow hot refrigerant gas through the outdoor coil to melt the accumulated frost. Water will start to drain freely from the unit, and steam may be emitted from the unit.

The length of the defrost cycle will vary depending upon actual outdoor temperature, humidity levels and amount of accumulated frost. It could range from 1-2 minutes up to but not exceeding 8 minutes. When the defrost cycle

terminates, the reversing valve will shift back to heating mode and the outdoor fan will restart. There is typically a large puff of steam emitted as the fan restarts. When the heat pump shifts from cool to heating mode, from heating to cooling mode and especially during defrost cycles, there will be a pressure transfer sound heard as the reversing valve redirects the flow of refrigerant. This is commonly described as a hissing noise and is a normal sound for this type equipment.

For air source heat pumps, it is important to keep heavy snow from accumulating around the machine to the point of blocking the inlet and outlet openings to the outdoor coil section. For wall mounted or other equipment that is elevated, this should not be a factor; but for equipment installed on or near the ground, this can be an issue in areas prone to heavy and/or blowing snow. The air source heat pump cannot operate effectively and efficiently when snowbound just as a car cannot function well in heavy snow conditions.

Water-to-Air Cooling and Heating Products (Geothermal Heat Pumps)

These types of heat pumps are also commonly referred to as water source or geothermal systems. Just like the air source heat pump, they are refrigerant-based systems that both heat and cool using a compressor for both modes of operation. The primary difference is that the system uses water or antifreeze-protected water solution instead of an air-cooled outdoor heat transfer coil, and there is no outdoor motor/fan system but instead a water pump to provide adequate water flow to the system.

Cooling Mode

The cooling mode of a water-to-air heat pump is exactly the same as that described for an air conditioner in the previous Air Conditioner section, except that the outdoor coil uses water instead of air for the heat transfer medium.

Heat Mode

The system operates in reverse cycle, meaning that it acquires and moves heat from the water supply flowing through the water to refrigerant coil and transfers it indoors to be rejected into the circulating air stream.

Most water-to-air heat pumps (but not all) will also be equipped with some amount of electric heat to supplement the heating capacity of the compressor system on an as-needed basis. This operation is entirely automatic and is controlled by the indoor thermostat.

Because of the design of water-to-air heat pumps and the water temperatures involved, no defrost system is required as in air-to-air heat pumps.

Water Supply Systems

Depending upon the type and application of the water-to-air heat pump, the water side of the system could be one of the following:

1. Individual closed loop buried in a trench or vertical bore hole(s).
2. Individual loop submerged in a pond.
3. Water supplied from a well and discharged into pond, stream, ditch or another well.
4. Water supplied from a boiler/tower system, typically only in larger multi-unit installations.

Dehumidification and Ventilation Operation

Dehumidification (Air-to-Air or Water-to-Air Systems)

Many Bard systems, typically those used in schools or other commercial applications, have a dedicated dehumidification capability by having a special additional refrigeration circuit (factory-installed option only) in addition to the basic system. These special systems, sometimes also referred to as hot gas reheat, are designed to control humidity on demand from a humidity controller much the same as the basic cooling and/or heating system is controlled by a wall thermostat. Consult your installer and/or service company to determine if your installation has any of these devices and for any instructions or maintenance requirements you should be aware of as the user.

Ventilation Options (Air-to-Air or Water-to-Air Systems)

All Bard systems are available with factory-installed vent options. Most units can have ventilation field installed after unit installation.

Ventilation has multiple purposes:

- Outside air intake for occupied structures
- Positive pressurization
- Energy savings when outdoor air can be used for cooling
- Agricultural use of bringing in outdoor air and exhausting room air
- Equipment and electronics ventilation

Review product specifications and manuals for more details regarding available ventilation options and features. Product documentation is shipped with the product and also available at www.bardhvac.com.

All Units – Troubleshooting

Your Bard product is made to operate for many trouble-free years if installed properly and maintenance practices are followed. Be sure to verify that all filters are clean, and condenser coils are free of dirt and debris. Often these items may look clean at first, but upon closer inspection, show signs of dirt and debris build-up. New units on new structures may have dirt and dust in filters from the building construction process.

Thermostats and unit controllers often contain vent holes for proper sensor measurement inside the device. Make sure the thermostat or controller are not full of dirt and dust from building construction or years of use.

Verify all requirements in the installation instructions and specification sheets are met. Unit voltages, airflow clearance requirements and clean unit power without brownouts or spikes play a critical role in unit performance. If 208 VAC power is supplied to the unit, the 208V tap must be used on the 24 VAC transformer located inside the control panel. Common sense must also be used when installing the unit in an environment that may put the unit at risk of improper operation.

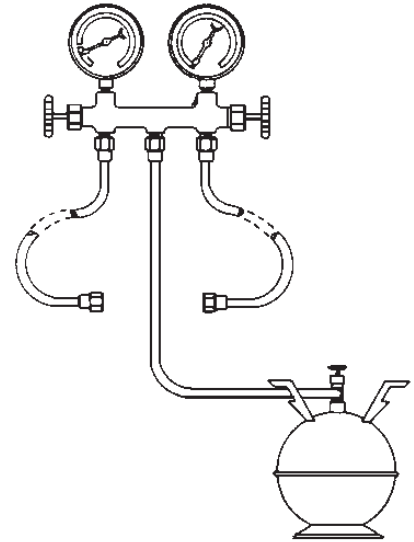
Helpful Hints and Good Operating Practices

The following information will help you enjoy the full comfort and benefits of your Bard cooling and heating system, maximize the performance and efficiency and help extend the life of your system.

1. Always keep the equipment in peak operating condition with routine scheduled maintenance, especially for the air filters, and to assure a clean outdoor coil.
2. For most efficient operation, set the thermostat at the temperature you prefer and then let it take control. If any changes to the settings are required, they should be made in small adjustments and the system be allowed time to respond. Rapid changes either up or down should not be done.
3. Setting the thermostat very high does not make the system heat faster and setting it very low does not make it cool faster.
4. It is not recommended to turn the system "Off" then back "On" when you need it. This can allow temperature and humidity to build up in warm weather conditions and force the system to run continuously to try and catch up. If the building is to be unoccupied for a lengthy period, it is best to adjust the thermostat to a reasonable higher (or lower—depending on the season) setting rather than turning it completely off. Upon return, the inside conditions will not be totally out of control and recovery time to desired conditions would be much shorter.
5. Airflow inside the room or building is very important. Keep all supply registers open and all returns free and unrestricted. Avoid placing objects in areas that will hinder unit airflow. The heating and cooling system is designed to have a certain amount of airflow for proper operation. Therefore, closing off registers, in unused rooms as an example, could reduce airflow below acceptable levels and should not be done without review by your service company who can assess the overall situation and advise you accordingly.
6. Heat pumps, especially air-to-air heat pumps, may have the system (compressor) run continuously at lower outdoor temperatures, and this is normal. The heat pump (compressor) mode is controlled by the beginning stages of the thermostat and delivers the most efficient heat. As the outdoor temperature drops off, the heat pump mode heat will also diminish (because there is less heat in the outdoor air to absorb) and must be supplemented by additional electric heat stages, which are not as efficient as the heat pump. The thermostat automatically controls everything and the backup heat will only operate on demand as needed to maintain the desired temperature.
7. The thermostat or controller is the user's primary connection to the system so it is very important to have a thorough understanding of how it works and how to use it properly. Have your installer or service company explain and demonstrate proper operation of the controls.
8. Make sure you thoroughly understand how the heating and cooling system itself is intended to operate and what to expect from it. Have your installer or service company explain and demonstrate proper operation of the heating and cooling system.

SERVICING PROCEDURE

R-410A LEAK TEST EVACUATION CHARGING



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

Since 1914...Moving ahead, just as planned.

Manual No.: 2100-479
Supersedes: NEW
File: Volume I, Tab 1
Date: 03-08-07

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GENERAL



WARNING

The oils used with R-410A refrigerant are hygroscopic and absorb water from the atmosphere readily. Do not leave systems open to the atmosphere for more than 5 minutes. If the system has been open for more than 5 minutes, change the filter dryer immediately before evacuation. Then recharge the system to the factory specified charge.

Recovery equipment rated for R-410A refrigerant

R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.

The gauge manifold set is specially designed to withstand the higher pressure associated with R-410A. Manifold sets are required to range up to 800 psig on the high side and 250 psig on the low side with a 250 psig low side retard.

All hoses must have a service rating of 800 psig. (This information will be indicated on the hoses.)

Vacuum Pump and micron gauge must be used when evacuating a system to 500 microns.

Leak Detectors

An electronic leak detector capable of detecting HFC refrigerant can be used with R-410A refrigerant.

GAUGE MANIFOLD



WARNING

Gauge manifold must be suitable for use with R-410A refrigerant and POE oils.

A necessary instrument in checking and serving air conditioning and heat pump equipment is the gauge manifold. Its purpose is to determine the operating refrigerant pressures in order for the serviceman to analyze the condition of the system.

The valving on the manifold is so arranged that when the valves are closed (front-seated) the center port on the manifold is closed to the gauges and gauge ports. With the valves in the closed position, the gauge ports are still open to the gauges, permitting the gauges to register system pressures. Opening either valve opens the center port to that side of the manifold and system.

ATTACHING GAUGE MANIFOLD

For leak testing, purging, checking charge, charging liquid or evacuating, connect high pressure side of gauge manifold to Schrader valve on liquid or discharge line. Connect suction side of gauge manifold to Schrader valve on suction line. On heat pumps the suction line is between compressor and reversing valve.

ATTACHING MANIFOLD HOSE TO SCHRADER VALVE



WARNING

As a safety measure, it is wise to detach refrigerant hoses at the lowest pressure readings on the system. To do this:

- A. Put high pressure hose "B" on first. (Unit should not be running.)
- B. Put low pressure hose "A" on second. (Unit should be running.)

1. Remove cap from valve.
2. Make sure gauge manifold valves are closed.
3. If hose does not have an unseating pin, a number 395 Superior or equivalent unseating coupler must be used.
4. Make sure coupler is lined up straight with Schrader valve. Screw coupler on to valve.
5. Open gauge manifold valve slightly and purge air from hose with refrigerant.
6. Read the suction pressure on compound gauge and heat pressure on pressure gauge.
7. To remove, push end of hose tight against end of Schrader valve and hold in place while quickly unscrewing coupler nut from Schrader valve.
8. Remove coupler from Schrader valve. Replace caps on valve.

Leak Test

1. Remove gauge port cap from suction and liquid service valve ports and attach manifold gauge hoses. Connect an upright R-410A drum to center port of gauge manifold. Open refrigerant drum valve and manifold high pressure gauge valve to pressurize system to a positive pressure with refrigerant vapor. Pressurize the complete system with dry nitrogen, or CO2 until the pressure reaches 200 psig. **Do not** exceed 250 psig.
2. Close manifold high pressure gauge valve. Check all soldered joints, including those on the evaporator coil with an Electronic Leak Detector suitable for use with HFC refrigerants or R-410A. If a leak is found which requires soldering, pressure in the system must be bled off since it is impossible to solder with unit pressurized. Be sure all leaks are located and marked before bleeding pressure from system.

3. Close drum valve and disconnect from center port. Release nitrogen or CO2 into the atmosphere through suction line of gauge manifold.
4. Correct any leaks and recheck. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.
5. Change the filter dryer. When leaks, if any, have been repaired, system is ready to be evacuated and charged. Relieve all pressure from the system down to 0 psig.

EVACUATION

Evacuation

An evacuation to 500 microns is usually sufficient to remove moisture from a system using R-22 and mineral oil lubricant. A 500 micron evacuation, however, will not separate moisture from Polyol Ester oil (POE) in R-410A systems.

In addition to a 500 micron evacuation, the liquid line filter dryer (R-410A compatible) must be replaced any time the system is open. When removing a filter dryer from a system, do not use a torch; use a tubing cutter to avoid releasing moisture back into the system.

Older R-22 leak detectors, as well as halide torch leak detectors, will not detect leaks in R-410A systems. Never use air and R-410A to leak check, as the mixture may become flammable at pressures above 1 atmosphere. A system can be safely leak-checked by using nitrogen or a trace gas of R-410A and nitrogen.

Remember: *Always use a pressure regulator with nitrogen and a safety valve down stream - set at no more than 150 psig.*

1. Evacuate system to less than 500 microns, using a good vacuum pump and an accurate high vacuum gauge. Operate the pump below 500 microns for 60 minutes and then close valve to the vacuum pump. Allow the system to stand for 30 additional minutes to be sure a 500 micron vacuum or less is maintained.



WARNING

At no time use the compressor to evacuate the system or any part of it.

2. Disconnect charging line at vacuum pump and connect to refrigerant supply. Crack the cylinder valve and purge charging line at center on manifold. Then close cylinder valve.
3. The system is now ready for the correct operating charge of Refrigerant R-410A.

R-410A System Charging

Even though R-410A has a very small fractionation potential, it cannot be ignored completely when charging. To avoid fractionation, charging of an air conditioner or heat pump system incorporating R-410A **shall be done with “liquid”** to maintain optimum system performance. To insure that the proper blend composition is charged into the system, it is important that liquid only be removed from the charging cylinder. Some cylinders supplied by manufacturers have dip tubes, which allow liquid refrigerant to be removed from the cylinder when it is in the upright position. Cylinders without dip tubes have to be tipped upside down in order for liquid to be removed. The Service Technician must differentiate between which type of charging cylinder they are using to avoid removing vapor refrigerant instead of liquid refrigerant to avoid fractionation and for safety concerns.

Connect the gauge manifold to the high and low side. Allow liquid to enter the high side only. The high side will hold 80-100% of the total charge. When liquid stops flowing, close high side port. The remainder of the charge will be added to the low side. Keep in mind two issues: first, never start the compressor with less than 55 psig of suction pressure. Secondly, make sure the liquid is throttled, thus vaporized into the low side of the system to avoid compressor damage. A throttling valve can be used to insure that liquid is converted to vapor prior to entering the system. Proper manipulation (restricting) of the manifold gauge set can also act as a throttling device to insure liquid is not entering the compressor.

CHARGING

1. **Single Package Units**—Refer to the unit serial plate for the full operating charge.

PRELIMINARY CHARGING STEPS

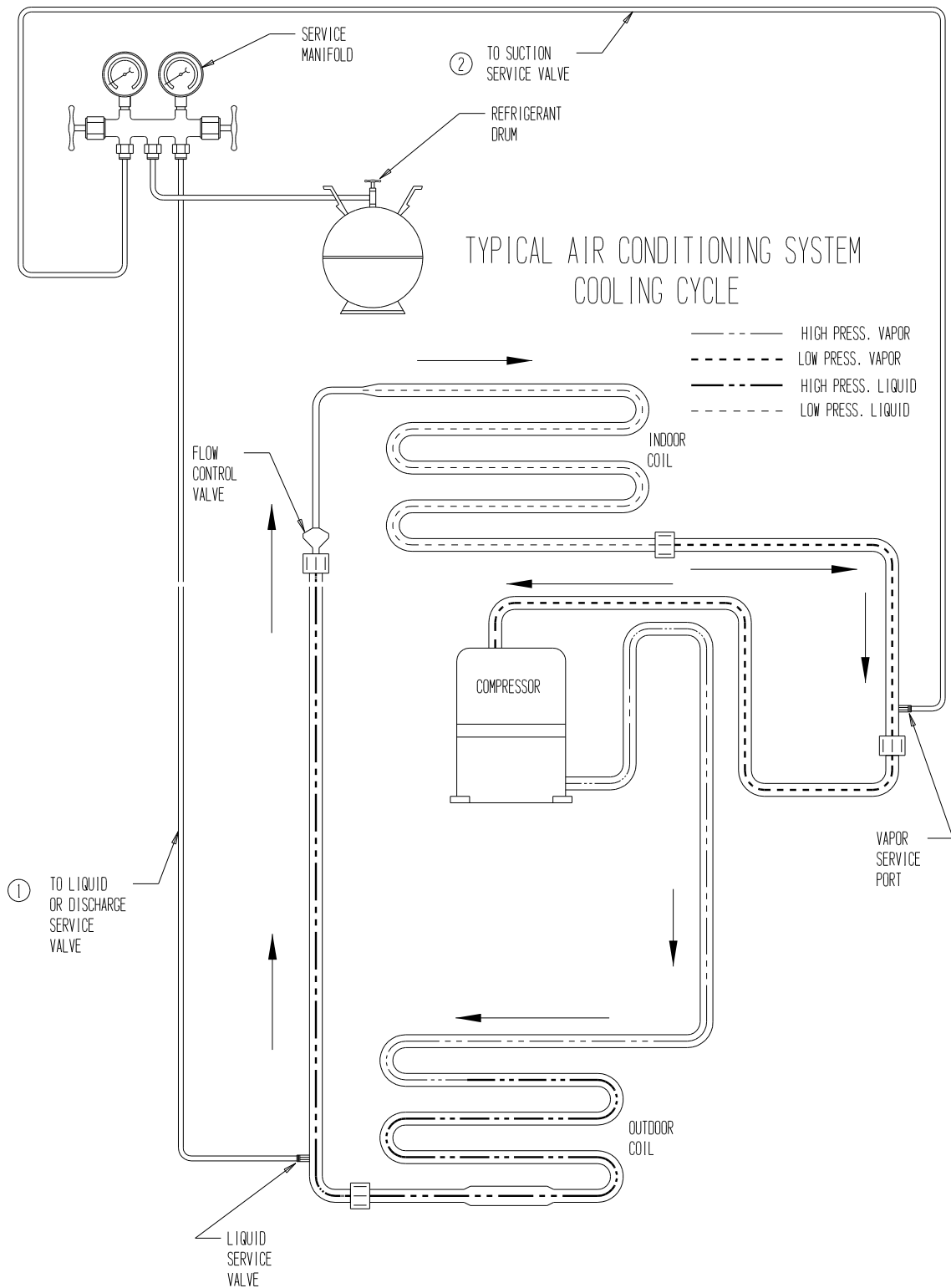
If the system has been open to the atmosphere, the filter dryer should be replaced and then evacuated. Then proceed as follows:

1. Attach a drum of proper, clean refrigerant to the center port of the charging manifold with one of the charging hoses.
2. Attach a second charging hose to the suction gauge (low pressure) side of the gauge manifold.
3. Remove the cap from the suction line valve.
4. Loosely attach the suction gauge hose to the line valve. Open the valve on the refrigerant drum and the suction valve on the charging manifold slightly to purge the air from the manifold and hoses before tightening the fitting.
5. Attach the third hose to the high pressure side of the manifold and the liquid line valve. Repeat steps 3 and 4 above.

CHARGING THE SYSTEM BY WEIGHT

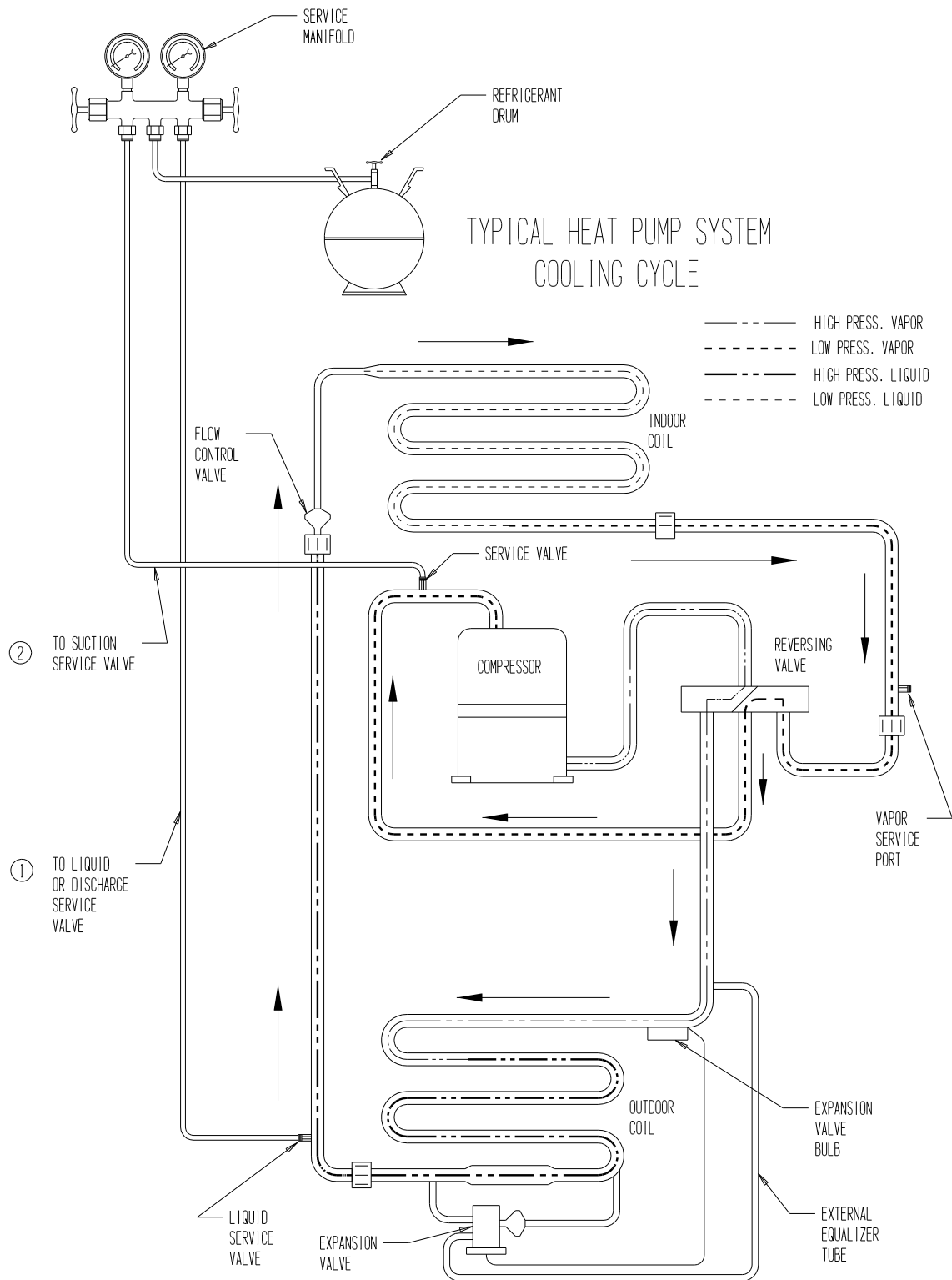
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder liquid valve and allow pressure in system to balance with pressure of cylinder or 80% of charge is in the unit - whichever comes first.
4. When there is approximately an 80% charge, front seat (close) the discharge manifold valve and let the system stabilize for about five minutes.
5. Start compressor by setting thermostat.
6. Finish charging with liquid by cracking the suction valve. Open the manifold low pressure valve to allow refrigerant to flow into the system. Throttle the manifold valve to keep pressure about 100 psig for R-410A.
7. When the correct weight of refrigerant has been added to the unit, close refrigerant cylinder valve and allow unit to run for 30 minutes. Refer to Start-Up Procedure and Check List for further start-up details.
8. Front seat gauge manifold valves, disconnect charging and gauge hoses and replace all valve caps.

FIGURE 1
TYPICAL AIR CONDITIONING SYSTEM COOLING CYCLE



MIS-369

FIGURE 2
TYPICAL HEAT PUMP SYSTEM COOLING CYCLE



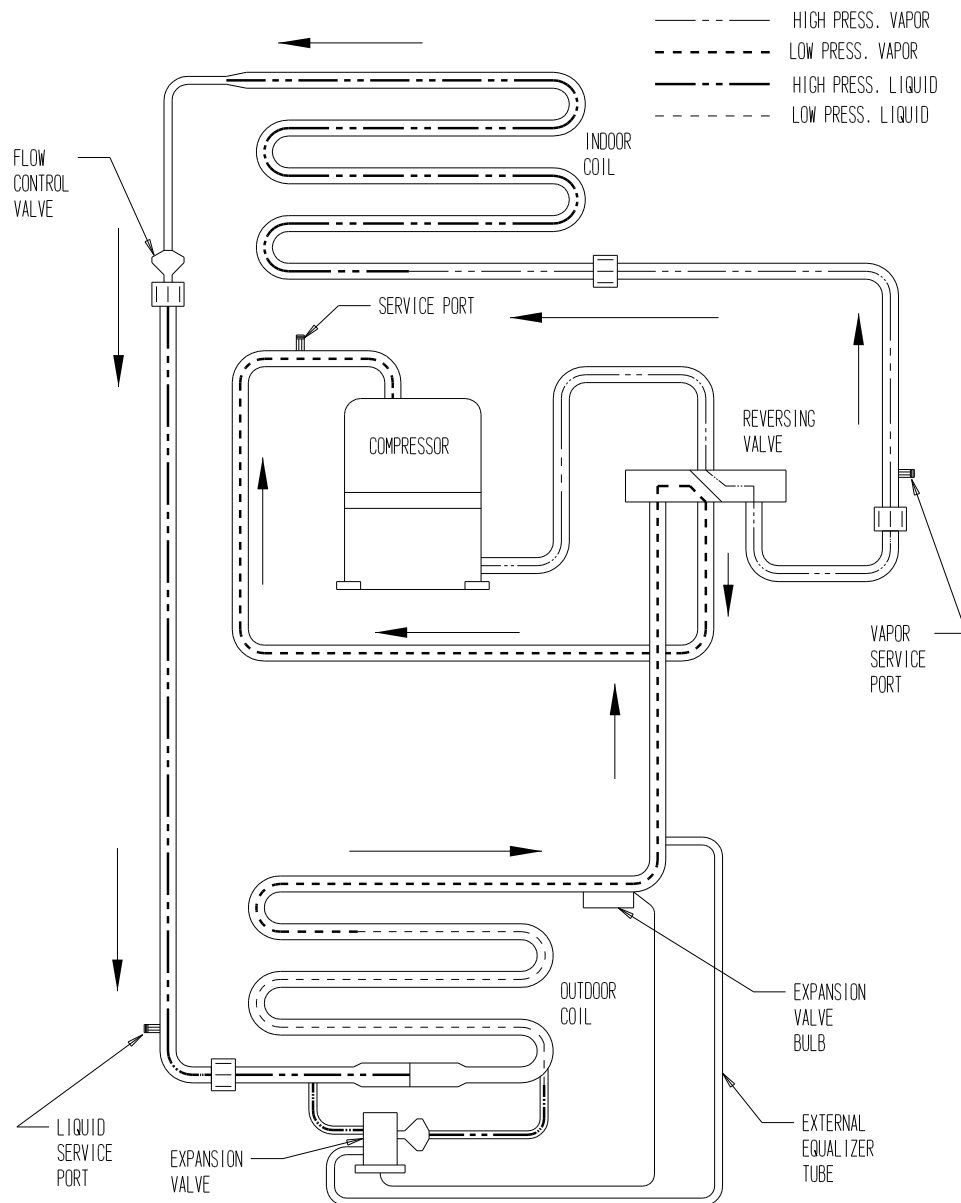
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WARNING

To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130°F). Remember to either consider the total weight of the pan of water or remove the drum for weighing frequently to keep track of the charging process.

**FIGURE 3
HEATING CYCLE**



MIS-289

TROUBLESHOOTING THE MECHANICAL SYSTEM

AIR CONDITIONING AND HEAT PUMP — COOLING

LOW SUCTION—LOW HEAD PRESSURE

1. Restricted airflow over indoor coil.
2. Defective indoor fan motor.
3. Low indoor temperature
4. Iced indoor coil.
5. Restricted liquid line, dryer, metering device, etc.
6. Low charge.
7. Low ambient entering air temperature. (Low entering water temperature to water coil.①)

HIGH SUCTION—LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPRV valve open.
3. Defective reversing valve.

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low airflow outdoor coil. (Low water flow.①)
3. Overcharged.
4. Air in system.
5. Restricted outdoor coil. (Restricted water coil.①)
6. High indoor air temperature.

① Water source heat pump.

HEAT PUMP — HEATING

LOW SUCTION—LOW HEAD PRESSURE

1. Restricted airflow through outdoor coil. (Restricted water flow through water coil.①)
2. Defective outdoor motor. (Defective water pump.①)
3. Low outdoor air temperature. (Low water temperature.①)
4. Frozen outdoor coil. (Frozen water coil.①)
5. Restricted liquid line, dryer, metering device, etc.
6. Low charge.
7. Low indoor air temperature.

HIGH SUCTION—LOW HEAD PRESSURE

1. Defective or broken valves.
2. IPR valve open.
3. Defective reversing valve.

LOW SUCTION—HIGH HEAD PRESSURE

1. Partial restriction and then overcharged.

HIGH SUCTION—HIGH HEAD PRESSURE

1. High entering outdoor air temperature. (High entering water temperature.①)
2. Low indoor airflow.
3. Overcharged.
4. Air in system.
5. Restricted air coil.
6. High indoor air temperature.

① Water source heat pump.

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TROUBLESHOOTING CHART FOR AIR TO AIR HEAT PUMPS

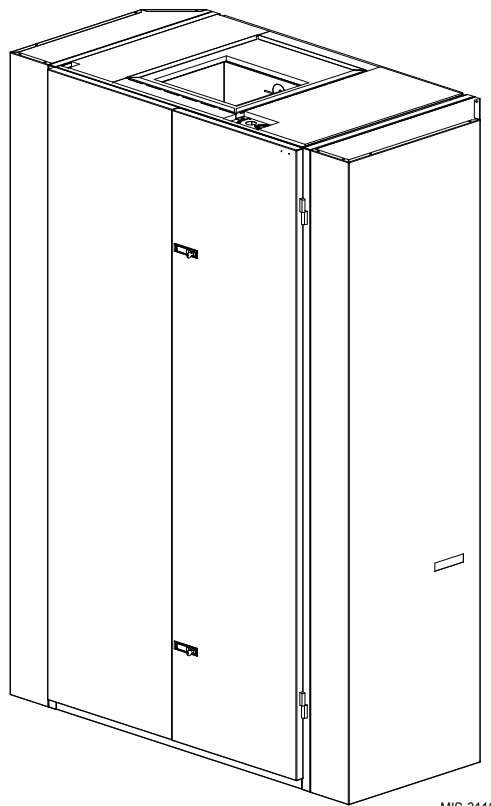
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INSTALLATION INSTRUCTIONS

I-TEC® Series Packaged Heat Pump

Models:

I36Z1-A	I48Z1-A	I60Z1-A
I36Z1-B	I48Z1-B	I60Z1-B
I36Z1-C	I48Z1-C	I60Z1-C



MIS-3116



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

Manual: 2100-5780
Supersedes: 2100-578N
Date: 5-14-21

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GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help when installing the air conditioner or heat pump. They can usually be found at the local library or purchase them directly from the publisher. Be sure to consult current edition of each standard.

National Electrical Code..... ANSI/NFPA 70

Standard for the Installation ANSI/NFPA 90A
of Air Conditioning and Ventilating Systems

Standard for Warm Air..... ANSI/NFPA 90B
Heating and Air Conditioning Systems

Load Calculation for ACCA Manual J or
Winter and Summer Manual N
Air Conditioning

Low Pressure, Low Velocity ACCA Manual D or
Duct System Design Manual Q
Winter and Summer Air Conditioning

For more information, contact these publishers:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Avenue
Washington, DC 20009
Telephone: (202) 483-9370
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ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
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ASHRAE **American Society of Heating, Refrigeration,
and Air Conditioning Engineers, Inc.**
1791 Tullie Circle, N.E.
Atlanta, GA 30329-2305
Telephone: (404) 636-8400
Fax: (404) 321-5478

NFPA **National Fire Protection Association**
Batterymarch Park
P.O. Box 9101
Quincy, MA 02269-9901
Telephone: (800) 344-3555
Fax: (617) 984-7057

GENERAL

The equipment covered in this manual is to be installed by trained, experienced service and installation technicians.

The I-TEC must be installed with the Bard manufactured IWS wall sleeve and ILG louver grille accessories. These are sold as separate accessories. Any substitutions will void the manufacturer's warranty.

The unit is designed for use with or without ductwork. For use without ductwork, Plenum Box IPBDFZ18-color (18" height) or IPBDFZ12-color (12" height) is recommended.

These instructions explain the recommended method to install the air cooled self-contained unit and the electrical connections to it.

These instructions and any instructions packaged with any separate equipment required to make up the entire heating and air conditioning system should be carefully read before beginning the installation. Note particularly "Start Procedure" and any tags and/or labels attached to the equipment.

While these instructions are intended as a general recommended guide, they do not supersede any national and/or local codes in any way. Authorities having jurisdiction should be consulted before the installation is made. See page 3 for information on codes and standards.

Size of unit for a proposed installation should be based on heat loss or heat gain calculation made according to methods of Air Conditioning Contractors of America (ACCA). The air duct should be installed in accordance with the Standards of the National Fire Protection Systems of Other Than Residence Type, NFPA No. 90A, and Residence Type Warm Air Heating and Air Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

ANSI Z535.5 Definitions:

- **DANGER:** Indicate[s] a hazardous situation which, if not avoided, will result in death or serious injury. The signal word "DANGER" is to be limited to the most extreme situations. DANGER [signs] should not be used for property damage hazards unless personal injury risk appropriate to these levels is also involved.
- **WARNING:** Indicate[s] a hazardous situation which, if not avoided, could result in death or serious injury. WARNING [signs] should not be used for property damage hazards unless personal injury risk appropriate to this level is also involved.
- **CAUTION:** Indicate[s] a hazardous situation which, if not avoided, could result in minor or moderate injury. CAUTION [signs] without a safety alert symbol may be used to alert against unsafe practices that can result in property damage only.
- **NOTICE:** [this header is] preferred to address practices not related to personal injury. The safety alert symbol shall not be used with this signal word. As an alternative to "NOTICE" the word "CAUTION" without the safety alert symbol may be used to indicate a message not related to personal injury.



I-TEC Series General Information

I-TEC MODEL NOMENCLATURE Z-Version (CA) 2-Stage Air Source Heat Pumps

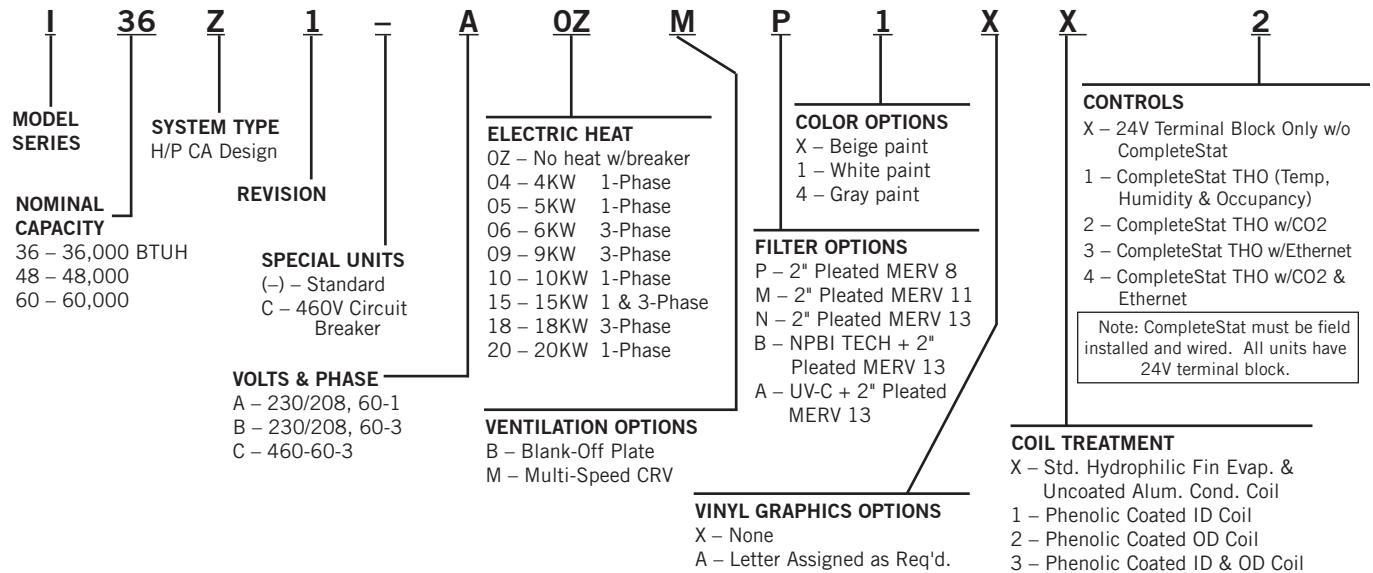


TABLE 1
Factory Built-In Electric Heat Table

Models	I36Z1-A		I36Z1-B		I36Z1-C	I48Z1-A		I48Z1-B I60Z1-B		I48Z1-C I60Z1-C	I60Z1-A	
	240V-1 BTUH	208V-1 BTUH	240V-3 BTUH	208V-3 BTUH	460V-3 BTUH	240V-1 BTUH	208V-1 BTUH	240V-3 BTUH	208V-3 BTUH	460V-3 BTUH	240V-1 BTUH	208V-1 BTUH
4.0						13,652	10,239					
5.0	17,065	12,799				17,065	12,799				17,065	12,799
6.0			20,478	15,359	20,478			20,478	15,359	20,478		
9.0			30,717	23,038	30,717			30,717	23,038	30,717		
10.0	34,130	25,598				34,130	25,598				34,130	25,598
15.0	51,195	38,396	51,195	38,396	51,195	51,195	38,396	51,195	38,396	51,195	51,195	38,396
18.0								61,434	46,076	61,434		
20.0						68,260	51,195				68,260	51,195

TABLE 1A
Indoor Blower Performance ①

Model	Rated ESP	Max. ESP	② Continuous CFM	Rated 2nd Stage CFM	Rated 1st Stage CFM	③ 4 - 10KW CFM	④ 15 - 20KW CFM
I36Z1	.15	0.50	600	1150	850	700	1050
I48Z1	.20	0.50	725	1400	1050	700	1400
I60Z1	.20	0.50	850	1600	1100	700	1400

① Motor will deliver consistent CFM through voltage supply range with no deterioration.

② Continuous fan CFM is the total air being circulated during continuous fan mode.

③ Will operate at rated Full Load Airflow when operating with heat pump.

④ Will occur automatically with a call for "W3" or "Emergency Heat" signal from the thermostat (heat pump operation is terminated at this condition).

TABLE 2
Electrical Specifications

MODEL	Rated Volts, Hertz & Phase	Single Circuit					Multiple Circuit							
		No. Field Power Circuits	Minimum Circuit Ampacity	Maximum External Fuse or Ckt. Brkr.	Field Power Wire Size	Ground Wire	Minimum Circuit Ampacity		Maximum External Fuse or Ckt. Breaker		Field Power Wire Size		Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
I36Z1-A0Z A05 A10 ① A15	230/208-1	1 1 1 or 2 1 or 2	26 52 78 84	40 60 80 90	8 6 4 4	10 10 8 8	26 26	52 52	40 40	60 60	8 8	6 6	10 10	10 10
I36Z1-B0Z B06 B09 ① B15	230/208-3	1 1 1 1	22 40 49 51	30 45 50 60	10 8 8 6	10 10 10 10								
I36Z1-C0Z C06 C09 ① C15	460-3	1 1 1 1	11 20 24 28	15 20 25 30	14 12 10 10	14 12 10 10								
I48Z1-A0Z A04 A05 A10 ① A15 ① A20	230/208-1	1 1 1 or 2 1 or 2 1 or 2 1 or 2	34 54 59 85 85 110	50 60 70 90 90 110	8 6 6 3 3 2	10 10 8 8 8 6	35 35 35 59	26 52 52 52	45 45 45 60	30 60 60 60	8 8 8 6	10 6 6 6	10 10 10 10	10 10 10 10
I48Z1-B0Z B06 B09 ① B15 ① B18	230/208-3	1 1 1 1 1	26 44 53 53 53	35 50 60 60 60	8 8 6 6 6	10 10 10 10 10								
I48Z1-C0Z C06 C09 ① C15 ① C18	230/208-1	1 1 1 1 1	15 25 29 29 29	20 30 30 30 30	12 10 10 10 10	12 10 10 10 10								
I60Z1-A0Z A05 A10 ① A15 ① A20	230/208-1	1 1 or 2 1 or 2 1 or 2 1 or 2	44 70 96 96 112	60 80 100 100 120	8 4 3 3 2	10 8 8 8 6	44 44 44 60	26 52 52 52	60 60 60 60	30 60 60 60	8 8 8 6	10 6 6 6	10 10 10 10	10 10 10 10
I60Z1-B0Z B06 B09 ① B15 ① B18	230/208-3	1 1 1 1 2	31 49 58 58 58	45 60 60 60 60	8 8 6 6 6	10 10 10 10 10	31	54	45	60	8	6	10	10
I60Z1-C0Z C06 C09 ① C15 ① C18	460-3	1 1 1 1 1	15 25 29 29 29	20 30 30 30 30	12 10 10 10 10	12 10 10 10 10								

These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electric Code (latest revision), Article 310 for power conductor sizing.

Caution: When more than one field power conductor circuit is run through one conduit, the conductors must be derated. Pay special attention to note 8 of table 310 regarding Ampacity Adjustment Factors when more than three (3) current carrying conductors are in a raceway.

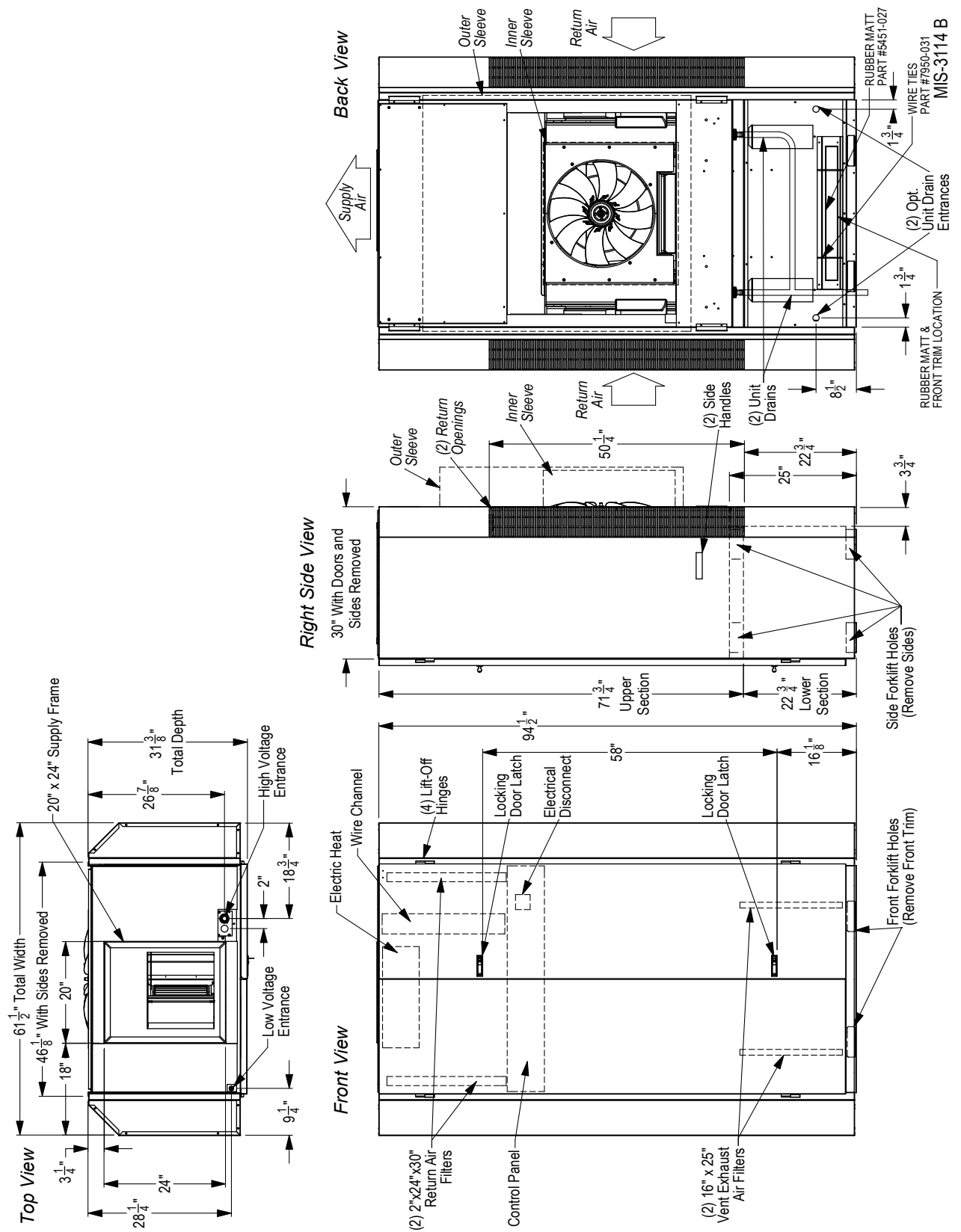
Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

Based on 75°C copper wire. All wiring must conform to the National Electrical Code and all local codes.

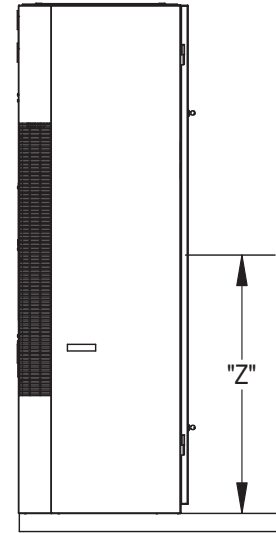
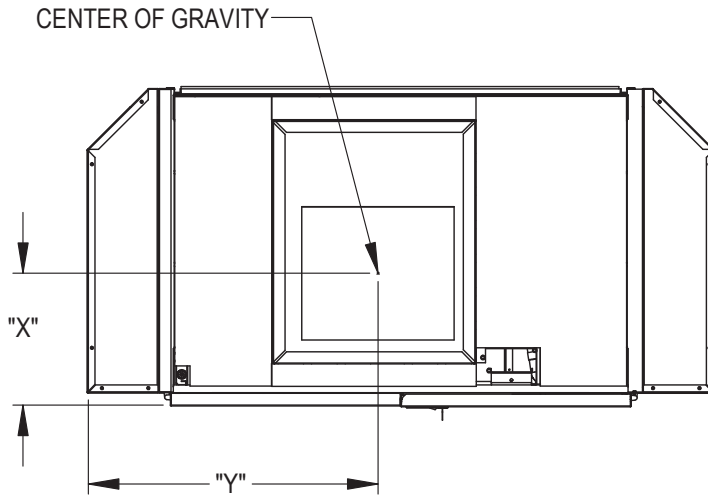
Maximum KW that can operate with the heat pump is 10KW for 1-Phase and 9KW for 3-Phase.

① Represents Electric Heat only. Electric Control Circuit will lock-out Heat Pump Operation.

FIGURE 1 – Unit Dimensions



Center of Gravity



MIS-3268

Unit Tested	FRONT OF UNIT DOOR TO CENTER	LEFT SIDE TO CENTER	FLOOR TO CENTER CRV & ERV	FLOOR TO CENTER NO VENT
	"X" Dimension	"Y" Dimension	"Z" Dimension	"Z" Dimension
I36Z1-A, B	13½"	31"	43½"	47"
I36Z1-C	13½"	31½"	43½"	47"
I48Z1-A, B	13½"	31"	43½"	47"
I48Z1-C	13½"	31½"	43½"	47"
I60Z1-A, B	13½"	31"	43½"	47"
I60Z1-C	13½"	31½"	43½"	47"

SHIPPING DAMAGE

Upon receipt of equipment, the unit should be checked for external signs of shipping damage. The skid must remain attached until the unit is ready for installation. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

UNIT REMOVAL FROM SKID

WARNING

This unit is heavy and requires more than one person to handle during installation and removal from the skid. Extreme caution must be taken to prevent injury to personnel and damage to the unit. Use appropriate safety equipment, including gloves when handling. Failure to do so may result in serious injury.

CAUTION

*Tip unit from left side only.
Failure to do so may result in injury due to unit top-heaviness or compressor damage!*

HANDLING UNIT AFTER REMOVAL FROM SKID

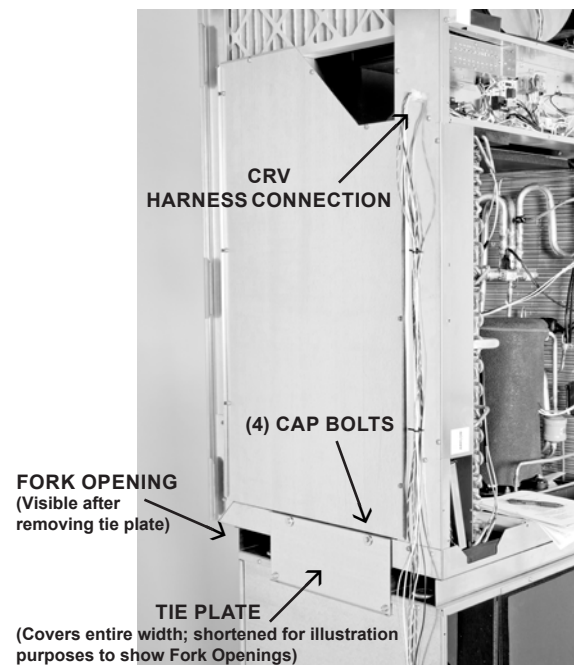
If a wide and tall opening exists, the I-TEC can be moved as a complete assembled unit. If not, use the following directions for dis-assembly to allow it to pass through a 36" wide door.

1. Depress and release both top and bottom door latches and open doors.
2. Remove doors by lifting straight up and off from the hinge pins.
3. Remove cabinet sides by first removing the four (4) sheet metal screws from the front (leading edge) of the side panel. The panel will not fall off. Swing the panel away from the chassis 20-30° and then pull forward from the two tabs supporting the rear edge. At this point, the unit can be tipped on its left side enough to get dolly carts under it. Use dolly carts to move unit into installation area. Use care not to damage vent wire harness. This method is not suggested due to unit weight and if a forklift or unit lift is available, continue with the following steps for separation of top section and bottom base.
4. On each side of the unit is a tie plate that secures the top and bottom sections with four (4) cap bolts. Using a ½" wrench or socket, remove these screws from both plates and set aside.
5. If the unit is equipped with a CRV, unplug the wire harness on the left-hand side of the control box.
6. **A forklift or a lift rated for the load is required to lift the top section off from the bottom base. Do not attempt to do this manually! Failure to do so could result in the unit tipping over and causing bodily injury and/or damage to the unit.**
7. The top section can be forked from either the right-hand or left-hand side. See Figure 1 for fork openings.
8. Carefully lift the top section straight up avoiding tipping.
9. Move the top section through the doorway and place on flat surface free of debris.
10. The bottom base can now be moved through the doorway the same way.
11. Reassemble the unit by reversing this procedure.

FIGURE 2A
Unit on Lift



FIGURE 2B
Unit Side



REQUIRED STEPS AFTER FINAL PLACEMENT

The compressor is secured to the base with two (2) bolts for shipping. Although the unit will perform as designed with the shipping bolts in place, there may be noticeable additional noise and vibration noted. To obtain the lowest noise and vibration levels, remove the shipping bolts after the unit is in its final operating location. To gain access to the compressor, the compressor access panel must be removed (Figure 7). Once this panel is removed, the CRV air duct must be removed. See Figure 4.

The air duct is removed by pulling it straight out; there are no screws securing it in place. Both the top and bottom slide at the same time (*pull hard*). Once removed, the compressor is visible as well as the tags on the shipping bolts (Figure 3).

After the compressor shipping bolts have been removed, the CRV air duct can be slid back in place and the compressor access panel attached.

MINIMUM INSTALLATION CLEARANCES

The minimum installation height to the bottom of the roof or fixed ceiling for ducted applications is 9' 7". This provides enough clearance to install the duct work. See Figure 5A.

The IWS Series wall sleeve has a built-in vertical adjustment to fit window sill heights from 31-34". If additional height is required, two riser platform accessories are available. The IRZ3 increases the unit height by 3" (Figure 5B) and the IRZ6 by 6" (Figure 5C).

Several construction options are available for unit installation of the IZ Series. Serviceability and filter access must be considered before installing. See Figure 5D for required clearances and recommended service access dimensions.

SECURING UNIT TO STRUCTURE

Shipped with the I-TEC unit is a wall mounting bracket (screwed to shipping skid on backside of unit). This bracket can be utilized to secure the top portion of the unit to the wall using the appropriate field-supplied hardware based upon the material being fastened to. *(There are several offset holes, sized to accept up to a 1/4" diameter fastener, that will easily allow studs to be hit on a framed wall.)* See **Bracket Wall Section View** for locating this top wall bracket which will need to be applied after the unit is located in the final position.

Additional/optional mounting holes for up to a 3/8" diameter fastener are also available in the backside and base of the unit. These can be accessed by:

- removing the air filters (uppermost set)
- removing the compressor section service door (lower set)
- removing vent door and vent partitions (base set)

Refer to **Wood Framed Installation** for additional framing required to secure unit to wall.

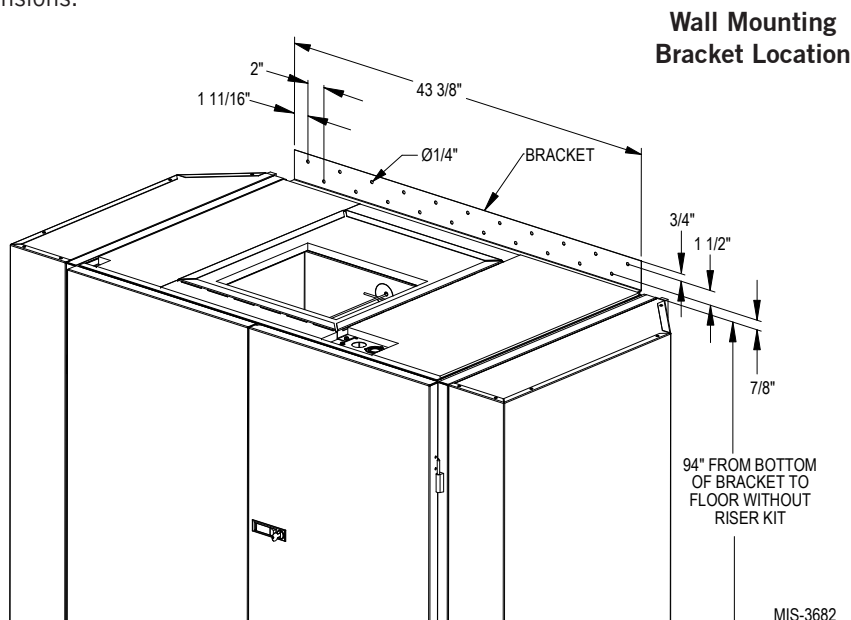
The additional/optional mounting holes will require a long extension to drive the fasteners.

SEISMIC CONSIDERATIONS

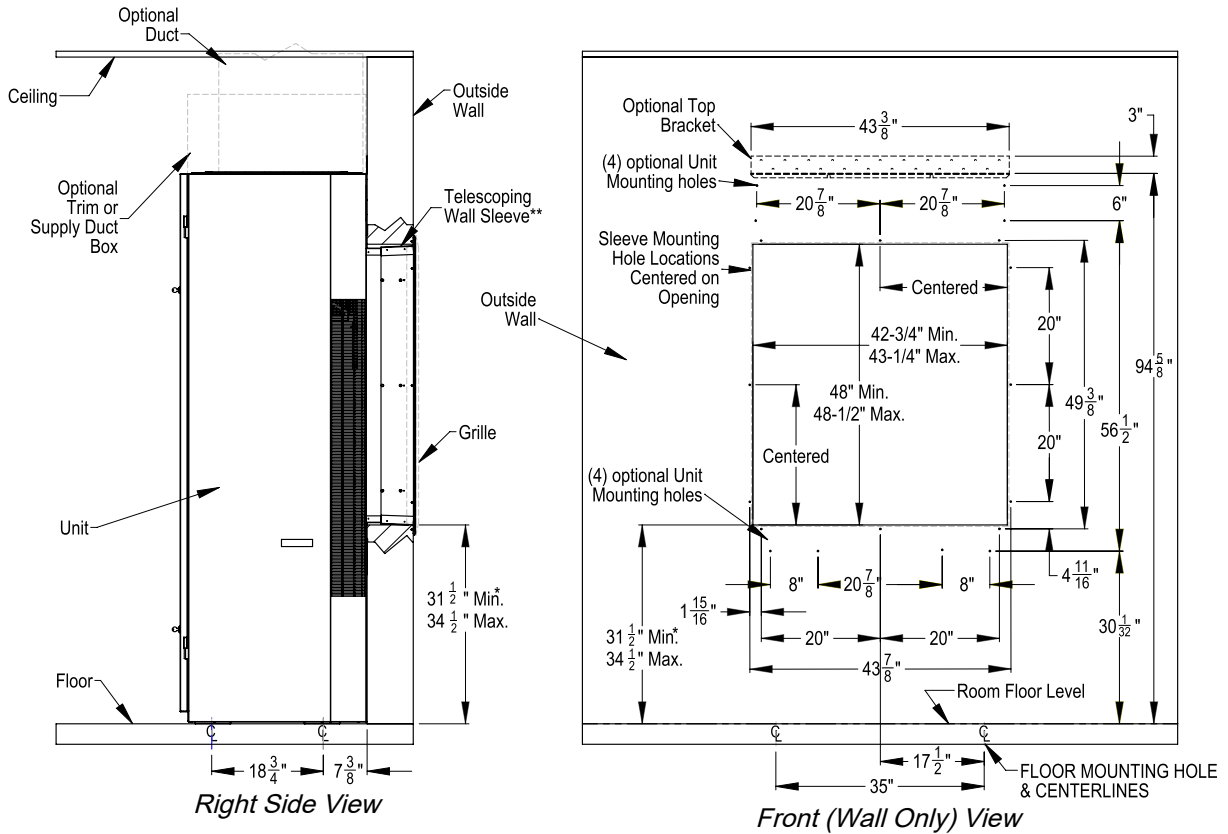
The I-TEC product features several locations for product securement but all site conditions are different. Consult with a licensed Seismic Engineer to advise of particular needs when attaching the I-TEC unit to the structure.

RUBBER MAT

Unit rests on rubber mat placed under base rails during installation. Place mat on floor flush with wall and centered over wall opening.



Bracket Wall Section View

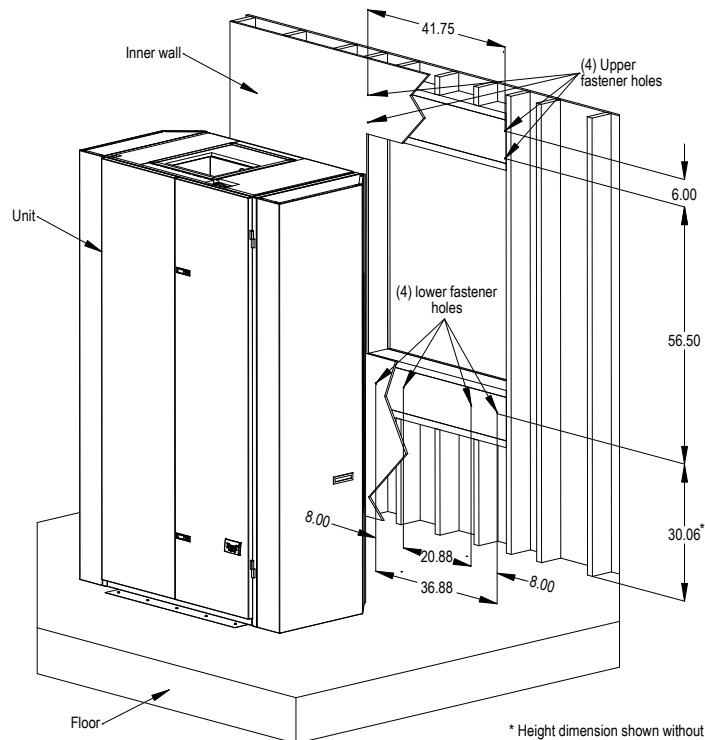


* Higher Sill Heights Achievable With Base Kit.

** Separate telescoping sleeves available for different wall thicknesses.

MIS-3196 B

Wood Framed Installation (for Wall Attachment)



* Height dimension shown without riser kit. If unit uses riser kit add appropriate dimension to height.

MIS-3197 A

FIGURE 3
Compressor Shipping Bolts

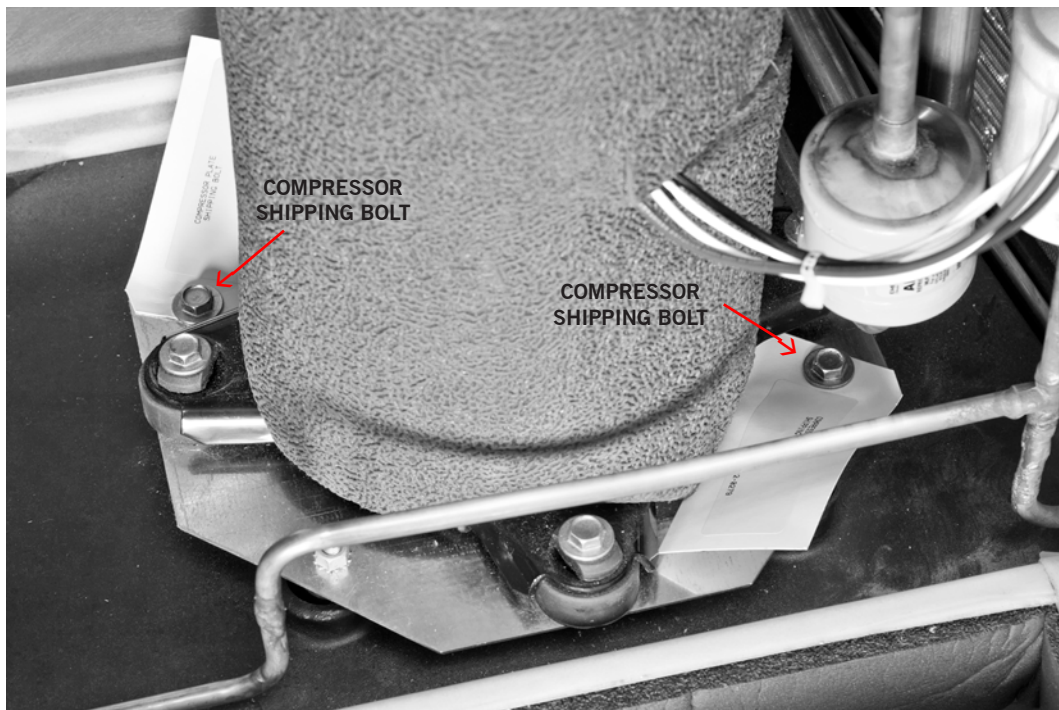


FIGURE 4
Removal of Air Duct

CRV
AIR DUCT



FIGURE 5A
Ducted Application – Basic Unit

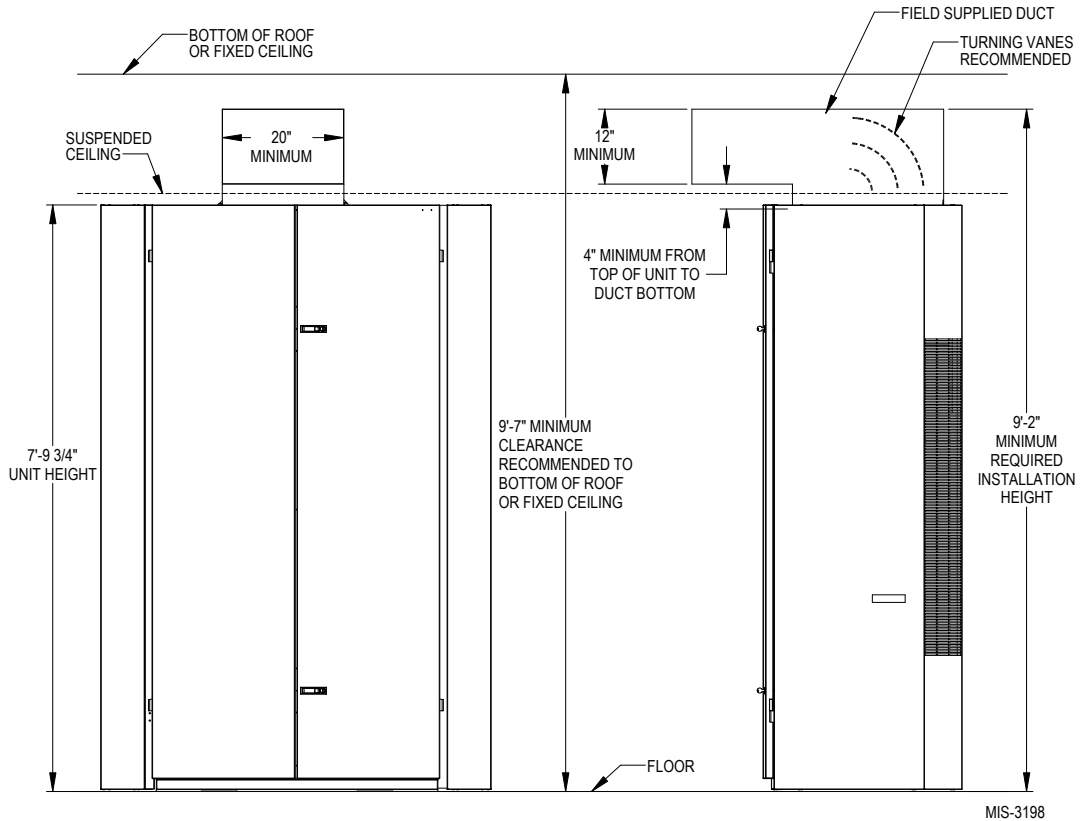


FIGURE 5B
3" Riser Application

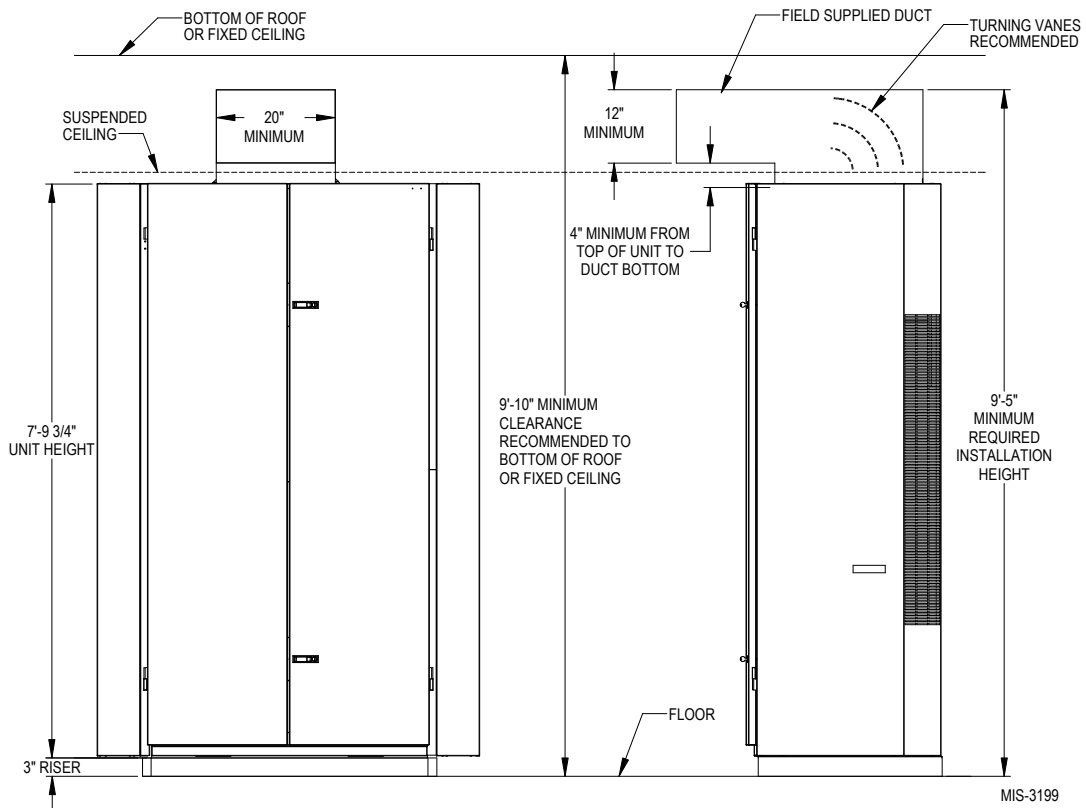


FIGURE 5C
6" Riser Application

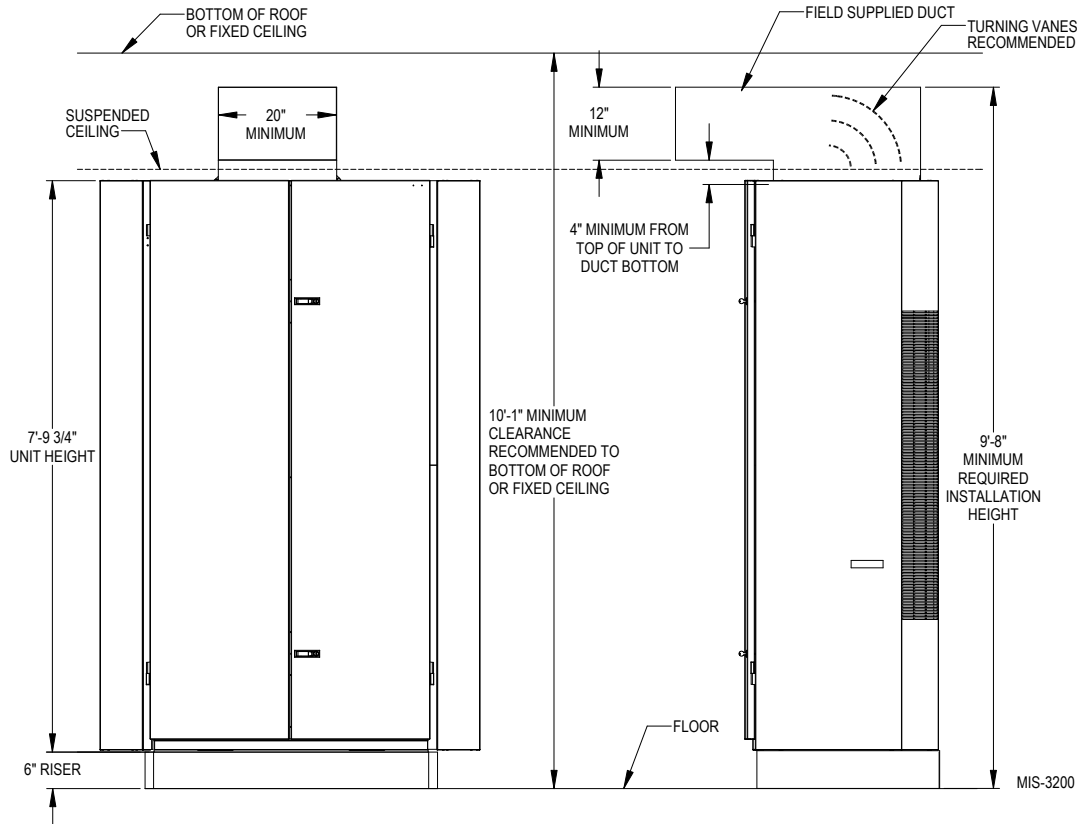
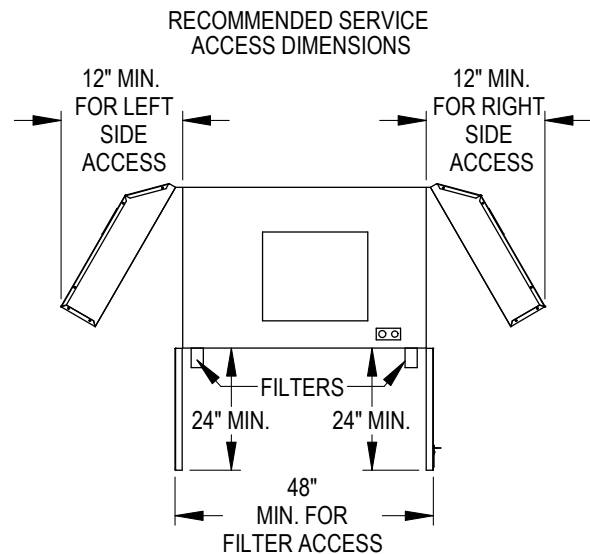
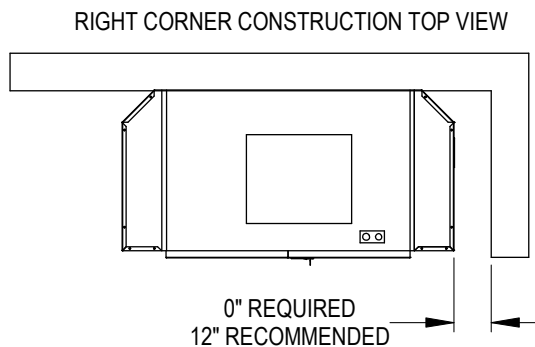
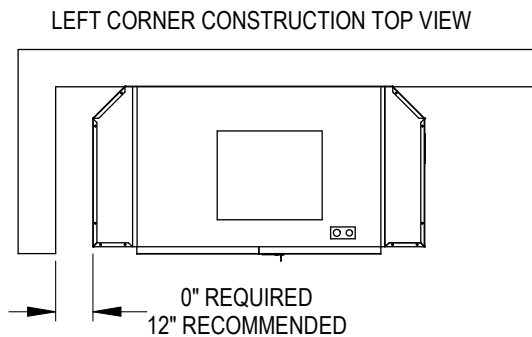
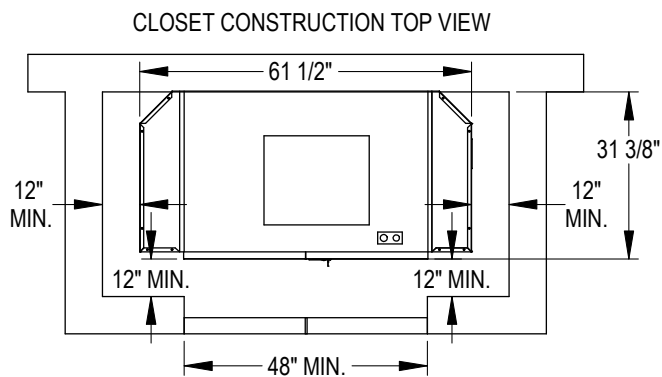
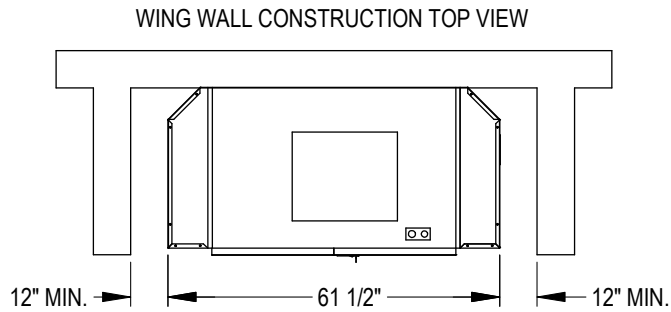


FIGURE 5D
Required Clearances and Recommended Access



IMPORTANT
 Unit can be located in corner
 with 0" clearance as long as
 other side is unobstructed

MIS-3230

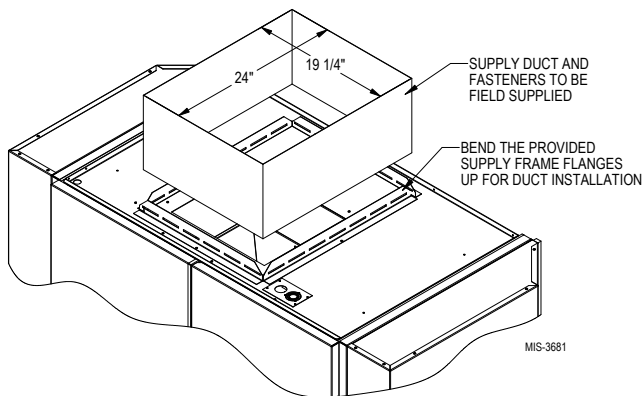
DUCT WORK

Any heat pump is more critical of proper operating charge and an adequate duct system than a straight air conditioning unit. All duct work must be properly sized for the design airflow requirement of the equipment. Air Conditioning Contractors of America (ACCA) is an excellent guide to proper sizing. All duct work or portions thereof not in the conditioned space should be properly insulated in order to both conserve energy and prevent condensation or moisture damage. When duct runs through unheated spaces, it should be insulated with a minimum of one inch of insulation. Use insulation with a vapor barrier on the outside of the insulation. Flexible joints should be used to connect the duct work to the equipment in order to keep the noise transmission to a minimum.

The I-TEC series heat pump has provision to attach a supply air duct to the top of the unit. Duct connection size is 20" x 24". The flanges are shipped flat and must be bent upward using sheet metal flanging pliers. The duct work is field supplied. See Figure 6 for suggested attachment method.

Make sure to seal the slots in the bend-up flange at the time of securing your ductwork to the flange. This can be accomplished with either foil tape or caulk. Failing to do so may cause air leakage/whistling of air.

FIGURE 6
Supply Duct Connections



NOTE: Unit cabinet, supply air duct and duct free plenum are approved for 0" clearance to combustible material.

The I-TEC series heat pumps are designed for use with free return (non-ducted) and either duct free with the use of IPBDFZ Series Plenum Box (18" or 12") or a duct supply air system.

The IPBDZ Plenum Box mounts on top of the unit and has both vertically and horizontally adjustable louvers on the front discharge grille.

When used with a ducted supply, a cabinet extension may be used to conceal the ductwork above the unit

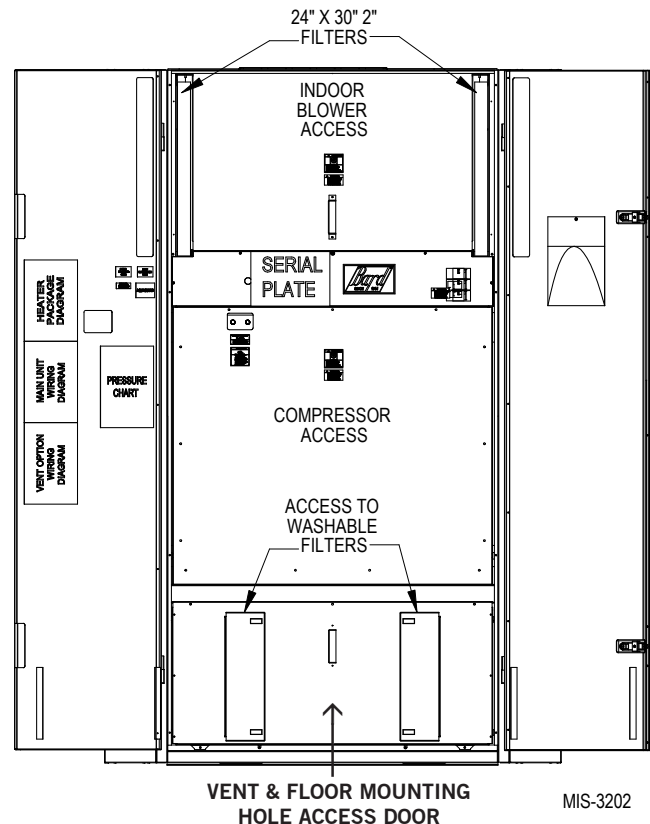
to the ceiling. The ICX28 extends 28" above the unit for a total height of 10'-2" or can be trimmed to any height.

The unit is equipped with a variable speed indoor blower motor which increases in speed with an increase in duct static pressure. The unit will therefore deliver proper rated airflow up to the maximum ESP shown in Table 1A. However, for quiet operation of the air system, the duct static should be kept as low as practical, within the guidelines of good duct design.

FILTERS

Two 2" throw away filters (24 x 30) and two 1" throw away filters (16 x 25) are supplied with each unit. The 2" filters slide into brackets on both sides for the return air openings. If a CRV vent option is used, there are two additional 1" throw away filters included with that option. See Figure 7 for specific locations. The filters are serviced from the inside of the building by opening the cabinet doors, and do not require any tools to access.

FIGURE 7
Filter Location



CONDENSATE DRAIN

There are two condensate drain connections from the condenser drain pan (compressor area). These are visible from the rear of the unit. Factory-installed tubing connects the two drains at a tee connection and then a single drain hose with a barbed hose connector carries the condensate to the draining option chosen. Enough tubing is provided to reach all drain options and can be cut down in length.

The unit is shipped from the factory with the drain line on the left-hand side when looking at the rear of the unit. The tubing can be removed from the drain connections and flipped for a right-hand drain. See Figure 8.

The drain can be routed directly through the floor or through the wall. There are also two optional drain locations in the lower rear back panel. See Figure 8.

The I-TEC design does not require a trap in the condensate disposal tubing. Check local codes to see if a "P" trap is required.

For a stand pipe floor drain or through the wall, there is adequate hose length to reach needed location behind the unit. The lower rear portion of the cabinet is recessed approximately 4" allowing room for a "P" trap (if required) to be installed with the cabinet flush with the wall. Keep in mind, the drain line must be able to be removed from the unit if necessary to remove the unit from the wall.

Access plates are located on the rear of the unit for servicing the drain trap. See Figure 8. ***If the drain line is to be routed through an unconditioned space, it must be protected from freezing.***

The condensate drain line can also be routed back into the unit through either the right-hand or left-hand optional drain locations on the rear of the unit. The hole is covered by insulation on the inside of the unit and will have to be cut away. Located inside the unit, about 12" in from the front on both the left and right side are drain holes in the bottom of the base. These holes are covered with insulation and are not visible from inside vent option area. They are located very close to the side panels and can be found by pressing down on the insulation or looking at back of vent option area (See Figure 8). Cut insulation away to expose the hole. A drain trap can now be installed inside of the cabinet, and the drain hose routed directly through the floor.

Once the I-TEC is installed, the rear drains exiting the condenser section can be easily serviced with removal of the pre-painted metal sides (lift-off doors, remove four [4] screws to remove side).

If side access is not available, the drain lines and trap can be serviced by removing either one of the drain access panels on the rear of the unit (in the ventilation package area.) See Figure 8.

After drain installation is complete, drain area must be insulated for sound purposes with 45" x 24¾" x 6" piece of insulation. See Figure 8.

With No Vent Option

To remove the drain access panels in the rear of this section, simply remove the front door/cover from the box. Rear drain access panels are now visible on both right-hand and left-hand sides in rear of box.

With Commercial Room Ventilator

1. Open hinged front doors.
2. Disconnect unit power to eliminate shock hazard.
3. Remove front cover/door of CRV vent package. (Can leave filter access panels in place.)
4. Unplug wires coming in on left side from upper unit section.
5. Unplug two wire harness from front (intake) blower.
6. Remove two (2) screws securing front (intake) blower and slide blower out of unit.
7. Remove four (4) screws that retian the partition behind/beneath intake blower removed in Step #6.
8. Rear drain access panels are now visible on both right-hand and left-hand sides in rear of box.

FIGURE 8
Drain Locations

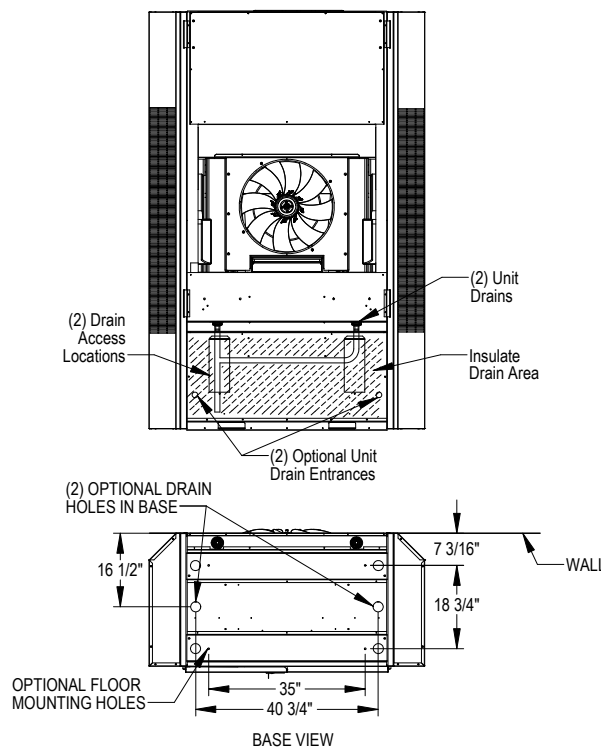


FIGURE 9A
Unit Mounting

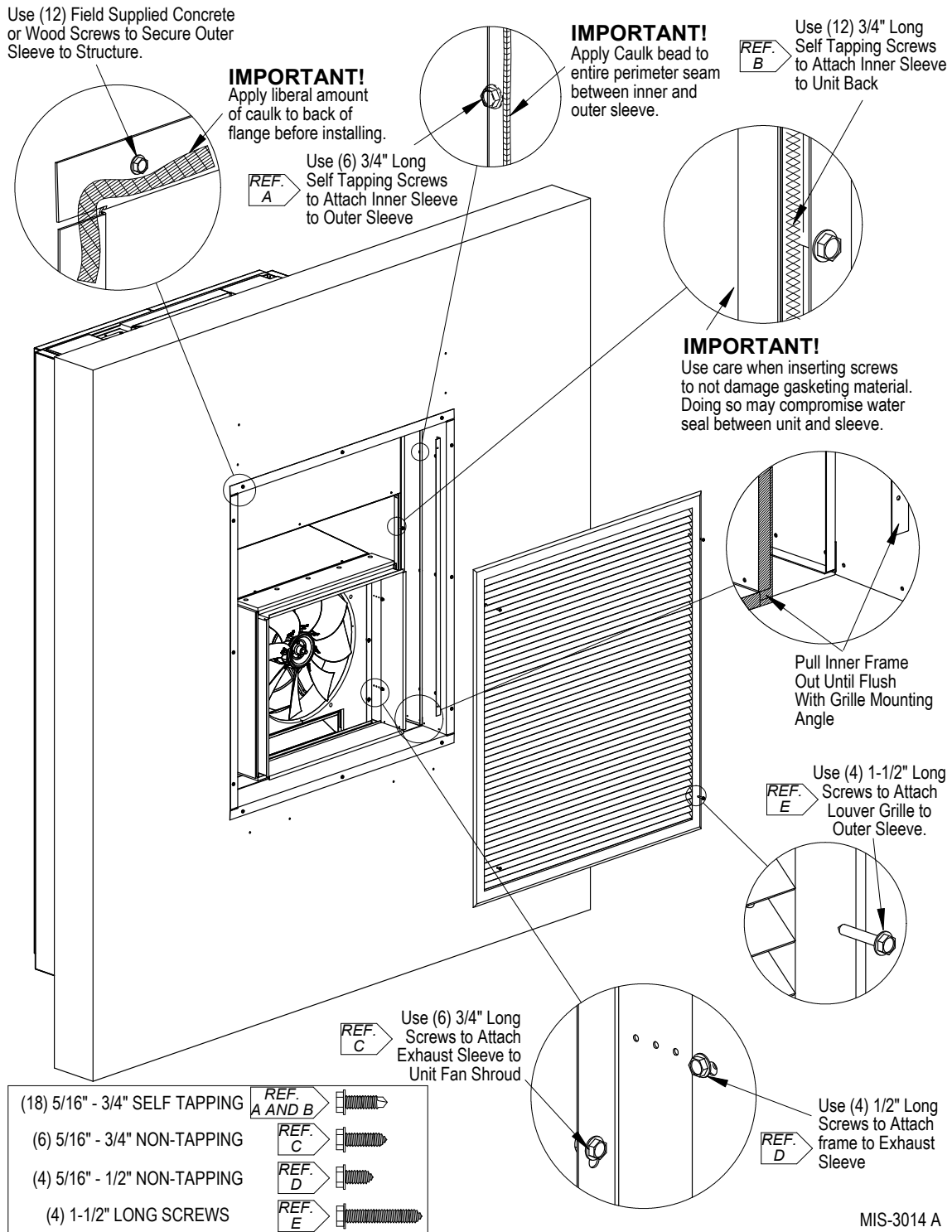
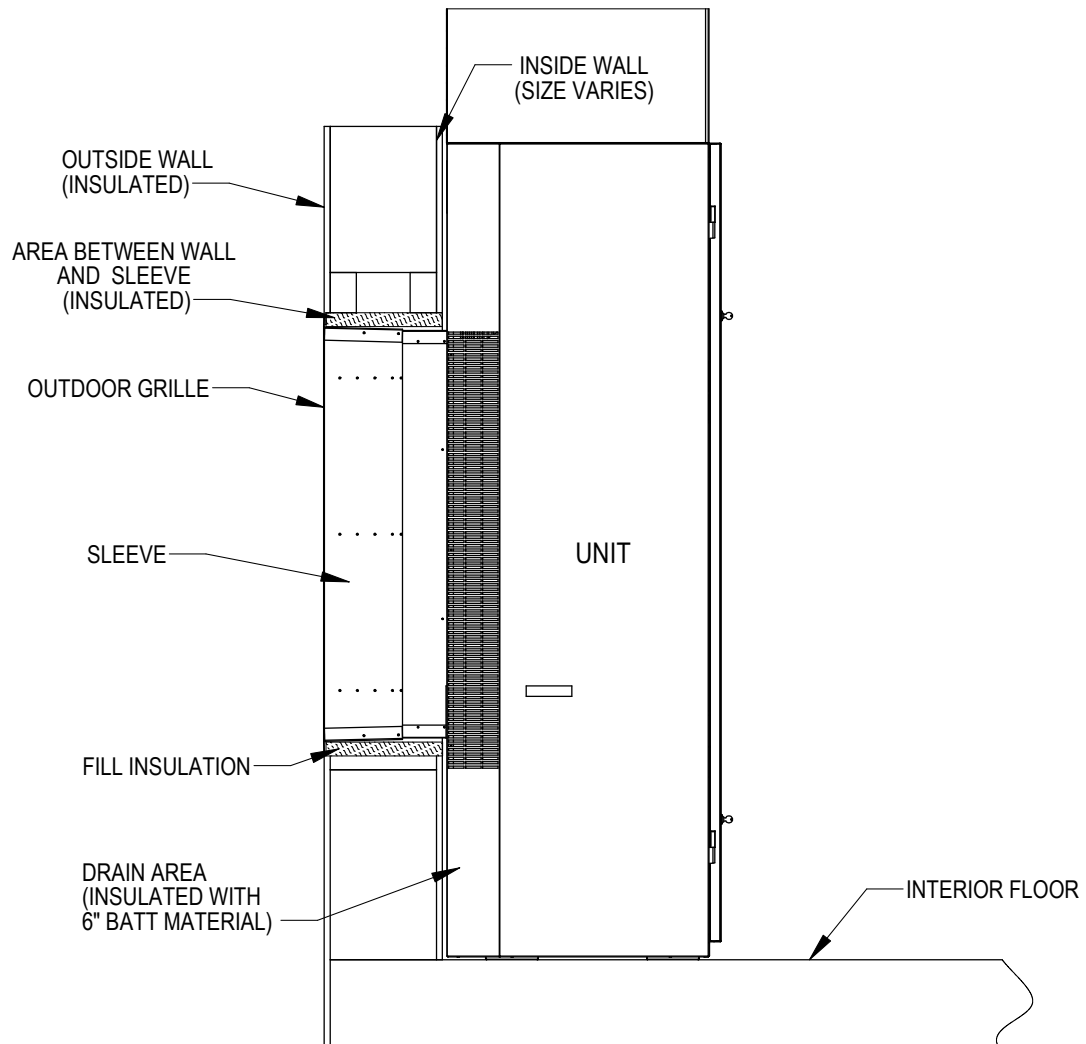


FIGURE 9B
Unit Mounting



MIS-3201 A

NOTICE: *In order to achieve optimum sound reduction, the following areas need insulated:*

1. Outside wall.
2. Area between sleeve and wall.
3. Drain area behind unit.

INSTALLATION

MOUNTING THE UNIT

The wall sleeve is attached to the I-TEC unit from the outside of the building. See Figures 9A & 9B. Refer to wall sleeve Manual 2100-562 supplied with sleeve.

Following are the steps for attaching the I-TEC to the wall sleeve.

1. Lift the unit into place making sure that it is aligned side-to-side. Align unit with rubber mat.
2. Push the unit back until the rear panel touches the sleeve gasket.
3. This unit must be level from side-to-side and from front-to-back. If adjustments are necessary, shim up under the base rails with sheets of metal or any substance not affected by moisture.
4. Attach the sleeve to the unit using the ten (10) $\frac{3}{4}$ " long self-tapping screws supplied with the sleeve.
5. The exhaust sleeve has three (3) $\frac{3}{4}$ " long screw slots in each side flange. Line these up with the screw engagement holes in the fan panel. Attach using six (6) $\frac{3}{4}$ " long pointed sheet metal screws supplied with the sleeve. Extend the sleeve out until it is flush with the louver grill attachment angles.
6. Lock the sleeve in place using two (2) $\frac{1}{2}$ " long pointed sheet metal screws on each side by shooting through the slot into a pre-punched hole.
7. A bottom trim piece is shipped loose for installation beneath the doors. Attach the trim piece to the unit with screws provided.
8. The compressor is secured to the base with two (2) bolts for shipping. Both bolts are identified with a tag. Remove shipping bolts (Figure 3).

WIRING – MAIN POWER

Refer to the unit rating plate and/or Table 2 for wire sizing information and maximum fuse or circuit breaker size. Each unit is marked with a "Minimum Circuit Ampacity". This means that the field wiring used must be sized to carry that amount of current. Depending on the installed KW of electric heat, there may be two field power circuits required. If this is the case, the unit serial plate will so indicate. All models are suitable only for connection with copper wire. Each unit and/or wiring diagram will be marked "Use Copper Conductors Only suitable for at least 75°C". **THESE INSTRUCTIONS MUST BE ADHERED TO.** Refer to the National Electrical Code (NEC) for complete current carrying capacity data on the various insulation grades of wiring material. All wiring must conform to NEC and all local codes.

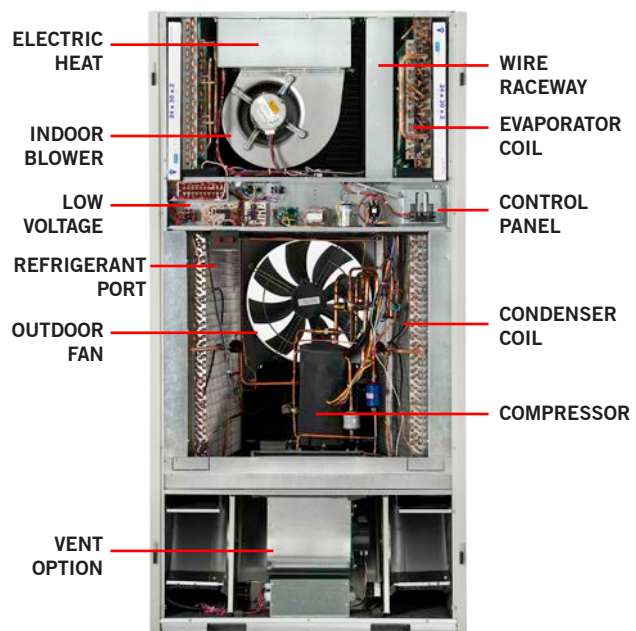
The electrical data lists fuse and wire sizes (75°C copper) for all models, including the most commonly used heater sizes. Also shown are the number of field power circuits required for the various models with heaters.

The unit rating plate lists a "Maximum Time Delay Relay Fuse" or circuit breaker that is to be used with the equipment. The correct size must be used for proper circuit protection, and also to assure that there will be no nuisance tripping due to the momentary high starting current of the compressor motor.

See "START UP" section for information on three phase scroll compressor start-ups.

The field wiring conduit connections are located on the top right-hand corner of the unit with a wire raceway to feed the wires down to the circuit breaker(s). See Figure 10.

FIGURE 10
Component Location



WIRING – LOW VOLTAGE WIRING

230/208V, 1 PHASE AND 3 PHASE EQUIPMENT DUAL PRIMARY VOLTAGE TRANSFORMERS

All equipment leaves the factory wired on 240V tap. For 208V operation, reconnect from 240V to 208V tap. The acceptable operating voltage range for the 240 and 208V taps are as noted in Table 3.

TABLE 3 – Operating Voltage Range

TAP	RANGE
240V	253 – 216
208V	220 – 187

NOTE: The voltage should be measured at the field power connection point in the unit and while the unit is operating at full load (maximum amperage operating condition).

The standard unit includes a remote thermostat connection terminal strip. See Figures 11 through 16 for connection diagrams. Compatible thermostats are listed in Table 4.

TABLE 4 – Wall Thermostats

Thermostat	Predominant Features
8403-060 (1120-445)	3 Stage Cool; 3 Stage Heat Programmable/Non-Programmable Electronic HP or Conventional Auto or Manual changeover
8403-096 (CDT-2W40-LCD-RLY)	Carbon Dioxide Sensor with LCD for Sensor Readings
8403-084 (VT8600U5000B)	2 stage Cool; 2 stage Heat Programmable/Non-Programmable Electronic HP or Conventional, Auto or Manual changeover with BACnet
CS9B-TH0A	3 Stage Heat, 3 Stage Cool, Prog/ NonProg, HP or Conv, Auto or Manual Changeover, Humidity Sensor w/dehumidification, Motion Sensor w/Intelligent Learning Control, BACnet-compatible
CS9B-TH0CA	3 Stage Heat, 3 Stage Cool, Prog/ NonProg, HP or Conv, Auto or Manual Changeover, Humidity Sensor w/dehumidification, CO ₂ Sensor, Motion Sensor w/Intelligent Learning Control, BACnet-compatible
CS9BE-TH0A	3 Stage Heat, 3 Stage Cool, Prog/ NonProg, HP or Conv, Auto or Manual Changeover, Humidity Sensor w/dehumidification, Motion Sensor, Intelligent Learning Control, BACnet-compatible, Ethernet- compatible
CS9BE-TH0CA	3 Stage Heat, 3 Stage Cool, Prog/ NonProg, HP or Conv, Auto or Manual Changeover, Humidity Sensor w/ dehumidification, CO ₂ Sensor, Motion Sensor w/Intelligent Learning Control, BACnet-compatible, Ethernet-compatible

LOW VOLTAGE CONNECTIONS

These units use a grounded 24 volt AC low voltage circuit.

“G” terminal is the *fan input*.

“Y1” terminal is the *compressor part load input*.

“Y2” terminal is the *compressor full load input*.

“B/W1” terminal is the *reversing valve input*.

The reversing valve must be energized for heating mode.

“R” terminal is 24 VAC *hot*.

“C” terminal is 24 VAC *grounded*.

“L” terminal is *compressor lockout output*. This terminal is activated on a high or low pressure trip and

condensate overflow trip by the electronic heat pump control. This is a 24 VAC output.

“W2” terminal is *first stage electric heat* (if equipped). First stage electric heat can be operated simultaneously with the heat pump operating.

“A” terminal is the *ventilation input*. This terminal energizes any factory installed ventilation option.

“W3” terminal is *second stage electric heat*. When “W3” terminal is energized, it locks out compressor operation to limit discharge air temperature and required branch circuit ampacity.

NOTE: For total and proper control using DDC, a minimum of 9 controlled outputs are needed when above 10KW Electric Heat is employed with ventilation, a total of 8 controlled outputs with below 10KW Electric Heat with Ventilation, 7 controlled outputs below 10KW Electric Heat with no ventilation, 7 controlled outputs with no Electric Heat, but with ventilation, and 6 controlled outputs with no electric heat and no ventilation. If Dehumidification Model & Vent, 10 controlled outputs are needed when above 10KW Electric Heat is employed with ventilation.

LOW VOLTAGE CONNECTIONS FOR DDC CONTROL	
Fan Only	Energize G
Cooling Part Load	Energize G, Y1
Cooling Full Load	Energize G, Y1, Y2
HP Heating Part Load	Energize G, Y1, B/W1
HP Heating Full Load	Energize G, Y1, Y2, B/W1
HP Heating Full Load + Electric Heat (up to 10KW)	Energize G, Y1, Y2, B/W1, W2
Heating with Bank #1 Electric Heat Only	Energize G, W2
Emergency Heat (<i>Heat pump operation is negated for this condition</i>)	Energize G, W2, W3
Ventilation	Energize A

GENERAL

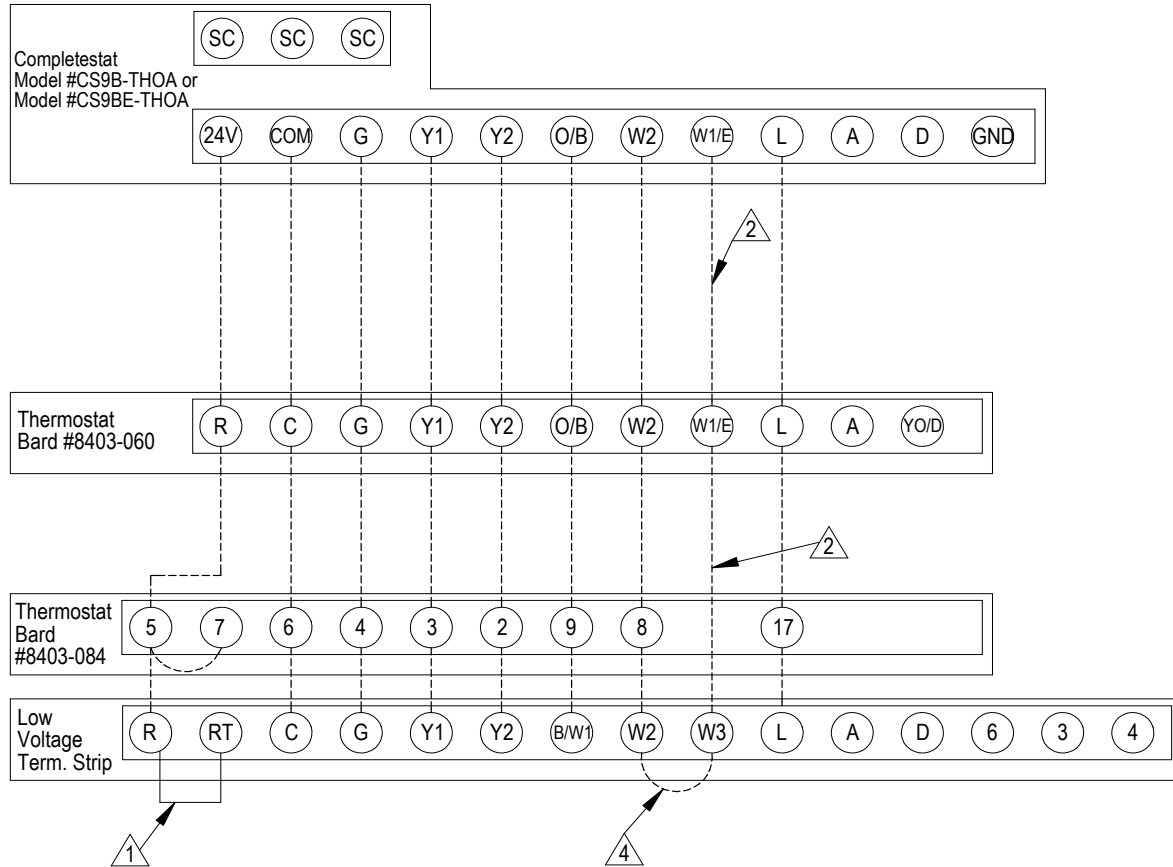
This unit is equipped with a variable speed ECM motor. The motor is designed to maintain rated airflow up to the maximum static allowed. ***It is important that the blower motor plugs are not plugged in or unplugged while the power is on. Failure to remove power prior to unplugging or plugging in the motor could result in motor failure.***



CAUTION

Do not plug in or unplug blower motor connectors while the power is on. Failure to do so may result in motor failure.

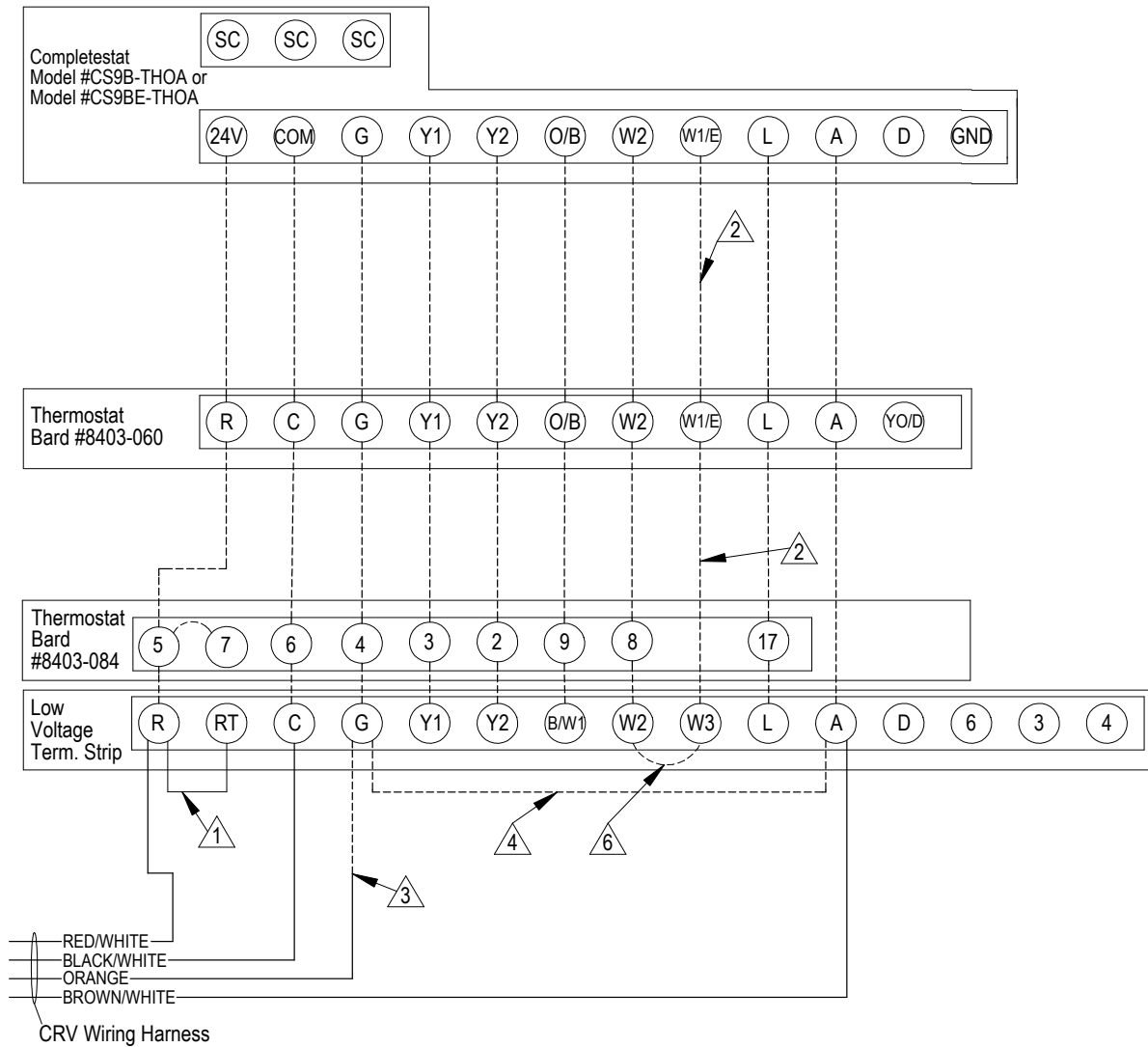
FIGURE 11
Basic Heat Pump with No Ventilation Package



- △1 Factory installed jumper. Remove jumper and connect to N.C fire alarm
- △2 Not needed below 15KW
- △3 Relay Provided with Completestat
- △4 Jumper W2 to W3 at terminal block when using 8403-084 with unit with 15 KW

MIS-3203 C

FIGURE 12
Heat Pump with CRV, without CO₂ Control



1 Factory installed jumper. Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.

2 Not needed below 15KW.

3 Connect to "G" terminal when thermostat has "Occupancy Signal".

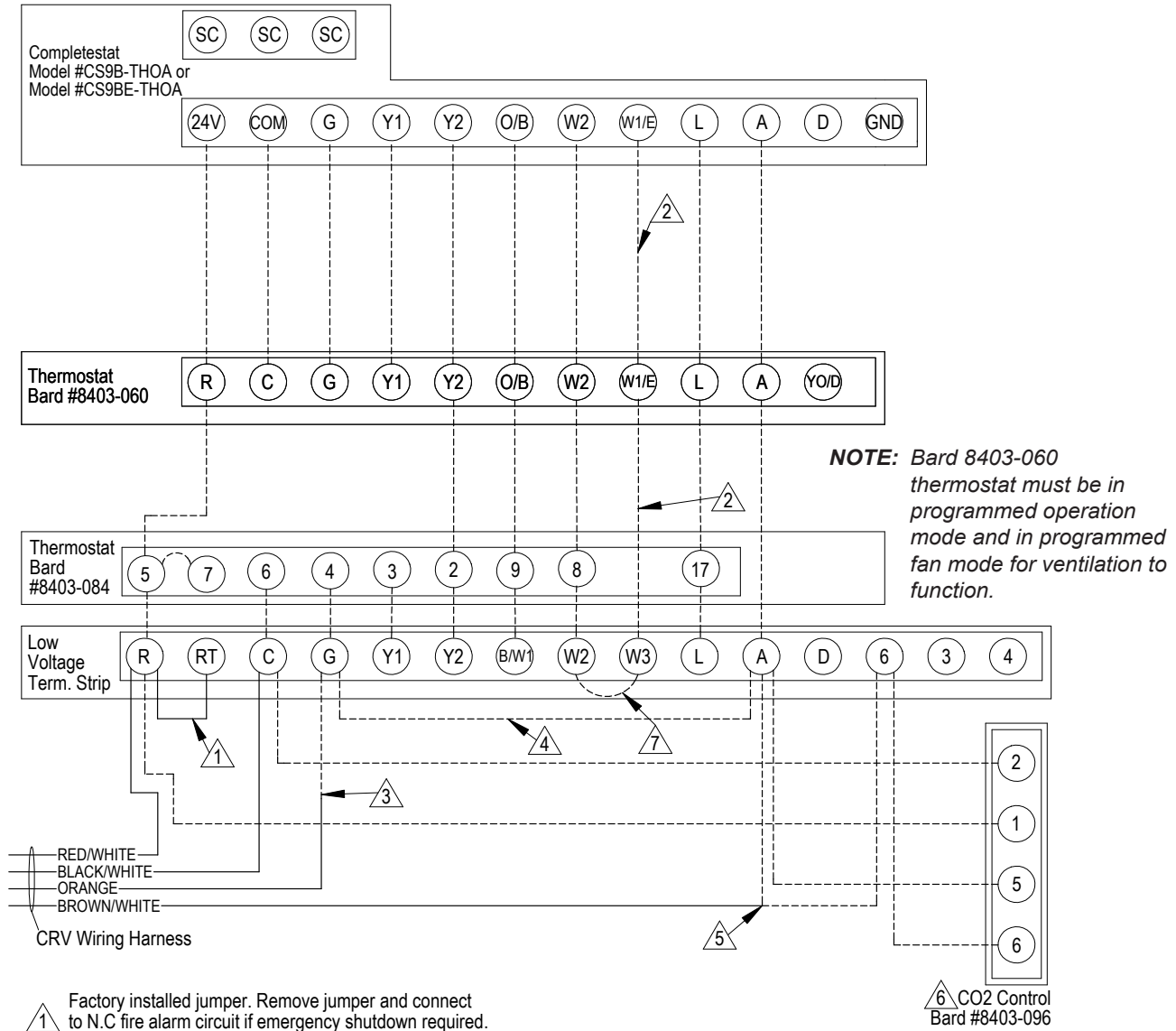
4 Install a jumper between "G" and "A" only when thermostat without "Occupancy Signal" is used.

5 Relay Provided with Completestat

6 Jumper W2 to W3 at terminal block when using 8403-084 with unit with 15 KW

MIS-3204 C

FIGURE 13
Heat Pump with CRV and CO₂ Control



MIS-3205 D

THESE UNITS REQUIRE R-410A REFRIGERANT AND POLYOL ESTER OIL.

GENERAL

1. Use separate service equipment to avoid cross contamination of oil and refrigerants.
2. Use recovery equipment rated for R-410A refrigerant.
3. Use manifold gauges rated for R-410A (800 psi/250 psi low).
4. R-410A is a binary blend of HFC-32 and HFC-125.
5. R-410A is nearly azeotropic—similar to R-22 and R-12. Although nearly azeotropic, charge with liquid refrigerant.
6. R-410A operates at 40-70% higher pressure than R-22, and systems designed for R-22 cannot withstand this higher pressure.
7. R-410A has an ozone depletion potential of zero, but must be reclaimed due to its global warming potential.
8. R-410A compressors use Polyol Ester oil.
9. Polyol Ester oil is hygroscopic; it will rapidly absorb moisture and strongly hold this moisture in the oil.
10. A liquid line dryer must be used; even a deep vacuum will not separate moisture from the oil.
11. Limit atmospheric exposure to 15 minutes.
12. If compressor removal is necessary, always plug compressor immediately after removal. Purge with small amount of nitrogen when inserting plugs.

TOPPING OFF SYSTEM CHARGE

If a leak has occurred in the system, Bard Manufacturing recommends reclaiming, evacuating (see criteria above), and charging to the nameplate charge. However, if done correctly, topping off the system charge can be done without problems.

With R-410A, there are no significant changes in the refrigerant composition during multiple leaks and recharges. R-410A refrigerant is close to being an azeotropic blend (it behaves like a pure compound or single component refrigerant). The remaining refrigerant charge, in the system, may be used after leaks have occurred and then “top-off” the charge by utilizing the charging charts on the inner control panel cover as a guideline.

REMEMBER: When adding R-410A refrigerant, it must come out of the charging cylinder/tank as a liquid to avoid any fractionation, and to insure optimal system performance. Refer to instructions for the cylinder that is being utilized for proper method of liquid extraction.



WARNING

Failure to conform to these practices could lead to injury or death.

SAFETY PRACTICES

1. Never mix R-410A with other refrigerants.
2. Use gloves and safety glasses. Polyol Ester oils can be irritating to the skin and liquid refrigerant will freeze the skin.
3. Never use air and R-410A to leak check; the mixture may become flammable.
4. Do not inhale R-410A—the vapor attacks the nervous system, creating dizziness, loss of coordination and slurred speech. Cardiac irregularities, unconsciousness and ultimate death can result from breathing this concentration.
5. Do not burn R-410A. This decomposition produces hazardous vapors. Evacuate the area if exposed.
6. Use only cylinders rated DOT4BA/4BW 400.
7. Never fill cylinders over 80% of total capacity.
8. Store cylinders in a cool area, out of direct sunlight.
9. Never heat cylinders above 125°F.
10. Never trap liquid R-410A in manifold sets, gauge lines or cylinders. R-410A expands significantly at warmer temperatures. Once a cylinder or line is full of liquid, any further rise in temperature will cause it to burst.

DESCRIPTION OF STANDARD EQUIPMENT

Solid State Electronic Heat Pump Control

Provides efficient 30-, 60- or 90-minute defrost cycle. A thermistor sensor and speed up terminal for service along with a 8-minute defrost override are standard on the electronic heat pump control. By default, the I-TEC are factory shipped on the 90-minute defrost cycle.

High/Low Pressure Switch

Provides refrigerant circuit high pressure and loss of charge protection. Includes lockout circuit built into heat pump control that is resettable from room thermostat.

Five Minute Compressor Time Delay

Provides short cycle protection for the compressor which extends compressor life. Built into the electronic heat pump control as standard.

Condensate Overflow

Senses and provides system shut down if draining issue causes water level to rise in the lower drain pan.

Low Ambient Control

The low ambient control permits cooling operation down to 0°F outdoor ambient.

IMPORTANT INSTALLER NOTE

For improved start-up performance, wash the indoor coil with a dishwasher detergent.

PHASE MONITOR

All units with three phase scroll compressors are equipped with a three phase line monitor to prevent compressor damage due to phase reversal.

The phase monitor in this unit is equipped with two LEDs. If the Y signal is present at the phase monitor and phases are correct the green LED will light and the compressor contactor is allowed to energize.

If phases are reversed, the red fault LED will be lit and compressor operation is inhibited.

If a fault condition occurs, reverse two of the supply leads to the unit. Do not reverse any of the unit factory wires as damage may occur.

THREE PHASE SCROLL COMPRESSOR START UP INFORMATION

Scroll compressors, like several other types of compressors, will only compress in one rotational direction. Direction of rotation is not an issue with single phase compressors since they will always start and run in the proper direction.

However, three phase compressors will rotate in either direction depending upon phasing of the power.

Since there is a 50-50 chance of connecting power in such a way as to cause rotation in the reverse direction, ***verification of proper rotation must be made.*** Verification of proper rotation direction is made by observing that suction pressure drops and discharge pressure rises when the compressor is energized. Reverse rotation also results in an elevated sound level over that with correct rotation, as well as substantially reduced current draw compared to tabulated values.

Verification of proper rotation must be made at the time the equipment is put into service. If improper rotation is corrected at this time there will be no negative impact on the durability of the compressor. However, reverse operation for even 1 hour may have a negative impact on the bearing due to oil pump out.

All three phase scroll compressors used in the I-TEC series are wired identically internally. As a result, once the correct phasing is determined for a specific system or installation, connecting properly phased power leads to the same Fusite terminal should maintain proper rotation direction. The direction of rotation of the motor may be changed by reversing any two line connections to the unit.

SERVICE HINTS

1. Caution user to maintain clean air filters at all times and to not needlessly close off supply air registers. This may reduce airflow through the system, which shortens equipment service life as well as increasing operating costs and noise levels.
2. Switching to heating cycle at 75°F or higher outside temperature may cause a nuisance trip of the remote reset high pressure switch. Turn thermostat off, then on to reset the high pressure switch.
3. The heat pump wall thermostats perform multiple functions. Be sure that all function switches are correctly set for the desired operating mode before trying to diagnose any reported service problems.
4. Check all power fuses or circuit breakers to be sure they are the correct rating.
5. Periodic cleaning of the outdoor coils to permit full and unrestricted airflow circulation is essential.
6. Annual maintenance is required to make sure that all of the systems are functioning properly.
 - a. Check to make sure that the drains are not obstructed in any way.
 - b. Remove any debris in the condenser section of the unit.
 - c. Inspect and wash outdoor coils as necessary.
7. All motors are sealed and require no oiling.

SEQUENCE OF OPERATION

COOLING PART LOAD – Circuit R-Y1 makes at thermostat pulling in compressor contactor, starting the compressor and outdoor motor. The G (indoor motor) circuit is automatically completed on any call for cooling operation or can be energized by manual fan switch on subbase for constant air circulation.

COOLING FULL LOAD – Circuit R-Y1 & Y2 makes at the thermostat energizing the 2nd stage solenoid in the compressor. The default position of the compressor staging solenoid is non-energized. The compressor will run at low capacity until this solenoid is energized.

HEATING STAGE 1 – A 24V solenoid coil on reversing valve controls heating cycle operation. Two thermostat options, one allowing “Auto” changeover from cycle to cycle and the other constantly energizing solenoid coil during heating season and thus eliminating pressure equalization noise except during defrost, are to be used. On “Auto” option a circuit is completed from R-B and R-Y1 on each heating “on” cycle, energizing reversing valve solenoid and pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor. Heat pump heating cycle now in operation. The second option has no “Auto” changeover position, but instead energizes the reversing valve solenoid constantly whenever the system switch on subbase is placed in “Heat” position, the “B” terminal being constantly energized from R. A thermostat demand for Stage 1 heat completes R-Y1 circuit, pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor.

HEATING STAGE 2 – Circuit R-Y1 & Y2 makes at the thermostat energizing the 2nd stage solenoid in the compressor.

PRESSURE SERVICE PORTS

High and low pressure service ports are installed on all units so that the system operating pressures can be observed. Pressure tables can be found later in the manual covering all models. It is imperative to match the correct pressure table to the unit by model number. Upper and lower service doors must be attached to obtain proper reading.

This unit employs high-flow Coremax valves instead of the typical Shrader type valves.

WARNING! Do NOT use a Schrader valve core removal tool with these valves. Use of such a tool could result in eye injuries or refrigerant burns!

To change a Coremax valve without first removing the refrigerant, a special tool is required which can be obtained at www.fastestinc.com/en/SCCA07H. See the replacement parts manual for replacement core part numbers.

DEFROST CYCLE

The defrost cycle is controlled by temperature and time on the solid state heat pump control. See Figure 14.

When the outdoor temperature is in the lower 40°F temperature range or colder, the outdoor coil temperature is 32°F or below. This coil temperature is sensed by the coil temperature sensor mounted near the bottom of the outdoor coil. Once coil temperature reaches 30°F or below, the coil temperature sensor sends a signal to the control logic of the heat pump control and the defrost timer will start accumulating run time.

After 30, 60 or 90 minutes of heat pump operation at 30°F or below, the heat pump control will place the system in the defrost mode. Factory default setting is 90 minutes.

During the defrost mode, the refrigerant cycle switches back to the cooling cycle, the outdoor motor stops, electric heaters are energized, and hot gas passing through the outdoor coil melts any accumulated frost. When the temperature rises to approximately 57°F, the coil temperature sensor will send a signal to the heat pump control which will return the system to heating operations automatically.

If some abnormal or temporary condition such as a high wind causes the heat pump to have a prolonged defrost cycle, the heat pump control will restore the system to heating operation automatically after 8 minutes.

The heat pump defrost control board has an option of 30-, 60- or 90-minute setting. All models are shipped from the factory on the 90-minute pin. If special circumstances require a change to another time, remove the wire from the 90-minute terminal and reconnect to the desired terminal.

The manufacturer's recommendation is for 90-minute defrost cycles. Refer to Figure 14.

There is a cycle speed up jumper on the control. This can be used for testing purposes to reduce the time between defrost cycle operation without waiting for time to elapse.

Use a small screwdriver or other metallic object, or another ¼" QC, to short between the **SPEEDUP** terminals to accelerate the HPC timer and initiate defrost.

Be careful not to touch any other terminals with the instrument used to short the **SPEEDUP** terminals. It may take up to 15 seconds with the **SPEEDUP** terminals shorted for the speedup to be completed and the defrost cycle to start.

As soon as the defrost cycle kicks in remove the shorting instrument from the SPEEDUP terminals.

Otherwise the timing will remain accelerated and run through the 1-minute minimum defrost length sequence in a matter of seconds and will automatically terminate the defrost sequence.

There is an initiate defrost jumper (**SEN JMP**) on the control that can be used at any outdoor ambient during the heating cycle to simulate a 0° coil temperature.

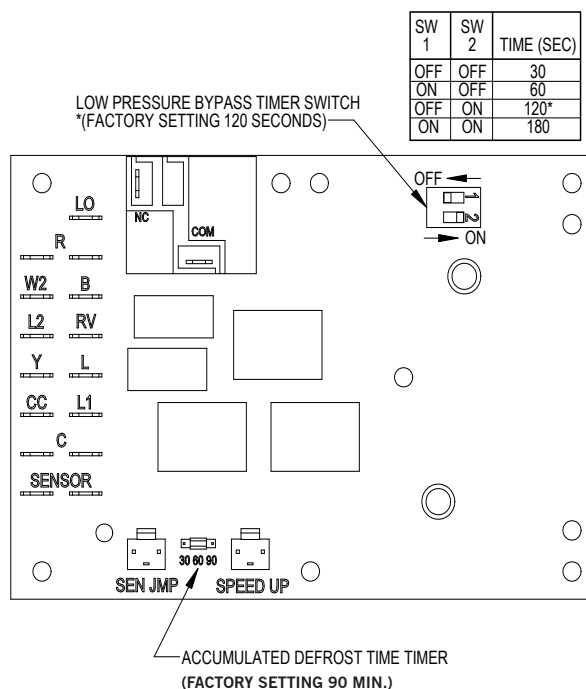
This can be used to check defrost operation of the unit without waiting for the outdoor ambient to fall into the defrost region.

By placing a jumper across the **SEN JMP** terminals (a ¼" QC terminal works best) the defrost sensor mounted on the outdoor coil is shunted out & will activate the timing circuit. This permits the defrost cycle to be checked out in warmer weather conditions without the outdoor temperature having to fall into the defrost region.

In order to terminate the defrost test the SEN JMP jumper must be removed. If left in place too long, the compressor could stop due to the high pressure condition created by operating in the cooling mode with outdoor fan off. Pressure will rise rapidly as there is likely no actual frost on the outdoor coil in this artificial test condition.

There is also a 5-minute compressor time delay function built into the Heat Pump Control to protect the compressor from short cycling conditions. The board's LED will have a fast blink rate when in the compressor time delay function. In some instances, it is helpful to the service technician to override or speed up this timing period, and shorting out the **SPEEDUP** terminals for a few seconds can do this.

FIGURE 14
Heat Pump Control
Defrost Cycle



MIS-2668 A

I-TEC COMMERCIAL ROOM VENTILATOR SYSTEM

GENERAL DESCRIPTION

The I-TEC Commercial Room Ventilator (CRV) is designed to be used with all Bard I-TEC models. The only intent of this device is to provide the required ventilation by delivering fresh air to meet IAQ (Indoor Air Quality) requirements. In the installed application, this system also includes exhaust provisions which are balanced with the intake air to maintain building pressurization requirements of ASHRAE 62.1 Standard.

Ventilation is accomplished with two blower/motor assemblies for maximum ventilation at low sound levels. The intake and exhaust blowers are programmed independently and are balanced to maintain a slight positive pressurization in accordance to ASHRAE 62.1 Standard.

The I-TEC CRV is also provided with filters to reduce the required service needed and to further improve the IAQ. The exhaust air blowers and intake air blowers are protected by two throw away filters. Both are accessible without the need for tools.

CONTROL WIRING

The I-TEC CRV comes wired from the factory set to 450 CFM of ventilation. Care must be taken when deciding how to control the operation of the ventilator. When designing the control circuit for the ventilator, the following requirements must be met.

1. The indoor blower must be run whenever the I-TEC CRV is run.
2. Select and configure the correct CFM ventilation level that the I-TEC CRV needs to operate and configure the system to this level following later instructions within this section. Over ventilating serves no useful purpose and significantly affects the overall efficiency of the heat pump system. System operating costs would also increase.
3. Run the I-TEC CRV only during periods when the conditioned space is occupied. Running the ventilation during unoccupied periods wastes energy, decreases the expected life of the CRV, and can result in large moisture buildup in the structure. Running the CRV when the structure is unoccupied allows moisture to build up in the structure because there is little or no cooling load. Thus, the air conditioner is not running enough to remove the excess moisture being brought in. Use a control system that in some way can control the system based upon occupancy.

NOTICE

Operating the I-TEC CRV during unoccupied periods can result in a build up of excess moisture in the structure.

RECOMMENDED CONTROL SEQUENCES

Several possible scenarios are listed below:

1. Use a programmable electronic thermostat with auxiliary terminal to control the CRV based on daily programmed occupancy periods. Bard markets and recommends Bard Part #8403-060 programmable electronic thermostat.
2. Use Bard CompleteStat™ that incorporates temperature, humidity and occupancy control with learning capability into a single device. No programming required.
3. Use a DDC control system to control the CRV based upon a room occupancy schedule to control the CRV.
4. Tie the operation of the CRV into the light switch. The lights in a room are usually on only when occupied.
5. Use a manual timer that the occupants turn to energize the CRV for a specific number of hours.
6. Use a programmable mechanical timer to energize the CRV and indoor blower during occupied periods of the day.

NOTE: The ventilation package comes with a blower interlock function, but is disabled when it is shipped from the factory in case a thermostat with an occupancy output or occupancy sensor is not utilized and "A" terminal to "G" terminal must be tied to drive the ventilation package. If a thermostat or control does drive occupancy output, remove the tape from the orange wire located in the low voltage terminal box and connect it to the "G" terminal to activate this function. (See Figures 11-13.)

SETTING THE VENTILATION CFM LEVELS

The I-TEC CRV has four pre-set levels of ventilation CFM available. These are 300, 375, 450 and 525 CFM of ventilation air. The I-TEC CRV is shipped from the factory set on the 450 CFM ventilation level. To change between these four different levels of provided ventilation CFM, first refer to Figure 15 to look up the corresponding CFM needed for the intake and exhaust blowers to meet the design criteria and determine which "speed/wire color" is needed. Then, perform the following steps.



1. Open front swinging doors of main unit (by popping front door latches).
2. Throw main power disconnect to the "OFF" position to eliminate risk of injury or death due to electrical shock.
3. Remove six (6) screws holding front CRV door in place (See Figure 16).
4. Locate brown wire with white trace that has a black terminal on the end where it connects to the terminal strip (See Figure 15).
5. Move brown wire with white trace to the corresponding CFM level needed in accordance with Figure 15.

FIGURE 15
CRV Motor Speed/CFM Configuration

VENT OPTION INTAKE/EXHAUST SPEEDS		
WIRE COLOR	SPEED	NOM. CFM
BLACK	HI	525
BLUE	MED-HI	450
ORANGE	MED-LO	375
RED	LO	300
TO CHANGE SPEEDS, MOVE BROWN WIRE WITH WHITE TRACE.		
7961-755-2		

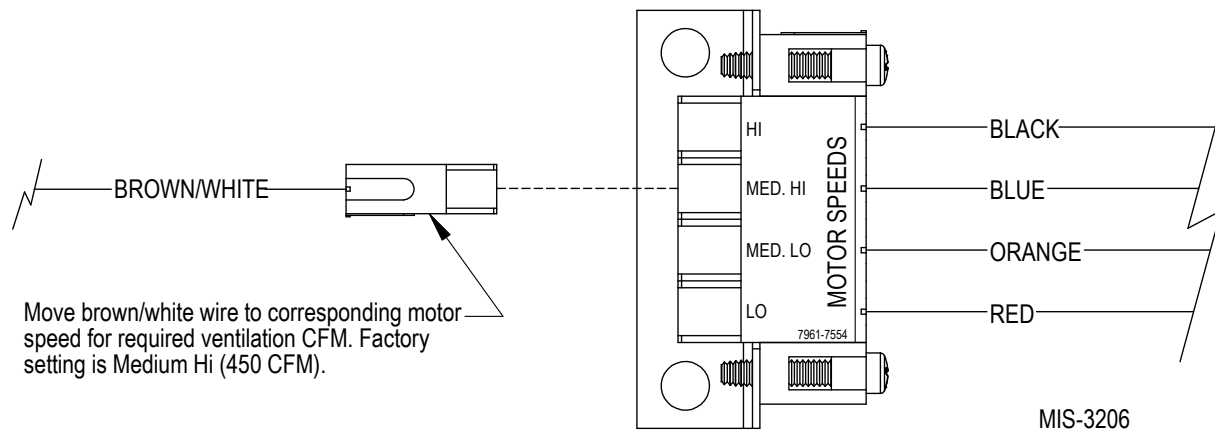


FIGURE 16
CRV Speed Change Terminal Access

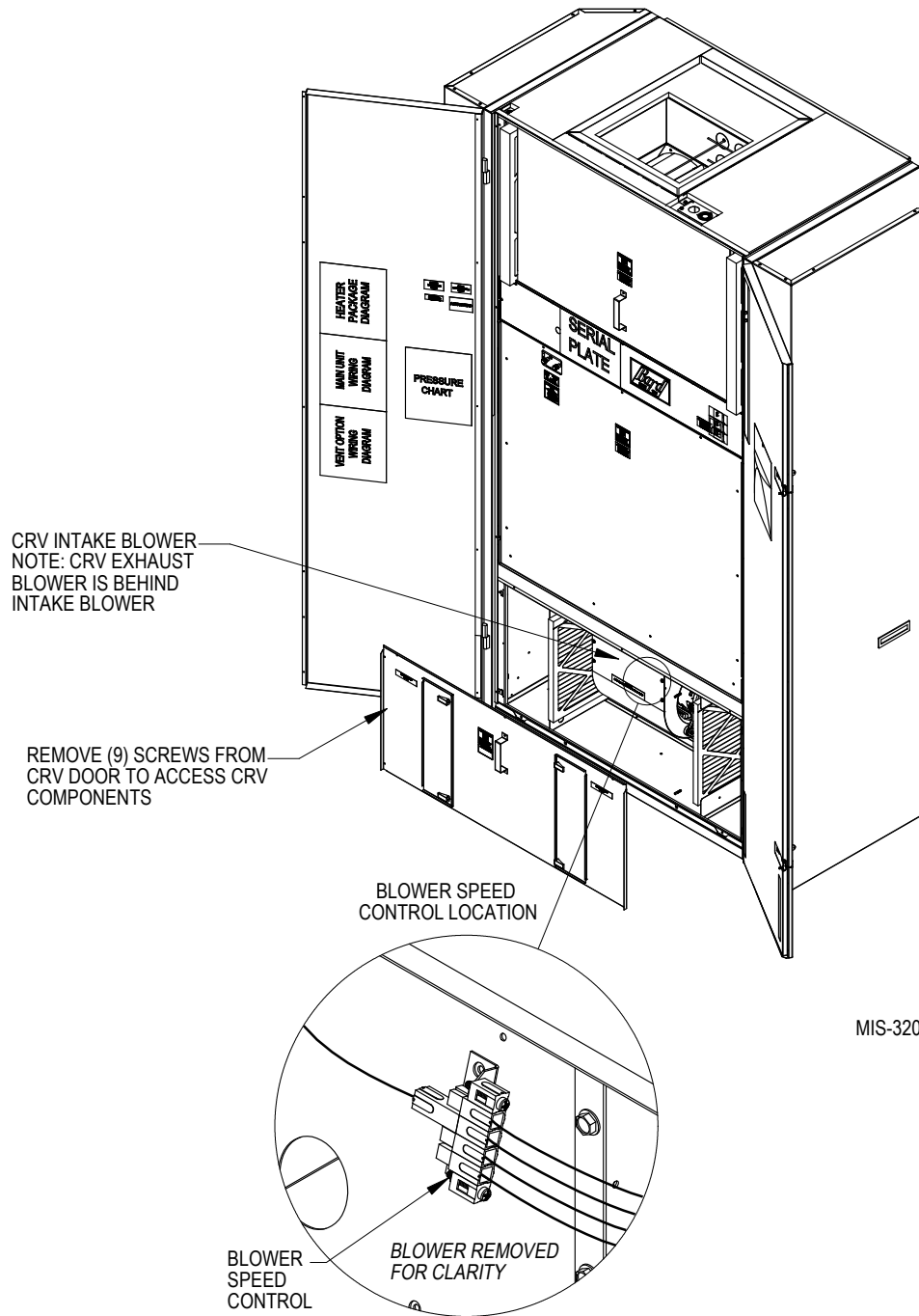
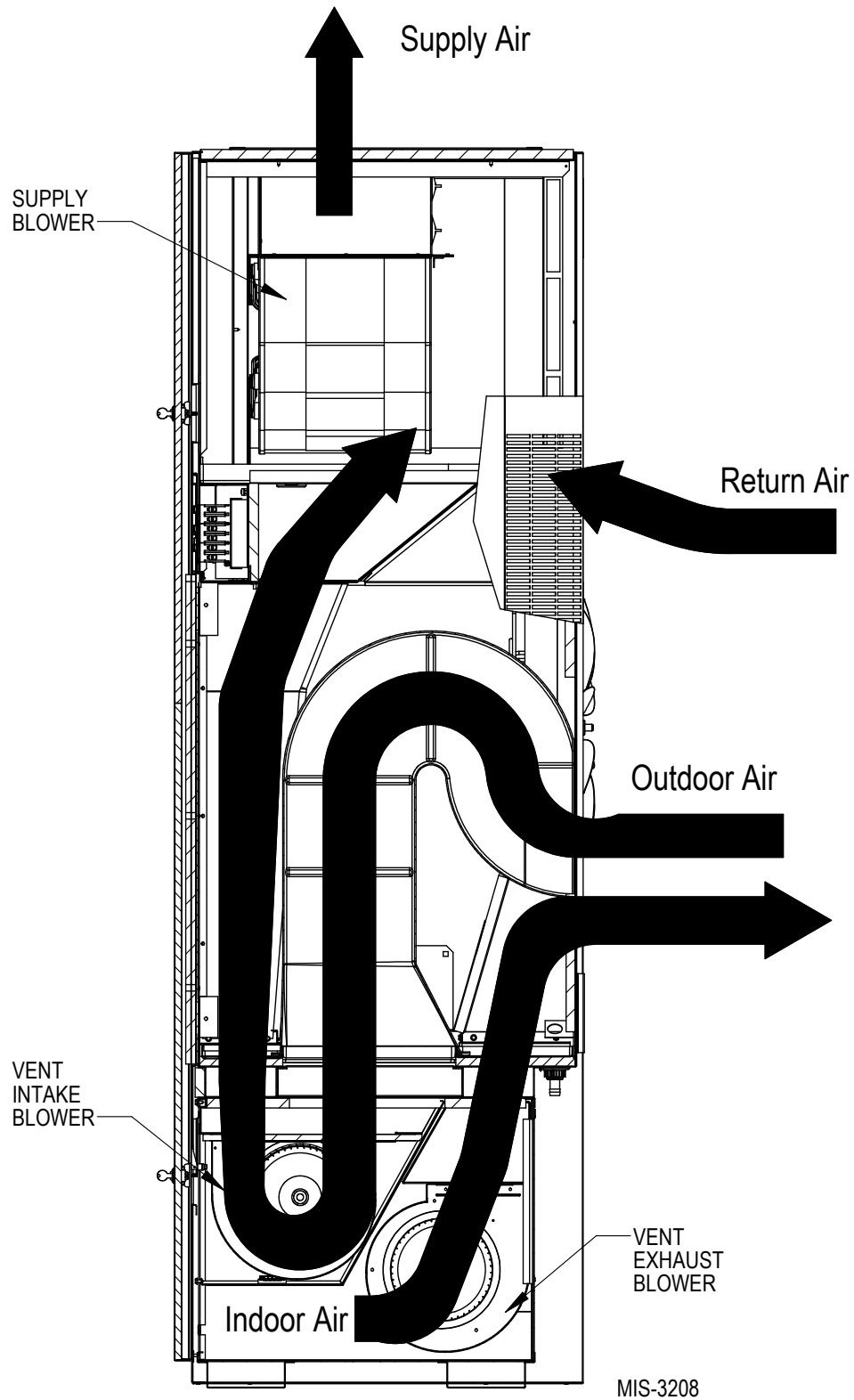


FIGURE 17
Ventilation Airflow Diagram



TROUBLESHOOTING

SOLID STATE HEAT PUMP CONTROL

- NOTE:** A thorough understanding of the defrost cycle sequence is essential. Review that section earlier in this manual prior to troubleshooting the control. Turn on AC power supply to unit.
- Turn thermostat blower switch to “fan on”—the indoor blower should start. (If it doesn’t, troubleshoot indoor unit and correct problem.)
- Turn thermostat blower to “auto” position. Indoor blower should stop.
- Set system switch to “heat” or “cool”. Adjust thermostat to call for heat or cool. The indoor blower, compressor and outdoor fan should start.

NOTE: If there was no power to 24 volt transformer, the compressor and outdoor fan motor will not start for 5 minutes. This is because of the compressor short cycle protection.

<u>CODES</u>	<u>FUNCTION</u>
Slow Blink	Normal Operation
Fast Blink	Compressor Time Delay
1 Blink	Low Pressure Switch Failure
2 Blink	High Pressure Switch Failure or Condensate Overflow Switch Activated
3 Blink	Defrost Mode Active
4 Blink	High Pressure or Overflow Switch Lockout

TABLE 5 – Troubleshooting

Symptom	Description, Check & Possible Causes	What & How to Check / Repair
Compressor will not start (heating or cooling)	1. Check for LED illumination. Is there an LED illuminated on the board (flashing)?	Yes = go to Step #2; No = go to Step #3
	2. Check for error codes. Is the LED flashing a Code?	Yes = go to Step #4; No = go to Step #8
	3. Check for power at board. Is there 24 volts AC between R and C?	Yes = go to Step #13; No = go to Step #9
	4. Check codes. What code is blinking?	Code "1", go to Step #6; Code "2", go to Steps #7A & #7B; Fast Blink, go to Step #5
	5. Compressor delay active. Wait for 5 minute delay or jump board's "speed up pins".	Check for proper operation; if still needed, go back to Step #1.
	6. Low pressure fault.	Check wiring circuit and unit pressures.
	7A. High pressure fault.	Check wiring circuit and unit pressures.
	7B. Condensate overflow fault.	Check upper indoor coil drains; check lower outdoor coil drains; check main drain line.
	8. Check for Compressor input signal. Is there 24 volts AC between Y and C?	Yes = go to Step #10; No = go to Step #11
	9. No power to board.	The unit either does not have unit voltage, the transformer is bad or the unit wiring is incorrect.
	10. Check for Compressor output signal. Is there 24 volts AC between CC & C?	Yes = go to Step #12; No = go to Step #13
	11. No "Y" compressor input signal.	Check thermostat wiring, incorrect phase of unit (see section on Phase Monitor), and finally unit wiring.
	12. No "CC" compressor output signal.	Check compressor contactor for proper operation and finally check compressor.
	13. Faulty board.	Replace defrost board.
Fan outdoor motor does not run (cooling or heating except during defrost)	Heat pump control defective	Check across fan relay on heat pump control. (Com-NC) Replace heat pump control.
	Motor defective	Check for open or shorted motor winding. Replace motor.
	Motor capacitor defective	Check capacitor rating. Check for open or shorted capacitor. Replace capacitor.
Reversing valve does not energize (heating only)	Heat pump control defective	Check for 24V between RV-C and B-C. 1. Check control circuit wiring. 2. Replace heat pump control
	Reversing valve solenoid coil defective	Check for open or shorted coil. Replace solenoid coil.
Unit will not go into defrost (heating only)	Temperature sensor or heat pump control defective	Disconnect temperature sensor from board and jumper across "SPEEDUP" terminals and "SEN JMP" terminals. This should cause the unit to go through a defrost cycle within one minute. 1. If unit goes through defrost cycle, replace temperature sensor. 2. If unit does not go through defrost cycle, replace heat pump control.
Unit will not come out of defrost (heating only)	Temperature sensor or heat pump control defective.	Jumper across "SPEEDUP" terminal. This should cause the unit to come out of defrost within one minute. 1. If unit comes out of defrost cycle, replace temperature sensor. 2. If unit does not come out of defrost cycle, replace heat pump control.

CHECKING TEMPERATURE SENSOR

1. Disconnect temperature sensor from board and from right-hand outdoor coil.
2. Use an ohmmeter and measure the resistance of the sensor. Also use ohmmeter to check for short or open.
3. Check resistance reading to chart of resistance use sensor ambient temperature. (Tolerance of part is $\pm 10\%$.)
4. If sensor resistance reads very low, then sensor is shorted and will not allow proper operation of the heat pump control.
5. If sensor is out of tolerance, shorted, open or reads very low ohms, it should be replaced.

TABLE 6
Temperature (F) vs. Resistance (R) of Temperature Sensor

F	R	F	R	F	R	F	R
-25	196871	13	56985	51	19374	89	7507
-24	190099	14	55284	52	18867	90	7334
-23	183585	15	53640	53	18375	91	7165
-22	177318	16	52051	54	17989	92	7000
-21	171289	17	50514	55	17434	93	6840
-20	165487	18	49028	56	16984	94	6683
-19	159904	19	47590	57	16547	95	6531
-18	154529	20	46200	58	16122	96	6383
-17	149355	21	44855	59	15710	97	6239
-16	144374	22	43554	60	15310	98	6098
-15	139576	23	42295	61	14921	99	5961
-14	134956	24	41077	62	14544	100	5827
-13	130506	25	39898	63	14177	101	5697
-12	126219	26	38757	64	13820	102	5570
-11	122089	27	37652	65	13474	103	5446
-10	118108	28	36583	66	13137	104	5326
-9	114272	29	35548	67	12810	105	5208
-8	110575	30	34545	68	12492	106	5094
-7	107010	31	33574	69	12183	107	4982
-6	103574	32	32634	70	11883	108	4873
-5	100260	33	31723	71	11591	109	4767
-4	97064	34	30840	72	11307	110	4663
-3	93981	35	29986	73	11031	111	4562
-2	91008	36	29157	74	10762	112	4464
-1	88139	37	28355	75	10501	113	4367
0	85371	38	27577	76	10247	114	4274
1	82699	39	26823	77	10000	115	4182
2	80121	40	26092	78	9760	116	4093
3	77632	41	25383	79	9526	117	4006
4	75230	42	24696	80	9299	118	3921
5	72910	43	24030	81	9077	119	3838
6	70670	44	23384	82	8862	120	3757
7	68507	45	22758	83	8653	121	3678
8	66418	46	22150	84	8449	122	3601
9	64399	47	21561	85	8250	123	3526
10	62449	48	20989	86	8057	124	3452
11	60565	49	20435	87	7869		
12	58745	50	19896	88	7686		

Troubleshooting Condensate Overflow Systems

The Bard I-TEC Series is equipped with dual condensate overflow switches. One switch (float type) is located in the indoor drain pan. It is secured to the drain pan with a screw-down clamp (see Figure 18). The second switch (electronic/conductance) is located in the control panel with the sensor mounted adjacent to the left outdoor coil in the outdoor drain pan (see Figure 19).

The float type switch in the indoor drain pan is equipped with an LED light that indicates when an overflow condition is present.

Electrically, the two condensate switches are wired in series with the unit's high pressure switch. All three switches have normally closed contacts, but if any of them are activated, it will then activate initially a soft lockout of the compressor circuit. If recurrence

happens on the same cooling call cycle, a hard lockout of the compressor circuit will occur.

The electronic switch for the outdoor drain pan has three LED lights giving a status update (see Figure 20).

To test the electronic overflow switch function, bridge across the probes with a wet finger. The unit should stop, and the RED LED should come on. Remove the finger from the probe. After approximately 5 seconds, the RED LED should go off and the GREEN and AMBER LEDs should come on.

To Reset (Clear AMBER LED):

Bridge across the sensor probes with wet finger until the RED LED comes on, then remove the bridge quickly. While the RED LED is still on, bridge the probes again quickly (within 2 seconds). Hold until the AMBER LED goes off, then immediately remove the bridge.

FIGURE 18
Indoor Condensate Overflow Switch



FIGURE 19
Outdoor Condensate Sensor

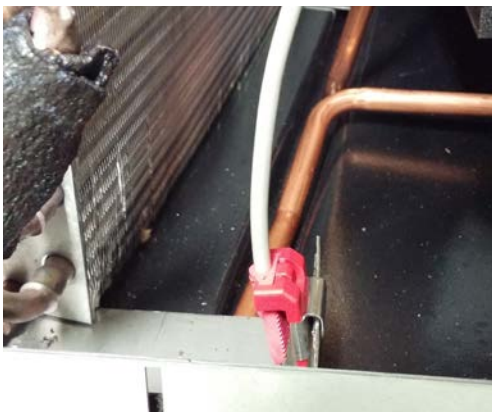


FIGURE 20
Outdoor Condensate Control



RED LED Illuminated:
Overflow currently being detected,
switch activated

GREEN LED Illuminated:
No overflow currently being
detected

AMBER LED Illuminated:
Previous condition detected

Troubleshooting ECM™ 142R Outdoor Fan Motors

 **WARNING**



- EXPOSED MOVING PARTS.
- DISCONNECT ALL ELECTRICAL POWER BEFORE SERVICING.
- FAILURE TO DO SO CAN RESULT IN SEVERE INJURY OR AMPUTATION.

 **WARNING**

- HAZARD OF ELECTRICAL SHOCK.
- ELECTRICAL SHOCK CAN RESULT IN SERIOUS INJURY OR DEATH.
- DISCONNECT THE REMOTE ELECTRIC POWER SUPPLY OR SUPPLIES BEFORE SERVICING.

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CAUTION

Do not operate motor without fan blade attached. Such operations will cause the motor to oscillate up and down.

CAUTION

You must obtain the correct replacement motor from the manufacturer that is a direct replacement for the failed motor.

USING THE WRONG MOTOR VOIDS ALL WARRANTIES AND MAY PRODUCE UNEXPECTED RESULTS.

1. In normal operation, this motor may rock back and forth on start up. Do not replace if this is the only symptom identified.
2. If the system is operating properly, but the motor appears to run slower than it should, the motor is good. High efficiency systems with optimized fan blades are engineered to run slow to decrease noise. The Bard I-TEC Series models also adjust fan speed based upon varied outdoor ambient conditions to optimize sound and unit efficiency.
3. If the system is noisy, freezing up, running a high head pressure, tripping the high pressure switch or compressor overload, check the following:
 - a. Ensure cleanliness of condenser coil(s) and fan blade/shroud.
 - b. Confirm the fan blade is not bent or deformed, isn't rubbing on the shroud and that it is tight on the motor shaft. Also ensure the motor is secure in its mounting system, and the mounting system is secure to the unit.
 - c. The Bard I-TEC is equipped with a low ambient control pressure switch. This pressure switch completes the 24VAC Common feed to the outdoor fan motor control in cooling mode. If this switch is defective, or if the outdoor air temperature is too cold to raise the head pressure to the 325# switch closing set-point, or the system charge is too low, this could be the cause of the issue. (In heat pump {heating} mode, the low ambient fan cycling control is bypassed.)
 - d. If motor is not running, go to next section.
4. If the motor does not appear to be running at the proper speed or does not shut off, refer to the next section for voltage checks to determine if the motor is getting the proper input signals.
 If the motor IS NOT receiving any communication, troubleshoot the communication issue using the diagnostic table for the fan logic control.
 - a. This motor uses a 7 wire harness to control the motor.
 - Line power is connected as follows:
 Red wire connects to "L1"
 Black wire connects to "L2"
 Green/yellow wire connects to ground
 - Control power is connected as follows:
 Blue wire connects to fan relay of the defrost logic control, and subsequently connects to 24VAC common through the fan logic control board. Yellow wire connects to "Y" on the fan logic control board. White wire connects to "W" on the fan logic control board. Orange wire connects to "O" on the fan logic control board.

NOTE: *A combination of the yellow, white and orange wires being energized (with 24V "R" signal) determines the five different speeds the fan motor will operate at. The fan logic control board uses an outdoor thermistor sensor to determine the speed the fan should operate. It also utilizes the "B" reversing valve input for heat pump mode to determine speed should operate.*

TABLE 7
Troubleshooting ECM™ 142R Outdoor Fan Motor

Check Line Power to Motor	Check between Red and Black Wires for Line Power
	Verify Ground by checking Green Wire to L1 and L2 Line Power
Check for 24VAC common signal to motor (against Transformer "R" Signal)	Check "BR" terminal of Fan Logic Control Board
	Check "Blue" Fan Lead on "Fan Relay Terminal" of "Defrost Logic Control"
	** Is not energized in cooling mode until Low Ambient Fan Cycling Control is closed by 325 PSIG refrigerant pressure. Above 65°F outdoors in cooling mode, the low ambient control is bypassed.
	** Circuit is completed automatically when "B" is energized on the Fan Logic Control Board
Check 24VAC "hot" outputs (to "Blue" on Fan Logic Control) to motor. See the following tables based upon outdoor temperature and model of operation.	

Troubleshooting Fan Logic Control

Please reference the Thermistor Temperature/Resistance Chart on page 34 (Table 6).

- GREEN STATUS LED – Blinks indicating there is a call for fan operation (simultaneous to call for compressor operation) and is normal.
- RED STATUS LIGHT (LA) – Is illuminated when low ambient control switch is in the closed position. (NOTE: This is not required in heat pump operation as the low ambient switch is bypassed in this mode of operation. Low ambient switch is also negated in cooling mode above 65°F outdoor temperature.)
- YELLOW STATUS LIGHT (B) – Is illuminated when there is a reversing valve call (for heat pump

operation). (NOTE: As mentioned above, this mode of operation negates the low ambient fan cycling control.)

If the board is reading a fan temperature thermistor value of 3375Ω or less (equivalent to 125°F or an "open" sensor), the fan will operate at the highest speed setting (energizes "W" and "Y" outputs on the board).

If the board is reading a fan temperature value of 118,110Ω or greater (equivalent to -10°F or a "shorted" sensor), the fan will operate at the highest speed setting (energizes "W" and "Y" outputs on the board).

If the low ambient switch is open, the red light will not be illuminated and the "BR" terminal will show open. The "BR" terminal is the "24 volt common" switching output to the outdoor fan motor.

TABLE 8
Cooling Mode

O.D. Temp Sensor	24VAC Signals Between
Below 55°F	Orange to Blue
Between 56° - 69°F	White to Blue
Between 70° - 85°F	Yellow to Blue
Between 86° - 112°F	Orange and White to Blue
Above 112°F	White and Yellow to Blue

TABLE 9
Heat Pump Mode

O.D. Temp Sensor	24VAC Signals Between
Above 56°F	Orange to Blue
Between 55° - 30°F	White to Blue
Between 29° - 14°F	Yellow to Blue
Below 13°F	Orange and White to Blue

If the output signals are not matching the specified temperature range, go to Table 6 on page 34 and verify the thermistor output curve. If the motor is receiving proper communications and proper high voltage power, and is still not running, proceed with motor replacement. (When checking the resistance/temperature curve, don't forget about the optional 2.2k ohm fan control resistor assembly.)

Replacing the Motor

This motor is replaced in one piece. The control cannot be replaced separately from the motor. Even if the control is remotely located, the replacement part will be a new control with harness and new motor.

The correct replacement motor from the manufacturer that is a direct replacement for the failed motor must be used.

USING THE WRONG MOTOR VOIDS ALL PRODUCT WARRANTIES AND MAY PRODUCE UNEXPECTED RESULTS.

Always mount the replacement motor and control according to the manufacturers specifications using all required hardware to reduce vibration. Make sure all wires are free of the fan blade and not pinched in mountings or cabinet through points.

Troubleshooting ECM™ Indoor Blower Motors

CAUTION:

Disconnect power from unit before removing or replacing connectors, or servicing motor. To avoid electric shock from the motor's capacitors, disconnect power and wait at least 5 minutes before opening motor.

Symptom

Motor rocks slightly when starting

Motor won't start

- No movement

- Motor rocks, but won't start

Motor oscillates up & down while being tested off of blower

Motor starts, but runs erratically

- Varies up and down or intermittent

- "Hunts" or "puffs" at high CFM (speed)

- Stays at low CFM despite system call for cool or heat CFM

- Stays at high CFM

- Blower won't shut off

Excessive noise

- Air noise

Cause/Procedure

- This is normal start-up for ECM

- Check blower turns by hand
- Check power at motor
- Check low voltage (24 Vac R to C) at motor
- Check low voltage connections (G, Y, W, R, C) at motor
- Check for unseated pins in connectors on motor harness
- Test with a temporary jumper between R - G
- Check motor for tight shaft
- Perform motor/control replacement check
- **Perform Moisture Check**

- Check for loose or compliant motor mount
- Make sure blower wheel is tight on shaft
- Perform motor/control replacement check

- It is normal for motor to oscillate with no load on shaft

- Check line voltage for variation or "sag"
- Check low voltage connections (G, Y, W, R, C) at motor, unseated pins in motor harness connectors
- Check "Bk" for erratic CFM command (in variable-speed applications)
- Check out system controls, Thermostat
- Perform Moisture Check

- Does removing panel or filter reduce "puffing"?
 - Reduce restriction
 - Reduce max airflow

- Check low voltage (Thermostat) wires and connections
- Verify fan is not in delay mode; wait until delay complete
- "R" missing/not connected at motor
- Perform motor/control replacement check

- "R" missing/not connected at motor
- Is fan in delay mode? - wait until delay time complete
- Perform motor/control replacement check

- Current leakage from controls into G, Y or W?
 - Check for Triac switched thermostat or solid-state relay

- Determine if it's air noise, cabinet, duct or motor noise; interview customer, if necessary
- High static creating high blower speed?
 - Is airflow set properly?
 - Does removing filter cause blower to slow down? Check filter
 - Use low-pressure drop filter
 - Check/correct duct restrictions

Symptom

- Noisy blower or cabinet

- "Hunts" or "puffs" at high CFM (speed)

Evidence of Moisture

- Motor failure or malfunction has occurred and moisture is present
- Evidence of moisture present inside air mover

Do

- Check out motor, controls, wiring and connections thoroughly before replacing motor
- Orient connectors down so water can't get in
 - Install "drip loops"
- Use authorized motor and model #'s for replacement
- Keep static pressure to a minimum:
 - Recommend high efficiency, low static filters
 - Recommend keeping filters clean.
 - Design ductwork for min. static, max. comfort
 - Look for and recommend ductwork improvement, where necessary

- Size the equipment wisely

- Check orientation before inserting motor connectors

Moisture Check

- Connectors are oriented "down" (or as recommended by equipment manufacturer)
- Arrange harness with "drip loop" under motor
- Is condensate drain plugged?
- Check for low airflow (too much latent capacity)
- Check for undercharged condition
- Check and plug leaks in return ducts, cabinet

Comfort Check

- Check proper airflow settings
- Low static pressure for lowest noise
- Set low continuous-fan CFM
- Use humidistat and 2-speed cooling units
- Use zoning controls designed for ECM that regulate CFM
- Thermostat in bad location?

Cause/Procedure

- Check for loose blower housing, panels, etc.
- High static creating high blower speed?
 - Check for air whistling through seams in ducts, cabinets or panels
 - Check for cabinet/duct deformation

- Does removing panel or filter reduce "puffing"?
 - Reduce restriction
 - Reduce max. airflow

- Replace motor and **Perform Moisture Check**

- **Perform Moisture Check**

Don't

- Automatically assume the motor is bad.

- Locate connectors above 7 and 4 o'clock positions

- Replace one motor or control model # with another (unless an authorized replacement)
- Use high pressure drop filters; some have ½" H2O drop!
- Use restricted returns

- Oversize system, then compensate with low airflow

- Plug in power connector backwards
- Force plugs

Replacing ECM Control Module

To replace the control module for the GE variable-speed indoor blower motor you need to take the following steps:

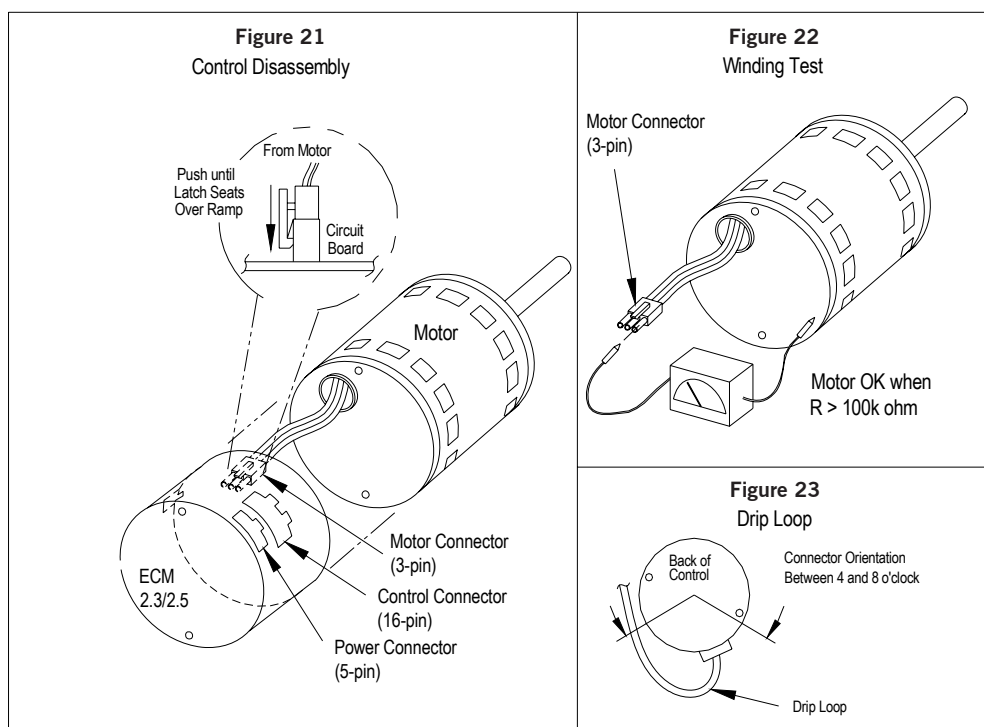
1. You **MUST** have the correct replacement module. The controls are factory programmed for specific operating modes. Even though they look alike, different modules may have completely different functionality.

USING THE WRONG CONTROL MODULE VOIDS ALL PRODUCT WARRANTIES AND MAY PRODUCE UNEXPECTED RESULTS.

2. Begin by removing AC power from the unit being serviced. **DO NOT WORK ON THE MOTOR WITH AC POWER APPLIED.** To avoid electric shock from the motor's capacitors, disconnect power and wait at least 5 minutes before opening motor.
3. It is not necessary to remove the motor from the blower assembly, nor the blower assembly from the unit. Unplug the two cable connectors to the motor control assembly. There are latches on each connector. **DO NOT PULL ON THE WIRES.** The plugs remove easily when properly released.
4. Locate the screws that retain to the motor control bracket to the sheet metal of the unit and remove them. Remove two (2) nuts that retain the control to the bracket and then remove two (2) nuts that retain sheet metal motor control end plate. *Refer to Figure 21.*
5. Disconnect the three (3) wires interior of the motor control by using your thumb and forefinger squeezing the latch tab and the opposite side of the connector plug, gently pulling the connector. **DO NOT PULL ON THE WIRES, GRIP THE PLUG ONLY.** *Refer to Figure 21.*
6. The control module is now completely detached from the motor. Verify with a standard ohmmeter that the resistance from each motor lead (in the motor plug just removed) to the motor shell is $>100K$ ohms. *Refer to Figure 22.* (Measure to unpainted motor end plate.) If any motor lead fails this test, do not proceed to install the control module. **THE MOTOR IS DEFECTIVE AND MUST BE REPLACED.** Installing the new control module will cause it to fail also.

7. Verify that the replacement control is correct for your application. Refer to the manufacturer's authorized replacement list. **USING THE WRONG CONTROL WILL RESULT IN IMPROPER OR NO BLOWER OPERATION.** Orient the control module so that the 3-wire motor plug can be inserted into the socket in the control. Carefully insert the plug and press it into the socket until it latches. **A SLIGHT CLICK WILL BE HEARD WHEN PROPERLY INSERTED.**
8. Reverse the steps #5, 4, 3 to reconnect the motor control to the motor wires, securing the motor control cover plate, mounting the control to the bracket, and mounting the motor control bracket back into the unit. **MAKE SURE THE ORIENTATION YOU SELECT FOR REPLACING THE CONTROL ASSURES THE CONTROL'S CABLE CONNECTORS WILL BE LOCATED DOWNWARD IN THE APPLICATION SO THAT WATER CANNOT RUN DOWN THE CABLES AND INTO THE CONTROL. DO NOT OVERTIGHTEN THE BOLTS.**
9. Plug the 16-pin control plug into the motor. The plug is keyed. Make sure the connector is properly seated and latched.
10. Plug the 5-pin power connector into the motor. Even though the plug is keyed, **OBSERVE THE PROPER ORIENTATION. DO NOT FORCE THE CONNECTOR.** It plugs in very easily when properly oriented. **REVERSING THIS PLUG WILL CAUSE IMMEDIATE FAILURE OF THE CONTROL MODULE.**
11. Final installation check. Make sure the motor is installed as follows:
 - a. Motor connectors should be oriented between the 4 o'clock and 8 o'clock positions when the control is positioned in its final location and orientation.
 - b. Add a drip loop to the cables so that water cannot enter the motor by draining down the cables. *Refer to Figure 23.*

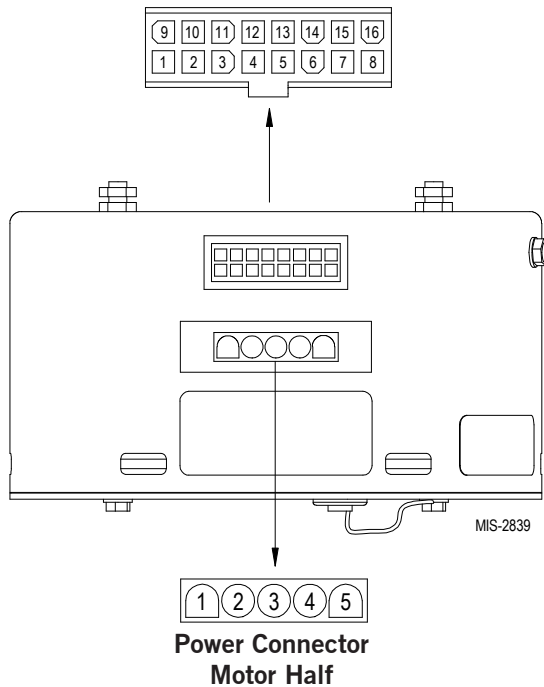
The installation is now complete. Reapply the AC power to the HVAC equipment and verify that the new motor control module is working properly. Follow the manufacturer's procedures for disposition of the old control module.



Troubleshooting ECM™ Indoor Blower Motors

MODE of OPERATION	OFF	Continuous Blower (Ventilation Mode)	Part Load Cooling	Full Load Cooling	Dehum. Mode (when equipped)	Part Load Heat Pump	Full Load Heat Pump	Heat Pump Full Load w/ 1st Bank of Elec. Heat	Heat Pump Full Load w/ 1st & 2nd Bank of Elec. Heat	Emergency Heat Mode
Thermostat 24 VAC Input Signals	—	"G"	"G", "Y1", "Y2"	"G", "Y1", "Y2"	"D"	"G", "B", "Y1"	"G", "B", "Y1", "Y2"	"G", "Y1", "Y2", "B", "W1"	"G", "Y1", "Y2", "B", "W2", "W3"	"G", "W2", "W3"
Pin #1	24 VAC "C" (Common) Signal, Always Energized									
Pin #2								X		
Pin #3	24 VAC "C" (Common) Signal, Always Energized									
Pin #4	Not Used									
Pin #5	Not Used									
Pin #6			X	X	X	X	X	X	X	
Pin #7	Not Used									
Pin #8	Not Used									
Pin #9						X	X	X		
Pin #10	Not Used									
Pin #11	Not Used									
Pin #12	24 VAC Hot "R" Signal, Always Energized									
Pin #13									X	X
Pin #14				X	X	X		X	X	
Pin #15		X	X	X	X	X	X	X	X	X
Pin #16	Not Used									

FIGURE 24 – Control Connector Motor Half



POWER CONNECTOR	
PWB HEADER	AMP 1-350945-0
PIN	Description
1	Jumper Pin 1 to Pin 2 for 120VAC Line Input Only **
2	
3	Chassis Ground
4	AC Line
5	AC Line

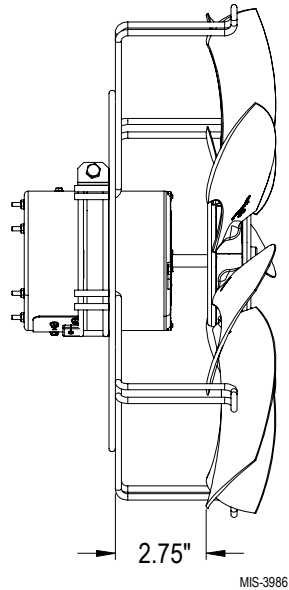
* Suggested mating connector
Housing – AMP 350809-1
Contact – AMP 350537-1

** **WARNING: Applying 240VAC line input with PIN 1 to PIN 2 jumper in place will permanently damage unit!**

FAN BLADE SETTING DIMENSIONS

The position of the fan blade should be set at 2.75", measuring from the motor mount to the closest point on the fan blade (as shown in Figure 25). Spin the blade by hand to make sure it does not hit the ring.

FIGURE 25
Fan Blade Position



REFRIGERANT CHARGE

This unit was charged at the factory with the quantity of refrigerant listed on the serial plate. AHRI capacity and efficiency ratings were determined by testing with this refrigerant charge quantity. The pressure tables on page 42 show nominal pressures and temperatures for the units. Since many installation specific situations can affect the pressure readings, this information should only be used by certified technicians as a guide for evaluating proper system performance. They shall not be used to adjust charge. If charge is in doubt, reclaim, evacuate and recharge the unit to the serial plate charge.

TABLE 10A – Full Load Cooling Pressure/Temperature

Model	Return Air Temp.	Pressure	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
I36Z1	75° DB 62° WB	Low Side	126	127	129	130	131	132	134	135	136	137	138	139	140	141	141
		High Side	209	231	252	274	295	317	338	360	381	407	433	458	484	510	536
	80° DB 67° WB	Low Side	137	139	141	142	144	148	149	150	151	152	153	154	155	156	157
		High Side	219	239	260	280	300	314	341	359	381	407	433	458	484	510	535
	85° DB 72° WB	Low Side	154	155	157	158	159	160	162	163	164	165	166	167	168	169	171
		High Side	217	240	262	285	307	330	352	375	397	424	451	477	504	531	540
I48Z1	75° DB 62° WB	Low Side	118	121	124	126	129	131	134	136	139	140	141	142	143	144	145
		High Side	221	239	257	275	293	311	329	347	365	397	430	462	494	527	559
	80° DB 67° WB	Low Side	132	134	137	139	141	141	144	148	151	152	154	155	156	157	159
		High Side	223	242	261	280	299	348	373	366	375	408	442	475	508	541	575
	85° DB 72° WB	Low Side	140	144	147	151	154	158	161	165	168	170	171	173	174	175	177
		High Side	234	253	271	289	307	326	344	362	380	414	448	482	515	549	583
I60Z1	75° DB 62° WB	Low Side	123	124	124	125	126	127	128	129	129	131	132	134	135	136	138
		High Side	218	241	265	289	312	336	360	383	407	431	456	481	505	530	554
	80° DB 67° WB	Low Side	137	137	138	138	139	140	140	141	141	143	144	146	147	149	150
		High Side	219	244	269	294	319	341	375	392	418	443	469	494	519	544	570
	85° DB 72° WB	Low Side	146	147	148	150	151	153	154	156	157	159	161	162	164	166	167
		High Side	231	255	279	303	327	352	376	400	424	450	475	501	527	552	578

TABLE 10B – Full Load Heating Pressure/Temperature

Model	Return Air Temp.	Pressure	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
I36Z1	70° DB	Low Side	38	45	51	57	63	70	76	82	92	101	107	114	120	127	133
		High Side	317	319	320	322	324	326	327	329	356	382	388	395	401	408	414
I48Z1	70° DB	Low Side	33	40	47	54	60	67	74	81	89	97	106	114	122	130	138
		High Side	268	276	285	293	301	309	318	326	334	342	349	356	363	370	377
I60Z1	70° DB	Low Side	38	42	46	50	54	58	63	67	80	94	100	107	114	120	127
		High Side	285	289	293	297	301	305	309	313	335	357	365	372	380	387	395

**TABLE 11A
Part Load Cooling Pressure/Temperature**

Model	Return Air Temp.	Pressure	55°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°	125°
I36Z1	75° DB 62° WB	Low Side	131	133	134	136	137	139	140	142	143	144	145	146	148	149	150
		High Side	188	209	230	250	271	292	313	333	354	379	403	428	453	478	502
	80° DB 67° WB	Low Side	145	146	148	149	150	154	154	155	155	156	158	159	160	161	163
		High Side	192	213	234	254	275	292	320	336	358	383	408	433	458	483	508
	85° DB 72° WB	Low Side	158	159	161	162	163	164	166	167	168	169	171	172	173	175	176
		High Side	198	219	240	260	281	302	323	343	364	389	415	440	466	491	517
I48Z1	75° DB 62° WB	Low Side	126	127	129	130	131	133	134	135	137	138	139	140	141	142	144
		High Side	172	196	221	245	269	294	318	343	367	390	414	438	461	485	508
	80° DB 67° WB	Low Side	137	139	141	142	144	147	148	150	151	152	154	155	156	157	159
		High Side	171	197	222	248	274	312	346	355	377	401	426	450	474	498	523
	85° DB 72° WB	Low Side	150	152	154	156	158	160	162	164	166	167	168	170	171	173	174
		High Side	177	203	229	254	280	305	331	357	382	407	431	456	481	505	530
I60Z1	75° DB 62° WB	Low Side	127	127	128	128	129	130	130	131	131	133	134	136	138	139	141
		High Side	196	218	240	261	283	305	326	348	370	394	418	443	467	491	515
	80° DB 67° WB	Low Side	138	139	140	141	142	143	144	144	145	147	149	150	152	154	156
		High Side	196	219	242	265	288	316	347	359	380	405	430	455	480	505	530
	85° DB 72° WB	Low Side	152	153	153	154	155	156	157	158	159	161	163	165	167	169	171
		High Side	203	226	249	271	294	317	340	363	385	411	436	461	487	512	537

**TABLE 11B
Part Load Heating Pressure/Temperature**

Model	Return Air Temp.	Pressure	0°	5°	10°	15°	20°	25°	30°	35°	40°	45°	50°	55°	60°	65°	70°
I36Z1	70° DB	Low Side	45	51	57	63	69	75	81	87	94	100	110	119	129	138	148
		High Side	270	272	274	276	278	280	282	284	300	315	321	326	332	337	343
I48Z1	70° DB	Low Side	33	42	50	58	66	75	83	91	97	103	113	122	132	141	151
		High Side	261	267	272	278	284	290	295	301	311	320	330	340	350	360	370
I60Z1	70° DB	Low Side	37	44	52	59	67	74	82	89	97	104	111	119	126	134	141
		High Side	261	270	280	289	299	308	318	327	339	350	359	368	378	387	396

Air Temperature Entering Outdoor Coil °F

REPLACEMENT PARTS MANUAL

I-TEC® Series Packaged Heat Pump

Models:

I36Z1-A	I48Z1-A	I60Z1-A
I36Z1-B	I48Z1-B	I60Z1-B
I36Z1-C	I48Z1-C	I60Z1-C

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Wiring Diagram Charts	
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• Exploded View	4
• Usage List	5
Painted Cabinet Components	
• Exploded View	6
• Usage List	7
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• Exploded View	14
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Control Panel Components - 460V 3 Phase	
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• Usage List	23
CRV Components	
• Exploded View	24
• Usage List	25
CRV Blower Components	
• Exploded View	26
• Usage List	27
Sleeve Components	
• Exploded View	28
• Usage List	29
Riser Platform Components	
• Exploded View	30
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General Notes

- Revised and/or additional pages may be issued from time to time.
- A complete and current manual consists of pages shown in the following contents section.

Important

- Contact the installing and/or local Bard distributor for all parts requirements. Be sure to have the complete model and serial number available from the unit rating plates.



Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506
www.bardhvac.com

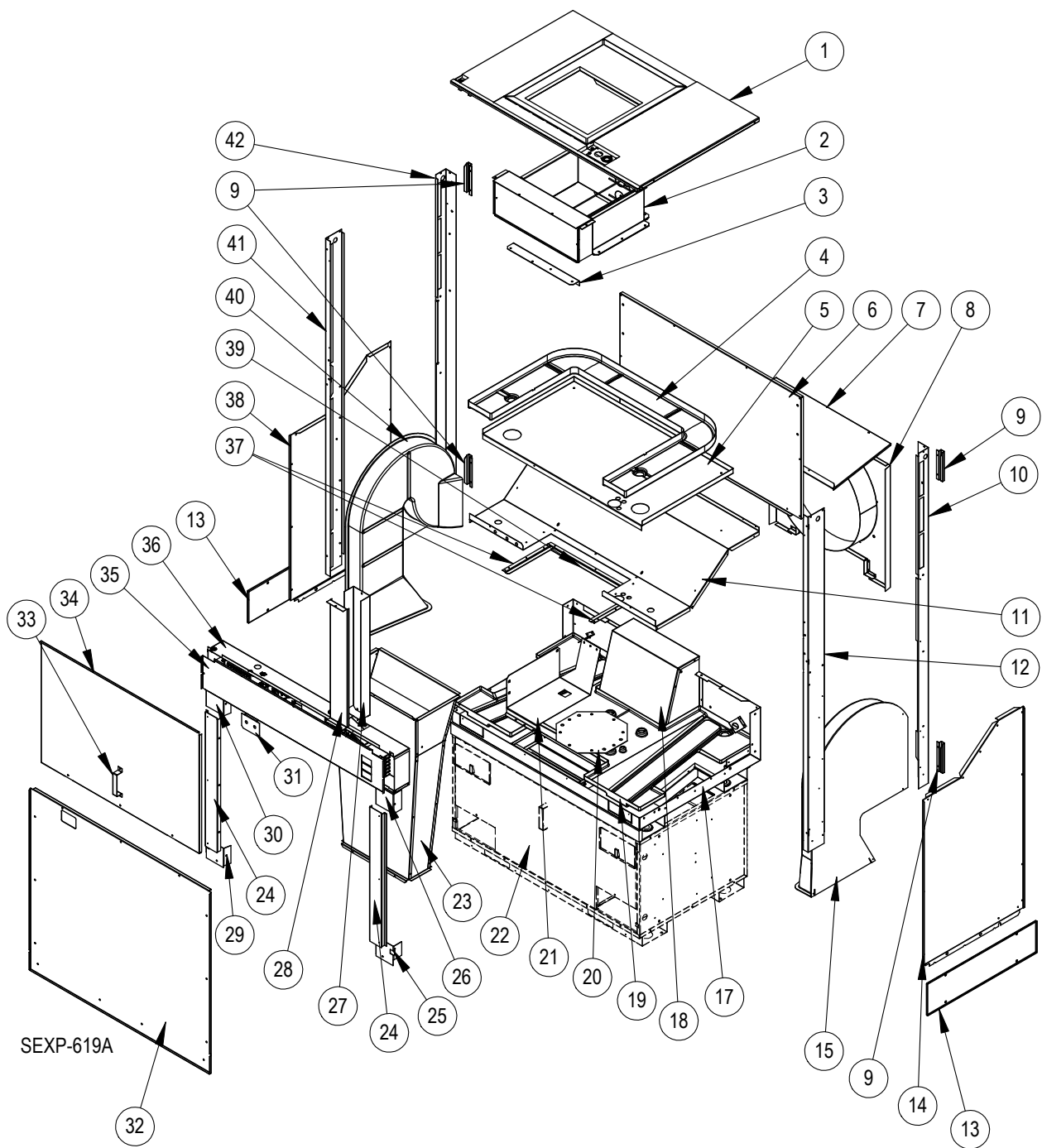
Manual: 2110-590W
Supersedes: 2110-590V
Date: 3-24-23

I**Z1 SERIES WIRING DIAGRAM MATRIX

Model	Wiring Diagram	Ventilation Package	Wiring Diagram	Heater	Wiring Diagram
I36Z1-A	4202-101	Commercial Room Ventilator	4204-103	0KW	4203-100
		Energy Recovery Ventilator	4204-104	5KW	4203-101
		Economizer	4204-105	10KW	4203-103
				15KW	4203-104
I36Z1-B	4202-201	Commercial Room Ventilator	4204-103	0KW	4203-200
		Energy Recovery Ventilator	4204-104	6KW	4203-201
		Economizer	4204-105	9KW	4203-201
				15KW	4203-202
I36Z1-C	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-300
		Energy Recovery Ventilator	4204-104	6KW	4203-301
		Economizer	4204-105	9KW	4203-301
				15KW	4203-302
I48Z1-A	4202-101	Commercial Room Ventilator	4204-103	0KW	4203-100
		Energy Recovery Ventilator	4204-104	4KW	4203-101
		Economizer	4204-105	5KW	4203-102
				10KW	4203-103
				15KW	4203-104
I48Z1-B	4202-201	Commercial Room Ventilator	4204-103	0KW	4203-200
		Energy Recovery Ventilator	4204-104	6KW	4203-201
		Economizer	4204-105	9KW	4203-201
				15KW	4203-202
				18KW	4203-202
I48Z1-C	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-300
		Energy Recovery Ventilator	4204-104	6KW	4203-301
		Economizer	4204-105	9KW	4203-301
				15KW	4203-302
				18KW	4203-302
I60Z1-A	4202-101	Commercial Room Ventilator	4204-103	0KW	4203-100
		Energy Recovery Ventilator	4204-104	4KW	4203-101
		Economizer	4204-105	5KW	4203-102
				10KW	4203-103
				15KW	4203-104
I60Z1-B	4202-201	Commercial Room Ventilator	4204-103	0KW	4203-200
		Energy Recovery Ventilator	4204-104	6KW	4203-201
		Economizer	4204-105	9KW	4203-201
				15KW	4203-202
				18KW	4203-203
I60Z1-C	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-300
		Energy Recovery Ventilator	4204-104	6KW	4203-301
		Economizer	4204-105	9KW	4203-301
				15KW	4203-302
				18KW	4203-302
I36Z1CC	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-303
		Energy Recovery Ventilator	4204-104	6KW	4203-304
		Economizer	4204-105	9KW	4203-304
				15KW	4203-305
I48Z1CC	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-303
		Energy Recovery Ventilator	4204-104	6KW	4203-304
		Economizer	4204-105	9KW	4203-304
				15KW	4203-305
I60Z1CC	4202-301	Commercial Room Ventilator	4204-103	0KW	4203-303
		Energy Recovery Ventilator	4204-104	6KW	4203-304
		Economizer	4204-105	9KW	4203-304
				15KW	4203-305
				18KW	4203-305

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CABINET COMPONENTS

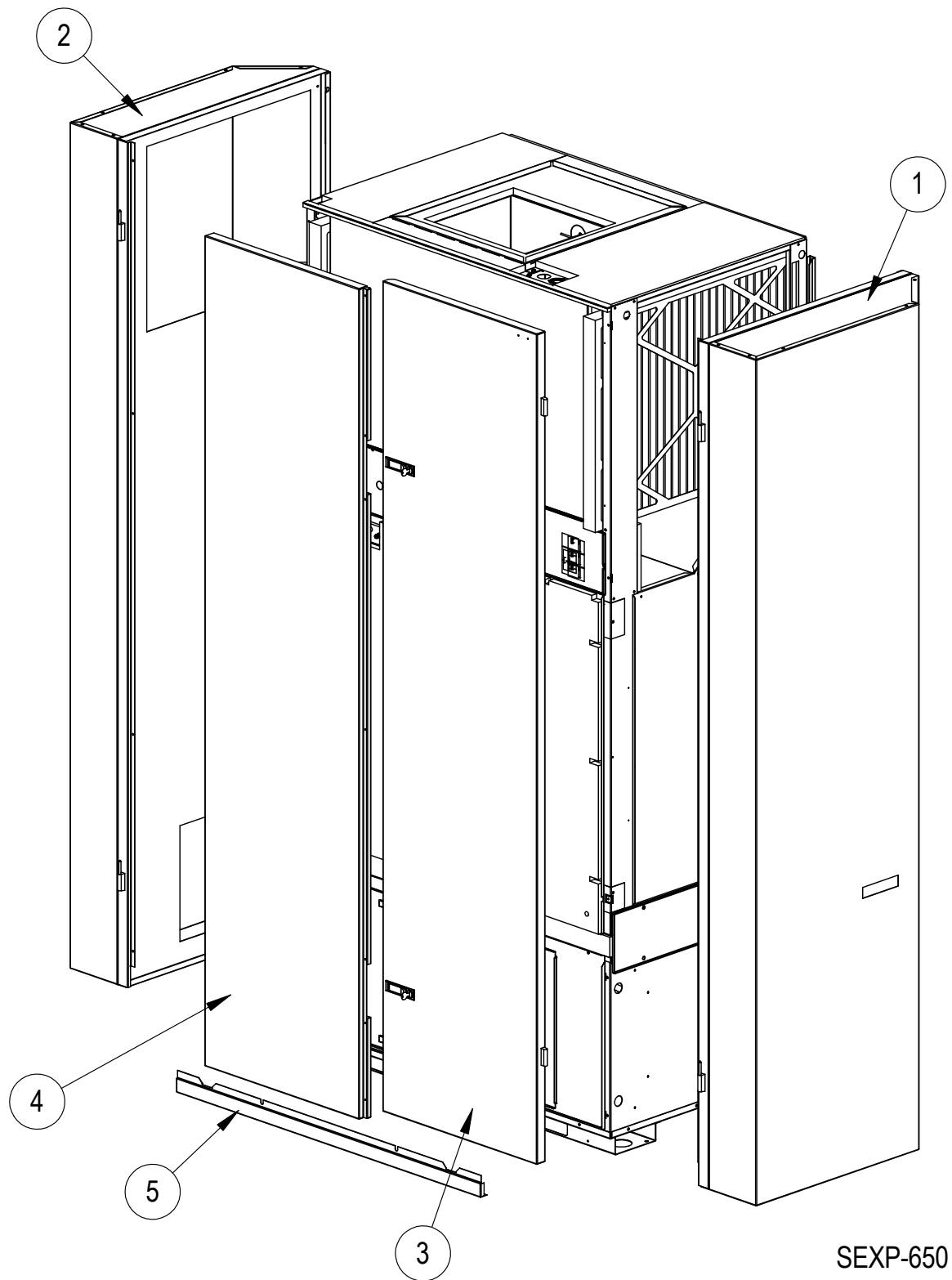


CABINET COMPONENTS

Drawing No.	Part Number	Description	All Models
1	S507-296	Top Assembly	X
2	See Heater Pkg. Section	Heater Package	X
3	105-1256	Front blower angle	X
4	6096-001	Indoor drain pan	X
5	S141-383	Evap. Coil Support	X
6	509-259-8	Unit Back Assembly	X
7	S137-641	Cond. Coil Top Fill	X
8	S125-065	Fan Shroud/Venturi Assembly	X
9	113-439	Side Bracket	4
10	S149-120	Right Rear Corner	X
11	S121-456	Condenser Partition	X
12	S149-123	Right Front Corner	X
13	113-630	Unit Connection Bracket	2
14	S101X635	Right Inner Side Panel	X
15	7001-026	Right Hand Inlet Duct (used on CRV units only)	X
17	S127-522	Condenser Base Assembly	X
18	S921-0003	Exhaust Duct Assembly	X
19	6096-009	Outdoor Drain Pan	X
20	126-417	Compressor Mounting Base	X
21	113-595	460V trans. Mtg brkt. (I36 & I48)	X
	113-449	460V trans. Mtg brkt. (I60 Only)	X
22	See Vent Section	Vent Option	X
23	511-177	Intake Duct Assembly (used on CRV units only)	X
24	S141-391	Condenser Coil Access Door	X
25	S141X390	Lower Right Condenser Coil Support	X
26	S141X389	Upper Right Condenser Coil Support	X
27	165-603	High Voltage Wire Channel	X
28	143-202	High Voltage Wire Channel Cover	X
29	S141Y390	Lower Left Condenser Coil Support	X
30	S141Y389	Upper Left Condenser Coil Support	X
31	S113-440	Dual Service Port Bracket	X
32	S553-498	Condenser Door	X
33	113-441	Door Latch Bracket	X
34	S553-496	Evaporator Door	X
35	153-755	Control Panel Door (230V Units)	X
	153-756	Control Panel Door (460V Units)	X
36	See Control Panel Section	Control Panel	X
37	103-493	Cond. Partition Side Offset	2
38	S101Y635	Left Inner Side Panel	X
39	103-494	Cond. Partition Rear Offset	X
40	7001-027	Left Hand Inlet Duct (used on CRV units only)	X
41	S149-121	Left Front Corner	X
42	S149-122	Left Rear Corner	X
NS	S113-426	Top Mounting Bracket	X

NS = Not Shown

PAINTED CABINET COMPONENTS



PAINTED CABINET COMPONENTS

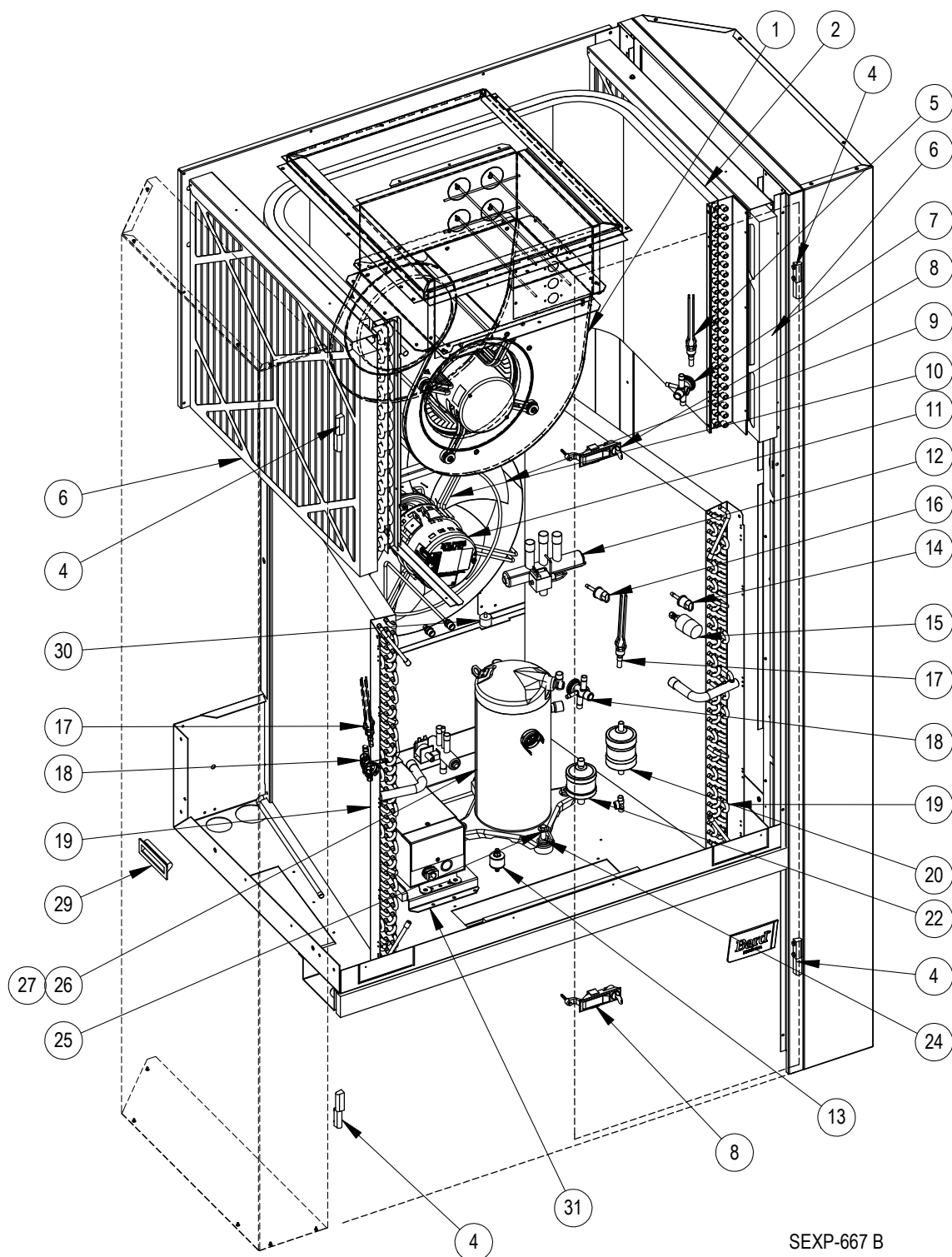
Drawing No.	Part Number	Description	All Models
1	S501-704-*	Right Side	X
2	S501-702-*	Left Side	X
3	S553-531-*	Right Front Door	X
4	S553-532-*	Left Front Door	X
5	115-206-*	Front Unit Trim	X
NS	5451-031	Hinge Spacer (Black Nylon)	2

** Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, reference the following codes:*

Beige -X
White -1
Buckeye Gray -4

NS – Not Shown

FUNCTIONAL COMPONENTS



This drawing to be used for reference for pages 9 and 10

FUNCTIONAL COMPONENTS

Drawing No.	Part Number	Description	I36Z1-A	I36Z1-B	I36Z1-C	I48Z1-A	I48Z1-B	I48Z1-C	I60Z1-A	I60Z1-B	I60Z1-C
1	5154-017-0089BX	Complete Blower Assembly	X	X	X						
1	5154-017-0114BX	See Blower Section for				X	X	X			
1	5154-018-0117BX	Individual Components							X	X	X
2	5060-168BX	Evaporator Coil	X	X	X	X	X	X			
2	5060-175BX	Evaporator Coil							X	X	X
4	5400-006	Polymide Lift-Off Hinge	4	4	4	4	4	4	4	4	4
5	5625-007	Distributor	X	X	X	X	X	X			
5	5625-008	Distributor							X	X	X
6	7004-050	MERV 8 Filter	2	2	2	2	2	2	2	2	2
6	7004-051	MERV 11 Filter	2	2	2	2	2	2	2	2	2
6	7004-053	MERV 13 Filter	2	2	2	2	2	2	2	2	2
7	5651-211	Expansion Valve	X	X	X						
7	5651-212	Expansion Valve				X	X	X			
7	5651-241	Expansion Valve							X	X	X
8	1171-063	Lockable Latch	2	2	2	2	2	2	2	2	2
9	5151-058	Fan Blade	X	X	X	X	X	X	X	X	X
10	8200-045	Fan Mount	X	X	X	X	X	X	X	X	X
11	S8105-058-0095	Programmed Outdoor Motor	X	X	X						
11	S8106-054-0113	Programmed Outdoor Motor				X	X	X			
11	S8106-054-0116	Programmed Outdoor Motor							X	X	X
12	5650-039	Reversing Valve	X	X	X						
12	5650-040	Reversing Valve				X	X	X	X	X	X
14	8406-142	High Pressure Switch	X	X	X	X	X	X	X	X	X
15	8406-112	Low Ambient Control	X	X	X	X	X	X	X	X	X
16	8406-135	Low Pressure Switch	X	X	X	X	X	X	X	X	X
17	5625-013	Distributor	2	2	2						
17	5625-007	Distributor				2	2	2	2	2	2
18	5651-217	Expansion Valve	2	2	2						
18	5651-218	Expansion Valve				2	2	2			
18	5651-200	Expansion Valve							2	2	2
19	5051-171BX	Condenser Coil	2	2	2						
19	5051-172BX	Condenser Coil				2	2	2	2	2	2
20	5201-020	Filter-Drier	X	X	X	X	X	X	X	X	X
Continued on page 10											

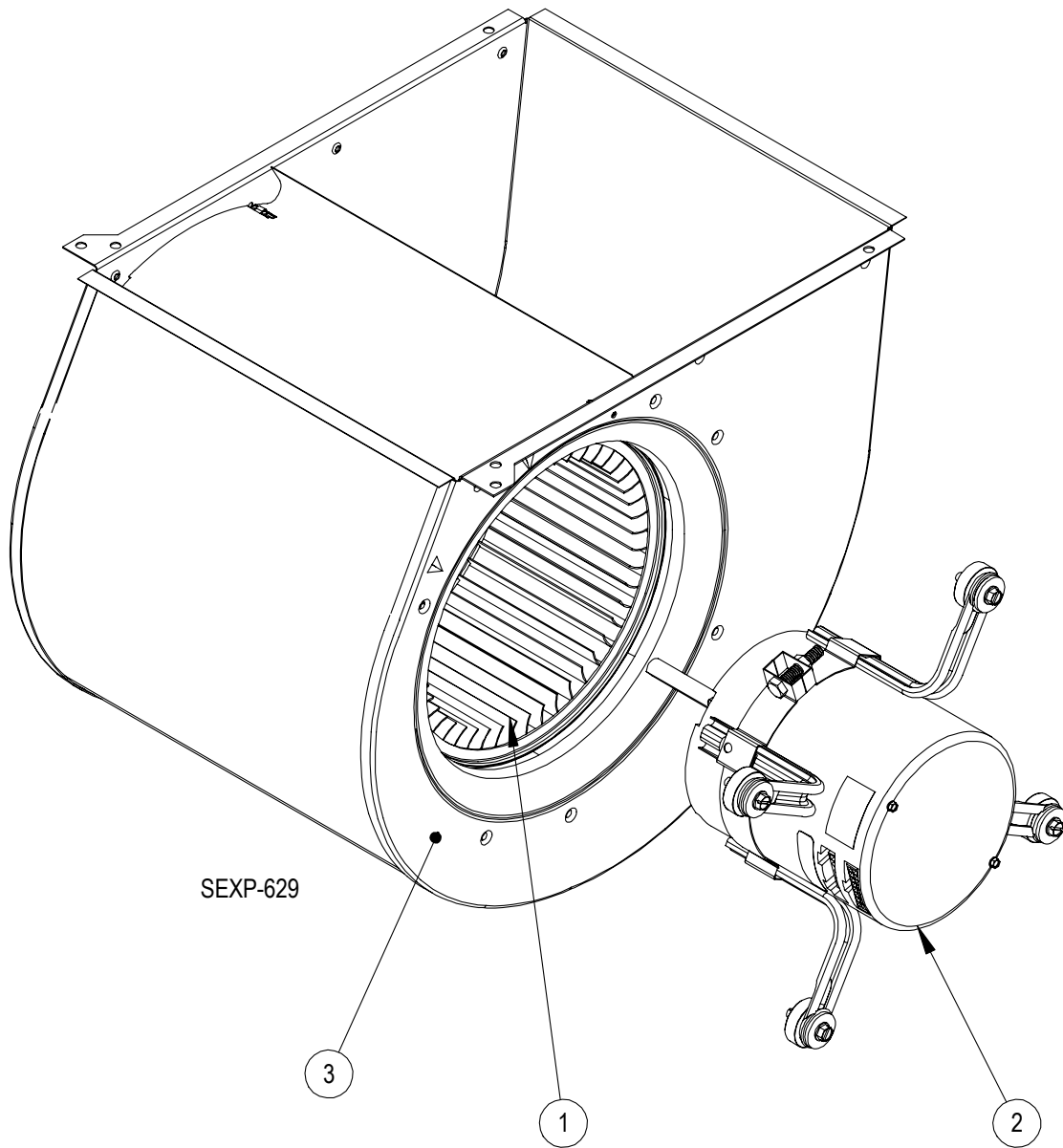
FUNCTIONAL COMPONENTS

Drawing No.	Part Number	Description	I36Z1-A	I36Z1-B	I36Z1-C	I48Z1-A	I48Z1-B	I48Z1-C	I60Z1-A	I60Z1-B	I60Z1-C
<i>Continued from page 9</i>											
22	5220-013	Pulsation Dampener / Muffler	X	X	X	X	X	X	X	X	X
24	8001-013	Compressor Grommet	4	4	4	4	4	4	4	4	4
25	1012-328	Compressor Bolt	4	4	4	4	4	4	4	4	4
26	8000-379	Compressor	X								
26	8000-380	Compressor		X							
26	8000-381	Compressor			X						
26	8000-382	Compressor				X					
26	8000-383	Compressor					X				
26	8000-384	Compressor						X			
26	8000-424	Compressor							X		
26	8000-425	Compressor								X	
26	8000-426	Compressor									X
27	8002-012	Compressor Sound Cover	X	X	X						
27	8002-013	Compressor Sound Cover				X	X	X	X	X	X
29	1171-060	Flush Plastic Door Pull	2	2	2	2	2	2	2	2	2
30	5451-018	Motor Mount Grommet	2	2	2	2	2	2	2	2	2
31	<i>See separate chart below for Item #31</i>										
NS	6094-011	3/4" Barbed Drain Pan Fitting	4	4	4	4	4	4	4	4	4
NS	6001-016	Nylon Barbed Tee	X	X	X	X	X	X	X	X	X
NS	7950-021	1" Hose Clamp	8	8	8	8	8	8	8	8	8
NS	6031-010	R-410A Tamper Resistant Cap	2	2	2	2	2	2	2	2	2
NS	910-1977	Evap. Overflow Switch Ass'y	X	X	X	X	X	X	X	X	X
NS	6031-009	Coremax Valve Core	X	X	X	X	X	X	X	X	X

With Vent			No Vent		
31	I36Z1-C	910-1881BX 2 KVA Stepdown Transformer with Base	910-1880BX 1.5 KVA Stepdown Transformer with Base		
	I48Z1-C				
	I60Z1-C	910-1814BX 3 KVA Stepdown Transformer with Base	910-1881BX 2 KVA Stepdown Transformer with Base		

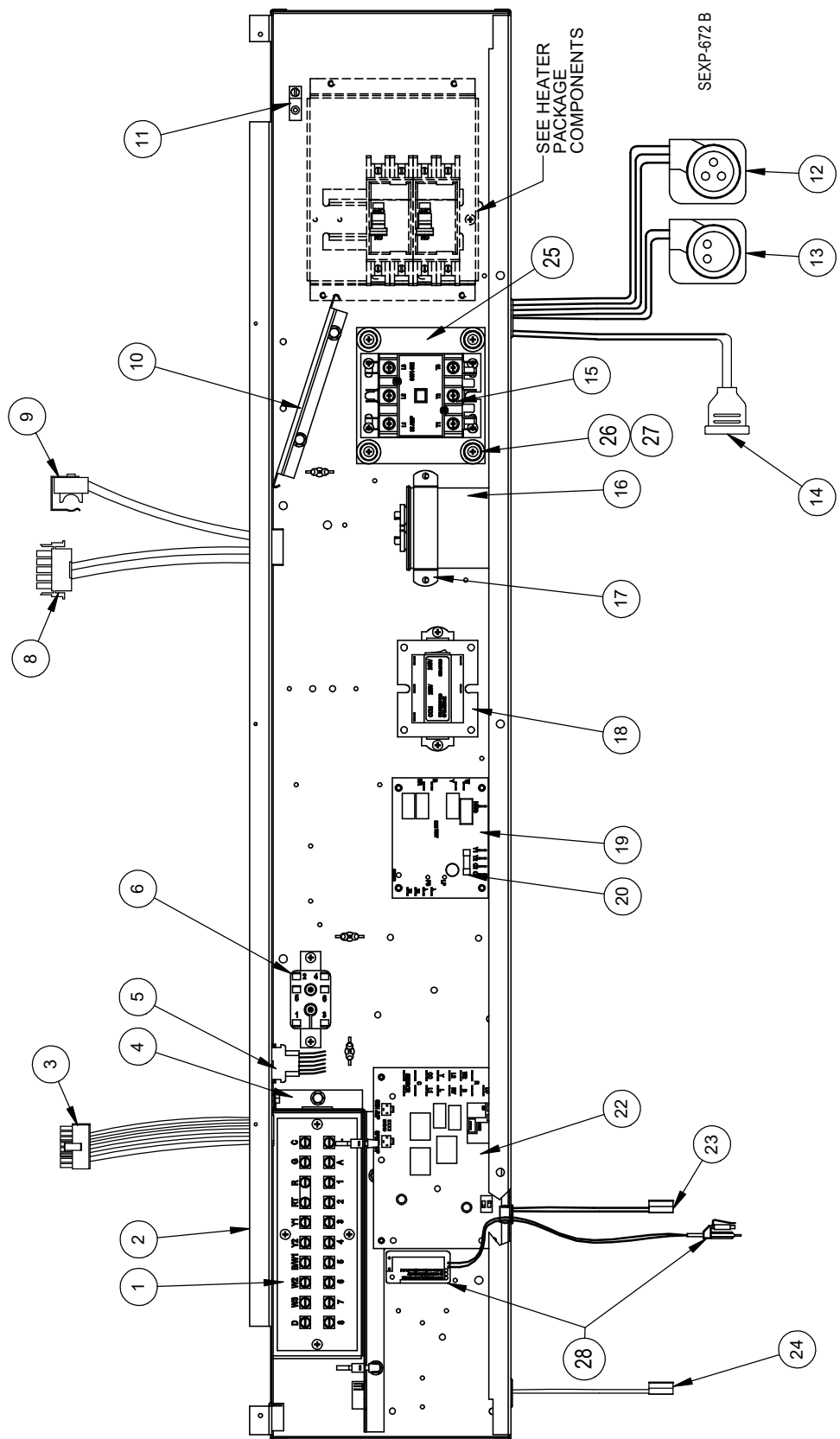
Refer to drawing on page 8

BLOWER ASSEMBLY COMPONENTS



Drawing No.	Part Number	Description	5154-017-0089 (136Z)	5154-017-0114 (148Z)	5154-018-0117 (160Z)
1	5152-049	Blower Wheel	X	X	X
2	8106-072-0089BX	1/2 HP Programmed Motor	X		
2	8106-072-0114BX	1/2 HP Programmed Motor		X	
2	8107-033-0117BX	3/4 HP Programmed Motor			X
3	151-122	Housing	X	X	X

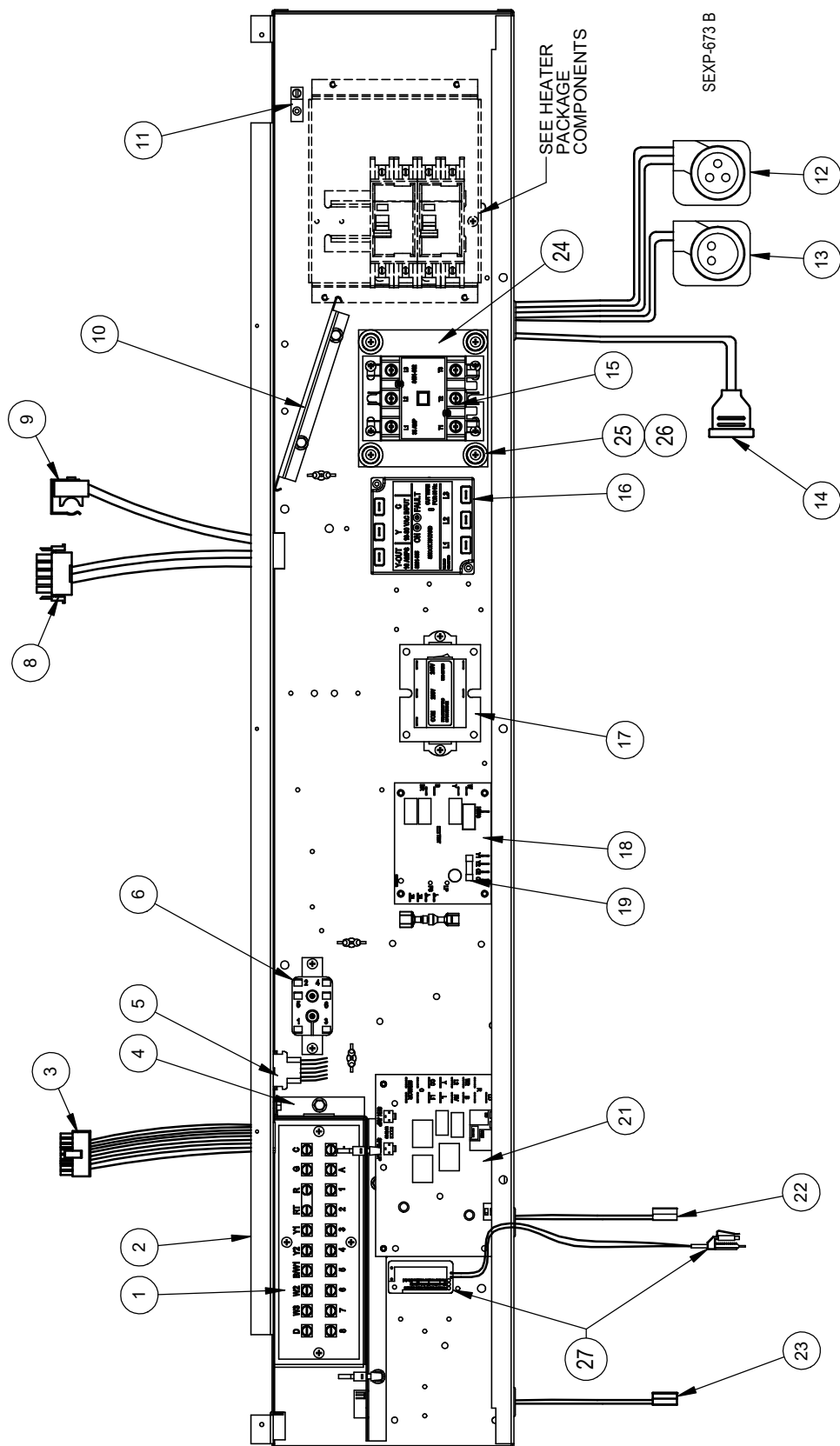
CONTROL PANEL COMPONENTS – 1 PHASE



CONTROL PANEL COMPONENTS – 1 PHASE

Drawing No.	Part Number	Description	I36Z1-A	I48Z1-A	I60Z1-A
1	8607-032	Low Voltage Terminal Strip	X	X	X
2	517-441	Control Panel	X	X	X
3	3000-1396	16 Pin 24V Indoor Blower Motor Control	X	X	X
4	117-319	Low Voltage Terminal Box	X	X	X
5	3000-1397	6 Pin Electric Heat	X	X	X
6	8201-015	Relay	X	X	X
8	3000-1398	5 Pin Indoor Blower Motor Power	X	X	X
9	8408-048	Freeze Protect Thermostat	X	X	X
10	135-417	Wire Shield	X	X	X
11	8611-006	Ground Terminal	X	X	X
12	3000-1222	Compressor Power Plug	X	X	X
13	3000-1223	Compressor Solenoid Plug	X	X	X
14	5650-044	Solenoid Valve Plug	X	X	X
15	8401-025	Contactora 2 Pole 40 Amp	X	X	X
16	8552-035	Capacitor 40MFD 370V	X		
16	8552-095	Capacitor 30MFD 370V		X	
16	8552-096	Capacitor 40MFD 440V			X
17	8550-007	Capacitor Bracket 2" Round	X		X
17	8550-006	Capacitor Bracket 1-3/4" Round		X	
18	8407-048	Transformer 75VA with Circuit Breaker	X	X	X
19	8201-166	Fan Logic Control	X	X	X
20	8614-052	3.15 Amp Fuse	X	X	X
22	8620-223	Defrost Control Board Kit (includes new sensor)	X	X	X
23	8620-225	Defrost Sensor Kit	X	X	X
24	8408-043	Fan Control Thermistor	X	X	X
25	116-332	Contactora Isolation Plate	X	X	X
26	5451-025	Rubber Grommet	4	4	4
27	5451-026	Nylon Flanged Bushing	4	4	4
28	910-1914	Overflow Switch Assembly	X	X	X

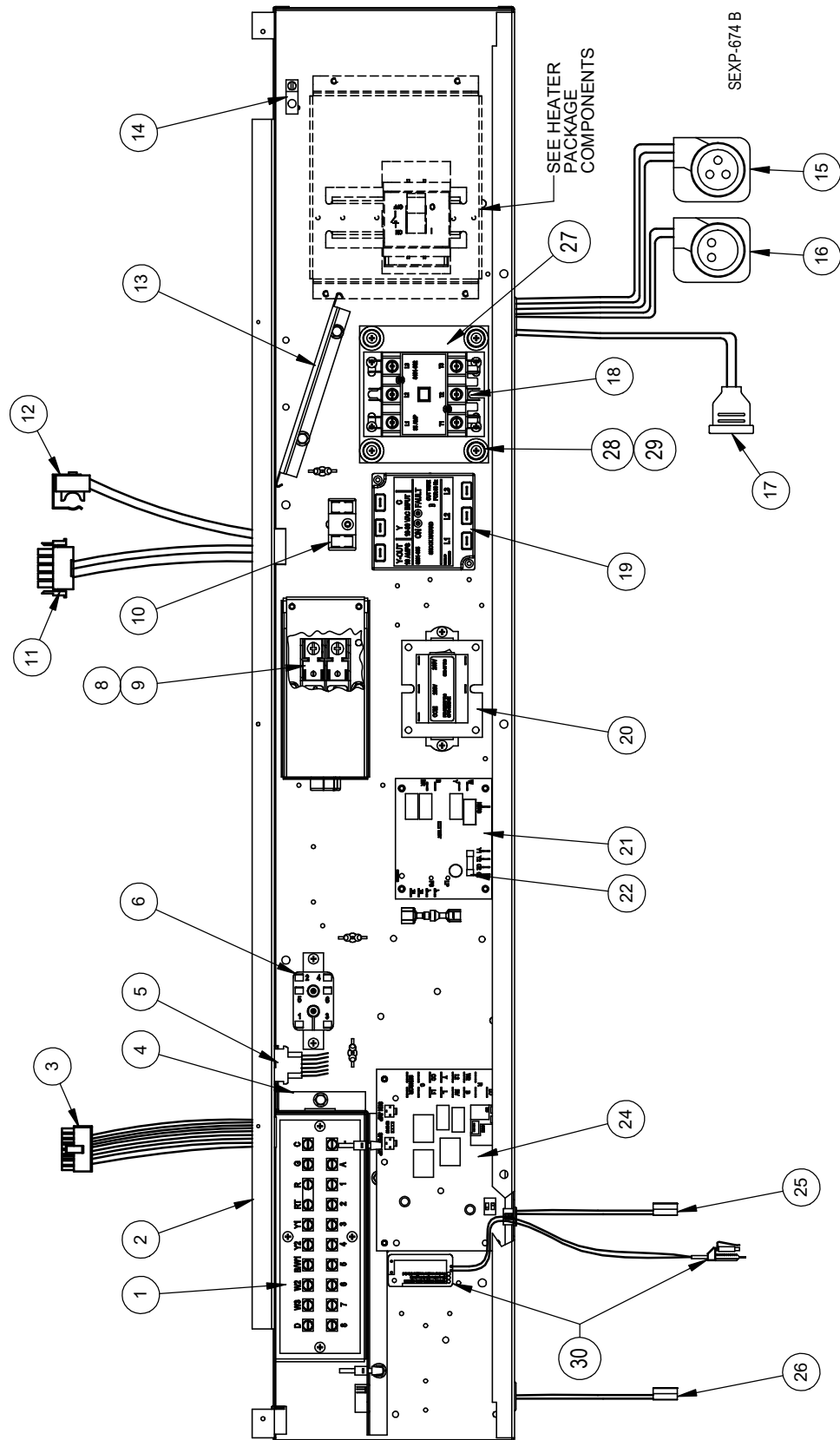
CONTROL PANEL COMPONENTS – 3 PHASE



CONTROL PANEL COMPONENTS – 3 PHASE

Drawing No.	Part Number	Description	I36Z1-B	I48Z1-B	I60Z1-B
1	8607-032	Low Voltage Terminal Strip	X	X	X
2	517-441	Control Panel	X	X	X
3	3000-1396	16 Pin 24V Indoor Blower Motor Control	X	X	X
4	117-319	Low Voltage Terminal Box	X	X	X
5	3000-1397	6 Pin Electric Heat	X	X	X
6	8201-015	Relay	X	X	X
8	3000-1398	5 Pin Indoor Blower Motor Power	X	X	X
9	8408-048	Freeze Protect Thermostat	X	X	X
10	135-417	Wire Shield	X	X	X
11	8611-006	Ground Terminal	X	X	X
12	3000-1231	Compressor Power Plug	X	X	X
13	3000-1223	Compressor Solenoid Plug	X	X	X
14	5650-044	Solenoid Valve Plug	X	X	X
15	8401-002	Contactactor 3 Pole 25 Amp	X	X	X
16	8201-174BX	3-PH Line Monitor	X	X	X
17	8407-048	Transformer 75VA with Circuit Breaker	X	X	X
18	8201-166	Fan Logic Control	X	X	X
19	8614-052	3.15 Amp Fuse	X	X	X
21	8620-223	Defrost Control Board Kit (includes new sensor)	X	X	X
22	8620-225	Defrost Sensor Kit	X	X	X
23	8408-043	Fan Control Thermistor	X	X	X
24	116-332	Contactactor Isolation Plate	X	X	X
25	5451-025	Rubber Grommet	4	4	4
26	5451-026	Nylon Flanged Bushing	4	4	4
27	910-1914	Overflow Switch Assembly	X	X	X

CONTROL PANEL COMPONENTS – 460V 3 PHASE

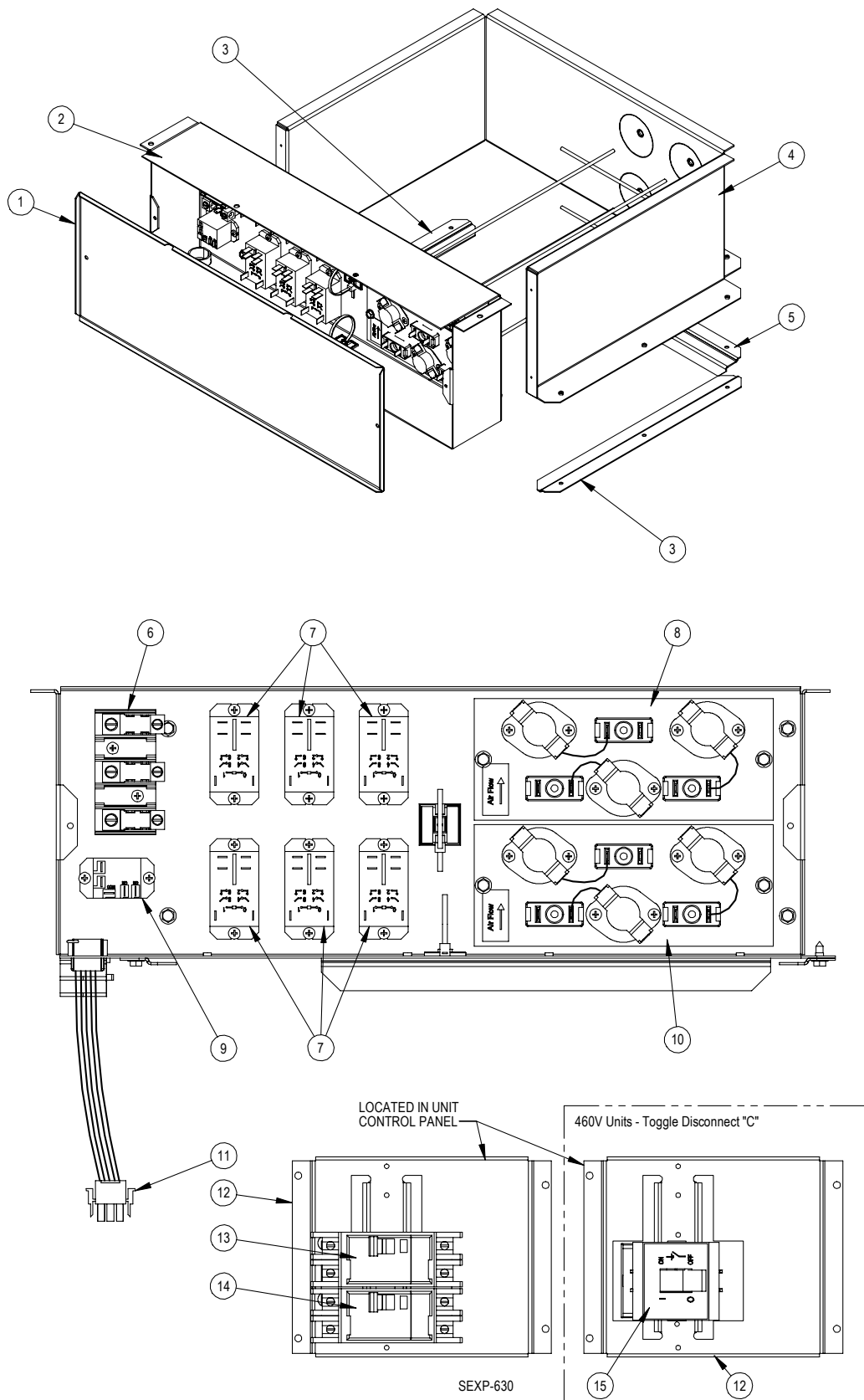


CONTROL PANEL COMPONENTS – 460V 3 PHASE

Drawing No.	Part Number	Description	I36Z1-C	I48Z1-C	I60Z1-C
1	8607-032	Low Voltage Terminal Strip	X	X	X
2	517-441	Control Panel	X	X	X
3	3000-1396	16 pin 24V Indoor Blower Motor Control	X	X	X
4	117-319	Low Voltage terminal box	X	X	X
5	3000-1397	6 Pin Elect. Heat	X	X	X
6	8201-015	Relay	X	X	X
8	8614-041	Fuse Block	X	X	X
9	See separate chart below for Item #9				
10	8607-017	Terminal Block	X	X	X
11	3000-1398	5 Pin Indoor Blower Motor Power	X	X	X
12	8408-048	Freeze Protect Thermostat	X	X	X
13	135-417	Wire Shield	X	X	X
14	8611-006	Ground Terminal	X	X	X
15	3000-1231	Compressor Power Plug	X	X	X
16	3000-1223	Compressor Solenoid Plug	X	X	X
17	5650-044	Solenoid Valve Plug	X	X	X
18	8401-002	Contactor 3 Pole 25 Amp	X	X	X
19	8201-174BX	3-PH Line Monitor	X	X	X
20	8407-048	Transformer 75VA with Circuit Breaker	X	X	X
21	8201-166	Fan Logic Control	X	X	X
22	8614-052	3.15 Amp Fuse	X	X	X
24	8620-223	Defrost Control Board Kit (includes new sensor)	X	X	X
25	8620-225	Defrost Sensor Kit	X	X	X
26	8408-043	Fan Control Thermistor	X	X	X
27	116-332	Contactor Isolation Plate	X	X	X
28	5451-025	Rubber Grommet	4	4	4
29	5451-026	Nylon Flanged Bushing	4	4	4
30	910-1914	Overflow Switch Assembly	X	X	X

With Vent			No Vent
9	I36Z1-C	(2) Part #8614-042 7A Class CC Fuse	(2) Part #8614-046 5A Class Fuse
	I48Z1-C	(2) Part #8614-042 7A Class CC Fuse	(2) Part #8614-046 5A Class CC Fuse
	I60Z1-C	(2) Part #8614-043 10A Class CC Fuse	(2) Part #8614-042 7A Class CC Fuse

ELECTRIC HEATER COMPONENTS



ELECTRIC HEATER COMPONENTS

Drawing No.	Part Number	Description	I36Z1-A0Z	I36Z1-A05	I36Z1-A10	I36Z1-A15	I48Z1-A0Z	I48Z1-A04	I48Z1-A05	I48Z1-A10	I48Z1-A15	I48Z1-A20	I60Z1-A0Z	I60Z1-A05	I60Z1-A10	I60Z1-A15	I60Z1-A20
1	143-148	Heater Box Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	117-313	Heater Front Plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	103-486	Side Blower Offset	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	117-307	Heater Wrapper	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	103-487	Rear Blower Angle	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
7	8401-036	Contactor 2-Pole 30A		X	2	3		X	X	2	3	4		X	2	3	4
8	142-159	Heater Blank Off Plate	X	X	X		X	X	X	X			X	X	X		
8	8604-135	Heat Strip 5KW				X					X					X	
8	8604-136	Heat Strip 10KW										X					X
9	8201-130	Relay		X	X	X		X	X	X	X	X		X	X	X	X
10	142-159	Heater Blank Off Plate	X				X						X				
10	8604-135	Heat Strip 5KW		X					X					X			
10	8604-136	Heat Strip 10KW			X	X				X	X	X			X	X	X
10	8604-134	Heat Strip 4KW						X	X								
11	3003-097	6-Pin Electric Heater Wire Harness		X				X	X					X			
11	3003-099	6-Pin Electric Heater Wire Harness			X					X					X		
11	3003-101	6-Pin Electric Heater Wire Harness				X					X					X	
11	3003-108	6-Pin Electric Heater Wire Harness										X					X
12	127-418	Circuit Breaker Base	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
13	8615-037	Circuit Breaker 30A 2-Pole							X					X			
13	8615-041	Circuit Breaker 60A 2-Pole			X	X				X	X	X			X	X	X
14	8615-040	Circuit Breaker 50A 2-Pole					X		X								
14	8615-055	Circuit Breaker 40A 2-Pole	X		X	X											
14	8615-041	Circuit Breaker 60A 2-Pole		X				X				X	X	X	X	X	X
14	8615-039	Circuit Breaker 45A 2-Pole								X	X						

NS = Not Shown

ELECTRIC HEATER COMPONENTS

Drawing No.	Part Number	Description	I36Z1-B0Z	I36Z1-B06	I36Z1-B09	I36Z1-B15	I48Z1-B0Z	I48Z1-B06	I48Z1-B09	I48Z1-B15	I48Z1-B18	I60Z1-B0Z	I60Z1-B06	I60Z1-B09	I60Z1-B15	I60Z1-B18
1	143-148	Heater Box Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	117-313	Heater Front Plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	103-486	Side Blower Offset	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	117-307	Heater Wrapper	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	103-487	Rear Blower Angle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	8607-014	Terminal Block									X					X
7	8401-036	Contact 2-Pole 30A		3	3	6		3	3	6	6		3	3	6	6
8	142-159	Heater Blank Off Plate	X	X	X		X	X	X			X	X	X		
8	8604-137	Heat Strip 6KW				X				X					X	
8	8604-138	Heat Strip 9KW									X					X
9	8201-130	Relay		X	X	X		X	X	X	X		X	X	X	X
10	142-159	Heater Blank Off Plate	X				X					X				
10	8604-137	Heat Strip 6KW		X				X					X			
10	8604-138	Heat Strip 9KW			X	X			X	X	X			X	X	X
11	3003-103	6-Pin Electric Heater Wire Harness		X	X			X	X				X	X		
11	3003-105	6-Pin Electric Heater Wire Harness				X				X	X				X	X
12	127-418	Circuit Breaker Base		X	X	X	X	X	X	X	X	X	X	X	X	X
13	8615-046	Circuit Breaker 60A 3-Pole				X				X					X	X
14	8615-042	Circuit Breaker 35A 3-Pole					X									
14	8615-052	Circuit Breaker 30A 3-Pole	X													
14	8615-044	Circuit Breaker 45A 3-Pole		X		X				X		X			X	X
14	8615-045	Circuit Breaker 50A 3-Pole			X			X								
14	8615-046	Circuit Breaker 60A 3-Pole							X		X		X	X		

NS = Not Shown

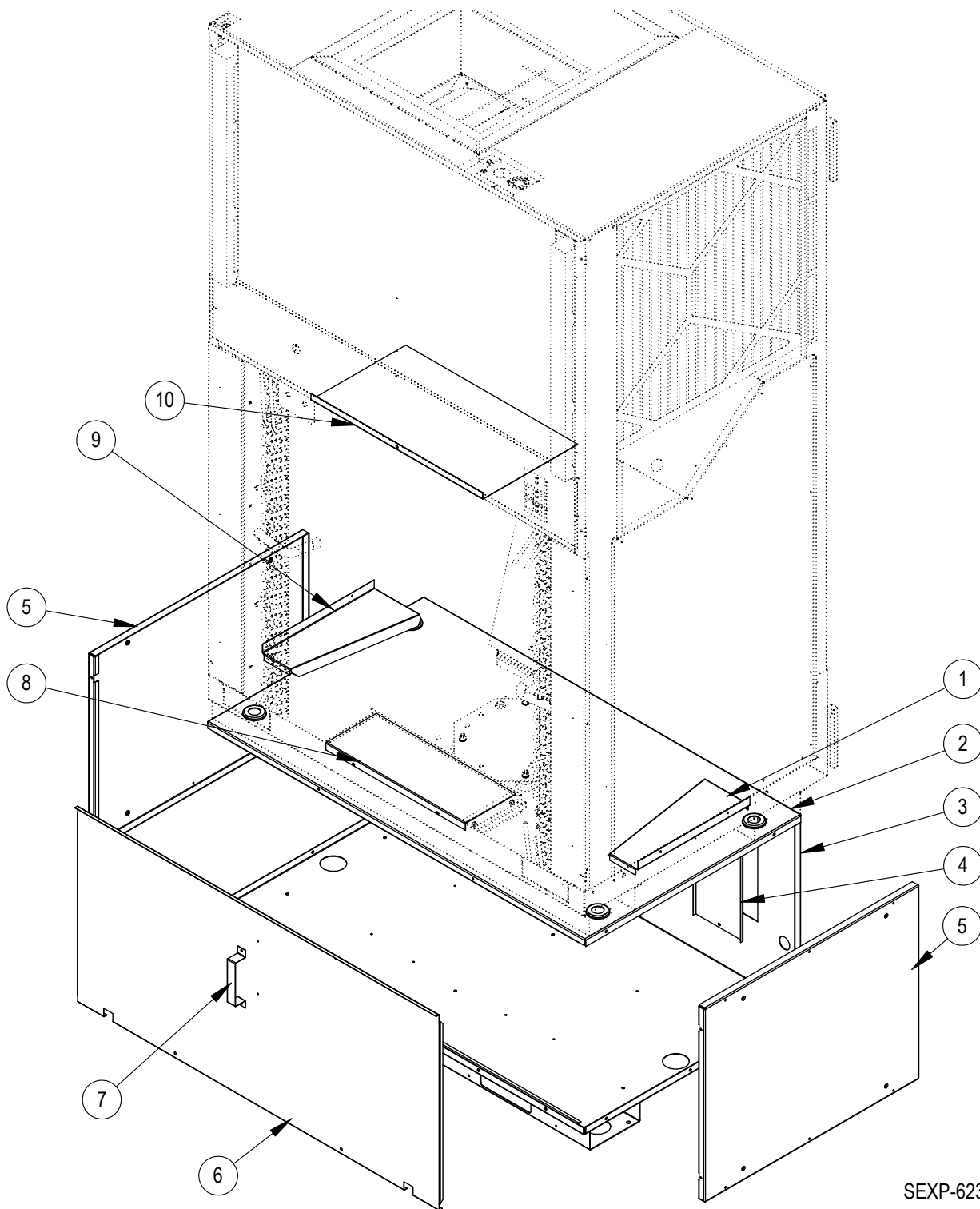
ELECTRIC HEATER COMPONENTS

Drawing No.	Part Number	Description	I36Z1-C0Z	I36Z1-C06	I36Z1-C09	I36Z1-C15	I48Z1-C0Z	I48Z1-C06	I48Z1-C09	I48Z1-C15	I48Z1-C18	I60Z1-C0Z	I60Z1-C06	I60Z1-C09	I60Z1-C15	I60Z1-C18
1	143-148	Heater Box Cover	X	X	X	X	X	X	X	X	X	X	X	X	X	X
2	117-313	Heater Front Plate	X	X	X	X	X	X	X	X	X	X	X	X	X	X
3	103-486	Side Blower Offset	2	2	2	2	2	2	2	2	2	2	2	2	2	2
4	117-307	Heater Wrapper	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5	103-487	Rear Blower Angle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	8607-014	Terminal Block				X									X	
7	8401-036	Contactor 2-Pole 30A		2	2	6		2	2	6	4		2	2	6	4
8	142-159	Heater Blank Off Plate	X	X	X		X	X	X			X	X	X		
8	8604-139	Heat Strip 6KW				X				X					X	
8	8604-140	Heat Strip 9KW														X
9	8201-130	Relay		X	X	X		X	X		X	X	X			X
10	142-159	Heater Blank Off Plate	X				X					X				
10	8604-139	Heat Strip 6KW		X				X					X			
10	8604-140	Heat Strip 9KW			X	X			X	X	X			X	X	X
11	3003-099	6-Pin Electric Heater Wire Harness		X	X			X	X				X	X		
11	3003-108	6-Pin Electric Heater Wire Harness				X				X	X				X	X
12	127-418	Circuit Breaker Base	X	X	X	X	X	X	X	X	X	X	X	X	X	X
14	See separate chart below for Item #14															
15	8615-067	Toggle Disconnect 40A 460V	X	X	X	X	X	X	X	X	X	X	X	X	X	X

NS = Not Shown

			I36Z1CC0Z	I36Z1CC06	I36Z1CC09	I36Z1CC15	I48Z1CC0Z	I48Z1CC06	I48Z1CC09	I48Z1CC15	I48Z1CC18	I60Z1CC0Z	I60Z1CC06	I60Z1CC09	I60Z1CC15	I60Z1CC18
14	8615-062	Circuit Breaker 15A	X													
	8615-063	Circuit Breaker 20A		X			X					X				
	8615-064	Circuit Breaker 25A			X											
	8615-065	Circuit Breaker 30A				X		X	X	X	X		X	X	X	X

VENT BOX (ONLY) COMPONENTS

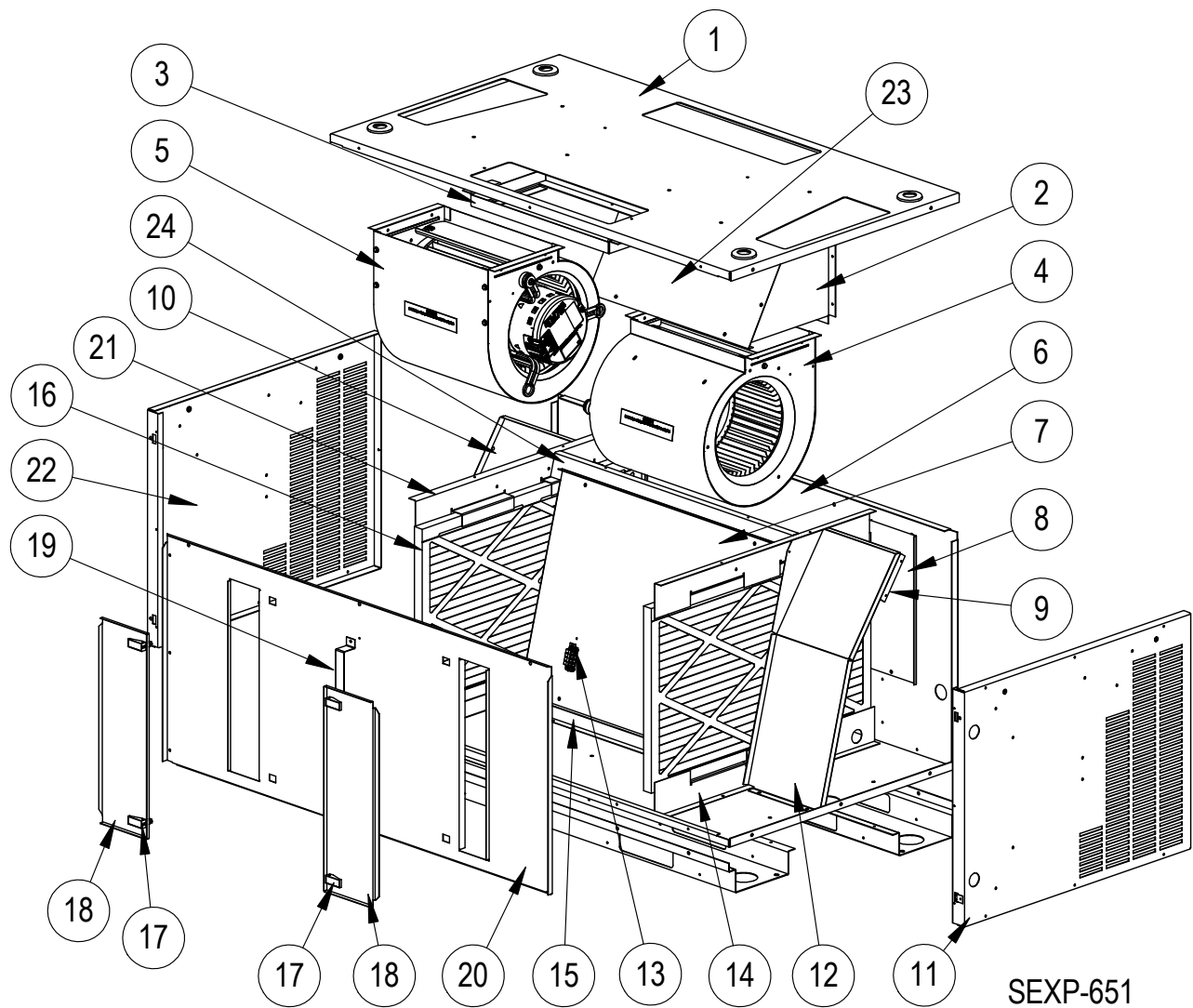


SEXP-623

VENT BOX (ONLY) COMPONENTS

Drawing No.	Part Number	Description	Vent Box Only
1	S143X164	Right Side Intake Fill	X
2	507-298	Vent Box Top	X
3	S527-563	Vent Box Base	X
4	543-158	Drain Access Plate	2
5	S501-639	Vent Box Side	2
6	553-508	Vent Box Door	X
7	113-441	Door Latch Bracket	X
8	S143-160	Lower Intake Fill	X
9	S143Y164	Left Side Intake Fill	X
10	S143-161	Upper Intake Fill	X

CRV COMPONENTS

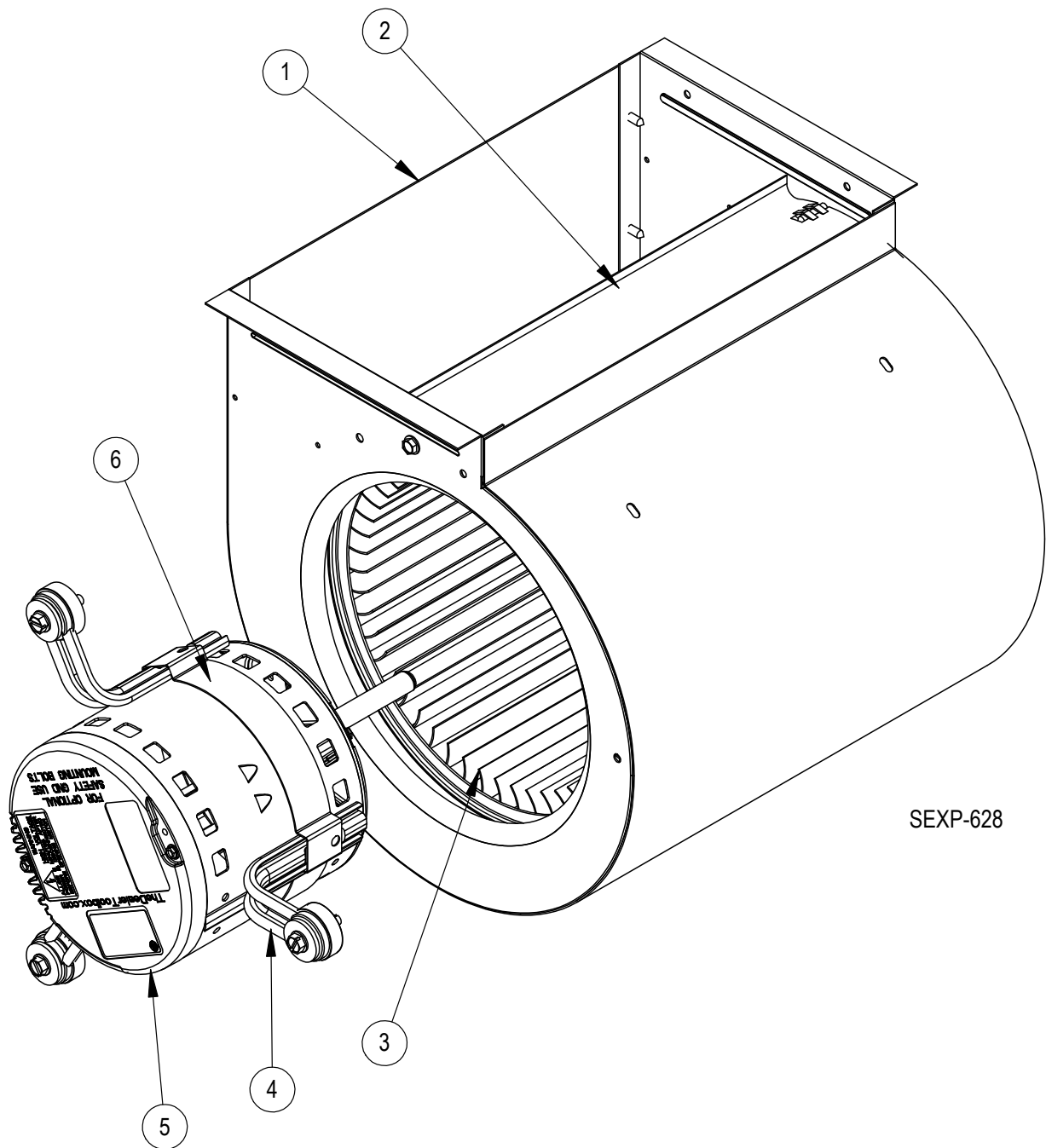


CRV COMPONENTS

Drawing No.	Part Number	Description	No. Required
1	S507-297	Vent Box Top	1
2	103-489	Rear Blower Offset	1
3	103-488	Front Blower Offset	1
4	900-318-003	Exhaust Blower Assy	1
5	900-318-004	Intake Blower Assy	1
6	S527-563	Vent Box Base	1
7	521-476	Center Partition	1
8	543-158	Drain Access Plate	2
9	105-1290	Partition Angle	2
10	521-477	Left Side Partition	1
11	501-706	Right Side	1
12	521-478	Right Side Partition	1
13	S910-1809	Terminal Block Assembly	1
14	113-477	Lower Filter Bracket	2
15	105-1291	Lower Partition Support Angle	1
16	7004-011	16 X 25 Filter	2
17	1171-053	Swell Latch	4
18	553-534	Filter Door	2
19	113-441	Door Latch Bracket	1
20	553-533	Blower Door	1
21	113-478	Upper Filter Bracket	2
22	501-707	Left Side	1
23	137-671	Rear Blower Fill Plate	1
24	105-1292	Upper Partition Support Angle	1

NS = Not Shown

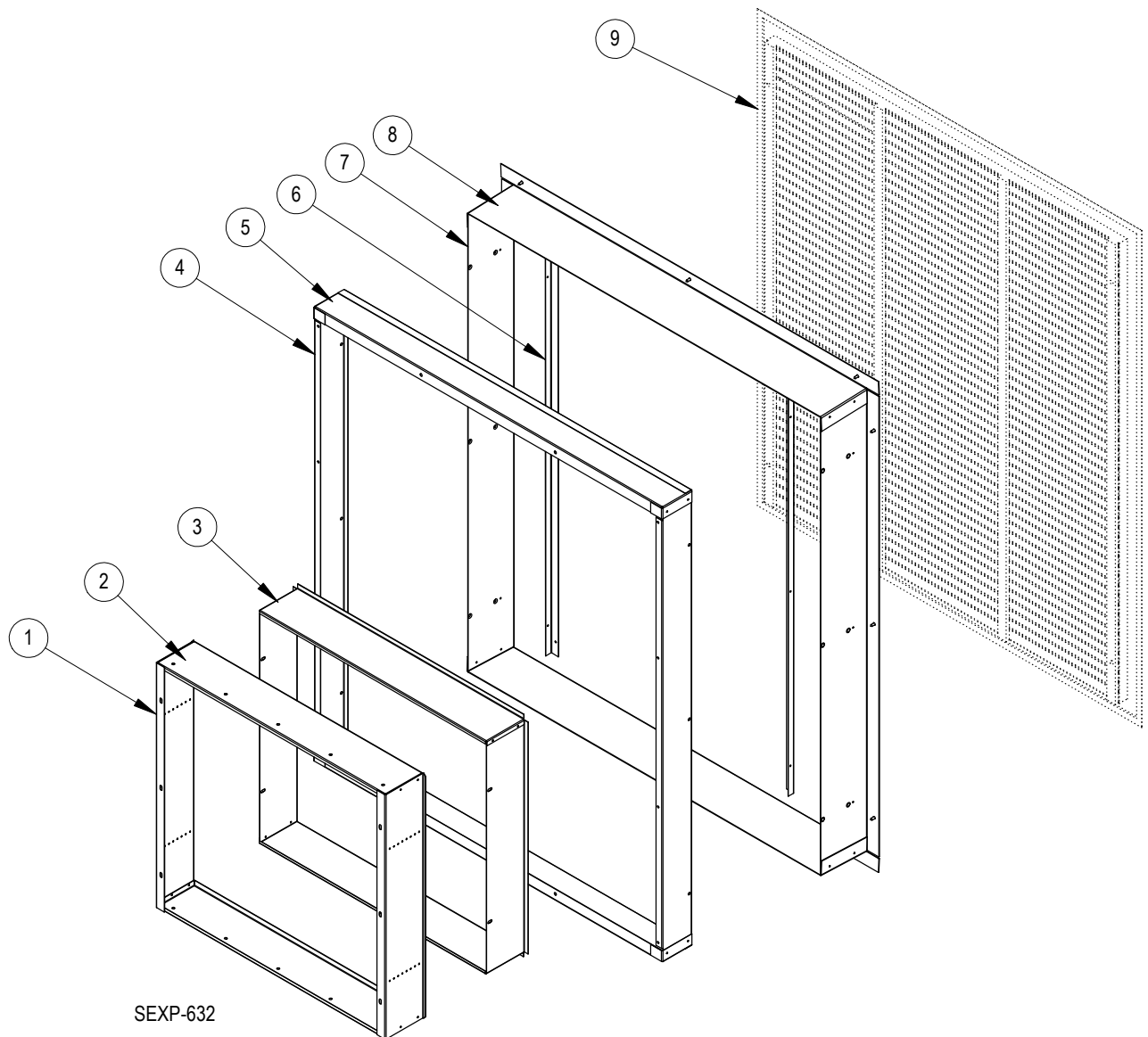
CRV BLOWER COMPONENTS



CRV BLOWER COMPONENTS

Drawing No.	Part Number	Description	900-318-003	900-318-004
1	151-124	Blower Housing	X	X
2	144-129	Diffuser	X	X
3	5152-067	Blower Wheel	X	X
4	8200-046	Motor Mount Arm	3	3
5	S8105-056-0112	1/3 HP Programmed Motor – CRV Exhaust		X
5	S8105-056-0111	1/3 HP Programmed Motor – CRV Intake	X	
6	8620-034	Motor Mount Band	X	X

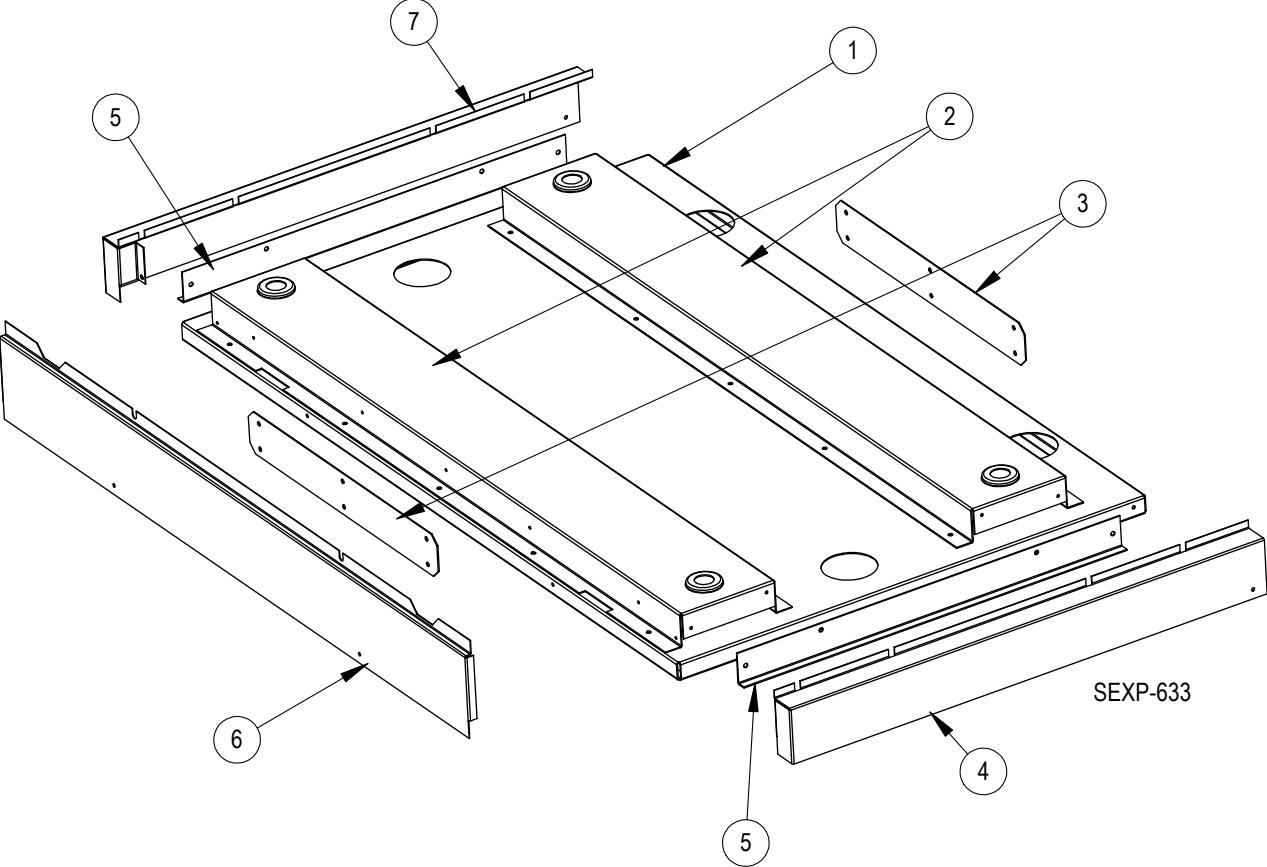
SLEEVE COMPONENTS



SLEEVE COMPONENTS

Drawing No.	Part Number	Description	IWS-A	IWS-B	IWS-C
1	S111-188-8 4½" Deep	Outer Sleeve Side	X		
1	S111-195-8 7" Deep	Outer Sleeve Side		X	
1	S111-202-8 12" Deep	Outer Sleeve Side			X
2	S111-187-8 4½" Deep	Outer Sleeve End	X		
2	S111-194-8 7" Deep	Outer Sleeve End		X	
2	S111-201-8 12" Deep	Outer Sleeve End			X
3	111-189-8 4½" Deep	Inner Fan Sleeve Side	2		
3	111-196-8 7" Deep	Inner Fan Sleeve Side		2	
3	111-203-8 12" Deep	Inner Fan Sleeve Side			2
4	111-186-8 3½" Deep	Inner Sleeve Side	X		
4	111-193-8 6" Deep	Inner Sleeve Side		X	
4	111-200-8 11" Deep	Inner Sleeve Side			X
5	111-185-8 3½" Deep	Inner Sleeve End	X		
5	111-192-8 6" Deep	Inner Sleeve End		X	
5	111-199-8 11" Deep	Inner Sleeve End			X
6	105-1257-8	Grille Support Angle	2	2	2
7	111-184-8 5½" Deep	Outer Sleeve Side	X		
7	111-191-8 8" Deep	Outer Sleeve Side		X	
7	111-198-8 13" Deep	Outer Sleeve Side			X
8	111-183-8 5½" Deep	Outer Sleeve End	X		
8	111-190-8 8" Deep	Outer Sleeve End		X	
8	111-197-8 13" Deep	Outer Sleeve End			X
9	ILG-10	Outdoor Louver Grille - Clear anodized	X	X	X
9	ILG-20	Outdoor Louver Grille - Medium Bronze	X	X	X
9	ILG-30	Outdoor Louver Grille - Dark Bronze	X	X	X

RISER PLATFORM COMPONENTS



RISER PLATFORM COMPONENTS

Drawing No.	Part Number	Description	IRPZA-3-*	IRPZA-6-*
1	127-420-X	Base Plate	X	X
2	141-480 3"	Base Rail	2	
2	141-479 6"	Base Rail		2
3	112-447	Base Connection Plate		
4	135-311-* 3"	Right Side Trim		
4	135-314-* 6"	Right Side Trim		
4	135-352-x	Right Side Trim	X	
4	135-353-x	Right Side Trim		X
5	105-1263 3"	Side Support Angle	2	
5	105-1264 6"	Side Support Angle		2
6	135-309-* 3"	Front Trim	X	
	135-312-* 6"	Front Trim		X
7	135-310-* 3"	Left Side Trim		
7	135-313-* 6"	Left Side Trim		
7	135-351-x	Left Side Trim	X	
7	135-354-x	Left Side Trim		X

* Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, reference the following codes:

Beige -X
 White -1
 Buckeye Gray -4



Limited Warranty

**For units applied within the United States, Puerto Rico,
US Virgin Islands, Guam, Canada and Mexico**

Limited Warranty To Original Purchaser:

Bard Manufacturing Company, Inc. Bryan, Ohio 43506 warrants to you, the original purchaser, that your Bard product will be free from defects in materials and workmanship when used under normal conditions from the installation date through the time periods outlined in the "Duration of Warranty" section (see reverse side).

Proof Of Purchase:

You must be able to show us the date on which you purchased your product when you make a claim under this warranty. Your owner's registration card filed online at www.wallmountwarranty.com or your contractor's invoice, bill of sale, or similar document is sufficient at time of warranty claim. This must be registered within 90 days of installation. If you can not show us the actual date of purchase, the time periods in this warranty will start on the date that we shipped your Bard product from our factory.

What This Warranty Does Not Cover: (Also see Duration of Warranty on reverse side.)

This warranty does not cover defects or damage caused by:

1. Alterations not approved by Bard; improper installation (including over or under sizing), improper repairs, or servicing; or improper parts and accessories not supplied by Bard.
2. Misuse or failure to follow installation and operating instructions (including failure to perform preventative maintenance) or limitations on the rating plate. This includes failure to use low ambient controls on all applications requiring compressor operation in cooling mode below 60F outdoor ambient.
3. Any corrosion from operation in a corrosive atmosphere (examples: acids, halogenated hydrocarbons or environmental conditions).
4. Parts that must be replaced periodically (such as filters, mist eliminators, ERV belts, pile seals, etc.).
5. Improper fuel or electrical supply (such as low voltage, voltage transients, power interruption, and units on generators with no brownout protection).
6. Accidents or other events beyond our reasonable control (such as storm, fire, or transportation damage).
7. Defects that happen after
 - (a) Anyone has tampered with the product.
 - (b) The product has been improperly serviced according to accepted trade practices;
 - (c) The product has been moved from its original place of installation; or,
 - (d) The product has been damaged by an event beyond Bard's control (See also No. 5 above).
8. Consequential damages (such as increased living expenses while the product is being repaired). Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.
9. This warranty has certain limitations for units installed on over-the-road trucks, vans and trailers. (See reverse side.)
10. Cost of service call at installation site to diagnose causes of trouble, labor to replace defective component or transportation costs for replacement parts.
11. This Limited Warranty does not apply to products installed or operated outside of the US, Puerto Rico, US Virgin Islands, Guam, Canada and Mexico. Units operated in coastal areas where the operating environment is exposed to airborne saline particles (typically 5 miles from coast line) must have corrosion protection or warranty claims will be declined on corrosion-based cabinet and part failures.
12. Bard does not endorse, approve or certify any online sales of its products through auction websites, online retailers, liquidators or any other method of online sales direct to consumers. Bard will not honor the factory warranty of any Bard equipment purchased over the Internet.

Your Responsibilities:

You are responsible for

1. Preventative maintenance of the product (such as cleaning coils and replacement of filters, nozzles and other consumable parts).
2. Ensuring that the instruction manual is followed for care and use of your product.
3. Ensuring that your product is installed by a competent, qualified contractor, following all local and national codes, and industry standards.

What Bard Will Do About A Defect:

Bard will either repair or replace the defective part only. Replacement parts may be reconditioned parts. The warranty for the repaired or replaced part will last only for the remainder of the warranty period for the original part.

Defective parts must be supplied to a Bard distributor who will then submit a parts warranty claim form. Credits are issued to the Bard distributor.

Bard will not pay or be responsible for labor or defective/replacement part transportation costs or delays in repairing or failures to complete repairs caused by events beyond our reasonable control.

What You Must Do

1. Tell your heating and air conditioning contractor as soon as you discover a problem and have the contractor make repairs.
2. Pay for all transportation, related service labor, diagnostic charges, refrigerant, refrigerant recovery and related items.

Service

If your product requires service, you should contact the contractor who installed it or the contractor that has been providing the product's preventative maintenance and repair service. You may find the installing contractor's name on the product or in your Owner's packet. If you do not know who that is, you should contact a competent, qualified contractor to make the repairs. If in doubt, you should contact the nearest distributor that handles Bard products (www.bardhvac.com). Please note that contractors and distributors that handle Bard products are independent contractors and distributors, and therefore, are not under the direction of Bard Manufacturing Company, Inc.

Only Warranty

There are no other express warranties. All implied warranties are limited in duration to the duration of the applicable written warranty made above.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitation or exclusion may not apply to you.

Duration Of Warranty is limited to defects arising during the periods shown in the following table:

Model Number Series:	— Number of Years from Installation Date ① —			
	Compressor ④	Sealed System Components ② ④ ⑤	All Other Functional Parts ③	Heat Exchangers
AIR CONDITIONERS W12A, W18A, W24A, W30A, W36A, W42A, W48A, W60A, W72A, W090A, W120A, W150, W180A, W18L, W24L, W30L, W36L, W3SA, W4SA, W5SA, Q36A, Q42A, Q48A, I30A, I36A, I42A, I48A, I60A	5	5	5	N/A
AIR SOURCE HEAT PUMPS W18H, W24H, W30H, W36H, W42H, W48H, W60H, C24H, C30H, C36H, C42H, C48H, C60H, T24H, T30H, T36H, T42H, T48H, T60H, T24S, T30S, T36S, T42S, T48S, T60S, Q24H, Q30H, Q36H, Q43H, Q48H, I30H, I36H, I42H, I48H, I60H, I36Z, I48Z, I60Z	5	5	5	N/A
ENVIRONMENTAL CONTROL UNITS W6RV, W6LV	5	5	1	N/A
AGRICULTURAL UNITS A36C and all HVAC equipment used in this application.	5	5	1	N/A
EQUIPMENT SHELTER UNITS MULTI-TEC, MEGA-TEC, FUSION-TEC, and all HVAC equipment used in this application.	5	5	1	N/A
GEOHERMAL/WATER SOURCE HEAT PUMPS QW2S, QW3S, QW4S, QW5S, QC50 (No Compressor)	5	5	5	N/A
GAS/ELECTRIC WALL-MOUNT W24G, W30G, W36G, W42G, W48G, W60G, WG3S, WG4S, WG5S	5	5	5	10
ACCESSORIES Factory/Field Installed Bard Ventilation and Heater Packages, Bard branded Thermostats/ Temperature Controllers, UV-C LED Light Kits, LC6000, LV1000, MC4002, DC3003, TEC40, BG1000, PGD, PGDX, MC5300, MC5600, Humidistats, CO2 Controllers, add-on controller/thermostat cards and all other field-installed accessories not listed separately	N/A N/A N/A N/A	N/A N/A N/A N/A	5 5 1 1	N/A N/A N/A N/A

① For equipment that does not have an online warranty registration, the warranty period starts when the product was shipped from the factory.

② Heat transfer coils (refrigerant to air coils for air source and coaxial coils for water source units) are covered for leaks for 5 years. Physical damage to air side coils resulting in leaks or insufficient airflow, or fin deterioration due to corrosive atmosphere (such as acids, halogenated hydrocarbons, agricultural or coastal environmental conditions) are not covered. Leaks in coaxial coils due to freezing of the coils are not covered. Copper coaxial coils for QW are not warranted for ground water/open loop installations.

③ Functional parts warranty is 1 year for all telecommunication, electric switch stations, pump stations, agricultural use, and similar applications. This also applies to all OTR (over the road) applications.

④ All OTR (over the road) applications that are moved from one location to another:

Factory Warranty applies up to the point of initial start-up and test at all OEM manufacturing locations or subsequent outfitting facility. Once it goes into OTR service, the warranty expires immediately for compressor and sealed system components. This OTR exemption does not apply to relocatable classrooms, construction, or office trailers.

⑤ Factory-coated coils have a "5" year warranty in corrosive environments that are listed as approved.



Internet Resources

Recognized as a leader in the HVAC industry, Bard combines quality products and outstanding service with innovation and technological advances to deliver high-performance heating and cooling products around the world. Please visit www.bardhvac.com for additional information regarding warranty and product information.

BARD MANUFACTURING CO., INC. — 1914 Randolph Dr. — BRYAN, OHIO 43506
Dependable quality equipment . . . since 1914

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