Bard®
SINCE 1914
Climate Control Solutions

Literature Assembly
911-0824

Contains the following:

2100-034(G)	User's Guide
2100-479	Leak Test, Evacuation, Charging
2100-516(M)	Low Volt CTRL Circuit Manual
2100-737(A)	Wall Mount PKG H/P Manual
2110-1557(D)	Replacement Parts Manual
7960-627(C)	Supplemental Dehum Instructions
7960-420	Warranty

USER'S APPLICATION GUIDE AND TECHNICAL PRODUCT OVERVIEW

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

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

Bard®
SINCE 1914

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.

Contents

Overview

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

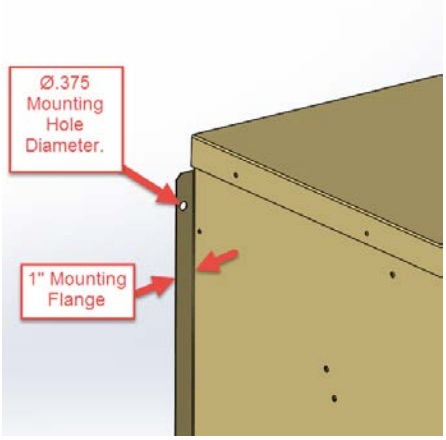
Installation plays a key part in unit functionality, performance and safety. Product securing and placement, duct design and supply/return location, electrical routing and condensate and defrost drainage all play key roles in making sure a unit will perform per the design specifications.

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 (Rated-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.

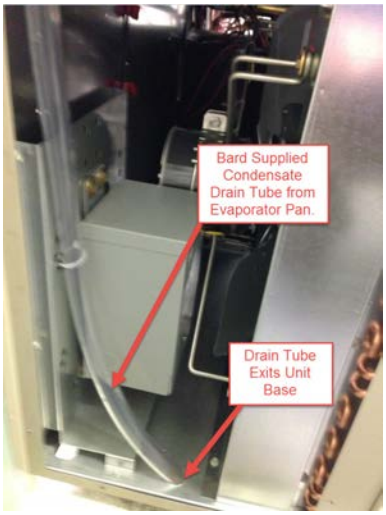
WALL MOUNT Products – Condensate and Defrost Drainage

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.

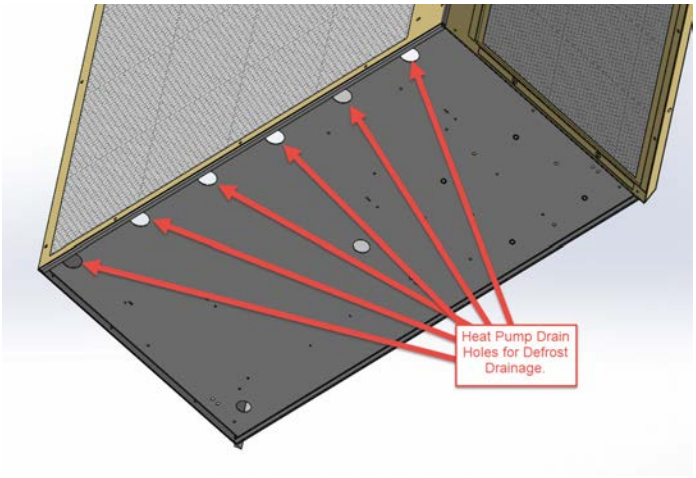
Condensate Water Drainage:

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



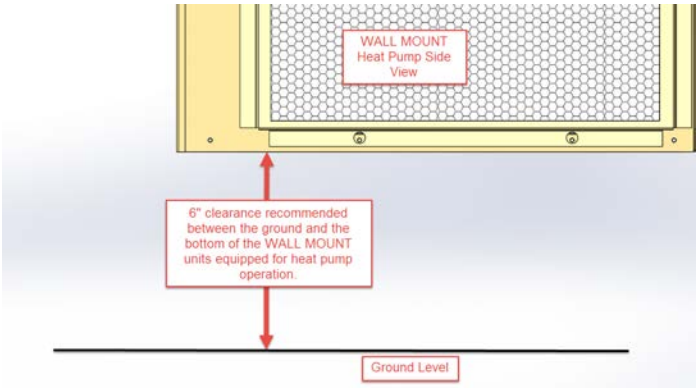
Defrost Water Drainage:

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

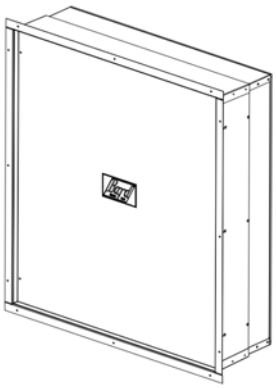
Q-TEC

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.

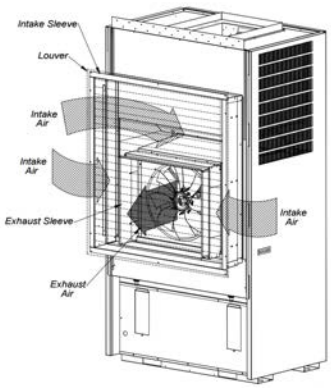
Wall Sleeve:

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

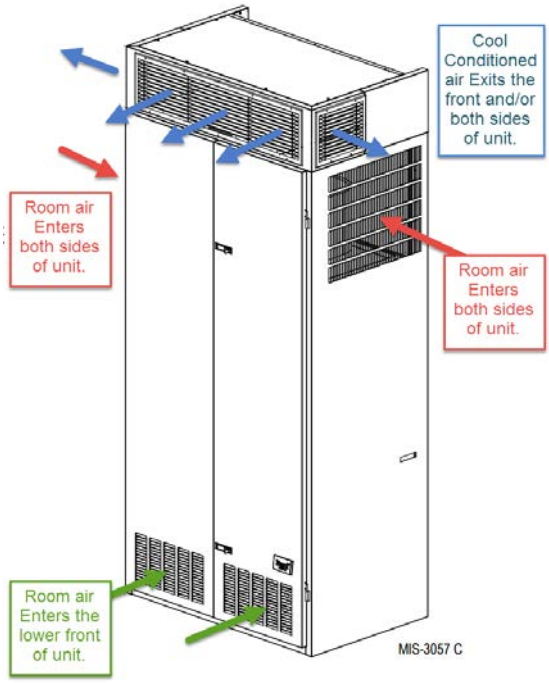
The Bard unit should be placed in an area where the supply (leaving conditioned air) and return (unit air intake) air paths will be unrestricted. Avoid placing objects inside the room within 24" of the return (unit air intake) louvers or grille. Avoid placing objects directly in the path of the supply (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

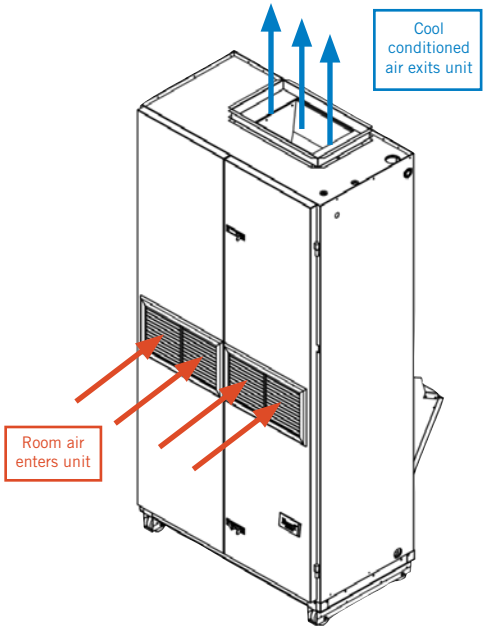
The I-TEC product has been engineered for extremely quiet unit operation and has multiple air paths for air entering and exiting the unit. Room air enters the upper sides to be conditioned (cooled) inside the unit and exits the unit top. The unit will either be ducted to supply registers or have a supply 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.

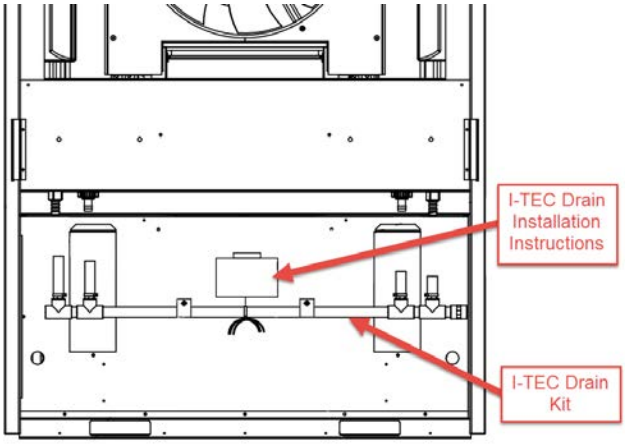
I-TEC and Q-TEC Products – Condensate Drainage

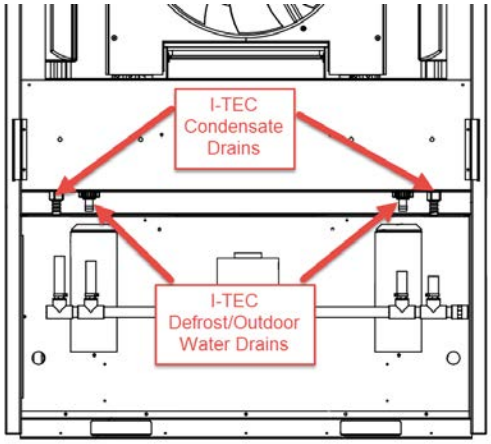
Condensate drainage for Bard indoor cooling units is a very important part of unit installation. During normal air conditioning operation, large amounts of condensate water are generated inside the unit as moisture is extracted from the supply air. This is collected in an evaporator pan and needs to 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:

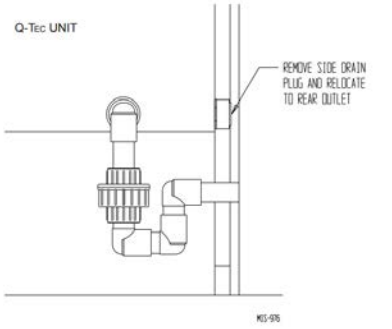
The I-TEC drainage system consists of a manifold drain kit that combines all drains behind the unit to allow connection to the building system.



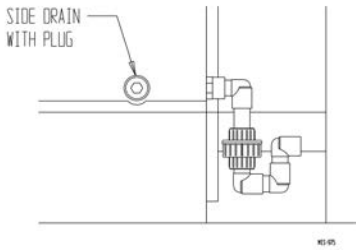


Q-TEC Drain System:

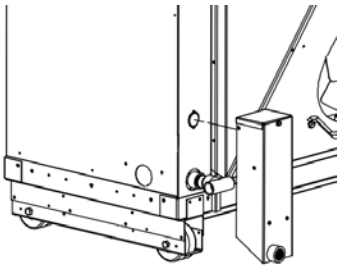
The Q-TEC drainage system consists of a lower right side or lower right rear connection fitting. An optional in-wall drain box may also be purchased as an accessory that allows separate evaporator and defrost water drainage.



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

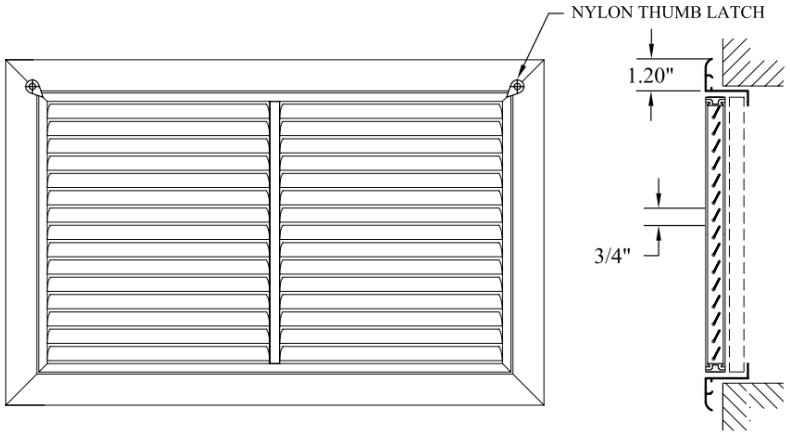
All Products – Filters and Filter Servicing

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.



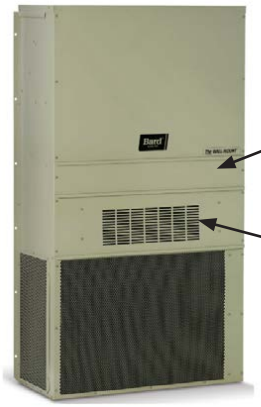
Return Air Filter Grille:

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.

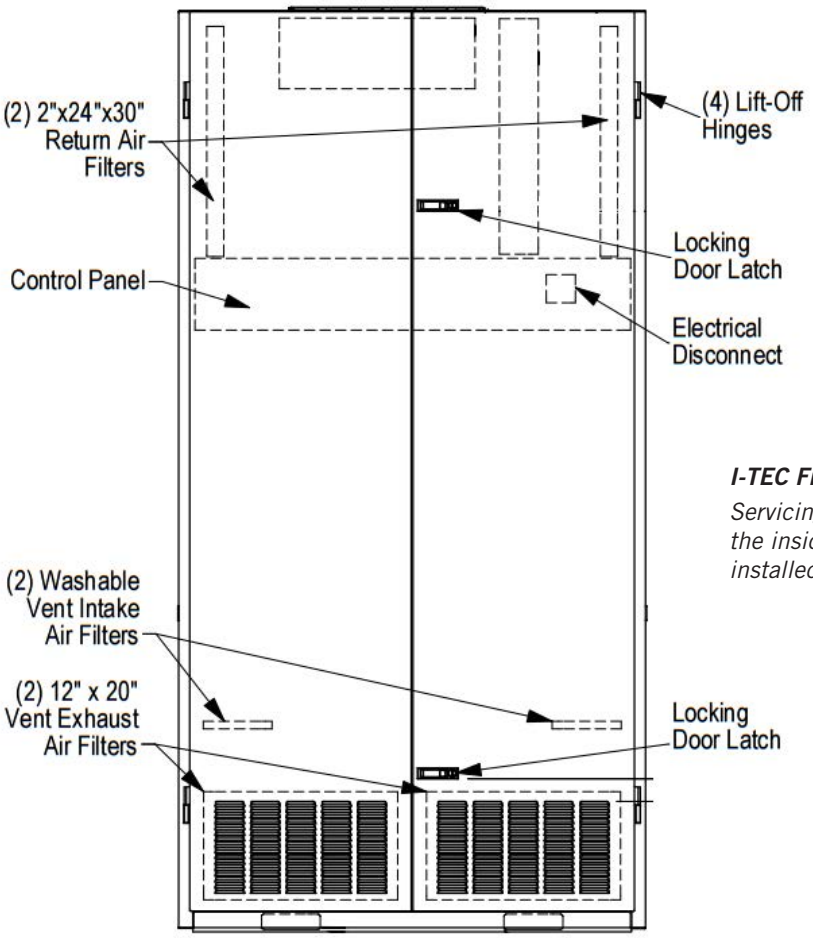
I-TEC Indoor Products – Filters and Filter Servicing

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.

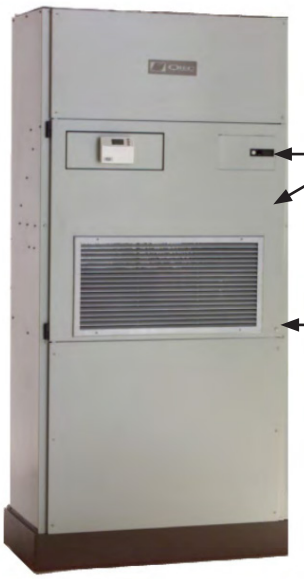
The I-TEC product installation instructions contain additional information regarding unit maintenance. This information may be accessed at www.bardhvac.com.

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.

QWS Unit



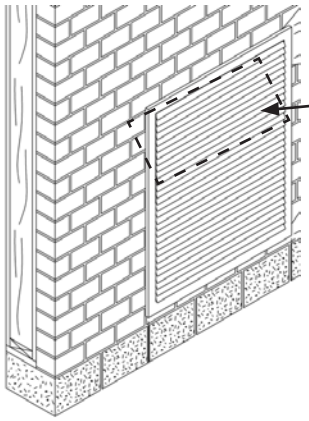
Q-TEC Filter Location:

The Q-TEC room air filters are located behind this hinged door. Unlock door latch and remove screw to open door.

Screw location

QH/QA Unit

Filter locations



Pre-filter location

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

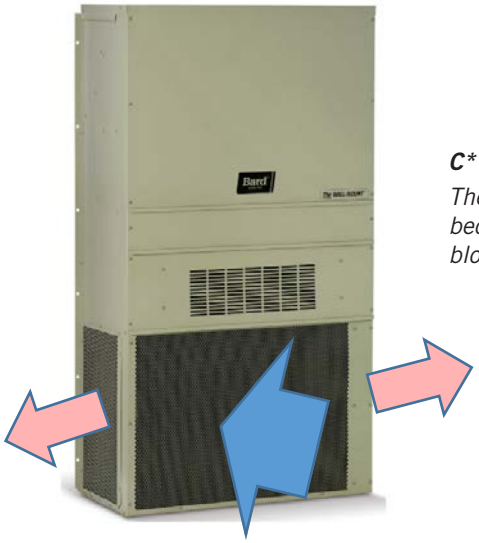
1. Avoid having any lawn sprinkler spray directly on the equipment, especially if from a brackish water source.
2. In coastal areas or corrosive environments, locate equipment as far away from the corrosion source as feasible. Units exposed directly to salt spray should be coated by a secondary protective 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

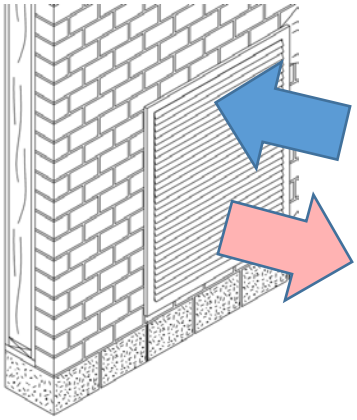
W**A, W**H, T**H, T**S, W*RV Wall Mount Units:

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.

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 0ºF, 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.

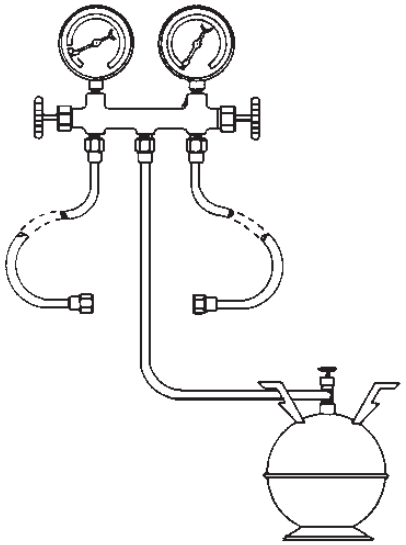
Helpful Hints and Good Operating Practices

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



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

CONTENTS

General

⚠ WARNING

The oils used with R-410A refrigerant are hydroscopic 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

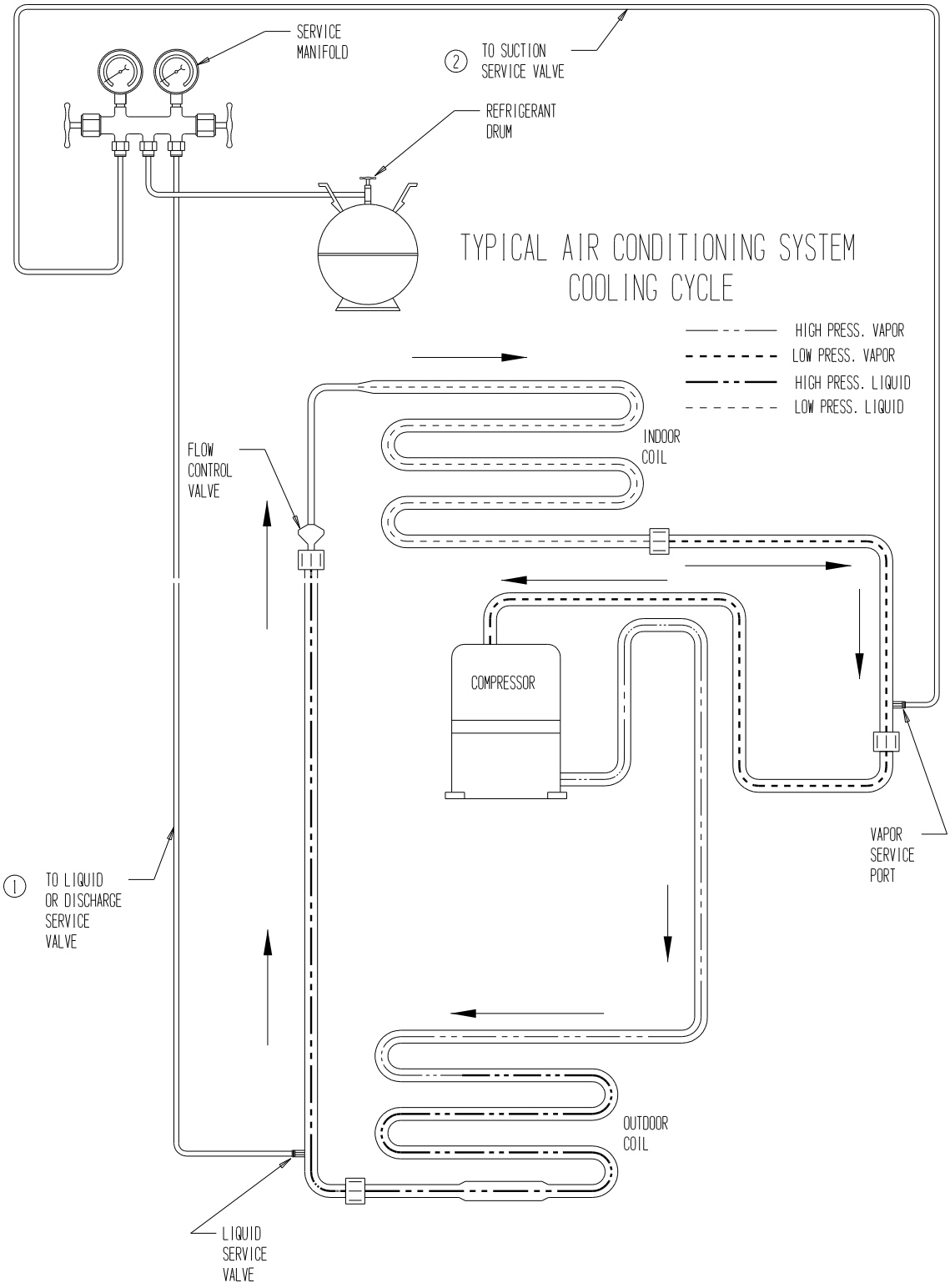
If the system has been open to the atmosphere, the filter dryer should be replaced and then evacuated. Then proceed as follows:

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

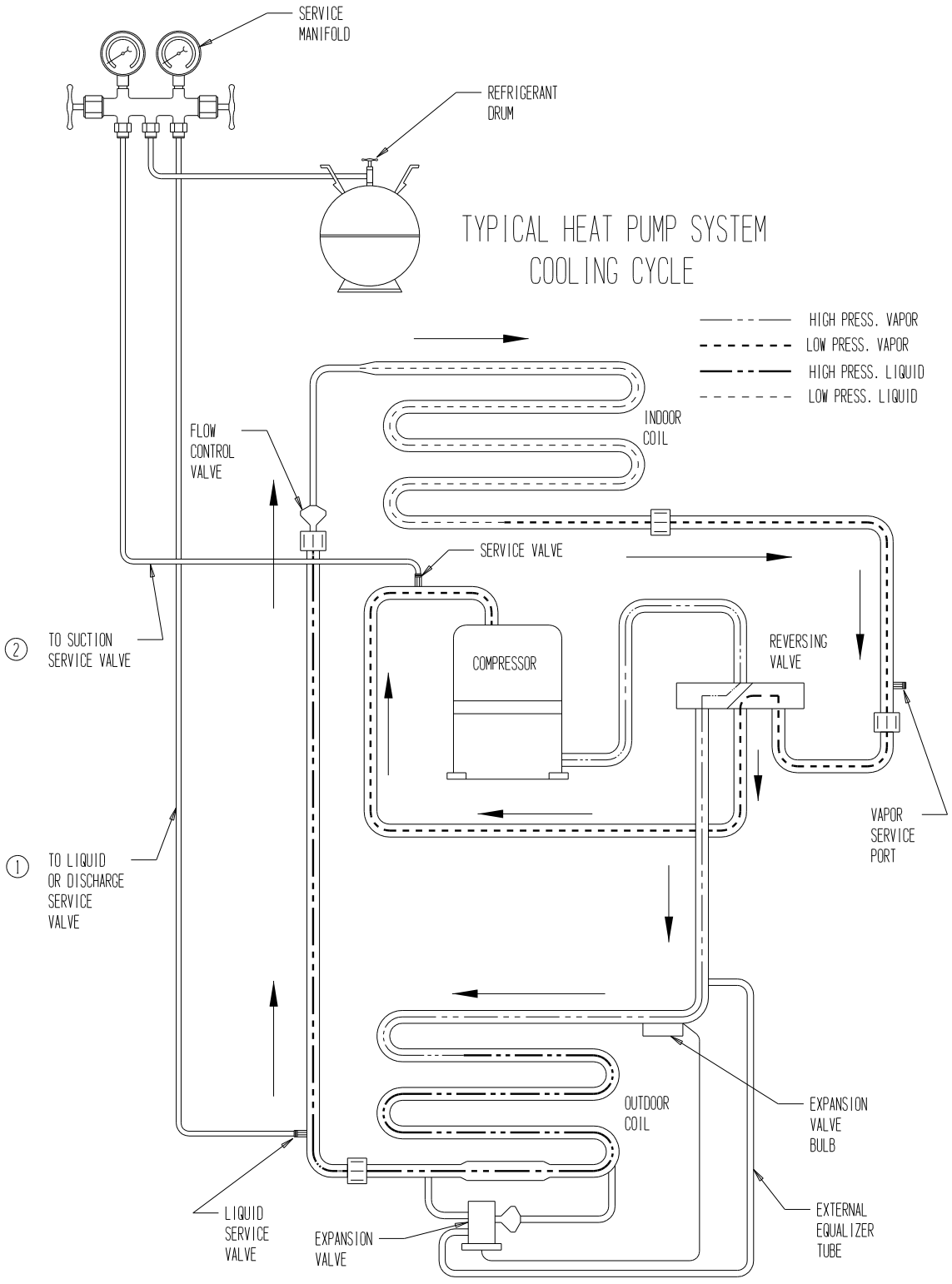
1. Connect manifold as instructed.
2. Place refrigerant drum upright on scale and determine exact weight of the refrigerant and cylinder.
3. With manifold suction valve closed and manifold discharge valve open, open refrigerant cylinder liquid valve and allow pressure in system to balance with pressure 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

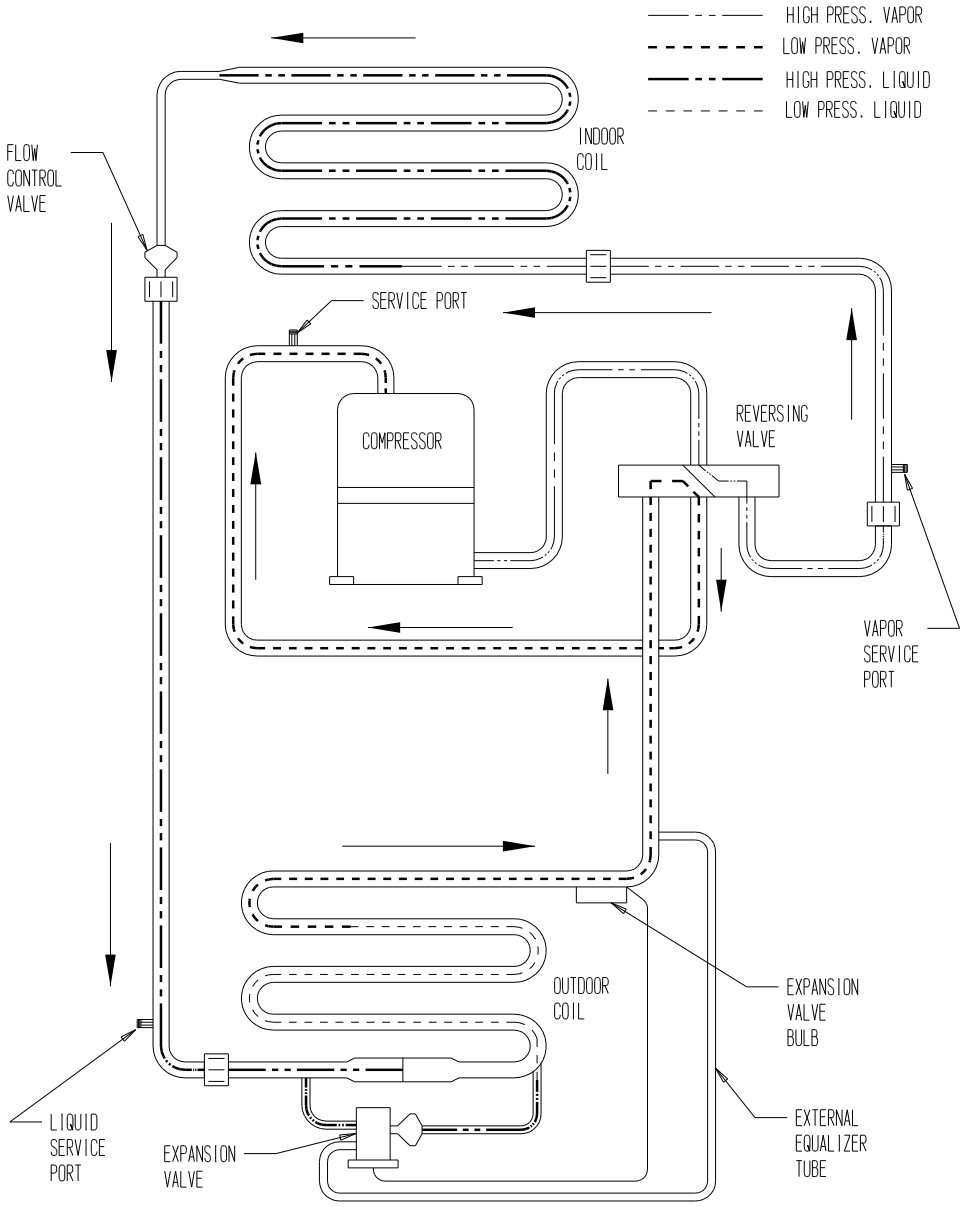


MIS-368

⚠ WARNING

To speed refrigerant flow, it may be necessary to place refrigerant drum in a pan of warm water (not greater than 130ºF). 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.

TROUBLESHOOTING CHART FOR AIR CONDITIONERS

● Generally the cause. Always make these checks first.

◆ Occasionally the cause. Make these checks only if first checks fail to locate trouble.

■ Rarely the cause. Make this check only if previous checks fail to locate trouble.

	Power Supply																	
	Meter to Line Side of Contactor								Load Side of Contactor to Motor Terminal									
	Power Failure	Blown Fuses or Tripped Circuit Breakers	Faulty Wiring	Loose Terminals	Low Voltage	Single 1PH Failure of 3PH	Unbalanced Power Supply 3PH	Voltage Too High	Open Disconnect Switch	Faulty Wiring	Loose Terminal	Low Voltage	Defective Contacts in Contactor	Compressor Overload	Potential Relay Fails to Open	Potential Relay Fails to Close	Run Capacitor	Start Capacitor
Compressor and condenser fan motor will not start	●	●	●	●	◆	■	■		●	●	●	◆	◆	●				
Compressor will not start but condenser fan will run				◆	◆	◆	◆			●	●	◆	◆	●		◆	●	●
Condenser fan motor will not start										●	●							
Compressor "hums" but will not start			●	●	◆	◆	◆			●	●	◆	◆	●	●			●
Compressor cycles on overload			●	●	●	■	●			●	●	●	●	◆	●		●	
Compressor short cycles on low pressure																		
Compressor runs continuously—no cooling																		
Compressor runs continuously —cooling																		
Compressor noisy																	◆	
Compressor loses oil																		
Head pressure too high																		
Head pressure too low																		
Liquid line frosting or sweating																		
Suction pressure too high																		
Suction pressure too low																		
Evaporator frosting																		
Suction line frosting or sweating																		
Evaporator blower will not start	●	●	●	●	■	■				●	●	■						
Condenser fan motor runs contactor not pulled in																		
Liquid refrigerant flooding back to compressor— cap tube system																		
Space temperature too high																		

	Power Supply													High Pressure Side of System					
	Control Circuit									Motors				Compressor					
	Faulty Wiring	Loose Terminals	Control Transformer	Low Voltage	Thermostat	Contactor Coil	Pressure Control	Condenser Fan Relay	Evaporator Fan Relay	Compressor Motor	Condenser Motor	Evaporator Motor	Compressor Off on Internal Overload	Hold Down Bolts	Defective Compressor Bearings	Seized Compressor	Defective Compressor Valves	Compressor Oil Level	Open or Short Motor Windings
Compressor and condenser fan motor will not start	●	●	●	◆	◆	●	●				■	■							
Compressor will not start but condenser fan will run										●					●	●			●
Condenser fan motor will not start								●			●								
Compressor "hums" but will not start										◆					●	◆			◆
Compressor cycles on overload										◆							■	■	◆
Compressor short cycles on low pressure																			
Compressor runs continuously—no cooling																	●		
Compressor runs continuously —cooling	●				●														
Compressor noisy														●	●		●	●	
Compressor loses oil																			
Head pressure too high																		■	
Head pressure too low																	◆		
Liquid line frosting or sweating																			
Suction pressure too high																	●		
Suction pressure too low																			
Evaporator frosting												◆							
Suction line frosting or sweating																			
Evaporator blower will not start	●	●	●	■	■				●			●							
Condenser fan motor runs contactor not pulled in													●						
Liquid refrigerant flooding back to compressor— cap tube system																			
Space temperature too high					●												◆		

	High Pressure Side of System													
	System Operation									Condenser Air				
	Refrigerant Charge Low	Overcharge of Refrigerant	High Head Pressure	High Suction Pressure	Low Suction Pressure	Temperatures	Non-Condensables (Air, etc.)	Excessive Load in Space	Liquid Valve Partially Closed	Condenser Fins Dirty or Plugged	Condenser Fan Belt Slipping	Condenser Air Short Circuiting	Low Condenser Air Volume	Condenser Air Temperature Low
Compressor and condenser fan motor will not start	●	■	●		●		●			■	■	■	■	
Compressor will not start but condenser fan will run														
Condenser fan motor will not start														
Compressor "hums" but will not start		■	■		■	■								
Compressor cycles on overload	◆	◆	◆	◆			◆	◆		■	■	■	■	■
Compressor short cycles on low pressure	●				●									
Compressor runs continuously—no cooling	●			◆			◆			■	■	■	■	■
Compressor runs continuously —cooling								●						
Compressor noisy														
Compressor loses oil	●				●									
Head pressure too high		●				●	●	◆		●	●	◆	●	
Head pressure too low	●				●									●
Liquid line frosting or sweating									●					
Suction pressure too high		◆	●			◆		●						
Suction pressure too low	●					◆								
Evaporator frosting	◆				●	◆								
Suction line frosting or sweating		●												
Evaporator blower will not start														
Condenser fan motor runs contactor not pulled in														
Liquid refrigerant flooding back to compressor— cap tube system		●				■								
Space temperature too high	●				●									

	Low Side						General					
	Evaporator Air											
	Plugged or Restricted Metering Device	Evaporator Fins Dirty or Plugged	Evaporator Belt Slipping	Low Evaporator Air Volume	Dirty Filters	Ductwork Small or Restricted	Restrictions	Thermostat Setting	Thermostat Location	Stratified Air in Space	Incorrect Refrigerant Piping	System Too Small
Compressor and condenser fan motor will not start								■				
Compressor will not start but condenser fan will run												
Condenser fan motor will not start												
Compressor "hums" but will not start												
Compressor cycles on overload							■					
Compressor short cycles on low pressure	●	●	●	●	●	●	●			■		
Compressor runs continuously—no cooling	◆	●	●	●	●	●	◆	■	◆	◆		
Compressor runs continuously —cooling									●			◆
Compressor noisy											◆	
Compressor loses oil		■	■	■	■	■	◆				●	
Head pressure too high	◆						■					
Head pressure too low												
Liquid line frosting or sweating	◆						●					
Suction pressure too high												
Suction pressure too low	◆	◆	●	●	●	●	◆			◆	■	
Evaporator frosting	◆	◆	●	●	●	●	◆			◆	■	
Suction line frosting or sweating	◆●	●	●	◆●	■							
Evaporator blower will not start												
Condenser fan motor runs contactor not pulled in												
Liquid refrigerant flooding back to compressor— cap tube system		◆	◆	◆	◆	◆				■		
Space temperature too high	◆	●	●	●	●	●		●	◆	◆	■	●

TROUBLESHOOTING CHART FOR AIR TO AIR HEAT PUMPS

- ● Denotes common cause.
- ◆ Denotes occasional cause.

		Power Supply																				Outdoor Section																										Indoor Section								Aux. Heat
		Line Voltage												Control Circuit								Compressor					Refrigerant System								Defrost Control			Rev. Valve		Check Valve		Outdoor Fan Motor and Coil						Indoor Blower Motor and Coil						Check		
		Power Failure	Blown Fuse or Tripped Breaker	Faulty Wiring	Loose Terminals	Low Voltage	Single 1PH Failure of 3PH	Unbalanced 3PH	Defective Contacts in Contactor	Compressor Overload	Potential Relay	Run Capacitor	Start Capacitor	Faulty Wiring	Loose Terminals	Control Transformer	Low Voltage	Thermostat	Contactor Coil	Pressure Control or Impedance Relay	Indoor Fan Relay	Discharge Line Hitting Inside of Shell	Bearings Defective	Seized	Valve Defective	Motor Windings Defective	Refrigerant Charge Low	Refrigerant Overcharge	High Head Pressure	Low Head Pressure	High Suction Pressure	Low Suction Pressure	Non-Condensables	Unequalized Pressures	Sensing Bulb Loose-Poorly Located	Cycle Too Long (Clock timer)	Defective Control, Timer or Relay	Leaking	Defective Valve or Coil	Sticking Closed	Leaking or Defective	Plugged or Restricted Meter Device (Htg)	Fins Dirty or Plugged	Motor Winding Defective	Recirculation or Air	Air Volume Low (Cooling)	Low Temperature Coil Air (Cooling)	Plugged or Restricted Metering Device (Clg)	Fins Dirty or Plugged	Motor Winding Defective	Air Volume Low	Air Filters Dirty	Undersized or Restricted Ductwork	Sticking Closed	Leaking or Defective	Auxiliary Heat Upstream of Coil
Heating or Cooling Cycles	Compressor and O.D. fan motor do not operate	●	●	●	●		◆	◆	◆	◆				●	●	●	◆	◆	●	●																																				
	Compressor will not run O.D. fan motor runs			●	●	●	◆	◆		●	●	●	●										◆	●		●								●																						
	Compressor "hums" but will not start			●	●	●	●	◆	◆		●	●	●										●	●		●								●																						
	Compressor cycles on overload			●	●	●	◆	◆	◆	●	●	●	●										◆		◆	◆	●	●	◆		◆		●					◆					◆	◆	◆	◆			◆	◆	◆	●	◆			
	Compressor off on high pressure control																			◆	●							●					●		◆	●	●			●		◆	●	●	●	●		◆	●	●	●	●	●	●		●
	Compressor noisy																					◆	◆		●																															
	Head pressure too high																											●					●		◆	◆			◆	◆		◆	●	●	◆	●		◆	◆	◆	●	●	◆	◆		●
	Head pressure too low																								●		●					●						●			◆						●								◆	
	Suction pressure too high																								●			●	●									●			◆														◆	
	Suction pressure too low																										●			◆										◆		◆	●	●	◆		◆	◆	●	◆	●	●	◆	◆		
	I.D. blower will not start	●	●	●	●									●	●	●	◆	◆			●																																			
	I.D. coil frosting or icing-																										●					●								◆								◆	●	●	●	●	◆			
	High compressor amps					●																	●	●				●	●		●		●							◆									●	●	●	●	◆	◆		
Cooling Cycle	Compressor runs continuously—no cooling																								●		●																◆	◆	◆	◆	◆		●	●	●	●	◆			
	Liquid refrigerant flooding back to compressor																											●	●																				●	●	●	●	◆	◆		
Heating Cycle	Compressor runs continuously—no heating																								●		●									◆	◆	●																		
	Defrost cycle initiates no ice on coil																										◆										●																			
	Reversing valve does not shift			●	●																						◆			◆									●																	
	Ice build up on lower part of O.D. coil																										●					◆			●	●	●																			
	Liquid refrigerant flooding back to compressor																											●	●																											
	Auxiliary heat on I.D. blower off			●	●									●	●			◆			●																													●						
	Excessive operating costs			◆	◆													◆									●	●									●	●	●				◆	◆	◆				◆	◆	◆					
	Excessive ice on O.D. coil			◆	◆																						●								●	●	●		●																	

INSTALLATION INSTRUCTIONS

Single Stage Heat Pump
Low Voltage Control Circuit Wiring

Heat Pump Models:

T24-60H1
W18-60H1
W18-60H2
S26-61H1
CH3-5S1

T24-60H1D
W18-60H1D
W18-60H2D
S38-61H1D

Ventilation Packages:

CRVS-3
CRVS-3A
CRVS-5
CRVS-5A
CHCRV-5
CHCRV-5A

CHEIFM-5

ERVF-A3
ERVF-C3
ERVF-A5
ERVF-C5

MFAD-3
MFAD-5

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual : 2100-516M
Supersedes: 2100-516L
Date: 4-27-23

CONTENTS

TABLE 1
Diagram to Use with Unit and Vents

System	Vent	None		EIFM Economizer		ECONWM*		CRVS-*, ERV, MFAD		CRVMWH-3, CHCRV-5		CRVS-3A, CRVS-5A		CHCRV-5A	
	Vent Code	X		E		T, W, S		R, M, V, P		C		V		C	
	Thermostat	Programmable		Programmable		Programmable		Programmable		Programmable		Programmable		Programmable	
	Model Series	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Heat Pump	T**H S**H W**H CH*S	1	1	N/A	5	N/A	12	3, 4	2, 3, 4	14	13, 14	16	15	16	15
Heat Pump with Dehumidification	T**H*D S**H*D W**H*D	7	6, 7	N/A	11	N/A	N/A	9, 10	8, 9, 10	N/A	13, 14	18	17	N/A	N/A

Low Voltage Wiring

230/208V 1 phase and 3 phase equipment use 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 240V and 208V taps are:

TABLE 2
Operating Voltage Range

Tap	Range
240V	253 – 216
208V	215 – 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).*

An 18 gauge copper, color-coded thermostat cable is recommended. The connection points are shown in Table 2.

Low Voltage Connection

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

The "*R*" terminal is the *hot* terminal and the "*C*" terminal is *grounded*.

"*G*" terminal is the *fan input*.

"*Y*" terminal is the *compressor input*.

"*B*" terminal is the *reversing valve input*. The reversing valve must be energized for heating mode.

"*R*" terminal is the *24 VAC hot*.

"*RT*" terminal is the *24 VAC hot from transformer* on T**H and T**H*D units (used with "R" for fire/smoke shutdown).

"*C*" terminal is the *24 VAC grounded*.

"*L*" terminal is *compressor lockout output*. This terminal is activated on a high or low pressure trip by the electronic heat pump control. This is a 24 VAC output.

"*W2*" terminal is *second stage heat* (if equipped).

"*O1*" terminal is the *ventilation input*. This terminal energizes any factory-installed ventilation option.

"*E*" terminal is the *emergency heat input*. This terminal energizes the emergency heat relay.

"*W3*" terminal is the *dehumidification input*. This terminal energizes compressor, blower and three-way valve. This applies only to models equipped for dehumidification sequence.

Low Voltage Connections for DDC Control

Fan Only	Energize G
Cooling Mode	Energize Y, G
Heat Pump Heating	Energize Y, G, B
2nd Stage Heating w/Heat Pump (if employed)	Energize G, W2, Y, B
Ventilation	Energize G, O1
Emergency Heat	Energize B, W2, E, G
Dehumidification	Energize W3

TABLE 3
Wall Thermostat

Part Number	Predominate Features
8403-058 (TH5220D1151) ***No Longer Available***	2 stage Cool, 2 stage Heat - Conventional 1 stage Cool, 2 stage Heat - Heat Pump Electronic Non-Programmable Auto or Manual changeover
8403-060 (1120-445)	3 stage Cool; 3 stage Heat HP or Conventional Auto or Manual changeover Dehumidification Output
8403-090 (T6 Pro) 8403-092 (T6 Pro w/Wi-Fi)	2 stage Cool, 2 stage Heat - Conventional 2 stage Cool, 3 stage Heat - Heat Pump Programmable/Non-Programmable Electronic Auto or Manual changeover

TABLE 4
Humidity Controls

Part Number	Predominate Features
8403-100* (H6062A1000)	Electronic humidistat DPST Humidity range 10-90% with adjustable stops
8403-047 (H200-10-21-10)	Electronic dehumidistat SPST closes-on-rise Humidity range 10-90% with adjustable stops

* If using Honeywell HumidiPRO (H6062A1000) 8403-100 humidistat, it must be configured for dehumidification in the menu.

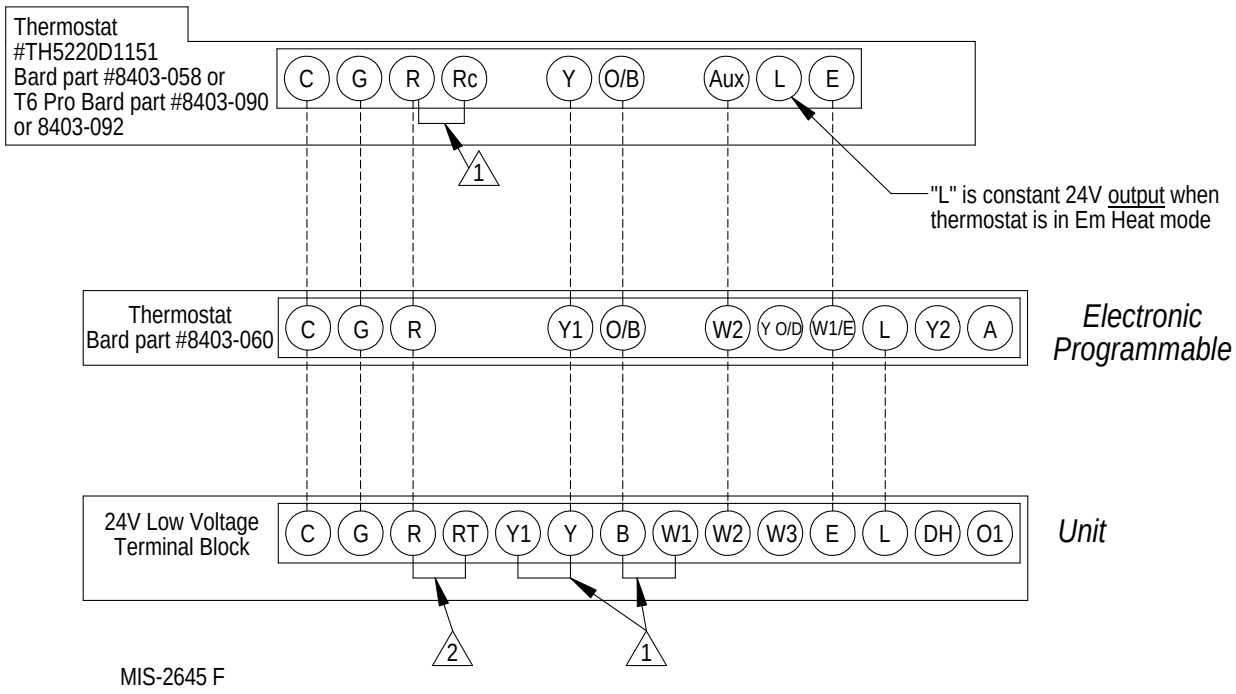
TABLE 5
CO_2 Controller

Part Number	Predominate Features
8403-067 ***No Longer Available***	Normally Open SPST relay closes-on-rise 24V dual wave length sensor. Default setting 950ppm, adjustable to 0-2000ppm Default off setting 1000ppm, adjustable to 0-200 ppm can be calibrated
8403-096	Normally Open SPST relay closes-on-rise 24V dual wave length sensor with 0-10V output. Default relay setting 1000ppm, adjustable to 0-2000/5000ppm. Default relay-off setting 950ppm, adjustable to 0-2000/5000ppm can be calibrated. 0-10V low-output range set to 0ppm, adjustable to 0-2000/5000ppm. 0-10V high-output range set to 2000/5000ppm, adjustable to 0-2000/5000ppm.

TABLE 6
Thermostat Wire Size

Transformer VA	FLA	Wire Gauge	Maximum Distance in Feet
55	2.3	18 gauge 16 gauge 14 gauge 12 gauge	60 100 160 250

FIGURE 1
Low Voltage Wiring Diagram:
Heat Pump with Optional Electric Heat
No Economizer or Ventilation Packages

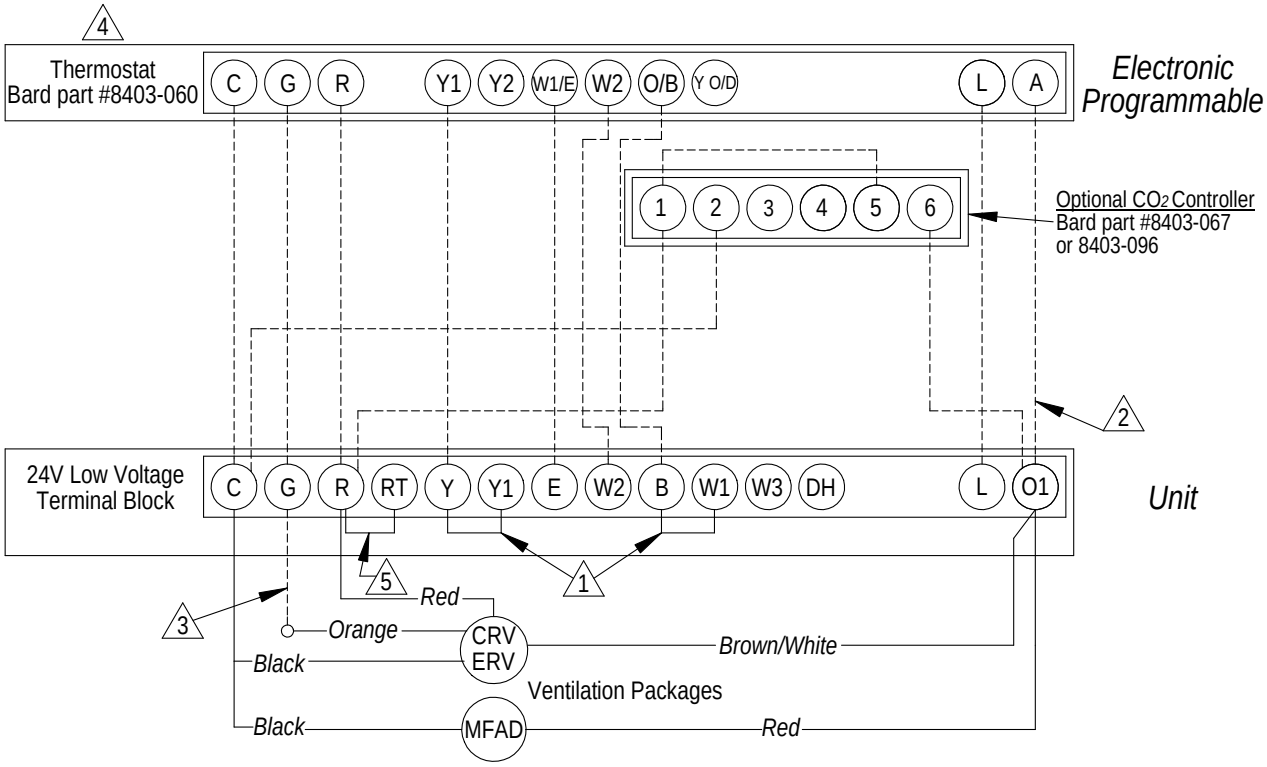


1 *Factory Jumper Installed*

2 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 2
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package
with Programmable Thermostat (Recommended)

*For CRVS-*A information, refer to Figure 15 on page 19.*



1 *Factory Jumper Installed*

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

3 *Connect orange wire to "G" only if optional CO_2 controller is used.*

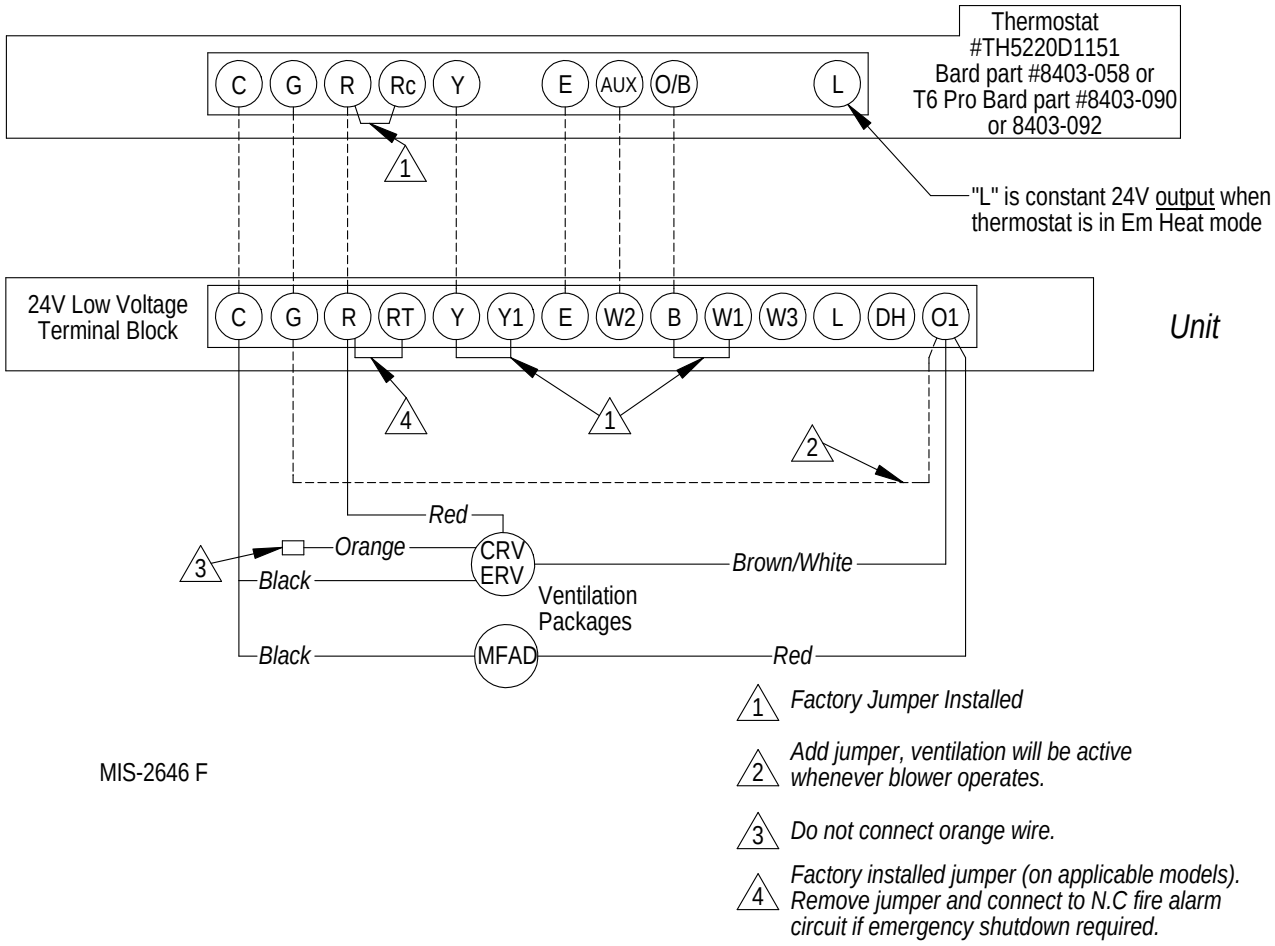
4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2633 E

FIGURE 3
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package with Thermostat (No Occupied Signal)

*For CRVS-*A information, refer to Figure 16 on page 20.*



MIS-2646 F

FIGURE 4
Low Voltage Wiring Diagram:
Heat Pump with Optional MFAD, CRVS-* or ERV Ventilation Package with Thermostat with CO_2 Controller

*For CRVS-*A information, refer to Figure 16 on page 20.*

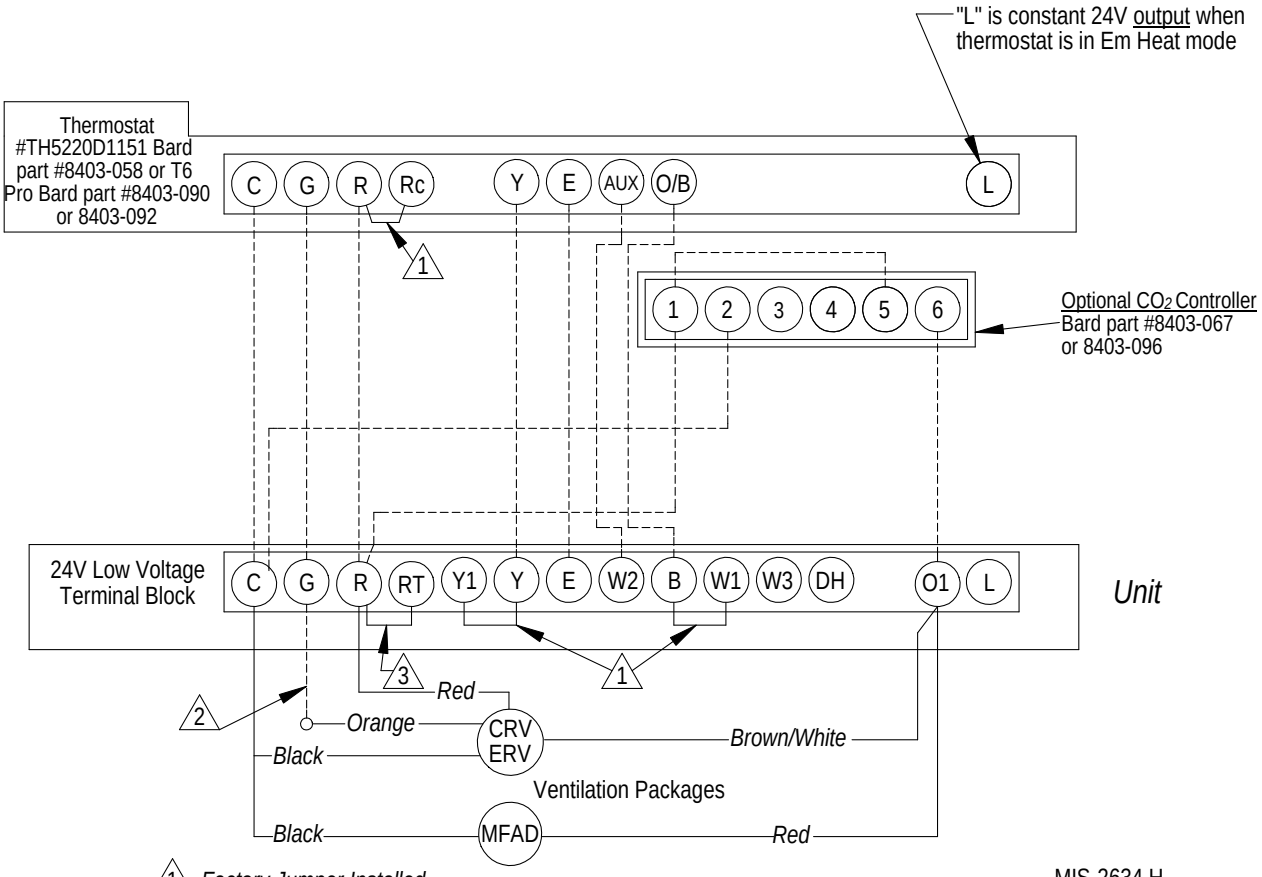
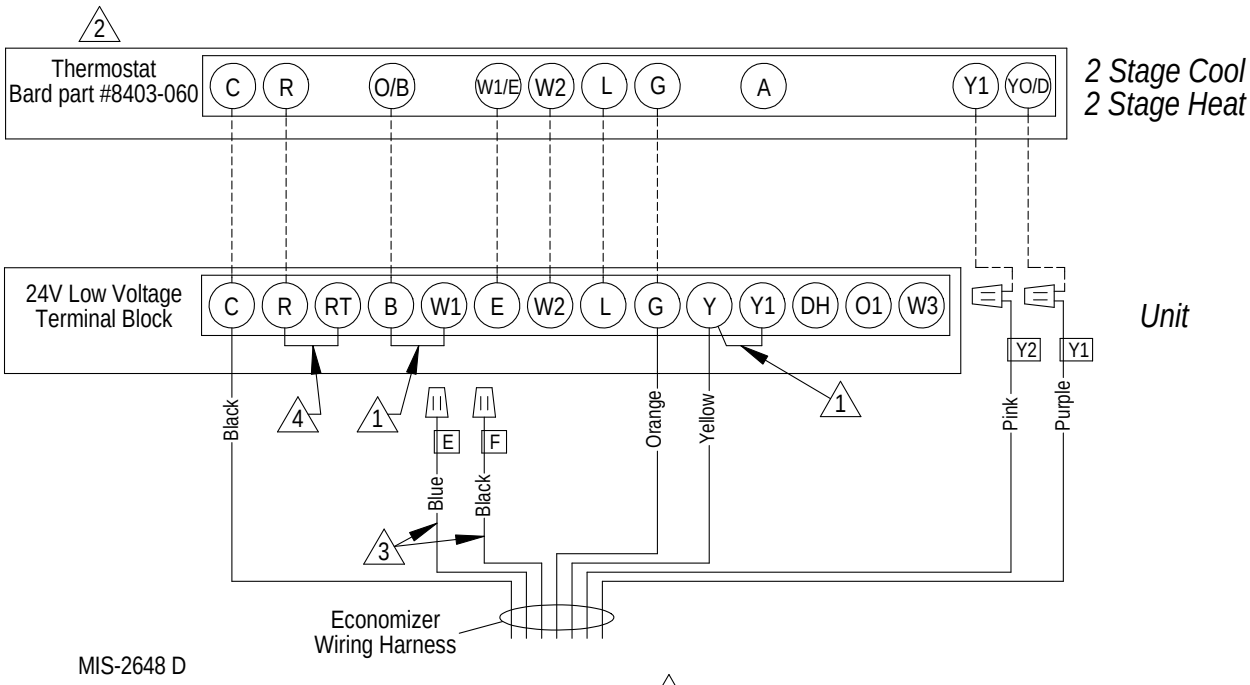


FIGURE 5
Low Voltage Wiring Diagram:
Heat Pump with Optional EIFM Economizer "E" Vent Option



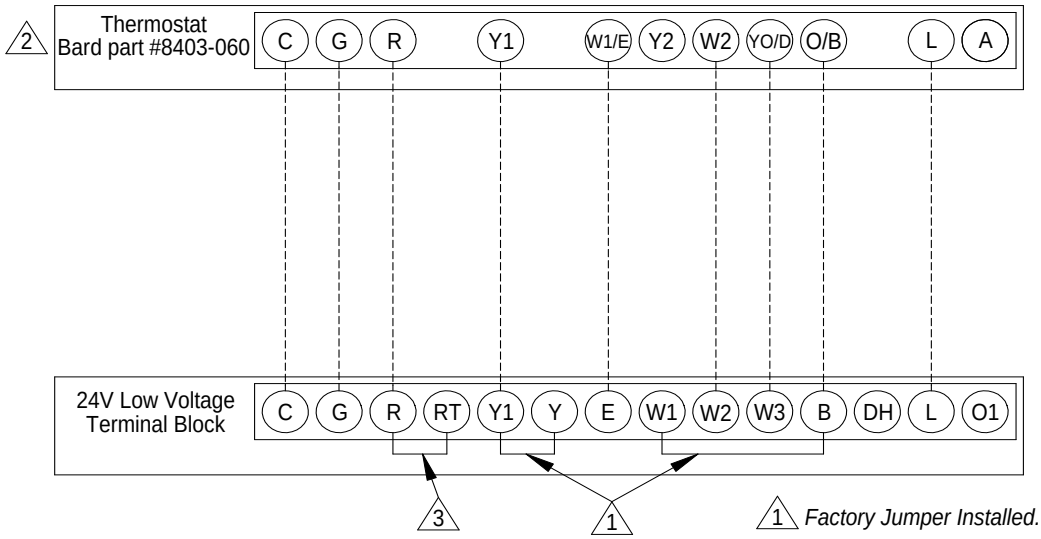
1 *Factory Jumper Installed.*

2 *Must be configured for economizer with YO/D output to be active as first stage cooling.*

3 *These wires are used in special control applications only.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 6
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and No Ventilation Package
Using Thermostat #8403-060 Combination Temperature and Humidity Control



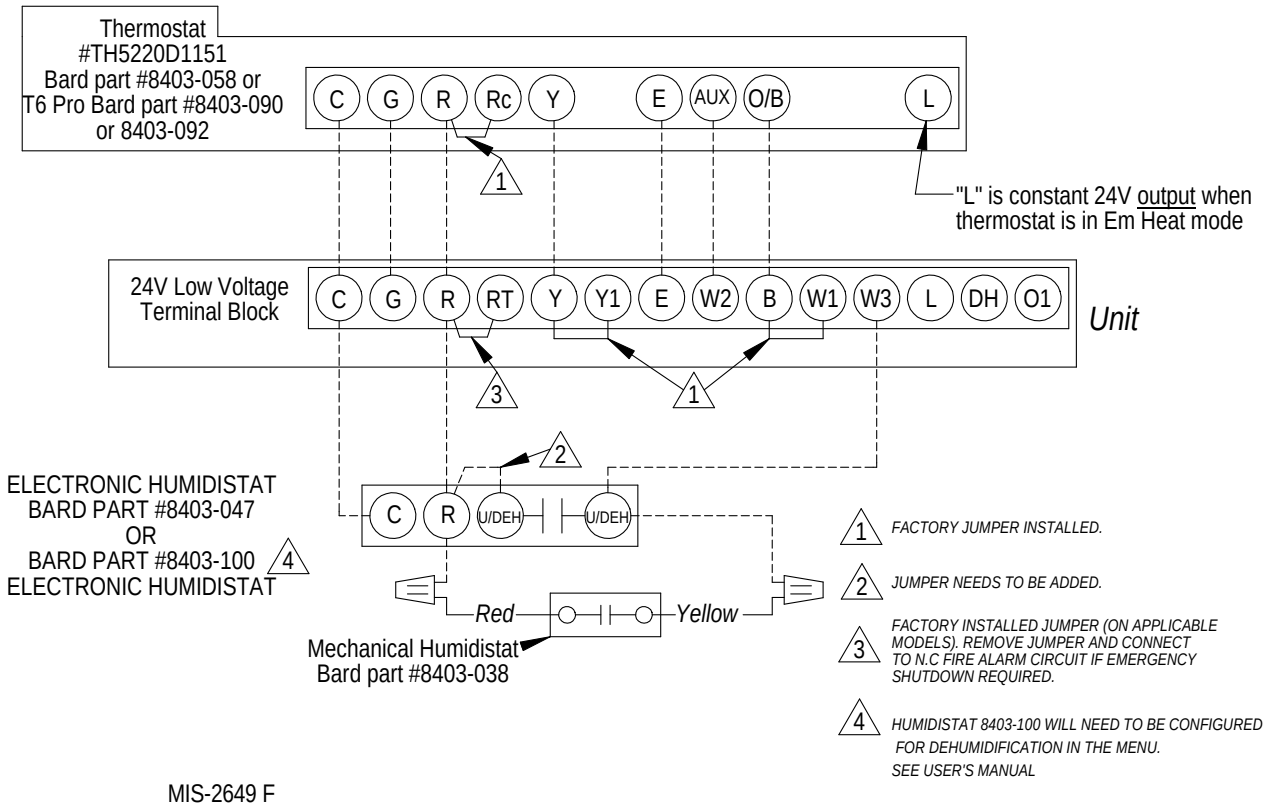
1 *Factory Jumper Installed.*

2 *Must be configured for "No economizer" for YO/D to be active for humidity control*

3 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2636 B

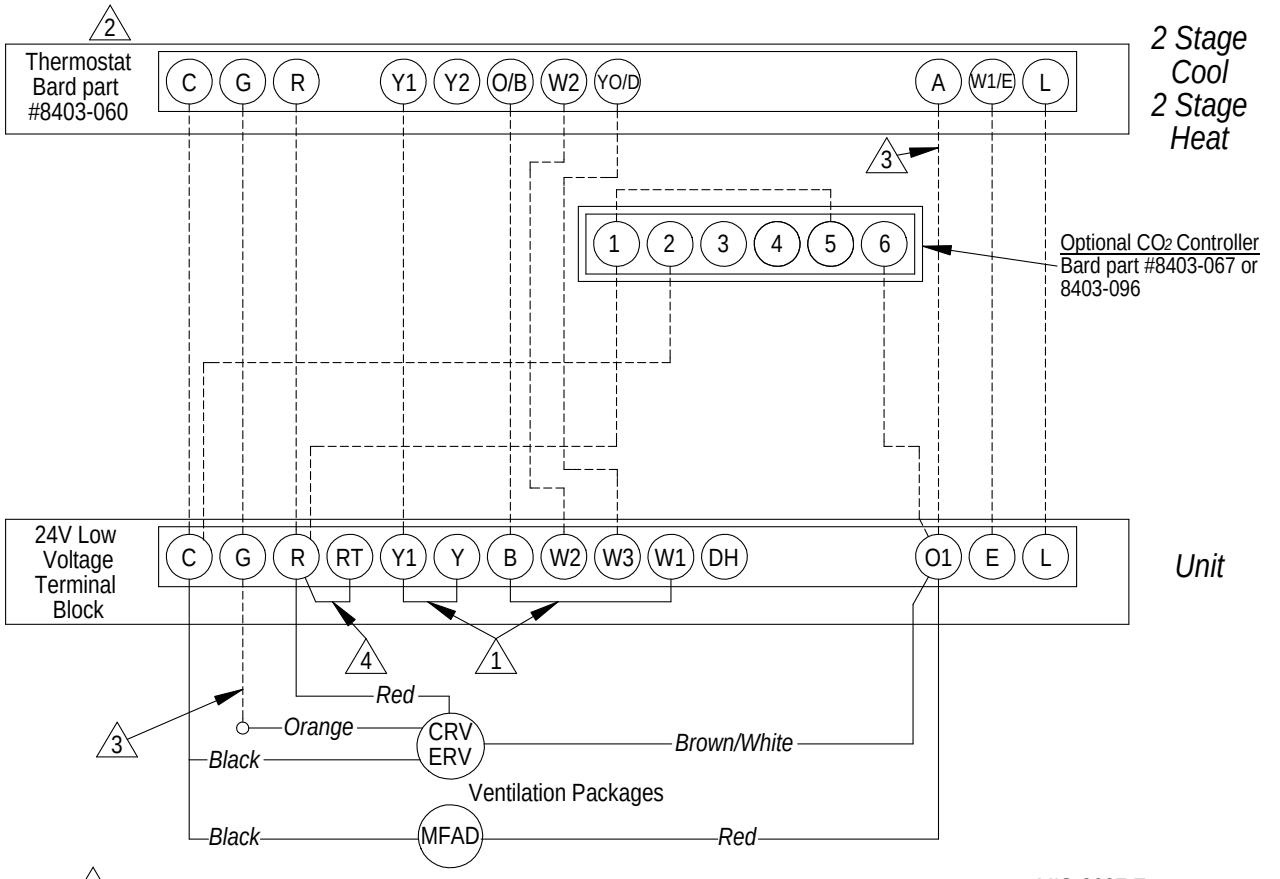
FIGURE 7
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence



MIS-2649 F

FIGURE 8
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package
Using Electronic Thermostat with Combination Temperature and Humidity Control with Optional CO_2 Controller

*For CRVS-*A information, refer to Figure 17 on page 21.*



1 *Factory Jumper Installed*

2 *Must be configured to "no economizer" to make YO/D output active for humidity control. Must be configured to programmable and fan set to programmed fan for the "A" output to function during scheduled occupied periods.*

3 *Do not connect "A" from thermostat if optional CO^2 controller is used. Connect orange wire to "G" only when optinal CO^2 controller is used.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2637 E

FIGURE 9
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package Using Thermostat (No Occupied Signal)

*For CRVS-*A information, refer to Figure 18 on page 22.*

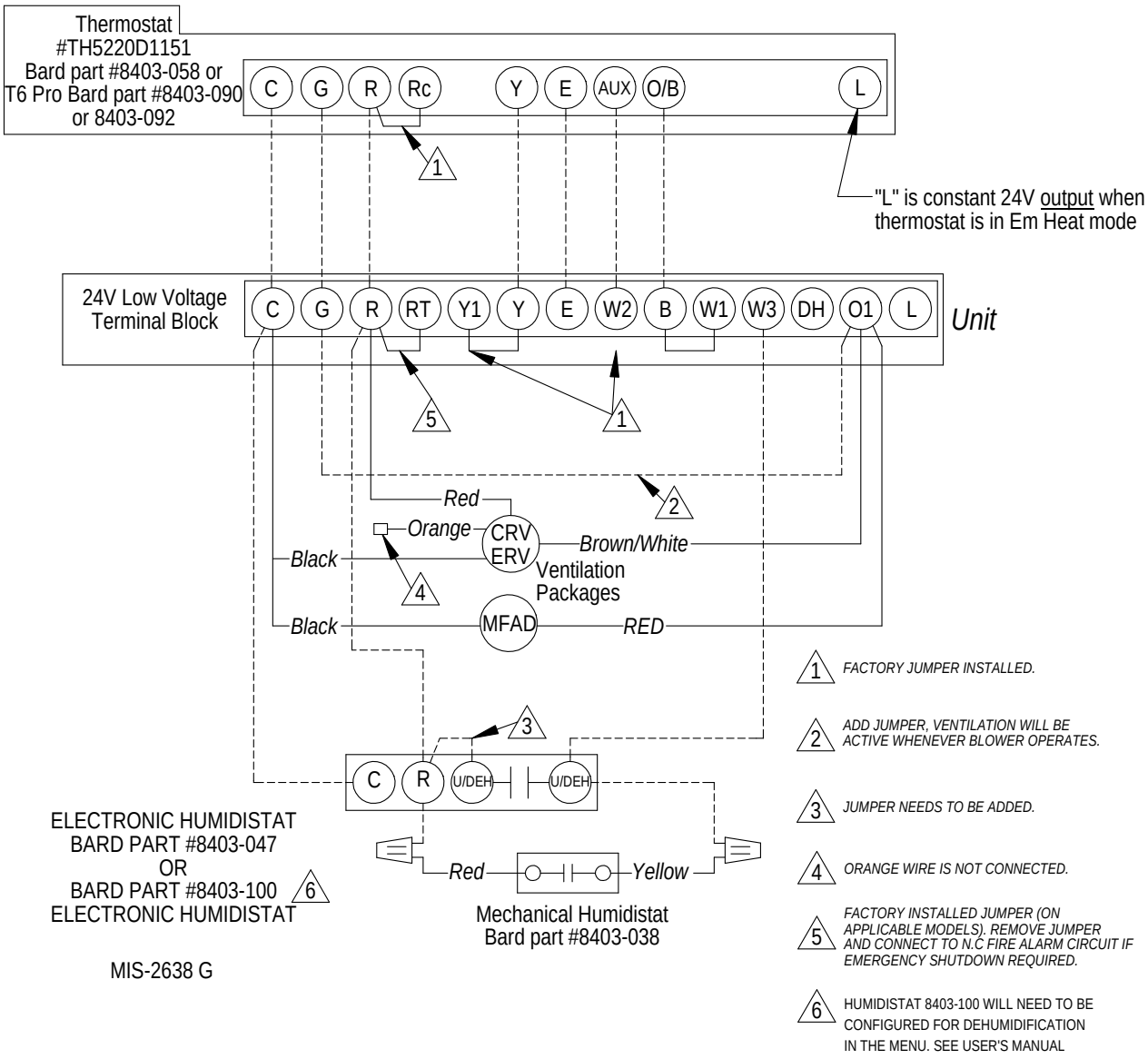


FIGURE 10
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional MFAD, CRVS-* or ERV Ventilation Package
Using Thermostat with CO_2 Controller

*For CRVS-*A information, refer to Figure 18 on page 22.*

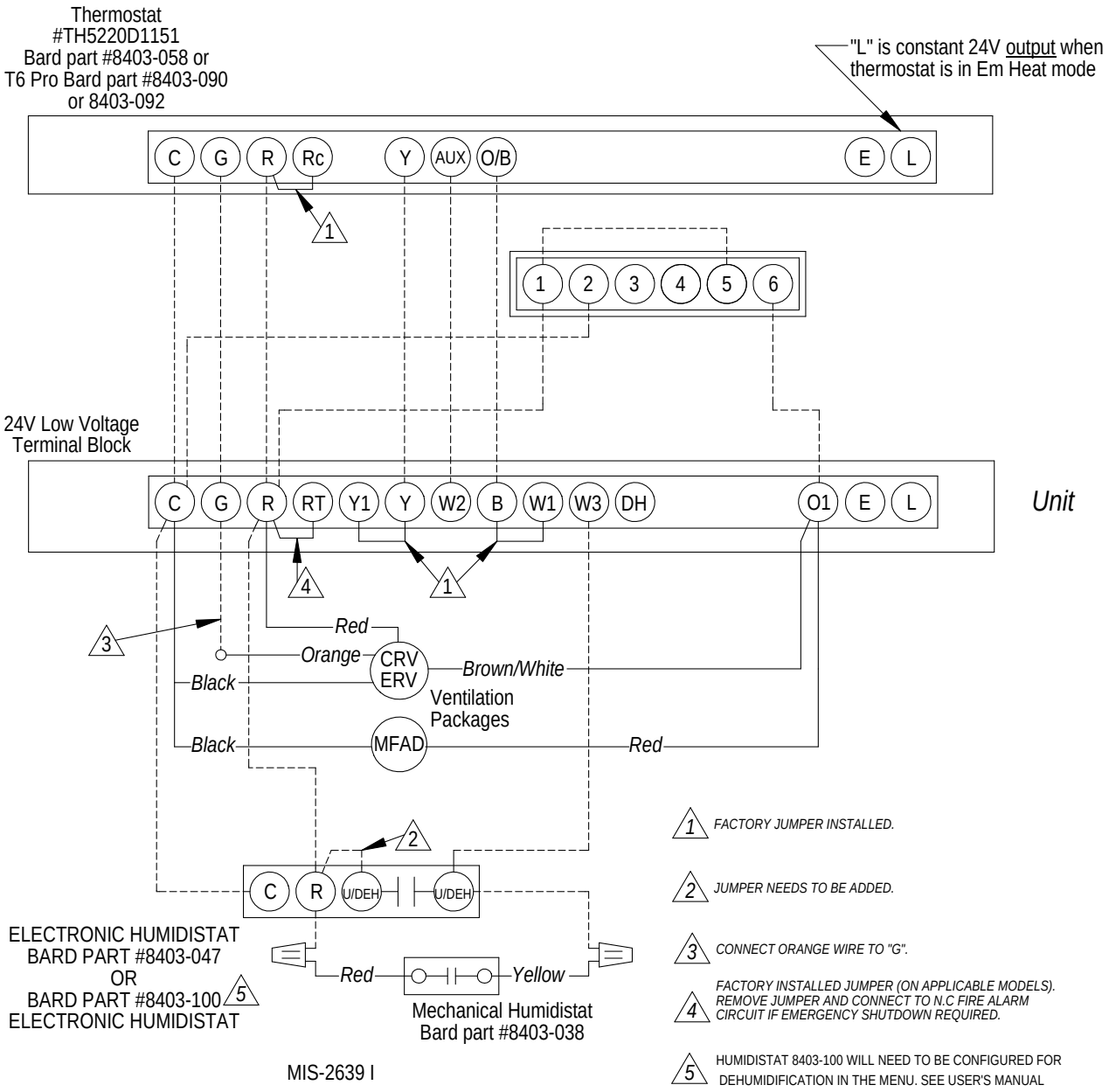
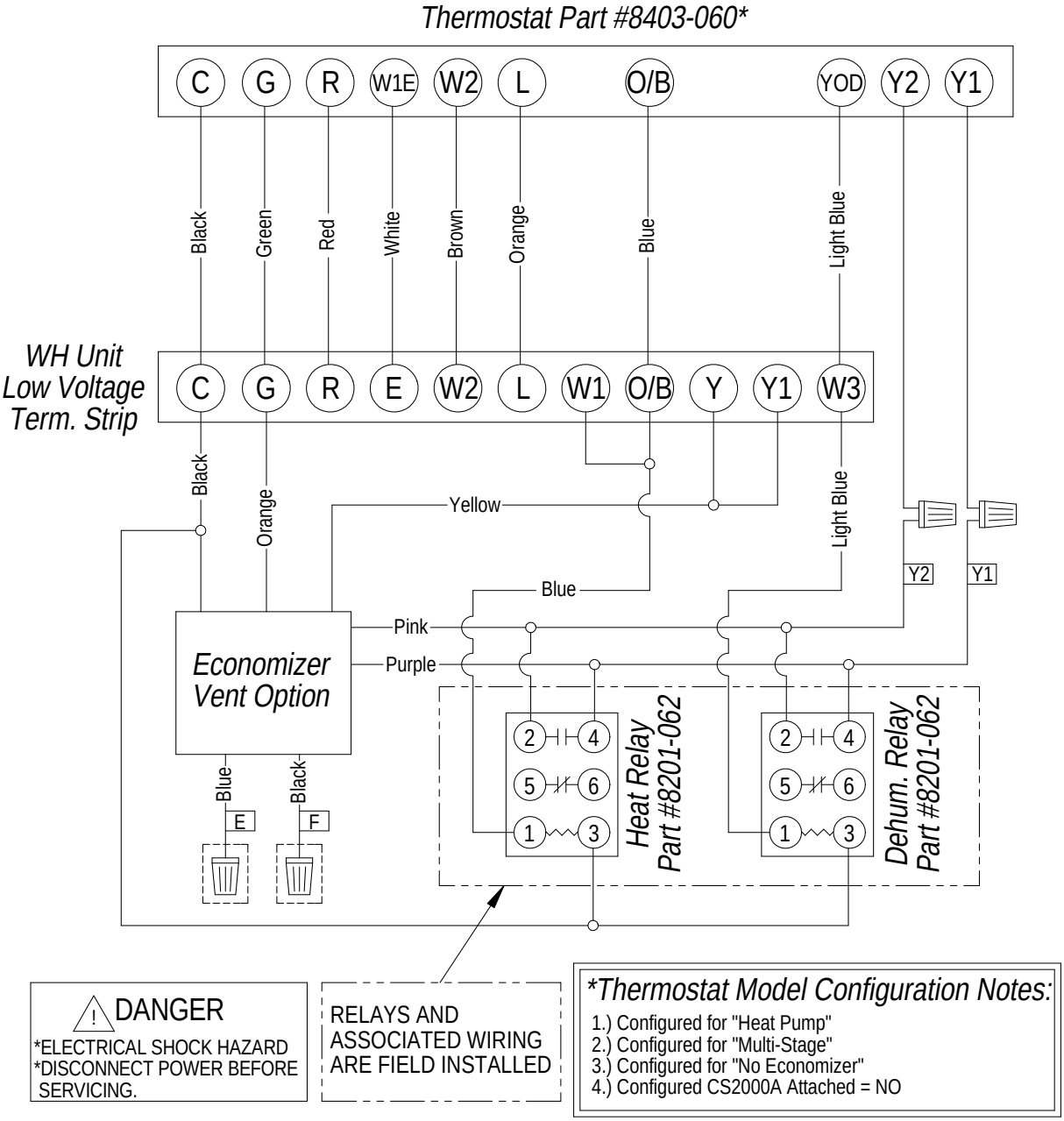
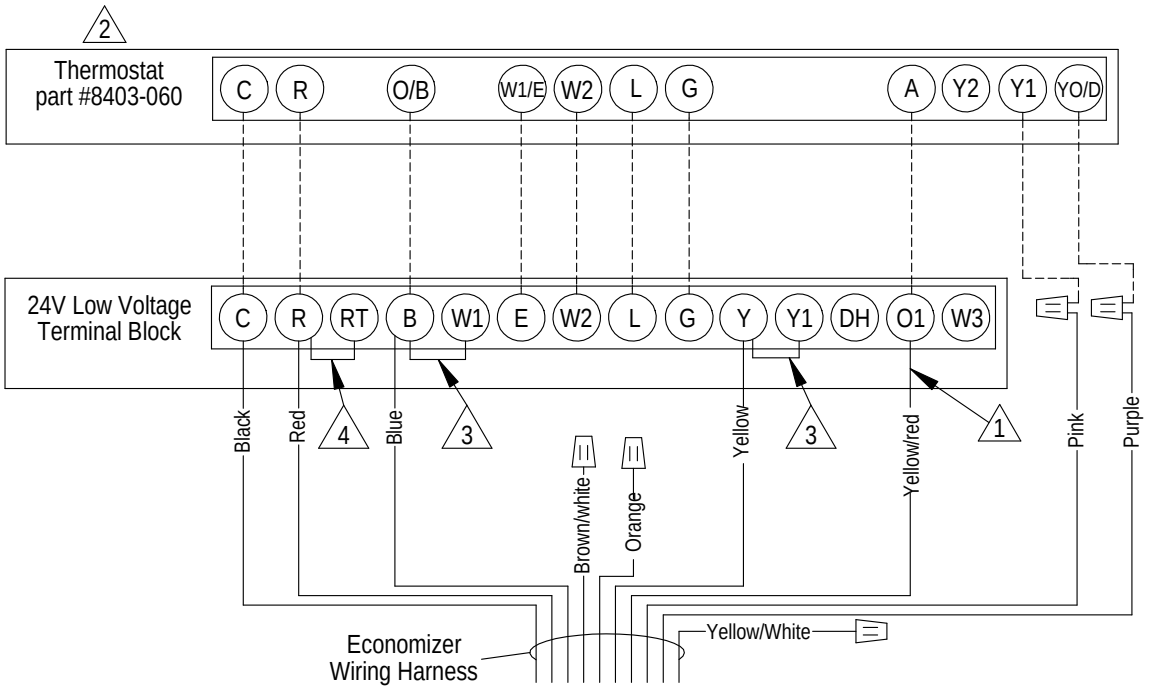


FIGURE 11
Low Voltage Wiring Diagram:
WH1 Dehum. with Economizer and #8403-060 Thermostat (EIFM) "E" Vent Option**



4200-001 B

FIGURE 12
Low Voltage Wiring Diagram:
1-stage Heat Pump with Optional Electric Heat without Dehumidification with ECONWM∗ Style Economizer
"S", "W" or "T" Vent Option



1 *Must be energized to enable minimum position. NOTE: Economizer Control Default Setting is 10V (100%). Depending upon application may require setting to lower value.*

2 *Must be configured for heat pump / multistage/ no economizer/ to enable YO/D output to be active as dehumidification output*

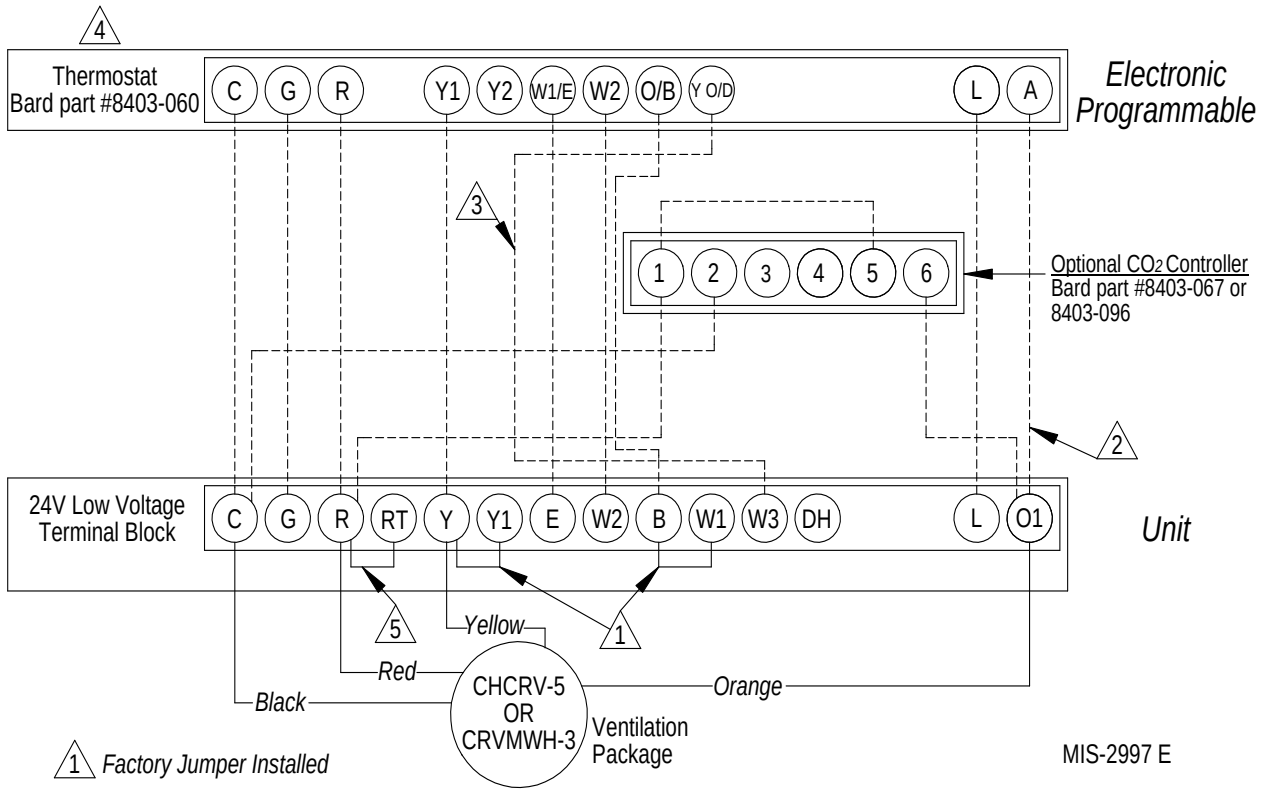
3 *Factory Jumper Installed.*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-2981 D

FIGURE 13
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVMWH-3 or CHCRV-5 Ventilation Package with Programmable Thermostat (Recommended)

For CHCRV-5A information, refer to Figure 15 on page 19.



1 *Factory Jumper Installed*

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

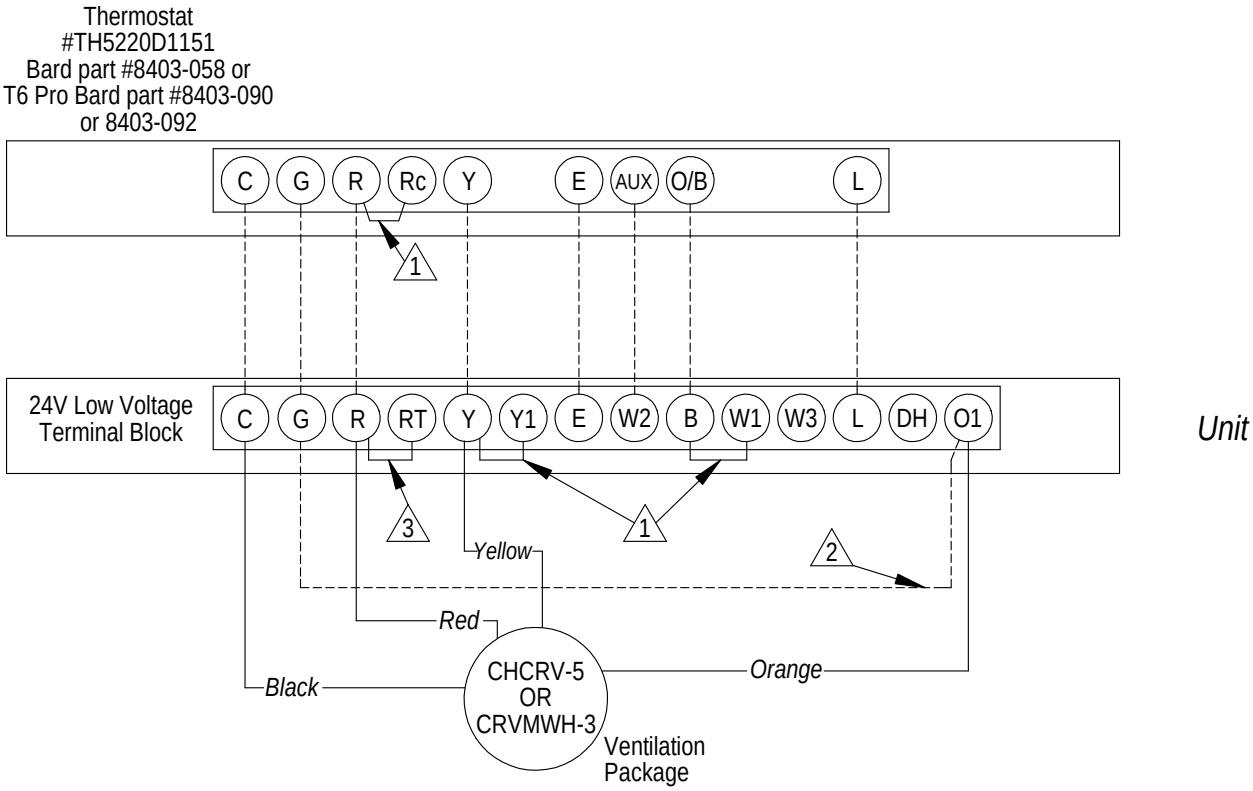
3 *Wire only needed for dehumidification units*

4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 14
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVMWH-3 or CHCRV-5 Ventilation Package with Thermostat (No Occupied Signal)

For CHCRV-5A information, refer to Figure 16 on page 20.



MIS-2998 D

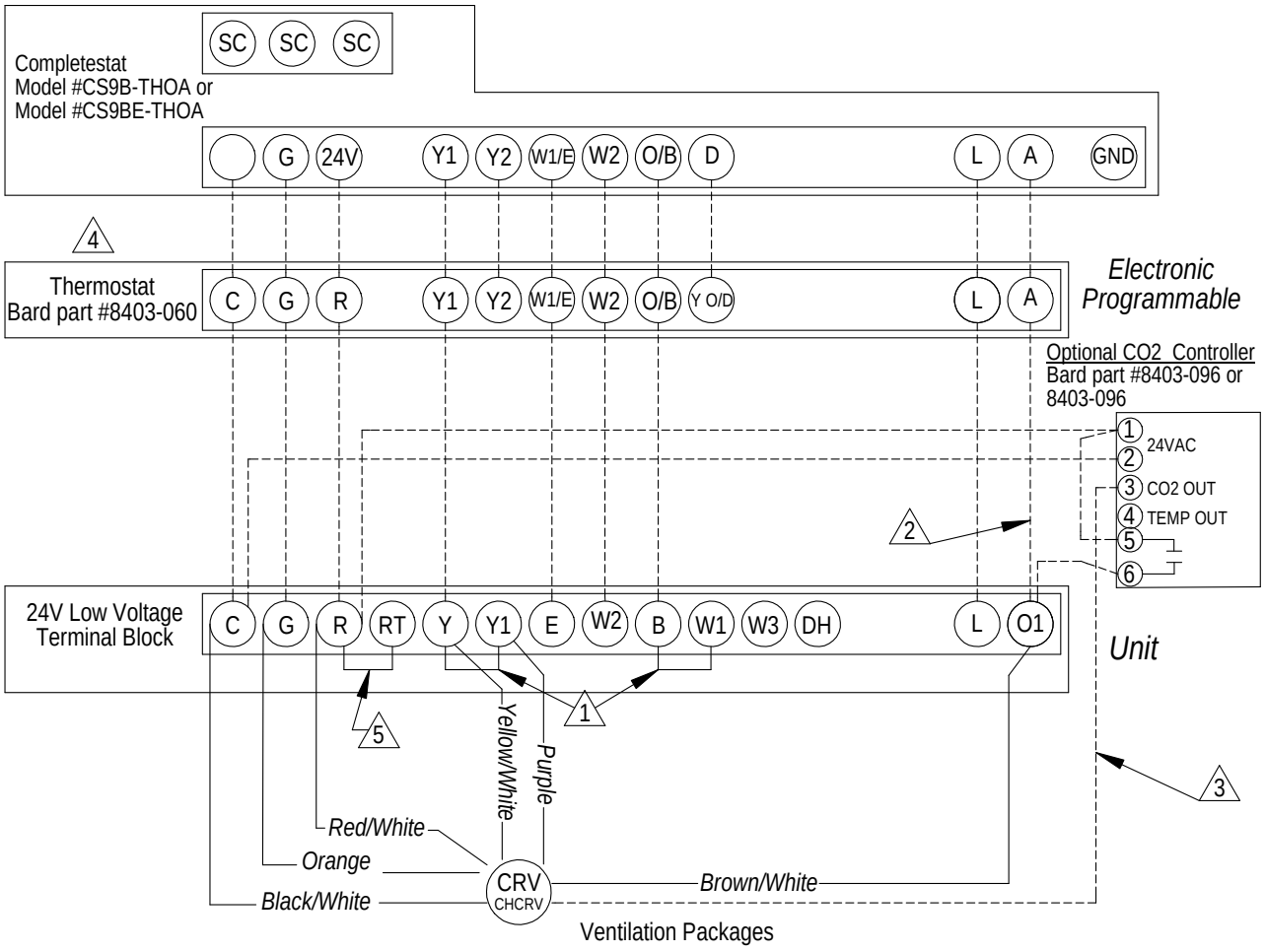
1 *Factory Jumper Installed*

2 *Add jumper, ventilation will be active whenever blower operates.*

3 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

FIGURE 15
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVS-*A or CHCRV-5A Ventilation Package
with Programmable Thermostat (Recommended), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figure 2 on page 6.*
For CHCRV-5 (non A version) information, refer to Figure 13 on page 17.



1 *Factory Jumper Installed*

2 *Do not connect "A" from tstat #8403-060 if optional CO_2 controller is used.*

3 *Connect orange wire to "G" only if optional CO_2 controller is used.*

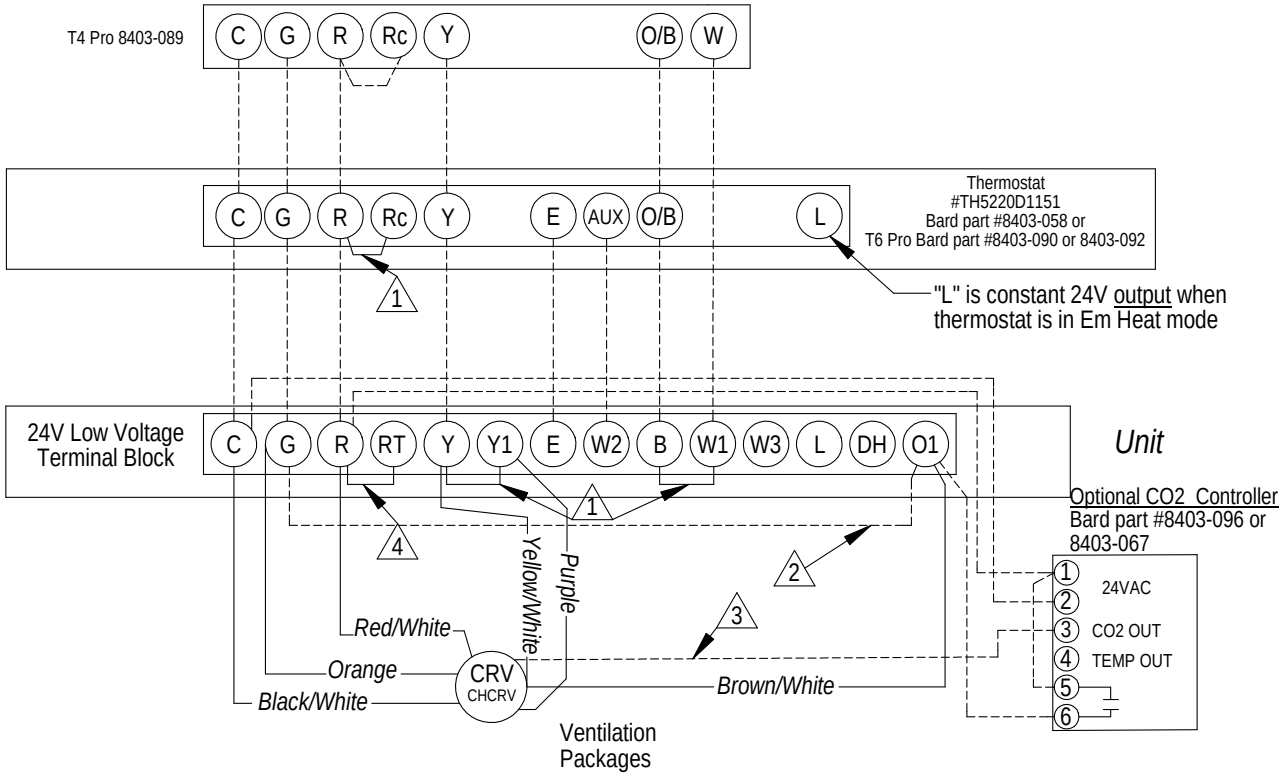
4 *Must be configured to programmable and fan set to programmed for the "A" output to function during scheduled occupied periods*

5 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-4352 A

FIGURE 16
Low Voltage Wiring Diagram:
Heat Pump with Optional CRVS-*A or CHCRV-5A Ventilation Package
with Thermostat (No Occupied Signal), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figures 3 and 4 on pages 7 and 8.*
For CHCRV-5 (non A version) information, refer to Figure 14 on page 18.



1 *Factory Jumper Installed*

2 *Add jumper, ventilation will be active whenever blower operates.Will require a wire change on vent relay to prevent relay lock-out. Refer to ventilator wiring diagram.*

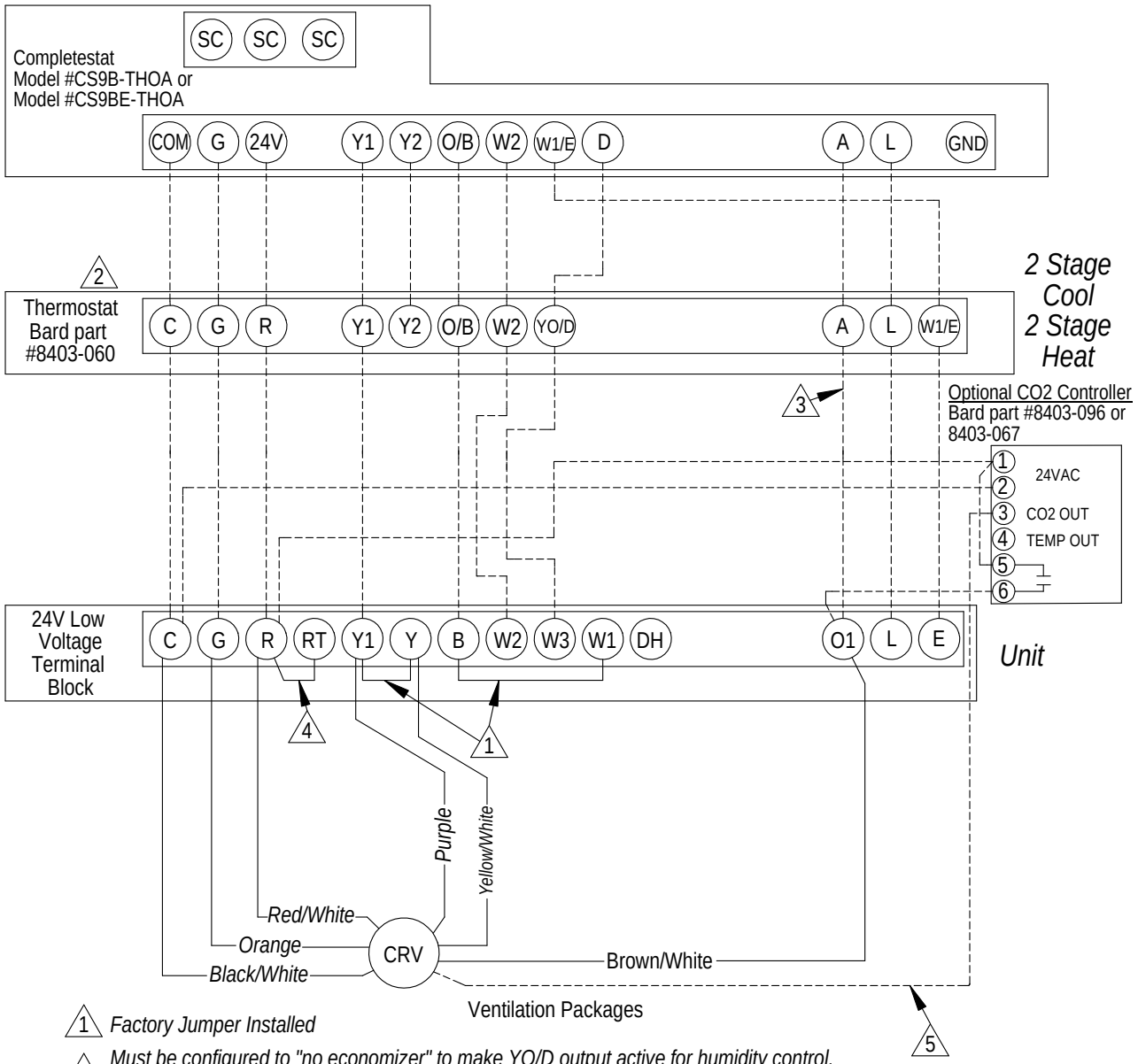
3 *Connect field wire for modulating CO2 ventilator control. Do NOT connect on/off ventilator control (To minimum blade position)*

4 *Factory installed jumper (on applicable models). Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

MIS-4353 A

FIGURE 17
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional CRVS-*A Ventilation Package
Using Electronic Thermostat with Combination Temperature and Humidity Control with Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figure 8 on page 12.*



1 *Factory Jumper Installed*

2 *Must be configured to "no economizer" to make YO/D output active for humidity control. Must be configured to programmable and fan set to programmed fan for the "A" output to function during scheduled occupied periods.*

3 *Do not connect "A" from thermostat if optional CO_2 controller is used.*

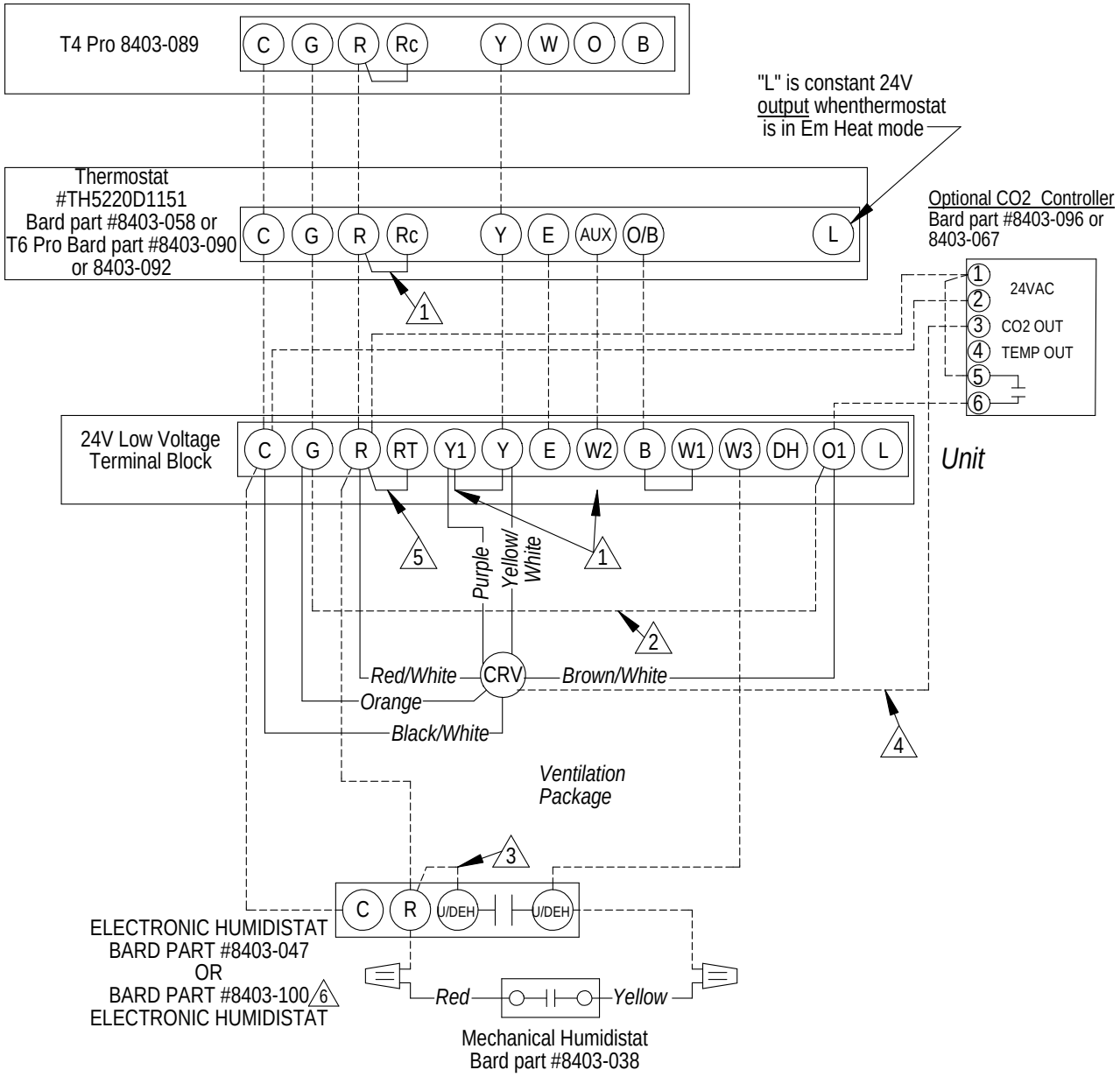
4 *Factory installed jumper (on applicable models).Remove jumper and connect to N.C fire alarm circuit if emergency shutdown required.*

5 *Connect field wire for modulating CO2 ventilator control. Do NOT connect for on/off ventilator control (To minimum blade position).*

MIS-4354 A

FIGURE 18
Low Voltage Wiring Diagram:
Heat Pump with Dehumidification Sequence and Optional CRVS-*A Ventilation Package
Using Thermostat (No Occupied Signal), with or without Optional CO_2 Controller

For CRVS- (non A version) information, refer to Figures 9 and 10 on pages 13 and 14.*



1. FACTORY JUMPER INSTALLED.
2. ADD JUMPER, VENTILATION WILL BE ACTIVE WHENEVER BLOWER OPERATES. WILL REQUIRE A WIRE CHANGE ON VENT RELAY TO PREVENT RELAY LOCK-OUT. REFER TO VENTILATOR WIRING DIAGRAM.
3. JUMPER NEEDS TO BE ADDED.
4. CONNECT FIELD WIRE FOR MODULATING CO2 VENTILATOR CONTROL. DO NOT CONNECT FOR ON/OFF VENTILATOR CONTROL (TO MINIMUM BLADE POSITION).
5. FACTORY INSTALLED JUMPER (ON APPLICABLE MODELS). REMOVE JUMPER AND CONNECT TO N.C FIRE ALARM CIRCUIT IF EMERGENCY SHUTDOWN REQUIRED.
6. HUMIDISTAT 8403-100 WILL NEED TO BE CONFIGURED FOR DEHUMIDIFICATION IN THE MENU. SEE USER'S MANUAL

MIS-4355 B

INSTALLATION INSTRUCTIONS

Wall-Mounted Packaged Heat Pump

Models:

T60H2-A T60H2-B T60H2-C

Bard®
SINCE 1914
Climate Control Solutions

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

Manual: 2100-737A
Supersedes: 2100-737
Date: 5-14-21

CONTENTS

GETTING OTHER INFORMATION AND PUBLICATIONS

These publications can help when installing the furnace. They can usually be found at the local library or purchased directly from the publisher. Be sure to consult the 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
Residential Winter and Summer Air Conditioning

Duct Design for Residential ..... ACCA Manual D
Winter and Summer Air Conditioning and Equipment Selection

For more information, contact these publishers:

ACCA **Air Conditioning Contractors of America**
1712 New Hampshire Ave. N.W.
Washington, DC 20009
Telephone: (202) 483-9370
Fax: (202) 234-4721

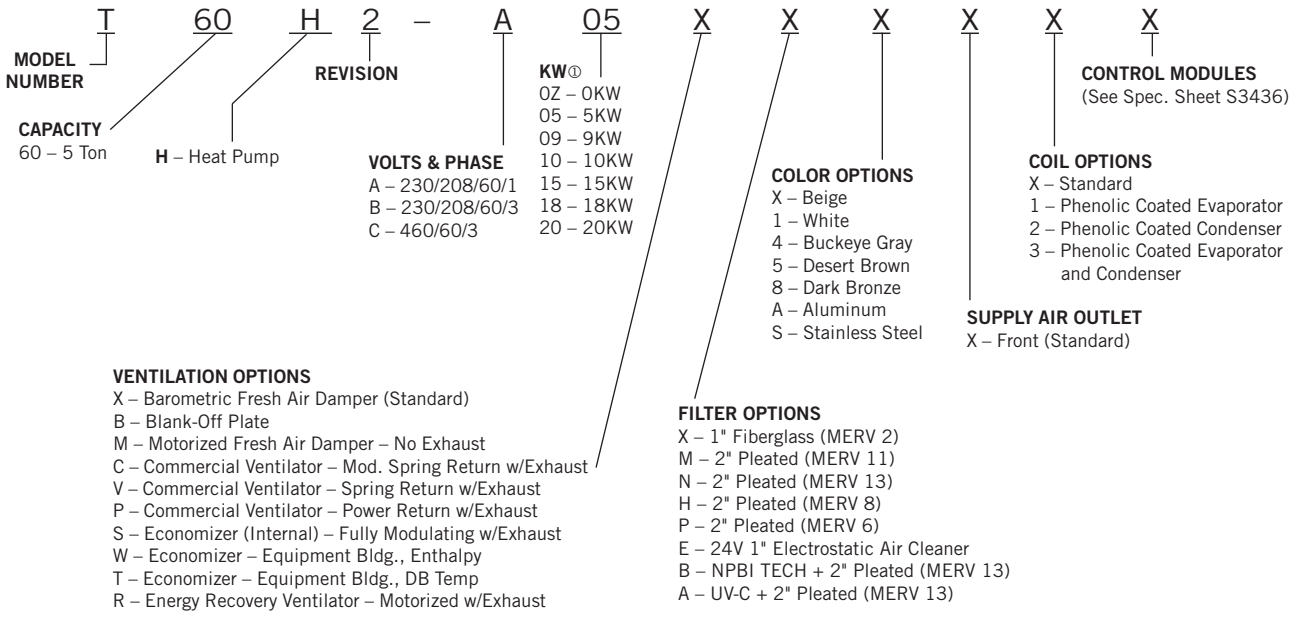
ANSI **American National Standards Institute**
11 West Street, 13th Floor
New York, NY 10036
Telephone: (212) 642-4900
Fax: (212) 302-1286

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

WALL MOUNT GENERAL INFORMATION

HEAT PUMP WALL MOUNT MODEL NOMENCLATURE



① For 0 KW and circuit breakers (230/208 volt) or toggle disconnect (460V) applications, insert 0Z in the KW field of the model number. See page 22.

NOTE: *Vent options X, B and M are without exhaust capability. May require separate field-supplied barometric relief in building.*

SHIPPING DAMAGE

Upon receipt of equipment, the carton should be checked for external signs of shipping damage. If damage is found, the receiving party must contact the last carrier immediately, preferably in writing, requesting inspection by the carrier's agent.

GENERAL

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

The refrigerant system is completely assembled and charged. All internal wiring is complete.

The unit is designed for use with or without duct work. Flanges are provided for attaching the supply and return ducts.

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

These instructions and any instructions packaged with any separate equipment required to make up the entire air conditioning system should be carefully read before beginning the installation. Note particularly "Starting 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/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 Association for the Installation of Air Conditioning and Ventilating 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.

DUCT WORK

All duct work, supply and return, 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.

Design the duct work according to methods given by the Air Conditioning Contractors of America (ACCA). When duct runs through unheated spaces, it should be insulated with a minimum of 1" 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.

A 1/4" clearance to combustible material for the first 3' of duct attached to the outlet air frame is required. See Wall Mounting Instructions and Figures 3 and 4 for further details.

Ducts through the walls must be insulated and all joints taped or sealed to prevent air or moisture entering the wall cavity.

Some installations may not require any return air duct. A metallic return air grille is required with installations not requiring a return air duct. The spacing between louvers on the grille shall not be larger than 5/8".

Any grille that meets with 5/8" louver criteria may be used. It is recommended that Bard Return Air Grille Kit RG2 through RG5 or RFG2 through RFG5 be installed when no return duct is used. Contact distributor or factory for ordering information. If using a return air filter grille, filters must be of sufficient size to allow a maximum velocity of 400 fpm.

NOTE: *If no return air duct is used, applicable installation codes may limit this cabinet to installation only in a single story structure.*

FILTERS

A 1" throwaway filter is standard with each unit. The filter slides into position making it easy to service. This filter can be serviced from the outside by removing the filter access panel. 2" pleated filters are also available as optional accessories. The internal filter brackets are adjustable to accommodate the 2" filter by bending two (2) tabs down on each side of the filter support bracket.

FRESH AIR INTAKE

All units are built with fresh air inlet slots punched in the service door.

If the unit is equipped with a fresh air damper assembly, the assembly is shipped already attached to the unit. The damper blade is locked in the closed position. To allow the damper to operate, the maximum and minimum blade position stops must be installed (see Figure 1).

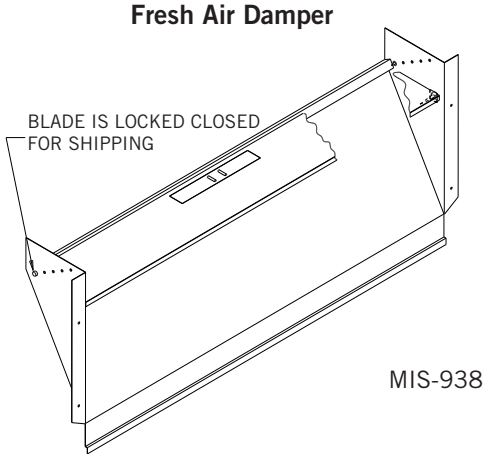
All capacity, efficiency and cost of operation information is based upon the fresh air blank-off plate in place and is recommended for maximum energy efficiency.

The blank-off plate is available upon request from the factory and is installed in place of the fresh air damper shipped with each unit.

CONDENSATE DRAIN

A plastic drain hose extends from the drain pan at the top of the unit down to the unit base. There are openings in the unit base for the drain hose to pass through. In the event the drain hose is connected to a drain system of some type, it must be an open or vented type system to assure proper drainage.

FIGURE 1
Fresh Air Damper



WALL MOUNTING INFORMATION

1. Two holes for the supply and return air openings must be cut through the wall as shown in Figure 3.
2. On wood frame walls, the wall construction must be strong and rigid enough to carry the weight of the unit without transmitting any unit vibration.
3. Concrete block walls must be thoroughly inspected to insure that they are capable of carrying the weight of the installed unit.

MOUNTING THE UNIT

1. These units are secured by wall mounting brackets which secure the unit to the outside wall surface at both sides. A bottom mounting bracket, attached to skid for shipping, is provided for ease of installation, but is not required.
2. The unit itself is suitable for 0" clearance, but the supply air duct flange and the first 3' of supply air duct require a minimum of 1/4" clearance to combustible material. However, it is generally recommended that a 1" clearance is used for ease of installation and maintaining the required clearance to combustible material. See Figure 3 for details on opening sizes.
3. Locate and mark lag bolt locations and bottom mounting bracket location. See Figure 3.
4. Mount bottom mounting bracket.
5. Hook top rain flashing, attached to front-right of supply flange for shipping, under back bend of top.
6. Position unit in opening and secure with 5/16" lag bolts; use 7/8" diameter flat washers on the lag bolts.
7. Secure rain flashing to wall and caulk across entire length of top. See Figure 3.
8. For additional mounting rigidity, the return air and supply air frames or collars can be drilled and screwed or welded to the structural wall itself (depending upon wall construction). Be sure to observe required clearance if combustible wall.

⚠ WARNING

Failure to provide the 1/4" clearance between the supply duct and a combustible surface for the first 3' of duct can result in fire causing damage, injury or death.

PLACEMENT

1. On side-by-side installations, maintain a minimum of 20" clearance on right side to allow access to control panel and heat strips, and to allow proper airflow to the outdoor coil. Additional clearance may be required to meet local or national codes.
2. Care should be taken to ensure that the recirculation and obstruction of condenser discharge air does not occur. Recirculation of condenser discharge air can be from either a single unit or multiple units. Any object such as shrubbery, a building or a large object can cause obstructions to the condenser discharge air. Recirculation or reduced airflow caused by obstructions will result in reduced capacity, possible unit pressure safety lockouts and reduced unit service life.

   For units with a blow-through condenser, it is recommended there be a minimum distance of 15' between the front of the unit and any barrier or 20' between the fronts of two opposing (facing) units.

Clearances Required for Service Access and Adequate Condenser Airflow

MODELS	LEFT SIDE	RIGHT SIDE
T60H	20"	20"

Minimum Clearances Required to Combustible Materials

MODELS	SUPPLY AIR DUCT FIRST 3'	CABINET
T60H	1/4"	0"

FIGURE 2
Unit Dimensions

Model	Width	Depth	Height	Supply		Return																
				A	B	C	B	E	F	G	I	J	K	L	M	N	O	P	Q	R	S	T
T60H	42.075	22.432	93.000	9.88	29.88	15.88	29.88	43.88	13.56	37.00	30.00	40.81	35.06	42.81	40.56	3.37	43.00	31.00	10.00	1.44	16.00	10.00

All dimensions are in inches. Dimensional drawings are not to scale.

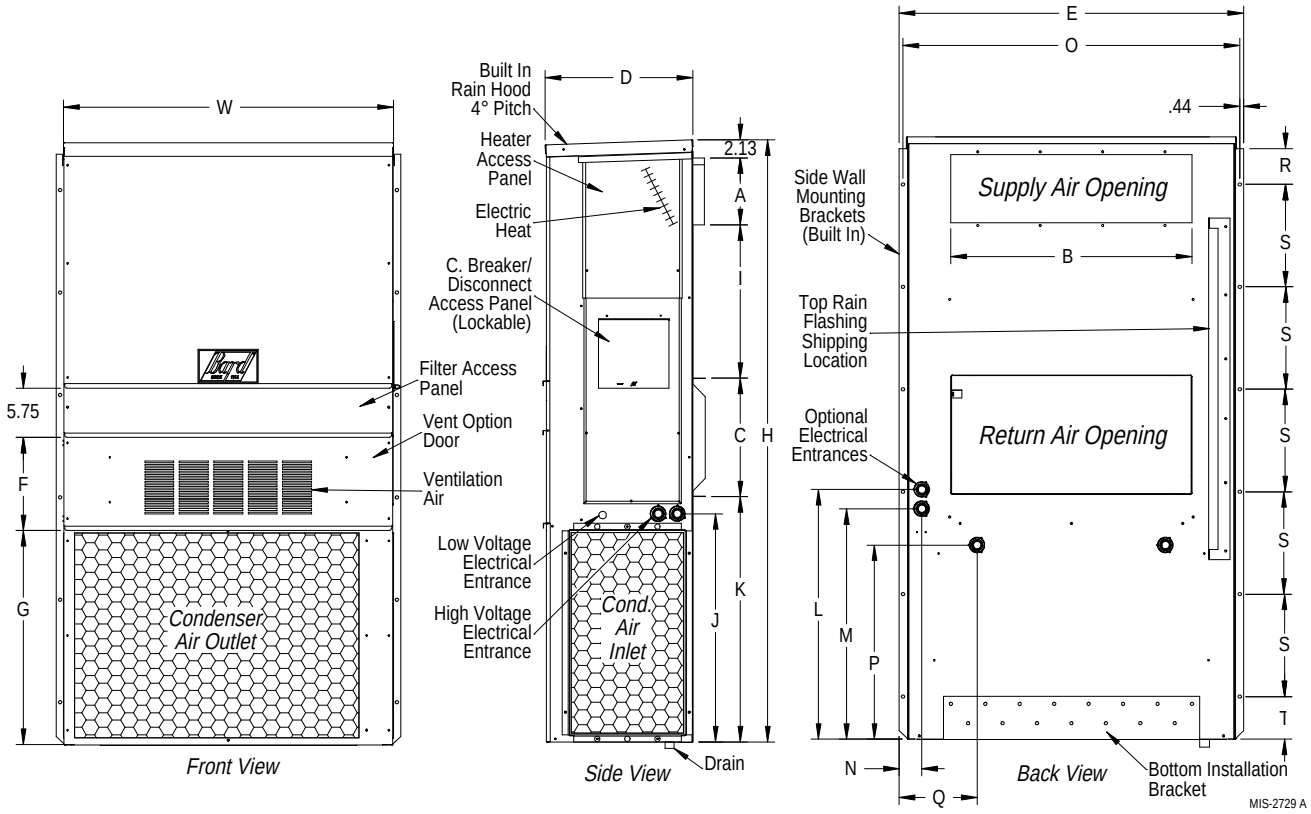
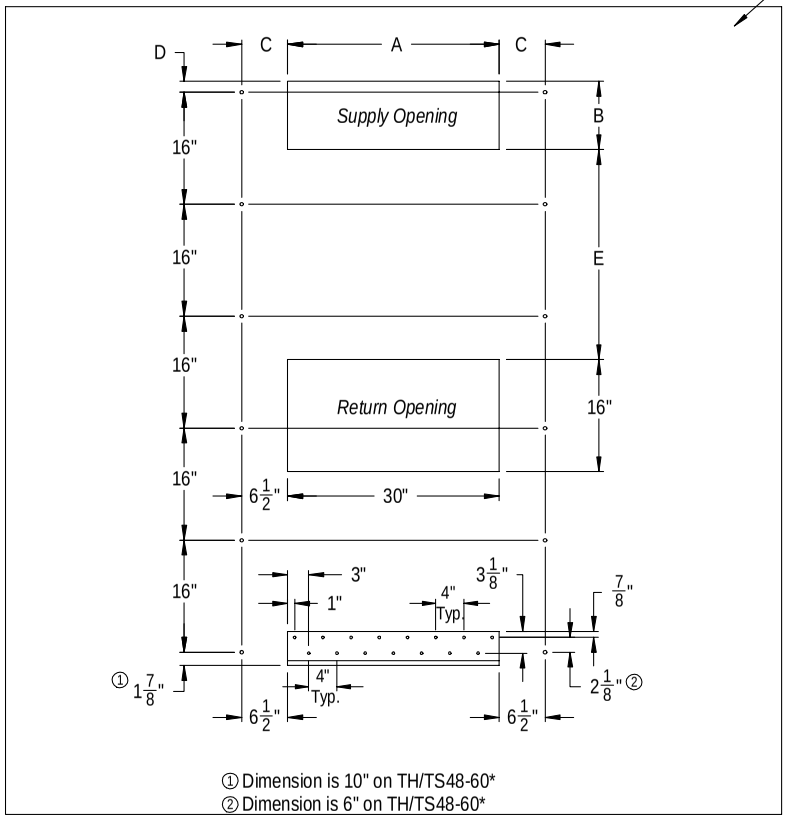
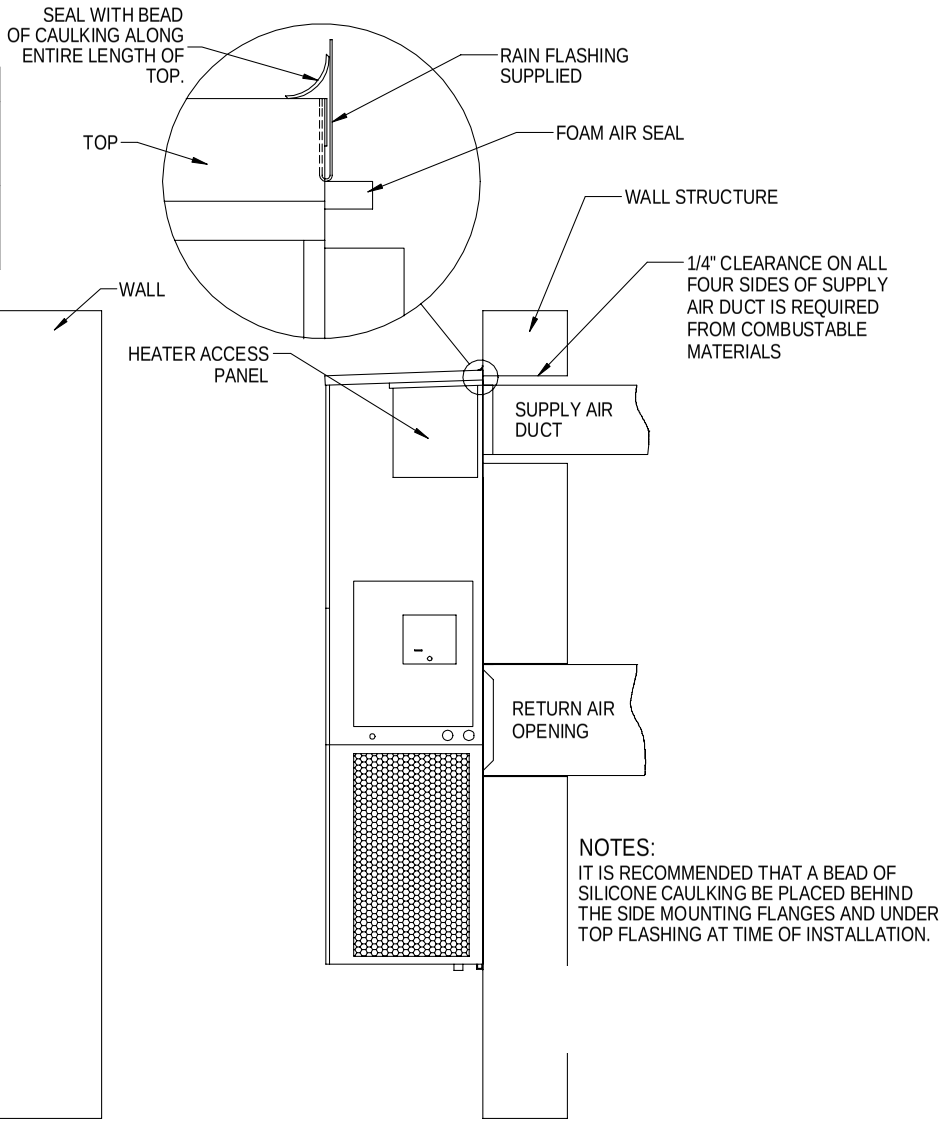


FIGURE 3
Mounting Instructions

	A	B	C	D	E
REQUIRED DIMENSIONS TO MAINTAIN 1/4" MIN. CLEARANCE FROM COMBUSTIBLE MATERIALS	30 1/2	10 1/2	6 1/4	1 1/4	29 3/4
REQUIRED DIMENSIONS TO MAINTAIN RECOMMENDED 1" CLEARANCE FROM COMBUSTIBLE MATERIALS	32	12	5 1/2	2	29



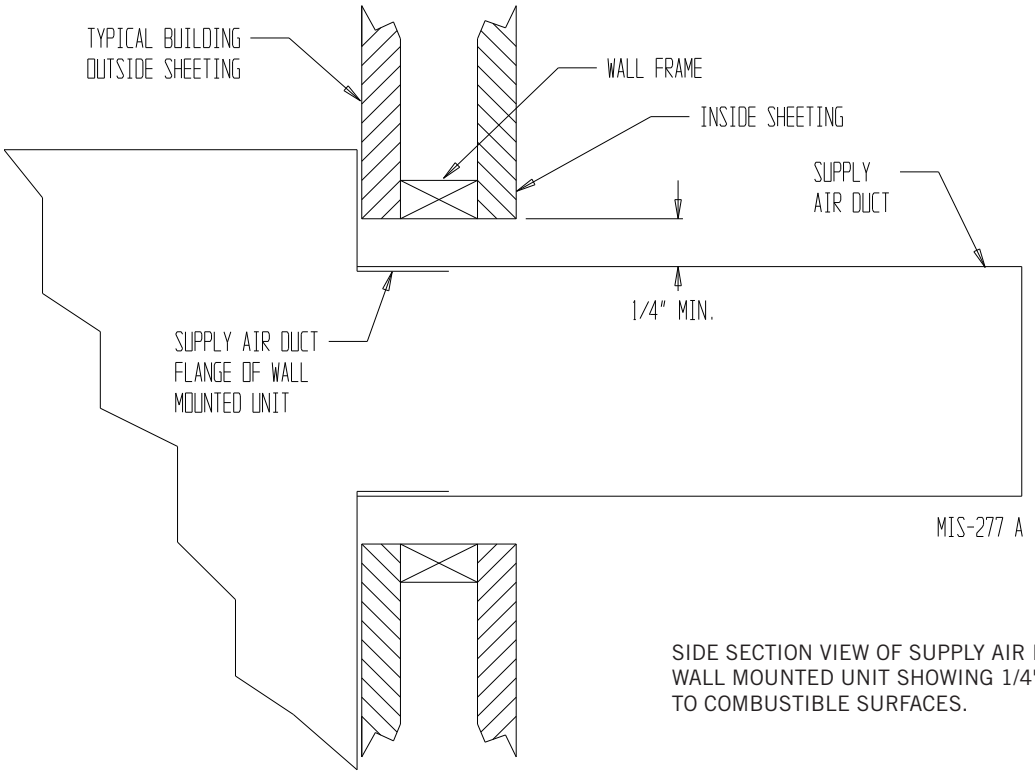
Wall Opening and Hole Location View



Right Side View

MIS-416 F

FIGURE 4
Electric Heat Clearance



SIDE SECTION VIEW OF SUPPLY AIR DUCT FOR WALL MOUNTED UNIT SHOWING 1/4" CLEARANCE TO COMBUSTIBLE SURFACES.

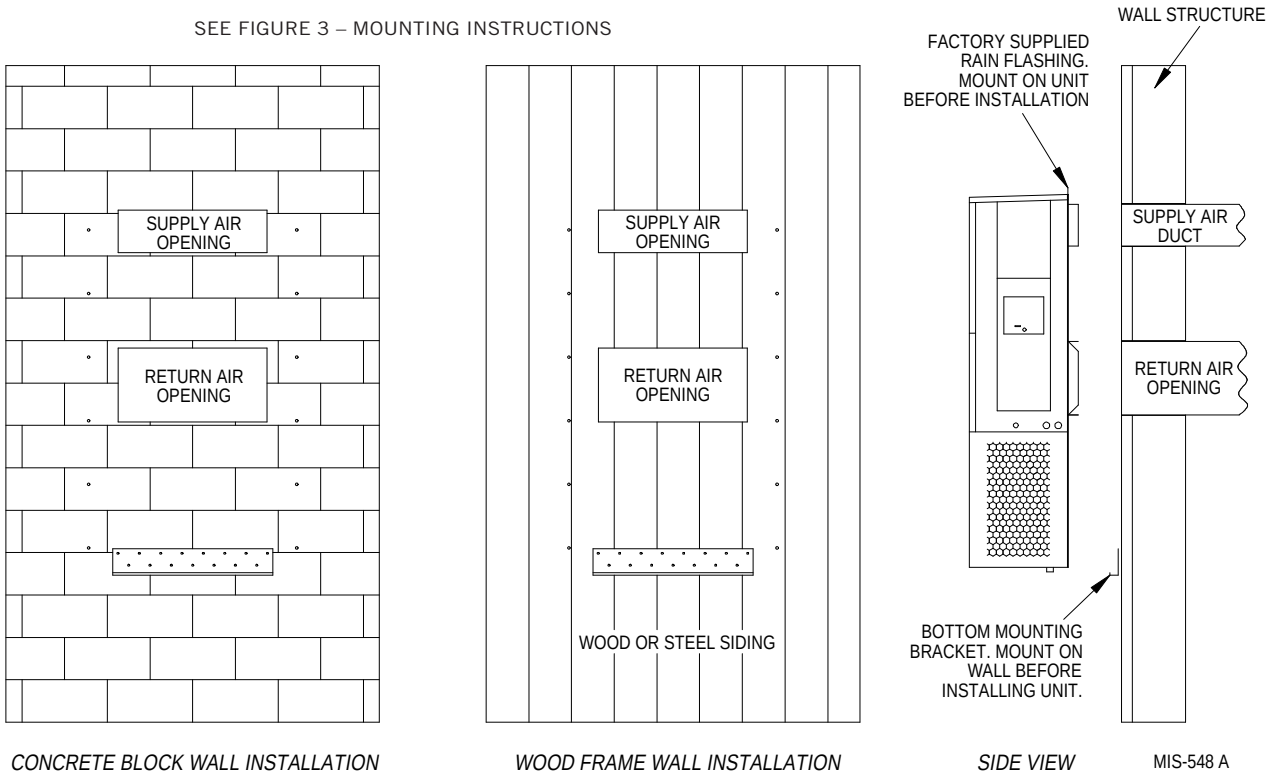
⚠ WARNING

A ***minimum*** of 1/4" clearance must be maintained between the supply air duct and combustible materials. This is required for the first 3' of ducting.

It is important to insure that the 1/4" minimum spacing is maintained at all points.

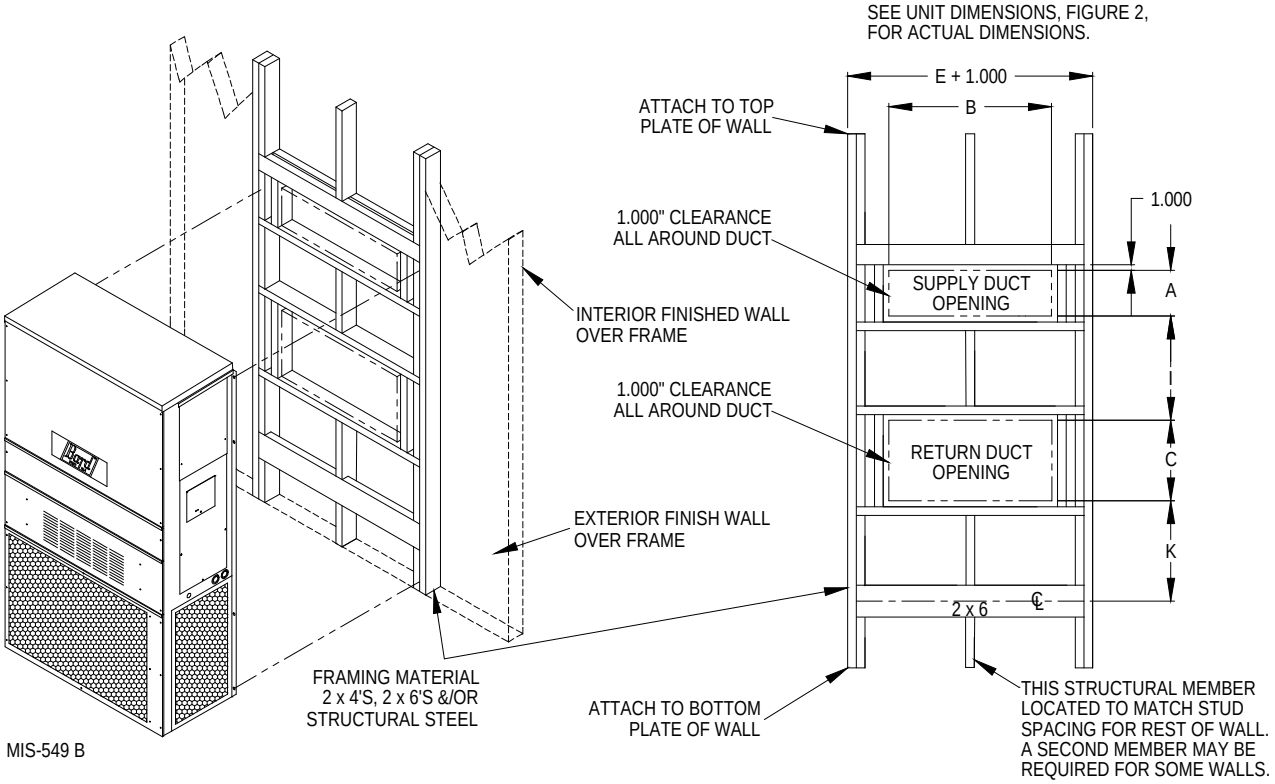
Failure to do this could result in overheating the combustible material and may result in a fire causing damage, injury or death.

FIGURE 5
Wall Mounting Instructions



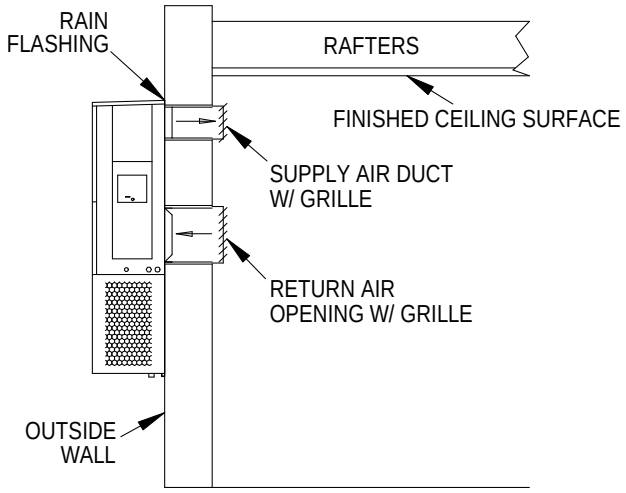
CONCRETE BLOCK WALL INSTALLATION *WOOD FRAME WALL INSTALLATION* *SIDE VIEW* MIS-548 A

FIGURE 6
Wall Mounting Instructions

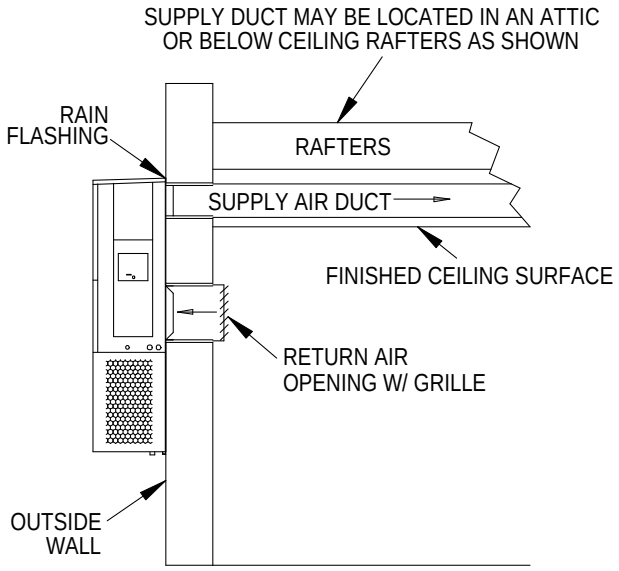


MIS-549 B

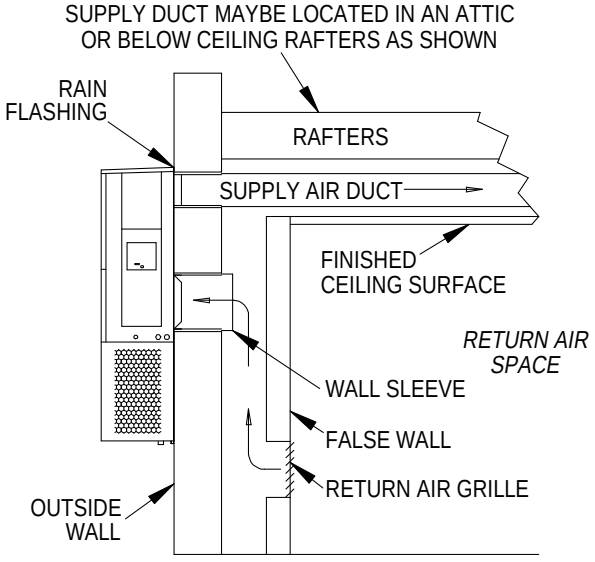
FIGURE 7
Common Wall Mounting Installations



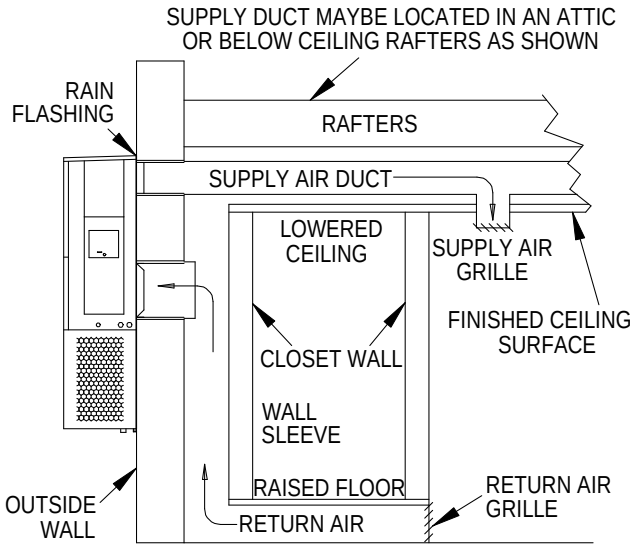
FREE AIR FLOW
NO DUCT



DUCTED SUPPLY
RETURN AT UNIT



FALSE WALL INSTALLATION



CLOSET INSTALLATION

MIS-550 B

WIRING – MAIN POWER

Refer to the unit rating plate for wire sizing information and maximum fuse or circuit breaker size. Each outdoor 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". 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.

The disconnect access door on this unit may be locked to prevent unauthorized access to the disconnect. To convert for the locking capability, bend the tab located in the bottom left-hand corner of the disconnect opening under the disconnect access panel straight out. This tab will now line up with the slot in the door. When shut, a padlock may be placed through the hole in the tab preventing entry.

See "Start Up" section for important information on three phase scroll compressor start ups.

See Table 4 on page 22 for electrical specifications.

WIRING – LOW VOLTAGE WIRING

All 230/208V 1 phase and 3 phase equipment have 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:

TAP	RANGE
240	253 – 216
208	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).*

For wiring size and connections, refer to Wiring Manual 2100-516.

OPTIONAL OUTDOOR THERMOSTAT APPLICATIONS

Since most equipment at the time of manufacture is not designated for any specific destination of the country and are installed in areas not approaching the lower outdoor temperature range, outdoor thermostats are not factory installed as standard equipment, but are offered as an option. There are also different applications for applying outdoor thermostats. The set point of either type of outdoor thermostat application is variable with geographic region and sizing of the heating equipment to the individual structure. Utilization of the heating Application Data, and the heat loss calculation of the building are useful in determining the correct set points.

NOTE: *The additional LAB (low ambient bypass) relay is required to prevent heater operation during low temperature cooling operation.*

OPTIONAL COMPRESSOR CUTOFF THERMOSTAT (See Figures 8 & 9)

Heat pump compressor operation at outdoor temperatures below 0°F are neither desirable nor advantageous in term of efficiency. An outdoor thermostat can be applied to take the mechanical heating (compressor) off line, and send the (compressor) signal to energize electric heat in its place (to make electric heat first stage heating). This can also be applied to bank the quantity of available electric heat. For example: A heat pump operates with 10KW second stage heat – once the outdoor thermostat has switched then operates 15KW without the compressor as first stage heat.

FIGURE 8
Compressor Cutoff Thermostat Wiring
4 – 10KW 1 PH/6 & 9KW 3 PH

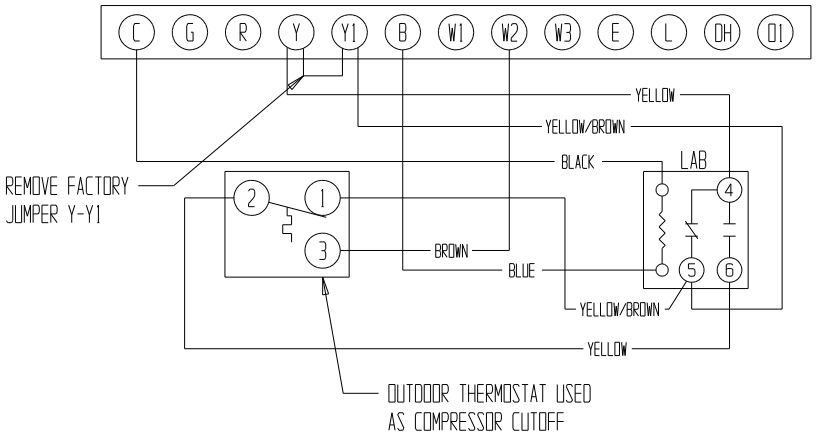
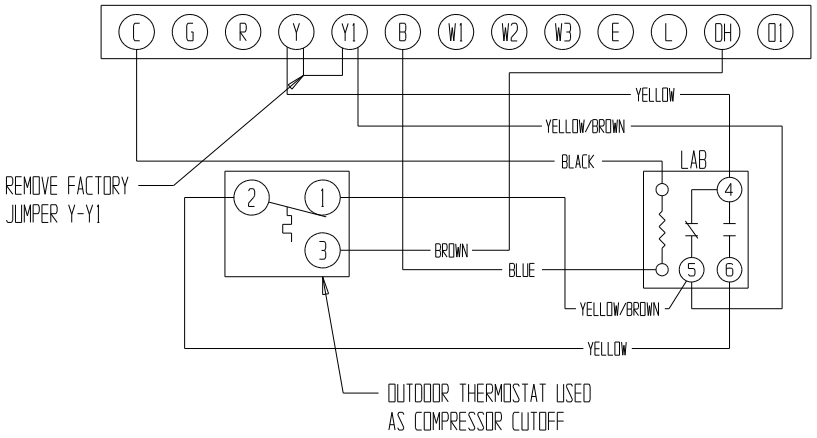


FIGURE 9
Compressor Cutoff Thermostat Wiring
15 – 20KW 1 PH & 3 PH



MIS-409A

ELECTRIC HEAT HOLD-OFF (See Figures 10 & 11)

In other applications, it is desirable to disable the operation of the electric heat until outdoor temperatures have reached a certain design point. This won't allow the electric heat to come on as second stage heating unless the outdoor temperature is below the set point of the outdoor thermostat. This is done to maximize efficiency by utilizing the heat pump to bring the conditioned space temperature up, rather than cycling on the electric heat due a second stage call for heat from the thermostat on start-up coming off a night set-back condition or someone increasing the thermostat set point. (***NOTE:*** *Some programmable thermostats do have a built-in time delay for pulling in second stage heat when coming off set-back conditions.*)

FIGURE 10
Electric Heat Hold-Off Wiring
4 – 10KW 1 PH/6 & 9KW 3 PH

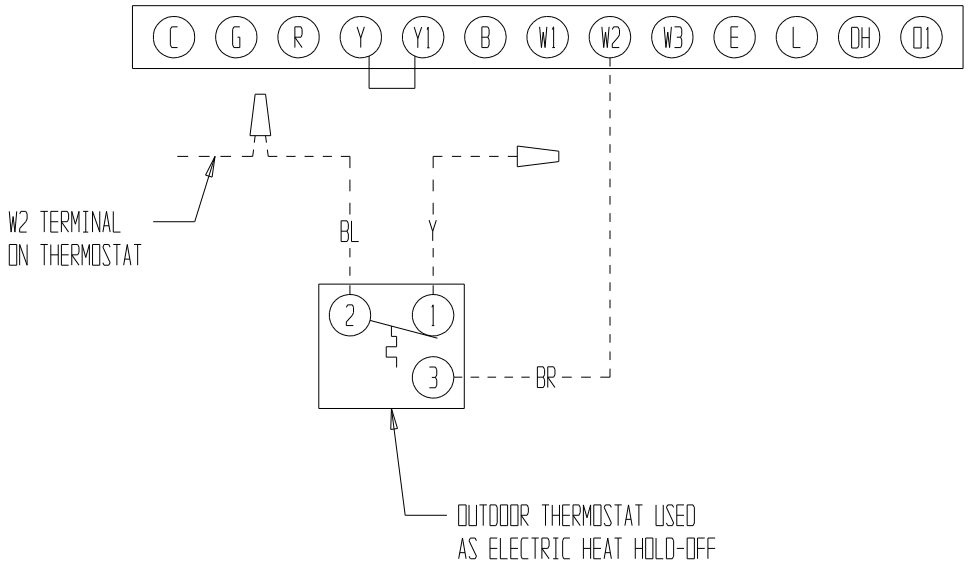
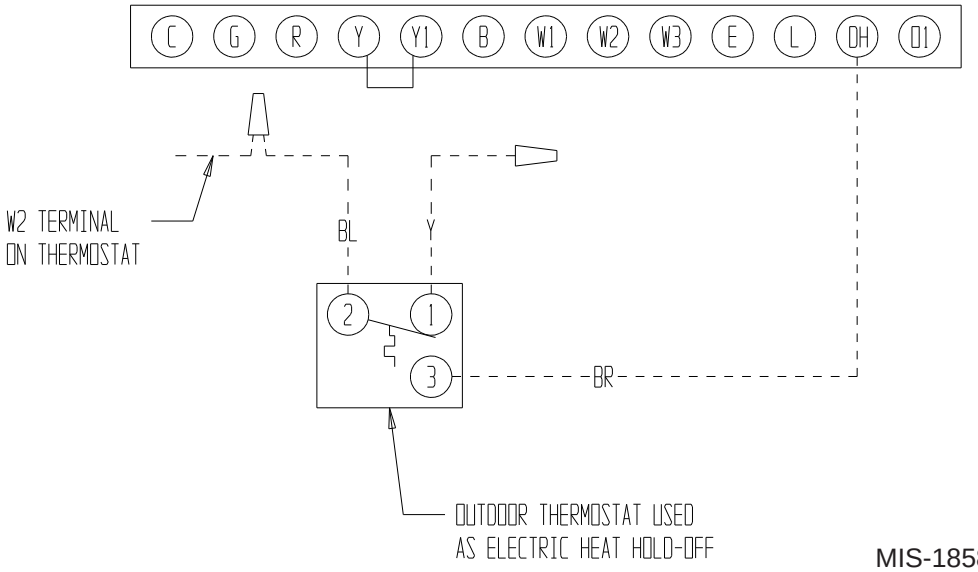


FIGURE 11
Electric Heat Hold-Off Wiring
15 – 20KW 1 PH & 3 PH



MIS-1858

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. 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 pressure 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 ensure 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 damage, 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 ultimately 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.

IMPORTANT INSTALLER NOTE

For improved start up performance wash the indoor coil with a dish washing detergent.

HIGH AND LOW PRESSURE SWITCH

All T**S wall mounted air conditioner series models are supplied with a remote reset for the high and low pressure switch. If tripped, this pressure switch may be reset by turning the thermostat off then back on again.

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 over 1 hour may have a negative impact on the bearing due to oil pump out.

NOTE: *If compressor is allowed to run in reverse rotation for an extended period of time, the compressor's internal protector will trip.*

All three phase ZP compressors 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 compressor may be changed by reversing any two line connections to the unit.

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.

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.***

SERVICE HINTS

1. Caution owner/operator to maintain clean air filters at all times and to not needlessly close off supply and return air registers. This reduces airflow through the system, which shortens equipment service life as well as increasing operating costs.
2. Check all power fuses or circuit breakers to be sure they are the correct rating.
3. Periodic cleaning of the outdoor coil to permit full and unrestricted airflow circulation is essential.

SEQUENCE OF OPERATION

Cooling

Circuit R-Y 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.

Heating

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-Y 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-Y circuit, pulling in compressor contactor starting compressor and outdoor motor. R-G also make starting indoor blower motor.

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 5A and 5B covering all models can be found on page 21. It is imperative to match the correct pressure table to the unit by model number.

DEFROST CYCLE

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

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.

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.

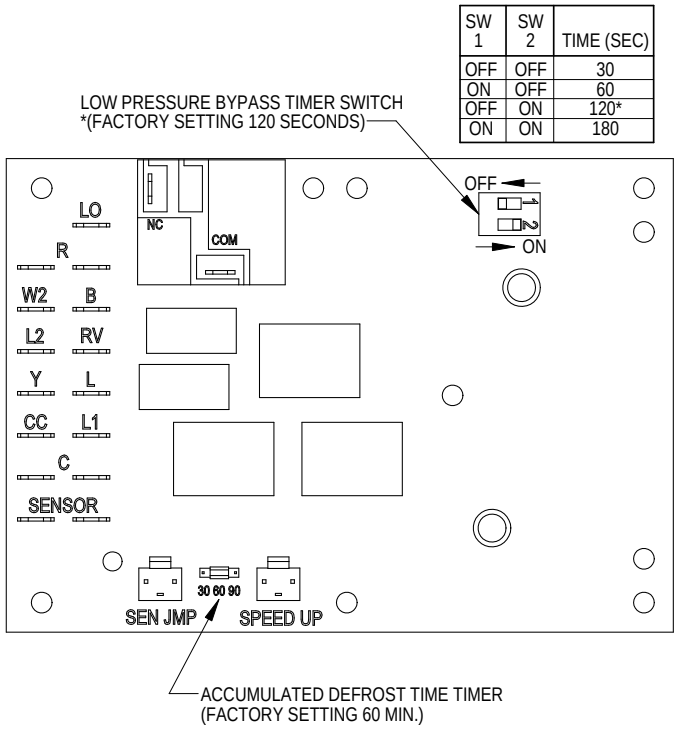
The heat pump defrost control board has an option of 30, 60 or 90-minute setting. By default, this unit is shipped from the factory with the defrost time on the 60-minute pin. If circumstances require a change to another time, remove the wire from the 60-minute terminal and reconnect to the desired terminal. Refer to Figure 12.

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 10 seconds with the *SPEEDUP* terminals shorted for the speedup to be completed and the defrost cycle to start.

FIGURE 12
Defrost Control Board



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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 jump) 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 and 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 control opening because of high pressure condition created by operating in the cooling mode with outdoor fan off. Pressure will rise fairly fast 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 HPC. This is to protect the compressor from short cycling conditions. The board's LED will have a fast blink rate when in the compressor time delay. 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.

Low Pressure Switch Bypass Operation

The control has a selectable (SW1) low pressure switch bypass set up to ignore the low pressure switch input during the first (30, 60, 120 or 180 seconds) of "Y" operation. Factory default is 120 seconds.

After this period expires, the control will then monitor the low pressure switch input normally to make sure that the switch is closed during "Y" operation.

High Pressure Switch Operation

The control has a built-in lockout system that allows the unit to have the high pressure switch trip up to two times in 1 hour and only encounter a "soft" lockout. A "soft" lockout shuts the compressor off and waits for the pressure switch to reset, which at that point then allows the compressor to be restarted as long as the 5-minute short cycle timer has run out. If the high pressure switch trips a third time within 1 hour, the unit is in "hard" lockout indicating something is certainly wrong and it will not restart itself.

SOLID STATE HEAT PUMP CONTROL TROUBLESHOOTING PROCEDURE

1. ***NOTE:*** *A thorough understanding of the defrost cycle sequence is essential. Review that section (page 17) prior to troubleshooting the control.* Turn on AC power supply to unit.
2. Turn thermostat blower switch to "fan on"—the indoor blower should start. (If it doesn't, troubleshoot indoor unit and correct problem.)
3. Turn thermostat blower to "auto" position. Indoor blower should stop. ***NOTE:*** *Many models have a 1-minute blower time delay on "off" command; wait for this to time out.*
4. 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.*

LED BLINK CODES	
BLINK	**FUNCTION**
Slow	Normal function (1.0 sec on/1.0 sec off)
Fast	Compressor Delay timer active (0.1 sec on/0.1 sec off)
1	Low pressure switch failure
2	High pressure switch failure/"Soft" Lockout
3	Defrost mode active
4	High pressure switch failure/"Hard" Lockout

TABLE 1 – Troubleshooting

Sympton	Description, Check & Possible Cause	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", got to Step #6; Code "2", go to Step #7; 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.
	7. High pressure fault.	Check wiring circuit and unit pressures.
	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 and 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 24 V between RV-C and B-C. 1. Check circuit control 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 goes through defrost cycle, replace temperature sensor. 2. If unit does not go through defrost cycle, replace heat pump control.

CHECKING TEMPERATURE SENSOR OUTSIDE UNIT CIRCUIT

1. Disconnect temperature sensor from board and from 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 ± 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 then it should be replaced.

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

F	R	F	R	F	R	F	R
-25.0	196871	13.0	56985	53.0	19374	89.0	7507
-24.0	190099	14.0	55284	52.0	18867	90.0	7334
-23.0	183585	15.0	53640	53.0	18375	91.0	7165
-22.0	177318	16.0	52051	54.0	17989	92.0	7000
-21.0	171289	17.0	50514	55.0	17434	93.0	6840
-20.0	165487	18.0	49028	56.0	16984	94.0	6683
-19.0	159904	19.0	47590	57.0	16547	95.0	6531
-18.0	154529	20.0	46200	58.0	16122	96.0	6383
-17.0	149355	21.0	44855	59.0	15710	97.0	6239
-16.0	144374	22.0	43554	60.0	15310	98.0	6098
-15.0	139576	23.0	42295	61.0	14921	99.0	5961
-14.0	134956	24.0	41077	62.0	14544	100.0	5827
-13.0	130506	25.0	39898	63.0	14177	101.0	5697
-12.0	126219	26.0	38757	64.0	13820	102.0	5570
-11.0	122089	27.0	37652	65.0	13474	103.0	5446
-10.0	118108	28.0	36583	66.0	13137	104.0	5326
-9.0	114272	29.0	35548	67.0	12810	105.0	5208
-8.0	110575	30.0	34545	68.0	12492	106.0	5094
-7.0	107010	31.0	33574	69.0	12183	107.0	4982
-6.0	103574	32.0	32634	70.0	11883	108.0	4873
-5.0	100260	33.0	31723	71.0	11591	109.0	4767
-4.0	97064	34.0	30840	72.0	11307	110.0	4663
-3.0	93981	35.0	29986	73.0	11031	111.0	4562
-2.0	91008	36.0	29157	74.0	10762	112.0	4464
-1.0	88139	37.0	28355	75.0	10501	113.0	4367
0.0	85371	38.0	27577	76.0	10247	114.0	4274
1.0	82699	39.0	26823	77.0	10000	115.0	4182
2.0	80121	40.0	26092	78.0	9760	116.0	4093
3.0	77632	41.0	25383	79.0	9526	117.0	4006
4.0	75230	42.0	24696	80.0	9299	118.0	3921
5.0	72910	43.0	24030	81.0	9077	119.0	3838
6.0	70670	44.0	23384	82.0	8862	120.0	3757
7.0	68507	45.0	22758	83.0	8653	121.0	3678
8.0	66418	46.0	22150	84.0	8449	122.0	3601
9.0	64399	47.0	21561	85.0	8250	123.0	3526
10.0	62449	48.0	20989	86.0	8057	124.0	3452
11.0	60565	49.0	20435	87.0	7869		
12.0	58745	50.0	19896	88.0	7686		

FAN BLADE SETTING DIMENSIONS

Shown in Figure 13 is the correct fan blade setting for proper air delivery across the outdoor coil. Refer to Table 2 for unit specific dimension.

Any service work requiring removal or adjustment in the fan and/or motor area will require that the dimensions below be checked and blade adjusted in or out on the motor shaft accordingly.

FIGURE 13
Fan Blade Setting

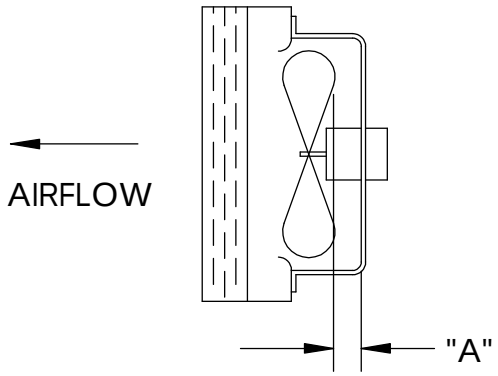

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TABLE 2
Fan Blade Dimension

Model	Dimension A
T60H	1.75"

REMOVAL OF FAN SHROUD

1. Disconnect all power to the unit.
2. Remove the screws holding both grilles, one on each side of unit, and remove grilles.
3. Remove nine screws holding fan shroud to condenser and bottom.
4. Unwire condenser fan motor.
5. Slide complete motor, fan blade and shroud assembly out the left side of the unit.
6. Service motor/fan as needed.
7. Reverse steps to re-install.

R-410A 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 following pressure tables show nominal pressures 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 3A
Cooling Pressures

Air Temperature Entering Outdoor Coil °F

Model	Return Air Temperature	Pressure	75	80	85	90	95	100	105	110	115	120	125
T60H	75° DB 62° WB	Low Side High Side	124 331	126 353	128 377	130 401	132 427	134 453	135 481	137 509	139 539	140 570	142 602
	80° DB 67° WB	Low Side High Side	133 340	135 363	137 387	139 412	141 438	143 465	145 493	147 523	148 553	150 585	152 617
	85° DB 72° WB	Low Side High Side	137 352	139 375	142 400	144 426	146 453	148 481	150 510	152 541	154 572	156 605	157 639

Low side pressure ± 4 PSIG
High side pressure ± 10 PSIG

Tables are based upon rated CFM (airflow) across the evaporator coil. If there is any doubt as to correct operating charge being in the system, the charge should be removed, system evacuated and recharged to serial plate charge weight.

NOTE: Pressure table based on high speed condenser fan operation. If condensing pressures appear elevated check condenser fan wiring. See "Condenser Fan Operation".

TABLE 3B
Heating Pressures (All Temperatures °F)

Model	Return Air Temperature	Pressure	0	5	10	15	20	25	30	35	40	45	50	55	60	65
T60H	70°	Low Side High Side	36 281	41 287	47 294	53 301	60 309	66 317	73 326	81 335	88 345	96 355	104 366	113 377	122 389	131 401

TABLE 4
Electrical Specifications

Models	Rated Volts, HZ and Phase	No. of Field Power Circuits	Single Circuit				Multiple Circuit											
			Min. Circuit Ampacity ①	Max. External Fuse or Circuit Breaker ②	Field Power Wire Size ③	Ground WIre Size ③	Minimum Circuit Ampacity ①			Maximum Circuit Exterior Fuse or Circuit Breaker ②			Field Power Wire Size ③			Ground WIre Size ③		
							Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C	Ckt. A	Ckt. B	Ckt. C
T60H2-A00, A0Z	230/208-60-1	1	43	60	8	10												
-A05		1 or 2	69	80	4	8	43	26		50	30		8	10		10	10	
-A10		1 or 2	95	100	3	8	43	52		50	60		8	6		10	10	
④-A15		1 or 2	95	100	3	8	43	52		50	60		8	6		10	10	
④-A20		1 or 3	113	125	2	6	43	52	52	50	60	60	8	6	6	10	10	10
T60H2-B00, B0Z	230/208-60-3	1	34	40	8	10												
-B09		1	59	60	6	10												
⑤-B15		1	59	60	6	10												
⑤-B18		2	N/A	N/A	N/A	N/A	59	28		60	30		6	10		10	10	
T60H2-C0Z	460-60-3	1	18	25	12	12												
-C06		1	32	35	10	10												
⑤-C15		1	32	35	10	10												
⑤-C18		1	34	35	8	10												

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical Code (latest version), Article 310 for power conductor sizing.

Caution: When more than one field power 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) conductors are in a raceway.

② Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

③ Based on 75°C copper wire. All wiring must conform to the National Electrical Code and all local codes.

④ Maximum KW that can operate with the heat pump on is 10KW. Full heat available during Emergency Heat Mode.

⑤ Maximum KW that can operate with the heat pump on is 9KW. Full heat available during Emergency Heat Mode.

IMPORTANT: While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses & conductor wires in accordance with the National Electrical Code and all local codes.

TABLE 5
Indoor Blower Performance – CFM (0.00" - 0.50" H_20) ①

Model	Rated ESP	① Maximum ESP	② Blower Only Except for CRVMP Vent Options	③ Blower Only For CRVMP Vent Options	④ Cooling & Heat Pump	④ Electric Heat
T60H	.20	.50	1650	850	1650	1650

NOTE: *These units are equipped with a variable speed (ECM) indoor motor that automatically adjusts itself to maintain approximately the same rate of indoor airflow in both heating & cooling, dry & wet coil conditions and at both 230/208 or 460 volts.*

① Maximum ESP (inches WC) shown is with 2" thick disposable filter.
② Blower only CFM is the total air being circulated during continuous fan mode. Airflow remains constant.
③ Blower only CFM reduces during continuous fan mode. Requires wiring modification; consult Wiring Diagram and unplug and leave disconnected the insulated male/female connector connecting together the Gray & Orange wires located near the 24V terminal block enclosure.
④ CFM output on Cooling or Electric Heat.

TROUBLESHOOTING GE ECM™ 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	Cause/Procedure
Motor rocks slightly when starting	• This is normal start-up for ECM
Motor won't start • No movement	• 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**
• Motor rocks, but won't start	• Check for loose or compliant motor mount • Make sure blower wheel is tight on shaft • Perform motor/control replacement check
Motor oscillates up load **& down while being tested off of blower**	• It is normal for motor to oscillate with no on shaft
Motor starts, but runs erratically	
• Varies up and down or intermittent	• 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**
• "Hunts" or "puffs" at high CFM (speed)	• Does removing panel or filter reduce "puffing"? - Reduce restriction - Reduce max airflow
• Stays at low CFM despite system call for cool or heat CFM	• 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
• Stays at high CFM	• "R" missing/not connected at motor • Is fan in delay mode? - wait until delay time complete • Perform motor/control replacement check
• Blower won't shut off	• Current leakage from controls into G, Y or W? Check for Triac switched thermostat or solid-state relay
Excessive noise	• Determine if it's air noise, cabinet, duct or motor noise; interview customer, if necessary
• Air noise	• 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
• Noisy blower or cabinet	• 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
• "Hunts" or "puffs" at high CFM (speed)	• Does removing panel or filter reduce "puffing"? - Reduce restriction - Reduce max. airflow
Evidence of Moisture	
• Motor failure or malfunction has occurred and moisture is present	• Replace motor and **Perform Moisture Check**
• Evidence of moisture present inside air mover	• **Perform Moisture Check**

Do	Don't
• Check out motor, controls, wiring and connections thoroughly before replacing motor	• Automatically assume the motor is bad.
• Orient connectors down so water can't get in - Install "drip loops"	• Locate connectors above 7 and 4 o'clock positions
• Use authorized motor and model #'s for replacement	• Replace one motor or control model # with another (unless an authorized 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	• Use high pressure drop filters some have ½" H20 drop! • Use restricted returns
• Size the equipment wisely	• Oversize system, then compensate with low airflow
• Check orientation before inserting motor connectors	• Plug in power connector backwards • Force plugs

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?

Replacing ECM Control Module

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

1. The correct replacement module must be used. 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 furnace or air handler 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 usually not necessary to remove the motor from the blower assembly. However, it is recommended that the whole blower assembly, with the motor, be removed from the furnace/air handler. (Follow the manufacturer's procedures). Unplug the two cable connectors to the motor. There are latches on each connector. **Do not pull on the wires.** The plugs remove easily when properly released.
4. Locate the two standard ¼" hex head bolts at the rear of the control housing (at the back end of the control opposite the shaft end). *Refer to Figure 14.* Remove these two bolts from the motor and control assembly while holding the motor in a way that will prevent the motor or control from falling when the bolts are removed. If an ECM2.0 control is being replaced (recognized by an aluminum casting rather that a deep-drawn black steel can housing the electronics), remove only the hex-head bolts. **Do not remove the torx-head screws.**
5. The control module is now free of mechanical attachment to the motor endshield but is still connected by a plug and three wires inside the control. Carefully rotate the control to gain access to the plug at the control end of the wires. With thumb and forefinger, reach the latch holding the plug to the control and release it by squeezing the latch tab and the opposite side of the connector plug and gently pulling the plug out of the connector socket in the control. **Do not pull on the wires. Grip the plug only.**
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 15.* (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. Finish installing the replacement control per one of the three following paragraphs, 8a, 8b or 8c.

   8a. **If replacing an ECM 2.0 control** (control in cast aluminum can with air vents on the back of the can) **with an ECM 2.3 control** (control containing black potting for water protection in black deep-drawn steel case with no vents in the bottom of the can), locate the two through-bolts and plastic tab that are packed with the replacement control. Insert the plastic tab into the slot at the perimeter of the open end of the can so that the pin is located on the inside of the perimeter of the can. Rotate the can so that the tab inserts into the tab locator hole in the endshield of the motor. Using the two through-bolts provided with the replacement control, reattach the can to the motor. **The two through-bolts provided with the replacement ECM 2.3 control are shorter than the bolts originally removed from the ECM 2.0 control and must be used if secure attachment of the control to the motor is to be achieved. *Do not overtighten the bolts.***

   8b. **If replacing an ECM 2.3 control with an ECM 2.3 control,** the plastic tab and shorter through-bolts are not needed. The control can be oriented in two positions 180° apart. **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.** Simply orient the new control to the motor's endshield, insert bolts, and tighten. ***Do not overtighten the bolts.***

   8c. **If replacing an ECM 2.0 control with an ECM 2.0 control** *(It is recommended that ECM 2.3 controls be used for all replacements),* the new control must be attached to the motor using through bolts identical to those removed with the original control. ***Do not overtighten the bolts.***
9. Reinstall the blower/motor assembly into the HVAC equipment. Follow the manufacturer's suggested procedures.
10. Plug the 16-pin control plug into the motor. The plug is keyed. Make sure the connector is properly seated and latched.
11. 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.**
12. Final installation check. Make sure the motor is installed as follows:
    a. Unit is as far INTO the blower housing as possible.
    b. Belly bands are not on the control module or covering vent holes.
    c. Motor connectors should be oriented between the 4 o'clock and 8 o'clock positions when the blower is positioned in its final location and orientation.
    d. Add a drip loop to the cables so that water cannot enter the motor by draining down the cables. *Refer to Figure 16 .*

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.

Figure 14
Control Disassembly

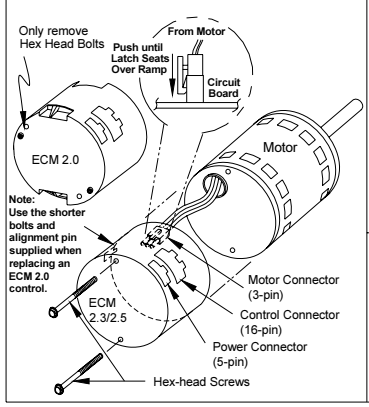


Figure 15
Winding Test

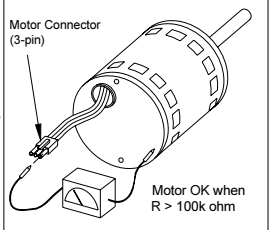
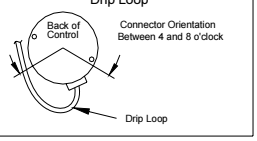


Figure 16
Drip Loop



REPLACEMENT PARTS MANUAL

Wall-Mounted
Packaged Heat Pump

Models:

T60H2-A T60H2-B T60H2-C

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.

Contents

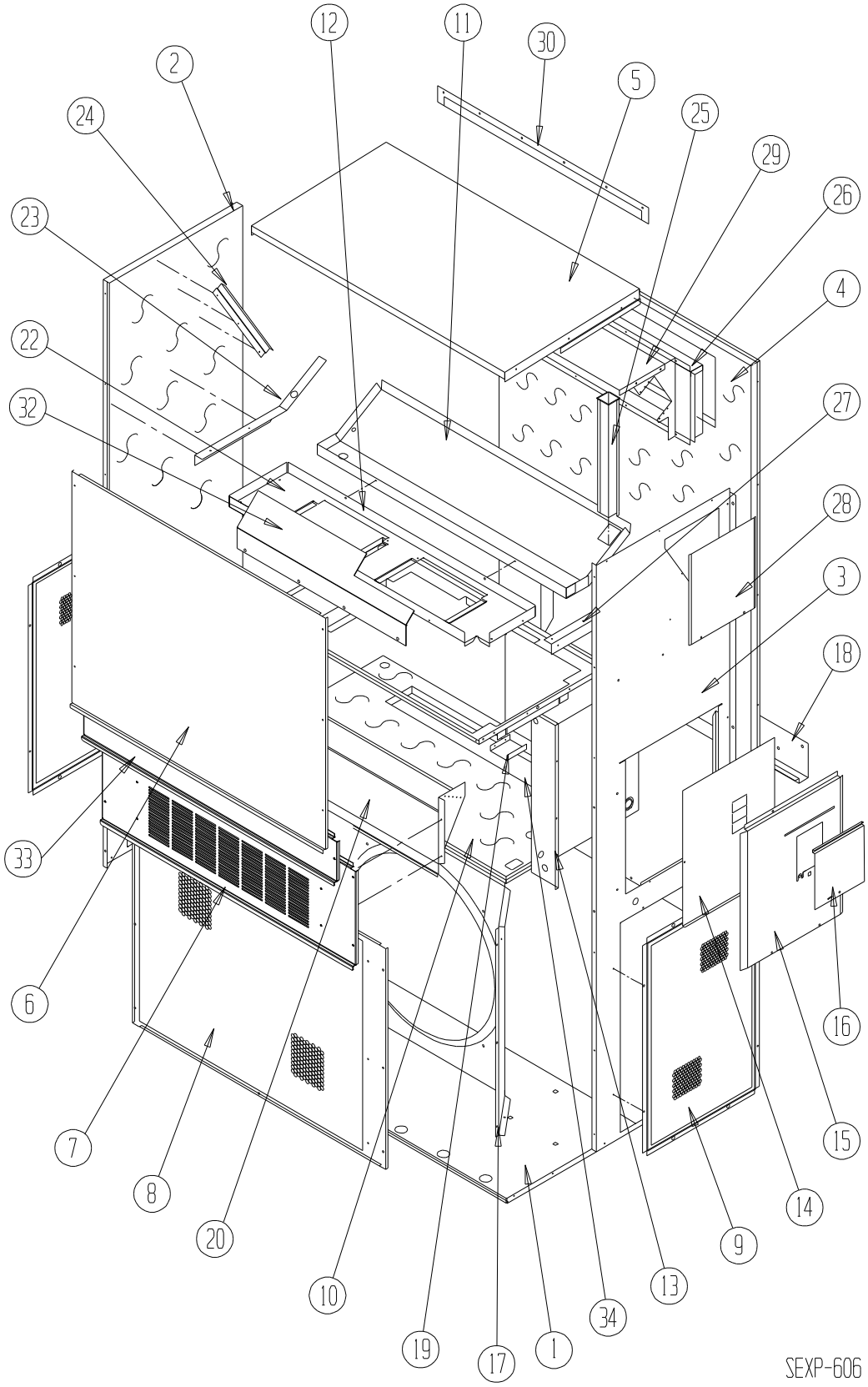
Bard® SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual: 2110-1557D
Supersedes: 2110-1557C
Date: 3-17-23

CABINET COMPONENTS

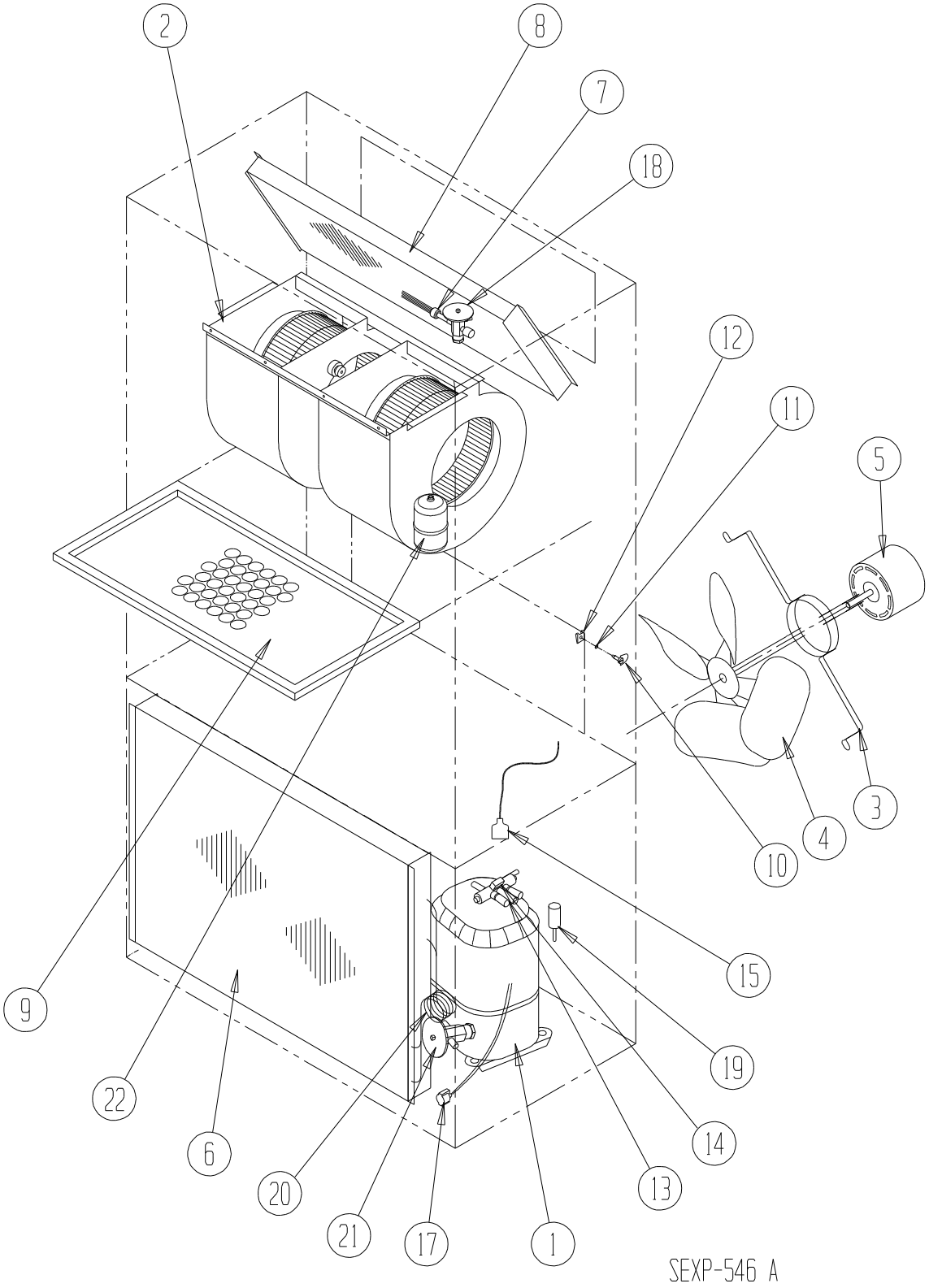


Dwg. No.	Part Number	Description	T60H2-A, -B	T60H2-C
1	S127X214	Lower Base	X	X
1	S127X369 ③	Lower Base	X	X
2	S500-613-* ①	Left Side	X	X
2	S500-615 ②	Left Side	X	X
2	S500-617 ③	Left Side	X	X
3	S500-612-* ①	Right Side	X	X
3	S500-614 ②	Right Side	X	X
3	S500-616 ③	Right Side	X	X
4	S508-251	Back	X	X
4	S508-252 ②	Back	X	X
4	S508-253 ③	Back	X	X
5	S506-142-* ①	Top	X	X
5	S506-251 ②	Top	X	X
5	S506-274 ③	Top	X	X
6	S515-193-* ①	Upper Front	X	X
6	S514-194 ②	Upper Front	X	X
6	S514-195 ③	Upper Front	X	X
7	S553-383-* ①	Vent Option Door	X	X
7	S553-408-* ①	Vent Option Door with ERV	X	X
7	S552-456 ②	Vent Option Door	X	X
7	S553-449 ③	Vent Option Door	X	X
8	118-085-* ①	Condenser Grille	X	X
8	118-087 ②	Condenser Grille	X	X
8	118-089 ③	Condenser Grille	X	X
9	118-086-* ①	Side Grille	2	2
9	118-088 ②	Side Grille	2	2
9	118-090 ③	Side Grille	2	2
10	S521X258	Condenser Partition	X	X
11	S123-122	Drain Pan	X	X
12	121X216	Blower Partition	X	X
13	Control Panel Assembly	See Control Panel Assembly Drawing and Parts List Assembly	X	X
14	S132-114	Control Panel Cover (Inner)	X	
14	S132-344	Control Panel Cover (Inner)		X
15	S533-113-* ①	Control Panel Cover (Outer)	X	X
15	S533-185 ②	Control Panel Cover (Outer)	X	X
15	S533-195 ③	Control Panel Cover (Outer)	X	X
16	S153-218-* ①	Disconnect Access Door	X	X
16	S153-387 ②	Disconnect Access Door	X	X
16	S153-405 ③	Disconnect Access Door	X	X
17	125-063	Fan Shroud	X	X
17	125-064 ③	Fan Shroud	X	X
18	113-140	Bottom Mounting Bracket	X	X
19	137-209	Fill	X	X
20	BFAD-5	Fresh Air Damper Assembly	X	X
22	131X099	Filter Tray	X	X
23	105X877	Left Side Support	X	X
24	147-046	Left Evaporator Support	X	X
25	135-303	Raceway	2	2
26	S111X034	Outlet Air Frame Assembly	X	X
27	105X878	Right Side Support	X	X
28	S143-144-* ①	Right Side Cover Plate (Outer)	X	X
28	S143-145 ②	Right Side Cover Plate (Outer)	X	X
28	S143-146 ③	Right Side Cover Plate (Outer)	X	X
29	135-129	Heat Shield	X	X
30	113-150-* ①	Top Rain Flashing	X	X
30	113-359-* ③	Top Rain Flashing	X	X
33	S553-384-* ①	Filter Door Assembly	X	X
33	S552-457 ②	Filter Door Assembly	X	X
33	S553-450 ③	Filter Door Assembly	X	X
34	S536-258	Condenser Part. Blank-Off Plate	X	X
NS	141-356	Compressor Mounting Plate	X	X

① Exterior cabinet parts are manufactured with various paint color options. To ensure the proper paint color is received, please reference the following codes:

Beige	-X	White	-1	Buckeye Gray	-4
Desert Brown	-5	Dark Bronze	-8		
② Aluminum	A	③ Stainless Steel	S		

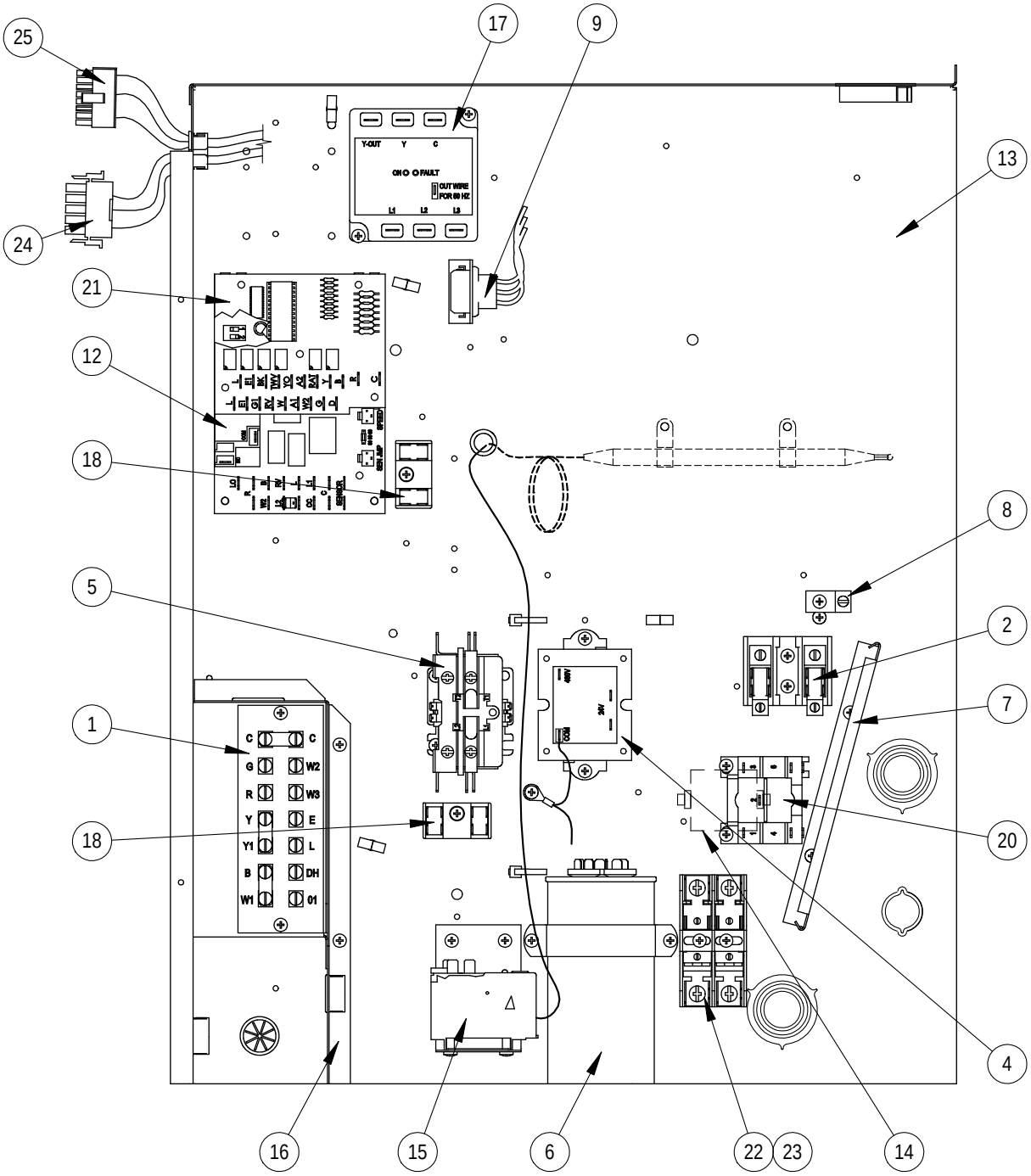
FUNCTIONAL COMPONENTS



Dwg. No.	Part Number	Description	T60H2-A	T60H2-B	T60H2-C
1	8000-456	Compressor	X		
1	8000-457	Compressor		X	
1	8000-458	Compressor			X
2	S900-273-0010	Blower Assembly	X	X	X
3	8200-004	Fan Motor Mount	X	X	X
4	5151-063	Fan Blade	X	X	X
5	8106-053	Condenser Motor	X	X	X
6	5051-169BX	Condenser Coil	X	X	X
7	800-0416	Cooling Distributor	X	X	X
8	917-0190BX	Evaporator Coil	X	X	X
9	7004-016	Air Filter 1" Throw-Away	X	X	X
9	7004-049	Air Filter 2" Pleated MERV 11 ①	X	X	X
9	7004-027	Air Filter 2" Pleated MERV 6 ①	X	X	X
10	1171-022	1/4" Turn Fastener	X	X	X
11	1171-024	1/4" Turn Retainer	X	X	X
12	1171-023	1/4" Receptacle	X	X	X
13	5650-040	Reversing Valve with 24V Solenoid Coil	X	X	X
14	5650-042	Rev. Valve Solenoid, Red Casing (Ranco)	X	X	X
14	5650-046	Rev. Valve Solenoid, Black Casing (San Hua)	X	X	X
15	5650-037	Molded Plug 36" Lead	X	X	X
17	8620-225	Defrost Sensor	X	X	X
19	1804-0462	High Pressure Switch (Flare) ①	X	X	X
20	800-0414	Heating Distributor Assembly	X	X	X
21	5651-199	Expansion Valve Heating	X	X	X
22	5201-010	Filter Drier	X	X	X
NS	1804-0107	Low Pressure Switch (Flare) ①	X	X	X
NS	CMH-19	Low Ambient Control (Flare) ①	X	X	X
NS	3000-1224	Molded Compressor Plug	X		
NS	3000-1231	Molded Compressor Plug		X	X

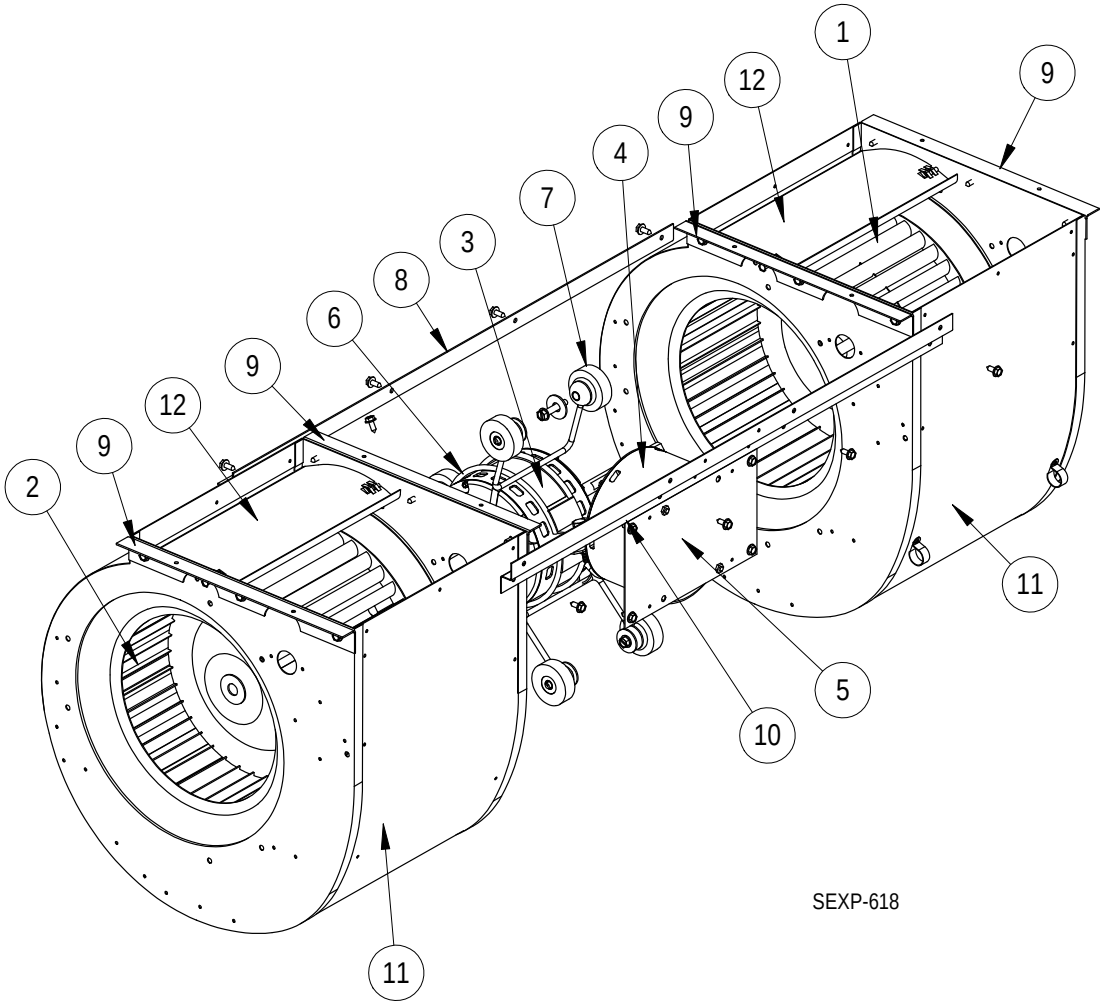
NS – Not Shown
① – Optional

CONTROL PANEL



Dwg. No.	Part Number	Description	T60H2-A	T60H2-B	T60H2-C
1	8607-031	Low Voltage Terminal Strip	X	X	X
2	8607-013	Terminal Block 2 Pole	X		
2	8607-014	Terminal Block 3 Pole		X	X
2	8607-015	Phenolic Insulator			X
4	8407-068	Transformer	X	X	
4	8407-069	Transformer			X
5	S8401-002	Compressor Contactor		X	X
5	8401-025	Compressor Contactor	X		
6	8552-088	Compressor Capacitor	X		
7	135-130	Wire Shield	X	X	X
8	8611-006	Ground Terminal	X	X	X
9	3000-1324	6 Pin Connector	X	X	X
10	8201-086	Low Ambient Bypass Relay ①	X	X	X
12	8620-223	Defrost Board Replacement Kit	X	X	X
13	117-309	Control Panel (Sheet Metal Only)	X	X	X
14	8551-004	Start Device ① PTCR	X		
16	117-312	Low Voltage Box	X	X	X
17	8201-174BX	Phase Monitor		X	X
18	8607-017	Terminal Block ①	X	X	X
20	8201-032	Outdoor Fan Relay			X
23	8614-046	Fuse			2
23	8614-042	Fuse			2
24	3000-1221	Blower Wire Harness Power	X	X	X
25	3000-1323	Blower Wire Harness Control	X	X	X
NS	4096-158	Wiring Diagram	X		
NS	4096-256	Wiring Diagram		X	
NS	4096-357	Wiring Diagram			X
NS	8615-041	Circuit Breaker 60A 2 Pole (OZ)	X		
NS	8615-043	Circuit Breaker 40A 3 Pole (OZ)		X	
NS	S8615-101	Rotary Disconnect (OZ)			X

NS – Not Shown
① – Optional



Dwg. No.	Part Number	Description	S900-273-0010
1	5152-011	10-Inch Wheel (CW)	X
2	5152-012	10-Inch Wheel (CCW)	X
3	8107-032-0086BX	3/4 HP Programmed Motor	X
4	C8107-032-0086A	Programmed Motor Control Only	X
5	112-344	Blower Motor Control Bracket	X
6	8200-040	Motor Mount	X
7	5451-011	Grommets	6
8	105-881	Back Brace	X
9	105-880	Side Angle	4
10	103-389	Front Brace	X
11	151-101	Housing	2
12	144-166	Diffuser	2

Supplemental Instructions

Models:

T24H1D, T30H1D, T36H1D, T42H1D, T48H1D

This model provides a unique dehumidification circuit for periods of high indoor humidity conditions. Additionally an “energy recovery ventilator” may be provided to allow for outside ventilation air requirements by eliminating excessive sensible and latent loads as a result of the increased ventilation requirement.

Refer to Specification Sheet S3436 for the standard features of the base unit. Electrical data for the dehumidification models is different than the electrical data for the standard T**H1 models. Refer to page 7 for the electrical data.

Dehumidification Circuit

The dehumidification circuit incorporates an independent heat exchanger coil in the supply air stream in addition to the standard evaporator coil. This coil reheats the supply air after it passes over the cooling coil, and is sized to nominally match the sensible cooling capacity of the evaporator coil. Extended run times in dehumidification mode can be achieved using waste heat from the refrigeration cycle to achieve the reheat process, while at the same time large amounts of moisture can be extracted from the passing air stream. Models that also have electric heaters installed have the electric heat inhibited during dehumidification mode, although it remains available for additional reheat during certain conditions. See below for specific operating sequences, and see attached tables for performance on sensible and latent capacities, water removal ratings and supply air delivery conditions.

The dehumidification refrigerant reheat circuit is controlled by a 3-way valve directing the refrigerant gas to the normal condenser during periods when standard air conditioning is required. During periods of time of low ambient temperature (approximately 65° to 75° outdoor) and high indoor humidity, a humidistat senses the need for mechanical dehumidification. It then energizes both the compressor circuit and the 3-way valve, thus directing the hot refrigerant discharge gas into a separate desuperheating condenser circuit which reheats the conditioned air before it is delivered to the room. The refrigerant gas is then routed from the desuperheating condenser to the system condenser for further heat transfer. A small orifice inserted between the reheat coil return line and suction line will prevent liquid from accumulating in the reheat coil when it is inactive. This drain does not affect the normal operation of the system. A check valve is located in the reheat coil return line. It has a soft spring to hold the ball on the seat. Refer to page 3 for the location of the check valve and drain back orifice. When the humidistat is satisfied, the system automatically switches back to normal A/C mode and either continues to operate or turns off based on the signal from the wall thermostat. The result is separate humidity control at minimum operating cost.

Bard SINCE 1914
Climate Control Solutions

Bard Manufacturing Company, Inc.
Bryan, Ohio 43506

www.bardhvac.com

Manual: 7960-627C
Supersedes: 7960-627B
Date: 5-14-21

Dehumidification Sequence of Operation

Dehumidification is controlled through the thermostat (if capable) or through a separate humidistat. On a call for dehumidification mode of operation, the compressor and 3-way valve that feeds the reheat coil are energized through circuit R-W3. Dehumidification will continue until the humidistat is satisfied.

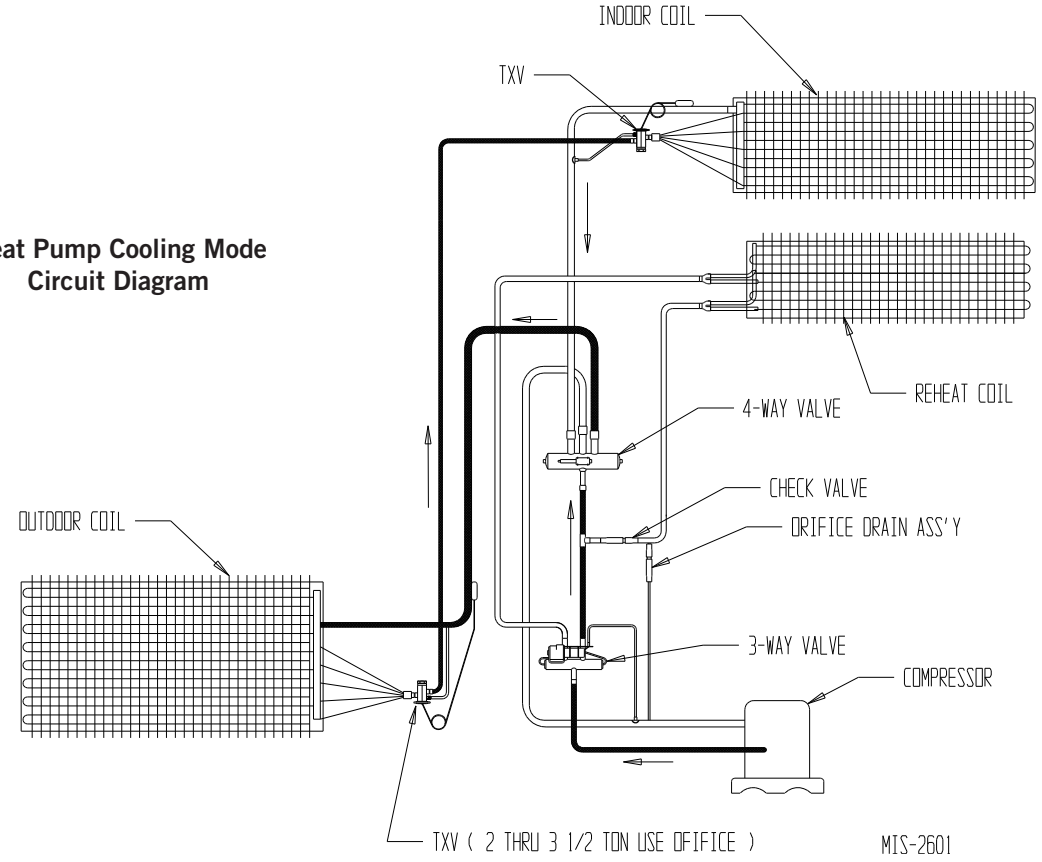
If the room temperature falls below 1st stage heating setpoint, electric heat will be energized by the room thermostat and cycle to maintain room temperature.

If 2nd stage heating setpoint is reached, dehumidification cycle is de-energized and heat pump heating is energized.

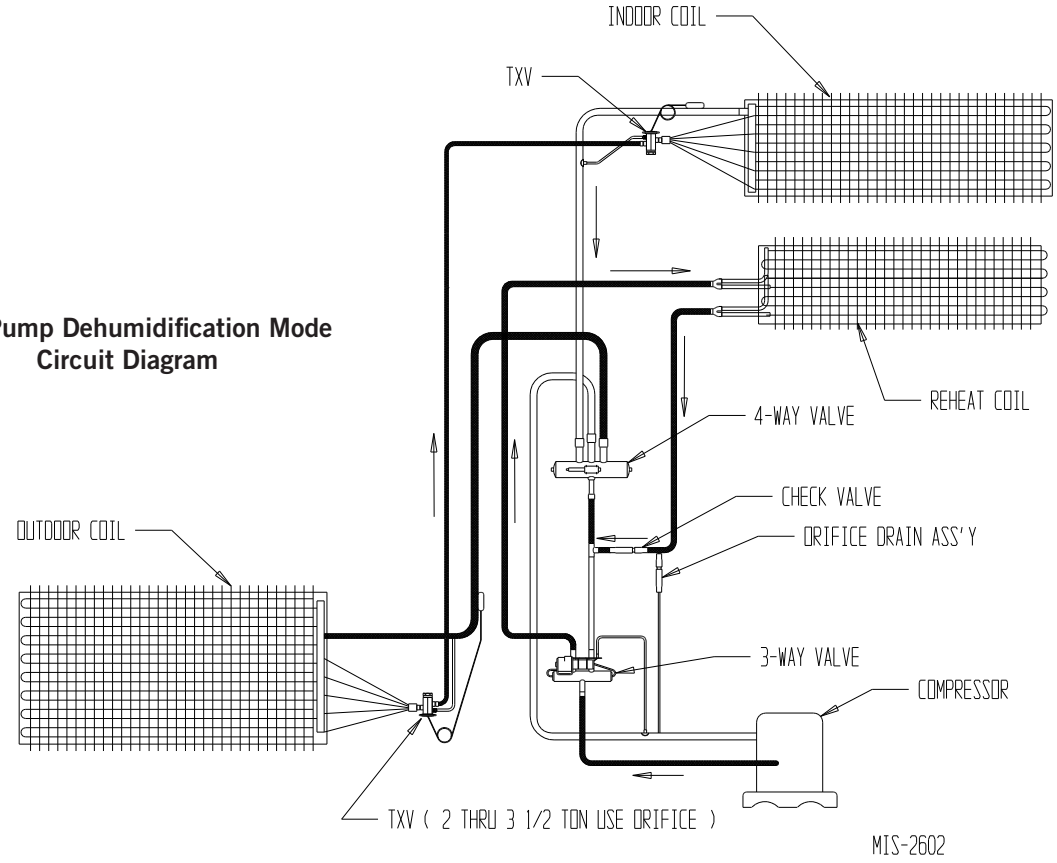
If the mixed air (return and ventilation, if used) temperature (measured at the internal filter location) drops below 65°F during dehumidification cycle, electric heat will cycle to help maintain room temperature to the 65°F condition.

Anytime there is a call for R-Y circuit, dehumidification is canceled and the unit will operate until satisfied. If dehumidification call is still present when R-Y call is satisfied, the unit will continue to operate and revert to dehumidification mode.

Heat Pump Cooling Mode Circuit Diagram



Heat Pump Dehumidification Mode Circuit Diagram



T24H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs. Dehum
65/63	90	65	27,230	11,436	15,794	0.42	14.90	800	52.5 / 52.0	A/C
65/63	90	65	8,842	(-1,495)	10,337	0.00	9.75	800	65.8 / 58.1	Dehum
75/62.5	50	75	25,378	19,858	5,520	0.78	5.21	800	53.3 / 51.8	A/C
75/62.5	50	75	6,386	2,409	3,977	0.38	3.75	800	72.3 / 60.0	Dehum
75/65.5	60	75	27,264	17,181	10,083	0.63	9.51	800	56.3 / 55.0	A/C
75/65.5	60	75	7,067	991	6,076	0.14	5.73	800	73.9 / 63.0	Dehum
75/68	70	75	28,309	14,950	13,359	0.53	12.60	800	58.7 / 57.8	A/C
75/68	70	75	8,073	(-247)	8,320	0.00	7.85	800	75.2 / 65.3	Dehum
80/67	50	95	(-897)	(-3,304)	2,407	0.00	2.27	800	83.6 / 67.2	Dehum

T30H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs. Dehum
65/63	90	65	32,779	13,937	18,842	0.43	17.78	900	51.1 / 50.8	A/C
65/63	90	65	16,217	(-1,847)	18,064	0.00	17.04	900	66.8 / 57.5	Dehum
75/62.5	50	75	31,374	23,293	8,081	0.74	7.62	900	51.7 / 50.4	A/C
75/62.5	50	75	12,215	4,719	7,496	0.39	7.07	900	70.2 / 58.1	Dehum
75/65.5	60	75	29,392	19,065	10,327	0.65	9.74	900	65.4 / 56.1	A/C
75/65.5	60	75	14,080	2,309	11,771	0.16	11.10	900	72.7 / 61.0	Dehum
75/68	70	75	30,640	16,363	14,277	0.53	13.47	900	58.8 / 57.8	A/C
75/68	70	75	15,833	253	15,580	0.02	14.70	900	74.7 / 63.2	Dehum
80/67	50	95	6,355	(-1,066)	7,421	0.00	7.00	900	81.1 / 65.1	Dehum

T36H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs. Dehum
65/63	90	65	40,066	17,003	23,063	0.42	21.76	1100	51.0 / 50.4	A/C
65/63	90	65	9,568	(-9,930)	19,498	0.00	18.39	1100	73.1 / 60.7	Dehum
75/62.5	50	75	36,553	28,237	8,316	0.77	7.85	1100	52.2 / 51.2	A/C
75/62.5	50	75	14,065	7,016	7,049	0.50	6.65	1100	69.2 / 58.4	Dehum
75/65.5	60	75	39,273	24,713	14,560	0.63	13.74	1100	58.3 / 54.0	A/C
75/65.5	60	75	17,153	4,370	12,783	0.25	12.06	1100	71.3 / 60.6	Dehum
75/68	70	75	41,587	21,828	19,759	0.52	18.64	1100	57.1 / 56.4	A/C
75/68	70	75	20,012	1,878	18,134	0.09	17.11	1100	73.4 / 62.6	Dehum
80/67	50	95	6,521	(-367)	6,888	0.00	6.50	1100	80.3 / 65.3	Dehum

Values shown in ( ) are BTUH of heat available at these conditions

T42H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs. Dehum
65/63	90	65	45,654	19,530	26,124	0.43	24.65	1100	51.3 / 50.8	A/C
65/63	90	65	25,011	(-538)	25,549	0.00	24.10	1100	65.4 / 56.7	Dehum
75/62.5	50	75	39,967	31,252	8,715	0.78	8.22	1100	52.9 / 51.6	A/C
75/62.5	50	75	16,304	8,113	8,191	0.50	7.73	1100	69.2 / 58.3	Dehum
75/65.5	60	75	43,127	27,465	15,662	0.64	14.78	1100	55.3 / 54.4	A/C
75/65.5	60	75	19,946	4,954	14,992	0.25	14.14	1100	71.5 / 66.7	Dehum
75/68	70	75	45,549	21,391	24,158	0.47	22.79	1100	57.6 / 56.8	A/C
75/68	70	75	23,317	2,454	20,863	0.11	19.68	1100	73.4 / 62.7	Dehum
80/67	50	95	7,758	(-67)	7,825	0.00	7.38	1100	80.0 / 65.2	Dehum

T48H1D Application Performance Data

Indoor Conditions		Outdoor Conditions	System Capacity				Pounds of Water/Hour	Evaporator Airflow	Approximate Supply Air	Mode
DB/WB	% RH	DB	Total	Sensible	Latent	S/T	Lbs.	CFM	DB/WB	A/C vs. Dehum
65/63	90	65	54,167	23,646	30,521	0.44	28.79	1550	51.4 / 51.1	A/C
65/63	90	65	29,286	784	28,502	0.03	26.89	1550	64.7 / 56.9	Dehum
75/62.5	50	75	49,595	39,408	10,187	0.79	9.61	1550	52.0 / 51.2	A/C
75/62.5	50	75	21,913	11,832	10,081	0.54	9.51	1550	68.2 / 57.9	Dehum
75/65.5	60	75	52,973	34,343	18,630	0.65	17.58	1550	54.9 / 54.3	A/C
75/65.5	60	75	25,907	7,703	18,204	0.30	17.17	1550	70.6 / 60.5	Dehum
75/68	70	75	56,025	29,806	26,219	0.53	24.73	1550	57.6 / 57.1	A/C
75/68	70	75	29,335	4,229	25,106	0.14	23.68	1550	72.5 / 62.6	Dehum
80/67	50	95	11,338	2,395	8,943	0.21	8.44	1550	78.6 / 64.8	Dehum

Values shown in ( ) are BTUH of heat available at these conditions

TABLE 1
Dehumidification Relay Logic Board

		Inputs to Board								Outputs From Board								
		G	Y	B	W2	A1	D	RAT	L	G1	BK	YO	W	E	A2	TWV	L	RV
Cooling Mode	Unoccupied	X	X							X	X	X						
Cooling Mode	Occupied	X	X			X				X	X	X			X			
Cooling Mode	w/Dehum	X	X				X			X	X	X						
1st Stage Heating	Unoccupied	X	X	X						X	X	X						X
1st Stage Heating	Occupied	X	X	X		X				X	X	X			X			X
1st Stage Heating	w/Dehum	X	X	X			X			X	X	X	X			X		X
2nd Stage Heating	Unoccupied	X	X	X	X					X	X	X	X					X
2nd Stage Heating	Occupied	X	X	X	X	X				X	X	X	X		X			X
2nd Stage Heating	w/Dehum	X	X	X	X		X			X	X	X	X					X
Emergency Heat	Unoccupied				X					X	X		X	X				
Emergency Heat	Occupied				X	X				X	X		X	X	X			
Emergency Heat	w/Dehum				X		X			X		X		X		X		
Dehumidification	Unoccupied						X			X		X				X		
Dehumidification	Occupied						X	X		X	X	X	X			X		

TABLE 2
Electrical Specifications

Models	Rated Volts, HZ and Phase	No. of Field Power Circuits	Single Circuit				Multiple Circuit							
			① Minimum Circuit Ampacity	② Maximum External Fuse or Ckt. Brkr.	③ Field Power Wire Size	③ Ground Wire	① Minimum Circuit Ampacity		② Maximum External Fuse or Ckt. Breaker		③ Field Power Wire Size		③ Ground Wire Size	
							Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B	Ckt. A	Ckt. B
T24H1DA00, DA0Z	230/208-60-1	1	24	35	8	10								
DA04		1	45	50	8	10								
④ DAS8		1	48	50	8	10								
⑦ DAF8		1 or 2	65	70	6	8	24	42	35	45	8	8	10	10
T24H1DB00, DB0Z	230/208-60-3	1	16	20	12	12								
DB06		1	34	35	8	10								
DB09		1	42	45	8	10								
T24H1DC0Z	460-60-3	1	9	15	14	14								
DC06		1	18	20	12	12								
DC09		1	23	25	10	10								
T30H1DA00, DA0Z	230/208-60-1	1	24	35	8	10								
DA04		1	45	50	8	10								
④ DAS8		1	48	50	8	10								
⑦ DAF8		1 or 2	66	70	4	8	24	42	35	45	8	8	10	10
T30H1DB00, DB0Z	230/208-60-3	1	18	25	10	10								
DB06		1	36	40	8	10								
DB09		1	45	45	8	10								
T30H1DC0Z	460-60-3	1	10	15	14	14								
DC06		1	19	20	12	12								
DC09		1	24	25	10	10								
T36H1DA00, DA0Z	230/208-60-1	1	29	40	8	10								
DA05		1	55	60	6	10								
DA08		1 or 2	70	70	4	8	29	42	40	45	8	8	10	10
DA10		1 or 2	81	90	4	8	29	52	40	60	8	6	10	10
⑤ DA15		1 or 2	85	90	4	8	33	52	40	60	8	6	10	10
T36H1DB00, DB0Z	230/208-60-3	1	21	30	10	10								
DB06		1	39	45	8	10								
DB09		1	48	50	6	10								
⑥ DB15		1	52	60	6	10								
T36H1DC0Z	460-60-3	1	12	15	14	14								
DC06		1	21	25	10	10								
DC09		1	26	30	10	10								
⑥ DC15		1	27	30	10	10								
T42H1DA00, DA0Z	230/208-60-1	1	31	40	8	10								
DA05		1	57	60	6	10								
DA08		1 or 2	73	80	4	8	31	42	40	45	8	8	10	10
DA10		1 or 2	83	90	4	8	31	52	40	60	8	6	10	10
⑤ DA15		1 or 2	86	90	3	8	34	52	40	60	8	6	10	10
T42H1DB00, DB0Z	230/208-60-3	1	26	35	8	10								
DB06		1	44	50	8	10								
DB09		1	53	60	6	10								
⑥ DB15		1	53	60	6	10								
T42H1DC0Z	460-60-3	1	13	15	12	12								
DC06		1	22	25	10	10								
DC09		1	26	30	10	10								
⑥ DC15		1	27	30	10	10								
T48H1DA00, DA0Z	230/208-60-1	1	37	50	8	10								
DA05		1 or 2	63	70	6	8	37	26	50	30	8	10	10	10
DA08		1 or 2	79	90	4	8	37	42	50	50	8	8	10	10
DA10		1 or 2	89	100	3	8	37	52	50	60	8	6	10	10
⑤ DA15		1 or 2	89	100	3	8	37	52	50	60	8	6	10	10
T48H1DB00, DB0Z	230/208-60-3	1	27	40	8	10								
DB06		1	45	50	8	10								
DB09		1	54	60	6	10								
⑥ DB15		1	55	60	6	10								
T48H1DC0Z	460-60-3	1	15	20	12	12								
DC06		1	24	25	10	10								
DC09		1	28	30	10	10								
⑥ DC15		1	29	30	10	10								

① These "Minimum Circuit Ampacity" values are to be used for sizing the field power conductors. Refer to the National Electrical code (latest version), Article 310 for power conductor sizing. ***CAUTION:*** *When more than one field power 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.*

② Maximum size of the time delay fuse or circuit breaker for protection of field wiring conductors.

③ Based on 75°copper wire. All wiring must conform to the National Electrical Code and all local codes.

④ Maximum KW that can operate with the heat pump on is 4KW. Full heat available during emergency heat mode.

⑤ Maximum KW that can operate with the heat pump on is 10KW. Full heat available during emergency heat mode.

⑥ Maximum KW that can operate with the heat pump on is 9KW. Full heat available during emergency heat mode.

⑦ Maximum KW that can operate with the heat pump on is 8KW. Full heat available during emergency heat mode.

NOTE: *The Maximum Overcurrent Protection (MOCP) value listed is the maximum value as per UL 1995 calculations for MOCP (branch-circuit conductor sizes in this chart are based on this MOCP). The actual factory-installed overcurrent protective device (circuit breaker) in this model may be lower than the maximum UL 1995 allowable MOCP value, but still above the UL 1995 minimum calculated value or Minimum Circuit Ampacity (MCA) listed.*

IMPORTANT: *While this electrical data is presented as a guide, it is important to electrically connect properly sized fuses and conductor wires in accordance with the National Electrical Code and all local codes.*

Bard®
SINCE 1914
Climate Control Solutions

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 ②④⑤	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
GEOTHERMAL/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, C02 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.